ATTACHMENT E

# 15183 CONSISTENCY CHECKLIST

FOR THE

# BEAR CREEK SOUTH RESIDENTIAL PROJECT

MARCH 2026

*Prepared for:*

City of Stockton
345 N. El Dorado Street
Stockton, CA 95202

*Prepared by:*

De Novo Planning Group
1020 Suncast Lane, Suite 106
El Dorado Hills, CA 95762
(916) 580-9818

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A Land Use Planning, Design, and Environmental Firm

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# ENVIRONMENTAL CHECKLIST

## PROJECT TITLE

Bear Creek South

## LEAD AGENCY NAME AND ADDRESS

City of Stockton, Community Development Department, Planning Division
345 N. El Dorado Street
Stockton, CA 95202
(209) 937-8266

## CONTACT PERSON AND PHONE NUMBER

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## PROJECT SPONSORS' NAMES AND ADDRESSES

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(415) 231-8374

## INTRODUCTION

This document provides an analysis of the proposed Bear Creek South Project (proposed Project) with respect to the Project's consistency with the City of Stockton General Plan, the analysis contained in the General Plan Environmental Impact Report (EIR), and any site-specific environmental impacts or cumulative impacts that are peculiar to the Project.

As explained in the following pages, the proposed Project is consistent with the City's General Plan, for which an EIR was prepared and certified, and there are no site-specific or cumulative

impacts associated with the proposed Project that have not been fully addressed in a previous environmental document, or that cannot be mitigated to a less than significant level through the application of uniformly applied development policies and/or standards. The findings presented below demonstrate that no additional environmental analysis is required under the California Environmental Quality Act (CEQA) prior to approval of the proposed Project.

## PROJECT OVERVIEW

### *PROJECT LOCATION*

The Bear Creek South Project site (proposed Project site) is in the northern portion of the City of Stockton Metropolitan Area, within the unincorporated area of San Joaquin County. The Project site is adjacent to the City of Stockton's northern city limits, within the City of Stockton (City) Sphere of Influence (SOI) (as defined in the Envision Stockton 2040 General Plan), and within the City of Stockton Urban Services Boundary.

The Project site is immediately northeast of the intersection of West Lane and Morada Lane. The Project site is bounded on the north by Bear Creek, on the west by West Lane, which is an existing regional arterial, on the south by Morada Lane, and on the east by the Union Pacific Railroad (UPRR) right of way. Figures 1 and 2 show the Project's regional location and vicinity.

### *PROJECT AND ANNEXATION AREAS DEFINED*

The overall Project consists of three proposed vesting Tentative Maps. The Project applicants processing the individual vesting Tentative Maps are referred to as Arnaiz, Klein and Tri Pointe Homes (TPH) throughout this Project Description. Collectively, the Project is referred to as the Bear Creek South Project.

The following terms are used throughout this Project Description to describe the boundaries within the Project site:

- **Development Area or Project Site** – includes a total area of 503.89 acres that is intended for the development of up to 2,241 residential units, five parks, a lineal open space area along Bear Creek and public infrastructure.
- **Non-Development Area** – includes six parcels (or a portion of) totaling 26.29 acres consisting of City of Stockton rights-of-way, a UPRR easement area (via Congressional Grant), and two Sacramento-San Joaquin Drainage District easement areas.
- **Annexation Area** – includes the whole of the Project, including the Development and Non-Development Areas (totaling 530.18 acres).

Table PD-1 lists each parcel included in the Project site and Figure 3 illustrates the APNs.

***Table PD-1: Parcels Within the Project Site/Development and Non-Development Areas***

| | *Area (AC)* | *Total Area (AC)* | *Land (%)* |
|---|---|---|---|
| *Development Area* | | | |
| *Arnaiz - Development Area* | | | |
| APN: 120-020-270 | 111.57 | 111.57 | 22% |
| *Klein - Development Area* | | | |
| APN: 120-030-060 | 53.07 | 220.09 | 44% |
| APN: 120-020-320 | 23.45 | | |
| APN: 120-020-310 | 70.94 | | |
| *Tri Pointe Homes Holdings - Development Area* | | | |
| Portion of APN: 120-020-300 | 101.29 | 172.23 | 34% |
| APN: 120-030-100 | 70.94 | | |
| ***Total*** | | ***503.89*** | ***100%*** |
| *Non-Development Area* | | | |
| *City of Stockton (Road Right-of-Way)* | | | |
| APN: 120-030-070 | 0.24 | 6.06 | 23% |
| APN: 120-030-090 | 3.97 | | |
| APN: 120-020-260 | 1.85 | | |
| *Union Pacific Railroad (Congressional Grant Area)* | | | |
| APN: 122-010-050 | 0.37 | 19.62 | 75% |
| Portion of APN: 120-020-300 | 11.75 | | |
| APN: 124-010-010, -030, -070 | 7.26 | | |
| *Sacramento-San Joaquin Drainage District* | | | |
| APN: 124-020-110 | 0.09 | 0.61 | 2% |
| APN: 124-020-120 | 0.52 | | |
| ***Total*** | | ***26.29*** | ***100%*** |
| ***Total Project Area*** | | ***530.18 acres*** | |

*SOURCE: VVH ENGINEERING. MAP DATE: JULY 8, 2024.*

## *SITE TOPOGRAPHY*

The Project site is relatively flat and ranges in elevation from approximately 24 feet above sea level in the southwest corner, rising to 32 feet above sea level in the northeast corner of the Project site.

## *EXISTING SITE USES*

The Development Area is predominantly comprised of agricultural uses and related facilities such as associated agricultural equipment and irrigation ditches. Additionally, six dirt/gravel roadways bisect the Development Area, including three dirt roadways extending south to north from Morada Lane, and three other dirt roadways trending west to east, including one along the base of the Bear Creek levee.

Irrigation canals, operated by the Woodbridge Irrigation District (WID), run along the northeast and central portions of the Development Area, and are referred to as the Peters Castle Lateral and are used for delivery of irrigation water to District customers.

The portion of the WID's Peters Castle Lateral located within the Development Area is currently an open ditch canal approximately 7,130 feet in length that begins at the west boundary of the UPRR right of way, proceeds westerly until it meets the Bear Creek levee, and then turns southerly to Morada Lane where it transitions into an underground pipe.

The Non-Development Area along the proposed Project site's entire eastern boundary consists of a UPRR 200-foot setback easement area. One single is located within this UPRR right of way.

The Annexation Area includes right-of-way areas along West Lane and Morada Lane, forming the western and southern borders of the Project site, respectively.

Figure 4 shows aerial imagery of the current existing site use within the Project site.

### *EXISTING SURROUNDING USES*

The overall Development Area is bordered on the north by Bear Creek, on the east by UPRR right-of-way, on the west by West Lane, and on the south by Morada Lane. The Project site is primarily bounded by lands within the City of Stockton (City) to the north, south, west, and east. Uses within the surrounding area include the following:

- North – Bear Creek, and further north of Bear Creek is the approved Tra Vigne Residential Development. Current uses within the Tra Vigne site are agricultural and industrial.
- South – Westwood Elementary School, single family residential uses and commercial at the southeast corner of West Lane and Morada Lane.
- West – West Lane, and further west of West Lane is McNair High School and Masasi Park.
- East – UPRR and east of the Railroad right-of-way are residential subdivisions that are part of the Cannery Residential Master Plan area.

## EXISTING GENERAL PLAN LAND USE DESIGNATIONS

The Project site is currently located within San Joaquin County. The Project site is outside Stockton city limits, but within the City's Sphere of Influence (SOI). The Envision Stockton 2040 General Plan delineates three areas known as the Urban Service Area Boundary (USAB), Sphere of Influence (SOI), and General Plan Planning Area, all of which are larger than the city limit. The General Plan Environmental Impact Report (EIR) focused on the analysis of potential changes within the SOI (i.e., the "(General Plan) EIR Study Area"). The Envision Stockton 2035 General Plan designated the Project site for Low Density Residential uses. The Envision Stockton 2040 General Plan also designates the Project site for Low Density Residential uses.

### *GENERAL PLAN LAND USE DESIGNATIONS*

The Envision Stockton 2040 General Plan Land Use Map (Figure 5) designates the entire Project site as Low Density Residential (LDR). Below is a general description of the City-designated LDR land use within the Project site:

**Low Density Residential (LDR):** This designation allows for single-family residential units, duplexes, triplexes, semi-detached patio homes, town homes, public and quasi-public uses, second units, and other similar and compatible uses. The maximum density is 6.1 units per acre based on gross acreage and 8.7 units per acre based on net acreage.

### *SURROUNDING GENERAL PLAN DESIGNATIONS*

The entire Project site is surrounded by the City of Stockton. Within the City, lands to the east and north are designated LDR. Lands to the south are designated Commercial, LDR, and Medium Density Residential. Lands to the west are designated Parks and Recreation, and Institutional.

## PROJECT DESCRIPTION

### *PROJECT OBJECTIVES*

Consistent with CEQA Guidelines Section 15124(b), a clear statement of objectives and the underlying purpose of the proposed Project shall be discussed. The principal objective of the proposed Project is the approval and subsequent implementation of the Bear Creek South Project (the proposed Project). The quantifiable objectives of the proposed Project include the development of the approximately 503.89-acres Development Area for residential and park uses, as well as the annexation of the 530.18-acre Annexation Area, as described below.

The Bear Creek South Project identifies the following Project objectives as part of the stated purpose:

- Provide residential housing opportunities that are visually attractive and accommodate the future housing needs in Stockton.
- Provide infrastructure, public facilities, and park space that meets City standards, in a centralized setting that is integrated with existing and planned facilities and connections and increases recreational opportunities for existing and future residents of the City.
- Incorporate Woodbridge Irrigation District facilities into the Project design, that maintains their purpose while avoiding any conflicts with future residents.
- Establish a logical phasing plan among the three landowners to ensure that each phase of development would include necessary public improvements that are required to meet City standards, both onsite and offsite.
- Annex the Annexation Area and eliminate the unincorporated island that was created with the annexation of the Tra Vigne Project to the north.

### *PROJECT DESCRIPTION*

The proposed Project consists of 2,241 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Minimum lot sizes will be 5,000 square feet (sf).

Additionally, the Project includes the following components:

- **Parks**: Approximately 27.7 acres of parks, five in total, are proposed around a centrally located park/basin, which provides each neighborhood an opportunity to access these spaces through a network of enhanced walkways, also referred to as wellness walks (see bullet below for more detail regarding wellness walks). The parks are themed with differing types of uses and amenities within each park to encourage park users to use the wellness walks to explore the opportunities and activities within each park.
- **Open Space Areas**: Approximately 27.2 acres of open spaces are included within the Project site. The open space is utilized for detention (4.9 acres) and a linear buffer area along Bear Creek (22.3 acres). The basin will include an enhanced walkway around the perimeter of the basin and a liner multi use trail will be provided along the Bear Creek corridor. Wellness walks will connect the parks to each other and the linear open space area along Bear Creek.
- **Wellness Walks**: The Project area has designated streets with enhanced walkways (i.e., wide sidewalks and landscaped areas) that will encourage pedestrians to walk to parks and open space features.
- **Project Entries**: Enhanced Project entries would be provided along the Project site access points along West Lane and E. Morada Lane. These are visual opportunities for making a statement and creating a sense of place.
- **Perimeter Improvements**: The Project includes buildout of the West Lane and Morada Lane rights-of-way to includes bike lanes, additional travel lanes, perimeter landscaping, and signalized intersections.

Table PD-2 summaries the total unit count and acreage for each proposed land use in the Project site. Figure 7 provides an overall Site Plan of all three ownerships combined.

***Table PD-2: Gross Land Use Summary – Overall Project Area***

| *Proposed Land Use* | *Approximate Acres* | *Number of Units* |
|---|---|---|
| Low Density Residential (min. 5,000 sf lots) | 301.1 | 2,241 |
| Parks | 27.7 | -- |
| Storm Basin | 4.9 | -- |
| Bear Creek Open Space | 22.3 | -- |
| Project Streets | 140.8 | -- |
| WID Future Easement (Parcel 1) | 3.8 | -- |
| Morada Lane (Parcel 2) | 0.4 | -- |
| Morada Lane (Parcel 3) | 0.8 | -- |
| Morada Lane (Parcel A) | 0.6 | -- |
| Morada Lane (Parcel B) | 0.6 | -- |
| West Lane (Parcel B) | 0.2 | -- |
| West Lane (Parcel C) | 0.6 | -- |

*Source: VVH Consulting Engineers, 2024.*

**Residential Development**

The proposed Project includes three vesting tentative maps that would subdivide the Development Area consistent with the proposed land uses. The Development Area would have 2,241 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Minimum lot sizes will be 5,000 sf.

The Project would be developed in three major phases as represented by the three individual vesting tentative maps. Sub-phases within each vesting tentative map will be identified later in the engineering process. The general pattern of phases will be north to south from Morada Lane, and west to east from West Lane.

Necessary improvements per vesting tentative map have been identified to anticipate needed improvements to accommodate any one of the vesting tentative maps going forward as the first phase.

**Parks and Open Space**

The Project includes the following park facilities:

- An approximately 4.7-acre "Central" Park adjacent to and surrounding the primary detention basin, which is approximately 4.9 acres in size;
- An approximately 4.9-acre "Northwest" Park;
- An approximately 7.7-acre "Northeast" Park;
- An approximately 4.9-acre "Southeast" Park; and
- An approximately 5.5-acre "Southwest" Park.

The "traditional" type park facilities total approximately 27.7 acres.

In addition to the Parks, there will be a series of streets with an enhanced right of way to accommodate a pedestrian "wellness walk." This "wellness walk" will tie different areas to the internal parks and encourage movement throughout the Project site.

Further, Bear Creek will be bordered by a frontage road with an open space area containing a 20-foot width from the toe of slope, adjacent to a 19-foot landscaped area with a 12-foot wide multi use path. The total open space area along Bear Creek is approximately 22.3 acres.

**Circulation**

The proposed street network will connect into the greater Stockton community at five access points, including three along Morada Lane and two along West Lane. These connection points will be made up of a combination of minor arterial roads, with and without a median, and collector roads. The street network within Project site is intended to contribute to the aesthetics of the community, with residents experiencing varied street scenes and street designs.

As noted previously, the Project will include full frontage improvements along West Lane and Morada Lane. Included in these improvements will be full signalized intersections at the northern entry point along West Lane and at the central entrance along Morada Lane.

Figure 8 shows the pedestrian circulation plan.

**Utilities and Planned Infrastructure Improvements**

The construction of on-site infrastructure improvements would be required to accommodate build out of the Development Area, as described below.

*Potable Water System*

Water supply will be provided by the City of Stockton, which includes surface and ground water supplies. Water distribution will be by an underground distribution system designed and constructed per the City of Stockton standards and specifications.

The Project requires extension of offsite potable water conveyance infrastructure to the Project site to comply with the City's 2021 Water Master Plan Update; however, this is not required for the initial phases of the Project because existing City water mains are in West Lane and Morada Lane. Improvements to the potable water system would be constructed in accordance with the City's 2021 Water Master Plan Update adopted February 23, 2021. Improvements identified in the Water Master Plan Update include: (1) a 16-inch diameter potable water transmission pipeline connection to existing potable water in West Lane, (2) a 16-inch diameter potable water transmission pipeline connection to existing potable water in Morada Lane, and (3) an 18-inch diameter potable water transmission pipeline connection to the existing Cannery Park project located east of the existing UPRR. The 18-inch diameter pipeline would cross under the UPRR tracks to connect to the existing stub-out constructed by the Cannery Park project. Service line connections are not allowed by the City of Stockton on water lines 16-inches diameter or larger. The Project will construct a potable water distribution system with pipe sizes ranging from six inches to 12 inches. Stubs from the transmission pipelines will be constructed as required by the City to connect to the Project potable water distribution system. The Project may also construct a parallel distribution pipeline for connection of fire hydrants along Project frontage roads if required by the City, with interconnection to the transmission pipeline as required.

The City prepared the Water Supply Assessment for the proposed Project, consistent with Senate Bill (SB) 610's requirements. According to the Bear Creek South Residential Project Water Supply Assessment (Appendix F) (West Yost, 2024), the City has adequate water supplies to serve the Project.

*Wastewater System*

The Project is located within existing City of Stockton Collection System Service Area 10 and is identified as a major development in the City's 2022 Wastewater Master Plan Update (adopted October 18, 2022). The Project would construct wastewater infrastructure in accordance with the 2022 Wastewater Master Plan Update, which shows a 21-inch diameter future gravity sewer

connection from the Project to existing City of Stockton gravity sewer locate in Morada Lane. Effluent from all tributary areas would be collected and conveyed through gravity sewer pipelines. All sewer collection and conveyance infrastructure would be sized and constructed according to adopted City of Stockton sewer hydrologic and hydraulic design criteria, design standards, and specifications.

*Stormwater System*

The Project storm drainage infrastructure would consist of an engineered network of inlets, storm drainage pipes, maintenance holes, storm water quality treatment systems/devices, a detention basin, a basin discharge pump station, and a pressure force main for conveying discharge from the detention basin to an existing outfall at Bear Creek. All drainage collection and conveyance infrastructure would be sized and constructed according to adopted City of Stockton storm drainage hydrologic and hydraulic design criteria, design standards, and specifications. Onsite stormwater runoff would be directed into an underground pipe system which would collect the runoff and direct it to the central storm drainage basin. Stormwater from this basin would be discharged via a new pump station and force main into Bear Creek through an existing 24-inch diameter outfall structure located on the south side of Bear Creek, just east of the West Lane overcrossing. The basin drawdown rate would meet City of Stockton Municipal Utilities Department (COSMUD) standards to discharge the 100-year, 24-hour design storm volume over a period of 48 hours and would be less than predeveloped runoff rates from the Project area.

The proposed Project would incorporate site design measures, landscape features, and approved engineered treatment facilities (bioretention facilities or COSMUD-approved equivalent) for water quality treatment that minimizes imperviousness, retains or detains stormwater, slows runoff rates, and reduces pollutants in post-development runoff consistent with the City of Stockton NPDES SWMP and the City of Stockton and County of San Joaquin Stormwater Quality Control Criteria Plan.

*Regulated Public Utilities*

Electrical, gas, phone, cable, and related internet services would be extended to all portions of the Project site from existing facilities located along West Lane and Morada Lane, or other utility systems in the Project vicinity. Utility improvements would be installed in conjunction with planned street improvements.

## *Land Use and Pre-Zoning*

Figure 9 provides a map of the General Plan land use designations and Figure 10 shows the proposed pre-zoning.

As noted previously, under the Envision Stockton 2040 General Plan, the LDR designation allows for single-family residential units, duplexes, triplexes, semi-detached patio homes, town homes, public and quasi-public uses, second units, and other similar and compatible uses. The maximum density is 6.1 units per acre based on gross acreage and 8.7 units per acre based on net acreage.

The proposed residential density would be approximately 4.45 units per acre (2,241 units on the 503.89-acre Development Area). The proposed Project is consistent with the allowed uses and density for the existing LDR designation for the site. Figure 9 reflects the General Plan land use map after the requested City annexation is approved.

As previously stated, the Project site is currently outside of the jurisdiction of the City of Stockton and, therefore, the City of Stockton Zoning Ordinance does not currently apply to the Project site. The San Joaquin County Local Agency Formation Commission (LAFCo) will require the Project site to be pre-zoned by the City of Stockton in conjunction with the proposed annexation. The proposed Project includes a request for pre-zoning of the Development Area and Non-Development Area. The pre-zoning request is for an RL (Residential, Low Density) District which is consistent with the City's General Plan designation of Low Density Residential. Under the City's RL zoning, the minimum lot size is limited to 5,000 square feet. The pre-zoning would go into effect upon annexation into the City of Stockton. Below is a general description of the proposed RL zoning on the Project site:

> **RL (Residential, Low Density) District:** The RL zoning district is applied to single-family residential neighborhoods, low-density residential planned developments, and/or other low-density residential development, and is intended to maintain densities and protect existing neighborhood character. Allowable density shall be up to 8.7 dwelling units per net acre and 6.1 per gross acre.

### *VESTING TENTATIVE SUBDIVISION MAPS*

The proposed Project includes three Vesting Tentative Subdivision Maps for the Development Area. The tentative maps would result in the subdivision of 503.89 acres into 2,241 single-family residential units, five parks, and a storm basin facility. Total parkland is 27.7 acres. In addition, there will be a series of streets with an enhanced right of ways to accommodate a pedestrian "wellness walk" connecting the parks and a lineal open space area paralleling the south edge of Bear Creek.

### *ANNEXATION*

The proposed Project includes a request for annexation of 15 APNs, totaling 530.18 acres, into the City of Stockton. This includes the proposed 503.89-acre Development Area (including future right-of-way and existing roadway right-of-way along West Lane and Morada Lane) and 26.29-acre Non-Development Area.

## REQUESTED ENTITLEMENTS AND OTHER APPROVALS

The City of Stockton will be the Lead Agency for the proposed Project, pursuant to the CEQA Guidelines, Section 15050. Actions that would be required from the City include, but are not limited to the following:

- Approval of City of Stockton Pre-zoning;
- Approval of three Vesting Tentative Maps;

- Approval of the Development Agreement;
- Approval of Annexation and Authorization to submit Annexation request to San Joaquin LAFCo;
- Approval of future Final Maps;
- Approval of Design Review for new residential;
- Approval of future Improvement Plans;
- Approval of future Grading Plans;
- Approval of future Building Permits;
- Issuance of grading, encroachment, and building permits; and
- City review and approval of Project utility plans.

## OTHER PUBLIC AGENCIES WHOSE APPROVAL IS REQUIRED (E.G., PERMITS, ETC.)

The following agencies may be required to issue permits or approve certain aspects of the proposed Project. Other governmental agencies that may require approval include, but are not limited to, the following:

- Central Valley Regional Water Quality Control Board (CVRWQCB) – Storm Water Pollution Prevention Plan (SWPPP);
- San Joaquin Council of Governments (SJCOG) – Issuance of incidental take permit under the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP);
- San Joaquin County Flood Control and Water Conservation District;
- San Joaquin Local Agency Formation Commission (LAFCo) – Annexation;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) – Construction-related permits;
- Union Pacific Railroad – Encroachment Permit for the water line;
- Woodbridge Irrigation District (WID) encroachment permit.

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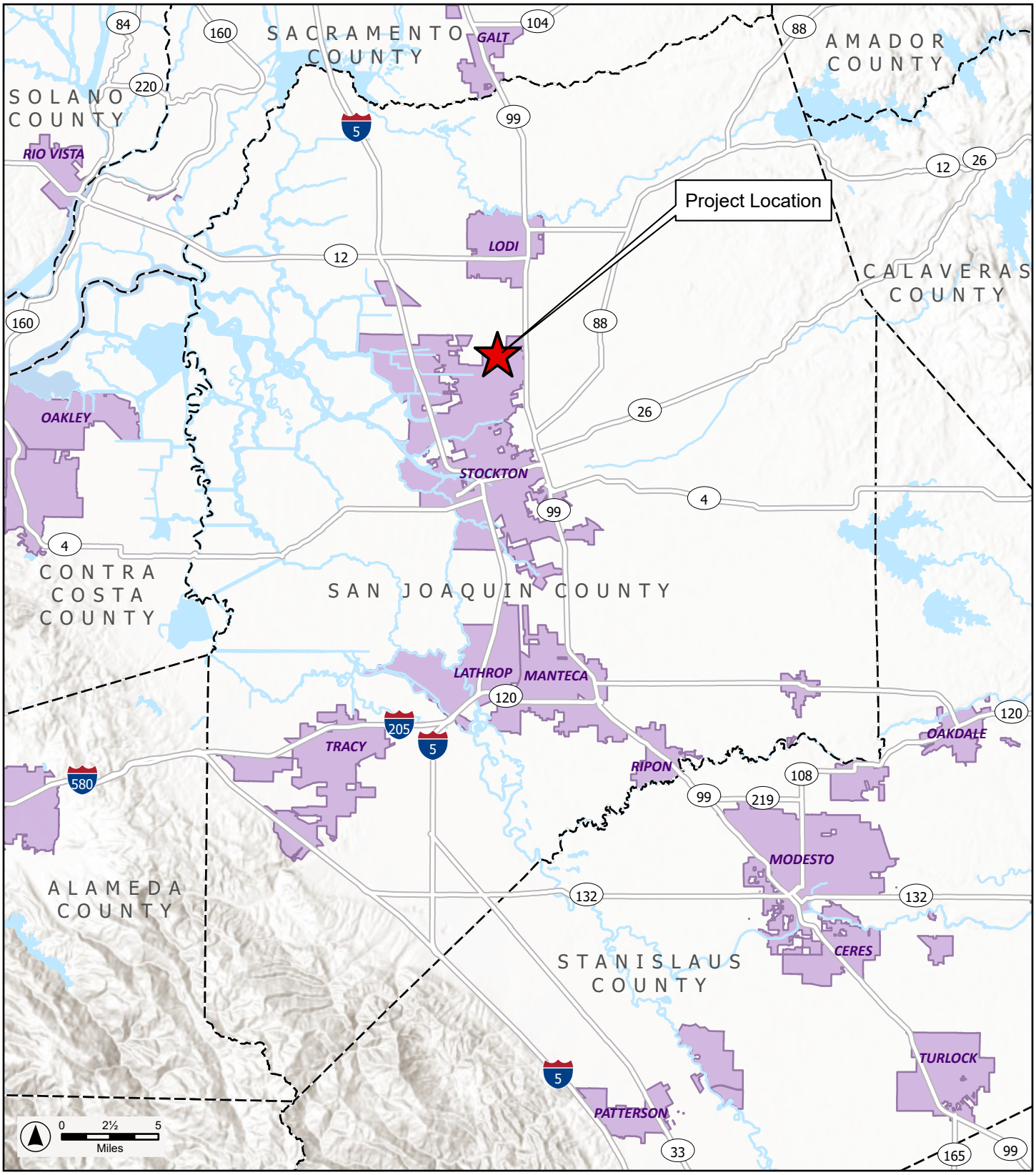
ATTACHMENT E




Legend

- Project Location
- County Area
- Incorporated Area

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 1. Regional Location

*Sources: California State Geoportal. Map date: March 14, 2024.*

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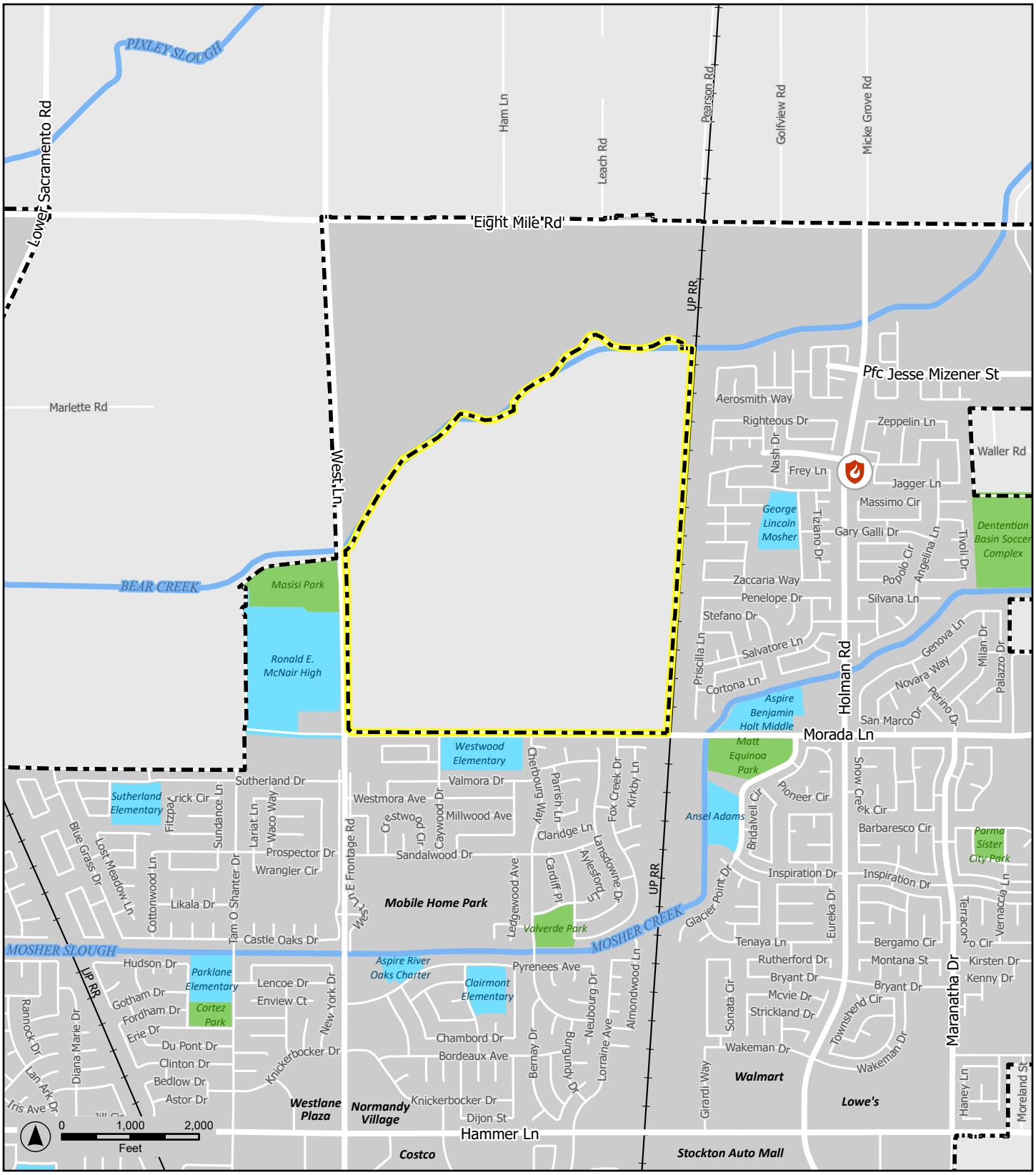


Legend

- Annexation Area
- City of Stockton
- Unincorporated San Joaquin County
- Park
- Public School
- City of Stockton Fire Station 13

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 2. Vicinity Map

*Sources: San Joaquin County GIS. Map date: March 14, 2024.*

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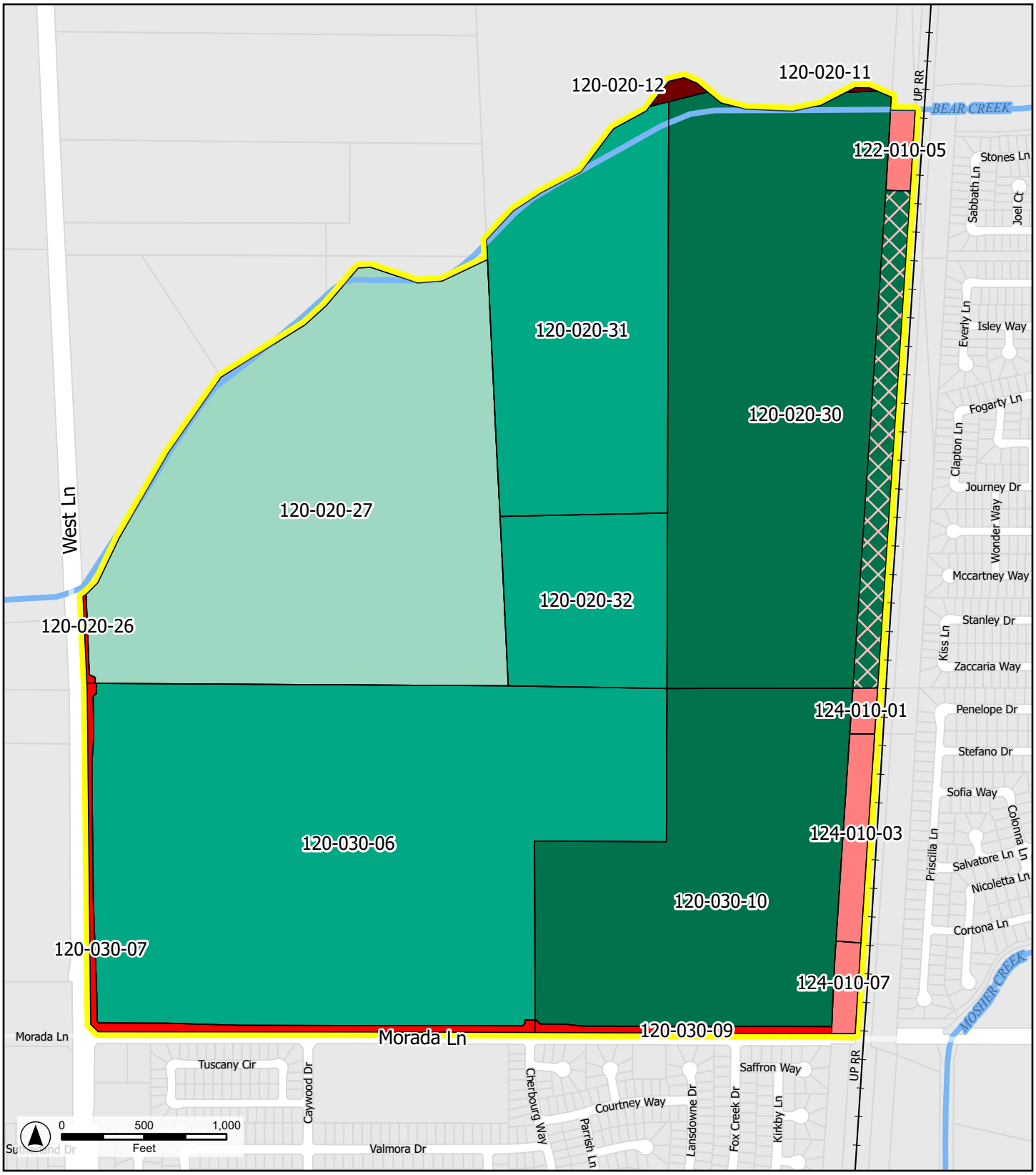


**Legend**

- Annexation Area

**Development Areas**

- ARNAIZ Development Area
- Klein Development Area
- TPH Development Area

**Non-Development Areas**

- City of Stockton Right-of-Way
- Union Pacific Railroad
- Sacramento-San Joaquin Drainage District
- Non-Development Portion of TPH Parcel

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 3. Assessor Parcel Map

*Sources: San Joaquin County GIS; MAXAR Imagery, 10/24/2023. Map date: March 26, 2024.*

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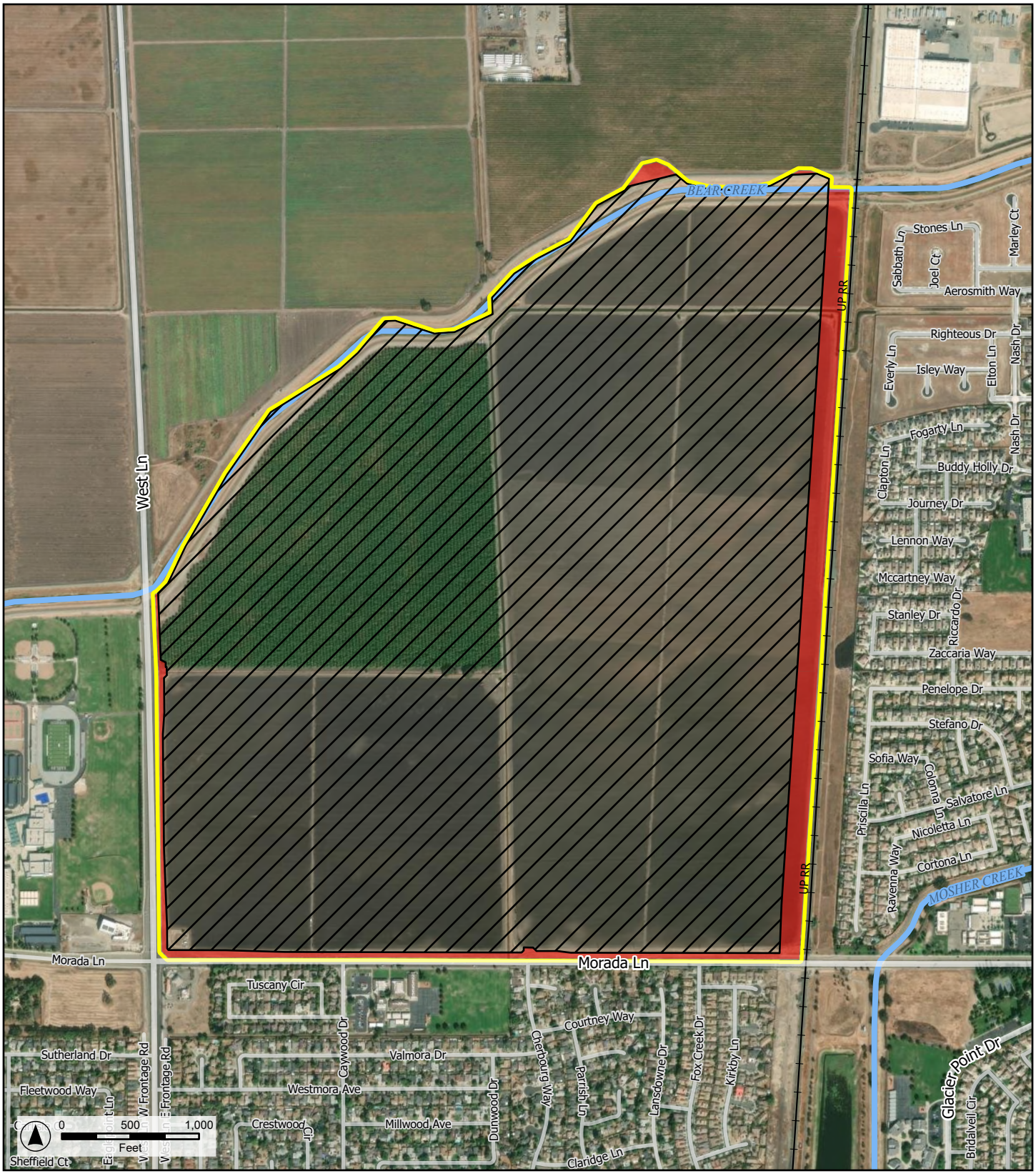


Legend

- Annexation Area
- Development Area
- Non-Development Area

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 4. Aerial Map

*Sources: San Joaquin County GIS; MAXAR Imagery, 10/24/2023. Map date: March 26, 2024.*

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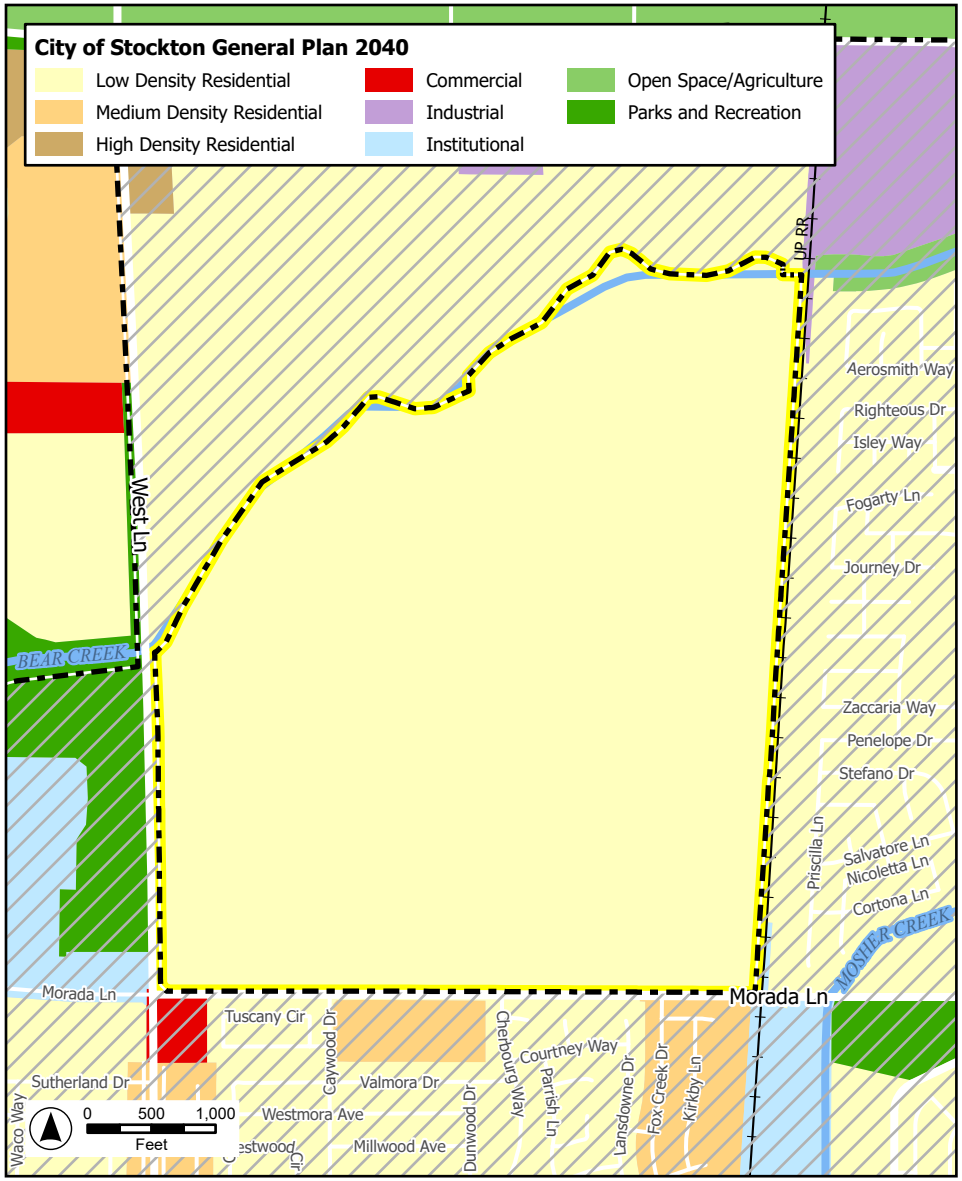


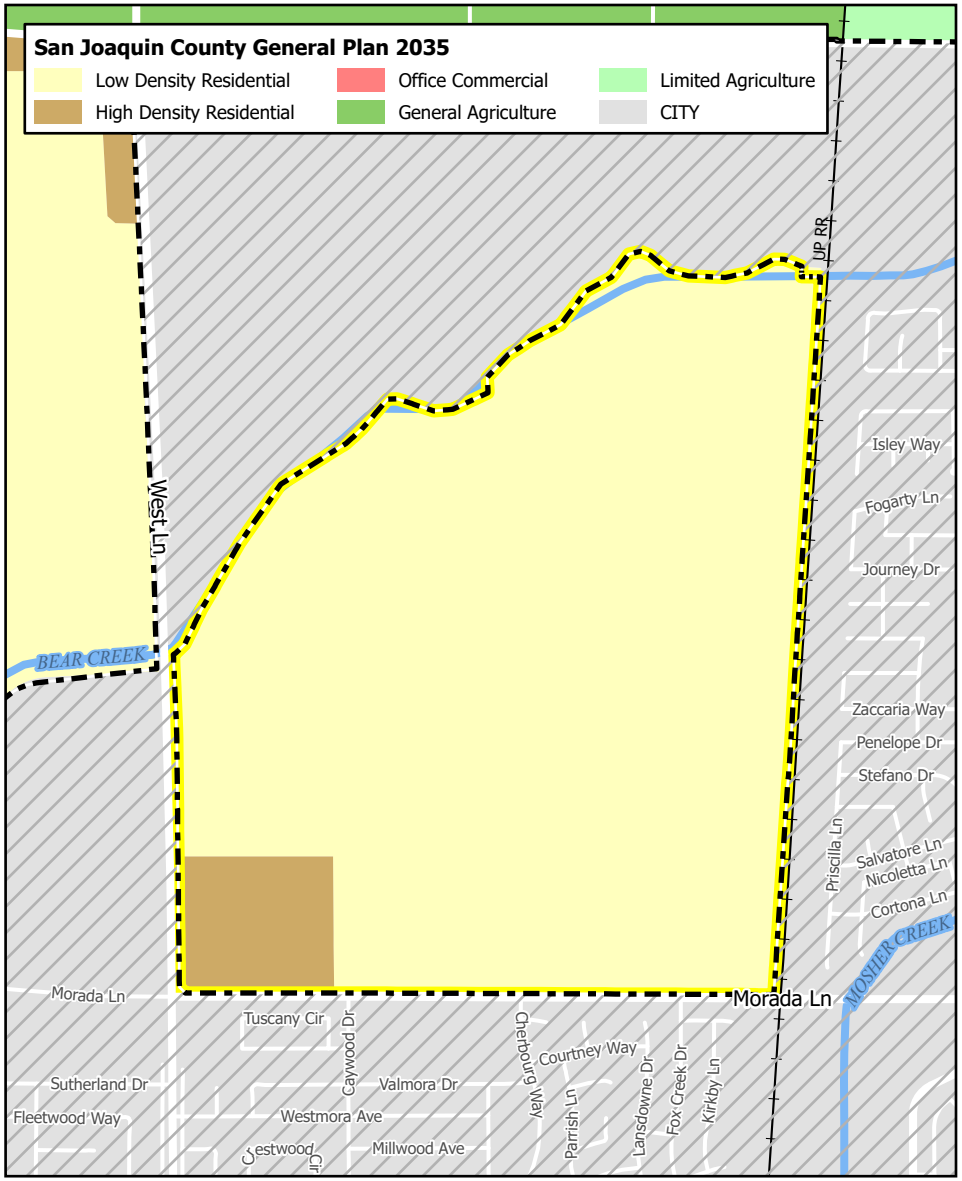


**Legend**

- Annexation Area
- City of Stockton

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 5. Existing General Plan

*Sources: City of Stockton GIS; San Joaquin County GIS. Map date: March 14, 2024.*

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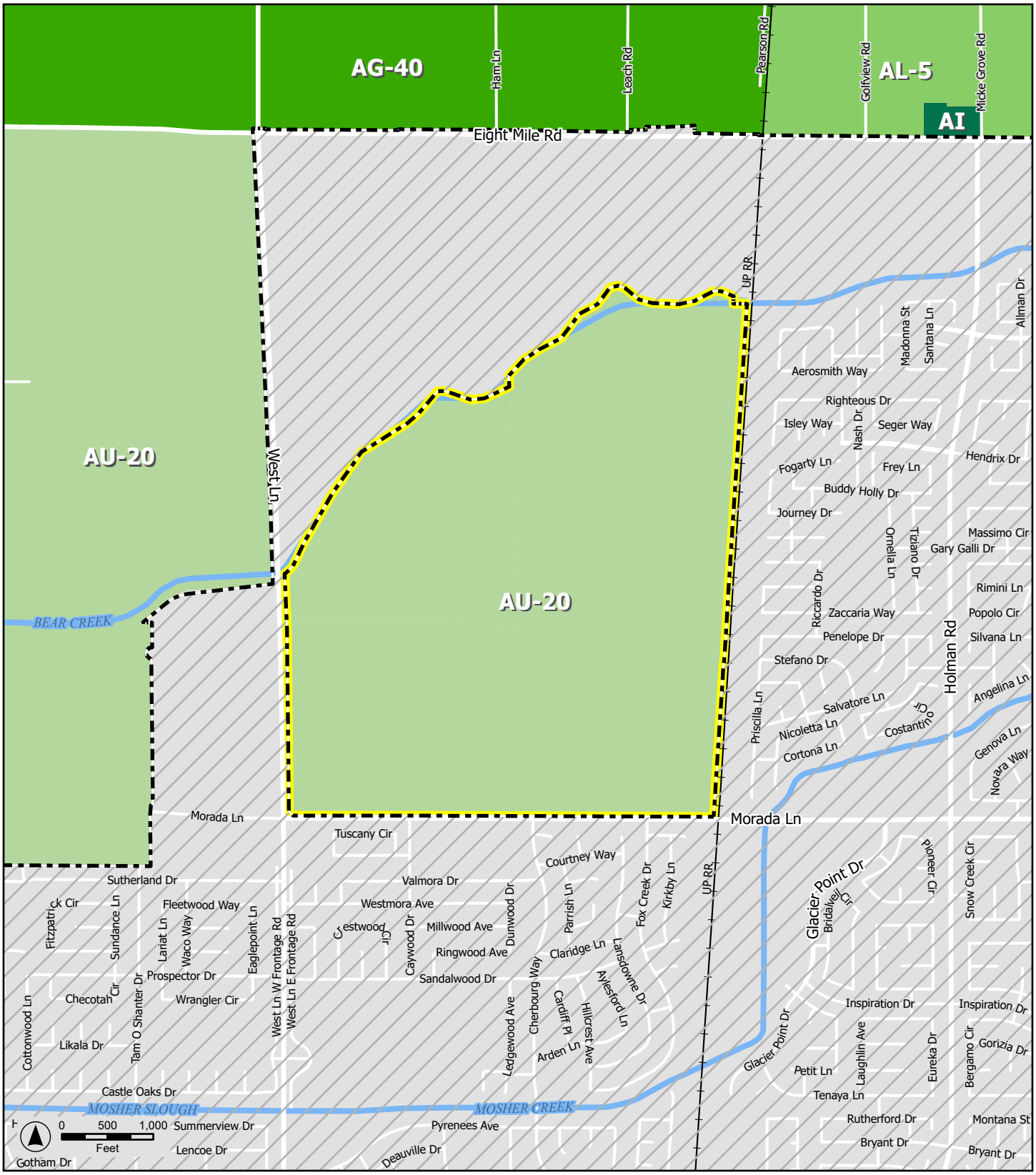


Legend

- Annexation Area
- City of Stockton

**San Joaquin County Zoning**

- AG-40
- AI
- AL-5
- AU-20

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 6. Existing Zoning

*Sources: San Joaquin County GIS. Map date: March 13, 2024.*

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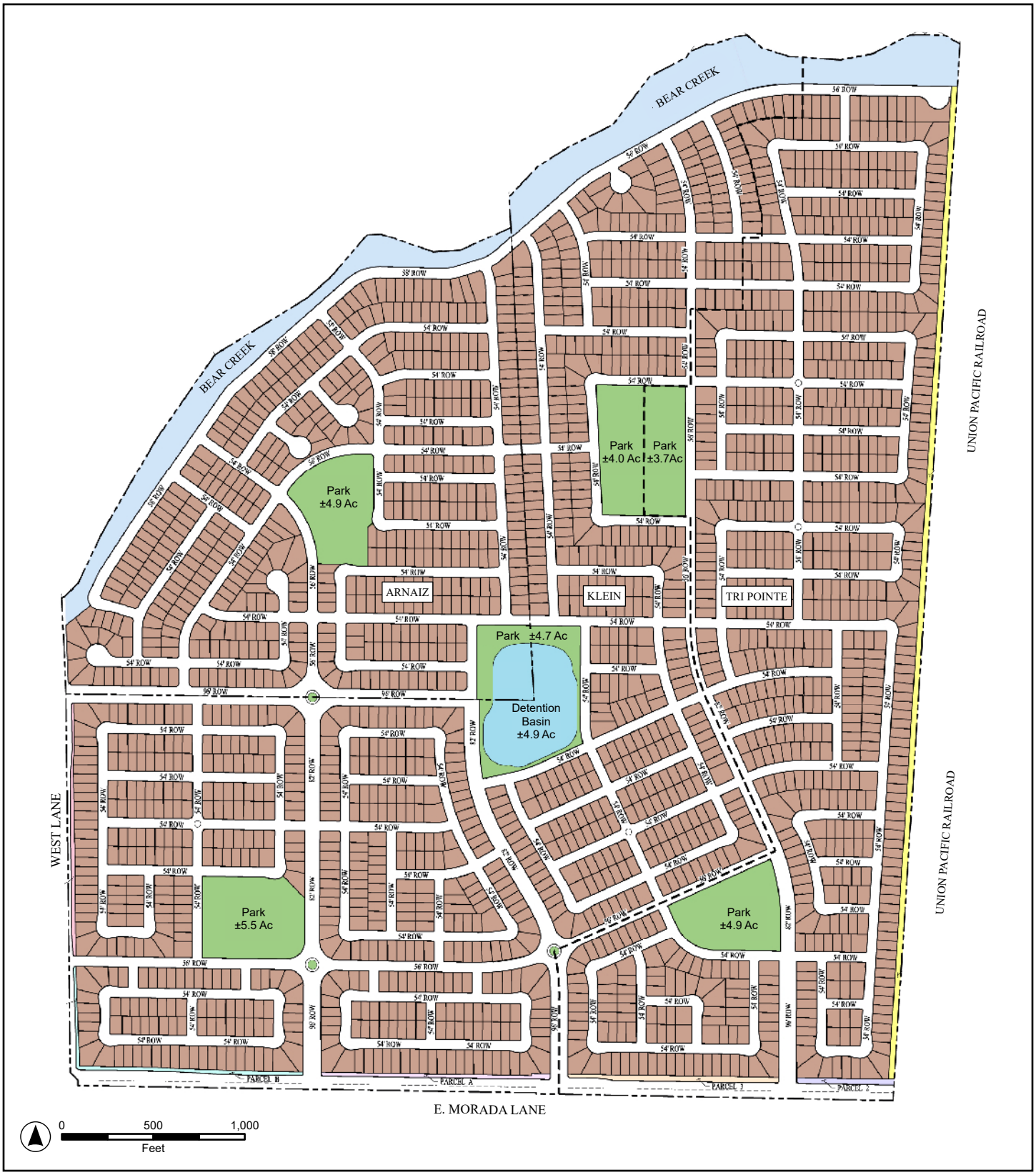


Legend

- Park
- Basin
- Bear Creek
- Residential Lot

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 7. Site Plan

*Sources: WH Consulting Engineers/cbg Civil Engineers, 2-20-2024. Map date: November 12, 2024.*

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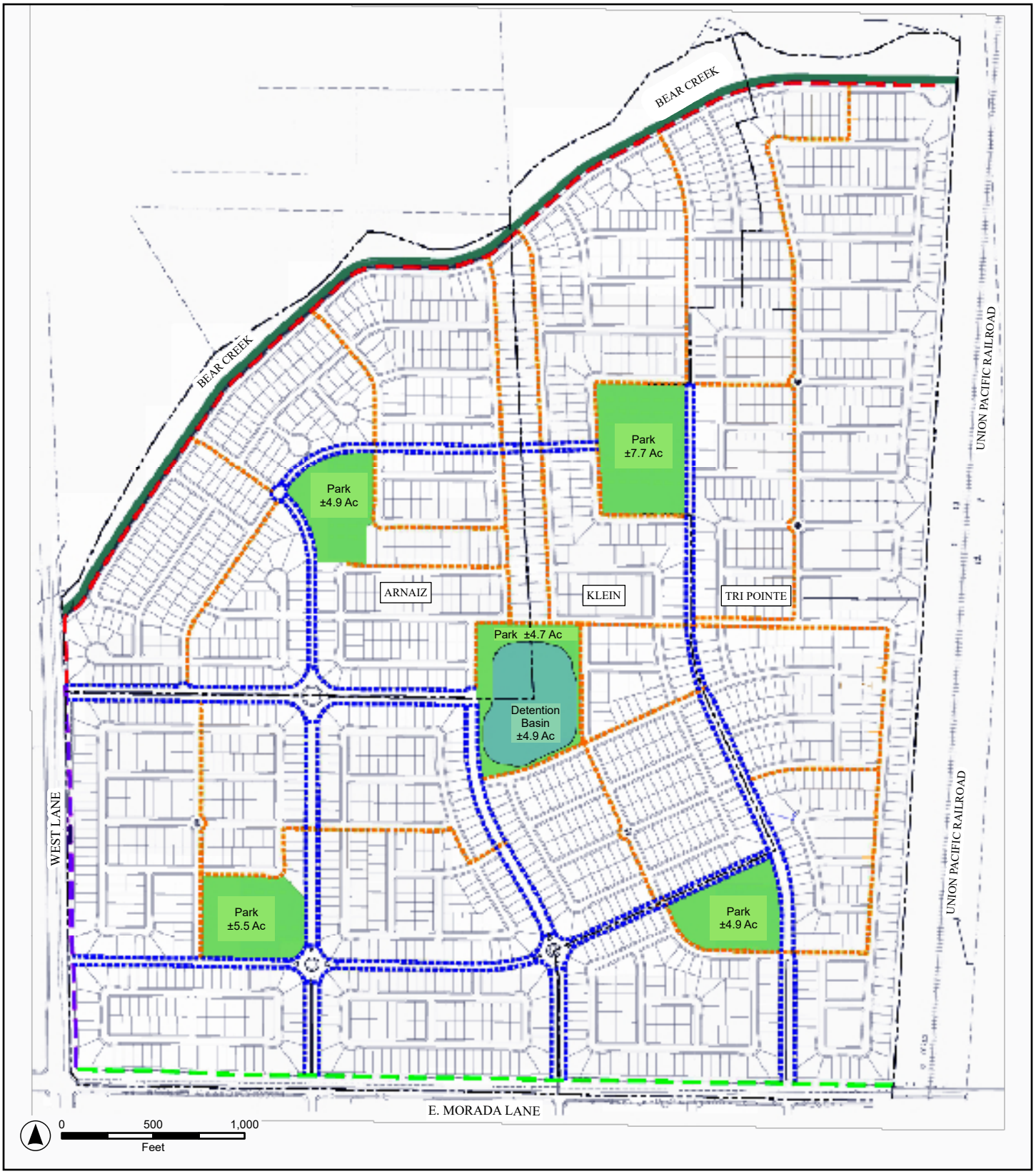


Legend

- Wellness Walks - 15' Landscape Corridor with 8' Meandering Sidewalk
- Multi-Use Pedestrian Pathway
- 5' Separated Sidewalk
- West Lane Improvements - 8' Meandering Walk & 11' Bike Lane
- E. Morada Improvements - 8' Meandering Walk & 5' Bike Lane
- Open Space along Bear Creek

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 8. Pedestrian Circulation Plan

*Sources: WH Consulting Engineers/cbg Civil Engineers, 2-16-2024. Map date: November 12, 2024.*

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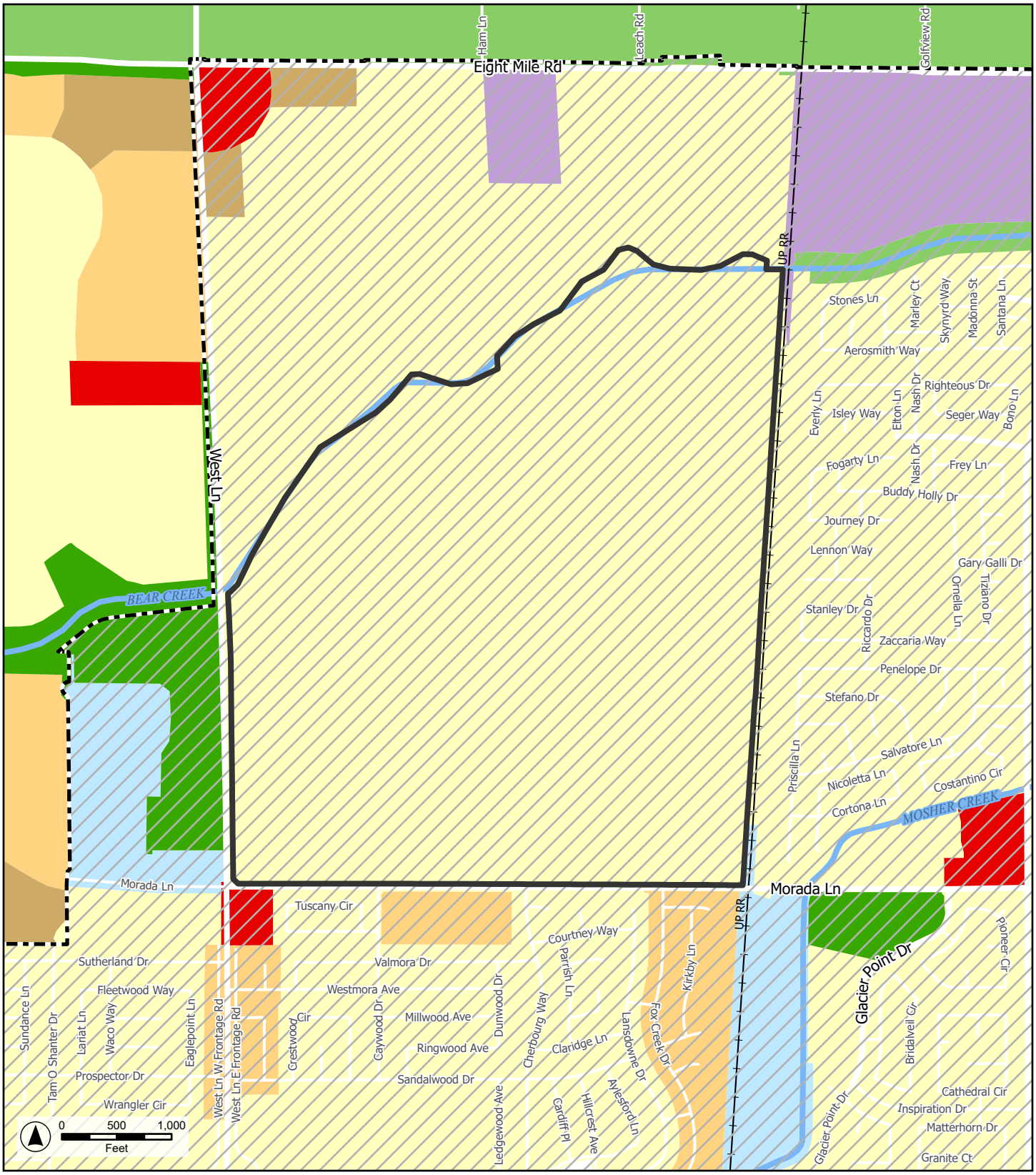
ATTACHMENT E




Legend

- Annexation Area
- Stockton City Boundary (after Annexation)
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Open Space/Agriculture
- Parks and Recreation

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 9. Proposed General Plan Map

*Sources: San Joaquin County GIS; MAXAR Imagery, 10/24/2023. Map date: March 19, 2024.*

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm

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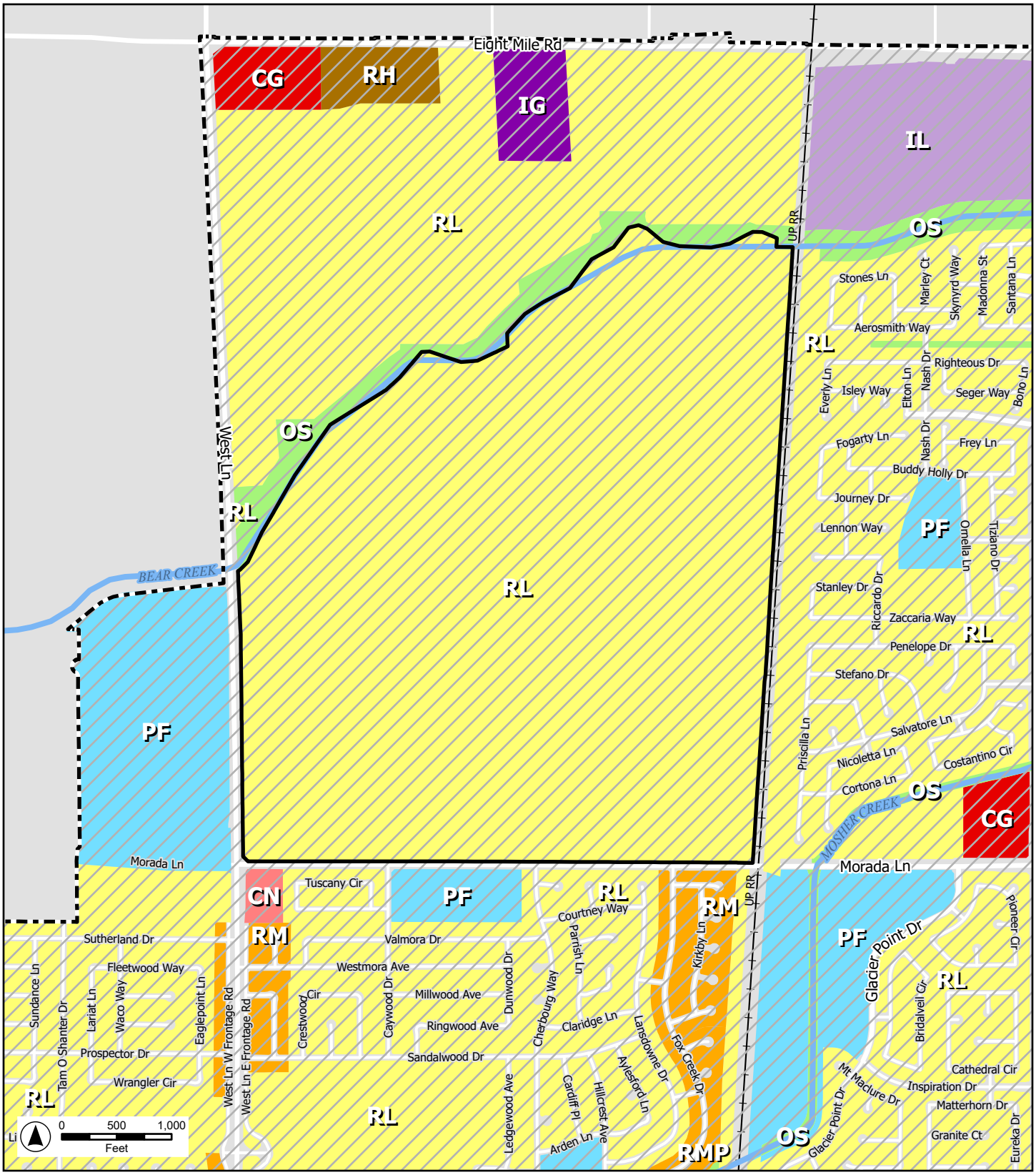


Legend

- Annexation Area
- Stockton City Boundary (after Annexation)

**City of Stockton Zoning**

- RL - Low Density Residential
- RM/P - Medium Density Residential
- RH - High Density Residential
- CG - General Commercial
- CN - Neighborhood Commercial
- IG - General Industrial
- IL - Limited Industrial
- OS - Open Space
- PF - Public Facility

*Sources: San Joaquin County GIS; City of Stockton. Map date: March 19, 2024.*

**CITY OF STOCKTON - BEAR CREEK SOUTH RESIDENTIAL**

Figure 10. Proposed Zoning

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## PREVIOUS ENVIRONMENTAL ANALYSES OF THE PROPOSED PROJECT

One previous environmental analysis has been prepared and certified which is applicable to the proposed Project.

The proposed Project is consistent with the Stockton General Plan (*Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements*, 2018), for which an EIR was certified on December 4, 2018 (SCH#2017052062). The certified General Plan EIR assumed full development and buildout of the Project site with uses that are proposed under the current application. As stated in the Envision Stockton General Plan EIR, "This EIR does not evaluate the changes in the General Plan relative to the existing 2035 General Plan but rather evaluates the impacts of the proposed General Plan relative to existing conditions, as required by CEQA Guidelines Section 15126.2." In other words, the General Plan EIR described the baseline/existing conditions for Bear Creek South as agriculture and vacant and compared the existing agricultural uses/vacant site with the proposed low density residential uses planned for the site based on the Envision Stockton 2040 General Plan.

Appendix G includes a memo that examines the Bear Creek South Project relative to the General Plan and General Plan EIR. The memo is intended to provide a more formal examination of the City of Stockton's General Plan EIR for purposes of tiering of a "subsequent activity" under the General Plan, and application of the Section 15183 (as well as 15152, 15162, and 15168(c)) to the Project. The analysis is intended to provide substantial evidence to support a decision that the Project does in fact meet the requirement for a Public Resources Code Section 21083.3 and CEQA Guidelines 15183 statutory exemption. As discussed, a full examination of the Project in the Initial Study, combined with the examination of the Project within the context of the General Plan supporting documents, the adopted General Plan, the certified General Plan EIR, adopted Sphere of Influence, and adopted Municipal Service Review as summarized in Appendix G, confirms the opinion that the Project qualifies for a statutory exemption under Public Resources Code Section 21083.3 and CEQA Guidelines Section 15183.

The cumulative impacts associated with buildout of the Stockton General Plan, including the Project site, were fully addressed in the General Plan EIR.

### *CEQA GUIDELINES SECTION 15183 EXEMPTIONS*

CEQA Guidelines Section 15183 allows a streamlined environmental review process for projects that are consistent with the densities established by existing zoning, community plan or general plan policies for which an Environmental Impact Report (EIR) was certified. As noted above, the proposed Project is consistent with the land use designation and densities established by the Stockton General Plan, for which an EIR was certified. The provisions contained in Section 15183 of the CEQA Guidelines are presented below.

**15183. Projects Consistent with a Community Plan or Zoning**

*(a) CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified shall not*

*require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the project or its site. This streamlines the review of such projects and reduces the need to prepare repetitive environmental studies.*

*(b) In approving a project meeting the requirements of this section, a public agency shall limit its examination of environmental effects to those which the agency determines, in an initial study or other analysis:*

> *(1) Are peculiar to the project or the parcel on which the project would be located,*
> *(2) Were not analyzed as significant effects in a prior EIR on the zoning action, general plan, or community plan, with which the project is consistent,*
> *(3) Are potentially significant off-site impacts and cumulative impacts which were not discussed in the prior EIR prepared for the general plan, community plan or zoning action, or*
> *(4) Are previously identified significant effects which, as a result of substantial new information which was not known at the time the EIR was certified, are determined to have a more severe adverse impact than discussed in the prior EIR.*

*(c) If an impact is not peculiar to the parcel or to the project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards, as contemplated by subdivision (e) below, then an additional EIR need not be prepared for the project solely on the basis of that impact.*

*(d) This section shall apply only to projects which meet the following conditions:*

> *(1) The project is consistent with:*
>
> > *(A) A community plan adopted as part of a general plan,*
> > *(B) A zoning action which zoned or designated the parcel on which the project would be located to accommodate a particular density of development, or*
> > *(C) A general plan of a local agency, and*
>
> *(2) An EIR was certified by the lead agency for the zoning action, the community plan, or the general plan.*

*(e) This section shall limit the analysis of only those significant environmental effects for which:*

> *(1) Each public agency with authority to mitigate any of the significant effects on the environment identified in the planning or zoning action undertakes or requires others to undertake mitigation measures specified in the EIR which the lead agency found to be feasible, and*
> *(2) The lead agency makes a finding at a public hearing as to whether the feasible mitigation measures will be undertaken.*

*(f) An effect of a project on the environment shall not be considered peculiar to the project or the parcel for the purposes of this section if uniformly applied development policies or standards have*

*been previously adopted by the City or county with a finding that the development policies or standards will substantially mitigate that environmental effect when applied to future projects, unless substantial new information shows that the policies or standards will not substantially mitigate the environmental effect. The finding shall be based on substantial evidence which need not include an EIR. Such development policies or standards need not apply throughout the entire City or county, but can apply only within the zoning district in which the project is located, or within the area subject to the community plan on which the lead agency is relying. Moreover, such policies or standards need not be part of the general plan or any community plan, but can be found within another pertinent planning document such as a zoning ordinance. Where a City or county, in previously adopting uniformly applied development policies or standards for imposition on future projects, failed to make a finding as to whether such policies or standards would substantially mitigate the effects of future projects, the decision-making body of the City or county, prior to approving such a future project pursuant to this section, may hold a public hearing for the purpose of considering whether, as applied to the project, such standards or policies would substantially mitigate the effects of the project. Such a public hearing need only be held if the City or county decides to apply the standards or policies as permitted in this section.*

*(g) Examples of uniformly applied development policies or standards include, but are not limited to:*

*(1) Parking ordinances.*
*(2) Public access requirements.*
*(3) Grading ordinances.*
*(4) Hillside development ordinances.*
*(5) Flood plain ordinances.*
*(6) Habitat protection or conservation ordinances.*
*(7) View protection ordinances.*
*(8) Requirements for reducing greenhouse gas emissions, as set forth in adopted land use plans, policies, or regulations.*

*(h) An environmental effect shall not be considered peculiar to the project or parcel solely because no uniformly applied development policy or standard is applicable to it.*

*(i) Where the prior EIR relied upon by the lead agency was prepared for a general plan or community plan that meets the requirements of this section, any rezoning action consistent with the general plan or community plan shall be treated as a project subject to this section.*

*(1) "Community plan" is defined as a part of the general plan of a City or county which applies to a defined geographic portion of the total area included in the general plan, includes or references each of the mandatory elements specified in Section 65302 of the Government Code, and contains specific development policies and implementation measures which will apply those policies to each involved parcel.*
*(2) For purposes of this section, "consistent" means that the density of the proposed Project is the same or less than the standard expressed for the involved parcel in the general plan, community plan or zoning action for which an EIR has been certified, and that the project*

*complies with the density-related standards contained in that plan or zoning. Where the zoning ordinance refers to the general plan or community plan for its density standard, the project shall be consistent with the applicable plan.*

*(j) This section does not affect any requirement to analyze potentially significant offsite or cumulative impacts if those impacts were not adequately discussed in the prior EIR. If a significant offsite or cumulative impact was adequately discussed in the prior EIR, then this section may be used as a basis for excluding further analysis of that offsite or cumulative impact.*

## PROJECT-SPECIFIC ENVIRONMENTAL REVIEW

The attached Environmental Checklist includes a discussion and analysis of any peculiar or site-specific environmental impacts associated with construction and operation of the proposed Project. The Environmental Checklist identifies the applicable City of Stockton development standards and policies that would apply to the proposed Project during both the construction and operational phases, and explains how the application of these uniformly applied standards and policies would ensure that no peculiar or site-specific environmental impacts would occur.

## CONCLUSION

The entire Project site was assumed for Low Density Residential development under the Stockton General Plan. Under the existing General Plan land use designation for the site (Low Density Residential), the 503.89-acre Development Area could be developed with up to 6.1 units per gross acre, or up to 3,073 units. Under the Project, up to 2,241 residential units would be constructed, which is well within the assumed housing units count for the Project site analyzed as part of the General Plan EIR.

The Stockton General Plan EIR provides the Development Projections that are used in the EIR (See General Plan Draft EIR, pp. 3-20). The EIR explains that it uses a "horizon-year projection," which is based on an estimate of the amount of development that would occur by 2040. The EIR also uses a Buildout Projection which represents full buildout of the General Plan, but with a date uncertain. Each projection is described below:

The horizon-year projection includes the following (See General Plan Draft EIR, pp. 3-20):

- 40,900 new dwelling units, including:
  - 26,300 new single-family units
  - 14,600 new multi-family units
- 132,200 new residents
- 13.8 million square feet of new commercial and office space
- 35.6 million square feet of new industrial space

The full buildout projection includes the following (See General Plan Draft EIR, pp. 3-22):

- 119,700 new dwelling units, including:
  - 43,800 new single-family units
  - 75,900 new multi-family units

- 386,700 new residents
- 50.9 million square feet of new commercial and office space
- 242.4 million square feet of new industrial space

The EIR indicates that there are almost 7,000 acres of vacant within the SOI (i.e. the EIR Study Area) (See General Plan Draft EIR, pp.3-22), which specifically includes the 530.18-acre Project site. The EIR indicates that a land use demand forecast (prepared as part of a Market Analysis that supports the projections for the General Plan) for Stockton in 2040 results in between 19,800 and 41,000 new housing units, including between 13,800 and 28,700 new single-family units and between 5,900 and 12,300 new multi-family units (See General Plan Draft EIR, pp. 3-24). These projections are based in part on the land use inventory from the General Plan land use map, in addition to market and economic factors that drive growth. Out of the 40,900 new units projected for the horizon year of the General Plan buildout, 12,100 units would result from the growth projected in 2040 from the General Plan and 28,800 units are expected as a result of the growth from Approved and Pending Projects. (See General Plan Draft EIR, Table 3-2.) As the Project's proposed 2,241 units are being proposed in accordance with the proposed density and land use designation in the General Plan, they are assumed to be included in the 12,100 units resulting from the growth projected in 2040 from the General Plan. The Project site provides approximately 5% of the total housing demand through the Horizon-Year Projection, and approximately 1.8% of the total housing demand through the Full Buildout Projection. There is nothing peculiar about the Project as it relates to house capacity/demand provided in the Horizon-Year Projection, Full Buildout Projection, or the Market Study Projections.

As described above, the proposed Project is consistent with the Stockton General Plan (*Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements*, 2018), for which an EIR was certified on December 4, 2018 (SCH#2017052062). Cumulative impacts associated with development and buildout of the Project site, as proposed, were fully addressed in the Stockton General Plan EIR (SCH# 2017052062). Since the proposed Project is consistent with the land use designation and development intensity assumed under the General Plan, and the General Plan EIR evaluated the impacts of developing low density residential uses as compared to the baseline condition with vacant land, implementation of the proposed Project would not result in any new cumulative environmental impacts beyond those addressed in the General Plan EIR.

The analysis in the attached CEQA Environmental Checklist demonstrates that there are no site-specific or peculiar impacts associated with the Project, and identifies uniformly applied standards and policies that would be applied to the Project. The Project Requirements identified in the attached environmental analysis include requirements that must be implemented by the proposed Project to ensure that any site-specific impacts or construction-related impacts are reduced to a less than significant level. All Project Requirements identified in the attached Environmental Checklist shall be made a condition of Project approval and shall be implemented within the timeframes identified.

# ENVIRONMENTAL CHECKLIST

## *I. AESTHETICS*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Have a substantial adverse effect on a scenic vista? | | | X | |
| b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway? | | | X | |
| c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with the applicable zoning and other regulations governing scenic quality? | | | X | |
| d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? | | | X | |

*Project Impacts:*

The development of a 2,241 single-family lot residential subdivision would change the existing visual nature / character of the Project site from agricultural uses to a residential neighborhood. The Project site is not designated as a scenic vista or scenic highway. The development of the Project site would create new sources of light and glare that is typical of a residential development. The proposed Project is allowed under the existing General Plan land use designation. There is nothing peculiar about the site that presents impacts greater than was anticipated under the General Plan. For instance, the Project site is not topographically elevated from the surrounding lands and is not highly visible from areas beyond the immediate vicinity of the Project site. A few trees are in the central portion of the site. There are no prominent features on the Project site, such as rock outcroppings or historic buildings, or other visually distinctive features that contribute to the scenic quality of the Project site.

*Prior Environmental Analysis:*

Implementation of the proposed Project would introduce new residential uses to the Project site compared to existing agricultural uses, and would be consistent with the surrounding uses anticipated for the Project site by the 2040 General Plan and analyzed in Chapter 4.1 of the 2040 General Plan EIR (City of Stockton General Plan Draft EIR, pages 4.1-6 through 4.1-10). The overall Development Area is bordered on the north by Bear Creek, on the east by UPRR right-of-way, on the west by West Lane, and on the south by Morada Lane. The Project site is primarily

bounded by lands within the City of Stockton (City) to the north, south, west, and east. Uses within the surrounding area include the following:

- North – Bear Creek, and further north of Bear Creek is the approved Tra Vigne Residential Development. Current uses within the Tra Vigne site are agricultural and industrial.
- South – Westwood Elementary School, single family residential uses and commercial at the southeast corner of West Lane and Morada Lane.
- West – West Lane, and further west of West Lane is McNair High School and Masasi Park.
- East – UPRR and east of the Railroad right-of-way are residential subdivisions that are part of the Cannery Residential Master Plan area.

Within the City, lands to the east and north are designated LDR by the City's General Plan Land Use Map. Lands to the south are designated Commercial, LDR, and Medium Density Residential. Lands to the west are designated Parks and Recreation, and Institutional.

As such, the proposed Project is consistent with the adopted vision and uses identified in the General Plan, and would not result in any new or increased impacts beyond those that were already addressed in the General Plan EIR. The General Plan EIR determined that visual and aesthetic impacts were less than significant. These impacts were adequately addressed in Chapter 4.1 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed compared to the agricultural/vacant conditions of the Project site. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to visual character of the City. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Policy LU-5.3 directs the City to define discrete and clear city edges that preserve agriculture, open space, and scenic views, and is implemented by Actions LU-5.3.A and LU-5.3.B, which direct the use of landscaping and other attractive edging instead of soundwalls and similar utilitarian edges of development at interfaces with rural landscapes, and to develop a plan for a greenbelt or community separator around the city. This policy and these actions will protect scenic views from soundwalls and other unattractive edges of development and from future development through a greenbelt.
- Policy LU-1.3 and its three supporting actions work to improve the visual quality of the urban environment at key gateways and along travel corridors by creating a gateway district program to coordinate the design of public and private investment in a cohesive and attractive way; improving maintenance, code enforcement, screening, and landscaping of viewsheds along major transportation routes; and requiring the incorporation of scenic views into the design of the built environment.
- Policy LU-3.1 and its six supporting actions ensure that the external features of new development are compatible with surrounding buildings, spaces, and cultural and historic resources, thus protecting the degradation of a neighborhood's visual quality from new, conflicting development design. The supporting actions focus on historic

resource preservation and reuse as well as the maintenance and upkeep of the Citywide Design Guidelines.

- Policies LU-3.2 and LU-3.3 also help to protect the visual quality and character of existing neighborhoods by retaining narrower roadways to preserve street trees and mature landscaping, maintaining and expanding public parks and open space areas, and periodically reviewing the City's Development Impact Fee requirements to reflect the City's priorities for parks, community centers, and libraries.
- Policy LU-5.1 and its three supporting actions integrate nature into the city and thus improve the visual quality of the urban landscape. These actions direct the City to require new and redevelopment to provide open spaces that create gateways and social focal points; protect riparian areas; and require native landscaping, which helps to preserve the visual integrity of the landscape.

*Responses to Checklist Questions*

**Response a):** As discussed in Chapter 4.1 of the General Plan EIR, the existing General Plan does not designate official scenic vistas. The proposed Project is not located along or near a scenic vista. The proposed Project has land uses that are consistent with the General Plan land use designations, and compatible with the surrounding land use designations. The proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR. No additional analysis is required. Therefore, with the Project, this impact will remain **less than significant,** as concluded in the General Plan EIR.

**Response b):** As discussed in Chapter 4.1 of the General Plan EIR, no adopted State scenic highways are in Stockton. Only one highway section in San Joaquin County is listed as a Designated Scenic Highway by the California Department of Transportation (Caltrans) Scenic Highway Mapping System; the segment of Interstate 580 (I-580) from Interstate 5 to Interstate 205. This route traverses the edge of the Coast Range to the west and Central Valley to the east. The City of Stockton, including the Project site, is not visible from this roadway segment, which is located approximately 20 miles southwest of the Project site. The General Plan EIR determined that implementation of the General Plan would have a less than significant impact relative to this topic (See General Plan Draft EIR, pp. 4.1-8). The proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR. No additional analysis is required. Therefore, this impact is considered to remain **less than significant,** as concluded in the General Plan EIR.

**Response c):** CEQA Guidelines Section 15387 defines an urbanized area as a central city or a group of contiguous cities with a population of 50,000 or more, together with adjacent densely populated areas having a population density of at least 1,000 persons per square mile. The Project site is within the unincorporated area of San Joaquin County, adjacent to the City of Stockton's northern city limits, which is defined as an urbanized area.

Chapter 4.1 of the General Plan EIR notes that future development consistent with the General Plan would be subject to the City's design review process in accordance with Chapter 16.120 of the Stockton Municipal Code, which has established a set of required findings to ensure quality

design. The proposed Project is subject to the design review process and requires the City to decide that the Project is visually compatible with surrounding development. The proposed residential uses are in an area that the General Plan envisions to be developed with residential uses. Additionally, the surrounding area currently contains numerous residential uses like those proposed, and the proposed uses are scaled to be visually compatible with the surrounding land uses. The proposed Project would be zoned for low density residential use that is consistent with the General Plan land use designation.

The General Plan EIR determined that implementation of the General Plan would have a less than significant impact relative to this topic (pages 4.1-8 and 4,1-9). The proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR because the proposed residential uses comprise low density residential uses as proposed under the General Plan. Under the existing General Plan land use designation for the site (Low Density Residential), the 503.89-acre Development Area could be developed with up to 6.1 units per gross acre, or up to 3,073 units. Under the Project, up to 2,241 residential units would be constructed, which is well within the assumed unit count for the Project site analyzed as part of the General Plan EIR. No additional analysis is required. After the implementation of City standards and requirements, the Project impacts related to visual quality or character would remain **less than significant,** as concluded in the General Plan EIR.

**Response d):** During the day, sunlight reflecting from structures and vehicles is a primary source of glare, while nighttime light and glare can be divided into both stationary and mobile sources. Some types of stationary sources of nighttime light include structure illumination, interior lighting, decorative landscape lighting, and street lights. The principal mobile source of nighttime light and glare is vehicle headlamp illumination.

The General Plan EIR (See General Plan Draft EIR, pp. 4.1-10) notes that there is a significant amount of ambient lighting that comes from existing development, including roadways. The developed and inhabited land uses in the City of Stockton are the main source of daytime and nighttime light and glare. They are typified by single and multi-family residences, commercial structures, industrial areas, and street lights. These areas and their associated human activities (inclusive of vehicular traffic) characterize the existing light and glare environment present during daytime and nighttime hours in the developed portions of the city. Because the Project site is adjacent to developed portions of the City of Stockton, ambient light in this area is more pronounced than in areas farther away from the developed areas.

The surrounding area has existing sources of light and glare created by streetlights, car headlights, and interior and exterior lighting from buildings, including adjacent residential like the Project. The proposed Project would create these similar sources of light and glare. Chapter 4.1 of the General Plan EIR notes that exterior lighting is allowed under the General Plan, but is required to comply with City standards for outdoor lighting (Municipal Code Sections 16.32.070 and 16.36.060(B)). These standards require exterior lighting to be energy efficient, stationary, shielded and directed away from adjoining properties and public rights-of-way. These City standards would apply to the Project as well.

The General Plan EIR determined that implementation of the General Plan would have a less than significant impact relative to this topic (See General Plan Draft EIR, pp. 4.1-10). The proposed Project would not result in new or substantially more severe impacts than what was previously disclosed in the General Plan EIR because the Project would result in the development of 2,241 single-family residential units consistent with the level of development proposed in the General Plan for the Project site. No additional analysis is required. Thus, the implementation of City standards and requirements would ensure that any impacts related to light and glare remain **less than significant**, as concluded in the General Plan EIR.

## *II. AGRICULTURE AND FOREST RESOURCES*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? | | | X | |
| b) Conflict with existing zoning for agricultural use, or a Williamson Act contract? | | | X | |
| c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 1222(g)) or timberland (as defined in Public Resources Code section 4526)? | | | X | |
| d) Result in the loss of forest land or conversion of forest land to non-forest use? | | | X | |
| e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use? | | | X | |

*Project Impacts:*

The development of a 2,241 single-family lot residential subdivision would change the existing character of the Project site from predominately agricultural fields to a residential neighborhood. The Project site contains areas designated as Prime Farmland, Unique Farmland, Farmland of Local Importance, and Farmland of Statewide Importance and is zoned for Agriculture Urban Reserve by San Joaquin County. Most of the Project site is currently vacant and disturbed land and is generally located in an area of the city that includes developed areas, residential and some undeveloped lands. The City's General Plan designates the Project site Low Density Residential and the proposed Project includes a request for a pre-zone to RL (Residential, Low Density) District that supports residential development at densities and configurations, compatible with the areas that surround the Project site. The General Plan designates the Project site for urban land uses and the General Plan EIR already identified the Project site as an area for potential farmland conversion. (See General Plan Draft EIR, pp. 4.2-10-4.2-12; Figure 4.2-4.) As such, implementation of the proposed Project would not create new impacts over and above those identified in the General Plan EIR, nor significantly change previously identified impacts.

The Project site is not under a Williamson Act contract. The proposed Project would not conflict with existing zoning for agricultural use, or a Williamson Act contract.

*Prior Environmental Analysis:*

Implementation of the proposed Project would introduce new residential uses to the Project site compared to the existing agriculture and vacant uses of the Project site, and would be consistent

with the surrounding uses anticipated for the Project site by the 2040 General Plan and analyzed in Chapter 4.2 of the 2040 General Plan EIR (City of Stockton General Plan Draft EIR, pages 4.2-10 through 4.2-15). As such, the proposed Project is consistent with the adopted vision and uses identified within the General Plan, and would not result in any new or increased impacts beyond those that were evaluated in the General Plan EIR. Although the General Plan contains a strategy to protect agricultural lands beyond the city edges from conversion to non-agricultural use, the General Plan EIR identified the conversion of farmlands of concern under CEQA to non-agricultural uses as a significant impact. The General Plan EIR notes that because these parcels are located near existing urbanized areas, they may not be viable for agricultural operations due to conflicts with nearby urbanized areas. As discussed under Impact AG-1 of the General Plan EIR, no additional mitigation is available, resulting in a significant and unavoidable impact. The City of Stockton adopted a Statement of Overriding Considerations on February 28th, 2022 stating that the EIR for the General Plan concludes that General Plan impacts on agricultural land conversion, air quality, greenhouse gas emissions, noise and transportation impacts are significant and that feasible mitigation measures are not available that would conclusively reduce these impacts to a less than significant level. As the General Plan EIR already identified the Project site as an area for potential farmland conversion, (see General Plan Draft EIR, pp. 4.2-10-4.2-12; Figure 4.2-4); the Project would not result in the loss of more agricultural land than that contemplated in the General Plan EIR.

Thus, these impacts were adequately addressed in Chapter 4.2 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed in the General Plan EIR. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to agricultural resources of the City. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Action LU-1.3.C directs the City to require the incorporation of scenic views, including open space features like waterways, wetlands, natural landscapes, and parks, into design of the built environment, ensuring that forested areas would be maintained in new development.
- Policy LU-5.1 directs the City to integrate nature into the city and maintain Stockton's urban forest. Supporting actions require projects to provide open space; protect, preserve, and improve riparian corridors; and require that landscape plans incorporate native plants. This policy and these actions support preservation and protection of forested open space and riparian areas.
- Policy LU-5.2: Protect natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources from encroachment or destruction by incompatible development.
- Policy LU-5.3: Define discrete and clear city edges that preserve agriculture, open space, and scenic views.
- Action LU-5.3.B: Coordinate with San Joaquin County to develop a plan for a greenbelt or community separator around the city.

- Action LU-5.3.C: Maintain the City's agricultural conservation program that requires either dedication of an agricultural conservation easement at a 1:1 ratio or payment of an in-lieu agricultural mitigation fee for the conversion of prime farmland, farmland of statewide importance, or unique farmland, as defined by the State of Farmland Monitoring and Mapping Program.
- Action LU-6.2.B: Do not approve future annexations or City utility connections unless they are consistent with the overall goals and policies of the General Plan and do not adversely impact the City's fiscal viability, environmental resources, infrastructure and services, and quality of life.

*Responses to Checklist Questions*

**Response a):** The General Plan designates approximately 16,160 acres of agricultural land for development to non-agricultural/urban uses, *including* the Project site, including the Project site. (See General Plan EIR, pp. 4.2-10-4.2-12; Figure 4.2-4). The General Plan EIR found that buildout of the General Plan would have a potentially significant impact on conversion of Important Farmland. However, the General Plan EIR concluded that the residual significance would remain significant and unavoidable (City of Stockton, 2022).

The proposed Project is subject to the requirements of the Stockton Agricultural Lands Mitigation Program which will involve a contribution of conservation easement-protected land or payment of in-lieu fees to the Mitigation Program as compensation for the agricultural land conversion impacts of the Project. The City of Stockton adopted the Agricultural Land Mitigation Program in 2007. The Program applies to projects that would convert agricultural lands, as defined by the most-recent Important Farmland Maps published by the California Department of Conservation. Projects may provide "agricultural mitigation land" on a 1:1 basis for each acre of land converted, including administrative costs of approximately $1,000 per acre, or pay the established Agricultural Land Mitigation Fee of $12,822 (San Joaquin Council of Governments [SJCOG] San Joaquin County Multi-Species Habitat Conservation and Open Space Plan [SJMSCP] Habitat Fees, 2020) per acre. The Agricultural Land Mitigation Program provides that agricultural mitigation lands will be dedicated to a qualifying management entity such as the Central Valley Farmland Trust. The fees would be collected by the City, held in a dedicated account, and then expended by the City to acquire agricultural mitigation land or pay for the monitoring and administrative costs of the program. The fees may also be transferred to a qualifying entity for the same purpose.

The proposed Project would not result in new or substantially more severe impacts than what was previously disclosed in the General Plan EIR because conversion of the entire Project site from agricultural to Low Density Residential uses was assumed in the General Plan EIR. No additional analysis is required. As such, with implementation of City standards and requirements, that implementation of the proposed Project would not increase the severity of the impacts identified in the General Plan EIR.

**Response b):** The San Joaquin County Zoning Ordinance zones the Project site Agriculture Urban Reserve. As part of the annexation request, the proposed Project includes a request for to pre-zone the Project site to RL (Residential, Low Density) District. The General Plan EIR already

identified the Project site as an area for potential farmland conversion, (see General Plan EIR, pp. 4.2-10-4.2-12; Figure 4.2-4.) The General Plan EIR noted that because these parcels are located near existing urbanized areas, they may not be viable for agricultural operations due to conflicts with nearby urbanized areas. As discussed under Impact AG-1 of the General Plan EIR, no additional mitigation is available, and the General Plan EIR concluded that the impact relative to his topic resulted in a significant and unavoidable impact. The proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR because conversion of the entire Project site from agricultural to Low Density Residential uses was assumed in the General Plan EIR. No additional analysis is required. As such, implementation of the proposed Project would not increase the severity of the impacts identified in the General Plan EIR related to this environmental topic.

**Responses c) and d):** The Project site is not forest land (as defined in Public Resources Code section 1222(g)) or timberland (as defined in Public Resources Code section 4526). As discussed in the General Plan EIR, the Stockton Municipal Code does not identify a zoning district for forest or timberland (see General Plan EIR, pp. 4.2-14-4.2-15, and thus the proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland and would not result in the loss of forest land or conversion of forest land to non-forest use. There are no forest resources on the Project site or in the immediate vicinity of the Project site. Therefore, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

**Response e):** The General Plan EIR noted that the General Plan land use map was generally developed to arrange new designations to place compatible uses adjacent to existing uses See General Plan Draft EIR, pp. 4.2-15). Nevertheless, the General Plan would allow development that could result in potentially incompatible urban uses next to farms or ranches, creating circumstances that impair the productivity and profitability of agricultural operation, and could eventually lead farmers to take their land out of production. Further, the General plan EIR already identified the Project site as an area for potential farmland conversion. (See General Plan Draft EIR, pp. 4.2-10-4.2-12; Figure 4.2-4.) As described in the discussion for Threshold AG-1 of the General Plan EIR, the General Plan includes policies and actions that aim to protect agricultural lands outside of the city from conversion to non-agricultural use, including from incompatible uses. Furthermore, as discussed in Section 4.2.1.1 of the General Plan EIR, the Stockton Municipal Code (SMC § 16.36.040) contains a "Right-to-Farm Ordinance," under which the City notifies property buyers to accept inconveniences or discomforts resulting from nearby agricultural activities, thereby protecting agricultural operations from nuisance complaints. With implementation of the General Plan policies and actions, as well as the City's Right-to-Farm Ordinance, the General Plan EIR concluded that the impact relative to this topic would be less than significant. The proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR. No additional analysis is required.

## *III. AIR QUALITY*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Conflict with or obstruct implementation of the applicable air quality plan? | | | X | |
| b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard? | | | X | |
| c) Expose sensitive receptors to substantial pollutant concentrations? | | | X | |
| d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? | | | X | |

*Project Impacts:*

The Project site is located within the boundaries of the San Joaquin Valley Air Pollution Control District (SJVAPCD). This agency is responsible for monitoring air pollution levels and ensuring compliance with federal and state air quality regulations within the San Joaquin Valley Air Basin (SJVAB) and has jurisdiction over most air quality matters within its borders.

The Project is consistent with the existing General Plan land use designation on the Project site and is consistent with the growth assumptions of applicable air quality plans. There is nothing peculiar about the site that presents impacts greater than was anticipated under the General Plan as the General Plan land use designation on the Project site contemplated a total of up to 3,073 single-family residences and the Project includes 2,241 single-family lot residential units. As discussed below, compliance with General Plan Mitigation Measures AQ-2 and AQ-3, the General Plan goals and policies, and applicable City Code and compliance with applicable Federal, State, and local laws and regulations would reduce Project impacts related to air quality to a less than significant level.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated air quality impacts associated with the future urban development that was contemplated by the General Plan. These impacts included implementation of air quality plans, cumulative considerable net increase of pollutants, exposure of sensitive receptors, and other emissions resulting from implementation of the General Plan (City of Stockton General Plan Draft EIR, 2018, pages 4.3-24 through 4.3-44). The General Plan EIR concluded that development anticipated by the General Plan 2040 would result in new sources of criteria air pollutant emissions which represent a substantial increase in emissions compared to existing conditions and emissions above the significance thresholds and/or TACs near existing or planned sensitive receptors. With application of State and SJVAPCD rules and regulations, implementation of the General Plan policies and actions, and Mitigation Measures

AQ-1 through AQ-6, construction and operation-related criteria air pollutants would be reduced to the greatest extent possible.

Mitigation Measure AQ-1 of the General Plan EIR requires implementation of Mitigation Measure AQ-3 to further reduce long-term criteria air pollutant emissions. Mitigation Measure AQ-2 of the General Plan EIR requires a construction-related air quality evaluation to be prepared for development projects subject to CEQA, and requires specific construction-related emission reduction measures be implemented. Mitigation Measure AQ-3 of the General Plan EIR requires an operational air quality evaluation to be prepared for development projects subject to CEQA, and requires specific operational emission reduction measures be implemented, as feasible. Mitigation Measure AQ-4a of the General Plan EIR requires implementation of Mitigation Measures AQ-2 and AQ-3. Mitigation Measure AQ-4b of the General Plan EIR requires development projects to assess their projects to the SJVAPCD's Rule 9510 Applicability Thresholds. Applicants for development projects that exceed this ambient air quality screening threshold are required to prepare or have prepared an ambient air quality analysis, consistent with the SJVAPCD Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI), to assess whether the subject development project would cause or contribute to a violation of any California Ambient Air Quality Standard or National Ambient Air Quality Standard. Mitigation Measure AQ-5 of the General Plan EIR requires applicants for industrial or warehousing land uses in addition to commercial land uses that would generate substantial diesel truck travel to contact the SJVAPCD or the City of Stockton in conjunction with the SJVAPCD to determine the appropriate level of health risk assessment (HRA) required. If preparation of an HRA is required, all HRAs shall be submitted to the City of Stockton and the SJVAPCD for evaluation. Mitigation Measure AQ-6 requires odor management plans for facilities that have the potential to emit nuisance odors.

Of these General Plan mitigation measures, Mitigation Measures AQ-2 and AQ-3 apply to the proposed Project.

Additionally, review of development projects by SJVAPCD for permitted sources of air toxics (e.g., industrial facilities, dry cleaners, and gasoline dispensing facilities) in addition to General Plan policies and actions would ensure that health risks are minimized. But the General Plan EIR concluded that the air quality impacts resulting from the General Plan build-out would remain significant and unavoidable.

This is also consistent with the GP EIR's description of what was analyzed quantitatively in the EIR, which is defined as all land within the SOI (i.e. the EIR Study Area). The Bear Creek South project is within the SOI and it represents approximately 5% of the total units anticipated to be built in the Horizon Project Year 2040. Additionally, as further confirmation that the Bear Creek South project was modeled within the General Plan EIR, City staff confirmed with Placeworks (i.e. the consultants who developed the GP EIR) that these model inputs were carried out through all the modeling (per. Communication Nicole Moore March 14, 2025).

It should also be noted that the General Plan EIR included the proposed Project in its analysis. Specifically, the development projections (i.e. 40,900 units) were used. It can be confirmed that in Appendix B from the General Plan EIR, the model inputs are consistent with the development projections (see page 682 of the Draft EIR). For air quality modeling, for example, as stated on page 6 of Appendix B from the General Plan EIR, and as also described in Table 4.3-7 of the General Plan EIR:

- Transportation emissions were modeled based on on-road VMT provided by Fehr & Peers and modeled using EMFAC2014-PL. EMFAC2014-PL provided the future year emissions rates, based on location and year;
- Energy emissions were based on energy use data provided by the PG&E. Emissions forecasts were estimated based on changes in population (residential energy), employment (nonresidential energy). These emissions were based on a three-year average (2014-2016) of energy data as provided by PG&E.
- Area source (Landscaping, Lighting, and Commercial Equipment) emissions were estimated using the OFFROAD2007 model to calculate emission rates for commercial equipment. Emissions forecasts were estimated based on population (Landscaping) and employment (Light Commercial Equipment) for the City of Stockton as a percentage of San Joaquin County.
- Area source (Consumer Product) emissions were estimated using CalEEMod, following a methodology utilized to calculate VOC emissions from use of household consumer cleaning products. Emissions forecasts account for the correct number of residential units in the SOI by 2040 (40,900 new units) (see page 187 of the Appendix).
- Other (Construction and Agricultural Equipment) emissions were estimated utilized the OFFROAD2007 model to agricultural equipment rates for construction and agricultural equipment. Agricultural equipment emissions are based on the proportion of farmland within the City of Stockton compared to San Joaquin County; emissions forecasts for agricultural equipment are based on the decrease in agricultural land, based on forecasted rate of change for the County of San Joaquin for years from 2000 to 2014). Construction emissions estimated based on housing permit data for San Joaquin County and City of Stockton from the US Census.

*Responses to Checklist Questions*

**Responses a), b):** The proposed Project would be both a direct and indirect source of air pollution. Direct sources of pollution include area, energy, and water and waste sources, due to development of the on-site buildings and associated infrastructure. Indirect sources of pollution would be due to the generation of trips of from vehicles traveling to and from the Project site.

**Operational**: CalEEMod™ (v.2022.1) was used to model operational emissions of the proposed Project. Table Air-1 shows proposed Project emissions as provided by CalEEMod. Both state and Air District rules and regulations were accounted for, where possible.[1] Further details are

[1] That is, State requirements related to the Title 24 Building Energy Efficiency Standards were accounted for by the modeling, for Project operation. Specifically, consistent with the latest (2022) version of the

provided in Appendix A. The SJVAPCD provides a list of applicable air quality emissions thresholds.

***Table AIR-1: Operational Project Generated Emissions (tons per year)***

| *POLLUTANT* | *CO* | *NOX* | *ROG* | *SOX* | *PM10* | *PM2.5* |
|---|---|---|---|---|---|---|
| ***Threshold*** | 100 | 10 | 10 | 27 | 15 | 15 |
| ***Emissions*** | 133 | 19.4 | 32.8 | 0.34 | 29.1 | 7.78 |
| ***Exceeds Threshold?*** | **Y** | **Y** | **Y** | **N** | **Y** | **N** |

*SOURCES: CALEEMOD (V.2022.1)*

The SJVAPCD has established their thresholds of significance by which the Project emissions are compared against to determine the level of significance. The SJVAPCD has established operations related emissions thresholds of significance as follows: 100 tons per year of carbon monoxide (CO, 10 tons per year of oxides of nitrogen ($NO_x$), 10 tons per year of reactive organic gases (ROG), 27 tons per year of sulfur oxides ($SO_x$), 15 tons per year particulate matter of 10 microns or less in size ($PM_{10}$), and 15 tons per year particulate matter of 2.5 microns or less in size ($PM_{2.5}$).

As shown in Table AIR-1 above, operational emissions would exceed the SJVACPD operational thresholds of significance for CO, NOx, ROG, PM10, and PM2.5. The General Plan EIR identified General Plan Policies and Actions along with Mitigation Measures AQ-1 through AQ-6 to reduce the long-term emissions from the General Plan build out. Of these General Plan mitigation measures, Mitigation Measures AQ-2 and AQ-3 apply to the proposed Project. However, as previously described, the General Plan EIR analyzed the anticipated impacts of air quality associated with the future development of the proposed land uses- Year 2040 as contemplated by the General Plan, (see General Plan EIR, Table 4.3-7, and Appendix B), and already found these impacts to be significant and unavoidable. The proposed Project would not add any new or different development than contemplated by the General Plan 2040. The exceedance of the project-level threshold was anticipated in the General Plan EIR for projects that develop consistent with the General Plan. As noted previously, under the existing General Plan land use designation for the site (Low Density Residential), the 503.89-acre Development Area could be developed with up to 6.1 units per gross acre, or up to 3,073 units. Under the Project, up to 2,241 residential units would be constructed, which is well within the assumed housing units count for the Project site assumed in the General Plan. Because trip generation is based on the number of residential units, the corresponding number of vehicle trips that could result from the Project site under the existing General Plan designation is higher than the number of vehicle trips that could result from the proposed Project.

**Construction**: Emissions from construction activities represent temporary impacts that are typically short in duration, depending on the size, phasing, and type of project. Air quality impacts can nevertheless be acute during construction periods, resulting in significant localized impacts

Title 24 Energy Efficiency Standards, the Project was assumed to require energy efficient appliances for single-family housing; produce 30% of electricity for the single-family housing on-site via rooftop solar PV; and utilize water efficient landscaping.

to air quality. Construction-related activities would result in Project-generated emissions from demolition, site preparation, grading, paving, building construction, and architectural coatings. CalEEMod™ (v.2022.1) was used to estimate construction emissions for the proposed Project. Table AIR-2, below, provides the construction criteria pollutant emissions associated with implementation of the proposed Project. Further details are provided in Appendix A.

***Table AIR-2: Maximum Construction Project Generated Emissions (tons per year)***

| ***POLLUTANT*** | *CO* | *NOX* | *ROG* | *SOX* | *$PM_{10}$* | *$PM_{2.5}$* |
|---|---|---|---|---|---|---|
| ***THRESHOLD*** | 100 | 10 | 10 | 27 | 15 | 15 |
| ***EMISSIONS*** | 6.95 | 3.35 | 2.23 | 0.01 | 1.39 | 0.60 |
| ***EXCEEDS THRESHOLD?*** | **N** | **N** | **N** | **N** | **N** | **N** |

*SOURCES: CALEEMOD (V.2022.1)*

As shown in Table AIR-2, Project maximum construction emissions would not exceed the SJVAPCD thresholds of significance. Nevertheless, regardless of emission quantities, the SJVAPCD requires construction related control measures in accordance with their rules and regulations. Implementation of these control measures (provided in further detail below) would further reduce proposed Project construction related emissions to the extent possible.

The first step is to prepare a Dust Control Plan that meets all the applicable requirements of APCD Rule 8021. All construction activities are required to implement dust control measures, as required by APCD Rules 8011-8081, to limit Visible Dust Emissions to 20% opacity or less. Dust control measures include application of water or chemical dust suppressants to unpaved roads and graded areas, covering or stabilization of transported bulk materials, prevention of carryout or trackout of soil materials to public roads, limiting the area subject to soil disturbance, construction of wind barriers, access restrictions to inactive sites as required by the applicable rules. The following dust control practices are identified in Tables 6-2 and 6-3 of the GAMAQI (2002):

a. *All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.*
b. *All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.*
c. *All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall control fugitive dust emissions by application of water or by presoaking.*
d. *When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions, or at least six inches of freeboard space from the top of the container shall be maintained.*
e. *All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly*

*forbidden.*

f. *Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.*
g. *Limit traffic speeds on unpaved roads to 15 mph.*
h. *Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.*

The proposed Project would comply with pre-existing requisite federal, State, SJVAPCD, and other local regulations and requirements, as well as implement the control measures provided by the SJVAPCD for construction-related $PM_{10}$ emissions.

**Conclusion**

The proposed Project would comply with pre-existing requisite federal, State, SJVAPCD, other local regulations and requirements, and mitigation measures in the General Plan EIR, as well as implement the control measures provided by the SJVAPCD for construction-related $PM_{10}$ emissions. Some criteria pollutant emissions would exceed the SJVAPCD's criteria pollutant emissions thresholds (for CO, NOX, ROG, PM10, and PM2.5), and such exceedance of the project-level thresholds was anticipated for projects, like the proposed Project, that develop consistent with the General Plan in the General Plan EIR. Compliance with the General Plan policies and actions, existing rules and regulations, and General Plan EIR mitigation measures would reduce the criteria pollutant emissions from the Project, but the impacts could remain significant and unavoidable. As the General Plan EIR evaluated this topic and also concluded the impacts will remain significant and unavoidable. Because the Project would be consistent with the land use and density assumed in the Proposed land use plan-year 2040 buildout used to evaluate air quality impacts in the General Plan, the proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR. Under the existing General Plan land use designation for the site (Low Density Residential), the 503.89-acre Development Area could be developed with up to 6.1 units per gross acre, or up to 3,073 units. Under the Project, up to 2,241 residential units would be constructed, which is well within the assumed housing units count for the Project site analyzed as part of the General Plan EIR shown in Appendix B of the General Plan EIR.[2] The amount of emissions resulting from a project directly correlates to the size of a project site and the unit count of a project. As the General Plan EIR's Air quality modelling assumed the build out of areas in Sphere of Influence, including the Project site, and the Project is proposing units within the residential density range considered din the general Plan for this Project Site, no additional analysis is required. Therefore, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to air quality emissions as compared with the General Plan EIR.

**Response c):** A toxic air contaminant (TAC) is defined as an air pollutant that may cause or

[2] The air emissions modeling within the General Plan EIR Included the SOI areas, which includes the Project site.

contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air. However, their high toxicity or health risk may pose a threat to public health even at very low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the state and federal governments have set ambient air quality standards.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. EPA regulate 188 air toxics, also known as hazardous air pollutants. The U.S. EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources. In addition, the U.S. EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment. These are acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter.

The 2007 U.S. EPA rule requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (VMT) increases by 145 percent, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050. California maintains stricter standards for clean fuels and emissions compared to the national standards, therefore it is expected that MSAT trends in California will decrease consistent with or more than the U.S. EPA's national projections.

The California Air Resources Board (CARB) published the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB, 2005) to provide information to local planners and decision-makers about land use compatibility issues associated with emissions from industrial, commercial and mobile sources of air pollution. The CARB Handbook indicates that mobile sources continue to be the largest overall contributors to the State's air pollution problems, representing the greatest air pollution health risk to most Californians. The most serious pollutants on a statewide basis include diesel exhaust particulate matter (diesel PM), benzene, and 1,3-butadiene, all of which are emitted by motor vehicles. These mobile source air toxics are largely associated with freeways and high traffic roads. Non-mobile source air toxics are largely associated with industrial and commercial uses. Table Air-3 provides the California Air Resources Board minimum separation recommendations on siting sensitive land uses.

***Table Air-3: CARB Minimum Separation Recommendations on Siting Sensitive Land Uses***

| *SOURCE CATEGORY* | *ADVISORY RECOMMENDATIONS* |
|---|---|
| Freeways and High-Traffic Roads | • Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. |

| *SOURCE CATEGORY* | *ADVISORY RECOMMENDATIONS* |
|---|---|
| Distribution Centers | • Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).<br>• Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points. |
| Rail Yards | • Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard.<br>• Within one mile of a rail yard, consider possible siting limitations and mitigation approaches. |
| Ports | • Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the CARB on the status of pending analyses of health risks. |
| Refineries | • Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation. |
| Chrome Platers | • Avoid siting new sensitive land uses within 1,000 feet of a chrome plater. |
| Dry Cleaners Using Perchloro-ethylene | • Avoid siting new sensitive land uses within 300 feet of any dry-cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district.<br>• Do not site new sensitive land uses in the same building with perc dry cleaning operations. |
| Gasoline Dispensing Facilities | • Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50-foot separation is recommended for typical gas dispensing facilities. |

*SOURCES: AIR QUALITY AND LAND USE HANDBOOK: A COMMUNITY HEALTH PERSPECTIVE" (CARB 2005)*

As discussed in the Stockton General Plan EIR (See General Plan Draft EIR, Impact AQ-5, pp. 4.3-40 through 4.3-43), implementation of the proposed General Plan would not have the potential to substantially increase CO hotspots at intersections in the vicinity of the EIR Study Area. Similarly, impacts related to permitted stationary sources of TACs are considered less than significant. However, health risk impacts from non-permitted sources associated with development of industrial and commercial land uses are considered significant. The proposed Project consists of the development of 2,241 single-family residences and does not include any land uses that would generate notable sources of TACs. Since the proposed Project would not generate a significant risk of public exposure to TACs and would not result in change from land use and density designation proposed for the Project site in the General Plan, it would not result in substantially greater impact than that evaluated in the General Plan EIR, and the proposed Project would continue to have a **less than significant** impact related to exposure of sensitive receptors to toxic air contaminants, as concluded in the General Plan EIR.

**Response d):** Operation of the proposed Project would not generate notable odors. The land uses included in the proposed Project are compatible with the surrounding existing and proposed land uses. People in the immediate vicinity of construction activities may be subject to temporary odors typically associated with construction activities (diesel exhaust, hot asphalt, etc.).

However, any odors generated by construction activities would be minor and would be short and temporary in duration.

Impacts related to operational odors as a result of General Plan buildout were determined to be potentially significant, while impacts related to construction-related odors were determined to be less than significant (See General Plan Draft EIR, Impact AQ-6, pp. 4.3-43 and 4.3-44). Mitigation Measure AQ-6 would ensure that sources identified by SJVAPCD are mitigated through adherence to an odor control plan and comply with SJVAPCD Rule 4102.

Examples of facilities that are known producers of operational odors include: Wastewater Treatment Facilities, Chemical Manufacturing, Sanitary Landfill, Fiberglass Manufacturing, Transfer Station, Painting/Coating Operations (e.g. auto body shops), Composting Facility, Food Processing Facility, Petroleum Refinery, Feed Lot/Dairy, Asphalt Batch Plant, and Rendering Plant. If a project would locate receptors and known odor sources in proximity to each other further analysis may be warranted; however, if a project would not locate receptors and known odor sources in proximity to each other, then further analysis is not warranted. The Project does not propose to locate the proposed residences (i.e., sensitive receptors) near these types of stationary sources, and thus, the Project would not be exposed to odors in the vicinity. Surrounding land uses generally include vacant agricultural land proposed for development of residential uses, an elementary school, commercial uses, residential uses, and UPRR right-of-way. Should any of the future residential or park uses generate odors during construction, the odors would be contained within the building envelope and proper ventilation would be provided. The Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to odors as compared with the General Plan EIR.

## *IV. BIOLOGICAL RESOURCES*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service? | | | X | |
| b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service? | | | X | |
| c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? | | | X | |
| d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites? | | | X | |
| e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? | | | X | |
| f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan? | | | X | |

*Project Impacts:*

The proposed Project includes the development of 2,241 single-family residences and would modify existing habitats through the removal of plant cover on the Project site. There is limited potential for impacts to special status animal or plant species to occur due to the lack of habitat, the existing agricultural uses, and the existing developed lands surrounding the Project site. The following discussion summarizes the pre-field investigation, field survey, and special-status species which may occur in the Project area.

It is noted that the Project is subject to the SJMSCP which will require obtaining coverage for the Project. This would mean that the SJCOG, under authorization from the USFWS and CNDDB would review the Project and issue incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species.

**Pre-Field Investigation**

Prior to the field investigation, numerous maps, databases, and reports were reviewed including:

- U.S. Geological Survey (USGS) 7.5-minute Quadrangle
- USGS National Hydrography Data Set
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps
- National Resource Conservation Service (NRCS) Soil Survey
- California Wildlife Habitat Relationships (CWHR) maps
- CNDDB
- CNPS Inventory of Rare and Endangered Plants
- USFWS IPac
- USFWS Official List

**Field Survey**

The Project site was subject to a field survey by De Novo Principal Biologist Steve McMurtry on April 18, and again on May 9, 2022. The site reconnaissance surveys served several purposes. First, they served as reconnaissance of the site to establish the existing conditions of the site and to verify information gathered in the pre-field investigation. This included identification of the habitat types, hydrologic features, topography, soil characteristics, and vegetation. The field investigations followed the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2009). Habitat was recorded. Visibility during each survey was excellent.

**Special-Status Species**

The following discussion is based on a background search of special-status species that are documented in the CNDDB, the CNPS Inventory of Rare and Endangered Plants, and the USFWS records of listed endangered and threatened species from the IPAC database. The background search was regional in scope and focused on the documented occurrences within the 9-quadrangle (approximately 10 miles) region for the Project site. Table BIO-1 provides a list of special-status plants and Table BIO-2 provides a list of special-status animals. Figure 3.4-2 presents the documented occurrences within a one-mile radius of the Project site.

***Table BIO-1: Special-Status Plant Species Which May Occur in Project Area***

| *Species* | *Status (Fed./CA / CNPS/ SJMSCP)* | *Geographic Distribution* | *Habitat and Blooming Period* | *Presence Determination* |
|---|---|---|---|---|
| Alkali milk-vetch *Astragalus tener var. tener* | --/--/1B.2/Yes | Eastern San Francisco Bay region, the Delta, and western San Joaquin Valley south to the lower Salinas and San Benito valleys | Grassy alkaline flats and vernally moist meadows at elevations below 500 ft. March-June. | Not Present. Not observed during field survey. No appropriate habitat. |

| *SPECIES* | *STATUS (FED./CA / CNPS/ SJMSCP)* | *GEOGRAPHIC DISTRIBUTION* | *HABITAT AND BLOOMING PERIOD* | *PRESENCE DETERMINATION* |
|---|---|---|---|---|
| Big tarplant *Blepharizonia plumosa* | --/--/1B.1/No | San Francisco Bay area with occurrences in Alameda, Contra Costa, San Joaquin, Stanislaus, and Solano Counties | Valley and foothill grassland; 30-505 m. July-Oct. | Not Present. Not observed during field survey. No appropriate habitat. |
| Bolander's water-hemlock *Cicuta maculata var. bolanderi* | --/--/2B.1/No | Marin, Solano, Contra Costa, Sacramento, and San Joaquin Counties | Marshes and swamps. In fresh or brackish water. 0-20 m. July-Sept. | Not Present. Not observed during field survey. No appropriate habitat. |
| bristly sedge *Carex comosa* | --/--/2B.1/Yes | Scattered occurrences throughout California; Oregon and Washington | Coastal prairie, marshes and swamps at lake margins, valley and foothill grassland; below 625 m | Not Present. Not observed during field survey. No appropriate habitat. |
| Delta mudwort *Limosella australis* | --/--/2B.1/Yes | Found in Contra Costa County, Sacramento County, San Joaquin County, and Solano County. | Riparian scrub, marshes and swamps. Usually on mud banks of the Delta in marshy or scrubby riparian associations; often with Lilaeopsis masonii. 0-5 m. May-Aug. | Not Present. Not observed during field survey. No appropriate habitat. |
| Delta tule pea *Lathyrus jepsonii var. jepsonii* | --/--/1B.2/Yes | Found mainly in the Sacramento-San Joaquin Delta and has been documented in Contra Costa, Sacramento, San Joaquin, Solano, Napa, and Alameda Counties | Marshes and swamps. In freshwater and brackish marshes. Often found with Typha, Aster lentus, Rosa californica, Juncus spp., Scirpus, etc. Usually on marsh and slough edges. 0-5 m. May-Jul(Aug-Sep) | Not Present. Not observed during field survey. No appropriate habitat. |
| Heartscale *Atriplex cordulata var. cordulata* | --/--/1B.2/Yes | Central Valley and interior valleys of the Coast Range from Butte to Kern counties. | Saline or alkaline sandy soils in grassland or saltbush scrub. March-October | Not Present. Not observed during field survey. No appropriate habitat. |
| legenere *Legenere limosa* | --/--/1B.1/Yes | Central Valley or primarily located in the lower Sacramento Valley, also from north Coast Ranges, San Joaquin Valley, and the Santa Cruz Mountains | Deep, seasonally wet habitats such as vernal pools, ditches, marsh edges, and riverbanks; below 150 m. April-June | Not Present. Not observed during field survey. No appropriate habitat. |
| Mason's lilaeopsis *Lilaeopsis masonii* | --/R/1B.1/Yes | Sacramento-San Joaquin River Delta and nearby shores of San Francisco Bay | Marshes and swamps, riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. In brackish or freshwater. 0-10 m. Apr-Nov. | Not Present. Not observed during field survey. No appropriate habitat. |
| Palmate-bracted bird's-beak *Chloropyron palmatum* | E/E/1B.1/Yes | Scattered locations in Fresno and Madera counties in the San Joaquin Valley, San Joaquin, Yolo, and Colusa counties in the Sacramento Valley, and the Livermore Valley area of Alameda County | Saline-alkaline soils in seasonally-flooded lowland plains and basins at elevations of less than 500 feet. May-October | Not Present. Not observed during field survey. No appropriate habitat. |

| *Species* | *Status (Fed./CA / CNPS/ SJMSCP)* | *Geographic Distribution* | *Habitat and Blooming Period* | *Presence Determination* |
|---|---|---|---|---|
| Recurved larkspur *Delphinium recurvatum* | --/-- /1B.2/Yes | Central Valley from Colusa to Kern Counties | Alkaline soils in saltbush scrub, cismontane woodland, valley and foothill grassland; 3-750 m. March-May. | Not Present. Not observed during field survey. No appropriate habitat. |
| Saline clover *Trifolium hydrophilum* | --/-- /1B.2/No | Eastern and Northern San Francisco Bay region, the Delta, western San Joaquin Valley, southern San Jose | Marshes and swamps, Valley and foothill grassland (mesic, alkaline), and Vernal pools. April-June | Not Present. Not observed during field survey. No appropriate habitat. |
| San Joaquin spearscale *Extriplex joaquinana* | --/-- /1B.2/Yes | Delta region, central valley and central coast | Alkaline. Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland. April-October | Not Present. Not observed during field survey. No appropriate habitat. |
| Sanford's arrowhead *Sagittaria sanfordii* | --/-- /1B.2/Yes | Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Marin, Napa, Orange, Placer, Sacramento, San Bernardino, Shasta, San Joaquin, Solano, Tehama, Tulare, Ventura, and Yuba Counties | Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0-605 m. May-Oct(Nov) | Not Present. Not observed during field survey. No appropriate habitat. |
| side-flowering skullcap *Scutellaria lateriflora* | --/-- /2B.2/Yes | Northern San Joaquin Valley, east of the Sierra Nevada, Inyo and San Joaquin Counties; New Mexico, Oregon, and elsewhere | Mesic meadows, marshes and swamps; below 500 m | Not Present. Not observed during field survey. No appropriate habitat. |
| succulent owl's-clover *Castilleja campestris var. succulenta* | T/E/1B.2/ Yes | Solano, Stanislaus, Merced, Madera, and Fresno Counties | Vernal pools. Moist places, often in acidic soils. 20-705 m. April-May. | Not Present. Not observed during field survey. No appropriate habitat. |
| Suisun Marsh aster *Symphyotrichum lentum* | --/-- /1B.2/Yes | Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties | Marshes and swamps (brackish and freshwater). Most often seen along sloughs with Phragmites, Scirpus, blackberry, Typha, etc. 0-15 m. (Apr)May-Nov | Not Present. Not observed during field survey. No appropriate habitat. |
| Watershield *Brasenia schreberi* | --/-- /2B.3/No | Butte, Calaveras, El Dorado, Fresno, Kern, Lake, Lassen, Mendocino, Merced, Nevada, Plumas, Sacramento, Shasta, Sierra, Siskiyou, San Joaquin, Sonoma, Sutter, Tehama, Trinity, Tulare, and Tuolumne Counties | Freshwater marshes and swamps. Aquatic known from water bodies both natural and artificial in California. 1-2180 m. Jun-Sep | Not Present. Not observed during field survey. No appropriate habitat. |
| Woolly rose-mallow *Hibiscus lasiocarpos var. occidentalis* | --/-- /1B.2/No | Central Valley of California, as well as populations in eastern North America | All along the waterways of the Delta. June-September | Not Present. Not observed during field survey. No appropriate habitat. |

*Sources: CNDDB, 2024; De Novo Planning Group, 2024.*

*Notes: CNPS = California Native Plant Society; SJMSCP = San Joaquin Multi-Species Habitat Conservation and Open Space Plan*

***Federal:** E = endangered under the federal Endangered Species Act; T = threatened under the federal Endangered Species Act.*

***STATE:*** *E = ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT.*
***CALIFORNIA NATIVE PLANT SOCIETY:***
*1B = RARE, THREATENED, OR ENDANGERED IN CALIFORNIA AND ELSEWHERE.*
*2 = RARE, THREATENED, OR ENDANGERED IN CALIFORNIA, BUT MORE COMMON ELSEWHERE.*
*.1 = SERIOUSLY ENDANGERED IN CALIFORNIA (OVER 80% OF OCCURRENCES THREATENED-HIGH DEGREE AND IMMEDIACY OF THREAT).*
*.2 = FAIRLY ENDANGERED IN CALIFORNIA (20-80% OCCURRENCES THREATENED).*
*.3 = NOT VERY ENDANGERED IN CALIFORNIA (<20% OF OCCURRENCES THREATENED).*

### *Table BIO-2: Special-Status Animal Species Which May Occur in Project Area*

| *SPECIES* | *STATUS (FED/CA/ SJMSCP)* | *GEOGRAPHIC DISTRIBUTION* | *HABITAT REQUIREMENTS* | *PRESENCE DETERMINATION* |
|---|---|---|---|---|
| *INVERTEBRATES* | | | | |
| American bumble bee *Bombus pensylvanicus* | --/--/No | Southern Arizona, New Mexico, and California | Long-tongued; forages on a wide variety of flowers including vetches (Vicia), clovers (Trifolium), thistles (Cirsium), sunflowers (Helianthus), etc. Nests above ground under long grass or underground. Queens overwinter in rotten wood or underground. | Not Present. Appropriate habitat is not present. |
| Crotch bumble bee *Bombus crotchii* | --/C/No | Central California south to Baja California del Norte, Mexico, and includes coastal areas east to the edges of the deserts and the Central Valley | Open grassland and scrub | Not Present. Appropriate habitat is not present. |
| valley elderberry longhorn beetle *Desmocerus californicus dimorphus* | T/--/Yes | Stream side habitats below 3,000 feet throughout the Central Valley | Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant. | Not Present. Appropriate habitat is not present. |
| California linderiella *Linderiella occidentalis* | --/--/No | Ranges from near Redding in the north to as far south as Fresno County, mainly to the east of the Sacramento and San Joaquin Rivers | Natural, and artificial, seasonally ponded habitat types including: vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches, backhoe pits, and ruts caused by vehicular activities | Not Present. No appropriate habitat. |
| Midvalley fairy shrimp *Branchinecta mesovallensis* | --/--/Yes | Have been found in Sacramento, Solano, Yolo, Contra Costa, San Joaquin, Madera, Merced and Fresno counties. The increase of known locations lends additional support to the idea that the range and distribution of midvalley fairy shrimp is greater than the distribution of known occurrences. | Shallow ephemeral pools, vernal swales, and various artificial ephemeral wetland habitats. | Not Present. No appropriate habitat. |

| *Species* | *Status (Fed/CA/ SJMSCP)* | *Geographic Distribution* | *Habitat Requirements* | *Presence Determination* |
|---|---|---|---|---|
| Vernal pool fairy shrimp *Branchinecta lynchi* | T/--/Yes | Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County | Common in vernal pools; they are also found in sandstone rock outcrop pools. | Not Present. No appropriate habitat. |
| Vernal pool tadpole shrimp *Lepidurus packardi* | E/--/Yes | Shasta County south to Merced County | Vernal pools and ephemeral stock ponds. | Not Present. No appropriate habitat. |
| western ridged mussel *Gonidea angulata* | --/--/No | Extirpated throughout their original range in California, particularly in southern California and the Central Valley. They have also been extirpated from many sites in the Snake and Columbia watersheds. | Primarily creeks and rivers and less often lakes. Originally in most of state, now extirpated from Central and Southern California. | Not Present. No appropriate habitat. |
| *Amphibians* | | | | |
| California tiger salamander *Ambystoma californiense (A. tigrinum c.)* | T/SSC/Yes | Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County. | Small ponds, lakes, or vernal pools in grass-lands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy. | Not Present. No appropriate habitat. |
| foothill yellow-legged frog - south Sierra DPS *Rana boylii pop. 5* | PE/E/Yes | Occurs in the Klamath, Cascade, north Coast, south Coast, Transverse, and Sierra Nevada Ranges up to approximately 6,000 feet | Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along the edge. Usually found near riffles with rocks and sunny banks nearby. | Not Present. No appropriate habitat. |
| western spadefoot *Spea hammondii* | --/SSCC/Yes | Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County | Permanent and semi-permanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May estivate in rodent burrows or cracks during dry periods. | Not Present. No appropriate habitat. |
| *Birds* | | | | |
| Burrowing owl *Athene cunicularia* | BCC/SSC/Yes | Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast | Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows | Potentially Present. Nesting and foraging habitat is present on the Project site. No nests were located on the Project site. |
| California black rail | --/T(FP)/Yes | Permanent resident in the San Francisco Bay and east-ward through the | Tidal salt marshes associated with heavy growth of pickleweed; also | Known to occur in the region. No appropriate |

| *Species* | *Status (Fed/CA/ SJMSCP)* | *Geographic Distribution* | *Habitat Requirements* | *Presence Determination* |
|---|---|---|---|---|
| *Laterallus jamaicensis coturniculus* | | Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties | occurs in brackish marshes or freshwater marshes at low elevations | nesting habitat. Limited foraging habitat associated with the irrigation ditches. Low possibility for presence. |
| Least Bell's vireo *Vireo bellii pusillus* | E/E/No | Central Valley of California and other low-elevation river valleys. | Dense brush, mesquite, willow-cottonwood forest, streamside thickets, and scrub oak. | Known to occur in the region. No appropriate nesting habitat. Limited foraging habitat associated with the irrigation ditches. Low possibility for presence. |
| Song sparrow (Modesto Population) *Melospiza melodia* | BCC/SSC/Yes | Restricted to California, where it is locally numerous in the Sacramento Valley, Sacramento–San Joaquin River Delta, and northern San Joaquin Valley. Exact boundaries of range uncertain. | Found in emergent freshwater marshes dominated by tules (Scirpus spp.) and cattails (Typha spp.) as well as riparian willow (Salix spp.) thickets. They also nest in riparian forests of Valley Oak (Quercus lobata) with a sufficient understory of blackberry (Rubus spp.), along vegetated irrigation canals and levees, and in recently planted Valley Oak restoration sites. | Known to occur in the region. No appropriate nesting habitat. Limited foraging habitat associated with the irrigation ditches. |
| Swainson's hawk *Buteo swainsoni* | BCC/T/Yes | Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County | Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields | Known to occur in the region. Potential nesting and foraging habitat present within Project area. Observed foraging over the Project site. |
| Tricolored blackbird *Agelaius tricolor* | BCC/C (SSC)/Yes | Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and | Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields. Habitat must be large enough to support 50 pairs. Probably requires water at or near the nesting colony | Known to occur in the region. No appropriate nesting habitat. Limited foraging habitat associated with the irrigation ditches. Low possibility for presence. |

| *Species* | *Status (Fed/CA/ SJMSCP)* | *Geographic Distribution* | *Habitat Requirements* | *Presence Determination* |
|---|---|---|---|---|
| | | Lassen Counties | | |
| White-tailed kite *Elanus leucurus* | --/FP/Yes | Gulf Coast in Texas and Mexico and in the valley and coastal regions of central and southern California | Grasslands, marshes, row crops and alfalfa, where they hover while foraging for rodents and insects. | Potentially Present. Nesting and foraging habitat is present on the Project site. No nests were located on the Project site. |
| yellow warbler *Setophaga petechia* | --/SSC/Yes | Coast range in Del Norte county, east to Modoc plateau, south along coast range to Santa Barbara and Ventura counties and along western slope of Sierra Nevada south to Kern county | Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in Cascades and Sierra Nevada. Frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders. | Known to occur in the region. No appropriate nesting habitat. Limited foraging habitat associated with the irrigation ditches. Low possibility for presence. |
| *Fish* | | | | |
| Delta smelt *Hypomesus transpacificus* | T/T/Yes | Primarily in the Sacramento–San Joaquin Estuary but has been found as far upstream as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay. | Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand. | Not Present. No appropriate habitat. |
| green sturgeon - southern DPS *Acipenser medirostris pop. 1* | T/--/Yes | Spawns in the Sacramento, Feather and Yuba Rivers. Presence in upper Stanislaus and San Joaquin Rivers may indicate spawning. | Spawning site fidelity. Non-spawning adults occupy marine/estuarine waters. Delta Estuary is important for rearing juveniles. Spawning occurs primarily in cool (11-15 C) sections of mainstem rivers in deep pools (8-9 meters) with substrate containing small to medium sized sand, gravel, cobble, or boulder. | Not Present. No appropriate habitat. |
| Longfin smelt *Spirinchus thaleichthys* | --/SSC/Yes | Occurs in estuaries along the California coast. Adults concentrated in Suisun, San Pablo, and North San Francisco Bays. | Prior to spawning, these fish aggregate in deepwater habitats available in the northern Delta, including, primarily, the channel habitats of Suisun Bay and the Sacramento River. Spawning occurs in fresh water on the San Joaquin River below Medford Island | Not Present. No appropriate habitat. |

| *Species* | *Status (Fed/CA/ SJMSCP)* | *Geographic Distribution* | *Habitat Requirements* | *Presence Determination* |
|---|---|---|---|---|
| | | | and on the Sacramento River below Rio Vista. | |
| Sacramento splittail *Pogonichthys macrolepidotus* | --/SSC/Yes | Sacramento splittail are found only in California's Central Valley. Currently largely confined to: (1) the Delta, (2) Suisun Bay, (3) Suisun Marsh, (4) Napa River, (5) Petaluma River, and (6) other parts of the Sacramento-San Joaquin Estuary. | Adults require flooded vegetation for spawning and rearing, and are often found in areas subject to flooding. Spawning occurs on submerged vegetation in temporarily flooded upland and riparian habitat. Spawning occurs in the lower reaches of rivers, bypasses used for flood management, dead-end sloughs and in larger sloughs such as Montezuma Slough. | Not Present. No appropriate habitat. |
| Steelhead - Central Valley DPS *Oncorhynchus mykiss irideus pop. 11* | T/--/No | From Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay basins. | Aquatic, flowing waters. Populations in the Sacramento and San Joaquin rivers and their tributaries. | Not Present. No appropriate habitat. |
| *Mammals* | | | | |
| Riparian brush rabbit *Sylvilagus bachmani riparius* | E/E/Yes | Limited to San Joaquin County at Caswell State Park near the confluence of the Stanislaus and San Joaquin Rivers and Paradise Cut area on Union Pacific right-of-way lands | Native valley riparian habitats with large clumps of dense shrubs, low-growing vines, and some tall shrubs and trees | Not Present. No appropriate habitat. |
| *Reptiles* | | | | |
| Giant garter snake *Thamnophis couchi gigas* | T/T/Yes | Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno | Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; they are also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter. | Aquatic habitat is present in the irrigation ditches within the Project site. The upland areas on the Project site are not expected to serve as habitat given that they are regularly disturbed in association with the agricultural operations. |
| western pond turtle *Emys marmorata* | --/SSC/Yes | Occurs from the Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada | Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests | Potentially Present. Appropriate habitat is present within the irrigation ditches. The upland areas on the Project site are not expected to serve as habitat |

| *Species* | *Status (Fed/CA/ SJMSCP)* | *Geographic Distribution* | *Habitat Requirements* | *Presence Determination* |
|---|---|---|---|---|
| | | | | given that they are regularly disturbed in association with the agricultural operations. |

*Sources: CNDDB, 2024; De Novo Planning Group, 2024.*
*Note: SJMSCP = San Joaquin Multi-Species Habitat Conservation and Open Space Plan*
*Status explanations:*
***Federal***
*E = endangered under the federal Endangered Species Act.*
*T = threatened under the federal Endangered Species Act.*
*C = candidate species for listing under the federal Endangered Species Act.*
*PE = Proposed endangered under the federal Endangered Species Act.*
*BCC = Bird of Conservation Concern.*
***State***
*E = endangered under the California Endangered Species Act.*
*T = threatened under the California Endangered Species Act.*
*C = candidate species for listing under the State Endangered Species Act.*
*FP = fully protected under the California Fish and Game Code.*
*SSC = species of special concern in California.*

## *Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts that would occur to the biological resources of the City of Stockton because of the future urban development that was contemplated by the General Plan. These impacts included development impacts to special-status species, species of concern, non-listed species, biological communities, and migratory wildlife corridors (City of Stockton General Plan Draft EIR, 2018, pages 4.4-22 through 4.4-28). General Plan includes policies and actions that encourage the protection and conservation of biological resources and require compliance with rules and regulations protecting biological resources.

As the General Plan Land Use Plan identified the Project site for Low Density residential development, the proposed Project is consistent with the General Plan's adopted vision and land uses designated on the Project site, and would not result in any new or substantially increased impacts beyond those that were already addressed in the General Plan EIR. The General Plan EIR determined that impacts to these environmental topics were less than significant. These impacts were adequately addressed in Chapter 4.4 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed. The General Plan EIR did not identify any mitigation measures, but the General Plan included policies that would serve to minimize potential impacts to biological resources. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Actions LU-5.1.A through LU-5.1.C require projects to provide open space; direct the City to protect, preserve, and improve riparian corridors; and require native and drought-tolerant plants in landscape plans. These actions will minimize conversion of habitat by requiring open space in new development and preservation of riparian corridors, and they will ensure that plants used in landscaping provide habitat for native plants and animals, including special status species.

- Actions LU-5.2.A through LU-5.2.C direct the City to continue to comply with the terms of the SJMSCP; require biological assessments for projects on or within 100 feet of sites that have the potential to contain special-status species or critical or sensitive habitats, and if sensitive biological resources are present, require the project to avoid or mitigate impacts; and require new development to implement best practices to protect biological resources including incidental take minimization measures and other federal and State requirements and recommendations, that are consistent with the SJMSCP. These actions will ensure that the City continues to protect critical habitat areas through the SJMSCP. When considering development applications, these actions will ensure that any special status species or critical or sensitive habitats are identified for project-specific avoidance or mitigation, and they ensure that construction activity for such development protects sensitive resources throughout the construction period.
- Action LU-5.3.C maintains an agricultural conservation program by which the City will mitigate the loss of agricultural lands, some of which provide habitat to special status species.
- Action LU-5.2.B would require baseline assessments to be prepared by a qualified biologist for any project on or within 100 feet of a site with the potential to contain special status species or critical or sensitive habitats, and if such species or habitat are found, to avoid or mitigate potential impacts.

*Responses to Checklist Questions*

**Response a):** The Project site is primarily leveled agricultural fields farmed in row crops that are biologically unremarkable. Due to a lack of suitable habitat, it is unlikely that special-status plants occur on the Project site. No special-status wildlife species were observed on the Project site and few are expected to occur on the Project site on more than a very occasional or transitory basis. The site is not in designated critical habitat of any federally listed species. California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB, 2024) was searched prior to the field survey. The CNDDB search included the USGS 7.5-minute following topographic quadrangles: Thornton, Lodi North, Lockeford, Terminous, Lodi South, Waterloo, Holt, Stockton West, and Stockton East. The United States Fish and Wildlife Service (USFWS) IPaC Trust Report of Federally Threatened and Endangered species that may occur in or be affected by projects in the project's geographical area was also reviewed. This information was used to identify wildlife and plant species that have been previously documented in the Project vicinity or have the potential to occur based on suitable habitat and geographical distribution. Habitats on the Project site are highly disturbed from intensive farming for decades and periodic disking and tilling of portions of the site for several years. The fields on the site were being farmed in various vegetable crops. Ruderal grassland vegetation on the Project site is primarily constrained to the outer edges of the vegetable fields on the Project site.

**Special-Status Plants**

Special-status plants generally occur in relatively undisturbed areas in vegetation communities such as vernal pools, marshes and swamps, seasonal wetlands, riparian scrub, and areas with unusual soils. All special-status plants in area occur in habitat types that do not occur on the

Project site. The site contains ruderal grassland species that is routinely disked and the site has been historically farmed for decades and is not suitable for special-status plants. No special-status plants or potentially suitable habitat for special-status plants are observed on the Project site. Due to lack of suitable habitat, it is unlikely that special status plants occur in the Project site. Human settlement has involved a high frequency of ground disturbance associated with the historical farming activities in the region, including the Project site. Therefore, the Project site does not contain suitable habitat for special-status plant species. Implementation of the proposed Project the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to special-status plant species as compared with the General Plan EIR.

**Special-Status Wildlife**

Special-status wildlife species recorded within two miles of the Project site in the CNDDB (2024) query include burrowing owl, Swainson's hawk, tricolored blackbird, California linderiella, midvalley fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and Central Valley steelhead. While the Project site may have provided habitat for several of the special-status wildlife species at some time in the past, intensive farming and development have substantially modified natural habitats in the greater Project vicinity, including those in the Project site.

Invertebrates. There are eight (8) special-status invertebrates that are documented within the nine (9)-quadrangle region for the Project site according to the CNDDB, including: American bumble bee (*Bombus pensylvanicus*), Crotch bumble bee (*Bombus crotchii*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), California linderiella (*Linderiella occidentalis*), Midvalley fairy shrimp (*Branchinecta mesovallensis*), Vernal pool fairy shrimp (*Branchinecta lynchi*), Vernal pool tadpole shrimp (*Lepidurus packardi*), and western ridged mussel (*Gonidea angulata*).

As noted previously, the Project site is predominantly comprised of agricultural and undeveloped uses. According to the CNDDB records search, there are no documented or observed special-status invertebrate species on the Project site. Additionally, appropriate habitat for the special-status invertebrates in the 9-quadrangle region were not observed within the Project site during the field survey and none are expected to be affected by the proposed Project.

Reptiles and Amphibians. There are two (2) special-status amphibians and two (2) special-status reptiles that are documented within the nine (9)-quadrangle area for the Project site according to the CNDDB, including: Giant garter snake (*Thamnophis couchi gigas*), Northern California legless lizard (*Anniella pulchra*), California tiger salamander (*Ambystoma californiense*), and western spadefoot (*Spea hammondii*). The Giant garter snake, California tiger salamander, and western spadefoot are covered species under the SJMSCP; the Northern California legless lizard is not covered.

*Giant garter snake* is a state and federal threatened species. The nearest CNDDB occurrence for this species is located approximately 1.75 miles northwest of the Project site. There is some limited habitat for this species within the irrigation ditches located on the Project site. It is noted

that this species was not observed during the field survey and has not been documented on the Project site. It is noted that the Project is subject to the SJMSCP which will require obtaining coverage for the Project. This would mean that the SJCOG, under authorization from the USFWS and CNDDB would review the Project and issue incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species. Full coverage under the SJMSCP is included in Project Requirement 1.

*Northern California legless lizard* is a Species of Special Concern. The nearest CNDDB occurrence for this species is located approximately 21.9 miles southeast of the Project site. The Project site does not contain adequate habitat for Northern California legless lizard. This species was not observed during the field survey and has not been documented on the Project site. Based on field survey, this species is not present.

*California tiger salamander* is a Species of Special Concern and federal threatened species. The nearest CNDDB occurrence for this species is located approximately 5.3 miles south of the Project site. The Project site does not contain adequate estivation habitat for this species because of the frequency of disturbance associated with the agricultural activities. The irrigation ditches have limited water during the non-irrigation season, which coincides with the breeding season. This means that the irrigation ditches have very limited potential to serve as aquatic habitat for this species. This species was not observed and has not been documented on the Project site. This species is not anticipated to be present due to the lack of adequate habitat. It is noted that the Project is subject to the SJMSCP which will require obtaining coverage for the Project. This would mean that the SJCOG, under authorization from the USFWS and CNDDB would review the Project and issue incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species. Full coverage under the SJMSCP is included in Project Requirement 1.

*Western spadefoot toad* is a Species of Special Concern. The nearest CNDDB occurrence for this species is located approximately 6.7 miles south of the Project site. The Project site does not contain appropriate and adequate habitat for western spadefoot. This species was not observed during the field survey and has not been documented on the Project site.

Western pond turtle is a Species of Special Concern. Appropriate habitat for this species is present within the irrigation ditches. The upland areas on the Project site are not expected to serve as habitat given that they are regularly disturbed in association with the agricultural operations. This species was not observed during the field survey and has not been documented on the Project site.

Birds. There are eight (8) special-status birds that are documented in the CNDDB within the nine (9)-quadrangle area for the Project site according to the CNDDB, including: Burrowing owl (*Athene cunicularia*), California black rail (*Laterallus jamaicensis coturniculus*), Least Bell's vireo (*Vireo bellii pusillus*), Song sparrow (Modesto Population) (*Melospiza melodia*), Swainson's hawk

(*Buteo swainsoni*), Tricolored blackbird (*Agelaius tricolor*), White-tailed kite (*Elanus leucurus*), and Yellow-headed blackbird (*Xanthocephalus xanthocephalus*). All of these bird species, except for Least bell's vireo, are covered species under the SJMSCP.

Potential nesting habitat is present in a variety of trees located within the Project site and in the vicinity. There is also the potential for other special-status birds that do not nest in this region and represent migrants or winter visitants to forage on the Project site.

*Year-round birds*: Special-status birds that can be present in the region throughout the year include: burrowing owl (*Athene cunicularia*), California black rail (*Laterallus jamaicensis coturniculus*), song sparrow (Modesto population) (*Melospiza melodia*), tricolored blackbird (*Agelaius tricolor*), and Least Bell's vireo (*Vireo bellii pusillus*), among others. Some of these species are migratory, but also reside year-round in California.

*Summering Birds*: The only special-status bird listed in the CNDDB search that is only present in the region in the spring and summer months is Yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

*Nesting Raptors (Birds of Prey)*: All raptors (owls, hawks, eagles, falcons), including species and their nests, are protected from take pursuant to the Fish and Game Code of California Section 3503.5, and the federal Migratory Bird Treaty Act, among other federal and State regulations. Special-status raptors that are known to occur in the region include: Swainson's hawk (*Buteo swainsoni*) and white-tailed kite (*Elanus leucurus*), among others.

*Analysis*: Powerlines and trees located in the region represent potentially suitable nesting habitat for a variety of special-status birds. Additionally, the agricultural land represents potentially suitable nesting habitat for some ground-nesting birds. In general, most nesting occurs from late February and early March through late July and early August, depending on various environmental conditions. The CNDDB currently contains records for Swainson's hawk, burrowing owl, and tricolored blackbird in the vicinity of the Project site. In addition to the species described above, common raptors, may nest in or adjacent to the Project site.

New sources of noise and light during the construction and operational phases of the Project could adversely affect nesters if they located adjacent to the Project site in any given year. Additionally, the proposed Project would eliminate the agricultural areas on the Project site, which serve as potential foraging habitat for birds throughout the year.

As per Project Requirement 1, the Project would be required to participate in the SJMSCP. As part of the SJMSCP, SJCOG requires preconstruction surveys for projects that initiate grading activities during the avian breeding season (March 1 – August 31). When active nests are identified, the biologists develop buffer zones around the active nests as deemed appropriate until the young have fledged. SJCOG also uses the fees to purchase habitat as compensation for the loss of foraging habitat.

Additionally, pursuant to the SJMSCP, if construction is scheduled to commence during the nesting season (i.e., between February 15 through August 31), and Swainson's hawks are nesting in or near the Project site, a construction setback of twice the diameter of the drip-line of the nest tree (as measured from under the nest) would be required until nesting is complete. The implementation of Project Requirement 2 would ensure that Swainson's hawks are not impacted during construction activities. The implementation of Project Requirements 1and 2 would ensure that the Project implements the requirements specified in the General Plan to protect biological resources.

Further, if burrow habitat for burrowing owl becomes available in the future, this species may utilize habitats in the Project site for nesting. Pursuant to the SJMSCP, if construction is scheduled to commence outside the nesting season (i.e., if construction starts between September 1 and January 31) and burrowing owls are present on-site, they can be passively relocated. If construction commences during the nesting season and burrowing owls are present on-site, a 250-foot construction setback from the natal burrow would be required until nesting is complete. The implementation of Project Requirement 3 would ensure that burrowing owls are not impacted during construction activities. The implementation of Project Requirements 1 and 3 would ensure that the Project implements the requirements specified in the General Plan to protect biological resources.

Lastly, pursuant to the SJMSCP, if construction is scheduled to commence during the nesting season (i.e., between February 15 through September 15), and white-tailed kites are nesting in or near the Project site, a construction setback of a 100-foot construction setback from the nest would be required until nesting is complete. The implementation of Project Requirement 4 would ensure that white-tailed kites are not impacted during construction activities. The implementation of Project Requirements 1 and 4 would ensure that the Project implements the requirements specified in the General Plan to protect biological resources.

Mammals. There is one (1) special-status mammal that is documented within the nine (9)-quadrangle area for the Project site. Riparian brush rabbit (*Sylvilagus bachmani riparius*) is a covered species under the SJMSCP.

*Riparian brush rabbit:* This species is a state and federal endangered species. The Project site does not contain appropriate habitat for riparian brush rabbit. This species was not observed during the field survey and has not been documented on the Project site. The nearest CNDDB occurrence for this species is located approximately 11.3 miles northwest of the Project site. Regardless, the Project is subject to the SJMSCP which will require obtaining coverage for the Project. This would mean that the SJCOG, under authorization from the USFWS and CNDDB would review the Project and issue incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the MBTA. Full coverage under the SJMSCP is included in Project Requirement 1.

Fish. There are five (5) special-status fish that are documented within the nine (9)-quadrangle area for the Project site, including: Delta smelt (*Hypomesus transpacificus*), green sturgeon - southern DPS (*Acipenser medirostris pop. 1*), longfin smelt (*Spirinchus thaleichthys*), Sacramento splittail (*Pogonichthys macrolepidotus*), and Steelhead - Central Valley DPS (*Oncorhynchus mykiss irideus pop. 11*).

Of the five (5) documented species, there are three (3) federal listed species (threatened) and three (3) state listed species (Species of Special Concern and threatened). Four (4) of the five (5) fish species are covered by the SJMSCP, while the remaining species is not covered (Steelhead - Central Valley DPS).

The Project site does not include appropriate habitat for any of these species. No special-status fish were observed within the Project site during the field survey.

**Conclusion**

The proposed Project would be required to comply with the City's General Plan and adopted Federal, State, and local regulations for the protection of special-status plants and animals, including habitat. The City of Stockton General Plan includes numerous policies and actions intended to protect special-status plants and animals, including habitat, from adverse effects associated with future development and improvement projects. Additionally, the Project would be subject to the requirements set forth by the SJMSCP. Implementation of the General Plan policies and actions, local plans and regulations, as well as Federal and State regulations, would ensure that the Project impacts remain less than significant would not result in any new significant effects or increase the severity of previously identified environmental effects related to these species as compared with the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 1:*** *Prior to commencement of any grading activities, the Project proponent shall seek coverage under the San Joaquin County Multi-Species Habitat Conservation Plan (SJMSCP) to mitigate for habitat impacts to covered special status species. Coverage involves compensation for habitat impacts on covered species through implementation of incidental take and minimization measures (ITMMs) and payment of fees for conversion of lands that may provide habitat for covered special status species. These fees are used to preserve and/or create habitat in preserves to be managed in perpetuity. Obtaining coverage for a Project includes incidental take authorization (permits) under the Endangered Species Act Section 10(a), California Fish and Game Code Section 2081, and the Migratory Bird Treaty Act (MBTA). Coverage under the SJMSCP would fully mitigate all habitat impacts on covered special-status species.*

***Project Requirement 2:*** *Prior to the commencement of grading activities or other ground disturbing activities on the Project site, the Project applicant shall arrange for a qualified biologist to conduct a preconstruction survey for Swainson's hawks. If no hawks or hawk nests are detected, then construction activities may commence. If Swainson's hawks or occupied nests are discovered, then the following shall be implemented:*

- *During the nesting season (February 15 through August 31) and Swainson's hawks are nesting in or near the Project site, a construction setback of 250 feet of the nest tree (as measured from under the nest) would be required until nesting is complete.*

*This requirement is consistent with the incidental take and minimization measures (ITMMs) outlined in the SJMSCP. Implementation of this requirement shall occur prior to grading or site clearing activities. SJCOG shall be responsible for monitoring and a qualified biologist shall conduct surveys as required.*

***Project Requirement 3:*** *Prior to the commencement of grading activities or other ground disturbing activities on the Project site, the Project applicant shall arrange for a qualified biologist to conduct a preconstruction survey for burrowing owls. If no owls or owl nests are detected, then construction activities may commence. If burrowing owls or occupied nests are discovered, then the following shall be implemented:*

- *During the nesting season (February 1 and August 31) and burrowing owls are present on-site, a 250-foot construction setback from the natal burrow would be required until nesting is complete.*

- *Outside the nesting season (September 1 and January 31) burrowing owls occupying the Project site should be evicted from the Project site by passive relocation as described in the California Department of Fish and Game's Staff Report on Burrowing Owls (Oct., 1995)*

*These requirements are consistent with the incidental take and minimization measures (ITMMs) outlined in the SJMSCP. Implementation of this requirement shall occur prior to grading or site clearing activities. SJCOG shall be responsible for monitoring and a qualified biologist shall conduct surveys and relocate owls as required.*

***Project Requirement 4:*** *Prior to the commencement of grading activities or other ground disturbing activities on the Project site, the Project applicant shall arrange for a qualified biologist to conduct a preconstruction survey for white-tailed kites. If no kites or kite nests are detected, then construction activities may commence. If white-tailed kite or occupied nests are discovered, then the following shall be implemented:*

- *During the nesting season (February 15 through September 15) occupied nests shall not be disturbed and shall be provided with a 100-foot construction setback 100-foot construction setback from the nest would be required until nesting is complete.*

*This requirement is consistent with the incidental take and minimization measures (ITMMs) outlined in the SJMSCP. Implementation of this requirement shall occur prior to grading or site clearing activities. SJCOG shall be responsible for monitoring and a qualified biologist shall conduct surveys as required.*

**Response b):** The CNDDB record search revealed documented occurrences of four sensitive habitats within the nine-quadrangle area for the Project site: Coastal and Valley Freshwater Marsh, Great Valley Valley Oak Riparian Forest, Northern Hardpan Vernal Pool, and Valley Oak

Woodland. Based on the field surveys conducted by De Novo, these sensitive natural communities do not occur within the Project site. Additionally, the Project site does not contain riparian habitat. Therefore, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to riparian habitat or other sensitive natural community as compared with the General Plan EIR.

**Response c):** A wetland is an area that is inundated or saturated by surface or ground water 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. Wetlands generally include swamps, marshes, bogs, and similar areas. State and federal agencies regulate these habitats and Section 404 of the Clean Water Act requires that a permit be secured prior to the discharge of dredged or fill materials into any waters of the U.S., including wetlands. Some jurisdictional waters of the U.S. also fall under the jurisdiction of CDFW and/or the California Regional Water Quality Control Board (RWQCB).

Wetlands are defined by regulatory agencies as having special vegetation, soil, and hydrology characteristics. Hydrology, or water inundation, is a catalyst for the formation of wetlands. Frequent inundation and low oxygen causes chemical changes to the soil properties resulting in what is known as hydric soils. The prevalent vegetation in wetland communities consists of hydrophytic plants, which are adapted to areas that are frequently inundated with water. Hydrophytic plant species can grow, effectively compete, reproduce, and persist in low oxygen soil conditions.

No wetlands or waters of the U.S. or waters of the State have been delineated on the Project site. The irrigation ditches are manmade agricultural irrigation facilities that are not jurisdictional. Water flows are controlled by the irrigation district that owns the facilities. There are no other aquatic features. Therefore, implementation of the proposed Project would have no impact on wetlands and jurisdictional waters, and is within the range of impacts analyzed in the General Plan EIR for wetlands.

**Response d):** Impacts related to wildlife corridors and movement of wildlife as a result of General Plan implementation were determined to be less than significant. The General Plan EIR concluded that waterway like Bear Creek could be used as movement corridors by aquatic animals, but General Plan Action SAF-2.4.C and compliance with the federal and state law and regulations would ensure that the impacts remain less-than-significant. (General Plan EIR, p. 4.4-27.) The CNDDB record search did not reveal any documented wildlife corridors or wildlife nursery sites on or adjacent to the Project site. The Project site is located within a mostly developed area that includes roads, existing residential developments. Thus, with compliance with the General Plan policies and actions and the federal and state regulations, the residential development of the proposed Project is not anticipated to 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 wildlife nursery sites. Therefore, development of the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

**Response e):** The Stockton Municipal Code, Title 16 Development Code protects Heritage Oak Trees through permit requirements. Section 16.130.020 provides the Director with Review Authority for permits to remove heritage trees. The decision of the Director is subject to an appeal to the Council in compliance with Chapter 16.100 (Appeals). (Ord. 015-09 C.S., eff. 12-3-09). Section 16.130.030 provides the permit requirements, and describes the process for approval or denial of a permit application. Section 16.130.040 establishes fines for violation of this requirement. Section 16.130.050 provides exemptions under emergencies. Section 16.130.060 establishes the replacement requirements.

There are various trees located on the site, mainly along the site border and along agricultural ditches.

*Heritage Tree Permit*

The City evaluates Heritage Tree impacts pursuant to existing regulations in Chapter 16.130, Heritage Tree Permit, of the City of Stockton Municipal Code. Any removal of Heritage oak trees will require a permit under the specific provisions of Chapter 16.130, Heritage Tree Permit, of the City of Stockton Municipal Code. If removal of the Heritage Trees is required, replacement tree plantings will be required, as specified in the Municipal Code. This is presented as Project Requirement 5 from SJMSCP below. Consistency with the existing ordinance protecting Heritage Trees, as well as the Project Requirements, will ensure that the proposed Project would have a **less than significant** impact relative to this topic, and development of the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 5:*** *If removal of any oak tree on the Project site is required, a certified arborist shall survey the oak trees proposed for removal to determine if they are Heritage Trees as defined in Stockton Municipal Code Chapter 16.130. The arborist report with its findings shall be submitted to the City's Community Development Department. If Heritage Trees are determined to exist on the property, removal of any such tree shall require a permit to be issued by the City in accordance with Stockton Municipal Code Chapter 16.130. The permittee shall comply with all permit conditions, including tree replacement at specified ratios.*

**Responses f):** The Project site is located within the boundaries of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan ("Plan" or "SJMSCP") and is located within the Central Zone of the SJMSCP. The San Joaquin Council of Governments (SJCOG) prepared the Plan pursuant to a Memorandum of Understanding adopted by SJCOG, San Joaquin County, the United States Fish and Wildlife Service (USFWS), the CDFW, Caltrans, and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy in October 1994. On February 27, 2001, the Plan was unanimously adopted in its entirety by SJCOG and approved by the USFWS.

According to Chapter 1 of the SJMSCP, its key purpose is to "provide a strategy for balancing the need to conserve open space and the need to convert open space to non-open space uses, while protecting the region's agricultural economy; preserving landowner property rights; providing

for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the Federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); providing and maintaining multiple use Open Spaces which contribute to the quality of life of the residents of San Joaquin County; and, accommodating a growing population while minimizing costs to project proponents and society at large."

In addition to providing compensation for conversion of open space to non-open space uses, which affect plant and animal species covered by the SJMSCP, the SJMSCP also provides some compensation to offset impacts of open space conversions on non-wildlife related resources such as recreation, agriculture, scenic values, and other beneficial open space uses. Specifically, the SJMSCP compensates for conversions of open space to urban development and the expansion of existing urban boundaries, among other activities, for public and private activities throughout the County and within Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy.

Participation in the SJMSCP is voluntary for both local jurisdictions and project applicants. Only agencies adopting the SJMSCP would be covered by the SJMSCP. As noted in the General Plan EIR, the City of Stockton is a plan participant, for the SJMSCP and the proposed General Plan Land Use Action LU-5.2.A directs the City to continue to coordinate with SJCOG and comply with the terms of the SJMSCP. (General Plan, p. 4.4-28.)

Individual project applicants have two options if their project is in a jurisdiction participating in the SJMSCP: mitigating under the SJMSCP or negotiating directly with the state and/or federal permitting agencies. If a project applicant opts for SJMSCP coverage in a jurisdiction that is participating under the SJMSCP, the following options are available, unless their activities are otherwise exempted: pay the appropriate fee; dedicate, as conservation easements or fee title, habitat lands; purchase approved mitigation bank credits; or, propose an alternative mitigation plan.

Responsibilities of permittees covered by the SJMSCP include collection of fees, maintenance of implementing ordinances/resolutions, conditioning permits (if applicable), and coordinating with the Joint Powers Authority (JPA) for Annual Report accounting. Funds collected for the SJMSCP are to be used for the following: acquiring Preserve lands, enhancing Preserve lands, monitoring, and management of Preserve lands in perpetuity, and the administration of the SJMSCP. Because the primary goal of SJMSCP is to preserve productive agricultural use that is compatible with SJMSCP's biological goals, most of the SJMSCP's Preserve lands would be acquired through the purchase of easements in which landowners retain ownership of the land and continue to farm the land. These functions are managed by SJCOG.

The proposed Project is classified as Urban under the SJMSCP. The proposed Project was analyzed for consistency with the SJMSCP by Principal Biologist Steve McMurtry, De Novo Planning Group, and it was determined that the proposed Project would not conflict with the SJMSCP. The City of Stockton and the Project applicant shall consult with SJCOG to utilize coverage of the Project pursuant to the SJMSCP prior to development of the Project site, as

provided under Project Requirement 1. The implementation of Project Requirement 1 would [3]ensure that the Project implements the requirements specified in the General Plan to protect biological resources. Thus, with implementation of proposed General Plan actions and SJMSHCP and the federal, state and local regulations requiring the survey and mitigation processes for development, if needed, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

[33] According to the SJMSCP Land Use Map, available here: https://ca-sjcog2.civicplus.com/DocumentCenter/View/10/Land-Use-Map-pdf

## *V. CULTURAL RESOURCES*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Cause a substantial adverse change in the significance of a historical resource pursuant to '15064.5? | | | X | |
| b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to '15064.5? | | | X | |
| c) Disturb any human remains, including those interred outside of formal cemeteries? | | | X | |

*Project Impacts:*

A *Cultural Resource Assessment Summary* (Peak & Associates, Inc. 2025) has been prepared for the proposed Project (Appendix C), which was prepared based on a records search, check of the Native American Heritage Commission Sacred Lands files, and a field survey of the Project Site by a qualified archeologist. The following discussion is based on the Cultural Resource Assessment Summary.

**Research**

Five resources have been reported in the Project area. One of the sites listed in the Project area is the bridge over Bear Creek on the railroad line, technically outside the Project area (P-3900363). Another site records the levees along Bear Creek (P-39-004875).

P-39-004642 is an irrigation system with ten features.

P-039-004641 (CA-SJO-315/H) has many artifacts representing the prehistoric, protohistoric and historic periods, with surface artifacts covering some 12,000 square meters.

P-39-000005 (CA-39-253) contains bone and chipped stone, and the recorder thought the site might be a small village site. The metate is thought to be pulled out of a deeply buried cultural sediment. The site recorder emphasized that the site boundaries could not be determined due to dense crops, and the site is highly disturbed.

Additionally, six resources have been found in the 0.25-mile buffer search radius for the Project.

There are six reports for studies within the Project site, and sixteen other studies in the 0.25-mile search radius. Covering the Development Area are studies by Napton in 1990 (SJ 805); Hinshaw in 1993 (SJ 2016); (SJ 06843 Busby in 1996 (SJ 6507); Jurich, Martinez and Smith (SJ 6541); and ESA in 2007). Full citations for the reports are included in the Report List in Appendix 2 of Appendix C.

**Project Soils**

The Project area contains a mix of two soil types: about 90 percent Jacktone clay and 10 percent Stockton clay. The Stockton clay is located along Bear Creek and to the south on the west end of the Project.

The Jacktone clay extends from ground level to 20 to 40 inches as a dark clay, ending on a duripan. Below the duripan is a stratified sandy loam to clay loam, cemented at about 60 inches. Composed of mixed alluvium. This deposit dates to the Early to Middle Holocene, and is rated "high" for buried site potential (Appendix D of Appendix C).

The Stockton clay, is 0 to 40 inches clay, with 40 to 60 inches clay loam. This deposit is also cemented at about 60 inches. It is composed of mixed alluvium dating to the Middle to Late Holocene and is rated "very high" for buried site potential (Appendix D of Appendix C).

In conclusion, the Project has a high likelihood of containing prehistoric period resources, in particular, below a depth of 5 feet.

**Field Assessment**

A field survey of the Project site was conducted in April 2022. See Appendix C for additional information regarding the field survey of the Project Site. Only portions of the Project area could be covered due to the dense growth of alfalfa on some pieces, and inundation of stormwater of other portions of the site. This survey was focused on finding the previously recorded sites.

Prehistoric period artifacts were found in three locations during the survey, one near the north end of the Project area and several in roughly the same area as the recorded location of P-39-00005. A few scattered historic period items were found, consisting of fragments of milk glass, aqua glass with bubbles, amber glass, porcelain, and brick fragments in the location of P-39-004641. Along with several prehistoric flakes.

The failure to re-locate the recorded sites as described in the site records may be due to crop rotation, error in the original site recordation, or plowing within the development area.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts that would occur to historical, cultural, and paleontological resources within the Planning area because of the future urban development that was contemplated by the General Plan. These impacts included potential destruction or damage to any historical, cultural, and paleontological resources (City of Stockton General Plan Draft EIR, 2018, pages 4.5-16 through 4.5-20). However, the General Plan contains goals, policies, and actions for the preservation and treatment of archaeological, historical, cultural, and paleontological resources. In particular, prior to development, as part of the permitting process, Action LU-5.2.D requires identification and protection of archaeological resources, including through a treatment plan in accordance with the Secretary of the Interior's Standards for Treatment of Archaeological Sites where avoidance is not feasible. In addition, as described in Section 4.5.1.1, the Stockton Municipal Code requires appropriate evaluation of unanticipated

archaeological deposits discovered during ground-disturbance. The General Plan action described above, combined with the Stockton Municipal Code requirements, would protect historical archaeological deposits in the EIR planning area by providing for the early detection of potential conflicts between development and resource protection, and by preventing or minimizing the material impairment of the ability of archaeological deposits to convey their significance through excavation or preservation. Implementation of the proposed action identified above, as well as compliance with federal, State, and local laws and regulations, would reduce potential impacts to historical archaeological deposits to a less-than-significant level.

*Responses to Checklist Questions*

**Response a), b), c):** As noted previously, Resource P-039-004641 (CA-SJO-315/H) has many artifacts representing the prehistoric, protohistoric and historic periods, with surface artifacts covering some 12,000 square meters. According to the Cultural Resource Assessment Summary prepared for the proposed Project (Appendix C), the historic evidence at P-004641 needs to be evaluated under the criteria of the California Register of Historical Resources for its information potential. In-depth historical research needs to be undertaken to identify landowners and the use of the site through time. It appears to be the remains of a farm or ranch. An excavation should then be conducted of the site, and a formal evaluation made of the significance of the resources. These recommendations are included as part of Project Requirement 6, which incorporates the requirements of the General Plan Action LU-5.2.D and Project Requirements 8 related to discovery of undocumented archeological resources as per the requirements of *Section 16.36.050 of the City's Municipal Code*.

There are no known human remains located on the Project site. The Stockton General Plan includes policies and actions that would reduce impacts to cultural, historic, and archaeological resources, as well as policies and actions for the conservation of cultural, historic, and archaeological resources. The proposed Project would be subject to all relevant General Plan policies and actions and the Stockton Municipal Code requirements that provide protections for cultural, historical, and tribal resources. The General Plan policies and actions along with the Code requirements provide a framework for ensuring that effects on significant unknown historic, archaeological, and tribal cultural resources are reduced to the extent feasible. The Project would be subject to all General Plan policies and actions and the Code requirements and is consistent with the development types anticipated under the General Plan and General Plan EIR. Furthermore, in accordance with the City of Stockton General Plan, a cultural resources constraints analysis was prepared for the Project, which included recommendations to be incorporated into the construction of the proposed Project. These recommendations have been incorporated into the following Project requirements. Implementation of the following Project requirements would ensure the potential impacts are **less than significant.**

*Project Requirement(s)*

***Project Requirement 6****: Consistent with the requirements of the General Plan Action LU-5.2.D, prior to the beginning of construction work, subsurface testing of the property shall be completed to determine if any buried sites are located on-site. If findings are made, particularly of human remains, a major archeological data recovery effort shall be required. A discovery excavation shall*

*be done with backhoe trenching and/or other standard practices of excavating in areas identified by a qualified archeologist, including the use of hand tools, if necessary and feasible, and shall involve a tribal representative from the Northern Valley Yokuts.*

*Subsurface testing shall be conducted extending to a depth of more than 60 inches to locate the location and extent of the buried sites using trenches or test units as per the recommendations of the Cultural Resources Assessment Summary of the site. The locations of the subsurface testing shall be determined by a qualified archaeologist. These resources may provide information on early man in this region.*

*Non-invasive testing such as ground penetrating radar or a magnetometer survey are not advised. There are not likely to be intact burials or subsurface features due to the long-term plowing over the last 175 years, deep ripping, development of orchards as well as other agricultural features such as ditches cut through the landscape, disturbing the soils. Non-invasive methods result in the need to open anomaly locations to determine what is there, turning those methods into roughly the same as excavated trenches.*

*There is always a possibility that a site may exist in the Project area, and be obscured by vegetation, siltation, or historic activities, leaving no surface evidence, even with testing. As per the requirements of the General Plan Action LU-5.2.F, prior to the beginning of construction work, the developer shall contact an appropriate Tribal representative from the Northern Valley Yokuts to train construction workers on appropriate avoidance and minimization measures, requirements for confidentiality and culturally appropriate treatment, other applicable regulations, and consequences of violating State laws and regulations. If artifacts, exotic rock, shell, or bone are uncovered during the construction, work in that area shall stop immediately and a qualified archeologist and the Tribal representative from the Northern Valley Yokuts shall be contacted to examine and evaluate the deposit.*

*If the examination and evaluation reveals significant resources, a treatment plan in accordance with appropriate standards, such as the Secretary of the Interior's Standards for Treatment of Archaeological Sites would be prepared by a qualified archaeologist and a Tribal monitor from the Northern Valley Yokuts if the development cannot avoid an archaeological or paleontological deposit prior to construction.*

***Project Requirement 7**: As per the requirements of California Public Resources Code section 5097.98 and to Section 16.36.050 of the City's Municipal Code, in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area suspected to overlie adjacent remains. In accordance with the California Health and Safety Code (Section 7050.5), the San Joaquin County Sheriff/Coroner must be contacted immediately.*

*The San Joaquin County Coroner shall determine whether the remains are subject to any provisions of law concerning investigation of the circumstances, manner and cause of death, and shall make recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative. The County*

*Coroner shall make his or her determination within two working days from the time the person responsible for the excavation, or his or her authorized representative, notifies the coroner of the discovery or recognition of the human remains.*

*If the Coroner determines the remains to be of Native American origin, the Coroner will notify the Native American Heritage Commission, which will in turn appoint a Most Likely Descendent (MLD) to act as a tribal representative. The MLD will work with the Project proponent/applicant and a qualified archaeologist to determine the proper treatment of the human remains and any associated funerary objects. Construction activities will not resume until either the human remains are exhumed, or the remains are avoided via Project construction design change.*

*After notification, the NAHC will follow the procedures outlined in Public Resources Code Section 5097.98. that include notifications of the MLDs, and recommendations for the treatment of the remains. The MLDs will have 48 hours after notification by the NAHC to make their recommendations (PRC Section 5097.98).*

***Project Requirement 8**: Consistent with Section 16.36.050 of the City's Municipal Code, if presently undocumented buried archaeological deposits are encountered during construction activities, work must cease within a 50-foot radius of the discovery. A qualified archaeologist must be retained to document the discovery, assess its significance, and recommend treatment in accordance with appropriate standards, such as the Secretary of the Interior's "Standards for Treatment of Archaeological Sites."*

## *VI. ENERGY*

| ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation? | | | X | |
| b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency? | | | X | |

*Project Impacts:*

As discussed below, energy would be used during both the construction phase and during the operational phase of the proposed Project. Energy usage during the construction phase would originate from mobile and stationary construction equipment. Construction-related energy usage can vary substantially depending on the level of activity, length of the construction period, specific construction operations, and types of equipment. Operational energy usage would be generated by electricity use for the onsite facilities and landscaping at the Project site. As described under the *Response to Checklist Questions* below, energy usage during both the construction and operational phases of the proposed Project would not represent a wasteful, inefficient, or unnecessary consumption of energy resources, and would not conflict with or obstruct any state or local plan for renewable energy or energy efficiency.

*Prior Environmental Analysis:*

The General Plan (EIR) evaluated energy impacts in the Utilities chapter in the Energy Conservation section. The General Plan EIR included a host of other adopted regulations that require energy efficiency standards, including:

- Assembly Bill (AB) 1493: Pavley Fuel Efficiency Standards
- Title 20 California Code of Regulations (CCR): Appliance Energy Efficiency Standards
- Title 24, Part 6, CCR: Building Energy Efficiency Standards
- Title 24, Part 11, CCR: Green Building Standards Code

Consistency with these standards, as well as other applicable city regulations, would ensure energy efficiency to the greatest extent feasible.

Additionally, the General Plan EIR included an analysis of the electricity supplies, natural gas supplies, and energy facilities that would be required for the implementation of the General Plan.

The General Plan EIR found that there are sufficient electricity and natural gas supplies to serve development allowed under the General Plan. In addition, the General Plan includes the following policies and actions that avoid and reduce inefficient, wasteful, and unnecessary energy consumption:

- Policy LU-5.4: Require water and energy conservation and efficiency in both new construction and retrofits.
- Action LU-5.4.B: Require all new development, including major rehabilitation, renovation, and redevelopment, to incorporate feasible and appropriate energy conservation and green building practices, such as building orientation and shading, landscaping, and the use of active and passive solar heating and water systems.
- Action SAF-4.1.A: Require the construction and operation of new development to implement best practices that reduce air pollutant emissions, including through installation of Energy Star-certified appliances.
- Action CH-3.3.C: Continue to work with commtrbia l unity-based organizations that employ local Stockton youth to perform energy efficiency, alternative energy, and water conservation assessments and installations in local homes and businesses.

Furthermore, as discussed in Section 4.7 of the General Plan EIR, Air Quality, the proposed General Plan includes goals, policies, and actions that promote energy efficiency from the transportation sector. Specifically, policies and actions under Goals TR-1 and TR-2 encompass multi-modal and active transit improvements, including requiring new development to incorporate design features that would provide easier access to transit (Action TR-2.2.A), dedication of adequate bicycle and transit right-of-way on arterial and collector streets (Action TR-2.3.B), and developing guidelines for installation of electric vehicle charging stations for new developments (Action TR-3.2.B). Additionally, Policies LU-1.1 and LU-6 would support infill and mixed-use development, which would increase use of alternative transit options (i.e., walking, biking, and public transit) and decrease vehicle trips and the average trip distances traveled. Furthermore, Policy SAF-4.2 and Action SAF-4.2.A encourages new employers to participate in a transportation demand management program.

Although new and/or expanded transmission and distribution lines and pipelines may be required to serve development allowed by the proposed General Plan, the General Plan EIR found that the estimated timing or location of such required facilities or the exact nature of these facilities are not known, so future project-specific environmental impacts that would occur from their construction and operation cannot be determined at the time of the General Plan EIR.

However, the General Plan EIR identified that such impacts would be specifically associated with physical development projects, and would therefore require permitting and review in accordance with CEQA, which would ensure that any environmental impacts are disclosed and mitigated to the extent possible. Therefore, the impact is less than significant.

*Responses to Checklist Questions*

**Responses a-b):** Appendix G of the State CEQA Guidelines requires consideration of the potentially significant energy implications of a Project. CEQA requires mitigation measures to reduce "wasteful, inefficient and unnecessary" energy usage (Public Resources Code Section 21100, subdivision [b][3]). According to Appendix G of the CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. In

particular, the proposed Project would be considered "wasteful, inefficient, and unnecessary" if it were to violate state and federal energy standards and/or result in significant adverse impacts related to project energy requirements, energy inefficiencies, energy intensiveness of materials, cause significant impacts on local and regional energy supplies or generate requirements for additional capacity, fail to comply with existing energy standards, otherwise result in significant adverse impacts on energy resources, or conflict or create an inconsistency with applicable plan, policy, or regulation.

The proposed Project includes various characteristics that reduce the inefficient, wasteful, or unnecessary use of energy and reduce energy emissions. For example, the Project would comply with State requirements such as the energy efficiency requirements of the latest version of the California Title 24 Energy Efficiency Standards. The Project is also anticipated to produce on-site solar photovoltaic (PV) for on-site use, also consistent with the latest version of the California Title 24 Energy Efficiency Standards.

Moreover, it should be noted that, over time, electrification of the vehicles will increase due to state requirements, and state and national trends. Electric charging infrastructure would be installed on the property to facilitate the conversion of the truck fleet to zero-emission electric trucks as they become available in the market and used for truck deliveries to and from the facility.

The amount of energy used at the Project site would directly correlate to the energy consumption (including fuel) used by vehicle trips generated during Project construction, fuel used by off-road construction vehicles during construction, fuel used by vehicles during Project operation, and electricity and natural gas usage during Project operation. The following discussion provides a detailed calculation of energy usage expected for the proposed Project, as provided by applicable modelling software (i.e. CalEEMod v2022.1) and the CARB EMFAC2021). Additional assumptions and calculations are provided within Appendix A of this EIR.

### Electricity and Natural Gas

**Operation.** Electricity and natural gas used by the proposed Project during operation would be used primarily to generate energy for Project buildings, as well as for outdoor parking lot lighting. As shown in further detail in the CalEEMod modeling outputs provided in Appendix A, "Energy" is one of the categories that was modeled for GHG emissions. As also shown in the CalEEMod modeling outputs as provided in Appendix A, the proposed Project is anticipated to consume approximately 19,106,115 kWh of electricity per year and approximately 65,190,747 kBTU per of natural gas per year.

The proposed Project's buildings would be designed and constructed in accordance with the City's latest adopted energy efficiency standards, which are based on the State's Title 24 Energy Efficiency Standards for Residential Buildings and Green Building Code Standards. These standards include minimum energy efficiency requirements related to building envelope, mechanical systems (e.g., heating, ventilation, and air conditioning [HVAC] and water heating systems), and indoor and outdoor lighting, are widely regarded as the some of the most advanced

and stringent building energy efficiency standards in the country. In addition, the on-site solar PV system would meet the State legal requirements. As such, the design of the proposed project would facilitate the future commitment to renewable energy resources. Therefore, building energy consumption would not be considered wasteful, inefficient, or unnecessary.

Additionally, the proposed Project is anticipated to implement renewable energy features. In particular, the proposed Project would be required to implement on-site solar, consistent with the most recent (2022) Title 24 standards. The 2022 Title 24 standards require single-family homes and low-rise multi-family projects to install solar photovoltaic (PV) systems and be "battery-ready", by installing either a subpanel or a split-bus main panel with four backed-up circuits.[4] This is a requirement as part of the 2022 Title 24 standards. However, it should be noted that additional on-site solar PV could be installed, especially in the case that stricter Title 24 standards come into effect prior to portions of Project development.

Separately, the 2022 Title 24 standard requires that the number of electric vehicle (EV) charging spaces depends on the building type and total number of parking spaces on-site. Similarly, such requirements would be anticipated to further reduce energy consumption beyond what is modeled herein.

**Construction.** Temporary electric power for as-necessary lighting and electronic equipment, such as computers inside temporary construction trailers, and water for dust control would be provided by PG&E. The electricity used for such activities would be temporary, would be substantially less than that required for Project operation, and would therefore have a negligible contribution to the Project's overall energy consumption. Natural gas is not anticipated to be required during construction of the Project. Fuels used for construction would primarily consist of diesel and gasoline, which are discussed below under the "on-road and off-road vehicles" subsections. Any minor amounts of natural gas that may be consumed as a result of Project construction would be substantially less than that required for Project operation and would have a negligible contribution to the Project's overall energy consumption.

ON-ROAD VEHICLES (OPERATION)

The proposed Project would generate vehicle trips (i.e., passenger vehicles for employees and heavy-duty trucks for hauling) during its operational phase. Compliance with applicable State laws and regulations would limit idling and a part of a comprehensive regulatory framework that is implemented by the CARB. A description of Project operational on-road mobile energy usage is provided below.

According to the Traffic Study prepared for the proposed Project (Barrios Transportation Consulting, 2024), the proposed Project would increase total vehicle trips by approximately 17,633 new daily trips. In order to calculate operational on-road vehicle energy usage, De Novo Planning Group used fleet mix data from the CalEEMod (v.2022.1) output for the proposed Project, and Year 2040 gasoline and diesel MPG (miles per gallon) factors for individual vehicle

[4] See: https://calsolarinc.com/news/title-24-california/

classes as provided by EMFAC2021, to derive weighted average gasoline and diesel MPG factors for the vehicle fleet as a whole. Based on these calculations, as provided in Appendix A, upon full buildout, the proposed Project would generate operational vehicle trips that would use a total of approximately 4,326 gallons of gasoline and 10,774 gallons of diesel per day, or 1,579,036 gallons of gasoline and 3,932,473 gallons of diesel per year. Additionally, the Project would generate operational vehicle trips that require electricity for electric vehicles, which is dependent on the amount of electric vehicles within the vehicle fleet at the time of Project operation.

Over the lifetime of the Project, the fuel efficiency of the vehicles being used by the Project is expected to increase. As such, the amount of petroleum consumed as a result of vehicular trips to and from the Project site during operation would decrease over time. Numerous regulations are in place that require and encourage increased fuel efficiency. For example, CARB has adopted a new approach to passenger vehicles by combining the control of smog-causing pollutants and GHG emissions into a single coordinated package of standards. The new approach also includes efforts to support and accelerate the numbers of plug-in hybrids and ZEVs in California. The Project would be required to comply with CARB's Airborne Toxics Control Measure, which restricts heavy-duty diesel vehicle idling time to 5 minutes, which would minimize fuel consumption. Operation of the Project is expected to use decreasing amounts of petroleum over time due to advances in fuel economy. The Project would provide a bike-friendly, pedestrian-friendly development and facilitate ride-sharing and carpooling to reduce VMT.

In summary, although Project implementation would result in an increase in petroleum use during construction and operation, over time vehicles would use less petroleum due to advances in fuel economy. Given these considerations, petroleum consumption associated with the Project would not be considered inefficient or wasteful, and impacts would be less than significant.

ON-ROAD VEHICLES (CONSTRUCTION)

The proposed Project would also generate on-road vehicle trips during Project construction (from construction workers and vendors travelling to and from the Project site). De Novo Planning Group estimated the vehicle fuel consumed during these trips based on the assumed construction schedule, vehicle trip lengths and number of workers per construction phase as provided by CalEEMod, and Year 2027 gasoline and diesel MPG factors provided by EMFAC2021 (year 2027 factors were used to represent a conservative analysis, as the energy efficiency of construction activities is anticipated to improve over time). For the sake of simplicity and to be conservative, it was assumed that all construction worker light duty passenger cars and truck trips use gasoline as a fuel source, and all medium and heavy-duty vendor trucks use diesel fuel. Table ENERGY-1, below, describes gasoline and diesel fuel consumed during each construction phase (in aggregate). As shown, the vast majority of on-road mobile vehicle fuel used during the construction of the proposed Project would occur during the building construction phase. See Appendix A of this CEQA document for a detailed accounting of construction on-road vehicle fuel usage estimates.

*Table ENERGY-1: On-road Mobile Fuel Usage by Project Construction Activities – By Phase*

| *Construction Phase* | *Total Gallons of Gasoline Fuel[B]* | *Total Gallons of Diesel Fuel[B]* |
|---|---|---|
| Site Preparation | 2,271 | 0 |
| Grading | 4,332 | 0 |
| Building Construction | 42,989 | 31,243 |
| Paving | 1,830 | 0 |
| Architectural Coatings | 171,528 | 0 |
| **Total** | **222,950** | **31,243** |

*Note: [A] Provided by CalEEMod Output. [B]See Appendix A of this EIR for Further Detail*

*Source: CalEEMod (v.2022.1); EMFAC2021.*

### Off-road Equipment (Construction)

Off-road construction equipment would use diesel fuel during the construction phase of the proposed Project. A non-exhaustive list of off-road constructive equipment expected to be used during the construction phase of the proposed Project includes: forklifts, generator sets, tractors, excavators, and dozers. Based on the total amount of $CO_2$ emissions expected to be generated by the proposed Project (as provided by the CalEEMod output), and standard conversion factors (as provided by the U.S. Energy Information Administration), the proposed Project would use a total of approximately 223,812 gallons of diesel fuel for off-road construction equipment. Detailed calculations are provided in Appendix A of this EIR.

State laws and regulations would limit idling from both on-road and off-road diesel-powered equipment and are part of a comprehensive regulatory framework that is implemented by the CARB. Additionally, as a practical matter, it is reasonable to assume that the overall construction schedule and process would be designed to be as efficient as feasible in order to avoid excess monetary costs. For example, equipment and fuel are not typically used wastefully due to the added expense associated with renting the equipment, maintaining it, and fueling it. Therefore, the opportunities for further future efficiency gains during construction are limited. For the foregoing reasons, it is anticipated that the construction phase of the project would not result in wasteful, inefficient, and unnecessary consumption of energy.

### Conclusion

The proposed Project would use energy resources for the operation of Project buildings (natural gas and electricity), outdoor lighting (electricity), on-road vehicle trips (e.g. gasoline and diesel fuel) generated by the proposed Project, and off-road and on-road construction activities associated with the proposed Project (e.g. diesel fuel). Each of these activities would require the use of energy resources. The proposed Project would be responsible for conserving energy, including through the Project Requirements provided throughout this EIR, as well as through the implementation of statewide and local measures. The proposed Project would be responsible for conserving energy by complying with existing rules and regulations and General Plan goals and policies.

The proposed Project would comply with all existing energy standards, including those established by the City of Stockton and San Joaquin County. For example, buildings developed as part of the proposed Project would be required to comply with the latest version of the California Building Energy Efficiency Standards (Title 24), which require a high degree of energy efficiency for new buildings. The latest version of Title 24 also includes a requirement that approximately 30% of the electricity for the Project's single-family residences would be supported by on-site rooftop solar PV. Furthermore, the latest version of the Title 24 Building Energy Efficiency Standards also requires energy efficient appliances for new developments (such as the proposed Project). Additionally, the Project would be required to comply with other statewide measures, including those intended to improve the energy efficiency of the statewide passenger and heavy-duty truck vehicle fleet (e.g., the Pavley Bill and the Low Carbon Fuel Standard), which improve vehicle fuel economies, thereby conserving gasoline and diesel fuel for any trips that would be generated by the Project. These energy savings would continue to accrue over time.

It is also noted that the Project area has designated streets with enhanced walkways (i.e., wide sidewalks and landscaped areas) that will encourage pedestrians to walk to parks and open space features. In addition to the proposed wellness walks, multi-use pathways, and separated sidewalks, West Land and Morada Lane will be improved along the Project frontages to include sidewalks and bike lanes to further encourage walking and bicycling. By encouraging walking and biking with these provided improvements, the Project promotes multi-modal transportation in order to minimize energy use related to vehicle trips.

The amount of energy used by the proposed Project during operation would include the amount of energy used by the Project building and outdoor lighting, the fuel used by vehicle trips generated during operation, and fuel used by Project maintenance activities during Project operation. Additionally, as shown above, for construction, the proposed Project would not require energy consumption that would be out of the ordinary for a Project of its size and type.

Overall, the proposed Project would not violate any state or federal energy standards and/or result in significant adverse impacts related to Project energy requirements, energy efficiencies, energy intensiveness of materials, cause significant impacts on local and regional energy supplies or generate requirements for additional capacity, fail to comply with existing energy standards, otherwise result in significant adverse impacts on energy resources, or conflict or create an inconsistency with applicable plan, policy, or regulation.

The General Plan policies and actions provide a framework for ensuring that effects on energy resources and usage are reduced to the extent feasible. The Project would be subject all General Plan Requirements, and is consistent with the development types anticipated under the General Plan and General Plan EIR (See General Plan Draft EIR, pp. 4.15-33). As such, with compliance with the General Plan policies and actions, the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *VII. GEOLOGY AND SOILS*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: | | | X | |
| i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. | | | X | |
| ii) Strong seismic ground shaking? | | | X | |
| iii) Seismic-related ground failure, including liquefaction? | | | X | |
| iv) Landslides? | | | X | |
| b) Result in substantial soil erosion or the loss of topsoil? | | | X | |
| c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse? | | | X | |
| d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? | | | X | |
| e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water? | | | X | |
| f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? | | | X | |

*Project Impacts:*

The proposed Project includes the development of 2,241 single-family residences in a seismically active region. The Project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expressions of active faults are believed to exist within the Project site. The U.S. Geological Survey identifies the potential seismic source within 30 miles of the Project site. Three of the closest known faults classified as active by the California Geological Survey include the Vernalis Fault east of the Tracy, the San Joaquin Fault southeast of

Tracy, and the Great Valley Thrust Fault System south of Tracy. Other faults that could potentially affect the proposed Project include the Midway Fault, the Midland Fault, the Black Butte Fault, Corral Hollow-Carnegie Fault, the Greenville Fault, and the Foothills Fault System.

Construction of the proposed Project will involve clearing and grading of the Project site, which could render the Project site susceptible to a temporary increase in erosion from the grading and construction activities. Grading and building design must be designed and constructed in accordance with the California Building Code.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the potential impacts due to local soils and geologic conditions that would occur because of the future urban development, such as residential development of the Project site, that was contemplated by the General Plan. These impacts included seismic hazards such as groundshaking and liquefaction, erosion, soil stability, and wastewater conflicts (City of Stockton General Plan Update Draft EIR, 2018, pages 4.6-12 through 4.6-15). The analysis found that while development and buildout of the General Plan can result in geological impacts, these impacts would be reduced to a less than significant level through the application of development standards contained in the Stockton Municipal Code, the application of General Plan goals and policies that would assist in minimizing or avoiding geologic hazards and compliance with local, state, and federal standards related to geologic conditions.

These goals, policies and standards include, but are not limited to, erosion control measures, the City's Grading and Erosion Control Ordinance, the City's Stormwater Management and Discharge Control Ordinance, and goals and policies in the General Plan Safety Element requiring soils and geotechnical reports for new development, enforcement of the building code, and limiting development of severe slopes.

The General Plan EIR determined that impacts due to geologic and seismic conditions were less than significant (pages 4.6-12 through 4.6-15). These impacts were adequately addressed in Chapter 4.6 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed in the General Plan EIR.

*Responses to Checklist Questions*

**Responses a.i), a.ii):** The Project site is in an area of moderate to high seismicity. However, no known active faults cross the Project site, and the Project site is not located within an Alquist-Priolo Earthquake Fault Zone. Nevertheless, relatively large earthquakes have historically occurred in the Bay Area and along the margins of the Central Valley. Many earthquakes of low magnitude occur every year in California.

Portions of the Great Valley fault are considered seismically active thrust faults; however, since the Great Valley fault segments are not known to extend to the ground surface, the State of California has not defined Earthquake Fault Hazard Zones around the postulated traces. The Great Valley fault is considered capable of causing significant ground shaking at the Project site, but the recurrence interval is believed longer than for more distant, strike-slip faults. Further seismic activity can be expected to continue along the western margin of the Central Valley, and

as with all projects in the area, the proposed Project will be designed to accommodate strong earthquake ground shaking, in compliance with the applicable California building code standards.

Since there are no known active faults crossing the Project site and the Project site is not located within an Earthquake Fault Special Study Zone, the potential for ground rupture at the Project site is considered low.

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region and along the margins of the central valley could cause considerable ground shaking at the Project site, like that which has occurred in the past. To minimize potential damage to the proposed structures caused by groundshaking, all construction would comply with the latest California Building Code standards, as required by the City of Stockton Municipal Code.

Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage.

Building new structures for human use would increase the number of people exposed to local and regional seismic hazards. Seismic hazards are a significant risk for most property in California.

The City reviews all proposed development projects for consistency with the General Plan policies and California Building Code provisions identified above. This review occurs throughout the project application review and processing stage, and throughout plan check and building inspection phases prior to the issuance of a certificate of occupancy. Furthermore, in accordance with the City of Stockton General Plan, a geotechnical report for the Project shall be prepared, which would include earthwork, foundation, and design recommendations to be incorporated into the Project design plans and specifications. Therefore, compliance with federal, state and local regulations, development standards, General Plan policies and implementation of the Project requirements would ensure that the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to seismic hazards as compared with the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 9****: All Project buildings shall be designed in conformance with the current edition of the California Building Code (CBC), as adopted and amended by the City of Stockton.*

***Project Requirement 10****: In accordance with the CBC Section 1803, prior to final design approval and issuance of building permits for each phase of the Project, the Project applicant shall hire a qualified geotechnical engineer to complete a geotechnical report for the Project. The investigation*

*shall evaluate and identify onsite soil conditions and identify any site-specific engineering measures to be implemented during the construction of building foundations and subsurface utilities in accordance with the recommendations of the California Geological Survey. Measures shall be recommended by the Project geotechnical consultant and these measures shall be noted on the Project improvement plans.*

***Project Requirement 11****: In accordance with the CBC and Stockton Municipal Code Chapter 15.08, all grading and foundation plans for the development shall be designed by a Civil and Structural Engineer and reviewed and approved by the City Engineer, Chief Building Official, and a qualified Geotechnical Engineer prior to issuance of grading and building permits to ensure that all geotechnical recommendations specified in the geotechnical report are properly incorporated and utilized in the Project design.*

**Response a.iii):** Liquefaction normally occurs when sites underlain by saturated, loose to medium dense, granular soils are subjected to relatively high ground shaking. During an earthquake, ground shaking may cause certain types of soil deposits to lose shear strength, resulting in ground settlement, oscillation, loss of bearing capacity, landsliding, and the buoyant rise of buried structures. Most liquefaction hazards are associated with sandy soils, some silty soils of low plasticity, and some gravelly soils. Cohesive soils are generally not considered to be susceptible to liquefaction. In general, liquefaction hazards are most severe within the upper 50 feet of the surface, except where slope faces or deep foundations are present.

The City of Stockton General Plan requires geotechnical investigations to be completed prior to approval of any buildings to ensure that these facilities are constructed in a way that mitigates site-specific seismic and/or geological hazards. Any future development would be required to prepare soils investigations to address seismic safety issues and provide adequate mitigation for potential hazards identified, and would be required to comply with all CBC seismic requirements.

The City requires that, prior to development of the Project site, a subsurface geotechnical investigation must be performed to identify onsite soil conditions and identify any site-specific engineering measures to be implemented during the construction of building foundations and subsurface utilities. As noted above, this requirement will be met because a geotechnical investigation which includes recommendations to be incorporated in the design of the Project and implemented during construction is required by Project Requirement 10. Adherence to the engineering requirements contained in the subsurface geotechnical report would ensure that the Project implements the requirements specified in the General Plan. Therefore, compliance with federal, state and local regulations, development standards, General Plan policies and implementation of the Project requirements would ensure that the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to liquefaction as compared with the General Plan EIR.

**Response a.iv):** The Project site is relatively flat and there are no major slopes in the vicinity of the Project site. As such, the Project site is exposed to little or no risk associated with landslides, and the Project would not result in any new significant effects or increase the severity of

previously identified environmental effects related to landslides as compared with the General Plan EIR.

**Response b):** During the construction preparation process, exposed surfaces could be susceptible to erosion from wind and water. Effects from erosion include impacts on water quality and air quality. Exposed soils that are not properly contained or capped increase the potential for increased airborne dust and increased discharge of sediment and other pollutants into nearby stormwater drainage facilities. Risks associated with erosive surface soils can be reduced by using appropriate controls during construction and properly re-vegetating exposed areas, as required under the existing regulatory requirements, such as implementation of erosion control measures specified in the CBC, Chapter 15.48 of the City of Stockton Municipal Code, and the City's grading permit process.

In accordance with Chapter 15.48 of the City of Stockton Municipal Code, a grading and erosion control permit shall be required for all construction projects which disturb the soil. Grading plans shall be prepared in conformance with the City's requirements for improvement plans as delineated in Title 16, Development Code and Appendix J, California Building Code. Additionally, construction activities that disturb one acre or more shall provide for effective control of erosion, sediment, and all other pollutants as required in the Construction General Permit. The permit holder shall be responsible for the installation and monitoring of effective erosion and sediment controls. Such controls may be evaluated by the authorized enforcement officer and shall be required to comply with the provisions in Section 15.48.080 of the Municipal Code.

Thus, with compliance with the existing regulatory requirements and the City's grading permit process, the proposed Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Responses c), d):** The potential for the Project to be exposed to unstable soil conditions resulting from on-or off-site landslide, and liquefaction are discussed above under Responses a.iii, and a.iv., and were found that the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to landslides as compared with the General Plan EIR.

**Lateral Spreading:** The geologic conditions conducive to lateral spreading include gentle surface slope (0.3-5% slope), and liquefiable soils, none of which are present on the Project site. According to the General Plan EIR, the majority of the EIR Study Area does not appear to be located atop unstable geologic materials that are prone to subsidence, lateral spreading, or collapse (See General Plan Draft EIR, pp. 4.6-13). The proposed Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Expansive Soils:** Expansive soils shrink/swell when subjected to moisture fluctuations, which could cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to moisture changes in expansive soils could be reduced by appropriate grading practices and using posttensioned slab foundations or similarly stiffened foundation systems which are designed to resist the deflections associated with soil

expansion. As noted in Section 4.6, Geology and Soils, of the General Plan EIR, all future projects would be required to comply with the provisions of the CBC, which requires development projects to: perform geotechnical investigations in accordance with State law, and engineer and incorporate improvements to address potential geologic issues. As noted above, as per Project Requirement 10, a geotechnical investigation has been prepared for the proposed Project which includes recommendations to be incorporated in the design of the Project and implemented during construction. Adherence to the engineering requirements contained in the subsurface geotechnical report and compliance with the State and local regulations and standards would ensure that the Project implements the requirements specified in the General Plan. The proposed Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Response e):** The Project site would be served by public wastewater facilities and does not require an alternative wastewater system such as septic tanks. Implementation of the proposed Project would have **no impact** on this environmental issue, and would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Response f):** The Project site is in an area known to have paleontological resources. The Stockton General Plan includes policies and actions that would reduce impacts to paleontological resources, as well as policies and actions for the conservation of paleontological resources. For example, General Plan Action LU-5.2.D requires identification and protection of paleontological resources, including through a treatment plan in accordance with appropriate standards where avoidance is not feasible. General Plan Action LU-5.2.D requires that a records search be done at the Central California Information Center, the University of California Museum of Paleontology at Berkeley, and other appropriate repositories to identify cultural resources in a project site. Additionally, the Stockton Municipal Code requires appropriate evaluation of unanticipated archaeological deposits discovered in the course of ground-disturbance. The proposed Project would be subject to all relevant General Plan policies and actions that provide protections for paleontological resources.

The General Plan policies and actions provide a framework for ensuring that effects on significant unknown paleontological resources are reduced to the extent feasible. The Project would be subject all General Plan Requirements, and is consistent with the development types anticipated under the General Plan and General Plan EIR (See General Plan Draft EIR, pp. 4.5-19). As such, with compliance with the General Plan policies and actions, the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *XIII. GREENHOUSE GAS EMISSIONS*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? | | | X | |
| b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gasses? | | | X | |

### *Project Impacts:*

As discussed below, development of the proposed Project will result in an increase in greenhouse gas emissions from construction and operational activities. The proposed Project is allowed under the existing General Plan land use designation and is consistent with the growth assumptions of applicable plans. There is nothing peculiar about the site that presents impacts greater than was anticipated under the General Plan. As discussed below, compliance with the mitigation measures incorporated into the General Plan goals and policies and applicable City Code and compliance with applicable Federal, State, and local laws and regulations would reduce impacts related to greenhouse gas emissions to a less than significant level.

### *Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts of greenhouse gas emissions associated with the future urban development that was contemplated by the General Plan. These impacts included direct and indirect greenhouse gas emissions and compliance with applicable adopted greenhouse gas plans, policies, or regulations resulting from implementation of the General Plan (City of Stockton General Plan Draft EIR, 2018, pages 4.7-28 through 4.7-43). The General Plan EIR concluded that due to the magnitude of growth associated with the buildout of the General Plan, development anticipated by the General Plan could remain substantial and would not contribute to net achievement of the State's long-term climate stabilization goals. However, implementation of the proposed General Plan policies and actions, combined with application of the Federal and State regulations, the CARB's Scoping Plan, SJCOG's RTP/SCS, City of Stockton's Climate Action Plan (CAP), would reduce GHG emissions to the extent feasible. In addition, findings of fact and a statement of overriding consideration were adopted by the Stockton City Council regarding these impacts.

### *Background Discussion*

Various gases in the Earth's atmosphere, classified as atmospheric greenhouse gases (GHGs), play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation.

Naturally occurring GHGs include water vapor ($H_2O$), carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), and ozone ($O_3$). Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also GHGs, but they are, for the most part, solely a product of industrial activities. Although the direct GHGs, including $CO_2$, $CH_4$, and $N_2O$, occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. From the pre-industrial era (i.e., ending about 1750) to 2011, concentrations of these three GHGs have increased globally by 40, 150, and 20 percent, respectively (IPCC, 2013).

Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide ($CO_2$), methane ($CH_4$), ozone ($O_3$), water vapor, nitrous oxide ($N_2O$), and chlorofluorocarbons (CFCs).

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2021, accounting for 39% of total GHG emissions in the state. This category was followed by the industrial sector (22%), the electricity generation sector (including both in-state and out of-state sources) (16%) and the agriculture and forestry sector (8%) (California Energy Commission, 2024).

As the name implies, global climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern, respectively. California produced approximately 381 million gross metric tons of carbon dioxide equivalents ($MMTCO_2e$) in 2021 (California Energy Commission, 2024). Given that the U.S. EPA estimates that worldwide emissions from human activities totaled nearly 46 billion gross metric tons of carbon dioxide equivalents ($BMTCO_2e$) in 2010, California's incremental contribution to global GHGs is approximately 2% (U.S. EPA, 2014).

Carbon dioxide equivalents are a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential of a GHG, is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only $CO_2$ were being emitted.

*Responses to Checklist Questions*

**Responses a), b):** Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. Therefore, the cumulative global emissions of GHGs contributing to global climate change can be attributed to every nation, region, and city,

and virtually every individual on Earth. A project's GHG emissions are at a micro-scale relative to global emissions but could result in a cumulatively considerable incremental contribution to a significant cumulative macro-scale impact. Implementation of the proposed Project would contribute to increases of GHG emissions that are associated with global climate change. Estimated GHG emissions attributable to future development would be primarily associated with increases of $CO_2$ and other GHG pollutants, such as methane ($CH_4$) and nitrous oxide ($N_2O$), from mobile sources and utility usage.

The proposed Project's short-term construction-related and long-term operational GHG emissions were estimated using the California Emission Estimator Model (CalEEMod)™. CalEEMod is a statewide model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify GHG emissions from land use projects. The model quantifies direct GHG emissions from construction and operation (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. Emissions are expressed in annual metric tons of $CO_2$ equivalent units of measure (i.e., MT $CO_2e$), based on the global warming potential of the individual pollutants.

### SHORT-TERM CONSTRUCTION GHG EMISSIONS

Estimated maximum mitigated GHG emissions associated with construction of the proposed Project are summarized in Table GHG-1. These emissions include all worker vehicle, vendor vehicle, hauler vehicle, and off-road construction vehicle GHG emissions. For the purposes of this analysis, based on input from the Project proponents, the proposed Project is assumed to commence construction in 2027 and finish in 2039. It should be noted that this schedule is an approximation and may change over time. A regularized construction schedule was utilized for modelling purposes for the sake of simplicity.

***Table GHG-1: Maximum Construction GHG Emissions (Mitigated Average MT $CO_2e$/year)***

| YEAR | BIO- $CO_2$ | NON-BIO- $CO_2$ | TOTAL $CO_2$ | $CH_4$ | $N_2O$ | $CO_2E$ |
|---|---|---|---|---|---|---|
| 2031 | 0 | 2,060 | 2,060 | 0.04 | 0.11 | 2,096 |

*SOURCE: CALEEMOD (V.2022.1)*

As presented in the table above, short-term construction emissions of GHGs are estimated at a maximum of approximately 2,096 MT $CO_2e$ per year.

### OPERATIONAL GHG EMISSIONS

The operational GHG emissions estimate for the proposed Project includes on-site area, energy, mobile, waste, and water emissions generated by the Project during its operation. Estimated GHG emissions associated with the proposed Project are summarized in Table GHG-2, below. It should be noted that CalEEMod does not account for the Governor Newsom's Zero-Emission by 2035 Executive Order (N-79-20), which requires that all new cars and passenger trucks sold in California be zero-emission vehicles by 2035. Additionally, the CalEEMod modeling conducted does not account for the incorporation of additional Renewables Portfolio Standard attainment

beyond CalEEMod defaults, incorporation of AB 341, and incorporation of Title 24 requirements for the EV charging stations. This is anticipated to substantially reduce the operational emissions associated with passenger vehicles (i.e. mobile emissions), energy emissions, and waste emissions, over time, including prior the 2035 final implementation year. Therefore, the operational emissions results are likely an overestimate for mobile, energy, and waste emissions. As shown in the following table, as conservatively modeled, the annual GHG emissions associated with the proposed Project would be approximately 2,411 MT $CO_2e$.

***Table GHG-2: Operational GHG Emissions at Buildout (Metric Tons/Year)***

| *Sector* | *Bio- $CO_2$* | *Non-Bio- $CO_2$* | *Total $CO_2$* | *$CH_4$* | *$N_2O$* | *R* | *$CO_2E$* |
|---|---|---|---|---|---|---|---|
| Mobile | 0 | 29,685 | 29,685 | 1.14 | 1.41 | 47.3 | 30,180 |
| Area | 0 | 27.8 | 27.8 | <0.1 | <0.1 | 0 | 27.9 |
| Energy | 0 | 4,656 | 4,656 | 0.50 | <0.1 | 0 | 4,677 |
| Water | 28.9 | 62.2 | 91.2 | 2.98 | <0.1 | 0 | 187 |
| Waste | 177 | 0 | 177 | 17.7 | 0 | 0 | 620 |
| Refrig. | 0 | 0 | 0 | 0 | 0 | 5.2 | 5.18 |
| **Total** | **206** | **34,430** | **34,637** | **22.3** | **1.51** | **52.5** | **35,697** |

*Source: CalEEMod (v.2022.1)*

Pacific Gas & Electric (PG&E), the electrical service provider for the Project site, will need to continue to annually increase renewable electricity through 2045 in order to meet the carbon-free electricity target set by SB 100. The Project would need to comply with AB 341, which set a target of reducing landfill waste by 75 percent by 2020, and the Title 24 standards, which require incorporation of rooftop PV systems and solar panels, as well as electric vehicle charging capabilities. The potential reductions in GHG emission associated with this requirement were not incorporated in the reductions, as the amount would be confirmed at a later stage; therefore, the operational emissions shown in Table GHG-2 are conservative.

### Project Consistency with Applicable Plans

Several plans and policies have been adopted to reduce GHG emissions in the San Joaquin Valley region. The Project's consistency with the State's 2022 Scoping Plan, as well as the San Joaquin Council of Government's (SJCOG's) 2022 Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS), and the City of Stockton Climate Action Plan.

#### The CARB's 2022 Scoping Plan

The 2022 Scoping Plan strategies that are applicable to the Project include reducing fossil fuel use, energy demand, and vehicle miles traveled (VMT); maximizing recycling and diversion from landfills; and increasing water conservation. The Project would be consistent with these goals through Project design, which includes complying with the latest requirements of the CALGreen Code and Building Energy Efficiency Standards, providing EV parking spaces and charging equipment, and complying with the AB 341 waste diversion goal of 75 percent. In addition, the Project would receive electricity from PG&E, which is required to reduce GHG emissions by increasing procurement from eligible renewable energy by set target years. Moreover, the Project would provide extensive pedestrian connectivity to encourage alternative modes of

transportation, and be consistent with the requirements of the latest (2022) version of the Title 24 Energy Code, or better. For example, the Project area has designated streets with enhanced walkways (i.e., wide sidewalks and landscaped areas) that will encourage pedestrians to walk to parks and open space features. In addition to the proposed wellness walks, multi-use pathways, and separated sidewalks, West Land and Morada Lane will be improved along the Project frontages to include sidewalks and bike lanes to further encourage walking and bicycling. Therefore, the Project would be consistent with the 2022 Scoping Plan.[5] Additionally, Table GHG-3 and Table GHG-4, below, provide further analysis of the Project's consistency with the Scoping Plan's policies.

***Table GHG-3: Project Consistency with Table 1 of Appendix D of the 2022 Scoping Plan***

| ***TABLE 1 OF APPENDIX D OF THE SCOPING PLAN*** | |
|---|---|
| *POLICY* | *PROJECT CONSISTENCY* |
| **Transportation Electrification** | |
| Convert local government fleets to ZEVs and provide EV charging at public sites | **No Conflict.** This goal is not applicable to an individual residential development project. |
| Create a jurisdiction-specific ZEV ecosystem to support deployment of ZEVs statewide (such as building standards that exceed state building codes, permit streamlining, infrastructure siting, consumer education, preferential parking policies, and ZEV readiness plans) | |
| **VMT Reduction** | |
| Reduce or eliminate minimum parking standards | **No Conflict.** Although this goal is not applicable to an individual residential development project, the Project is implementing neighborhood design improvements such as pedestrian network improvements and traffic calming measures. Furthermore, the proposed Project would enable walkable development. |
| Implement Complete Streets policies and investments, consistent with general plan circulation element requirements | |
| Increase access to public transit by increasing density of development near transit, improving transit service by increasing service frequency, creating bus priority lanes, reducing or eliminating fares, microtransit, etc. | |
| Increase public access to clean mobility options by planning for and investing in electric shuttles, bike share, car share, and walking | |
| Implement parking pricing or transportation demand management pricing strategies | |
| Amend zoning or development codes to enable mixed-use, walkable, transit-oriented, and compact infill development (such as increasing the allowable density of a neighborhood) | |
| Preserve natural and working lands by implementing land use policies that guide development toward infill areas and do not convert "greenfield" land to urban uses (e.g., green belts, strategic conservation easements) | |
| **Building Decarbonization** | |
| Adopt all-electric new construction reach codes for residential and commercial uses | **No Conflict.** Although this goal is not applicable to an individual residential development project, the Project would be consistent |
| Adopt policies and incentive programs to implement energy efficiency retrofits for existing buildings, such as weatherization, lighting | |

[5] It should be noted that, the 2022 Scoping Plan Appendix D states that " Lead agencies may determine… that projects that incorporate some, but not all, of the key project attributes are consistent with the State's climate goals."

| *TABLE 1 OF APPENDIX D OF THE SCOPING PLAN* | |
|---|---|
| *POLICY* | *PROJECT CONSISTENCY* |
| upgrades, and replacing energy-intensive appliances and equipment with more efficient systems (such as Energy Star-rated equipment and equipment controllers) | with the applicable Title 24 Building Envelope Energy Efficiency Standards, which ensure highly energy efficient development. Additionally, the proposed Project would utilize electricity from PG&E, which has been increasing its overall supply of renewable energy as part of its overall energy portfolio, consistent with the State's Renewable Portfolio Standard. |
| Adopt policies and incentive programs to electrify all appliances and equipment in existing buildings such as appliance rebates, existing building reach codes, or time of sale electrification ordinances | |
| Facilitate deployment of renewable energy production and distribution and energy storage on privately owned land uses (e.g., permit streamlining, information sharing) | |
| Deploy renewable energy production and energy storage directly in new public projects and on existing public facilities (e.g., solar photovoltaic systems on rooftops of municipal buildings and on canopies in public parking lots, battery storage systems in municipal buildings) | |

*SOURCE: 2022 SCOPING PLAN, TABLE 1, APPENDIX D*

***Table GHG-4: Project Consistency with Table 3 of Appendix D of the 2022 Scoping Plan***

| *TABLE 3 OF APPENDIX D OF THE SCOPING PLAN* | |
|---|---|
| *POLICY* | *PROJECT CONSISTENCY* |
| **Transportation Electrification** | |
| Provides EV charging infrastructure that, at minimum, meets the most ambitious voluntary standard in the California Green Building Standards Code at the time of project approval | **Inconsistent.** Although the Project would provide EV charging infrastructure that would meet the minimum California Green Building Standards Code requirements (at the time of project approval), it is not anticipated that the Project would provide EV charging infrastructure that would meet the most ambitious voluntary standards. |
| **VMT Reduction** | |
| Is located on infill sites that are surrounded by existing urban uses and reuses or redevelops previously undeveloped or underutilized land that is presently served by existing utilities and essential public services (e.g., transit, streets, water, sewer) | **No Conflict.** The Project is surrounded by existing development to the east and south. Additionally, the Project redevelops previously undeveloped land that is presently served by existing utilities and essential public services. |
| Does not result in the loss or conversion of natural and working lands | **Inconsistent.** The General Plan designates approximately 16,160 acres of agricultural land for development to non-agricultural/urban uses, including the Project site. Therefore, the Project could lead to a net loss or conversion of natural and working lands. |

| *TABLE 3 OF APPENDIX D OF THE SCOPING PLAN* | |
|---|---|
| *POLICY* | *PROJECT CONSISTENCY* |
| Consists of transit-supportive densities (minimum of 20 residential dwelling units per acre), or<br><br>Is in proximity to existing transit stops (within a half mile), or<br><br>Satisfies more detailed and stringent criteria specified in the region's SCS | **No Conflict.** The proposed Project's maximum density is 6.1 units per acre based on gross acreage and 8.7 units per acre based on net acreage. Refer to Chapter 2.0: Project Description, for further detail. However, the proposed Project would be in proximity to transit stops within a half mile. Specifically, existing bus stops are located along the western boundary of the Project site along West Lane; additional bus stops are located approximately 0.36 miles from the Project site, along Sandalwood Drive. |
| Reduces parking requirements by: Eliminating parking requirements or including maximum allowable parking ratios (i.e., the ratio of parking spaces to residential units or square feet); or Providing residential parking supply at a ratio of less than one parking space per dwelling unit; or<br><br>For multifamily residential development, requiring parking costs to be unbundled from costs to rent or own a residential unit. | **Inconsistent.** The proposed Project would not reduce parking requirements consistent with this policy, or require parking costs to be unbundled from costs to rent or own a residential unit, for multifamily development. |
| At least 20 percent of units included are affordable to lower-income residents | **Inconsistent.** Development of the proposed Project is not anticipated to result in at least 20 percent of units included to be affordable to lower-income residents. |
| **Building Decarbonization** | |
| Uses all-electric appliances without any natural gas connections and does not use propane or other fossil fuels for space heating, water heating, or indoor cooking | **Inconsistent.** The Project is not anticipated to be entirely all-electric. |

*SOURCE: 2022 SCOPING PLAN, TABLE 3, APPENDIX D*

### SJCOG 2022 RTP/SCS

The SJCOG's 2022 RTP/SCS includes eight policies with corresponding implementation strategies for conserving energy, maximizing mobility and accessibility, increasing safety and security, preserving the transportation system, supporting economic development, promoting interagency cooperation and public participation, maximizing cost effectiveness, and improving quality of life for residents. These strategies include similar measures to the 2022 Scoping Plan, such as supporting energy and water efficiency. The Project's consistency with the applicable 2022 RTP/SCS strategies is discussed in Table GHG-5, below. As shown therein, the Project would

be consistent with the GHG emissions reduction strategies contained in the SJCOG's 2022 RTP/SCS.

***Table GHG-5: Project Consistency with the SJCOG's 2022 RTP/SCS***

| *POLICY* | *PROJECT CONSISTENCY* |
|---|---|
| Enhance the Environment for Existing and Future Generations and Conserve Energy | No Conflict. The Project would utilize electricity provided by Pacific Gas & Electric (PG&E) which is required to meet the year 2030, 2045, and 2050 performance standards. In addition, future development associated with Project implementation would be required to meet the applicable requirements of the 2022 (or more current) Title 24 Building Energy Efficiency Standards, which include requirements relating to on-site rooftop solar PV for renewable electricity consumption, as well as a wide array of energy efficiency requirements. For example, other requirements include Title 24, Part 6, which contains energy standards for non-residential indoor lighting and outdoor lighting, as well as emissions reductions associated electric vehicle charging infrastructure. |
| Maximize Mobility and Accessibility | No Conflict. The Project would support the use of zero-emission and low-emission vehicles, by implementing EV-ready charging spaces, consistent with the requirements of the 2022 Title 24 Building Energy Efficiency Standards.[6] The 2022 Title 24 standard requires that the number of EV charging spaces depends on the building type and total number of parking spaces on-site. |
| Increase Safety and Security | No Conflict. The Project would be developed using the latest State and local requirements relating to safety and security. Development of the Project site would include other uses to support and compliment the proposed residential development include public utility infrastructure, public and private roadways, curb/gutters/sidewalks, other pedestrian facilities, private parking, street lighting, and street signage, which would enhance the safety and security of the site and it surroundings, by connecting to existing development. |
| Preserve the Efficiency of the Existing Transportation System | Not applicable. This is not a transportation improvement project and is therefore not applicable. |
| Support Economic Vitality | No Conflict. The Project would add residential land uses to the local community, adding tax revenues, thereby supporting economic vitality. |
| Promote Interagency Coordination and Public Participation for Transportation Decision-Making and Planning Efforts | Not applicable. This is not a transportation improvement project and is therefore not applicable. |
| Maximize the Cost Effectiveness | No Conflict. The Project would add residential land uses to the local community, in a location that is logical and appropriate form a cost effectiveness perspective. |
| Improve the Quality of Life for Residents | No Conflict. The Project would add recreational and other in-demand residential land uses the community. |

*SOURCE: SJCOG 2022 RTP/SCS*

[6] See Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030. Available at: https://www.energy.ca.gov/publications/2020/assembly-bill-2127-electric-vehicle-charging-infrastructure-assessment-analyzing

**Consistency with the City of Stockton Climate Action Plan:** The City of Stockton adopted its CAP in 2014. The City's GHG Inventory is evaluated for baselines years 2005 and 2010 and is projected for years 2020 and 2035. The proposed Project would not conflict with the City of Stockton Climate Action Plan. For example, the proposed Project would comply with the applicable GHG reduction strategies identified in the CAP, such as CAP Strategy ENERGY-6, which requires the City encourage businesses and residents to install rooftop solar using Power Purchase Agreements and other low or zero up-front cost options for installing solar photovoltaic systems.

Table GHG-6, below, provides an analysis of the consistency of the proposed Project with the GHG reduction measures contained within the CAP. As shown, the proposed Project would be consistent with all applicable GHG reduction measures that would be applicable to the proposed Project.[7]

Table GHG-6 Project Consistency with the City of Stockton Climate Action Plan

| *GHG REDUCTION MEASURE* | *PROJECT CONSISTENCY* |
|---|---|
| Energy-1: Green Building Ordinance | No Conflict. The Project would more than adhere to the 2008 Title 24 of the California Code of Regulations Standards, since the most recent version of the Title 24 Standards is much more stringent. Simply meeting the current Title 24 Standards would result in significant energy and GHG savings for the City because the state has regularly updated the Title 24 requirements since 2005 and plans to continue to update the Title 24 standards periodically in the future. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Energy-2: Outdoor Lighting Upgrades for Existing Development | Not applicable. The proposed Project is a new development; therefore, GHG reduction measures associated with existing development would not apply. |
| Energy-3: Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings | Not applicable. The proposed Project is a new development; therefore, GHG reduction measures associated with existing development would not apply. |
| Energy-4: Energy Efficiency Programs to Promote Retrofits for Existing Non-Residential Buildings | Not applicable. The proposed Project is a new development; therefore, GHG reduction measures associated with existing development would not apply. Moreover, the proposed Project does not include non-residential development. |
| Energy-5: Solar-Powered Parking | No Conflict. The Project would be consistent with the current Title 24 Standards associated with solar PV, as applicable. Therefore, the proposed Project would not conflict with this GHG reduction measure. |

[7] It should be noted that, subsequent to adoption of the CAP, the *Golden Door Properties, LLC v. County of San Diego* case held that the use of a quantitative threshold (like the efficiency threshold included within the Stockton Climate Action Plan), which has historically been used for EIRs throughout California, must be adopted by the City via a resolution, ordinance or regulation based on a public review process, and supported by substantial evidence. However, such a quantitative threshold as included with the City of Stockton Climate Action Plan has never been specifically adopted as a threshold by the City via a resolution, ordinance, or regulation. Moreover, this efficiency threshold also relates only to year 2020, which has already come and gone. Therefore, overall, the usage of a per capita efficiency metric, such as the one included within the City of Stockton Climate Action Plan, is also not relevant or appropriate in a CEQA context.

| *GHG REDUCTION MEASURE* | *PROJECT CONSISTENCY* |
|---|---|
| Energy-6: Residential and Non-residential Rooftop Solar | No Conflict. The Project would be consistent with the current Title 24 Standards associated with solar PV. Specifically, based on the 2022 version of the Title 24 standards, although the exact percentage of electricity generated by the PV system can vary based on factors such as the climate zone, conditioned floor area, and possible plug loads of the building, the goal is to offset a large portion of electrical consumption of the proposed building. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-1: Land Use/Transportation System Design Integration | No Conflict. The Project would increase density in the City of Stockton, thereby facilitating additional land use and existing transportation integration. That is, the development of the Project would increase use of existing roadways that have been designed to accommodate additional traffic, such as that as would be generated by the proposed Project. Overall, the Project land uses have been previously planned for and integrate appropriately with the existing transportation system Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-2: Parking Policies | Not applicable. This GHG reduction measure would apply to the downtown area, which the Project is not in. Therefore, this GHG reduction measure would not apply to the proposed Project. |
| Trans-3: Transit System Support | No Conflict. The Project would not hinder the development of the City's transit system. Furthermore, the increased residential density of the area that would occur with development of the proposed Project would incentivize further development of local transit options, beyond which would be anticipated to occur without development of the proposed Project. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-4: Efficient Goods Movement | Not applicable. This GHG reduction measure would apply to the City's rail lines. Therefore, this GHG reduction measure would not apply to the proposed Project. |
| Trans-5: Reduce Barriers for Non-Motorized Travel | No Conflict. The Project would connect the City's existing transportation system, via pedestrian walkways (including sidewalks) and connect with the existing system. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-6: Transit System Improvements | No Conflict. This GHG reduction measure would apply to the City's transit system. Nevertheless, the proposed Project would be accessible via the City's existing transit system. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-7: Safe Routes to School | No Conflict. The Project would connect the City's existing transportation system, via pedestrian walkways (including sidewalks). Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Trans-8: Transportation Demand Management and Additional Safe Routes to School | No Conflict. The Project is consistent with the land use presented in the *Envision Stockton 2040 General Plan* (i.e., low density residential with less than 6.1 units per gross acre). The Project is also located within a half-mile of two transit stops on West Lane. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Waste-1: Increased Waste Diversion | No Conflict. The Project would be consistent with the State's 75% waste diversion goal as required by AB 341. It should be noted that AB 341 has been superseded by California's SB 1383, which sets a more stringent goal of diverting 75% of the waste stream from landfills by 2025 and includes enforcement mechanisms, such as monetary fines, for non-compliance. The Project would be required to comply with SB 1383, and since AB 341 has come |

| *GHG REDUCTION MEASURE* | *PROJECT CONSISTENCY* |
|---|---|
| | and gone, the Project would not conflict with requirements associated with AB 341. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Water-1: Comply with Senate Bill X7-7 | No Conflict. The Project would be consistent with the State's statewide goal of a 20% reduction in urban per capita use, as required by Senate Bill X7-7. Senate Bill X7-7 is a California state law that requires the state to reduce urban water consumption by 20% by the year 2020. Since the year 2020 has come and gone, the Project would not conflict with this law. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Water-2: Promotion of Water-Efficiency for Existing Development | Not applicable. This GHG reduction measure would apply only to existing development. The proposed Project does not contain any existing development; rather, it includes new development. Therefore, this GHG reduction measure would not apply to the proposed Project. |
| Wastewater-1: Energy Efficiency Improvements at the Regional Wastewater Treatment Plant | No Conflict. The Project would not conflict with the City's goal of reducing energy usage as the Regional Wastewater Treatment Plant. The Project is not anticipated to be a large generate of wastewater demand, since it is a commercial and industrial project. Additionally, the Project would not hinder energy efficiency improvements or other upgrades at the Regional Wastewater Treatment Plant. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Urban Forestry-1: Urban Tree Planting Programs | No Conflict. The Project would include landscaping trees that would not conflict with this GHG reduction measure. |
| High GWP GHG-1: Residential Responsible Appliance Disposal Programs | No Conflict. The Project is a new development that would install new energy-efficient refrigerators and freezers. Therefore, the proposed Project would not conflict with the goal of replacing existing inefficient sources of high global warming potential (GWP) appliances. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Off-Road-1: Electric-Powered Construction Equipment | No Conflict. The Project would not conflict with the City's goal of increasing the percentage of construction equipment that is electric powered. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Off-Road-2: Reduced Idling Times for Construction Equipment | No Conflict. The Project would be consistent with the CARB's Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling currently limits diesel-fueled commercial motor vehicle idling time to 5 minutes. Therefore, the proposed Project would not conflict with this GHG reduction measure. |
| Off-Road-3: Electric Landscaping Equipment | No Conflict. The Project would not conflict with the City's goal of 15% of the City's landscaping equipment to be electric or battery powered. Therefore, the proposed Project would not conflict with this GHG reduction measure. |

*SOURCE: CITY OF STOCKTON CLIMATE ACTION PLAN, 2014*

**Consistency with the SJVAPCD Requirements:** The proposed Project would be required to comply with all applicable SJVAPCD (i.e. Air District) Rules and regulations. For example, Regulations and rules that may apply to the proposed Project could include Regulation VIII provides fugitive $PM_{10}$ dust prohibitions; Rule 8021 provides rules for $PM_{10}$ dust prohibition associated with construction, demolition activities, excavation, extraction, and other earthmoving activities; Rule 4601 provides rules to limit VOC emissions for architectural coatings. In sum, the proposed Project would comply with all applicable SJVAPCD Rules and regulations.

CONCLUSION

The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed as the Project site was assumed for development of low density residential uses in the General Plan EIR. The proposed low density residential uses are consistent with the assumed location and assumed use for the site that was analyzed in the General Plan EIR.[8]

However, the General Plan EIR identified that the General Plan EIR would not meet the 2050 climate stabilization target of 1.2 MTCO2e/SP. Furthermore, the General Plan identified that additional federal, State, and local GHG reductions would be needed to achieve the 2050 Plan-Level efficiency target and the State's climate stabilization goals. Therefore, the General Plan EIR includes Mitigation Measure GHG-1, which requires an update to the City's CAP.

Nevertheless, since publication of the General Plan EIR, the *Golden Door Properties, LLC v. County of San Diego* case held that the use of a quantitative threshold (like the efficiency thresholds included within the General Plan EIR, and the Stockton CAP), which has historically been used for EIRs throughout California, must be adopted by the City via a resolution, ordinance or regulation based on a public review process, and supported by substantial evidence. However, such quantitative thresholds as included with the General Plan EIR and the Stockton CAP have never been specifically adopted as a threshold by the City via a resolution, ordinance, or regulation. Therefore, overall, the usage of any per capita efficiency metric is not relevant or appropriate in a CEQA context.

Separately, as stated in the General Plan EIR, development that would be accommodated by the General Plan would generate a net increase of approximately 3.12 million vehicle miles per day. Implementation of proposed General Plan goals, policies, and actions could contribute in reducing GHG emissions compared to a no project buildout scenario. As discussed in Section 4.7, Air Quality, the Transportation Chapter of the Draft General Plan includes goals, policies, and actions that encompass multi-modal and active transit improvements within the EIR Study Area (e.g., Goals TR-1 and TR-2). Improvements include requiring new development to incorporate design features that would provide easier access to transit (Action TR-2.2.A), dedication of adequate bicycle and transit right-of-way on arterial and collector streets (Action TR-2.3.B), and developing guidelines for installation of electric vehicle charging stations for new developments (Action TR-3.2.B). Additionally, support of infill and mixed-use development (see Policy LU-1.1 and Policy LU-6.2) further supports balanced development which contributes in reducing VMT by increasing use of alternative transit options (i.e., walking, biking, and public transit) and decreasing vehicle trips and the average trip distances traveled. Furthermore, the Safety Chapter includes a policy and action to encourage new employers to participate in a transportation demand management program (Policy SAF-4.2 and Action SAF-4.2.A). These goals, policies, and

[8] The air emissions modeling within the General Plan EIR Included the SOI areas, which includes the Project site.

actions would contribute to reducing VMT and in minimizing long-term mobile-source GHG emissions to the extent feasible.

Overall, the Project, including the off-site improvements, would be consistent with the plans, policies, regulations, and GHG emissions reduction actions/strategies outlined in the SJCOG's 2022 RTP/SCS and the City of Stockton Climate Action Plan, as described in the above analysis. Additionally, the Project would be consistent with the 2022 Scoping Plan, using a qualitative approach (consistent with the guidance provided by the 2022 Scoping Plan). The General Plan EIR found that impacts associated with greenhouse gases emissions were significant and unavoidable. The proposed Project would comply with the mitigation measures in the General Plan EIR. The potential for the proposed Project to be generate GHG impacts was anticipated for projects, like the proposed Project, that develop consistent with the General Plan in the General Plan EIR. Compliance with the General Plan policies and actions, existing rules and regulations, and General Plan EIR mitigation measures would reduce the criteria pollutant emissions from the Project, but the impacts could remain significant and unavoidable. As the General Plan EIR evaluated this topic and also concluded the impacts will remain significant and unavoidable. Because the Project would be consistent with the land use and density assumed in the Proposed land use plan-year 2040 buildout used to evaluate air quality impacts in the General Plan, the proposed Project would not result in new or more severe impacts than what was previously disclosed in the General Plan EIR. Under the existing General Plan land use designation for the site (Low Density Residential), the 503.89-acre Development Area could be developed with up to 6.1 units per gross acre, or up to 3,073 units. Under the Project, up to 2,241 residential units would be constructed, which is well within the assumed housing units count for the Project site analyzed as part of the General Plan EIR shown in Appendix B of the General Plan EIR.[9] The amount of GHG emissions resulting from a project directly correlates to the size of a project site and the unit count of a project. As the General Plan EIR's greenhouse gas emissions modelling assumed the build out of areas in Sphere of Influence, including the Project site, and the Project is proposing units within the residential density range considered din the general Plan for this Project Site, no additional analysis is required. Therefore, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to greenhouse gas emissions as compared with the General Plan EIR.

[9] The air emissions modeling within the General Plan EIR Included the SOI areas, which includes the Project site.

## *IX. HAZARDS AND HAZARDOUS MATERIALS*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? | | | X | |
| b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? | | | X | |
| c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? | | | X | |
| d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment? | | | X | |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area? | | | X | |
| f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? | | | X | |
| g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires? | | | X | |

*Project Impacts:*

The proposed Project includes the development of a 2,241 single-family lot residential subdivision and would not result in activities that transport, store, or use hazards and hazardous materials. As discussed below, compliance with the General Plan goals and policies and applicable City Code and compliance with applicable Federal, State, and local laws and regulations would reduce impacts related to hazards and hazardous materials to a less than significant level.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated human health and hazards impacts that would occur because of the future urban development that was contemplated by the General Plan. These impacts included wildland fire hazards, transportation, use and disposal of hazardous materials, and emergency response and evacuation plans (City of Stockton General Plan Draft EIR, 2018,

pages 4.8-22 through 4.8-27). The analysis found that while development and buildout of the Stockton General Plan can introduce a variety of human health and hazards impacts, these impacts would be reduced to a less than significant level through the application of development standards in the Stockton Municipal Code, the application of General Plan goals and policies that would assist in minimizing or avoiding hazardous conditions, and compliance with local, state and federal standards related to hazards and hazardous materials. These impacts were adequately addressed in Chapter 4.8 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed as the Project site was assumed for development of low density residential uses in the General Plan EIR. The proposed low density residential uses are consistent with the location and assumed use for the site that was analyzed in the General Plan EIR. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to hazards or hazardous materials. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Policy SAF-2.1 directs the City to ensure that community members are adequately prepared for emergencies through education and training, and in support of this policy, Action SAF-2.1.A directs the City to develop neighborhood watch and emergency support groups that are trained and ready to be put into action in the event of an emergency. Implementation of this policy and action will ensure that community members know how to protect themselves and their neighbors in the event of an accidental release of hazardous materials.
- Policy SAF-2.2 directs the City to prepare sufficiently for major events to enable quick and effective response. To support this policy, Action SAF-2.2.A directs the City to require that new development provide adequate access for emergency vehicles and evacuation routes; Action SAF-2.2.C ensures that new critical facilities, including hospitals, emergency operations centers, communications facilities, fire stations, and police stations, are be located, designed, and constructed to avoid or mitigate potential risks and ensure functional operation during fires and explosions; and Action SAF-2.2.D directs cooperation with San Joaquin County, the County Office of Emergency Services, other cities in the region, and disaster agencies to coordinate disaster and emergency preparedness planning. This policy and associated actions will ensure that emergency response to the accidental release of hazardous materials is coordinated, quick, and effective.

*Responses to Checklist Questions*

**Responses a), b):** The proposed Project would place new residential uses in an area of the City that currently contains predominantly residential uses. The proposed residential land uses do not routinely transport, use, or dispose of hazardous materials, or present a reasonably foreseeable release of hazardous materials, except for common residential grade hazardous materials such as household cleaners, paint, etc. The operational phase of the proposed Project does not pose a significant hazard to the public or the environment. According to the California Department of Toxic Substances Control (DTSC) there are no Federal Superfund Sites, State Response Sites, or Voluntary Cleanup Sites on, or in the near vicinity of the Project site. The

Project site is not included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5. There are no other listed cleanup sites located within 1,000 feet of the Project site.

Development of the Project would involve site grading, excavation for utilities, trenching, backfilling, and the construction of proposed facilities that could result in the exposure of construction workers and the general public to hazardous materials. Like most agricultural and farming operations in the Central Valley, agricultural practices in the area have used agricultural chemicals including pesticides and herbicides as a standard practice. Continuous spraying of crops over many years can potentially result in a residual buildup of pesticides, in farm soils. Of highest concern relative to agrichemicals are chlorinated herbicides, organophosphate pesticides, and organochlorine pesticides (OCPs), such as such as Mecoprop (MCPP), Dinoseb, chlordane, dichloro-diphenyltrichloroethane (DDT), and dichloro-diphenyl-dichloroethylene (DDE). Project Requirement 12 requires site-specific soil sampling to determine if chemicals of potential concern associated with the historical agricultural uses at the Project site are present in shallow soil at concentrations that would pose a threat to human health.

Any operations that involve the use of hazardous materials would be required to have the hazardous material transported, stored, used, and disposed of in compliance with local, state, and federal regulations. The San Joaquin County Department of Environmental Health is the Certified Unified Program Agencies (CUPA) for San Joaquin County and is responsible for the implementation of statewide programs within the city including Hazardous Materials Business Plan (HMBP) requirements, among numerous other programs. Additionally, businesses are regulated by Cal/Occupational Safety and Health Administration (OSHA) and are therefore required to ensure employee safety. Specific requirements include identifying hazardous materials in the workplace, providing safety information to workers that handle hazardous materials, and adequately training workers. To further ensure the safety of employees, and reduce the potential for accidental release of hazardous materials into the environment, the applicant must submit a HMBP to San Joaquin County Department of Environmental Health for review and approval prior to bringing hazardous materials onsite.

Construction equipment and materials would likely require the use of petroleum-based products (oil, gasoline, diesel fuel), and a variety of common chemicals including paints, cleaners, and solvents. Transportation, storage, use, and disposal of hazardous materials during construction activities would be required to comply with applicable federal, state, and local statutes and regulations. Compliance would ensure that human health and the environment are not exposed to hazardous materials. In addition, Project Requirement 11 (Hydrology and Water Quality) requires the Project applicant to implement a SWPPP during construction activities, which would prevent any contaminated runoff from leaving the Project site. Therefore, compliance with applicable federal, state, local statutes (including but not limited to the Storm Water Quality Control Criteria Plan [SWQCCP]), and regulations, and the SWPPP provided in Project Requirement 11, would ensure that the Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to hazards as compared with the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 12****: Prior to the issuance of grading permits, the applicant shall hire a qualified consultant to perform site-specific soil sampling to determine if chemicals of potential concern associated with the historical agricultural uses at the Project site are present in shallow soil at concentrations that would pose a threat to human health. In order to achieve this, a soil sampling and analysis workplan shall be submitted for approval by the San Joaquin County Department of Environmental Health prior to the work. The sampling and analysis plan shall meet the requirements of the Department of Toxic Substances Control Interim Guidance for Sampling Agricultural Properties (2008).*

*If the sampling results indicate the presence of agrichemicals that exceed residential screening levels, a removal action workplan shall be prepared in coordination with San Joaquin County Department of Environmental Health. The removal action workplan shall include a detailed engineering plan for conducting the removal action, a description of the onsite contamination, the goals to be achieved by the removal action, and any alternative removal options that were considered and rejected and the basis for that rejection. A no further action letter shall be issued by San Joaquin County Department of Environmental Health upon completion of the removal action. The removal action shall be deemed complete when the confirmation samples exhibit concentrations below the residential screening levels, which will be established by the agencies.*

**Response c):** The Project site is located within 1/4-mile of an existing school. The nearest school to the Project site is the Ronald McNair High School, located adjacent west of the Project site.

Project construction activities would involve the routine transport, use, or disposal of hazardous materials, such as petroleum-based products and a variety of chemicals including paints, cleaners, and solvents with the potential of accidental release. The level of risk associated with the accidental release of hazardous substances is not considered significant due to the small volume and low concentration of hazardous materials utilized during construction. Standard construction practices would be observed such that any materials released are appropriately contained and remediated as required by local, State, and federal law.

Additionally, the Project does not propose uses that would involve the use or storage of hazardous substances other than limited quantities of hazardous materials such as solvents, fertilizers, pesticides, and other materials used for regular household maintenance of buildings and landscaping. The quantities of these materials would not typically be at an amount that would pose a significant hazard to the public or the environment. Should the LUSD decide to pursue building a school at the proposed school site, compliance with applicable laws and regulations governing hazardous materials would ensure all potentially hazardous materials are used and handled in an appropriate manner and would ensure that risks associated with the proposed Project's limited use of hazardous materials within one-quarter mile of an existing or proposed school would be **less than significant**. Therefore, compliance with applicable federal, state, local statutes, and regulations would ensure that the Project would not result in any new significant

effects or increase the severity of previously identified environmental effects related to accidental release near schools as compared with the General Plan EIR.

**Response d):** The proposed Project would not be located on a Cortese List site, and no impact would occur. The Project would not result in new or more severe impacts than what was disclosed in the General Plan EIR.

**Response e):** The Federal Aviation Administration (FAA) establishes distances of ground clearance for take-off and landing safety based on such items as the type of aircraft using the airport.

The Stockton Metropolitan Airport is the closest airport to the Project site, located approximately 9.5 miles to the south. The probability of an aircraft accident is highest along the extended runway centerline, and within one mile of the runway end. According to SJCOG Guidelines there are seven zones in which land use restrictions apply due to proximity to the airport:

1. Zone 1 Runway Protection Zone (RPZ)
2. Zone 2 Inner Approach/Departure Zone (IADZ)
3. Zone 3 Inner Turning Zone (ITZ)
4. Zone 4 Outer Approach/Departure Zone (OADZ)
5. Zone 5 Sideline Safety Zone (SSZ)
6. Zone 7 Traffic Pattern Zone (TPZ)
7. Zone 8 Airport Influence Area (AIA)

Land use constraints in these zones become progressively less restrictive from the RPZ to the TPZ. The proposed Project is not located within any of the safety zones. The proposed Project is not located within one mile of the airport, nor along the extended runway centerline, or within an AIA. Additionally, there are no private airstrips within the vicinity of the Project site. The proposed Project consists of low-rise structures and does not propose any structures of substantial height that would protrude into active airspace. Therefore, safety hazards related to the Project's proximity to the Stockton Metropolitan Airport are **less than significant.** And the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

**Response f):** The proposed Project does not include any actions that would impair or physically interfere with an adopted emergency response plan or emergency evacuation plan. The Project involves the development of residential land uses within an urbanized environment and would not interfere with any emergency response or evacuation plans. The nearest police station is approximately 6.1 miles south of the Project site. The nearest fire station is approximately 1.9 miles south of the Project site. Evacuation routes in the vicinity of the Project site include West Lane and Morada Lane.

As noted above, impacts related to emergency response plans or emergency evacuation plans were determined to be less than significant in the General Plan EIR (See General Plan Draft EIR, pp. 4.8-26). The application of development standards in the Stockton Municipal Code, the

application of General Plan goals and policies that would assist in minimizing or avoiding hazardous conditions, and compliance with local, state and federal standards related to hazards and hazardous materials would be required for the proposed Project. For example, the proposed General Plan includes policies and actions that ensure community members know how to protect themselves and their neighbors during emergencies and that facilitate coordinated, quick, and effective emergency response. In particular, Action SAF-2.2.A directs the City to require that new development provide adequate access for emergency vehicles and evacuation routes. The Project would be subject to this action. Action SAF-2.2.B directs the City to formulate, review, periodically update, and make available to the public emergency management plans for the safe evacuation of people from areas subject to inundation from levee and dam failure; Action SAF-2.2.C requires new critical facilities, including hospitals, emergency operations centers, communications facilities, fire stations, and police stations, to be located, designed, and constructed to avoid or mitigate potential risks and ensure functional operation during flood events, seismic and geological events, fires, and explosions; and Action SAF-2.2.D directs the City to work with San Joaquin County, the County Office of Emergency Services, other cities in the region, and disaster agencies to coordinate disaster and emergency preparedness planning. Because the Project is consistent with land use designation and density assigned to the Project site in the General Plan, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

**Response g): Less than Significant.** The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). Steep slopes contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Fuels such as grass are highly flammable because they have a high surface area to mass ratio and require less heat to reach the ignition point, while fuels such as trees have a lower surface area to mass ratio and require more heat to reach the ignition point.

The City has areas with an abundance of flashy fuels (i.e. grassland) in the outlying residential parcels and open lands that, when combined with warm and dry summers with temperatures often exceeding 100 degrees Fahrenheit, create a situation that results in higher risk of wildland fires. Most wildland fires are human caused, so areas with easy human access to land with the appropriate fire parameters generally result in an increased risk of fire.

According to the General Plan EIR, impacts related to exposure of people or structures to a significant risk of loss, injury, or death involving wildlife fires were determined to be less than significant (See General Plan Draft EIR, pp. 4.8-26 and 4.8-27). The proposed General Plan includes policies and actions that support effective response in the event of an emergency, including from a wildfire. For example, Action LU-6.1.G ensures that there are adequate fire protection service providers in the event of a fire by directing the City to maintain adequate staffing levels to support achieving the City's service level goals for fire protection. Furthermore, State and City regulations have established structural fire resistance and protection standards, as well as requirements regarding debris and vegetation in wildfire hazard areas. The Project would be subject to these State and City regulations.

Since the Project site is not located within a designated wildfire hazard area and would comply with the state and local building regulations and the General Plan policies and actions, and because the Project is consistent with land use designation and density assigned to the Project site in the General Plan, the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

## *X. HYDROLOGY AND WATER QUALITY*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality? | | | X | |
| b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin? | | | X | |
| c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: | | | X | |
| (i) result in substantial erosion or siltation on- or off-site; | | | X | |
| (ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; | | | X | |
| (iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems to provide substantial additional sources of polluted runoff; or | | | X | |
| (iv) impede or redirect flood flows? | | | X | |
| d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation? | | | X | |
| e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? | | | X | |

*Project Impacts:*

The proposed Project includes the development of a 2,241 single-family lot residential subdivision and would require grading activities that would remove some limited vegetation cover and expose soil to wind and water erosion and potentially impact water quality. Waterways in the Stockton area have the potential to flood and expose people or structures to flooding. Additional impervious surfaces from roadways, curbs, gutter, sidewalk, driveways, backyards, and roofs would be created with the development of the proposed Project.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated hydrology and water quality impacts that would occur because of the future urban development that was contemplated by the General Plan. These impacts included water quality, ground water quality and supply, drainage, flooding, risks of seiche, tsunami and mudflow (City of Stockton General Plan Draft EIR, 2018, pages 4.9-23 through 4.9-35). The analysis found that while development and buildout of the General Plan can result in hydrology and water quality impacts, these impacts would be reduced to a less than significant level through the application of development standards contained in the Grading and Erosion Control Ordinance and Stormwater Management and Discharge Control Ordinance of the Stockton Municipal Code, the application of General Plan goals and policies related to hydrology, flooding and water quality, and compliance with local, state, and federal water quality standards and floodplain development requirements.

These goals, policies and standards include, but are not limited to, erosion control measures, the City's Grading and Erosion Control Ordinance, the City's Stormwater Management and Discharge Control Ordinance, the State Water Resources Control Board General Construction Activity Storm Water Permit requirements, and goals and policies in the General Plan Safety Elements requiring the protection of new and existing development from flood and drainage hazards, the prevention of storm drainage run-off in excess of pre- development levels, and the development and application of erosion control plans and best management practices.

These impacts were adequately addressed in Chapter 4.9 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential water quality impacts from the operation of new development The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Action SAF-2.2.A: Require new development to provide adequate access for emergency vehicles and evacuation routes, including by designing roadway systems to provide multiple escape routes in the event of a levee failure.
- Action SAF-2.2.B: Formulate, review, periodically update, and make available to the public emergency management plans for the safe evacuation of people from areas subject to inundation from levee and dam failure.
- Action SAF-3.1.A: Actively participate in appropriate forums designed to discuss and solve regional water supply and quality issues.
- Policy SAF-3.2: Protect the availability of clean potable water from groundwater sources.
- Action SAF-3.2.B: Require new development to employ low impact development (LID) approaches, including:
    - Conserving natural areas and reducing imperviousness.
    - Runoff storage.
    - Hydro-modification (to mimic pre-development runoff volume and flow rate).
    - Reducing trash accumulation.
    - Public education and outreach.

*Responses to Checklist Questions*

**Response a):** To ensure that stormwater runoff from the Project site does not adversely increase pollutant levels in adjacent surface waters and stormwater conveyance infrastructure, the City requires the application of BMPs to effectively reduce pollutants from stormwater leaving the Project site during both the construction and operational phases of the Project. Additionally, projects are required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and comply with the SWQCCP. The final storm drainage infrastructure plan for the Project would also be submitted to the City for review and approval.

The collection of fees and determined fair share fee amounts are adopted by the City as Conditions of Approval (COAs) for all new development projects prior to project approval. The payment of applicable development impact fees by the proposed Project would ensure that the Project pays its fair-share of capital improvement fees towards future system expansions. Additionally, through compliance with the NPDES permit requirements, compliance with the SWQCCP, and compliance with the SWPPP, the proposed Project would not result in a violation of any water quality standards or waste discharge requirements. Compliance with the NPDES, the SWPPP required by Project Requirement 13, and the final storm drainage infrastructure plan required by Project Requirement 14, would ensure that the Project implements the requirements specified in the General Plan, and the Project would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 13****: Pursuant to Section 15.48.080 of the City's Municipal Code, the Project applicant shall prepare a Storm Water Pollution Prevention Plan (SWPPP) that includes specific types and sources of stormwater pollutants, determine the location and nature of potential impacts, and specify appropriate control measures to eliminate any potentially significant impacts on receiving water quality from stormwater runoff. The SWPPP shall require treatment BMPs that incorporate, at a minimum, the required hydraulic sizing design criteria for volume and flow to treat projected stormwater runoff. The SWPPP shall comply with the most current standards established by the Central Valley RWQCB. Best Management Practices shall be selected from the City's Manual of Stormwater Quality Control Standards for New Development and Redevelopment according to site requirements and shall be subject to approval by the City Engineer and Central Valley RWQCB.*

***Project Requirement 14:*** *Prior to approval of the Final Map, the Project applicant shall submit a detailed storm drainage infrastructure plan to the City of Stockton Development Services Department for review and approval. Pursuant to Section 16.72.200 of the City's Municipal Code, the Project's storm drainage infrastructure plans shall, to the satisfaction of the City Engineer, demonstrate adequate infrastructure capacity to collect and direct all stormwater generated on the Project site within onsite retention/detention facilities to the City's existing stormwater conveyance system, and demonstrate that the Project would not result in on- or off-site flooding impacts. The Project shall also pay all applicable development impact fees, which would include funding for offsite*

*Citywide storm drainage infrastructure improvements identified in the City of Stockton Stormwater Master Plan.*

**Response b):** The proposed Project would not result in the construction of new groundwater wells, nor would it increase existing levels of groundwater pumping. As previously discussed, the certified General Plan EIR assumed full development and buildout of the Project site with uses that are proposed under the current application. As stated in the Envision Stockton General Plan EIR, "This EIR does not evaluate the changes in the General Plan relative to the existing 2035 General Plan but rather evaluates the impacts of the proposed General Plan relative to existing conditions, as required by CEQA Guidelines Section 15126.2." In other words, the General Plan EIR described the baseline/existing conditions for Bear Creek South as agriculture and vacant and compared the existing agricultural uses/vacant site with the proposed low density residential uses planned for the site based on the Envision Stockton 2040 General Plan. As discussed in Appendix G, the Stockton General Plan EIR assumes 40,900 new residential units to be constructed through the Horizon Year of 2040. These projections are based in part on the land use inventory from the General Plan land use map, in addition to market and economic factors that drive growth. The Project site provides approximately 5% of the total housing demand through the Horizon-Year Projection, and approximately 1.8% of the total housing demand through the Full Buildout Projection. Therefore was considered in the City's planning projections, including the water planning projections. Therefore, development of the proposed Project would not be considered to interfere substantially with groundwater recharge. The Project would be required to prepare a SWPPP that would include BMPs for capturing stormwater. Therefore, the Project would not result in new or more severe impacts than what was disclosed in the General Plan EIR.

Groundwater recharge occurs primarily through percolation of surface waters through the soil and into the groundwater basin. The addition of significant areas of impervious surfaces (such as roads, parking lots, buildings, etc.) can interfere with this natural groundwater recharge process. Upon full Project buildout, portions of the Project site would be covered in impervious surfaces, which would limit the potential for groundwater percolation to occur on the Project site. However, the Project would be required to incorporate BMPs and LID approaches that minimize impervious areas and retain, reuse, and/or infiltrate stormwater, as per General Plan Action SAF-3.2.B. And because the City has adequate existing water service capacity to serve the Project, and the limited scope of impervious surface coverage (when compared to the larger groundwater basin), the proposed Project would result in not result in any new significant effects or increase the severity of previously identified environmental effects related to depletion of groundwater supplies and interference with groundwater recharge as compared with the General Plan EIR.

**Response c):** When land is in a natural or undeveloped condition, soils, mulch, vegetation, and plant roots absorb rainwater. This absorption process is called infiltration or percolation. Much of the rainwater that falls on natural or undeveloped land slowly infiltrates the soil and is stored either temporarily or permanently in underground layers of soil. When the soil becomes completely soaked or saturated with water or the rate of rainfall exceeds the infiltration capacity of the soil, the rainwater begins to flow on the surface of land to low lying areas, ditches, channels,

streams, and rivers. Rainwater that flows off a site is defined as storm water runoff. When a site is in a natural condition or is undeveloped, a larger percentage of rainwater infiltrates into the soil and a smaller percentage flow off the Project site as storm water runoff.

The infiltration and runoff process are altered when a site is developed with urban uses. Houses, buildings, roads, and parking lots introduce asphalt, concrete, and roofing materials to the landscape. These materials are relatively impervious, which means that they absorb less rainwater. As impervious surfaces are added to the ground conditions, the natural infiltration process is reduced. As a result, the volume and rate of storm water runoff increases. The increased volumes and rates of storm water runoff may result in flooding if adequate storm drainage facilities are not provided.

There are no waterways, creeks, streams, or other water courses within the Project site. As such, there is no potential for the Project to alter a water course, which could lead to on or offsite flooding. Drainage improvements associated with the Project site would be located on the Project site as per General Plan Policies and Actions requirements, and the Project would not alter or adversely impact offsite drainage facilities. Specifically, the General Plan includes policies and actions to prevent flooding, including the following:

- Policy SAF-2.3: Protect the community from potential flood events.
- Action SAF-2.3A: Coordinate with appropriate State, federal, and local flood control agencies to develop a flood protection plan for the levee systems protecting the city that:
    - Identifies the levees protecting the city and the entities responsible for the operation and maintenance of the levees;
    - Determines the flood levels in the waterways and the level of protection offered by the existing levees along the waterways;
    - Identifies a long-term plan to upgrade the system as necessary to provide at least a 100-year level of flood protection to the city, and 200-year level of flood protection, where feasible;
    - Encourages multi-purpose flood management projects that, where feasible, incorporate recreation, resource conservation, preservation of natural riparian habitat, and scenic values of the city's streams, creeks, and lakes; and
    - Includes provisions for updates to reflect future State or federally mandated levels of flood protection.
- Action SAF-2.3B: Collaborate with State and local flood management agencies and other interested parties to develop funding mechanisms to finance the local share of flood management responsibilities, and maintain cooperative working relationships with appropriate agencies to minimize flood hazards and improve safety.
- Action SAF-2.3C: Require new public and private waterfront development to be oriented to waterways and provide setbacks and easements along levees and channels to provide space for levee widening, flood fighting, roadway and maintenance access, open space and trail amenities, and appropriate landscaping.

- Action SAF-2.4C: Preserve floodways and floodplains for non-urban uses to maintain existing flood carrying capacities, except when mitigated in conformance with the City's floodplain management program.

Development of the Project site would place impervious surfaces on portions of the Project site. Development of the Project site would potentially increase local runoff production, and would introduce constituents into storm water that are typically associated with urban runoff. These constituents include heavy metals (such as lead, zinc, and copper) and petroleum hydrocarbons. BMPs will be applied to the proposed site development to limit the concentrations of these constituents in any site runoff that is discharged into downstream facilities to acceptable levels. Storm mains will be installed within the subdivision to serve the Project. Onsite stormwater runoff would be directed into an underground pipe system which would collect the runoff and direct it to the central storm drainage basin. Stormwater from this basin would be discharged via a new pump station and force main into Bear Creek through an existing 24-inch diameter outfall structure located on the south side of Bear Creek, just east of the West Lane overcrossing. The basin drawdown rate would meet COSMUD standards to discharge the 100-year, 24-hour design storm volume over a period of 48 hours and would be less than predeveloped runoff rates from the Project area.

To ensure that stormwater runoff from the Project site does not adversely increase pollutant levels in adjacent surface waters and stormwater conveyance infrastructure, Project Requirement 13 requires the preparation of a SWPPP. As described previously, the SWPPP would require the application of BMPs to effectively reduce pollutants from stormwater leaving the Project site during both the construction and operational phases of the Project.

The Project is also required to pay all applicable development impact fees. To ensure that stormwater runoff from the Project site does not adversely increase pollutant levels in adjacent surface waters and stormwater conveyance infrastructure, or otherwise degrade water quality, Project Requirement 13 requires the preparation of a SWPPP, and structural BMPs. As described above, the SWPPP would require the application of BMPs to effectively reduce pollutants from stormwater leaving the Project site, which would ensure that stormwater runoff does not adversely increase pollutant levels, and would reduce the potential for disturbed soils and ground surfaces to result in erosion and sediment discharge into adjacent surface waters during construction and operational phases of the Project. The implementation of this requirement would reduce this impact to a less than significant level.

Ultimately, to ensure that stormwater runoff generated at the Project site because of new impervious surfaces does not exceed the capacity of the existing or planned stormwater drainage system, Project Requirement 14 above requires the Project applicant to submit a detailed storm drainage infrastructure plan to the City of Stockton Community Development Department for review and approval. The Project's storm drainage infrastructure plans shall, to the satisfaction of the City Engineer, demonstrate adequate infrastructure capacity to collect and direct all stormwater generated on the Project site within onsite retention/detention facilities to the City's existing stormwater conveyance system, and demonstrate that the Project would not result in

on- or off-site flooding impacts. The implementation of this requirement would reduce this impact to a less than significant level.

The payment of all applicable fees, compliance with General Plan policies and actions, and the implementation of Project Requirements 13 and 14, would ensure that the Project would not result in any new significant effects or increase the severity of previously identified environmental effect related to drainage patterns as compared with the General Plan EIR **Response d):** The General Plan EIR identifies special flood hazard areas mapped on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). As shown, the Project site is not located within a regulatory floodway or flood zone delineated by FEMA. The Project site is in the FEMA flood zone X which is an area of minimal flood hazard. Similarly, the Project site is not located within a dam inundation area. Therefore, the Project would not result in new or substantially more severe impacts than what was disclosed in the General Plan EIR.

**Response e):** The proposed Project would be subject to a Municipal National Pollutant Discharge Elimination System Permit and would ensure that adequate drainage would be provided through connection to the City's existing water and sanitary sewer lines and development of bioretention areas for stormwater runoff. As previously mentioned, the proposed Project would be required to prepare and implement a SWPPP in accordance with applicable federal and state requirements. The SWPPP would identify BMPs that are intended to prevent erosion runoff during construction. The Project would also be required to comply with the requirements of the SWQCCP. Furthermore, the General Plan contains several policies and actions intended to protect groundwater supplies. For example, General Plan Action SAF-3.2.B requires new development to employ LID approaches that conserve natural areas and reduce impervious areas. Additionally, General Plan Policy SAF-3.2 and Actions SAF-3.1.A and SAF-3.2.A support regional efforts to reduce reliance on groundwater by directing the City to actively participate in regional forums to address water supply issues, protect the availability of clean potable water from groundwater sources, and cooperate with other regional agencies to monitor groundwater withdrawals and ensure that they fall within the target yield for the drinking water aquifer. In addition, proposed General Plan Actions LU-5.1.C and 5.4.A require new development to minimize overall water use through drought-tolerant landscaping, other best management practices for water use efficiency, and demonstrated water conservation measures.

The General Plan designates the Project site for residential use, and the Project site would be developed consistent with that land use designation. Therefore, the proposed Project is considered planned growth and would not conflict with the Water Quality Control Plan, Urban Water Management Plan, or Comprehensive Groundwater Management Plan. Impacts would be less than significant. As such, the Project would not result in new or more severe impacts than what was disclosed in the General Plan EIR and the criteria for requiring further CEQA review is not met.

## *XI. LAND USE AND PLANNING*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Physically divide an established community? | | | X | |
| b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect? | | | X | |

*Project Impacts:*

The development of 2,241 single-family residences would not physically divide the community, and there are no conflicts with land use plans, policies, or regulations.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts on land use because of the future urban development that was contemplated by the General Plan. These impacts included dividing an established community and potential conflicts with established land uses within and adjacent to the City (City of Stockton General Plan Draft EIR, 2018, pages 4.10-13 through 4.10-24). The analysis found that while development and buildout of the General Plan can result in land use impacts, these impacts would be reduced to a less than significant level through the application of General Plan goals and policies that would assist in minimizing or avoiding land use impacts.

These goals and policies include but are not limited to goals and policies in the General Plan Land Use Element requiring buffering of land uses, reviewing development proposals for compatibility issues, establishing, and maintaining development standards and encouraging communication between adjacent jurisdictions.

*Responses to Checklist Questions*

**Response a):** The Project site is surrounded by existing and proposed residential and agricultural uses. The Project is consistent with the land use designation and density assigned to the Project Site in the General Plan, and would be consistent and compatible with the surrounding land uses (which generally include vacant agricultural land proposed for development of residential uses, an elementary school, commercial uses, residential uses, and UPRR right-of-way) and would not divide an established community. As such, the Project would not result in new or more severe impacts than what was disclosed in the General Plan EIR .

**Response b):** The proposed Project would be consistent with the land use designation and density for the Project site designated in the General Plan. Thus, the Project has been designed consistent with the City's General Plan land use designation, goals and policies, and relevant ordinances, and is therefore considered planned growth that would not conflict with the General Plan. Therefore, the development of 2,241 residential lots would be consistent with the General Plan Low Density Residential designation and would not result in any impacts and would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *XII. MINERAL RESOURCES*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? | | | X | |
| b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan? | | | X | |

*Responses to Checklist Questions*

**Responses a), b):** The Stockton General Plan EIR does not identify significant mineral resources within the area. Furthermore, there are no mineral resources of local or statewide importance within the Project site. Therefore, there is no possibility of loss of mineral resources of local or statewide importance. Therefore, the proposed Project would not result in the loss of availability of known mineral resources or mineral resource recovery sites. The proposed Project would result in no impact and would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *XIII. NOISE*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Generation of a temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? | | | X | |
| b) Generation of excessive groundborne vibration or groundborne noise levels? | | | X | |
| 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? | | | X | |

*Project Impacts:*

As discussed below, development of the proposed Project will result in an increase in noise from construction and operational activities. Compliance with the General Plan goals and policies, and the City of Stockton Noise Ordinance, in addition to specific Project requirements provided herein, would reduce noise related impacts to a less-than-significant level. An Environmental Noise Assessment has been prepared for the proposed Project (Appendix D).

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts of noise associated with the future urban development that was contemplated by the General Plan. These impacts included construction noise, traffic noise, operational noise, groundborne vibration, and overall increased in noise resulting from implementation of the General Plan (City of Stockton General Plan Draft EIR, 2018, pages 4.11-30 through 4.11-53).

Noise reduction measures to address the noise impacts are incorporated into the General Plan in the Noise Element, which includes policies that require acoustical analyses to determine noise compatibility between land uses, application of stationary and mobile noise source sound limits/design standards, restriction of development of noise-sensitive land uses unless effective noise mitigations are incorporated into projects, and mitigation of noise levels to ensure that the noise level design standards of the Noise Element are not exceeded.

The General Plan EIR concluded that, despite these goals and policies, significant noise impacts will occur because of development under the General Plan and further, that these impacts cannot be reduced to a less than significant level. Specifically, the General Plan EIR noted that the existing and proposed policies, actions, and regulations would serve to reduce noise from vehicles at the source and to otherwise shield sensitive uses from excessive noise. However, while these policies, actions, and regulations would help to reduce the severity of the effects of traffic noise, they

would not prevent all the anticipated traffic noise increases along the impacted roadway segments identified in Table 4.11-14 of the EIR, and the impact would be significant. Thus, because no feasible mitigation measures are available to mitigate noise impacts to a less than significant level, traffic noise would remain a significant and unavoidable impact. Findings of fact and a statement of overriding consideration were adopted by the Stockton City Council regarding these impacts.

*Responses to Checklist Questions*
**Response a):**

**Traffic Noise Increases at Off-Site Receptors**

The Federal Interagency Committee on Noise guidelines specify criteria to determine the significance of traffic noise impacts. Where existing traffic noise levels are greater than 65 dB $L_{dn}$, a +1.5 dB $L_{dn}$ increase in roadway noise levels will be considered significant. The maximum increase is traffic noise at the nearest sensitive receptor is predicted to be 1.2 dBA. Therefore, impacts resulting from increased traffic noise would be considered **less-than-significant**, and no mitigation is required.

**Operational Noise at Existing Sensitive Receptors**

The proposed Project would include typical residential noise which would be compatible with the existing adjacent residential uses. Sensitive receptors (existing residential uses) are located 150 feet or further from the Project site. Common noise sources associated with residential, open space, and passive recreational land uses include: property maintenance equipment, music playback systems, social gatherings, public trails, and picnic areas. These types of noise sources are typically intermittent and infrequent (See General Plan Draft EIR, pp. 4.11-39). As disccused in the General Plan Draft EIR (See General Plan Draft EIR, pp. 4.11-39) through the implementation and enforcement of the proposed General Plan policies and actions and the existing Municipal Code standards, stationary source noise from long-term operations associated with the various types of proposed land uses would not substantially increase the noise environment within the EIR Study Area, and the impact would be less than significant. Because the Project is consistent with the land use designation and density assigned to the Project Site in the General Plan, and would be required to comply with the General Plan policies and actions, the City's development standards and the Municipal Code requirements, the proposed Project would result in new or substantially more severe operational noise impacts than identified in the General Plan EIR.

**Construction Noise**

During the construction phases of the Project, noise from construction activities would add to the noise environment in the immediate Project vicinity. Activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA $L_{max}$ at a distance of 50 feet. Construction activities would also be temporary in nature and are anticipated to occur during normal daytime working hours.

The City of Stockton Municipal Code exempts construction noise from the noise ordinance between the hours of 7:00 a.m. and 10:00 p.m. Construction equipment that may be used in the development of the Project has the potential to generate noise levels of up to 90 dBA $L_{MAX}$ at 50 feet. It is noted that sensitive receptors (existing residential uses) are located 150 feet or further from the Project site. Caltrans defines a significant increase due to noise as an increase of 12 dBA over existing ambient noise levels. This criterion was used to evaluate increases due to construction noise associated with the Project. Table NOI-1 shows the predicted maximum noise levels for each phase of project construction, assuming the equipment are to be used near the edge of each phase closest to existing receptors. Based upon Table NOI-1, construction related noise levels are predicted to be less than existing ambient noise levels.

***Table NOI-1: Construction Noise Levels at Nearest Receptors***

| *Phase* | *Distance to Receptors (feet)* | *Construction $L_{MAX}$, 50'* | *Construction $L_{MAX}$ at Receptor* | *Existing $L_{MAX}$[1]* | *Change* |
|---|---|---|---|---|---|
| A1 | 2,210 | 90 dBA | 57.1 dBA | 80-81 dBA | 0.0 |
| A2 | 2,210 | 90 dBA | 57.1 dBA | 80-81 dBA | 0.0 |
| A3 | 2,700 | 90 dBA | 55.4 dBA | 80-81 dBA | 0.0 |
| K1 | 185 | 90 dBA | 78.6 dBA | 80-81 dBA | 0.0 |
| K2 | 775 | 90 dBA | 66.2 dBA | 80-81 dBA | 0.0 |
| K3 | 1,470 | 90 dBA | 60.6 dBA | 80-81 dBA | 0.0 |
| T1 | 185 | 90 dBA | 78.6 dBA | 80-81 dBA | 0.0 |
| T2 | 510 | 90 dBA | 69.8 dBA | 80-81 dBA | 0.0 |
| T3 | 510 | 90 dBA | 69.8 dBA | 80-81 dBA | 0.0 |

*Source: Saxelby Acoustics, 2025.*

It is also noted that the Municipal Code Section 16.60.030 includes restrictions on construction noise. Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work between the hours of 10:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, is prohibited, except for emergency work of public service utilities. Therefore, Project construction would not cause an increase of greater than 12 dBA over existing ambient noise levels.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A Project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from the construction site. This noise increase would be of short duration and would occur during daytime hours (7:00 AM to 10:00 PM), as required by Section 16.60.030 of the City's Municipal Code.

Although construction activities are temporary in nature and would occur during normal daytime working hours, construction-related noise could result in sleep interference at existing noise-sensitive land uses in the vicinity of the construction if construction activities were to occur outside the normal daytime hours. As discussed in the General Plan Draft EIR (See General Plan Draft EIR, pp. 4.11-51), impacts from temporary or periodic increases to ambient noise levels as a result of construction would be reduced to a less–than-significant level. Because the Project is consistent with the General Plan and the analysis in the General Plan EIR, construction of the

Project would not result in new or substantially increased impacts than those identified in the General Plan EIR.

Along with Project Requirement 15 discussed below, and the Project's compliance with the General Plan policies and actions, the City's development standards and the Municipal Code requirements, the proposed Project would not result in new or substantially more severe noise impacts than identified in the General Plan EIR.

*Project Requirement(s)*

***Project Requirement 15:*** *The City of Stockton Community Development Services Department shall establish the following as conditions of approval for any permit that results in the use of construction equipment:*

- *Construction shall be limited to 7:00 a.m. to 10:00 p.m., as required by Section 16.60.030 of the City's Municipal Code.*
- *All construction equipment powered by internal combustion engines shall be properly muffled and maintained.*
- *Quiet construction equipment, particularly air compressors, are to be selected whenever possible.*
- *All stationary noise-generating construction equipment such as generators or air compressors are to be located as far as is practical from existing residences. In addition, the Project contractor shall place such stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site.*
- *Unnecessary idling of internal combustion engines is prohibited.*
- *The construction contractor shall, to the maximum extent practical, locate on-site equipment staging areas to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction.*

**Response b):** Based on information obtained from the City of Stockton General Plan DEIR, it is estimated that approximately 28 trains per day currently operate on the tracks adjacent to the Project site. As mentioned previously, information contained in the General Plan DEIR suggests that current railroad operations within the city are at or near full capacity. According to the FTA guidelines, vibration impacts would be significant if vibration levels exceed 80 VdB (for "infrequent" events, or fewer than 30 vibration events of the same source per day). Measured vibration levels at the Project site did not exceed 74 VdB at 60 feet from the center of the tracks. When projected to the building facades of the nearest residences of the development located approximately 80 feet away, vibration levels are calculated to be approximately 48 VdB. Because the projected vibration levels at the Project site would satisfy the applicable FTA vibration level criterion of 80 VdB by a wide margin, railroad vibration impacts are not identified for this Project and no additional consideration of vibration mitigation would be warranted.

The primary vibration-generating activities associated with the proposed Project would occur during construction when activities such as grading, utilities placement, and roadway construction occur. Construction vibration levels anticipated for the Project are less than the 0.2

in/sec threshold at distances of 26 feet. It is noted that sensitive receptors (existing residential uses) are located 150 feet or further from the Project site. As such, sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located further than 26 feet from typical construction activities. At distances greater than 26 feet construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

As described in the General Plan EIR, the adopted regulations included in the Stockton Municipal Code would serve to ensure that perceptible vibration can be kept to a minimum, and as such would not result in a significant impact with respect to perception. Therefore, the potential for significant impacts associated with construction vibration is less than significant. The proposed Project would comply with Action N 1e and is consistent with the analysis and conclusions included within the General Plan and General Plan EIR. As a result, short-term groundborne vibration impacts of the Project would not result in new or substantially more severe vibration impacts than identified in the General Plan EIR.**.**

**Response c):** There are no airports within two miles of the Project vicinity. The Stockton Metropolitan Airport is the closest airport to the Project site, located approximately 9.5 miles to the south. The Project site is located outside of both the 65 dB Community Noise Equivalent Level (CNEL) and the 60 dB CNEL noise contours for the Stockton Metropolitan Airport, and the Project site is outside of the Airport Influence Area (AIA). As such, the Project site would not be exposed to excessive noise from the Stockton Metropolitan Airport**,** and the Project would not result in new or substantially more severe airport noise impacts than identified in the General Plan EIR.

## *XIV. POPULATION AND HOUSING*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? | | | X | |
| b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere? | | | X | |

*Project Impacts:*

The proposed Project will result in the construction of 2,241 single-family residential units, which would increase population growth within the Project area.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated population and housing impacts that would occur because of the future urban development that was contemplated by the General Plan. These impacts included population growth and availability of housing opportunities (City of Stockton General Plan Draft EIR, 2018, pages 4.12-5 through 4.12-8). The analysis found that while development and buildout of the General Plan can result in population and housing impacts, implementation of the General Plan would not contribute to a significant generation of growth that would substantially exceed any established growth projections nor would it displace substantial numbers of housing units or people. Moreover, the proposed Project will not construct off-site infrastructure that would induce substantial development, unplanned or otherwise. As such, population and housing impacts were determined to be less than significant. These impacts were adequately addressed in Chapter 4.12 of the General Plan EIR.

As noted previously, the Stockton General Plan EIR (the EIR) provides the Development Projections that are used in the EIR (See General Plan Draft EIR, pp. 3-20). The EIR explains that it uses a "horizon-year projection," which is based on an estimate of the amount of development that would occur by 2040. The EIR also uses a Buildout Projection which represents full buildout of the General Plan, but with a date uncertain. Each projection is described below:

The horizon-year projection includes the following (See General Plan Draft EIR, pp. 3-20):

- 40,900 new dwelling units, including:
  - 26,300 new single-family units
  - 14,600 new multi-family units
- 132,200 new residents
- 13.8 million square feet of new commercial and office space
- 35.6 million square feet of new industrial space

The full buildout projection includes the following (See General Plan Draft EIR, pp. 3-22, and Table 3-2):

- 119,700 new dwelling units, including:
  - 43,800 new single-family units
  - 75,900 new multi-family units
  -
- 386,700 new residents
- 50.9 million square feet of new commercial and office space
- 242.4 million square feet of new industrial space

The EIR indicates that there are almost 7,000 acres of vacant within the SOI (i.e. the EIR Study Area) (See General Plan Draft EIR, pp.3-22), which specifically includes the 530.18-acre Project site. The EIR indicates that a land use demand forecast (prepared as part of a Market Analysis that supports the projections for the General Plan) for Stockton in 2040 results in between 19,800 and 41,000 new housing units, including between 13,800 and 28,700 new single-family units and between 5,900 and 12,300 new multi-family units (See General Plan Draft EIR, pp. 3-24). These projections are based in part on the land use inventory from the General Plan land use map, in addition to market and economic factors that drive growth. Out of the 40,900 new units projected for the horizon year of the General Plan buildout, 12,100 units would result from the growth projected in 2040 from the General Plan and 28,800 units are expected as a result of the growth from Approved and Pending Projects. (See General Plan Draft EIR, pp. 3-22, and Table 3-2): As the Project's proposed 2,241 units are being proposed in accordance with the Proposed density and land use designation in the General Plan, they are assumed to be included in the 12,100 units resulting from the growth projected in 2040 from the General Plan. Further, the Project site provides approximately 5% of the total housing demand through the Horizon-Year Projection, and approximately 1.8% of the total housing demand through the Full Buildout Projection. There is nothing peculiar about the Project as it relates to house capacity/demand provided in the Horizon-Year Projection, Full Buildout Projection, or the Market Study Projections.

The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed.

*Responses to Checklist Questions*

**Response a):** The proposed Project is consistent with the land use designation and density in the General Plan and can be considered planned growth assumed under the General Plan. Therefore, the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Response b):** The Project site is undeveloped and does not include any existing housing or residents requiring replacement housing. Therefore, no impact would occur, and the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *XV. PUBLIC SERVICES*

| | | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|---|
| a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: | | | | X | |
| i) | Fire protection? | | | X | |
| ii) | Police protection? | | | X | |
| iii) | Schools? | | | X | |
| iv) | Parks? | | | X | |
| v) | Other public facilities? | | | X | |

*Project Impacts:*

The proposed Project includes the development of a 2,241 single-family lot residential subdivision and would be anticipated to increase the need for the provision of new and/or expanded public services or facilities.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts on the demand for fire and police protection and school and recreation facilities because of the future urban development that was contemplated by the General Plan. These impacts included increased demand for fire, police and school services, provision of adequate fire flow, and increased demand for parks and recreation (City of Stockton General Plan Update Draft EIR, 2018, pages 4.13-10 through 4.13-40). The analysis found that while development and buildout of the General Plan can result in public services and facilities impacts, these impacts would be reduced to a less than significant level through compliance with state and local standards related to the provision of public services and facilities and through the application of General Plan goals and policies that would assist in minimizing or avoiding impacts to public services and facilities.

These goals, policies and standards include, but are not limited to the California Fire Code, the California Health and Safety Code, Chapters 5.08 and 5.12 of the Stockton Municipal Code, and goals and policies in the General Plan Safety Element requiring periodic review of the City's Development Impact Fee requirements, proportional share participation in the financial costs of public services and facilities, maintaining adequate staffing levels, providing adequate access for

emergency vehicles and evacuation routes, and requiring certain types of development that may generate higher demand or special needs to mitigate the demands/needs.

These impacts were adequately addressed in Chapter 4. 13 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to public services of the City. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Action LU-6.1.G: Maintain adequate staffing levels to support achieving the City's service level goals for police and fire protection.
- Action SAF-1.2.A: Update the City's Design Guidelines and Development Code to require new and retrofitted development to support effective police and fire protection response and services by using the following principles of crime prevention through environmental design (CPTED):
    - Delineate private and public spaces
    - Enhance visibility
    - Control property access
    - Ensure adequate property maintenance
- Action SAF-2.2.A: Require new development to provide adequate access for emergency vehicles and evacuation routes, including by designing roadway systems to provide multiple escape routes in the event of a levee failure.
- Action SAF-2.2.C: Require new critical facilities, including hospitals, emergency operations centers, communications facilities, fire stations, and police stations, to be located, designed, and constructed to avoid or mitigate potential risks and ensure functional operation during flood events (i.e., avoid locating in the 100-year and 200-year floodplains), seismic and geological events, fires, and explosions.
- Action LU-6.3.A: Require development to mitigate any impacts to existing sewer, water, stormwater, street, fire station, park, or library infrastructure that would reduce service levels.

*Responses to Checklist Questions*

**Response a):**

**i) Fire Protection and Emergency Medical Services:** The proposed Project is located within the jurisdiction of the Stockton Fire Department (SFD). All new future construction would meet all applicable building and safety codes and would be required to be reviewed for safety access. The Project would not require the development of any new SFD facilities. The Project would be served by Fire Station 13 (3606 Hendrix Drive, Stockton), which is located approximately 1.43 road miles from the southeastern proposed Project entry, or Station 11 (1211 E Swain Road, Stockton), which is located approximately 2.22 miles from the southwestern proposed Project entry.

Fire response time is a function of the time interval for receiving and processing an emergency call (911 dispatch/emergency communication center), the turnout time (responding fire company), and the travel time to the incident (responding fire company). In calculating fire response times, the time interval for the receiving and processing an emergency call and the fire company turnout is generally a fixed time interval as established by the National Fire Protection Association (NFPA). The time interval for travel time, however, is highly variable because it is dependent on travel distance to the incident and the speed at which the fire vehicle/apparatus can safely travel given the roadway infrastructure, weather conditions, number of turns/intersections, roadway congestion, and other factors. Urban and suburban areas will generally have different travel conditions, which will affect travel speeds. The roadway design speed can vary significantly on roadways and will affect the safe travel speed for emergency vehicles (i.e. freeways, arterials, collectors, and local roads will accommodate varying travel speeds).

The RAND Corporation conducted extensive studies of fire department response times and developed a formula for calculating travel time. ISO, working with several fire departments, recently conducted its own review of the formula and found the RAND work still valid as a predictive tool. The RAND formula is as follows:

$$T = 0.65 + (S)D$$

- T = time in minutes to the nearest 1/10 of a minute
- 0.65 = a vehicle-acceleration constant for the first 0.5 mile traveled
- S = a vehicle-speed constant validated for response distances ranging from 0.5 miles to 8.0 miles.
    - Average Speed Factor = 60 ÷ Average Speed
- D = distance traveled in miles

The General Plan indicates that the Stockton Fire Department attempts to achieve a travel time standard of 4 minutes or less for the initial arriving company, and 8 minutes or less for the full alarm assignment. (*It is noted that “travel time” does not include call processing and turnout time.) The City’s travel time goal is consistent with National Fire Protection Association (NFPA) 1710, which indicates that travel time to a fire incident should be 4 minutes or less for the initial arriving company and within 8 minutes for all other arriving companies. NFPA 1710 also indicates that turnout time should be 80 seconds for fire incidents and 60 seconds for EMS incidents. To achieve this rating, and to meet the City’s recommended goal, the Stockton Fire Department must maintain adequate personnel, updated equipment and facilities to provide service within their territory to meet the demand (call volume). The following discussion summarizes the calculated fire department response times specifically for the proposed Project.

The anticipated fire response time to reach the Project site would be 2.55 to 3.10 minutes, which is below the four-minute travel time goal for fire response.

Expected Travel Time in Minutes = 0.65 + (1.33 × 1.43 Miles)

⇔ Expected Travel Time in Minutes = 2.55

Expected Travel Time in Minutes = 0.65 + (1.5 × 1.43 Miles)

⇔ Expected Travel Time in Minutes = 2.80

Expected Travel Time in Minutes = 0.65 + (1.71 × 1.43 Miles)

⇔ Expected Travel Time in Minutes = 3.10

Emergency vehicle access is anticipated to be sufficient since the onsite road would connect to the entrance of the Project site and emergency vehicles would have adequate ability to turn around on the Project site. Furthermore, impact fees from new development are collected based upon projected impacts from each development. The adequacy of impact fees is reviewed on an annual basis to ensure that the fee is commensurate with the service. Payment of the applicable impact fees by the Project applicant as COAs prior to Project approval, and ongoing revenues that would come from property taxes, sales taxes, and other revenues generated by the Project, would fund capital and labor costs associated with fire protection services.

To provide adequate fire protection and suppression services to the Project site, the SFD must have access to adequate onsite hydrants with adequate fire-flow pressure available to meet the needs of fire suppression units. The final site plans and development specifications developed for the proposed Project will indicate the location and design specifications of the fire hydrants that will be required within the Project site.

The proposed Project would comply with all applicable General Plan policies related to reducing fire risks. Project plans would also be reviewed by the SFD to ensure that the Project site is acceptable for fire safety purposes. As noted in Section XX, Wildfire, the Project site is not located in or near a State Responsibility Area (SRA). The City of Stockton, including the Project site, is not categorized as a "Very High" Fire Hazard Severity Zone (FHSZ) by CalFire.

Further, the proposed Project is consistent with the Residential land use designation for the Project site, and therefore to the extent that the Project would increase demand for fire protection services was previously considered by the General Plan EIR. There is no anticipated requirement for a new fire station with this Project. The Project would not result in new or substantially more severe impacts than identified in the General Plan EIR, no mitigation measures are required, and the criteria for requiring further CEQA review are not met.

**ii) Police Protection:** Impact fees from new developments are collected based upon projected impacts from each development by the City as COAs prior to Project approval. The adequacy of impact fees is reviewed on an annual basis to ensure that the fee is commensurate with the

service. Payment of the applicable impact fees by the Project applicant, and ongoing revenues that would come from property taxes, and other revenues generated by the Project, would fund capital and labor costs associated with police services.

Upon annexation into the City of Stockton, the Project site would be served by the Stockton Police Department. As previously discussed, the proposed Project is consistent with the Residential land use designation for the Project site, and therefore the extent that the Project would increase demand for police protection services was previously considered by the General Plan EIR. The Project would not result in new or substantially more severe impacts than identified in the General Plan EIR, no mitigation measures are required, and the criteria for requiring further CEQA review are not met.

It is not anticipated that implementation of the proposed Project would result in significant new demand for police services. Project implementation would not require the construction of new police facilities to serve the Project site, nor would it result in impacts to the existing response times and existing police protection service levels.

**iii) Schools:** The proposed Project is within the service area of the Lodi Unified School District (LUSD). All new residential development in the City is required to pay a developer impact fee to fund school improvement projects to mitigate impacts to school facilities, as applicable. The development impact fee is the source of school capital improvement funding provided by new development. The LUSD is eligible to levy Level 1 development impact fees on new residential and commercial development. Development impact fees for LUSD are $3.48 per square foot of single-family residential development. The proposed Project includes the development of 2,241 additional housing units. The number of students generated by the proposed residential Project would be consistent with the levels assumed in General Plan EIR as the Project is consistent with General Plan's land use assumptions for the Project site.

Payment of development fees is considered to fully mitigate the impacts of new development on school facilities under Section 65996 of the California Government Code. Therefore, the proposed Project would not result in new or substantially more severe impacts than identified in the General Plan EIR. No mitigation measures are required and the criteria for requiring further CEQA review are not met.

**iv) Parks:** Potential Project impacts to parks and recreational facilities are addressed in Section XVI below.

**v) Other Public Facilities:** The Project is within the scope of projected growth under the General Plan and the anticipated uses on the Project site are assumed in the General Plan EIR. The Project would result in the construction of an additional 2,241 residential units that would increase demand for other public facilities.

As described in the General Plan EIR Impact 3.13-39 the General Plan implementation potential to result in adverse physical impacts associated with the deterioration of other public facilities, such as Stockton-San Joaquin County Public Library (SSJCPL) library facilities, was found to be

less than significant. Development anticipated under the proposed Project would be consistent with development levels analyzed in the Stockton General Plan EIR. In-lieu fees would be required upon issuance of a building permit. In-lieu fees would ultimately fund the construction of other public facilities to offset the increased demand for these facilities, but location and timing new or expanded library of such facilities is not yet known. (See General Plan EIR, p. 4.13-40.) Therefore, the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR. No mitigation measures are required and the criteria for requiring further CEQA review are not met.

## *XVI. RECREATION*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? | | | X | |
| b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment? | | | X | |

*Project Impacts:*

The proposed Project includes the development of a 2,241 single-family lot residential subdivision and would be anticipated to increase the use of, and demand for, recreational facilities.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts on the demand for recreation facilities because of the future urban development that was contemplated by the General Plan. These impacts included increased demand for parks and recreation (City of Stockton General Plan Update Draft EIR, 2018, pages 4.13-26 through 4.13-30). The analysis found that while development and buildout of the General Plan can result in recreation facilities impacts, these impacts would be reduced to a less than significant level through the application of General Plan goals and policies that would assist in minimizing or avoiding impacts to recreation facilities. The General Plan has established a parkland standard of 2 acres of neighborhood parkland, 3 acres of community parkland, and 3 acres of regional parkland per 1,000 residents. The General Plan has adopted goals and policies to ensure that this standard is met. These goals and policies call for the provision of new park and recreational facilities as needed by new development through parkland dedication and the payment of park and recreation fees. These programs and practices are recognized in the General Plan Open Space, Conservation and Recreation Element, which mitigates these impacts to a less than significant level.

In addition, compliance with state and local standards related to the provision of public services and facilities and the application of General Plan goals and policies would assist in minimizing or avoiding impacts to public services and facilities, as noted above. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to park and recreational facilities of the City. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Policy LU-3.3: Maintain or expand the currently available amount of public park and open space area in each neighborhood.

- Action LU-3.3.A: Continue to improve and maintain park facilities and fields to address deficiencies and improve park sustainability, including lighting improvements, conversion to solar lighting, drinking fountain maintenance, and natural stormwater management.
- Action LU-3.3.B: Pursue joint use recreational facilities where possible, including on school grounds and utility easements.
- Action LU-3.3.C: Establish a citywide park maintenance assessment district.
- Action LU-3.3.D: Periodically review the City's Development Impact Fee requirements to determine whether they should be adjusted to reflect the City's priorities for parks, community centers, and libraries that serve the surrounding neighborhoods.
- Action SAF-1.3.A: Design and maintain parks, waterways, trail corridors, and other facilities to meet the recreational needs of the community, while maximizing public safety and access concerns, such as through the following approaches:
    - Locate facilities to ensure visibility along public roadways where appropriate;
    - Provide clear access points;
    - Maintain vegetation to maximize visibility and demonstrate active attention to the Project site; and Use signage to clearly convey site ownership and rules.
- Policy CH-1.1: Maintain walking and wheeling facilities and parks that are safe and accessible in all areas of Stockton.
- Action CH-1.1.B: Prepare a parks master plan that assesses the quality and distribution of existing parks, facilities, and community centers throughout the city relative to the population served (i.e., within a set walking distance) and their needs (i.e., considering age, income, and abilities), and, based on this information, identifies and prioritizes new, renovation, and expansion park and community center projects and describes funding means and timelines.

*Responses to Checklist Questions*

**Responses a), b):** As discussed in the General Plan EIR, new residents from development allowed by the General Plan would increase the demand for recreational opportunities and facilities. In addition, the proposed Project includes construction of additional parks or recreational facilities. The Project is constructing its fair share of local and neighborhood parks in accordance with General Plan parkland requirements and the resulting proposed Project population to adequately serve future project residents. The potential for environmental impacts associated with construction and operation of a park within the residential areas on the Project site are addressed throughout this document. There are no other anticipated impacts associated with the park facility construction activities beyond what is already discussed throughout this document.

The General Plan contains policies and actions that would support parkland goals, and, as described in Section 4.13.3.1, the Stockton Municipal Code establishes parkland dedication and/or fee requirements for new development. The collection of fees and determined fair share fee amounts are adopted by the City as COAs for all new development projects prior to project

approval. Fees paid aid in the development of new park-space and maintenance as required, to ensure continued high quality park facilities for all City residents.

Furthermore, the Project is within the scope of projected growth under the General Plan and the anticipated uses on the Project site areas assumed in the General Plan EIR. Additionally, the Project includes construction of certain parks to serve the Project residents, the construction impacts of which are addressed throughout this document. Thus, the Project would not result in new or substantially more severe impacts than identified in the General Plan EIR, and the overall impact of constructing new park facilities on the Project site will be **less than significant** impact.

## *XVII. TRANSPORTATION*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Conflict with a program plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities? | | | X | |
| b) Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)? | | | X | |
| c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? | | | X | |
| d) Result in inadequate emergency access? | | | X | |

*Project Impacts:*

The following is based on the Transportation Impact Analysis completed for the Project by Barrios Transportation Consulting (July 25, 2024). See Appendix E.

### Project Trip Generation

This section presents the forecasted Project trip generation, including trip distribution and assignment.

*Trip Generation*

Trip generation refers to the process of estimating the amount of vehicular traffic a Project would add to the surrounding roadway system. Estimates are created for the daily condition and for the peak one-hour period during the morning and evening commute when traffic volumes on the adjacent streets are typically the highest. Project trip generation was estimated using rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition), with the resulting estimates presented in Table Traffic-1. The Project is expected to generate approximately 17,633 new daily vehicle trips, including approximately 1,262 morning peak hour and 1,848 evening peak hour trips.

***Table Traffic-1: Project Trip Generation***

| *Land Use* | *Quantity* | *Daily Trips* | *AM Peak Hour Trips* | | | *PM Peak Hour Trips* | | |
|---|---|---|---|---|---|---|---|---|
| | | | *In* | *Out* | *Total* | *In* | *Out* | *Total* |
| Single-family detached housing (ITE 210) | 2,241 Dwelling Units | 17,633 | 316 | 946 | 1,262 | 1,164 | 684 | 1,848 |
| *Notes:*<br>*ITE land use category 210 – Single-Family Homes (Adj Streets, 7-9A, 4-6P):*<br>*Daily: Ln(T) = 0.92Ln(X) + 2.68*<br>*AM Peak Hour: Ln(T) = 0.91Ln(X)+0.12; Enter = 25%; Exit = 75%*<br>*PM Peak Hour: Ln(T) = 0.94Ln(X) + 0.27; Enter = 63%; Exit = 37%* | | | | | | | | |

*Source: BTC, 2024.*

### *Trip Distribution*

Project trip distribution refers to the directions of approach and departure that vehicles would take to access and leave the site. Estimates of Project trip distribution were developed based on City of Stockton Travel Demand Model and engineering judgement using existing traffic count data and land use patterns. The trip distribution percentages are shown in Table Traffic-2 and traffic assignment is shown on Figure 3-1 of Appendix E.

***Table Traffic-2: Project Trip Generation***

| *Direction of Travel* | *% of Travel* |
|---|---|
| Eight Mile Road: West of West Lane | 6% |
| West Lane: North of Eight Mile Road | 11% |
| Eight Mile Road: East of West Lane | 2% |
| Morada Lane: East of Diamond Bar Place | 40% |
| Holman Road: North of Morada Lane | 3% |
| Holman Road: South of Morada Lane | 4% |
| Hammer Lane: West of West Lane | 7% |
| Hammer Lane: East of West Lane | 4% |
| West Lane: South of Hammer Lane | 14% |
| South of Morada Lane: West of West Lane | 3% |
| South of Morada Lane: East of West Lane | 2% |
| Morada Lane: West of West Lane | 4% |

*Source: BTC, 2024.*

### *Responses to Checklist Questions*

**Response a):** Barrios Transportation Consulting reviewed the City of Stockton Envision 2040 General Plan (2018) and City of Stockton Bicycle Master Plan (2017) to determine if the proposed Project results in any inconsistencies with adopted transportation related policies or design standards.

### *Stockton General Plan*

***Land Use & Zoning:*** The adopted City of Stockton General Plan designates the Project site as low density residential allowing the maximum density of 6.1 dwelling units per acre. The Project is consistent with the adopted General Plan land use designation and density included in the Envision General Plan 2040 as the Project proposes an average density of 5.8 single family dwelling units per acre.

***Transportation:*** Relevant policies include:

- Policy TR-1.1: Ensure that roadways safely and efficiently accommodate all modes and users, including private, commercial, and transit vehicles, as well as bicycles and pedestrians and vehicles for disabled travelers.

- Policy TR-2.1: Develop safe and interconnected bicycle and pedestrian facilities, including along "complete" streets that target multiple travel modes.
- Policy TR-3.1: Avoid widening existing roadways in an effort to preclude inducement of additional vehicle traffic.

Proposed street sections for new streets to be constructed by the Project meet the minimum City of Stockton design standards for low and medium volume residential streets (City of Stockton Standard Drawings, No. R-4, R-14), which comply with the General Plan policy and action listed above. An assessment of existing and proposed transit, bicycle and pedestrian facilities is provided below.

**Transit Network:** In the Project vicinity, within one half-mile walking distance, transit service (Route 93) is provided along West Lane by the San Joaquin Regional Transit District (SJRTD). SJRTD is the regional transit provider for San Joaquin County, serving the Stockton Metropolitan Area and the County with intercity, interregional, and rural transit services. Route 93 travels between Lodi (Lodi Transit Station [LTS]) and Downtown Stockton (Downtown Transit Center [DTS]). A bus stop for northbound travel is provided on the east side of West Lane at the southeast corner of the West Lane/Morada Lane intersection. A bus stop for southbound travel is provided on the west side of West Lane about 600 feet north of Morada Lane. Neither bus stop provides transit stop amenities (e.g., benches, shelters, etc.).

As of July 30, 2023, northbound bus service begins at the DTC at 6:10 AM and ends at the LTS at 7:39 PM. The frequency of service ranges from 1 to 3 hours. Southbound bus service begins at the LTS at 6:03 AM and ends at the DTC at 8:52 AM. The frequency of service ranges from 1 to 2.5 hours.

The Project does not disrupt an existing transit facility or service and would not interfere with the implementation of future transit service; therefore, the Project's impact to transit would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Bicycle Network:** Bicycle facilities include the following:

- Bike paths (Class I) – Bike paths are paved trails that are separated from roadways. These trails are sometimes shared with pedestrians.
- Bike lanes (Class II) – Bike lanes are lanes on roadways designated for use by bicycles through striping, pavement legends, and signs.
- Bike routes (Class III) – Bike routes provide a right-of-way designated by signs and/or pavement markings (also known as "sharrows") to alert motorists to expect to share this roadway with bicyclists. A Bicycle Boulevard is a special type of shared route that optimizes bicycle travel. Bike Boulevards can have a variety of traffic calming elements to improve safety and comfort for bicycles.
- Separated bikeways (Class IV) – Separated bikeways, also referred to as cycle tracks or protected bikeways, are bikeways for the exclusive use of bicycles which are physically separated from vehicle traffic. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers, or on-street parking.

In the Project vicinity, within a two-mile bicycling distance, there are Class III bicycle facilities on West Lane between Morada Lane and Bear Creek. Although there are paved shoulders on West Lane north of Bear Creek (within San Joaquin County) there are no signs or pavement markings indicating Class III bicycle facilities.

Class II bicycle facilities are provided on Morada Lane on both the north and south sides but the start and end points are different. On the south side, the bicycle lane starts about 250 feet west of Fox Creek Drive and ends at the Maranatha Drive intersection.

On the north side, the bicycle lane starts at the Diamond Bar Place intersection and ends at the Holman Road intersection. Between Holman Road and the UPRR tracks there are sections of paved shoulder but there are no bicycle pavement markings or signs. Just west of the UPRR tracks there is about 200 feet of striped Class II bicycle facility that is unusable because the start of the bike lane is blocked by K-rail (temporary concrete traffic barrier).

The Project would provide the following along its frontage: 1) Class II bike lanes on Morada Lane and 2) one-way separated bikeway (Class IV) on West Lane. The proposed bicycle facilities are consistent with the *City of Stockton Bicycle Master Plan* (2017). The Project does not disrupt existing bicycle facilities, interfere with planned bicycle facilities, or propose any changes to the bicycle system that are inconsistent with adopted bicycle system plans; therefore, the Project's impact to the bicycle system would not result in new or substantially more severe impacts than identified in the General Plan EIR. .

**Pedestrian Facilities:** Pedestrian facilities include sidewalks, crosswalks, pedestrian signals, and multi-use trails. In the Project vicinity, sidewalks are not currently provided on West Lane or Morada Lane along the Project's frontage. Existing sidewalk (within one half-mile walking distance from the Project site) is provided on the following roadways:

- West side of West Lane north of Morada Lane (8-foot sidewalk)
- East side of West Lane south of Morada Lane (4-foot sidewalk)
- South side of Morada Lane (4-foot sidewalk)
- North side of Morada Lane east of the eastern edge of the Project site boundary (4-foot sidewalk)
- Both sides of the Caywood Drive, Cherbourg Way, and Fox Creek Drive (4-foot sidewalk)

Near the Project vicinity, the intersection of West Lane/Morada Lane provides crosswalks on the west and south legs of the intersection. The West Lane/Morada Lane intersection provides access to the Ronald E. McNair High School and as a result there is high pedestrian demand at the intersection.

There are currently no pedestrian facilities along the Project frontage. The Project would construct eight-foot-wide sidewalks along the Project frontage on Morada Lane and West Lane, which is consistent with the City of Stockton Standard Plans and Specifications. The Project does not disrupt existing pedestrian facilities, interfere with planned pedestrian facilities, or propose any changes to the pedestrian system that would be inconsistent with pedestrian system policies,

therefore the Project's impact to the pedestrian system would not result in new or substantially more severe impacts than identified in the General Plan EIR.

*Policy Consistency Determination*

The proposed street network will connect into the greater Stockton community at five access points, including three along Morada Lane and two along West Lane. These connection points will be made up of a combination of minor arterial roads, with and without a median, and collector roads. The street network within Project site is intended to contribute to the aesthetics of the community, with residents experiencing varied street scenes and street designs.

As noted previously, the Project will include full frontage improvements along West Lane and Morada Lane. Included in these improvements will be full signalized intersections at the northern entry point along West Lane and at the central entrance along Morada Lane.

The proposed Project is consistent with adopted transportation-related programs, plans, ordinances, and policies. The Project's street improvements are subject to the City's adopted street plans and design standards. Therefore, the Project is not expected to impact the proposed and surrounding circulation system, including planned transit, roadway, bicycle, and pedestrian facilities.

The payment of applicable traffic impact fees by the proposed Project would ensure that the Project pays its fair-share of capital improvement fees towards the future transportation system improvements and expansions. Payment of these fair-share traffic impact fees would assist the City with implementation of various improvements, to maintain acceptable levels of service throughout the City.

The proposed Project would not induce any additional required improvements. The collection of fees and determined fair share fee amounts are adopted by the City as COAs for all new development projects prior to project approval. The payment of the required traffic impact fees to the City of Stockton would reduce Project-related traffic impacts to a **less than significant** level.

Moreover, the Project is within the scope of projected growth under the General Plan and the anticipated uses on the Project site as assumed in the General Plan EIR. As discussed in Appendix G, the Project is considered planned growth under the General Plan and was considered in the analysis of the General Plan EIR, which acknowledged LOS impacts from buildout of the City. Therefore, the proposed Project would not result in new or substantially more severe LOS impacts than identified in the General Plan EIR.

**Response b)**: As of July 1, 2020, CEQA Guidelines Section 15064.3(b) states that the recommended metric for the evaluation of transportation impacts is VMT. It outlines the criteria for analyzing a project's transportation impacts. For land use projects, this section states that "vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact."

For the purposes of CEQA, level of service cannot be used to determine a project's environmental impact; CEQA Guidelines Section §15064.3 requires Vehicle Miles of Travel (VMT) analysis for land use developments. The City of Stockton VMT impact analysis process is documented in the *City of Stockton Transportation Impact Analysis Guidelines* (Adopted May 2, 2023).

According to the City's TIA Guidelines, a project is relieved from VMT impact analysis if it meets one of the following screening criteria:

1. Within a Transit Priority Area (TPA);
2. Is 100% restricted affordable housing;
3. Small project (generating 110 trips or less per day);
4. Is a locally serving public facility that contributes and supports community needs;
5. Neighborhood-serving retail project less than 50,000 square feet;
6. Located within a low VMT area; or
7. For specific project types that are consistent with General Plan and zoning standards, and do not trigger and EIR such as:
    a. **Housing**: Residential projects within the City Limits that are consistent with all General Plan and zoning standards, are near transit (i.e., is within half a mile of a transit stop), or included as a housing capacity site needed to meet the City's fair share of Regional Housing Needs Allocation (RHNA), as outlined in the City's Housing Element.
    b. **General Plan and Zoning Consistency**: Projects that are:
        i. Consistent with the General Plan and Zoning that do not require a General Plan land use map amendment.
        ii. Do not require an EIR for project related impacts beyond the General Plan EIR.
        iii. Located within the Greater Downtown Planning area, as defined in the General Plan, and do not require a land use map amendment or EIR.

As discussed in Appendix G, the Project meets screening criteria #7 (consistent with General Plan & zoning standards). The Project is consistent with the land use presented in the *Envision Stockton 2040 General Plan* (i.e., low density residential with less than 6.1 units per gross acre). The Project is also located within a half-mile of two transit stops on West Lane. Based on the screening criteria the Project is presumed to not require additional CEQA VMT impact analysis.

**Response c)**: Vehicular access to the Project site would be provided by two unsignalized and three signalized intersections that are designed to be perpendicular to the major streets. Parking is restricted on the major streets and there are no additional obstructions that would limit sight distance from the Project driveways. The Project would also provide turn pockets with adequate vehicle storage and deceleration lane distance. As with current practice, the improvements would be designed and reviewed in accordance to the City of Stockton Standard Specifications, which are developed by the Public Works Department and adopted by the City. The Project does not propose any substandard design features, therefore, the Project's impact to geometric design

hazards would not result in new or substantially more severe impacts than identified in the General Plan EIR.

**Response d)**: Several factors determine whether a project has adequate access for emergency vehicles, including the following:

1. Number of access points (both public and emergency access only)
2. Width of internal roadways
3. Turnarounds at dead-end streets

As discussed in the General Plan Draft EIR, impacts related to hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment) were determined to be less than significant (See General Plan Draft EIR, pp. 4.14-37).

Emergency vehicle access to the Project site is provided from all five roadway access locations that are designed to accommodate emergency vehicles. Cross-sections for the proposed streets within the Project site were reviewed and all street sections provide a minimum of 20-feet of clearway (meaning no obstructions in terms of parked vehicles, landscaping, etc.), such that sufficient width is provided for emergency vehicle access and circulation. There are several dead-end streets provided within the residential development that measure less than 500-feet and provide 96-foot diameter cul-de-sacs. This meets the requirements of the California Fire Code. Emergency vehicle access to the Project site is consistent with Policy SAF-2.2 and Action SAF-2.2A of the General Plan. As the Project would be subject to City engineering standards and the proposed General Plan actions, the Project's impact to emergency access would not result in new or substantially more severe impacts than identified in the General Plan EIR.

## *XVIII. TRIBAL CULTURAL RESOURCES*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: | | | X | |
| a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)? | | | X | |
| b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resources to a California Native American tribe. | | | X | |

*Project Impacts:*

As discussed above in Section V, a *Cultural Resource Assessment Summary* was prepared for the proposed Project, which was prepared based on a records search, check of the Native American Heritage Commission Sacred Lands files, and a field survey of the Project Site by a qualified archeologist. The Project site does not contain any known resources that are listed with the California Register of Historical Resources or that have been determined by the lead agency to have significance to a California Native American Tribe. However, during the field survey of the Project site, prehistoric period artifacts and prehistoric flakes were found in three locations in roughly the same area as the recorded location of P-39-00005 and P-39-004641. The field survey, however, failed to re-locate the recorded sites in the site records, which may be due to crop rotation, error in the original site recordation, or plowing within the development area. The proposed Project is in a region where cultural resources have been recorded in the past and there remains a potential that some undocumented archaeological resources that may meet the Tribal Cultural Resource definition could be unearthed or otherwise discovered during ground-disturbing and construction activities. Thus, the City is treating these prerecorded period resources as Tribal Cultural Resources under PRC section 21074.

However, less-than-significant impacts to tribal cultural resources are anticipated with incorporation of Project Requirements.

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts that would occur to historical, cultural, tribal cultural, and paleontological resources within the Planning area because of the future urban development that was contemplated by the General Plan. These impacts included potential destruction or damage to any historical, cultural, and paleontological resources (City of Stockton General Plan Draft EIR, 2018, pages 4.5-16 through 4.5-20). However, the General Plan contains goals, policies, and actions for the preservation and treatment of prehistoric, archaeological, historical, cultural, and paleontological resources. In particular, prior to development, as part of the permitting process, Action LU-5.2.D and Project Requirement 6 requires subsurface testing of the property prior to construction for identification of any buried sites are located on-site via subsurface testing and protection of archaeological resources, including avoidance and through a treatment plan in accordance with the Secretary of the Interior's Standards for Treatment of Archaeological Sites where avoidance is not feasible. In addition, as described in Section 4.5.1.1, the Stockton Municipal Code requires appropriate evaluation of unanticipated archaeological deposits discovered during ground-disturbance. The General Plan action described above, combined with the Stockton Municipal Code requirements, would protect historical archaeological deposits in the EIR planning area by providing for the early detection of potential conflicts between development and resource protection, and by preventing or minimizing the material impairment of the ability of archaeological deposits to convey their significance through excavation or preservation. Implementation of the proposed action identified above, as well as compliance with federal, State, and local laws and regulations, would reduce potential impacts to historical archaeological deposits to a less-than-significant level.

*Responses to Checklist Questions*

**Responses a), b):** According to the General Plan EIR, cultural resources have been identified within the Stockton Planning Area; however, as noted previously, five resources have been reported in the Project area. One of the sites listed as in the Project area is the bridge over Bear Creek on the railroad line, technically outside the Project area (P-3900363). Another site records the levees along Bear Creek (P-39-004875). Further, as discussed above in Section V, the proposed Project is in a region where cultural resources have been recorded and during the field survey of the Project site, prehistoric period artifacts and prehistoric flakes were found in three locations in roughly the same area as the recorded location of P-39-00005 and P-39-004641. (See Section V above). But the field survey failed to re-locate the recorded sites in the site records, which may be due to crop rotation, error in the original site recordation, or plowing within the development area. There remains a potential that some undocumented archaeological resources that may meet the Tribal Cultural Resource definition could be unearthed or otherwise discovered during ground-disturbing and construction activities.

Due to the possible presence of undiscovered/undocumented archeological or Tribal Cultural Resources within the Project site, appropriate steps to detect, preserve and/or document any previously undiscovered resources that may be encountered during construction and/or operational activities, including human remains, would be required. The Stockton General Plan includes policies and actions that would reduce impacts to cultural, historic, and archaeological

resources, as well as policies and actions for the conservation of cultural, historic, and archaeological resources. As such, the proposed Project is consistent with the adopted vision and uses identified within the General Plan, and would not result in any new or increased impacts beyond those that were already addressed in the General Plan EIR. The General Plan EIR determined that impacts to these environmental topics were less than significant. These impacts were adequately addressed in Chapter 4.1 of the General Plan EIR. The proposed Project would not result in a new or substantially more severe impact than what was previously analyzed. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to archaeological, historical, cultural, and paleontological resources of the City. Furthermore, in accordance with the City of Stockton General Plan, a cultural resources constraints analysis was prepared for the Project, which included several recommendations to be incorporated into the construction of the proposed Project. These recommendations have been incorporated into the Project Requirements in Section V, Cultural Resources (see pages 79 through 83. Pursuant to General Plan Action LU-5.2D requirements, implementation of the Project Requirements 6 through 8 (see Section V, Cultural Resources) would ensure the potential impacts are **less than significant.**

## *XIX. UTILITIES AND SERVICE SYSTEMS*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects? | | | X | |
| b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years? | | | X | |
| c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments? | | | X | |
| d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reductions goals? | | | X | |
| e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste? | | | X | |

*Project Impacts:*

The proposed Project includes the development of a 2,241 single-family lot residential subdivision and would be anticipated to increase the use of, and demand for utilities and service systems. Public utilities will be constructed with the proposed Project, including the extension of water, sewer, storm, and dry utilities into the Project site.

The Project will construct a potable water distribution system with pipe sizes ranging from six inches to 12 inches. Stubs from the transmission pipelines will be constructed as required by the City to connect to the Project potable water distribution system. The Project may also construct a parallel distribution pipeline for connection of fire hydrants along Project frontage roads if required by the City, with interconnection to the transmission pipeline as required. The Project would construct wastewater infrastructure in accordance with the 2022 Wastewater Master Plan Update, which shows a 21-inch diameter future gravity sewer connection from the Project to existing City of Stockton gravity sewer locate in Morada Lane. Effluent from all tributary areas would be collected and conveyed through gravity sewer pipelines. All sewer collection and conveyance infrastructure would be sized and constructed according to adopted City of Stockton sewer hydrologic and hydraulic design criteria, design standards, and specifications.

Onsite stormwater runoff would be directed into an underground pipe system which would collect the runoff and direct it to the central storm drainage basin. Stormwater from this basin would be discharged via a new pump station and force main into Bear Creek through an existing 24-inch diameter outfall structure located on the south side of Bear Creek, just east of the West Lane overcrossing. The basin drawdown rate would meet COSMUD standards to discharge the 100-year, 24-hour design storm volume over a period of 48 hours and would be less than predeveloped runoff rates from the Project area.

Electrical, gas, phone, cable, and related internet services would be extended to all portions of the Project site from existing facilities located along West Lane and Morada Lane, or other utility systems in the Project vicinity. Utility improvements would be installed in conjunction with planned street improvements.

Although upgrades and improvements to the utility system (including water, wastewater, stormwater, electrical, gas, phone, cable, and internet) may be required in order to serve the proposed Project, this would not cause additional significant environmental effects due to the proposed Project, as such potential improvements have already been planned for. No off-site utility improvements are required as part of the Project. All utility improvements would be within the bounds of the Project site. The potential for environmental impacts associated with installation of the proposed utility system and construction activities within the Project site are addressed throughout this document. There are no other anticipated impacts associated with the infrastructure construction activities beyond what is already discussed throughout this document.

As discussed in greater detail below, there is adequate wastewater treatment and water capacity to meet the water and wastewater treatment demands of the proposed Project, and no expansions would be required because of the Project. Utility extensions to the Project site are nearby and would need to extend services to serve the Project area

*Prior Environmental Analysis:*

The General Plan EIR analyzed the anticipated impacts on the demand for utilities and service systems because of the future urban development that was contemplated by the General Plan. These impacts included increased demand for utilities and service systems (City of Stockton General Plan Update Draft EIR, 2018, pages 4.15-8 through 4.15-33). The analysis found that while development and buildout of the General Plan can result in utilities and service system impacts, these impacts would be reduced to a less than significant level through the application of General Plan goals and policies that would assist in minimizing or avoiding impacts to utilities and service systems. In addition, compliance with state and local standards related to the provision of utilities and service systems and the application of General Plan goals and policies would assist in minimizing or avoiding impacts to utilities and service systems, as noted above. The General Plan did not identify any mitigation measures, but did include policies that would serve to minimize potential impacts to utilities and service systems of the City. The following are General Plan policies presented in the General Plan EIR relative to this environmental topic:

- Action LU-5.1.C: Require landscape plans to incorporate native and drought-tolerant plants in order to preserve the visual integrity of the landscape, conserve water, provide habitat conditions suitable for native vegetation, and ensure that a maximum number and variety of well-adapted plants are maintained.
- Policy LU-5.4: Require water and energy conservation and efficiency in both new construction and retrofits.
- Action LU-5.4.A: Require all new development, including major rehabilitation, renovation, and redevelopment, to adopt best management practices for water use efficiency and demonstrate specific water conservation measures.
- Policy LU-6.3: Ensure that all neighborhoods have access to well-maintained public facilities and utilities that meet community service needs.
- Action LU-6.3.A: Require development to mitigate any impacts to existing sewer, water, stormwater, street, fire station, park, or library infrastructure that would reduce service levels.
- Action LU-6.3.B: Ensure that public facilities, infrastructure, and related land area and other elements are designed and right-of-way is acquired to meet 2040 planned development requirements to avoid the need for future upsizing or expansion, unless planned as phased construction.
- Action LU-6.3.C: Coordinate, to the extent possible, upgrades and repairs to roadways with utility needs, infrastructure upgrades, and bicycle and pedestrian improvements (i.e., "dig once").
- Policy SAF-3.1: Secure long-term renewable contracts and related agreements to ensure that surface water rights will be available to meet projected demand.
- Action SAF-3.1.A: Actively participate in appropriate forums designed to discuss and solve regional water supply and quality issues.
- Policy SAF-3.2: Protect the availability of clean potable water from groundwater sources.
- Policy SAF-3.3: Encourage use of recycled ("gray") water for landscaping irrigation to reduce demand on potable supplies.
- Action SAF-3.3.A: Require new development to install non-potable water infrastructure for irrigation of large landscaped areas where feasible.
- Action SAF-3.3.B: Investigate and implement Code amendments to allow installation of dual plumbing and/or rainwater capture systems to enable use of recycled water and/or captured rainwater generated on- site.
- Policy CH-5.2: Expand opportunities for recycling, re-use of materials, and waste reduction.

*Responses to Checklist Questions*

**Responses a), c):** The City's sewer system includes approximately 914 miles of gravity sewers and force mains (pressure pipelines) ranging from less than 6-inches to 72-inches in diameter and 28 sewer pump stations. The sewer system flows to the Stockton Regional Wastewater Control Facility (RWCF), where it is treated and discharged to the San Joaquin River. The Stockton RWCF consists of a main treatment plant with 48 MGD capacity, and a tertiary treatment plant

with 55 MGD capacity. The tertiary treatment plant includes approximately 630 acres of oxidation ponds, an engineered wetland, disinfection facilities, and a river outfall discharge system. Wastewater treatment requirements for discharges from the Stockton RWCF are set forth in CVRWQCB Order No. R5-2014-0070-03 issued by the CVRWQCB in 2014.

The General Plan EIR concluded that wastewater generation and discharges from development allowed under the General Plan would not cause exceedances of wastewater treatment requirements for effluent or capacity of the RWCF, and impacts would be less than significant. The City has adequate capacity to serve the Project's projected demand for wastewater treatment services in addition to its existing commitments, and no improvements or expansions to the existing RWCF are required to serve the proposed Project. The addition of Project-generated wastewater would not result in any CVRWQCB violations related to effluent treatment or discharge.

The General Plan designates the Project site for Low Density Residential use and the proposed Project is consistent with that land use designation. Therefore, the proposed Project is considered planned growth. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR. The criteria for requiring further CEQA review are not met.

**Response b):**

The construction of the proposed Project would increase water demand on-site. The General Plan designates the Project site for Residential use and the proposed Project is consistent with that land use designation. Furthermore, the General Plan EIR concluded that the City of Stockton will have sufficient water supplies to meet the projected demands from development allowed by the General Plan, and therefore has sufficient water supplies available to serve the proposed Project from existing entitlements and resources, and would not require new or expanded entitlements during normal, dry, and multiple dry years. The proposed Project is considered planned growth and to the extent that the proposed Project would require additional water supply, this was previously considered by the General Plan EIR. Further, according to the Bear Creek South Residential Project Water Supply Assessment (Appendix F) (West Yost, 2024), the City has adequate water supplies to serve the Project.

For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR. The criteria for requiring further CEQA review are not met.

**Responses d), e):** The proposed Project would not generate significant or abnormal volumes of solid waste. Because the General Plan EIR determined that solid waste capacity is adequate to serve the demand resulting from General Plan build-out and the proposed Project's use is consistent with the General Plan land use designation for the Project site and would not result in new or increased impacts. Furthermore, the General Plan EIR concluded that construction and operation of development allowed under the General Plan would not conflict with State and local regulations governing solid waste disposal and diversion, and the proposed General Plan includes policies and actions to promote consistency with other solid waste regulations. The

proposed Project would be required to comply with all federal, state, and local regulations regarding solid waste. To the extent that the proposed Project would generate both construction and operational solid waste, this was previously considered by the General Plan EIR. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan FEIR. The criteria for requiring further CEQA review are not met.

## *XX. WILDFIRE*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: | | | | |
| a) Substantially impair an adopted emergency response plan or emergency evacuation plan? | | | X | |
| b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? | | | X | |
| c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment? | | | X | |
| d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes? | | | X | |

### *Project Impacts*

The Project site is not located in or near a State Responsibility Area (SRA). The City of Stockton, including the Project site, is not categorized as a "Very High" Fire Hazard Severity Zone (FHSZ) by CalFire. Therefore, this CEQA topic is not relevant to the proposed Project and does not require further analysis. Nevertheless, a discussion of this topic is included below.

### *Prior Environmental Review:*

The General Plan EIR analyzed the anticipated impacts of wildland fires that would occur because of the future urban development that was contemplated by the General Plan. These impacts included exposure of people or structures to significant risk of loss, injury or death involving wildland fires, impairment, or interference with implementation of emergency response and evacuation plans and cumulative hazard impacts (City of Stockton General Plan Update Draft EIR, 2018, pages 4.8-26 through 4.8-27). The analysis concluded that because there are no High or Very High FHSZs within the EIR planning area, and because existing State and local regulations, combined with General Plan policies and actions, would further prevent the exposure of people and structures to significant risks from wildland fires, the impact would be less than significant.

As discussed in the General Plan EIR, the General Plan includes policies and actions that support effective response in the event of an emergency, including from a wildfire. In addition, Action LU-6.1.G ensures that there are adequate fire protection service providers in the event of a fire by directing the City to maintain adequate staffing levels to support achieving the City's service level

goals for fire protection. Furthermore, as discussed in Section 4.8.1.1 of the General Plan EIR, State and City regulations have established structural fire resistance and protection standards, as well as requirements regarding debris and vegetation in wildfire hazard areas.

*Responses to Checklist Questions*

**Response a):** The Project site would connect to an existing network of City streets. The appropriate turning radiuses have been planned to accommodate fire trucks on-site. The proposed circulation improvements would allow for greater emergency access relative to existing conditions. Moreover, the proposed Project would require building construction to meet the fire code requirements, and would have fire hydrants consistent with the standards of the City; such fire hydrants would assist with fire suppression efforts if a fire was to occur on or near the Project site. The proposed Project would also not impair an adopted emergency response plan or emergency evacuation plan. Implementation of the proposed Project would not alter any roadways, access points, or otherwise degrade traffic operations and access to the area in such a way as to interfere with an emergency response or evacuation plan. Therefore, impacts from Project implementation would be considered **less than significant** impact relative to adopted emergency response plans or evacuation plans. Moreover, the Project would also be constructed consistent with California Fire Code requirements for emergency access as directed by the City's Fire Department preliminary review. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR.

**Response b):** The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). Steep slopes contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Fuels such as grass are highly flammable because they have a high surface area to mass ratio and require less heat to reach the ignition point. The Project site is in an area that is predominately residential, which is not considered at a significant risk of wildfire. There are no steep slopes on or near the Project site. Development of the Project would not exacerbate fire risks. Therefore, impacts from Project implementation would be considered **less than significant** impact relative to the spread of wildfire. Moreover, the Project would also be constructed consistent with California Fire Code requirements for emergency access as directed by the City's Fire Department preliminary review. The General Plan EIR determined that implementation of the General Plan would have a less than significant impact relative to this topic. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR.

**Response c):** The Project includes development of infrastructure (water, sewer, and storm drainage) to serve the proposed residential buildings. The Project does not include the construction of fuel breaks, emergency water sources, or power lines. As noted above, the proposed Project would require fire hydrants consistent with the standards of the City, and such fire hydrants would assist with fire suppression efforts if a fire was to occur. The proposed infrastructure improvements would allow for decreased fire risk relative to existing conditions. Therefore, impacts from Project implementation would be considered **less than significant** impact relative to infrastructure that may exacerbate fire risk. Moreover, the Project would also

be constructed consistent with California Fire Code requirements for emergency access as directed by the City's Fire Department preliminary review. The General Plan EIR determined that implementation of the General Plan would have a less than significant impact relative to this topic. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR.

**Response d):** The proposed Project would require the installation of storm drainage infrastructure to ensure that storm waters properly drain from the Project site and does not result in downstream flooding or major drainage changes. Overall, impacts from Project implementation would be considered **less than significant** impact relative to risks, including downslope or downstream flooding or landslides, because of runoff, post-fire slope instability, or drainage changes. Moreover, the Project would also be constructed consistent with California Fire Code requirements for emergency access as directed by the City's Fire Department preliminary review. The General Plan EIR determined that implementation of the General Plan would have a **less than significant** impact relative to this topic. For these reasons, the proposed Project would not result in new or more severe impacts disclosed in the General Plan EIR.

## *XXI. MANDATORY FINDINGS OF SIGNIFICANCE*

| | ***Significant Impact Peculiar to the Project or the Project Site*** | ***Significant Impact due to New Information*** | ***Impact Adequately Addressed in the General Plan EIR*** | ***Impact not Previously Addressed in General Plan EIR*** |
|---|---|---|---|---|
| a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory? | | | X | |
| b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)? | | | X | |
| c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly? | | | X | |

*Responses to Checklist Questions*

**Response a):** As discussed in this document, the proposed Project would not result in new or substantially more severe impacts than identified in the General Plan EIR and would comply with applicable General Plan FEIR mitigation measures. The criteria for requiring further CEQA review are not met.

**Response b)**: The General Plan EIR assumed full development and buildout of the Project site, consistent with the use and density proposed by the Project. The cumulative impacts associated with buildout of the City of Stockton General Plan, including the Project site, were fully addressed in the General Plan EIR. Additionally, as described throughout the analysis above, the proposed Project would not result in any significant individual or cumulative impacts that would not be reduced to less than significant levels through the application of uniformly applied development policies and/or standards.

**Response c):** As described throughout the analysis above, the proposed Project would not result in any significant impacts that would have environmental effects which will cause substantial adverse effects on humans that have not already been addressed n the General P**l**an EIR. The analysis in the relevant sections above provides the application of uniformly applied development policies and/or standards reduce any potentially significant impacts on humans to less than significant levels. A variety of requirements including those related to aesthetics and light and glare, GHG and air quality, cultural resources, hazardous materials, seismic hazards,

water pollution and water quality, and noise, ensure any adverse effects on humans are reduce to an acceptable standard. Therefore, this is considered a **less than significant** impact.

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# Appendix A: CalEEMod Results

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# Stockton Bear Creek South Detailed Report

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# 1. Basic Project Information

## 1.1. Basic Project Information

| Data Field | Value |
|---|---|
| Project Name | Stockton Bear Creek South |
| Construction Start Date | 3/1/2025 |
| Operational Year | 2026 |
| Lead Agency | — |
| Land Use Scale | Project/site |
| Analysis Level for Defaults | County |
| Windspeed (m/s) | 3.40 |
| Precipitation (days) | 0.40 |
| Location | 38.043498060622966, -121.28645599809919 |
| County | San Joaquin |
| City | Unincorporated |
| Air District | San Joaquin Valley APCD |
| Air Basin | San Joaquin Valley |
| TAZ | 2149 |
| EDFZ | 4 |
| Electric Utility | Pacific Gas & Electric Company |
| Gas Utility | Pacific Gas & Electric |
| App Version | 2022.1.1.26 |

## 1.2. Land Use Types

| Land Use Subtype | Size | Unit | Lot Acreage | Building Area (sq ft) | Landscape Area (sq ft) | Special Landscape Area (sq ft) | Population | Description |
|---|---|---|---|---|---|---|---|---|
| Single Family Housing | 2,461 | Dwelling Unit | 301 | 4,798,950 | 28,825,341 | 0.00 | 7,949 | Residential Uses |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| City Park | 26.1 | Acre | 26.1 | 0.00 | 0.00 | 0.00 | — | Parks |
| City Park | 22.3 | Acre | 22.3 | 0.00 | 0.00 | 0.00 | — | Open Space |
| Other Asphalt Surfaces | 141 | Acre | 141 | 0.00 | 0.00 | 0.00 | — | Project Street |

### 1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

# 2. Emissions Summary

### 2.1. Construction Emissions Compared Against Thresholds

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

| Un/Mit. | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 19.4 | 18.6 | 28.0 | 63.2 | 0.09 | 1.17 | 19.8 | 21.0 | 1.08 | 10.1 | 11.2 | — | 19,371 | 19,371 | 0.37 | 1.08 | 31.5 | 19,719 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 19.4 | 18.5 | 28.0 | 57.6 | 0.09 | 1.17 | 19.8 | 21.0 | 1.08 | 10.1 | 11.2 | — | 18,880 | 18,880 | 0.44 | 1.38 | 0.82 | 19,302 |
| Average Daily (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 13.5 | 13.1 | 18.4 | 40.1 | 0.07 | 0.77 | 13.0 | 13.8 | 0.71 | 6.65 | 7.35 | — | 13,374 | 13,374 | 0.28 | 0.78 | 8.57 | 13,611 |
| Annual (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 2.46 | 2.39 | 3.35 | 7.32 | 0.01 | 0.14 | 2.37 | 2.51 | 0.13 | 1.21 | 1.34 | — | 2,214 | 2,214 | 0.05 | 0.13 | 1.42 | 2,254 |

### 2.2. Construction Emissions by Year, Unmitigated

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

| Year | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily - Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2027 | 3.70 | 3.12 | 28.0 | 29.1 | 0.05 | 1.17 | 19.8 | 21.0 | 1.08 | 10.1 | 11.2 | — | 5,454 | 5,454 | 0.22 | 0.05 | 0.49 | 5,474 |
| 2028 | 3.50 | 2.95 | 24.4 | 28.0 | 0.06 | 0.99 | 9.37 | 10.4 | 0.91 | 3.69 | 4.60 | — | 6,773 | 6,773 | 0.27 | 0.06 | 0.50 | 6,798 |
| 2029 | 3.39 | 2.85 | 22.8 | 27.6 | 0.06 | 0.92 | 9.37 | 10.3 | 0.84 | 3.69 | 4.54 | — | 6,768 | 6,768 | 0.27 | 0.05 | 0.45 | 6,791 |
| 2030 | 17.5 | 16.9 | 18.4 | 55.3 | 0.08 | 0.38 | 10.9 | 11.3 | 0.35 | 2.65 | 3.00 | — | 18,102 | 18,102 | 0.33 | 1.08 | 31.5 | 18,464 |
| 2031 | 19.4 | 18.6 | 23.9 | 63.2 | 0.09 | 0.57 | 11.1 | 11.6 | 0.48 | 2.68 | 3.16 | — | 19,371 | 19,371 | 0.37 | 1.04 | 27.8 | 19,719 |
| 2032 | 16.8 | 16.5 | 17.3 | 51.0 | 0.08 | 0.28 | 10.9 | 11.2 | 0.27 | 2.65 | 2.91 | — | 17,422 | 17,422 | 0.31 | 1.03 | 23.9 | 17,760 |
| 2033 | 16.7 | 16.3 | 16.5 | 49.2 | 0.08 | 0.26 | 10.9 | 11.2 | 0.25 | 2.65 | 2.89 | — | 17,109 | 17,109 | 0.31 | 0.98 | 20.6 | 17,428 |
| 2034 | 16.5 | 16.1 | 16.1 | 47.8 | 0.08 | 0.25 | 10.9 | 11.2 | 0.24 | 2.65 | 2.88 | — | 16,818 | 16,818 | 0.28 | 0.98 | 17.6 | 17,134 |
| 2035 | 16.4 | 16.1 | 15.7 | 46.2 | 0.08 | 0.24 | 10.9 | 11.2 | 0.22 | 2.65 | 2.87 | — | 16,551 | 16,551 | 0.28 | 0.92 | 14.9 | 16,848 |
| 2036 | 16.3 | 16.0 | 15.3 | 44.8 | 0.08 | 0.23 | 10.9 | 11.2 | 0.21 | 2.65 | 2.86 | — | 16,311 | 16,311 | 0.28 | 0.92 | 12.5 | 16,605 |
| 2037 | 16.2 | 15.8 | 14.8 | 43.9 | 0.08 | 0.21 | 10.9 | 11.2 | 0.20 | 2.65 | 2.85 | — | 16,098 | 16,098 | 0.28 | 0.92 | 10.5 | 16,391 |
| 2038 | 16.1 | 15.8 | 14.5 | 43.1 | 0.08 | 0.21 | 10.9 | 11.1 | 0.20 | 2.65 | 2.84 | — | 15,877 | 15,877 | 0.28 | 0.87 | 8.70 | 16,152 |
| 2039 | 16.0 | 15.4 | 14.3 | 42.3 | 0.08 | 0.20 | 10.9 | 11.1 | 0.19 | 2.65 | 2.84 | — | 15,710 | 15,710 | 0.28 | 0.87 | 7.16 | 15,983 |
| Daily - Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2027 | 3.69 | 3.11 | 28.0 | 28.9 | 0.05 | 1.17 | 19.8 | 21.0 | 1.08 | 10.1 | 11.2 | — | 5,439 | 5,439 | 0.22 | 0.05 | 0.01 | 5,459 |
| 2028 | 3.67 | 3.09 | 27.5 | 28.9 | 0.06 | 1.14 | 19.8 | 20.9 | 1.05 | 10.1 | 11.2 | — | 6,756 | 6,756 | 0.27 | 0.06 | 0.01 | 6,781 |
| 2029 | 3.39 | 2.85 | 22.8 | 27.5 | 0.06 | 0.92 | 9.37 | 10.3 | 0.84 | 3.69 | 4.54 | — | 6,751 | 6,751 | 0.27 | 0.06 | 0.01 | 6,776 |
| 2030 | 19.4 | 18.5 | 25.9 | 57.6 | 0.09 | 0.88 | 11.1 | 11.7 | 0.81 | 3.69 | 4.51 | — | 18,880 | 18,880 | 0.44 | 1.38 | 0.82 | 19,302 |
| 2031 | 18.9 | 18.3 | 24.8 | 55.4 | 0.09 | 0.57 | 11.1 | 11.6 | 0.48 | 2.68 | 3.16 | — | 18,527 | 18,527 | 0.42 | 1.32 | 0.72 | 18,933 |
| 2032 | 18.7 | 18.2 | 24.1 | 53.9 | 0.09 | 0.48 | 11.1 | 11.5 | 0.45 | 2.68 | 3.13 | — | 18,223 | 18,223 | 0.42 | 1.04 | 0.63 | 18,545 |
| 2033 | 16.5 | 16.1 | 17.3 | 42.1 | 0.08 | 0.26 | 10.9 | 11.2 | 0.25 | 2.65 | 2.89 | — | 16,301 | 16,301 | 0.33 | 0.98 | 0.53 | 16,600 |
| 2034 | 16.3 | 16.0 | 16.9 | 40.7 | 0.08 | 0.25 | 10.9 | 11.2 | 0.24 | 2.65 | 2.88 | — | 16,021 | 16,021 | 0.33 | 0.98 | 0.46 | 16,320 |
| 2035 | 16.3 | 15.9 | 16.5 | 39.6 | 0.08 | 0.24 | 10.9 | 11.2 | 0.22 | 2.65 | 2.87 | — | 15,763 | 15,763 | 0.33 | 0.92 | 0.39 | 16,047 |
| 2036 | 16.2 | 15.9 | 15.8 | 38.6 | 0.08 | 0.23 | 10.9 | 11.2 | 0.21 | 2.65 | 2.86 | — | 15,531 | 15,531 | 0.31 | 0.92 | 0.33 | 15,814 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2037 | 16.1 | 15.8 | 15.5 | 37.6 | 0.08 | 0.21 | 10.9 | 11.2 | 0.20 | 2.65 | 2.85 | — | 15,326 | 15,326 | 0.31 | 0.92 | 0.27 | 15,609 |
| 2038 | 16.0 | 15.4 | 15.3 | 36.7 | 0.08 | 0.21 | 10.9 | 11.1 | 0.20 | 2.65 | 2.84 | — | 15,113 | 15,113 | 0.30 | 0.87 | 0.23 | 15,380 |
| 2039 | 15.9 | 15.3 | 15.1 | 36.1 | 0.08 | 0.20 | 10.9 | 11.1 | 0.19 | 2.65 | 2.84 | — | 14,951 | 14,951 | 0.30 | 0.87 | 0.19 | 15,218 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2027 | 2.42 | 2.04 | 18.4 | 19.0 | 0.03 | 0.77 | 13.0 | 13.8 | 0.71 | 6.65 | 7.35 | — | 3,568 | 3,568 | 0.14 | 0.03 | 0.14 | 3,581 |
| 2028 | 2.53 | 2.13 | 18.0 | 20.1 | 0.04 | 0.73 | 8.47 | 9.20 | 0.67 | 3.73 | 4.40 | — | 4,620 | 4,620 | 0.19 | 0.04 | 0.15 | 4,637 |
| 2029 | 2.42 | 2.04 | 16.3 | 19.6 | 0.04 | 0.65 | 6.69 | 7.35 | 0.60 | 2.64 | 3.24 | — | 4,825 | 4,825 | 0.19 | 0.04 | 0.14 | 4,843 |
| 2030 | 10.4 | 9.91 | 14.4 | 31.8 | 0.05 | 0.36 | 7.59 | 7.94 | 0.33 | 2.05 | 2.38 | — | 10,973 | 10,973 | 0.24 | 0.78 | 7.71 | 11,219 |
| 2031 | 13.5 | 13.1 | 17.5 | 40.1 | 0.07 | 0.41 | 7.90 | 8.31 | 0.34 | 1.91 | 2.25 | — | 13,374 | 13,374 | 0.28 | 0.74 | 8.57 | 13,611 |
| 2032 | 12.0 | 11.7 | 12.7 | 31.9 | 0.06 | 0.21 | 7.84 | 8.04 | 0.19 | 1.90 | 2.09 | — | 12,059 | 12,059 | 0.24 | 0.74 | 7.40 | 12,292 |
| 2033 | 11.8 | 11.5 | 12.2 | 30.7 | 0.06 | 0.19 | 7.81 | 8.00 | 0.18 | 1.89 | 2.07 | — | 11,778 | 11,778 | 0.24 | 0.70 | 6.34 | 11,998 |
| 2034 | 11.6 | 11.4 | 11.7 | 29.6 | 0.06 | 0.18 | 7.81 | 7.99 | 0.17 | 1.89 | 2.06 | — | 11,576 | 11,576 | 0.22 | 0.70 | 5.42 | 11,795 |
| 2035 | 11.6 | 11.4 | 11.4 | 28.9 | 0.06 | 0.17 | 7.81 | 7.98 | 0.16 | 1.89 | 2.05 | — | 11,390 | 11,390 | 0.22 | 0.66 | 4.59 | 11,597 |
| 2036 | 11.6 | 11.4 | 11.2 | 28.1 | 0.06 | 0.16 | 7.83 | 8.00 | 0.15 | 1.90 | 2.05 | — | 11,254 | 11,254 | 0.22 | 0.66 | 3.88 | 11,461 |
| 2037 | 11.5 | 11.3 | 10.9 | 27.3 | 0.06 | 0.15 | 7.81 | 7.97 | 0.14 | 1.89 | 2.04 | — | 11,076 | 11,076 | 0.22 | 0.66 | 3.23 | 11,281 |
| 2038 | 11.4 | 11.2 | 10.8 | 26.9 | 0.06 | 0.15 | 7.81 | 7.96 | 0.14 | 1.89 | 2.03 | — | 10,922 | 10,922 | 0.20 | 0.62 | 2.69 | 11,115 |
| 2039 | 10.4 | 10.00 | 9.68 | 24.1 | 0.05 | 0.13 | 7.15 | 7.28 | 0.12 | 1.73 | 1.85 | — | 9,888 | 9,888 | 0.18 | 0.57 | 2.03 | 10,064 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2027 | 0.44 | 0.37 | 3.35 | 3.46 | 0.01 | 0.14 | 2.37 | 2.51 | 0.13 | 1.21 | 1.34 | — | 591 | 591 | 0.02 | 0.01 | 0.02 | 593 |
| 2028 | 0.46 | 0.39 | 3.28 | 3.67 | 0.01 | 0.13 | 1.55 | 1.68 | 0.12 | 0.68 | 0.80 | — | 765 | 765 | 0.03 | 0.01 | 0.02 | 768 |
| 2029 | 0.44 | 0.37 | 2.97 | 3.58 | 0.01 | 0.12 | 1.22 | 1.34 | 0.11 | 0.48 | 0.59 | — | 799 | 799 | 0.03 | 0.01 | 0.02 | 802 |
| 2030 | 1.90 | 1.81 | 2.62 | 5.80 | 0.01 | 0.07 | 1.38 | 1.45 | 0.06 | 0.37 | 0.43 | — | 1,817 | 1,817 | 0.04 | 0.13 | 1.28 | 1,857 |
| 2031 | 2.46 | 2.39 | 3.20 | 7.32 | 0.01 | 0.07 | 1.44 | 1.52 | 0.06 | 0.35 | 0.41 | — | 2,214 | 2,214 | 0.05 | 0.12 | 1.42 | 2,254 |
| 2032 | 2.18 | 2.13 | 2.32 | 5.82 | 0.01 | 0.04 | 1.43 | 1.47 | 0.04 | 0.35 | 0.38 | — | 1,997 | 1,997 | 0.04 | 0.12 | 1.23 | 2,035 |
| 2033 | 2.14 | 2.10 | 2.23 | 5.60 | 0.01 | 0.03 | 1.43 | 1.46 | 0.03 | 0.35 | 0.38 | — | 1,950 | 1,950 | 0.04 | 0.12 | 1.05 | 1,986 |
| 2034 | 2.12 | 2.08 | 2.14 | 5.40 | 0.01 | 0.03 | 1.43 | 1.46 | 0.03 | 0.35 | 0.38 | — | 1,917 | 1,917 | 0.04 | 0.12 | 0.90 | 1,953 |
| 2035 | 2.12 | 2.08 | 2.09 | 5.27 | 0.01 | 0.03 | 1.43 | 1.46 | 0.03 | 0.35 | 0.37 | — | 1,886 | 1,886 | 0.04 | 0.11 | 0.76 | 1,920 |
| 2036 | 2.12 | 2.08 | 2.04 | 5.12 | 0.01 | 0.03 | 1.43 | 1.46 | 0.03 | 0.35 | 0.37 | — | 1,863 | 1,863 | 0.04 | 0.11 | 0.64 | 1,897 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2037 | 2.10 | 2.05 | 2.00 | 4.98 | 0.01 | 0.03 | 1.43 | 1.45 | 0.03 | 0.35 | 0.37 | — | 1,834 | 1,834 | 0.04 | 0.11 | 0.53 | 1,868 |
| 2038 | 2.08 | 2.04 | 1.97 | 4.91 | 0.01 | 0.03 | 1.43 | 1.45 | 0.03 | 0.35 | 0.37 | — | 1,808 | 1,808 | 0.03 | 0.10 | 0.44 | 1,840 |
| 2039 | 1.90 | 1.82 | 1.77 | 4.39 | 0.01 | 0.02 | 1.30 | 1.33 | 0.02 | 0.32 | 0.34 | — | 1,637 | 1,637 | 0.03 | 0.09 | 0.34 | 1,666 |

## 2.4. Operations Emissions Compared Against Thresholds

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

| Un/Mit. | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 337 | 264 | 131 | 1,480 | 3.93 | 84.0 | 157 | 241 | 80.9 | 39.9 | 121 | 14,741 | 251,487 | 266,228 | 211 | 8.95 | 696 | 274,859 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 319 | 246 | 142 | 1,222 | 3.78 | 83.9 | 157 | 241 | 80.9 | 39.9 | 121 | 14,741 | 237,295 | 252,036 | 211 | 9.61 | 51.5 | 260,237 |
| Average Daily (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 227 | 204 | 114 | 860 | 2.31 | 21.2 | 157 | 178 | 20.4 | 39.8 | 60.3 | 4,372 | 220,635 | 225,006 | 162 | 9.27 | 320 | 232,146 |
| Annual (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Unmit. | 41.5 | 37.3 | 20.9 | 157 | 0.42 | 3.87 | 28.6 | 32.5 | 3.73 | 7.27 | 11.0 | 724 | 36,529 | 37,252 | 26.9 | 1.54 | 53.0 | 38,434 |

## 2.5. Operations Emissions by Sector, Unmitigated

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

| Sector | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 83.8 | 76.6 | 81.7 | 769 | 1.86 | 1.51 | 157 | 158 | 1.42 | 39.9 | 41.3 | — | 189,871 | 189,871 | 6.55 | 8.14 | 662 | 193,123 |
| Area | 251 | 187 | 30.8 | 704 | 1.95 | 81.0 | — | 81.0 | 78.0 | — | 78.0 | 13,374 | 26,283 | 39,657 | 63.0 | 0.05 | — | 41,248 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 34,670 | 34,670 | 3.93 | 0.27 | — | 34,849 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,175 | 0.00 | 1,175 | 117 | 0.00 | — | 4,111 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| Total | 337 | 264 | 131 | 1,480 | 3.93 | 84.0 | 157 | 241 | 80.9 | 39.9 | 121 | 14,741 | 251,487 | 266,228 | 211 | 8.95 | 696 | 274,859 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 78.4 | 71.0 | 94.5 | 650 | 1.72 | 1.52 | 157 | 158 | 1.42 | 39.9 | 41.3 | — | 176,052 | 176,052 | 7.27 | 8.81 | 17.2 | 178,877 |
| Area | 238 | 174 | 29.5 | 564 | 1.94 | 80.9 | — | 80.9 | 78.0 | — | 78.0 | 13,374 | 25,909 | 39,284 | 63.0 | 0.05 | — | 40,874 |
| Energy | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 34,670 | 34,670 | 3.93 | 0.27 | — | 34,849 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,175 | 0.00 | 1,175 | 117 | 0.00 | — | 4,111 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| Total | 319 | 246 | 142 | 1,222 | 3.78 | 83.9 | 157 | 241 | 80.9 | 39.9 | 121 | 14,741 | 237,295 | 252,036 | 211 | 9.61 | 51.5 | 260,237 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 78.4 | 71.1 | 89.1 | 657 | 1.76 | 1.52 | 157 | 158 | 1.42 | 39.8 | 41.3 | — | 179,297 | 179,297 | 6.91 | 8.51 | 286 | 182,291 |
| Area | 147 | 132 | 7.29 | 196 | 0.44 | 18.2 | — | 18.2 | 17.5 | — | 17.5 | 3,005 | 6,005 | 9,009 | 14.2 | 0.01 | — | 9,367 |
| Energy | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 34,670 | 34,670 | 3.93 | 0.27 | — | 34,849 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| Waste | — | — | — | — | — | — | — | — | — | — | — | 1,175 | 0.00 | 1,175 | 117 | 0.00 | — | 4,111 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| Total | 227 | 204 | 114 | 860 | 2.31 | 21.2 | 157 | 178 | 20.4 | 39.8 | 60.3 | 4,372 | 220,635 | 225,006 | 162 | 9.27 | 320 | 232,146 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mobile | 14.3 | 13.0 | 16.3 | 120 | 0.32 | 0.28 | 28.6 | 28.9 | 0.26 | 7.27 | 7.53 | — | 29,685 | 29,685 | 1.14 | 1.41 | 47.3 | 30,180 |
| Area | 26.8 | 24.1 | 1.33 | 35.7 | 0.08 | 3.32 | — | 3.32 | 3.20 | — | 3.20 | 497 | 994 | 1,492 | 2.34 | < 0.005 | — | 1,551 |
| Energy | 0.39 | 0.19 | 3.30 | 1.40 | 0.02 | 0.27 | — | 0.27 | 0.27 | — | 0.27 | — | 5,740 | 5,740 | 0.65 | 0.05 | — | 5,770 |
| Water | — | — | — | — | — | — | — | — | — | — | — | 31.8 | 110 | 142 | 3.27 | 0.08 | — | 247 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waste | — | — | — | — | — | — | — | — | — | — | — | 195 | 0.00 | 195 | 19.4 | 0.00 | — | 681 |
| Refrig. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 5.69 | 5.69 |
| Total | 41.5 | 37.3 | 20.9 | 157 | 0.42 | 3.87 | 28.6 | 32.5 | 3.73 | 7.27 | 11.0 | 724 | 36,529 | 37,252 | 26.9 | 1.54 | 53.0 | 38,434 |

# 3. Construction Emissions Details

## 3.1. Site Preparation (2027) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.63 | 3.05 | 28.0 | 28.3 | 0.05 | 1.17 | — | 1.17 | 1.08 | — | 1.08 | — | 5,298 | 5,298 | 0.21 | 0.04 | — | 5,316 |
| Dust From Material Movement | — | — | — | — | — | — | 19.7 | 19.7 | — | 10.1 | 10.1 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.63 | 3.05 | 28.0 | 28.3 | 0.05 | 1.17 | — | 1.17 | 1.08 | — | 1.08 | — | 5,298 | 5,298 | 0.21 | 0.04 | — | 5,316 |
| Dust From Material Movement | — | — | — | — | — | — | 19.7 | 19.7 | — | 10.1 | 10.1 | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 2.38 | 2.00 | 18.3 | 18.5 | 0.03 | 0.77 | — | 0.77 | 0.71 | — | 0.71 | — | 3,473 | 3,473 | 0.14 | 0.03 | — | 3,485 |
| Dust From Material Movement | — | — | — | — | — | — | 12.9 | 12.9 | — | 6.62 | 6.62 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.43 | 0.37 | 3.35 | 3.38 | 0.01 | 0.14 | — | 0.14 | 0.13 | — | 0.13 | — | 575 | 575 | 0.02 | < 0.005 | — | 577 |
| Dust From Material Movement | — | — | — | — | — | — | 2.35 | 2.35 | — | 1.21 | 1.21 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.07 | 0.07 | 0.04 | 0.78 | 0.00 | 0.00 | 0.15 | 0.15 | 0.00 | 0.03 | 0.03 | — | 156 | 156 | < 0.005 | 0.01 | 0.49 | 158 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.06 | 0.05 | 0.62 | 0.00 | 0.00 | 0.15 | 0.15 | 0.00 | 0.03 | 0.03 | — | 141 | 141 | < 0.005 | 0.01 | 0.01 | 143 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.04 | 0.04 | 0.03 | 0.42 | 0.00 | 0.00 | 0.10 | 0.10 | 0.00 | 0.02 | 0.02 | — | 94.8 | 94.8 | < 0.005 | < 0.005 | 0.14 | 96.2 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | 0.01 | 0.01 | 0.08 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | < 0.005 | < 0.005 | — | 15.7 | 15.7 | < 0.005 | < 0.005 | 0.02 | 15.9 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.3. Site Preparation (2028) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.61 | 3.04 | 27.5 | 28.4 | 0.05 | 1.14 | — | 1.14 | 1.05 | — | 1.05 | — | 5,300 | 5,300 | 0.21 | 0.04 | — | 5,318 |
| Dust From Material Movement | — | — | — | — | — | — | 19.7 | 19.7 | — | 10.1 | 10.1 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.61 | 0.51 | 4.62 | 4.77 | 0.01 | 0.19 | — | 0.19 | 0.18 | — | 0.18 | — | 892 | 892 | 0.04 | 0.01 | — | 895 |
| Dust From Material Movement | — | — | — | — | — | — | 3.31 | 3.31 | — | 1.70 | 1.70 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.84 | 0.87 | < 0.005 | 0.04 | — | 0.04 | 0.03 | — | 0.03 | — | 148 | 148 | 0.01 | < 0.005 | — | 148 |
| Dust From Material Movement | — | — | — | — | — | — | 0.60 | 0.60 | — | 0.31 | 0.31 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.05 | 0.04 | 0.58 | 0.00 | 0.00 | 0.15 | 0.15 | 0.00 | 0.03 | 0.03 | — | 138 | 138 | < 0.005 | 0.01 | 0.01 | 140 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | 0.01 | 0.01 | 0.10 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.01 | 0.01 | — | 23.9 | 23.9 | < 0.005 | < 0.005 | 0.03 | 24.2 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | 0.02 | 0.00 | 0.00 | < 0.005 | < 0.005 | 0.00 | < 0.005 | < 0.005 | — | 3.95 | 3.95 | < 0.005 | < 0.005 | 0.01 | 4.01 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.5. Grading (2028) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.43 | 2.88 | 24.3 | 27.2 | 0.06 | 0.99 | — | 0.99 | 0.91 | — | 0.91 | — | 6,598 | 6,598 | 0.27 | 0.05 | — | 6,621 |
| Dust From Material Movement | — | — | — | — | — | — | 9.20 | 9.20 | — | 3.65 | 3.65 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.43 | 2.88 | 24.3 | 27.2 | 0.06 | 0.99 | — | 0.99 | 0.91 | — | 0.91 | — | 6,598 | 6,598 | 0.27 | 0.05 | — | 6,621 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dust From Material Movement | — | — | — | — | — | — | 9.20 | 9.20 | — | 3.65 | 3.65 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.88 | 1.58 | 13.3 | 14.9 | 0.03 | 0.54 | — | 0.54 | 0.50 | — | 0.50 | — | 3,615 | 3,615 | 0.15 | 0.03 | — | 3,628 |
| Dust From Material Movement | — | — | — | — | — | — | 5.04 | 5.04 | — | 2.00 | 2.00 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.34 | 0.29 | 2.43 | 2.72 | 0.01 | 0.10 | — | 0.10 | 0.09 | — | 0.09 | — | 599 | 599 | 0.02 | < 0.005 | — | 601 |
| Dust From Material Movement | — | — | — | — | — | — | 0.92 | 0.92 | — | 0.37 | 0.37 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.07 | 0.07 | 0.04 | 0.83 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.04 | 0.04 | — | 175 | 175 | < 0.005 | 0.01 | 0.50 | 177 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.07 | 0.06 | 0.05 | 0.66 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.04 | 0.04 | — | 158 | 158 | < 0.005 | 0.01 | 0.01 | 160 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.04 | 0.03 | 0.03 | 0.37 | 0.00 | 0.00 | 0.09 | 0.09 | 0.00 | 0.02 | 0.02 | — | 88.8 | 88.8 | < 0.005 | < 0.005 | 0.12 | 90.0 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | 0.01 | < 0.005 | 0.07 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | < 0.005 | < 0.005 | — | 14.7 | 14.7 | < 0.005 | < 0.005 | 0.02 | 14.9 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.7. Grading (2029) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.32 | 2.79 | 22.7 | 26.9 | 0.06 | 0.92 | — | 0.92 | 0.84 | — | 0.84 | — | 6,596 | 6,596 | 0.27 | 0.05 | — | 6,619 |
| Dust From Material Movement | — | — | — | — | — | — | 9.20 | 9.20 | — | 3.65 | 3.65 | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.32 | 2.79 | 22.7 | 26.9 | 0.06 | 0.92 | — | 0.92 | 0.84 | — | 0.84 | — | 6,596 | 6,596 | 0.27 | 0.05 | — | 6,619 |
| Dust From Material Movement | — | — | — | — | — | — | 9.20 | 9.20 | — | 3.65 | 3.65 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 2.37 | 1.99 | 16.2 | 19.2 | 0.04 | 0.65 | — | 0.65 | 0.60 | — | 0.60 | — | 4,712 | 4,712 | 0.19 | 0.04 | — | 4,728 |
| Dust From Material Movement | — | — | — | — | — | — | 6.57 | 6.57 | — | 2.61 | 2.61 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.43 | 0.36 | 2.96 | 3.50 | 0.01 | 0.12 | — | 0.12 | 0.11 | — | 0.11 | — | 780 | 780 | 0.03 | 0.01 | — | 783 |
| Dust From Material Movement | — | — | — | — | — | — | 1.20 | 1.20 | — | 0.48 | 0.48 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.07 | 0.06 | 0.04 | 0.78 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.04 | 0.04 | — | 172 | 172 | < 0.005 | < 0.005 | 0.45 | 172 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.06 | 0.05 | 0.61 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.04 | 0.04 | — | 155 | 155 | < 0.005 | 0.01 | 0.01 | 157 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.04 | 0.03 | 0.45 | 0.00 | 0.00 | 0.12 | 0.12 | 0.00 | 0.03 | 0.03 | — | 114 | 114 | < 0.005 | < 0.005 | 0.14 | 115 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | 0.01 | 0.01 | 0.08 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.01 | 0.01 | — | 18.8 | 18.8 | < 0.005 | < 0.005 | 0.02 | 19.1 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.9. Grading (2030) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 3.23 | 2.72 | 21.7 | 26.9 | 0.06 | 0.88 | — | 0.88 | 0.81 | — | 0.81 | — | 6,596 | 6,596 | 0.27 | 0.05 | — | 6,619 |
| Dust From Material Movement | — | — | — | — | — | — | 9.20 | 9.20 | — | 3.65 | 3.65 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.48 | 0.40 | 3.22 | 3.99 | 0.01 | 0.13 | — | 0.13 | 0.12 | — | 0.12 | — | 981 | 981 | 0.04 | 0.01 | — | 984 |
| Dust From Material Movement | — | — | — | — | — | — | 1.37 | 1.37 | — | 0.54 | 0.54 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.09 | 0.07 | 0.59 | 0.73 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 162 | 162 | 0.01 | < 0.005 | — | 163 |
| Dust From Material Movement | — | — | — | — | — | — | 0.25 | 0.25 | — | 0.10 | 0.10 | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.05 | 0.04 | 0.58 | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.04 | 0.04 | — | 153 | 153 | < 0.005 | 0.01 | 0.01 | 155 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | 0.01 | 0.01 | 0.09 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.01 | 0.01 | — | 23.3 | 23.3 | < 0.005 | < 0.005 | 0.03 | 23.6 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | 0.02 | 0.00 | 0.00 | < 0.005 | < 0.005 | 0.00 | < 0.005 | < 0.005 | — | 3.85 | 3.85 | < 0.005 | < 0.005 | < 0.005 | 3.91 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.11. Building Construction (2030) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.12 | 0.94 | 8.39 | 12.9 | 0.02 | 0.26 | — | 0.26 | 0.24 | — | 0.24 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.12 | 0.94 | 8.39 | 12.9 | 0.02 | 0.26 | — | 0.26 | 0.24 | — | 0.24 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.64 | 0.53 | 4.75 | 7.29 | 0.01 | 0.15 | — | 0.15 | 0.14 | — | 0.14 | — | 1,356 | 1,356 | 0.05 | 0.01 | — | 1,360 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.12 | 0.10 | 0.87 | 1.33 | < 0.005 | 0.03 | — | 0.03 | 0.02 | — | 0.02 | — | 224 | 224 | 0.01 | < 0.005 | — | 225 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.87 | 2.60 | 1.42 | 32.2 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 7,474 | 7,474 | 0.12 | 0.06 | 17.5 | 7,512 |
| Vendor | 0.32 | 0.17 | 7.49 | 2.61 | 0.05 | 0.11 | 2.01 | 2.11 | 0.11 | 0.55 | 0.66 | — | 6,603 | 6,603 | 0.09 | 0.99 | 10.5 | 6,911 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.67 | 2.38 | 1.98 | 25.5 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,762 | 6,762 | 0.16 | 0.29 | 0.45 | 6,853 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.30 | 0.16 | 8.00 | 2.69 | 0.05 | 0.11 | 2.01 | 2.11 | 0.11 | 0.55 | 0.66 | — | 6,610 | 6,610 | 0.09 | 0.99 | 0.27 | 6,907 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.52 | 1.35 | 0.95 | 14.7 | 0.00 | 0.00 | 4.21 | 4.21 | 0.00 | 0.99 | 0.99 | — | 3,919 | 3,919 | 0.08 | 0.16 | 4.26 | 3,975 |
| Vendor | 0.18 | 0.09 | 4.42 | 1.50 | 0.03 | 0.06 | 1.14 | 1.20 | 0.06 | 0.31 | 0.37 | — | 3,736 | 3,736 | 0.05 | 0.56 | 2.56 | 3,907 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.28 | 0.25 | 0.17 | 2.69 | 0.00 | 0.00 | 0.77 | 0.77 | 0.00 | 0.18 | 0.18 | — | 649 | 649 | 0.01 | 0.03 | 0.71 | 658 |
| Vendor | 0.03 | 0.02 | 0.81 | 0.27 | 0.01 | 0.01 | 0.21 | 0.22 | 0.01 | 0.06 | 0.07 | — | 619 | 619 | 0.01 | 0.09 | 0.42 | 647 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.13. Building Construction (2031) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.10 | 0.92 | 8.12 | 12.8 | 0.02 | 0.24 | — | 0.24 | 0.22 | — | 0.22 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.10 | 0.92 | 8.12 | 12.8 | 0.02 | 0.24 | — | 0.24 | 0.22 | — | 0.22 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.78 | 0.66 | 5.80 | 9.18 | 0.02 | 0.17 | — | 0.17 | 0.16 | — | 0.16 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.14 | 0.12 | 1.06 | 1.67 | < 0.005 | 0.03 | — | 0.03 | 0.03 | — | 0.03 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.71 | 2.44 | 1.38 | 30.3 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 7,342 | 7,342 | 0.10 | 0.06 | 15.4 | 7,377 |
| Vendor | 0.32 | 0.17 | 7.24 | 2.54 | 0.05 | 0.11 | 2.01 | 2.11 | 0.05 | 0.55 | 0.61 | — | 6,396 | 6,396 | 0.09 | 0.94 | 9.06 | 6,686 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.30 | 2.24 | 1.71 | 23.9 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,643 | 6,643 | 0.14 | 0.29 | 0.40 | 6,733 |
| Vendor | 0.30 | 0.16 | 7.71 | 2.57 | 0.05 | 0.11 | 2.01 | 2.11 | 0.05 | 0.55 | 0.61 | — | 6,402 | 6,402 | 0.09 | 0.94 | 0.24 | 6,684 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.66 | 1.62 | 1.18 | 17.5 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,862 | 4,862 | 0.08 | 0.04 | 4.74 | 4,882 |
| Vendor | 0.22 | 0.12 | 5.37 | 1.80 | 0.04 | 0.08 | 1.43 | 1.51 | 0.04 | 0.40 | 0.43 | — | 4,570 | 4,570 | 0.06 | 0.67 | 2.80 | 4,774 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.30 | 0.30 | 0.22 | 3.19 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 805 | 805 | 0.01 | 0.01 | 0.79 | 808 |
| Vendor | 0.04 | 0.02 | 0.98 | 0.33 | 0.01 | 0.01 | 0.26 | 0.28 | 0.01 | 0.07 | 0.08 | — | 757 | 757 | 0.01 | 0.11 | 0.46 | 790 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.15. Building Construction (2032) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.07 | 0.90 | 7.87 | 12.8 | 0.02 | 0.22 | — | 0.22 | 0.21 | — | 0.21 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.07 | 0.90 | 7.87 | 12.8 | 0.02 | 0.22 | — | 0.22 | 0.21 | — | 0.21 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.77 | 0.64 | 5.64 | 9.16 | 0.02 | 0.16 | — | 0.16 | 0.15 | — | 0.15 | — | 1,717 | 1,717 | 0.07 | 0.01 | — | 1,723 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.14 | 0.12 | 1.03 | 1.67 | < 0.005 | 0.03 | — | 0.03 | 0.03 | — | 0.03 | — | 284 | 284 | 0.01 | < 0.005 | — | 285 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.34 | 2.30 | 1.36 | 28.8 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 7,249 | 7,249 | 0.10 | 0.06 | 13.4 | 7,282 |
| Vendor | 0.32 | 0.17 | 6.99 | 2.48 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 6,193 | 6,193 | 0.09 | 0.94 | 7.77 | 6,482 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.20 | 2.15 | 1.69 | 22.7 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,560 | 6,560 | 0.14 | 0.06 | 0.35 | 6,581 |
| Vendor | 0.30 | 0.15 | 7.41 | 2.57 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 6,199 | 6,199 | 0.09 | 0.94 | 0.20 | 6,481 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.57 | 1.54 | 1.00 | 16.6 | 0.00 | 0.00 | 5.33 | 5.33 | 0.00 | 1.25 | 1.25 | — | 4,815 | 4,815 | 0.08 | 0.04 | 4.16 | 4,834 |
| Vendor | 0.23 | 0.12 | 5.20 | 1.81 | 0.04 | 0.04 | 1.44 | 1.48 | 0.04 | 0.40 | 0.44 | — | 4,437 | 4,437 | 0.06 | 0.67 | 2.41 | 4,642 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.29 | 0.28 | 0.18 | 3.03 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 797 | 797 | 0.01 | 0.01 | 0.69 | 800 |
| Vendor | 0.04 | 0.02 | 0.95 | 0.33 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 735 | 735 | 0.01 | 0.11 | 0.40 | 768 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.17. Building Construction (2033) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.05 | 0.88 | 7.67 | 12.8 | 0.02 | 0.20 | — | 0.20 | 0.19 | — | 0.19 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.05 | 0.88 | 7.67 | 12.8 | 0.02 | 0.20 | — | 0.20 | 0.19 | — | 0.19 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.75 | 0.63 | 5.48 | 9.13 | 0.02 | 0.15 | — | 0.15 | 0.13 | — | 0.13 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.14 | 0.11 | 1.00 | 1.67 | < 0.005 | 0.03 | — | 0.03 | 0.02 | — | 0.02 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.24 | 2.20 | 1.11 | 27.4 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 7,150 | 7,150 | 0.10 | 0.06 | 11.7 | 7,181 |
| Vendor | 0.27 | 0.17 | 6.74 | 2.43 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,999 | 5,999 | 0.09 | 0.89 | 6.53 | 6,271 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.11 | 2.05 | 1.44 | 21.4 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,470 | 6,470 | 0.12 | 0.06 | 0.30 | 6,491 |
| Vendor | 0.24 | 0.15 | 7.16 | 2.51 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 6,006 | 6,006 | 0.09 | 0.89 | 0.17 | 6,272 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.49 | 1.46 | 0.98 | 15.8 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,736 | 4,736 | 0.08 | 0.04 | 3.61 | 4,754 |
| Vendor | 0.18 | 0.11 | 5.01 | 1.76 | 0.04 | 0.04 | 1.43 | 1.47 | 0.04 | 0.40 | 0.43 | — | 4,287 | 4,287 | 0.06 | 0.63 | 2.01 | 4,479 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.27 | 0.27 | 0.18 | 2.89 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 784 | 784 | 0.01 | 0.01 | 0.60 | 787 |
| Vendor | 0.03 | 0.02 | 0.91 | 0.32 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 710 | 710 | 0.01 | 0.10 | 0.33 | 742 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.19. Building Construction (2034) - Unmitigated

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

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

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.03 | 0.86 | 7.52 | 12.8 | 0.02 | 0.19 | — | 0.19 | 0.18 | — | 0.18 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.03 | 0.86 | 7.52 | 12.8 | 0.02 | 0.19 | — | 0.19 | 0.18 | — | 0.18 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.74 | 0.62 | 5.37 | 9.12 | 0.02 | 0.14 | — | 0.14 | 0.13 | — | 0.13 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.13 | 0.11 | 0.98 | 1.66 | < 0.005 | 0.03 | — | 0.03 | 0.02 | — | 0.02 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 2.11 | 2.07 | 1.09 | 26.3 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 7,060 | 7,060 | 0.08 | 0.06 | 10.1 | 7,090 |
| Vendor | 0.27 | 0.17 | 6.49 | 2.37 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,815 | 5,815 | 0.09 | 0.89 | 5.48 | 6,087 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.01 | 1.97 | 1.42 | 20.3 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,390 | 6,390 | 0.12 | 0.06 | 0.26 | 6,411 |
| Vendor | 0.24 | 0.15 | 6.97 | 2.45 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,822 | 5,822 | 0.09 | 0.89 | 0.14 | 6,088 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.41 | 1.38 | 0.80 | 14.9 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,677 | 4,677 | 0.07 | 0.04 | 3.11 | 4,695 |
| Vendor | 0.18 | 0.11 | 4.84 | 1.72 | 0.04 | 0.04 | 1.43 | 1.47 | 0.04 | 0.40 | 0.43 | — | 4,156 | 4,156 | 0.06 | 0.63 | 1.69 | 4,348 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.26 | 0.25 | 0.15 | 2.73 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 774 | 774 | 0.01 | 0.01 | 0.51 | 777 |
| Vendor | 0.03 | 0.02 | 0.88 | 0.31 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 688 | 688 | 0.01 | 0.10 | 0.28 | 720 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.21. Building Construction (2035) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.01 | 0.85 | 7.34 | 12.7 | 0.02 | 0.18 | — | 0.18 | 0.17 | — | 0.17 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 1.01 | 0.85 | 7.34 | 12.7 | 0.02 | 0.18 | — | 0.18 | 0.17 | — | 0.17 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.72 | 0.61 | 5.24 | 9.06 | 0.02 | 0.13 | — | 0.13 | 0.12 | — | 0.12 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.13 | 0.11 | 0.96 | 1.65 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.07 | 2.05 | 1.09 | 25.1 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,981 | 6,981 | 0.08 | 0.06 | 8.63 | 7,009 |
| Vendor | 0.27 | 0.17 | 6.31 | 2.32 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,644 | 5,644 | 0.09 | 0.83 | 4.54 | 5,899 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 1.97 | 1.93 | 1.40 | 19.5 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,318 | 6,318 | 0.12 | 0.06 | 0.22 | 6,339 |
| Vendor | 0.24 | 0.15 | 6.73 | 2.40 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,651 | 5,651 | 0.09 | 0.83 | 0.12 | 5,901 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.41 | 1.37 | 0.80 | 14.4 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,625 | 4,625 | 0.07 | 0.04 | 2.66 | 4,641 |
| Vendor | 0.18 | 0.11 | 4.70 | 1.68 | 0.04 | 0.04 | 1.43 | 1.47 | 0.04 | 0.40 | 0.43 | — | 4,033 | 4,033 | 0.06 | 0.59 | 1.40 | 4,214 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.26 | 0.25 | 0.15 | 2.63 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 766 | 766 | 0.01 | 0.01 | 0.44 | 768 |
| Vendor | 0.03 | 0.02 | 0.86 | 0.31 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 668 | 668 | 0.01 | 0.10 | 0.23 | 698 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.23. Building Construction (2036) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.99 | 0.83 | 7.12 | 12.6 | 0.02 | 0.17 | — | 0.17 | 0.16 | — | 0.16 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 0.99 | 0.83 | 7.12 | 12.6 | 0.02 | 0.17 | — | 0.17 | 0.16 | — | 0.16 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.71 | 0.60 | 5.10 | 9.03 | 0.02 | 0.12 | — | 0.12 | 0.11 | — | 0.11 | — | 1,717 | 1,717 | 0.07 | 0.01 | — | 1,723 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.13 | 0.11 | 0.93 | 1.65 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 284 | 284 | 0.01 | < 0.005 | — | 285 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 2.01 | 1.97 | 1.07 | 24.0 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,909 | 6,909 | 0.08 | 0.06 | 7.34 | 6,936 |
| Vendor | 0.26 | 0.16 | 6.17 | 2.32 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,489 | 5,489 | 0.09 | 0.83 | 3.73 | 5,743 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.93 | 1.89 | 1.15 | 18.8 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,253 | 6,253 | 0.10 | 0.06 | 0.19 | 6,274 |
| Vendor | 0.24 | 0.15 | 6.59 | 2.39 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,496 | 5,496 | 0.09 | 0.83 | 0.10 | 5,747 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.38 | 1.36 | 0.79 | 13.8 | 0.00 | 0.00 | 5.33 | 5.33 | 0.00 | 1.25 | 1.25 | — | 4,590 | 4,590 | 0.07 | 0.04 | 2.27 | 4,606 |
| Vendor | 0.18 | 0.11 | 4.58 | 1.69 | 0.04 | 0.04 | 1.44 | 1.48 | 0.04 | 0.40 | 0.44 | — | 3,934 | 3,934 | 0.06 | 0.60 | 1.15 | 4,114 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.25 | 0.25 | 0.14 | 2.52 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 760 | 760 | 0.01 | 0.01 | 0.38 | 763 |
| Vendor | 0.03 | 0.02 | 0.84 | 0.31 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 651 | 651 | 0.01 | 0.10 | 0.19 | 681 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.25. Building Construction (2037) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.98 | 0.82 | 6.99 | 12.5 | 0.02 | 0.16 | — | 0.16 | 0.14 | — | 0.14 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.98 | 0.82 | 6.99 | 12.5 | 0.02 | 0.16 | — | 0.16 | 0.14 | — | 0.14 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.70 | 0.58 | 4.99 | 8.93 | 0.02 | 0.11 | — | 0.11 | 0.10 | — | 0.10 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.13 | 0.11 | 0.91 | 1.63 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.91 | 1.87 | 0.84 | 23.4 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,847 | 6,847 | 0.08 | 0.06 | 6.21 | 6,872 |
| Vendor | 0.26 | 0.16 | 6.04 | 2.27 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,352 | 5,352 | 0.09 | 0.83 | 3.01 | 5,605 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.85 | 1.81 | 1.13 | 18.0 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,197 | 6,197 | 0.10 | 0.06 | 0.16 | 6,217 |
| Vendor | 0.24 | 0.15 | 6.41 | 2.34 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,359 | 5,359 | 0.09 | 0.83 | 0.08 | 5,609 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.31 | 1.28 | 0.78 | 13.3 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,536 | 4,536 | 0.07 | 0.04 | 1.92 | 4,552 |
| Vendor | 0.18 | 0.11 | 4.48 | 1.64 | 0.04 | 0.04 | 1.43 | 1.47 | 0.04 | 0.40 | 0.43 | — | 3,825 | 3,825 | 0.06 | 0.59 | 0.93 | 4,004 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 0.24 | 0.23 | 0.14 | 2.42 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 751 | 751 | 0.01 | 0.01 | 0.32 | 754 |
| Vendor | 0.03 | 0.02 | 0.82 | 0.30 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 633 | 633 | 0.01 | 0.10 | 0.15 | 663 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.27. Building Construction (2038) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.97 | 0.81 | 6.89 | 12.5 | 0.02 | 0.15 | — | 0.15 | 0.14 | — | 0.14 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.97 | 0.81 | 6.89 | 12.5 | 0.02 | 0.15 | — | 0.15 | 0.14 | — | 0.14 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.69 | 0.58 | 4.92 | 8.90 | 0.02 | 0.11 | — | 0.11 | 0.10 | — | 0.10 | — | 1,712 | 1,712 | 0.07 | 0.01 | — | 1,718 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.13 | 0.11 | 0.90 | 1.62 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 283 | 283 | 0.01 | < 0.005 | — | 284 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.85 | 1.81 | 0.82 | 22.8 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,766 | 6,766 | 0.08 | 0.06 | 5.25 | 6,790 |
| Vendor | 0.26 | 0.16 | 5.91 | 2.27 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,228 | 5,228 | 0.09 | 0.78 | 2.41 | 5,465 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.76 | 1.48 | 1.13 | 17.4 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,123 | 6,123 | 0.10 | 0.06 | 0.14 | 6,143 |
| Vendor | 0.24 | 0.15 | 6.28 | 2.34 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,235 | 5,235 | 0.08 | 0.78 | 0.06 | 5,469 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.25 | 1.23 | 0.78 | 13.0 | 0.00 | 0.00 | 5.31 | 5.31 | 0.00 | 1.25 | 1.25 | — | 4,482 | 4,482 | 0.06 | 0.04 | 1.62 | 4,497 |
| Vendor | 0.18 | 0.11 | 4.38 | 1.64 | 0.04 | 0.04 | 1.43 | 1.47 | 0.04 | 0.40 | 0.43 | — | 3,736 | 3,736 | 0.06 | 0.56 | 0.74 | 3,905 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.23 | 0.22 | 0.14 | 2.37 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 742 | 742 | 0.01 | 0.01 | 0.27 | 745 |
| Vendor | 0.03 | 0.02 | 0.80 | 0.30 | 0.01 | 0.01 | 0.26 | 0.27 | 0.01 | 0.07 | 0.08 | — | 619 | 619 | 0.01 | 0.09 | 0.12 | 646 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.29. Building Construction (2039) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.96 | 0.80 | 6.78 | 12.4 | 0.02 | 0.15 | — | 0.15 | 0.13 | — | 0.13 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.96 | 0.80 | 6.78 | 12.4 | 0.02 | 0.15 | — | 0.15 | 0.13 | — | 0.13 | — | 2,397 | 2,397 | 0.10 | 0.02 | — | 2,405 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.63 | 0.53 | 4.43 | 8.11 | 0.02 | 0.10 | — | 0.10 | 0.09 | — | 0.09 | — | 1,567 | 1,567 | 0.06 | 0.01 | — | 1,572 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.10 | 0.81 | 1.48 | < 0.005 | 0.02 | — | 0.02 | 0.02 | — | 0.02 | — | 259 | 259 | 0.01 | < 0.005 | — | 260 |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.76 | 1.48 | 0.82 | 22.2 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,718 | 6,718 | 0.08 | 0.06 | 4.38 | 6,742 |
| Vendor | 0.26 | 0.16 | 5.78 | 2.21 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,118 | 5,118 | 0.08 | 0.78 | 1.90 | 5,354 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.72 | 1.45 | 1.11 | 17.0 | 0.00 | 0.00 | 7.44 | 7.44 | 0.00 | 1.74 | 1.74 | — | 6,080 | 6,080 | 0.10 | 0.06 | 0.11 | 6,100 |
| Vendor | 0.24 | 0.15 | 6.21 | 2.29 | 0.05 | 0.05 | 2.01 | 2.06 | 0.05 | 0.55 | 0.61 | — | 5,125 | 5,125 | 0.08 | 0.78 | 0.05 | 5,359 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 1.11 | 0.93 | 0.70 | 11.5 | 0.00 | 0.00 | 4.86 | 4.86 | 0.00 | 1.14 | 1.14 | — | 4,073 | 4,073 | 0.05 | 0.04 | 1.24 | 4,087 |
| Vendor | 0.17 | 0.10 | 3.93 | 1.47 | 0.03 | 0.03 | 1.31 | 1.35 | 0.03 | 0.36 | 0.40 | — | 3,347 | 3,347 | 0.05 | 0.51 | 0.54 | 3,501 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.20 | 0.17 | 0.13 | 2.10 | 0.00 | 0.00 | 0.89 | 0.89 | 0.00 | 0.21 | 0.21 | — | 674 | 674 | 0.01 | 0.01 | 0.21 | 677 |
| Vendor | 0.03 | 0.02 | 0.72 | 0.27 | 0.01 | 0.01 | 0.24 | 0.25 | 0.01 | 0.07 | 0.07 | — | 554 | 554 | 0.01 | 0.08 | 0.09 | 580 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.31. Paving (2030) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.77 | 0.64 | 6.28 | 9.90 | 0.01 | 0.22 | — | 0.22 | 0.20 | — | 0.20 | — | 1,511 | 1,511 | 0.06 | 0.01 | — | 1,516 |
| Paving | 1.27 | 1.27 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.05 | 0.04 | 0.38 | 0.60 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 91.6 | 91.6 | < 0.005 | < 0.005 | — | 92.0 |
| Paving | 0.08 | 0.08 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.07 | 0.11 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.2 | 15.2 | < 0.005 | < 0.005 | — | 15.2 |
| Paving | 0.01 | 0.01 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.04 | 0.03 | 0.43 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.03 | 0.03 | — | 114 | 114 | < 0.005 | < 0.005 | 0.01 | 116 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | 0.03 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | < 0.005 | < 0.005 | — | 7.12 | 7.12 | < 0.005 | < 0.005 | 0.01 | 7.22 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | < 0.005 | 0.00 | 0.00 | < 0.005 | < 0.005 | 0.00 | < 0.005 | < 0.005 | — | 1.18 | 1.18 | < 0.005 | < 0.005 | < 0.005 | 1.20 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.33. Paving (2031) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.75 | 0.63 | 6.13 | 9.88 | 0.01 | 0.21 | — | 0.21 | 0.19 | — | 0.19 | — | 1,511 | 1,511 | 0.06 | 0.01 | — | 1,516 |
| Paving | 1.27 | 1.27 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 0.75 | 0.63 | 6.13 | 9.88 | 0.01 | 0.21 | — | 0.21 | 0.19 | — | 0.19 | — | 1,511 | 1,511 | 0.06 | 0.01 | — | 1,516 |
| Paving | 1.27 | 1.27 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.53 | 0.45 | 4.38 | 7.06 | 0.01 | 0.15 | — | 0.15 | 0.14 | — | 0.14 | — | 1,079 | 1,079 | 0.04 | 0.01 | — | 1,083 |
| Paving | 0.91 | 0.91 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.10 | 0.08 | 0.80 | 1.29 | < 0.005 | 0.03 | — | 0.03 | 0.03 | — | 0.03 | — | 179 | 179 | 0.01 | < 0.005 | — | 179 |
| Paving | 0.17 | 0.17 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.04 | 0.02 | 0.51 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.03 | 0.03 | — | 124 | 124 | < 0.005 | < 0.005 | 0.26 | 125 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.04 | 0.04 | 0.03 | 0.40 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.03 | 0.03 | — | 112 | 112 | < 0.005 | < 0.005 | 0.01 | 114 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.03 | 0.03 | 0.02 | 0.30 | 0.00 | 0.00 | 0.09 | 0.09 | 0.00 | 0.02 | 0.02 | — | 82.3 | 82.3 | < 0.005 | < 0.005 | 0.08 | 82.7 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.01 | < 0.005 | < 0.005 | 0.05 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | < 0.005 | < 0.005 | — | 13.6 | 13.6 | < 0.005 | < 0.005 | 0.01 | 13.7 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.35. Paving (2032) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.72 | 0.61 | 6.00 | 9.86 | 0.01 | 0.20 | — | 0.20 | 0.18 | — | 0.18 | — | 1,511 | 1,511 | 0.06 | 0.01 | — | 1,516 |
| Paving | 1.27 | 1.27 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road | 0.01 | 0.01 | 0.12 | 0.19 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 29.6 | 29.6 | < 0.005 | < 0.005 | — | 29.7 |
| Paving | 0.02 | 0.02 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | < 0.005 | < 0.005 | 0.02 | 0.04 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 4.89 | 4.89 | < 0.005 | < 0.005 | — | 4.91 |
| Paving | < 0.005 | < 0.005 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.04 | 0.04 | 0.03 | 0.38 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.03 | 0.03 | — | 111 | 111 | < 0.005 | < 0.005 | 0.01 | 111 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | 0.01 | 0.00 | 0.00 | < 0.005 | < 0.005 | 0.00 | < 0.005 | < 0.005 | — | 2.23 | 2.23 | < 0.005 | < 0.005 | < 0.005 | 2.24 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | < 0.005 | < 0.005 | < 0.005 | < 0.005 | 0.00 | 0.00 | < 0.005 | < 0.005 | 0.00 | < 0.005 | < 0.005 | — | 0.37 | 0.37 | < 0.005 | < 0.005 | < 0.005 | 0.37 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.37. Architectural Coating (2030) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.12 | 0.10 | 0.78 | 1.11 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.12 | 0.10 | 0.78 | 1.11 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.07 | 0.06 | 0.44 | 0.63 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 75.5 | 75.5 | < 0.005 | < 0.005 | — | 75.8 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architect Coatings | 7.09 | 7.09 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.08 | 0.11 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 12.5 | 12.5 | < 0.005 | < 0.005 | — | 12.5 |
| Architectural Coatings | 1.29 | 1.29 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.57 | 0.52 | 0.28 | 6.45 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,495 | 1,495 | 0.02 | 0.01 | 3.49 | 1,502 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.53 | 0.48 | 0.40 | 5.10 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,352 | 1,352 | 0.03 | 0.06 | 0.09 | 1,371 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.30 | 0.27 | 0.19 | 2.95 | 0.00 | 0.00 | 0.84 | 0.84 | 0.00 | 0.20 | 0.20 | — | 784 | 784 | 0.02 | 0.03 | 0.85 | 795 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 0.06 | 0.05 | 0.03 | 0.54 | 0.00 | 0.00 | 0.15 | 0.15 | 0.00 | 0.04 | 0.04 | — | 130 | 130 | < 0.005 | 0.01 | 0.14 | 132 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.39. Architectural Coating (2031) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.12 | 0.10 | 0.78 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.12 | 0.10 | 0.78 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.07 | 0.55 | 0.79 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.02 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |
| Architectural Coatings | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.54 | 0.49 | 0.28 | 6.06 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,468 | 1,468 | 0.02 | 0.01 | 3.08 | 1,475 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.46 | 0.45 | 0.34 | 4.77 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,329 | 1,329 | 0.03 | 0.06 | 0.08 | 1,347 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.33 | 0.32 | 0.24 | 3.50 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 972 | 972 | 0.02 | 0.01 | 0.95 | 976 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.06 | 0.04 | 0.64 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 161 | 161 | < 0.005 | < 0.005 | 0.16 | 162 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.41. Architectural Coating (2032) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.77 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipm | 0.11 | 0.09 | 0.77 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.07 | 0.55 | 0.79 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 95.6 | 95.6 | < 0.005 | < 0.005 | — | 95.9 |
| Architectural Coatings | 8.98 | 8.98 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.9 |
| Architectural Coatings | 1.64 | 1.64 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.47 | 0.46 | 0.27 | 5.77 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,450 | 1,450 | 0.02 | 0.01 | 2.69 | 1,456 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.44 | 0.43 | 0.34 | 4.54 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,312 | 1,312 | 0.03 | 0.01 | 0.07 | 1,316 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.31 | 0.31 | 0.20 | 3.32 | 0.00 | 0.00 | 1.07 | 1.07 | 0.00 | 0.25 | 0.25 | — | 963 | 963 | 0.02 | 0.01 | 0.83 | 967 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.06 | 0.06 | 0.04 | 0.61 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 159 | 159 | < 0.005 | < 0.005 | 0.14 | 160 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.43. Architectural Coating (2033) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.07 | 0.55 | 0.79 | < 0.005 | 0.01 | — | 0.01 | < 0.005 | — | < 0.005 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architectural Coating | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.45 | 0.44 | 0.22 | 5.48 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,430 | 1,430 | 0.02 | 0.01 | 2.34 | 1,436 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.42 | 0.41 | 0.29 | 4.28 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,294 | 1,294 | 0.02 | 0.01 | 0.06 | 1,298 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.30 | 0.29 | 0.20 | 3.17 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 947 | 947 | 0.02 | 0.01 | 0.72 | 951 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.05 | 0.04 | 0.58 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 157 | 157 | < 0.005 | < 0.005 | 0.12 | 157 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.45. Architectural Coating (2034) - Unmitigated

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

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

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.06 | 0.54 | 0.79 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

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| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |
| Architectural Coatings | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.42 | 0.41 | 0.22 | 5.25 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,412 | 1,412 | 0.02 | 0.01 | 2.01 | 1,418 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.40 | 0.39 | 0.28 | 4.06 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,278 | 1,278 | 0.02 | 0.01 | 0.05 | 1,282 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.28 | 0.28 | 0.16 | 2.99 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 935 | 935 | 0.01 | 0.01 | 0.62 | 939 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.05 | 0.03 | 0.55 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 155 | 155 | < 0.005 | < 0.005 | 0.10 | 155 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.47. Architectural Coating (2035) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.76 | 1.10 | < 0.005 | 0.01 | — | 0.01 | 0.01 | — | 0.01 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Roa Equipment | 0.08 | 0.06 | 0.54 | 0.78 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |
| Architectural Coatings | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.41 | 0.41 | 0.22 | 5.02 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,396 | 1,396 | 0.02 | 0.01 | 1.73 | 1,402 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.39 | 0.39 | 0.28 | 3.90 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,264 | 1,264 | 0.02 | 0.01 | 0.04 | 1,268 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.28 | 0.27 | 0.16 | 2.89 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 925 | 925 | 0.01 | 0.01 | 0.53 | 928 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.05 | 0.03 | 0.53 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 153 | 153 | < 0.005 | < 0.005 | 0.09 | 154 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.49. Architectural Coating (2036) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.75 | 1.10 | < 0.005 | 0.01 | — | 0.01 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.75 | 1.10 | < 0.005 | 0.01 | — | 0.01 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.06 | 0.54 | 0.79 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 95.6 | 95.6 | < 0.005 | < 0.005 | — | 96.0 |
| Architectural Coatings | 8.98 | 8.98 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.9 |
| Architectural Coatings | 1.64 | 1.64 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.40 | 0.39 | 0.21 | 4.80 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,382 | 1,382 | 0.02 | 0.01 | 1.47 | 1,387 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.39 | 0.38 | 0.23 | 3.75 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,251 | 1,251 | 0.02 | 0.01 | 0.04 | 1,255 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.28 | 0.27 | 0.16 | 2.76 | 0.00 | 0.00 | 1.07 | 1.07 | 0.00 | 0.25 | 0.25 | — | 918 | 918 | 0.01 | 0.01 | 0.45 | 921 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.05 | 0.03 | 0.50 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 152 | 152 | < 0.005 | < 0.005 | 0.08 | 153 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.51. Architectural Coating (2037) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.75 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.75 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.06 | 0.53 | 0.78 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |
| Architectural Coatings | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.38 | 0.37 | 0.17 | 4.67 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,369 | 1,369 | 0.02 | 0.01 | 1.24 | 1,374 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.37 | 0.36 | 0.23 | 3.61 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,239 | 1,239 | 0.02 | 0.01 | 0.03 | 1,243 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.26 | 0.26 | 0.16 | 2.66 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 907 | 907 | 0.01 | 0.01 | 0.38 | 910 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.05 | 0.03 | 0.48 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 150 | 150 | < 0.005 | < 0.005 | 0.06 | 151 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.53. Architectural Coating (2038) - Unmitigated

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

| Location | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Onsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road | 0.11 | 0.09 | 0.75 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.75 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.08 | 0.06 | 0.53 | 0.78 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 95.4 | 95.4 | < 0.005 | < 0.005 | — | 95.7 |
| Architectural Coatings | 8.95 | 8.95 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.10 | 0.14 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 15.8 | 15.8 | < 0.005 | < 0.005 | — | 15.8 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architect Coatings | 1.63 | 1.63 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.37 | 0.36 | 0.16 | 4.55 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,353 | 1,353 | 0.02 | 0.01 | 1.05 | 1,358 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.35 | 0.30 | 0.23 | 3.47 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,225 | 1,225 | 0.02 | 0.01 | 0.03 | 1,229 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.25 | 0.25 | 0.16 | 2.60 | 0.00 | 0.00 | 1.06 | 1.06 | 0.00 | 0.25 | 0.25 | — | 896 | 896 | 0.01 | 0.01 | 0.32 | 899 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.05 | 0.04 | 0.03 | 0.47 | 0.00 | 0.00 | 0.19 | 0.19 | 0.00 | 0.05 | 0.05 | — | 148 | 148 | < 0.005 | < 0.005 | 0.05 | 149 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## 3.55. Architectural Coating (2039) - Unmitigated

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

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

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.74 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.11 | 0.09 | 0.74 | 1.09 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 134 | 134 | 0.01 | < 0.005 | — | 134 |
| Architectural Coatings | 12.5 | 12.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.07 | 0.06 | 0.49 | 0.71 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 87.3 | 87.3 | < 0.005 | < 0.005 | — | 87.6 |
| Architectural Coatings | 8.19 | 8.19 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Off-Road Equipment | 0.01 | 0.01 | 0.09 | 0.13 | < 0.005 | < 0.005 | — | < 0.005 | < 0.005 | — | < 0.005 | — | 14.4 | 14.4 | < 0.005 | < 0.005 | — | 14.5 |
| Architectural Coatings | 1.49 | 1.49 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Onsite truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Offsite | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.35 | 0.30 | 0.16 | 4.43 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,344 | 1,344 | 0.02 | 0.01 | 0.88 | 1,348 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.34 | 0.29 | 0.22 | 3.39 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.35 | 0.35 | — | 1,216 | 1,216 | 0.02 | 0.01 | 0.02 | 1,220 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Average Daily | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.22 | 0.19 | 0.14 | 2.30 | 0.00 | 0.00 | 0.97 | 0.97 | 0.00 | 0.23 | 0.23 | — | 815 | 815 | 0.01 | 0.01 | 0.25 | 817 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Worker | 0.04 | 0.03 | 0.03 | 0.42 | 0.00 | 0.00 | 0.18 | 0.18 | 0.00 | 0.04 | 0.04 | — | 135 | 135 | < 0.005 | < 0.005 | 0.04 | 135 |
| Vendor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hauling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# 4. Operations Emissions Details

## 4.1. Mobile Emissions by Land Use

### 4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

## 4.2. Energy

### 4.2.1. Electricity Emissions By Land Use - Unmitigated

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

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | 11,726 | 11,726 | 1.90 | 0.23 | — | 11,842 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 11,726 | 11,726 | 1.90 | 0.23 | — | 11,842 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | 11,726 | 11,726 | 1.90 | 0.23 | — | 11,842 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 11,726 | 11,726 | 1.90 | 0.23 | — | 11,842 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | 1,941 | 1,941 | 0.31 | 0.04 | — | 1,961 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | 1,941 | 1,941 | 0.31 | 0.04 | — | 1,961 |

### 4.2.3. Natural Gas Emissions By Land Use - Unmitigated

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

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 22,944 | 22,944 | 2.03 | 0.04 | — | 23,007 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 22,944 | 22,944 | 2.03 | 0.04 | — | 23,007 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single Family Housing | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 22,944 | 22,944 | 2.03 | 0.04 | — | 23,007 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | 2.12 | 1.06 | 18.1 | 7.69 | 0.12 | 1.46 | — | 1.46 | 1.46 | — | 1.46 | — | 22,944 | 22,944 | 2.03 | 0.04 | — | 23,007 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | 0.39 | 0.19 | 3.30 | 1.40 | 0.02 | 0.27 | — | 0.27 | 0.27 | — | 0.27 | — | 3,799 | 3,799 | 0.34 | 0.01 | — | 3,809 |
| City Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 | 0.00 | — | 0.00 | — | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | 0.39 | 0.19 | 3.30 | 1.40 | 0.02 | 0.27 | — | 0.27 | 0.27 | — | 0.27 | — | 3,799 | 3,799 | 0.34 | 0.01 | — | 3,809 |

## 4.3. Area Emissions by Source

### 4.3.1. Unmitigated

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

| Source | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Hearths | 126 | 62.4 | 29.5 | 564 | 1.94 | 80.9 | — | 80.9 | 78.0 | — | 78.0 | 13,374 | 25,909 | 39,284 | 63.0 | 0.05 | — | 40,874 |
| Consumer Products | 103 | 103 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Architectural | 8.70 | 8.70 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Landscape Equipment | 13.1 | 12.4 | 1.35 | 140 | 0.01 | 0.07 | — | 0.07 | 0.05 | — | 0.05 | — | 373 | 373 | 0.02 | < 0.005 | — | 375 |
| Total | 251 | 187 | 30.8 | 704 | 1.95 | 81.0 | — | 81.0 | 78.0 | — | 78.0 | 13,374 | 26,283 | 39,657 | 63.0 | 0.05 | — | 41,248 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Hearths | 126 | 62.4 | 29.5 | 564 | 1.94 | 80.9 | — | 80.9 | 78.0 | — | 78.0 | 13,374 | 25,909 | 39,284 | 63.0 | 0.05 | — | 40,874 |
| Consumer Products | 103 | 103 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Architectural Coatings | 8.70 | 8.70 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | 238 | 174 | 29.5 | 564 | 1.94 | 80.9 | — | 80.9 | 78.0 | — | 78.0 | 13,374 | 25,909 | 39,284 | 63.0 | 0.05 | — | 40,874 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Hearths | 5.17 | 2.56 | 1.21 | 23.1 | 0.08 | 3.32 | — | 3.32 | 3.20 | — | 3.20 | 497 | 964 | 1,461 | 2.34 | < 0.005 | — | 1,520 |
| Consumer Products | 18.8 | 18.8 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Architectural Coatings | 1.59 | 1.59 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Landscape Equipment | 1.18 | 1.11 | 0.12 | 12.6 | < 0.005 | 0.01 | — | 0.01 | < 0.005 | — | < 0.005 | — | 30.5 | 30.5 | < 0.005 | < 0.005 | — | 30.6 |
| Total | 26.8 | 24.1 | 1.33 | 35.7 | 0.08 | 3.32 | — | 3.32 | 3.20 | — | 3.20 | 497 | 994 | 1,492 | 2.34 | < 0.005 | — | 1,551 |

## 4.4. Water Emissions by Land Use

### 4.4.1. Unmitigated

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

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 192 | 663 | 855 | 19.8 | 0.48 | — | 1,493 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 31.8 | 110 | 142 | 3.27 | 0.08 | — | 247 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 31.8 | 110 | 142 | 3.27 | 0.08 | — | 247 |

## 4.5. Waste Emissions by Land Use

### 4.5.1. Unmitigated

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

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 1,173 | 0.00 | 1,173 | 117 | 0.00 | — | 4,103 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 2.24 | 0.00 | 2.24 | 0.22 | 0.00 | — | 7.85 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 1,175 | 0.00 | 1,175 | 117 | 0.00 | — | 4,111 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 1,173 | 0.00 | 1,173 | 117 | 0.00 | — | 4,103 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 2.24 | 0.00 | 2.24 | 0.22 | 0.00 | — | 7.85 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 1,175 | 0.00 | 1,175 | 117 | 0.00 | — | 4,111 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | 194 | 0.00 | 194 | 19.4 | 0.00 | — | 679 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | 0.37 | 0.00 | 0.37 | 0.04 | 0.00 | — | 1.30 |
| Other Asphalt Surfaces | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | — | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | 195 | 0.00 | 195 | 19.4 | 0.00 | — | 681 |

## 4.6. Refrigerant Emissions by Land Use

### 4.6.1. Unmitigated

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

| Land Use | TOG | ROG | NOx | CO | SO2 | PM10E | PM10D | PM10T | PM2.5E | PM2.5D | PM2.5T | BCO2 | NBCO2 | CO2T | CH4 | N2O | R | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily, Summer (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| Daily, Winter (Max) | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 34.4 | 34.4 |
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Single Family Housing | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 5.69 | 5.69 |
| City Park | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.00 | 0.00 |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 5.69 | 5.69 |

## 4.7. Offroad Emissions By Equipment Type

### 4.7.1. Unmitigated

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

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

## 4.8. Stationary Emissions By Equipment Type

### 4.8.1. Unmitigated

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

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

## 4.9. User Defined Emissions By Equipment Type

### 4.9.1. Unmitigated

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

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

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

## 4.10. Soil Carbon Accumulation By Vegetation Type

### 4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

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

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

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

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

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

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

## 4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

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

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

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avoided | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sequestered | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Removed | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Subtotal | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

# 5. Activity Data

## 5.1. Construction Schedule

| Phase Name | Phase Type | Start Date | End Date | Days Per Week | Work Days per Phase | Phase Description |
|---|---|---|---|---|---|---|
| Site Preparation | Site Preparation | 1/31/2027 | 3/26/2028 | 5.00 | 300 | — |
| Grading | Grading | 3/27/2028 | 3/17/2030 | 5.00 | 515 | — |
| Building Construction | Building Construction | 3/18/2030 | 11/30/2039 | 5.00 | 2,533 | — |
| Paving | Paving | 12/1/2030 | 1/10/2032 | 5.00 | 290 | — |
| Architectural Coating | Architectural Coating | 3/18/2030 | 11/30/2039 | 5.00 | 2,533 | — |

## 5.2. Off-Road Equipment

### 5.2.1. Unmitigated

| Phase Name | Equipment Type | Fuel Type | Engine Tier | Number per Day | Hours Per Day | Horsepower | Load Factor |
|---|---|---|---|---|---|---|---|
| Site Preparation | Rubber Tired Dozers | Diesel | Average | 3.00 | 8.00 | 367 | 0.40 |
| Site Preparation | Tractors/Loaders/Backhoes | Diesel | Average | 4.00 | 8.00 | 84.0 | 0.37 |
| Grading | Graders | Diesel | Average | 1.00 | 8.00 | 148 | 0.41 |
| Grading | Excavators | Diesel | Average | 2.00 | 8.00 | 36.0 | 0.38 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Grading | Tractors/Loaders/Back | Diesel | Average | 2.00 | 8.00 | 84.0 | 0.37 |
| Grading | Scrapers | Diesel | Average | 2.00 | 8.00 | 423 | 0.48 |
| Grading | Rubber Tired Dozers | Diesel | Average | 1.00 | 8.00 | 367 | 0.40 |
| Building Construction | Forklifts | Diesel | Average | 3.00 | 8.00 | 82.0 | 0.20 |
| Building Construction | Generator Sets | Diesel | Average | 1.00 | 8.00 | 14.0 | 0.74 |
| Building Construction | Cranes | Diesel | Average | 1.00 | 7.00 | 367 | 0.29 |
| Building Construction | Welders | Diesel | Average | 1.00 | 8.00 | 46.0 | 0.45 |
| Building Construction | Tractors/Loaders/Back hoes | Diesel | Average | 3.00 | 7.00 | 84.0 | 0.37 |
| Paving | Pavers | Diesel | Average | 2.00 | 8.00 | 81.0 | 0.42 |
| Paving | Paving Equipment | Diesel | Average | 2.00 | 8.00 | 89.0 | 0.36 |
| Paving | Rollers | Diesel | Average | 2.00 | 8.00 | 36.0 | 0.38 |
| Architectural Coating | Air Compressors | Diesel | Average | 1.00 | 6.00 | 37.0 | 0.48 |

## 5.3. Construction Vehicles

### 5.3.1. Unmitigated

| Phase Name | Trip Type | One-Way Trips per Day | Miles per Trip | Vehicle Mix |
|---|---|---|---|---|
| Site Preparation | — | — | — | — |
| Site Preparation | Worker | 17.5 | 11.9 | LDA,LDT1,LDT2 |
| Site Preparation | Vendor | — | 9.10 | HHDT,MHDT |
| Site Preparation | Hauling | 0.00 | 20.0 | HHDT |
| Site Preparation | Onsite truck | — | — | HHDT |
| Grading | — | — | — | — |
| Grading | Worker | 20.0 | 11.9 | LDA,LDT1,LDT2 |
| Grading | Vendor | — | 9.10 | HHDT,MHDT |
| Grading | Hauling | 0.00 | 20.0 | HHDT |
| Grading | Onsite truck | — | — | HHDT |
| Building Construction | — | — | — | — |

| | | | | |
|---|---|---|---|---|
| Building Construction | Worker | 886 | 11.9 | LDA,LDT1,LDT2 |
| Building Construction | Vendor | 263 | 9.10 | HHDT,MHDT |
| Building Construction | Hauling | 0.00 | 20.0 | HHDT |
| Building Construction | Onsite truck | — | — | HHDT |
| Paving | — | — | — | — |
| Paving | Worker | 15.0 | 11.9 | LDA,LDT1,LDT2 |
| Paving | Vendor | — | 9.10 | HHDT,MHDT |
| Paving | Hauling | 0.00 | 20.0 | HHDT |
| Paving | Onsite truck | — | — | HHDT |
| Architectural Coating | — | — | — | — |
| Architectural Coating | Worker | 177 | 11.9 | LDA,LDT1,LDT2 |
| Architectural Coating | Vendor | — | 9.10 | HHDT,MHDT |
| Architectural Coating | Hauling | 0.00 | 20.0 | HHDT |
| Architectural Coating | Onsite truck | — | — | HHDT |

## 5.4. Vehicles

### 5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

## 5.5. Architectural Coatings

| Phase Name | Residential Interior Area Coated (sq ft) | Residential Exterior Area Coated (sq ft) | Non-Residential Interior Area Coated (sq ft) | Non-Residential Exterior Area Coated (sq ft) | Parking Area Coated (sq ft) |
|---|---|---|---|---|---|
| Architectural Coating | 9,717,874 | 3,239,291 | 0.00 | 0.00 | 367,995 |

## 5.6. Dust Mitigation

### 5.6.1. Construction Earthmoving Activities

| Phase Name | Material Imported (Ton of Debris) | Material Exported (Ton of Debris) | Acres Graded (acres) | Material Demolished (sq. ft.) | Acres Paved (acres) |
|---|---|---|---|---|---|
| Site Preparation | 0.00 | 0.00 | 450 | 0.00 | — |
| Grading | 0.00 | 0.00 | 1,545 | 0.00 | — |
| Paving | 0.00 | 0.00 | 0.00 | 0.00 | 168 |

### 5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

## 5.7. Construction Paving

| Land Use | Area Paved (acres) | % Asphalt |
|---|---|---|
| Single Family Housing | 27.1 | 0% |
| City Park | 0.00 | 0% |
| City Park | 0.00 | 0% |
| Other Asphalt Surfaces | 141 | 100% |

## 5.8. Construction Electricity Consumption and Emissions Factors

### kWh per Year and Emission Factor (lb/MWh)

| Year | kWh per Year | CO2 | CH4 | N2O |
|---|---|---|---|---|
| 2027 | 0.00 | 204 | 0.03 | < 0.005 |
| 2028 | 0.00 | 204 | 0.03 | < 0.005 |
| 2029 | 0.00 | 204 | 0.03 | < 0.005 |
| 2030 | 0.00 | 204 | 0.03 | < 0.005 |
| 2031 | 0.00 | 204 | 0.03 | < 0.005 |
| 2032 | 0.00 | 204 | 0.03 | < 0.005 |
| 2033 | 0.00 | 204 | 0.03 | < 0.005 |
| 2034 | 0.00 | 204 | 0.03 | < 0.005 |
| 2035 | 0.00 | 204 | 0.03 | < 0.005 |
| 2036 | 0.00 | 204 | 0.03 | < 0.005 |

| | | | | |
|---|---|---|---|---|
| 2037 | 0.00 | 204 | 0.03 | < 0.005 |
| 2038 | 0.00 | 204 | 0.03 | < 0.005 |
| 2039 | 0.00 | 204 | 0.03 | < 0.005 |

## 5.9. Operational Mobile Sources

### 5.9.1. Unmitigated

| Land Use Type | Trips/Weekday | Trips/Saturday | Trips/Sunday | Trips/Year | VMT/Weekday | VMT/Saturday | VMT/Sunday | VMT/Year |
|---|---|---|---|---|---|---|---|---|
| Total all Land Uses | 17,633 | 17,633 | 17,633 | 6,436,045 | 220,064 | 220,064 | 220,064 | 80,323,360 |

## 5.10. Operational Area Sources

### 5.10.1. Hearths

#### 5.10.1.1. Unmitigated

| Hearth Type | Unmitigated (number) |
|---|---|
| Single Family Housing | — |
| Wood Fireplaces | 0 |
| Gas Fireplaces | 1231 |
| Propane Fireplaces | 0 |
| Electric Fireplaces | 0 |
| No Fireplaces | 1231 |
| Conventional Wood Stoves | 0 |
| Catalytic Wood Stoves | 123 |
| Non-Catalytic Wood Stoves | 123 |
| Pellet Wood Stoves | 0 |

### 5.10.2. Architectural Coatings

| Residential Interior Area Coated (sq ft) | Residential Exterior Area Coated (sq ft) | Non-Residential Interior Area Coated (sq ft) | Non-Residential Exterior Area Coated (sq ft) | Parking Area Coated (sq ft) |
|---|---|---|---|---|
| 9717873.75 | 3,239,291 | 0.00 | 0.00 | 367,995 |

### 5.10.3. Landscape Equipment

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

## 5.11. Operational Energy Consumption

### 5.11.1. Unmitigated

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

| Land Use | Electricity (kWh/yr) | CO2 | CH4 | N2O | Natural Gas (kBTU/yr) |
|---|---|---|---|---|---|
| Single Family Housing | 20,981,771 | 204 | 0.0330 | 0.0040 | 71,590,552 |
| City Park | 0.00 | 204 | 0.0330 | 0.0040 | 0.00 |
| City Park | 0.00 | 204 | 0.0330 | 0.0040 | 0.00 |
| Other Asphalt Surfaces | 0.00 | 204 | 0.0330 | 0.0040 | 0.00 |

## 5.12. Operational Water and Wastewater Consumption

### 5.12.1. Unmitigated

| Land Use | Indoor Water (gal/year) | Outdoor Water (gal/year) |
|---|---|---|
| Single Family Housing | 100,098,160 | 494,503,878 |
| City Park | 0.00 | 0.00 |
| City Park | 0.00 | 0.00 |
| Other Asphalt Surfaces | 0.00 | 0.00 |

## 5.13. Operational Waste Generation

### 5.13.1. Unmitigated

| Land Use | Waste (ton/year) | Cogeneration (kWh/year) |
|---|---|---|
| Single Family Housing | 2,176 | — |
| City Park | 2.24 | — |
| City Park | 1.92 | — |
| Other Asphalt Surfaces | 0.00 | — |

## 5.14. Operational Refrigeration and Air Conditioning Equipment

### 5.14.1. Unmitigated

| Land Use Type | Equipment Type | Refrigerant | GWP | Quantity (kg) | Operations Leak Rate | Service Leak Rate | Times Serviced |
|---|---|---|---|---|---|---|---|
| Single Family Housing | Average room A/C & Other residential A/C and heat pumps | R-410A | 2,088 | < 0.005 | 2.50 | 2.50 | 10.0 |
| Single Family Housing | Household refrigerators and/or freezers | R-134a | 1,430 | 0.12 | 0.60 | 0.00 | 1.00 |
| City Park | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| City Park | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | 0.04 | 1.00 | 0.00 | 1.00 |
| City Park | Other commercial A/C and heat pumps | R-410A | 2,088 | < 0.005 | 4.00 | 4.00 | 18.0 |
| City Park | Stand-alone retail refrigerators and freezers | R-134a | 1,430 | 0.04 | 1.00 | 0.00 | 1.00 |

## 5.15. Operational Off-Road Equipment

#### 5.15.1. Unmitigated

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

## 5.16. Stationary Sources

#### 5.16.1. Emergency Generators and Fire Pumps

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

#### 5.16.2. Process Boilers

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

## 5.17. User Defined

| Equipment Type | Fuel Type |
|---|---|

## 5.18. Vegetation

#### 5.18.1. Land Use Change

#### 5.18.1.1. Unmitigated

| Vegetation Land Use Type | Vegetation Soil Type | Initial Acres | Final Acres |
|---|---|---|---|

#### 5.18.1. Biomass Cover Type

#### 5.18.1.1. Unmitigated

| Biomass Cover Type | Initial Acres | Final Acres |
|---|---|---|

#### 5.18.2. Sequestration

#### 5.18.2.1. Unmitigated

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

# 6. Climate Risk Detailed Report

## 6.1. Climate Risk Summary

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

| Climate Hazard | Result for Project Location | Unit |
|---|---|---|
| Temperature and Extreme Heat | 24.1 | annual days of extreme heat |
| Extreme Precipitation | 2.50 | annual days with precipitation above 20 mm |
| Sea Level Rise | — | meters of inundation depth |
| Wildfire | 0.00 | annual hectares burned |

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

## 6.2. Initial Climate Risk Scores

| Climate Hazard | Exposure Score | Sensitivity Score | Adaptive Capacity Score | Vulnerability Score |
|---|---|---|---|---|
| Temperature and Extreme Heat | 2 | 0 | 0 | N/A |
| Extreme Precipitation | N/A | N/A | N/A | N/A |
| Sea Level Rise | N/A | N/A | N/A | N/A |
| Wildfire | N/A | N/A | N/A | N/A |

| | | | | |
|---|---|---|---|---|
| Flooding | 0 | 0 | 0 | N/A |
| Drought | 0 | 0 | 0 | N/A |
| Snowpack Reduction | N/A | N/A | N/A | N/A |
| Air Quality Degradation | 0 | 0 | 0 | N/A |

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

## 6.3. Adjusted Climate Risk Scores

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

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

## 6.4. Climate Risk Reduction Measures

# 7. Health and Equity Details

## 7.1. CalEnviroScreen 4.0 Scores

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

| Indicator | Result for Project Census Tract |
|---|---|
| Exposure Indicators | — |
| AQ-Ozone | 47.0 |
| AQ-PM | 50.1 |
| AQ-DPM | 33.9 |
| Drinking Water | 99.8 |
| Lead Risk Housing | 28.5 |
| Pesticides | 87.0 |
| Toxic Releases | 21.8 |
| Traffic | 31.7 |
| Effect Indicators | — |
| CleanUp Sites | 4.12 |
| Groundwater | 52.4 |
| Haz Waste Facilities/Generators | 54.6 |
| Impaired Water Bodies | 66.7 |
| Solid Waste | 75.7 |
| Sensitive Population | — |
| Asthma | 50.8 |
| Cardio-vascular | 77.7 |
| Low Birth Weights | 86.8 |
| Socioeconomic Factor Indicators | — |
| Education | 68.8 |
| Housing | 12.0 |
| Linguistic | 61.9 |
| Poverty | 52.5 |
| Unemployment | 40.6 |

## 7.2. Healthy Places Index Scores

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

| Indicator | Result for Project Census Tract |
|---|---|
| Economic | — |
| Above Poverty | 58.77069165 |
| Employed | 40.16424997 |
| Median HI | 63.15924548 |
| Education | — |
| Bachelor's or higher | 36.40446555 |
| High school enrollment | 20.46708585 |
| Preschool enrollment | 39.62530476 |
| Transportation | — |
| Auto Access | 84.51174131 |
| Active commuting | 29.75747466 |
| Social | — |
| 2-parent households | 95.8937508 |
| Voting | 58.07776209 |
| Neighborhood | — |
| Alcohol availability | 93.60964969 |
| Park access | 27.678686 |
| Retail density | 8.700115488 |
| Supermarket access | 17.15642243 |
| Tree canopy | 58.29590658 |
| Housing | — |
| Homeownership | 88.78480688 |
| Housing habitability | 96.44552804 |
| Low-inc homeowner severe housing cost burden | 77.08199666 |
| Low-inc renter severe housing cost burden | 96.70216861 |

| | |
|---|---|
| Uncrowded housing | 52.3675093 |
| Health Outcomes | — |
| Insured adults | 47.32452201 |
| Arthritis | 82.7 |
| Asthma ER Admissions | 57.7 |
| High Blood Pressure | 39.5 |
| Cancer (excluding skin) | 82.6 |
| Asthma | 76.7 |
| Coronary Heart Disease | 87.2 |
| Chronic Obstructive Pulmonary Disease | 81.8 |
| Diagnosed Diabetes | 55.5 |
| Life Expectancy at Birth | 57.0 |
| Cognitively Disabled | 28.0 |
| Physically  Disabled | 26.6 |
| Heart Attack ER Admissions | 42.9 |
| Mental Health Not Good | 61.1 |
| Chronic Kidney Disease | 85.5 |
| Obesity | 74.1 |
| Pedestrian Injuries | 84.5 |
| Physical Health Not Good | 65.0 |
| Stroke | 75.8 |
| Health Risk Behaviors | — |
| Binge Drinking | 89.9 |
| Current Smoker | 51.2 |
| No Leisure Time for Physical Activity | 32.7 |
| Climate Change Exposures | — |
| Wildfire Risk | 0.0 |
| SLR Inundation Area | 0.0 |

| | |
|---|---|
| Children | 50.1 |
| Elderly | 24.7 |
| English Speaking | 36.6 |
| Foreign-born | 63.8 |
| Outdoor Workers | 62.2 |
| Climate Change Adaptive Capacity | — |
| Impervious Surface Cover | 76.9 |
| Traffic Density | 44.9 |
| Traffic Access | 0.0 |
| Other Indices | — |
| Hardship | 50.9 |
| Other Decision Support | — |
| 2016 Voting | 35.4 |

## 7.3. Overall Health & Equity Scores

| Metric | Result for Project Census Tract |
|---|---|
| CalEnviroScreen 4.0 Score for Project Location (a) | 72.0 |
| Healthy Places Index Score for Project Location (b) | 56.0 |
| Project Located in a Designated Disadvantaged Community (Senate Bill 535) | No |
| Project Located in a Low-Income Community (Assembly Bill 1550) | No |
| Project Located in a Community Air Protection Program Community (Assembly Bill 617) | No |

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

## 7.4. Health & Equity Measures

No Health & Equity Measures selected.

## 7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

## 7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

# 8. User Changes to Default Data

| Screen | Justification |
|---|---|
| Land Use | Land uses as provided in Project Description. |
| Construction: Construction Phases | Construction schedule simplified for the purposes of modeling. Assumes full buildout by 2040. |

# Appendix B: IPAC Species List

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# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: 07/29/2024 16:01:13 UTC
Project Code: 2024-0122625
Project Name: Bear Creek South

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

**Migratory Birds**: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

# OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Sacramento Fish And Wildlife Office**
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

# PROJECT SUMMARY

Project Code: 2024-0122625
Project Name: Bear Creek South
Project Type: Residential Construction
Project Description: The Bear Creek South Project site (proposed Project site) is in the northern portion of the City of Stockton Metropolitan Area, within the unincorporated area of San Joaquin County. The Project site is adjacent to the City of Stockton's northern city limits, within the City of Stockton (City) Sphere of Influence (SOI) (as defined in the Envision Stockton 2040 General Plan), and within the City of Stockton Urban Services Boundary.

The Project site is immediately northeast of the intersection of West Lane and Morada Lane. The Project site is bounded on the north by Bear Creek, on the west by West Lane, which is an existing regional arterial, on the south by Morada Lane, and on the east by the Union Pacific Railroad (UPRR) right of way.

The proposed Project consists of 2,491 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Minimum lot sizes will be 5,000 square feet (sf).

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.0452691,-121.28620443471237,14z

Counties: San Joaquin County, California

# ENDANGERED SPECIES ACT SPECIES

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

| NAME | STATUS |
|---|---|
| Riparian Brush Rabbit *Sylvilagus bachmani riparius*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/6189 | Endangered |

## REPTILES

| NAME | STATUS |
|---|---|
| Giant Garter Snake *Thamnophis gigas*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/4482 | Threatened |
| Northwestern Pond Turtle *Actinemys marmorata*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/1111 | Proposed Threatened |

## AMPHIBIANS

| NAME | STATUS |
|---|---|
| California Tiger Salamander *Ambystoma californiense*<br>Population: U.S.A. (Central CA DPS)<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/2076 | Threatened |
| Western Spadefoot *Spea hammondii*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/5425 | Proposed Threatened |

## INSECTS

| NAME | STATUS |
|---|---|
| Monarch Butterfly *Danaus plexippus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Candidate |
| Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/7850 | Threatened |

## CRUSTACEANS

| NAME | STATUS |
|---|---|
| Vernal Pool Fairy Shrimp *Branchinecta lynchi*<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/498 | Threatened |
| Vernal Pool Tadpole Shrimp *Lepidurus packardi* | Endangered |

| NAME | STATUS |
| --- | --- |

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2246

## FLOWERING PLANTS

| NAME | STATUS |
| --- | --- |
| Fleshy Owl's-clover *Castilleja campestris ssp. succulenta* | Threatened |

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8095

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

## IPAC USER CONTACT INFORMATION

Agency: Stockton city
Name: Elise Laws
Address: 1020 Suncast Lane
Address Line 2: #106
City: El Dorado Hills
State: CA
Zip: 95762
Email elaws@denovoplanning.com
Phone: 9162350116

## LEAD AGENCY CONTACT INFORMATION

Lead Agency: Stockton city

# Appendix C: Cultural Resources Assessment

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ATTACHMENT E

# CULTURAL RESOURCE ASSESSMENT SUMMARY

# FOR THE BEAR CREEK SOUTH RESIDENTIAL PROJECT

# SAN JOAQUIN COUNTY, CALIFORNIA

Prepared by

Melinda A. Peak
**Peak & Associates, Inc.**
3941 Park Drive, Suite 20-329
El Dorado Hills, CA 95762
(916) 939-2405

Prepared for

**De Novo Planning Group**
1020 Suncast Lane, Suite 106
El Dorado Hills, CA 95762

September 2024 (revised December 2025)
(Job #21-094)

# INTRODUCTION

## Project Location

The Bear Creek South Residential Project site (proposed Project site) is in the northern portion of the City of Stockton Metropolitan Area, within the unincorporated area of San Joaquin County. The Project site is adjacent to the City of Stockton's northern city limits, within the City of Stockton (City) Sphere of Influence (SOI) (as defined in the Envision Stockton 2040 General Plan), and within the City of Stockton Urban Services Boundary.

The Project site is immediately northeast of the intersection of West Lane and Morada Lane. The Project site is bounded on the north by Bear Creek, on the west side by West Lane, which is an existing regional arterial, on the south by Morada Lane, and on the east by the Union Pacific Railroad (UPRR) right of way. Figures 1 and 2 show the Project's regional location and vicinity.

## Project and Annexation Areas Defined

The overall Project is comprised of three proposed vesting Tentative Maps. The Project applicants processing the individual vesting Tentative Maps are referred to as Arnaiz, Klein and Tri Pointe Homes (TPH) throughout this Project Description. Collectively, the Project is referred to as the Bear Creek South Residential Project.

The following terms are used throughout this Project Description to describe the boundaries within the Project site:

- **Development Area or Project Site** – includes a total area of 503.89 acres, that is intended for the development of up to 2,241 residential units, five parks, a lineal open space area along Bear Creek and public infrastructure.
- **Non-Development Area** – includes six parcels (or a portion of) totaling 26.29 acres consisting of City of Stockton rights-of-way, a UPRR easement area (via Congressional Grant), and two Sacramento-San Joaquin Drainage District easement areas.
- **Annexation Area** – includes the whole of the Project, including the Development and Non-Development Areas (totaling 530.18 acres).

Table 1 lists each parcel included in the Project site and Figure 3 illustrates the APNs.

***TABLE 1: PARCELS WITHIN THE PROJECT SITE/DEVELOPMENT AND NON-DEVELOPMENT AREAS***

| | | Area (AC) | Total Area (AC) | Land (%) |
|---|---|---|---|---|
| *Development Area* | | | | |
| *Arnaiz - Development Area* | | | | |
| | APN: 120-020-270 | 111.57 | 111.57 | 22% |
| *Klein - Development Area* | | | | |
| | APN: 120-030-060 | 53.07 | 220.09 | 44% |
| | APN: 120-020-320 | 23.45 | | |
| | APN: 120-020-310 | 70.94 | | |
| *Tri Pointe Homes Holdings - Development Area* | | | | |
| | Portion of APN: 120-020-300 | 101.29 | 172.23 | 34% |
| | APN: 120-030-100 | 70.94 | | |
| | | ***Total*** | ***503.89*** | ***100%*** |
| *Non-Development Area* | | | | |
| *City of Stockton (Road Right-of-Way)* | | | | |
| | APN: 120-030-070 | 0.24 | 6.06 | 23% |
| | APN: 120-030-090 | 3.97 | | |
| | APN: 120-020-260 | 1.85 | | |
| *Union Pacific Railroad (Congressional Grant Area)* | | | | |
| | APN: 122-010-050 | 0.37 | 19.62 | 75% |
| | Portion of APN: 120-020-300 | 11.75 | | |
| | APN: 124-010-010, -030, -070 | 7.26 | | |
| *Sacramento-San Joaquin Drainage District* | | | | |
| | APN: 124-020-110 | 0.09 | 0.61 | 2% |
| | APN: 124-020-120 | 0.52 | | |
| | | ***Total*** | ***26.29*** | ***100%*** |
| | | ***Total Project Area*** | ***530.18 acres*** | |

*SOURCES: VVH ENGINEERING. MAP DATE: JULY 8, 2024.*

## *Site Topography*

The Project site is relatively flat and ranges in elevation from approximately 24 feet above sea level in the southwest corner, rising to 32 feet above sea level in the northeast corner of the Project site.

## *Existing Site Uses*

The Development Area is predominantly comprised of agricultural uses and related facilities such as associated agricultural equipment and irrigation ditches. Additionally, six dirt/gravel roadways bisect the Development Area, including three dirt roadways extending south to north from Morada Lane, and three other dirt roadways trending west to east, including one along the base of the Bear Creek levee.

Irrigation canals, operated by the Woodbridge Irrigation District (WID), run along the northeast and central portions of the Development Area, and are referred to as the Peters Castle Lateral and are used for delivery of irrigation water to District customers.

The portion of the WID's Peters Castle Lateral located within the Development Area is currently an open ditch canal approximately 7,130 feet in length that begins at the west boundary of the UPRR right of way, proceeds westerly until it meets the Bear Creek levee, and then turns southerly to Morada Lane where it transitions into an underground pipe.

Figure 4 shows aerial imagery of the current existing site use within the Project site.

## *Existing General Plan Land Use Designations*

The Project site is currently located within San Joaquin County. The Project site is outside Stockton city limits, but within the City's Sphere of Influence (SOI).

### General Plan Land Use Designations

Below is a general description of the City-designated LDR land use within the Project site:

**Low Density Residential (LDR):** This designation allows for single-family residential units, duplexes, triplexes, semi-detached patio homes, town homes, public and quasi-public uses, second units, and other similar and compatible uses. The maximum density is 6.1 units per acre based on gross acreage and 8.7 units per acre based on net acreage.

### Surrounding General Plan Designations

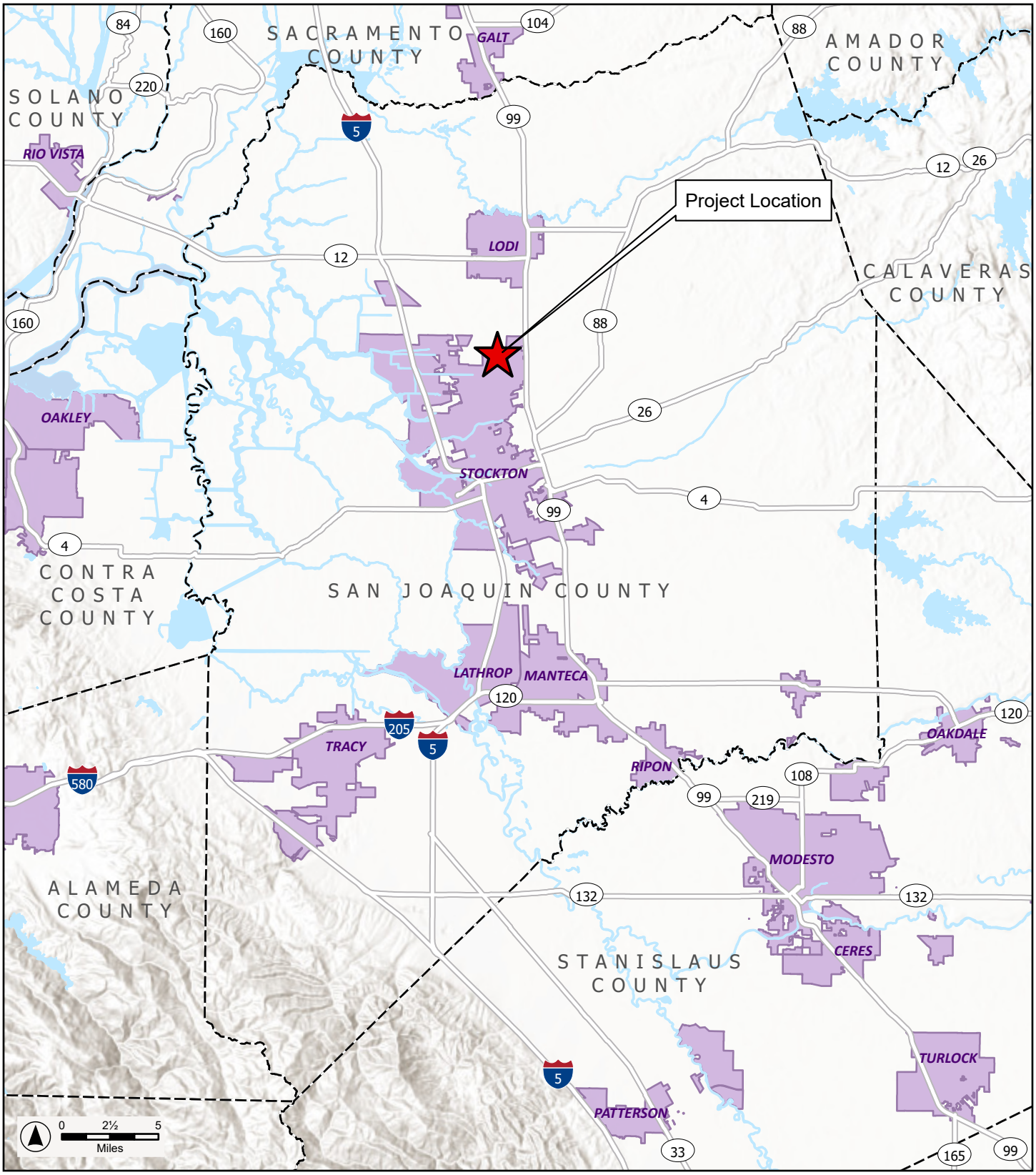
The entire Project site is surrounded by the City of Stockton. Within the City, lands to the east and north are designated LDR. Lands to the south are designated Commercial, LDR, and Medium Density Residential. Lands to the west are designated Parks and Recreation, and Institutional.

## *Project Description*

### Project Objectives

Consistent with CEQA Guidelines Section 15124(b), a clear statement of objectives and the underlying purpose of the proposed Project shall be discussed. The principal objective of the proposed Project is the approval and subsequent implementation of the Bear Creek South Residential Project (the proposed Project). The quantifiable objectives of the proposed Project include the development of the approximately 503.89-acres Development Area for residential and park uses, as well as the annexation of the 530.18-acre Annexation Area, as described below.

ATTACHMENT E




Legend

- Project Location
- County Area
- Incorporated Area

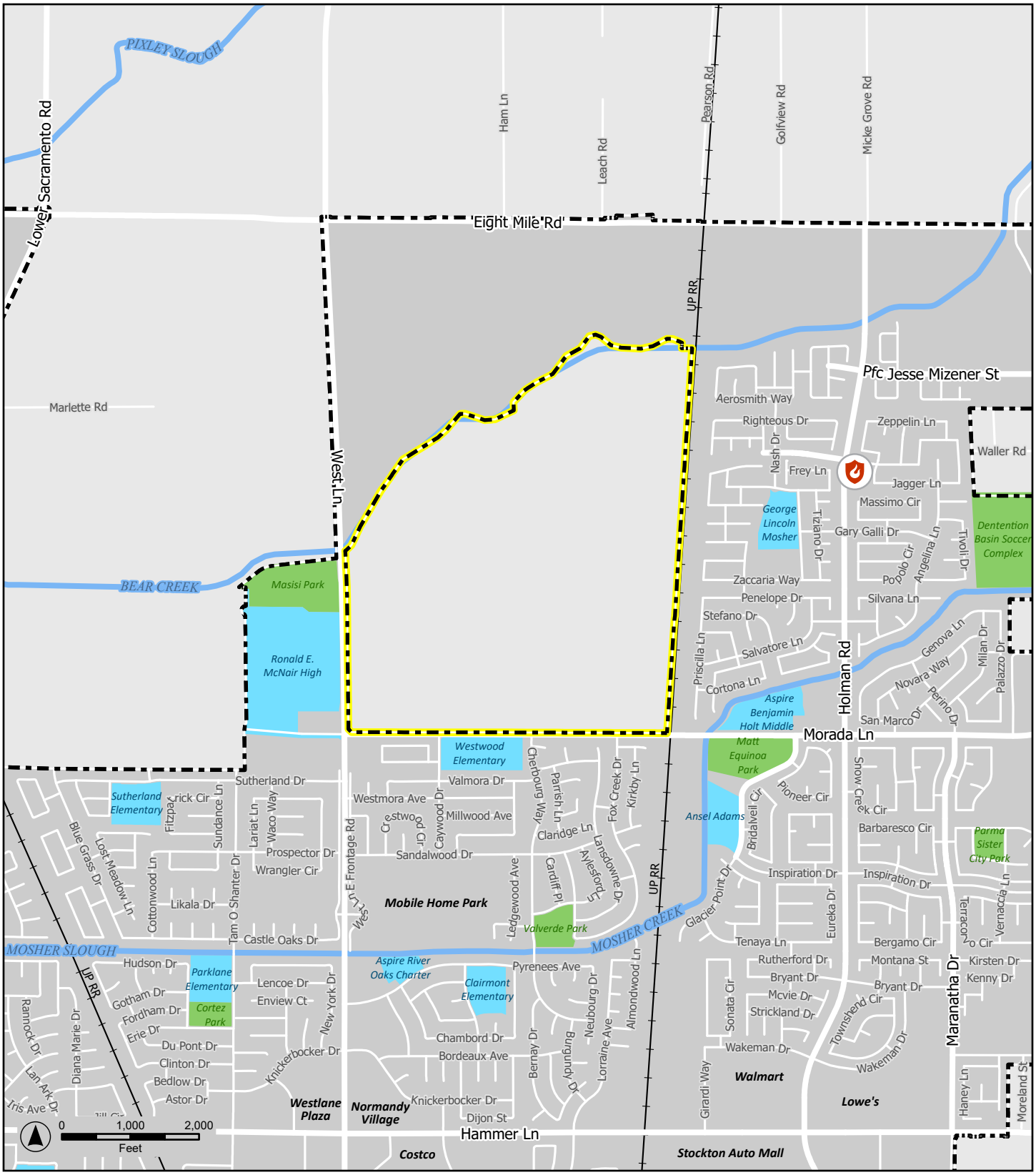
**CITY OF STOCKTON - BEAR CREEK SOUTH**

Figure 1. Regional Location

*Sources: California State Geoportal. Map date: March 14, 2024.*

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm

ATTACHMENT E



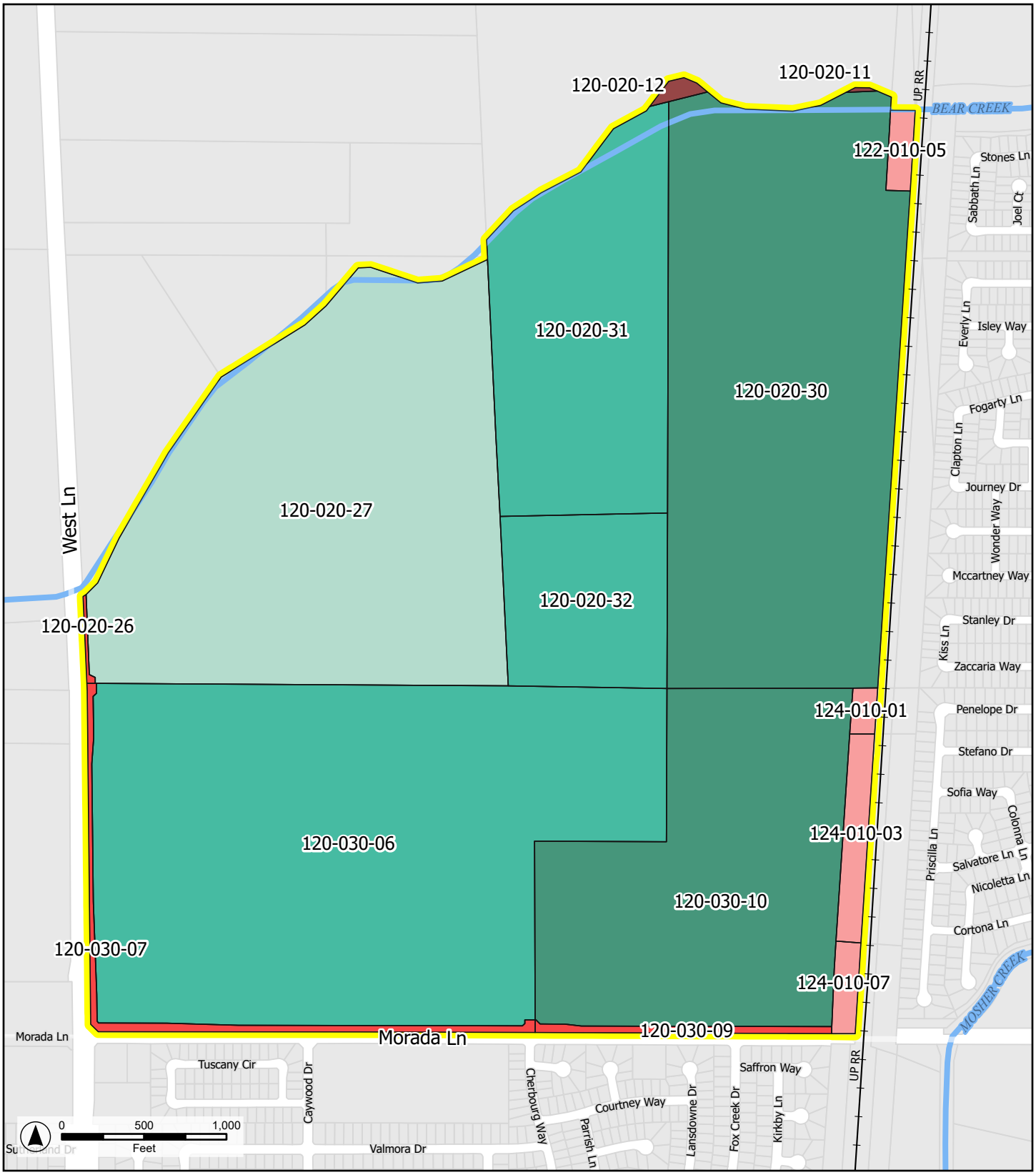

Legend

- Annexation Area
- City of Stockton
- Unincorporated San Joaquin County
- Park
- Public School
- City of Stockton Fire Station 13

**CITY OF STOCKTON - BEAR CREEK SOUTH**

Figure 2. Vicinity Map

*Sources: San Joaquin County GIS. Map date: March 14, 2024.*




Legend

- Annexation Area

**Development Areas**

- ARNAIZ Development Area
- Klein Development Area
- TPH Development Area

**Non-Development Areas**

- City of Stockton Right-of-Way
- Union Pacific Railroad
- Sacramento-San Joaquin Drainage District

**CITY OF STOCKTON - BEAR CREEK SOUTH**

Figure 3. Assessor Parcel Map

*Sources: San Joaquin County GIS; MAXAR Imagery, 10/24/2023. Map date: March 13, 2024.*

Legend

- Annexation Area
- WaterLines

**CITY OF STOCKTON - BEAR CREEK SOUTH**

Figure 4. Aerial Map

*Sources: San Joaquin County GIS; MAXAR Imagery, 10/24/2023. Map date: March 13, 2024.*

The Bear Creek South Residential Project identifies the following Project objectives as part of the stated purpose:

- Provide residential housing opportunities that are visually attractive and accommodate the future housing needs in Stockton.
- Provide infrastructure, public facilities, and park space that meets City standards, in a centralized setting that is integrated with existing and planned facilities and connections and increases recreational opportunities for existing and future residents of the City.
- Incorporate Woodbridge Irrigation District facilities into the Project design, that maintains their purpose while avoiding any conflicts with future residents.
- Establish a logical phasing plan among the three landowners to ensure that each phase of development would include necessary public improvements that are required to meet City standards, both onsite and offsite.
- Annex the Annexation Area and eliminate the unincorporated island that was created with the annexation of the Tra Vigne Project to the north.

**Project Description**

The proposed Project consists of 2,241 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Minimum lot sizes will be 5,000 square feet (sf).

Additionally, the Project includes the following components:

- **Parks**: Approximately 26.1 acres of parks, five in total, are proposed around a centrally located park/basin, which provides each neighborhood an opportunity to access these spaces through a network of enhanced walkways, also referred to as wellness walks (see bullet below for more detail regarding wellness walks). The parks are themed with differing types of uses and amenities within each park to encourage park users to use the wellness walks to explore the opportunities and activities within each park.
- **Open Space Areas**: Approximately 28.9 acres of open spaces are included within the Project site. The open space is utilized for detention (6.6 acres) and a linear buffer area along Bear Creek (22.3 acres). The basin will include an enhanced walkway around the perimeter of the basin and a liner multi-use trail will be provided along the Bear Creek corridor. Wellness walks will connect the parks to each other and the linear open space area along Bear Creek.
- **Wellness Walks**: The Project site has designated streets with enhanced walkways (i.e., wide sidewalks and landscaped areas) that will encourage pedestrians to walk to parks and open space features.

- **Project Entries**: Enhanced Project entries would be provided along the Project site access points along West Lane and E. Morada Lane. These are visual opportunities for making a statement and creating a sense of place.
- **Perimeter Improvements**: The Project includes buildout of the West Lane and Morada Lane rights-of-way to includes bike lanes, additional travel lanes, perimeter landscaping, and signalized intersections.

Table 2 summaries the total unit count and acreage for each proposed land use in the Project site.

**Residential Development**
The proposed Project includes three vesting tentative maps that would subdivide the Development Area consistent with the proposed land uses. The Development Area would have 2,241 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Minimum lot sizes will be 5,000 sf.

The Project would be developed in three major phases as represented by the three individual vesting tentative maps. Sub-phases within each vesting tentative map will be identified later in the engineering process. The general pattern of phases will be north to south from Morada Lane, and west to east from West Lane.

Necessary improvements per vesting tentative map have been identified to anticipate needed improvements to accommodate any one of the vesting tentative maps going forward as the first phase.

***TABLE 2: GROSS LAND USE SUMMARY – OVERALL PROJECT AREA***

| *PROPOSED LAND USE* | *APPROXIMATE ACRES* | *NUMBER OF UNITS* |
|---|---|---|
| Low Density Residential (min. 5,000 sf lots) | 301.1 | 2,241 |
| Parks | 26.1 | -- |
| Storm Basin | 6.6 | -- |
| Bear Creek Open Space | 22.3 | -- |
| Project Streets | 140.8 | -- |
| WID Future Easement (Parcel 1) | 3.8 | -- |
| Morada Lane (Parcel 2) | 0.4 | -- |
| Morada Lane (Parcel 3) | 0.8 | -- |
| Morada Lane (Parcel A) | 0.6 | -- |
| Morada Lane (Parcel B) | 0.6 | -- |
| West Lane (Parcel B) | 0.2 | -- |
| West Lane (Parcel C) | 0.6 | -- |

*SOURCE: VVH CONSULTING ENGINEERS, 2024.*

**Parks and Open Space**
The Project includes the following park facilities:

- An approximately 3.2-acre "Central" Park adjacent to and surrounding the primary detention basin, which is approximately 5.1 acres in size;
- An approximately 4.8-acre "Northwest" Park;
- An approximately 7.7-acre "Northeast" Park;
- An approximately 4.9-acre "Southeast" Park; and
- An approximately 5.5-acre "Southwest" Park.

The park facilities total approximately 26.1 acres, with an additional 5.1 acres of detention basin. In addition to the Parks, there will be a series of streets with an enhanced right of way to accommodate a pedestrian "wellness walk." This "wellness walk" will tie different areas to the internal parks and encourage movement throughout the Project site.

Further, Bear Creek will be bordered by a frontage road with an open space area containing a 20-foot width from the toe of slope, adjacent to a 19-foot landscaped area with a 12-foot wide multi use path. The total open space area along Bear Creek is approximately 22.3 acres.

**Circulation**

The proposed street network will connect into the greater Stockton community at five access points, including three along Morada Lane and two along West Lane. These connection points will be made up of a combination of minor arterial roads, with and without a median, and collector roads. The street network within Project site is intended to contribute to the aesthetics of the community, with residents experiencing varied street scenes and street designs.

As noted previously, the Project will include full frontage improvements along West Lane and Morada Lane. Included in these improvements will be full signalized intersections at the northern entry point along West Lane and at the central entrance along Morada Lane.

**Utilities and Planned Infrastructure Improvements**

The construction of on-site infrastructure improvements would be required to accommodate build out of the Development Area, as described below.

*Potable Water System*

Water supply will be provided by the City of Stockton, which includes surface and ground water supplies. Water distribution will be by an underground distribution system designed and constructed per the City of Stockton standards and specifications.

The Project requires extension of offsite potable water conveyance infrastructure to the Project site to comply with the City's 2021 Water Master Plan Update; however, this is not required for the initial phases of the Project because existing City water mains are in West Lane and Morada Lane. Improvements to the potable water system would be constructed in accordance with the City's 2021 Water Master Plan Update adopted February 23, 2021. Improvements identified in the Water Master Plan Update include: (1) a 16-inch diameter potable water transmission pipeline connection to existing potable water in West Lane, (2) a 16-inch diameter potable water transmission pipeline connection to existing potable water in Morada Lane, and (3) an 18-inch diameter potable water

transmission pipeline connection to the existing Cannery Park project located east of the existing UPRR. The 18-inch diameter pipeline would cross under the UPRR tracks to connect to the existing stub-out constructed by the Cannery Park project. Service line connections are not allowed by the City of Stockton on water lines 16-inches diameter or larger. The Project will construct a potable water distribution system with pipe sizes ranging from six inches to 12 inches. Stubs from the transmission pipelines will be constructed as required by the City to connect to the Project potable water distribution system. The Project may also construct a parallel distribution pipeline for connection of fire hydrants along Project frontage roads if required by the City, with interconnection to the transmission pipeline as required.

*Wastewater System*

The Project is located within existing City of Stockton Collection System Service Area 10 and is identified as a major development in the City's 2022 Wastewater Master Plan Update (adopted October 18, 2022). The Project would construct wastewater infrastructure in accordance with the 2022 Wastewater Master Plan Update, which shows a 21-inch diameter future gravity sewer connection from the Project to existing City of Stockton gravity sewer locate in Morada Lane. Effluent from all tributary areas would be collected and conveyed through gravity sewer pipelines. All sewer collection and conveyance infrastructure would be sized and constructed according to adopted City of Stockton sewer hydrologic and hydraulic design criteria, design standards, and specifications.

*Stormwater System*

The Project storm drainage infrastructure would consist of an engineered network of inlets, storm drainage pipes, maintenance holes, storm water quality treatment systems/devices, a detention basin, a basin discharge pump station, and a pressure force main for conveying discharge from the detention basin to an existing outfall at Bear Creek. All drainage collection and conveyance infrastructure would be sized and constructed according to adopted City of Stockton storm drainage hydrologic and hydraulic design criteria, design standards, and specifications. Onsite stormwater runoff would be directed into an underground pipe system which would collect the runoff and direct it to the central storm drainage basin. Stormwater from this basin would be discharged via a new pump station and force main into Bear Creek through an existing 24-inch diameter outfall structure located on the south side of Bear Creek, just east of the West Lane overcrossing. The basin drawdown rate would meet City of Stockton Municipal Utilities Department (COSMUD) standards to discharge the 100-year, 24-hour design storm volume over a period of 48 hours and would be less than predeveloped runoff rates from the Project area.

The proposed Project would incorporate site design measures, landscape features, and approved engineered treatment facilities (bioretention facilities or COSMUD-approved equivalent) for water quality treatment that minimizes imperviousness, retains or detains stormwater, slows runoff rates, and reduces pollutants in post-development runoff consistent with the City of Stockton NPDES SWMP and the City of Stockton and County of San Joaquin Stormwater Quality Control Criteria Plan

*Regulated Public Utilities*
Electrical, gas, phone, cable, and related internet services would be extended to all portions of the Project site from existing facilities located along West Lane and Morada Lane, or other utility systems in the Project vicinity. Utility improvements would be installed in conjunction with planned street improvements.

*Vesting Tentative Subdivision Maps*
The proposed Project includes three Vesting Tentative Subdivision Maps for the Development Area. The tentative maps would result in the subdivision of 503.89 acres into 2,241 single-family residential units, five parks, and a storm basin facility. Total parkland is 26.1 acres. In addition, there will be a series of streets with an enhanced right of ways to accommodate a pedestrian "wellness walk" connecting the parks and a lineal open space area paralleling the south edge of Bear Creek.

## ANNEXATION

The proposed Project includes a request for annexation of 15 APNs, totaling 530.18 acres, into the City of Stockton. This includes the proposed 503.89-acre Development Area (including future right-of-way and existing roadway right-of-way along West Lane and Morada Lane) and 26.29-acre Non-Development Area.

## CULTURAL RESOURCES

The following study has been prepared to meet the needs of a CEQA review. The project research included a records search, check of the Native American Heritage Commission Sacred Lands files, and a field survey of the Development Area.

Melinda A. Peak, senior historian/archeologist with Peak & Associates, Inc. served as principal investigator for the study, with archeologist Michael Lawson completing the field survey (resumes, Appendix 1).

## REGULATORY CONTEXT

State historic preservation regulations affecting this project include the statutes and guidelines contained in the California Environmental Quality Act (CEQA; Public Resources Code sections 21083.2 and 21084.1 and sections 15064.5 and 15126.4 (b) of the CEQA Guidelines). CEQA Section 15064.5 requires that lead agencies determine whether projects may have a significant effect on archaeological and historical resources. Public Resources Code Section 21098.1 further cites: A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.

An "historical resource" includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript that is historically or archaeologically significant (Public Resources Code section 5020.1).

Advice on procedures to identify such resources, evaluate their importance, and estimate potential effects is given in several agency publications such as the series produced by the Governor's Office of Planning and Research (OPR), *CEQA and Archaeological Resources,* 1994. The technical advice series produced by OPR strongly recommends that Native American concerns and the concerns of other interested persons and corporate entities, including, but not limited to, museums, historical commissions, associations, and societies be solicited as part of the process of cultural resources inventory. In addition, California law protects Native American burials, skeletal remains, and associated grave goods regardless of the antiquity and provides for the sensitive treatment and disposition of those remains (California Health and Safety Code Section 7050.5, California Public Resources Codes Sections 5097.94 et al).

**The California Register of Historical Resources (Public Resources Code Section 5020 et seq.)**

The State Historic Preservation Office (SHPO) maintains the California Register of Historical Resources (CRHR). Properties listed, or formally designated as eligible for listing, on the National Register of Historic Places are automatically listed on the CRHR, as are State Landmarks and Points of Interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

For the purposes of CEQA, an historical resource is a resource listed in, or determined eligible for listing in the California Register of Historical Resources. When a project will impact a site, it needs to be determined whether the site is an historical resource. The criteria are set forth in Section 15064.5(a) (3) of the CEQA Guidelines, and are defined as any resource that does any of the following:

A. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

B. Is associated with the lives of persons important in our past;

C. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

D. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, the CEQA Guidelines, Section 15064.5(a) (4) states:

The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey

(meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code section 5020.1(j) or 5024.1.

**California Health and Safety Code Sections 7050.5, 7051, and 7054**

These sections collectively address the illegality of interference with human burial remains, as well as the disposition of Native American burials in archaeological sites. The law protects such remains from disturbance, vandalism, or inadvertent destruction, and establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project, including the treatment of remains prior to, during, and after evaluation, and reburial procedures.

**California Public Resources Code Section 15064.5(e)**

This law addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction. The section establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project and establishes the Native American Heritage Commission as the entity responsible to resolve disputes regarding the disposition of such remains.

**Assembly Bill 52**

Assembly Bill (AB) 52 establishes a formal consultation process for California tribes as part of CEQA and equates significant impacts on tribal cultural resources with significant environmental impacts. AB 52 defines a "California Native American Tribe" as a Native American tribe located in California that is on the contact list maintained by the Native American Heritage Commission. Section 21074 of the Public Resources Code states that "tribal cultural resources" are: (1) sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a tribe that are listed, or determined to be eligible for listing, in the national or state register of historical resources, or listed in a local register of historic resources; or (2) resources that the lead agency determines, in its discretion, are tribal cultural resource.

AB 52 requires formal consultation with California Native American Tribes prior to determining the level of environmental document if a tribe has requested to be informed by the lead agency of proposed projects. AB 52 also requires that consultation address project alternatives, mitigation measures, for significant effects, if requested by the California Native American Tribe, and that consultation be considered concluded when either the parties agree to measures to mitigate or avoid a significant effect, or the agency concludes that mutual agreement cannot be reached. Under AB 52, such measures shall be recommended for inclusion in the environmental document and adopted mitigation monitoring program if determined to avoid or lessen a significant impact on a tribal cultural resource.

# CULTURAL SETTING

## Prehistory

The Central Valley region was among the first in the state to attract intensive fieldwork, and research has continued to the present day. This has resulted in a substantial accumulation of data. In the early decades of the 1900s, E.J. Dawson explored numerous sites near Stockton and Lodi, later collaborating with W.E. Schenck (Schenck and Dawson 1929). By 1933, the focus of work was directed to the Cosumnes locality, where survey and excavation studies were conducted by the Sacramento Junior College (Lillard and Purves 1936).

Excavation data from the stratified Windmiller site (CA-Sac-107), suggested two temporally distinct cultural traditions. Later work at other mounds by Sacramento Junior College and the University of California, Berkeley, enabled the investigators to identify a third cultural tradition, intermediate between the previously postulated Early and Late Horizons.

The three-horizon sequence, based on discrete changes in ornamental artifacts and mortuary practices, as well as on observed differences in soils within sites (Lillard, Heizer and Fenenga 1939), was later refined by Beardsley (1954). An expanded definition of artifacts diagnostic of each time period was developed, and its application extended to parts of the central California coast. Traits held in common allow the application of this system within certain limits of time and space to other areas of prehistoric central California.

The Windmiller Culture (Early Horizon) is characterized by ventrally-extended burials (some dorsal extensions are known), with westerly orientation of heads; a high percentage of burials with grave goods; frequent presence of red ocher in graves; large projectile points, of which 60 percent are of materials other than obsidian; rectangular *Haliotis* beads; *Olivella* shell beads (types A1a and L); rare use of bone; some use of baked clay objects; and well-fashioned charmstones, usually perforated.

The Cosumnes Culture (Middle Horizon) displays considerable changes from the preceding cultural expression. The burial mode is predominately flexed, with variable cardinal orientation and some cremations present. There are a lower percentage of burials with grave goods, and ocher staining is common in graves. *Olivella* beads of types C1, F and G predominate, and there is abundant use of green *Haliotis* sp. rather than red *Haliotis* sp. Other characteristic artifacts include perforated and canid teeth; asymmetrical and "fishtail" charmstones, usually unperforated; cobble mortars and evidence of wooden mortars; extensive use of bone for tools and ornaments; large projectile points, with considerable use of rock other than obsidian; and use of baked clay.

Hotchkiss Culture (Late Horizon) -- The burial pattern retains the use of the flexed mode, and there is wide spread evidence of cremation, lesser use of red ocher, heavy use of baked clay, *Olivella* beads of Types E and M, extensive use of *Haliotis* ornaments of many elaborate shapes and forms, shaped mortars and cylindrical pestles, bird-bone tubes with elaborate geometric designs, clam shell disc beads, small projectile points indicative of the introduction of the bow and arrow, flanged

tubular pipes of steatite and schist, and use of magnesite (Moratto 1984:181-183). The characteristics noted are not all-inclusive, but cover the more important traits.

Schulz (1981), in an extensive examination of the central California evidence for the use of acorns, used the terms Early, Middle and Late Complexes, but the traits attributed to them remain generally the same. While it is not altogether clear, Schulz seemingly uses the term “Complex” to refer to the particular archeological entities (above called “Horizons”) as defined in this region. Ragir’s (1972) cultures are the same as Schulz's complexes.

Bennyhoff and Hughes (1984) have presented alternative dating schemes for the Central California Archeological Sequence. The primary emphasis is a more elaborate division of the horizons to reflect what is seen as cultural/temporal changes within the three horizons and a compression of the temporal span.

There have been other chronologies proposed, including Fredrickson (1973), and since it is correlated with Bennyhoff's (1977) work, it does merit discussion. The particular archeological cultural entities Fredrickson has defined, based upon the work of Bennyhoff, are patterns, phases and aspects. Bennyhoff's (1977) work in the Plains Miwok area is the best definition of the Cosumnes District, which likely conforms to Fredrickson's pattern. Fredrickson also proposed periods of time associated heavily with economic modes, which provides a temporal term for comparing contemporary cultural entities. It corresponds with Willey and Phillips’ (1958) earlier “tradition”, although it is tied more specifically to the archeological record in California.

**Ethnography**

The project area lies within the northern portion of the ethnographic territory of the Yokuts people. The Yokuts were members of the Penutian language family which held all of the Central Valley, San Francisco Bay Area, and the Pacific Coast from Marin County to near Point Sur. The Yokuts differed from other ethnographic groups in California as they had true tribal divisions with group names (Kroeber 1925; Latta 1949). Each tribe spoke a particular dialect, common to its members, but similar enough to other Yokuts that they were mutually intelligible (Kroeber 1925).

The Yokuts held portions of the San Joaquin Valley from the Tehachapi in the south to Stockton in the north. On the north they were bordered by the Plains Miwok, and on the west by the Saclan or Bay Miwok and Costonoan peoples. Although neighbors were often from distinct language families, differences between the people appear to have been more influenced by environmental factors as opposed to linguistic affinities. Thus, the Plains Miwok were more similar to the nearby Yokuts than to foothill members of their own language group. Similarities in cultural inventory co-varied with distance from other groups and proximity to culturally diverse people. The material culture of the southern San Joaquin Yokuts was therefore more closely related to that of their non-Yokuts neighbors than to that of Delta members of their own language group.

Trade was well developed, with mutually beneficial interchange of needed or desired goods. Obsidian, rare in the San Joaquin Valley, was obtained by trade with Paiute and Shoshoni groups

on the eastern side of the Sierra Nevada, where numerous sources of this material are located, and to some extent from the Napa Valley to the north. Shell beads, obtained by the Yokuts from coastal people, and acorns, rare in the Great Basin, were among many items exported to the east by Yokuts traders (Davis 1961).

Economic subsistence was based on the acorn, with substantial dependency on gathering and processing of wild seeds and other vegetable foods. The rivers, streams, and sloughs that formed a maze within the valley provided abundant food resources such as fish, shellfish, and turtles. Game, wild fowl, and small mammals were trapped and hunted to provide protein augmentation of the diet. In general, the eastern portion of the San Joaquin Valley provided a lush environment of varied food resources, with the estimated large population centers reflecting this abundance (Cook 1955; Baumhoff 1963).

Settlements were oriented along the water ways, with their village sites normally placed adjacent to these features for their nearby water and food resources. House structures varied in size and shape (Latta 1949; Kroeber 1925), with most constructed from the readily available tules found in the extensive marshes of the low-lying valley areas. The housepit depressions for the structures ranged in diameter from 3 meters to 18 meters (Wallace 1978:470).

**Historical Background**

The agricultural value of the San Joaquin Valley was recognized early in time, with much of the region used for dry land grain farming. The early completion of railroads through the region helped provide a ready means of shipping farm projects. The 1870 San Joaquin County map shows the Western Pacific railroad line west of the Project site. By 1883, the rail line had been acquired by the Central Pacific and by 1905, the Southern Pacific.

The land of the overall Development Area has been used for agricultural purposes, with many different owners over time. It is only now, with increasing urbanization in the region, in part spurred on by the expansion of population growth and increased real estate cost in the Bay Area, that development has also spread to the Stockton area, resulting in conversion of agricultural properties to residential uses.

The earliest map available for the Project area is the 1865 General Land Office plat for Township 2 North Range 6 East. Little detail is shown, but the distinctive curve in a slough in section 2 (partial) and section 3 suggests that Bear Creek is in its original channel.

The acreage includes all land in Section 2 that lies south of Bear Creek with owners C. M. Hohenshell and J.U. Castle in 1895. Owners in the northern portion of Section 14 include J.U. Castle, J. Little, C.M. Hohenshell and J.A. Cramer. Hohenshell's house was located just south of the project area and is illustrated in the 1879 San Joaquin County history. A section of the Project area is included in the illustration.

It appears that increasing canal construction in the region led to a switch circa 1890-1900 to crops that required irrigation were planted rather than the dry grain farming of previous landowners.

## RESEARCH

Five resources have been reported in the Project area. One of the sites listed as in the project area is the bridge over Bear Creek on the railroad line, but technically outside the project area---P-39-00363. Another site record has been prepared for the levees along Bear Creek (P-39-004875), also outside the Project area.

P-39-004642 is an irrigation system with ten features, primarily floodgates, weirs, and culverts. One feature is dated 1946.

P-039-004641 (CA-SJO-315/H) has many artifacts representing the prehistoric, protohistoric and historic periods, with surface artifacts covering some 12,000 square meters. This site appears to be the former location of a historic period residence.

P-39-000005 (CA-SJO-253) contains bone and chipped stone, and the recorder thought the site might be a small village site. The metate is thought to be pulled out of a deeply buried cultural sediment.

The site recorder emphasized that the site boundaries could not be determined due to dense crops, and the site is highly disturbed.

Six other resources have been found and recorded in the 0.25-mile buffer search radius for the project.

There are six reports within the Project area, and sixteen other studies in the 0.25-mile search radius. Covering the Development Area are studies by Napton in 1990 (SJ-805); Hinshaw in 1993 (SJ-2016); Busby in 1996 (SJ-6507); Jurich, Martinez and Smith (SJ-6541); and ESA in 2007 (SJ-06843). Full citations for the reports are included in the Report List in Appendix 2.

## PROJECT SOILS

The Project area contains a mix of two soil types: about 90 per cent Jacktone clay and 10 per cent Stockton clay. The Stockton clay is located along Bear Creek and to the south on the west end of the project.

The Jacktone clay extends from ground level to 20-40 inches as a dark clay, ending on a duripan. Below the duripan it is a stratified sandy loam to clay loam, cemented at about 60 inches. Composed of mixed alluvium. This deposit dates to the Early to Middle Holocene, and is rated “high” for buried site potential (Meyers and Rosenthal 2004, Appendix D).

The Stockton clay, is 0 – 40 inches clay, with from 40 – 60 inches clay loam. This deposit is also cemented at about 60 inches. It is composed of mixed alluvium dating to the Middle to Late Holocene and is rated "very high" for buried site potential (Meyers and Rosenthal 2004: Appendix D).

In conclusion, the Project Area may be likely to contain prehistoric period resources, especially in the zone below a depth of 5 feet.

## FIELD ASSESSMENT

The Development Area of 503.89 acres was surveyed by Michael Lawson on April 1, 2, 15 and 16, 2022. The area is connecting square agricultural fields currently tilled and planted, bordered by West Lane on the west, the UPRR on the east, Morada Lane on the south, and a natural drainage, Bear Creek, lies to the north of the overall Project Site.

The entire Development Area is flat and level. Dirt roadways running between fields are elevated to 6" to 12". The various fields are in different stages of agricultural production from recent planting to 6" tall. A large Woodbridge Irrigation District runs north to south through the center

of the Project Area, with smaller ditches in the fields, appearing to have been re-routed depending upon the crop grown on the property over the many seasons of agricultural use.

The soil throughout fields is similar. The color is medium brown, silty loam in nature with light stone component mostly consisting of small pebbles of granitic components (quartzite, mica, and feldspar. Other noted stone types include meta-volcanic and unidentified crypto-crystalline silicates. Soil within the likely previous building area is darker and with more loam component. Stains consistent in appearance with industrial oil are common in this area.

View of the ground was excellent due to recent tilling and other weed abatement, rodent excavation, as well as vehicular travel, and recent ditch clearing. The only areas where ground view was impinged upon was along ditches and roadways.

Lawson conducted the survey on four sunny days, working from 7:30 a.m. to 6:30 p.m. with appropriate breaks. Figure 5 indicates the portions of the property surveyed by date.

The northeast portion with divided fields of newly planted alfalfa was surveyed on April 1. The following day, the adjacent divided fields to the south of newly planted alfalfa were covered. On April 15, the southern portion of the divided fields of newly planted alfalfa was surveyed. The following day, the survey was completed by inspection of the survey area to the northwest including a maturing field of alfalfa that reduced visibility to a degree (Figure 5).

# BEAR CREEK SOUTH COVERAGE BY DATE OF SURVEY

FIGURE 5

Due to reported resources nearby, and knowledge of those sites reported from older survey efforts win the Project Area, the reported site areas were covered by narrow transects no greater than 3 meters, hoping to find evidence of reported artifacts or any cultural use. Dirt access roads and drainage ditches received additional inspection.

Soil visibility was very good at the time of the survey due to recent plowing and newly sprouted alfalfa. Slightly less coverage occurred in the northwest portion because of the maturing plants.

Due to known pre-contact and historical sites in the general area, parallel transects of no more than 3 to 5 meters were used, with the plow rows used for measurement. Closer overlapping inspection occurred within the excavated ditches and areas disturbed by burrowing animals, as well as fence lines and the area where buildings may have been.

He found prehistoric period artifacts in three locations during the survey, one near the north end of the project area and several in roughly the same area as the recorded location of P-39-00005. A few scattered historic period items were found, consisting of fragments of milk glass, aqua glass with bubbles, amber glass, porcelain, and brick fragments in the location of P-39-004641, along with several prehistoric flakes.

The failure to re-locate the recorded sites as described in the site records may be due to crop rotation, error in the original site recordation or plowing within the development area.

## RECOMMENDATIONS

### Historic Period Resources

The historic evidence at P-004641 needs to be evaluated under the criteria of the California Register of Historical Resources for its information potential. It is possible that the plowing over the last 175 years may have destroyed intact features and deposits. This site appears to be the remains of a farm or ranch, and may be the Hohenshell residence. There could also be a prehistoric period deposit with artifacts located in this area. A monitor shall be retained for all excavation work in the vicinity of P-004641. If an intact feature or historic period artifacts be located, work shall be halted and equipment moved 100 feet away. A determination should be made at this point, the appropriate actions for preservation, protection, or other action such as data recovery excavations. Historic period deposits may be located elsewhere on the property, and would be subject to the same actions.

### Prehistoric Period and Tribal Cultural Resources

During the field survey of the Project site, prehistoric period artifacts and prehistoric flakes were found in three locations in roughly the same area as the recorded location of P-39-00005 and P-39-004641. The field survey, however, failed to re-locate the recorded sites in the site records, which may be due to crop rotation, error in the original site recordation, or plowing within the development area. The proposed Project is in a region where cultural resources have been recorded in the past and there

remains a potential that some undocumented archaeological resources that may meet the Tribal Cultural Resource definition could be unearthed or otherwise discovered during ground-disturbing and construction activities. Thus, the City is treating these prerecorded period resources as Tribal Cultural Resources under PRC section 21074.

The recommendations below provided for prehistoric period resources will also avoid any significant impacts on tribal cultural resources under the CEQA AB 52 requirements.

There is always a possibility that prehistoric period sites may exist in the project area, and be obscured by vegetation, siltation, or historic activities, leaving no surface evidence, even with testing. If artifacts, exotic rock, shell, or bone are uncovered during the construction, work should stop in that area immediately and a qualified archeologist should be contacted to examine and evaluate the deposit. A determination should be made at this point, the appropriate actions for preservation, protection, or other action such as data recovery excavations. The Native American monitor needs to be involved in the decision-making. Subsurface testing extending to a depth of more than 60" to locate the location and extent of the buried sites. These resources may provide information of early man in this region. A program for testing should be developed. Non-invasive testing such as ground penetrating radar or a magnetometer survey are not advised. There are not likely to be intact burials or subsurface features due to the long-term plowing over the last 175 years, deep ripping, development of orchards as well as other agricultural features such as ditches cut through the landscape, disturbing the soils. Non-invasive methods result in the need to open anomaly locations to determine what is there, turning those methods into roughly the same as excavated trenches.

We recommend that the property owners consider pre-development testing of the property to prevent impact to the buried resources present, if present. Some of our predecessors who conducted surveys on the property included similar recommendations: testing of the property. If testing did occur and findings are made, particularly of human remains, a major archeological data recovery effort will be required. Testing would include backhoe trenching, test units, and/or other standard practices of excavating in areas identified by a qualified archeologist, including the use of hand tools, if necessary and feasible, and should involve the Northern Valley Yokuts group who is knowledgeable about local resources.

Subsurface testing should be conducted extending to a depth of more than 60" to locate the location and extent of the buried sites. These resources may provide information on early man in this region.

Additionally, prior to the beginning of construction work, the developer shall contact an appropriate Northern Valley Yokuts Tribal representative to train construction workers on appropriate avoidance and minimization measures, requirements for confidentiality and culturally appropriate treatment, other applicable regulations, and consequences of violating State laws and regulations. If artifacts, exotic rock, shell, or bone are uncovered during the construction, work in that area shall stop immediately and a qualified archeologist and the Northern Valley Yokuts Tribal representative shall be contacted to examine and evaluate the deposit.

If the examination and evaluation reveals significant resources, a treatment plan in accordance with appropriate standards, such as the Secretary of the Interior's Standards for Treatment of

Archaeological Sites would be prepared by a qualified archaeologist and a Tribal monitor if the development cannot avoid an archaeological or paleontological deposit prior to construction.

**Discovery of Human Remains**

In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area suspected to overlie adjacent remains until the San Joaquin County Coroner has determined that the remains are not subject to any provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative. The County Coroner shall make his or her determination within two working days from the time the person responsible for the excavation, or his or her authorized representative, notifies the coroner of the discovery or recognition of the human remains.

If the San Joaquin County Coroner determines that the remains are not subject to his or her authority and if the County Coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission (NAHC).

After notification, the NAHC will follow the procedures outlined in Public Resources Code Section 5097.98. that include notifications of the most likely descendants (MLDs), and recommendations for the treatment of the remains. The MLDs will have 48 hours after notification by the NAHC to make their recommendations (PRC Section 5097.98).

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# APPENDIX 1

## Resumes

**PEAK & ASSOCIATES, INC.**
**RESUME**

**MELINDA A. PEAK** **January 2024**
**Senior Historian/Archeologist**
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## PROFESSIONAL EXPERIENCE

Ms. Peak has served as the principal investigator on a wide range of prehistoric and historic excavations throughout California. She has directed laboratory analyses of archeological materials, including the historic period. She has also conducted a wide variety of cultural resource assessments in California, including documentary research, field survey, Native American coordination and consultation, and report preparation.

In addition, Ms. Peak has developed a second field of expertise in applied history, specializing in site-specific research for historic period resources. She is a registered professional historian and has completed many historical research projects for a wide variety of site types.

Through her education and experience, Ms. Peak meets the Secretary of Interior Standards for historian, architectural historian, prehistoric archeologist, and historic archeologist.

## EDUCATION

M.A. - History - California State University, Sacramento, 1989
Thesis: *The Bellevue Mine: A Historical Resources Management Site Study in Plumas and Sierra Counties, California*
B.A. - Anthropology - University of California, Berkeley

## PROJECTS

In recent months, Ms. Peak has completed several determinations of eligibility and effect documents in coordination with the Corps of Engineers for projects requiring federal permits, assessing the eligibility of many sites for the National Register of Historic Places.

She has also completed historical research projects on a wide variety of topics for any projects including the development of navigation and landings on the Napa River, wineries, farmhouses dating to the 1860s, bridges, an early roadhouse, Folsom Dam, and a section of an electric railway line.

In recent years, Ms. Peak has prepared a number of cultural resource overviews and predictive models for blocks of land proposed for future development for general and specific plans. She has been able to direct several surveys of these areas, allowing the model to be tested.

She served as principal investigator for the multi-phase Twelve Bridges Golf Club project in Placer County. She served as liaison with the various agencies, helped prepare the historic properties treatment plan, managed the various phases of test and data recovery excavations, and completed the final report on the analysis of the test phase excavations of several prehistoric sites. She is currently involved as the principal investigator for the Teichert Quarry project adjacent to Twelve Bridges in the City of Rocklin, coordinating contacts with Native Americans, the Corps of Engineers, and the Office of Historic Preservation.

Ms. Peak has served as project manager for several major survey and excavation projects in recent years, including the many surveys and site definition excavations for the 172-mile-long Pacific Pipeline proposed for construction in Santa Barbara, Ventura, and Los Angeles counties. She also completed an archival study in the City of Los Angeles for the project. She also served as principal investigator for a major coaxial cable removal project for AT&T.

Additionally, she completed several small surveys, served as a construction monitor at several urban sites, and conducted emergency recovery excavations for sites found during monitoring. She has directed the excavations of several historic complexes in Sacramento, Placer, and El Dorado Counties.

Ms. Peak is the author of a chapter and two sections of a published history (1999) of Sacramento County, *Sacramento: Gold Rush Legacy, Metropolitan Legacy*. She served as the consultant for a children's book on California, published by Capstone Press in 2003 in the Land of Liberty series.

**PEAK & ASSOCIATES, INC.**
**RESUME**

**MICHAEL LAWSON** **January 2024**
**Archeological Field Director**
3941 Park Drive, Suite 20-329
El Dorado Hills, CA 95672
(916) 939-2405

## PROFESSIONAL EXPERIENCE

Mr. Lawson has compiled an excellent record of undertaking excavation and survey projects for both the public and private sectors over the past thirty years. He has conducted numerous surveys throughout northern and central California and Hawaii, as well as serving as an archeological technician, site monitor, crew chief and field director for a number of excavation projects.

Mr. Lawson is qualified by the Bureau of Land Management as a field director for archeological surveys and excavations. In 2022, he led teams as the field director on several field surveys in the Sierras for the proposed undergrounding of PG&E transmission lines, dealing with both historic and prehistoric cultural resources. Lawson works for several firms based in the Sacramento Area and Bay Area.

## EDUCATION

B.A. - Anthropology - California State University, Sacramento

Special Course: Comparative Osteology. University of Tennessee, Knoxville. Forensic Anthropology Center. January 2018.

The special course included: intensive lab and outdoor study with human example from outdoor research facility, including typical and non-metric examples, compared with fifty non-human species commonly confused with human remains. Work at the outdoor research facility "The Body Farm" study included survey, photography, collection, and identification of faunal and human bone fragments, with a Power Point presentation discussing finds.

## EXPERIENCE

- Extensive monitoring of open space, streets and project development areas for prehistoric period and historic period resources. Areas monitored include Sutter Street in Folsom; Mud Creek Archeological District in Chico; Camp Roberts, San Luis Obispo County; Avila Beach, San Luis Obispo County; Edgewood Golf Course, South Lake Tahoe; Davis Water Project, Davis; Star Bend levee section, Sutter County; Feather River levees, Sutter County; Bodega Bay, Sonoma County; San Jose BART line extension, Santa Clara County; and numerous sites for PG&E in San Francisco.

- Over thirty years of experience working in cultural resource management, volunteer, and academic settings in California historic, proto-historic, and prehistoric archaeology.

- Expertise in pedestrian survey, excavation, feature (including burial) exposure, laboratory techniques, research. Field positions include field director, assistant field director, crew chief and lead technician.

# APPENDIX 2

## Record Search

# CENTRAL CALIFORNIA INFORMATION CENTER

*California Historical Resources Information System*

**Department of Anthropology – California State University, Stanislaus**
**One University Circle, Turlock, California 95382**
**(209) 667-3307**

*Alpine, Calaveras, Mariposa, Merced, San Joaquin, Stanislaus & Tuolumne Counties*


Date: 4/11/2022

Records Search File No.: 12149L
Access Agreement: #137
Project: Bear Creek South

Robert Gerry
Peak & Associates, Inc.
3941 Park Drive, Suite 30-329
El Dorado Hills, CA 95762
916-939-2405 peakinc@surewest.net

Dear Mr. Gerry:

The Central California Information Center received your record search request for the project area referenced above, located on the Lodi South 7.5' quadrangle in San Joaquin County. The following reflects the results of the records search for the project study area and radius:

As per data currently available at the CCaIC, the locations of resources/reports are provided in the following format: ☒ custom GIS maps ☐ GIS Data/shape files ☐ hand-drawn maps

**Summary Data:**

| | |
|---|---|
| Resources within the project area: | 5: P-39-000005, 363, 4641, 4642, 4875 |
| Resources within the 1/4-mile radius: | 6: P-39-000003, 4, 4491, 4693, 5250<br>1 Informal Resource: Lithic scatter 5607-1 (refers to Report SJ-05607) |
| Reports within the project area: | 6: SJ-00805, 2016, 3128, 6507, 6541, 6843 |
| Reports within the 1/4-mile radius: | 16: SJ-00791, 829, 847, 2824, 3129, 3130, 3995, 4996, 5165, 5488, 5607, 6132, 6345, 6851, 8066, 8302 |

| | |
|---|---|
| **Resource Database Printout (list):** | ☒ enclosed ☐ not requested ☐ nothing listed |
| **Resource Database Printout (details):** | ☐ enclosed ☒ not requested ☐ nothing listed |
| **Resource Digital Database Records:** | ☐ enclosed ☒ not requested ☐ nothing listed |
| **Report Database Printout (list):** | ☒ enclosed ☐ not requested ☐ nothing listed |
| **Report Database Printout (details):** | ☐ enclosed ☒ not requested ☐ nothing listed |
| **Report Digital Database Records:** | ☐ enclosed ☒ not requested ☐ nothing listed |
| **Resource Record Copies:** | ☒ enclosed ☐ not requested ☐ nothing listed |
| **Report Copies:** | ☒ enclosed ☐ not requested ☐ nothing listed |

**OHP Historic Properties Directory: New Excel File: Built Environment Resource Directory (BERD) Dated 11/17/2021**

Not all resources listed in the BERD are mapped in GIS, nor do we have records on file for; if you identify additional resources in the BERD that you need copies of, contact the IC.

☐ enclosed ☐ not requested ☒ nothing listed

**Archaeological Determinations of Eligibility:** ☐ enclosed ☐ not requested ☒ nothing listed

**CA Inventory of Historic Resources (1976):** ☐ enclosed ☒ not requested ☐ nothing listed

**Caltrans Bridge Survey:** ☐ enclosed ☒ not requested ☐ nothing listed

**Ethnographic Information:** ☐ enclosed ☒ not requested ☐ nothing listed

**Historical Literature:** ☐ enclosed ☒ not requested ☐ nothing listed

**Historical Maps:** ☐ enclosed ☒ not requested ☐ nothing listed

**Local Inventories:** ☐ enclosed ☒ not requested ☐ nothing listed

**GLO and/or Rancho Plat Maps:** ☐ enclosed ☒ not requested ☐ nothing listed

**Shipwreck Inventory:** ☒ not available at CCIC; please go to http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp

**Soil Survey Maps:** ☒ not available at CCIC; please go to http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System (CHRIS).

**Note:** Billing will be transmitted separately via email by our Financial Services office *($344.55), payable within 60 days of receipt of the invoice.

**If you wish to include payment by Credit Card, you must wait to receive the official invoice from Financial Services so that you can reference the CMP # (Invoice Number), and then contact the link below:**

https://commerce.cashnet.com/ANTHROPOLOGY

Sincerely,

E. A. Greathouse, Coordinator
Central California Information Center
California Historical Resources Information System

* Invoice Request sent to: ARBilling@csustan.edu, CSU Stanislaus Financial Services

Insert topo figure

## Report List

| Report No. | Other IDs | Year | Author(s) | Title | Affiliation | Resources |
|---|---|---|---|---|---|---|
| SJ-00791 | NADB-R - 1361613 | 1989 | Napton, L. K. | Cultural Resource Investigation of the Preliminary Alternative Alignments for the Eight Mile Road Specific Plan, San Joaquin County, California. | CSDU Stanislaus, Institute for Archaeological Research; for Omni-Means | 39-000226 |
| SJ-00805 | NADB-R - 1361624 | 1990 | Napton, L. K. | Cultural Resource Investigation of the Kaufman Broad EIR, 398.5 Acres in North Stockton, San Joaquin County, California. | L. K. Napton | |
| SJ-00829 | NADB-R - 1364356 | 1966 | Riddell, F. A. and William H. Olsen | An Archaeological Survey of Mosher Creek, San Joaquin County, California. | Francis A. Riddell and William H. Olsen; for CA State Parks and Recreation Dept. | 39-000244, 39-000267, 39-000268 |
| SJ-00847 | NADB-R - 1361666 | 1988 | Werner, R. H. | Cultural Resource Investigation Morada Lane Development Project, Stockton, California. | ASI, for Jones and Stokes Associates | |
| SJ-02016 | NADB-R - 1360522 | 1993 | Hinshaw, J. | Cultural Resource Reconnaissance Survey of Three Possible High School Site Locations (Approx. 240 Acres) North of Stockton, San Joaquin County, California. | The Planning Center | 39-000003, 39-000004, 39-000005 |
| SJ-02824 | NADB-R - 1362195 | 1996 | Busby, C., S. Guedon, and M. Tannam | Cultural Resources Assessment, San Joaquin Area Flood Control Restoration Plan, San Joaquin County, California (Oct. 1995) [2824a] (and) Cultural Resources Assessment Addendum San Joaquin Area Flood Control Restoration Plan (Draft, Jan. 1996) [2824b]. | Basin Research Associates, Inc. | 39-000002, 39-000004, 39-000075, 39-000155, 39-000162, 39-000211, 39-000226, 39-000229, 39-000231, 39-000234, 39-000241, 39-000244, 39-000271, 39-002516 |
| SJ-03128 | NADB-R - 1363282 | 1996 | Busby, C. I. | Letter to Ms. Cathy McAfee of EIP Associates, Regarding Cultural Resources Inventory in Compliance with Mitigation Measure 4.5-1(a), Middle Bear Creek and Two Detention Basins, San Joaquin Area Flood Control Restoration Plan. | Basin Research Associates | 39-000226 |
| SJ-03129 | NADB-R - 1363283 | 1996 | Busby, C. I. | Letter to Ms. Cathy McAfee, EIP Associates, RE: Cultural Resources Inventory - In Compliance with Mitigation Measure 4.5-1(a), Lower Bear Creek and Mosher Slough, San Joaquin Area Flood Control Restoration Plan. | Basin Research Associates; for EIP | 39-000244 |
| SJ-03130 | NADB-R - 1363286 | 1997 | Busby, C. I., S. Guedon, and M. Tannam | Cultural Resources Assessment, Addendum for Supplementary EIR, San Joaquin Area Flood Control Restoration Plan, San Joaquin County, California, Revised Draft. | Basin Research Associates; for EIP | 39-000212, 39-000244, 39-000363 |

## Report List

| Report No. | Other IDs | Year | Author(s) | Title | Affiliation | Resources |
|---|---|---|---|---|---|---|
| SJ-03995 | NADB-R - 1366235 | 2000 | Nelson, W. J. | Cultural Resource Survey for the Level (3) Communications Long Haul Fiber Optics Project; Segment WS04: Sacramento to Bakersfield | Far Western Anthropological Research Group, Inc.; for Parsons, Brinckerhoff Network Services | 39-000002, 39-000354, 50-000001, 50-000439 |
| SJ-04996 | NADB-R - 1364883 | 2003 | Jensen, P. and S. Jensen | Archaeological Inventory Survey, Cannery Park Multi-Use Development Project, c. 448 Acres Adjacent to Eightmile Road and State Route 99, San Joaquin County, California. | Jensen & Associates | |
| SJ-05165 | NADB-R - 1365045 | 2003 | Jensen, P. | Archaeological Inventory Survey: Proposed Lodi Unified School District's High School Project, c. 75-Acres Along Bear Creek Near Stockton, San Joaquin County, California. | Jensen & Associates | 39-000003, 39-000004 |
| SJ-05488 | NADB-R - 1365372 | 2004 | Jensen, Peter | Archaeological Inventory Survey, Alpine Packing Annexation and Specific Plan Project, c. 1,100 Acres Along Eightmile Road, San Joaquin County, California. | Jensen & Associates | 39-000098, 39-004489, 39-004490, 39-004491 |
| SJ-05607 | NADB-R - 1365491 | 2004 | Jensen, P. | Archaeological Inventory Survey, Proposed Bear Creek East Development Project, c. 315 Acres Along Eightmile Road, San Joaquin County, California. | Jensen & Associates | 39-005250 |
| SJ-06132 | NADB-R - 1366151 | 2006 | Marvin, J. and T. Brejla | Historical Resources Survey and Constraints Analysis for the Bear Creek West Development Project Area, Lower Sacramento Road, West Lane, and Eight Mile Road, San Joaquin County, California | LSA Associates | 39-004489, 39-004490 |
| SJ-06345 | NADB-R - 1366576 | 2006 | SWCA Environmental Consultants | Cultural Resources Final Report of Monitoring and Findings for the QWest Network Construction Project, State of California. SWCA Project No. 10715-180. | SWCA Environmental Consultants, for Qwest Communications | 39-000002, 39-000354 |
| SJ-06507 | NADB-R - 1366739 | 2007 | URS Corporation | Cultural Resources Report for Geotechnical Evaluations of the San Joaquin Area Flood Control Agency Project Levees | URS Corporation; for DWR | 39-000220, 39-004639, 39-004640 |
| SJ-06541 | NADB-R - 1366774 | 2008 | Jurich, D., J. Martinez, and S. Smith | A Phase I Cultural Resource Survey of Approximately 510 Acres For The Bear Creek South, Environmental Impact Report, San Joaquin County, California | PBS&J | 39-000005, 39-004641, 39-004642, 39-004643 |
| SJ-06843 | NADB-R - 1367119 | 2007 | ESA | Stockton Delta Water Supply Project Cultural Resources Inventory Report. | ESA; for the City of Stockton | |

## Report List

| Report No. | Other IDs | Year | Author(s) | Title | Affiliation | Resources |
|---|---|---|---|---|---|---|
| SJ-06851 | NADB-R - 1367106; Other - Ron MCNair HS; SAC-446B | 2008 | Billat, L. | New Tower ("NT") Submission Packet FCC Form 620 Project Name: Ron McNair HS, Project Number: SAC-446B | Earth Touch, Inc. | |
| SJ-08066 | | 2003 | Werner, R., and R. P. Hampson | Archaeological Investigations, McNair High School Campus, Ca. 75 Acres North Stockton, San Joaquin County, California | ASI for Lodi Unified School District | 39-000003, 39-000004, 39-004491, 39-004640 |
| SJ-08302 | | 2005 | Jensen, S. | Letter to: The Matthews Company; RE: Status Report upon Completion of Delineation/Evaluation of Areas 1 and 2, and Initiation of Monitoring of Structure Demolition at Area 2. | Genesis Society | 39-005250 |
| SJ-08302A | | 2005 | Jensen, S. | Letter to The Matthews Company RE: Bear Creek East, Completion of Burial Recovery. | Genesis Society | |
| SJ-08302B | | 2006 | Jensen, S. | Letter to The Matthews Company RE: Status Report upon Continuation of Monitoring of Ground Disturbing Activities at Area 2. | Genesis Society | |
| SJ-08302C | | 2005 | Jensen, S. | Letter to The Matthews Company RE: Status Report for Monitoring of Structure Demolition and Shovel Test Pit Work in Vicinity of Potential Prehistoric Site. | Genesis Society | |
| SJ-08302D | | 2011 | Unknown | 8. Cultural Resources (120384/STO11R233) | Unknown; Cultural Resources Element of an EIR | |

# Appendix D: Environmental Noise Assessment

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# Environmental Noise Assessment

# Bear Creek South

**City of Stockton, California**

**March 27, 2025**

**Project #240309**

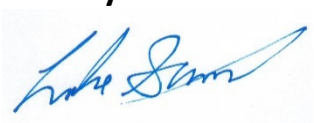
**Prepared for:**

DE NOVO PLANNING GROUP

**De Novo Planning Group**
1020 Suncast Lane, Suite 106
El Dorado Hills, CA 95762

**Prepared by:**

**Saxelby Acoustics LLC**



**Luke Saxelby, INCE Bd. Cert.**
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Roseville, CA 95678

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Appendix B: Field Noise Measurement Data
Appendix C: Traffic Noise Calculations
Appendix D: Interior Noise Reduction Calculations

## INTRODUCTION

The Bear Creek South project is located in the City of Stockton, California. The project includes the construction of a single family home residential development. The project will be adjacent to Ronald E. McNair high school to the west, Westwood Elementary to the south, residential land uses to the east, and is directly bordered by UPRR to the east.

**Figure 1** shows the project site plan. **Figure 2** shows an aerial photo of the project site.

## ENVIRONMENTAL SETTING

### BACKGROUND INFORMATION ON NOISE

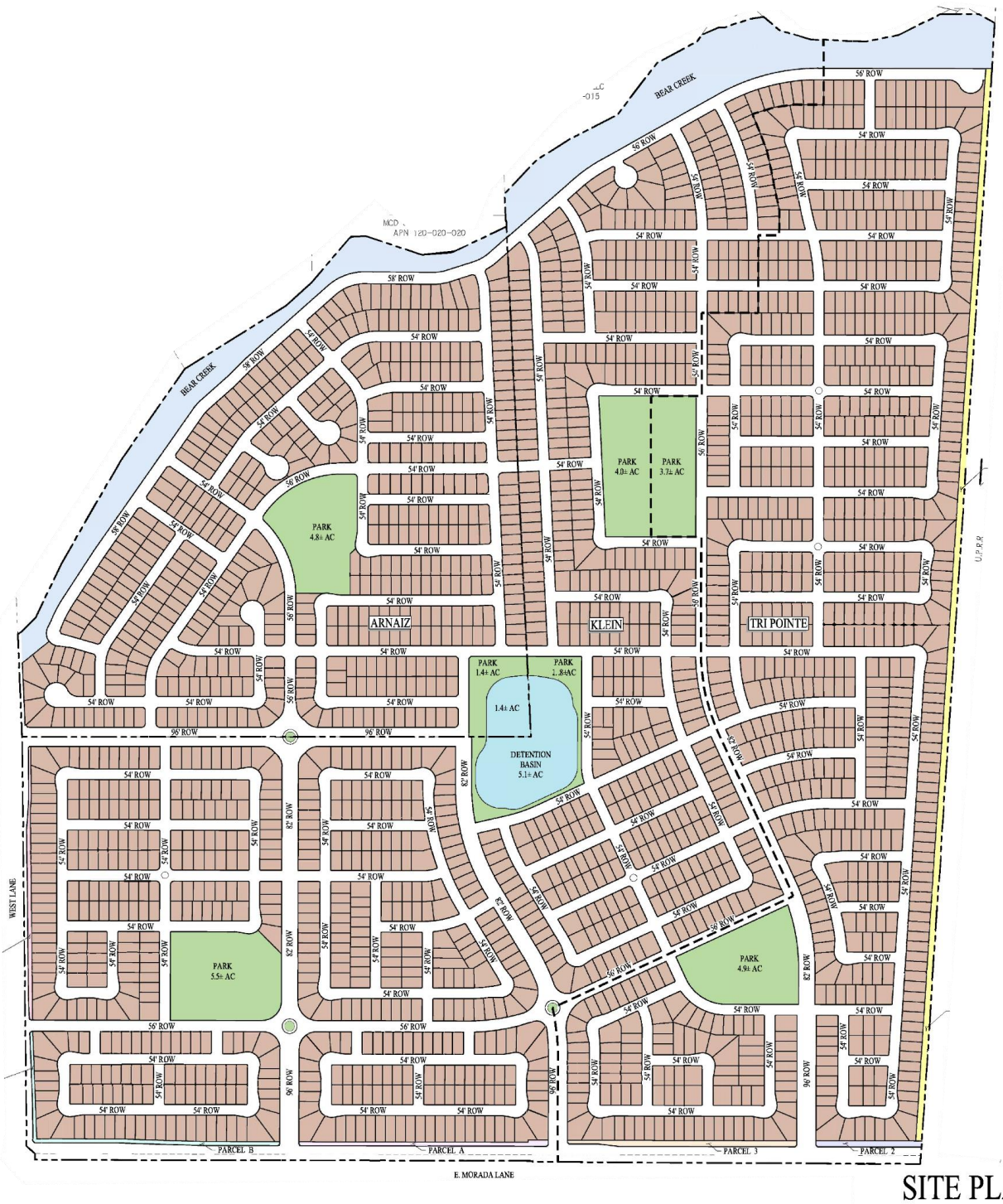
#### *Fundamentals of Acoustics*

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

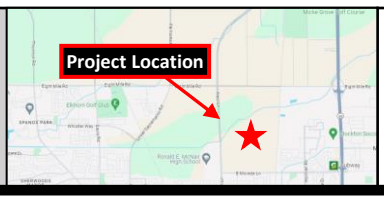
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment.




SITE PLAN
BEAR CREEK SOUTH

**Bear Creek South**
**City of Stockton, California**

**Figure 1**
**Project Site Plan**




SAXELBY ACOUSTICS
Acoustics · Noise · Vibration

## Bear Creek South

City of Stockton, California

Figure 2

Noise Measurement Sites

**Legend**

- Project Site
- Noise Measurement Site - Long Term

0 ft 500 ft 1000 ft 1750 ft

Projection: UTM Zone 10 / WGS84 / meters
Rev. Date: 07/25/2024

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The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60-dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level ($L_{eq}$), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The $L_{eq}$ is the foundation of the composite noise descriptor, $L_{dn}$, and shows very good correlation with community response to noise.

The day/night average level (DNL or $L_{dn}$) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because $L_{dn}$ represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

**Table 1** lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

**TABLE 1: TYPICAL NOISE LEVELS**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|---|---|---|
| | --110-- | Rock Band |
| Jet Fly-over at 300 m (1,000 ft.) | --100-- | |
| Gas Lawn Mower at 1 m (3 ft.) | --90-- | |
| Diesel Truck at 15 m (50 ft.),<br>at 80 km/hr. (50 mph) | --80-- | Food Blender at 1 m (3 ft.)<br>Garbage Disposal at 1 m (3 ft.) |
| Noisy Urban Area, Daytime<br>Gas Lawn Mower, 30 m (100 ft.) | --70-- | Vacuum Cleaner at 3 m (10 ft.) |
| Commercial Area<br>Heavy Traffic at 90 m (300 ft.) | --60-- | Normal Speech at 1 m (3 ft.) |
| Quiet Urban Daytime | --50-- | Large Business Office<br>Dishwasher in Next Room |
| Quiet Urban Nighttime | --40-- | Theater, Large Conference Room (Background) |
| Quiet Suburban Nighttime | --30-- | Library |
| Quiet Rural Nighttime | --20-- | Bedroom at Night, Concert Hall (Background) |
| | --10-- | Broadcast/Recording Studio |
| Lowest Threshold of Human Hearing | --0-- | Lowest Threshold of Human Hearing |

*Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.*

***Effects of Noise on People***

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

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

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

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate.

## EXISTING NOISE AND VIBRATION ENVIRONMENTS

### EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise-sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

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

### EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is primarily defined by traffic on West Lane, East Morada Lane and the UPRR. To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted continuous (24-hr.) noise level measurements at three locations on the project site. Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted $L_{max}$, represents the highest noise level measured. The average value, denoted $L_{eq}$, represents the energy average of all the noise received by the sound level meter microphone during the monitoring period. The median value, denoted $L_{50}$, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) model 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

**TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA**

| Location | Date | $L_{dn}$ | Daytime $L_{eq}$ | Daytime $L_{50}$ | Daytime $L_{max}$ | Nighttime $L_{eq}$ | Nighttime $L_{50}$ | Nighttime $L_{max}$ |
|---|---|---|---|---|---|---|---|---|
| LT-1: 150 feet from the CL to West Ln | 4/18/24 | 65 | 61 | 58 | 80 | 58 | 51 | 74 |
| LT-2: 95 feet from the CL to Morada Ln | 4/18/24 | 66 | 63 | 61 | 81 | 59 | 51 | 75 |
| LT-3: 110 feet from the CL of UPRR | 4/18/24 | 73 | 64 | 47 | 80 | 67 | 45 | 87 |

- *All values shown in dBA*
- *Daytime hours: 7:00 a.m. to 10:00 p.m.*
- *Nighttime hours: 10:00 p.m. to 7:00 a.m.*
- *Source: Saxelby Acoustics, 2024.*

## FUTURE TRAFFIC NOISE ENVIRONMENT AT OFF-SITE RECEPTORS

### OFF-SITE TRAFFIC NOISE IMPACT ASSESSMENT METHODOLOGY

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at sensitive receptors for existing and future, project and no-project conditions.

Existing, Existing Plus Approved (EPAP), Cumulative noise levels due to traffic are calculated using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

The FHWA model was developed to predict hourly $L_{eq}$ values for free-flowing traffic conditions. To predict traffic noise levels in terms of $L_{dn}$, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

Project trip generation volumes were provided by the project traffic engineer (Barrios 2024), truck usage and vehicle speeds on the local area roadways were estimated from field observations. The predicted increases in traffic noise levels on the local roadway network for Existing, EPAP, and Cumulative conditions which would result from the project are provided in terms of $L_{dn}$.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each project-area roadway segment. In some locations sensitive receptors may not receive full shielding from noise barriers or may be located at distances which vary from the assumed calculation distance.

**Tables 3 - 5** summarize the modeled traffic noise levels at the nearest sensitive receptors along each roadway segment in the Project area. **Appendix C** provides the complete inputs and results of the FHWA traffic modeling.

**TABLE 3: EXISTING TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES**

| Roadway | Segment | Existing No Project | Existing + Project | Change |
|---|---|---|---|---|
| West Lane | North of Eight Mile Road | 60.6 | 61.1 | 0.5 |
| Eight Mile Road | West of West Lane | 63.4 | 64.1 | 0.7 |
| Eight Mile Road | East of West Lane | 57.8 | 57.9 | 0.1 |
| E. Morada Lane | Between West Lane and Caywood Drive | 65.4 | 66.2 | 0.8 |
| West Lane | Between E. Morada Lane and W. Frontage Lane | 64.3 | 64.9 | 0.6 |
| West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 68.6 | 69.2 | 0.6 |
| W Lane Frontage Rd | West of West Lane | 62.5 | 62.6 | 0.1 |
| Knickerbocker Dr | West of West Lane | 56.8 | 56.8 | 0.0 |
| Knickerbocker Dr | East of West Lane | 58.9 | 59.1 | 0.2 |
| E. Hammer Ln | West of West Lane | 58.2 | 58.3 | 0.1 |
| E. Hammer Ln | Between West Lane and Lorraine Avenue | 70.7 | 70.7 | 0.0 |
| West Lane | Between E Hammer Lane and E Swain Road | 67.9 | 68.2 | 0.3 |
| Glacier Point Dr | South of E. Morada Lane | 63.7 | 63.7 | 0.0 |
| E. Morada Ln | Between Glacier Point Drive and Fox Creek Drive | 71.7 | 72.9 | 1.2 |
| Holman Rd | North of E. Morada Lane | 59.9 | 60.0 | 0.1 |
| Holman Rd | South of E. Morada Lane | 60.3 | 60.5 | 0.2 |
| E. Morada Ln | West of Holman Road | 66.7 | 67.8 | 1.1 |
| E. Morada Ln | East of Holman Road | 67.8 | 68.9 | 1.1 |
| Perino Dr | North of E. Morada Lane | 54.9 | 54.9 | 0.0 |
| Maranatha Dr | South of E. Morada Lane | 58.0 | 57.8 | -0.2 |
| E. Morada Ln | Between Maranatha Drive and Holman Road | 67.5 | 68.6 | 1.1 |
| Diamond Bar Pl | North of E. Morada Lane | 62.9 | 64.1 | 1.2 |
| Diamond Bar Pl | South of E. Morada Lane | 44.0 | 44.0 | 0.0 |

**TABLE 4: EPAP TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES**

| Roadway | Segment | EPAP No Project | EPAP + Project | Change |
|---|---|---|---|---|
| West Lane | North of Eight Mile Road | 61.3 | 61.7 | 0.4 |
| Eight Mile Road | West of West Lane | 65.4 | 65.6 | 0.2 |
| Eight Mile Road | East of West Lane | 59.8 | 59.9 | 0.1 |
| E. Morada Lane | Between West Ln and Caywood Dr | 65.9 | 66.6 | 0.7 |
| West Lane | Between E. Morada Lane and W. Frontage Lane | 65.0 | 65.6 | 0.6 |
| West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 69.3 | 69.8 | 0.5 |
| W Lane Frontage Rd | West of West Lane | 62.5 | 62.6 | 0.1 |
| Knickerbocker Dr | West of West Lane | 56.8 | 57.1 | 0.3 |
| Knickerbocker Dr | East of West Lane | 58.9 | 59.1 | 0.2 |
| E. Hammer Ln | West of West Lane | 58.2 | 58.3 | 0.1 |
| E. Hammer Ln | Between West Lane and Lorraine Avenue | 70.7 | 70.7 | 0.0 |
| West Lane | Between E Hammer Lane and E Swain Road | 68.6 | 68.8 | 0.2 |
| Glacier Point Dr | South of E. Morada Lane | 63.7 | 63.7 | 0.0 |
| E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 72.0 | 71.1 | -0.9 |
| Holman Rd | North of E. Morada Lane | 61.4 | 61.5 | 0.1 |
| Holman Rd | South of E. Morada Lane | 61.2 | 61.3 | 0.1 |
| E. Morada Ln | West of Holman Road | 67.0 | 68.1 | 1.1 |
| E. Morada Ln | East of Holman Road | 68.4 | 69.3 | 0.9 |
| Perino Dr | North of E. Morada Lane | 54.9 | 54.9 | 0.0 |
| Maranatha Dr | South of E. Morada Lane | 57.8 | 57.8 | 0.0 |
| E. Morada Ln | Between Maranatha Dr and Holman Road | 68.1 | 69.1 | 1.0 |
| Diamond Bar Pl | North of E. Morada Lane | 63.6 | 64.6 | 1.0 |
| Diamond Bar Pl | South of E. Morada Lane | 44.0 | 44.0 | 0.0 |

**TABLE 5: CUMULATIVE TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES**

| Roadway | Segment | Cumulative No Project | Cumulative + Project | Change |
|---|---|---|---|---|
| West Lane | North of Eight Mile Road | 61.7 | 62.5 | 0.8 |
| Eight Mile Road | West of West Lane | 66.7 | 66.8 | 0.1 |
| Eight Mile Road | East of West Lane | 61.8 | 62.0 | 0.2 |
| E. Morada Lane | Between West Ln and Caywood Dr | 67.2 | 67.7 | 0.5 |
| West Lane | Between E. Morada Ln and W. Frontage Ln | 66.0 | 66.5 | 0.5 |
| West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 70.3 | 70.7 | 0.4 |
| W Lane Frontage Rd | West of West Lane | 62.7 | 62.8 | 0.1 |
| Knickerbocker Dr | West of West Lane | 57.0 | 57.2 | 0.2 |
| Knickerbocker Dr | East of West Lane | 59.1 | 59.3 | 0.2 |
| E. Hammer Ln | West of West Lane | 58.5 | 58.6 | 0.1 |
| E. Hammer Ln | Between West Ln and Lorraine Ave | 71.0 | 71.0 | 0.0 |
| West Lane | Between E Hammer Ln and E Swain Rd | 69.3 | 69.5 | 0.2 |
| Glacier Point Dr | South of E. Morada Lane | 63.8 | 63.8 | 0.0 |
| E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 73.1 | 74.0 | 0.9 |
| Holman Rd | North of E. Morada Lane | 61.6 | 61.7 | 0.1 |
| Holman Rd | South of E. Morada Lane | 61.4 | 61.5 | 0.1 |
| E. Morada Ln | West of Holman Road | 68.1 | 68.9 | 0.8 |
| E. Morada Ln | East of Holman Road | 69.4 | 70.1 | 0.7 |
| Perino Dr | North of E. Morada Lane | 55.1 | 55.1 | 0.0 |
| Maranatha Dr | South of E. Morada Lane | 58.6 | 58.0 | -0.6 |
| E. Morada Ln | Between Maranatha Drive and Holman Road | 69.2 | 69.9 | 0.7 |
| Diamond Bar Pl | North of E. Morada Lane | 64.7 | 65.6 | 0.9 |
| Diamond Bar Pl | South of E. Morada Lane | 44.1 | 44.5 | 0.4 |

Based upon **Tables 3 -5** data, the proposed project is predicted to result in an increase in a maximum traffic noise level increase of 1.2 dBA.

## EVALUATION OF FUTURE TRANSPORTATION NOISE ON PROJECT SITE

Saxelby Acoustics used the SoundPLAN noise model to calculate traffic noise levels at the proposed residential uses due to traffic on East Morada Lane, West Lane, and UPRR. Inputs to the SoundPLAN noise model include topography, existing structures, roadway elevations, and the proposed building pad elevations. It was estimated that existing noise levels would increase by +1 dBA based upon an assumed 1% per year increase in traffic volumes on West Lane, East Morada Lane, and UPRR. The results of this analysis are shown graphically on **Figure 3**.

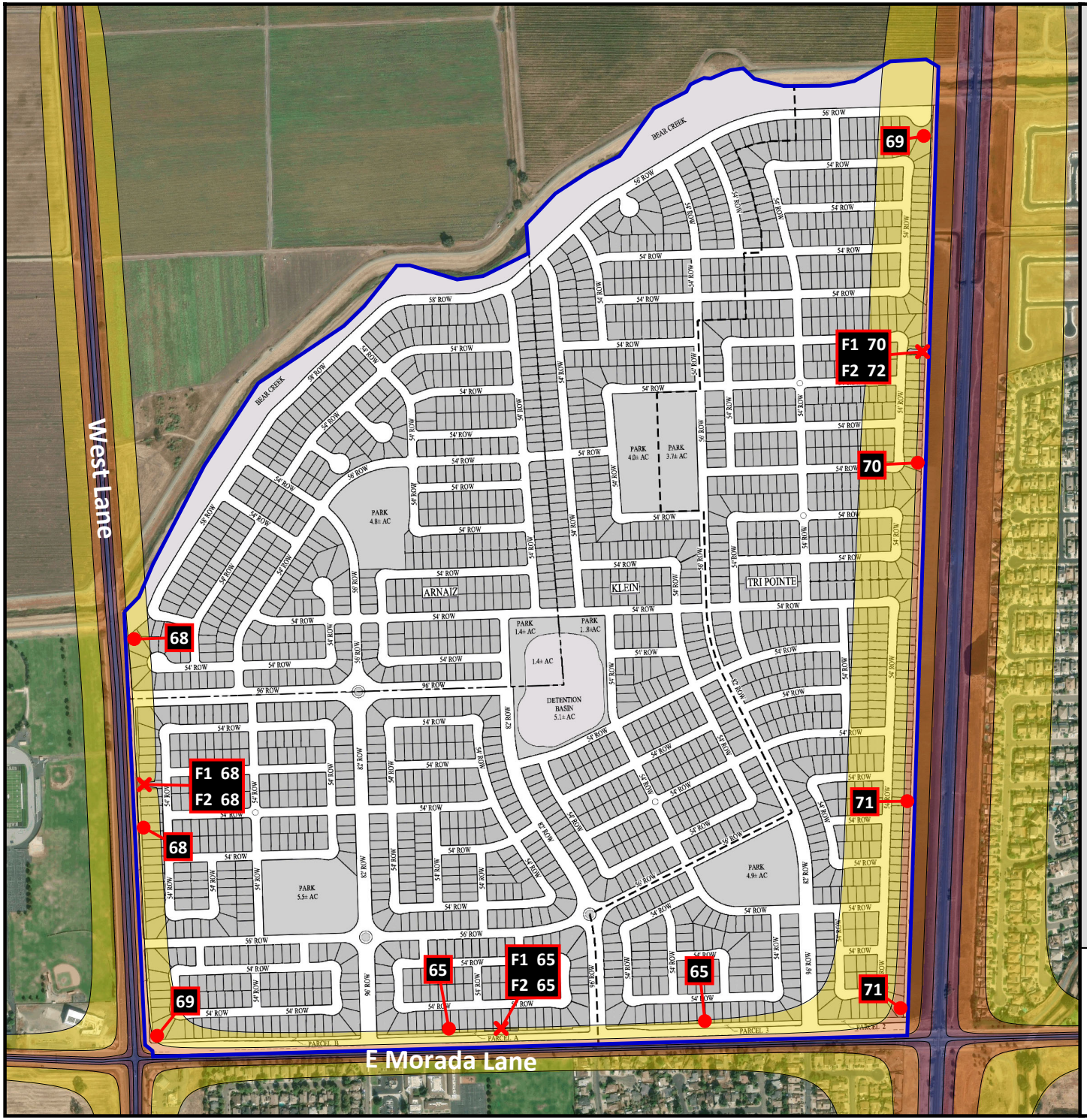
ATTACHMENT E

# Bear Creek South

**City of Stockton, California**

**Figure 3**

**Future Transportation Noise Contours**
**Ldn, dB(A)**




**Noise Level, dB(A)**

| | | |
|---|---|---|
| 65 < | <= | 70 |
| 70 < | <= | 75 |
| 75 < | <= | 80 |
| 80 < | | |

**Legend**

- Project Site
- Facade Noise Level
- Outdoor Area Noise Level

**Scale 1:850**

0 150 300 600 900 1200 feet

N

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## CONSTRUCTION NOISE ENVIRONMENT

During the construction of the proposed project, noise from construction activities would temporarily add to the noise environment in the project vicinity. As shown in **Table 6**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dB at a distance of 50 feet.

**TABLE 6: CONSTRUCTION EQUIPMENT NOISE**

| Type of Equipment | Maximum Level, dBA at 50 feet |
|---|---|
| Auger Drill Rig | 84 |
| Backhoe | 78 |
| Compactor | 83 |
| Compressor (air) | 78 |
| Concrete Saw | 90 |
| Dozer | 82 |
| Dump Truck | 76 |
| Excavator | 81 |
| Generator | 81 |
| Jackhammer | 89 |
| Pneumatic Tools | 85 |

*Source: Roadway Construction Noise Model User's Guide. Federal Highway Administration. FHWA-HEP-05-054. January 2006.*

## CONSTRUCTION VIBRATION ENVIRONMENT

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. **Table 7** shows the typical vibration levels produced by construction equipment.

**TABLE 7: VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT**

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

*Source: Transit Noise and Vibration Impact Assessment Guidelines. Federal Transit Administration. May 2006.*

## REGULATORY CONTEXT

### FEDERAL

There are no federal regulations related to noise that apply to the Proposed Project.

### STATE

#### *California Environmental Quality Act*

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, indicate that a significant noise impact may occur if a project exposes persons to noise or vibration levels in excess of local general plans or noise ordinance standards, or cause a substantial permanent or temporary increase in ambient noise levels. CEQA standards are discussed in more detail under the Thresholds of Significance section.

### LOCAL

#### *City of Stockton General Plan*

*Policy SAF-2.5:* Protect the community from health hazards and annoyance associated with excessive noise levels.

A. Prohibit new commercial, industrial, or other noise-generating land uses adjacent to existing sensitive noise receptors such as residential uses, schools, health care facilities, libraries, and churches if noise levels are expected to exceed 70 dBA Community Noise Equivalent (CNEL) (decibels on A-weighted scale CNEL) when measured at the property line of the noise sensitive land use.
B. Require projects that would locate noise sensitive land uses where the projected ambient noise level is greater than the "normally acceptable" noise level indicated on **Table 8** to provide an acoustical analysis that shall:
    a. Be the responsibility of the applicant;
    b. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics;
    c. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions;
    d. Estimate existing and projected (20-year) noise levels in terms of $L_{dn}$/CNEL and compare the levels to the adopted noise policies and actions in this General Plan;
    e. Recommend appropriate mitigation to achieve compatibility with the adopted noise policies and standards;
    f. Where the noise source in question consists of intermittent single events, address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance;
    g. Estimate noise exposure after the prescribed mitigation measures have been implemented;
    h. If the project does not comply with the adopted standards and policies of this General Plan, provide acoustical information for a statement of overriding considerations for the project; and

i. Describe a post-project assessment program, which could be used to evaluate the effectiveness of the proposed mitigation measures.

C. Require noise produced by commercial uses to not exceed 75 dB $L_{dn}$/CNEL at the nearest property line.

D. Grant exceptions to the noise standards for commercial and industrial uses only if a recorded noise easement is conveyed by the affected property owners.

E. Require all new habitable structures to be set back from railroad tracks to protect residents from noise, vibration, and safety impacts.

**TABLE 8: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE**

TABLE 4.11-10 LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

| Land Use Type | Noise Level, $L_{dn}$ (dBA) 0-55 | 56-60 | 61-65 | 66-70 | 71-75 | 75-80 | >81 |
|---|---|---|---|---|---|---|---|
| Residential | | | | | | | |
| Urban Residential Infill | | | | | | | |
| Hotels, Motels | | | | | | | |
| Schools, Libraries, Churches, Hospitals, Extended Care Facilities | | | | | | | |
| Auditoriums, Concert Halls, Amphitheaters | | | | | | | |
| Sports Arenas, Outdoor Spectator Sports | | | | | | | |
| Playgrounds, Neighborhood Parks | | | | | | | |
| Golf Courses, Riding Stables, Water Recreation, Cemeteries | | | | | | | |
| Office Buildings, Business Commercial and Professional | | | | | | | |
| Mining, Industrial, Manufacturing, Utilities, Agriculture | | | | | | | |

| | |
|---|---|
| | *Normally Acceptable*. Specified land use is satisfactory based on the assumption that any buildings involved are of normal, conventional construction, without any special noise insulation requirements. |
| | *Conditionally Acceptable*. New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed insulation features have been included in the design. |
| | *Unacceptable*. New construction or development should not be undertaken. |

Notes: If existing noise standards are currently exceeded, a proposed project shall not incrementally increase noise levels by more than 3 dBA. Urban residential infill applies to residential uses in the Greater Downtown.
Source: Stockton General Plan 2035, Goal Policies Report; Table 11-1

***City of Stockton Development Code***

16.60.030 Activities deemed violations of this chapter:

The following acts are a violation of this chapter and are therefore prohibited.

A. Construction Noise: Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work between the hours of 10:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

16.60.040 Standards.

A. The following provisions shall apply to all uses and properties, as described below, and shall establish the City's standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses and transportation-related sources:

    a. Standards For Proposed Noise-Sensitive Land Uses on Noise-Impacted Sites (Except Infill Areas). Excluding proposed noise-sensitive land uses on infill sites, which shall comply with subsection C of this section:

        i. Existing Transportation-Related Noise Sources. Proposed noise sensitive land uses that will be impacted by existing or projected transportation noise sources shall be required to mitigate the noise levels from these transportation noise sources so that the resulting noise levels on the proposed noise-sensitive land use(s) do not exceed the standards in **(Table 9)**.

        ii. Existing Land Use-Related Noise Sources. Proposed noise sensitive land uses that will be impacted by existing land use-related noise sources shall be required to mitigate the noise levels from those noise sources so that the resulting noise levels on the proposed noise-sensitive land use(s) do not exceed the standards in **(Table 10)**.

B. Standards for Proposed Noise-Generating Land Uses and Transportation-Related Sources. Excluding noise-generating projects on infill sites, which shall comply with subsection C of this section, the following shall apply:

    1. Transportation-Related Noise Sources (Except Infill Sites). Transportation-related projects that include the development of new transportation facilities or the expansion of existing transportation facilities shall be required to mitigate their noise levels so that the resulting noise:

        a. Does not adversely impact noise-sensitive land uses; and

        b. Does not exceed the standards in **Table 9**.

Noise levels shall be measured at the property line of the nearest site, which is occupied by, and/or zoned or designated to allow the development of, noise-sensitive land uses.

**TABLE 9: TRANSPORTATION-RELATED NOISE STANDARDS (OUTDOOR/INDOOR)**

| Noise Level Descriptor, dB | Maximum Allowable Noise Exposure ($L_{dn}$ dB) | |
|---|---|---|
| | Outdoor Activity Areas | Indoor Spaces |
| Residential (all types) | 65 | 45 |
| Childcare | -- | 45 |
| Educational Facilities | -- | 45 |
| Libraries and museums | -- | 45 |
| Live-work facilities | 65 | 45 |
| Lodging | 65 | 45 |
| Medical services | -- | 45 |
| Multi-use (with residential) | 65 | 45 |

**TABLE 10: LAND USE-RELATED NOISE STANDARDS**

| Noise Level Descriptor, dB | Daytime (7 a.m. to 10 p.m.) | Nighttime (10 p.m. to 7 a.m.) |
|---|---|---|
| Hourly $L_{eq}$ | 55 | 45 |
| Maximum Sound Level $L_{max}$ | 75 | 65 |

*(1) The noise standard must be applied at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards must be applied on the receiving side of noise barriers or other property line noise mitigation measures.*

*(2) Each of the noise level standards specified must be decreased by 5 for impulse noise, simple tone noise, or noise consisting primarily of speech or music.*

*Source: City of Stockton Municipal Code Section 16.60.040, Standards.*

***Summary of Applicable Noise Level Standards***

**Table 8** shows the City of Stockton Land Use Compatibility Chart. The table indicates that development of residential uses is "Normally Acceptable" where the ambient noise level is 60 dBA $L_{dn}$ or less. Construction where the ambient noise level exceeds 70 dBA $L_{dn}$ is considered "Unacceptable." Construction may occur where noise levels range from 60 dBA $L_{dn}$ to 70 dBA $L_{dn}$ if noise reduction measures are implemented to ensure interior and exterior spaces are protected from excessive noise. **Table 9** establishes an acceptable exterior noise level of 65 dBA Ldn at outdoor activity areas and 45 dBA $L_{dn}$ at interior spaces.

The project may not be exposed to land use noise levels greater than 55 dBA $L_{eq}$ during daytime (7:00 a.m. to 10:00 p.m.) hours and 45 dBA $L_{50}$ during nighttime (10:00 p.m. to 7:00 a.m.) hours at the property line of the adjacent residential uses per the City's standards shown in **Table 10**. The City standards also establish maximum noise level standards of 75 dBA $L_{max}$ during the daytime and 65 dBA $L_{max}$ during the nighttime.

**CRITERIA FOR ACCEPTABLE VIBRATION**

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. **Table 11**, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

**Table 11** indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v. A threshold of 0.20 in/sec p.p.v. is considered to be a reasonable threshold for short-term construction projects.

**TABLE 11: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS**

| Peak Particle Velocity | | Human Reaction | Effect on Buildings |
|---|---|---|---|
| mm/second | in/second | | |
| 0.15-0.30 | 0.006-0.019 | Threshold of perception; possibility of intrusion | Vibrations unlikely to cause damage of any type |
| 2.0 | 0.08 | Vibrations readily perceptible | Recommended upper level of the vibration to which ruins and ancient monuments should be subjected |
| 2.5 | 0.10 | Level at which continuous vibrations begin to annoy people | Virtually no risk of "architectural" damage to normal buildings |
| 5.0 | 0.20 | Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations) | Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage |
| 10-15 | 0.4-0.6 | Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges | Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage |

*Source: Transportation Related Earthborne Vibrations. Caltrans. TAV-02-01-R9601. February 20, 2002.*

## IMPACTS AND MITIGATION MEASURES

### THRESHOLDS OF SIGNIFICANCE

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in significant noise impacts if noise levels conflict with adopted environmental standards or plans or if noise generated by the project would substantially increase existing noise levels at sensitive receivers on a permanent or temporary basis. Significance criteria for noise impacts are drawn from CEQA Guidelines Appendix G (Items XI [a-c]).

Would the project:

a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b. Generate 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?

The proposed project is not located within two miles of a public or private airport, therefore item “c” is not discussed any further in this study.

#### *Noise Level Increase Criteria for Long-Term Project-Related Noise Level Increases*

The California Environmental Quality Act (CEQA) guidelines define a significant impact of a project if it “increases substantially the ambient noise levels for adjoining areas.” Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local project criteria or ordinances, or substantially increase noise levels at noise sensitive land uses. The potential increase in traffic noise from the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following:

- A 3-dB change is barely perceptible,
- A 5-dB change is clearly perceptible, and
- A 10-dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project noise conditions. **Table 12** is based upon recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been accepted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the $L_{dn}$.

**TABLE 12: SIGNIFICANCE OF CHANGES IN NOISE EXPOSURE**

| Ambient Noise Level Without Project, $L_{dn}$ | Increase Required for Significant Impact |
|---|---|
| <60 dB | +5.0 dB or more |
| 60-65 dB | +3.0 dB or more |
| >65 dB | +1.5 dB or more |

*Source: Federal Interagency Committee on Noise (FICON).*

Based on the **Table 12** data, an increase in the traffic noise level of 5 dB or more would be significant where the pre-project noise levels are less than 60 dB $L_{dn}$, or 3 dB or more where existing noise levels are between 60 to 65 dB $L_{dn}$. Extending this concept to higher noise levels, an increase in the traffic noise level of 1.5 dB or more may be significant where the pre-project traffic noise level exceeds 65 dB $L_{dn}$. The rationale for the **Table 12** criteria is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance.

***Temporary Construction Noise Impacts***

With temporary noise impacts (construction), identification of "substantial increases" depends upon the duration of the impact, the temporal daily nature of the impact, and the absolute change in decibel levels. Per the City of Stockton Municipal Code, construction activities operating between 7:00 a.m. and 10:00 p.m. are exempt from the ordinance.

The City has not adopted any formal standard for evaluating temporary construction noise which occurs within allowable hours. For short-term noise associated with Project construction, Saxelby Acoustics recommends use of the Caltrans increase criteria of 12 dBA (Caltrans Traffic Noise Protocol, 2020), applied to existing residential receptors in the project vicinity. This level of increase is approximately equivalent to a doubling of sound energy and has been the standard of significance for Caltrans projects at the state level for many years. Application of this standard to construction activities is considered reasonable considering the temporary nature of construction activities.

**PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES**

***Impact 1:*** ***Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?***

***Traffic Noise Increases at Off-Site Receptors***

The FICON guidelines specify criteria to determine the significance of traffic noise impacts. Where existing traffic noise levels are greater than 65 dB $L_{dn}$, a +1.5 dB $L_{dn}$ increase in roadway noise levels will be considered significant. According to **Tables 3 - 5**, the maximum increase is traffic noise at the nearest sensitive receptor is predicted to be 1.2 dBA. Therefore, impacts resulting from increased traffic noise would be considered ***less-than-significant***, and no mitigation is required.

***Operational Noise at Existing Sensitive Receptors***

The proposed project would include typical residential noise which would be compatible with the existing adjacent residential uses.

This is a ***less-than-significant*** impact, and no mitigation is required.

***Construction Noise***

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. As indicated in **Table 6,** activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA $L_{max}$ at a distance of 50 feet. Construction activities would also be temporary in nature and are anticipated to occur during normal daytime working hours.

The City of Stockton Municipal Code exempts construction noise from the noise ordinance between the hours of 7:00 a.m. and 10:00 p.m. As shown in **Table 6**, construction equipment that may be used in the development of the project has the potential to generate noise levels of up to 90 dBA $L_{max}$ at 50 feet.

Caltrans defines a significant increase due to noise as an increase of 12 dBA over existing ambient noise levels; Saxelby Acoustics used this criterion to evaluate increases due to construction noise associated with the project.

As shown in **Table 6**, construction equipment is predicted to generate noise levels of up to 90 dBA $L_{max}$ at 50 feet. **Table 13** shows the predicted maximum noise levels for each phase of project construction, assuming the equipment were to be used near the edge of each phase closest to existing receptors.

**TABLE 13: CONSTRUCTION NOISE LEVELS AT NEAREST RECEPTORS**

| Phase | Distance to Receptors (feet) | Construction $L_{max}$, 50' | Construction $L_{max}$ at Receptor | Existing $L_{max}$[1] | Change |
|---|---|---|---|---|---|
| A1 | 2210 | 90 dBA | 57.1 dBA | 80-81 dBA | 0.0 |
| A2 | 2210 | 90 dBA | 57.1 dBA | 80-81 dBA | 0.0 |
| A3 | 2700 | 90 dBA | 55.4 dBA | 80-81 dBA | 0.0 |
| K1 | 185 | 90 dBA | 78.6 dBA | 80-81 dBA | 0.0 |
| K2 | 775 | 90 dBA | 66.2 dBA | 80-81 dBA | 0.0 |
| K3 | 1470 | 90 dBA | 60.6 dBA | 80-81 dBA | 0.0 |
| T1 | 185 | 90 dBA | 78.6 dBA | 80-81 dBA | 0.0 |
| T2 | 510 | 90 dBA | 69.8 dBA | 80-81 dBA | 0.0 |
| T3 | 510 | 90 dBA | 69.8 dBA | 80-81 dBA | 0.0 |

[1] Existing daytime ambient $L_{max}$ as measured at site LT-1 and LT-2.

Based upon **Table 13**, construction related noise levels are predicted to be less than existing ambient noise levels. Therefore, project construction would not cause an increase of greater than 12 dBA over existing ambient noise levels.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from the construction site. This noise increase would be of short duration and would occur during daytime hours.

Although construction activities are temporary in nature and would occur during normal daytime working hours, construction-related noise could result in sleep interference at existing noise-sensitive land uses in the vicinity of the construction if construction activities were to occur outside the normal daytime hours. Therefore, impacts resulting from noise levels temporarily exceeding the threshold of significance due to construction would be considered ***potentially significant***. Mitigation measure 1(a) would reduce construction noise impacts to ***less-than-significant***.

***Transportation Noise on Project Site (Non-CEQA Issue)***

***Exterior Transportation Noise***

Compliance with City's standards on new noise-sensitive receptors is not a CEQA consideration. However, this information is provided here so that a determination can be made regarding the ability of the proposed project to meet the requirements of the City of Stockton for exterior and interior noise levels at new sensitive uses proposed under the project.

As shown on **Figure 3**, several of the proposed outdoor activity areas are predicted to be exposed to exterior transportation noise levels up to approximately 71 dBA $L_{dn}$. This would exceed the 65 dBA limit for outdoor areas established by the City of Stockton. Therefore, additional noise control measures would be required.

Saxelby Acoustics determined the effect of including a sound wall in the project design. A sound barrier ranging from 6-foot to 12-foot tall was modeled along the west, south, and east project boundary. The barrier is predicted to lower noise levels at all outdoor activity areas on the project site to 65 dBA $L_{dn}$ or lower. **Figure 4** shows the recommended sound wall and resulting noise level contours.

Note: Standard construction is sufficient for project units that do not need acoustical upgrades. Standard construction assumes a minimum STC rating of 29 for exterior window assemblies.

**Interior Noise Control Measures**
**(Required for the Indicated Lots, for Facades facing the Railroad)**

- *Glazing shall have a sound transmission class (STC) rating of 34 minimum;*
- *Exterior finish shall be stucco with sheathing;*
- *Interior gypsum at exterior walls shall be 5/8";*
- *Ceiling gypsum shall be 5/8";*
- *Mechanical ventilation shall be installed in all residential uses to allow residents to keep doors and windows closed, as desired for acoustical isolation;*
- *No PTAC's shall be used.*

# Bear Creek South

**City of Stockton, California**

**Figure 5**

**Interior Noise Control Measures**

## Legend

**Indicated Lots Needing Acoustic Upgrades**

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***Interior Transportation Noise***

Modern building construction methods typically yield an exterior-to-interior noise level reduction of 25 dBA[1]. Therefore, where exterior noise levels are 70 dBA $L_{dn}$, or less, no additional interior noise control measures are typically required. For this project, exterior noise levels are predicted to be up to 71 dBA $L_{dn}$ at the second story of the buildings closest to the Union Pacific Railroad. This would result in interior noise levels of up to 46 dBA $L_{dn}$ at the second story receivers based on typical building construction. This exceeds the City of Stockton which requires that interior noise levels do not exceed 45 dB $L_{dn}$. Therefore, additional noise control measures are required to reduce interior noise to acceptable levels.

The proposed residential buildings located along the Union Pacific Railroad frontage shall be designed to achieve a 26 dBA exterior to interior noise level reduction to satisfy the requirements of the City of Stockton. **Figure 5** shows the locations of facades requiring acoustic upgrades. **Figure 5** and **Appendix D** provide an estimate of interior noise control measures required to meet the applicable standards. It should be noted that interior noise control measures are based upon an estimate of the future residence layouts. These assumptions should be verified once floor plans become available for an accurate assessment of interior noise control measures.

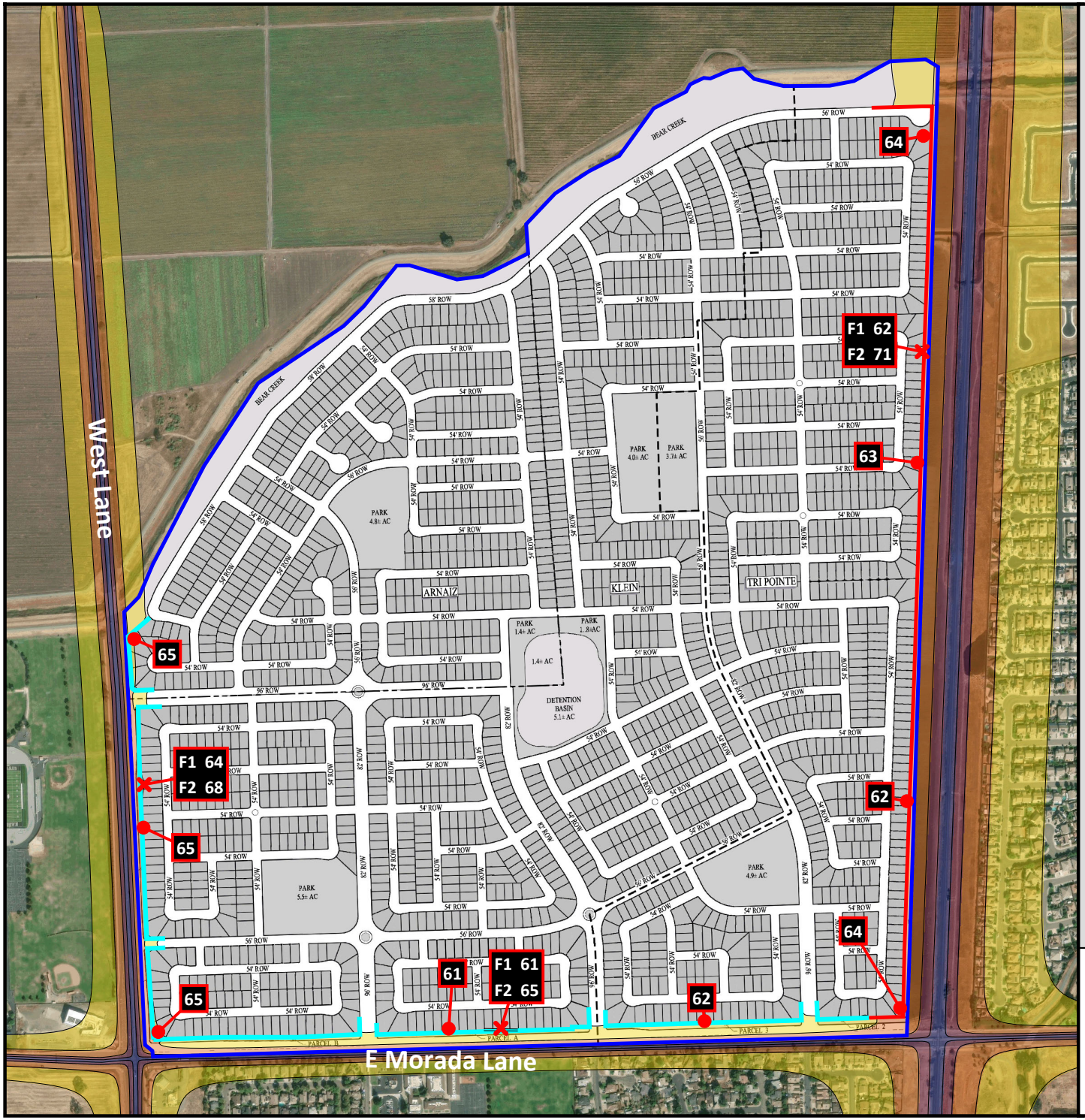
[1] Assuming standard construction with a minimum STC rating of 29 for exterior window assemblies

# Bear Creek South

City of Stockton, California

**Figure 4**

**Future Transportation Noise Contours with Recommended Sound Walls Ldn, dB(A)**




**Noise Level, dB(A)**

| | | | |
|---|---|---|---|
| 65 < | <= | 70 | |
| 70 < | <= | 75 | |
| 75 < | <= | 80 | |
| 80 < | | | |

**Legend**

- 12-Foot Wall
- 6-Foot Wall
- Facade Noise Level
- Outdoor Area Noise Level
- Project Site

**Scale 1:850**

0 150 300 600 900 1200 feet

N

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*Mitigation Measures*

*1(a)* The City shall establish the following as conditions of approval for any permit that results in the use of construction equipment:

- Construction shall be limited to 7:00 a.m. to 10:00 p.m.
- All construction equipment powered by internal combustion engines shall be properly muffled and maintained.
- Quiet construction equipment, particularly air compressors, are to be selected whenever possible.
- All stationary noise-generating construction equipment such as generators or air compressors are to be located as far as is practical from existing residences. In addition, the project contractor shall place such stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- Unnecessary idling of internal combustion engines is prohibited.
- The construction contractor shall, to the maximum extent practical, locate on-site equipment staging areas to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

*Timing/Implementation:* Implemented prior to approval of grading and/or building permits
*Enforcement/Monitoring:* City of Stockton Community Development Services Department

Implementation of mitigation measures 1(a) would help to reduce construction-generated noise levels. With mitigation, this impact would be considered ***less-than-significant***.

*Recommended Condition of Approval*

*Prior to approval of project improvement plans, the plans for the proposed project shall show that the southeastern area of the project site shall be shielded from UPRR, Morada Lane, and West Lane through the use of minimum six-foot-tall to 12-foot-tall sound walls per the approval of the City Engineer. Sound wall may include a combination of earthen berm and masonry wall to achieve the required wall height. Wall heights shall be measured relative to either pad or roadway centerline elevations, whichever is higher. The approximate locations of these barriers are shown on* ***Figure 4****. Other types of barrier may be employed but shall be reviewed by an acoustical engineer prior to being constructed.*

*Additionally, the proposed residential buildings located along the Union Pacific frontage shall be designed to achieve a 26 dBA exterior to interior noise level reduction to satisfy the requirements of the City of Stockton interior noise level standard of 45 dBA.* ***Figure 5*** *shows the locations of facades requiring acoustic upgrades.* ***Figure 5*** *and* ***Appendix D*** *provide an estimate of interior noise control measures required to meet the applicable standards. It should be noted that interior noise control measures are based upon an estimate of the future residence layouts. These assumptions should be verified once floor plans become available for an accurate assessment of interior noise control measures.*

***Impact 2:*** ***Would the project generate excessive groundborne vibration or groundborne noise levels?***

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

The **Table 7** data indicates that construction vibration levels anticipated for the project are less than the 0.2 in/sec threshold at distances of 26 feet. Sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located further than 26 feet from typical construction activities. At distances greater than 26 feet construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

This is a **less-than-significant** impact and no mitigation is required.

***Impact 3:*** ***For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?***

There are no airports within two miles of the project vicinity. Therefore, this impact is not applicable to the proposed project.

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## Appendix A: Acoustical Terminology

| | |
|---|---|
| **Acoustics** | The science of sound. |
| **Ambient Noise** | The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study. |
| **ASTC** | Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic. |
| **Attenuation** | The reduction of an acoustic signal. |
| **A-Weighting** | A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response. |
| **Decibel or dB** | Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. |
| **CNEL** | Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA. |
| **DNL** | See definition of Ldn. |
| **IIC** | Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic. |
| **Frequency** | The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz). |
| **Ldn** | Day/Night Average Sound Level. Similar to CNEL but with no evening weighting. |
| **Leq** | Equivalent or energy-averaged sound level. |
| **Lmax** | The highest root-mean-square (RMS) sound level measured over a given period of time. |
| **L(n)** | The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period. |
| **Loudness** | A subjective term for the sensation of the magnitude of sound. |
| **NIC** | Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation. |
| **NNIC** | Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation. |
| **Noise** | Unwanted sound. |
| **NRC** | Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption. |
| **RT60** | The time it takes reverberant sound to decay by 60 dB once the source has been removed. |
| **Sabin** | The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin. |
| **SEL** | Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event. |
| **SPC** | Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room. |
| **STC** | Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic. |
| **Threshold of Hearing** | The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing. |
| **Threshold of Pain** | Approximately 120 dB above the threshold of hearing. |
| **Impulsive** | Sound of short duration, usually less than one second, with an abrupt onset and rapid decay. |
| **Simple Tone** | Any sound which can be judged as audible as a single pitch or set of single pitches. |

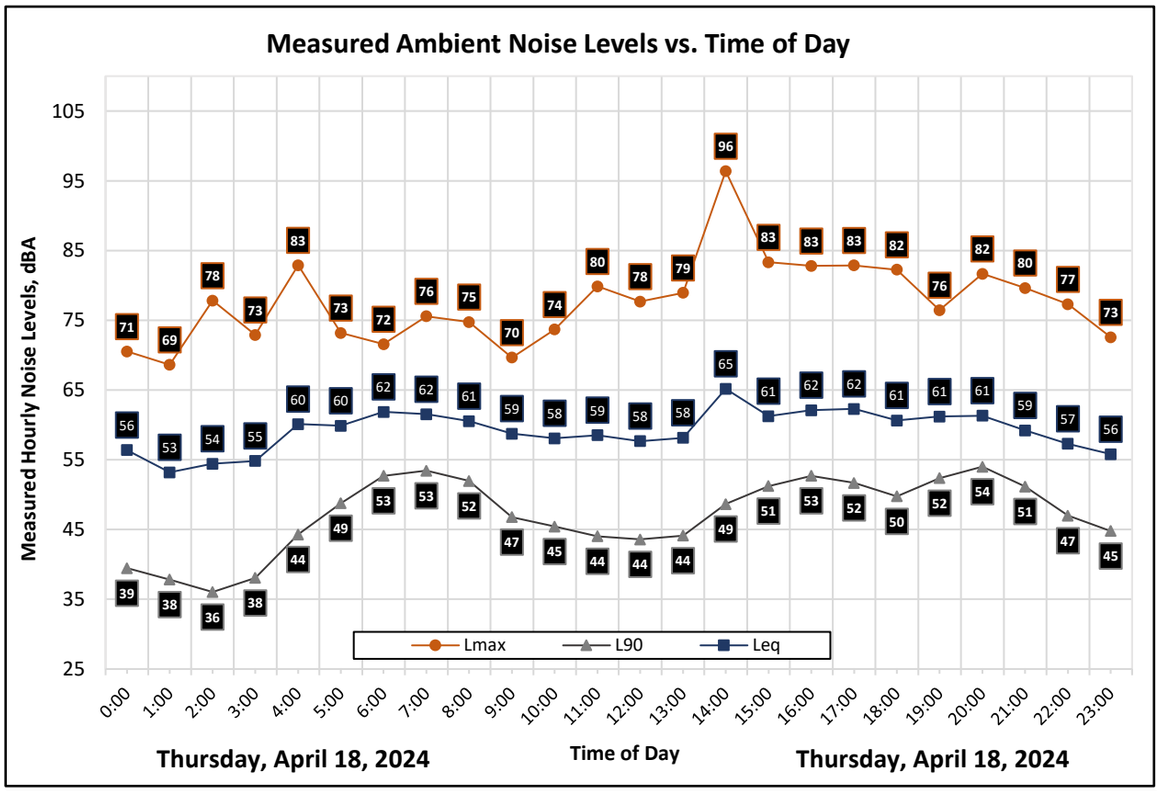
# Appendix B: Continuous Long-Term Ambient Noise Measurement Results

## Appendix B1: Continuous Noise Monitoring Results

**Site:** LT-1
**Project:** Bear Creek South EIR
**Location:** Eastern Project Boundary
**Coordinates:** (38.0427984, -121.2946402)
**Meter:** LDL 820-1
**Calibrator:** CAL200

| Date | Time | Measured Level, dBA | | | |
|---|---|---|---|---|---|
| | | $L_{eq}$ | $L_{max}$ | $L_{50}$ | $L_{90}$ |
| Thursday, April 18, 2024 | 0:00 | 56 | 71 | 48 | 39 |
| Thursday, April 18, 2024 | 1:00 | 53 | 69 | 42 | 38 |
| Thursday, April 18, 2024 | 2:00 | 54 | 78 | 43 | 36 |
| Thursday, April 18, 2024 | 3:00 | 55 | 73 | 46 | 38 |
| Thursday, April 18, 2024 | 4:00 | 60 | 83 | 54 | 44 |
| Thursday, April 18, 2024 | 5:00 | 60 | 73 | 57 | 49 |
| Thursday, April 18, 2024 | 6:00 | 62 | 72 | 60 | 53 |
| Thursday, April 18, 2024 | 7:00 | 62 | 76 | 60 | 53 |
| Thursday, April 18, 2024 | 8:00 | 61 | 75 | 59 | 52 |
| Thursday, April 18, 2024 | 9:00 | 59 | 70 | 57 | 47 |
| Thursday, April 18, 2024 | 10:00 | 58 | 74 | 56 | 45 |
| Thursday, April 18, 2024 | 11:00 | 59 | 80 | 55 | 44 |
| Thursday, April 18, 2024 | 12:00 | 58 | 78 | 55 | 44 |
| Thursday, April 18, 2024 | 13:00 | 58 | 79 | 55 | 44 |
| Thursday, April 18, 2024 | 14:00 | 65 | 96 | 57 | 49 |
| Thursday, April 18, 2024 | 15:00 | 61 | 83 | 59 | 51 |
| Thursday, April 18, 2024 | 16:00 | 62 | 83 | 60 | 53 |
| Thursday, April 18, 2024 | 17:00 | 62 | 83 | 60 | 52 |
| Thursday, April 18, 2024 | 18:00 | 61 | 82 | 58 | 50 |
| Thursday, April 18, 2024 | 19:00 | 61 | 76 | 59 | 52 |
| Thursday, April 18, 2024 | 20:00 | 61 | 82 | 59 | 54 |
| Thursday, April 18, 2024 | 21:00 | 59 | 80 | 57 | 51 |
| Thursday, April 18, 2024 | 22:00 | 57 | 77 | 54 | 47 |
| Thursday, April 18, 2024 | 23:00 | 56 | 73 | 53 | 45 |

| Statistics | Leq | Lmax | L50 | L90 |
|---|---|---|---|---|
| Day Average | 61 | 80 | 58 | 49 |
| Night Average | 58 | 74 | 51 | 43 |
| Day Low | 58 | 70 | 55 | 44 |
| Day High | 65 | 96 | 60 | 54 |
| Night Low | 53 | 69 | 42 | 36 |
| Night High | 62 | 83 | 60 | 53 |
| Ldn | 65 | Day % | | 78 |
| CNEL | 65 | Night % | | 22 |

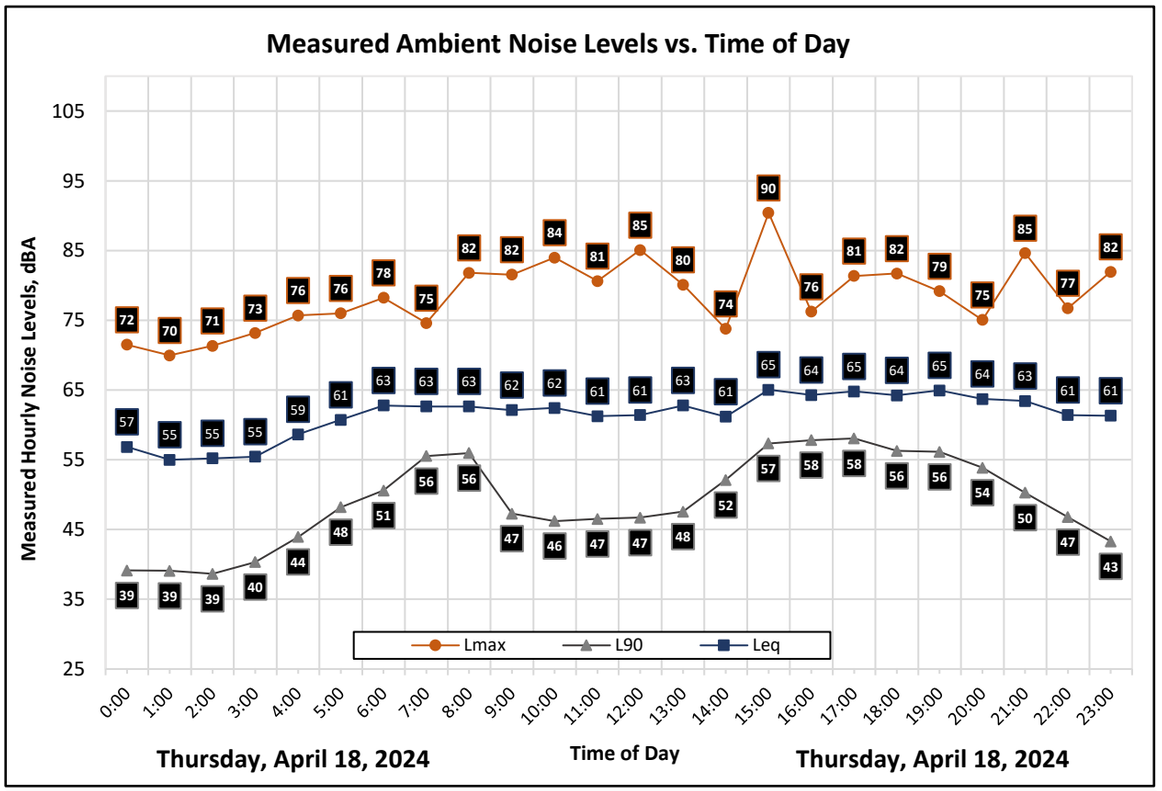


## Appendix B2: Continuous Noise Monitoring Results

**Site:** LT-2
**Project:** Bear Creek South EIR
**Meter:** LDL 820-6
**Location:** Southern Project Boundary
**Calibrator:** CAL200
**Coordinates:** (38.0371534, -121.2847666)

| Date | Time | Measured Level, dBA | | | |
|---|---|---|---|---|---|
| | | $L_{eq}$ | $L_{max}$ | $L_{50}$ | $L_{90}$ |
| Thursday, April 18, 2024 | 0:00 | 57 | 72 | 48 | 39 |
| Thursday, April 18, 2024 | 1:00 | 55 | 70 | 45 | 39 |
| Thursday, April 18, 2024 | 2:00 | 55 | 71 | 44 | 39 |
| Thursday, April 18, 2024 | 3:00 | 55 | 73 | 46 | 40 |
| Thursday, April 18, 2024 | 4:00 | 59 | 76 | 52 | 44 |
| Thursday, April 18, 2024 | 5:00 | 61 | 76 | 56 | 48 |
| Thursday, April 18, 2024 | 6:00 | 63 | 78 | 60 | 51 |
| Thursday, April 18, 2024 | 7:00 | 63 | 75 | 61 | 56 |
| Thursday, April 18, 2024 | 8:00 | 63 | 82 | 61 | 56 |
| Thursday, April 18, 2024 | 9:00 | 62 | 82 | 59 | 47 |
| Thursday, April 18, 2024 | 10:00 | 62 | 84 | 59 | 46 |
| Thursday, April 18, 2024 | 11:00 | 61 | 81 | 59 | 47 |
| Thursday, April 18, 2024 | 12:00 | 61 | 85 | 59 | 47 |
| Thursday, April 18, 2024 | 13:00 | 63 | 80 | 59 | 48 |
| Thursday, April 18, 2024 | 14:00 | 61 | 74 | 59 | 52 |
| Thursday, April 18, 2024 | 15:00 | 65 | 90 | 63 | 57 |
| Thursday, April 18, 2024 | 16:00 | 64 | 76 | 63 | 58 |
| Thursday, April 18, 2024 | 17:00 | 65 | 81 | 63 | 58 |
| Thursday, April 18, 2024 | 18:00 | 64 | 82 | 63 | 56 |
| Thursday, April 18, 2024 | 19:00 | 65 | 79 | 64 | 56 |
| Thursday, April 18, 2024 | 20:00 | 64 | 75 | 62 | 54 |
| Thursday, April 18, 2024 | 21:00 | 63 | 85 | 60 | 50 |
| Thursday, April 18, 2024 | 22:00 | 61 | 77 | 58 | 47 |
| Thursday, April 18, 2024 | 23:00 | 61 | 82 | 53 | 43 |

| Statistics | Leq | Lmax | L50 | L90 |
|---|---|---|---|---|
| Day Average | 63 | 81 | 61 | 53 |
| Night Average | 59 | 75 | 51 | 43 |
| Day Low | 61 | 74 | 59 | 46 |
| Day High | 65 | 90 | 64 | 58 |
| Night Low | 55 | 70 | 44 | 39 |
| Night High | 63 | 82 | 60 | 51 |
| Ldn | 66 | Day % | | 83 |
| CNEL | 67 | Night % | | 17 |

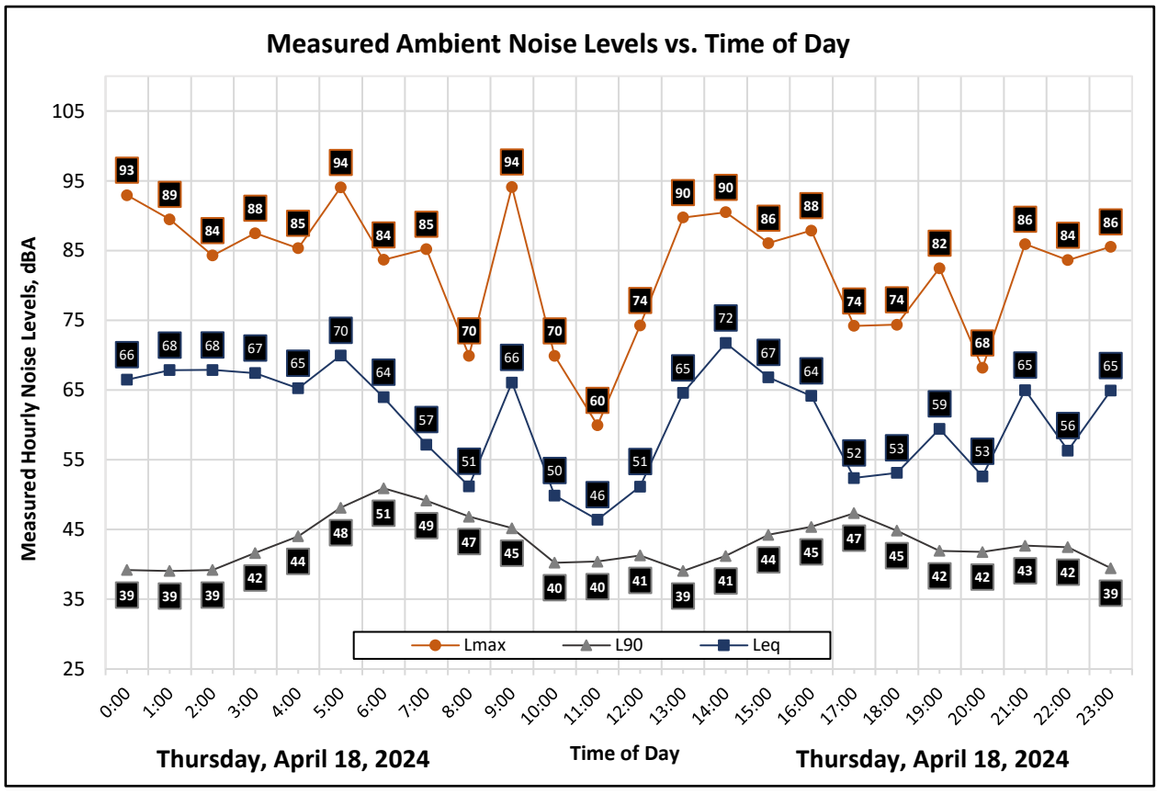


## Appendix B3: Continuous Noise Monitoring Results

**Site:** LT-3
**Project:** Bear Creek South EIR
**Location:** Northeast of Project Boundar
**Coordinates:** (38.0528574, -121.2769969)
**Meter:** LDL 820-5
**Calibrator:** CAL200

| Date | Time | Measured Level, dBA | | | |
|---|---|---|---|---|---|
| | | $L_{eq}$ | $L_{max}$ | $L_{50}$ | $L_{90}$ |
| Thursday, April 18, 2024 | 0:00 | 66 | 93 | 42 | 39 |
| Thursday, April 18, 2024 | 1:00 | 68 | 89 | 42 | 39 |
| Thursday, April 18, 2024 | 2:00 | 68 | 84 | 43 | 39 |
| Thursday, April 18, 2024 | 3:00 | 67 | 88 | 44 | 42 |
| Thursday, April 18, 2024 | 4:00 | 65 | 85 | 46 | 44 |
| Thursday, April 18, 2024 | 5:00 | 70 | 94 | 50 | 48 |
| Thursday, April 18, 2024 | 6:00 | 64 | 84 | 55 | 51 |
| Thursday, April 18, 2024 | 7:00 | 57 | 85 | 51 | 49 |
| Thursday, April 18, 2024 | 8:00 | 51 | 70 | 49 | 47 |
| Thursday, April 18, 2024 | 9:00 | 66 | 94 | 49 | 45 |
| Thursday, April 18, 2024 | 10:00 | 50 | 70 | 45 | 40 |
| Thursday, April 18, 2024 | 11:00 | 46 | 60 | 44 | 40 |
| Thursday, April 18, 2024 | 12:00 | 51 | 74 | 45 | 41 |
| Thursday, April 18, 2024 | 13:00 | 65 | 90 | 42 | 39 |
| Thursday, April 18, 2024 | 14:00 | 72 | 90 | 47 | 41 |
| Thursday, April 18, 2024 | 15:00 | 67 | 86 | 49 | 44 |
| Thursday, April 18, 2024 | 16:00 | 64 | 88 | 50 | 45 |
| Thursday, April 18, 2024 | 17:00 | 52 | 74 | 51 | 47 |
| Thursday, April 18, 2024 | 18:00 | 53 | 74 | 49 | 45 |
| Thursday, April 18, 2024 | 19:00 | 59 | 82 | 48 | 42 |
| Thursday, April 18, 2024 | 20:00 | 53 | 68 | 45 | 42 |
| Thursday, April 18, 2024 | 21:00 | 65 | 86 | 47 | 43 |
| Thursday, April 18, 2024 | 22:00 | 56 | 84 | 45 | 42 |
| Thursday, April 18, 2024 | 23:00 | 65 | 86 | 42 | 39 |

| Statistics | Leq | Lmax | L50 | L90 |
|---|---|---|---|---|
| Day Average | 64 | 80 | 47 | 43 |
| Night Average | 67 | 87 | 45 | 43 |
| Day Low | 46 | 60 | 42 | 39 |
| Day High | 72 | 94 | 51 | 49 |
| Night Low | 64 | 84 | 42 | 39 |
| Night High | 70 | 94 | 55 | 51 |
| Ldn | 73 | Day % | | 46 |
| CNEL | 73 | Night % | | 54 |



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# Appendix C: Traffic Noise Calculation Inputs and Results

**Appendix C-1**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** Existing Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 10,990 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 220 | 102 | 47 | 60.6 |
| 2 | Eight Mile Road | West of West Lane | 14,770 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 268 | 124 | 58 | 63.4 |
| 3 | Eight Mile Road | East of West Lane | 10,560 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 214 | 99 | 46 | 57.8 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 14,520 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 199 | 92 | 43 | 65.4 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 23,260 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 250 | 116 | 54 | 64.3 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 25,050 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 262 | 122 | 57 | 68.6 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,160 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 103 | 48 | 22 | 62.5 |
| 8 | Knickerbocker Dr | West of West Lane | 2,930 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 34 | 16 | 7 | 56.8 |
| 9 | Knickerbocker Dr | East of West Lane | 5,480 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 51 | 24 | 11 | 58.9 |
| 10 | E. Hammer Ln | West Of West Ln | 31,970 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 309 | 143 | 66 | 58.2 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 31,850 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 308 | 143 | 66 | 70.7 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 25,850 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 268 | 124 | 58 | 67.9 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,110 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 70 | 33 | 15 | 63.7 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 19,330 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 240 | 112 | 52 | 71.7 |
| 15 | Holman Rd | North of E. Morada Ln | 11,600 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 191 | 89 | 41 | 59.9 |
| 16 | Holman Rd | South of E. Morada Ln | 10,640 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 180 | 84 | 39 | 60.3 |
| 17 | E. Morada Ln | West Of Holman Rd | 20,790 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 252 | 117 | 54 | 66.7 |
| 18 | E. Morada Ln | East of Holman Rd | 18,270 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 231 | 107 | 50 | 67.8 |
| 19 | Perino Dr | North of E. Morada Ln | 2,750 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 32 | 15 | 7 | 54.9 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,380 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 37 | 17 | 8 | 58.0 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 17,020 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 221 | 102 | 48 | 67.5 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 15,260 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 101 | 47 | 22 | 62.9 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 1,940 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 26 | 12 | 6 | 44.0 |

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**Appendix C-2**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** Existing Plus Project Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 12,380 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 238 | 110 | 51 | 61.1 |
| 2 | Eight Mile Road | West of West Lane | 17,730 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 302 | 140 | 65 | 64.1 |
| 3 | Eight Mile Road | East of West Lane | 10,820 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 218 | 101 | 47 | 57.9 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 17,360 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 224 | 104 | 48 | 66.2 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 26,970 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 276 | 128 | 59 | 64.9 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 28,580 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 286 | 133 | 62 | 69.2 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,340 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 105 | 49 | 23 | 62.6 |
| 8 | Knickerbocker Dr | West of West Lane | 2,920 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 34 | 16 | 7 | 56.8 |
| 9 | Knickerbocker Dr | East of West Lane | 5,660 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 52 | 24 | 11 | 59.1 |
| 10 | E. Hammer Ln | West Of West Ln | 32,840 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 314 | 146 | 68 | 58.3 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 32,390 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 311 | 145 | 67 | 70.7 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 27,630 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 280 | 130 | 60 | 68.2 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,110 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 70 | 33 | 15 | 63.7 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 25,330 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 288 | 134 | 62 | 72.9 |
| 15 | Holman Rd | North of E. Morada Ln | 11,970 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 195 | 90 | 42 | 60.0 |
| 16 | Holman Rd | South of E. Morada Ln | 11,170 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 186 | 86 | 40 | 60.5 |
| 17 | E. Morada Ln | West Of Holman Rd | 26,790 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 299 | 139 | 64 | 67.8 |
| 18 | E. Morada Ln | East of Holman Rd | 23,330 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 272 | 126 | 59 | 68.9 |
| 19 | Perino Dr | North of E. Morada Ln | 2,750 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 32 | 15 | 7 | 54.9 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,220 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 36 | 17 | 8 | 57.8 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 21,940 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 262 | 121 | 56 | 68.6 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 20,340 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 122 | 57 | 26 | 64.1 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 1,940 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 26 | 12 | 6 | 44.0 |

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**Appendix C-3**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** EPAP Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 12,860 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 244 | 113 | 53 | 61.3 |
| 2 | Eight Mile Road | West of West Lane | 23,720 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 367 | 170 | 79 | 65.4 |
| 3 | Eight Mile Road | East of West Lane | 16,900 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 293 | 136 | 63 | 59.8 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 16,030 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 212 | 98 | 46 | 65.9 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 27,840 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 281 | 131 | 61 | 65.0 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 29,630 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 293 | 136 | 63 | 69.3 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,160 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 103 | 48 | 22 | 62.5 |
| 8 | Knickerbocker Dr | West of West Lane | 2,930 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 34 | 16 | 7 | 56.8 |
| 9 | Knickerbocker Dr | East of West Lane | 5,480 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 51 | 24 | 11 | 58.9 |
| 10 | E. Hammer Ln | West Of West Ln | 31,980 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 309 | 143 | 67 | 58.2 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 31,860 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 308 | 143 | 66 | 70.7 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 30,430 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 299 | 139 | 64 | 68.6 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,110 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 70 | 33 | 15 | 63.7 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 20,840 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 253 | 117 | 54 | 72.0 |
| 15 | Holman Rd | North of E. Morada Ln | 16,490 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 241 | 112 | 52 | 61.4 |
| 16 | Holman Rd | South of E. Morada Ln | 13,070 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 206 | 96 | 44 | 61.2 |
| 17 | E. Morada Ln | West Of Holman Rd | 22,300 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 264 | 123 | 57 | 67.0 |
| 18 | E. Morada Ln | East of Holman Rd | 20,860 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 253 | 117 | 54 | 68.4 |
| 19 | Perino Dr | North of E. Morada Ln | 2,750 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 32 | 15 | 7 | 54.9 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,220 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 36 | 17 | 8 | 57.8 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 19,470 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 241 | 112 | 52 | 68.1 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 17,870 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 112 | 52 | 24 | 63.6 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 1,940 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 26 | 12 | 6 | 44.0 |

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**Appendix C-4**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** EPAP Plus Project Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 14,250 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 261 | 121 | 56 | 61.7 |
| 2 | Eight Mile Road | West of West Lane | 24,500 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 375 | 174 | 81 | 65.6 |
| 3 | Eight Mile Road | East of West Lane | 17,160 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 296 | 137 | 64 | 59.9 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 18,770 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 236 | 109 | 51 | 66.6 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 31,550 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 306 | 142 | 66 | 65.6 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 33,260 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 317 | 147 | 68 | 69.8 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,340 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 105 | 49 | 23 | 62.6 |
| 8 | Knickerbocker Dr | West of West Lane | 3,110 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 35 | 16 | 8 | 57.1 |
| 9 | Knickerbocker Dr | East of West Lane | 5,660 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 52 | 24 | 11 | 59.1 |
| 10 | E. Hammer Ln | West Of West Ln | 32,840 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 314 | 146 | 68 | 58.3 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 32,360 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 311 | 144 | 67 | 70.7 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 32,210 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 310 | 144 | 67 | 68.8 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,110 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 70 | 33 | 15 | 63.7 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 16,840 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 219 | 102 | 47 | 71.1 |
| 15 | Holman Rd | North of E. Morada Ln | 16,880 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 245 | 114 | 53 | 61.5 |
| 16 | Holman Rd | South of E. Morada Ln | 13,600 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 212 | 98 | 46 | 61.3 |
| 17 | E. Morada Ln | West Of Holman Rd | 28,300 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 310 | 144 | 67 | 68.1 |
| 18 | E. Morada Ln | East of Holman Rd | 25,940 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 292 | 136 | 63 | 69.3 |
| 19 | Perino Dr | North of E. Morada Ln | 2,750 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 32 | 15 | 7 | 54.9 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,220 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 36 | 17 | 8 | 57.8 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 24,550 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 282 | 131 | 61 | 69.1 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 22,950 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 133 | 62 | 29 | 64.6 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 1,940 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 26 | 12 | 6 | 44.0 |

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**Appendix C-3**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** Cumulative Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 14,230 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 261 | 121 | 56 | 61.7 |
| 2 | Eight Mile Road | West of West Lane | 31,680 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 445 | 207 | 96 | 66.7 |
| 3 | Eight Mile Road | East of West Lane | 27,040 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 401 | 186 | 86 | 61.8 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 21,920 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 261 | 121 | 56 | 67.2 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 35,160 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 329 | 153 | 71 | 66.0 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 37,080 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 341 | 158 | 73 | 70.3 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,420 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 106 | 49 | 23 | 62.7 |
| 8 | Knickerbocker Dr | West of West Lane | 3,050 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 35 | 16 | 7 | 57.0 |
| 9 | Knickerbocker Dr | East of West Lane | 5,720 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 53 | 24 | 11 | 59.1 |
| 10 | E. Hammer Ln | West Of West Ln | 34,000 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 322 | 149 | 69 | 58.5 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 34,300 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 323 | 150 | 70 | 71.0 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 35,910 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 333 | 155 | 72 | 69.3 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,370 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 72 | 33 | 16 | 63.8 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 26,910 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 300 | 139 | 65 | 73.1 |
| 15 | Holman Rd | North of E. Morada Ln | 17,210 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 248 | 115 | 53 | 61.6 |
| 16 | Holman Rd | South of E. Morada Ln | 13,840 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 215 | 100 | 46 | 61.4 |
| 17 | E. Morada Ln | West Of Holman Rd | 28,430 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 311 | 144 | 67 | 68.1 |
| 18 | E. Morada Ln | East of Holman Rd | 26,340 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 295 | 137 | 64 | 69.4 |
| 19 | Perino Dr | North of E. Morada Ln | 2,870 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 33 | 15 | 7 | 55.1 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,810 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 40 | 19 | 9 | 58.6 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 25,360 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 288 | 134 | 62 | 69.2 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 23,250 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 134 | 62 | 29 | 64.7 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 2,020 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 26 | 12 | 6 | 44.1 |

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**Appendix C-4**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 240309
**Description:** Cumulative Plus Project Traffic
**Ldn/CNEL:** Ldn
**Hard/Soft:** Soft

| Segment | Roadway | Segment | ADT | Day % | Eve % | Night % | % Med. Trucks | % Hvy. Trucks | Speed | Distance | Offset (dB) | Contours (ft.) - No Offset 60 dBA | 65 dBA | 70 dBA | Level, dBA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | West Lane | North of Eight Mile Road | 16,910 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 200 | 0 | 293 | 136 | 63 | 62.5 |
| 2 | Eight Mile Road | West of West Lane | 32,840 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 160 | 0 | 456 | 212 | 98 | 66.8 |
| 3 | Eight Mile Road | East of West Lane | 27,680 | 78 | 0 | 22 | 1.0% | 1.0% | 50 | 140 | -5 | 407 | 189 | 88 | 62.0 |
| 4 | E. Morada Lane | Between West Ln and Caywood Dr | 24,650 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | -5 | 283 | 131 | 61 | 67.7 |
| 5 | West Lane | Between E. Morada Ln and W. Frontage Ln | 38,870 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 130 | 0 | 352 | 163 | 76 | 66.5 |
| 6 | West Lane | Between W. Ln Frontage Rd and Knickerbocker Dr | 40,620 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 362 | 168 | 78 | 70.7 |
| 7 | W Lane Frontage Rd | West of West Ln | 6,600 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 70 | 0 | 108 | 50 | 23 | 62.8 |
| 8 | Knickerbocker Dr | West of West Lane | 3,230 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 55 | 0 | 36 | 17 | 8 | 57.2 |
| 9 | Knickerbocker Dr | East of West Lane | 5,900 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 60 | 0 | 54 | 25 | 12 | 59.3 |
| 10 | E. Hammer Ln | West Of West Ln | 34,660 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 405 | 0 | 326 | 151 | 70 | 58.6 |
| 11 | E. Hammer Ln | Between West Ln and Lorraine Ave | 34,730 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 60 | 0 | 326 | 151 | 70 | 71.0 |
| 12 | West Lane | Between E Hammer Ln and E Swain Rd | 37,690 | 78 | 0 | 22 | 1.0% | 1.0% | 40 | 80 | 0 | 344 | 160 | 74 | 69.5 |
| 13 | Glacier Point Dr | South of E. Morada Ln | 6,370 | 78 | 0 | 22 | 1.0% | 1.0% | 30 | 40 | 0 | 72 | 33 | 16 | 63.8 |
| 14 | E. Morada Ln | Between Glacier Point Dr. and Fox Creek Dr | 32,930 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 40 | 0 | 343 | 159 | 74 | 74.0 |
| 15 | Holman Rd | North of E. Morada Ln | 17,600 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 90 | -5 | 252 | 117 | 54 | 61.7 |
| 16 | Holman Rd | South of E. Morada Ln | 14,170 | 78 | 0 | 22 | 1.0% | 1.0% | 45 | 80 | -5 | 218 | 101 | 47 | 61.5 |
| 17 | E. Morada Ln | West Of Holman Rd | 34,230 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 90 | 0 | 352 | 163 | 76 | 68.9 |
| 18 | E. Morada Ln | East of Holman Rd | 31,420 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 332 | 154 | 72 | 70.1 |
| 19 | Perino Dr | North of E. Morada Ln | 2,870 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 70 | 0 | 33 | 15 | 7 | 55.1 |
| 20 | Maranatha Dr | South of E. Morada Ln | 3,360 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 50 | 0 | 37 | 17 | 8 | 58.0 |
| 21 | E. Morada Ln | Between Maranatha Dr and Holman Rd | 29,990 | 83 | 0 | 17 | 1.0% | 1.0% | 45 | 70 | 0 | 322 | 149 | 69 | 69.9 |
| 22 | Diamond Bar Pl | North of E. Morada Ln | 28,550 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 65 | 0 | 153 | 71 | 33 | 65.6 |
| 23 | Diamond Bar Pl | South of E. Morada Ln | 2,220 | 78 | 0 | 22 | 1.0% | 1.0% | 25 | 300 | 0 | 28 | 13 | 6 | 44.5 |

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# Appendix D: Exterior to Interior Noise Reduction Calculations

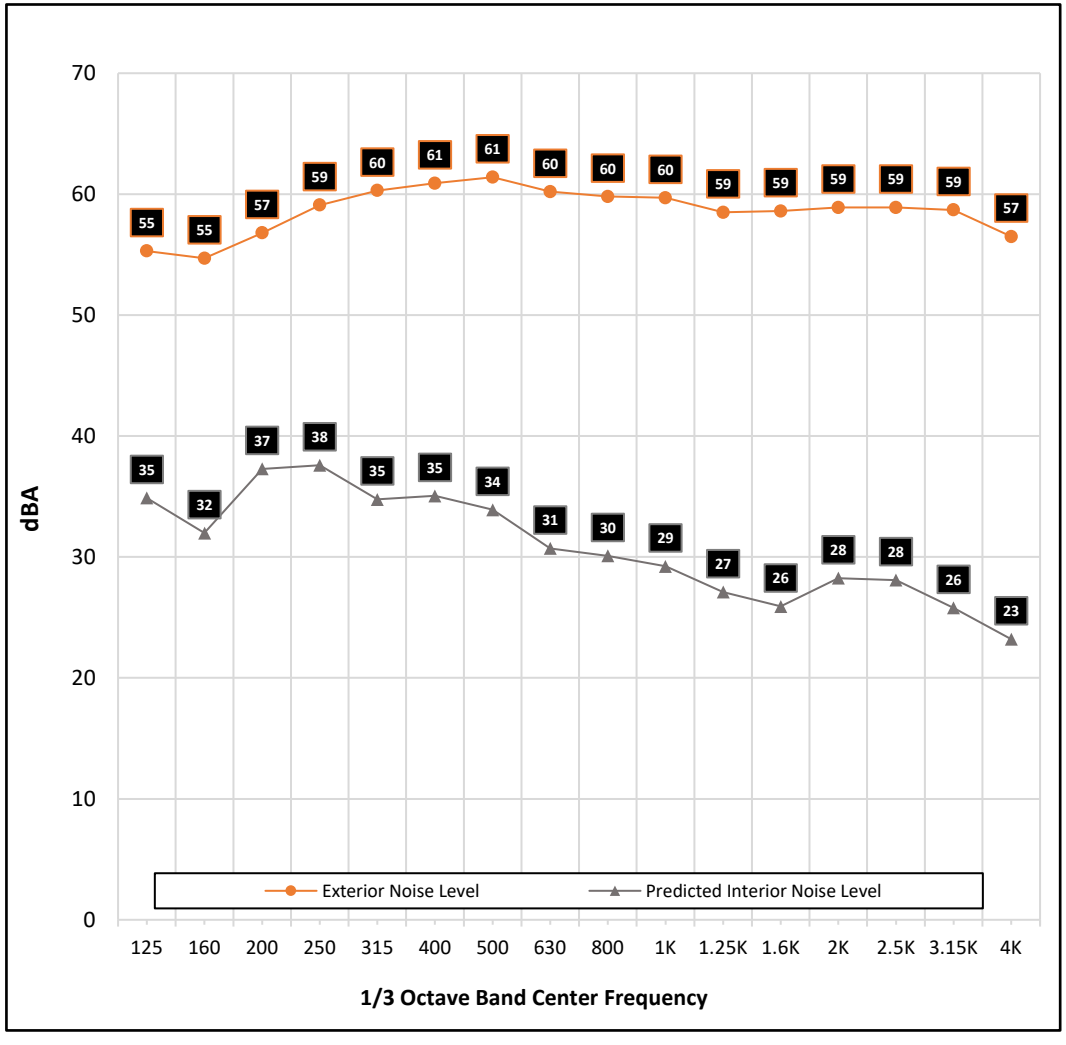
## Appendix D1: Interior Noise Calculation Sheet

**Project:** Bear Creek South
**Room Description:** Bedroom

### Inputs

| | | |
|---|---|---|
| **Parallel Exterior level, dBA:** | 71.0 | **Ldn** |
| **Correction Factor, dBA:** | 5.0 | |
| **Noise Source:** | Railroad Locomotive and Cars | |
| **Room Length, ft:** | 12.0 | |
| **Room Width, ft:** | 11.0 | |
| **Room Height, ft:** | 9.0 | |
| **Transmitting Panel Length, ft:** | 21.0 | |
| **Glazing Area, ft:** | 24.0 | |
| **Ceiling Finish:** | Gyp Board | |
| **Ceiling, sf:** | 132 | |
| **Wall Finish 1:** | Gyp Board | |
| **Wall Finish 1, sf:** | 390 | |
| **Wall Finish 2:** | Glass | |
| **Wall Finish 2, sf:** | 24 | |
| **Floor:** | Vinyl Plank | |
| **Floor, sf:** | 132 | |
| **Misc. Finish:** | Soft Furnishings | |
| **Misc. Finish, sf:** | 25 | |
| **Transmitting Element 1:** | Wall - 1-Coat Stucco, 5/8" gyp INSUL | |
| Element 1, sf: | 165 | |
| **Transmitting Element 2:** | Glazing - STC 34 | |
| Element 2, sf: | 24 | |
| **Transmitting Element 3:** | | |
| Element 3, sf: | | |
| **Transmitting Element 4:** | | |
| Element 4, sf: | | |

**Predicted Interior Noise Level, dBA: 45**
**Noise Reduction, dBA: -26**

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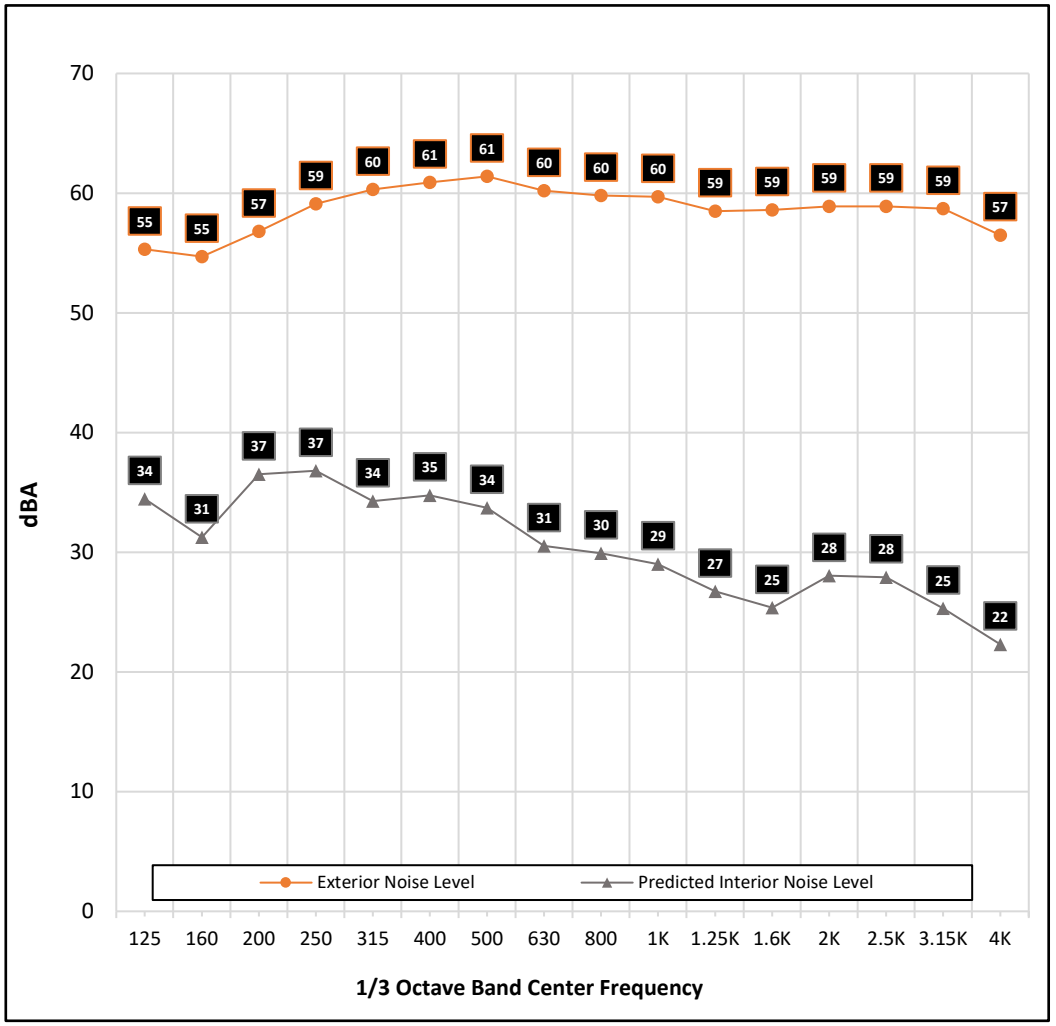
## Appendix D2: Interior Noise Calculation Sheet

**Project:** Bear Creek South
**Room Description:** Living Room

### Inputs

| | |
|---|---|
| Parallel Exterior level, dBA: | 71.0 Ldn |
| Correction Factor, dBA: | 5.0 |
| Noise Source: | Railroad Locomotive and Cars |
| Room Length, ft: | 15.0 |
| Room Width, ft: | 15.0 |
| Room Height, ft: | 9.0 |
| Transmitting Panel Length, ft: | 28.0 |
| Glazing Area, ft: | 24.0 |
| Ceiling Finish: | Gyp Board |
| Ceiling, sf: | 225 |
| Wall Finish 1: | Gyp Board |
| Wall Finish 1, sf: | 516 |
| Wall Finish 2: | Glass |
| Wall Finish 2, sf: | 24 |
| Floor: | Vinyl Plank |
| Floor, sf: | 225 |
| Misc. Finish: | Soft Furnishings |
| Misc. Finish, sf: | 25 |
| Transmitting Element 1: | Wall - 1-Coat Stucco, 5/8" gyp INSUL |
| Element 1, sf: | 228 |
| Transmitting Element 2: | Glazing - STC 34 |
| Element 2, sf: | 24 |
| Transmitting Element 3: | |
| Element 3, sf: | |
| Transmitting Element 4: | |
| Element 4, sf: | |

**Predicted Interior Noise Level, dBA: 44**
**Noise Reduction, dBA: -27**

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# Appendix E: Transportation Impact Analysis

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*Draft*

# Bear Creek South Residential Project

## *Transportation Impact Analysis*

Prepared for:
De Novo Planning Group

*Prepared by:*

BTC
BARRIOS
TRANSPORTATION CONSULTING

July 25, 2024

*BTC-0021*

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# EXECUTIVE SUMMARY

This report presents the analysis and findings of the Transportation Impact Analysis (TIA) prepared for the proposed Bear Creek South Residential Project (Project) in the City of Stockton, California (City). The Project proposes to develop approximately 2,241 single-family dwelling units and is bounded by Bear Creek to the north, Morada Lane to the south, West Lane to the west, and United Pacific Railroad (UPRR) tracks to the east. Project access would be provided by new roadway connections to West Lane and Morada Lane. A conceptual Project site plan is shown on **Figure 1-1** in the main body of the report.

This TIA satisfies the requirements documented in the *City of Stockton Transportation Impact Analysis Guidelines* (TIA Guidelines) dated May 2023. Based on the expected project daily trip generation (17,633 trips), the TIA Guidelines require the preparation of a Local Transportation Study and California Environmental Quality Act (CEQA) Transportation Study. Both studies are included in this report.

## STUDY AREA

The study area for the TIA assessment includes the area immediately adjacent to the Project site. The following 15 intersections were selected for evaluation. The study area is shown on **Figure 1-2** in the main body of the report.

1. West Lane / Eight Mile Road
2. West Lane / Project Roadway Access #1 (evaluated under Project conditions)
3. West Lane / Project Roadway Access #2 (evaluated under Project conditions)
4. West Lane / Morada Lane
5. West Lane / West Lane Frontage
6. West Lane / Knickerbocker Drive
7. West Lane / Hammer Lane
8. Caywood Drive / Morada Lane / Project Roadway Access #3
9. Cherbourg Way / Morada Lane / Project Roadway Access #4
10. Fox Creek Drive / Morada Lane / Project Roadway Access #5
11. Glacier Point Drive / Morada Lane
12. Holman Road / Morada Lane
13. Maranatha Drive / Morada Lane
14. Diamond Bar Place / Morada Lane
15. West Lane/Marlette Road (future intersection built by other development project)

# ANALYSIS SCENARIOS

Operations of the study intersections above were evaluated for the following scenarios:

- **Existing Conditions** – Existing conditions as they were in the fall of 2023 based on traffic volumes collected in September 2023.
- **Existing Plus Project Conditions** – Existing traffic volumes plus traffic generated by the proposed Project.
- **Background No Project Conditions (Existing Plus Approved Development Projects)** – Existing traffic volumes plus traffic generated by approved development projects near the Project site.
- **Background Plus Project Conditions (Existing Plus Approved Development Projects Plus Project)** – Existing traffic volumes plus traffic generated by approved development projects plus traffic generated by the proposed Project.
- **Cumulative Year (2040) No Project Conditions** – Year 2040 traffic volumes and future roadway improvements based on the City's Travel Demand Model under General Plan Buildout Conditions, without development of the Project.
- **Cumulative Year (2040) Plus Project Conditions** – Year 2040 traffic volumes and future roadway improvements based on the City's Travel Demand Model under General Plan Buildout Conditions, plus traffic generated by the proposed Project.

# VEHICULAR SITE ACCESS AND CIRCULATION

Site access and internal circulation for vehicles, pedestrians, and bicycles was evaluated based on the site plan presented on **Figure 1-1**. Vehicular access to the Project site would be provided from the following locations:

- West Lane / Project Roadway Access #1 (Intersection 2)
- West Lane / Project Roadway Access #2 (Intersection 3)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)
- Fox Creek Drive / Morada Lane / Project Roadway Access #5 (Intersection 10)

All movements into and out of the Project site are anticipated to operate at LOS D or better under all analysis scenarios assuming a traffic signal at Intersection 2, 8, and 9 and side-street stop control at Intersection 3 and 10. A two-lane roundabout is also under consideration at Project Roadway Access #3 and #4 (Intersection 8 and 9). Under Existing Plus Project and Background Plus Project conditions, all

movements into and out of the Project site are anticipated to operate at LOS D or better with a two-lane roundabout. However, under Cumulative Plus Project conditions, the eastbound Morada Lane approach at Intersection 9, including the eastbound left-turn into the Project site, is anticipated to operate at LOS F during the AM peak hour. The City's policy is to maintain LOS D or better operations except along corridors with physical constraints that limit the improvements that can be constructed. With a two-lane roundabout, the operations of Intersection 9 would not be consistent with the City's LOS policy under Cumulative Plus Project conditions.

Adequate vehicle storage would be provided at the site access locations to accommodate the 95th percentile vehicle queues and adequate deceleration lane lengths are proposed for the left-turn and right-turn lanes on West Lane and Morada Lane assuming a traffic signal at Intersection 2, 8, and 9 and side-street stop control at Intersection 3 and 10. **Table E-1** compares the proposed deceleration lane lengths and vehicle storage against the guidance presented in the Caltrans *Highway Design Manual* (HDM). West Lane has a posted speed limit of 55 mph and Morada Lane has a posted speed limit of 45 mph.

**Table E-1. Vehicle Storage and Deceleration Lane Length Comparison**

| Intersection | | Movement[1] | Proposed (feet) | | | HDM (feet) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Taper | Vehicle Storage and Deceleration Lane | Total | Taper | Vehicle Storage and Deceleration Lane[2] | Total |
| 2 | West Lane / Project Roadway Access #1 | NBR | 120 | 250 | 370 | 120 | 229 | 349 |
| | | SBL | 120 | 340 | 460 | 120 | 342 | 462 |
| 3 | West Lane / Project Roadway Access #2 | NBR | 120 | 200 | 320 | 120 | 195 | 315 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | EBL | 90 | 300 | 390 | 90 | 214 | 304 |
| | | WBL | 90 | 300 | 390 | 90 | 232 | 322 |
| | | WBR | 90 | 250 | 340 | 90 | 181 | 271 |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | EBL | 90 | 350 | 440 | 90 | 284 | 374 |
| | | WBL | 90 | 350 | 440 | 90 | 334 | 424 |
| | | WBR | 90 | 250 | 340 | 90 | 185 | 275 |
| 10 | Fox Creek Drive / Morada Lane | EBL | 90 | 250 | 340 | 90 | 195 | 285 |
| | | WBL | 90 | 250 | 340 | 90 | 245 | 335 |
| | | WBR | 90 | 250 | 340 | 90 | 195 | 285 |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. Vehicle storage is equal to the maximum 95th percentile queue reported for that movement under Cumulative Plus Project conditions. Deceleration lane length assumes partial deceleration (15 mph) is permitted in the through lanes per HDM.

Source: BTC, 2024.

All internal local residential roadways are proposed to have a 54' right-of-way (ROW) with a curb-to-curb width of 34 feet that would accommodate two travel lanes (one lane in each direction). All internal collector roadways are proposed to have a 56' ROW with a curb-to-curb width of 26 feet that would accommodate two travel lanes (one lane in each direction). The major project roadways providing access to West Lane (intersection 2) or Morada Lane (intersections 8, 9, and 10) are proposed to have a 96' ROW and can accommodate four travel lanes (two lanes in each direction). The proposed internal roadway designs are consistent with City of Stockton street design standards and would provide adequate vehicular capacity to accommodate Project traffic.

Emergency vehicle access to the Project site is provided from all five roadway access locations that are designed to accommodate emergency vehicles. Cross-sections for the proposed streets within the Project site were reviewed and all street sections provide a minimum of 20-feet of clearway (meaning no obstructions in terms of parked vehicles, landscaping, etc.), such that sufficient width is provided for emergency vehicle access and circulation.

## PEDESTRIAN AND BICYCLE CIRCULATION

All internal project roadways will have at a minimum 5' sidewalk on either side of the street and in some areas an 8' meandering sidewalk is proposed. There will be no gaps in the pedestrian circulation system and pedestrian access will be provided to West Lane and Morada Lane via the Project roadway access intersections.

Bicycle facilities that will be provided by the Project include the following:

- 12' multi-use pedestrian path along Bear Creek
- 11' one-way separated bikeway (Class IV) on West Lane along the Project frontage
- 5' bike lane (Class II) on Morada Lane along the Project frontage

The proposed bicycle facilities are consistent with the *City Stockton Bicycle Master Plan* (2017).

## CEQA AND LOCAL TRANSPORTATION STUDY

Under the California Environmental Quality Act (CEQA), level of service ("LOS"), a qualitative description of traffic on a roadway facility or intersection, can no longer be used to determine a project's environmental impact. Instead, Section 15064.3 of the *2023 CEQA Statue and Guidelines* includes guidance related to assessing the Vehicle Miles of Travel ("VMT") generated by various types of land use, and thresholds for the identification of significant impacts. The City of Stockton VMT impact analysis process is documented in the *City of Stockton Transportation Impact Analysis Guidelines* (Adopted May 2, 2023).

According to the City's TIA Guidelines, a project is relieved from VMT impact analysis if it meets one of the following screening criteria:

1. Within a Transit Priority Area (TPA);
2. Is 100% restricted affordable housing;
3. Small project (generating 110 trips or less per day);
4. Is a locally serving public facility that contributes and supports community needs;
5. Neighborhood-serving retail project less than 50,000 square feet;
6. Located within a low VMT area; or
7. For specific project types that are consistent with General Plan and zoning standards, and do not trigger and EIR such as:
    a. **Housing**: Residential projects within the City Limits that are consistent with all General Plan and zoning standards, are near transit (i.e., is within half a mile of a transit stop), or included as a housing capacity site needed to meet the City's fair share of Regional Housing Needs Allocation (RHNA), as outlined in the City's Housing Element.
    b. **General Plan and Zoning Consistency**: Projects that are:
        i. Consistent with the General Plan and Zoning that do not require a General Plan land use map amendment.
        ii. Do not require an EIR for project related impacts beyond the General Plan EIR.
        iii. Located within the Greater Downtown Planning area, as defined in the General Plan, and do not require a land use map amendment or EIR.

The Project meets screening criteria #7 (consistent with General Plan & zoning standards). The Project is consistent with the land use presented in the *Envision Stockton 2040 General Plan* (i.e., low density residential with less than 6.1 units per gross acre). The Project is also located within a half-mile of two transit stops on West Lane. Based on the screening criteria the Project is presumed to not require additional CEQA VMT impact analysis.

In addition, according to CEQA and City of Stockton policies, a transportation impact from a project is considered to be significant if the associated change to the transportation system with the project would:

A. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

B. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

C. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

D. Result in inadequate emergency access.

The Project's impact to the transit, bicycle, and pedestrian facilities are less-than-significant. The Project is also expected to have a less-than-significant impact related to geometric design features and emergency access. The Project will have several significant impacts related to the roadway system primarily dealing 95$^{th}$ percentile queues that exceed available storage. Potential mitigation for the significant impacts is provided in the analysis.

The Local Transportation Study is prepared to provide information to decision-makers and the public in understanding what types of improvements should be considered as Conditions of Approval for the ultimate development of a project, and to evaluate the project's consistency with the City's General Plan LOS policy. The City's policy is to maintain LOS D or better operations except along corridors with physical constraints that limit the improvements that can be constructed. The LOS standard for the intersections along these corridors (Hammer Lane) is LOS E or better. An intersection (roadway) impact and LOS deficiency summary is provided in **Table E-2**.

**Table E-2. Intersection Impact and LOS Deficiency Summary**

| Intersection | | Existing Plus Project | | | | | Background Plus Project | | | | | Cumulative Plus Project | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic |
| 1 | West Lane / Eight Mile Road | Queue | TR-1 Construct 2nd NB left-turn lane; Modify signal timing | LOS | EX-1 Implement TR-1 | 10% | Queue | TR-5 Implement TR-1 | - | - | 8% | Queue | TR-9 Contribute towards local and regional impact fees | - | - | 6% |
| 2 | West Lane / Project Roadway Access #1 | - | - | - | - | 22% | - | - | - | - | 17% | - | - | - | - | 13% |
| 3 | West Lane / Project Roadway Access #2 | - | - | - | - | 13% | - | - | - | - | 9% | - | - | - | - | 7% |
| 4 | West Lane / Morada Lane | - | - | - | - | 15% | - | - | - | - | 15% | - | - | - | - | 9% |
| 5 | West Lane / West Lane Frontage | - | - | LOS | EX-2 Construct a third NB and SB through lane; Modify signal timing | 15% | - | - | LOS | BG-1 Implement EX-2 | 13% | - | - | - | - | 10% |
| 6 | West Lane / Knickerbocker Drive | Queue | TR-2 Modify signal timing | - | - | 14% | Queue | TR-6 Implement TR-2 | - | - | 12% | - | - | - | - | 10% |
| 7 | West Lane / Hammer Lane | Queue | TR-3 Modify signal timing | - | - | 6% | Queue | TR-7 Implement TR-3 | - | - | 6% | Queue | TR-10 Implement TR-9 | - | - | 5% |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | - | - | - | - | 26% | - | - | - | - | 24% | - | - | - | - | 18% |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | - | - | - | - | 33% | - | - | - | - | 31% | - | - | - | - | 24% |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | - | - | - | - | 33% | - | - | - | - | 32% | - | - | - | - | 25% |
| 11 | Glacier Point Drive / Morada Lane | - | - | - | - | 26% | - | - | - | - | 24% | - | - | - | - | 20% |

| Intersection | | Existing Plus Project | | | | | Background Plus Project | | | | | Cumulative Plus Project | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic | CEQA Impact | CEQA Mitigation | Non-CEQA Deficiency | Non-CEQA Conditions of Approval | Percent Project Traffic |
| 12 | Holman Road / Morada Lane | Queue | TR-4 Restripe one EB through lane to EB left-turn lane; Restripe one NB through lane to NB left-turn lane; Modify signal timing | - | - | 22% | Queue | TR-8 Implement TR-4 | - | - | 19% | Queue | TR-11 Implement TR-9 | LOS | CU-1 Implement TR-9 | 16% |
| 13 | Maranatha Drive / Morada Lane | - | - | - | - | 25% | - | - | - | - | 23% | - | - | - | - | 18% |
| 14 | Diamond Bar Place / Morada Lane | - | - | - | - | 24% | - | - | - | - | 22% | - | - | - | - | 18% |
| 15 | West Lane / Marlette Road | n/a | n/a | n/a | n/a | n/a | - | - | - | - | 11% | - | - | - | - | 8% |

Source: BTC, 2024.

# 1. INTRODUCTION

This report presents the analysis and findings of the Transportation Impact Analysis (TIA) prepared for the proposed Bear Creek South Residential Project (Project) in the City of Stockton, California (City). The Project proposes to develop approximately 2,241 single-family dwelling units and is bounded by Bear Creek to the north, Morada Lane to the south, West Lane to the west, and United Pacific Railroad (UPRR) tracks to the east. Project access would be provided by new roadway connections to West Lane and Morada Lane. A conceptual Project site plan is shown on **Figure 1-1**.

This TIA satisfies the requirements documented in the *City of Stockton Transportation Impact Analysis Guidelines* (TIA Guidelines) dated May 2023. Based on the expected project daily trip generation (17,633 trips), the TIA Guidelines require the preparation of a Local Transportation Study and California Environmental Quality Act (CEQA) Transportation Study. Both studies are included in this report.

## 1.1 CEQA TRANSPORTATION STUDY

Under the California Environmental Quality Act (CEQA), level of service ("LOS"), a qualitative description of traffic on a roadway facility or intersection, can no longer be used to determine a project's environmental impact. Instead, Section 15064.3 of the *2023 CEQA Statue and Guidelines* includes guidance related to assessing the Vehicle Miles of Travel (VMT) generated by various types of land use, and thresholds for the identification of significant impacts. The City of Stockton VMT impact analysis process is documented in the City's TIA Guidelines. According to the City's TIA Guidelines, a project is relieved from VMT impact analysis if it meets one of seven screening criteria. If the Project does not meet one of the seven screening criteria then the City has adopted the following VMT impact criteria for residential land use projects:

- *Significance Criteria:* A project exceeds existing citywide home-based VMT per resident minus 15%.
- *Baseline Level:* 17.46 home-based VMT per resident (citywide average)
- *Impact Threshold:* 15% below baseline (14.84 home-based VMT per resident)

In addition, according to CEQA and City of Stockton policies, a transportation impact from a project is considered to be significant if the associated change to the transportation system with the project would:

A. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit roadway, bicycle, and pedestrian facilities.

B. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

C. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

D. Result in inadequate emergency access.

*Site Plan Source: Carlson, Barbee & Gibson, Inc., February 20, 2024.*

Figure 1-1

Conceptual Project Site Plan

## 1.2 LOCAL TRANSPORTATION STUDY

The Local Transportation Study is typically prepared to provide information to decision-makers and the public in understanding what types of improvements should be considered as Conditions of Approval for the ultimate development of a project, and to evaluate the project's consistency with the City's General Plan level of service (LOS) policy.

### 1.2.1 INTERSECTION LEVEL OF SERVICE

LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (free-flow conditions) to LOS F (over capacity conditions). The City generally strives to maintain LOS D or better for intersection operations, with the exception of select corridors with physical constraints that limit the traffic improvements that can be constructed, as outlined in the *Envision Stockton 2040 General Plan* (General Plan) approved in 2018.

Operations of intersections were evaluated in Synchro 11 using the method from the Transportation Research Board's *Highway Capacity Manual*, 6th Edition (HCM), which uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. **Table 1-1** summarizes the relationship between average delay per vehicle and LOS for signalized and unsignalized intersections.

**Table 1-1. Intersection Impact and LOS Deficiency Summary**

| Level of Service | Description | Signalized | Unsignalized/ Roundabout |
|---|---|---|---|
| | | Delay (seconds/vehicle) | |
| A | Operations with very low delay occurring with favorable progression and/or short cycle length. | ≤ 10.0 | ≤ 10.0 |
| B | Operations with low delay occurring with good progression and/or short cycle lengths. | > 10.0 to 20.0 | > 10.0 to 15.0 |
| C | Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear. | > 20.0 to 35.0 | > 15.0 to 25.0 |
| D | Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable. | > 35.0 to 55.0 | > 25.0 to 35.0 |
| E | Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. | > 55.0 to 80.0 | > 35.0 to 50.0 |
| F | Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths. | > 80.0 | > 50.0 |

Source: *Highway Capacity Manual*, 6th Edition. (Transportation Research Board, 2016).

### 1.2.2 TRAFFIC SIGNAL WARRANTS

The *California Manual of Uniform Traffic Control Devices* (MUTCD) 2014 Edition provides nine warrants to determine if a traffic signal is justified. For this study, the unsignalized intersections were evaluated using Figure 4C-4 (Warrant 3, Peak Hour) in the MUTCD to reflect posted speed limits above 40 mph on Morada Lane and West Lane. Note that the peak hour signal warrant analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured traffic data and a thorough study of traffic and safety conditions. A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

## 1.3 STUDY AREA

The study area for the TIA assessment includes the area immediately adjacent to the Project site. The following 15 intersections were selected for evaluation in consultation with City of Stockton. The study area is shown on **Figure 1-2**.

1. West Lane / Eight Mile Road
2. West Lane / Project Roadway Access #1 (evaluated under Project conditions)
3. West Lane / Project Roadway Access #2 (evaluated under Project conditions)
4. West Lane / Morada Lane
5. West Lane / West Lane Frontage
6. West Lane / Knickerbocker Drive
7. West Lane / Hammer Lane
8. Caywood Drive / Morada Lane / Project Roadway Access #3
9. Cherbourg Way / Morada Lane / Project Roadway Access #4
10. Fox Creek Drive / Morada Lane / Project Roadway Access #5
11. Glacier Point Drive / Morada Lane
12. Holman Road / Morada Lane
13. Maranatha Drive / Morada Lane
14. Diamond Bar Place / Morada Lane
15. West Lane/Marlette Road (future intersection built by other development project)

All study intersections fall under City of Stockon jurisdiction except the West Lane/Eight Mile Road intersection which is within San Joaquin County jurisdiction. The Stockton General Plan notes that the West Lane/Hammer Lane intersection is located along a corridor with physical constraints that limit the improvements that can be constructed. The LOS standard for the West Lane/Hammer Lane intersection is

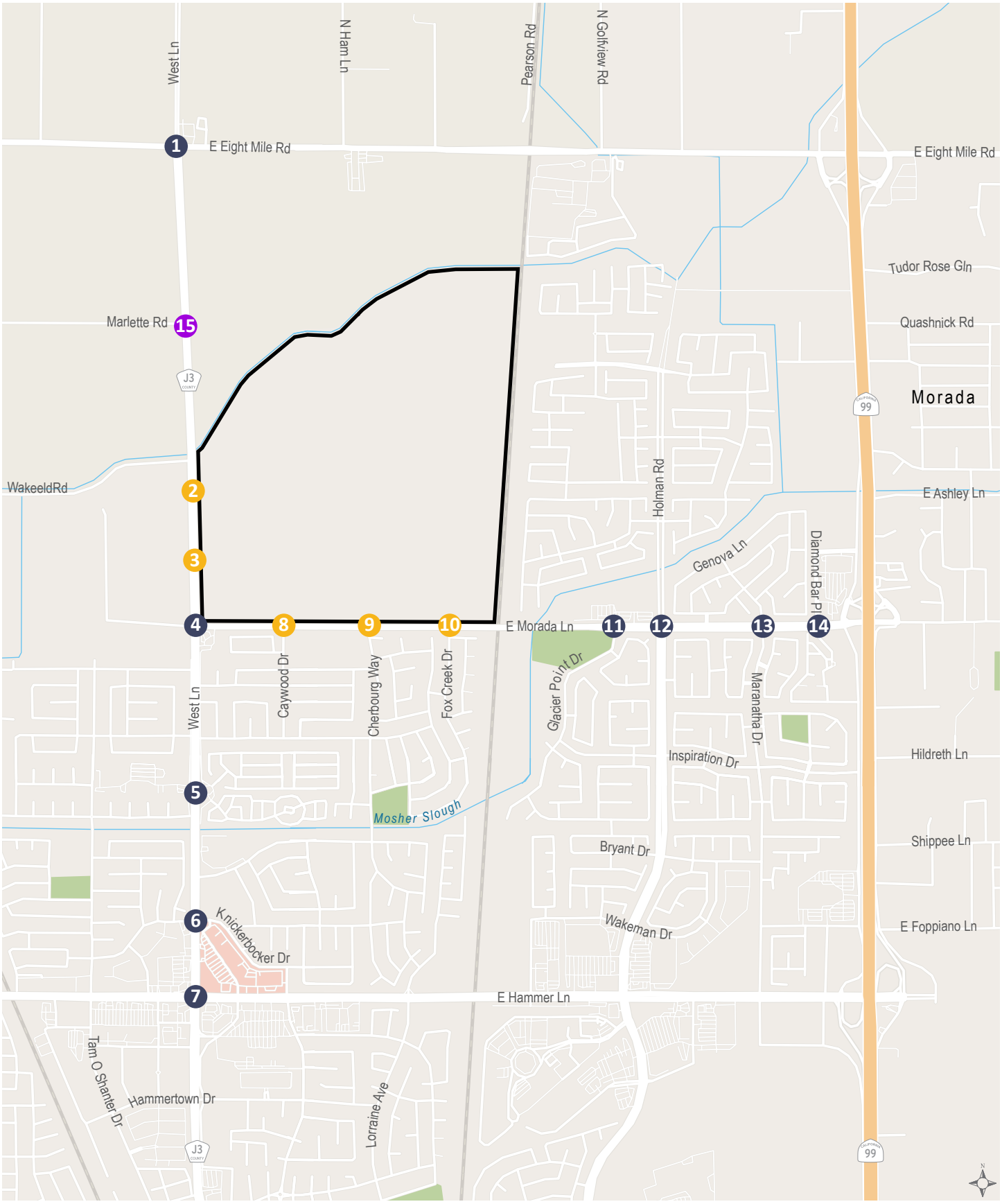
LOS E or better. At all other study intersections, the City of Stockton strives to maintain LOS D or better conditions.

## 1.4 ANALYSIS SCENARIOS

Operations of the study intersections above were evaluated for the following scenarios in consultation with the City of Stockton:

- **Existing Conditions** – Existing conditions as they were in the fall of 2023 based on traffic volumes collected in September 2023.
- **Existing Plus Project Conditions** – Existing traffic volumes plus traffic generated by the proposed Project.
- **Background No Project Conditions (Existing Plus Approved Development Projects)** – Existing traffic volumes plus traffic generated by approved development projects near the Project site.
- **Background Plus Project Conditions (Existing Plus Approved Development Projects Plus Project)** – Existing traffic volumes plus traffic generated by approved development projects plus traffic generated by the proposed Project.
- **Cumulative Year (2040) No Project Conditions** – Year 2040 traffic volumes and future roadway improvements based on the City's Travel Demand Model under General Plan Buildout Conditions, without development of the Project.
- **Cumulative Year (2040) Plus Project Conditions** – Year 2040 traffic volumes and future roadway improvements based on the City's Travel Demand Model under General Plan Buildout Conditions, plus traffic generated by the proposed Project.

ATTACHMENT E




Project Location | # Study Intersection | # Project Site Access Study Intersection | 15 Future Study Intersection

BTC

Figure 1-2

Project Site Vicinity and Study Intersections

# 2. EXISTING TRANSPORTATION SYSTEM

This chapter describes the existing transportation conditions in the Project study area, including the roadway network and the transit, pedestrian, and bicycle facilities in the vicinity of the Project site.

## 2.1 ROADWAY SYSTEM

The following is a description of major roadways that provide access to the proposed Project site.

**Morada Lane** is a discontinuous east-west roadway. In the Project vicinity, Morada Lane extends from West Lane to the east of SR 99 into San Joaquin County. Morada Lane is a two-lane roadway between West Lane and Cherbourg Way. Between Cherbourg Way and North 99 Frontage Road West, Morada Lane has been widened to provide between three and six lanes depending on location. East of North 99 Frontage Road West, Morada Lane provides two lanes. Adjacent to the Project site the roadway has a posted speed limit of 45 mph.

**West Lane** is a north-south arterial roadway with a northern terminus in the City of Lodi and a southern terminus in downtown Stockton. The City of Stockon/San Joaquin County jurisdictional boundary crosses West Lane near Bear Creek. West Lane provides four lanes between Knickerbocker Drive and its northern terminus in the City of Lodi. South of Knickerbocker Drive, West Lane provides eight lanes up to its intersection with Swain Road. South of Swain Road, West Lanes provided between four and six lanes depending on location. Adjacent to the Project site the roadway has a posted speed limit of 50 mph.

**Eight Mile Road** is an east-west roadway north of the Project site. In the Project vicinity the majority of Eight Mile Road is two lanes wide. However, some portions of Eight Mile Road are four lanes wide. In the Project vicinity the posted speed limit along Eight Mile Road is 45 mph.

**Hammer Lane** is a major east-west arterial in the vicinity of the proposed Project site. It has a western terminus west of I-5, and an eastern terminus east of SR 99. In the Project vicinity Hammer Lane provides eight lanes and has a posted speed limit of 40 mph.

## 2.2 TRANSIT SYSTEM

In the project vicinity, within one half-mile walking distance, transit service (Route 93) is provided along West Lane by the San Joaquin Regional Transit District (SJRTD). SJRTD is the regional transit provider for

San Joaquin County, serving the Stockton Metropolitan Area and the County with intercity, interregional, and rural transit services. Route 93 travels between Lodi (Lodi Transit Station) and Downtown Stockton (Downtown Transit Center). A bus stop for northbound travel is provided on the east side of West Lane at the southeast corner of the West Lane/Morada Lane intersection. A bus stop for southbound travel is provided on the west side of West Lane about 600 feet north of Morada Lane. Neither bus stop provides transit stop amenities (e.g., benches, shelters, etc.).

As of July 30, 2023 northbound bus service begins at the Downtown Transit Center (DTC) at 6:10 AM and ends at the Lodi Transit Station (LTS) at 7:39 PM. The frequency of service ranges from 1 to 3 hours. Southbound bus service begins at the LTS at 6:03 AM and ends at the DTC at 8:52 AM. The frequency of service ranges from 1 to 2.5 hours.

## 2.3 EXISTING PEDESTRIAN FACILITIES

Pedestrian facilities include sidewalks, crosswalks, pedestrian signals, and multi-use trails. In the Project vicinity, sidewalk is currently not provided on West Lane or Morada Lane along the Project's frontage. Existing sidewalk (within one half-mile walking distance from the Project site) is provided on the following roadways:

- West side of West Lane north of Morada Lane (8-foot sidewalk)
- East side of West Lane south of Morada Lane (4-foot sidewalk)
- South side of Morada Lane (4-foot sidewalk)
- North side of Morada Lane east of the eastern edge of the Project site boundary (4-foot sidewalk)
- Both sides of the Caywood Drive, Cherbourg Way, and Fox Creek Drive (4-foot sidewalk)

Near the Project vicinity, the intersection of West Lane/Morada Lane provides crosswalks on the west and south legs of the intersection. The West Lane/Morada Lane intersection provides access to the Ronald E. McNair High School and as a result there is high pedestrian demand at the intersection.

## 2.4 EXISTING BICYCLE FACILITIES

Bicycle facilities include the following:

- **Bike paths (Class I)** – Bike paths are paved trails that are separated from roadways. These trails are sometimes shared with pedestrians.
- **Bike lanes (Class II)** – Bike lanes are lanes on roadways designated for use by bicycles through striping, pavement legends, and signs.

- **Bike routes (Class III)** – Bike routes provide a right-of-way designated by signs and/or pavement markings (also known as "sharrows") to alert motorists to expect to share this roadway with bicyclists. A Bicycle Boulevard is a special type of shared route that optimizes bicycle travel. Bike Boulevards can have a variety of traffic calming elements to improve safety and comfort for bicycles.
- **Separated bikeways (Class IV)** – Separated bikeways, also referred to as cycle tracks or protected bikeways, are bikeways for the exclusive use of bicycles which are physically separated from vehicle traffic. Types of separation may include, but are not limited to, grade separation, flexible posts, physical barriers, or on-street parking.

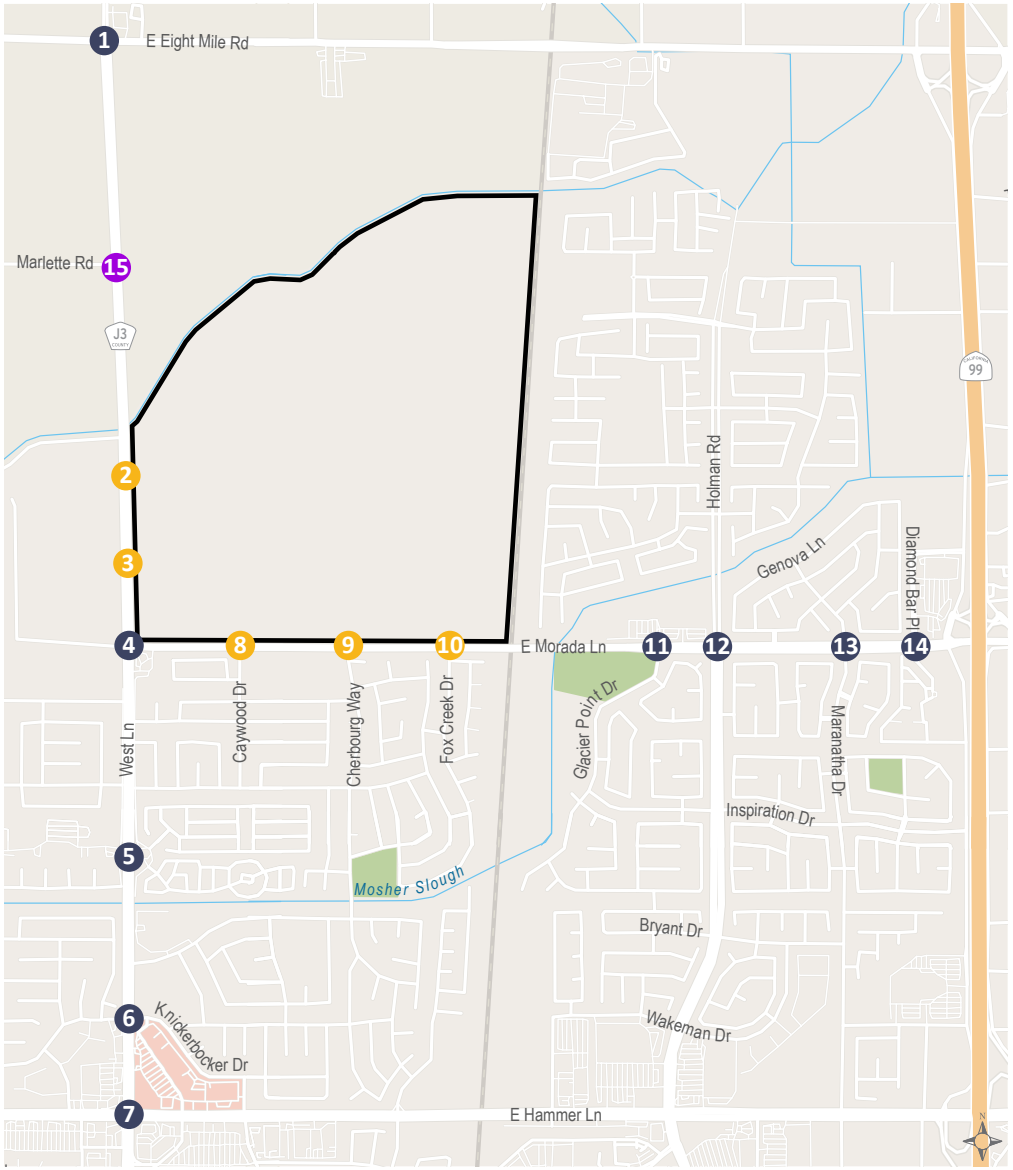
In the Project vicinity, within a two-mile bicycling distance, there are Class III bicycle facilities on West Lane between Morada Lane and Bear Creek. Although there are paved shoulders on West Lane north of Bear Creek (within San Joaquin County) there are no signs or pavement markings indicating Class III bicycle facilities.

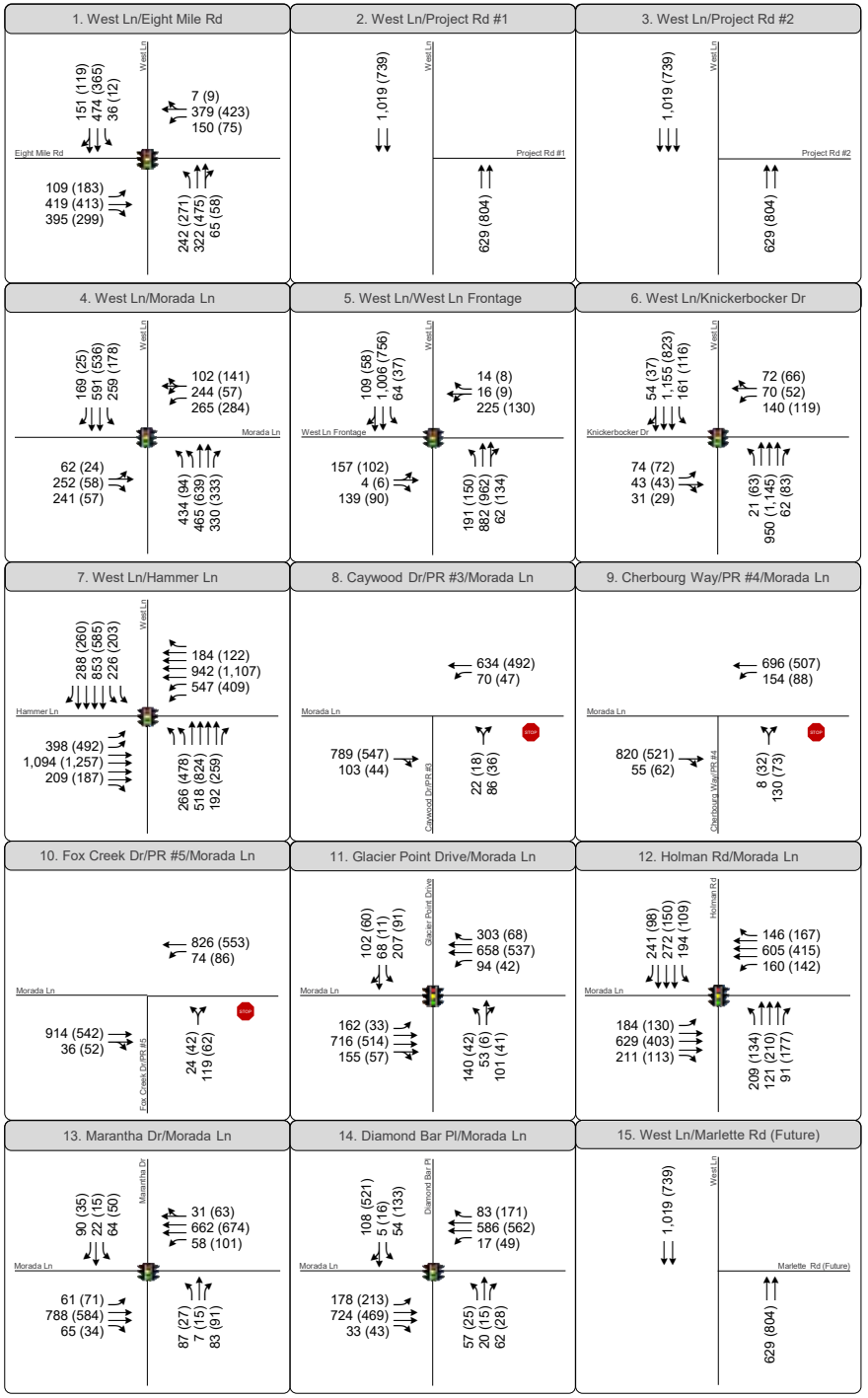
Class II bicycle facilities are provided on Morada Lane on both the north and south sides but the start and end points are different. On the south side, the bicycle lane starts about 250 feet west of Fox Creek Drive and ends at the Maranatha Drive intersection.

On the north side, the bicycle lane starts at the Diamond Bar Place intersection and ends at the Holman Road intersection. Between the Holman Road and the UPRR tracks there are sections of paved shoulder but there are no bicycle pavement markings or signs. Just west of the UPRR tracks there is about 200 feet of striped Class II bicycle facility that is unusable because the start of the bike lane is blocked by K-rail (temporary concrete traffic barrier).

## 2.5 EXISTING INTERSECTION LEVELS OF SERVICE

Weekday morning (AM) and evening (PM) peak period intersection turning movement counts were conducted at the study intersections in the fall of 2023 between 7:00 to 9:00 AM and 4:00 to 6:00 PM, including separate counts of trucks, pedestrians, and bicyclists. The counts were collected for three weekdays (Tuesday through Thursday) from September 12, 2023 through September 14, 2023. For the study intersections, the single hour with the highest traffic volumes during each count period was identified. The final AM and PM peak hour volumes were the average of the three days of count data. The AM peak hour in the Project study area is generally 7:30 to 8:30 AM and the PM peak hour is generally 4:45 to 5:45 PM. The peak hour volumes are presented on **Figure 2-1** along with the existing lane configuration and traffic control. Existing peak hour bicycle and pedestrian activity is shown on **Figure 2-2**. Traffic count worksheets are provided in **Appendix A**.




XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

Study Intersection

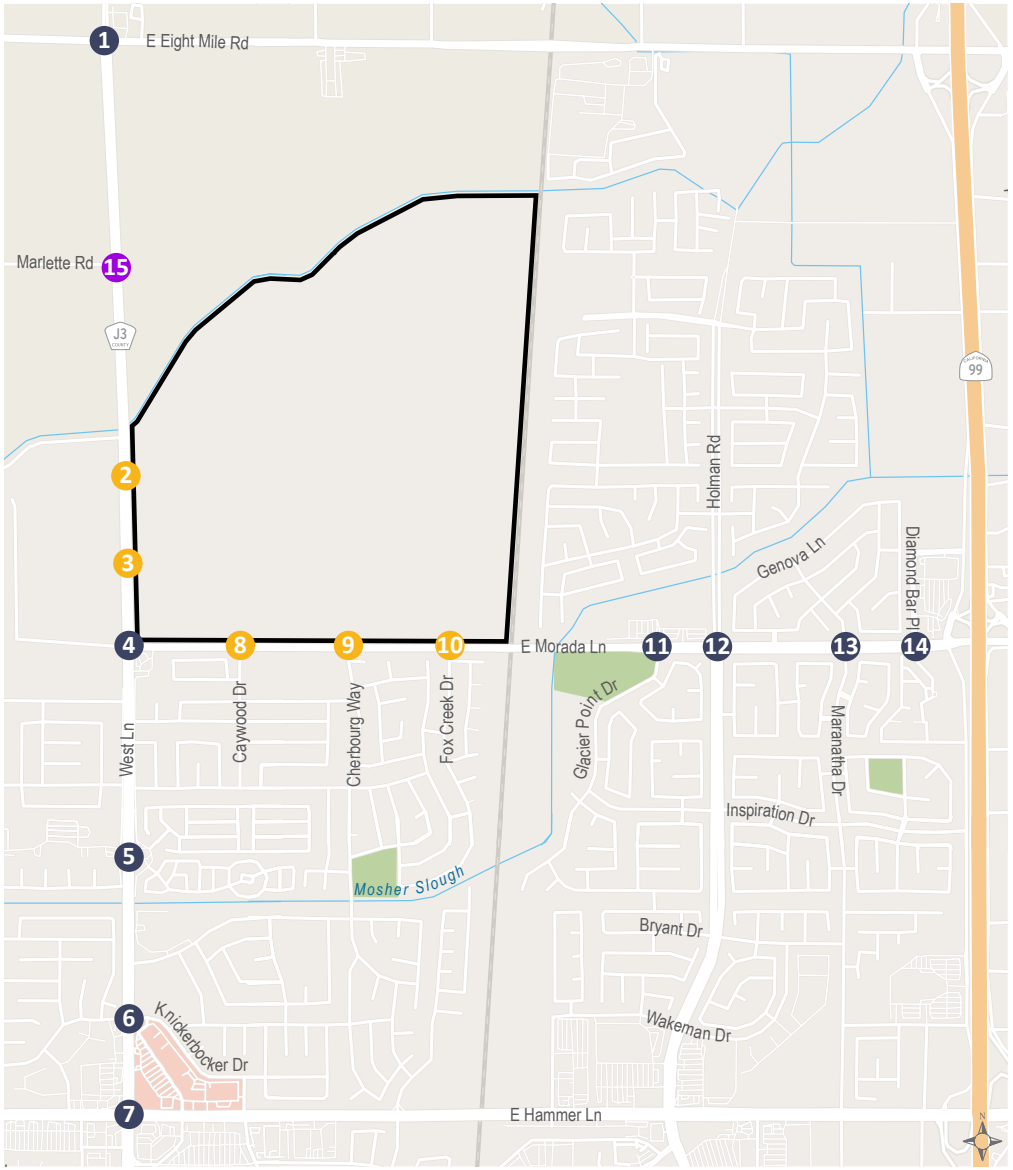
Project Site Access Study Intersection

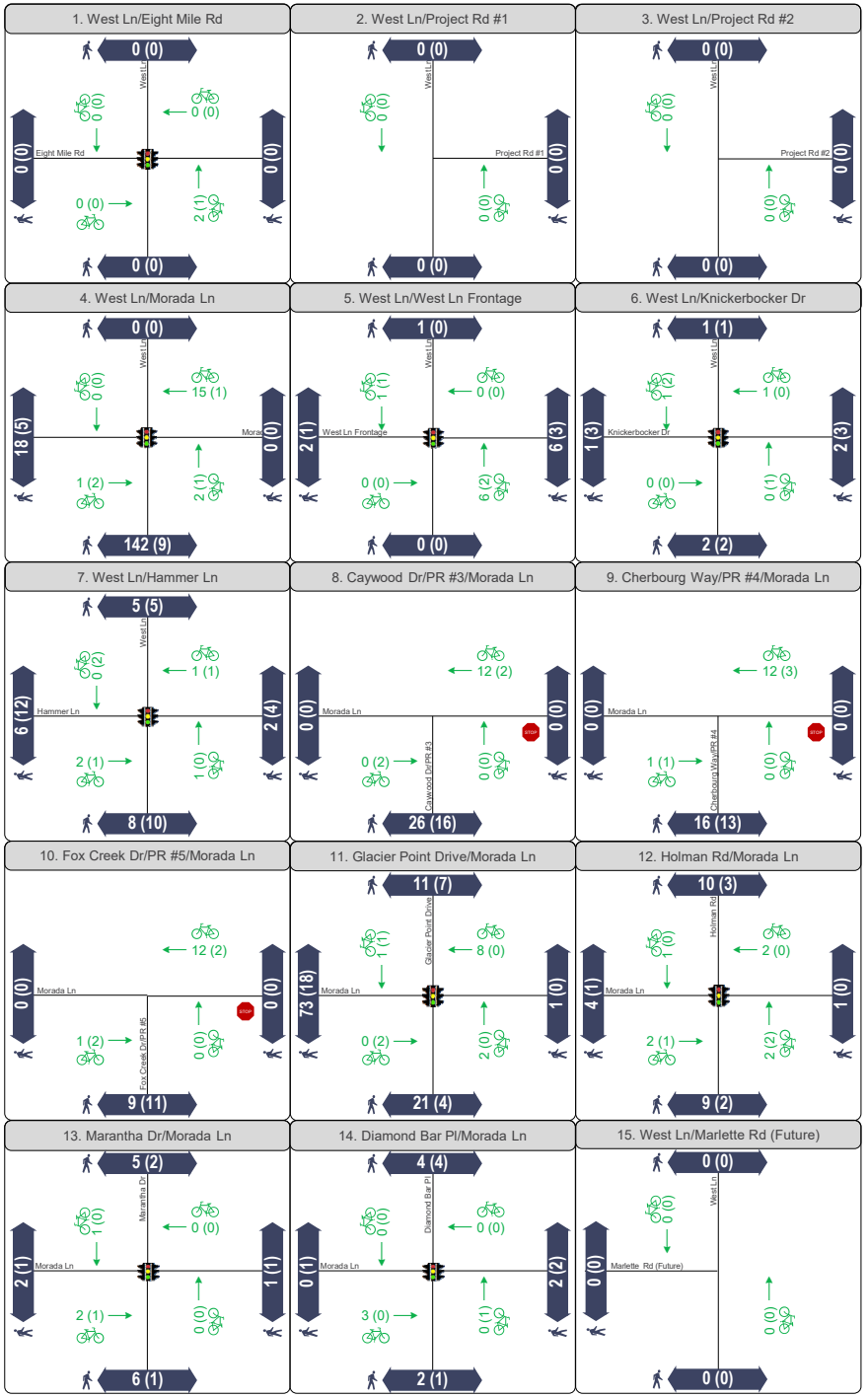
Future Study Intersection

Figure 2-1

BTC

Existing Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control




0 (0) AM (PM) Peak Hour Pedestrian Volumes

0 (0) AM (PM) Peak Hour Bicycle Volumes

Signalized Intersection

Stop Sign

Project Location

# Study Intersection

# Project Site Access Study Intersection

15 Future Study Intersection

Figure 2-2

BTC

Existing Conditions Peak Hour Pedestrian And Bicycle Volumes

Existing intersection lane configurations, signal timings, and peak hour turning movement volumes were used to calculate the levels of service for the study intersections during each peak hour using the Synchro 11.0 software program, as presented in **Table 2-1**. Observed peak hour factors[1] were used at all intersections for the existing analysis. Trucks and pedestrian/bicycle activity were also factored into the analysis.

The following intersections have deficient operations during at least one peak hour:

- West Lane/Morada Lane (Intersection 4) – AM peak hour
- Diamond Bar Place/Morada Lane (Intersection 14) – PM peak hour

All other study intersections operate at acceptable service levels in accordance with benchmarks set by the City during both the weekday morning and evening peak hours. Detailed intersection LOS calculation worksheets are presented in **Appendix B**.

The intersections of Morada Lane with Caywood Drive, Cherbourg Way, and Fox Creek Drive are not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F for at least one peak hour. A side-street stop controlled intersection is considered deficient if the intersection meets the CA MUTCD signal warrant criteria ***and*** there are no acceptable alternative routes that can be used. None of the existing unsignalized study intersections meet the peak hour traffic signal warrant (signal warrant worksheets are provided in **Appendix B**). The critical movement that operates at LOS F at these intersections is the northbound left-turn movement. There are two acceptable alternative routes for the northbound left-turn movement that would provide access to all likely destinations: the first is to use to use local streets in the residential neighborhood to access northbound West Lane via a right-turn movement at Westmora Avenue (a parallel road to Morada Lane); and the second is to access southbound West Lane via the signalized intersection of West Lane/West Lane Frontage.

[1] The peak hour factor is the relationship between the peak 15-minute flow rate and the full hourly volume: PHF = Hourly volume / (4 x (volume during the peak 15 minutes of flow)). The analysis is based on peak rates of flow occurring within the peak hour because substantial short-term fluctuations may occur during a peak hour.

**Table 2-1. Existing Intersection Levels of Service**

| Intersection | | Control[1] | Peak Hour | LOS | Delay |
|---|---|---|---|---|---|
| 1 | West Lane / Eight Mile Road[3] | Signal | AM | D | 44 |
| | | | PM | D | 35 |
| 2 | West Lane / Project Roadway Access #1 | n/a | AM | n/a | n/a |
| | | | PM | n/a | n/a |
| 3 | West Lane / Project Roadway Access #2 | n/a | AM | n/a | n/a |
| | | | PM | n/a | n/a |
| 4 | West Lane / Morada Lane | Signal | AM | **E** | **76** |
| | | | PM | D | 36 |
| 5 | West Lane / West Lane Frontage | Signal | AM | D | 44 |
| | | | PM | B | 18 |
| 6 | West Lane / Knickerbocker Drive | Signal | AM | B | 19 |
| | | | PM | B | 18 |
| 7 | West Lane / Hammer Lane[3] | Signal | AM | D | 44 |
| | | | PM | D | 49 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | SSSC | AM | A (F) | 4 (51) |
| | | | PM | A (C) | 1 (19) |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | SSSC | AM | A (F) | 5 (51) |
| | | | PM | A (D) | 3 (25) |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | SSSC | AM | B (F) | 11 (>100) |
| | | | PM | A (D) | 3 (32) |
| 11 | Glacier Point Drive / Morada Lane | Signal | AM | D | 37 |
| | | | PM | B | 18 |
| 12 | Holman Road / Morada Lane | Signal | AM | C | 32 |
| | | | PM | C | 21 |
| 13 | Maranatha Drive / Morada Lane | Signal | AM | B | 11 |
| | | | PM | B | 11 |
| 14 | Diamond Bar Place / Morada Lane | Signal | AM | C | 33 |
| | | | PM | **E** | **61** |
| 15 | West Lane / Marlette Road | n/a | AM | n/a | n/a |
| | | | PM | n/a | n/a |

Notes:
1. SSSC = side-street stop-controlled intersection. For SSSC intersections, LOS/delay is presented as: Intersection Average (Worst Movement).

n/a =not applicable
Deficient intersection operations based on City of Stockton General Plan are noted in **bold text**.
Source: BTC, 2024.

## 2.6 EXISTING VEHICLE QUEUES

Existing 95th percentile vehicle queues are presented for turn pockets at signalized study intersections in **Table 2-2**. All the study intersections have vehicle queues that periodically exceed the available storage except the Maranatha Drive/Morada Lane intersection. Queuing worksheets provided in **Appendix C** show the 95th percentile queue for all movements at signalized intersections.

**Table 2-2. Existing 95th Percentile Queue Lengths**

| Intersection | | Movement[1] | Storage Length (feet) | AM Peak Hour[2] | PM Peak Hour[2] |
|---|---|---|---|---|---|
| 1 | West Lane / Eight Mile Road | EBL | 240 | 196 | 273 |
| | | EBR | 240 | 311 | 174 |
| | | WBL | 165 | 254 | 136 |
| | | NBL | 375 | 432 | 441 |
| | | SBL | 410 | 85 | 36 |
| 4 | West Lane / Morada Lane | EBR | 1,270 | 393 | 39 |
| | | WBL | 250 | **405** | **383** |
| | | NBL | 300 | **378** | 86 |
| | | NBR | 300 | **342** | **331** |
| | | SBL | 320 | **552** | 276 |
| | | SBR | 2,000 | 230 | 7 |
| 5 | West Lane / West Lane Frontage | EBR | 50 | **97** | 38 |
| | | WBR | 50 | 0 | 0 |
| | | NBL | 415 | 252 | 147 |
| | | SBL | 400 | 105 | 55 |
| 6 | West Lane / Knickerbocker Drive | EBL | 140 | **196** | **168** |
| | | WBL | 70 | **227** | **182** |
| | | NBL | 275 | 56 | 113 |
| | | NBR | 130 | 0 | 3 |
| | | SBL | 260 | 259 | 179 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **289** | **439** |
| | | EBR | 265 | 92 | 103 |
| | | WBL | 340 | **480** | 328 |
| | | WBR | 190 | 108 | 91 |
| | | NBL | 390 | 197 | **420** |
| | | NBR | 390 | 62 | 96 |
| | | SBL | 390 | 173 | 164 |

| Intersection | | Movement[1] | Storage Length (feet) | AM Peak Hour[2] | PM Peak Hour[2] |
|---|---|---|---|---|---|
| | | SBR | 330 | 129 | 109 |
| 11 | Glacier Point Drive / Morada Lane | EBL | 310 | 234 | 56 |
| | | WBL | 215 | 153 | 66 |
| | | WBR | 590 | 157 | 16 |
| | | NBL | 100 | **208** | 66 |
| | | SBL | 230 | **316** | 116 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **277** | 193 |
| | | EBR | 225 | 67 | 51 |
| | | WBL | 300 | 252 | 208 |
| | | WBR | 215 | 60 | 59 |
| | | NBL | 315 | **357** | 199 |
| | | NBR | 215 | 47 | 58 |
| | | SBL | 300 | **319** | 170 |
| | | SBR | 225 | 72 | 47 |
| 13 | Maranatha Drive / Morada Lane | EBL | 300 | 77 | 81 |
| | | EBR | 1,470 | 27 | 9 |
| | | WBL | 310 | 74 | 106 |
| | | NBL | 100 | 79 | 29 |
| | | NBR | 100 | 32 | 31 |
| | | SBL | 90 | 61 | 46 |
| | | SBR | 90 | 33 | 9 |
| 14 | Diamond Bar Place / Morada Lane | EBL | 180 | **323** | **436** |
| | | EBR | 180 | 0 | 0 |
| | | WBL | 100 | 39 | 88 |
| | | WBR | 110 | 30 | 79 |
| | | NBL | 65 | **93** | 55 |
| | | NBR | 65 | 9 | 0 |
| | | SBL | 150 | 89 | **254** |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

# 3. PROJECT CHARATERISTICS

This chapter provides an overview of the proposed Project components and project trip generation, trip distribution, and trip assignment. These items allow for an evaluation of Project impacts on the surrounding roadway network. The amount of Project-related traffic volume estimated to be added to the transportation system after completion of the Project was assessed using a three-step process:

1. **Trip Generation** – The *amount* of vehicle traffic entering/exiting the site was estimated.
2. **Trip Distribution** – The *direction* trips will use to approach and depart the site was projected.
3. **Trip Assignment** – Trips were then *assigned* to specific roadway segments and intersection turning movements based on likely travel paths.

## 3.1 PROJECT DESCRIPTION

The Project, located in northern Stockton, proposes to develop approximately 2,241 single-family dwelling units (d.u.) and is bounded by Bear Creek to the north, Morada Lane to the south, West Lane to the west, and United Pacific Railroad (UPRR) tracks to the east. Project access would be provided by new roadway connections to West Lane and Morada Lane.

### 3.1.1 WEST LANE PROJECT IMPROVEMENTS

#### *3.1.1.1 ROADWAY IMPROVEMENTS*

West Lane is currently a four-lane arterial (two lanes in each direction) that is planned as a future six-lane arterial in the City of Stockton General Plan. The Project proposes to widen West Lane along the Project frontage to provide a third northbound travel lane per the Stockton General Plan. The Project does not propose widening the existing Bear Creek Bridge.

#### *3.1.1.2 PEDESTRIAN FACILITY IMPROVEMENTS*

Sidewalks are not currently provided on West Lane along the Project frontage. The Project would provide an 8-foot sidewalk along the Project frontage which is consistent with the City of Stockton Standard Plans and Specifications.

#### *3.1.1.3 BICYCLE FACILITY IMPROVEMENTS*

Bicycle facilities are currently not provided on West Lane along the Project frontage. The Project proposes to provide a separated one-way bikeway (Class IV) per the *City of Stockton Bicycle Master Plan* (2017).

#### *3.1.1.4 TYPICAL CROSS SECTION*

The proposed typical cross section for West Lane after completion of the Project is presented in Exhibit 1 below.

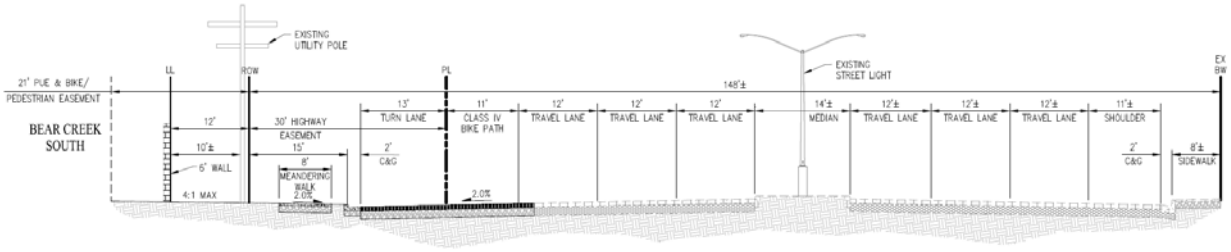



***Exhibit 1 – Typical West Lane Cross Section***

### 3.1.2 MORADA LANE PROJECT IMPROVEMENTS

#### *3.1.2.1 ROADWAY IMPROVEMENTS*

Morada Lane is primarily a two-lane arterial along the Project frontage that is planned as a future six-lane arterial in the City of Stockton General Plan. The Project proposes to widen Morada Lane along the Project frontage to provide sufficient right-of-way to accommodate a six-lane arterial.

#### *3.1.2.2 PEDESTRIAN FACILITY IMPROVEMENTS*

Sidewalks are currently not provided on Morada Lane along the Project frontage. The Project would provide an 8-foot sidewalk along the Project frontage which is consistent with the City of Stockton Standard Plans and Specifications.

#### *3.1.2.3 BICYCLE FACILITY IMPROVEMENTS*

Bicycle facilities are currently not provided on Morada Lane along the Project frontage. The Project proposes to provide a 5' Class II bike lane per the *City of Stockton Bicycle Master Plan* (2017).

#### *3.1.2.4 TYPICAL CROSS SECTION*

The proposed typical cross section for Morada Lane after completion of the Project is presented in Exhibit 2 below.

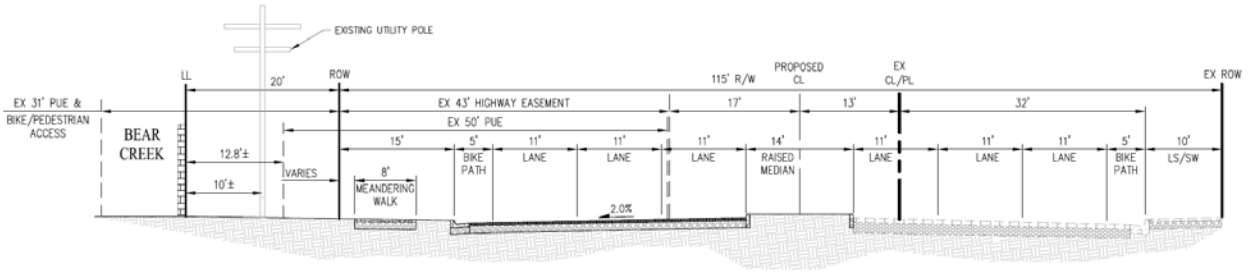



***Exhibit 2 – Typical Morada Lane Cross Section***

### 3.1.3 WEST LANE/MORADA LANE INTERSECTION IMPROVEMENTS

The Project proposes to make improvements at the intersection of West Lane/Morada Lane to be consistent with the proposed Project improvements on West Lane and Morada Lane and to accommodate new traffic from the Project. The proposed lane configuration is presented below:

- West Lane Northbound Approach: 2 left-turn lanes (300'), 3 through lanes, and 1 right-turn lane (300')
- West Lane Southbound Approach: 2 left-turn lanes (320'), 2 through lanes, and 1 right-turn lane
- Morada Lane Westbound Approach: 1 left-turn lane (450'), 1 "trap" left-turn lane,[2] 2 through lanes, and 1 right-turn lane (300')
- Morada Lane Eastbound Approach: 1 left-turn lane (200'), 1 through lane, and 1 right-turn lane

### 3.1.4 PROECT SITE ACCESS CONFIGURATION

Project access would be provided by new roadway connections to West Lane (two site access locations) and Morada Lane (three site access locations). The site access configurations used for the study are presented below.

#### *3.1.4.1 WEST LANE / PROJECT ROADWAY ACCESS #1*

This new intersection will provide full access (all movements allowed) to the Project site from West Lane. The Project proposes to signalize this intersection if it meets the peak hour signal warrant. The lane configuration is presented below:

- West Lane Northbound Approach: 3 through lanes and 1 right-turn lane (250')
- West Lane Southbound Approach: 1 left-turn lane (340') and 2 through lanes
- Project Roadway Access #1 Westbound Approach: 1 left-turn lane (200') and 1 right-turn lane

[2] One westbound through lane would become a left-turn lane at the intersection.

#### *3.1.4.2 WEST LANE / PROJECT ROADWAY ACCESS #2*

This new intersection will provide right turn in/right-turn out (RIRO) access to the Project site from West Lane (Project traffic stops and yields to traffic on West Lane). The lane configuration is presented below:

- West Lane Northbound Approach: 3 through lanes and 1 right-turn lane (200')
- West Lane Southbound Approach: 3 through lanes
- Project Roadway Access #2 Westbound Approach: 1 right-turn lane

#### *3.1.4.3 CAYWOOD DRIVE / MORADA LANE / PROJECT ROADWAY ACCESS #3*

The Project will provide a fourth (north) leg to an existing three-leg intersection. The Project proposes to signalize this intersection if it meets the peak hour signal warrant. A two-lane roundabout is also under consideration at this location. The lane configuration as a signalized intersection is presented below:

- Morada Lane Westbound Approach: 1 left-turn lane (300'), 3 through lanes, and 1 right-turn lane (250')
- Morada Lane Eastbound Approach: 1 left-turn lane (300'), 2 through lanes, and 1 shared through/right-turn lane
- Project Roadway Access #3 Southbound Approach: 1 left-turn lane (300') and 1 shared left/through/right-turn lane
- Caywood Drive Northbound Approach: 1 shared left/through/right-turn lane

#### *3.1.4.4 CHERBOURG WAY / MORADA LANE / PROJECT ROADWAY ACCESS #4*

The Project will provide a fourth (north) leg to an existing three-leg intersection. The Project proposes to signalize this intersection if it meets the peak hour signal warrant. A two-lane roundabout is also under consideration at this location. The lane configuration as a signalized intersection is presented below:

- Morada Lane Westbound Approach: 1 left-turn lane (350'), 3 through lanes, and 1 right-turn lane (250')
- Morada Lane Eastbound Approach: 1 left-turn lane (350'), 2 through lanes, and 1 shared through/right-turn lane
- Project Roadway Access #4 Southbound Approach: 1 left-turn lane (300') and 1 shared left/through/right-turn lane
- Cherbourg Way Northbound Approach: 1 shared left/through/right-turn lane

#### *3.1.4.5 FOX CREEK DRIVE / MORADA LANE / PROJECT ROADWAY ACCESS #5*

The Project will provide a fourth (north) leg to an existing three-leg intersection. The project *does not* propose to signalize this intersection to avoid the potential for westbound vehicle queues extending to the UPRR tracks. Southbound (exiting the Project site) left-turn and through movements will be prohibited via a raised channelization island that will permit only right-turning vehicles.

The lane configuration is presented below:

- Morada Lane Westbound Approach: 1 left-turn lane (250'), 3 through lanes, and 1 right-turn lane (250')
- Morada Lane Eastbound Approach: 1 left-turn lane (250'), 2 through lanes, and 1 shared through/right-turn lane
- Project Roadway Access #5 Southbound Approach: 1 right-turn lane only (through and left turns not allowed)
- Fox Creek Drive Northbound Approach: 1 shared left/through/right-turn lane

## 3.2 PROJECT TRIP GENERATION

Trip generation refers to the process of estimating the amount of vehicular traffic a project would add to the surrounding roadway system. Estimates are created for the daily condition and for the peak one-hour period during the morning and evening commute when traffic volumes on the adjacent streets are typically the highest. Project trip generation was estimated using rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (11th Edition), with the resulting estimates presented in **Table 3-1**. The project is expected to generate approximately 17,633 new daily vehicle trips, including approximately 1,262 morning peak hour and 1,848 evening peak hour trips.

**Table 3-1. Weekday Vehicle Trip Generation Estimates**

| Use | Size | Daily | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|---|
| | | | In | Out | Total | In | Out | Total |
| New Single Family | 2,241 d.u. | 17,633 | 316 | 946 | 1,262 | 1,164 | 684 | 1,848 |

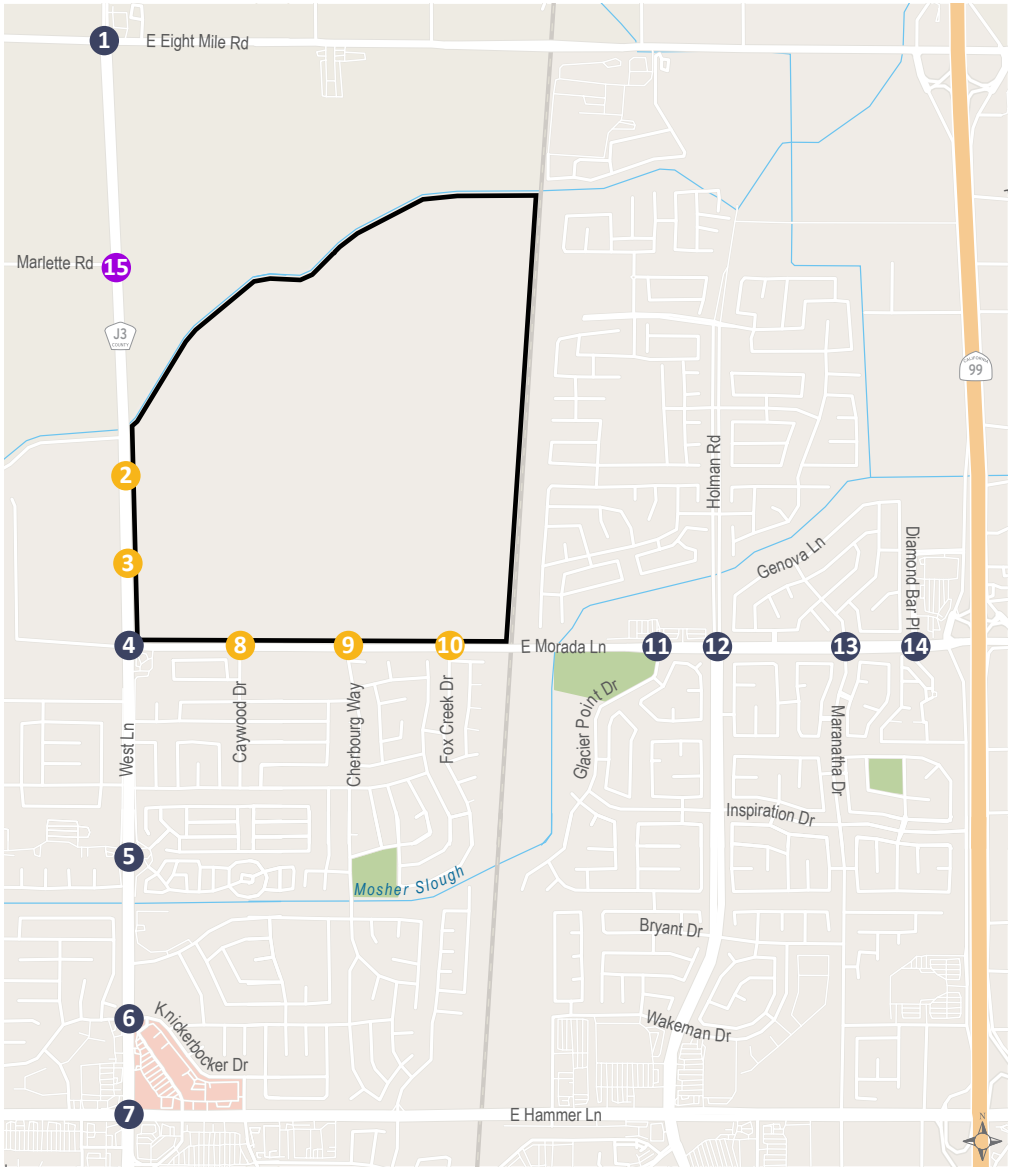
ITE land use category 210 – Single-Family Homes (Adj Streets, 7-9A, 4-6P):
Daily: Ln(T) = 0.92Ln(X) + 2.68
AM Peak Hour: Ln(T) = 0.91Ln(X)+0.12; Enter = 25%; Exit = 75%
PM Peak Hour: Ln(T) = 0.94Ln(X) + 0.27; Enter = 63%; Exit = 37%
Source: *Trip Generation Manual* (11th Edition); BTC, 2024.

## 3.3 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Project trip distribution refers to the directions of approach and departure that vehicles would take to access and leave the site. Estimates of project trip distribution were developed based on City of Stockton Travel Demand Model and engineering judgement using existing traffic count data and land use patterns. The trip distribution percentages are shown in **Table 3-2** and traffic assignment is shown on **Figure 3-1**.

**Table 3-2. Project Trip Distribution**

| Direction of Travel | % of Travel |
|---|---|
| Eight Mile Road: West of West Lane | 6% |
| West Lane: North of Eight Mile Road | 11% |
| Eight Mile Road: East of West Lane | 2% |
| Morada Lane: East of Diamond Bar Place | 40% |
| Holman Road: North of Morada Lane | 3% |
| Holman Road: South of Morada Lane | 4% |
| Hammer Lane: West of West Lane | 7% |
| Hammer Lane: East of West Lane | 4% |
| West Lane: South of Hammer Lane | 14% |
| South of Morada Lane: West of West Lane | 3% |
| South of Morada Lane: East of West Lane | 2% |
| Morada Lane: West of West Lane | 4% |




XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

# Study Intersection

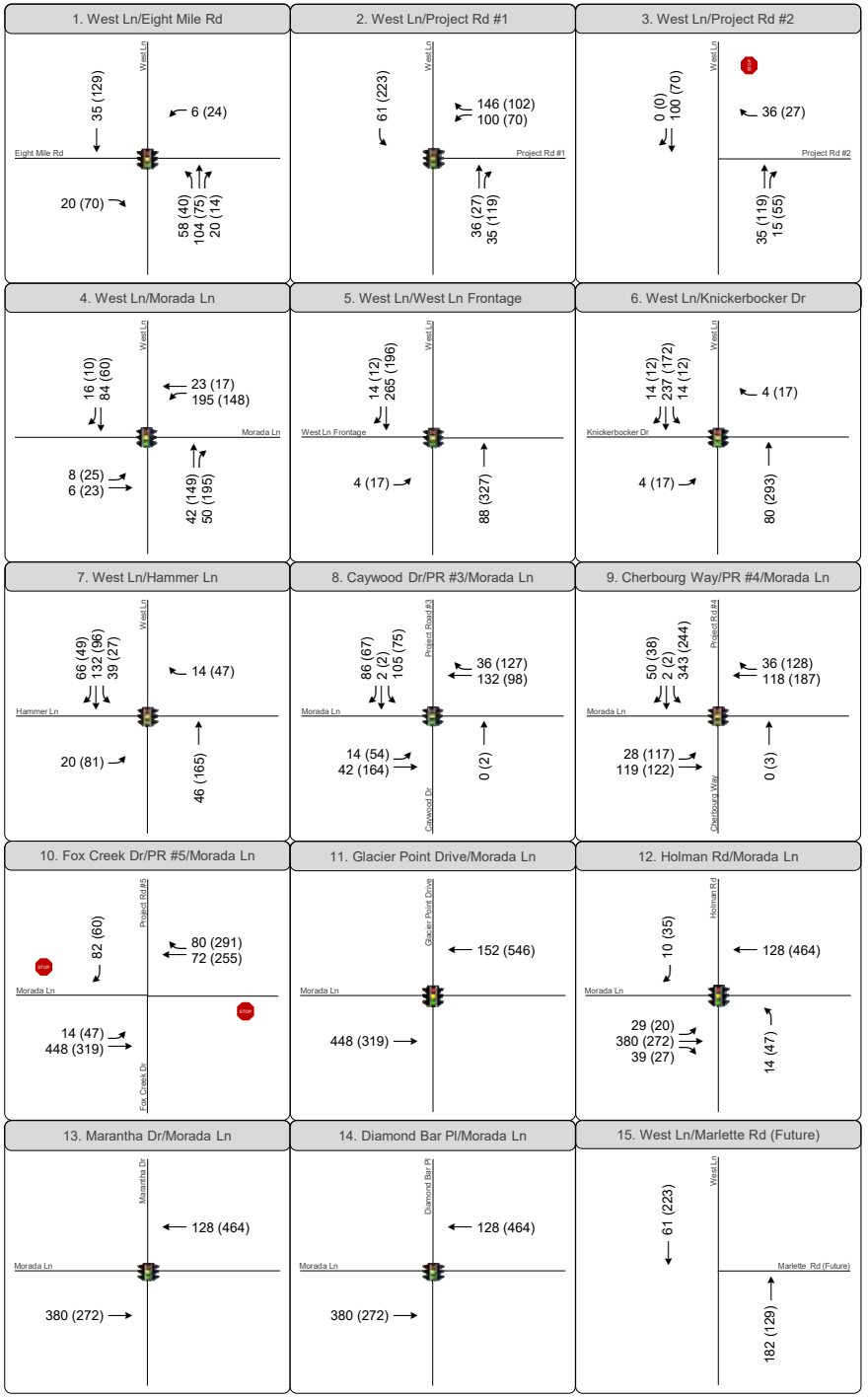
# Project Site Access Study Intersection

15 Future Study Intersection

BTC

Figure 3-1

## Project Peak Hour Traffic Assignment



# 4. EXISTING PLUS PROJECT PEAK HOUR TRAFFIC OPERATIONS

This chapter evaluates potential off-site traffic impacts under Existing Plus Project conditions. The Project trip assignment shown in **Figure 3-1** was added to the Existing peak hour traffic volumes shown in **Figure 2-1** to develop Existing Plus Project intersection turning movement volumes, as shown on **Figure 4-1**.

The roadway improvements presented in **Chapter 3** were assumed under Existing Plus Project conditions. Traffic signal timings, peak hour factors, pedestrian and bicycle activity at the study intersections were left unchanged from Existing Conditions. Measures to improve potentially deficient operations are provided in the CEQA Transportation Analysis (**Chapter 7**) and Local Roadway Transportation Analysis (**Chapter 8**).

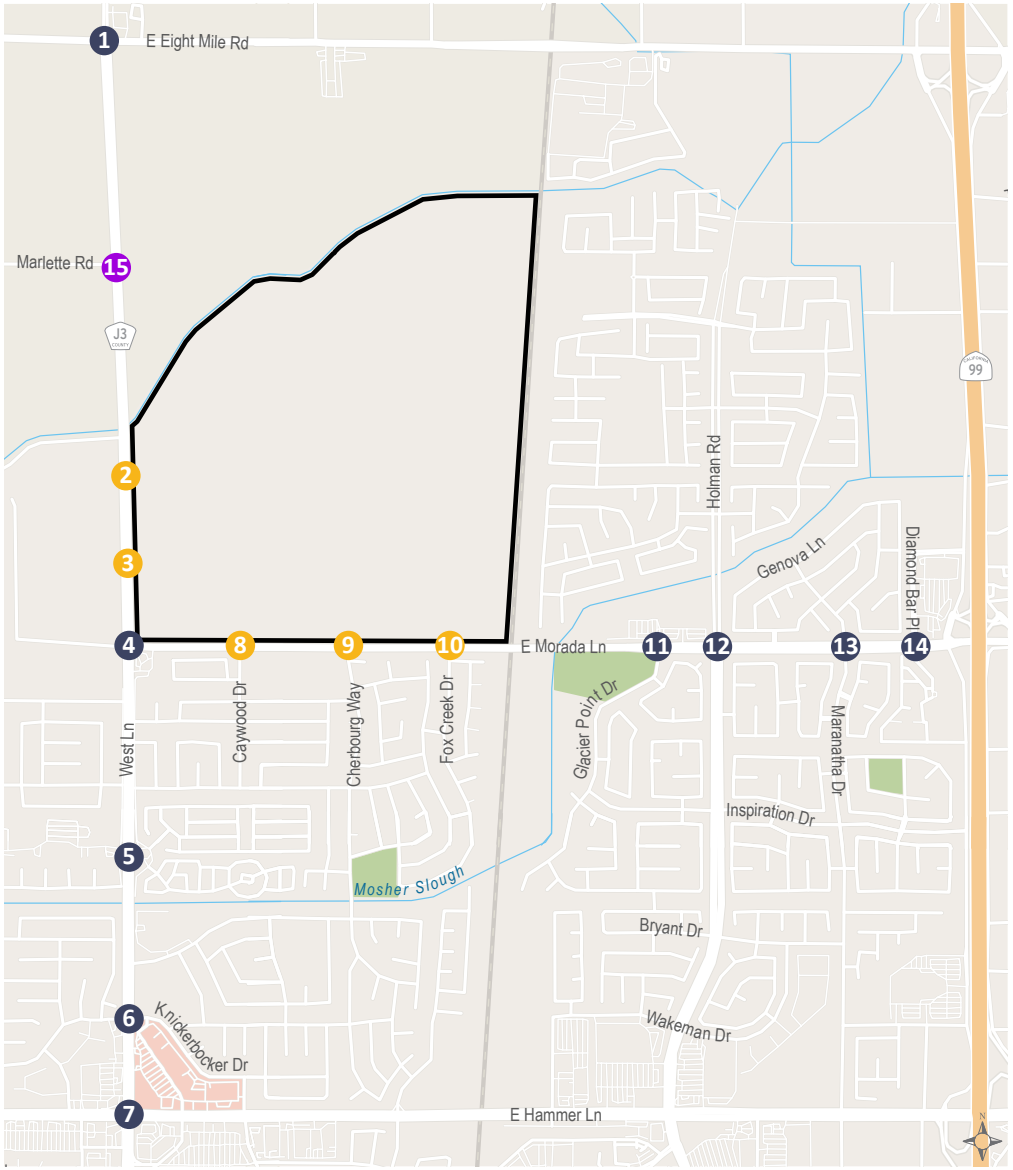
## 4.1 SIGNAL WARRANTS

Existing Plus Project peak hour traffic signal warrants were performed at the unsignalized study intersections (intersections 2, 8, 9, and 10) and the results are presented in **Table 4-1**. The peak hour traffic signal warrant is satisfied at the following intersections:

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The intersections listed above are assumed to be signalized under Existing Plus Project Conditions.[3] Signal warrant worksheets are provided in **Appendix D**.

[3] Intersection #8 and #9 were also evaluated as a two-lane roundabout under Project conditions.




XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

Study Intersection

Project Site Access Study Intersection

Future Study Intersection

Figure 4-1

BTC

Existing Plus Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control

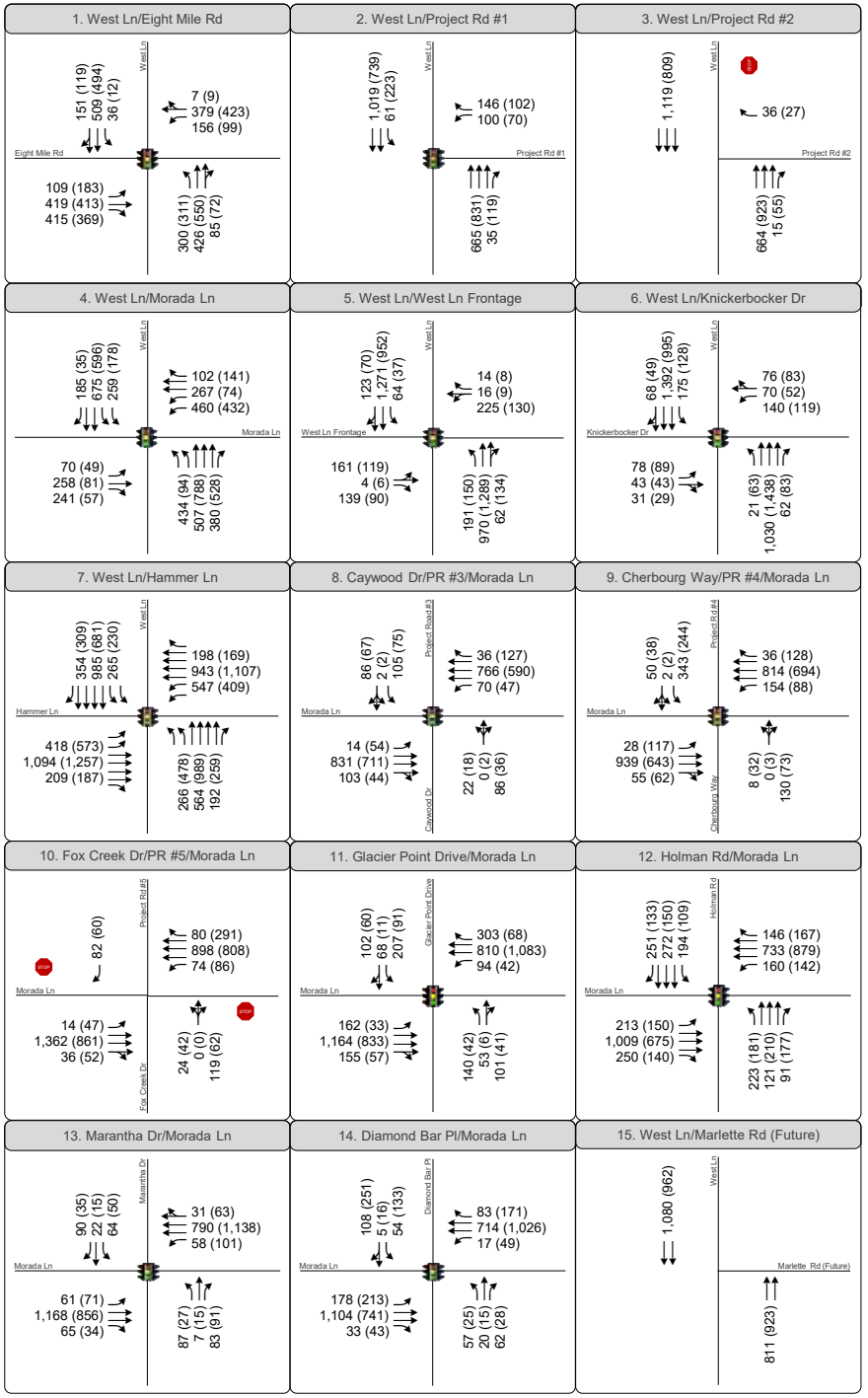


**Table 4-1. Existing Plus Project Peak Hour Signal Warrants**

| Intersection | | Peak Hour | Signal Warrant Met? |
|---|---|---|---|
| 2 | West Lane / Project Roadway Access #1 | AM | Yes |
| | | PM | Yes |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | AM | Yes |
| | | PM | Yes |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | AM | Yes |
| | | PM | Yes |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | AM | No |
| | | PM | No |

Source: BTC, 2024.

## 4.2 EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection levels of service for Existing Plus Project Conditions are presented in **Table 4-2**. Under Existing Plus Project Conditions, the addition of Project traffic would cause the following intersections to have deficient operations during at least one peak hour:

- West Lane / Eight Mile Road (Intersection 1) – AM peak hour
- West Lane / West Lane Frontage (Intersection 5) – AM peak hour

Intersection LOS calculation worksheets are provided in **Appendix E**. The intersection of Fox Creek Drive/Morada Lane/Project Roadway Access #5 is not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F under Existing and Existing Plus Project conditions. A side-street stop controlled intersection is considered deficient if the addition of project traffic causes the intersection to meet the CA MUTCD signal warrant criteria and there are no acceptable alternative routes that can be used. Under Existing Plus Project conditions that intersection does not meet the CA MUTCD signal warrant criteria and there are acceptable alternative routes via Cherbourg Way that can be reasonably be used by northbound traffic to access Morada Lane via a traffic signal.

**Table 4-2. Existing Plus Project Intersection Levels of Service**

| Intersection | | Control[1] | Peak Hour | Existing | | Existing Plus Project | |
|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay |
| 1 | West Lane / Eight Mile Road | Signal | AM | D | 44 | **E** | **55** |
| | | | PM | D | 35 | D | 45 |
| 2 | West Lane / Project Roadway Access #1 | Project Signal | AM | N/A | | A | 9 |
| | | | PM | | | B | 12 |
| 3 | West Lane / Project Roadway Access #2 | SSSC | AM | N/A | | A (B) | 1 (12) |
| | | | PM | | | A (B) | 1 (14) |
| 4 | West Lane / Morada Lane | Signal | AM | **E** | **76** | D | 50 |
| | | | PM | D | 36 | C | 31 |
| 5 | West Lane / West Lane Frontage | Signal | AM | D | 44 | **E** | **62** |
| | | | PM | B | 18 | C | 21 |
| 6 | West Lane / Knickerbocker Drive | Signal | AM | B | 19 | C | 20 |
| | | | PM | B | 18 | C | 20 |
| 7 | West Lane / Hammer Lane | Signal | AM | D | 44 | D | 50 |
| | | | PM | D | 49 | D | 55 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | SSSC [Signal] {RAB} | AM | A (F) | 4 (51) | [B] {A (A)} | [17] {7 (9)} |
| | | | PM | A (C) | 1 (19) | [B] {A (A)} | [15] {6 (7)} |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | SSSC [Signal] {RAB} | AM | A (F) | 5 (51) | [C] {B (C)} | [26] {13 (18)} |
| | | | PM | A (D) | 3 (25) | [C] {A (A)} | [22] {8 (10)} |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | SSSC | AM | B (F) | 11 (>100) | D (F) | 27 (>100) |
| | | | PM | A (D) | 3 (32) | A (F) | 6 (95) |
| 11 | Glacier Point Drive / Morada Lane | Signal | AM | D | 37 | D | 41 |
| | | | PM | B | 18 | B | 19 |
| 12 | Holman Road / Morada Lane | Signal | AM | C | 32 | D | 37 |
| | | | PM | C | 21 | C | 24 |
| 13 | Maranatha Drive / Morada Lane | Signal | AM | B | 11 | B | 12 |
| | | | PM | B | 11 | B | 11 |
| 14 | Diamond Bar Place / Morada Lane | Signal | AM | C | 33 | C | 29 |
| | | | PM | **E** | **61** | D | 51 |
| 15 | West Lane / Marlette Road | n/a | AM | n/a | n/a | n/a | n/a |
| | | | PM | n/a | n/a | n/a | n/a |

Notes:
1. SSSC = side-street stop-controlled intersection. For SSSC and Roundabout (RAB) intersections, LOS/delay is presented as: Intersection Average (Worst Movement). n/a =not applicable

Deficient intersection operations are noted in **bold text**.
Source: BTC, 2024.

## 4.3 EXISTING PLUS PROJECT VEHICLE QUEUES

Existing Plus Project 95th percentile vehicle queues are presented for turn pockets at signalized study intersections in **Table 4-3**. The addition of Project traffic is projected to cause the following locations to exceed available storage and increase vehicle queue lengths by more than 25 feet:

- West Lane/Eight Mile Road (Intersection 1)
- West Lane/Knickerbocker Drive (Intersection 6)
- West Lane/Hammer Lane (Intersection 7)
- Holman Road/Morada Lane (Intersection 12)

Queuing analysis worksheets provided in **Appendix F** show the 95th percentile queues for all movements at signalized intersections.

**Table 4-3. Existing Plus Project 95th Percentile Queue Lengths**

| Intersection | | Movement[1] | Existing[2] | | | Existing Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | 196 | **273** | 240 | 200 | **293** |
| | | EBR | 240 | **311** | 174 | 240 | **337** | **244** |
| | | WBL | 165 | **254** | 136 | 165 | **267** | **178** |
| | | NBL | 375 | **432** | **441** | 375 | **613** | **598** |
| | | SBL | 410 | 85 | 36 | 410 | 87 | 38 |
| 2 | West Lane / Project Roadway Access #1 | WBL | N/A | | | 300 | 67 | 64 |
| | | NBR | | | | 250 | 16 | 33 |
| | | SBL | | | | 340 | 48 | 147 |
| 4 | West Lane / Morada Lane | EBL | N/A | | | 200 | 121 | 70 |
| | | EBR | 1,270 | 393 | 39 | 1,270 | 210 | 0 |
| | | WBL | 250 | **405** | **383** | 450 | 329 | 288 |
| | | WBR | N/A | | | 300 | 33 | 48 |
| | | NBL | 300 | **378** | 86 | 300 | **340** | 76 |
| | | NBR | 300 | **342** | **331** | 300 | 120 | 103 |
| | | SBL | 320 | **552** | 276 | 320 | 211 | 122 |
| | | SBR | 2,000 | 230 | 7 | 2,000 | 73 | 0 |

| Intersection | | Movement[1] | Existing[2] | | | Existing Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 5 | West Lane / West Lane Frontage | EBR | 50 | **97** | 38 | 50 | **98** | 50 |
| | | WBR | 50 | 0 | 0 | 50 | 0 | 0 |
| | | NBL | 415 | 252 | 147 | 415 | 252 | 164 |
| | | SBL | 400 | 105 | 55 | 400 | 105 | 59 |
| 6 | West Lane / Knickerbocker Drive | EBL | 230 | 196 | 168 | 230 | 208 | 218 |
| | | WBL | 70 | **227** | **182** | 70 | **227** | **185** |
| | | NBL | 275 | 56 | 113 | 275 | 56 | 114 |
| | | NBR | 130 | 0 | 3 | 130 | 0 | 3 |
| | | SBL | 260 | 259 | 179 | 260 | **281** | 194 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **289** | **439** | 265 | **328** | **545** |
| | | EBR | 265 | 92 | 103 | 265 | 92 | 103 |
| | | WBL | 340 | **480** | 328 | 340 | **494** | 328 |
| | | WBR | 190 | 108 | 91 | 190 | 113 | 116 |
| | | NBL | 390 | 197 | **420** | 390 | 200 | **420** |
| | | NBR | 390 | 62 | 96 | 390 | 62 | 99 |
| | | SBL | 390 | 173 | 164 | 390 | 205 | 185 |
| | | SBR | 330 | 129 | 109 | 330 | 224 | 177 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | EBL | N/A | | | 300 | 27 | 57 |
| | | WBL | | | | 300 | 81 | 51 |
| | | WBR | | | | 250 | 0 | 36 |
| | | SBL | | | | 250 | 105 | 69 |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | EBL | N/A | | | 350 | 50 | 121 |
| | | WBL | | | | 350 | 177 | 98 |
| | | WBR | | | | 250 | 0 | 43 |
| | | SBL | | | | 300 | 217 | 147 |
| 11 | Glacier Point Drive / Morada Lane | EBL | 310 | 234 | 56 | 310 | 234 | 60 |
| | | WBL | 215 | 153 | 66 | 215 | 153 | 71 |
| | | WBR | 590 | 157 | 16 | 590 | 209 | 14 |
| | | NBL | 100 | **208** | 66 | 100 | **208** | 71 |
| | | SBL | 230 | **316** | 116 | 230 | **316** | 123 |

| Intersection | | Movement[1] | Existing[2] | | | Existing Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 12 | Holman Road / Morada Lane | EBL | 250 | **277** | 193 | 250 | **319** | 220 |
| | | EBR | 225 | 67 | 51 | 225 | 140 | 57 |
| | | WBL | 300 | 252 | 208 | 300 | 252 | 212 |
| | | WBR | 215 | 60 | 59 | 215 | 67 | 90 |
| | | NBL | 315 | **357** | 199 | 315 | **393** | 264 |
| | | NBR | 215 | 47 | 58 | 215 | 47 | 58 |
| | | SBL | 300 | **319** | 170 | 300 | **319** | 173 |
| | | SBR | 225 | 72 | 47 | 225 | 73 | 55 |
| 13 | Maranatha Drive / Morada Lane | EBL | 300 | 77 | 81 | 300 | 86 | 93 |
| | | EBR | 1,470 | 27 | 9 | 1,470 | 26 | 7 |
| | | WBL | 310 | 74 | 106 | 310 | 82 | 121 |
| | | NBL | 100 | 79 | 29 | 100 | 92 | 36 |
| | | NBR | 100 | 32 | 31 | 100 | 36 | 37 |
| | | SBL | 90 | 61 | 46 | 90 | 71 | 57 |
| | | SBR | 90 | 33 | 9 | 90 | 38 | 9 |
| 14 | Diamond Bar Place / Morada Lane | EBL | 180 | **323** | **436** | 180 | **323** | **436** |
| | | EBR | 180 | 0 | 0 | 180 | 0 | 0 |
| | | WBL | 100 | 39 | 88 | 100 | 39 | 88 |
| | | WBR | 110 | 30 | 86 | 110 | 30 | 108 |
| | | NBL | 65 | **93** | 55 | 65 | **93** | 55 |
| | | NBR | 65 | 9 | 0 | 65 | 9 | 0 |
| | | SBL | 150 | 89 | **254** | 150 | 89 | **254** |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

# 5. BACKGROUND PEAK HOUR TRAFFIC OPERATIONS

This chapter presents the analysis results under Background and Background Plus Project conditions. Background conditions represent projected traffic volumes and near-term roadway improvements expected to occur by the time the proposed Project would be operational. Measures to improve potentially deficient operations are provided in the CEQA Transportation Analysis (**Chapter 7**) and Local Roadway Transportation Analysis (**Chapter 8**).

## 5.1 BACKGROUND PEAK HOUR TRAFFIC VOLUMES

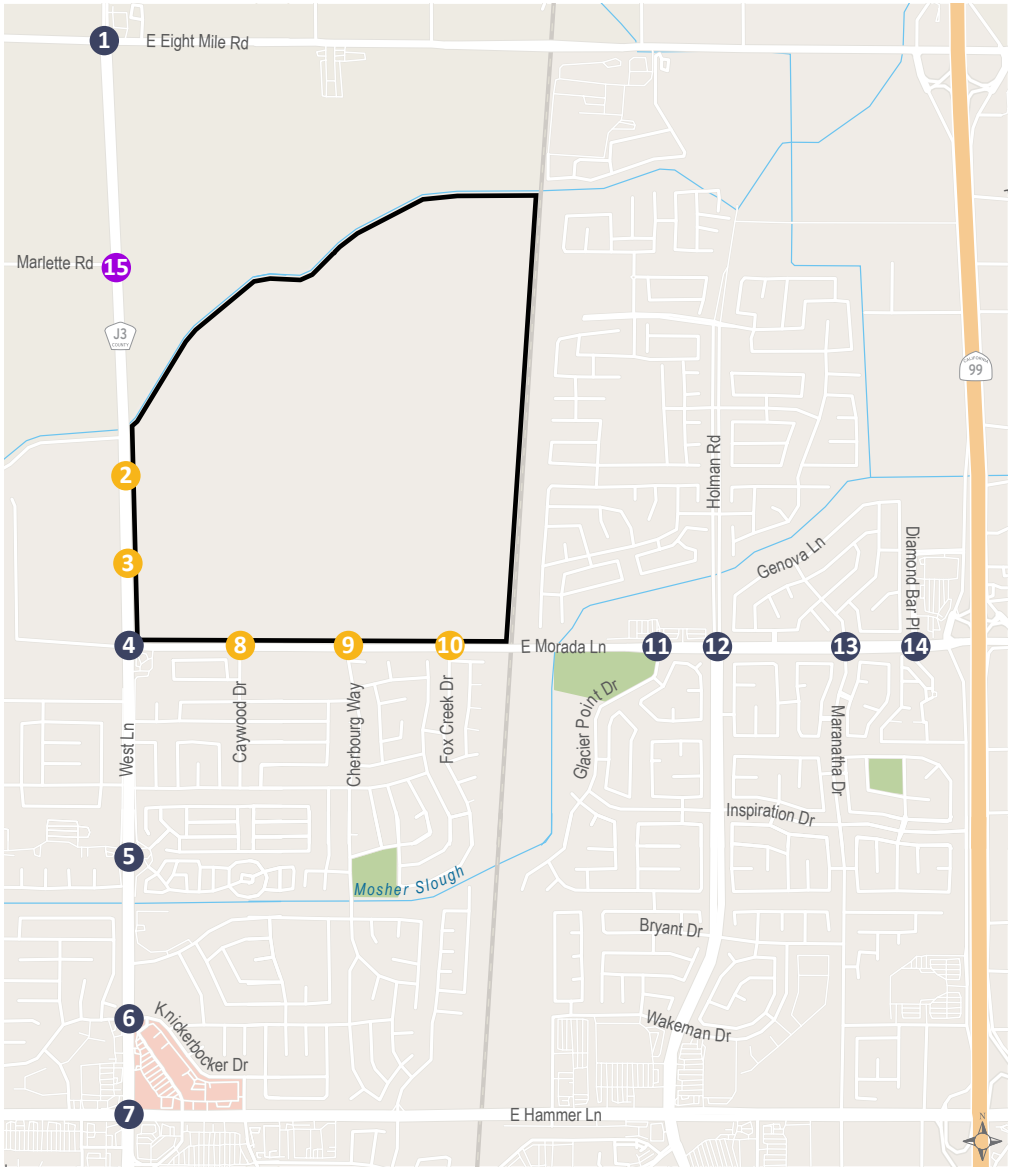
Development projects anticipated to generate traffic by the time the proposed Project would be operational include the following:

- Tra Vigne Development Project (southeast quadrant of West Lane/Eight Mile Road intersection)
- Gill Medical Center (northeast quadrant of West Lane/Eight Mile Road intersection)
- Cannery Park Project (southwest quadrant of the SR 99/Eight Mile Road interchange)

Traffic from these developments, based on traffic studies prepared for these developments, was added to Existing peak hour traffic volumes to develop Background No Project intersection turning movement volumes, as shown on **Figure 5-1**. The Project trip assignment shown in **Figure 3-1** was added to the Background No Project peak hour traffic volumes shown in **Figure 5-1** to develop Background Plus Project intersection turning movement volumes, as shown on **Figure 5-2**.

## 5.2 ROADWAY NETWORK ASSUMPTIONS

Under Background No Project conditions it was assumed that a new signalized intersection on West Lane (West Lane/Marlette Road) about 2,000 feet north of Bear Creek would be constructed to serve traffic from the Tra Vigne Development. For this study it was assumed that this intersection would be designed and constructed to accommodate General Plan Buildout as part of the Tra Vigne Development. Improvements to the West Lane/Eight Mile Road intersection would also be made to support the Tra Vigne Development and other approved projects. The assumed intersection lane configurations are shown on **Figure 5-1** for Background No Project conditions. Roadway improvements proposed by the Project and presented in **Chapter 3** were assumed under Background Plus Project conditions. The assumed intersection lane configurations are shown on **Figure 5-2** for Background Plus Project conditions.




XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

Study Intersection

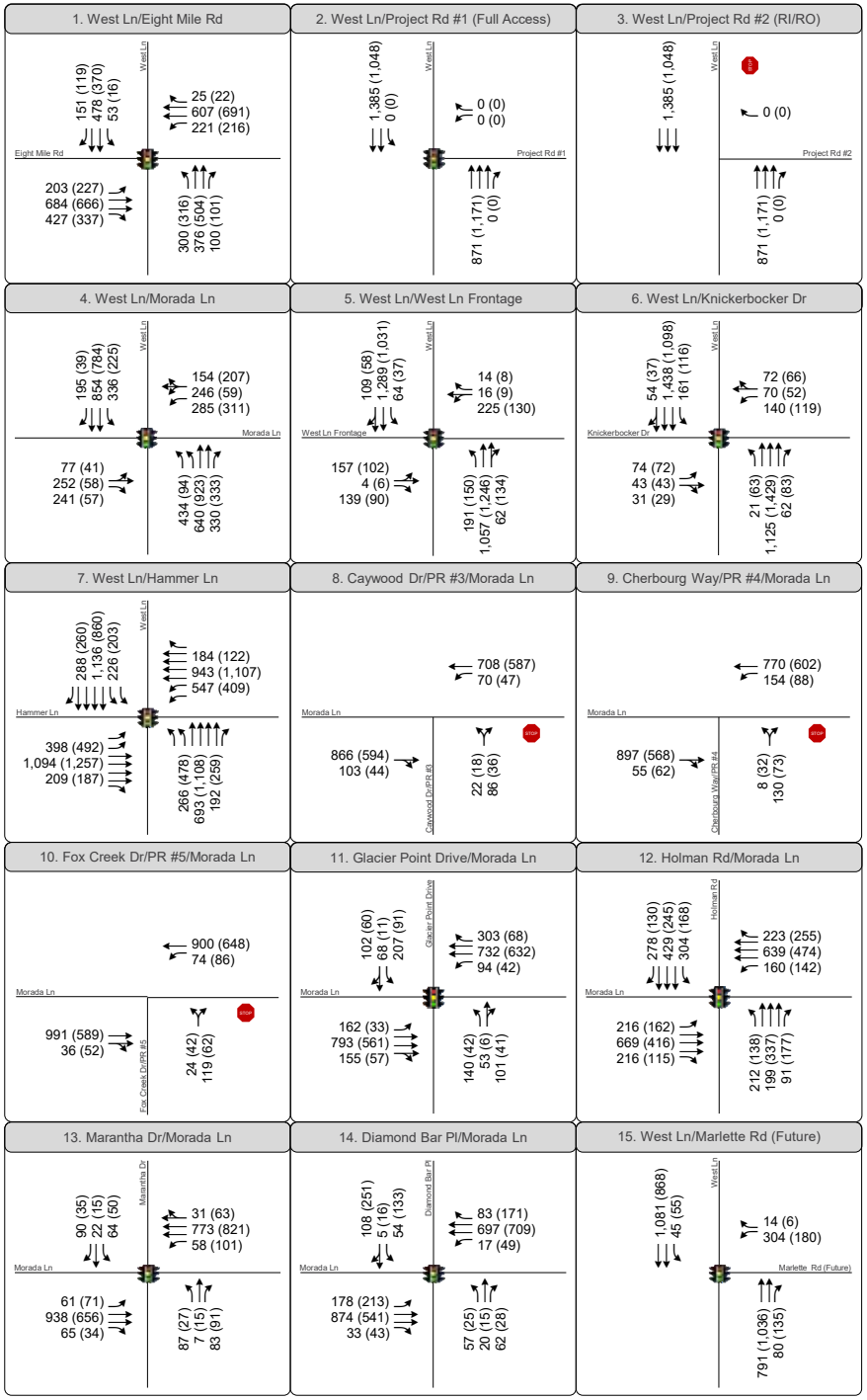
Project Site Access Study Intersection

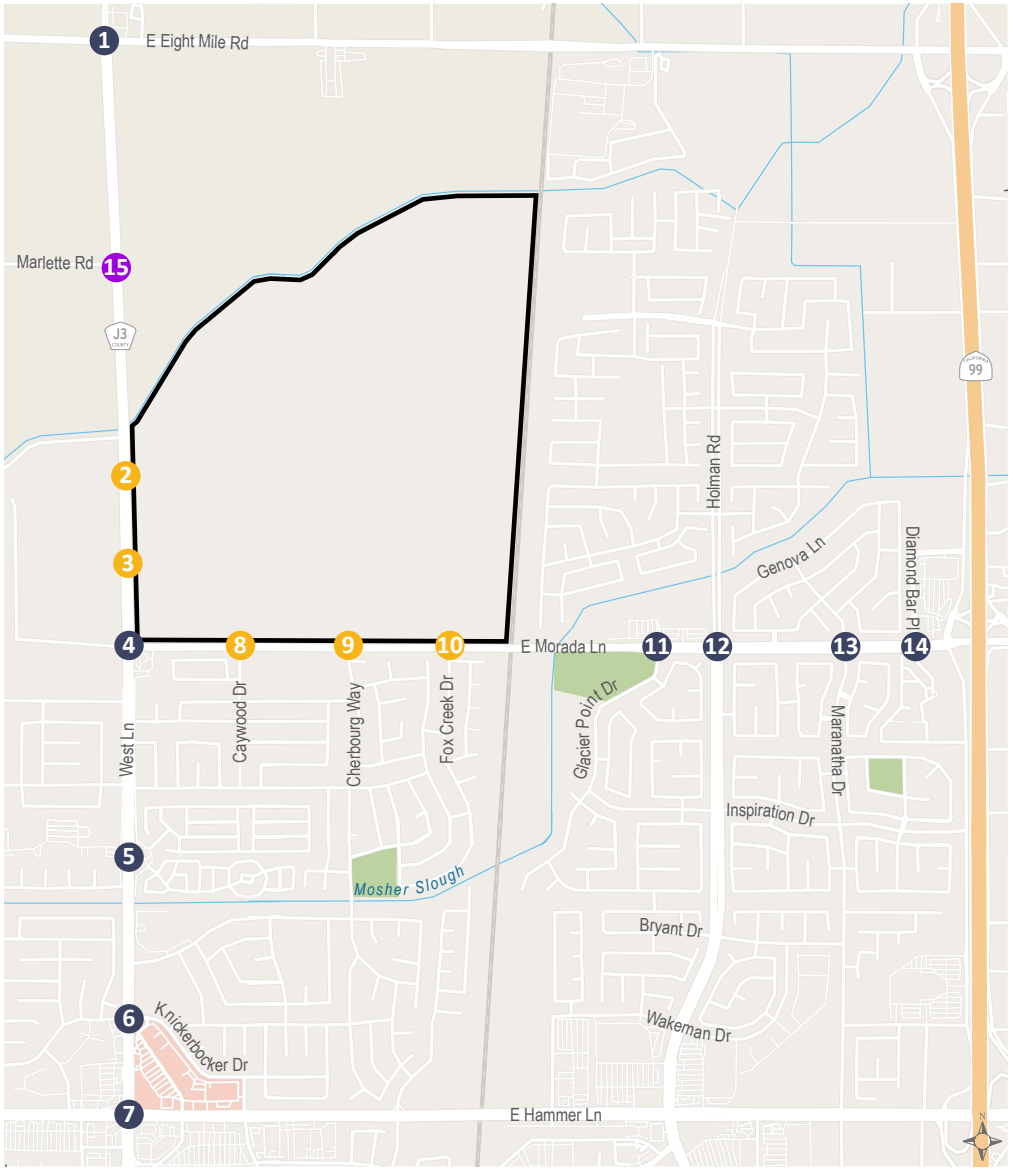
Future Study Intersection

Figure 5-1

BTC

## Background No Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control






XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

Study Intersection

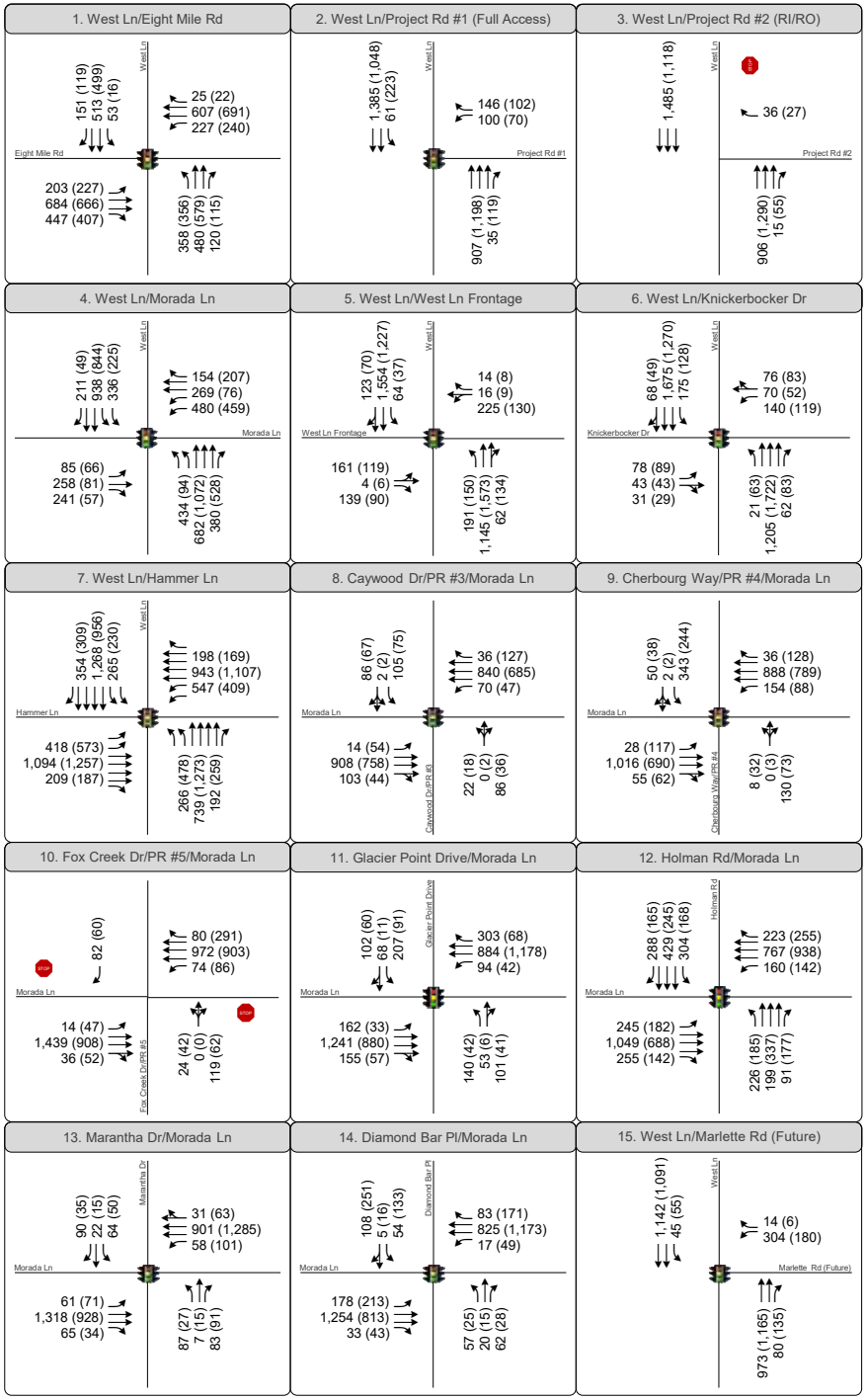
Project Site Access Study Intersection

Future Study Intersection

Figure 5-2

BTC

## Background Plus Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control



## 5.3 SIGNAL WARRANTS

Peak hour traffic signal warrants were performed at the unsignalized study intersections (intersections 2, 8, 9, and 10) and the results are presented in **Table 5-1**. The peak hour traffic signal warrants are satisfied at the following intersections under Background Plus Project conditions:

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The intersections listed above are assumed to be signalized under Background Plus Project Conditions.[4] Signal warrant worksheets are provided in **Appendix G**.

**Table 5-1. Background Peak Hour Signal Warrants**

| Intersection | | Peak Hour | Signal Warrant Met? | |
|---|---|---|---|---|
| | | | Background No Project | Background Plus Project |
| 2 | West Lane / Project Roadway Access #1 | AM | No | Yes |
| | | PM | No | Yes |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | AM | No | Yes |
| | | PM | No | Yes |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | AM | No | Yes |
| | | PM | No | Yes |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | AM | No | No |
| | | PM | No | No |

Source: BTC, 2024.

## 5.4 BACKGROUND INTERSECTION LEVELS OF SERVICE

Intersection operations under Background Conditions, with and without the Project, are presented in **Table 5-2**. Peak hour factors, pedestrian and bicycle activity, and heavy vehicle percentages were left unchanged from existing conditions. Signal timings were updated in the Background Conditions analysis to reflect updates that would occur alongside roadway improvements. Under Background No Project Conditions, the following intersections would have deficient operations for at least one peak hour:

- West Lane/Morada Lane (Intersection 4) – AM and PM peak hour

[4] Intersection #8 and #9 were also evaluated as a two-lane roundabout under Project conditions.

- West Lane / West Lane Frontage (Intersection 5) – AM peak hour

The intersections of Morada Lane with Caywood Drive, Cherbourg Way, and Fox Creek Drive are not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F for at least one peak hour. A side-street stop controlled intersection is considered deficient if the intersection meets the CA MUTCD signal warrant criteria ***and*** there are no acceptable alternative routes that can be used. These intersections do not meet the peak hour traffic signal warrant under Background No Project conditions. Furthermore, the critical movement that operates at LOS F at these intersections is the northbound left-turn movement and there are two acceptable alternative routes for the northbound left-turn movement that would provide access to all likely destinations: the first is to use to use local streets in the residential neighborhood to access northbound West Lane via a right-turn movement at Westmora Avenue (a parallel road to Morada Lane); and the second is to access southbound West Lane via the signalized intersection of West Lane/West Lane Frontage.

Under Background Plus Project Conditions, the following intersections would worsen under Project conditions and have deficient operations for at least one peak hour:

- West Lane / West Lane Frontage (Intersection 5) – AM peak hour

The intersection of Fox Creek Drive/Morada Lane/Project Roadway Access #5 is not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F under Background Plus Project conditions. Northbound traffic can reasonably access Morada Lane via the traffic signal at the intersection of Cherbourg Way/Morada Lane. Intersection LOS calculation worksheets are provided in **Appendix H**.

**Table 5-2. Background Intersection Levels of Service**

| Intersection | | Control[1] | Peak Hour | Background No Project | | Background Plus Project | |
|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay |
| 1 | West Lane / Eight Mile Road | Signal | AM | D | 42 | D | 49 |
| | | | PM | D | 36 | D | 45 |
| 2 | West Lane / Project Roadway Access #1 | Project Signal | AM | N/A | | A | 10 |
| | | | PM | | | B | 12 |
| 3 | West Lane / Project Roadway Access #2 | SSSC | AM | N/A | | A (B) | 1 (14) |
| | | | PM | | | A (C) | 1 (17) |
| 4 | West Lane / Morada Lane | Signal | AM | **F** | **115** | **E** | **57** |
| | | | PM | D | 50 | C | 33 |
| 5 | West Lane / West Lane Frontage | Signal | AM | **E** | **56** | **F** | **95** |
| | | | PM | B | 20 | C | 24 |
| 6 | West Lane / Knickerbocker Drive | Signal | AM | C | 20 | C | 22 |
| | | | PM | B | 19 | C | 21 |
| 7 | West Lane / Hammer Lane | Signal | AM | D | 46 | D | 51 |
| | | | PM | D | 50 | E | 56 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | SSSC [Signal] {RAB} | AM | A (F) | 5 (76) | [B] {A (A)} | [17] {8 (10)} |
| | | | PM | A (C) | 1 (22) | [B] {A (A)} | [15] {7 (7)} |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | SSSC [Signal] {RAB} | AM | A (F) | 6 (77) | [C] {B (C)} | [27] {15 (20)} |
| | | | PM | A (D) | 3 (32) | [C] {A (B)} | [22] {9 (11)} |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | SSSC | AM | C (F) | 18 (>100) | E (F) | 35 (>100) |
| | | | PM | A (E) | 4 (43) | A (F) | 7 (>100) |
| 11 | Glacier Point Drive / Morada Lane | Signal | AM | D | 38 | D | 44 |
| | | | PM | B | 18 | B | 20 |
| 12 | Holman Road / Morada Lane | Signal | AM | D | 37 | D | 43 |
| | | | PM | C | 26 | C | 28 |
| 13 | Maranatha Drive / Morada Lane | Signal | AM | B | 11 | B | 12 |
| | | | PM | B | 11 | B | 11 |
| 14 | Diamond Bar Place / Morada Lane | Signal | AM | C | 31 | C | 28 |
| | | | PM | D | 39 | D | 38 |
| 15 | West Lane / Marlette Road | Signal | AM | B | 11 | B | 15 |
| | | | PM | A | 9 | B | 12 |

Notes:
1. SSSC = side-street stop-controlled intersection. For SSSC and Roundabout (RAB) intersections, LOS/delay is presented as: Intersection Average (Worst Movement).

Deficient intersection operations based on the City of Stockton General Plan are noted in **bold text**.
Source: BTC, 2024.

## 5.5 BACKGROUND VEHICLE QUEUES

Background 95th percentile vehicle queues are presented for turn pockets at signalized study intersections in **Table 5-3**. The addition of Project traffic is projected to cause the following locations to exceed available storage and increase vehicle queue lengths by more than 25 feet:

- West Lane/Eight Mile Road (Intersection 1)
- West Lane/Knickerbocker Drive (Intersection 6)
- West Lane/Hammer Lane (Intersection 7)
- Holman Road/Morada Lane (Intersection 12)

Queuing analysis worksheets provided in **Appendix I** show the 95th percentile queues for all movements at signalized intersections.

**Table 5-3. Background 95th Percentile Queue Lengths**

| Intersection | | Movement[1] | Background No Project[2] | | | Background Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | **245** | **286** | 240 | **245** | **286** |
| | | EBR | 240 | 88 | 71 | 240 | 112 | 78 |
| | | WBL | 165 | **286** | **255** | 165 | **297** | **294** |
| | | WBR | 165 | 0 | 0 | 165 | 0 | 0 |
| | | NBL | 375 | 323 | 334 | 375 | **418** | **395** |
| | | NBR | 375 | 20 | 19 | 375 | 34 | 27 |
| | | SBL | 410 | 75 | 32 | 410 | 75 | 32 |
| | | SBR | 410 | 34 | 7 | 410 | 34 | 7 |
| 2 | West Lane / Project Roadway Access #1 | WBL | N/A | | | 300 | 84 | 64 |
| | | NBR | | | | 250 | 15 | 33 |
| | | SBL | | | | 340 | 60 | 147 |
| 4 | West Lane / Morada Lane | EBL | N/A | | | 200 | 141 | 111 |
| | | EBR | 1,270 | 433 | 41 | 1,270 | 83 | 0 |
| | | WBL | 250 | **433** | **455** | 450 | 345 | 272 |
| | | WBR | N/A | | | 300 | 65 | 52 |
| | | NBL | 300 | **405** | 91 | 300 | **340** | 74 |
| | | NBR | 300 | **514** | **467** | 300 | 160 | 106 |
| | | SBL | 320 | **860** | **356** | 320 | 272 | 151 |
| | | SBR | 2,000 | 319 | 25 | 2,000 | 132 | 0 |

| Intersection | | Movement[1] | Background No Project[2] | | | Background Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 5 | West Lane / West Lane Frontage | EBR | 50 | **86** | 43 | 50 | **88** | 49 |
| | | WBR | 50 | 0 | 0 | 50 | 0 | 0 |
| | | NBL | 415 | 239 | 174 | 415 | 239 | 174 |
| | | SBL | 400 | 102 | 62 | 400 | 102 | 62 |
| 6 | West Lane / Knickerbocker Drive | EBL | 230 | 196 | 168 | 230 | 208 | 218 |
| | | WBL | 70 | **227** | **182** | 70 | **227** | **185** |
| | | NBL | 275 | 56 | 113 | 275 | 56 | 114 |
| | | NBR | 130 | 0 | 3 | 130 | 0 | 3 |
| | | SBL | 260 | 259 | 179 | 260 | **281** | 194 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **330** | **447** | 265 | **403** | **614** |
| | | EBR | 265 | 96 | 102 | 265 | 102 | 109 |
| | | WBL | 340 | **532** | 335 | 340 | **592** | **380** |
| | | WBR | 190 | 113 | 91 | 190 | 126 | 125 |
| | | NBL | 390 | 210 | **429** | 390 | 227 | **479** |
| | | NBR | 390 | 61 | 96 | 390 | 60 | 97 |
| | | SBL | 390 | 187 | 167 | 390 | 234 | 202 |
| | | SBR | 330 | 130 | 109 | 330 | 226 | 178 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | EBL | N/A | | | 300 | 28 | 58 |
| | | WBL | | | | 300 | 83 | 53 |
| | | WBR | | | | 250 | 0 | 36 |
| | | SBL | | | | 250 | 108 | 71 |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | EBL | N/A | | | 350 | 50 | 126 |
| | | WBL | | | | 350 | 177 | 103 |
| | | WBR | | | | 250 | 0 | 42 |
| | | SBL | | | | 300 | 217 | 153 |
| 11 | Glacier Point Drive / Morada Lane | EBL | 310 | 234 | 59 | 310 | 234 | 60 |
| | | WBL | 215 | 153 | 70 | 215 | 153 | 71 |
| | | WBR | 590 | 186 | 15 | 590 | 228 | 14 |
| | | NBL | 100 | **208** | 70 | 100 | **208** | 71 |
| | | SBL | 230 | **316** | 122 | 230 | **316** | 123 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **325** | 236 | 250 | **389** | **264** |
| | | EBR | 225 | 68 | 51 | 225 | 151 | 56 |
| | | WBL | 300 | 252 | 212 | 300 | 252 | 217 |
| | | WBR | 215 | 73 | 73 | 215 | 94 | 140 |
| | | NBL | 315 | **364** | 208 | 315 | **400** | 279 |

| Intersection | | Movement[1] | Background No Project[2] | | | Background Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| | | NBR | 215 | 47 | 62 | 215 | 47 | 62 |
| | | SBL | 300 | **597** | 246 | 300 | **597** | 254 |
| | | SBR | 225 | 77 | 53 | 225 | 79 | 60 |
| 13 | Maranatha Drive / Morada Lane | EBL | 300 | 84 | 84 | 300 | 86 | 97 |
| | | EBR | 1,470 | 26 | 8 | 1,470 | 26 | 7 |
| | | WBL | 310 | 80 | 109 | 310 | 82 | 126 |
| | | NBL | 100 | 89 | 31 | 100 | 92 | 38 |
| | | NBR | 100 | 36 | 33 | 100 | 36 | 39 |
| | | SBL | 90 | 69 | 48 | 90 | 71 | 60 |
| | | SBR | 90 | 37 | 9 | 90 | 38 | 9 |
| 14 | Diamond Bar Place / Morada Lane | EBL | 180 | **323** | **335** | 180 | **323** | **335** |
| | | EBR | 180 | 0 | 0 | 180 | 0 | 0 |
| | | WBL | 100 | 39 | 88 | 100 | 39 | 88 |
| | | WBR | 110 | 30 | 92 | 110 | 30 | 92 |
| | | NBL | 65 | **93** | 55 | 65 | **93** | 55 |
| | | NBR | 65 | 9 | 0 | 65 | 9 | 0 |
| | | SBL | 150 | 89 | **254** | 150 | 89 | **254** |
| 15 | West Lane / Marlette Road | WBL | 400 | 242 | 146 | 400 | 227 | 140 |
| | | NBR | 400 | 26 | 30 | 400 | 28 | 32 |
| | | SBL | 400 | 57 | 61 | 400 | 56 | 59 |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

# 6. CUMULATIVE PEAK HOUR TRAFFIC OPERATIONS

This chapter presents the traffic operations analysis results under Cumulative (2040) year conditions without and with the Project. Cumulative conditions represent projected traffic volumes and future roadway improvements based on the City's Travel Demand Model under General Plan Buildout Conditions. Measures to improve potentially deficient operations are provided in the CEQA Transportation Analysis (**Chapter 7**) and Local Roadway Transportation Analysis (**Chapter 8**). Major roadway improvements in the study area are described in **Table 6-1**.

**Table 6-1. Planned Roadway Improvements for the Cumulative Year (2040)**

| Location | Improvement |
|---|---|
| Eight Mile Road | Four lanes west of West Lane<br>Six lanes east of West Lane |
| West Lane | Six lanes between Eight Mile Road and Hammer Lane |
| Morada Lane | Four lanes between West Lane and Fox Creek Road<br>Six lanes between Holman Road and SR 99 |

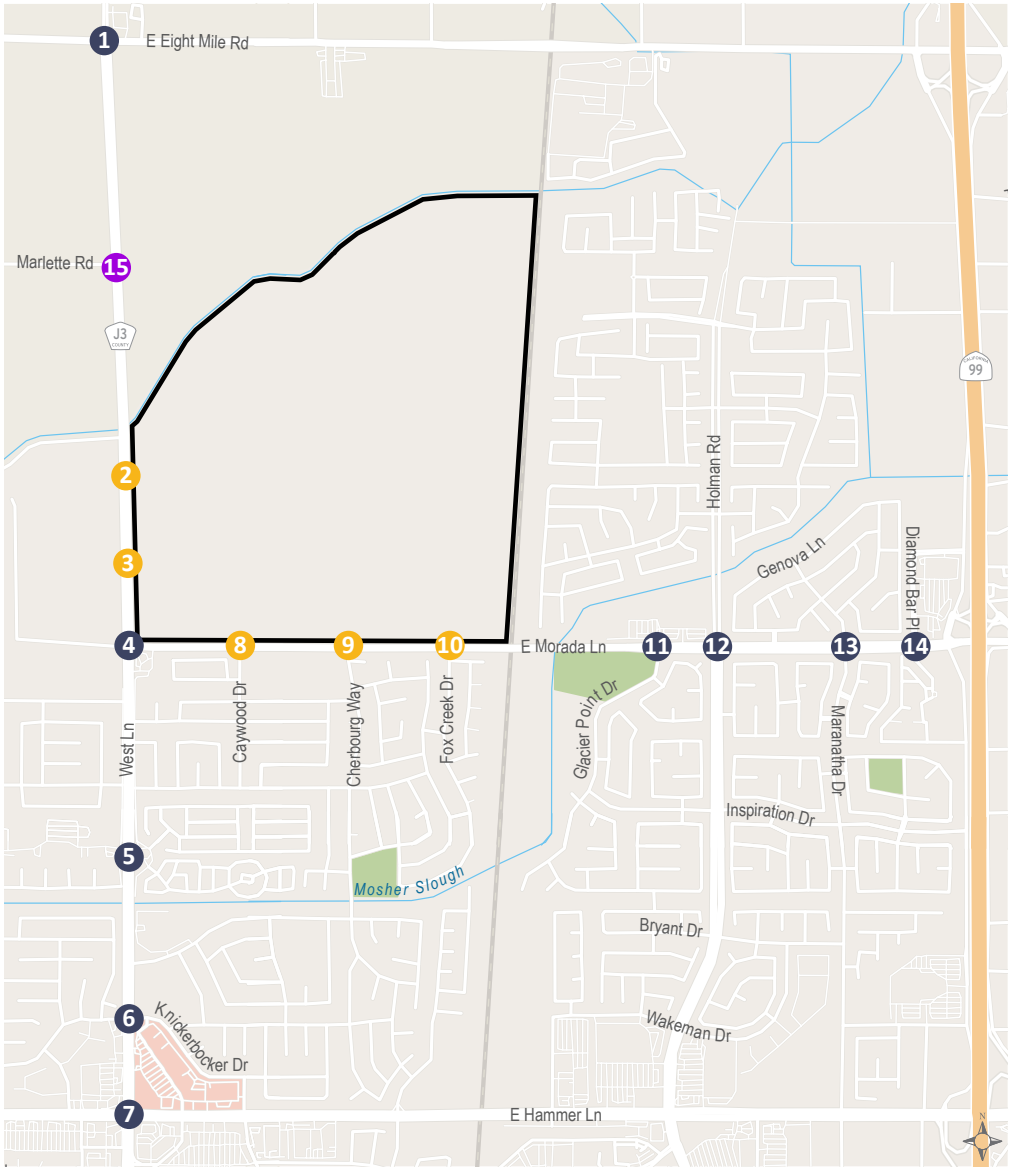
Source: Envision Stockton 2040 General Plan.

## 6.1 CUMULATIVE CONDITIONS PEAK HOUR TRAFFIC VOLUMES

Cumulative No Project peak hour traffic volumes were estimated using the City's Travel Demand Model. Cumulative No Project peak hour traffic volumes include traffic from General Plan Buildout (without the Project) and also reflect traffic from the following approved/planned development in the Project vicinity:

- Tra Vigne Development Project (southeast quadrant of West Lane/Eight Mile Road intersection)
- Gill Medical Center (northeast quadrant of West Lane/Eight Mile Road intersection)
- Cannery Park Project (southwest quadrant of the SR 99/Eight Mile Road interchange)
- LeBaron Ranch (southwest quadrant of West Lane/Eight Mile Road intersection)

Cumulative Plus Project peak hour traffic volumes were estimated by adding traffic generated by the Project to the Cumulative No Project intersection turning movement volumes. Cumulative No Project intersection turning movement volumes are presented in **Figure 6-1**. Cumulative Plus Project intersection turning movement volumes are presented in **Figure 6-2**.




XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

# Study Intersection

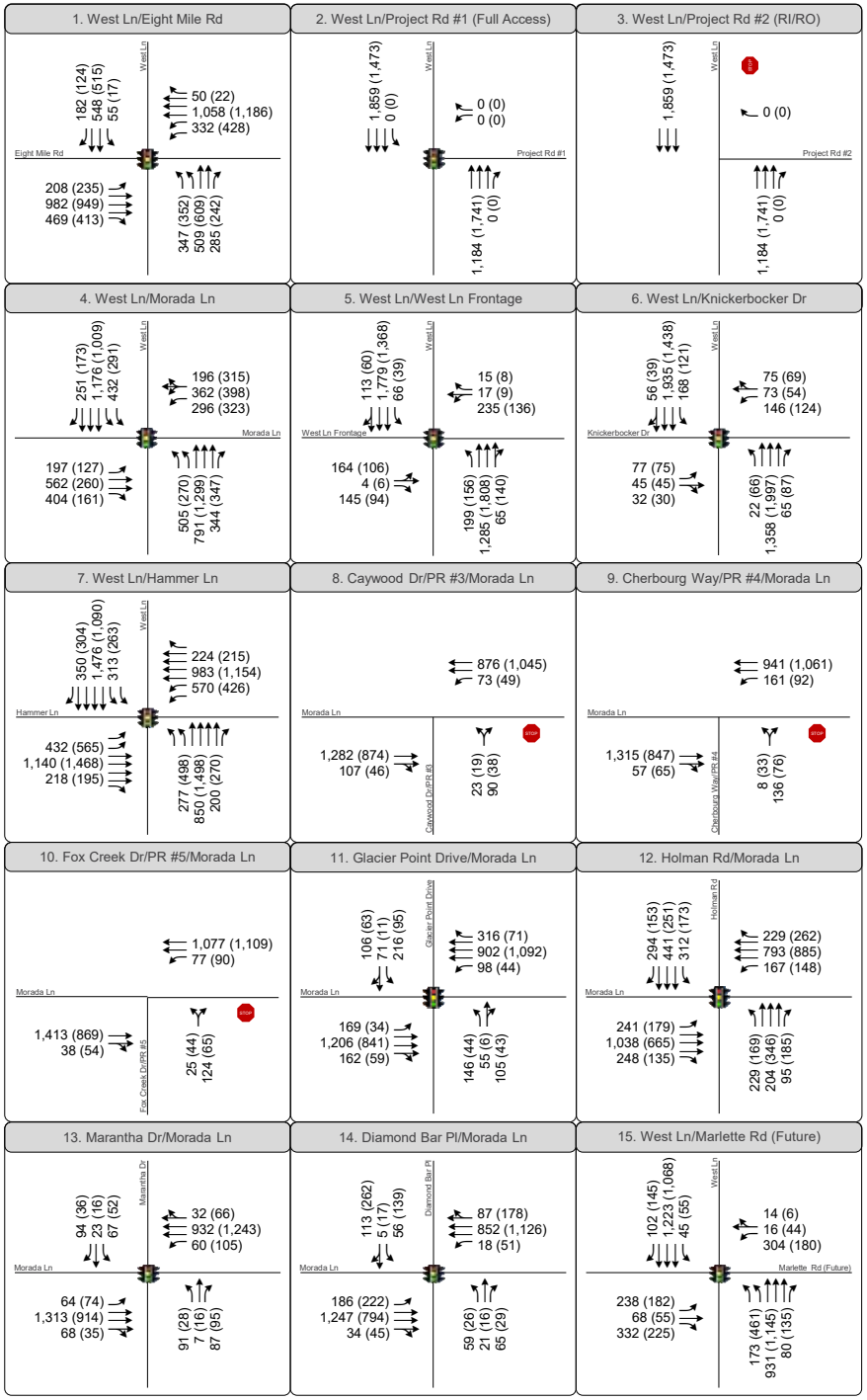
# Project Site Access Study Intersection

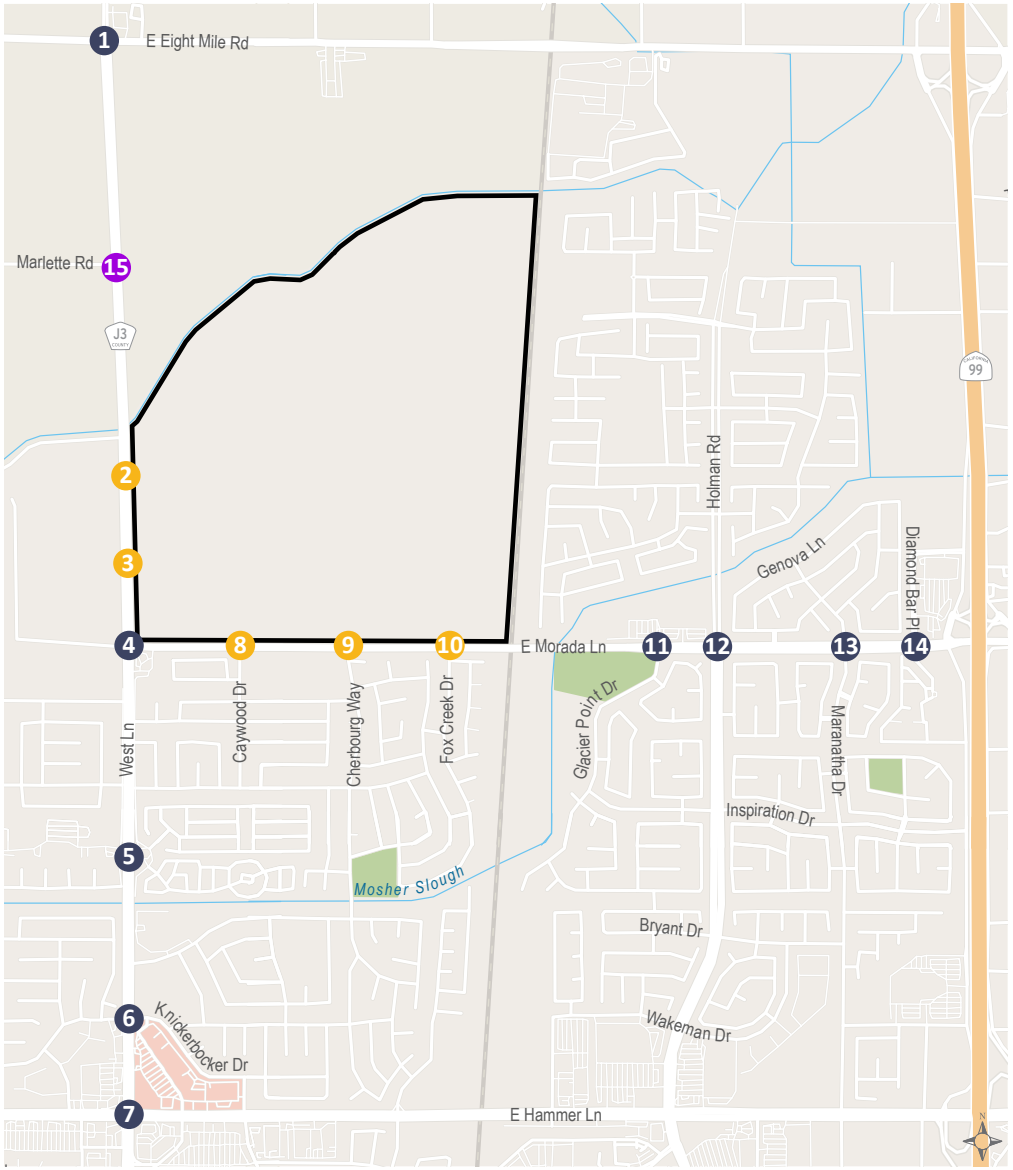
15 Future Study Intersection

Figure 6-1

BTC

## Cumulative No Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control






XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Location

# Study Intersection

# Project Site Access Study Intersection

15 Future Study Intersection

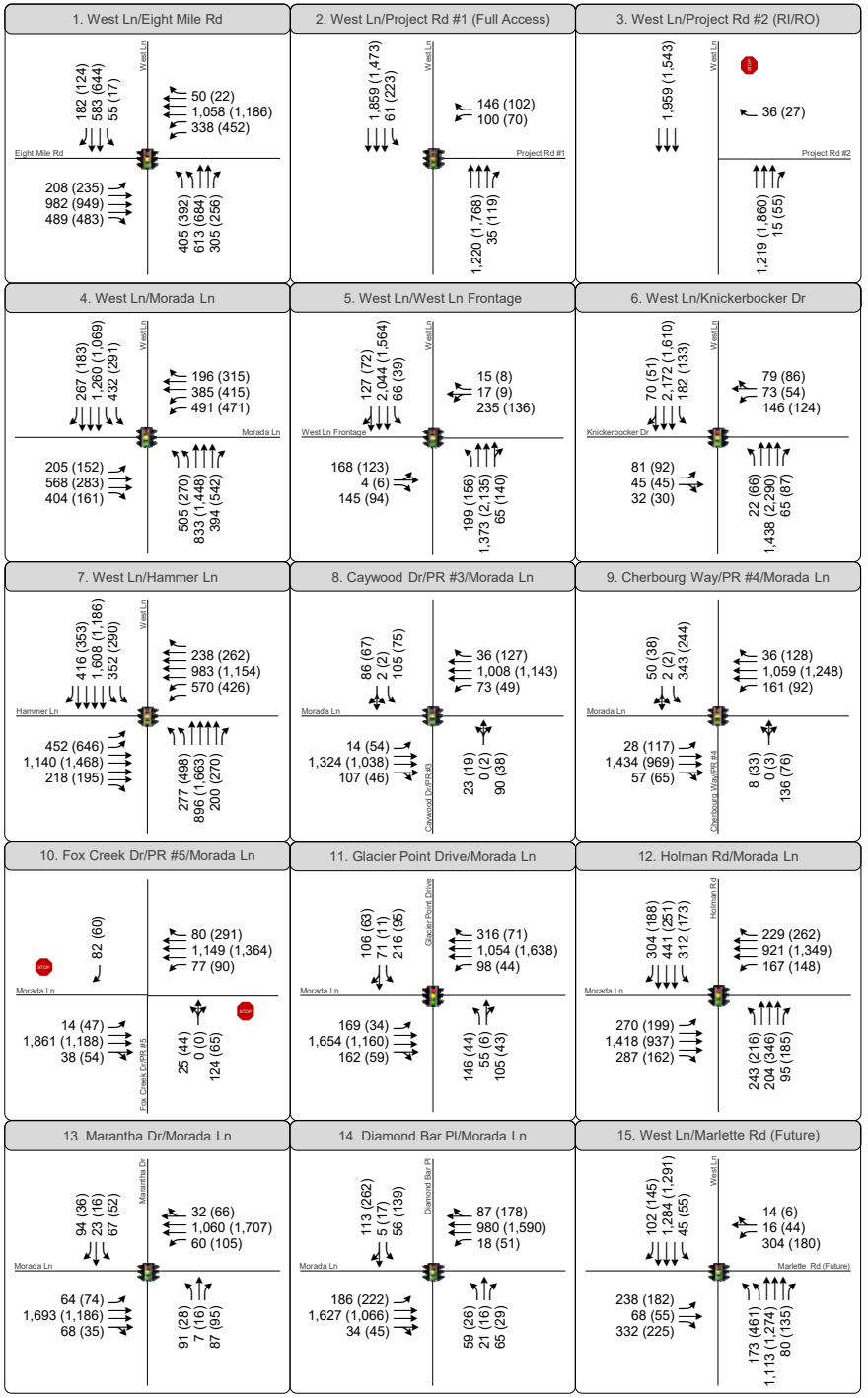



Figure 6-2

BTC

Cumulative Plus Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations, and Traffic Control

## 6.2 SIGNAL WARRANTS

Cumulative No Project and Cumulative Plus Project peak hour traffic signal warrants were performed at the unsignalized study intersections (intersections 2, 8, 9, and 10) and the results are presented in **Table 6-2**. Under Cumulative No Project conditions none of the unsignalized study intersections meet the peak hour traffic signal warrant. Under Cumulative Plus Project conditions the peak hour traffic signal warrants are satisfied at the following intersections:

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The intersections listed above are assumed to be signalized under Cumulative Plus Project Conditions.[5] Signal warrant worksheets are provided in **Appendix J**.

**Table 6-2. Cumulative Plus Project Peak Hour Signal Warrants**

| Intersection | | Peak Hour | Signal Warrant Met? | |
|---|---|---|---|---|
| | | | Cumulative No Project | Cumulative Plus Project |
| 2 | West Lane / Project Roadway Access #1 | AM | N/A | Yes |
| | | PM | N/A | Yes |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | AM | No | Yes |
| | | PM | No | Yes |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | AM | No | Yes |
| | | PM | No | Yes |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | AM | No | No |
| | | PM | No | No |

Source: BTC, 2024.

## 6.3 CUMULATIVE CONDITIONS INTERSECTION LEVELS OF SERVICE

Intersection operations under Cumulative Conditions, with and without the Project, are presented in **Table 6-3**. Pedestrian and bicycle activity, and heavy vehicle percentages were left unchanged from existing conditions. Peak hour factors were set to be equal to existing or a minimum of 0.92 (HCM recommended default).

[5] Intersection #8 and #9 were also evaluated as a two-lane roundabout under Project conditions.

Signal timings were updated in the Cumulative year analysis to reflect updates that would occur alongside roadway improvements. Under Cumulative No Project Conditions, the following intersections would have deficient operations for at least one peak hour:

- West Lane/Morada Lane (Intersection 4) – AM peak hour

The intersections of Morada Lane with Caywood Drive, Cherbourg Way, and Fox Creek Drive are not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F for at least one peak hour. A side-street stop controlled intersection is considered deficient if the intersection meets the CA MUTCD signal warrant criteria ***and*** there are no acceptable alternative routes that can be used. These intersections do not meet the peak hour traffic signal warrant under Cumulative No Project conditions. Furthermore, the critical movement that operates at LOS F at these intersections is the northbound left-turn movement and there are two acceptable alternative routes for the northbound left-turn movement that would provide access to all likely destinations: the first is to use to use local streets in the residential neighborhood to access northbound West Lane via a right-turn movement at Westmora Avenue (a parallel road to Morada Lane); and the second is to access southbound West Lane via the signalized intersection of West Lane/West Lane Frontage.

Under Cumulative Plus Project Conditions, the following intersections would worsen under Project conditions and have deficient operations for at least one peak hour:

- Holman Road/Morada Lane (Intersection 12) – AM peak hour

The intersection of Cherbourg Way/Morada Lane/Project Roadway Access #4 is not considered deficient because the intersection would operate at LOS C or better under traffic signal control. As a two-lane roundabout, the eastbound Morada Lane approach, including the eastbound left-turn into the Project site, is anticipated to operate at LOS F during the AM peak hour. As a two-lane roundabout, the operations of the intersection would not be consistent with the City's LOS policy under Cumulative Plus Project conditions.

The intersection of Fox Creek Drive/Morada Lane/Project Roadway Access #5 is not considered deficient based on the City of Stockton TIA Guidelines even though the northbound approach operates at LOS F under Cumulative Plus Project conditions. Northbound traffic can reasonably access Morada Lane via the traffic signal at the intersection of Cherbourg Way/Morada Lane. Intersection LOS calculation worksheets are provided in **Appendix K**.

**Table 6-3. Cumulative and Cumulative Plus Project Intersection Levels of Service**

| Intersection | | Control[1] | Peak Hour | Cumulative No Project | | Cumulative Plus Project | |
|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay |
| 1 | West Lane / Eight Mile Road | Signal | AM | C | 35 | D | 38 |
| | | | PM | D | 36 | D | 42 |
| 2 | West Lane / Project Roadway Access #1 | (Signal Project) | AM | n/a | n/a | A | 9 |
| | | | PM | n/a | n/a | B | 17 |
| 3 | West Lane / Project Roadway Access #2 | SSSC | AM | n/a | n/a | A (C) | 1 (17) |
| | | | PM | n/a | n/a | A (D) | 1 (26) |
| 4 | West Lane / Morada Lane | Signal | AM | **F** | **129** | **E** | **68** |
| | | | PM | **F** | **121** | D | 48 |
| 5 | West Lane / West Lane Frontage | Signal | AM | D | 46 | D | 54 |
| | | | PM | B | 19 | C | 21 |
| 6 | West Lane / Knickerbocker Drive | Signal | AM | C | 22 | C | 25 |
| | | | PM | C | 22 | C | 31 |
| 7 | West Lane / Hammer Lane | Signal | AM | D | 52 | E | 56 |
| | | | PM | E | 56 | E | 62 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | SSSC [Signal] {RAB} | AM | A **(F)** | 8 (>100) | [B] {B (C)} | [18] [11 (17)] |
| | | | PM | A (D) | 1 (33) | [B] {A (A)} | [14] {9 (11)} |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | SSSC [Signal] {RAB} | AM | A **(F)** | 7 (>100) | [C] {D **(F)**} | [29] {32 **(53)**} |
| | | | PM | A **(F)** | 4 (63) | [C] {B (C)} | [21] {14 (20)} |
| 10 | Fox Creek Drive / Morada Lane / Project Roadway Access #5 | SSSC | AM | C **(F)** | 19 (>100) | F (F) | 96 (>100) |
| | | | PM | A **(F)** | 6 (>100) | D (F) | 30 (>100) |
| 11 | Glacier Point Drive / Morada Lane | Signal | AM | D | 39 | D | 46 |
| | | | PM | B | 17 | B | 18 |
| 12 | Holman Road / Morada Lane | Signal | AM | D | 42 | **E** | **61** |
| | | | PM | C | 28 | C | 35 |
| 13 | Maranatha Drive / Morada Lane | Signal | AM | B | 11 | B | 12 |
| | | | PM | B | 11 | B | 11 |
| 14 | Diamond Bar Place / Morada Lane | Signal | AM | C | 22 | C | 21 |
| | | | PM | C | 33 | D | 36 |
| 15 | West Lane / Marlette Road | Signal | AM | D | 45 | D | 47 |
| | | | PM | C | 33 | D | 36 |

Notes:
1. SSSC = side-street stop-controlled intersection. For SSSC and Roundabout (RAB) intersections, LOS/delay is presented as: Intersection Average (Worst Movement).

Deficient intersection operations based on the City of Stockton General Plan are noted in **bold text**.
Source: BTC, 2024.

## 6.4 CUMULATIVE CONDITIONS VEHICLE QUEUES

Cumulative 95th percentile vehicle queues are presented for turn pockets at signalized study intersections in **Table 6-4**. The addition of Project traffic is projected to cause the following locations to exceed available storage and increase vehicle queue lengths by more than 25 feet:

- West Lane/Eight Mile Road (Intersection 1)
- West Lane/Hammer Lane (Intersection 7)
- Holman Road/Morada Lane (Intersection 12)

Queuing analysis worksheets provided in **Appendix L** show the 95th percentile queues for all movements at signalized intersections.

**Table 6-4. Cumulative Plus Project 95th Percentile Queue Lengths**

| Intersection | | Movement[1] | Cumulative[2] | | | Cumulative Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | 253 | **313** | 240 | 253 | **313** |
| | | EBR | 240 | **271** | 238 | 240 | **333** | **348** |
| | | WBL | 165 | **179** | **223** | 165 | **185** | **243** |
| | | WBR | 165 | 0 | 0 | 165 | 0 | 0 |
| | | NBL | 375 | 166 | 204 | 375 | 216 | 239 |
| | | NBR | 375 | 62 | 60 | 375 | 64 | 61 |
| | | SBL | 410 | 78 | 36 | 410 | 78 | 36 |
| | | SBR | 410 | 55 | 18 | 410 | 55 | 18 |
| 2 | West Lane / Project Roadway Access #1 | WBL | N/A | | | 300 | 87 | 64 |
| | | NBR | | | | 250 | 14 | 34 |
| | | SBL | | | | 340 | 63 | 147 |
| 4 | West Lane / Morada Lane | EBL | 400 | 259 | 228 | 400 | 381 | 206 |
| | | EBR | 400 | 328 | 63 | 400 | 197 | 58 |
| | | WBL | 250 | **430** | **461** | 450 | 432 | 334 |
| | | WBR | N/A | | | 300 | 65 | 93 |
| | | NBL | 300 | **506** | 297 | 300 | **339** | 275 |
| | | NBR | 300 | 88 | 123 | 300 | 156 | 251 |
| | | SBL | 320 | **419** | 312 | 320 | **320** | 192 |
| | | SBR | 320 | 93 | 58 | 320 | 77 | 55 |

| Intersection | | Movement[1] | Cumulative[2] | | | Cumulative Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 5 | West Lane / West Lane Frontage | EBR | 50 | **98** | 46 | 50 | **100** | 49 |
| | | WBR | 50 | 0 | 0 | 50 | 0 | 0 |
| | | NBL | 415 | 256 | 178 | 415 | 256 | 182 |
| | | SBL | 400 | 106 | 64 | 400 | 106 | 66 |
| 6 | West Lane / Knickerbocker Drive | EBL | 230 | 135 | 120 | 230 | 141 | 142 |
| | | WBL | 70 | **227** | **180** | 70 | **227** | **182** |
| | | NBL | 275 | 56 | 113 | 275 | 56 | 115 |
| | | NBR | 130 | 0 | 0 | 130 | 0 | 0 |
| | | SBL | 260 | 242 | 173 | 260 | 257 | 191 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **296** | **434** | 265 | **310** | **532** |
| | | EBR | 265 | 110 | 102 | 265 | 111 | 100 |
| | | WBL | 340 | **436** | 311 | 340 | **436** | 323 |
| | | WBR | 190 | 101 | 131 | 190 | 124 | 154 |
| | | NBL | 390 | 236 | **424** | 390 | 236 | **424** |
| | | NBR | 390 | 62 | 68 | 390 | 62 | 68 |
| | | SBL | 390 | 257 | 198 | 390 | 308 | 236 |
| | | SBR | 330 | 79 | 76 | 330 | 155 | 135 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | EBL | N/A | | | 300 | 28 | 69 |
| | | WBL | | | | 300 | 86 | 64 |
| | | WBR | | | | 250 | 0 | 33 |
| | | SBL | | | | 250 | 109 | 84 |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | EBL | N/A | | | 350 | 51 | 139 |
| | | WBL | | | | 350 | 185 | 117 |
| | | WBR | | | | 250 | 0 | 40 |
| | | SBL | | | | 300 | 227 | 172 |
| 11 | Glacier Point Drive / Morada Lane | EBL | 310 | 231 | 62 | 310 | 231 | 62 |
| | | WBL | 215 | 203 | 73 | 215 | 203 | 73 |
| | | WBR | 590 | 70 | 0 | 590 | 70 | 0 |
| | | NBL | 100 | **279** | 73 | 100 | **279** | 73 |
| | | SBL | 230 | **305** | 128 | 230 | **305** | 128 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **419** | **261** | 250 | **496** | **290** |
| | | EBR | 225 | 155 | 55 | 225 | **252** | 60 |
| | | WBL | 300 | 270 | 219 | 300 | 270 | 219 |

| Intersection | | Movement[1] | Cumulative[2] | | | Cumulative Plus Project[2] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| | | WBR | 215 | 90 | 74 | 215 | 127 | 167 |
| | | NBL | 315 | **354** | 248 | 315 | **376** | **336** |
| | | NBR | 215 | 51 | 63 | 215 | 51 | 63 |
| | | SBL | 300 | **549** | 253 | 300 | **549** | 253 |
| | | SBR | 225 | 84 | 57 | 225 | 86 | 62 |
| 13 | Maranatha Drive / Morada Lane | EBL | 300 | 92 | 100 | 300 | 91 | 105 |
| | | WBL | 310 | 87 | 129 | 310 | 88 | 135 |
| | | NBL | 100 | 100 | 39 | 100 | 100 | 41 |
| | | NBR | 100 | 39 | 39 | 100 | 39 | 41 |
| | | SBL | 90 | 77 | 62 | 90 | 77 | 65 |
| | | SBR | 90 | 40 | 12 | 90 | 41 | 12 |
| 14 | Diamond Bar Place / Morada Lane | EBL | 180 | **217** | **256** | 180 | **217** | **256** |
| | | WBL | 100 | 39 | 83 | 100 | 39 | 83 |
| | | NBL | 65 | **92** | 51 | 65 | **92** | 51 |
| | | NBR | 65 | 0 | 0 | 65 | 0 | 0 |
| | | SBL | 150 | 88 | **174** | 150 | 88 | **174** |
| 15 | West Lane / Marlette Rd | EBL | 400 | 244 | 240 | 400 | 244 | 240 |
| | | EBR | 400 | 215 | 72 | 400 | 215 | 72 |
| | | WBL | 400 | 299 | 235 | 400 | 299 | 235 |
| | | NBL | 400 | 104 | 215 | 400 | 104 | 215 |
| | | NBR | 400 | 21 | 37 | 400 | 21 | 37 |
| | | SBL | 400 | 74 | 82 | 400 | 74 | 82 |
| | | SBR | 400 | 39 | 42 | 400 | 39 | 42 |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.
Source: BTC, 2024.

# 7. PROJECT SITE ACCESS AND CIRCULATION

Site access and internal circulation for vehicles, pedestrians, and bicycles was evaluated based on the site plan presented on **Figure 1-1**.

## 7.1 VEHICULAR SITE ACCESS AND CIRCULATION

As discussed earlier in the report vehicular access to the Project site would be provided from the following locations:

- West Lane / Project Roadway Access #1 (Intersection 2)
- West Lane / Project Roadway Access #2 (Intersection 3)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)
- Fox Creek Drive / Morada Lane / Project Roadway Access #5 (Intersection 10)

### 7.1.1 TRAFFIC SIGNAL OR SIDE-STREET STOP CONTROL AT PROJECT ROADWAY ACCESS LOCATIONS

All movements into and out of the Project site are anticipated to operate at LOS D or better under all analysis scenarios assuming a traffic signal at Intersection 2, 8, and 9 and side-street stop control at Intersection 3 and 10. Furthermore, adequate vehicle storage would be provided at the site access locations to accommodate the 95$^{th}$ percentile vehicle queues, and adequate deceleration lane lengths are proposed for the left-turn and right-turn lanes on West Lane and Morada Lane. **Table 7-1** compares the proposed deceleration lane lengths and vehicle storage against the guidance presented in the Caltrans *Highway Design Manual* (HDM). West Lane has a posted speed limit of 55 mph and Morada Lane has a posted speed limit of 45 mph.

**Table 7-1. Vehicle Storage and Deceleration Lane Length Comparison**

| Intersection | | Movement[1] | Proposed (feet) | | | HDM (feet) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Taper | Vehicle Storage and Deceleration Lane | Total | Taper | Vehicle Storage and Deceleration Lane[2] | Total |
| 2 | West Lane / Project Roadway Access #1 | NBR | 120 | 250 | 370 | 120 | 229 | 349 |
| | | SBL | 120 | 340 | 460 | 120 | 342 | 462 |
| 3 | West Lane / Project Roadway Access #2 | NBR | 120 | 200 | 320 | 120 | 195 | 315 |
| 8 | Caywood Drive / Morada Lane / Project Roadway Access #3 | EBL | 90 | 300 | 390 | 90 | 214 | 304 |
| | | WBL | 90 | 300 | 390 | 90 | 232 | 322 |
| | | WBR | 90 | 250 | 340 | 90 | 181 | 271 |
| 9 | Cherbourg Way / Morada Lane / Project Roadway Access #4 | EBL | 90 | 350 | 440 | 90 | 284 | 374 |
| | | WBL | 90 | 350 | 440 | 90 | 334 | 424 |
| | | WBR | 90 | 250 | 340 | 90 | 185 | 275 |
| 10 | Fox Creek Drive / Morada Lane | EBL | 90 | 250 | 340 | 90 | 195 | 285 |
| | | WBL | 90 | 250 | 340 | 90 | 245 | 335 |
| | | WBR | 90 | 250 | 340 | 90 | 195 | 285 |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. Vehicle storage is equal to the maximum 95$^{th}$ percentile queue reported for that movement under Cumulative Plus Project conditions. Deceleration lane length assumes partial deceleration (15 mph) is permitted in the through lanes per HDM.

Source: BTC, 2024.

### 7.1.2 ROUNDABOUTS AT PROJECT ROADWAY ACCESS #3 AND #4

In addition to a traffic signal, a two-lane roundabout is also under consideration at Project Roadway Access #3 and #4 (Intersection 8 and 9). Under Existing Plus Project and Background Plus Project conditions, all movements into and out of the Project site are anticipated to operate at LOS D or better. However, under Cumulative Plus Project conditions, the eastbound Morada Lane approach at Intersection 9, including the eastbound left-turn into the Project site, is anticipated to operate at LOS F during the AM peak hour. As a two-lane roundabout, the operations of Intersection 9 would not be consistent with the City's LOS policy under Cumulative Plus Project conditions.

### 7.1.3 INTERNAL VEHICLE CIRCULATION

All internal local residential roadways are proposed to have a 54' right-of-way (ROW) with a curb-to-curb width of 34 feet that would accommodate two travel lanes (one lane in each direction). All internal collector roadways are proposed to have a 56' ROW with a curb-to-curb width of 26 feet that would

accommodate two travel lanes (one lane in each direction). The major project roadways providing access to West Lane (intersection 2) or Morada Lane (intersections 8, 9, and 10) are proposed to have a 96′ ROW and can accommodate four travel lanes (two lanes in each direction). The proposed internal roadway designs are consistent with City of Stockton street design standards.

Average daily traffic (ADT) volumes are presented in **Figure 7-1** for selected roadway locations within the Project site. These selected locations are representative of the range of ADT volumes that can be expected within the Project. **Figure 7-1** also presents total daily volume arriving at several internal intersections. The typical capacity of a two-lane collector roadway is about 13,200 daily vehicles based on the City of Stockton General Plan. The typical capacity of a four-way all-way stop controlled intersection with one lane on all approaches is about 13,500 daily vehicles while a single lane roundabout can accommodate about 20,000 daily vehicles based on HCM. The proposed internal roadway designs would provide adequate vehicular capacity to accommodate Project traffic.

## 7.2 PEDESTRIAN AND BICYCLE CIRCULATION

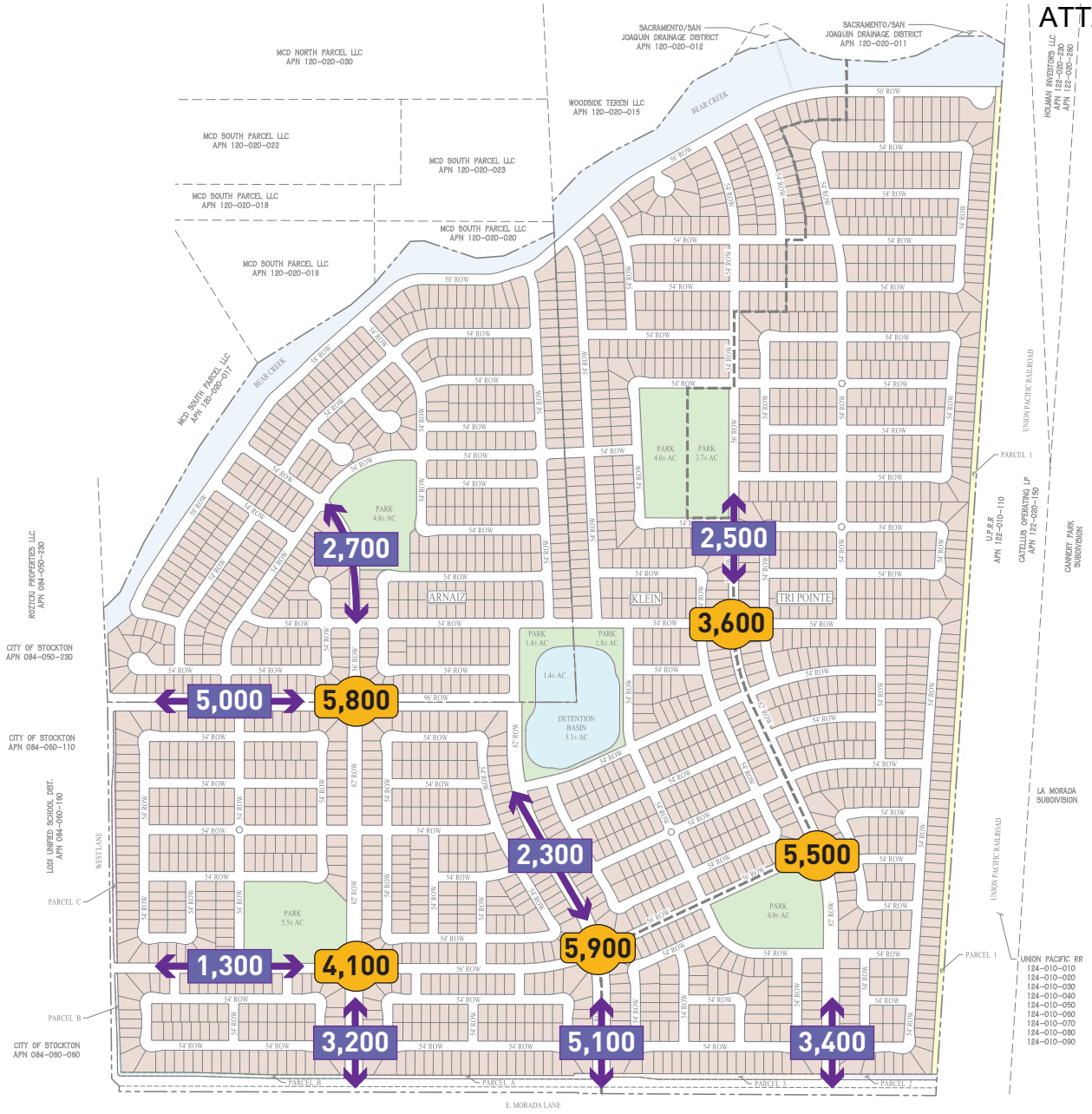
All internal project roadways will have at a minimum 5′ sidewalk on either side of the street. In some cases, an 8′ meandering sidewalk is proposed as shown in **Figure 7-2**. There will be no gaps in the pedestrian circulation system and pedestrian access will be provided to West Lane and Morada Lane via the project roadway access points.

**Figure 7-2** also presents the bicycle facilities that will be provided by the Project. These include:

- 12′ multi-use pedestrian path along Bear Creek
- 11′ one-way separated bikeway (Class IV) on West Lane along the Project frontage
- 5′ bike lane (Class II) on Morada Lane along the Project frontage

The proposed bicycle facilities are consistent with the *City Stockton Bicycle Master Plan* (2017).

ATTACHMENT E




*Site Plan Source: Carlson, Barbee & Gibson, Inc., February 20, 2024.*

# Roadway ADT Volume (Both Directions)

# Total Intersection ADT Volume

BTC

Figure 7-1

## Average Daily Traffic (ADT) Volume on Internal Project Roadways

*Site Plan Source: Carlson, Barbee & Gibson, Inc., February 16, 2024.*

Figure 7-2

# Pedestrian and Bicycle Circulation Plan

# 8. CEQA TRANSPORTATION ANALYSIS

Based on the definitions and determining factors outlined in the CEQA Appendix G Environmental Checklist Form, the Project would have a significant impact on the environment if the Project would:

A. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit roadway, bicycle, and pedestrian facilities.

B. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

C. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

D. Result in inadequate emergency access.

## 8.1 PROGRAMS, PLANS, ORDINANCES AND POLICIES

The TIA Guidelines includes a list of significance criteria consistent with policies set in the *Envision Stockton 2040 General Plan* (2018) and *City of Stockton Bicycle Master Plan* (2017).

### 8.1.1 ROADWAY SYSTEM

#### *8.1.1.1 TRAFFIC SIGNAL WARRANTS*

The Project would create a significant impact related to the roadway system if:

*At unsignalized intersections, the project results in any of the traffic signal warrants included in the CA Manual on Uniform Traffic Control Devices (MUTCD) to be satisfied, or for a location where any of the warrants are satisfied prior to the project, the project increases overall travel through the intersection.*

##### 8.1.1.1.1 EXISTING PLUS PROJECT CONDITIONS

The addition of Project traffic causes the signal warrant to be satisfied at the following intersections.

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The Project proposes to signalize intersections 2, 8, and 9; therefore, Project's impact to traffic signal warrants is considered ***less-than-significant***.

#### 8.1.1.1.2 BACKGROUND PLUS PROJECT CONDITIONS

The addition of Project traffic causes the signal warrant to be satisfied at the following intersections.

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The Project proposes to signalize intersections 2, 8, and 9; therefore, Project's impact to traffic signal warrants is considered ***less-than-significant***.

#### 8.1.1.1.3 CUMULATIVE PLUS PROJECT CONDITIONS

The addition of Project traffic causes the signal warrant to be satisfied at the following intersections.

- West Lane / Project Roadway Access #1 (Intersection 2)
- Caywood Drive / Morada Lane / Project Roadway Access #3 (Intersection 8)
- Cherbourg Way / Morada Lane / Project Roadway Access #4 (Intersection 9)

The Project proposes to signalize intersections 2, 8, and 9; therefore, Project's impact to traffic signal warrants is considered ***less-than-significant***.

### *8.1.1.2 95TH PERCENTILE QUEUES*

The Project would create a significant impact related to the roadway system if:

*The Project creates the potential for 95th percentile vehicle queues that exceed available storage and could periodically block or interfere with pedestrian, bicycle, or transit facilities.*

#### 8.1.1.2.1 EXISTING PLUS PROJECT CONDITIONS

*The addition of Project traffic, under Existing Plus Project conditions, causes the 95th percentile queue to exceed available storage and increases vehicle queue lengths by more than 25 feet at the following locations.*

***Impact TR-1***: West Lane/Eight Mile Road (Intersection 1) – During the AM and/or PM peak hour several turning movements (eastbound right, westbound left, and northbound left) exceed available storage and the 95th percentile queue increases by more than 25 feet with the addition of Project traffic. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Existing Plus Project conditions.

***Mitigation Measure TR-1****: The applicant shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to construct a second 375' northbound left-turn lane (with a second receiving lane on westbound Eight Mile Road) and the cost to modify the signal timing at the intersection of West Lane/Eight Mile Road (Intersection 1) to better accommodate changed travel patterns with the Project.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Existing without Project Conditions, as shown in **Table 8-1**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton in coordination with San Joaquin County will modify the intersection lane configuration, the impact could remain ***significant and unavoidable***.

***Impact TR-2***: West Lane/Knickerbocker Drive (Intersection 6) – During the AM peak hour the southbound left-turn would exceed the available storage with the addition of Project traffic. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Existing Plus Project conditions.

***Mitigation Measure TR-2****: The applicant shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to modify the signal timing at the intersection of West Lane/Knickerbocker Drive (Intersection 6) to better accommodate changed travel patterns with the Project.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Existing without Project Conditions, as shown in **Table 8-1**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the traffic signal timing, this impact could remain ***significant and unavoidable***.

***Impact TR-3***: West Lane/Hammer Lane (Intersection 7) – During the AM and PM peak hour the eastbound left-turn exceeds the available storage and the 95$^{th}$ percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Existing Plus Project conditions.

***Mitigation Measure TR-3****: The applicant shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to modify the signal timing at the intersection of West Lane/Hammer Lane (Intersection 7) to better accommodate changed travel patterns with the Project.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Existing without Project Conditions, as shown in **Table 8-1**, and reduce the Project impact

to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the traffic signal timing, this impact could remain ***significant and unavoidable***.

***Impact TR-4***: Holman Road/Morada Lane (Intersection 12) – During the AM peak hour the eastbound left-turn and northbound left-turn lane exceeds the available storage and the 95$^{th}$ percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Existing Plus Project conditions.

***Mitigation Measure TR-4****: The applicant shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to restripe one eastbound through lane to an eastbound left-turn lane and restripe one northbound through lane to a northbound left-turn lane and the cost to modify the signal timing at the intersection of Holman Road/Morada Lane (Intersection 12) to better accommodate changed travel patterns with the Project.*

The implementation of this measure would reduce the queue lengths to fall within the available vehicle storage or be better than Existing without Project Conditions, as shown in **Table 8-1**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the intersection lane configuration, this impact could remain ***significant and unavoidable***.

Queuing analysis worksheets provided in **Appendix M** show the 95$^{th}$ percentile queues for all movements at signalized intersections.

**Table 8-1. Existing Plus Project With Mitigation 95th Percentile Queue Lengths**

| Intersection | | Movement | Existing | | | Existing Plus Project | | | Existing Plus Project With Mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | 196 | **273** | 240 | 200 | **293** | 240 | 152 | 233 |
| | | EBR | 240 | **311** | 174 | 240 | **337** | **244** | 240 | 180 | 84 |
| | | WBL | 165 | **254** | 136 | 165 | **267** | **178** | 165 | **200** | 142 |
| | | NBL | 375 | **432** | **441** | 375 | **613** | **598** | 375 | 184 | 187 |
| | | SBL | 410 | 85 | 36 | 410 | 87 | 38 | 410 | 70 | 32 |
| 6 | West Lane / Knickerbocker Drive | EBL | 140 | **196** | **168** | 140 | **208** | **218** | 140 | **186** | **161** |
| | | WBL | 70 | **227** | **182** | 70 | **227** | **185** | 70 | **217** | **179** |
| | | NBL | 275 | 56 | 113 | 275 | 56 | 114 | 275 | 54 | 111 |
| | | NBR | 130 | 0 | 3 | 130 | 0 | 3 | 130 | 0 | 4 |
| | | SBL | 260 | 259 | 179 | 260 | **281** | 194 | 260 | 259 | 188 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **289** | **439** | 265 | **328** | **545** | 265 | **287** | **421** |
| | | EBR | 265 | 92 | 103 | 265 | 92 | 103 | 265 | 91 | 70 |
| | | WBL | 340 | **480** | 328 | 340 | **494** | 328 | 340 | **372** | 324 |
| | | WBR | 190 | 108 | 91 | 190 | 113 | 116 | 190 | 78 | 83 |
| | | NBL | 390 | 197 | **420** | 390 | 200 | **420** | 390 | 219 | **400** |
| | | NBR | 390 | 62 | 96 | 390 | 62 | 99 | 390 | 61 | 67 |
| | | SBL | 390 | 173 | 164 | 390 | 205 | 185 | 390 | 218 | 179 |
| | | SBR | 330 | 129 | 109 | 330 | 224 | 177 | 330 | 83 | 80 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **277** | 193 | 250 | **319** | 220 | 250 | 148 | 104 |
| | | EBR | 225 | 67 | 51 | 225 | 140 | 57 | 225 | 157 | 47 |
| | | WBL | 300 | 252 | 208 | 300 | 252 | 212 | 300 | 251 | 195 |
| | | WBR | 215 | 60 | 59 | 215 | 67 | 90 | 215 | 56 | 49 |
| | | NBL | 315 | **357** | 199 | 315 | **393** | 264 | 315 | 154 | 120 |
| | | NBR | 215 | 47 | 58 | 215 | 47 | 58 | 215 | 36 | 54 |
| | | SBL | 300 | **319** | 170 | 300 | **319** | 173 | 300 | **311** | 158 |
| | | SBR | 225 | 72 | 47 | 225 | 73 | 55 | 225 | 66 | 40 |

Notes:
1. Northbound = NB, Southbound = SB, Eastbound = EB, Westbound = WB, L = Left turn, R = Right turn.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

#### 8.1.1.2.2 BACKGROUND PLUS PROJECT CONDITIONS

*The addition of Project traffic, under Background Plus Project conditions, causes the 95th percentile queue to exceed available storage and increases vehicle queue lengths by more than 25 feet at the following locations.*

***Impact TR-5***: West Lane/Eight Mile Road (Intersection 1) – During the AM and/or PM peak hour several turning movements (westbound left and northbound left) exceed available storage and the 95th percentile queue increases by more than 25 feet with the addition of Project traffic. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Background Plus Project conditions.

***Mitigation Measure TR-5****: Implement Mitigation Measure TR-1.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Background No Project Conditions, as shown in **Table 8-2**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton in coordination with San Joaquin County will modify the intersection lane configuration, the impact could remain ***significant and unavoidable***.

***Impact TR-6***: West Lane/Knickerbocker Drive (Intersection 6) – During the AM peak hour the southbound left-turn would exceed the available storage with the addition of Project traffic. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Background Plus Project conditions.

***Mitigation Measure TR-6****: Implement Mitigation Measure TR-2.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Background No Project Conditions, as shown in **Table 8-2**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the traffic signal timing, this impact could remain ***significant and unavoidable***.

***Impact TR-7***: West Lane/Hammer Lane (Intersection 7) – During the AM peak hour the eastbound left-turn and westbound left-turn lane exceeds the available storage and the 95th percentile queue increases by more than 25 feet. During the PM peak hour the eastbound left-turn, westbound left-turn, and northbound left-turn lane exceeds the available storage and the 95th percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Background Plus Project conditions.

***Mitigation Measure TR-7****: Implement Mitigation Measure TR-3.*

The implementation of this measure would reduce the queue lengths to fall within the available storage or be better than Background No Project Conditions, as shown in **Table 8-2**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the traffic signal timing, this impact could remain ***significant and unavoidable***.

***Impact TR-8***: Holman Road/Morada Lane (Intersection 12) – During the AM peak hour the eastbound left-turn and northbound left-turn lane exceeds the available storage and the 95th percentile queue increases by more than 25 feet. During the PM peak hour the eastbound left-turn exceeds the available storage and the 95th percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Background Plus Project conditions.

***Mitigation Measure TR-8****: Implement Mitigation Measure TR-4.*

The implementation of this measure would reduce the queue lengths to fall within the available vehicle storage or be better than Background No Project Conditions, as shown in **Table 8-2**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton will modify the intersection lane configuration, this impact could remain ***significant and unavoidable***.

Queuing analysis worksheets provided in **Appendix N** show the 95th percentile queues for all movements at signalized intersections.

**Table 8-2. Background Plus Project With Mitigation 95th Percentile Queue Lengths**

| Intersection | | Movement | Background | | | Background Plus Project | | | Background Plus Project With Mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | **245** | **286** | 240 | **245** | **286** | 240 | 234 | **271** |
| | | EBR | 240 | 88 | 71 | 240 | 112 | 78 | 240 | 109 | 75 |
| | | WBL | 165 | **286** | **255** | 165 | **297** | **294** | 165 | **285** | **280** |
| | | WBR | 165 | 0 | 0 | 165 | 0 | 0 | 165 | 0 | 0 |
| | | NBL | 375 | 323 | 334 | 375 | **418** | **395** | 375 | 155 | 150 |
| | | NBR | 375 | 20 | 19 | 375 | 34 | 27 | 375 | 35 | 28 |
| | | SBL | 410 | 75 | 32 | 410 | 75 | 32 | 410 | 73 | 31 |
| | | SBR | 410 | 34 | 7 | 410 | 34 | 7 | 410 | 34 | 8 |

| Intersection | | Movement | Background | | | Background Plus Project | | | Background Plus Project With Mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 6 | West Lane / Knickerbocker Drive | EBL | 230 | 196 | 168 | 230 | 208 | 218 | 230 | 186 | 218 |
| | | WBL | 70 | **227** | **182** | 70 | **227** | **185** | 70 | **217** | **185** |
| | | NBL | 275 | 56 | 113 | 275 | 56 | 114 | 275 | 54 | 114 |
| | | NBR | 130 | 0 | 3 | 130 | 0 | 3 | 130 | 0 | 3 |
| | | SBL | 260 | 259 | 179 | 260 | **281** | 194 | 260 | 259 | 194 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **330** | **447** | 265 | **403** | **614** | 265 | **289** | **426** |
| | | EBR | 265 | 96 | 102 | 265 | 102 | 109 | 265 | 95 | 71 |
| | | WBL | 340 | **532** | 335 | 340 | **592** | **380** | 340 | **375** | 327 |
| | | WBR | 190 | 113 | 91 | 190 | 126 | 125 | 190 | 79 | 83 |
| | | NBL | 390 | 210 | **429** | 390 | 227 | **479** | 390 | 221 | **403** |
| | | NBR | 390 | 61 | 96 | 390 | 60 | 178 | 390 | 61 | 67 |
| | | SBL | 390 | 187 | 167 | 390 | 234 | 185 | 390 | 219 | 179 |
| | | SBR | 330 | 130 | 109 | 330 | 226 | 177 | 330 | 83 | 79 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **325** | 236 | 250 | **389** | **264** | 600 | 177 | 126 |
| | | EBR | 225 | 68 | 51 | 225 | 151 | 56 | 225 | 199 | 78 |
| | | WBL | 300 | 252 | 212 | 300 | 252 | 217 | 300 | 261 | 199 |
| | | WBR | 215 | 73 | 73 | 215 | 94 | 140 | 215 | 69 | 117 |
| | | NBL | 315 | **364** | 208 | 315 | **400** | 279 | 600 | 169 | 127 |
| | | NBR | 215 | 47 | 62 | 215 | 47 | 62 | 215 | 21 | 62 |
| | | SBL | 300 | **597** | 246 | 300 | **597** | 264 | 300 | **551** | 229 |
| | | SBR | 225 | 77 | 53 | 225 | 79 | 60 | 225 | 72 | 56 |

Notes:
1. EB=eastbound, WB=westbound, NB=northbound, SB=southbound. L=left, R=right.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

### 8.1.1.2.3 CUMULATIVE PLUS PROJECT CONDITIONS

*The addition of Project traffic, under Cumulative Plus Project conditions, causes the 95th percentile queue to exceed available storage and increases vehicle queue lengths by more than 25 feet at the following locations.*

***Impact TR-9***: West Lane/Eight Mile Road (Intersection 1) – During the AM and PM peak hour the eastbound right-turn lane exceeds the available storage and the 95th percentile queue increases by more

than 25 feet with the addition of Project traffic. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Cumulative Plus Project conditions.

***Mitigation Measure TR-9****: The applicant shall pay all local and regional transportation impact fees that help fund periodic traffic signal and intersection modifications by the responsible agency and shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to make modifications and improvements at this intersection.*

Extending the eastbound right-turn lane to provide 350 feet of vehicle storage would accommodate the queue length, as shown in **Table 8-3**, and reduce the Project impact to a ***less-than-significant*** level. However, as payment of a fee does not guarantee that the City of Stockton in coordination with San Joaquin County will implement the improvement, the impact could remain ***significant and unavoidable***.

***Impact TR-10***: West Lane/Hammer Lane (Intersection 7) – During the PM peak hour the eastbound left-turn exceeds the available storage and the 95$^{th}$ percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Cumulative Plus Project conditions.

***Mitigation Measure TR-10****: Implement Mitigation Measure TR-9.*

Modification of this intersection to restripe one eastbound through lane to a left-turn lane would reduce the queue lengths to fall within the available storage or be better than Cumulative No Project Conditions, as shown in **Table 8-3**, and reduce the Project impact to a ***less-than-significant*** level. The intersection LOS would remain at LOS E during the AM and PM peak hour. However, as payment of a fee does not guarantee that the City of Stockton will modify the intersection lane configuration, this impact could remain ***significant and unavoidable***.

***Impact TR-11***: Holman Road/Morada Lane (Intersection 12) – During the AM peak hour the eastbound left-turn and right-turn lane exceed the available storage and the 95$^{th}$ percentile queue increases by more than 25 feet. During the PM peak hour, the eastbound left-turn and northbound left-turn lane exceed the available storage and the 95$^{th}$ percentile queue increases by more than 25 feet. Based on the *City of Stockton TIA Guidelines*, this is considered a ***significant impact*** under Cumulative Plus Project conditions.

***Mitigation Measure TR-11****: Implement Mitigation Measure TR-9.*

Modification of this intersection to restripe one through lane to a left-turn lane on all approaches would reduce the queue lengths to fall within the available storage or be better than Cumulative No Project Conditions, as shown in **Table 8-3**, and reduce the Project impact to a ***less-than-significant*** level.

However, as payment of a fee does not guarantee that the City of Stockton will modify the intersection lane configuration, this impact could remain ***significant and unavoidable***.

Queuing analysis worksheets provided in **Appendix O** show the 95th percentile queues for all movements at signalized intersections.

**Table 8-3. Cumulative Plus Project With Mitigation 95th Percentile Queue Lengths**

| Intersection | | Movement | Cumulative | | | Cumulative Plus Project | | | Cumulative Plus Project With Mitigation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour | Storage Length (feet) | AM Peak Hour | PM Peak Hour |
| 1 | West Lane / Eight Mile Road | EBL | 240 | 253 | **313** | 240 | 253 | **313** | 240 | 253 | **313** |
| | | EBR | 240 | **271** | 238 | 240 | **333** | **348** | 350 | 333 | 348 |
| | | WBL | 165 | **179** | **223** | 165 | **185** | **243** | 165 | **185** | **243** |
| | | WBR | 165 | 0 | 0 | 165 | 0 | 0 | 165 | 0 | 0 |
| | | NBL | 375 | 166 | 204 | 375 | 216 | 239 | 375 | 216 | 239 |
| | | NBR | 375 | 62 | 60 | 375 | 64 | 61 | 375 | 64 | 61 |
| | | SBL | 410 | 78 | 36 | 410 | 78 | 36 | 410 | 78 | 36 |
| | | SBR | 410 | 55 | 18 | 410 | 55 | 18 | 410 | 55 | 18 |
| 7 | West Lane / Hammer Lane | EBL | 265 | **296** | **434** | 265 | **310** | **532** | 600 | 209 | 287 |
| | | EBR | 265 | 110 | 102 | 265 | 111 | 100 | 265 | 115 | 133 |
| | | WBL | 340 | **436** | 311 | 340 | **436** | 323 | 340 | **436** | 323 |
| | | WBR | 190 | 101 | 131 | 190 | 124 | 154 | 190 | 117 | 154 |
| | | NBL | 390 | 236 | **424** | 390 | 236 | **424** | 390 | 236 | **424** |
| | | NBR | 390 | 62 | 68 | 390 | 62 | 68 | 390 | 62 | 68 |
| | | SBL | 390 | 257 | 198 | 390 | 308 | 236 | 390 | 308 | 236 |
| | | SBR | 330 | 79 | 76 | 330 | 155 | 135 | 330 | 155 | 135 |
| 12 | Holman Road / Morada Lane | EBL | 250 | **419** | **261** | 250 | **496** | **290** | 250 | 188 | 142 |
| | | EBR | 225 | 155 | 55 | 225 | **252** | 60 | 225 | 191 | 65 |
| | | WBL | 300 | 270 | 219 | 300 | 270 | 219 | 300 | 127 | 103 |
| | | WBR | 215 | 90 | 74 | 215 | 127 | 167 | 215 | 120 | 150 |
| | | NBL | 315 | **354** | 248 | 315 | **376** | **336** | 315 | 208 | 161 |
| | | NBR | 215 | 51 | 63 | 215 | 51 | 63 | 215 | 18 | 55 |
| | | SBL | 300 | **549** | 253 | 300 | **549** | 253 | 300 | 280 | 118 |
| | | SBR | 225 | 84 | 57 | 225 | 86 | 62 | 225 | 163 | 64 |

Notes:
1. Northbound = NB, Southbound = SB, Eastbound = EB, Westbound = WB, L = Left turn, R = Right turn.
2. 95th percentile queue lengths that exceed the storage capacity are noted in **bold text**.

Source: BTC, 2024.

### 8.1.2 TRANSIT SYSTEM

The project would create a significant impact related to transit service if:

*The project disrupts an existing transit facility or service or interferes with the implementation of future transit service.*

The Project does not disrupt an existing transit facility or service and would not interfere with the implementation of future transit service; therefore, the Project's impact to transit is ***less-than-significant***.

### 8.1.3 BICYCLE SYSTEM

The project would create a significant impact related to the bicycle system if any of the following criteria are met:

- Disrupt existing bicycle facilities; or
- Interfere with planned bicycle facilities; or
- Cause other changes to the bicycle system that would be inconsistent with performance expectations established in adopted bicycle system plans, guidelines, policies, or standards.

The Project would provide the following along its frontage: 1) Class II bike lanes on Morada Lane and 2) one-way separated bikeway (Class IV) on West Lane. The proposed bicycle facilities are consistent with the *City of Stockton Bicycle Master Plan* (2017). The Project does not disrupt existing bicycle facilities, interfere with planned bicycle facilities, or propose any changes to the bicycle system that are inconsistent with adopted bicycle system plans; therefore, the Project's impact to the bicycle system is ***less-than-significant***.

### 8.1.4 PEDESTRIAN SYSTEM

The project would create a significant impact related to the pedestrian system if any of the following criteria are met:

- Disrupt existing pedestrian facilities; or
- Interfere with planned pedestrian facilities; or
- Cause other changes to the pedestrian system that would be inconsistent with performance expectations established in adopted pedestrian system plans, guidelines, policies, or standards, including the Americans with Disabilities Act (ADA).

There are currently no pedestrian facilities along the Project frontage. The Project would construct 8-foot sidewalk along the Project frontage on Morada Lane and West Lane, which is consistent with the City of Stockton Standard Plans and Specifications. The Project does not disrupt existing pedestrian facilities, interfere with planned pedestrian facilities, or propose any changes to the pedestrian system that would be inconsistent with pedestrian system policies, therefore the Project's impact to the pedestrian system is ***less-than-significant***.

## 8.2 VEHICLE MILES TRAVEL

For the purposes of CEQA, level of service cannot be used to determine a project's environmental impact; CEQA Guidelines Section §15064.3 requires Vehicle Miles of Travel (VMT) analysis for land use developments. The City of Stockton VMT impact analysis process is documented in the *City of Stockton Transportation Impact Analysis Guidelines* (Adopted May 2, 2023).

According to the City's TIA Guidelines, a project is relieved from VMT impact analysis if it meets one of the following screening criteria:

8. Within a Transit Priority Area (TPA);
9. Is 100% restricted affordable housing;
10. Small project (generating 110 trips or less per day);
11. Is a locally serving public facility that contributes and supports community needs;
12. Neighborhood-serving retail project less than 50,000 square feet;
13. Located within a low VMT area; or
14. For specific project types that are consistent with General Plan and zoning standards, and do not trigger and EIR such as:
    a. **Housing**: Residential projects within the City Limits that are consistent with all General Plan and zoning standards, are near transit (i.e., is within half a mile of a transit stop), or included as a housing capacity site needed to meet the City's fair share of Regional Housing Needs Allocation (RHNA), as outlined in the City's Housing Element.
    b. **General Plan and Zoning Consistency**: Projects that are:
        i. Consistent with the General Plan and Zoning that do not require a General Plan land use map amendment.
        ii. Do not require an EIR for project related impacts beyond the General Plan EIR.
        iii. Located within the Greater Downtown Planning area, as defined in the General Plan, and do not require a land use map amendment or EIR.

The Project meets screening criteria #7 (consistent with General Plan & zoning standards). The Project is consistent with the land use presented in the *Envision Stockton 2040 General Plan* (i.e., low density

residential with less than 6.1 units per gross acre). The Project is also located within a half-mile of two transit stops on West Lane. Based on the screening criteria the Project is presumed to not require additional CEQA VMT impact analysis.

## 8.3 GEOMETRIC DESIGN FEATURES

The Project would create a significant impact related to geometric design feature if it would:

*Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? This means that the project would cause a significant impact if the project adds demand to facilities that do not meet applicable design standards or if the project proposes transportation network modifications that are inconsistent with applicable design standards.*

Vehicular access to the Project site would be provided by two unsignalized and three signalized intersections that are designed to be perpendicular to the major streets. Parking is restricted on the major streets and there are no additional obstructions that would limit sight distance from the Project driveways. The Project would also provide turn pockets with adequate vehicle storage and deceleration lane distance. The Project does not propose any substandard design features, therefore the Project's impact to geometric design hazards is considered ***less-than-significant***.

## 8.4 EMERGENCY ACCESS

Several factors determine whether a project has adequate access for emergency vehicles, including the following:

1. Number of access points (both public and emergency access only)
2. Width of internal roadways
3. Turnarounds at dead-end streets

Emergency vehicle access to the Project site is provided from all five roadway access locations that are designed to accommodate emergency vehicles. Cross-sections for the proposed streets within the Project site were reviewed and all street sections provide a minimum of 20-feet of clearway (meaning no obstructions in terms of parked vehicles, landscaping, etc.), such that sufficient width is provided for emergency vehicle access and circulation. There are several dead-end streets provided within the residential development that measure less than 500' and provide 96-foot diameter cul-de-sacs. This meets the requirements of the California Fire Code. Emergency vehicle access to the Project site is consistent with Policy SAF-2.2 and Action SAF-2.2A of the General Plan. The Project's impact to emergency access is ***less-than-significant***.

# 9. LOCAL ROADWAY TRANSPORTATION ANALYSIS

The Local Transportation Study is prepared to provide information to decision-makers and the public, and to assist City staff in understanding what types of improvements should be considered as Conditions of Approval for the project, and to evaluate the Project's consistency with the City's General Plan LOS policy.

According to the TIA Guidelines, at a signalized intersection not located along a corridor with physical constraints that limit the improvements that can be constructed, a deficiency is identified:

- If the addition of project traffic causes a signalized intersection to perform at an unacceptable LOS E or F condition during a peak hour or,
- If the addition of project traffic exacerbates an existing LOS E or F condition by increasing the delay by 5 or more seconds.

At signalized intersections located along a corridor with physical constraints that limit the improvements that can be constructed,[6] a deficiency is identified:

- If the addition of project traffic causes a signalized intersection to perform at an unacceptable LOS F condition during a peak hour or,
- If the addition of project traffic exacerbates an existing LOS F condition by increasing the delay by 5 or more seconds.

For stop-controlled intersections, a deficiency is identified if:

- The addition of project traffic causes a stop-controlled intersection to perform at an unacceptable LOS E or F condition during a peak hour and causes the intersection to meet the CA MUTCD signal warrant criteria or,
- Exacerbates an existing LOS E or F condition by increasing the delay by 5 or more seconds and causes the intersection to meet the CA MUTCD signal warrant criteria.

[6] The Stockton General Plan notes that the intersection of West Lane/Hammer Lane is located along a corridor with physical constraints that limit the improvements that can be constructed. The LOS standard for this intersection is LOS E or better.

## 9.1 EXISTING PLUS PROJECT CONDITIONS

Under the Existing Plus Project scenario, the addition of Project traffic degrades operations below standards set by the City's General Plan LOS policy at the following intersections:

- West Lane / Eight Mile Road (Intersection 1)
- West Lane / West Lane Frontage (Intersection 5)

The following Conditions of Approvals (COA) would improve operations to acceptable or better than No Project conditions at the deficient intersections, as shown in **Table 9-1**.

**West Lane/Eight Mile Road (Intersection 1)** – The addition of Project traffic would degrade intersection operations from LOS D to E during the AM peak hour.

***Condition of Approval EX-1:*** *Implement Mitigation Measure TR-1.*

Modification of West Lane/Eight Mile Road (Intersection 1) to include a second northbound left-turn would improve operations to LOS D and LOS C during the AM and PM peak hour, respectively.

**West Lane/West Lane Frontage (Intersection 5)** – The addition of Project traffic would degrade intersection operations from LOS D to E during the AM peak hour.

***Condition of Approval EX-2:*** *The applicant shall pay a one-time only fee to the City of Stockton, prior to the City granting the last building occupancy, representing the Project's pro-rata share of the cost to construct a third northbound and southbound through lane and modify the signal timing at the intersection of West Lane/West Lane Frontage (Intersection 5) to better accommodate changed travel patterns with the Project.*

Modification of West Lane/West Lane Frontage (Intersection 5) to include a third northbound and southbound through lane would improve operations to LOS C and LOS B during the AM and PM peak hour, respectively. A third northbound and southbound through lane is consistent with the City's planned roadway improvement to widen West Lane to six lanes between Eight Mile Road and Hammer Lane.

Detailed intersection LOS calculation worksheets are presented in **Appendix P**.

**Table 9-1. Existing Plus Project With COA Intersection Levels of Service**

| Intersection | | Control | Peak Hour | Existing | | Existing Plus Project | | Existing Plus Project With COA | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay | LOS | Delay |
| 1 | West Lane / Eight Mile Road | Signal | AM | D | 44 | **E** | **55** | D | 41 |
| | | | PM | D | 35 | D | 53 | C | 33 |
| 5 | West Lane / West Lane Frontage | Signal | AM | D | 44 | **E** | **62** | C | 34 |
| | | | PM | B | 18 | C | 21 | B | 17 |

Notes:
Deficient intersection operations are noted in **bold text**.
Source: BTC, 2024.

## 9.2 BACKGROUND PLUS PROJECT CONDITIONS

Under the Background Plus Project scenario, the addition of Project traffic degrades operations below standards set by the City's General Plan LOS policy at the following intersection:

- West Lane / West Lane Frontage (Intersection 5)

The following Conditions of Approvals (COA) would improve operations to acceptable or better than No Project conditions at the deficient intersection, as shown in **Table 9-2**.

**West Lane/West Lane Frontage (Intersection 5)** – The addition of Project traffic would degrade intersection operations from LOS E to LOS F and add more than 5 seconds of delay during the AM peak hour.

***Condition of Approval BG-1:*** *Implement Condition of Approval EX-1.*

Modification of West Lane/West Lane Frontage (Intersection 5) to include a third northbound and southbound through lane would improve operations to LOS D and LOS B during the AM and PM peak hour, respectively. A third northbound and southbound through lane is consistent with the City's planned roadway improvement to widen West Lane to six lanes between Eight Mile Road and Hammer Lane.

Detailed intersection LOS calculation worksheets are presented in **Appendix Q**.

**Table 9-2. Background Plus Project With COA Intersection Levels of Service**

| Intersection | | Control | Peak Hour | Background No Project | | Background Plus Project | | Background Plus Project With COA | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay | LOS | Delay |
| 5 | West Lane / West Lane Frontage | Signal | AM | **E** | **56** | **F** | **95** | D | 40 |
| | | | PM | B | 20 | C | 23 | B | 18 |

Notes:
Deficient intersection operations are noted in **bold text**.
Source: BTC, 2024.

## 9.3 CUMULATIVE PLUS PROJECT CONDITIONS

Under the Cumulative Plus Project scenario, the addition of Project traffic degrades operations below standards set by the City's General Plan LOS policy at the following intersection:

- Holman Road / Morada Lane (Intersection 12)

The following Conditions of Approvals (COA) would improve operations to acceptable or better than No Project conditions at the deficient intersection, as shown in **Table 9-3**.

**Holman Road/Morada Lane (Intersection 12)** – The addition of Project traffic would worsen operations from LOS D to LOS E in the AM peak hour.

***Condition of Approval CU-1:*** *Implement Mitigation Measure TR-9.*

Restriping one through lane to a left-turn lane on all approaches to the intersection of Holman Road / Morada Lane (Intersection 12) would improve operations to LOS D or better conditions during the peak hours.

Detailed intersection LOS calculation worksheets are presented in **Appendix R**.

**Table 9-3. Cumulative Plus Project With COA Intersection Levels of Service**

| Intersection | | Control | Peak Hour | Cumulative No Project | | Cumulative Plus Project | | Cumulative Plus Project With COA | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | LOS | Delay | LOS | Delay | LOS | Delay |
| 12 | Holman Road / Morada Lane | Signal | AM | D | 42 | **E** | **61** | D | 51 |
| | | | PM | C | 28 | C | 35 | C | 32 |

Notes:
Deficient intersection operations are noted in **bold text**.
Source: BTC, 2024.

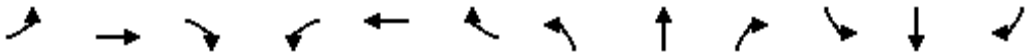
# Appendix A: Traffic Counts (Provided Electronically)

BTC
BARRIOS
TRANSPORTATION CONSULTING

# Appendix B: Existing Conditions LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 109 | 419 | 395 | 150 | 379 | 7 | 242 | 322 | 65 | 36 | 474 | 151 |
| Future Volume (veh/h) | 109 | 419 | 395 | 150 | 379 | 7 | 242 | 322 | 65 | 36 | 474 | 151 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 116 | 446 | 420 | 160 | 403 | 7 | 257 | 343 | 69 | 38 | 504 | 161 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 145 | 561 | 475 | 192 | 598 | 10 | 290 | 1092 | 217 | 54 | 633 | 201 |
| Arrive On Green | 0.08 | 0.30 | 0.30 | 0.11 | 0.33 | 0.33 | 0.16 | 0.37 | 0.37 | 0.03 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1833 | 32 | 1781 | 2942 | 584 | 1781 | 2653 | 843 |
| Grp Volume(v), veh/h | 116 | 446 | 420 | 160 | 0 | 410 | 257 | 205 | 207 | 38 | 337 | 328 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1865 | 1781 | 1777 | 1750 | 1781 | 1777 | 1719 |
| Q Serve(g_s), s | 7.4 | 25.3 | 29.1 | 10.2 | 0.0 | 21.9 | 16.3 | 9.5 | 9.7 | 2.4 | 20.5 | 20.7 |
| Cycle Q Clear(g_c), s | 7.4 | 25.3 | 29.1 | 10.2 | 0.0 | 21.9 | 16.3 | 9.5 | 9.7 | 2.4 | 20.5 | 20.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.33 | 1.00 | | 0.49 |
| Lane Grp Cap(c), veh/h | 145 | 561 | 475 | 192 | 0 | 608 | 290 | 659 | 649 | 54 | 424 | 410 |
| V/C Ratio(X) | 0.80 | 0.79 | 0.88 | 0.83 | 0.00 | 0.67 | 0.88 | 0.31 | 0.32 | 0.70 | 0.79 | 0.80 |
| Avail Cap(c_a), veh/h | 463 | 730 | 618 | 463 | 0 | 727 | 463 | 909 | 895 | 463 | 909 | 879 |
| 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 | 52.1 | 37.1 | 38.5 | 50.4 | 0.0 | 33.6 | 47.2 | 25.8 | 25.9 | 55.4 | 41.3 | 41.4 |
| Incr Delay (d2), s/veh | 9.6 | 4.6 | 11.7 | 9.0 | 0.0 | 1.9 | 11.7 | 0.3 | 0.3 | 15.0 | 3.4 | 3.7 |
| 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 | 11.8 | 12.2 | 4.9 | 0.0 | 9.8 | 7.9 | 3.8 | 3.9 | 1.3 | 9.3 | 9.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 61.7 | 41.7 | 50.1 | 59.5 | 0.0 | 35.5 | 58.9 | 26.1 | 26.2 | 70.4 | 44.7 | 45.0 |
| LnGrp LOS | E | D | D | E | A | D | E | C | C | E | D | D |
| Approach Vol, veh/h | | 982 | | | 570 | | | 669 | | | 703 | |
| Approach Delay, s/veh | | 47.7 | | | 42.2 | | | 38.7 | | | 46.2 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.4 | 40.6 | 23.8 | 33.5 | 14.4 | 43.6 | 8.5 | 48.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 30.0 | 45.0 | 30.0 | 59.0 | 30.0 | 45.0 | 30.0 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 12.2 | 31.1 | 18.3 | 22.7 | 9.4 | 23.9 | 4.4 | 11.7 |
| Green Ext Time (p_c), s | 0.4 | 3.5 | 0.5 | 4.8 | 0.3 | 2.2 | 0.1 | 2.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.2 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 62 | 252 | 241 | 265 | 244 | 102 | 434 | 465 | 330 | 259 | 591 | 169 |
| Future Volume (veh/h) | 62 | 252 | 241 | 265 | 244 | 102 | 434 | 465 | 330 | 259 | 591 | 169 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.82 | 1.00 | | 0.97 | 1.00 | | 0.99 | 1.00 | | 0.96 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 68 | 277 | 265 | 291 | 268 | 112 | 477 | 511 | 363 | 285 | 649 | 186 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 88 | 360 | 313 | 403 | 281 | 117 | 537 | 756 | 333 | 307 | 817 | 350 |
| Arrive On Green | 0.24 | 0.24 | 0.24 | 0.23 | 0.23 | 0.23 | 0.16 | 0.21 | 0.21 | 0.17 | 0.23 | 0.23 |
| Sat Flow, veh/h | 365 | 1487 | 1292 | 1781 | 1241 | 519 | 3456 | 3554 | 1563 | 1781 | 3554 | 1523 |
| Grp Volume(v), veh/h | 345 | 0 | 265 | 291 | 0 | 380 | 477 | 511 | 363 | 285 | 649 | 186 |
| Grp Sat Flow(s),veh/h/ln | 1852 | 0 | 1292 | 1781 | 0 | 1760 | 1728 | 1777 | 1563 | 1781 | 1777 | 1523 |
| Q Serve(g_s), s | 28.5 | 0.0 | 32.2 | 24.8 | 0.0 | 35.0 | 22.2 | 21.7 | 35.0 | 25.9 | 28.3 | 17.6 |
| Cycle Q Clear(g_c), s | 28.5 | 0.0 | 32.2 | 24.8 | 0.0 | 35.0 | 22.2 | 21.7 | 35.0 | 25.9 | 28.3 | 17.6 |
| Prop In Lane | 0.20 | | 1.00 | 1.00 | | 0.29 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 449 | 0 | 313 | 403 | 0 | 399 | 537 | 756 | 333 | 307 | 817 | 350 |
| V/C Ratio(X) | 0.77 | 0.00 | 0.85 | 0.72 | 0.00 | 0.95 | 0.89 | 0.68 | 1.09 | 0.93 | 0.79 | 0.53 |
| Avail Cap(c_a), veh/h | 450 | 0 | 314 | 2166 | 0 | 2140 | 735 | 756 | 333 | 379 | 817 | 350 |
| 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 | 58.0 | 0.0 | 59.4 | 58.8 | 0.0 | 62.8 | 68.1 | 59.5 | 64.7 | 67.0 | 59.7 | 55.5 |
| Incr Delay (d2), s/veh | 7.9 | 0.0 | 18.8 | 0.9 | 0.0 | 5.8 | 10.0 | 2.4 | 76.1 | 25.6 | 5.4 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 14.5 | 0.0 | 12.3 | 11.2 | 0.0 | 16.1 | 10.5 | 10.0 | 20.8 | 13.7 | 13.1 | 6.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 65.9 | 0.0 | 78.2 | 59.7 | 0.0 | 68.6 | 78.1 | 61.9 | 140.9 | 92.6 | 65.1 | 57.1 |
| LnGrp LOS | E | A | E | E | A | E | E | E | F | F | E | E |
| Approach Vol, veh/h | | 610 | | | 671 | | | 1351 | | | 1120 | |
| Approach Delay, s/veh | | 71.2 | | | 64.7 | | | 88.8 | | | 70.8 | |
| Approach LOS | | E | | | E | | | F | | | E | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 34.4 | 41.0 | | 43.2 | 31.6 | 43.8 | | 45.9 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 35.0 | 35.0 | | 200.0 | 35.0 | 35.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 27.9 | 37.0 | | 37.0 | 24.2 | 30.3 | | 34.2 | | | | |
| Green Ext Time (p_c), s | 0.5 | 0.0 | | 0.2 | 1.3 | 1.9 | | 1.8 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 76.3 | | | | | | | | | |
| HCM 6th LOS | | | E | | | | | | | | | |

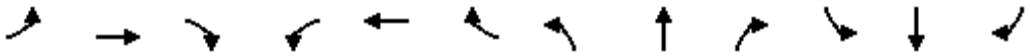
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/21/2024



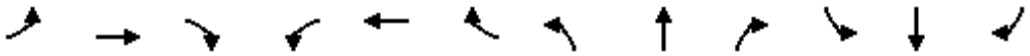
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 157 | 4 | 139 | 225 | 16 | 14 | 191 | 882 | 62 | 64 | 1006 | 109 |
| Future Volume (vph) | 157 | 4 | 139 | 225 | 16 | 14 | 191 | 882 | 62 | 64 | 1006 | 109 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 3495 | | 1770 | 3478 | |
| Flt Permitted | | 0.36 | 1.00 | | 0.52 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 662 | 1583 | | 969 | 1563 | 1770 | 3495 | | 1770 | 3478 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 178 | 5 | 158 | 256 | 18 | 16 | 217 | 1002 | 70 | 73 | 1143 | 124 |
| RTOR Reduction (vph) | 0 | 0 | 73 | 0 | 0 | 12 | 0 | 4 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 0 | 183 | 85 | 0 | 274 | 4 | 217 | 1068 | 0 | 73 | 1260 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 26.3 | 26.3 | | 26.3 | 26.3 | 17.9 | 55.7 | | 8.4 | 46.2 | |
| Effective Green, g (s) | | 26.3 | 26.3 | | 26.3 | 26.3 | 17.9 | 55.7 | | 8.4 | 46.2 | |
| Actuated g/C Ratio | | 0.25 | 0.25 | | 0.25 | 0.25 | 0.17 | 0.52 | | 0.08 | 0.43 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 163 | 391 | | 239 | 386 | 297 | 1829 | | 139 | 1510 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.31 | | 0.04 | c0.36 | |
| v/s Ratio Perm | | 0.28 | 0.05 | | c0.28 | 0.00 | | | | | | |
| v/c Ratio | | 1.12 | 0.22 | | 1.15 | 0.01 | 0.73 | 0.58 | | 0.53 | 0.83 | |
| Uniform Delay, d1 | | 40.1 | 31.9 | | 40.1 | 30.2 | 42.0 | 17.4 | | 47.1 | 26.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 107.2 | 0.3 | | 103.5 | 0.0 | 8.9 | 0.5 | | 3.6 | 4.1 | |
| Delay (s) | | 147.3 | 32.1 | | 143.5 | 30.2 | 50.9 | 17.9 | | 50.6 | 30.8 | |
| Level of Service | | F | C | | F | C | D | B | | D | C | |
| Approach Delay (s) | | 93.9 | | | 137.3 | | | 23.4 | | | 31.9 | |
| Approach LOS | | F | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 44.4 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.90 | | |
| Actuated Cycle Length (s) | 106.4 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 75.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 74 | 43 | 31 | 140 | 70 | 72 | 21 | 950 | 62 | 161 | 1155 | 54 |
| Future Volume (veh/h) | 74 | 43 | 31 | 140 | 70 | 72 | 21 | 950 | 62 | 161 | 1155 | 54 |
| 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 | | 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 | 83 | 48 | 35 | 157 | 79 | 81 | 24 | 1067 | 70 | 181 | 1298 | 61 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 107 | 88 | 64 | 205 | 120 | 123 | 39 | 1751 | 542 | 232 | 2254 | 106 |
| Arrive On Green | 0.06 | 0.09 | 0.09 | 0.11 | 0.14 | 0.14 | 0.02 | 0.34 | 0.34 | 0.13 | 0.45 | 0.45 |
| Sat Flow, veh/h | 1781 | 1002 | 731 | 1781 | 839 | 860 | 1781 | 5106 | 1580 | 1781 | 4991 | 235 |
| Grp Volume(v), veh/h | 83 | 0 | 83 | 157 | 0 | 160 | 24 | 1067 | 70 | 181 | 885 | 474 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1733 | 1781 | 0 | 1699 | 1781 | 1702 | 1580 | 1781 | 1702 | 1822 |
| Q Serve(g_s), s | 3.0 | 0.0 | 3.0 | 5.5 | 0.0 | 5.8 | 0.9 | 11.3 | 2.0 | 6.4 | 12.5 | 12.5 |
| Cycle Q Clear(g_c), s | 3.0 | 0.0 | 3.0 | 5.5 | 0.0 | 5.8 | 0.9 | 11.3 | 2.0 | 6.4 | 12.5 | 12.5 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.51 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 107 | 0 | 152 | 205 | 0 | 243 | 39 | 1751 | 542 | 232 | 1537 | 823 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.54 | 0.77 | 0.00 | 0.66 | 0.62 | 0.61 | 0.13 | 0.78 | 0.58 | 0.58 |
| Avail Cap(c_a), veh/h | 220 | 0 | 214 | 686 | 0 | 786 | 686 | 3778 | 1169 | 686 | 2519 | 1348 |
| 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 | 30.1 | 0.0 | 28.3 | 27.9 | 0.0 | 26.3 | 31.5 | 17.7 | 14.7 | 27.3 | 13.2 | 13.2 |
| Incr Delay (d2), s/veh | 11.3 | 0.0 | 3.0 | 5.9 | 0.0 | 3.0 | 15.3 | 0.3 | 0.1 | 5.6 | 0.3 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.6 | 0.0 | 1.3 | 2.6 | 0.0 | 2.5 | 0.5 | 3.9 | 0.7 | 2.8 | 4.0 | 4.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.4 | 0.0 | 31.3 | 33.8 | 0.0 | 29.3 | 46.7 | 18.0 | 14.8 | 32.9 | 13.5 | 13.8 |
| LnGrp LOS | D | A | C | C | A | C | D | B | B | C | B | B |
| Approach Vol, veh/h | | 166 | | | 317 | | | 1161 | | | 1540 | |
| Approach Delay, s/veh | | 36.4 | | | 31.5 | | | 18.4 | | | 15.9 | |
| Approach LOS | | D | | | C | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.5 | 28.2 | 12.5 | 10.7 | 6.4 | 35.3 | 8.9 | 14.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 8.4 | 13.3 | 7.5 | 5.0 | 2.9 | 14.5 | 5.0 | 7.8 |
| Green Ext Time (p_c), s | 0.4 | 8.9 | 0.4 | 0.1 | 0.0 | 11.0 | 0.0 | 0.9 |

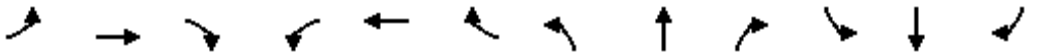
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 19.4 |
| HCM 6th LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 398 | 1094 | 209 | 547 | 943 | 184 | 266 | 518 | 192 | 226 | 853 | 288 |
| Future Volume (veh/h) | 398 | 1094 | 209 | 547 | 943 | 184 | 266 | 518 | 192 | 226 | 853 | 288 |
| 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 | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 545 | 202 | 238 | 898 | 303 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 490 | 1786 | 430 | 635 | 2055 | 497 | 349 | 1837 | 446 | 302 | 1749 | 428 |
| Arrive On Green | 0.14 | 0.28 | 0.28 | 0.18 | 0.32 | 0.32 | 0.10 | 0.29 | 0.29 | 0.09 | 0.27 | 0.27 |
| Sat Flow, veh/h | 3456 | 6434 | 1550 | 3456 | 6434 | 1558 | 3456 | 6434 | 1562 | 3456 | 6434 | 1575 |
| Grp Volume(v), veh/h | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 545 | 202 | 238 | 898 | 303 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1550 | 1728 | 1609 | 1558 | 1728 | 1609 | 1562 | 1728 | 1609 | 1575 |
| Q Serve(g_s), s | 15.0 | 19.9 | 15.1 | 20.7 | 15.7 | 12.3 | 10.0 | 8.4 | 13.4 | 8.5 | 14.9 | 22.0 |
| Cycle Q Clear(g_c), s | 15.0 | 19.9 | 15.1 | 20.7 | 15.7 | 12.3 | 10.0 | 8.4 | 13.4 | 8.5 | 14.9 | 22.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 490 | 1786 | 430 | 635 | 2055 | 497 | 349 | 1837 | 446 | 302 | 1749 | 428 |
| V/C Ratio(X) | 0.86 | 0.65 | 0.51 | 0.91 | 0.48 | 0.39 | 0.80 | 0.30 | 0.45 | 0.79 | 0.51 | 0.71 |
| Avail Cap(c_a), veh/h | 683 | 3559 | 857 | 683 | 3559 | 862 | 683 | 3559 | 864 | 546 | 3559 | 871 |
| 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 | 53.0 | 40.2 | 38.5 | 50.6 | 34.7 | 33.5 | 55.6 | 35.3 | 37.1 | 56.6 | 39.0 | 41.5 |
| Incr Delay (d2), s/veh | 7.6 | 0.4 | 0.9 | 15.4 | 0.2 | 0.5 | 4.3 | 0.1 | 0.7 | 4.6 | 0.2 | 2.2 |
| 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 | 6.9 | 7.8 | 5.8 | 10.1 | 6.1 | 4.6 | 4.5 | 3.3 | 5.1 | 3.9 | 5.8 | 8.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 60.7 | 40.6 | 39.4 | 66.0 | 34.8 | 34.0 | 60.0 | 35.4 | 37.8 | 61.2 | 39.2 | 43.7 |
| LnGrp LOS | E | D | D | E | C | C | E | D | D | E | D | D |
| Approach Vol, veh/h | | 1791 | | | 1763 | | | 1027 | | | 1439 | |
| Approach Delay, s/veh | | 45.2 | | | 44.9 | | | 42.6 | | | 43.8 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.1 | 42.1 | 28.2 | 40.1 | 17.8 | 40.4 | 22.9 | 45.4 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 10.5 | 15.4 | 22.7 | 21.9 | 12.0 | 24.0 | 17.0 | 17.7 |
| Green Ext Time (p_c), s | 0.5 | 4.7 | 0.6 | 11.4 | 0.8 | 8.7 | 1.0 | 9.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.3 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.7 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 789 | 103 | 70 | 634 | 22 | 86 |
| Future Vol, veh/h | 789 | 103 | 70 | 634 | 22 | 86 |
| Conflicting Peds, #/hr | 0 | 26 | 26 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 867 | 113 | 77 | 697 | 24 | 95 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1006 | 0 | 1801 | 950 |
| Stage 1 | - | - | - | - | 950 | - |
| Stage 2 | - | - | - | - | 851 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 689 | - | 88 | 315 |
| Stage 1 | - | - | - | - | 376 | - |
| Stage 2 | - | - | - | - | 419 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 672 | - | 76 | 307 |
| Mov Cap-2 Maneuver | - | - | - | - | 76 | - |
| Stage 1 | - | - | - | - | 367 | - |
| Stage 2 | - | - | - | - | 371 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.1 | 51.1 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 190 | - | - | 672 | - |
| HCM Lane V/C Ratio | 0.625 | - | - | 0.114 | - |
| HCM Control Delay (s) | 51.1 | - | - | 11 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 3.6 | - | - | 0.4 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.8 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 820 | 55 | 154 | 696 | 8 | 130 |
| Future Vol, veh/h | 820 | 55 | 154 | 696 | 8 | 130 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 89 | 89 | 89 | 89 | 89 | 89 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 921 | 62 | 173 | 782 | 9 | 146 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 999 | 0 | 2096 | 968 |
| Stage 1 | - | - | - | - | 968 | - |
| Stage 2 | - | - | - | - | 1128 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 693 | - | 57 | 308 |
| Stage 1 | - | - | - | - | 368 | - |
| Stage 2 | - | - | - | - | 309 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 682 | - | 42 | 303 |
| Mov Cap-2 Maneuver | - | - | - | - | 42 | - |
| Stage 1 | - | - | - | - | 362 | - |
| Stage 2 | - | - | - | - | 231 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 2.2 | 51.3 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 223 | - | - | 682 | - |
| HCM Lane V/C Ratio | 0.695 | - | - | 0.254 | - |
| HCM Control Delay (s) | 51.3 | - | - | 12.1 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 4.5 | - | - | 1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 11.3 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 914 | 36 | 74 | 826 | 24 | 119 |
| Future Vol, veh/h | 914 | 36 | 74 | 826 | 24 | 119 |
| Conflicting Peds, #/hr | 0 | 9 | 9 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 86 | 86 | 86 | 86 | 86 | 86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1063 | 42 | 86 | 960 | 28 | 138 |

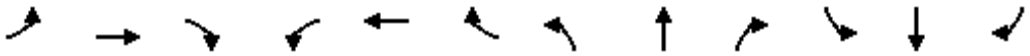
| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1114 | 0 | 2225 | 562 |
| Stage 1 | - | - | - | - | 1093 | - |
| Stage 2 | - | - | - | - | 1132 | - |
| Critical Hdwy | - | - | 4.13 | - | 6.63 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.83 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.43 | - |
| Follow-up Hdwy | - | - | 2.219 | - | 3.519 | 3.319 |
| Pot Cap-1 Maneuver | - | - | 625 | - | 42 | 471 |
| Stage 1 | - | - | - | - | 284 | - |
| Stage 2 | - | - | - | - | 307 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 620 | - | 36 | 467 |
| Mov Cap-2 Maneuver | - | - | - | - | 36 | - |
| Stage 1 | - | - | - | - | 281 | - |
| Stage 2 | - | - | - | - | 264 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1 | 151.7 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 155 | - | - | 620 | - |
| HCM Lane V/C Ratio | 1.073 | - | - | 0.139 | - |
| HCM Control Delay (s) | 151.7 | - | - | 11.7 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 8.6 | - | - | 0.5 | - |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 162 | 716 | 155 | 94 | 658 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Future Volume (veh/h) | 162 | 716 | 155 | 94 | 658 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.95 | 1.00 | | 0.98 | 1.00 | | 0.91 |
| 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 | 184 | 814 | 176 | 107 | 748 | 344 | 159 | 60 | 115 | 235 | 77 | 116 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 222 | 1375 | 295 | 138 | 1000 | 424 | 197 | 131 | 251 | 273 | 173 | 261 |
| Arrive On Green | 0.12 | 0.33 | 0.33 | 0.08 | 0.28 | 0.28 | 0.11 | 0.23 | 0.23 | 0.15 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1781 | 4182 | 896 | 1781 | 3554 | 1507 | 1781 | 567 | 1087 | 1781 | 633 | 953 |
| Grp Volume(v), veh/h | 184 | 661 | 329 | 107 | 748 | 344 | 159 | 0 | 175 | 235 | 0 | 193 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1674 | 1781 | 1777 | 1507 | 1781 | 0 | 1655 | 1781 | 0 | 1586 |
| Q Serve(g_s), s | 10.1 | 16.2 | 16.4 | 5.9 | 19.2 | 21.3 | 8.7 | 0.0 | 9.1 | 12.9 | 0.0 | 10.1 |
| Cycle Q Clear(g_c), s | 10.1 | 16.2 | 16.4 | 5.9 | 19.2 | 21.3 | 8.7 | 0.0 | 9.1 | 12.9 | 0.0 | 10.1 |
| Prop In Lane | 1.00 | | 0.54 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 222 | 1119 | 550 | 138 | 1000 | 424 | 197 | 0 | 382 | 273 | 0 | 434 |
| V/C Ratio(X) | 0.83 | 0.59 | 0.60 | 0.78 | 0.75 | 0.81 | 0.81 | 0.00 | 0.46 | 0.86 | 0.00 | 0.44 |
| Avail Cap(c_a), veh/h | 623 | 1224 | 602 | 623 | 1278 | 542 | 712 | 0 | 579 | 445 | 0 | 555 |
| 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 | 42.8 | 28.0 | 28.1 | 45.3 | 32.7 | 33.5 | 43.5 | 0.0 | 33.1 | 41.3 | 0.0 | 30.1 |
| Incr Delay (d2), s/veh | 7.7 | 0.6 | 1.4 | 9.0 | 1.8 | 7.2 | 7.7 | 0.0 | 0.9 | 9.2 | 0.0 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.7 | 6.3 | 6.4 | 2.9 | 8.0 | 8.6 | 4.3 | 0.0 | 3.8 | 6.4 | 0.0 | 3.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 50.5 | 28.6 | 29.4 | 54.4 | 34.6 | 40.7 | 51.2 | 0.0 | 34.0 | 50.6 | 0.0 | 30.8 |
| LnGrp LOS | D | C | C | D | C | D | D | A | C | D | A | C |
| Approach Vol, veh/h | | 1174 | | | 1199 | | | 334 | | | 428 | |
| Approach Delay, s/veh | | 32.3 | | | 38.1 | | | 42.2 | | | 41.6 | |
| Approach LOS | | C | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.7 | 38.9 | 16.0 | 32.4 | 17.5 | 34.2 | 20.3 | 28.1 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 7.9 | 18.4 | 10.7 | 12.1 | 12.1 | 23.3 | 14.9 | 11.1 |
| Green Ext Time (p_c), s | 0.3 | 5.8 | 0.5 | 1.2 | 0.5 | 4.9 | 0.5 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 36.8 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/21/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 184 | 629 | 211 | 160 | 605 | 146 | 209 | 121 | 91 | 194 | 272 | 241 |
| Future Volume (veh/h) | 184 | 629 | 211 | 160 | 605 | 146 | 209 | 121 | 91 | 194 | 272 | 241 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 198 | 676 | 227 | 172 | 651 | 157 | 225 | 130 | 98 | 209 | 292 | 259 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 243 | 1200 | 363 | 214 | 1118 | 338 | 270 | 1210 | 370 | 254 | 1162 | 354 |
| Arrive On Green | 0.14 | 0.24 | 0.24 | 0.12 | 0.22 | 0.22 | 0.15 | 0.24 | 0.24 | 0.14 | 0.23 | 0.23 |
| Sat Flow, veh/h | 1781 | 5106 | 1545 | 1781 | 5106 | 1542 | 1781 | 5106 | 1561 | 1781 | 5106 | 1556 |
| Grp Volume(v), veh/h | 198 | 676 | 227 | 172 | 651 | 157 | 225 | 130 | 98 | 209 | 292 | 259 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1545 | 1781 | 1702 | 1542 | 1781 | 1702 | 1561 | 1781 | 1702 | 1556 |
| Q Serve(g_s), s | 9.0 | 9.7 | 10.9 | 7.8 | 9.5 | 7.3 | 10.2 | 1.7 | 4.2 | 9.5 | 3.9 | 12.8 |
| Cycle Q Clear(g_c), s | 9.0 | 9.7 | 10.9 | 7.8 | 9.5 | 7.3 | 10.2 | 1.7 | 4.2 | 9.5 | 3.9 | 12.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 243 | 1200 | 363 | 214 | 1118 | 338 | 270 | 1210 | 370 | 254 | 1162 | 354 |
| V/C Ratio(X) | 0.81 | 0.56 | 0.62 | 0.80 | 0.58 | 0.47 | 0.83 | 0.11 | 0.26 | 0.82 | 0.25 | 0.73 |
| Avail Cap(c_a), veh/h | 644 | 1724 | 522 | 537 | 1478 | 446 | 537 | 2956 | 904 | 537 | 2956 | 901 |
| 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 | 34.8 | 28.0 | 28.4 | 35.5 | 29.0 | 28.2 | 34.2 | 24.8 | 25.8 | 34.6 | 26.2 | 29.7 |
| Incr Delay (d2), s/veh | 6.5 | 0.4 | 1.8 | 6.9 | 0.5 | 1.0 | 6.6 | 0.0 | 0.4 | 6.6 | 0.1 | 2.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.1 | 3.7 | 4.0 | 3.6 | 3.7 | 2.6 | 4.6 | 0.6 | 1.5 | 4.3 | 1.5 | 4.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.3 | 28.4 | 30.2 | 42.4 | 29.5 | 29.2 | 40.7 | 24.8 | 26.1 | 41.2 | 26.3 | 32.6 |
| LnGrp LOS | D | C | C | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 1101 | | | 980 | | | 453 | | | 760 | |
| Approach Delay, s/veh | | 31.1 | | | 31.7 | | | 33.0 | | | 32.6 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.8 | 25.7 | 15.0 | 25.5 | 17.6 | 24.9 | 16.3 | 24.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 11.5 | 6.2 | 9.8 | 12.9 | 12.2 | 14.8 | 11.0 | 11.5 |
| Green Ext Time (p_c), s | 0.4 | 1.1 | 0.4 | 4.4 | 0.5 | 2.8 | 0.5 | 3.8 |

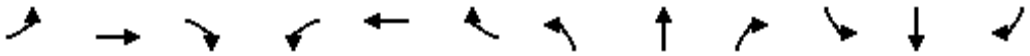
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 31.9 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 61 | 788 | 65 | 58 | 662 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Future Volume (veh/h) | 61 | 788 | 65 | 58 | 662 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.99 | 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 | 66 | 847 | 70 | 62 | 712 | 33 | 94 | 8 | 89 | 69 | 24 | 97 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 93 | 1483 | 643 | 89 | 2076 | 96 | 360 | 282 | 239 | 374 | 282 | 235 |
| Arrive On Green | 0.05 | 0.42 | 0.42 | 0.05 | 0.42 | 0.42 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 3554 | 1539 | 1781 | 5000 | 231 | 1266 | 1870 | 1582 | 1296 | 1870 | 1558 |
| Grp Volume(v), veh/h | 66 | 847 | 70 | 62 | 484 | 261 | 94 | 8 | 89 | 69 | 24 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1539 | 1781 | 1702 | 1827 | 1266 | 1870 | 1582 | 1296 | 1870 | 1558 |
| Q Serve(g_s), s | 1.4 | 7.2 | 1.1 | 1.3 | 3.8 | 3.8 | 2.7 | 0.1 | 2.0 | 1.9 | 0.4 | 2.2 |
| Cycle Q Clear(g_c), s | 1.4 | 7.2 | 1.1 | 1.3 | 3.8 | 3.8 | 3.1 | 0.1 | 2.0 | 2.0 | 0.4 | 2.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 93 | 1483 | 643 | 89 | 1413 | 759 | 360 | 282 | 239 | 374 | 282 | 235 |
| V/C Ratio(X) | 0.71 | 0.57 | 0.11 | 0.70 | 0.34 | 0.34 | 0.26 | 0.03 | 0.37 | 0.18 | 0.09 | 0.41 |
| Avail Cap(c_a), veh/h | 1133 | 4340 | 1880 | 1088 | 4158 | 2232 | 943 | 1142 | 966 | 970 | 1142 | 951 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 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 | 18.3 | 8.8 | 7.0 | 18.4 | 7.8 | 7.8 | 15.7 | 14.2 | 15.0 | 15.1 | 14.4 | 15.1 |
| Incr Delay (d2), s/veh | 9.5 | 0.3 | 0.1 | 9.3 | 0.1 | 0.3 | 0.4 | 0.0 | 1.0 | 0.2 | 0.1 | 1.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 1.7 | 0.2 | 0.7 | 0.9 | 1.0 | 0.7 | 0.1 | 0.7 | 0.5 | 0.2 | 0.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 27.8 | 9.1 | 7.1 | 27.7 | 8.0 | 8.1 | 16.1 | 14.3 | 16.0 | 15.3 | 14.5 | 16.3 |
| LnGrp LOS | C | A | A | C | A | A | B | B | B | B | B | B |
| Approach Vol, veh/h | | 983 | | | 807 | | | 191 | | | 190 | |
| Approach Delay, s/veh | | 10.2 | | | 9.5 | | | 16.0 | | | 15.7 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.0 | 21.4 | | 10.9 | 7.1 | 21.3 | | 10.9 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 3.3 | 9.2 | | 4.2 | 3.4 | 5.8 | | 5.1 | | | | |
| Green Ext Time (p_c), s | 0.1 | 6.8 | | 0.6 | 0.1 | 5.1 | | 0.6 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 10.9 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/21/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 178 | 724 | 33 | 17 | 586 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| Future Volume (veh/h) | 178 | 724 | 33 | 17 | 586 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| 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 | | 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 | 189 | 770 | 35 | 18 | 623 | 88 | 61 | 21 | 66 | 57 | 5 | 115 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 7 | 156 |
| Arrive On Green | 0.10 | 0.67 | 0.67 | 0.02 | 0.59 | 0.59 | 0.04 | 0.11 | 0.11 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 3554 | 1548 | 1781 | 3554 | 1580 | 1781 | 1870 | 1576 | 1781 | 66 | 1529 |
| Grp Volume(v), veh/h | 189 | 770 | 35 | 18 | 623 | 88 | 61 | 21 | 66 | 57 | 0 | 120 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1548 | 1781 | 1777 | 1580 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 12.0 | 11.5 | 1.0 | 1.3 | 10.9 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Cycle Q Clear(g_c), s | 12.0 | 11.5 | 1.0 | 1.3 | 10.9 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 0 | 163 |
| V/C Ratio(X) | 1.11 | 0.32 | 0.03 | 0.54 | 0.30 | 0.09 | 0.77 | 0.11 | 0.40 | 0.77 | 0.00 | 0.74 |
| Avail Cap(c_a), veh/h | 171 | 2376 | 1035 | 171 | 2101 | 934 | 171 | 588 | 495 | 171 | 0 | 498 |
| 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) | 0.92 | 0.92 | 0.92 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 56.5 | 8.8 | 7.0 | 60.8 | 12.7 | 11.1 | 59.1 | 50.6 | 52.2 | 59.3 | 0.0 | 54.5 |
| Incr Delay (d2), s/veh | 97.0 | 0.3 | 0.1 | 13.1 | 0.4 | 0.2 | 14.8 | 0.2 | 1.5 | 15.6 | 0.0 | 6.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.9 | 4.1 | 0.3 | 0.7 | 4.2 | 1.1 | 2.3 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 153.5 | 9.1 | 7.1 | 74.0 | 13.0 | 11.3 | 73.9 | 50.9 | 53.8 | 74.9 | 0.0 | 60.8 |
| LnGrp LOS | F | A | A | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 994 | | | 729 | | | 148 | | | 177 | |
| Approach Delay, s/veh | | 36.5 | | | 14.3 | | | 61.7 | | | 65.3 | |
| Approach LOS | | D | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 89.8 | 9.8 | 18.5 | 16.6 | 80.1 | 10.1 | 18.2 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 41.2 | 12.0 | * 39 | 12.0 | * 42 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 13.5 | 6.0 | 6.9 | 14.0 | 12.9 | 6.2 | 11.1 |
| Green Ext Time (p_c), s | 0.0 | 5.6 | 0.0 | 0.3 | 0.0 | 4.6 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 32.9 |
| HCM 6th LOS | C |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/21/2024

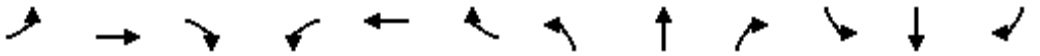
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 183 | 413 | 299 | 75 | 423 | 9 | 271 | 475 | 58 | 12 | 365 | 119 |
| Future Volume (veh/h) | 183 | 413 | 299 | 75 | 423 | 9 | 271 | 475 | 58 | 12 | 365 | 119 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 189 | 426 | 308 | 77 | 436 | 9 | 279 | 490 | 60 | 12 | 376 | 123 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 228 | 645 | 546 | 101 | 499 | 10 | 320 | 1136 | 139 | 25 | 508 | 164 |
| Arrive On Green | 0.13 | 0.34 | 0.34 | 0.06 | 0.27 | 0.27 | 0.18 | 0.36 | 0.36 | 0.01 | 0.19 | 0.19 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1826 | 38 | 1781 | 3180 | 388 | 1781 | 2641 | 853 |
| Grp Volume(v), veh/h | 189 | 426 | 308 | 77 | 0 | 445 | 279 | 273 | 277 | 12 | 251 | 248 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1864 | 1781 | 1777 | 1791 | 1781 | 1777 | 1717 |
| Q Serve(g_s), s | 10.0 | 18.7 | 15.3 | 4.1 | 0.0 | 22.1 | 14.8 | 11.3 | 11.4 | 0.6 | 12.9 | 13.2 |
| Cycle Q Clear(g_c), s | 10.0 | 18.7 | 15.3 | 4.1 | 0.0 | 22.1 | 14.8 | 11.3 | 11.4 | 0.6 | 12.9 | 13.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.22 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 228 | 645 | 546 | 101 | 0 | 510 | 320 | 635 | 640 | 25 | 341 | 330 |
| V/C Ratio(X) | 0.83 | 0.66 | 0.56 | 0.76 | 0.00 | 0.87 | 0.87 | 0.43 | 0.43 | 0.47 | 0.74 | 0.75 |
| Avail Cap(c_a), veh/h | 551 | 868 | 736 | 551 | 0 | 865 | 551 | 1082 | 1090 | 551 | 1082 | 1045 |
| 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 | 41.2 | 26.9 | 25.8 | 45.1 | 0.0 | 33.6 | 38.7 | 23.6 | 23.7 | 47.4 | 36.8 | 37.0 |
| Incr Delay (d2), s/veh | 7.6 | 1.2 | 0.9 | 11.2 | 0.0 | 5.3 | 7.7 | 0.5 | 0.5 | 13.0 | 3.1 | 3.4 |
| 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 | 4.7 | 8.0 | 5.4 | 2.1 | 0.0 | 10.1 | 6.7 | 4.4 | 4.5 | 0.4 | 5.8 | 5.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 48.8 | 28.1 | 26.7 | 56.2 | 0.0 | 38.9 | 46.4 | 24.1 | 24.1 | 60.4 | 39.9 | 40.4 |
| LnGrp LOS | D | C | C | E | A | D | D | C | C | E | D | D |
| Approach Vol, veh/h | | 923 | | | 522 | | | 829 | | | 511 | |
| Approach Delay, s/veh | | 31.9 | | | 41.5 | | | 31.6 | | | 40.6 | |
| Approach LOS | | C | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.5 | 39.4 | 22.4 | 24.6 | 17.4 | 32.5 | 6.4 | 40.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 30.0 | 45.0 | 30.0 | 59.0 | 30.0 | 45.0 | 30.0 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 6.1 | 20.7 | 16.8 | 15.2 | 12.0 | 24.1 | 2.6 | 13.4 |
| Green Ext Time (p_c), s | 0.2 | 3.5 | 0.6 | 3.4 | 0.4 | 2.4 | 0.0 | 3.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 35.2 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 24 | 58 | 57 | 284 | 57 | 141 | 94 | 639 | 333 | 178 | 536 | 25 |
| Future Volume (veh/h) | 24 | 58 | 57 | 284 | 57 | 141 | 94 | 639 | 333 | 178 | 536 | 25 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.94 | 1.00 | | 0.99 | 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 | 25 | 60 | 59 | 251 | 122 | 147 | 98 | 666 | 347 | 185 | 558 | 26 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 97 | 233 | 267 | 316 | 136 | 164 | 164 | 971 | 428 | 224 | 1249 | 553 |
| Arrive On Green | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.05 | 0.27 | 0.27 | 0.13 | 0.35 | 0.35 |
| Sat Flow, veh/h | 542 | 1301 | 1487 | 1781 | 766 | 923 | 3456 | 3554 | 1565 | 1781 | 3554 | 1574 |
| Grp Volume(v), veh/h | 85 | 0 | 59 | 251 | 0 | 269 | 98 | 666 | 347 | 185 | 558 | 26 |
| Grp Sat Flow(s),veh/h/ln | 1843 | 0 | 1487 | 1781 | 0 | 1690 | 1728 | 1777 | 1565 | 1781 | 1777 | 1574 |
| Q Serve(g_s), s | 3.9 | 0.0 | 3.3 | 13.3 | 0.0 | 15.3 | 2.7 | 16.5 | 20.3 | 10.0 | 11.9 | 1.1 |
| Cycle Q Clear(g_c), s | 3.9 | 0.0 | 3.3 | 13.3 | 0.0 | 15.3 | 2.7 | 16.5 | 20.3 | 10.0 | 11.9 | 1.1 |
| Prop In Lane | 0.29 | | 1.00 | 1.00 | | 0.55 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 330 | 0 | 267 | 316 | 0 | 300 | 164 | 971 | 428 | 224 | 1249 | 553 |
| V/C Ratio(X) | 0.26 | 0.00 | 0.22 | 0.79 | 0.00 | 0.90 | 0.60 | 0.69 | 0.81 | 0.83 | 0.45 | 0.05 |
| Avail Cap(c_a), veh/h | 750 | 0 | 605 | 3625 | 0 | 3438 | 1231 | 1266 | 557 | 634 | 1266 | 561 |
| 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 | 34.7 | 0.0 | 34.5 | 38.7 | 0.0 | 39.5 | 45.9 | 31.9 | 33.3 | 41.9 | 24.5 | 21.0 |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.4 | 1.7 | 0.0 | 3.8 | 3.4 | 1.0 | 6.8 | 7.6 | 0.3 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.8 | 0.0 | 1.2 | 5.7 | 0.0 | 6.4 | 1.2 | 6.9 | 8.2 | 4.6 | 4.6 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 35.1 | 0.0 | 34.9 | 40.4 | 0.0 | 43.3 | 49.3 | 33.0 | 40.2 | 49.5 | 24.8 | 21.1 |
| LnGrp LOS | D | A | C | D | A | D | D | C | D | D | C | C |
| Approach Vol, veh/h | | 144 | | | 520 | | | 1111 | | | 769 | |
| Approach Delay, s/veh | | 35.0 | | | 41.9 | | | 36.7 | | | 30.6 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.3 | 32.9 | | 23.5 | 10.7 | 40.5 | | 23.6 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 35.0 | 35.0 | | 200.0 | 35.0 | 35.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 12.0 | 22.3 | | 17.3 | 4.7 | 13.9 | | 5.9 | | | | |
| Green Ext Time (p_c), s | 0.5 | 4.5 | | 0.2 | 0.3 | 3.3 | | 0.7 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 35.8 | |
| HCM 6th LOS | | D | |

**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/21/2024

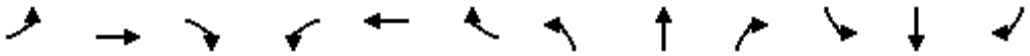
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 102 | 6 | 90 | 130 | 9 | 8 | 150 | 962 | 134 | 37 | 756 | 58 |
| Future Volume (vph) | 102 | 6 | 90 | 130 | 9 | 8 | 150 | 962 | 134 | 37 | 756 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1779 | 1583 | | 1779 | 1563 | 1770 | 3463 | | 1770 | 3496 | |
| Flt Permitted | | 0.64 | 1.00 | | 0.66 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1187 | 1583 | | 1230 | 1563 | 1770 | 3463 | | 1770 | 3496 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 106 | 6 | 94 | 135 | 9 | 8 | 156 | 1002 | 140 | 39 | 788 | 60 |
| RTOR Reduction (vph) | 0 | 0 | 74 | 0 | 0 | 6 | 0 | 8 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 112 | 20 | 0 | 144 | 2 | 156 | 1134 | 0 | 39 | 843 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 15.3 | 15.3 | | 15.3 | 15.3 | 12.7 | 37.1 | | 4.4 | 28.8 | |
| Effective Green, g (s) | | 15.3 | 15.3 | | 15.3 | 15.3 | 12.7 | 37.1 | | 4.4 | 28.8 | |
| Actuated g/C Ratio | | 0.21 | 0.21 | | 0.21 | 0.21 | 0.17 | 0.51 | | 0.06 | 0.40 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 249 | 332 | | 258 | 328 | 308 | 1764 | | 106 | 1383 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.33 | | 0.02 | 0.24 | |
| v/s Ratio Perm | | 0.09 | 0.01 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.45 | 0.06 | | 0.56 | 0.01 | 0.51 | 0.64 | | 0.37 | 0.61 | |
| Uniform Delay, d1 | | 25.1 | 23.0 | | 25.7 | 22.7 | 27.2 | 13.0 | | 32.9 | 17.5 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | 0.1 | | 2.6 | 0.0 | 1.3 | 0.8 | | 2.2 | 0.8 | |
| Delay (s) | | 26.4 | 23.1 | | 28.3 | 22.7 | 28.5 | 13.8 | | 35.0 | 18.3 | |
| Level of Service | | C | C | | C | C | C | B | | D | B | |
| Approach Delay (s) | | 24.9 | | | 28.0 | | | 15.6 | | | 19.0 | |
| Approach LOS | | C | | | C | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 18.3 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.63 | | |
| Actuated Cycle Length (s) | 72.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 62.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 72 | 43 | 29 | 119 | 52 | 66 | 63 | 1145 | 83 | 116 | 823 | 37 |
| Future Volume (veh/h) | 72 | 43 | 29 | 119 | 52 | 66 | 63 | 1145 | 83 | 116 | 823 | 37 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 75 | 45 | 30 | 124 | 54 | 69 | 66 | 1193 | 86 | 121 | 857 | 39 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 96 | 87 | 58 | 165 | 91 | 116 | 86 | 1993 | 603 | 160 | 2162 | 98 |
| Arrive On Green | 0.05 | 0.08 | 0.08 | 0.09 | 0.12 | 0.12 | 0.05 | 0.39 | 0.39 | 0.09 | 0.43 | 0.43 |
| Sat Flow, veh/h | 1781 | 1044 | 696 | 1781 | 745 | 952 | 1781 | 5106 | 1546 | 1781 | 5000 | 227 |
| Grp Volume(v), veh/h | 75 | 0 | 75 | 124 | 0 | 123 | 66 | 1193 | 86 | 121 | 583 | 313 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1739 | 1781 | 0 | 1696 | 1781 | 1702 | 1546 | 1781 | 1702 | 1823 |
| Q Serve(g_s), s | 2.5 | 0.0 | 2.5 | 4.1 | 0.0 | 4.2 | 2.2 | 11.4 | 2.2 | 4.1 | 7.2 | 7.2 |
| Cycle Q Clear(g_c), s | 2.5 | 0.0 | 2.5 | 4.1 | 0.0 | 4.2 | 2.2 | 11.4 | 2.2 | 4.1 | 7.2 | 7.2 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.56 | 1.00 | | 1.00 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 96 | 0 | 145 | 165 | 0 | 207 | 86 | 1993 | 603 | 160 | 1472 | 788 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.52 | 0.75 | 0.00 | 0.60 | 0.77 | 0.60 | 0.14 | 0.75 | 0.40 | 0.40 |
| Avail Cap(c_a), veh/h | 233 | 0 | 228 | 729 | 0 | 833 | 729 | 4013 | 1215 | 729 | 2675 | 1432 |
| 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 | 28.5 | 0.0 | 26.8 | 27.0 | 0.0 | 25.4 | 28.7 | 14.8 | 12.0 | 27.1 | 11.9 | 11.9 |
| Incr Delay (d2), s/veh | 12.7 | 0.0 | 2.8 | 6.8 | 0.0 | 2.7 | 13.5 | 0.3 | 0.1 | 7.0 | 0.2 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.4 | 0.0 | 1.1 | 2.0 | 0.0 | 1.8 | 1.2 | 3.7 | 0.7 | 1.9 | 2.2 | 2.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.2 | 0.0 | 29.7 | 33.8 | 0.0 | 28.1 | 42.2 | 15.1 | 12.1 | 34.1 | 12.0 | 12.2 |
| LnGrp LOS | D | A | C | C | A | C | D | B | B | C | B | B |
| Approach Vol, veh/h | | 150 | | | 247 | | | 1345 | | | 1017 | |
| Approach Delay, s/veh | | 35.5 | | | 31.0 | | | 16.2 | | | 14.7 | |
| Approach LOS | | D | | | C | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.5 | 29.8 | 10.7 | 10.1 | 7.9 | 32.4 | 8.3 | 12.4 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 6.1 | 13.4 | 6.1 | 4.5 | 4.2 | 9.2 | 4.5 | 6.2 |
| Green Ext Time (p_c), s | 0.3 | 10.4 | 0.3 | 0.1 | 0.1 | 6.4 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.0 |
| HCM 6th LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/21/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 492 | 1257 | 187 | 409 | 1107 | 122 | 478 | 824 | 259 | 203 | 585 | 260 |
| Future Volume (veh/h) | 492 | 1257 | 187 | 409 | 1107 | 122 | 478 | 824 | 259 | 203 | 585 | 260 |
| 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 | | 0.97 |
| 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 | 512 | 1309 | 195 | 426 | 1153 | 127 | 498 | 858 | 270 | 211 | 609 | 271 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 569 | 1900 | 458 | 490 | 1753 | 424 | 557 | 2131 | 523 | 269 | 1596 | 382 |
| Arrive On Green | 0.16 | 0.30 | 0.30 | 0.14 | 0.27 | 0.27 | 0.16 | 0.33 | 0.33 | 0.08 | 0.25 | 0.25 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1556 | 3456 | 6434 | 1579 | 3456 | 6434 | 1541 |
| Grp Volume(v), veh/h | 512 | 1309 | 195 | 426 | 1153 | 127 | 498 | 858 | 270 | 211 | 609 | 271 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1556 | 1728 | 1609 | 1579 | 1728 | 1609 | 1541 |
| Q Serve(g_s), s | 19.8 | 24.6 | 13.9 | 16.5 | 21.7 | 8.8 | 19.3 | 14.0 | 18.8 | 8.2 | 10.7 | 21.9 |
| Cycle Q Clear(g_c), s | 19.8 | 24.6 | 13.9 | 16.5 | 21.7 | 8.8 | 19.3 | 14.0 | 18.8 | 8.2 | 10.7 | 21.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 569 | 1900 | 458 | 490 | 1753 | 424 | 557 | 2131 | 523 | 269 | 1596 | 382 |
| V/C Ratio(X) | 0.90 | 0.69 | 0.43 | 0.87 | 0.66 | 0.30 | 0.89 | 0.40 | 0.52 | 0.78 | 0.38 | 0.71 |
| Avail Cap(c_a), veh/h | 633 | 3299 | 794 | 633 | 3299 | 798 | 633 | 3299 | 810 | 506 | 3299 | 790 |
| 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 | 55.9 | 42.6 | 38.8 | 57.4 | 44.0 | 39.3 | 56.1 | 35.2 | 36.8 | 61.8 | 42.6 | 46.8 |
| Incr Delay (d2), s/veh | 15.0 | 0.5 | 0.6 | 10.2 | 0.4 | 0.4 | 14.1 | 0.1 | 0.8 | 5.0 | 0.2 | 2.4 |
| 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 | 9.7 | 9.7 | 5.3 | 7.8 | 8.6 | 3.4 | 9.4 | 5.5 | 7.3 | 3.7 | 4.2 | 8.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 70.9 | 43.0 | 39.4 | 67.6 | 44.5 | 39.7 | 70.3 | 35.3 | 37.6 | 66.8 | 42.8 | 49.3 |
| LnGrp LOS | E | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 2016 | | | 1706 | | | 1626 | | | 1091 | |
| Approach Delay, s/veh | | 49.7 | | | 49.9 | | | 46.4 | | | 49.0 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.6 | 51.2 | 24.3 | 45.3 | 27.0 | 39.9 | 27.5 | 42.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 10.2 | 20.8 | 18.5 | 26.6 | 21.3 | 23.9 | 21.8 | 23.7 |
| Green Ext Time (p_c), s | 0.5 | 8.0 | 0.9 | 13.2 | 0.7 | 5.6 | 0.6 | 10.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 48.8 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 547 | 44 | 47 | 492 | 18 | 36 |
| Future Vol, veh/h | 547 | 44 | 47 | 492 | 18 | 36 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 582 | 47 | 50 | 523 | 19 | 38 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 645 | 0 | 1245 | 622 |
| Stage 1 | - | - | - | - | 622 | - |
| Stage 2 | - | - | - | - | 623 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 940 | - | 192 | 487 |
| Stage 1 | - | - | - | - | 535 | - |
| Stage 2 | - | - | - | - | 535 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 926 | - | 179 | 480 |
| Mov Cap-2 Maneuver | - | - | - | - | 179 | - |
| Stage 1 | - | - | - | - | 527 | - |
| Stage 2 | - | - | - | - | 506 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.8 | 19.3 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 308 | - | - | 926 | - |
| HCM Lane V/C Ratio | 0.187 | - | - | 0.054 | - |
| HCM Control Delay (s) | 19.3 | - | - | 9.1 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.7 | - | - | 0.2 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.7 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 521 | 62 | 88 | 507 | 32 | 73 |
| Future Vol, veh/h | 521 | 62 | 88 | 507 | 32 | 73 |
| Conflicting Peds, #/hr | 0 | 13 | 13 | 0 | 1 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 560 | 67 | 95 | 545 | 34 | 78 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 640 | 0 | 1343 | 607 |
| Stage 1 | - | - | - | - | 607 | - |
| Stage 2 | - | - | - | - | 736 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 944 | - | 168 | 496 |
| Stage 1 | - | - | - | - | 544 | - |
| Stage 2 | - | - | - | - | 474 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 932 | - | 149 | 490 |
| Mov Cap-2 Maneuver | - | - | - | - | 149 | - |
| Stage 1 | - | - | - | - | 537 | - |
| Stage 2 | - | - | - | - | 425 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.4 | 25.2 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 289 | - | - | 932 | - |
| HCM Lane V/C Ratio | 0.391 | - | - | 0.102 | - |
| HCM Control Delay (s) | 25.2 | - | - | 9.3 | - |
| HCM Lane LOS | D | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.8 | - | - | 0.3 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 542 | 52 | 86 | 553 | 42 | 62 |
| Future Vol, veh/h | 542 | 52 | 86 | 553 | 42 | 62 |
| Conflicting Peds, #/hr | 0 | 11 | 11 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 583 | 56 | 92 | 595 | 45 | 67 |

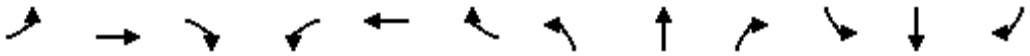
| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 650 | 0 | 1401 | 331 |
| Stage 1 | - | - | - | - | 622 | - |
| Stage 2 | - | - | - | - | 779 | - |
| Critical Hdwy | - | - | 4.13 | - | 6.63 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.83 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.43 | - |
| Follow-up Hdwy | - | - | 2.219 | - | 3.519 | 3.319 |
| Pot Cap-1 Maneuver | - | - | 934 | - | 142 | 666 |
| Stage 1 | - | - | - | - | 499 | - |
| Stage 2 | - | - | - | - | 451 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 924 | - | 127 | 659 |
| Mov Cap-2 Maneuver | - | - | - | - | 127 | - |
| Stage 1 | - | - | - | - | 494 | - |
| Stage 2 | - | - | - | - | 406 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.3 | 31.5 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 245 | - | - | 924 | - |
| HCM Lane V/C Ratio | 0.456 | - | - | 0.1 | - |
| HCM Control Delay (s) | 31.5 | - | - | 9.3 | - |
| HCM Lane LOS | D | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.2 | - | - | 0.3 | - |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 33 | 514 | 57 | 42 | 537 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| Future Volume (veh/h) | 33 | 514 | 57 | 42 | 537 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 38 | 584 | 65 | 48 | 610 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 59 | 1293 | 142 | 69 | 1010 | 445 | 139 | 38 | 258 | 137 | 43 | 242 |
| Arrive On Green | 0.03 | 0.28 | 0.28 | 0.04 | 0.28 | 0.28 | 0.08 | 0.18 | 0.18 | 0.08 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1781 | 4653 | 511 | 1781 | 3554 | 1566 | 1781 | 210 | 1407 | 1781 | 234 | 1328 |
| Grp Volume(v), veh/h | 38 | 425 | 224 | 48 | 610 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1760 | 1781 | 1777 | 1566 | 1781 | 0 | 1617 | 1781 | 0 | 1562 |
| Q Serve(g_s), s | 1.0 | 5.1 | 5.2 | 1.3 | 7.4 | 1.8 | 1.3 | 0.0 | 1.4 | 2.8 | 0.0 | 2.2 |
| Cycle Q Clear(g_c), s | 1.0 | 5.1 | 5.2 | 1.3 | 7.4 | 1.8 | 1.3 | 0.0 | 1.4 | 2.8 | 0.0 | 2.2 |
| Prop In Lane | 1.00 | | 0.29 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 59 | 946 | 489 | 69 | 1010 | 445 | 139 | 0 | 296 | 137 | 0 | 285 |
| V/C Ratio(X) | 0.65 | 0.45 | 0.46 | 0.69 | 0.60 | 0.17 | 0.35 | 0.00 | 0.18 | 0.75 | 0.00 | 0.28 |
| Avail Cap(c_a), veh/h | 1255 | 2468 | 1276 | 1255 | 2576 | 1135 | 1435 | 0 | 1140 | 897 | 0 | 1101 |
| 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 | 23.7 | 14.8 | 14.8 | 23.6 | 15.4 | 13.4 | 21.7 | 0.0 | 17.1 | 22.4 | 0.0 | 17.5 |
| Incr Delay (d2), s/veh | 11.5 | 0.3 | 0.7 | 11.5 | 0.6 | 0.2 | 1.5 | 0.0 | 0.3 | 7.9 | 0.0 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.6 | 1.6 | 1.7 | 0.7 | 2.4 | 0.6 | 0.6 | 0.0 | 0.5 | 1.4 | 0.0 | 0.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 35.2 | 15.1 | 15.5 | 35.1 | 15.9 | 13.6 | 23.2 | 0.0 | 17.4 | 30.4 | 0.0 | 18.0 |
| LnGrp LOS | D | B | B | D | B | B | C | A | B | C | A | B |
| Approach Vol, veh/h | | 687 | | | 735 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 16.4 | | | 17.0 | | | 20.1 | | | 25.0 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 19.8 | 8.9 | 14.0 | 6.6 | 20.1 | 8.8 | 14.1 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 7.2 | 3.3 | 4.2 | 3.0 | 9.4 | 4.8 | 3.4 |
| Green Ext Time (p_c), s | 0.1 | 4.0 | 0.1 | 0.5 | 0.1 | 4.2 | 0.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 17.8 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/21/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 130 | 403 | 113 | 142 | 415 | 167 | 134 | 210 | 177 | 109 | 150 | 98 |
| Future Volume (veh/h) | 130 | 403 | 113 | 142 | 415 | 167 | 134 | 210 | 177 | 109 | 150 | 98 |
| 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 | | 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 | 135 | 420 | 118 | 148 | 432 | 174 | 140 | 219 | 184 | 114 | 156 | 102 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 181 | 995 | 304 | 197 | 1042 | 322 | 187 | 965 | 295 | 152 | 866 | 268 |
| Arrive On Green | 0.10 | 0.19 | 0.19 | 0.11 | 0.20 | 0.20 | 0.10 | 0.19 | 0.19 | 0.09 | 0.17 | 0.17 |
| Sat Flow, veh/h | 1781 | 5106 | 1559 | 1781 | 5106 | 1578 | 1781 | 5106 | 1562 | 1781 | 5106 | 1582 |
| Grp Volume(v), veh/h | 135 | 420 | 118 | 148 | 432 | 174 | 140 | 219 | 184 | 114 | 156 | 102 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1559 | 1781 | 1702 | 1578 | 1781 | 1702 | 1562 | 1781 | 1702 | 1582 |
| Q Serve(g_s), s | 3.9 | 3.8 | 3.5 | 4.2 | 3.9 | 5.2 | 4.0 | 1.9 | 5.7 | 3.3 | 1.4 | 3.0 |
| Cycle Q Clear(g_c), s | 3.9 | 3.8 | 3.5 | 4.2 | 3.9 | 5.2 | 4.0 | 1.9 | 5.7 | 3.3 | 1.4 | 3.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 181 | 995 | 304 | 197 | 1042 | 322 | 187 | 965 | 295 | 152 | 866 | 268 |
| V/C Ratio(X) | 0.75 | 0.42 | 0.39 | 0.75 | 0.41 | 0.54 | 0.75 | 0.23 | 0.62 | 0.75 | 0.18 | 0.38 |
| Avail Cap(c_a), veh/h | 1020 | 2730 | 834 | 850 | 2340 | 723 | 850 | 4680 | 1432 | 850 | 4680 | 1450 |
| 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 | 22.9 | 18.5 | 18.4 | 22.6 | 18.1 | 18.6 | 22.8 | 18.0 | 19.5 | 23.4 | 18.6 | 19.3 |
| Incr Delay (d2), s/veh | 6.0 | 0.3 | 0.8 | 5.7 | 0.3 | 1.4 | 6.0 | 0.1 | 2.1 | 7.2 | 0.1 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.7 | 1.3 | 1.1 | 1.9 | 1.3 | 1.7 | 1.7 | 0.6 | 1.9 | 1.5 | 0.5 | 1.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 28.9 | 18.8 | 19.2 | 28.2 | 18.4 | 20.1 | 28.7 | 18.1 | 21.7 | 30.6 | 18.7 | 20.2 |
| LnGrp LOS | C | B | B | C | B | C | C | B | C | C | B | C |
| Approach Vol, veh/h | | 673 | | | 754 | | | 543 | | | 372 | |
| Approach Delay, s/veh | | 20.9 | | | 20.7 | | | 22.1 | | | 22.8 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.5 | 15.9 | 10.8 | 16.2 | 10.5 | 14.9 | 10.3 | 16.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 5.3 | 7.7 | 6.2 | 5.8 | 6.0 | 5.0 | 5.9 | 7.2 |
| Green Ext Time (p_c), s | 0.2 | 2.0 | 0.3 | 2.9 | 0.3 | 1.3 | 0.3 | 3.0 |

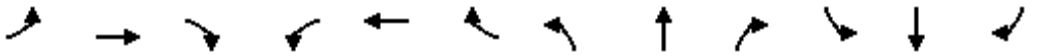
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 21.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/21/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 71 | 584 | 34 | 101 | 674 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| Future Volume (veh/h) | 71 | 584 | 34 | 101 | 674 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| 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 | | 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 | 76 | 628 | 37 | 109 | 725 | 68 | 29 | 16 | 98 | 54 | 16 | 38 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 108 | 1226 | 534 | 144 | 1734 | 162 | 373 | 231 | 195 | 364 | 231 | 195 |
| Arrive On Green | 0.06 | 0.34 | 0.34 | 0.08 | 0.36 | 0.36 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 3554 | 1549 | 1781 | 4751 | 443 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Grp Volume(v), veh/h | 76 | 628 | 37 | 109 | 518 | 275 | 29 | 16 | 98 | 54 | 16 | 38 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1549 | 1781 | 1702 | 1789 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Q Serve(g_s), s | 1.4 | 4.7 | 0.5 | 2.0 | 3.8 | 3.8 | 0.6 | 0.3 | 1.9 | 1.3 | 0.3 | 0.7 |
| Cycle Q Clear(g_c), s | 1.4 | 4.7 | 0.5 | 2.0 | 3.8 | 3.8 | 0.9 | 0.3 | 1.9 | 1.6 | 0.3 | 0.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.25 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 108 | 1226 | 534 | 144 | 1242 | 653 | 373 | 231 | 195 | 364 | 231 | 195 |
| V/C Ratio(X) | 0.70 | 0.51 | 0.07 | 0.76 | 0.42 | 0.42 | 0.08 | 0.07 | 0.50 | 0.15 | 0.07 | 0.19 |
| Avail Cap(c_a), veh/h | 1339 | 5127 | 2236 | 1285 | 4912 | 2582 | 1178 | 1349 | 1141 | 1127 | 1349 | 1141 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.3 | 8.7 | 7.3 | 15.0 | 7.9 | 7.9 | 13.3 | 12.9 | 13.6 | 13.6 | 12.9 | 13.1 |
| Incr Delay (d2), s/veh | 8.0 | 0.3 | 0.1 | 7.9 | 0.2 | 0.4 | 0.1 | 0.1 | 2.0 | 0.2 | 0.1 | 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 | 0.7 | 1.1 | 0.1 | 0.9 | 0.8 | 0.9 | 0.2 | 0.1 | 0.7 | 0.3 | 0.1 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 23.4 | 9.0 | 7.4 | 22.9 | 8.1 | 8.4 | 13.4 | 13.0 | 15.6 | 13.8 | 13.0 | 13.6 |
| LnGrp LOS | C | A | A | C | A | A | B | B | B | B | B | B |
| Approach Vol, veh/h | | 741 | | | 902 | | | 143 | | | 108 | |
| Approach Delay, s/veh | | 10.4 | | | 10.0 | | | 14.9 | | | 13.6 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.7 | 16.5 | | 9.1 | 7.0 | 17.1 | | 9.1 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.0 | 6.7 | | 3.6 | 3.4 | 5.8 | | 3.9 | | | | |
| Green Ext Time (p_c), s | 0.2 | 4.6 | | 0.3 | 0.2 | 5.6 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 10.7 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/21/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 213 | 469 | 43 | 49 | 562 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Future Volume (veh/h) | 213 | 469 | 43 | 49 | 562 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 227 | 499 | 46 | 52 | 598 | 182 | 27 | 16 | 30 | 141 | 17 | 267 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 158 | 2066 | 921 | 67 | 1884 | 837 | 42 | 258 | 215 | 158 | 19 | 305 |
| Arrive On Green | 0.09 | 0.58 | 0.58 | 0.04 | 0.53 | 0.53 | 0.02 | 0.14 | 0.14 | 0.09 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1781 | 3554 | 1584 | 1781 | 3554 | 1579 | 1781 | 1870 | 1557 | 1781 | 96 | 1502 |
| Grp Volume(v), veh/h | 227 | 499 | 46 | 52 | 598 | 182 | 27 | 16 | 30 | 141 | 0 | 284 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1584 | 1781 | 1777 | 1579 | 1781 | 1870 | 1557 | 1781 | 0 | 1597 |
| Q Serve(g_s), s | 12.0 | 9.2 | 1.7 | 3.9 | 12.8 | 8.3 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Cycle Q Clear(g_c), s | 12.0 | 9.2 | 1.7 | 3.9 | 12.8 | 8.3 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 158 | 2066 | 921 | 67 | 1884 | 837 | 42 | 258 | 215 | 158 | 0 | 325 |
| V/C Ratio(X) | 1.43 | 0.24 | 0.05 | 0.77 | 0.32 | 0.22 | 0.64 | 0.06 | 0.14 | 0.89 | 0.00 | 0.87 |
| Avail Cap(c_a), veh/h | 158 | 2066 | 921 | 158 | 1884 | 837 | 158 | 544 | 453 | 158 | 0 | 461 |
| 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) | 0.94 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 61.5 | 13.8 | 12.2 | 64.4 | 17.9 | 16.8 | 65.3 | 50.6 | 51.1 | 60.8 | 0.0 | 52.1 |
| Incr Delay (d2), s/veh | 225.7 | 0.3 | 0.1 | 16.9 | 0.4 | 0.6 | 15.2 | 0.1 | 0.3 | 41.5 | 0.0 | 12.6 |
| 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 | 15.3 | 3.7 | 0.6 | 2.1 | 5.2 | 3.2 | 1.1 | 0.5 | 0.9 | 6.6 | 0.0 | 10.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 287.2 | 14.0 | 12.3 | 81.3 | 18.4 | 17.4 | 80.6 | 50.7 | 51.4 | 102.4 | 0.0 | 64.7 |
| LnGrp LOS | F | B | B | F | B | B | F | D | D | F | A | E |
| Approach Vol, veh/h | | 772 | | | 832 | | | 73 | | | 425 | |
| Approach Delay, s/veh | | 94.2 | | | 22.1 | | | 62.1 | | | 77.2 | |
| Approach LOS | | F | | | C | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.7 | 84.7 | 16.6 | 24.0 | 16.6 | 77.8 | 7.8 | 32.8 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 51.2 | 12.0 | * 39 | 12.0 | * 52 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 5.9 | 11.2 | 12.6 | 4.3 | 14.0 | 14.8 | 4.0 | 25.3 |
| Green Ext Time (p_c), s | 0.0 | 3.6 | 0.0 | 0.1 | 0.0 | 4.9 | 0.0 | 1.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 61.1 |
| HCM 6th LOS | E |

**Notes**

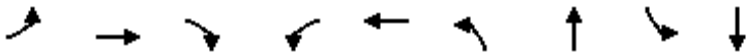
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# Appendix C: Existing Conditions Queue Worksheets

# Queues

## 1: West Ln & Eight Mile Rd

05/21/2024



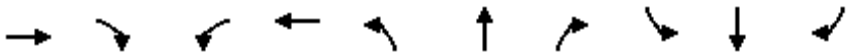
| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 116 | 446 | 420 | 160 | 410 | 257 | 412 | 38 | 665 |
| v/c Ratio | 0.63 | 0.80 | 0.65 | 0.70 | 0.68 | 0.80 | 0.31 | 0.37 | 0.80 |
| Control Delay | 81.8 | 62.0 | 23.7 | 80.6 | 52.9 | 77.9 | 33.3 | 81.9 | 59.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 81.8 | 62.0 | 23.7 | 80.6 | 52.9 | 77.9 | 33.3 | 81.9 | 59.5 |
| Queue Length 50th (ft) | 112 | 410 | 143 | 155 | 354 | 242 | 146 | 37 | 320 |
| Queue Length 95th (ft) | 196 | #702 | 311 | 254 | 560 | #432 | 214 | 85 | 418 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 5288 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 365 | 576 | 665 | 365 | 613 | 365 | 1429 | 365 | 1399 |
| 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 | 0.32 | 0.77 | 0.63 | 0.44 | 0.67 | 0.70 | 0.29 | 0.10 | 0.48 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/21/2024



| Lane Group | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 345 | 265 | 262 | 409 | 477 | 511 | 363 | 285 | 649 | 186 |
| v/c Ratio | 1.01 | 0.82 | 0.62 | 0.94 | 0.72 | 0.73 | 0.77 | 0.84 | 0.93 | 0.53 |
| Control Delay | 119.2 | 61.8 | 66.7 | 96.4 | 77.7 | 76.5 | 40.6 | 93.2 | 91.6 | 46.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 119.2 | 61.8 | 66.7 | 96.4 | 77.7 | 76.5 | 40.6 | 93.2 | 91.6 | 46.7 |
| Queue Length 50th (ft) | ~436 | 198 | 296 | 504 | 282 | 306 | 183 | 336 | 407 | 124 |
| Queue Length 95th (ft) | #720 | #393 | 405 | 660 | 378 | 407 | 342 | #552 | #579 | 230 |
| Internal Link Dist (ft) | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | | | 250 | | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 342 | 323 | 1681 | 1682 | 658 | 701 | 474 | 339 | 701 | 352 |
| 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 | 1.01 | 0.82 | 0.16 | 0.24 | 0.72 | 0.73 | 0.77 | 0.84 | 0.93 | 0.53 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/21/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 183 | 158 | 274 | 16 | 217 | 1072 | 73 | 1267 |
| v/c Ratio | 1.12 | 0.34 | 1.14 | 0.04 | 0.72 | 0.58 | 0.44 | 0.85 |
| Control Delay | 145.2 | 17.8 | 139.6 | 0.1 | 57.6 | 19.3 | 57.6 | 34.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 145.2 | 17.8 | 139.6 | 0.1 | 57.6 | 19.3 | 57.6 | 34.1 |
| Queue Length 50th (ft) | ~150 | 33 | ~228 | 0 | 138 | 245 | 47 | 376 |
| Queue Length 95th (ft) | #311 | 97 | #421 | 0 | 252 | 387 | 105 | 575 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 164 | 466 | 241 | 443 | 430 | 1983 | 430 | 1866 |
| 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 | 1.12 | 0.34 | 1.14 | 0.04 | 0.50 | 0.54 | 0.17 | 0.68 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/21/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 83 | 83 | 157 | 160 | 24 | 1067 | 70 | 181 | 1359 |
| v/c Ratio | 0.52 | 0.37 | 0.47 | 0.46 | 0.17 | 0.67 | 0.12 | 0.62 | 0.55 |
| Control Delay | 60.9 | 37.3 | 46.9 | 31.1 | 55.3 | 32.0 | 0.4 | 51.9 | 20.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 60.9 | 37.3 | 46.9 | 31.1 | 55.3 | 32.0 | 0.4 | 51.9 | 20.6 |
| Queue Length 50th (ft) | 43 | 31 | 78 | 61 | 12 | 175 | 0 | 90 | 148 |
| Queue Length 95th (ft) | #196 | 98 | 227 | 149 | 56 | 398 | 0 | 259 | 456 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 164 | 333 | 514 | 670 | 514 | 2836 | 923 | 514 | 2912 |
| 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 | 0.51 | 0.25 | 0.31 | 0.24 | 0.05 | 0.38 | 0.08 | 0.35 | 0.47 |

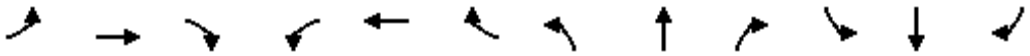
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 7: West Ln & Hammer Ln

05/21/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 545 | 202 | 238 | 898 | 303 |
| v/c Ratio | 0.62 | 0.65 | 0.39 | 0.86 | 0.56 | 0.36 | 0.63 | 0.34 | 0.38 | 0.60 | 0.60 | 0.54 |
| Control Delay | 55.5 | 44.2 | 9.9 | 65.2 | 42.4 | 13.4 | 62.3 | 41.1 | 7.2 | 63.6 | 46.5 | 12.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.5 | 44.2 | 9.9 | 65.2 | 42.4 | 13.4 | 62.3 | 41.1 | 7.2 | 63.6 | 46.5 | 12.6 |
| Queue Length 50th (ft) | 164 | 243 | 16 | 238 | 203 | 29 | 113 | 108 | 0 | 97 | 194 | 31 |
| Queue Length 95th (ft) | 289 | 350 | 92 | #480 | 297 | 108 | 197 | 158 | 62 | 173 | 271 | 129 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 673 | 3521 | 935 | 673 | 3521 | 918 | 673 | 3772 | 1000 | 538 | 3521 | 968 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.62 | 0.33 | 0.24 | 0.86 | 0.28 | 0.21 | 0.42 | 0.14 | 0.20 | 0.44 | 0.26 | 0.31 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

05/21/2024

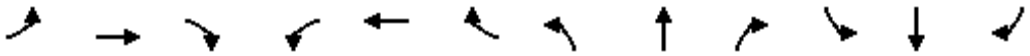
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 990 | 107 | 748 | 344 | 159 | 175 | 235 | 193 |
| v/c Ratio | 0.69 | 0.61 | 0.56 | 0.73 | 0.56 | 0.65 | 0.46 | 0.73 | 0.46 |
| Control Delay | 65.2 | 37.0 | 67.0 | 46.8 | 14.7 | 65.6 | 32.7 | 63.6 | 35.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 65.2 | 37.0 | 67.0 | 46.8 | 14.7 | 65.6 | 32.7 | 63.6 | 35.7 |
| Queue Length 50th (ft) | 147 | 246 | 86 | 295 | 50 | 127 | 82 | 182 | 102 |
| Queue Length 95th (ft) | 234 | 329 | 153 | 416 | 157 | 208 | 157 | #316 | 194 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 519 | 1659 | 519 | 1068 | 626 | 593 | 730 | 371 | 492 |
| 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 | 0.35 | 0.60 | 0.21 | 0.70 | 0.55 | 0.27 | 0.24 | 0.63 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/21/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 676 | 227 | 172 | 651 | 157 | 225 | 130 | 98 | 209 | 292 | 259 |
| v/c Ratio | 0.61 | 0.56 | 0.42 | 0.60 | 0.58 | 0.34 | 0.66 | 0.15 | 0.28 | 0.65 | 0.36 | 0.56 |
| Control Delay | 49.9 | 36.0 | 7.5 | 52.2 | 38.2 | 8.7 | 51.1 | 37.3 | 10.6 | 52.4 | 39.1 | 10.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.9 | 36.0 | 7.5 | 52.2 | 38.2 | 8.7 | 51.1 | 37.3 | 10.6 | 52.4 | 39.1 | 10.1 |
| Queue Length 50th (ft) | 100 | 119 | 0 | 87 | 116 | 0 | 112 | 23 | 0 | 105 | 54 | 0 |
| Queue Length 95th (ft) | 277 | 258 | 67 | 252 | 259 | 60 | #357 | 57 | 47 | #319 | 115 | 72 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 595 | 1745 | 678 | 496 | 1459 | 554 | 496 | 2738 | 885 | 496 | 2738 | 957 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.39 | 0.33 | 0.35 | 0.45 | 0.28 | 0.45 | 0.05 | 0.11 | 0.42 | 0.11 | 0.27 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 13: Maranatha Dr & Morada Ln

05/21/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 66 | 847 | 70 | 62 | 745 | 94 | 8 | 89 | 69 | 24 | 97 |
| v/c Ratio | 0.23 | 0.45 | 0.08 | 0.22 | 0.28 | 0.30 | 0.02 | 0.21 | 0.22 | 0.06 | 0.23 |
| Control Delay | 29.9 | 14.6 | 5.0 | 30.1 | 12.5 | 23.3 | 20.4 | 6.9 | 22.2 | 20.7 | 6.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.9 | 14.6 | 5.0 | 30.1 | 12.5 | 23.3 | 20.4 | 6.9 | 22.2 | 20.7 | 6.8 |
| Queue Length 50th (ft) | 19 | 106 | 0 | 17 | 57 | 26 | 2 | 0 | 19 | 6 | 0 |
| Queue Length 95th (ft) | 77 | 279 | 27 | 74 | 150 | 79 | 13 | 32 | 61 | 27 | 33 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 951 | 3021 | 1313 | 913 | 4259 | 736 | 992 | 874 | 746 | 992 | 875 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.07 | 0.28 | 0.05 | 0.07 | 0.17 | 0.13 | 0.01 | 0.10 | 0.09 | 0.02 | 0.11 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/21/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 770 | 35 | 18 | 623 | 88 | 61 | 21 | 66 | 57 | 120 |
| v/c Ratio | 0.64 | 0.33 | 0.03 | 0.19 | 0.35 | 0.11 | 0.46 | 0.10 | 0.25 | 0.44 | 0.45 |
| Control Delay | 59.9 | 13.9 | 0.1 | 60.2 | 21.6 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.9 | 13.9 | 0.1 | 60.2 | 21.6 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Length 50th (ft) | 142 | 94 | 0 | 14 | 145 | 0 | 48 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | #323 | 334 | 0 | 39 | 273 | 30 | 93 | 32 | 9 | 89 | 47 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 296 | 2360 | 1061 | 169 | 1793 | 830 | 169 | 585 | 564 | 169 | 576 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.33 | 0.03 | 0.11 | 0.35 | 0.11 | 0.36 | 0.04 | 0.12 | 0.34 | 0.21 |

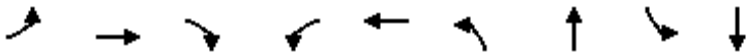
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 1: West Ln & Eight Mile Rd

05/21/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 426 | 308 | 77 | 445 | 279 | 550 | 12 | 499 |
| v/c Ratio | 0.73 | 0.62 | 0.44 | 0.53 | 0.79 | 0.76 | 0.40 | 0.15 | 0.77 |
| Control Delay | 76.1 | 42.8 | 14.6 | 78.1 | 57.7 | 68.8 | 33.1 | 74.1 | 61.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.1 | 42.8 | 14.6 | 78.1 | 57.7 | 68.8 | 33.1 | 74.1 | 61.1 |
| Queue Length 50th (ft) | 173 | 324 | 72 | 71 | 378 | 249 | 180 | 11 | 225 |
| Queue Length 95th (ft) | 273 | 497 | 174 | 136 | #625 | #441 | 290 | 36 | 310 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 5288 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 379 | 690 | 709 | 379 | 598 | 379 | 1484 | 379 | 1453 |
| 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 | 0.50 | 0.62 | 0.43 | 0.20 | 0.74 | 0.74 | 0.37 | 0.03 | 0.34 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

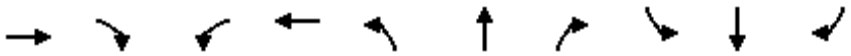
05/21/2024

| Lane Group | NBT | SBT |
|---|---|---|
| Lane Group Flow (vph) | 874 | 803 |
| v/c Ratio | 0.17 | 0.23 |
| Control Delay | 0.1 | 0.1 |
| Queue Delay | 0.0 | 0.0 |
| Total Delay | 0.1 | 0.1 |
| Queue Length 50th (ft) | 0 | 0 |
| Queue Length 95th (ft) | 0 | 0 |
| Internal Link Dist (ft) | 1387 | 5288 |
| Turn Bay Length (ft) | | |
| Base Capacity (vph) | 5056 | 3539 |
| Starvation Cap Reductn | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 |
| Storage Cap Reductn | 0 | 0 |
| Reduced v/c Ratio | 0.17 | 0.23 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/21/2024



| Lane Group | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 85 | 59 | 258 | 244 | 98 | 666 | 347 | 185 | 558 | 26 |
| v/c Ratio | 0.28 | 0.18 | 0.81 | 0.73 | 0.41 | 0.74 | 0.68 | 0.55 | 0.42 | 0.04 |
| Control Delay | 50.1 | 11.9 | 76.4 | 59.5 | 72.5 | 56.9 | 36.2 | 63.1 | 37.8 | 2.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 50.1 | 11.9 | 76.4 | 59.5 | 72.5 | 56.9 | 36.2 | 63.1 | 37.8 | 2.5 |
| Queue Length 50th (ft) | 67 | 0 | 267 | 208 | 50 | 338 | 186 | 174 | 233 | 0 |
| Queue Length 95th (ft) | 124 | 39 | 383 | 320 | 86 | #464 | 331 | 276 | 320 | 7 |
| Internal Link Dist (ft) | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | | | 250 | | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 466 | 469 | 1681 | 1586 | 875 | 902 | 509 | 451 | 1325 | 608 |
| 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 | 0.18 | 0.13 | 0.15 | 0.15 | 0.11 | 0.74 | 0.68 | 0.41 | 0.42 | 0.04 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/21/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 112 | 94 | 144 | 8 | 156 | 1142 | 39 | 848 |
| v/c Ratio | 0.44 | 0.23 | 0.55 | 0.02 | 0.50 | 0.63 | 0.21 | 0.66 |
| Control Delay | 33.1 | 8.1 | 36.1 | 0.1 | 35.6 | 16.1 | 38.1 | 22.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.1 | 8.1 | 36.1 | 0.1 | 35.6 | 16.1 | 38.1 | 22.2 |
| Queue Length 50th (ft) | 43 | 0 | 56 | 0 | 62 | 200 | 16 | 153 |
| Queue Length 95th (ft) | 109 | 38 | 138 | 0 | 147 | 344 | 55 | 280 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 428 | 631 | 443 | 610 | 665 | 2743 | 665 | 2766 |
| 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 | 0.26 | 0.15 | 0.33 | 0.01 | 0.23 | 0.42 | 0.06 | 0.31 |

Intersection Summary

# Queues
## 6: West Ln & Knickerbocker Dr

05/21/2024

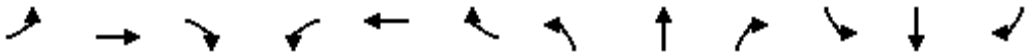
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 75 | 75 | 124 | 123 | 66 | 1193 | 86 | 121 | 896 |
| v/c Ratio | 0.44 | 0.31 | 0.49 | 0.36 | 0.34 | 0.66 | 0.13 | 0.48 | 0.41 |
| Control Delay | 55.7 | 34.2 | 49.1 | 25.8 | 50.6 | 28.4 | 0.8 | 49.1 | 21.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.7 | 34.2 | 49.1 | 25.8 | 50.6 | 28.4 | 0.8 | 49.1 | 21.8 |
| Queue Length 50th (ft) | 37 | 27 | 59 | 36 | 32 | 183 | 0 | 58 | 119 |
| Queue Length 95th (ft) | #168 | 87 | 182 | 104 | 113 | 432 | 3 | 179 | 288 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 181 | 362 | 567 | 725 | 567 | 3130 | 1000 | 567 | 3148 |
| 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 | 0.41 | 0.21 | 0.22 | 0.17 | 0.12 | 0.38 | 0.09 | 0.21 | 0.28 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/21/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 513 | 1309 | 195 | 426 | 1153 | 127 | 498 | 858 | 270 | 211 | 609 | 271 |
| v/c Ratio | 0.83 | 0.71 | 0.35 | 0.69 | 0.62 | 0.25 | 0.81 | 0.49 | 0.44 | 0.60 | 0.48 | 0.54 |
| Control Delay | 70.0 | 47.8 | 12.7 | 63.9 | 45.7 | 16.9 | 68.5 | 44.4 | 8.9 | 71.0 | 51.1 | 12.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 70.0 | 47.8 | 12.7 | 63.9 | 45.7 | 16.9 | 68.5 | 44.4 | 8.9 | 71.0 | 51.1 | 12.3 |
| Queue Length 50th (ft) | 218 | 287 | 27 | 176 | 245 | 27 | 211 | 187 | 14 | 90 | 142 | 21 |
| Queue Length 95th (ft) | #439 | 409 | 103 | #328 | 354 | 91 | #420 | 265 | 96 | 164 | 195 | 109 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 618 | 3231 | 851 | 618 | 3231 | 823 | 618 | 3462 | 955 | 494 | 3231 | 895 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.83 | 0.41 | 0.23 | 0.69 | 0.36 | 0.15 | 0.81 | 0.25 | 0.28 | 0.43 | 0.19 | 0.30 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

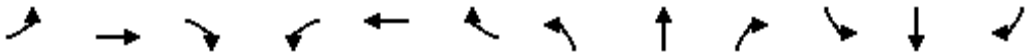
05/21/2024

| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 38 | 649 | 48 | 610 | 77 | 48 | 54 | 103 | 81 |
| v/c Ratio | 0.18 | 0.30 | 0.21 | 0.40 | 0.11 | 0.18 | 0.13 | 0.35 | 0.16 |
| Control Delay | 41.9 | 23.2 | 41.2 | 25.1 | 2.8 | 40.5 | 10.9 | 38.9 | 9.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.9 | 23.2 | 41.2 | 25.1 | 2.8 | 40.5 | 10.9 | 38.9 | 9.3 |
| Queue Length 50th (ft) | 15 | 79 | 19 | 113 | 0 | 19 | 3 | 40 | 5 |
| Queue Length 95th (ft) | 56 | 168 | 66 | 245 | 16 | 66 | 32 | 116 | 38 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 1025 | 2948 | 1025 | 2088 | 935 | 1121 | 1203 | 776 | 941 |
| 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 | 0.04 | 0.22 | 0.05 | 0.29 | 0.08 | 0.04 | 0.04 | 0.13 | 0.09 |

Intersection Summary

# Queues
## 12: Holman Rd & Morada Ln

05/21/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 135 | 420 | 118 | 148 | 432 | 174 | 140 | 219 | 184 | 114 | 156 | 102 |
| v/c Ratio | 0.47 | 0.42 | 0.30 | 0.49 | 0.42 | 0.38 | 0.48 | 0.26 | 0.44 | 0.43 | 0.20 | 0.31 |
| Control Delay | 42.0 | 30.6 | 9.2 | 41.6 | 30.0 | 8.2 | 41.9 | 30.2 | 9.0 | 42.9 | 31.4 | 10.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 42.0 | 30.6 | 9.2 | 41.6 | 30.0 | 8.2 | 41.9 | 30.2 | 9.0 | 42.9 | 31.4 | 10.4 |
| Queue Length 50th (ft) | 48 | 54 | 0 | 53 | 55 | 0 | 50 | 28 | 0 | 41 | 20 | 0 |
| Queue Length 95th (ft) | 193 | 155 | 51 | 208 | 158 | 59 | 199 | 80 | 58 | 170 | 62 | 47 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 770 | 2200 | 741 | 641 | 1874 | 684 | 641 | 3539 | 1143 | 641 | 3539 | 1118 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.18 | 0.19 | 0.16 | 0.23 | 0.23 | 0.25 | 0.22 | 0.06 | 0.16 | 0.18 | 0.04 | 0.09 |

Intersection Summary

# Queues
## 13: Maranatha Dr & Morada Ln

05/21/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 628 | 37 | 109 | 793 | 29 | 16 | 98 | 54 | 16 | 38 |
| v/c Ratio | 0.25 | 0.39 | 0.05 | 0.33 | 0.30 | 0.10 | 0.04 | 0.24 | 0.19 | 0.04 | 0.10 |
| Control Delay | 26.9 | 16.3 | 2.1 | 26.3 | 12.7 | 19.1 | 18.3 | 6.5 | 20.1 | 18.3 | 2.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.9 | 16.3 | 2.1 | 26.3 | 12.7 | 19.1 | 18.3 | 6.5 | 20.1 | 18.3 | 2.4 |
| Queue Length 50th (ft) | 18 | 70 | 0 | 25 | 56 | 7 | 4 | 0 | 13 | 4 | 0 |
| Queue Length 95th (ft) | 81 | 210 | 9 | 106 | 161 | 29 | 19 | 31 | 46 | 19 | 9 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 989 | 3188 | 1400 | 949 | 4484 | 771 | 1033 | 910 | 771 | 1033 | 897 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.08 | 0.20 | 0.03 | 0.11 | 0.18 | 0.04 | 0.02 | 0.11 | 0.07 | 0.02 | 0.04 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/21/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 227 | 499 | 46 | 52 | 598 | 182 | 27 | 16 | 30 | 141 | 284 |
| v/c Ratio | 0.60 | 0.23 | 0.05 | 0.43 | 0.36 | 0.23 | 0.27 | 0.09 | 0.12 | 0.90 | 0.62 |
| Control Delay | 56.3 | 15.1 | 0.1 | 70.8 | 24.8 | 7.8 | 67.2 | 49.6 | 1.0 | 109.5 | 12.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.3 | 15.1 | 0.1 | 70.8 | 24.8 | 7.8 | 67.2 | 49.6 | 1.0 | 109.5 | 12.9 |
| Queue Length 50th (ft) | 180 | 90 | 0 | 45 | 163 | 21 | 23 | 14 | 0 | 125 | 14 |
| Queue Length 95th (ft) | #436 | 213 | 0 | 88 | 257 | 79 | 55 | 29 | 0 | #254 | 80 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 381 | 2211 | 1002 | 158 | 1644 | 787 | 157 | 542 | 525 | 157 | 649 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.60 | 0.23 | 0.05 | 0.33 | 0.36 | 0.23 | 0.17 | 0.03 | 0.06 | 0.90 | 0.44 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Caywood Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Existing |
| Peak Hour | AM |

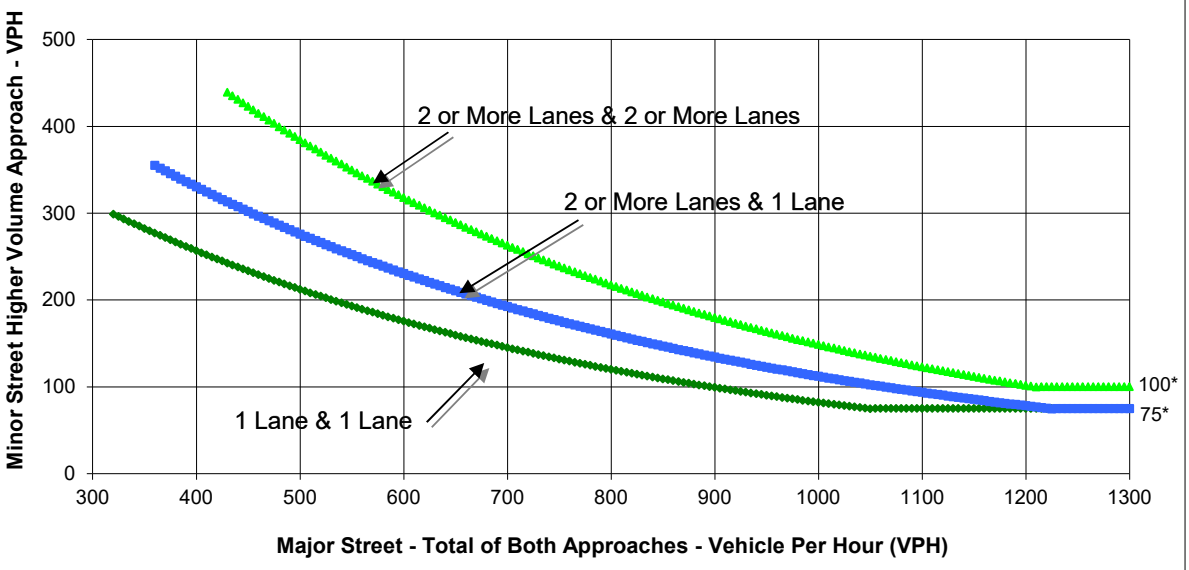
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 22 | 0 | 0 | 70 |
| Through | 0 | 0 | 789 | 634 |
| Right | 0 | 0 | 103 | 0 |
| Total | 22 | 0 | 892 | 704 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,596** | **22** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Caywood Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Existing |
| Peak Hour | PM |

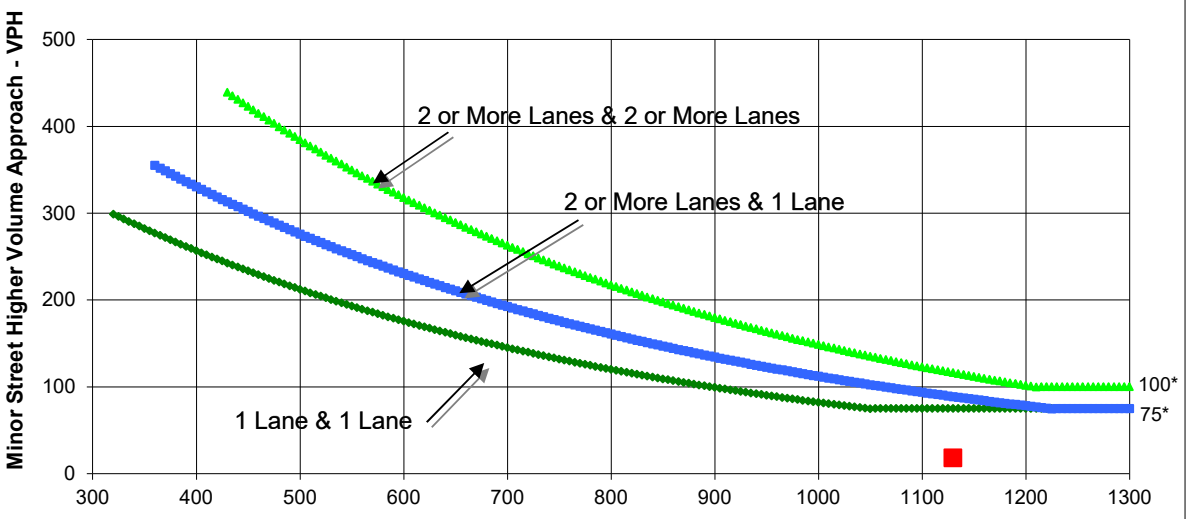
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 18 | 0 | 0 | 47 |
| Through | 0 | 0 | 547 | 492 |
| Right | 0 | 0 | 44 | 0 |
| Total | 18 | 0 | 591 | 539 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,130** | **18** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Cherbourg Way |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Existing |
| Peak Hour | AM |

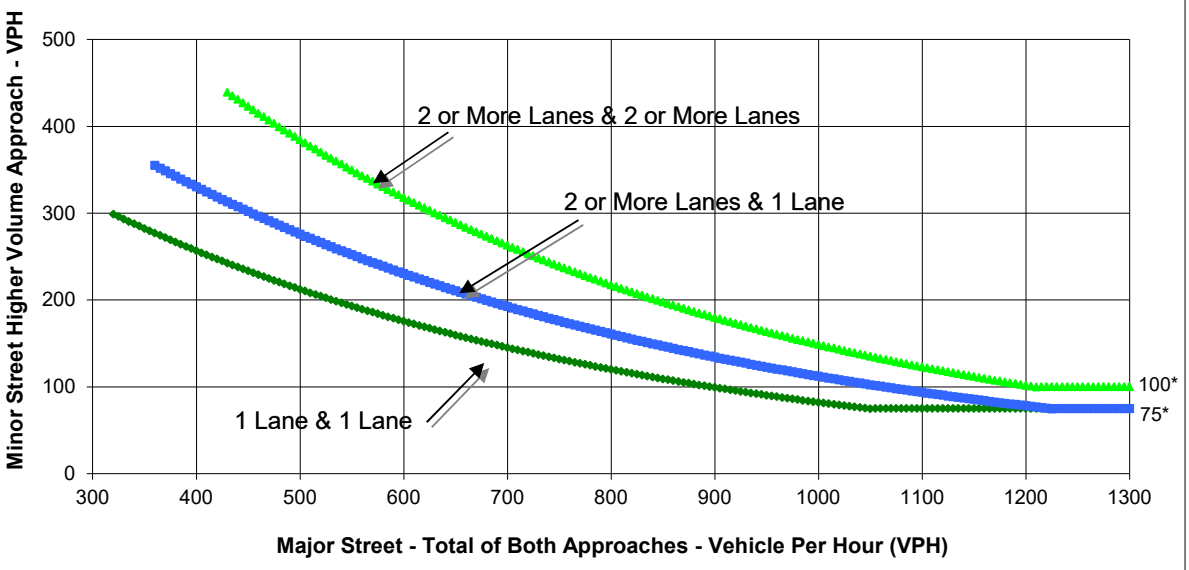
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 0 | 0 | 154 |
| Through | 0 | 0 | 820 | 696 |
| Right | 0 | 0 | 55 | 0 |
| Total | 8 | 0 | 875 | 850 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,725** | **8** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way | Scenario | Existing |
| | | Peak Hour | PM |

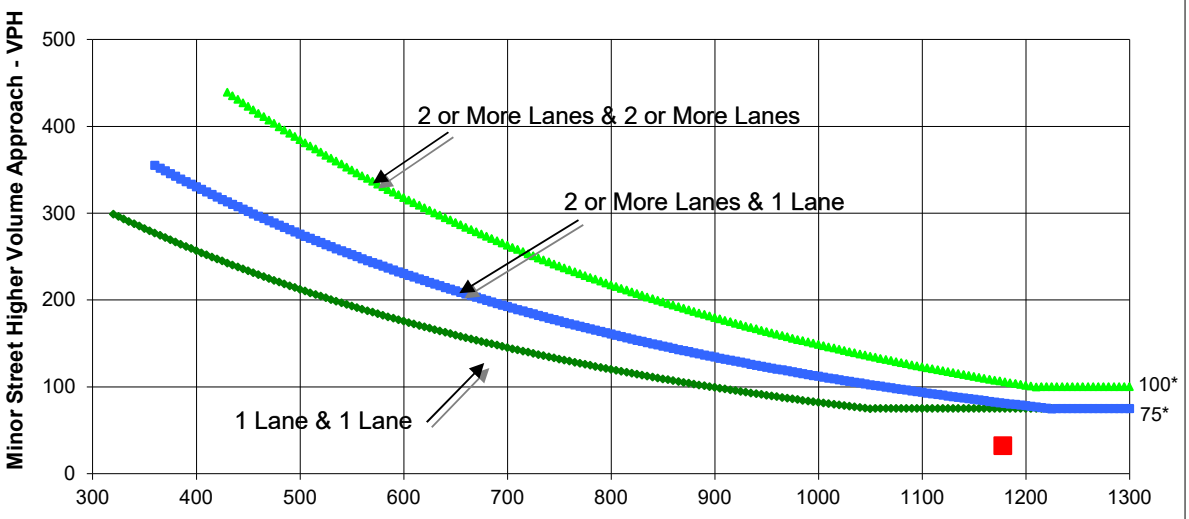
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 32 | 0 | 0 | 88 |
| Through | 0 | 0 | 521 | 507 |
| Right | 0 | 0 | 62 | 0 |
| Total | 32 | 0 | 583 | 595 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,178** | **32** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive | Scenario | Existing |
| | | Peak Hour | AM |

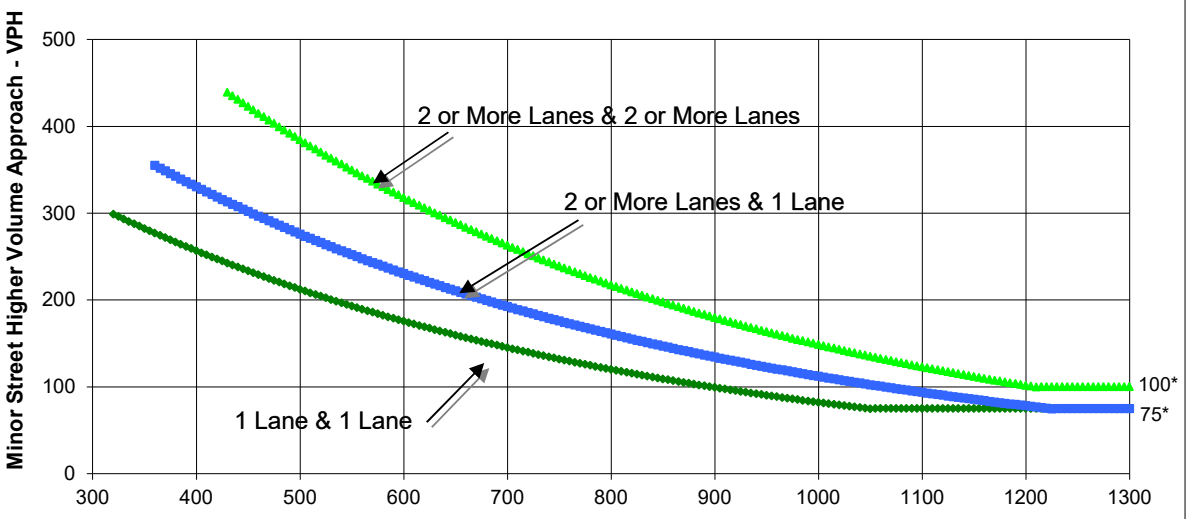
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 24 | 0 | 0 | 74 |
| Through | 0 | 0 | 914 | 826 |
| Right | 0 | 0 | 36 | 0 |
| Total | 24 | 0 | 950 | 900 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,850** | **24** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Fox Creek Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Existing |
| Peak Hour | PM |

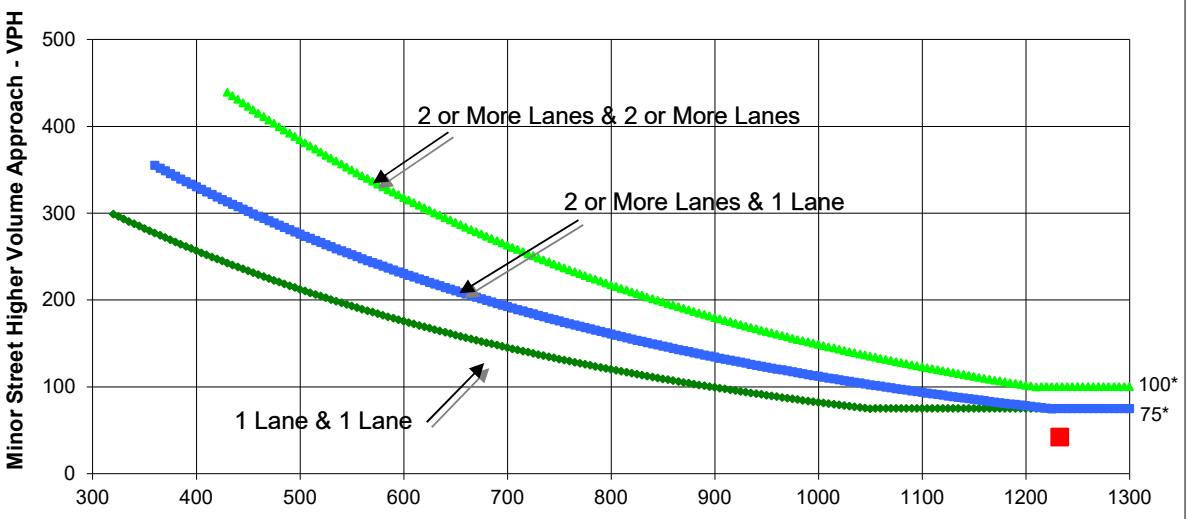
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 42 | 0 | 0 | 86 |
| Through | 0 | 0 | 542 | 553 |
| Right | 0 | 0 | 52 | 0 |
| Total | 42 | 0 | 594 | 639 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,233** | **42** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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# Appendix D: Existing Plus Project Signal Warrant Worksheets

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Existing Plus Project |
| | | Peak Hour | AM |

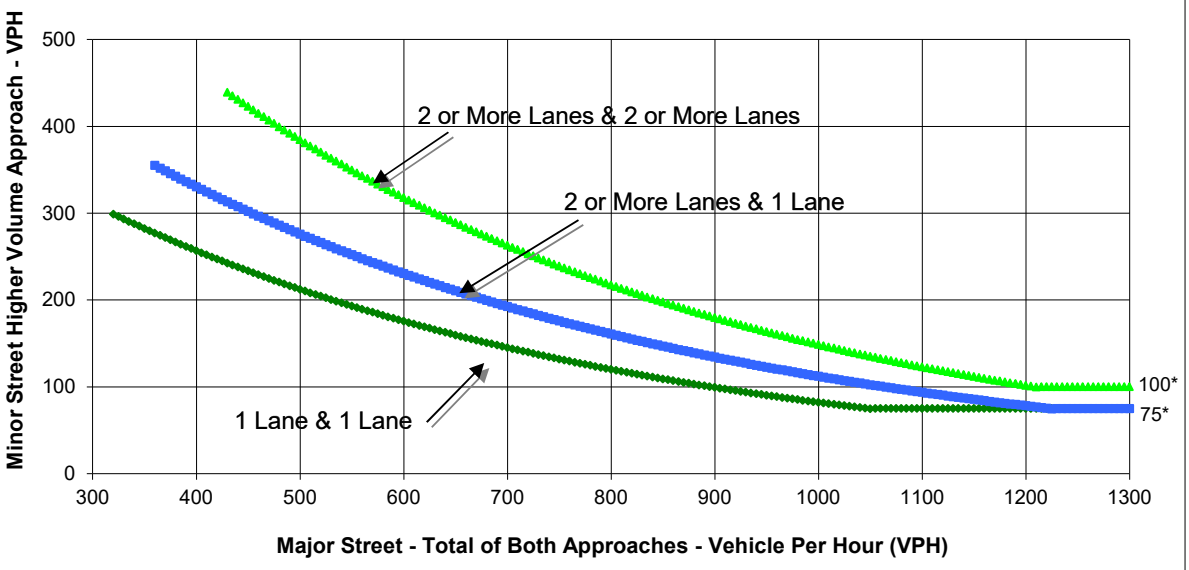
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 61 | 0 | 100 |
| Through | 665 | 1,019 | 0 | 0 |
| Right | 35 | 0 | 0 | 146 |
| Total | 700 | 1,080 | 0 | 246 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,780** | **246** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Existing Plus Project |
| | | Peak Hour | PM |

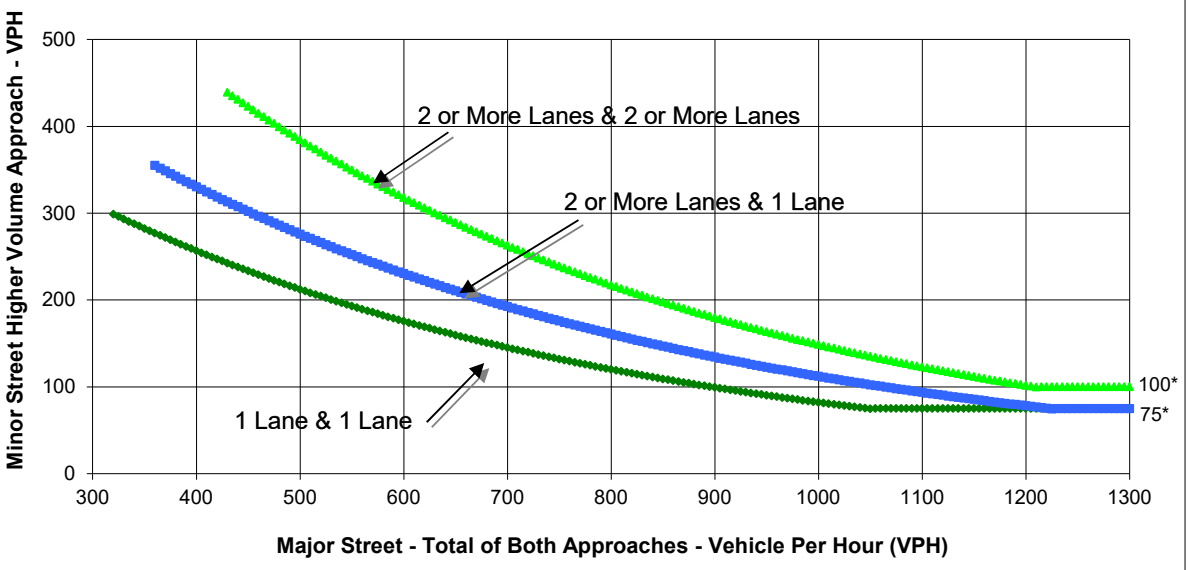
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 223 | 0 | 70 |
| Through | 831 | 739 | 0 | 0 |
| Right | 119 | 0 | 0 | 102 |
| Total | 950 | 962 | 0 | 172 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,912** | **172** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| | | Project | Bear Creek South Residential |
| Major Street | Morada Lane | Scenario | Existing Plus Project |
| Minor Street | Caywood Drive/Project Driveway #3 | Peak Hour | AM |

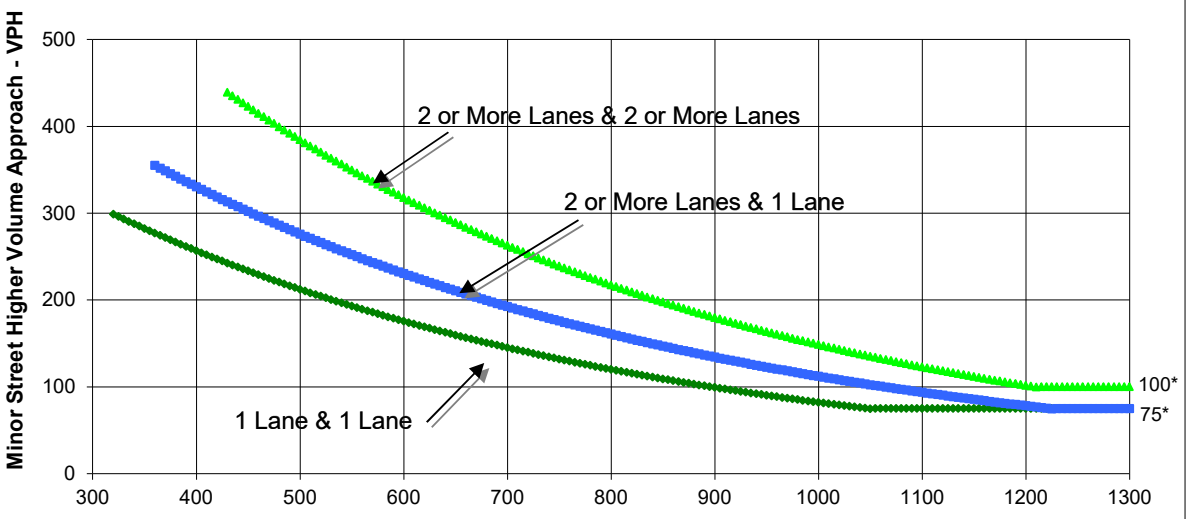
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 22 | 105 | 14 | 70 |
| Through | 0 | 2 | 831 | 766 |
| Right | 0 | 86 | 103 | 36 |
| Total | 22 | 193 | 948 | 872 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,820** | **193** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive/Project Driveway #3 | Scenario | Existing Plus Project |
| | | Peak Hour | PM |

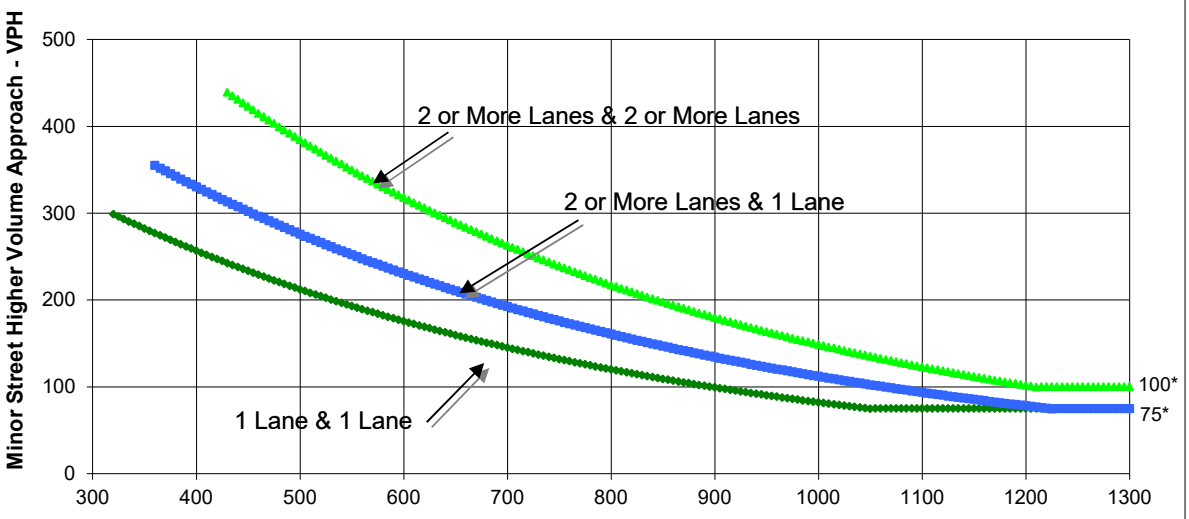
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 18 | 75 | 54 | 47 |
| Through | 2 | 2 | 711 | 590 |
| Right | 0 | 67 | 44 | 127 |
| Total | 20 | 144 | 809 | 764 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,573** | **144** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Existing Plus Project |
| | | Peak Hour | AM |

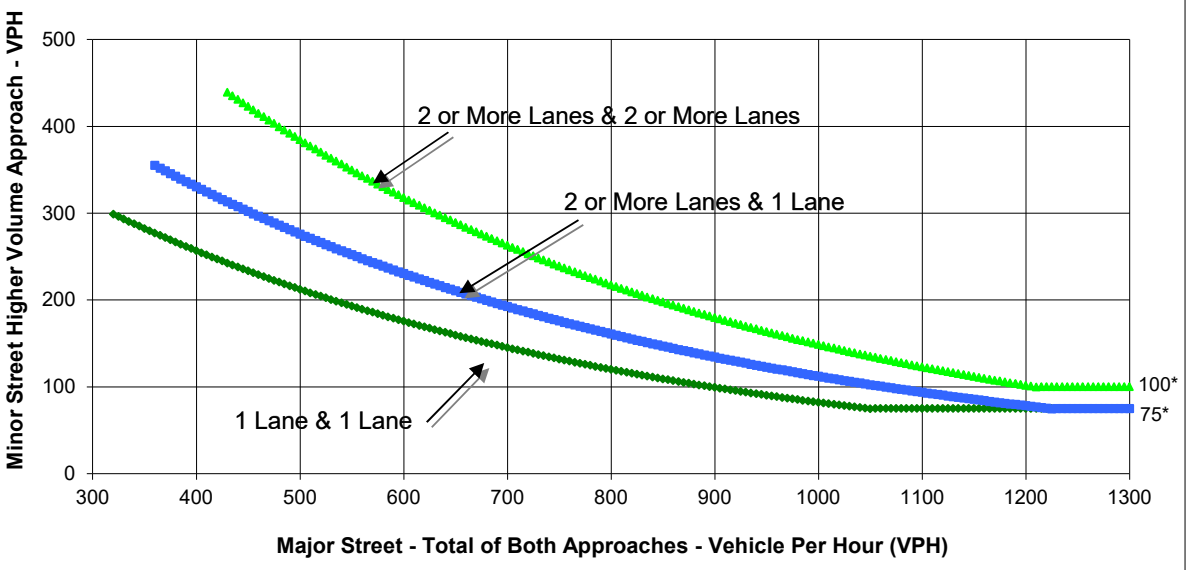
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 343 | 28 | 154 |
| Through | 0 | 2 | 939 | 814 |
| Right | 0 | 50 | 55 | 36 |
| Total | 8 | 395 | 1,022 | 1,004 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,026** | **395** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Existing Plus Project |
| | | Peak Hour | PM |

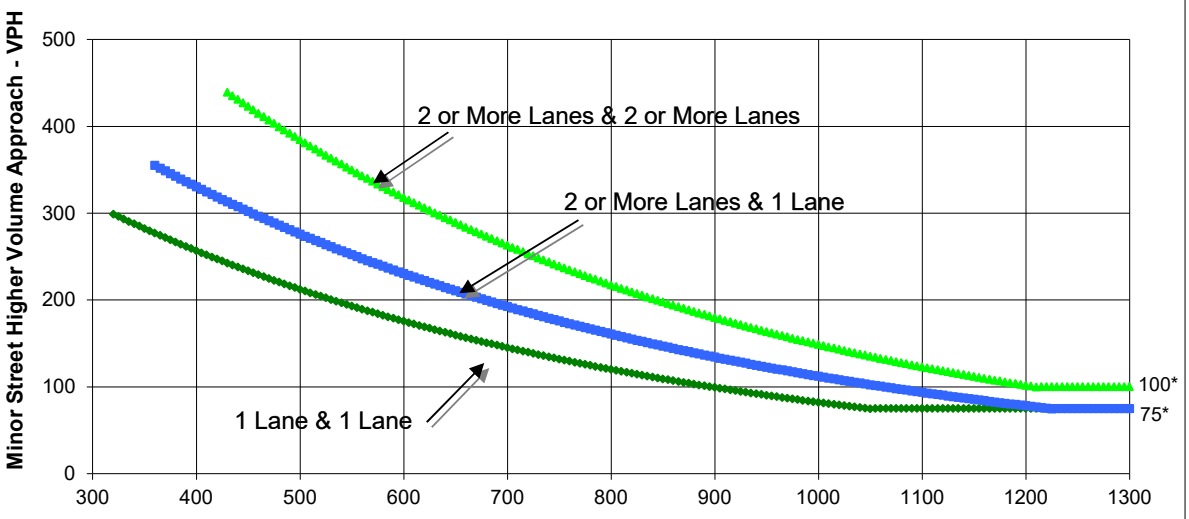
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 32 | 244 | 117 | 88 |
| Through | 3 | 2 | 643 | 694 |
| Right | 0 | 38 | 62 | 128 |
| Total | 35 | 284 | 822 | 910 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,732** | **284** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Existing Plus Project |
| | | Peak Hour | AM |

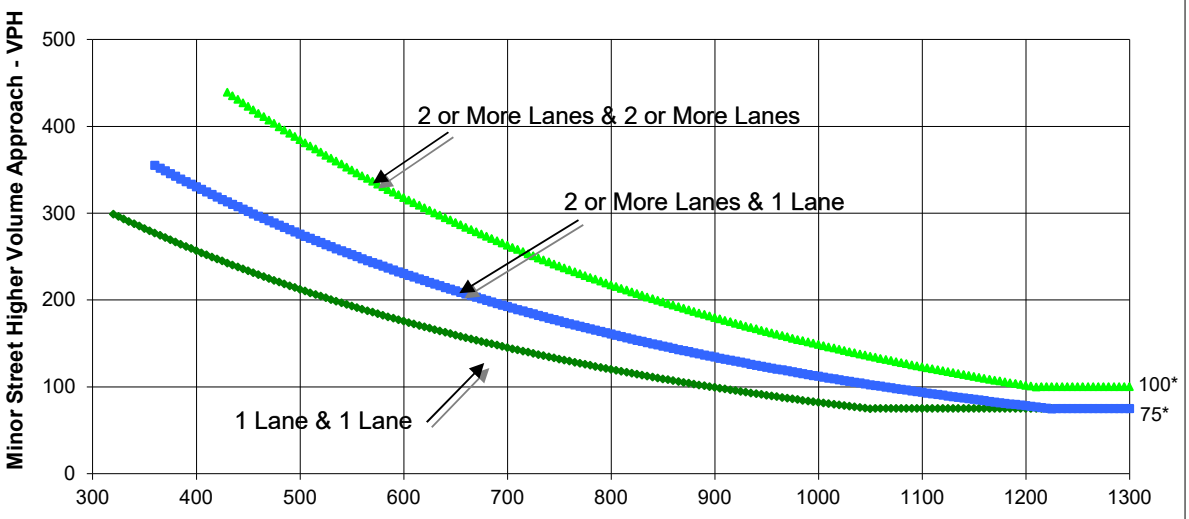
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 24 | 0 | 14 | 74 |
| Through | 0 | 0 | 1,362 | 898 |
| Right | 0 | 0 | 36 | 80 |
| Total | 24 | 0 | 1,412 | 1,052 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,464** | **24** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Existing Plus Project |
| | | Peak Hour | PM |

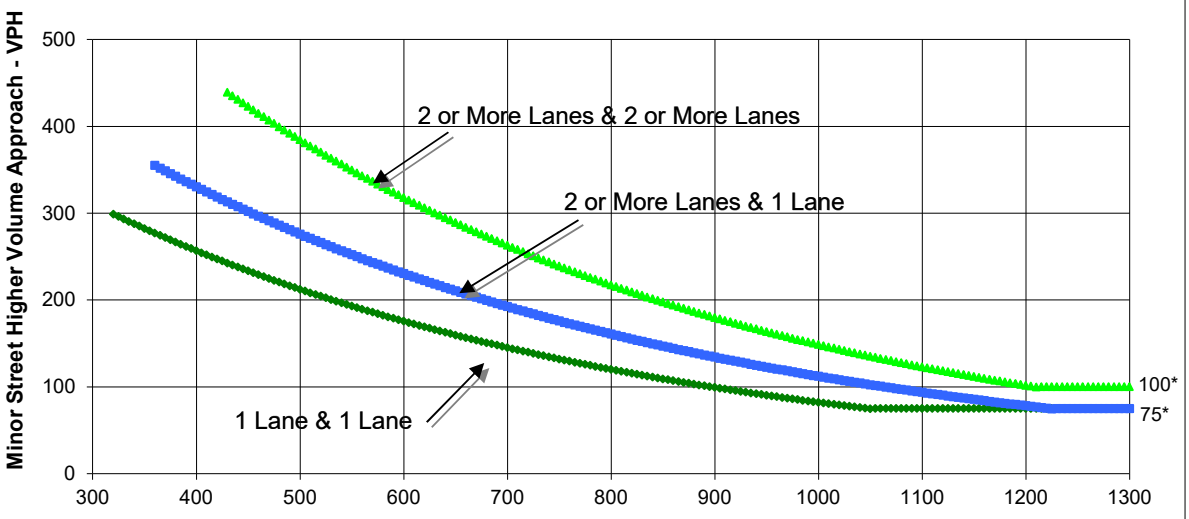
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 42 | 0 | 47 | 86 |
| Through | 0 | 0 | 861 | 808 |
| Right | 0 | 0 | 52 | 291 |
| Total | 42 | 0 | 960 | 1,185 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,145** | **42** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

# Appendix E: Existing Plus Project LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 109 | 419 | 415 | 156 | 379 | 7 | 300 | 426 | 85 | 36 | 509 | 151 |
| Future Volume (veh/h) | 109 | 419 | 415 | 156 | 379 | 7 | 300 | 426 | 85 | 36 | 509 | 151 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 116 | 446 | 441 | 166 | 403 | 7 | 319 | 453 | 90 | 38 | 541 | 161 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 141 | 560 | 475 | 193 | 602 | 10 | 344 | 1197 | 236 | 49 | 651 | 193 |
| Arrive On Green | 0.08 | 0.30 | 0.30 | 0.11 | 0.33 | 0.33 | 0.19 | 0.41 | 0.41 | 0.03 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1833 | 32 | 1781 | 2946 | 581 | 1781 | 2702 | 801 |
| Grp Volume(v), veh/h | 116 | 446 | 441 | 166 | 0 | 410 | 319 | 272 | 271 | 38 | 355 | 347 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1865 | 1781 | 1777 | 1750 | 1781 | 1777 | 1726 |
| Q Serve(g_s), s | 8.9 | 30.5 | 37.5 | 12.7 | 0.0 | 26.3 | 24.5 | 14.9 | 15.1 | 2.9 | 26.3 | 26.5 |
| Cycle Q Clear(g_c), s | 8.9 | 30.5 | 37.5 | 12.7 | 0.0 | 26.3 | 24.5 | 14.9 | 15.1 | 2.9 | 26.3 | 26.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.33 | 1.00 | | 0.46 |
| Lane Grp Cap(c), veh/h | 141 | 560 | 475 | 193 | 0 | 612 | 344 | 722 | 711 | 49 | 428 | 416 |
| V/C Ratio(X) | 0.82 | 0.80 | 0.93 | 0.86 | 0.00 | 0.67 | 0.93 | 0.38 | 0.38 | 0.77 | 0.83 | 0.83 |
| Avail Cap(c_a), veh/h | 385 | 606 | 514 | 385 | 0 | 612 | 385 | 755 | 744 | 385 | 755 | 733 |
| 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 | 63.0 | 44.8 | 47.2 | 60.9 | 0.0 | 40.2 | 55.1 | 28.9 | 29.0 | 67.1 | 50.0 | 50.1 |
| Incr Delay (d2), s/veh | 11.1 | 6.9 | 22.7 | 10.6 | 0.0 | 2.8 | 27.1 | 0.3 | 0.3 | 21.7 | 4.2 | 4.4 |
| 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 | 4.4 | 14.8 | 17.2 | 6.2 | 0.0 | 12.2 | 13.2 | 6.2 | 6.2 | 1.6 | 12.2 | 12.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 74.0 | 51.6 | 69.9 | 71.5 | 0.0 | 43.0 | 82.2 | 29.2 | 29.3 | 88.8 | 54.2 | 54.5 |
| LnGrp LOS | E | D | E | E | A | D | F | C | C | F | D | D |
| Approach Vol, veh/h | | 1003 | | | 576 | | | 862 | | | 740 | |
| Approach Delay, s/veh | | 62.2 | | | 51.2 | | | 48.9 | | | 56.1 | |
| Approach LOS | | E | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.1 | 47.6 | 31.8 | 39.5 | 16.0 | 51.6 | 8.9 | 62.4 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 30.0 | 45.0 | 30.0 | 59.0 | 30.0 | 45.0 | 30.0 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 14.7 | 39.5 | 26.5 | 28.5 | 10.9 | 28.3 | 4.9 | 17.1 |
| Green Ext Time (p_c), s | 0.3 | 2.1 | 0.3 | 5.0 | 0.2 | 2.0 | 0.1 | 3.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 55.2 |
| HCM 6th LOS | E |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/28/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 100 | 146 | 665 | 35 | 61 | 1019 |
| Future Volume (vph) | 100 | 146 | 665 | 35 | 61 | 1019 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 109 | 159 | 723 | 38 | 66 | 1108 |
| RTOR Reduction (vph) | 0 | 131 | 0 | 23 | 0 | 0 |
| Lane Group Flow (vph) | 109 | 28 | 723 | 15 | 66 | 1108 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 8.4 | 8.4 | 18.8 | 18.8 | 4.6 | 28.4 |
| Effective Green, g (s) | 8.4 | 8.4 | 18.8 | 18.8 | 4.6 | 28.4 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.39 | 0.39 | 0.10 | 0.59 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 311 | 278 | 1999 | 622 | 170 | 2102 |
| v/s Ratio Prot | | | 0.14 | | 0.04 | c0.31 |
| v/s Ratio Perm | c0.06 | 0.02 | | 0.01 | | |
| v/c Ratio | 0.35 | 0.10 | 0.36 | 0.02 | 0.39 | 0.53 |
| Uniform Delay, d1 | 17.3 | 16.5 | 10.3 | 8.9 | 20.3 | 5.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.7 | 0.2 | 0.1 | 0.0 | 1.5 | 0.2 |
| Delay (s) | 18.0 | 16.7 | 10.4 | 8.9 | 21.7 | 6.0 |
| Level of Service | B | B | B | A | C | A |
| Approach Delay (s) | 17.2 | | 10.3 | | | 6.9 |
| Approach LOS | B | | B | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 9.3 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 47.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 42.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 36 | 664 | 15 | 0 | 1119 |
| Future Vol, veh/h | 0 | 36 | 664 | 15 | 0 | 1119 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 39 | 722 | 16 | 0 | 1216 |

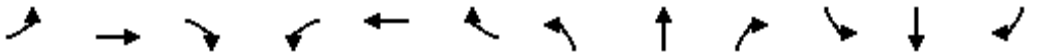
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 361 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 543 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 543 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 12.1 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 543 | - |
| HCM Lane V/C Ratio | - | - | 0.072 | - |
| HCM Control Delay (s) | - | - | 12.1 | - |
| HCM Lane LOS | - | - | B | - |
| HCM 95th %tile Q(veh) | - | - | 0.2 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 258 | 241 | 460 | 267 | 102 | 434 | 507 | 380 | 259 | 675 | 185 |
| Future Volume (veh/h) | 70 | 258 | 241 | 460 | 267 | 102 | 434 | 507 | 380 | 259 | 675 | 185 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.76 | 1.00 | | 0.98 | 1.00 | | 0.99 | 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 | 77 | 284 | 265 | 505 | 293 | 112 | 477 | 557 | 418 | 285 | 742 | 203 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 112 | 343 | 221 | 575 | 1020 | 444 | 576 | 1592 | 488 | 369 | 896 | 391 |
| Arrive On Green | 0.06 | 0.18 | 0.18 | 0.17 | 0.29 | 0.29 | 0.17 | 0.31 | 0.31 | 0.11 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1781 | 1870 | 1204 | 3456 | 3554 | 1548 | 3456 | 5106 | 1564 | 3456 | 3554 | 1551 |
| Grp Volume(v), veh/h | 77 | 284 | 265 | 505 | 293 | 112 | 477 | 557 | 418 | 285 | 742 | 203 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1204 | 1728 | 1777 | 1548 | 1728 | 1702 | 1564 | 1728 | 1777 | 1551 |
| Q Serve(g_s), s | 4.4 | 15.2 | 19.0 | 14.8 | 6.6 | 5.8 | 13.8 | 8.7 | 26.0 | 8.3 | 20.5 | 11.7 |
| Cycle Q Clear(g_c), s | 4.4 | 15.2 | 19.0 | 14.8 | 6.6 | 5.8 | 13.8 | 8.7 | 26.0 | 8.3 | 20.5 | 11.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 112 | 343 | 221 | 575 | 1020 | 444 | 576 | 1592 | 488 | 369 | 896 | 391 |
| V/C Ratio(X) | 0.69 | 0.83 | 1.20 | 0.88 | 0.29 | 0.25 | 0.83 | 0.35 | 0.86 | 0.77 | 0.83 | 0.52 |
| Avail Cap(c_a), veh/h | 327 | 343 | 221 | 634 | 1020 | 444 | 967 | 1675 | 513 | 800 | 994 | 434 |
| 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 | 47.6 | 40.7 | 42.3 | 42.2 | 28.7 | 28.4 | 41.8 | 27.5 | 33.5 | 45.0 | 36.6 | 33.3 |
| Incr Delay (d2), s/veh | 7.3 | 15.4 | 125.4 | 12.5 | 0.1 | 0.1 | 3.1 | 0.1 | 13.1 | 3.4 | 5.4 | 1.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.2 | 8.4 | 13.3 | 7.0 | 2.7 | 2.2 | 6.0 | 3.4 | 11.6 | 3.6 | 9.0 | 4.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 54.9 | 56.2 | 167.7 | 54.7 | 28.8 | 28.5 | 44.9 | 27.7 | 46.6 | 48.5 | 42.1 | 34.4 |
| LnGrp LOS | D | E | F | D | C | C | D | C | D | D | D | C |
| Approach Vol, veh/h | | 626 | | | 910 | | | 1452 | | | 1230 | |
| Approach Delay, s/veh | | 103.2 | | | 43.1 | | | 38.8 | | | 42.3 | |
| Approach LOS | | F | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.1 | 38.3 | 12.5 | 35.7 | 23.3 | 32.1 | 23.2 | 25.0 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Max Green Setting (Gmax), s | 24.0 | 34.0 | 19.0 | 19.0 | 29.0 | 29.0 | 19.0 | 19.0 |
| Max Q Clear Time (g_c+I1), s | 10.3 | 28.0 | 6.4 | 8.6 | 15.8 | 22.5 | 16.8 | 21.0 |
| Green Ext Time (p_c), s | 0.8 | 2.6 | 0.1 | 0.2 | 1.4 | 2.8 | 0.5 | 0.0 |

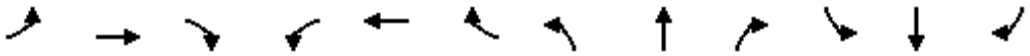
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 50.3 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024



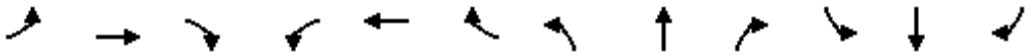
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 970 | 62 | 64 | 1271 | 123 |
| Future Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 970 | 62 | 64 | 1271 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 3499 | | 1770 | 3484 | |
| Flt Permitted | | 0.31 | 1.00 | | 0.48 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 578 | 1583 | | 894 | 1563 | 1770 | 3499 | | 1770 | 3484 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 183 | 5 | 158 | 256 | 18 | 16 | 217 | 1102 | 70 | 73 | 1444 | 140 |
| RTOR Reduction (vph) | 0 | 0 | 74 | 0 | 0 | 12 | 0 | 3 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 188 | 84 | 0 | 274 | 4 | 217 | 1169 | 0 | 73 | 1578 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 25.9 | 25.9 | | 25.9 | 25.9 | 18.7 | 66.2 | | 8.8 | 56.3 | |
| Effective Green, g (s) | | 25.9 | 25.9 | | 25.9 | 25.9 | 18.7 | 66.2 | | 8.8 | 56.3 | |
| Actuated g/C Ratio | | 0.22 | 0.22 | | 0.22 | 0.22 | 0.16 | 0.57 | | 0.08 | 0.48 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 128 | 350 | | 198 | 346 | 283 | 1981 | | 133 | 1677 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.33 | | 0.04 | c0.45 | |
| v/s Ratio Perm | | c0.32 | 0.05 | | 0.31 | 0.00 | | | | | | |
| v/c Ratio | | 1.47 | 0.24 | | 1.38 | 0.01 | 0.77 | 0.59 | | 0.55 | 0.94 | |
| Uniform Delay, d1 | | 45.5 | 37.4 | | 45.5 | 35.5 | 47.0 | 16.5 | | 52.1 | 28.7 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 248.4 | 0.4 | | 200.9 | 0.0 | 11.7 | 0.5 | | 4.6 | 11.0 | |
| Delay (s) | | 293.9 | 37.8 | | 246.4 | 35.5 | 58.7 | 17.0 | | 56.7 | 39.7 | |
| Level of Service | | F | D | | F | D | E | B | | E | D | |
| Approach Delay (s) | | 176.9 | | | 234.8 | | | 23.5 | | | 40.4 | |
| Approach LOS | | F | | | F | | | C | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 62.2 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 1.04 | | |
| Actuated Cycle Length (s) | 116.9 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 83.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 78 | 43 | 31 | 140 | 70 | 76 | 21 | 1030 | 62 | 175 | 1392 | 68 |
| Future Volume (veh/h) | 78 | 43 | 31 | 140 | 70 | 76 | 21 | 1030 | 62 | 175 | 1392 | 68 |
| 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 | | 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 | 88 | 48 | 35 | 157 | 79 | 85 | 24 | 1157 | 70 | 197 | 1564 | 76 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 114 | 92 | 67 | 203 | 116 | 125 | 38 | 1818 | 563 | 247 | 2360 | 115 |
| Arrive On Green | 0.06 | 0.09 | 0.09 | 0.11 | 0.14 | 0.14 | 0.02 | 0.36 | 0.36 | 0.14 | 0.47 | 0.47 |
| Sat Flow, veh/h | 1781 | 1002 | 731 | 1781 | 817 | 879 | 1781 | 5106 | 1581 | 1781 | 4982 | 242 |
| Grp Volume(v), veh/h | 88 | 0 | 83 | 157 | 0 | 164 | 24 | 1157 | 70 | 197 | 1068 | 572 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1733 | 1781 | 0 | 1696 | 1781 | 1702 | 1581 | 1781 | 1702 | 1820 |
| Q Serve(g_s), s | 3.4 | 0.0 | 3.2 | 6.0 | 0.0 | 6.4 | 0.9 | 13.2 | 2.1 | 7.5 | 16.9 | 16.9 |
| Cycle Q Clear(g_c), s | 3.4 | 0.0 | 3.2 | 6.0 | 0.0 | 6.4 | 0.9 | 13.2 | 2.1 | 7.5 | 16.9 | 16.9 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.52 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 114 | 0 | 160 | 203 | 0 | 241 | 38 | 1818 | 563 | 247 | 1612 | 862 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.52 | 0.77 | 0.00 | 0.68 | 0.63 | 0.64 | 0.12 | 0.80 | 0.66 | 0.66 |
| Avail Cap(c_a), veh/h | 203 | 0 | 197 | 634 | 0 | 724 | 634 | 3490 | 1080 | 634 | 2327 | 1244 |
| 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 | 32.4 | 0.0 | 30.4 | 30.2 | 0.0 | 28.6 | 34.1 | 18.8 | 15.2 | 29.3 | 14.2 | 14.2 |
| Incr Delay (d2), s/veh | 10.7 | 0.0 | 2.6 | 6.2 | 0.0 | 3.3 | 16.1 | 0.4 | 0.1 | 5.8 | 0.5 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.8 | 0.0 | 1.4 | 2.9 | 0.0 | 2.8 | 0.6 | 4.7 | 0.7 | 3.4 | 5.5 | 6.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 43.1 | 0.0 | 33.0 | 36.4 | 0.0 | 31.9 | 50.2 | 19.2 | 15.3 | 35.1 | 14.6 | 15.1 |
| LnGrp LOS | D | A | C | D | A | C | D | B | B | D | B | B |
| Approach Vol, veh/h | | 171 | | | 321 | | | 1251 | | | 1837 | |
| Approach Delay, s/veh | | 38.2 | | | 34.1 | | | 19.6 | | | 17.0 | |
| Approach LOS | | D | | | C | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.8 | 31.0 | 13.0 | 11.5 | 6.5 | 39.3 | 9.5 | 15.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 9.5 | 15.2 | 8.0 | 5.2 | 2.9 | 18.9 | 5.4 | 8.4 |
| Green Ext Time (p_c), s | 0.4 | 9.7 | 0.4 | 0.1 | 0.0 | 13.5 | 0.0 | 0.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 20.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 418 | 1094 | 209 | 547 | 943 | 198 | 266 | 564 | 192 | 265 | 985 | 354 |
| Future Volume (veh/h) | 418 | 1094 | 209 | 547 | 943 | 198 | 266 | 564 | 192 | 265 | 985 | 354 |
| 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 | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 594 | 202 | 279 | 1037 | 373 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 500 | 1707 | 411 | 617 | 1924 | 466 | 342 | 1988 | 483 | 336 | 1978 | 484 |
| Arrive On Green | 0.14 | 0.27 | 0.27 | 0.18 | 0.30 | 0.30 | 0.10 | 0.31 | 0.31 | 0.10 | 0.31 | 0.31 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1557 | 3456 | 6434 | 1562 | 3456 | 6434 | 1576 |
| Grp Volume(v), veh/h | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 594 | 202 | 279 | 1037 | 373 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1557 | 1728 | 1609 | 1562 | 1728 | 1609 | 1576 |
| Q Serve(g_s), s | 17.5 | 22.4 | 17.0 | 23.0 | 17.9 | 15.1 | 11.1 | 9.8 | 14.4 | 11.1 | 18.6 | 30.1 |
| Cycle Q Clear(g_c), s | 17.5 | 22.4 | 17.0 | 23.0 | 17.9 | 15.1 | 11.1 | 9.8 | 14.4 | 11.1 | 18.6 | 30.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 500 | 1707 | 411 | 617 | 1924 | 466 | 342 | 1988 | 483 | 336 | 1978 | 484 |
| V/C Ratio(X) | 0.88 | 0.67 | 0.54 | 0.93 | 0.52 | 0.45 | 0.82 | 0.30 | 0.42 | 0.83 | 0.52 | 0.77 |
| Avail Cap(c_a), veh/h | 617 | 3215 | 774 | 617 | 3215 | 778 | 617 | 3215 | 781 | 493 | 3215 | 787 |
| 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 | 58.7 | 46.1 | 44.1 | 56.7 | 40.7 | 39.7 | 61.9 | 36.8 | 38.4 | 62.1 | 40.0 | 44.0 |
| Incr Delay (d2), s/veh | 11.8 | 0.5 | 1.1 | 21.5 | 0.2 | 0.7 | 4.9 | 0.1 | 0.6 | 7.6 | 0.2 | 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 | 8.4 | 8.9 | 6.6 | 11.7 | 7.1 | 5.8 | 5.1 | 3.9 | 5.5 | 5.2 | 7.3 | 11.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 70.5 | 46.5 | 45.1 | 78.2 | 40.9 | 40.4 | 66.8 | 36.9 | 39.0 | 69.7 | 40.3 | 46.6 |
| LnGrp LOS | E | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 1812 | | | 1777 | | | 1076 | | | 1689 | |
| Approach Delay, s/veh | | 52.2 | | | 52.9 | | | 45.1 | | | 46.5 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.6 | 49.3 | 30.0 | 42.2 | 18.8 | 49.1 | 25.3 | 46.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 13.1 | 16.4 | 25.0 | 24.4 | 13.1 | 32.1 | 19.5 | 19.9 |
| Green Ext Time (p_c), s | 0.5 | 5.1 | 0.0 | 11.3 | 0.7 | 10.5 | 0.8 | 9.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 49.7 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 8: Caywood Dr & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 14 | 831 | 103 | 70 | 766 | 36 | 22 | 0 | 86 | 105 | 2 | 86 |
| Future Volume (vph) | 14 | 831 | 103 | 70 | 766 | 36 | 22 | 0 | 86 | 105 | 2 | 86 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | | 0.89 | | 1.00 | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.99 | |
| Satd. Flow (prot) | 1770 | 4963 | | 1770 | 5085 | 1583 | | 1645 | | 1681 | 1530 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.99 | |
| Satd. Flow (perm) | 1770 | 4963 | | 1770 | 5085 | 1583 | | 1645 | | 1681 | 1530 | |
| Peak-hour factor, PHF | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Adj. Flow (vph) | 15 | 913 | 113 | 77 | 842 | 40 | 24 | 0 | 95 | 115 | 2 | 95 |
| RTOR Reduction (vph) | 0 | 14 | 0 | 0 | 0 | 21 | 0 | 111 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 15 | 1012 | 0 | 77 | 842 | 19 | 0 | 8 | 0 | 103 | 27 | 0 |
| Confl. Peds. (#/hr) | | | 26 | 26 | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 1.1 | 28.2 | | 6.9 | 34.0 | 34.0 | | 4.7 | | 10.0 | 10.0 | |
| Effective Green, g (s) | 1.1 | 28.2 | | 6.9 | 34.0 | 34.0 | | 4.7 | | 10.0 | 10.0 | |
| Actuated g/C Ratio | 0.02 | 0.40 | | 0.10 | 0.48 | 0.48 | | 0.07 | | 0.14 | 0.14 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 27 | 1976 | | 172 | 2441 | 760 | | 109 | | 237 | 216 | |
| v/s Ratio Prot | 0.01 | c0.20 | | c0.04 | 0.17 | | | c0.00 | | c0.06 | 0.02 | |
| v/s Ratio Perm | | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.56 | 0.51 | | 0.45 | 0.34 | 0.03 | | 0.07 | | 0.43 | 0.13 | |
| Uniform Delay, d1 | 34.6 | 16.1 | | 30.2 | 11.5 | 9.7 | | 31.0 | | 27.8 | 26.6 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 22.5 | 0.2 | | 1.9 | 0.1 | 0.0 | | 0.3 | | 1.3 | 0.3 | |
| Delay (s) | 57.1 | 16.3 | | 32.0 | 11.5 | 9.7 | | 31.3 | | 29.1 | 26.8 | |
| Level of Service | E | B | | C | B | A | | C | | C | C | |
| Approach Delay (s) | | 16.9 | | | 13.1 | | | 31.3 | | | 27.9 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 17.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.45 | | |
| Actuated Cycle Length (s) | 70.8 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 49.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

# HCM Signalized Intersection Capacity Analysis
## 9: Cherbourg Wy & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 28 | 939 | 55 | 154 | 814 | 36 | 8 | 0 | 130 | 343 | 2 | 50 |
| Future Volume (vph) | 28 | 939 | 55 | 154 | 814 | 36 | 8 | 0 | 130 | 343 | 2 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.87 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | 0.95 | 0.96 | |
| Satd. Flow (prot) | 1770 | 5027 | | 1770 | 5085 | 1583 | | 1621 | | 1681 | 1642 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | 0.95 | 0.96 | |
| Satd. Flow (perm) | 1770 | 5027 | | 1770 | 5085 | 1583 | | 1621 | | 1681 | 1642 | |
| Peak-hour factor, PHF | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Adj. Flow (vph) | 31 | 1055 | 62 | 173 | 915 | 40 | 9 | 0 | 146 | 385 | 2 | 56 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 23 | 0 | 143 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 31 | 1112 | 0 | 173 | 915 | 17 | 0 | 12 | 0 | 223 | 208 | 0 |
| Confl. Peds. (#/hr) | | | 16 | 16 | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 4.4 | 27.9 | | 13.7 | 37.2 | 37.2 | | 6.5 | | 17.4 | 17.4 | |
| Effective Green, g (s) | 4.4 | 27.9 | | 13.7 | 37.2 | 37.2 | | 6.5 | | 17.4 | 17.4 | |
| Actuated g/C Ratio | 0.05 | 0.32 | | 0.16 | 0.43 | 0.43 | | 0.08 | | 0.20 | 0.20 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 90 | 1621 | | 280 | 2186 | 680 | | 121 | | 338 | 330 | |
| v/s Ratio Prot | 0.02 | c0.22 | | c0.10 | 0.18 | | | c0.01 | | c0.13 | 0.13 | |
| v/s Ratio Perm | | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.34 | 0.69 | | 0.62 | 0.42 | 0.03 | | 0.10 | | 0.66 | 0.63 | |
| Uniform Delay, d1 | 39.7 | 25.5 | | 34.0 | 17.1 | 14.2 | | 37.3 | | 31.8 | 31.6 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.3 | 1.2 | | 4.0 | 0.1 | 0.0 | | 0.3 | | 4.6 | 3.9 | |
| Delay (s) | 42.0 | 26.7 | | 38.0 | 17.3 | 14.2 | | 37.6 | | 36.4 | 35.5 | |
| Level of Service | D | C | | D | B | B | | D | | D | D | |
| Approach Delay (s) | | 27.1 | | | 20.3 | | | 37.6 | | | 36.0 | |
| Approach LOS | | C | | | C | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 26.4 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 86.5 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 65.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 26.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 14 | 1362 | 36 | 74 | 898 | 80 | 24 | 0 | 119 | 0 | 0 | 82 |
| Future Vol, veh/h | 14 | 1362 | 36 | 74 | 898 | 80 | 24 | 0 | 119 | 0 | 0 | 82 |
| Conflicting Peds, #/hr | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 16 | 1584 | 42 | 86 | 1044 | 93 | 28 | 0 | 138 | 0 | 0 | 95 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1137 | 0 | 0 | 1635 | 0 | 0 | 2236 | 2955 | 822 | - | - | 522 |
| Stage 1 | - | - | - | - | - | - | 1646 | 1646 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 590 | 1309 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 336 | - | - | 191 | - | - | 45 | 14 | 272 | 0 | 0 | 428 |
| Stage 1 | - | - | - | - | - | - | 70 | 155 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 420 | 227 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 336 | - | - | 189 | - | - | ~ 22 | 7 | 270 | - | - | 428 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | ~ 22 | 7 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 66 | 146 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 178 | 124 | - | - | - | - |

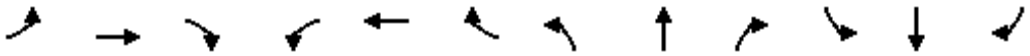
| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 2.7 | $ 471.2 | 15.8 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 93 | 336 | - | - | 189 | - | - | 428 |
| HCM Lane V/C Ratio | 1.788 | 0.048 | - | - | 0.455 | - | - | 0.223 |
| HCM Control Delay (s) | $ 471.2 | 16.3 | - | - | 39 | - | - | 15.8 |
| HCM Lane LOS | F | C | - | - | E | - | - | C |
| HCM 95th %tile Q(veh) | 13.7 | 0.2 | - | - | 2.1 | - | - | 0.8 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 162 | 1164 | 155 | 94 | 810 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Future Volume (veh/h) | 162 | 1164 | 155 | 94 | 810 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.95 | 1.00 | | 0.98 | 1.00 | | 0.91 |
| 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 | 184 | 1323 | 176 | 107 | 920 | 344 | 159 | 60 | 115 | 235 | 77 | 116 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 220 | 1590 | 212 | 137 | 1078 | 458 | 195 | 126 | 242 | 271 | 168 | 252 |
| Arrive On Green | 0.12 | 0.35 | 0.35 | 0.08 | 0.30 | 0.30 | 0.11 | 0.22 | 0.22 | 0.15 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1781 | 4540 | 604 | 1781 | 3554 | 1510 | 1781 | 567 | 1087 | 1781 | 632 | 951 |
| Grp Volume(v), veh/h | 184 | 992 | 507 | 107 | 920 | 344 | 159 | 0 | 175 | 235 | 0 | 193 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1740 | 1781 | 1777 | 1510 | 1781 | 0 | 1655 | 1781 | 0 | 1583 |
| Q Serve(g_s), s | 10.7 | 28.3 | 28.3 | 6.2 | 25.8 | 21.8 | 9.2 | 0.0 | 9.7 | 13.6 | 0.0 | 10.8 |
| Cycle Q Clear(g_c), s | 10.7 | 28.3 | 28.3 | 6.2 | 25.8 | 21.8 | 9.2 | 0.0 | 9.7 | 13.6 | 0.0 | 10.8 |
| Prop In Lane | 1.00 | | 0.35 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 220 | 1192 | 609 | 137 | 1078 | 458 | 195 | 0 | 368 | 271 | 0 | 420 |
| V/C Ratio(X) | 0.84 | 0.83 | 0.83 | 0.78 | 0.85 | 0.75 | 0.82 | 0.00 | 0.48 | 0.87 | 0.00 | 0.46 |
| Avail Cap(c_a), veh/h | 589 | 1192 | 609 | 589 | 1208 | 513 | 673 | 0 | 547 | 421 | 0 | 523 |
| 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 | 45.4 | 31.5 | 31.5 | 48.0 | 34.7 | 33.3 | 46.1 | 0.0 | 35.8 | 43.9 | 0.0 | 32.6 |
| Incr Delay (d2), s/veh | 8.1 | 5.2 | 9.6 | 9.3 | 5.6 | 5.4 | 8.1 | 0.0 | 1.0 | 11.3 | 0.0 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.1 | 11.7 | 12.8 | 3.0 | 11.3 | 8.6 | 4.5 | 0.0 | 4.1 | 6.9 | 0.0 | 4.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 53.4 | 36.7 | 41.1 | 57.3 | 40.3 | 38.7 | 54.2 | 0.0 | 36.7 | 55.2 | 0.0 | 33.3 |
| LnGrp LOS | D | D | D | E | D | D | D | A | D | E | A | C |
| Approach Vol, veh/h | | 1683 | | | 1371 | | | 334 | | | 428 | |
| Approach Delay, s/veh | | 39.9 | | | 41.2 | | | 45.0 | | | 45.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.1 | 43.1 | 16.6 | 33.1 | 18.1 | 38.1 | 21.1 | 28.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 8.2 | 30.3 | 11.2 | 12.8 | 12.7 | 27.8 | 15.6 | 11.7 |
| Green Ext Time (p_c), s | 0.3 | 4.0 | 0.4 | 1.2 | 0.5 | 4.4 | 0.5 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 41.4 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 213 | 1009 | 250 | 160 | 733 | 146 | 223 | 121 | 91 | 194 | 272 | 251 |
| Future Volume (veh/h) | 213 | 1009 | 250 | 160 | 733 | 146 | 223 | 121 | 91 | 194 | 272 | 251 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 229 | 1085 | 269 | 172 | 788 | 157 | 240 | 130 | 98 | 209 | 292 | 270 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 270 | 1374 | 417 | 210 | 1203 | 363 | 279 | 1246 | 381 | 248 | 1156 | 352 |
| Arrive On Green | 0.15 | 0.27 | 0.27 | 0.12 | 0.24 | 0.24 | 0.16 | 0.24 | 0.24 | 0.14 | 0.23 | 0.23 |
| Sat Flow, veh/h | 1781 | 5106 | 1548 | 1781 | 5106 | 1543 | 1781 | 5106 | 1561 | 1781 | 5106 | 1556 |
| Grp Volume(v), veh/h | 229 | 1085 | 269 | 172 | 788 | 157 | 240 | 130 | 98 | 209 | 292 | 270 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1548 | 1781 | 1702 | 1543 | 1781 | 1702 | 1561 | 1781 | 1702 | 1556 |
| Q Serve(g_s), s | 12.0 | 18.9 | 14.7 | 9.0 | 13.4 | 8.3 | 12.6 | 1.9 | 4.8 | 11.0 | 4.5 | 15.5 |
| Cycle Q Clear(g_c), s | 12.0 | 18.9 | 14.7 | 9.0 | 13.4 | 8.3 | 12.6 | 1.9 | 4.8 | 11.0 | 4.5 | 15.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 270 | 1374 | 417 | 210 | 1203 | 363 | 279 | 1246 | 381 | 248 | 1156 | 352 |
| V/C Ratio(X) | 0.85 | 0.79 | 0.65 | 0.82 | 0.66 | 0.43 | 0.86 | 0.10 | 0.26 | 0.84 | 0.25 | 0.77 |
| Avail Cap(c_a), veh/h | 558 | 1494 | 453 | 465 | 1280 | 387 | 465 | 2561 | 783 | 465 | 2561 | 781 |
| 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 | 39.5 | 32.5 | 30.9 | 41.2 | 33.1 | 31.1 | 39.3 | 28.1 | 29.2 | 40.2 | 30.4 | 34.6 |
| Incr Delay (d2), s/veh | 7.3 | 2.7 | 2.8 | 7.7 | 1.1 | 0.8 | 8.4 | 0.0 | 0.4 | 7.6 | 0.1 | 3.5 |
| 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 | 5.5 | 7.6 | 5.6 | 4.3 | 5.4 | 3.1 | 5.9 | 0.7 | 1.8 | 5.1 | 1.8 | 6.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.9 | 35.2 | 33.7 | 49.0 | 34.2 | 31.9 | 47.7 | 28.1 | 29.5 | 47.8 | 30.5 | 38.1 |
| LnGrp LOS | D | D | C | D | C | C | D | C | C | D | C | D |
| Approach Vol, veh/h | | 1583 | | | 1117 | | | 468 | | | 771 | |
| Approach Delay, s/veh | | 36.6 | | | 36.2 | | | 38.4 | | | 37.9 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.3 | 29.4 | 16.3 | 31.8 | 20.0 | 27.7 | 19.5 | 28.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 13.0 | 6.8 | 11.0 | 20.9 | 14.6 | 17.5 | 14.0 | 15.4 |
| Green Ext Time (p_c), s | 0.4 | 1.1 | 0.4 | 4.2 | 0.5 | 2.8 | 0.5 | 3.6 |

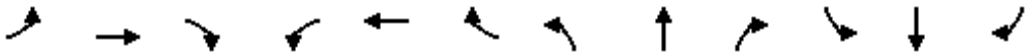
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 36.9 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 61 | 1168 | 65 | 58 | 790 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Future Volume (veh/h) | 61 | 1168 | 65 | 58 | 790 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 66 | 1256 | 70 | 62 | 849 | 33 | 94 | 8 | 89 | 69 | 24 | 97 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 85 | 1853 | 804 | 82 | 2621 | 102 | 302 | 258 | 218 | 316 | 258 | 215 |
| Arrive On Green | 0.05 | 0.52 | 0.52 | 0.05 | 0.52 | 0.52 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| Sat Flow, veh/h | 1781 | 3554 | 1542 | 1781 | 5042 | 196 | 1266 | 1870 | 1582 | 1296 | 1870 | 1557 |
| Grp Volume(v), veh/h | 66 | 1256 | 70 | 62 | 573 | 309 | 94 | 8 | 89 | 69 | 24 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1542 | 1781 | 1702 | 1834 | 1266 | 1870 | 1582 | 1296 | 1870 | 1557 |
| Q Serve(g_s), s | 1.9 | 13.3 | 1.2 | 1.8 | 4.9 | 5.0 | 3.6 | 0.2 | 2.6 | 2.5 | 0.6 | 2.9 |
| Cycle Q Clear(g_c), s | 1.9 | 13.3 | 1.2 | 1.8 | 4.9 | 5.0 | 4.1 | 0.2 | 2.6 | 2.7 | 0.6 | 2.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.11 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 85 | 1853 | 804 | 82 | 1769 | 953 | 302 | 258 | 218 | 316 | 258 | 215 |
| V/C Ratio(X) | 0.78 | 0.68 | 0.09 | 0.76 | 0.32 | 0.32 | 0.31 | 0.03 | 0.41 | 0.22 | 0.09 | 0.45 |
| Avail Cap(c_a), veh/h | 874 | 3348 | 1453 | 839 | 3207 | 1728 | 724 | 881 | 745 | 747 | 881 | 733 |
| 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 | 24.0 | 9.0 | 6.1 | 24.0 | 7.1 | 7.1 | 21.0 | 19.0 | 20.0 | 20.2 | 19.2 | 20.2 |
| Incr Delay (d2), s/veh | 14.0 | 0.4 | 0.0 | 13.3 | 0.1 | 0.2 | 0.6 | 0.0 | 1.2 | 0.3 | 0.2 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 3.4 | 0.3 | 1.0 | 1.2 | 1.3 | 1.0 | 0.1 | 1.0 | 0.7 | 0.2 | 1.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 38.0 | 9.5 | 6.2 | 37.4 | 7.2 | 7.3 | 21.6 | 19.1 | 21.3 | 20.5 | 19.3 | 21.7 |
| LnGrp LOS | D | A | A | D | A | A | C | B | C | C | B | C |
| Approach Vol, veh/h | | 1392 | | | 944 | | | 191 | | | 190 | |
| Approach Delay, s/veh | | 10.6 | | | 9.2 | | | 21.3 | | | 20.9 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.3 | 31.6 | | 12.0 | 7.4 | 31.5 | | 12.0 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 3.8 | 15.3 | | 4.9 | 3.9 | 7.0 | | 6.1 | | | | |
| Green Ext Time (p_c), s | 0.1 | 11.2 | | 0.6 | 0.1 | 6.3 | | 0.6 | | | | |

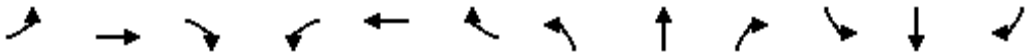
| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.6 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 178 | 1104 | 33 | 17 | 714 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| Future Volume (veh/h) | 178 | 1104 | 33 | 17 | 714 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| 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 | | 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 | 189 | 1174 | 35 | 18 | 760 | 88 | 61 | 21 | 66 | 57 | 5 | 115 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 7 | 156 |
| Arrive On Green | 0.10 | 0.67 | 0.67 | 0.02 | 0.59 | 0.59 | 0.04 | 0.11 | 0.11 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 3554 | 1548 | 1781 | 3554 | 1580 | 1781 | 1870 | 1576 | 1781 | 66 | 1529 |
| Grp Volume(v), veh/h | 189 | 1174 | 35 | 18 | 760 | 88 | 61 | 21 | 66 | 57 | 0 | 120 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1548 | 1781 | 1777 | 1580 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 12.0 | 20.4 | 1.0 | 1.3 | 13.9 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Cycle Q Clear(g_c), s | 12.0 | 20.4 | 1.0 | 1.3 | 13.9 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 0 | 163 |
| V/C Ratio(X) | 1.11 | 0.49 | 0.03 | 0.54 | 0.36 | 0.09 | 0.77 | 0.11 | 0.40 | 0.77 | 0.00 | 0.74 |
| Avail Cap(c_a), veh/h | 171 | 2376 | 1035 | 171 | 2101 | 934 | 171 | 588 | 495 | 171 | 0 | 498 |
| 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) | 0.72 | 0.72 | 0.72 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 56.5 | 10.3 | 7.0 | 60.8 | 13.3 | 11.1 | 59.1 | 50.6 | 52.2 | 59.3 | 0.0 | 54.5 |
| Incr Delay (d2), s/veh | 89.5 | 0.5 | 0.0 | 13.1 | 0.5 | 0.2 | 14.8 | 0.2 | 1.5 | 15.6 | 0.0 | 6.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.6 | 7.3 | 0.3 | 0.7 | 5.4 | 1.1 | 2.3 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 146.0 | 10.8 | 7.1 | 74.0 | 13.8 | 11.3 | 73.9 | 50.9 | 53.8 | 74.9 | 0.0 | 60.8 |
| LnGrp LOS | F | B | A | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1398 | | | 866 | | | 148 | | | 177 | |
| Approach Delay, s/veh | | 29.0 | | | 14.8 | | | 61.7 | | | 65.3 | |
| Approach LOS | | C | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 89.8 | 9.8 | 18.5 | 16.6 | 80.1 | 10.1 | 18.2 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 41.2 | 12.0 | * 39 | 12.0 | * 42 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 22.4 | 6.0 | 6.9 | 14.0 | 15.9 | 6.2 | 11.1 |
| Green Ext Time (p_c), s | 0.0 | 8.1 | 0.0 | 0.3 | 0.0 | 5.6 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 28.6 |
| HCM 6th LOS | C |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Roundabout
## 8: Caywood Dr & Morada Ln

05/28/2024

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 7.4 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1041 | 959 | 119 | 212 |
| Demand Flow Rate, veh/h | 1061 | 979 | 121 | 216 |
| Vehicles Circulating, veh/h | 198 | 39 | 1063 | 962 |
| Vehicles Exiting, veh/h | 980 | 1145 | 196 | 56 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 26 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 8.1 | 6.2 | 9.1 | 8.6 |
| Approach LOS | A | A | A | A |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.528 | 0.472 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 499 | 562 | 460 | 519 | 121 | 114 | 102 |
| Cap Entry Lane, veh/h | 1125 | 1200 | 1302 | 1374 | 575 | 557 | 627 |
| Entry HV Adj Factor | 0.980 | 0.981 | 0.980 | 0.979 | 0.983 | 0.985 | 0.977 |
| Flow Entry, veh/h | 489 | 552 | 451 | 508 | 119 | 112 | 100 |
| Cap Entry, veh/h | 1103 | 1178 | 1276 | 1346 | 566 | 549 | 612 |
| V/C Ratio | 0.444 | 0.468 | 0.353 | 0.378 | 0.210 | 0.205 | 0.163 |
| Control Delay, s/veh | 8.1 | 8.1 | 6.1 | 6.2 | 9.1 | 9.3 | 7.8 |
| LOS | A | A | A | A | A | A | A |
| 95th %tile Queue, veh | 2 | 3 | 2 | 2 | 1 | 1 | 1 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 13.0 |
| Intersection LOS | B |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1148 | 1128 | 155 | 443 |
| Demand Flow Rate, veh/h | 1171 | 1150 | 158 | 452 |
| Vehicles Circulating, veh/h | 571 | 41 | 1501 | 1118 |
| Vehicles Exiting, veh/h | 999 | 1618 | 241 | 73 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 17.5 | 7.0 | 17.3 | 15.2 |
| Approach LOS | C | A | C | C |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 550 | 621 | 540 | 610 | 158 | 240 | 212 |
| Cap Entry Lane, veh/h | 798 | 874 | 1300 | 1371 | 396 | 483 | 549 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.982 | 0.980 | 0.981 | 0.978 | 0.982 |
| Flow Entry, veh/h | 540 | 608 | 530 | 598 | 155 | 235 | 208 |
| Cap Entry, veh/h | 783 | 856 | 1276 | 1344 | 389 | 472 | 539 |
| V/C Ratio | 0.689 | 0.711 | 0.415 | 0.445 | 0.399 | 0.497 | 0.386 |
| Control Delay, s/veh | 17.6 | 17.4 | 6.9 | 7.0 | 17.3 | 17.4 | 12.7 |
| LOS | C | C | A | A | C | C | B |
| 95th %tile Queue, veh | 6 | 6 | 2 | 2 | 2 | 3 | 2 |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 183 | 413 | 369 | 99 | 423 | 9 | 311 | 550 | 72 | 12 | 494 | 119 |
| Future Volume (veh/h) | 183 | 413 | 369 | 99 | 423 | 9 | 311 | 550 | 72 | 12 | 494 | 119 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 189 | 426 | 380 | 102 | 436 | 9 | 321 | 567 | 74 | 12 | 509 | 123 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 221 | 594 | 504 | 129 | 486 | 10 | 353 | 1290 | 168 | 25 | 639 | 154 |
| Arrive On Green | 0.12 | 0.32 | 0.32 | 0.07 | 0.27 | 0.27 | 0.20 | 0.41 | 0.41 | 0.01 | 0.22 | 0.22 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1826 | 38 | 1781 | 3153 | 410 | 1781 | 2841 | 683 |
| Grp Volume(v), veh/h | 189 | 426 | 380 | 102 | 0 | 445 | 321 | 319 | 322 | 12 | 317 | 315 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1864 | 1781 | 1777 | 1786 | 1781 | 1777 | 1747 |
| Q Serve(g_s), s | 12.2 | 23.7 | 25.3 | 6.6 | 0.0 | 27.1 | 20.8 | 15.2 | 15.3 | 0.8 | 19.8 | 20.0 |
| Cycle Q Clear(g_c), s | 12.2 | 23.7 | 25.3 | 6.6 | 0.0 | 27.1 | 20.8 | 15.2 | 15.3 | 0.8 | 19.8 | 20.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.23 | 1.00 | | 0.39 |
| Lane Grp Cap(c), veh/h | 221 | 594 | 504 | 129 | 0 | 496 | 353 | 727 | 731 | 25 | 400 | 393 |
| V/C Ratio(X) | 0.85 | 0.72 | 0.75 | 0.79 | 0.00 | 0.90 | 0.91 | 0.44 | 0.44 | 0.49 | 0.79 | 0.80 |
| Avail Cap(c_a), veh/h | 454 | 715 | 606 | 454 | 0 | 712 | 454 | 890 | 895 | 454 | 890 | 875 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 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 | 50.5 | 35.5 | 36.1 | 53.7 | 0.0 | 41.7 | 46.2 | 25.0 | 25.1 | 57.7 | 43.1 | 43.1 |
| Incr Delay (d2), s/veh | 9.0 | 2.8 | 4.4 | 10.2 | 0.0 | 10.7 | 19.0 | 0.4 | 0.4 | 14.2 | 3.6 | 3.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.9 | 10.8 | 9.9 | 3.3 | 0.0 | 13.4 | 10.6 | 6.1 | 6.2 | 0.5 | 9.1 | 9.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 59.5 | 38.2 | 40.4 | 63.9 | 0.0 | 52.3 | 65.2 | 25.5 | 25.5 | 71.9 | 46.7 | 46.9 |
| LnGrp LOS | E | D | D | E | A | D | E | C | C | E | D | D |
| Approach Vol, veh/h | | 995 | | | 547 | | | 962 | | | 644 | |
| Approach Delay, s/veh | | 43.1 | | | 54.5 | | | 38.7 | | | 47.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.5 | 43.4 | 28.3 | 32.5 | 19.6 | 37.3 | 6.6 | 54.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 30.0 | 45.0 | 30.0 | 59.0 | 30.0 | 45.0 | 30.0 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 8.6 | 27.3 | 22.8 | 22.0 | 14.2 | 29.1 | 2.8 | 17.3 |
| Green Ext Time (p_c), s | 0.2 | 3.5 | 0.5 | 4.4 | 0.4 | 2.2 | 0.0 | 3.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.6 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/28/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 70 | 102 | 831 | 119 | 223 | 739 |
| Future Volume (vph) | 70 | 102 | 831 | 119 | 223 | 739 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 76 | 111 | 903 | 129 | 242 | 803 |
| RTOR Reduction (vph) | 0 | 98 | 0 | 84 | 0 | 0 |
| Lane Group Flow (vph) | 76 | 13 | 903 | 45 | 242 | 803 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 6.4 | 6.4 | 19.1 | 19.1 | 13.1 | 37.2 |
| Effective Green, g (s) | 6.4 | 6.4 | 19.1 | 19.1 | 13.1 | 37.2 |
| Actuated g/C Ratio | 0.12 | 0.12 | 0.35 | 0.35 | 0.24 | 0.68 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 207 | 185 | 1778 | 553 | 424 | 2411 |
| v/s Ratio Prot | | | c0.18 | | c0.14 | 0.23 |
| v/s Ratio Perm | c0.04 | 0.01 | | 0.03 | | |
| v/c Ratio | 0.37 | 0.07 | 0.51 | 0.08 | 0.57 | 0.33 |
| Uniform Delay, d1 | 22.2 | 21.5 | 14.0 | 11.9 | 18.3 | 3.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.1 | 0.2 | 0.2 | 0.1 | 1.9 | 0.1 |
| Delay (s) | 23.3 | 21.6 | 14.3 | 11.9 | 20.1 | 3.7 |
| Level of Service | C | C | B | B | C | A |
| Approach Delay (s) | 22.3 | | 14.0 | | | 7.5 |
| Approach LOS | C | | B | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 11.7 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 54.6 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 45.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 27 | 923 | 55 | 0 | 809 |
| Future Vol, veh/h | 0 | 27 | 923 | 55 | 0 | 809 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 29 | 1003 | 60 | 0 | 879 |

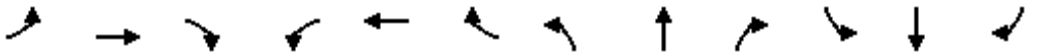
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 502 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 440 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 440 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 13.8 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 440 | - |
| HCM Lane V/C Ratio | - | - | 0.067 | - |
| HCM Control Delay (s) | - | - | 13.8 | - |
| HCM Lane LOS | - | - | B | - |
| HCM 95th %tile Q(veh) | - | - | 0.2 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 49 | 81 | 57 | 432 | 74 | 141 | 94 | 788 | 528 | 178 | 596 | 35 |
| Future Volume (veh/h) | 49 | 81 | 57 | 432 | 74 | 141 | 94 | 788 | 528 | 178 | 596 | 35 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.92 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 51 | 84 | 59 | 450 | 77 | 147 | 98 | 821 | 550 | 185 | 621 | 36 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 72 | 245 | 191 | 561 | 899 | 396 | 161 | 1920 | 588 | 267 | 1445 | 642 |
| Arrive On Green | 0.04 | 0.13 | 0.13 | 0.16 | 0.25 | 0.25 | 0.05 | 0.38 | 0.38 | 0.08 | 0.41 | 0.41 |
| Sat Flow, veh/h | 1781 | 1870 | 1458 | 3456 | 3554 | 1565 | 3456 | 5106 | 1565 | 3456 | 3554 | 1579 |
| Grp Volume(v), veh/h | 51 | 84 | 59 | 450 | 77 | 147 | 98 | 821 | 550 | 185 | 621 | 36 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1458 | 1728 | 1777 | 1565 | 1728 | 1702 | 1565 | 1728 | 1777 | 1579 |
| Q Serve(g_s), s | 2.5 | 3.6 | 3.3 | 11.1 | 1.5 | 6.9 | 2.5 | 10.6 | 30.0 | 4.6 | 11.2 | 1.2 |
| Cycle Q Clear(g_c), s | 2.5 | 3.6 | 3.3 | 11.1 | 1.5 | 6.9 | 2.5 | 10.6 | 30.0 | 4.6 | 11.2 | 1.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 72 | 245 | 191 | 561 | 899 | 396 | 161 | 1920 | 588 | 267 | 1445 | 642 |
| V/C Ratio(X) | 0.71 | 0.34 | 0.31 | 0.80 | 0.09 | 0.37 | 0.61 | 0.43 | 0.93 | 0.69 | 0.43 | 0.06 |
| Avail Cap(c_a), veh/h | 511 | 505 | 394 | 992 | 960 | 423 | 350 | 1955 | 599 | 545 | 1561 | 693 |
| 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 | 42.1 | 35.1 | 34.9 | 35.8 | 25.3 | 27.3 | 41.5 | 20.6 | 26.7 | 39.9 | 18.9 | 16.0 |
| Incr Delay (d2), s/veh | 12.2 | 0.8 | 0.9 | 2.7 | 0.0 | 0.2 | 3.6 | 0.2 | 21.9 | 3.2 | 0.2 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.3 | 1.7 | 1.2 | 4.6 | 0.6 | 2.6 | 1.1 | 4.0 | 14.4 | 2.0 | 4.1 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 54.3 | 35.9 | 35.9 | 38.6 | 25.3 | 27.6 | 45.2 | 20.8 | 48.5 | 43.1 | 19.2 | 16.0 |
| LnGrp LOS | D | D | D | D | C | C | D | C | D | D | B | B |
| Approach Vol, veh/h | | 194 | | | 674 | | | 1469 | | | 842 | |
| Approach Delay, s/veh | | 40.7 | | | 34.6 | | | 32.8 | | | 24.3 | |
| Approach LOS | | D | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.9 | 39.4 | 8.1 | 28.5 | 10.2 | 42.1 | 18.9 | 17.6 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 |
| Max Green Setting (Gmax), s | 14.0 | 34.0 | 25.5 | 24.0 | 9.0 | 39.0 | 25.5 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 6.6 | 32.0 | 4.5 | 8.9 | 4.5 | 13.2 | 13.1 | 5.6 |
| Green Ext Time (p_c), s | 0.3 | 1.4 | 0.1 | 0.1 | 0.1 | 4.0 | 1.3 | 0.6 |

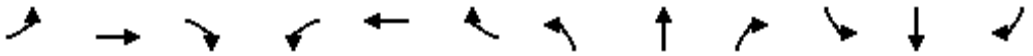
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 31.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024



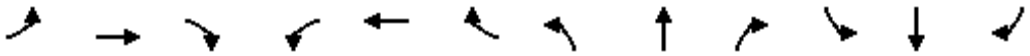
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1289 | 134 | 37 | 952 | 70 |
| Future Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1289 | 134 | 37 | 952 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 3480 | | 1770 | 3497 | |
| Flt Permitted | | 0.60 | 1.00 | | 0.63 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1114 | 1583 | | 1181 | 1563 | 1770 | 3480 | | 1770 | 3497 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 124 | 6 | 94 | 135 | 9 | 8 | 156 | 1343 | 140 | 39 | 992 | 73 |
| RTOR Reduction (vph) | 0 | 0 | 65 | 0 | 0 | 6 | 0 | 5 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 29 | 0 | 144 | 2 | 156 | 1478 | 0 | 39 | 1061 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 17.4 | 17.4 | | 17.4 | 17.4 | 13.7 | 48.7 | | 4.5 | 39.5 | |
| Effective Green, g (s) | | 17.4 | 17.4 | | 17.4 | 17.4 | 13.7 | 48.7 | | 4.5 | 39.5 | |
| Actuated g/C Ratio | | 0.20 | 0.20 | | 0.20 | 0.20 | 0.16 | 0.56 | | 0.05 | 0.46 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 223 | 318 | | 237 | 314 | 280 | 1956 | | 91 | 1595 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.42 | | 0.02 | 0.30 | |
| v/s Ratio Perm | | 0.12 | 0.02 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.58 | 0.09 | | 0.61 | 0.01 | 0.56 | 0.76 | | 0.43 | 0.66 | |
| Uniform Delay, d1 | | 31.3 | 28.2 | | 31.5 | 27.7 | 33.6 | 14.4 | | 39.8 | 18.4 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 3.8 | 0.1 | | 4.4 | 0.0 | 2.4 | 1.7 | | 3.2 | 1.1 | |
| Delay (s) | | 35.2 | 28.3 | | 35.9 | 27.7 | 36.0 | 16.1 | | 43.0 | 19.4 | |
| Level of Service | | D | C | | D | C | D | B | | D | B | |
| Approach Delay (s) | | 32.3 | | | 35.4 | | | 18.0 | | | 20.3 | |
| Approach LOS | | C | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 20.7 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 86.6 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 71.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 89 | 43 | 29 | 119 | 52 | 83 | 63 | 1438 | 83 | 128 | 995 | 49 |
| Future Volume (veh/h) | 89 | 43 | 29 | 119 | 52 | 83 | 63 | 1438 | 83 | 128 | 995 | 49 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 93 | 45 | 30 | 124 | 54 | 86 | 66 | 1498 | 86 | 133 | 1036 | 51 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 120 | 106 | 71 | 162 | 81 | 129 | 86 | 2212 | 670 | 172 | 2397 | 118 |
| Arrive On Green | 0.07 | 0.10 | 0.10 | 0.09 | 0.13 | 0.13 | 0.05 | 0.43 | 0.43 | 0.10 | 0.48 | 0.48 |
| Sat Flow, veh/h | 1781 | 1044 | 696 | 1781 | 649 | 1033 | 1781 | 5106 | 1547 | 1781 | 4978 | 245 |
| Grp Volume(v), veh/h | 93 | 0 | 75 | 124 | 0 | 140 | 66 | 1498 | 86 | 133 | 708 | 379 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1740 | 1781 | 0 | 1682 | 1781 | 1702 | 1547 | 1781 | 1702 | 1819 |
| Q Serve(g_s), s | 3.9 | 0.0 | 3.1 | 5.1 | 0.0 | 6.0 | 2.8 | 17.8 | 2.5 | 5.5 | 10.3 | 10.3 |
| Cycle Q Clear(g_c), s | 3.9 | 0.0 | 3.1 | 5.1 | 0.0 | 6.0 | 2.8 | 17.8 | 2.5 | 5.5 | 10.3 | 10.3 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.61 | 1.00 | | 1.00 | 1.00 | | 0.13 |
| Lane Grp Cap(c), veh/h | 120 | 0 | 176 | 162 | 0 | 210 | 86 | 2212 | 670 | 172 | 1639 | 876 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.43 | 0.77 | 0.00 | 0.67 | 0.76 | 0.68 | 0.13 | 0.77 | 0.43 | 0.43 |
| Avail Cap(c_a), veh/h | 189 | 0 | 184 | 589 | 0 | 667 | 589 | 3242 | 982 | 589 | 2162 | 1155 |
| 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 | 34.7 | 0.0 | 31.9 | 33.6 | 0.0 | 31.6 | 35.5 | 17.2 | 12.9 | 33.3 | 12.8 | 12.8 |
| Incr Delay (d2), s/veh | 10.3 | 0.0 | 1.6 | 7.3 | 0.0 | 3.6 | 13.0 | 0.4 | 0.1 | 7.1 | 0.2 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.0 | 0.0 | 1.4 | 2.5 | 0.0 | 2.6 | 1.5 | 6.1 | 0.9 | 2.6 | 3.4 | 3.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 45.0 | 0.0 | 33.5 | 40.9 | 0.0 | 35.2 | 48.5 | 17.6 | 12.9 | 40.4 | 13.0 | 13.2 |
| LnGrp LOS | D | A | C | D | A | D | D | B | B | D | B | B |
| Approach Vol, veh/h | | 168 | | | 264 | | | 1650 | | | 1220 | |
| Approach Delay, s/veh | | 39.9 | | | 37.9 | | | 18.6 | | | 16.1 | |
| Approach LOS | | D | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.3 | 38.7 | 11.9 | 12.7 | 8.7 | 42.4 | 10.1 | 14.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 7.5 | 19.8 | 7.1 | 5.1 | 4.8 | 12.3 | 5.9 | 8.0 |
| Green Ext Time (p_c), s | 0.3 | 13.0 | 0.3 | 0.1 | 0.1 | 8.2 | 0.0 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 20.3 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 573 | 1257 | 187 | 409 | 1107 | 169 | 478 | 989 | 259 | 230 | 681 | 309 |
| Future Volume (veh/h) | 573 | 1257 | 187 | 409 | 1107 | 169 | 478 | 989 | 259 | 230 | 681 | 309 |
| 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 | | 0.97 |
| 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 | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1030 | 270 | 240 | 709 | 322 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 591 | 1854 | 446 | 483 | 1653 | 400 | 548 | 2208 | 542 | 294 | 1736 | 416 |
| Arrive On Green | 0.17 | 0.29 | 0.29 | 0.14 | 0.26 | 0.26 | 0.16 | 0.34 | 0.34 | 0.09 | 0.27 | 0.27 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1556 | 3456 | 6434 | 1580 | 3456 | 6434 | 1543 |
| Grp Volume(v), veh/h | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1030 | 270 | 240 | 709 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1556 | 1728 | 1609 | 1580 | 1728 | 1609 | 1543 |
| Q Serve(g_s), s | 25.0 | 26.6 | 15.0 | 17.7 | 23.7 | 13.9 | 20.7 | 18.3 | 19.8 | 10.0 | 13.2 | 28.2 |
| Cycle Q Clear(g_c), s | 25.0 | 26.6 | 15.0 | 17.7 | 23.7 | 13.9 | 20.7 | 18.3 | 19.8 | 10.0 | 13.2 | 28.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 591 | 1854 | 446 | 483 | 1653 | 400 | 548 | 2208 | 542 | 294 | 1736 | 416 |
| V/C Ratio(X) | 1.01 | 0.71 | 0.44 | 0.88 | 0.70 | 0.44 | 0.91 | 0.47 | 0.50 | 0.82 | 0.41 | 0.77 |
| Avail Cap(c_a), veh/h | 591 | 3081 | 742 | 591 | 3081 | 745 | 591 | 3081 | 756 | 473 | 3081 | 739 |
| 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 | 60.6 | 46.5 | 42.4 | 61.7 | 49.2 | 45.5 | 60.5 | 37.5 | 38.0 | 65.7 | 43.8 | 49.2 |
| Incr Delay (d2), s/veh | 39.6 | 0.5 | 0.7 | 12.6 | 0.5 | 0.8 | 17.3 | 0.2 | 0.7 | 5.8 | 0.2 | 3.1 |
| 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 | 14.1 | 10.6 | 5.8 | 8.5 | 9.5 | 5.4 | 10.3 | 7.2 | 7.7 | 4.6 | 5.3 | 11.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 100.2 | 47.0 | 43.0 | 74.3 | 49.7 | 46.3 | 77.8 | 37.7 | 38.7 | 71.5 | 44.0 | 52.3 |
| LnGrp LOS | F | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 2101 | | | 1755 | | | 1798 | | | 1271 | |
| Approach Delay, s/veh | | 61.7 | | | 55.3 | | | 49.0 | | | 51.3 | |
| Approach LOS | | E | | | E | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.5 | 56.2 | 25.4 | 47.1 | 28.2 | 45.4 | 30.0 | 42.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 12.0 | 21.8 | 19.7 | 28.6 | 22.7 | 30.2 | 27.0 | 25.7 |
| Green Ext Time (p_c), s | 0.5 | 10.1 | 0.8 | 13.0 | 0.5 | 6.7 | 0.0 | 11.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 54.9 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 8: Caywood Dr & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 54 | 711 | 44 | 47 | 590 | 127 | 18 | 2 | 36 | 75 | 2 | 67 |
| Future Volume (vph) | 54 | 711 | 44 | 47 | 590 | 127 | 18 | 2 | 36 | 75 | 2 | 67 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.91 | | 1.00 | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.98 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 5027 | | 1770 | 5085 | 1583 | | 1653 | | 1681 | 1529 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.98 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 5027 | | 1770 | 5085 | 1583 | | 1653 | | 1681 | 1529 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 57 | 756 | 47 | 50 | 628 | 135 | 19 | 2 | 38 | 80 | 2 | 71 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 83 | 0 | 36 | 0 | 0 | 63 | 0 |
| Lane Group Flow (vph) | 57 | 796 | 0 | 50 | 628 | 52 | 0 | 23 | 0 | 72 | 18 | 0 |
| Confl. Peds. (#/hr) | | | 16 | 16 | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 4.1 | 22.0 | | 4.0 | 21.9 | 21.9 | | 3.5 | | 6.7 | 6.7 | |
| Effective Green, g (s) | 4.1 | 22.0 | | 4.0 | 21.9 | 21.9 | | 3.5 | | 6.7 | 6.7 | |
| Actuated g/C Ratio | 0.07 | 0.38 | | 0.07 | 0.38 | 0.38 | | 0.06 | | 0.12 | 0.12 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 126 | 1933 | | 123 | 1946 | 606 | | 101 | | 196 | 179 | |
| v/s Ratio Prot | c0.03 | c0.16 | | 0.03 | 0.12 | | | c0.01 | | c0.04 | 0.01 | |
| v/s Ratio Perm | | | | | | 0.03 | | | | | | |
| v/c Ratio | 0.45 | 0.41 | | 0.41 | 0.32 | 0.09 | | 0.23 | | 0.37 | 0.10 | |
| Uniform Delay, d1 | 25.5 | 12.9 | | 25.5 | 12.4 | 11.3 | | 25.6 | | 23.3 | 22.6 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.6 | 0.1 | | 2.2 | 0.1 | 0.1 | | 1.2 | | 1.2 | 0.3 | |
| Delay (s) | 28.0 | 13.0 | | 27.7 | 12.5 | 11.3 | | 26.7 | | 24.5 | 22.8 | |
| Level of Service | C | B | | C | B | B | | C | | C | C | |
| Approach Delay (s) | | 14.0 | | | 13.3 | | | 26.7 | | | 23.6 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 14.9 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.39 | | |
| Actuated Cycle Length (s) | 57.2 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 42.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis
## 9: Cherbourg Wy & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 117 | 643 | 62 | 88 | 694 | 128 | 32 | 3 | 73 | 244 | 2 | 38 |
| Future Volume (vph) | 117 | 643 | 62 | 88 | 694 | 128 | 32 | 3 | 73 | 244 | 2 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.91 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.97 | |
| Satd. Flow (prot) | 1770 | 4998 | | 1770 | 5085 | 1583 | | 1668 | | 1681 | 1639 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.97 | |
| Satd. Flow (perm) | 1770 | 4998 | | 1770 | 5085 | 1583 | | 1668 | | 1681 | 1639 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 126 | 691 | 67 | 95 | 746 | 138 | 34 | 3 | 78 | 262 | 2 | 41 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 99 | 0 | 70 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 126 | 746 | 0 | 95 | 746 | 39 | 0 | 45 | 0 | 155 | 138 | 0 |
| Confl. Peds. (#/hr) | | | 13 | 13 | | | 1 | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 8.4 | 20.2 | | 7.4 | 19.2 | 19.2 | | 5.6 | | 13.0 | 13.0 | |
| Effective Green, g (s) | 8.4 | 20.2 | | 7.4 | 19.2 | 19.2 | | 5.6 | | 13.0 | 13.0 | |
| Actuated g/C Ratio | 0.12 | 0.30 | | 0.11 | 0.29 | 0.29 | | 0.08 | | 0.19 | 0.19 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 221 | 1502 | | 194 | 1452 | 452 | | 139 | | 325 | 317 | |
| v/s Ratio Prot | c0.07 | c0.15 | | 0.05 | 0.15 | | | c0.03 | | c0.09 | 0.08 | |
| v/s Ratio Perm | | | | | | 0.02 | | | | | | |
| v/c Ratio | 0.57 | 0.50 | | 0.49 | 0.51 | 0.09 | | 0.33 | | 0.48 | 0.44 | |
| Uniform Delay, d1 | 27.7 | 19.3 | | 28.1 | 20.1 | 17.6 | | 29.0 | | 24.1 | 23.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.5 | 0.3 | | 1.9 | 0.3 | 0.1 | | 1.4 | | 1.1 | 1.0 | |
| Delay (s) | 31.2 | 19.6 | | 30.1 | 20.4 | 17.7 | | 30.4 | | 25.2 | 24.8 | |
| Level of Service | C | B | | C | C | B | | C | | C | C | |
| Approach Delay (s) | | 21.2 | | | 21.0 | | | 30.4 | | | 25.0 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 22.1 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.49 | | |
| Actuated Cycle Length (s) | 67.2 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 47.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 47 | 861 | 52 | 86 | 808 | 291 | 42 | 0 | 62 | 0 | 0 | 60 |
| Future Vol, veh/h | 47 | 861 | 52 | 86 | 808 | 291 | 42 | 0 | 62 | 0 | 0 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 51 | 926 | 56 | 92 | 869 | 313 | 45 | 0 | 67 | 0 | 0 | 65 |

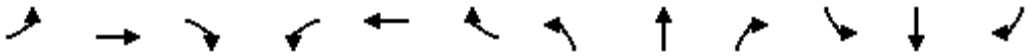
| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1182 | 0 | 0 | 993 | 0 | 0 | 1599 | 2433 | 502 | - | - | 435 |
| Stage 1 | - | - | - | - | - | - | 1067 | 1067 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 532 | 1366 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 319 | - | - | 394 | - | - | 112 | 31 | 440 | 0 | 0 | 487 |
| Stage 1 | - | - | - | - | - | - | 179 | 297 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 456 | 213 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 319 | - | - | 390 | - | - | 69 | 20 | 435 | - | - | 487 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 69 | 20 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 149 | 247 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 302 | 163 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.9 | 1.2 | 94.9 | 13.5 |
| HCM LOS | | | F | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 138 | 319 | - | - | 390 | - | - | 487 |
| HCM Lane V/C Ratio | 0.81 | 0.158 | - | - | 0.237 | - | - | 0.132 |
| HCM Control Delay (s) | 94.9 | 18.4 | - | - | 17.1 | - | - | 13.5 |
| HCM Lane LOS | F | C | - | - | C | - | - | B |
| HCM 95th %tile Q(veh) | 5 | 0.6 | - | - | 0.9 | - | - | 0.5 |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 33 | 833 | 57 | 42 | 1083 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| Future Volume (veh/h) | 33 | 833 | 57 | 42 | 1083 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.95 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 38 | 947 | 65 | 48 | 1231 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 54 | 2089 | 143 | 63 | 1542 | 682 | 125 | 31 | 208 | 137 | 36 | 204 |
| Arrive On Green | 0.03 | 0.43 | 0.43 | 0.04 | 0.43 | 0.43 | 0.07 | 0.15 | 0.15 | 0.08 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 4870 | 333 | 1781 | 3554 | 1572 | 1781 | 210 | 1407 | 1781 | 233 | 1321 |
| Grp Volume(v), veh/h | 38 | 661 | 351 | 48 | 1231 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1800 | 1781 | 1777 | 1572 | 1781 | 0 | 1617 | 1781 | 0 | 1555 |
| Q Serve(g_s), s | 1.4 | 9.3 | 9.3 | 1.8 | 20.2 | 2.0 | 1.7 | 0.0 | 2.0 | 3.8 | 0.0 | 3.1 |
| Cycle Q Clear(g_c), s | 1.4 | 9.3 | 9.3 | 1.8 | 20.2 | 2.0 | 1.7 | 0.0 | 2.0 | 3.8 | 0.0 | 3.1 |
| Prop In Lane | 1.00 | | 0.19 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 54 | 1460 | 772 | 63 | 1542 | 682 | 125 | 0 | 239 | 137 | 0 | 240 |
| V/C Ratio(X) | 0.71 | 0.45 | 0.45 | 0.77 | 0.80 | 0.11 | 0.38 | 0.00 | 0.23 | 0.75 | 0.00 | 0.33 |
| Avail Cap(c_a), veh/h | 924 | 1816 | 960 | 924 | 1896 | 839 | 1056 | 0 | 839 | 660 | 0 | 806 |
| 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 | 32.4 | 13.7 | 13.7 | 32.3 | 16.5 | 11.4 | 30.0 | 0.0 | 25.3 | 30.5 | 0.0 | 25.4 |
| Incr Delay (d2), s/veh | 15.6 | 0.2 | 0.4 | 17.4 | 2.0 | 0.1 | 1.9 | 0.0 | 0.5 | 8.1 | 0.0 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 3.0 | 3.2 | 1.0 | 7.1 | 0.7 | 0.8 | 0.0 | 0.8 | 1.9 | 0.0 | 1.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 48.0 | 13.9 | 14.1 | 49.7 | 18.6 | 11.4 | 31.9 | 0.0 | 25.8 | 38.7 | 0.0 | 26.2 |
| LnGrp LOS | D | B | B | D | B | B | C | A | C | D | A | C |
| Approach Vol, veh/h | | 1050 | | | 1356 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 15.2 | | | 19.3 | | | 28.7 | | | 33.2 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.4 | 34.9 | 9.7 | 15.4 | 7.0 | 35.3 | 10.2 | 15.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 3.8 | 11.3 | 3.7 | 5.1 | 3.4 | 22.2 | 5.8 | 4.0 |
| Green Ext Time (p_c), s | 0.1 | 6.6 | 0.1 | 0.5 | 0.1 | 7.0 | 0.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 19.0 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 150 | 675 | 140 | 142 | 879 | 167 | 181 | 210 | 177 | 109 | 150 | 133 |
| Future Volume (veh/h) | 150 | 675 | 140 | 142 | 879 | 167 | 181 | 210 | 177 | 109 | 150 | 133 |
| 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 | | 1.00 | 1.00 | | 0.99 | 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 | 156 | 703 | 146 | 148 | 916 | 174 | 189 | 219 | 184 | 114 | 156 | 139 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 204 | 1419 | 434 | 193 | 1390 | 430 | 241 | 973 | 298 | 151 | 714 | 221 |
| Arrive On Green | 0.11 | 0.28 | 0.28 | 0.11 | 0.27 | 0.27 | 0.14 | 0.19 | 0.19 | 0.08 | 0.14 | 0.14 |
| Sat Flow, veh/h | 1781 | 5106 | 1561 | 1781 | 5106 | 1580 | 1781 | 5106 | 1562 | 1781 | 5106 | 1582 |
| Grp Volume(v), veh/h | 156 | 703 | 146 | 148 | 916 | 174 | 189 | 219 | 184 | 114 | 156 | 139 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1561 | 1781 | 1702 | 1580 | 1781 | 1702 | 1562 | 1781 | 1702 | 1582 |
| Q Serve(g_s), s | 5.5 | 7.5 | 4.8 | 5.3 | 10.3 | 5.9 | 6.7 | 2.4 | 7.0 | 4.1 | 1.8 | 5.4 |
| Cycle Q Clear(g_c), s | 5.5 | 7.5 | 4.8 | 5.3 | 10.3 | 5.9 | 6.7 | 2.4 | 7.0 | 4.1 | 1.8 | 5.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 204 | 1419 | 434 | 193 | 1390 | 430 | 241 | 973 | 298 | 151 | 714 | 221 |
| V/C Ratio(X) | 0.77 | 0.50 | 0.34 | 0.77 | 0.66 | 0.40 | 0.78 | 0.23 | 0.62 | 0.76 | 0.22 | 0.63 |
| Avail Cap(c_a), veh/h | 822 | 2199 | 672 | 685 | 1885 | 583 | 685 | 3769 | 1153 | 685 | 3769 | 1167 |
| 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 | 28.0 | 19.7 | 18.7 | 28.2 | 21.0 | 19.4 | 27.2 | 22.3 | 24.1 | 29.1 | 24.8 | 26.4 |
| Incr Delay (d2), s/veh | 5.9 | 0.3 | 0.5 | 6.2 | 0.5 | 0.6 | 5.5 | 0.1 | 2.1 | 7.5 | 0.2 | 2.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 2.6 | 1.6 | 2.4 | 3.7 | 2.0 | 2.9 | 0.9 | 2.5 | 1.9 | 0.7 | 2.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 33.9 | 19.9 | 19.2 | 34.4 | 21.5 | 20.0 | 32.7 | 22.4 | 26.2 | 36.6 | 25.0 | 29.3 |
| LnGrp LOS | C | B | B | C | C | B | C | C | C | D | C | C |
| Approach Vol, veh/h | | 1005 | | | 1238 | | | 592 | | | 409 | |
| Approach Delay, s/veh | | 22.0 | | | 22.8 | | | 26.9 | | | 29.7 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.5 | 18.4 | 12.1 | 24.1 | 13.8 | 15.1 | 12.4 | 23.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 6.1 | 9.0 | 7.3 | 9.5 | 8.7 | 7.4 | 7.5 | 12.3 |
| Green Ext Time (p_c), s | 0.2 | 2.0 | 0.3 | 4.7 | 0.4 | 1.4 | 0.4 | 5.1 |

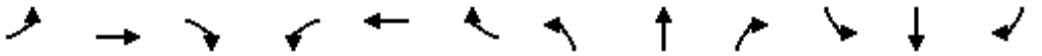
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 24.2 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 71 | 856 | 34 | 101 | 1138 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| Future Volume (veh/h) | 71 | 856 | 34 | 101 | 1138 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| 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 | | 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 | 76 | 920 | 37 | 109 | 1224 | 68 | 29 | 16 | 98 | 54 | 16 | 38 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 100 | 1591 | 694 | 145 | 2342 | 130 | 316 | 215 | 182 | 308 | 215 | 182 |
| Arrive On Green | 0.06 | 0.45 | 0.45 | 0.08 | 0.47 | 0.47 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 3554 | 1550 | 1781 | 4949 | 275 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Grp Volume(v), veh/h | 76 | 920 | 37 | 109 | 842 | 450 | 29 | 16 | 98 | 54 | 16 | 38 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1550 | 1781 | 1702 | 1820 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Q Serve(g_s), s | 1.8 | 8.1 | 0.6 | 2.5 | 7.3 | 7.3 | 0.8 | 0.3 | 2.5 | 1.7 | 0.3 | 0.9 |
| Cycle Q Clear(g_c), s | 1.8 | 8.1 | 0.6 | 2.5 | 7.3 | 7.3 | 1.2 | 0.3 | 2.5 | 2.0 | 0.3 | 0.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 100 | 1591 | 694 | 145 | 1611 | 861 | 316 | 215 | 182 | 308 | 215 | 182 |
| V/C Ratio(X) | 0.76 | 0.58 | 0.05 | 0.75 | 0.52 | 0.52 | 0.09 | 0.07 | 0.54 | 0.18 | 0.07 | 0.21 |
| Avail Cap(c_a), veh/h | 1056 | 4045 | 1765 | 1014 | 3875 | 2072 | 927 | 1064 | 900 | 887 | 1064 | 900 |
| 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 | 19.6 | 8.7 | 6.6 | 19.0 | 7.8 | 7.8 | 17.2 | 16.7 | 17.6 | 17.5 | 16.7 | 16.9 |
| Incr Delay (d2), s/veh | 11.4 | 0.3 | 0.0 | 7.6 | 0.3 | 0.5 | 0.1 | 0.1 | 2.5 | 0.3 | 0.1 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.9 | 2.0 | 0.1 | 1.2 | 1.6 | 1.8 | 0.2 | 0.1 | 0.9 | 0.5 | 0.1 | 0.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 31.0 | 9.0 | 6.6 | 26.6 | 8.0 | 8.3 | 17.3 | 16.8 | 20.1 | 17.8 | 16.8 | 17.5 |
| LnGrp LOS | C | A | A | C | A | A | B | B | C | B | B | B |
| Approach Vol, veh/h | | 1033 | | | 1401 | | | 143 | | | 108 | |
| Approach Delay, s/veh | | 10.5 | | | 9.6 | | | 19.1 | | | 17.5 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.4 | 23.9 | | 9.9 | 7.4 | 25.0 | | 9.9 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.5 | 10.1 | | 4.0 | 3.8 | 9.3 | | 4.5 | | | | |
| Green Ext Time (p_c), s | 0.2 | 7.4 | | 0.3 | 0.1 | 10.6 | | 0.4 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 10.8 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 213 | 741 | 43 | 49 | 1026 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Future Volume (veh/h) | 213 | 741 | 43 | 49 | 1026 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 227 | 788 | 46 | 52 | 1091 | 182 | 27 | 16 | 30 | 141 | 17 | 267 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 158 | 2066 | 921 | 67 | 1884 | 837 | 42 | 258 | 215 | 158 | 19 | 305 |
| Arrive On Green | 0.09 | 0.58 | 0.58 | 0.04 | 0.53 | 0.53 | 0.02 | 0.14 | 0.14 | 0.09 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1781 | 3554 | 1584 | 1781 | 3554 | 1579 | 1781 | 1870 | 1557 | 1781 | 96 | 1502 |
| Grp Volume(v), veh/h | 227 | 788 | 46 | 52 | 1091 | 182 | 27 | 16 | 30 | 141 | 0 | 284 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1584 | 1781 | 1777 | 1579 | 1781 | 1870 | 1557 | 1781 | 0 | 1597 |
| Q Serve(g_s), s | 12.0 | 16.1 | 1.7 | 3.9 | 28.1 | 8.3 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Cycle Q Clear(g_c), s | 12.0 | 16.1 | 1.7 | 3.9 | 28.1 | 8.3 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 158 | 2066 | 921 | 67 | 1884 | 837 | 42 | 258 | 215 | 158 | 0 | 325 |
| V/C Ratio(X) | 1.43 | 0.38 | 0.05 | 0.77 | 0.58 | 0.22 | 0.64 | 0.06 | 0.14 | 0.89 | 0.00 | 0.87 |
| Avail Cap(c_a), veh/h | 158 | 2066 | 921 | 158 | 1884 | 837 | 158 | 544 | 453 | 158 | 0 | 461 |
| 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) | 0.89 | 0.89 | 0.89 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 61.5 | 15.2 | 12.2 | 64.4 | 21.5 | 16.8 | 65.3 | 50.6 | 51.1 | 60.8 | 0.0 | 52.1 |
| Incr Delay (d2), s/veh | 224.2 | 0.5 | 0.1 | 16.9 | 1.3 | 0.6 | 15.2 | 0.1 | 0.3 | 41.5 | 0.0 | 12.6 |
| 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 | 15.2 | 6.4 | 0.6 | 2.1 | 11.6 | 3.2 | 1.1 | 0.5 | 0.9 | 6.6 | 0.0 | 10.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 285.7 | 15.7 | 12.3 | 81.3 | 22.8 | 17.4 | 80.6 | 50.7 | 51.4 | 102.4 | 0.0 | 64.7 |
| LnGrp LOS | F | B | B | F | C | B | F | D | D | F | A | E |
| Approach Vol, veh/h | | 1061 | | | 1325 | | | 73 | | | 425 | |
| Approach Delay, s/veh | | 73.3 | | | 24.4 | | | 62.1 | | | 77.2 | |
| Approach LOS | | E | | | C | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.7 | 84.7 | 16.6 | 24.0 | 16.6 | 77.8 | 7.8 | 32.8 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 51.2 | 12.0 | * 39 | 12.0 | * 52 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 5.9 | 18.1 | 12.6 | 4.3 | 14.0 | 30.1 | 4.0 | 25.3 |
| Green Ext Time (p_c), s | 0.0 | 6.0 | 0.0 | 0.1 | 0.0 | 8.4 | 0.0 | 1.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 51.1 |
| HCM 6th LOS | D |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.1 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 860 | 813 | 59 | 153 |
| Demand Flow Rate, veh/h | 877 | 830 | 60 | 156 |
| Vehicles Circulating, veh/h | 135 | 79 | 911 | 711 |
| Vehicles Exiting, veh/h | 732 | 892 | 101 | 198 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 6.4 | 5.8 | 6.6 | 6.1 |
| Approach LOS | A | A | A | A |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.532 | 0.468 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 412 | 465 | 390 | 440 | 60 | 83 | 73 |
| Cap Entry Lane, veh/h | 1192 | 1266 | 1255 | 1328 | 655 | 702 | 776 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.980 | 0.980 | 0.983 | 0.977 | 0.985 |
| Flow Entry, veh/h | 404 | 456 | 382 | 431 | 59 | 81 | 72 |
| Cap Entry, veh/h | 1169 | 1241 | 1230 | 1301 | 643 | 686 | 764 |
| V/C Ratio | 0.346 | 0.367 | 0.311 | 0.331 | 0.092 | 0.118 | 0.094 |
| Control Delay, s/veh | 6.4 | 6.4 | 5.8 | 5.8 | 6.6 | 6.5 | 5.7 |
| LOS | A | A | A | A | A | A | A |
| 95th %tile Queue, veh | 2 | 2 | 1 | 1 | 0 | 0 | 0 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 8.3 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 884 | 979 | 115 | 305 |
| Demand Flow Rate, veh/h | 902 | 999 | 118 | 311 |
| Vehicles Circulating, veh/h | 366 | 167 | 1101 | 893 |
| Vehicles Exiting, veh/h | 838 | 1052 | 167 | 273 |
| Ped Vol Crossing Leg, #/h | 1 | 0 | 13 | 0 |
| Ped Cap Adj | 0.999 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 8.9 | 7.4 | 9.5 | 9.1 |
| Approach LOS | A | A | A | A |

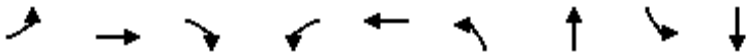
| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 424 | 478 | 470 | 529 | 118 | 165 | 146 |
| Cap Entry Lane, veh/h | 964 | 1040 | 1158 | 1232 | 557 | 594 | 665 |
| Entry HV Adj Factor | 0.980 | 0.980 | 0.979 | 0.981 | 0.974 | 0.980 | 0.982 |
| Flow Entry, veh/h | 416 | 469 | 460 | 519 | 115 | 162 | 143 |
| Cap Entry, veh/h | 944 | 1019 | 1133 | 1209 | 543 | 582 | 653 |
| V/C Ratio | 0.440 | 0.460 | 0.406 | 0.429 | 0.212 | 0.278 | 0.220 |
| Control Delay, s/veh | 9.0 | 8.8 | 7.4 | 7.3 | 9.5 | 9.9 | 8.2 |
| LOS | A | A | A | A | A | A | A |
| 95th %tile Queue, veh | 2 | 2 | 2 | 2 | 1 | 1 | 1 |

# Appendix F: Existing Plus Project Queue Worksheets

# Queues

## 1: West Ln & Eight Mile Rd

05/28/2024



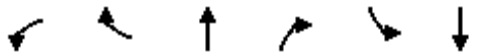
| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 116 | 446 | 441 | 166 | 410 | 319 | 543 | 38 | 702 |
| v/c Ratio | 0.65 | 0.84 | 0.68 | 0.73 | 0.70 | 0.92 | 0.39 | 0.38 | 0.82 |
| Control Delay | 85.6 | 67.9 | 25.8 | 84.5 | 56.2 | 93.4 | 34.7 | 84.8 | 62.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 85.6 | 67.9 | 25.8 | 84.5 | 56.2 | 93.4 | 34.7 | 84.8 | 62.3 |
| Queue Length 50th (ft) | 115 | 422 | 157 | 164 | 363 | 321 | 206 | 38 | 346 |
| Queue Length 95th (ft) | 200 | #729 | 337 | 267 | 574 | #613 | 290 | 87 | 451 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 4736 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 346 | 547 | 654 | 346 | 588 | 346 | 1396 | 346 | 1330 |
| 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 | 0.34 | 0.82 | 0.67 | 0.48 | 0.70 | 0.92 | 0.39 | 0.11 | 0.53 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

05/28/2024

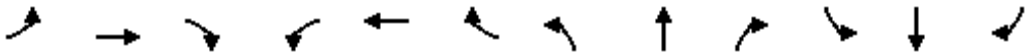


| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 109 | 159 | 723 | 38 | 66 | 1108 |
| v/c Ratio | 0.34 | 0.38 | 0.35 | 0.06 | 0.23 | 0.55 |
| Control Delay | 20.1 | 7.0 | 12.0 | 5.7 | 20.2 | 7.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 20.1 | 7.0 | 12.0 | 5.7 | 20.2 | 7.5 |
| Queue Length 50th (ft) | 24 | 0 | 54 | 0 | 15 | 77 |
| Queue Length 95th (ft) | 67 | 39 | 95 | 16 | 48 | 140 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 785 | 791 | 3836 | 1203 | 392 | 3457 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.14 | 0.20 | 0.19 | 0.03 | 0.17 | 0.32 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 77 | 284 | 265 | 505 | 293 | 112 | 477 | 557 | 418 | 285 | 742 | 203 |
| v/c Ratio | 0.18 | 0.62 | 0.42 | 0.59 | 0.33 | 0.23 | 0.89 | 0.44 | 0.61 | 0.75 | 1.03 | 0.43 |
| Control Delay | 52.1 | 63.2 | 23.7 | 59.3 | 53.4 | 4.7 | 88.1 | 54.1 | 9.5 | 84.2 | 105.5 | 9.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.1 | 63.2 | 23.7 | 59.3 | 53.4 | 4.7 | 88.1 | 54.1 | 9.5 | 84.2 | 105.5 | 9.4 |
| Queue Length 50th (ft) | 70 | 290 | 133 | 264 | 145 | 0 | 271 | 188 | 13 | 163 | 441 | 0 |
| Queue Length 95th (ft) | 121 | 401 | 210 | 329 | 194 | 33 | 340 | 239 | 120 | 211 | #578 | 73 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 438 | 461 | 664 | 850 | 876 | 481 | 601 | 1262 | 689 | 498 | 719 | 473 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.18 | 0.62 | 0.40 | 0.59 | 0.33 | 0.23 | 0.79 | 0.44 | 0.61 | 0.57 | 1.03 | 0.43 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/28/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 188 | 158 | 274 | 16 | 217 | 1172 | 73 | 1584 |
| v/c Ratio | 1.46 | 0.37 | 1.38 | 0.04 | 0.76 | 0.59 | 0.47 | 0.95 |
| Control Delay | 278.7 | 19.1 | 232.6 | 0.2 | 64.2 | 18.9 | 61.4 | 43.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 278.7 | 19.1 | 232.6 | 0.2 | 64.2 | 18.9 | 61.4 | 43.1 |
| Queue Length 50th (ft) | ~194 | 38 | ~275 | 0 | 153 | 282 | 52 | 560 |
| Queue Length 95th (ft) | #340 | 98 | #438 | 0 | 252 | 440 | 105 | #882 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 129 | 427 | 199 | 405 | 383 | 2001 | 383 | 1666 |
| 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 | 1.46 | 0.37 | 1.38 | 0.04 | 0.57 | 0.59 | 0.19 | 0.95 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

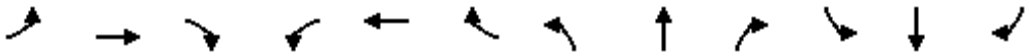
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 88 | 83 | 157 | 164 | 24 | 1157 | 70 | 197 | 1640 |
| v/c Ratio | 0.56 | 0.38 | 0.48 | 0.48 | 0.18 | 0.70 | 0.12 | 0.66 | 0.64 |
| Control Delay | 64.8 | 38.7 | 48.4 | 32.2 | 56.8 | 33.0 | 0.4 | 54.3 | 22.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.8 | 38.7 | 48.4 | 32.2 | 56.8 | 33.0 | 0.4 | 54.3 | 22.4 |
| Queue Length 50th (ft) | 48 | 33 | 83 | 65 | 13 | 201 | 0 | 103 | 196 |
| Queue Length 95th (ft) | #208 | 98 | 227 | 152 | 56 | 438 | 0 | 281 | 590 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 157 | 321 | 490 | 644 | 490 | 2708 | 888 | 490 | 2818 |
| 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 | 0.56 | 0.26 | 0.32 | 0.25 | 0.05 | 0.43 | 0.08 | 0.40 | 0.58 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



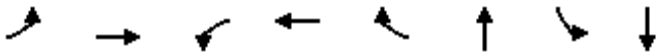
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 594 | 202 | 279 | 1037 | 373 |
| v/c Ratio | 0.69 | 0.66 | 0.39 | 0.90 | 0.57 | 0.39 | 0.64 | 0.36 | 0.37 | 0.64 | 0.63 | 0.63 |
| Control Delay | 60.6 | 46.7 | 10.1 | 73.5 | 44.8 | 13.8 | 65.6 | 42.2 | 7.0 | 66.3 | 47.2 | 19.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 60.6 | 46.7 | 10.1 | 73.5 | 44.8 | 13.8 | 65.6 | 42.2 | 7.0 | 66.3 | 47.2 | 19.6 |
| Queue Length 50th (ft) | 187 | 260 | 17 | 256 | 217 | 33 | 121 | 125 | 0 | 120 | 234 | 87 |
| Queue Length 95th (ft) | #328 | 355 | 92 | #494 | 301 | 113 | 200 | 173 | 62 | 205 | 321 | 224 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 639 | 3343 | 898 | 639 | 3343 | 884 | 639 | 3582 | 960 | 511 | 3343 | 932 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 0.34 | 0.24 | 0.90 | 0.30 | 0.24 | 0.44 | 0.17 | 0.21 | 0.55 | 0.31 | 0.40 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/28/2024

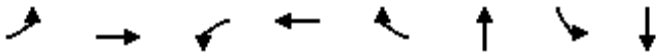


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 15 | 1026 | 77 | 842 | 40 | 119 | 103 | 109 |
| v/c Ratio | 0.09 | 0.54 | 0.33 | 0.32 | 0.05 | 0.41 | 0.41 | 0.35 |
| Control Delay | 35.1 | 19.5 | 34.3 | 11.5 | 0.1 | 9.7 | 34.2 | 12.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.1 | 19.5 | 34.3 | 11.5 | 0.1 | 9.7 | 34.2 | 12.7 |
| Queue Length 50th (ft) | 6 | 124 | 29 | 64 | 0 | 0 | 40 | 5 |
| Queue Length 95th (ft) | 27 | 210 | 81 | 154 | 0 | 36 | 105 | 53 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 285 | 2720 | 427 | 3205 | 1046 | 384 | 541 | 557 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.38 | 0.18 | 0.26 | 0.04 | 0.31 | 0.19 | 0.20 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 31 | 1117 | 173 | 915 | 40 | 155 | 223 | 220 |
| v/c Ratio | 0.21 | 0.74 | 0.60 | 0.41 | 0.05 | 0.53 | 0.65 | 0.63 |
| Control Delay | 44.8 | 31.3 | 44.8 | 19.2 | 0.1 | 12.1 | 41.6 | 38.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.8 | 31.3 | 44.8 | 19.2 | 0.1 | 12.1 | 41.6 | 38.6 |
| Queue Length 50th (ft) | 16 | 184 | 86 | 125 | 0 | 0 | 115 | 106 |
| Queue Length 95th (ft) | 50 | 315 | 177 | 215 | 0 | 43 | 217 | 205 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 215 | 1783 | 431 | 2429 | 818 | 354 | 615 | 610 |
| 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 | 0.14 | 0.63 | 0.40 | 0.38 | 0.05 | 0.44 | 0.36 | 0.36 |

Intersection Summary

# Queues
## 11: Glacier Point Dr & Morada Ln

05/28/2024

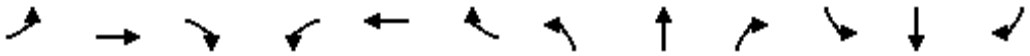
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 1499 | 107 | 920 | 344 | 159 | 175 | 235 | 193 |
| v/c Ratio | 0.69 | 0.89 | 0.57 | 0.88 | 0.59 | 0.66 | 0.46 | 0.73 | 0.47 |
| Control Delay | 66.0 | 47.7 | 67.5 | 53.9 | 20.3 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 66.0 | 47.7 | 67.5 | 53.9 | 20.3 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Length 50th (ft) | 147 | 434 | 86 | 388 | 88 | 127 | 82 | 182 | 102 |
| Queue Length 95th (ft) | 234 | #595 | 153 | #592 | 209 | 208 | 157 | #316 | 194 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 510 | 1688 | 510 | 1050 | 585 | 583 | 719 | 364 | 484 |
| 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 | 0.36 | 0.89 | 0.21 | 0.88 | 0.59 | 0.27 | 0.24 | 0.65 | 0.40 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 229 | 1085 | 269 | 172 | 788 | 157 | 240 | 130 | 98 | 209 | 292 | 270 |
| v/c Ratio | 0.71 | 0.72 | 0.45 | 0.64 | 0.59 | 0.30 | 0.73 | 0.15 | 0.28 | 0.71 | 0.38 | 0.58 |
| Control Delay | 56.8 | 39.4 | 12.9 | 57.9 | 39.0 | 9.2 | 57.0 | 39.3 | 10.4 | 58.8 | 42.7 | 10.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.8 | 39.4 | 12.9 | 57.9 | 39.0 | 9.2 | 57.0 | 39.3 | 10.4 | 58.8 | 42.7 | 10.5 |
| Queue Length 50th (ft) | 134 | 222 | 30 | 101 | 157 | 3 | 138 | 26 | 0 | 122 | 62 | 0 |
| Queue Length 95th (ft) | 319 | 436 | 140 | 252 | 317 | 67 | #393 | 57 | 47 | #319 | 115 | 73 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 523 | 1545 | 610 | 436 | 1343 | 517 | 436 | 2408 | 790 | 436 | 2408 | 879 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.44 | 0.70 | 0.44 | 0.39 | 0.59 | 0.30 | 0.55 | 0.05 | 0.12 | 0.48 | 0.12 | 0.31 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 13: Maranatha Dr & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 66 | 1256 | 70 | 62 | 882 | 94 | 8 | 89 | 69 | 24 | 97 |
| v/c Ratio | 0.31 | 0.69 | 0.09 | 0.29 | 0.34 | 0.37 | 0.02 | 0.25 | 0.27 | 0.07 | 0.27 |
| Control Delay | 38.3 | 18.1 | 4.4 | 38.3 | 12.7 | 32.0 | 26.6 | 8.5 | 29.8 | 26.9 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 38.3 | 18.1 | 4.4 | 38.3 | 12.7 | 32.0 | 26.6 | 8.5 | 29.8 | 26.9 | 8.4 |
| Queue Length 50th (ft) | 25 | 201 | 0 | 23 | 76 | 35 | 3 | 0 | 25 | 8 | 0 |
| Queue Length 95th (ft) | 86 | 471 | 26 | 82 | 180 | 92 | 16 | 36 | 71 | 32 | 38 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 668 | 2598 | 1138 | 641 | 3653 | 521 | 703 | 645 | 528 | 703 | 648 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.48 | 0.06 | 0.10 | 0.24 | 0.18 | 0.01 | 0.14 | 0.13 | 0.03 | 0.15 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/28/2024

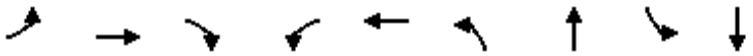
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 1174 | 35 | 18 | 760 | 88 | 61 | 21 | 66 | 57 | 120 |
| v/c Ratio | 0.64 | 0.50 | 0.03 | 0.19 | 0.42 | 0.11 | 0.46 | 0.10 | 0.25 | 0.44 | 0.45 |
| Control Delay | 59.9 | 16.4 | 0.1 | 60.2 | 22.8 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.9 | 16.4 | 0.1 | 60.2 | 22.8 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Length 50th (ft) | 142 | 167 | 0 | 14 | 186 | 0 | 48 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | #323 | #613 | 0 | 39 | 343 | 30 | 93 | 32 | 9 | 89 | 47 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 296 | 2360 | 1061 | 169 | 1793 | 830 | 169 | 585 | 564 | 169 | 576 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.50 | 0.03 | 0.11 | 0.42 | 0.11 | 0.36 | 0.04 | 0.12 | 0.34 | 0.21 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 426 | 380 | 102 | 445 | 321 | 641 | 12 | 632 |
| v/c Ratio | 0.76 | 0.68 | 0.55 | 0.61 | 0.83 | 0.91 | 0.43 | 0.15 | 0.80 |
| Control Delay | 83.2 | 51.6 | 18.3 | 84.3 | 66.1 | 89.5 | 32.9 | 79.8 | 63.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 83.2 | 51.6 | 18.3 | 84.3 | 66.1 | 89.5 | 32.9 | 79.8 | 63.0 |
| Queue Length 50th (ft) | 183 | 360 | 106 | 99 | 410 | 316 | 220 | 12 | 309 |
| Queue Length 95th (ft) | 293 | 565 | 244 | 178 | #705 | #598 | 343 | 38 | 406 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 4736 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 353 | 629 | 694 | 353 | 556 | 353 | 1486 | 353 | 1359 |
| 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 | 0.54 | 0.68 | 0.55 | 0.29 | 0.80 | 0.91 | 0.43 | 0.03 | 0.47 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

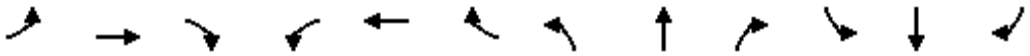
05/28/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 111 | 903 | 129 | 242 | 803 |
| v/c Ratio | 0.29 | 0.34 | 0.51 | 0.20 | 0.56 | 0.31 |
| Control Delay | 26.4 | 9.2 | 16.7 | 4.7 | 24.7 | 4.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.4 | 9.2 | 16.7 | 4.7 | 24.7 | 4.3 |
| Queue Length 50th (ft) | 22 | 0 | 86 | 0 | 69 | 48 |
| Queue Length 95th (ft) | 64 | 39 | 151 | 33 | 147 | 85 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 416 | 457 | 2191 | 755 | 1039 | 3370 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.18 | 0.24 | 0.41 | 0.17 | 0.23 | 0.24 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 51 | 84 | 59 | 450 | 77 | 147 | 98 | 821 | 550 | 185 | 621 | 36 |
| v/c Ratio | 0.18 | 0.20 | 0.13 | 0.83 | 0.14 | 0.38 | 0.39 | 0.61 | 0.67 | 0.49 | 0.58 | 0.07 |
| Control Delay | 36.6 | 36.3 | 0.6 | 61.8 | 47.7 | 8.7 | 63.0 | 39.9 | 7.9 | 56.5 | 36.8 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.6 | 36.3 | 0.6 | 61.8 | 47.7 | 8.7 | 63.0 | 39.9 | 7.9 | 56.5 | 36.8 | 0.2 |
| Queue Length 50th (ft) | 30 | 51 | 0 | 191 | 30 | 0 | 41 | 228 | 0 | 77 | 240 | 0 |
| Queue Length 95th (ft) | 70 | 101 | 0 | #288 | 57 | 48 | 76 | 290 | 103 | 122 | 307 | 0 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 535 | 760 | 715 | 762 | 785 | 474 | 277 | 1898 | 927 | 588 | 1642 | 785 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.11 | 0.08 | 0.59 | 0.10 | 0.31 | 0.35 | 0.43 | 0.59 | 0.31 | 0.38 | 0.05 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/28/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 130 | 94 | 144 | 8 | 156 | 1483 | 39 | 1065 |
| v/c Ratio | 0.57 | 0.24 | 0.60 | 0.02 | 0.55 | 0.74 | 0.24 | 0.70 |
| Control Delay | 45.3 | 12.2 | 45.7 | 0.1 | 44.7 | 18.2 | 46.6 | 22.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.3 | 12.2 | 45.7 | 0.1 | 44.7 | 18.2 | 46.6 | 22.8 |
| Queue Length 50th (ft) | 70 | 6 | 78 | 0 | 87 | 336 | 22 | 234 |
| Queue Length 95th (ft) | 145 | 50 | 157 | 0 | 164 | 514 | 59 | 377 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 339 | 538 | 359 | 526 | 561 | 2428 | 561 | 2418 |
| 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 | 0.38 | 0.17 | 0.40 | 0.02 | 0.28 | 0.61 | 0.07 | 0.44 |

Intersection Summary

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

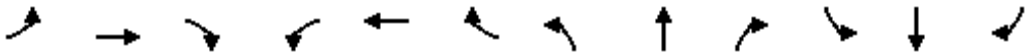
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 93 | 75 | 124 | 140 | 66 | 1498 | 86 | 133 | 1087 |
| v/c Ratio | 0.62 | 0.35 | 0.43 | 0.44 | 0.39 | 0.74 | 0.12 | 0.56 | 0.46 |
| Control Delay | 69.4 | 38.5 | 50.8 | 27.9 | 57.0 | 30.9 | 0.7 | 54.9 | 21.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 69.4 | 38.5 | 50.8 | 27.9 | 57.0 | 30.9 | 0.7 | 54.9 | 21.9 |
| Queue Length 50th (ft) | 55 | 32 | 71 | 47 | 38 | 261 | 0 | 76 | 156 |
| Queue Length 95th (ft) | #218 | 89 | 185 | 114 | 114 | #591 | 3 | 194 | 361 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 150 | 312 | 469 | 617 | 469 | 2590 | 852 | 469 | 2656 |
| 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 | 0.62 | 0.24 | 0.26 | 0.23 | 0.14 | 0.58 | 0.10 | 0.28 | 0.41 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



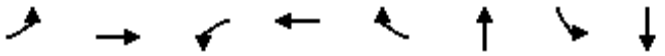
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1030 | 270 | 240 | 709 | 322 |
| v/c Ratio | 0.99 | 0.70 | 0.35 | 0.71 | 0.62 | 0.33 | 0.83 | 0.58 | 0.44 | 0.64 | 0.53 | 0.63 |
| Control Delay | 93.6 | 48.5 | 12.7 | 66.0 | 46.4 | 17.0 | 71.5 | 47.1 | 9.3 | 72.5 | 51.9 | 18.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 93.6 | 48.5 | 12.7 | 66.0 | 46.4 | 17.0 | 71.5 | 47.1 | 9.3 | 72.5 | 51.9 | 18.9 |
| Queue Length 50th (ft) | 277 | 300 | 28 | 187 | 256 | 40 | 223 | 242 | 17 | 107 | 172 | 62 |
| Queue Length 95th (ft) | #545 | 409 | 103 | #328 | 354 | 116 | #420 | 323 | 99 | 185 | 227 | 177 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 602 | 3150 | 834 | 602 | 3150 | 821 | 602 | 3376 | 936 | 482 | 3150 | 879 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.99 | 0.42 | 0.23 | 0.71 | 0.37 | 0.21 | 0.83 | 0.31 | 0.29 | 0.50 | 0.23 | 0.37 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/28/2024

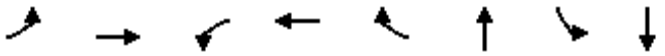


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 57 | 803 | 50 | 628 | 135 | 59 | 72 | 81 |
| v/c Ratio | 0.21 | 0.34 | 0.19 | 0.27 | 0.17 | 0.22 | 0.26 | 0.26 |
| Control Delay | 27.6 | 15.7 | 27.6 | 15.5 | 4.9 | 17.3 | 27.2 | 11.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.6 | 15.7 | 27.6 | 15.5 | 4.9 | 17.3 | 27.2 | 11.7 |
| Queue Length 50th (ft) | 19 | 87 | 16 | 67 | 0 | 7 | 24 | 3 |
| Queue Length 95th (ft) | 57 | 145 | 51 | 114 | 36 | 41 | 69 | 42 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 392 | 3814 | 392 | 3861 | 1234 | 397 | 745 | 718 |
| 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 | 0.15 | 0.21 | 0.13 | 0.16 | 0.11 | 0.15 | 0.10 | 0.11 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 126 | 758 | 95 | 746 | 138 | 115 | 155 | 150 |
| v/c Ratio | 0.42 | 0.49 | 0.35 | 0.51 | 0.25 | 0.43 | 0.47 | 0.45 |
| Control Delay | 34.7 | 22.1 | 35.2 | 23.8 | 6.3 | 20.8 | 33.8 | 30.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.7 | 22.1 | 35.2 | 23.8 | 6.3 | 20.8 | 33.8 | 30.8 |
| Queue Length 50th (ft) | 49 | 96 | 37 | 99 | 0 | 15 | 63 | 53 |
| Queue Length 95th (ft) | 121 | 168 | 98 | 174 | 43 | 73 | 147 | 133 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 618 | 3404 | 464 | 3183 | 1043 | 353 | 587 | 582 |
| 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 | 0.20 | 0.22 | 0.20 | 0.23 | 0.13 | 0.33 | 0.26 | 0.26 |

Intersection Summary

# Queues
## 11: Glacier Point Dr & Morada Ln

05/28/2024

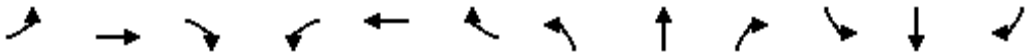
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 38 | 1012 | 48 | 1231 | 77 | 48 | 54 | 103 | 81 |
| v/c Ratio | 0.25 | 0.43 | 0.29 | 0.74 | 0.10 | 0.27 | 0.17 | 0.47 | 0.19 |
| Control Delay | 48.6 | 22.3 | 48.5 | 29.4 | 2.4 | 47.5 | 12.5 | 47.9 | 10.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.6 | 22.3 | 48.5 | 29.4 | 2.4 | 47.5 | 12.5 | 47.9 | 10.8 |
| Queue Length 50th (ft) | 19 | 136 | 24 | 291 | 0 | 24 | 3 | 51 | 6 |
| Queue Length 95th (ft) | 60 | 272 | 71 | #641 | 14 | 71 | 34 | 123 | 41 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 727 | 2343 | 727 | 1654 | 764 | 830 | 969 | 519 | 687 |
| 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 | 0.05 | 0.43 | 0.07 | 0.74 | 0.10 | 0.06 | 0.06 | 0.20 | 0.12 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 156 | 703 | 146 | 148 | 916 | 174 | 189 | 219 | 184 | 114 | 156 | 139 |
| v/c Ratio | 0.57 | 0.46 | 0.26 | 0.56 | 0.61 | 0.31 | 0.64 | 0.25 | 0.44 | 0.50 | 0.23 | 0.42 |
| Control Delay | 49.3 | 30.7 | 7.3 | 49.7 | 33.3 | 10.8 | 50.8 | 34.5 | 8.9 | 50.5 | 37.6 | 10.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.3 | 30.7 | 7.3 | 49.7 | 33.3 | 10.8 | 50.8 | 34.5 | 8.9 | 50.5 | 37.6 | 10.9 |
| Queue Length 50th (ft) | 75 | 107 | 0 | 71 | 148 | 12 | 91 | 37 | 0 | 55 | 27 | 0 |
| Queue Length 95th (ft) | 220 | 265 | 57 | 212 | 357 | 90 | 264 | 82 | 58 | 173 | 63 | 55 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 608 | 1756 | 634 | 506 | 1493 | 558 | 506 | 2797 | 942 | 506 | 2797 | 922 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.26 | 0.40 | 0.23 | 0.29 | 0.61 | 0.31 | 0.37 | 0.08 | 0.20 | 0.23 | 0.06 | 0.15 |

Intersection Summary

# Queues
## 13: Maranatha Dr & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 920 | 37 | 109 | 1292 | 29 | 16 | 98 | 54 | 16 | 38 |
| v/c Ratio | 0.28 | 0.49 | 0.04 | 0.36 | 0.47 | 0.11 | 0.05 | 0.27 | 0.21 | 0.05 | 0.11 |
| Control Delay | 32.6 | 16.2 | 1.6 | 31.8 | 14.1 | 24.9 | 24.0 | 8.0 | 26.1 | 24.0 | 2.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 32.6 | 16.2 | 1.6 | 31.8 | 14.1 | 24.9 | 24.0 | 8.0 | 26.1 | 24.0 | 2.7 |
| Queue Length 50th (ft) | 22 | 119 | 0 | 32 | 109 | 8 | 5 | 0 | 16 | 5 | 0 |
| Queue Length 95th (ft) | 93 | 329 | 7 | 121 | 286 | 36 | 24 | 37 | 57 | 24 | 9 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 848 | 2937 | 1295 | 814 | 4118 | 661 | 886 | 794 | 661 | 886 | 779 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.09 | 0.31 | 0.03 | 0.13 | 0.31 | 0.04 | 0.02 | 0.12 | 0.08 | 0.02 | 0.05 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 227 | 788 | 46 | 52 | 1091 | 182 | 27 | 16 | 30 | 141 | 284 |
| v/c Ratio | 0.60 | 0.36 | 0.05 | 0.43 | 0.66 | 0.24 | 0.27 | 0.09 | 0.12 | 0.90 | 0.62 |
| Control Delay | 56.3 | 16.6 | 0.1 | 70.8 | 31.2 | 11.9 | 67.2 | 49.6 | 1.0 | 109.5 | 12.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.3 | 16.6 | 0.1 | 70.8 | 31.2 | 11.9 | 67.2 | 49.6 | 1.0 | 109.5 | 12.9 |
| Queue Length 50th (ft) | 180 | 157 | 0 | 45 | 356 | 40 | 23 | 14 | 0 | 125 | 14 |
| Queue Length 95th (ft) | #436 | 355 | 0 | 88 | 536 | 108 | 55 | 29 | 0 | #254 | 80 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 381 | 2211 | 1002 | 158 | 1644 | 765 | 157 | 542 | 525 | 157 | 649 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.60 | 0.36 | 0.05 | 0.33 | 0.66 | 0.24 | 0.17 | 0.03 | 0.06 | 0.90 | 0.44 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Appendix G: Background Signal Warrant Worksheets

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Caywood Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | AM |

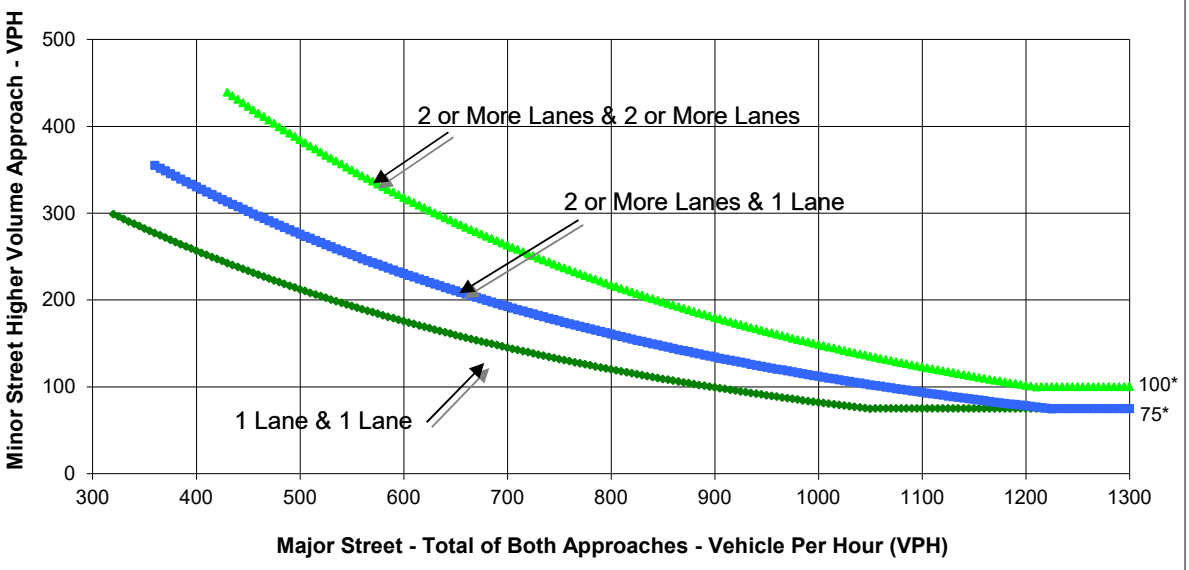
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 22 | 0 | 0 | 70 |
| Through | 0 | 0 | 866 | 708 |
| Right | 0 | 0 | 103 | 0 |
| Total | 22 | 0 | 969 | 778 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,747** | **22** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Caywood Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | PM |

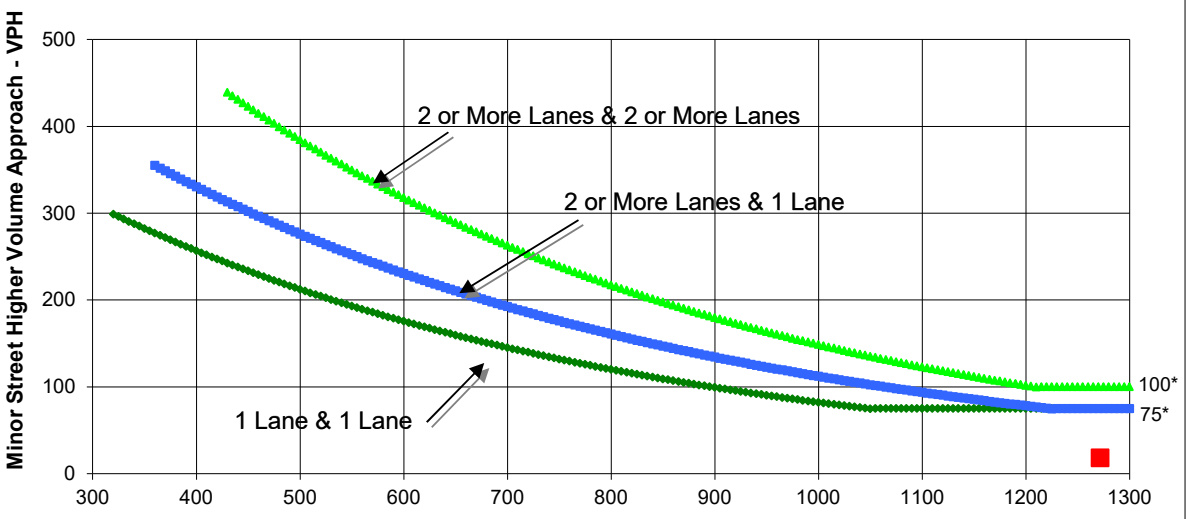
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 18 | 0 | 0 | 47 |
| Through | 0 | 0 | 594 | 587 |
| Right | 0 | 0 | 44 | 0 |
| Total | 18 | 0 | 638 | 634 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,272** | **18** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Cherbourg Way |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | AM |

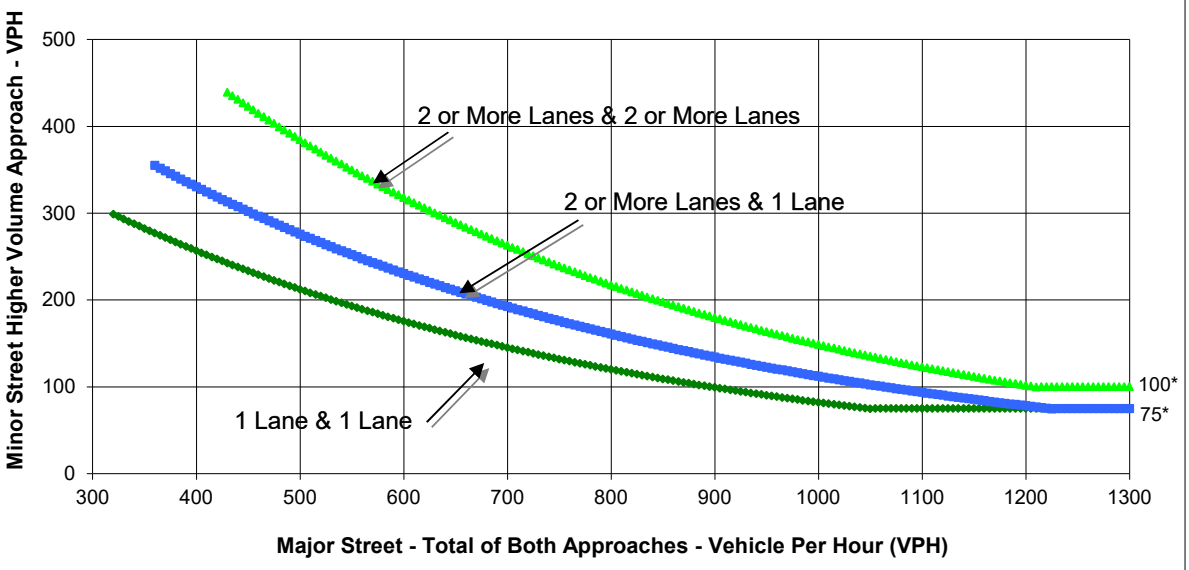
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 0 | 0 | 154 |
| Through | 0 | 0 | 897 | 770 |
| Right | 0 | 0 | 55 | 0 |
| Total | 8 | 0 | 952 | 924 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,876** | **8** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Cherbourg Way |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | PM |

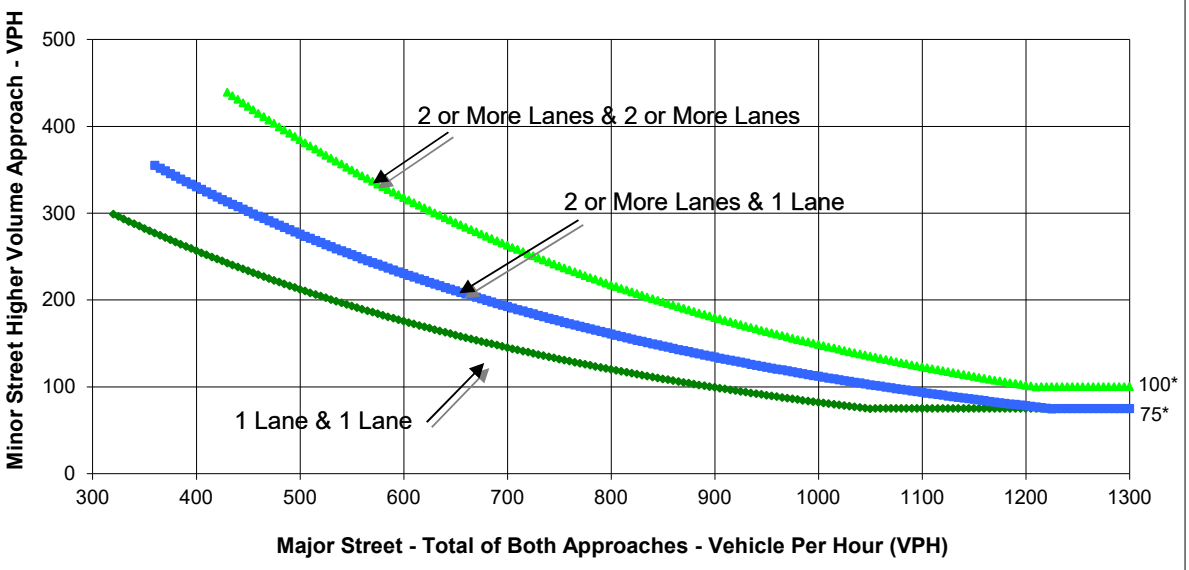
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 32 | 0 | 0 | 88 |
| Through | 0 | 0 | 568 | 602 |
| Right | 0 | 0 | 62 | 0 |
| Total | 32 | 0 | 630 | 690 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **1** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,320** | **32** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Fox Creek Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | AM |

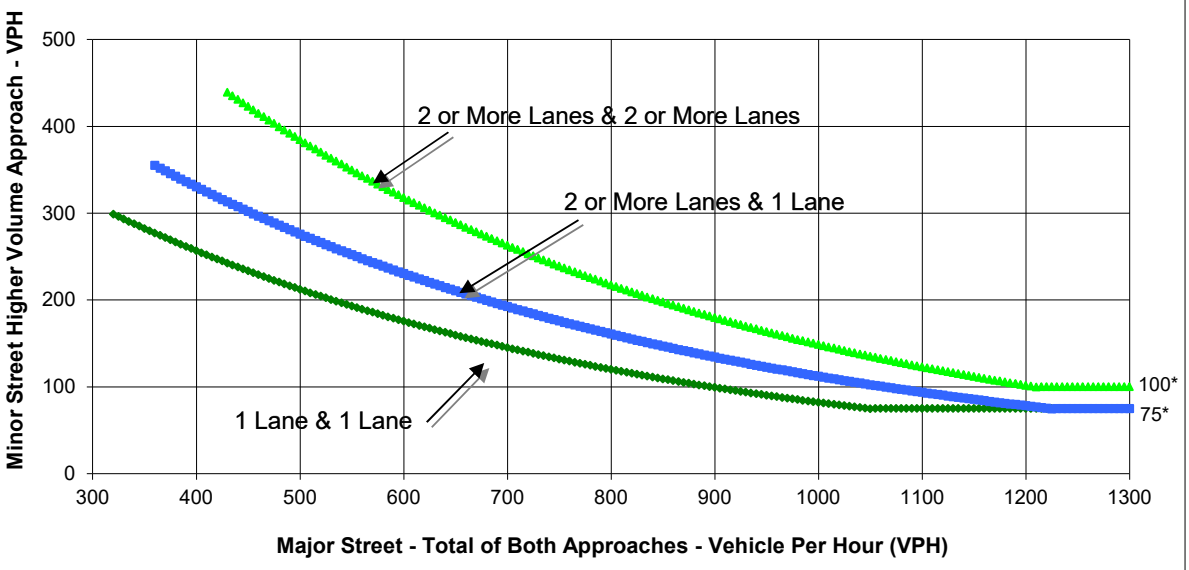
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 24 | 0 | 0 | 74 |
| Through | 0 | 0 | 991 | 900 |
| Right | 0 | 0 | 36 | 0 |
| Total | 24 | 0 | 1,027 | 974 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,001** | **24** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Fox Creek Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Background No Project |
| Peak Hour | PM |

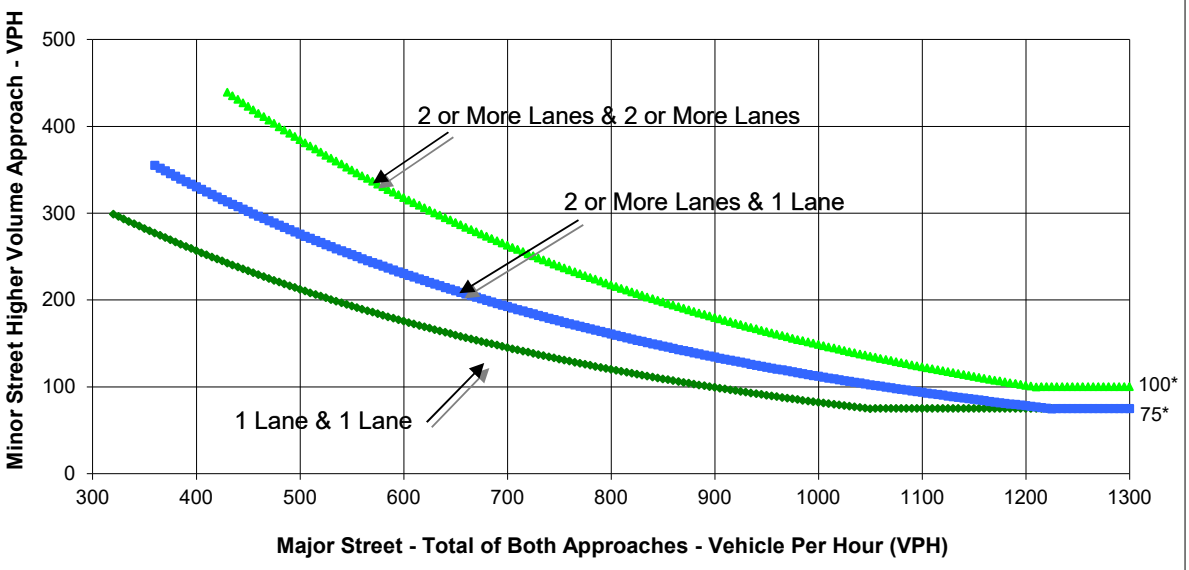
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 42 | 0 | 0 | 86 |
| Through | 0 | 0 | 589 | 648 |
| Right | 0 | 0 | 52 | 0 |
| Total | 42 | 0 | 641 | 734 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **1,375** | **42** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Background Plus Project |
| | | Peak Hour | AM |

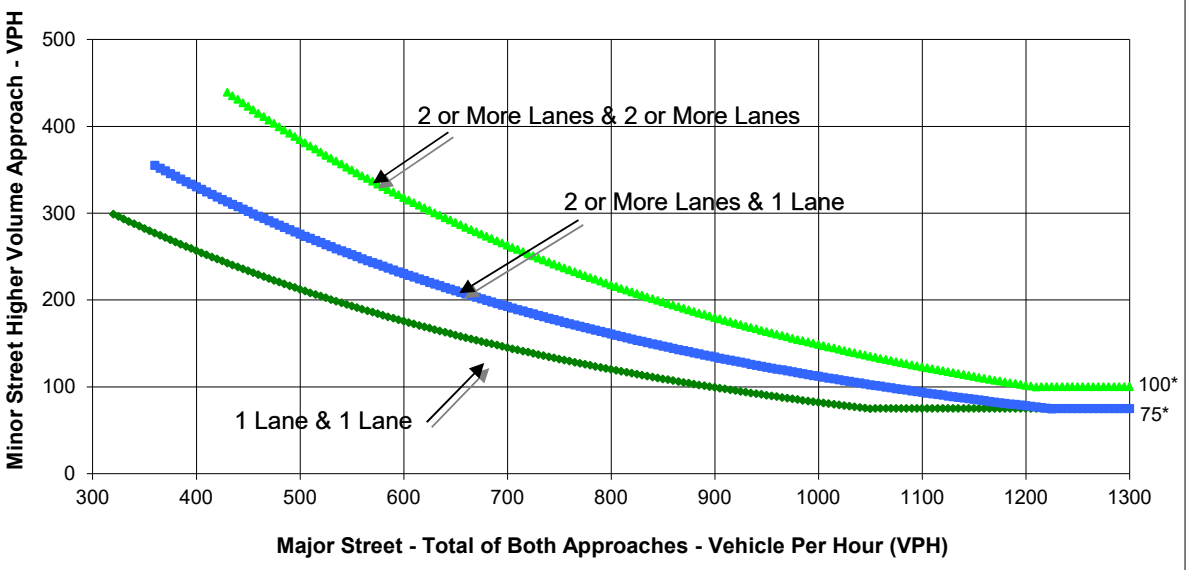
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 61 | 0 | 100 |
| Through | 907 | 1,385 | 0 | 0 |
| Right | 35 | 0 | 0 | 146 |
| Total | 942 | 1,446 | 0 | 246 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,388** | **246** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Background Plus Project |
| | | Peak Hour | PM |

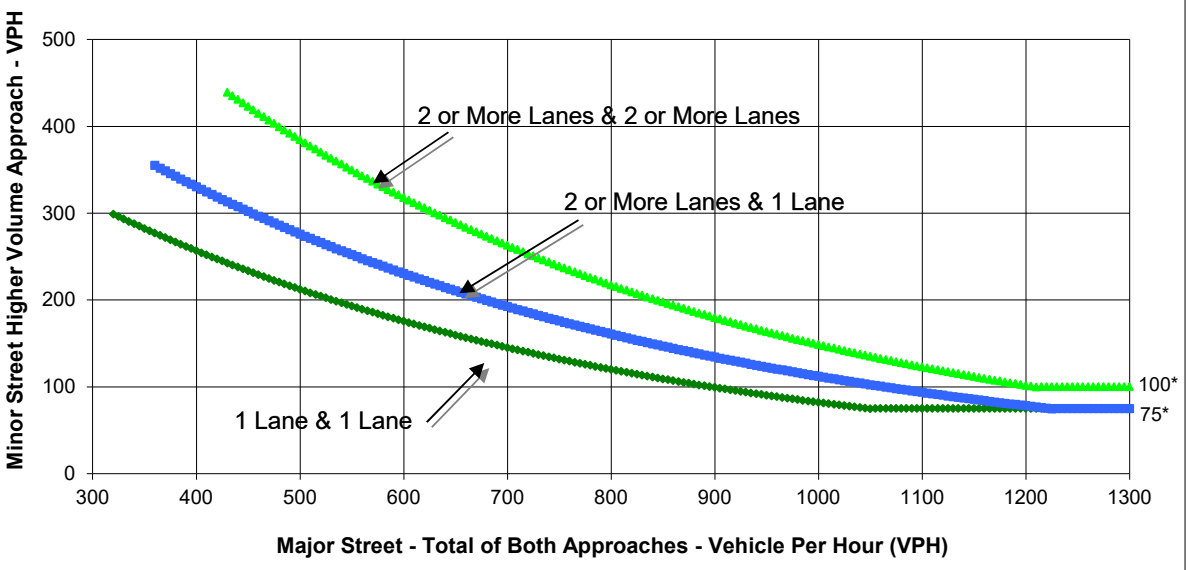
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 223 | 0 | 70 |
| Through | 1,198 | 1,048 | 0 | 0 |
| Right | 119 | 0 | 0 | 102 |
| Total | 1,317 | 1,271 | 0 | 172 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,588** | **172** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive/Project Driveway #3 | Scenario | Background Plus Project |
| | | Peak Hour | AM |

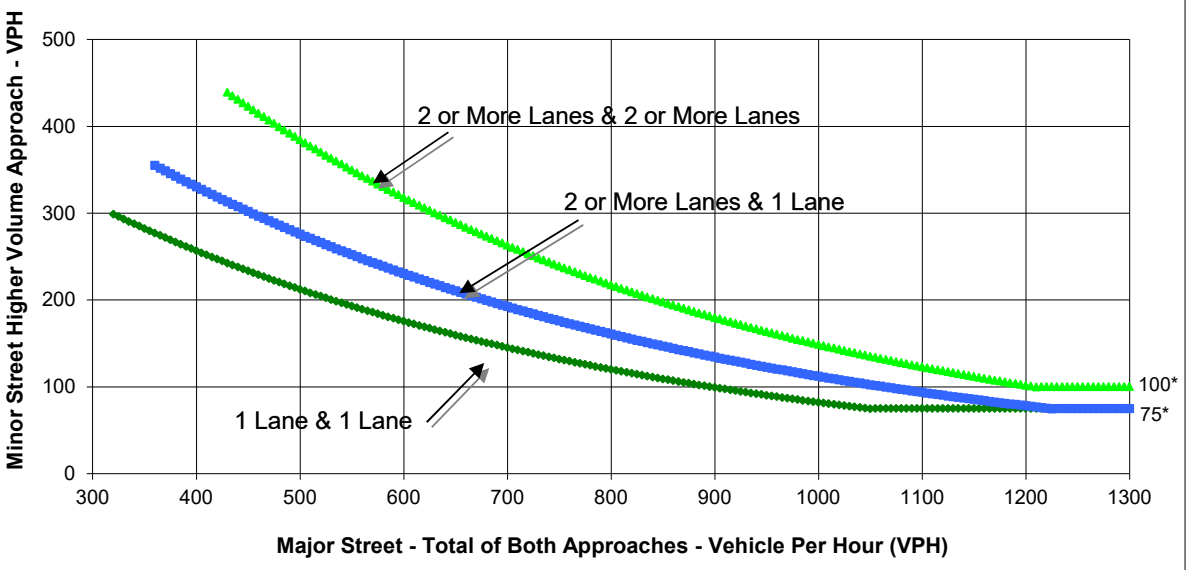
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 22 | 105 | 14 | 70 |
| Through | 0 | 2 | 908 | 840 |
| Right | 0 | 86 | 103 | 36 |
| Total | 22 | 193 | 1,025 | 946 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,971** | **193** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive/Project Driveway #3 | Scenario | Background Plus Project |
| | | Peak Hour | PM |

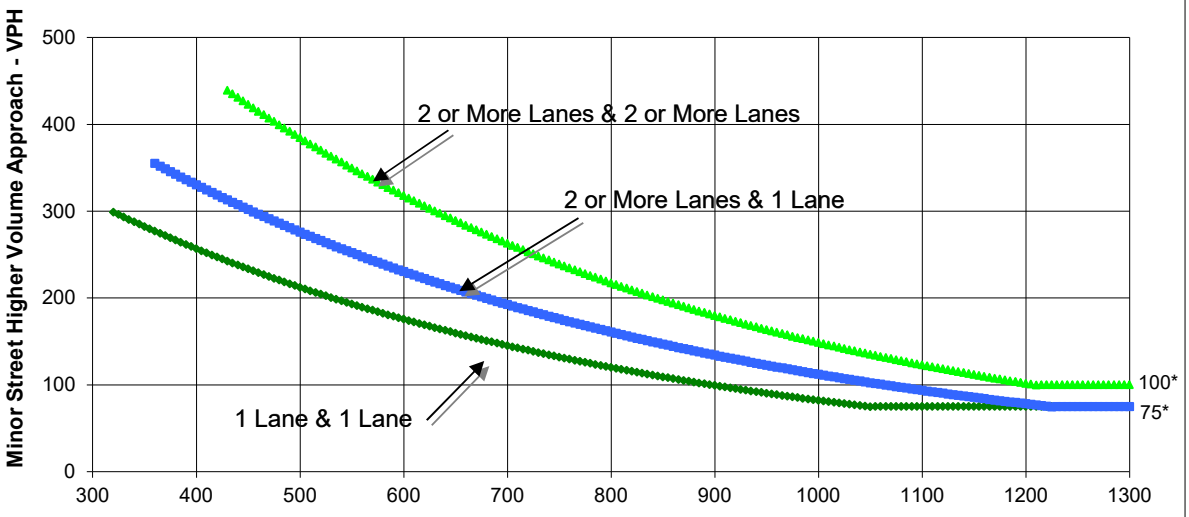
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 18 | 75 | 54 | 47 |
| Through | 2 | 2 | 758 | 685 |
| Right | 0 | 67 | 44 | 127 |
| Total | 20 | 144 | 856 | 859 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,715** | **144** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Background Plus Project |
| | | Peak Hour | AM |

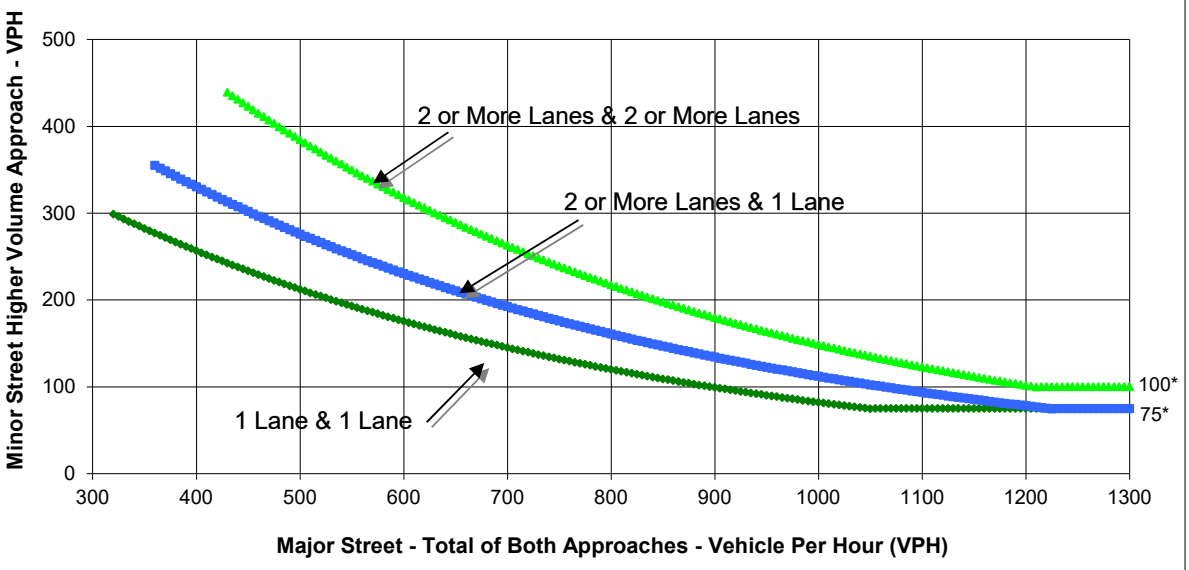
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 343 | 28 | 154 |
| Through | 0 | 2 | 1,016 | 888 |
| Right | 0 | 50 | 55 | 36 |
| Total | 8 | 395 | 1,099 | 1,078 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,177** | **395** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Background Plus Project |
| | | Peak Hour | PM |

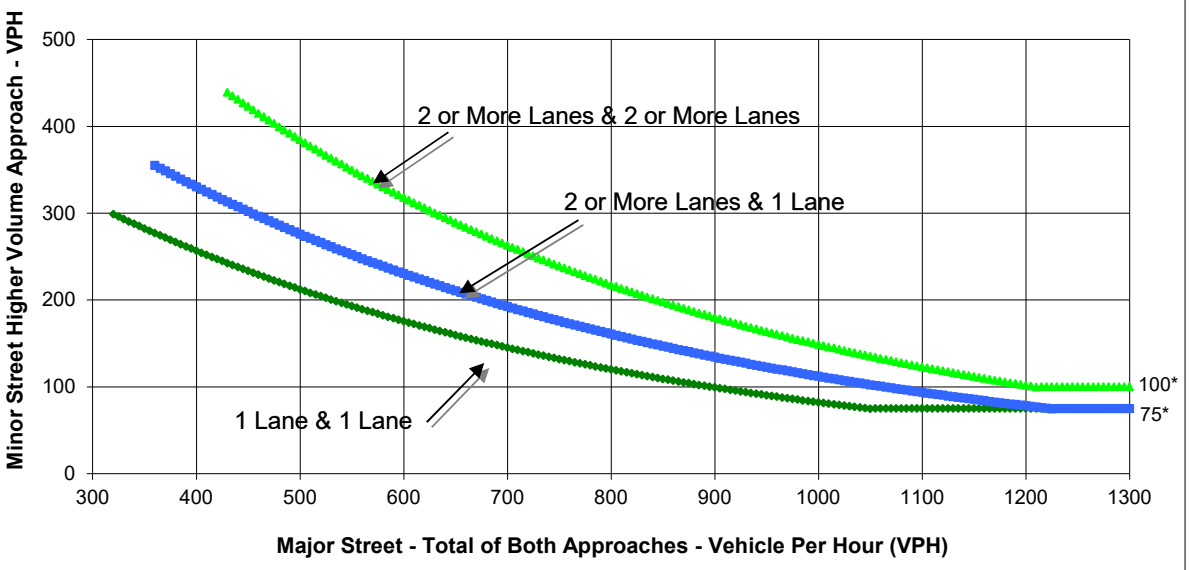
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 32 | 244 | 117 | 88 |
| Through | 3 | 2 | 690 | 789 |
| Right | 0 | 38 | 62 | 128 |
| Total | 35 | 284 | 869 | 1,005 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **1,874** | **284** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Background Plus Project |
| | | Peak Hour | AM |

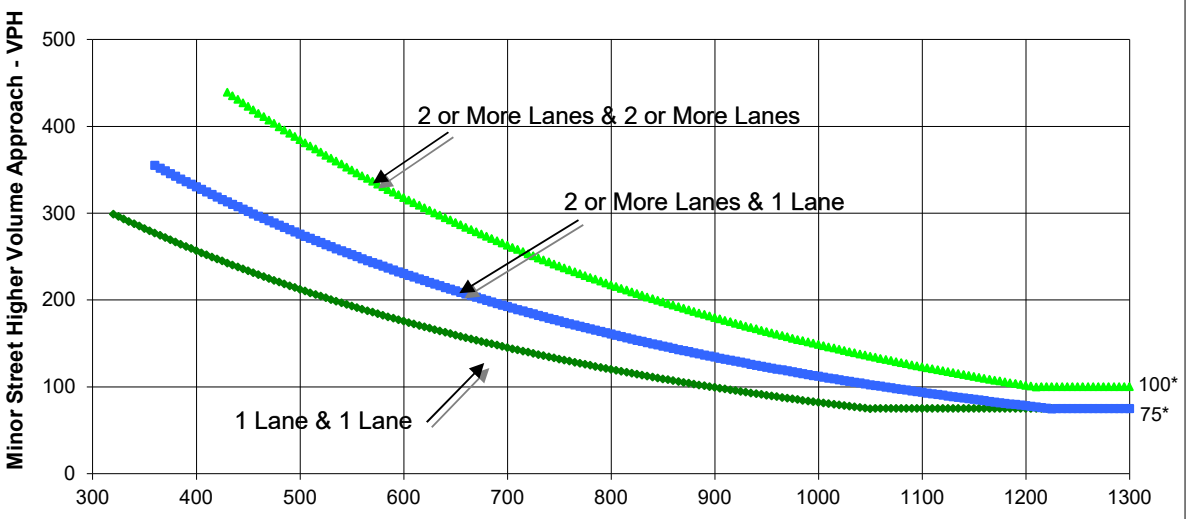
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 24 | 0 | 14 | 74 |
| Through | 0 | 0 | 1,439 | 972 |
| Right | 0 | 0 | 36 | 80 |
| Total | 24 | 0 | 1,489 | 1,126 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,615** | **24** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Background Plus Project |
| | | Peak Hour | PM |

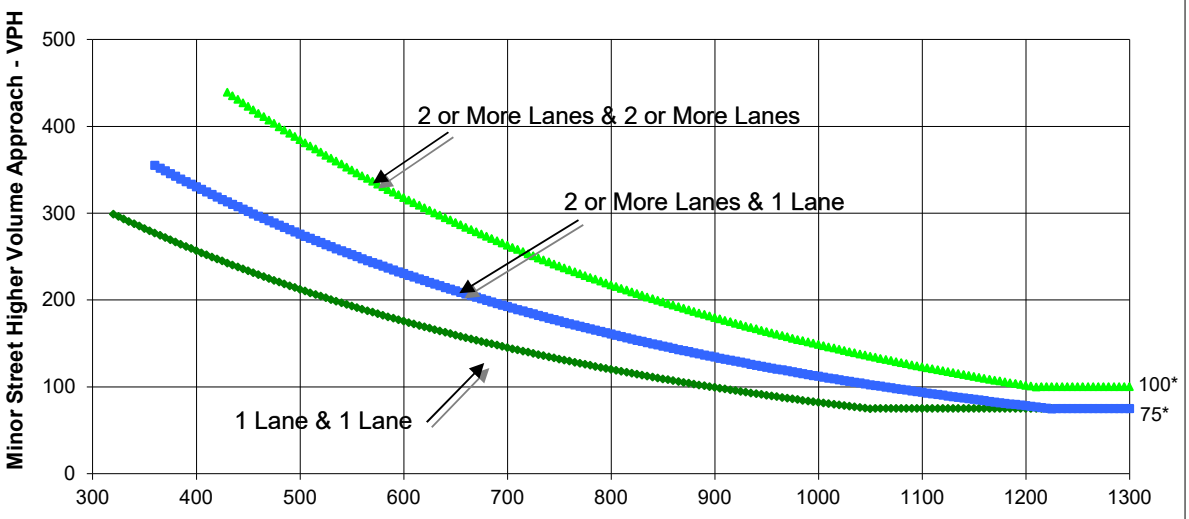
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 42 | 0 | 47 | 86 |
| Through | 0 | 0 | 908 | 903 |
| Right | 0 | 0 | 52 | 291 |
| Total | 42 | 0 | 1,007 | 1,280 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,287** | **42** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

# Appendix H: Background Conditions LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 203 | 684 | 427 | 221 | 607 | 25 | 300 | 376 | 100 | 53 | 478 | 151 |
| Future Volume (veh/h) | 203 | 684 | 427 | 221 | 607 | 25 | 300 | 376 | 100 | 53 | 478 | 151 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 216 | 728 | 318 | 235 | 646 | 27 | 319 | 400 | 106 | 56 | 509 | 161 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 252 | 855 | 381 | 270 | 889 | 397 | 358 | 1159 | 510 | 74 | 593 | 265 |
| Arrive On Green | 0.14 | 0.24 | 0.24 | 0.15 | 0.25 | 0.25 | 0.20 | 0.33 | 0.33 | 0.04 | 0.17 | 0.17 |
| Sat Flow, veh/h | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 | 1781 | 3554 | 1564 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 216 | 728 | 318 | 235 | 646 | 27 | 319 | 400 | 106 | 56 | 509 | 161 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 | 1781 | 1777 | 1564 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 10.8 | 17.9 | 17.4 | 11.8 | 15.2 | 1.2 | 16.0 | 7.8 | 4.5 | 2.8 | 12.7 | 8.6 |
| Cycle Q Clear(g_c), s | 10.8 | 17.9 | 17.4 | 11.8 | 15.2 | 1.2 | 16.0 | 7.8 | 4.5 | 2.8 | 12.7 | 8.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 252 | 855 | 381 | 270 | 889 | 397 | 358 | 1159 | 510 | 74 | 593 | 265 |
| V/C Ratio(X) | 0.86 | 0.85 | 0.83 | 0.87 | 0.73 | 0.07 | 0.89 | 0.35 | 0.21 | 0.76 | 0.86 | 0.61 |
| Avail Cap(c_a), veh/h | 311 | 932 | 416 | 292 | 893 | 398 | 448 | 1204 | 530 | 156 | 621 | 277 |
| 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 | 38.4 | 33.2 | 33.0 | 38.0 | 31.4 | 26.2 | 35.6 | 23.4 | 22.3 | 43.4 | 37.1 | 35.3 |
| Incr Delay (d2), s/veh | 17.4 | 7.2 | 12.8 | 22.6 | 3.0 | 0.1 | 16.9 | 0.2 | 0.2 | 14.5 | 11.2 | 3.6 |
| 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 | 5.7 | 8.1 | 7.5 | 6.6 | 6.5 | 0.4 | 8.1 | 3.0 | 1.5 | 1.5 | 6.4 | 3.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 55.8 | 40.4 | 45.8 | 60.6 | 34.4 | 26.2 | 52.5 | 23.6 | 22.5 | 57.9 | 48.3 | 38.9 |
| LnGrp LOS | E | D | D | E | C | C | D | C | C | E | D | D |
| Approach Vol, veh/h | | 1262 | | | 908 | | | 825 | | | 726 | |
| Approach Delay, s/veh | | 44.4 | | | 40.9 | | | 34.6 | | | 46.9 | |
| Approach LOS | | D | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.8 | 28.0 | 23.4 | 21.3 | 18.0 | 28.9 | 8.8 | 35.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 15.0 | 24.0 | 23.0 | 16.0 | 16.0 | 23.0 | 8.0 | 31.0 |
| Max Q Clear Time (g_c+I1), s | 13.8 | 19.9 | 18.0 | 14.7 | 12.8 | 17.2 | 4.8 | 9.8 |
| Green Ext Time (p_c), s | 0.1 | 2.1 | 0.4 | 0.5 | 0.2 | 2.0 | 0.0 | 2.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 41.9 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 77 | 252 | 241 | 285 | 246 | 154 | 434 | 640 | 330 | 336 | 854 | 195 |
| Future Volume (veh/h) | 77 | 252 | 241 | 285 | 246 | 154 | 434 | 640 | 330 | 336 | 854 | 195 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.80 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.96 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 85 | 277 | 265 | 313 | 270 | 169 | 477 | 703 | 363 | 369 | 938 | 214 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 95 | 311 | 278 | 468 | 280 | 175 | 529 | 684 | 301 | 343 | 825 | 354 |
| Arrive On Green | 0.22 | 0.22 | 0.22 | 0.26 | 0.26 | 0.26 | 0.15 | 0.19 | 0.19 | 0.19 | 0.23 | 0.23 |
| Sat Flow, veh/h | 434 | 1415 | 1264 | 1781 | 1064 | 666 | 3456 | 3554 | 1562 | 1781 | 3554 | 1524 |
| Grp Volume(v), veh/h | 362 | 0 | 265 | 313 | 0 | 439 | 477 | 703 | 363 | 369 | 938 | 214 |
| Grp Sat Flow(s),veh/h/ln | 1849 | 0 | 1264 | 1781 | 0 | 1731 | 1728 | 1777 | 1562 | 1781 | 1777 | 1524 |
| Q Serve(g_s), s | 34.5 | 0.0 | 37.6 | 28.6 | 0.0 | 45.5 | 24.7 | 35.0 | 35.0 | 35.0 | 42.2 | 22.8 |
| Cycle Q Clear(g_c), s | 34.5 | 0.0 | 37.6 | 28.6 | 0.0 | 45.5 | 24.7 | 35.0 | 35.0 | 35.0 | 42.2 | 22.8 |
| Prop In Lane | 0.23 | | 1.00 | 1.00 | | 0.38 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 407 | 0 | 278 | 468 | 0 | 455 | 529 | 684 | 301 | 343 | 825 | 354 |
| V/C Ratio(X) | 0.89 | 0.00 | 0.95 | 0.67 | 0.00 | 0.96 | 0.90 | 1.03 | 1.21 | 1.08 | 1.14 | 0.61 |
| Avail Cap(c_a), veh/h | 407 | 0 | 278 | 1960 | 0 | 1904 | 665 | 684 | 301 | 343 | 825 | 354 |
| 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 | 68.8 | 0.0 | 70.0 | 59.9 | 0.0 | 66.2 | 75.7 | 73.4 | 73.4 | 73.4 | 69.8 | 62.4 |
| Incr Delay (d2), s/veh | 20.9 | 0.0 | 41.2 | 0.6 | 0.0 | 6.2 | 13.4 | 41.6 | 120.1 | 70.3 | 76.4 | 2.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 18.9 | 0.0 | 15.5 | 12.9 | 0.0 | 20.6 | 11.9 | 19.8 | 24.0 | 22.4 | 27.6 | 9.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 89.6 | 0.0 | 111.2 | 60.5 | 0.0 | 72.4 | 89.1 | 115.0 | 193.5 | 143.7 | 146.2 | 65.3 |
| LnGrp LOS | F | A | F | E | A | E | F | F | F | F | F | E |
| Approach Vol, veh/h | | 627 | | | 752 | | | 1543 | | | 1521 | |
| Approach Delay, s/veh | | 98.7 | | | 67.4 | | | 125.5 | | | 134.2 | |
| Approach LOS | | F | | | E | | | F | | | F | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 41.0 | 41.0 | | 53.8 | 33.8 | 48.2 | | 46.0 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 35.0 | 35.0 | | 200.0 | 35.0 | 35.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 37.0 | 37.0 | | 47.5 | 26.7 | 44.2 | | 39.6 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.0 | | 0.3 | 1.2 | 0.0 | | 0.2 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 114.9 |
| HCM 6th LOS | | F |

**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/23/2024

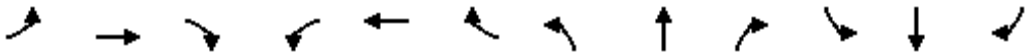
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 157 | 4 | 139 | 225 | 16 | 14 | 191 | 1057 | 62 | 64 | 1289 | 109 |
| Future Volume (vph) | 157 | 4 | 139 | 225 | 16 | 14 | 191 | 1057 | 62 | 64 | 1289 | 109 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 3502 | | 1770 | 3491 | |
| Flt Permitted | | 0.37 | 1.00 | | 0.52 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 686 | 1583 | | 975 | 1563 | 1770 | 3502 | | 1770 | 3491 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 178 | 5 | 158 | 256 | 18 | 16 | 217 | 1201 | 70 | 73 | 1465 | 124 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 0 | 12 | 0 | 3 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 183 | 82 | 0 | 274 | 4 | 217 | 1268 | 0 | 73 | 1584 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 30.8 | 30.8 | | 30.8 | 30.8 | 18.7 | 60.2 | | 8.8 | 50.3 | |
| Effective Green, g (s) | | 30.8 | 30.8 | | 30.8 | 30.8 | 18.7 | 60.2 | | 8.8 | 50.3 | |
| Actuated g/C Ratio | | 0.27 | 0.27 | | 0.27 | 0.27 | 0.16 | 0.52 | | 0.08 | 0.43 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 182 | 421 | | 259 | 415 | 285 | 1820 | | 134 | 1516 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.36 | | 0.04 | c0.45 | |
| v/s Ratio Perm | | 0.27 | 0.05 | | c0.28 | 0.00 | | | | | | |
| v/c Ratio | | 1.01 | 0.19 | | 1.06 | 0.01 | 0.76 | 0.70 | | 0.54 | 1.04 | |
| Uniform Delay, d1 | | 42.5 | 32.9 | | 42.5 | 31.3 | 46.4 | 20.9 | | 51.6 | 32.8 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 68.1 | 0.2 | | 72.0 | 0.0 | 11.4 | 1.2 | | 4.5 | 35.8 | |
| Delay (s) | | 110.6 | 33.1 | | 114.5 | 31.3 | 57.8 | 22.1 | | 56.0 | 68.5 | |
| Level of Service | | F | C | | F | C | E | C | | E | E | |
| Approach Delay (s) | | 74.7 | | | 109.9 | | | 27.3 | | | 68.0 | |
| Approach LOS | | E | | | F | | | C | | | E | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 55.8 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 0.99 | | |
| Actuated Cycle Length (s) | 115.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 83.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 74 | 43 | 31 | 140 | 70 | 72 | 21 | 1125 | 62 | 161 | 1438 | 54 |
| Future Volume (veh/h) | 74 | 43 | 31 | 140 | 70 | 72 | 21 | 1125 | 62 | 161 | 1438 | 54 |
| 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 | | 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 | 83 | 48 | 35 | 157 | 79 | 81 | 24 | 1264 | 70 | 181 | 1616 | 61 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 107 | 85 | 62 | 202 | 116 | 119 | 38 | 1946 | 602 | 229 | 2464 | 93 |
| Arrive On Green | 0.06 | 0.09 | 0.09 | 0.11 | 0.14 | 0.14 | 0.02 | 0.38 | 0.38 | 0.13 | 0.49 | 0.49 |
| Sat Flow, veh/h | 1781 | 1002 | 731 | 1781 | 839 | 860 | 1781 | 5106 | 1581 | 1781 | 5045 | 190 |
| Grp Volume(v), veh/h | 83 | 0 | 83 | 157 | 0 | 160 | 24 | 1264 | 70 | 181 | 1090 | 587 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1733 | 1781 | 0 | 1699 | 1781 | 1702 | 1581 | 1781 | 1702 | 1831 |
| Q Serve(g_s), s | 3.3 | 0.0 | 3.3 | 6.2 | 0.0 | 6.4 | 1.0 | 14.7 | 2.1 | 7.1 | 17.3 | 17.4 |
| Cycle Q Clear(g_c), s | 3.3 | 0.0 | 3.3 | 6.2 | 0.0 | 6.4 | 1.0 | 14.7 | 2.1 | 7.1 | 17.3 | 17.4 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.51 | 1.00 | | 1.00 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 107 | 0 | 148 | 202 | 0 | 235 | 38 | 1946 | 602 | 229 | 1662 | 894 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.56 | 0.78 | 0.00 | 0.68 | 0.64 | 0.65 | 0.12 | 0.79 | 0.66 | 0.66 |
| Avail Cap(c_a), veh/h | 198 | 0 | 193 | 619 | 0 | 708 | 619 | 3406 | 1054 | 619 | 2270 | 1221 |
| 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 | 33.3 | 0.0 | 31.6 | 31.0 | 0.0 | 29.5 | 34.9 | 18.3 | 14.4 | 30.4 | 13.9 | 13.9 |
| Incr Delay (d2), s/veh | 11.3 | 0.0 | 3.3 | 6.3 | 0.0 | 3.4 | 16.4 | 0.4 | 0.1 | 6.0 | 0.4 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.7 | 0.0 | 1.5 | 2.9 | 0.0 | 2.8 | 0.6 | 5.1 | 0.7 | 3.2 | 5.6 | 6.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.6 | 0.0 | 35.0 | 37.3 | 0.0 | 32.9 | 51.3 | 18.7 | 14.5 | 36.5 | 14.3 | 14.7 |
| LnGrp LOS | D | A | C | D | A | C | D | B | B | D | B | B |
| Approach Vol, veh/h | | 166 | | | 317 | | | 1358 | | | 1858 | |
| Approach Delay, s/veh | | 39.8 | | | 35.1 | | | 19.0 | | | 16.6 | |
| Approach LOS | | D | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.2 | 33.4 | 13.2 | 11.1 | 6.5 | 41.1 | 9.3 | 15.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 9.1 | 16.7 | 8.2 | 5.3 | 3.0 | 19.4 | 5.3 | 8.4 |
| Green Ext Time (p_c), s | 0.4 | 10.8 | 0.4 | 0.1 | 0.0 | 13.8 | 0.0 | 0.9 |

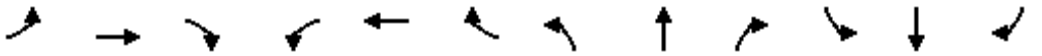
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 20.1 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 398 | 1094 | 209 | 547 | 943 | 184 | 266 | 693 | 192 | 226 | 1136 | 288 |
| Future Volume (veh/h) | 398 | 1094 | 209 | 547 | 943 | 184 | 266 | 693 | 192 | 226 | 1136 | 288 |
| 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 | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 729 | 202 | 238 | 1196 | 303 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 486 | 1750 | 421 | 627 | 2013 | 487 | 346 | 1941 | 471 | 299 | 1854 | 454 |
| Arrive On Green | 0.14 | 0.27 | 0.27 | 0.18 | 0.31 | 0.31 | 0.10 | 0.30 | 0.30 | 0.09 | 0.29 | 0.29 |
| Sat Flow, veh/h | 3456 | 6434 | 1550 | 3456 | 6434 | 1557 | 3456 | 6434 | 1562 | 3456 | 6434 | 1575 |
| Grp Volume(v), veh/h | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 729 | 202 | 238 | 1196 | 303 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1550 | 1728 | 1609 | 1557 | 1728 | 1609 | 1562 | 1728 | 1609 | 1575 |
| Q Serve(g_s), s | 15.7 | 21.0 | 16.0 | 21.7 | 16.6 | 13.0 | 10.5 | 11.8 | 13.7 | 9.0 | 21.5 | 22.5 |
| Cycle Q Clear(g_c), s | 15.7 | 21.0 | 16.0 | 21.7 | 16.6 | 13.0 | 10.5 | 11.8 | 13.7 | 9.0 | 21.5 | 22.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 486 | 1750 | 421 | 627 | 2013 | 487 | 346 | 1941 | 471 | 299 | 1854 | 454 |
| V/C Ratio(X) | 0.86 | 0.66 | 0.52 | 0.92 | 0.49 | 0.40 | 0.81 | 0.38 | 0.43 | 0.80 | 0.65 | 0.67 |
| Avail Cap(c_a), veh/h | 652 | 3399 | 819 | 652 | 3399 | 823 | 652 | 3399 | 825 | 522 | 3399 | 832 |
| 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 | 55.7 | 42.8 | 40.9 | 53.3 | 37.0 | 35.7 | 58.4 | 36.4 | 37.1 | 59.4 | 41.2 | 41.6 |
| Incr Delay (d2), s/veh | 9.0 | 0.4 | 1.0 | 17.9 | 0.2 | 0.5 | 4.6 | 0.1 | 0.6 | 4.8 | 0.4 | 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 | 7.3 | 8.3 | 6.1 | 10.8 | 6.5 | 4.9 | 4.8 | 4.6 | 5.3 | 4.1 | 8.4 | 8.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 64.6 | 43.2 | 41.9 | 71.1 | 37.2 | 36.3 | 63.0 | 36.6 | 37.7 | 64.2 | 41.6 | 43.3 |
| LnGrp LOS | E | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 1791 | | | 1763 | | | 1211 | | | 1737 | |
| Approach Delay, s/veh | | 48.1 | | | 48.2 | | | 42.9 | | | 45.0 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.5 | 46.0 | 29.0 | 41.0 | 18.3 | 44.2 | 23.6 | 46.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 11.0 | 15.7 | 23.7 | 23.0 | 12.5 | 24.5 | 17.7 | 18.6 |
| Green Ext Time (p_c), s | 0.5 | 6.4 | 0.3 | 11.3 | 0.7 | 12.5 | 0.9 | 9.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 46.3 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.8 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 866 | 103 | 70 | 708 | 22 | 86 |
| Future Vol, veh/h | 866 | 103 | 70 | 708 | 22 | 86 |
| Conflicting Peds, #/hr | 0 | 26 | 26 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 91 | 91 | 91 | 91 | 91 | 91 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 952 | 113 | 77 | 778 | 24 | 95 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1091 | 0 | 1967 | 1035 |
| Stage 1 | - | - | - | - | 1035 | - |
| Stage 2 | - | - | - | - | 932 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 640 | - | 69 | 282 |
| Stage 1 | - | - | - | - | 342 | - |
| Stage 2 | - | - | - | - | 383 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 624 | - | 59 | 275 |
| Mov Cap-2 Maneuver | - | - | - | - | 59 | - |
| Stage 1 | - | - | - | - | 333 | - |
| Stage 2 | - | - | - | - | 336 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1 | 75.9 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 158 | - | - | 624 | - |
| HCM Lane V/C Ratio | 0.751 | - | - | 0.123 | - |
| HCM Control Delay (s) | 75.9 | - | - | 11.6 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 4.7 | - | - | 0.4 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 897 | 55 | 154 | 770 | 8 | 130 |
| Future Vol, veh/h | 897 | 55 | 154 | 770 | 8 | 130 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 89 | 89 | 89 | 89 | 89 | 89 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1008 | 62 | 173 | 865 | 9 | 146 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1086 | 0 | 2266 | 1055 |
| Stage 1 | - | - | - | - | 1055 | - |
| Stage 2 | - | - | - | - | 1211 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 642 | - | 45 | 274 |
| Stage 1 | - | - | - | - | 335 | - |
| Stage 2 | - | - | - | - | 282 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 632 | - | 32 | 270 |
| Mov Cap-2 Maneuver | - | - | - | - | 32 | - |
| Stage 1 | - | - | - | - | 330 | - |
| Stage 2 | - | - | - | - | 205 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 2.1 | 76.7 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 189 | - | - | 632 | - |
| HCM Lane V/C Ratio | 0.82 | - | - | 0.274 | - |
| HCM Control Delay (s) | 76.7 | - | - | 12.8 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 5.8 | - | - | 1.1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 18.3 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 991 | 36 | 74 | 900 | 24 | 119 |
| Future Vol, veh/h | 991 | 36 | 74 | 900 | 24 | 119 |
| Conflicting Peds, #/hr | 0 | 9 | 9 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 86 | 86 | 86 | 86 | 86 | 86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1152 | 42 | 86 | 1047 | 28 | 138 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1203 | 0 | 2401 | 606 |
| Stage 1 | - | - | - | - | 1182 | - |
| Stage 2 | - | - | - | - | 1219 | - |
| Critical Hdwy | - | - | 4.13 | - | 6.63 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.83 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.43 | - |
| Follow-up Hdwy | - | - | 2.219 | - | 3.519 | 3.319 |
| Pot Cap-1 Maneuver | - | - | 578 | - | 32 | 441 |
| Stage 1 | - | - | - | - | 254 | - |
| Stage 2 | - | - | - | - | 278 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 573 | - | ~ 27 | 437 |
| Mov Cap-2 Maneuver | - | - | - | - | ~ 27 | - |
| Stage 1 | - | - | - | - | 252 | - |
| Stage 2 | - | - | - | - | 236 | - |

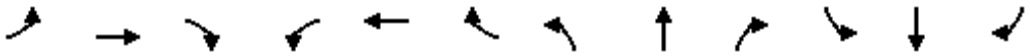
| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.9 | 268.6 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 123 | - | - | 573 | - |
| HCM Lane V/C Ratio | 1.352 | - | - | 0.15 | - |
| HCM Control Delay (s) | 268.6 | - | - | 12.4 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 11.1 | - | - | 0.5 | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/23/2024



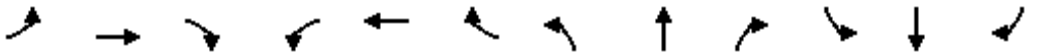
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 162 | 793 | 155 | 94 | 732 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Future Volume (veh/h) | 162 | 793 | 155 | 94 | 732 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.95 | 1.00 | | 0.98 | 1.00 | | 0.91 |
| 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 | 184 | 901 | 176 | 107 | 832 | 344 | 159 | 60 | 115 | 235 | 77 | 116 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 222 | 1429 | 278 | 137 | 1023 | 434 | 196 | 130 | 248 | 272 | 172 | 259 |
| Arrive On Green | 0.12 | 0.33 | 0.33 | 0.08 | 0.29 | 0.29 | 0.11 | 0.23 | 0.23 | 0.15 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1781 | 4265 | 829 | 1781 | 3554 | 1508 | 1781 | 567 | 1087 | 1781 | 632 | 953 |
| Grp Volume(v), veh/h | 184 | 718 | 359 | 107 | 832 | 344 | 159 | 0 | 175 | 235 | 0 | 193 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1690 | 1781 | 1777 | 1508 | 1781 | 0 | 1655 | 1781 | 0 | 1585 |
| Q Serve(g_s), s | 10.3 | 18.1 | 18.2 | 6.0 | 22.1 | 21.4 | 8.9 | 0.0 | 9.3 | 13.1 | 0.0 | 10.3 |
| Cycle Q Clear(g_c), s | 10.3 | 18.1 | 18.2 | 6.0 | 22.1 | 21.4 | 8.9 | 0.0 | 9.3 | 13.1 | 0.0 | 10.3 |
| Prop In Lane | 1.00 | | 0.49 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 222 | 1140 | 566 | 137 | 1023 | 434 | 196 | 0 | 378 | 272 | 0 | 430 |
| V/C Ratio(X) | 0.83 | 0.63 | 0.63 | 0.78 | 0.81 | 0.79 | 0.81 | 0.00 | 0.46 | 0.86 | 0.00 | 0.45 |
| Avail Cap(c_a), veh/h | 613 | 1205 | 598 | 613 | 1258 | 534 | 700 | 0 | 569 | 438 | 0 | 545 |
| 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 | 43.5 | 28.5 | 28.6 | 46.1 | 33.7 | 33.4 | 44.2 | 0.0 | 33.9 | 42.0 | 0.0 | 30.7 |
| Incr Delay (d2), s/veh | 7.8 | 1.0 | 2.0 | 9.1 | 3.5 | 6.6 | 7.8 | 0.0 | 0.9 | 9.8 | 0.0 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.8 | 7.1 | 7.3 | 2.9 | 9.5 | 8.6 | 4.4 | 0.0 | 3.8 | 6.5 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 51.3 | 29.5 | 30.6 | 55.2 | 37.1 | 40.0 | 52.0 | 0.0 | 34.7 | 51.8 | 0.0 | 31.5 |
| LnGrp LOS | D | C | C | E | D | D | D | A | C | D | A | C |
| Approach Vol, veh/h | | 1261 | | | 1283 | | | 334 | | | 428 | |
| Approach Delay, s/veh | | 33.0 | | | 39.4 | | | 43.0 | | | 42.7 | |
| Approach LOS | | C | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.8 | 40.1 | 16.2 | 32.6 | 17.7 | 35.3 | 20.6 | 28.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 8.0 | 20.2 | 10.9 | 12.3 | 12.3 | 24.1 | 15.1 | 11.3 |
| Green Ext Time (p_c), s | 0.3 | 6.0 | 0.5 | 1.2 | 0.5 | 5.1 | 0.5 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 37.7 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 216 | 669 | 216 | 160 | 639 | 223 | 212 | 199 | 91 | 304 | 429 | 278 |
| Future Volume (veh/h) | 216 | 669 | 216 | 160 | 639 | 223 | 212 | 199 | 91 | 304 | 429 | 278 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 232 | 719 | 232 | 172 | 687 | 240 | 228 | 214 | 98 | 327 | 461 | 299 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 273 | 1265 | 383 | 210 | 1085 | 327 | 267 | 1014 | 310 | 365 | 1295 | 395 |
| Arrive On Green | 0.15 | 0.25 | 0.25 | 0.12 | 0.21 | 0.21 | 0.15 | 0.20 | 0.20 | 0.20 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1781 | 5106 | 1546 | 1781 | 5106 | 1541 | 1781 | 5106 | 1560 | 1781 | 5106 | 1557 |
| Grp Volume(v), veh/h | 232 | 719 | 232 | 172 | 687 | 240 | 228 | 214 | 98 | 327 | 461 | 299 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1546 | 1781 | 1702 | 1541 | 1781 | 1702 | 1560 | 1781 | 1702 | 1557 |
| Q Serve(g_s), s | 12.1 | 11.8 | 12.7 | 9.0 | 11.7 | 13.9 | 11.9 | 3.3 | 5.1 | 17.0 | 7.1 | 16.9 |
| Cycle Q Clear(g_c), s | 12.1 | 11.8 | 12.7 | 9.0 | 11.7 | 13.9 | 11.9 | 3.3 | 5.1 | 17.0 | 7.1 | 16.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 273 | 1265 | 383 | 210 | 1085 | 327 | 267 | 1014 | 310 | 365 | 1295 | 395 |
| V/C Ratio(X) | 0.85 | 0.57 | 0.61 | 0.82 | 0.63 | 0.73 | 0.85 | 0.21 | 0.32 | 0.90 | 0.36 | 0.76 |
| Avail Cap(c_a), veh/h | 560 | 1499 | 454 | 467 | 1285 | 388 | 467 | 2571 | 785 | 467 | 2571 | 784 |
| 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 | 39.3 | 31.4 | 31.7 | 41.1 | 34.2 | 35.0 | 39.5 | 32.0 | 32.7 | 36.9 | 29.2 | 32.9 |
| Incr Delay (d2), s/veh | 7.3 | 0.4 | 1.7 | 7.7 | 0.8 | 5.8 | 7.6 | 0.1 | 0.6 | 16.6 | 0.2 | 3.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.6 | 4.6 | 4.7 | 4.3 | 4.7 | 5.5 | 5.5 | 1.3 | 1.9 | 8.7 | 2.8 | 6.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.6 | 31.8 | 33.4 | 48.8 | 34.9 | 40.8 | 47.0 | 32.1 | 33.2 | 53.5 | 29.4 | 35.9 |
| LnGrp LOS | D | C | C | D | C | D | D | C | C | D | C | D |
| Approach Vol, veh/h | | 1183 | | | 1099 | | | 540 | | | 1087 | |
| Approach Delay, s/veh | | 35.0 | | | 38.4 | | | 38.6 | | | 38.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 24.5 | 24.9 | 16.2 | 29.6 | 19.3 | 30.2 | 19.6 | 26.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 19.0 | 7.1 | 11.0 | 14.7 | 13.9 | 18.9 | 14.1 | 15.9 |
| Green Ext Time (p_c), s | 0.5 | 1.7 | 0.4 | 4.4 | 0.5 | 4.1 | 0.5 | 3.3 |

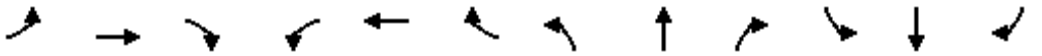
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 37.4 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 61 | 938 | 65 | 58 | 773 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Future Volume (veh/h) | 61 | 938 | 65 | 58 | 773 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.99 | 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 | 66 | 1009 | 70 | 62 | 831 | 33 | 94 | 8 | 89 | 69 | 24 | 97 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 90 | 1638 | 710 | 86 | 2311 | 92 | 336 | 272 | 230 | 350 | 272 | 227 |
| Arrive On Green | 0.05 | 0.46 | 0.46 | 0.05 | 0.46 | 0.46 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 3554 | 1541 | 1781 | 5038 | 200 | 1266 | 1870 | 1582 | 1296 | 1870 | 1557 |
| Grp Volume(v), veh/h | 66 | 1009 | 70 | 62 | 561 | 303 | 94 | 8 | 89 | 69 | 24 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1541 | 1781 | 1702 | 1833 | 1266 | 1870 | 1582 | 1296 | 1870 | 1557 |
| Q Serve(g_s), s | 1.6 | 9.3 | 1.1 | 1.5 | 4.6 | 4.7 | 3.0 | 0.2 | 2.2 | 2.1 | 0.5 | 2.5 |
| Cycle Q Clear(g_c), s | 1.6 | 9.3 | 1.1 | 1.5 | 4.6 | 4.7 | 3.5 | 0.2 | 2.2 | 2.3 | 0.5 | 2.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.11 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 90 | 1638 | 710 | 86 | 1562 | 841 | 336 | 272 | 230 | 350 | 272 | 227 |
| V/C Ratio(X) | 0.73 | 0.62 | 0.10 | 0.72 | 0.36 | 0.36 | 0.28 | 0.03 | 0.39 | 0.20 | 0.09 | 0.43 |
| Avail Cap(c_a), veh/h | 1024 | 3923 | 1701 | 983 | 3758 | 2024 | 850 | 1032 | 873 | 876 | 1032 | 860 |
| 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 | 20.4 | 8.8 | 6.6 | 20.4 | 7.6 | 7.6 | 17.6 | 15.9 | 16.8 | 16.9 | 16.1 | 16.9 |
| Incr Delay (d2), s/veh | 10.9 | 0.4 | 0.1 | 10.6 | 0.1 | 0.3 | 0.4 | 0.0 | 1.1 | 0.3 | 0.1 | 1.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 2.3 | 0.2 | 0.8 | 1.1 | 1.2 | 0.8 | 0.1 | 0.8 | 0.6 | 0.2 | 0.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 31.2 | 9.2 | 6.7 | 31.0 | 7.8 | 7.9 | 18.0 | 16.0 | 17.9 | 17.2 | 16.2 | 18.2 |
| LnGrp LOS | C | A | A | C | A | A | B | B | B | B | B | B |
| Approach Vol, veh/h | | 1145 | | | 926 | | | 191 | | | 190 | |
| Approach Delay, s/veh | | 10.3 | | | 9.4 | | | 17.9 | | | 17.6 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.1 | 25.0 | | 11.3 | 7.2 | 24.9 | | 11.3 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 3.5 | 11.3 | | 4.5 | 3.6 | 6.7 | | 5.5 | | | | |
| Green Ext Time (p_c), s | 0.1 | 8.5 | | 0.6 | 0.1 | 6.1 | | 0.6 | | | | |

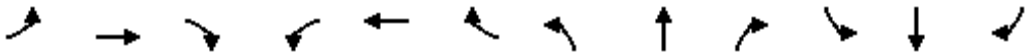
| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.1 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 178 | 874 | 33 | 17 | 697 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| Future Volume (veh/h) | 178 | 874 | 33 | 17 | 697 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| 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 | | 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 | 189 | 930 | 35 | 18 | 741 | 88 | 61 | 21 | 66 | 57 | 5 | 115 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 7 | 156 |
| Arrive On Green | 0.10 | 0.67 | 0.67 | 0.02 | 0.59 | 0.59 | 0.04 | 0.11 | 0.11 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 3554 | 1548 | 1781 | 3554 | 1580 | 1781 | 1870 | 1576 | 1781 | 66 | 1529 |
| Grp Volume(v), veh/h | 189 | 930 | 35 | 18 | 741 | 88 | 61 | 21 | 66 | 57 | 0 | 120 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1548 | 1781 | 1777 | 1580 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 12.0 | 14.7 | 1.0 | 1.3 | 13.5 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Cycle Q Clear(g_c), s | 12.0 | 14.7 | 1.0 | 1.3 | 13.5 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 0 | 163 |
| V/C Ratio(X) | 1.11 | 0.39 | 0.03 | 0.54 | 0.35 | 0.09 | 0.77 | 0.11 | 0.40 | 0.77 | 0.00 | 0.74 |
| Avail Cap(c_a), veh/h | 171 | 2376 | 1035 | 171 | 2101 | 934 | 171 | 588 | 495 | 171 | 0 | 498 |
| 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) | 0.88 | 0.88 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 56.5 | 9.3 | 7.0 | 60.8 | 13.2 | 11.1 | 59.1 | 50.6 | 52.2 | 59.3 | 0.0 | 54.5 |
| Incr Delay (d2), s/veh | 95.6 | 0.4 | 0.1 | 13.1 | 0.5 | 0.2 | 14.8 | 0.2 | 1.5 | 15.6 | 0.0 | 6.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.8 | 5.3 | 0.3 | 0.7 | 5.2 | 1.1 | 2.3 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 152.1 | 9.7 | 7.1 | 74.0 | 13.7 | 11.3 | 73.9 | 50.9 | 53.8 | 74.9 | 0.0 | 60.8 |
| LnGrp LOS | F | A | A | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1154 | | | 847 | | | 148 | | | 177 | |
| Approach Delay, s/veh | | 33.0 | | | 14.7 | | | 61.7 | | | 65.3 | |
| Approach LOS | | C | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 89.8 | 9.8 | 18.5 | 16.6 | 80.1 | 10.1 | 18.2 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 41.2 | 12.0 | * 39 | 12.0 | * 42 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 16.7 | 6.0 | 6.9 | 14.0 | 15.5 | 6.2 | 11.1 |
| Green Ext Time (p_c), s | 0.0 | 6.8 | 0.0 | 0.3 | 0.0 | 5.4 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 30.6 |
| HCM 6th LOS | C |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/23/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 304 | 14 | 791 | 80 | 45 | 1081 |
| Future Volume (veh/h) | 304 | 14 | 791 | 80 | 45 | 1081 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | No | | | No |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 330 | 15 | 860 | 87 | 49 | 1175 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 418 | 372 | 1381 | 616 | 90 | 1947 |
| Arrive On Green | 0.23 | 0.23 | 0.39 | 0.39 | 0.05 | 0.55 |
| Sat Flow, veh/h | 1781 | 1585 | 3647 | 1585 | 1781 | 3647 |
| Grp Volume(v), veh/h | 330 | 15 | 860 | 87 | 49 | 1175 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1585 | 1777 | 1585 | 1781 | 1777 |
| Q Serve(g_s), s | 8.0 | 0.3 | 9.0 | 1.6 | 1.2 | 10.3 |
| Cycle Q Clear(g_c), s | 8.0 | 0.3 | 9.0 | 1.6 | 1.2 | 10.3 |
| Prop In Lane | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 418 | 372 | 1381 | 616 | 90 | 1947 |
| V/C Ratio(X) | 0.79 | 0.04 | 0.62 | 0.14 | 0.54 | 0.60 |
| Avail Cap(c_a), veh/h | 968 | 862 | 2705 | 1206 | 968 | 5062 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.5 | 13.6 | 11.3 | 9.1 | 21.3 | 7.0 |
| Incr Delay (d2), s/veh | 3.4 | 0.0 | 0.5 | 0.1 | 5.0 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.2 | 0.1 | 2.9 | 0.5 | 0.6 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 19.9 | 13.6 | 11.8 | 9.2 | 26.3 | 7.3 |
| LnGrp LOS | B | B | B | A | C | A |
| Approach Vol, veh/h | 345 | | 947 | | | 1224 |
| Approach Delay, s/veh | 19.6 | | 11.6 | | | 8.1 |
| Approach LOS | B | | B | | | A |

| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.3 | 22.9 | | | 30.2 | 15.8 |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | | * 5 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 35.0 | | | * 66 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 3.2 | 11.0 | | | 12.3 | 10.0 |
| Green Ext Time (p_c), s | 0.1 | 6.9 | | | 12.1 | 0.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 11.0 |
| HCM 6th LOS | B |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 227 | 666 | 337 | 216 | 691 | 22 | 316 | 504 | 101 | 16 | 370 | 119 |
| Future Volume (veh/h) | 227 | 666 | 337 | 216 | 691 | 22 | 316 | 504 | 101 | 16 | 370 | 119 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 234 | 687 | 243 | 223 | 712 | 23 | 326 | 520 | 104 | 16 | 381 | 123 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 272 | 881 | 393 | 262 | 861 | 384 | 368 | 1167 | 514 | 33 | 497 | 222 |
| Arrive On Green | 0.15 | 0.25 | 0.25 | 0.15 | 0.24 | 0.24 | 0.21 | 0.33 | 0.33 | 0.02 | 0.14 | 0.14 |
| Sat Flow, veh/h | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 | 1781 | 3554 | 1565 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 234 | 687 | 243 | 223 | 712 | 23 | 326 | 520 | 104 | 16 | 381 | 123 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 | 1781 | 1777 | 1565 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 10.9 | 15.4 | 11.6 | 10.4 | 16.2 | 1.0 | 15.1 | 9.8 | 4.1 | 0.8 | 8.8 | 6.2 |
| Cycle Q Clear(g_c), s | 10.9 | 15.4 | 11.6 | 10.4 | 16.2 | 1.0 | 15.1 | 9.8 | 4.1 | 0.8 | 8.8 | 6.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 272 | 881 | 393 | 262 | 861 | 384 | 368 | 1167 | 514 | 33 | 497 | 222 |
| V/C Ratio(X) | 0.86 | 0.78 | 0.62 | 0.85 | 0.83 | 0.06 | 0.88 | 0.45 | 0.20 | 0.49 | 0.77 | 0.55 |
| Avail Cap(c_a), veh/h | 314 | 1001 | 446 | 334 | 1043 | 465 | 481 | 1376 | 606 | 105 | 626 | 279 |
| 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 | 35.2 | 29.9 | 28.5 | 35.4 | 30.6 | 24.8 | 32.8 | 22.5 | 20.6 | 41.4 | 35.3 | 34.2 |
| Incr Delay (d2), s/veh | 18.9 | 3.6 | 2.1 | 15.2 | 4.7 | 0.1 | 14.5 | 0.3 | 0.2 | 10.6 | 4.4 | 2.2 |
| 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 | 5.9 | 6.5 | 4.3 | 5.3 | 7.0 | 0.3 | 7.5 | 3.7 | 1.4 | 0.4 | 4.0 | 2.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 54.2 | 33.4 | 30.6 | 50.7 | 35.3 | 24.9 | 47.3 | 22.8 | 20.8 | 52.1 | 39.7 | 36.3 |
| LnGrp LOS | D | C | C | D | D | C | D | C | C | D | D | D |
| Approach Vol, veh/h | | 1164 | | | 958 | | | 950 | | | 520 | |
| Approach Delay, s/veh | | 37.0 | | | 38.6 | | | 31.0 | | | 39.3 | |
| Approach LOS | | D | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.5 | 27.1 | 22.6 | 17.9 | 18.0 | 26.7 | 6.6 | 34.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 16.0 | 24.0 | 23.0 | 15.0 | 15.0 | 25.0 | 5.0 | 33.0 |
| Max Q Clear Time (g_c+I1), s | 12.4 | 17.4 | 17.1 | 10.8 | 12.9 | 18.2 | 2.8 | 11.8 |
| Green Ext Time (p_c), s | 0.2 | 2.8 | 0.5 | 1.1 | 0.1 | 2.5 | 0.0 | 3.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 36.2 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 41 | 58 | 57 | 311 | 59 | 207 | 94 | 923 | 333 | 225 | 784 | 39 |
| Future Volume (veh/h) | 41 | 58 | 57 | 311 | 59 | 207 | 94 | 923 | 333 | 225 | 784 | 39 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.94 | 1.00 | | 0.99 | 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 | 43 | 60 | 59 | 300 | 94 | 216 | 98 | 961 | 347 | 234 | 817 | 41 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 132 | 184 | 255 | 361 | 101 | 232 | 155 | 1004 | 442 | 266 | 1375 | 609 |
| Arrive On Green | 0.17 | 0.17 | 0.17 | 0.20 | 0.20 | 0.20 | 0.04 | 0.28 | 0.28 | 0.15 | 0.39 | 0.39 |
| Sat Flow, veh/h | 765 | 1067 | 1484 | 1781 | 499 | 1147 | 3456 | 3554 | 1565 | 1781 | 3554 | 1575 |
| Grp Volume(v), veh/h | 103 | 0 | 59 | 300 | 0 | 310 | 98 | 961 | 347 | 234 | 817 | 41 |
| Grp Sat Flow(s),veh/h/ln | 1832 | 0 | 1484 | 1781 | 0 | 1646 | 1728 | 1777 | 1565 | 1781 | 1777 | 1575 |
| Q Serve(g_s), s | 6.1 | 0.0 | 4.2 | 20.0 | 0.0 | 22.9 | 3.5 | 33.0 | 25.3 | 15.9 | 22.7 | 2.0 |
| Cycle Q Clear(g_c), s | 6.1 | 0.0 | 4.2 | 20.0 | 0.0 | 22.9 | 3.5 | 33.0 | 25.3 | 15.9 | 22.7 | 2.0 |
| Prop In Lane | 0.42 | | 1.00 | 1.00 | | 0.70 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 315 | 0 | 255 | 361 | 0 | 334 | 155 | 1004 | 442 | 266 | 1375 | 609 |
| V/C Ratio(X) | 0.33 | 0.00 | 0.23 | 0.83 | 0.00 | 0.93 | 0.63 | 0.96 | 0.79 | 0.88 | 0.59 | 0.07 |
| Avail Cap(c_a), veh/h | 592 | 0 | 479 | 2876 | 0 | 2657 | 976 | 1004 | 442 | 503 | 1375 | 609 |
| 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 | 45.0 | 0.0 | 44.2 | 47.4 | 0.0 | 48.5 | 58.2 | 43.7 | 41.0 | 51.6 | 30.2 | 23.9 |
| Incr Delay (d2), s/veh | 0.6 | 0.0 | 0.5 | 1.9 | 0.0 | 4.9 | 4.2 | 18.9 | 9.0 | 9.2 | 0.7 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.9 | 0.0 | 1.6 | 8.8 | 0.0 | 9.6 | 1.6 | 16.7 | 10.6 | 7.5 | 9.3 | 0.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 45.6 | 0.0 | 44.7 | 49.3 | 0.0 | 53.4 | 62.4 | 62.7 | 50.0 | 60.8 | 30.9 | 24.0 |
| LnGrp LOS | D | A | D | D | A | D | E | E | D | E | C | C |
| Approach Vol, veh/h | | 162 | | | 610 | | | 1406 | | | 1092 | |
| Approach Delay, s/veh | | 45.3 | | | 51.4 | | | 59.5 | | | 37.1 | |
| Approach LOS | | D | | | D | | | E | | | D | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 24.5 | 41.0 | | 31.1 | 11.5 | 53.9 | | 27.3 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 35.0 | 35.0 | | 200.0 | 35.0 | 35.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 17.9 | 35.0 | | 24.9 | 5.5 | 24.7 | | 8.1 | | | | |
| Green Ext Time (p_c), s | 0.6 | 0.0 | | 0.2 | 0.3 | 3.7 | | 0.8 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 49.8 | |
| HCM 6th LOS | | D | |

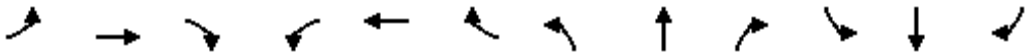
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 102 | 6 | 90 | 130 | 9 | 8 | 150 | 1246 | 134 | 37 | 1031 | 58 |
| Future Volume (vph) | 102 | 6 | 90 | 130 | 9 | 8 | 150 | 1246 | 134 | 37 | 1031 | 58 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1779 | 1583 | | 1779 | 1563 | 1770 | 3478 | | 1770 | 3507 | |
| Flt Permitted | | 0.60 | 1.00 | | 0.66 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1110 | 1583 | | 1230 | 1563 | 1770 | 3478 | | 1770 | 3507 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 106 | 6 | 94 | 135 | 9 | 8 | 156 | 1298 | 140 | 39 | 1074 | 60 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 0 | 6 | 0 | 5 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 112 | 18 | 0 | 144 | 2 | 156 | 1433 | 0 | 39 | 1131 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 16.8 | 16.8 | | 16.8 | 16.8 | 13.7 | 49.5 | | 4.5 | 40.3 | |
| Effective Green, g (s) | | 16.8 | 16.8 | | 16.8 | 16.8 | 13.7 | 49.5 | | 4.5 | 40.3 | |
| Actuated g/C Ratio | | 0.19 | 0.19 | | 0.19 | 0.19 | 0.16 | 0.57 | | 0.05 | 0.46 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 214 | 306 | | 238 | 302 | 279 | 1983 | | 91 | 1628 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.41 | | 0.02 | 0.32 | |
| v/s Ratio Perm | | 0.10 | 0.01 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.52 | 0.06 | | 0.61 | 0.01 | 0.56 | 0.72 | | 0.43 | 0.69 | |
| Uniform Delay, d1 | | 31.4 | 28.6 | | 32.0 | 28.3 | 33.8 | 13.6 | | 39.9 | 18.4 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 2.3 | 0.1 | | 4.3 | 0.0 | 2.4 | 1.3 | | 3.2 | 1.3 | |
| Delay (s) | | 33.7 | 28.6 | | 36.3 | 28.3 | 36.2 | 15.0 | | 43.1 | 19.7 | |
| Level of Service | | C | C | | D | C | D | B | | D | B | |
| Approach Delay (s) | | 31.4 | | | 35.8 | | | 17.0 | | | 20.5 | |
| Approach LOS | | C | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 20.2 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 86.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 70.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 72 | 43 | 29 | 119 | 52 | 66 | 63 | 1429 | 83 | 116 | 1098 | 37 |
| Future Volume (veh/h) | 72 | 43 | 29 | 119 | 52 | 66 | 63 | 1429 | 83 | 116 | 1098 | 37 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 75 | 45 | 30 | 124 | 54 | 69 | 66 | 1489 | 86 | 121 | 1144 | 39 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 97 | 82 | 55 | 163 | 86 | 110 | 86 | 2265 | 686 | 159 | 2454 | 84 |
| Arrive On Green | 0.05 | 0.08 | 0.08 | 0.09 | 0.12 | 0.12 | 0.05 | 0.44 | 0.44 | 0.09 | 0.48 | 0.48 |
| Sat Flow, veh/h | 1781 | 1043 | 696 | 1781 | 745 | 952 | 1781 | 5106 | 1547 | 1781 | 5066 | 173 |
| Grp Volume(v), veh/h | 75 | 0 | 75 | 124 | 0 | 123 | 66 | 1489 | 86 | 121 | 769 | 414 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1739 | 1781 | 0 | 1696 | 1781 | 1702 | 1547 | 1781 | 1702 | 1834 |
| Q Serve(g_s), s | 2.9 | 0.0 | 2.9 | 4.8 | 0.0 | 4.9 | 2.6 | 16.2 | 2.3 | 4.7 | 10.6 | 10.6 |
| Cycle Q Clear(g_c), s | 2.9 | 0.0 | 2.9 | 4.8 | 0.0 | 4.9 | 2.6 | 16.2 | 2.3 | 4.7 | 10.6 | 10.6 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.56 | 1.00 | | 1.00 | 1.00 | | 0.09 |
| Lane Grp Cap(c), veh/h | 97 | 0 | 137 | 163 | 0 | 197 | 86 | 2265 | 686 | 159 | 1649 | 888 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.55 | 0.76 | 0.00 | 0.62 | 0.77 | 0.66 | 0.13 | 0.76 | 0.47 | 0.47 |
| Avail Cap(c_a), veh/h | 201 | 0 | 197 | 630 | 0 | 719 | 630 | 3465 | 1050 | 630 | 2310 | 1245 |
| 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 | 33.0 | 0.0 | 31.4 | 31.4 | 0.0 | 29.8 | 33.3 | 15.5 | 11.6 | 31.5 | 12.1 | 12.1 |
| Incr Delay (d2), s/veh | 12.4 | 0.0 | 3.4 | 7.1 | 0.0 | 3.2 | 13.1 | 0.3 | 0.1 | 7.3 | 0.2 | 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 | 1.6 | 0.0 | 1.3 | 2.3 | 0.0 | 2.1 | 1.4 | 5.4 | 0.8 | 2.2 | 3.4 | 3.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 45.5 | 0.0 | 34.7 | 38.5 | 0.0 | 33.0 | 46.4 | 15.8 | 11.7 | 38.8 | 12.4 | 12.5 |
| LnGrp LOS | D | A | C | D | A | C | D | B | B | D | B | B |
| Approach Vol, veh/h | | 150 | | | 247 | | | 1641 | | | 1304 | |
| Approach Delay, s/veh | | 40.1 | | | 35.8 | | | 16.8 | | | 14.9 | |
| Approach LOS | | D | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 11.3 | 37.4 | 11.5 | 10.6 | 8.4 | 40.3 | 8.8 | 13.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 6.7 | 18.2 | 6.8 | 4.9 | 4.6 | 12.6 | 4.9 | 6.9 |
| Green Ext Time (p_c), s | 0.3 | 13.2 | 0.3 | 0.1 | 0.1 | 9.1 | 0.0 | 0.7 |

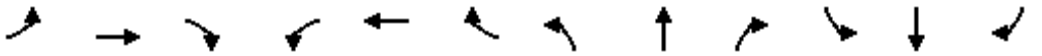
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.5 |
| HCM 6th LOS | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 492 | 1257 | 187 | 409 | 1107 | 122 | 478 | 1108 | 259 | 203 | 860 | 260 |
| Future Volume (veh/h) | 492 | 1257 | 187 | 409 | 1107 | 122 | 478 | 1108 | 259 | 203 | 860 | 260 |
| 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 | | 0.97 |
| 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 | 512 | 1309 | 195 | 426 | 1153 | 127 | 498 | 1154 | 270 | 211 | 896 | 271 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 565 | 1874 | 451 | 487 | 1728 | 418 | 553 | 2195 | 539 | 267 | 1663 | 399 |
| Arrive On Green | 0.16 | 0.29 | 0.29 | 0.14 | 0.27 | 0.27 | 0.16 | 0.34 | 0.34 | 0.08 | 0.26 | 0.26 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1556 | 3456 | 6434 | 1579 | 3456 | 6434 | 1542 |
| Grp Volume(v), veh/h | 512 | 1309 | 195 | 426 | 1153 | 127 | 498 | 1154 | 270 | 211 | 896 | 271 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1556 | 1728 | 1609 | 1579 | 1728 | 1609 | 1542 |
| Q Serve(g_s), s | 20.5 | 25.4 | 14.3 | 17.0 | 22.4 | 9.1 | 19.9 | 20.2 | 19.1 | 8.4 | 16.9 | 22.2 |
| Cycle Q Clear(g_c), s | 20.5 | 25.4 | 14.3 | 17.0 | 22.4 | 9.1 | 19.9 | 20.2 | 19.1 | 8.4 | 16.9 | 22.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 565 | 1874 | 451 | 487 | 1728 | 418 | 553 | 2195 | 539 | 267 | 1663 | 399 |
| V/C Ratio(X) | 0.91 | 0.70 | 0.43 | 0.88 | 0.67 | 0.30 | 0.90 | 0.53 | 0.50 | 0.79 | 0.54 | 0.68 |
| Avail Cap(c_a), veh/h | 615 | 3204 | 771 | 615 | 3204 | 775 | 615 | 3204 | 787 | 492 | 3204 | 768 |
| 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 | 57.7 | 44.3 | 40.4 | 59.2 | 45.8 | 40.9 | 57.9 | 37.2 | 36.8 | 63.7 | 44.9 | 46.9 |
| Incr Delay (d2), s/veh | 16.4 | 0.5 | 0.7 | 11.2 | 0.4 | 0.4 | 15.4 | 0.2 | 0.7 | 5.2 | 0.3 | 2.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 10.1 | 10.1 | 5.5 | 8.1 | 8.9 | 3.5 | 9.8 | 7.9 | 7.4 | 3.9 | 6.7 | 8.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 74.1 | 44.8 | 41.0 | 70.4 | 46.3 | 41.3 | 73.4 | 37.4 | 37.5 | 68.9 | 45.2 | 48.9 |
| LnGrp LOS | E | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 2016 | | | 1706 | | | 1922 | | | 1378 | |
| Approach Delay, s/veh | | 51.9 | | | 51.9 | | | 46.7 | | | 49.5 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.9 | 53.9 | 24.8 | 45.9 | 27.5 | 42.3 | 28.0 | 42.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 10.4 | 22.2 | 19.0 | 27.4 | 21.9 | 24.2 | 22.5 | 24.4 |
| Green Ext Time (p_c), s | 0.4 | 11.7 | 0.8 | 13.1 | 0.6 | 8.5 | 0.5 | 10.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 50.0 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 594 | 44 | 47 | 587 | 18 | 36 |
| Future Vol, veh/h | 594 | 44 | 47 | 587 | 18 | 36 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 632 | 47 | 50 | 624 | 19 | 38 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 695 | 0 | 1396 | 672 |
| Stage 1 | - | - | - | - | 672 | - |
| Stage 2 | - | - | - | - | 724 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 901 | - | 156 | 456 |
| Stage 1 | - | - | - | - | 508 | - |
| Stage 2 | - | - | - | - | 480 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 887 | - | 145 | 449 |
| Mov Cap-2 Maneuver | - | - | - | - | 145 | - |
| Stage 1 | - | - | - | - | 500 | - |
| Stage 2 | - | - | - | - | 453 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.7 | 22.4 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 264 | - | - | 887 | - |
| HCM Lane V/C Ratio | 0.218 | - | - | 0.056 | - |
| HCM Control Delay (s) | 22.4 | - | - | 9.3 | - |
| HCM Lane LOS | C | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.8 | - | - | 0.2 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.9 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 568 | 62 | 88 | 602 | 32 | 73 |
| Future Vol, veh/h | 568 | 62 | 88 | 602 | 32 | 73 |
| Conflicting Peds, #/hr | 0 | 13 | 13 | 0 | 1 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 611 | 67 | 95 | 647 | 34 | 78 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 691 | 0 | 1496 | 658 |
| Stage 1 | - | - | - | - | 658 | - |
| Stage 2 | - | - | - | - | 838 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 904 | - | 135 | 464 |
| Stage 1 | - | - | - | - | 515 | - |
| Stage 2 | - | - | - | - | 424 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 893 | - | 119 | 458 |
| Mov Cap-2 Maneuver | - | - | - | - | 119 | - |
| Stage 1 | - | - | - | - | 509 | - |
| Stage 2 | - | - | - | - | 379 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.2 | 31.7 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 245 | - | - | 893 | - |
| HCM Lane V/C Ratio | 0.461 | - | - | 0.106 | - |
| HCM Control Delay (s) | 31.7 | - | - | 9.5 | - |
| HCM Lane LOS | D | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.3 | - | - | 0.4 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 589 | 52 | 86 | 648 | 42 | 62 |
| Future Vol, veh/h | 589 | 52 | 86 | 648 | 42 | 62 |
| Conflicting Peds, #/hr | 0 | 11 | 11 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 633 | 56 | 92 | 697 | 45 | 67 |

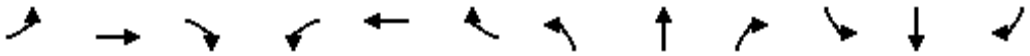
| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 700 | 0 | 1553 | 356 |
| Stage 1 | - | - | - | - | 672 | - |
| Stage 2 | - | - | - | - | 881 | - |
| Critical Hdwy | - | - | 4.13 | - | 6.63 | 6.93 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.83 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.43 | - |
| Follow-up Hdwy | - | - | 2.219 | - | 3.519 | 3.319 |
| Pot Cap-1 Maneuver | - | - | 895 | - | 114 | 641 |
| Stage 1 | - | - | - | - | 470 | - |
| Stage 2 | - | - | - | - | 404 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 886 | - | 101 | 634 |
| Mov Cap-2 Maneuver | - | - | - | - | 101 | - |
| Stage 1 | - | - | - | - | 465 | - |
| Stage 2 | - | - | - | - | 362 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.1 | 42.9 |
| HCM LOS | | | E |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 202 | - | - | 886 | - |
| HCM Lane V/C Ratio | 0.554 | - | - | 0.104 | - |
| HCM Control Delay (s) | 42.9 | - | - | 9.5 | - |
| HCM Lane LOS | E | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.9 | - | - | 0.3 | - |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/23/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 33 | 561 | 57 | 42 | 632 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| Future Volume (veh/h) | 33 | 561 | 57 | 42 | 632 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 38 | 638 | 65 | 48 | 718 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 58 | 1446 | 146 | 68 | 1115 | 492 | 137 | 37 | 248 | 137 | 41 | 235 |
| Arrive On Green | 0.03 | 0.31 | 0.31 | 0.04 | 0.31 | 0.31 | 0.08 | 0.18 | 0.18 | 0.08 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1781 | 4699 | 474 | 1781 | 3554 | 1567 | 1781 | 210 | 1407 | 1781 | 234 | 1327 |
| Grp Volume(v), veh/h | 38 | 460 | 243 | 48 | 718 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1769 | 1781 | 1777 | 1567 | 1781 | 0 | 1617 | 1781 | 0 | 1561 |
| Q Serve(g_s), s | 1.1 | 5.7 | 5.8 | 1.4 | 9.1 | 1.9 | 1.3 | 0.0 | 1.5 | 3.0 | 0.0 | 2.3 |
| Cycle Q Clear(g_c), s | 1.1 | 5.7 | 5.8 | 1.4 | 9.1 | 1.9 | 1.3 | 0.0 | 1.5 | 3.0 | 0.0 | 2.3 |
| Prop In Lane | 1.00 | | 0.27 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 58 | 1048 | 544 | 68 | 1115 | 492 | 137 | 0 | 285 | 137 | 0 | 276 |
| V/C Ratio(X) | 0.66 | 0.44 | 0.45 | 0.70 | 0.64 | 0.16 | 0.35 | 0.00 | 0.19 | 0.75 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 1188 | 2336 | 1213 | 1188 | 2438 | 1075 | 1358 | 0 | 1079 | 849 | 0 | 1041 |
| 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 | 25.1 | 14.5 | 14.6 | 24.9 | 15.5 | 13.0 | 23.0 | 0.0 | 18.4 | 23.7 | 0.0 | 18.7 |
| Incr Delay (d2), s/veh | 12.0 | 0.3 | 0.6 | 12.3 | 0.6 | 0.1 | 1.5 | 0.0 | 0.3 | 7.9 | 0.0 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.6 | 1.8 | 1.9 | 0.7 | 3.0 | 0.6 | 0.6 | 0.0 | 0.5 | 1.5 | 0.0 | 0.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 37.1 | 14.8 | 15.1 | 37.2 | 16.1 | 13.1 | 24.5 | 0.0 | 18.7 | 31.7 | 0.0 | 19.3 |
| LnGrp LOS | D | B | B | D | B | B | C | A | B | C | A | B |
| Approach Vol, veh/h | | 741 | | | 843 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 16.1 | | | 17.0 | | | 21.4 | | | 26.3 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.0 | 22.2 | 9.0 | 14.3 | 6.7 | 22.5 | 9.0 | 14.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 3.4 | 7.8 | 3.3 | 4.3 | 3.1 | 11.1 | 5.0 | 3.5 |
| Green Ext Time (p_c), s | 0.1 | 4.4 | 0.1 | 0.5 | 0.1 | 5.0 | 0.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 17.8 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 162 | 416 | 115 | 142 | 474 | 255 | 138 | 337 | 177 | 168 | 245 | 130 |
| Future Volume (veh/h) | 162 | 416 | 115 | 142 | 474 | 255 | 138 | 337 | 177 | 168 | 245 | 130 |
| 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 | | 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 | 169 | 433 | 120 | 148 | 494 | 266 | 144 | 351 | 184 | 175 | 255 | 135 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 218 | 1286 | 393 | 193 | 1213 | 375 | 188 | 950 | 291 | 224 | 1054 | 327 |
| Arrive On Green | 0.12 | 0.25 | 0.25 | 0.11 | 0.24 | 0.24 | 0.11 | 0.19 | 0.19 | 0.13 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1781 | 5106 | 1561 | 1781 | 5106 | 1579 | 1781 | 5106 | 1562 | 1781 | 5106 | 1583 |
| Grp Volume(v), veh/h | 169 | 433 | 120 | 148 | 494 | 266 | 144 | 351 | 184 | 175 | 255 | 135 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1561 | 1781 | 1702 | 1579 | 1781 | 1702 | 1562 | 1781 | 1702 | 1583 |
| Q Serve(g_s), s | 6.2 | 4.6 | 4.2 | 5.4 | 5.5 | 10.4 | 5.3 | 4.0 | 7.3 | 6.4 | 2.8 | 5.0 |
| Cycle Q Clear(g_c), s | 6.2 | 4.6 | 4.2 | 5.4 | 5.5 | 10.4 | 5.3 | 4.0 | 7.3 | 6.4 | 2.8 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 218 | 1286 | 393 | 193 | 1213 | 375 | 188 | 950 | 291 | 224 | 1054 | 327 |
| V/C Ratio(X) | 0.77 | 0.34 | 0.31 | 0.77 | 0.41 | 0.71 | 0.77 | 0.37 | 0.63 | 0.78 | 0.24 | 0.41 |
| Avail Cap(c_a), veh/h | 797 | 2132 | 652 | 664 | 1828 | 565 | 664 | 3655 | 1118 | 664 | 3655 | 1133 |
| 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 | 28.5 | 20.5 | 20.3 | 29.1 | 21.6 | 23.4 | 29.2 | 23.9 | 25.2 | 28.4 | 22.2 | 23.1 |
| Incr Delay (d2), s/veh | 5.8 | 0.2 | 0.4 | 6.3 | 0.2 | 2.5 | 6.4 | 0.2 | 2.3 | 5.8 | 0.1 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.7 | 1.7 | 1.4 | 2.5 | 2.0 | 3.7 | 2.4 | 1.5 | 2.6 | 2.8 | 1.0 | 1.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.3 | 20.7 | 20.8 | 35.4 | 21.8 | 25.9 | 35.6 | 24.1 | 27.5 | 34.2 | 22.3 | 23.9 |
| LnGrp LOS | C | C | C | D | C | C | D | C | C | C | C | C |
| Approach Vol, veh/h | | 722 | | | 908 | | | 679 | | | 565 | |
| Approach Delay, s/veh | | 23.9 | | | 25.2 | | | 27.4 | | | 26.4 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.4 | 18.5 | 12.3 | 22.9 | 12.1 | 19.8 | 13.2 | 21.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 8.4 | 9.3 | 7.4 | 6.6 | 7.3 | 7.0 | 8.2 | 12.4 |
| Green Ext Time (p_c), s | 0.4 | 2.9 | 0.3 | 3.0 | 0.3 | 2.1 | 0.4 | 3.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 25.6 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 71 | 656 | 34 | 101 | 821 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| Future Volume (veh/h) | 71 | 656 | 34 | 101 | 821 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| 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 | | 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 | 76 | 705 | 37 | 109 | 883 | 68 | 29 | 16 | 98 | 54 | 16 | 38 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 106 | 1326 | 578 | 144 | 1907 | 146 | 357 | 227 | 192 | 349 | 227 | 192 |
| Arrive On Green | 0.06 | 0.37 | 0.37 | 0.08 | 0.39 | 0.39 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 3554 | 1550 | 1781 | 4835 | 371 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Grp Volume(v), veh/h | 76 | 705 | 37 | 109 | 621 | 330 | 29 | 16 | 98 | 54 | 16 | 38 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1550 | 1781 | 1702 | 1802 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Q Serve(g_s), s | 1.5 | 5.5 | 0.5 | 2.1 | 4.8 | 4.8 | 0.7 | 0.3 | 2.1 | 1.4 | 0.3 | 0.8 |
| Cycle Q Clear(g_c), s | 1.5 | 5.5 | 0.5 | 2.1 | 4.8 | 4.8 | 1.0 | 0.3 | 2.1 | 1.7 | 0.3 | 0.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.21 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 106 | 1326 | 578 | 144 | 1343 | 711 | 357 | 227 | 192 | 349 | 227 | 192 |
| V/C Ratio(X) | 0.72 | 0.53 | 0.06 | 0.76 | 0.46 | 0.46 | 0.08 | 0.07 | 0.51 | 0.15 | 0.07 | 0.20 |
| Avail Cap(c_a), veh/h | 1261 | 4828 | 2106 | 1210 | 4625 | 2449 | 1109 | 1271 | 1074 | 1061 | 1271 | 1074 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.3 | 8.7 | 7.1 | 15.9 | 7.9 | 7.9 | 14.2 | 13.8 | 14.5 | 14.5 | 13.8 | 14.0 |
| Incr Delay (d2), s/veh | 8.7 | 0.3 | 0.0 | 7.8 | 0.2 | 0.5 | 0.1 | 0.1 | 2.1 | 0.2 | 0.1 | 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 | 0.7 | 1.3 | 0.1 | 1.0 | 1.0 | 1.1 | 0.2 | 0.1 | 0.7 | 0.4 | 0.1 | 0.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 25.0 | 9.0 | 7.2 | 23.7 | 8.2 | 8.4 | 14.3 | 13.9 | 16.6 | 14.7 | 13.9 | 14.5 |
| LnGrp LOS | C | A | A | C | A | A | B | B | B | B | B | B |
| Approach Vol, veh/h | | 818 | | | 1060 | | | 143 | | | 108 | |
| Approach Delay, s/veh | | 10.4 | | | 9.8 | | | 15.8 | | | 14.5 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.9 | 18.2 | | 9.3 | 7.1 | 18.9 | | 9.3 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.1 | 7.5 | | 3.7 | 3.5 | 6.8 | | 4.1 | | | | |
| Green Ext Time (p_c), s | 0.2 | 5.3 | | 0.3 | 0.2 | 7.0 | | 0.4 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 10.7 |
| HCM 6th LOS | | B |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/23/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 213 | 541 | 43 | 49 | 709 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Future Volume (veh/h) | 213 | 541 | 43 | 49 | 709 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 227 | 576 | 46 | 52 | 754 | 182 | 27 | 16 | 30 | 141 | 17 | 267 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 251 | 2066 | 921 | 67 | 1699 | 755 | 42 | 258 | 215 | 158 | 19 | 305 |
| Arrive On Green | 0.14 | 0.58 | 0.58 | 0.04 | 0.48 | 0.48 | 0.02 | 0.14 | 0.14 | 0.09 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1781 | 3554 | 1584 | 1781 | 3554 | 1578 | 1781 | 1870 | 1557 | 1781 | 96 | 1502 |
| Grp Volume(v), veh/h | 227 | 576 | 46 | 52 | 754 | 182 | 27 | 16 | 30 | 141 | 0 | 284 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1584 | 1781 | 1777 | 1578 | 1781 | 1870 | 1557 | 1781 | 0 | 1597 |
| Q Serve(g_s), s | 16.9 | 10.9 | 1.7 | 3.9 | 19.0 | 9.2 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Cycle Q Clear(g_c), s | 16.9 | 10.9 | 1.7 | 3.9 | 19.0 | 9.2 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 251 | 2066 | 921 | 67 | 1699 | 755 | 42 | 258 | 215 | 158 | 0 | 325 |
| V/C Ratio(X) | 0.90 | 0.28 | 0.05 | 0.77 | 0.44 | 0.24 | 0.64 | 0.06 | 0.14 | 0.89 | 0.00 | 0.87 |
| Avail Cap(c_a), veh/h | 269 | 2066 | 921 | 158 | 1699 | 755 | 158 | 544 | 453 | 158 | 0 | 461 |
| 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) | 0.93 | 0.93 | 0.93 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 57.1 | 14.1 | 12.2 | 64.4 | 23.3 | 20.8 | 65.3 | 50.6 | 51.1 | 60.8 | 0.0 | 52.1 |
| Incr Delay (d2), s/veh | 28.5 | 0.3 | 0.1 | 16.9 | 0.8 | 0.8 | 15.2 | 0.1 | 0.3 | 41.5 | 0.0 | 12.6 |
| 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 | 9.5 | 4.3 | 0.6 | 2.1 | 8.0 | 3.6 | 1.1 | 0.5 | 0.9 | 6.6 | 0.0 | 10.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 85.6 | 14.4 | 12.3 | 81.3 | 24.2 | 21.5 | 80.6 | 50.7 | 51.4 | 102.4 | 0.0 | 64.7 |
| LnGrp LOS | F | B | B | F | C | C | F | D | D | F | A | E |
| Approach Vol, veh/h | | 849 | | | 988 | | | 73 | | | 425 | |
| Approach Delay, s/veh | | 33.4 | | | 26.7 | | | 62.1 | | | 77.2 | |
| Approach LOS | | C | | | C | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.7 | 84.7 | 16.6 | 24.0 | 23.6 | 70.8 | 7.8 | 32.8 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 51.2 | 12.0 | * 39 | 20.4 | * 43 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 5.9 | 12.9 | 12.6 | 4.3 | 18.9 | 21.0 | 4.0 | 25.3 |
| Green Ext Time (p_c), s | 0.0 | 4.2 | 0.0 | 0.1 | 0.1 | 5.7 | 0.0 | 1.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 39.4 |
| HCM 6th LOS | D |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/23/2024

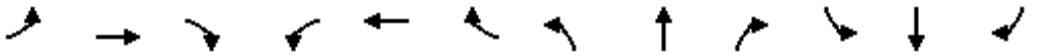
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 180 | 6 | 1036 | 135 | 55 | 868 |
| Future Volume (veh/h) | 180 | 6 | 1036 | 135 | 55 | 868 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | No | | | No |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 196 | 7 | 1126 | 147 | 60 | 943 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 264 | 235 | 1660 | 740 | 104 | 2253 |
| Arrive On Green | 0.15 | 0.15 | 0.47 | 0.47 | 0.06 | 0.63 |
| Sat Flow, veh/h | 1781 | 1585 | 3647 | 1585 | 1781 | 3647 |
| Grp Volume(v), veh/h | 196 | 7 | 1126 | 147 | 60 | 943 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1585 | 1777 | 1585 | 1781 | 1777 |
| Q Serve(g_s), s | 4.8 | 0.2 | 11.4 | 2.5 | 1.5 | 6.1 |
| Cycle Q Clear(g_c), s | 4.8 | 0.2 | 11.4 | 2.5 | 1.5 | 6.1 |
| Prop In Lane | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 264 | 235 | 1660 | 740 | 104 | 2253 |
| V/C Ratio(X) | 0.74 | 0.03 | 0.68 | 0.20 | 0.58 | 0.42 |
| Avail Cap(c_a), veh/h | 970 | 863 | 2709 | 1208 | 970 | 5031 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.7 | 16.7 | 9.5 | 7.2 | 21.1 | 4.2 |
| Incr Delay (d2), s/veh | 4.1 | 0.1 | 0.5 | 0.1 | 5.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.1 | 0.1 | 2.6 | 0.5 | 0.7 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 22.8 | 16.8 | 10.0 | 7.3 | 26.1 | 4.3 |
| LnGrp LOS | C | B | B | A | C | A |
| Approach Vol, veh/h | 203 | | 1273 | | | 1003 |
| Approach Delay, s/veh | 22.6 | | 9.7 | | | 5.6 |
| Approach LOS | C | | A | | | A |

| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.7 | 26.4 | | | 34.1 | 11.8 |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 35.0 | | | 65.0 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 3.5 | 13.4 | | | 8.1 | 6.8 |
| Green Ext Time (p_c), s | 0.1 | 8.1 | | | 7.1 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 9.1 |
| HCM 6th LOS | A |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 203 | 684 | 447 | 227 | 607 | 25 | 358 | 480 | 120 | 53 | 513 | 151 |
| Future Volume (veh/h) | 203 | 684 | 447 | 227 | 607 | 25 | 358 | 480 | 120 | 53 | 513 | 151 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 216 | 728 | 333 | 241 | 646 | 27 | 381 | 511 | 128 | 56 | 546 | 161 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 249 | 833 | 372 | 270 | 875 | 390 | 410 | 1248 | 549 | 72 | 574 | 256 |
| Arrive On Green | 0.14 | 0.23 | 0.23 | 0.15 | 0.25 | 0.25 | 0.23 | 0.35 | 0.35 | 0.04 | 0.16 | 0.16 |
| Sat Flow, veh/h | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 | 1781 | 3554 | 1564 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 216 | 728 | 333 | 241 | 646 | 27 | 381 | 511 | 128 | 56 | 546 | 161 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 | 1781 | 1777 | 1564 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 11.7 | 19.5 | 20.2 | 13.1 | 16.6 | 1.3 | 20.7 | 10.8 | 5.7 | 3.1 | 15.1 | 9.4 |
| Cycle Q Clear(g_c), s | 11.7 | 19.5 | 20.2 | 13.1 | 16.6 | 1.3 | 20.7 | 10.8 | 5.7 | 3.1 | 15.1 | 9.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 249 | 833 | 372 | 270 | 875 | 390 | 410 | 1248 | 549 | 72 | 574 | 256 |
| V/C Ratio(X) | 0.87 | 0.87 | 0.90 | 0.89 | 0.74 | 0.07 | 0.93 | 0.41 | 0.23 | 0.78 | 0.95 | 0.63 |
| Avail Cap(c_a), veh/h | 288 | 862 | 384 | 270 | 875 | 390 | 414 | 1248 | 549 | 144 | 574 | 256 |
| 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 | 41.7 | 36.5 | 36.7 | 41.2 | 34.4 | 28.6 | 37.3 | 24.3 | 22.7 | 47.0 | 41.1 | 38.7 |
| Incr Delay (d2), s/veh | 21.2 | 9.7 | 22.3 | 28.9 | 3.3 | 0.1 | 27.3 | 0.2 | 0.2 | 16.1 | 25.8 | 4.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.4 | 9.1 | 9.6 | 7.7 | 7.2 | 0.5 | 11.5 | 4.2 | 2.0 | 1.7 | 8.6 | 3.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 62.9 | 46.1 | 59.0 | 70.1 | 37.7 | 28.7 | 64.6 | 24.5 | 22.9 | 63.2 | 66.9 | 43.5 |
| LnGrp LOS | E | D | E | E | D | C | E | C | C | E | E | D |
| Approach Vol, veh/h | | 1277 | | | 914 | | | 1020 | | | 763 | |
| Approach Delay, s/veh | | 52.3 | | | 46.0 | | | 39.3 | | | 61.7 | |
| Approach LOS | | D | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 29.2 | 27.8 | 22.0 | 18.8 | 30.4 | 9.0 | 40.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 15.0 | 24.0 | 23.0 | 16.0 | 16.0 | 23.0 | 8.0 | 31.0 |
| Max Q Clear Time (g_c+I1), s | 15.1 | 22.2 | 22.7 | 17.1 | 13.7 | 18.6 | 5.1 | 12.8 |
| Green Ext Time (p_c), s | 0.0 | 1.1 | 0.0 | 0.0 | 0.1 | 1.6 | 0.0 | 3.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 49.3 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/24/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 100 | 146 | 907 | 35 | 61 | 1385 |
| Future Volume (vph) | 100 | 146 | 907 | 35 | 61 | 1385 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 109 | 159 | 986 | 38 | 66 | 1505 |
| RTOR Reduction (vph) | 0 | 133 | 0 | 20 | 0 | 0 |
| Lane Group Flow (vph) | 109 | 26 | 986 | 18 | 66 | 1505 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 9.1 | 9.1 | 26.6 | 26.6 | 4.9 | 36.5 |
| Effective Green, g (s) | 9.1 | 9.1 | 26.6 | 26.6 | 4.9 | 36.5 |
| Actuated g/C Ratio | 0.16 | 0.16 | 0.47 | 0.47 | 0.09 | 0.64 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 284 | 254 | 2389 | 743 | 153 | 2282 |
| v/s Ratio Prot | | | 0.19 | | 0.04 | c0.43 |
| v/s Ratio Perm | c0.06 | 0.02 | | 0.01 | | |
| v/c Ratio | 0.38 | 0.10 | 0.41 | 0.02 | 0.43 | 0.66 |
| Uniform Delay, d1 | 21.2 | 20.3 | 9.9 | 8.0 | 24.5 | 6.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.9 | 0.2 | 0.1 | 0.0 | 1.9 | 0.7 |
| Delay (s) | 22.1 | 20.4 | 10.0 | 8.1 | 26.5 | 6.9 |
| Level of Service | C | C | A | A | C | A |
| Approach Delay (s) | 21.1 | | 9.9 | | | 7.7 |
| Approach LOS | C | | A | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 9.8 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 56.6 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 53.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 36 | 906 | 15 | 0 | 1485 |
| Future Vol, veh/h | 0 | 36 | 906 | 15 | 0 | 1485 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 39 | 985 | 16 | 0 | 1614 |

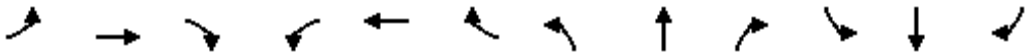
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 493 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 446 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 446 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 13.8 | 0 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 446 | - |
| HCM Lane V/C Ratio | - | - | 0.088 | - |
| HCM Control Delay (s) | - | - | 13.8 | - |
| HCM Lane LOS | - | - | B | - |
| HCM 95th %tile Q(veh) | - | - | 0.3 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 85 | 258 | 241 | 480 | 269 | 154 | 434 | 682 | 380 | 336 | 938 | 211 |
| Future Volume (veh/h) | 85 | 258 | 241 | 480 | 269 | 154 | 434 | 682 | 380 | 336 | 938 | 211 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.75 | 1.00 | | 0.98 | 1.00 | | 0.99 | 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 | 93 | 284 | 186 | 527 | 296 | 169 | 477 | 749 | 418 | 369 | 1031 | 232 |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 126 | 328 | 208 | 587 | 974 | 424 | 571 | 1543 | 472 | 453 | 953 | 416 |
| Arrive On Green | 0.07 | 0.18 | 0.18 | 0.17 | 0.27 | 0.27 | 0.17 | 0.30 | 0.30 | 0.13 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1781 | 1870 | 1187 | 3456 | 3554 | 1547 | 3456 | 5106 | 1564 | 3456 | 3554 | 1553 |
| Grp Volume(v), veh/h | 93 | 284 | 186 | 527 | 296 | 169 | 477 | 749 | 418 | 369 | 1031 | 232 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1187 | 1728 | 1777 | 1547 | 1728 | 1702 | 1564 | 1728 | 1777 | 1553 |
| Q Serve(g_s), s | 5.5 | 16.0 | 16.6 | 16.2 | 7.1 | 9.6 | 14.5 | 13.0 | 27.5 | 11.2 | 29.0 | 13.9 |
| Cycle Q Clear(g_c), s | 5.5 | 16.0 | 16.6 | 16.2 | 7.1 | 9.6 | 14.5 | 13.0 | 27.5 | 11.2 | 29.0 | 13.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 126 | 328 | 208 | 587 | 974 | 424 | 571 | 1543 | 472 | 453 | 953 | 416 |
| V/C Ratio(X) | 0.74 | 0.87 | 0.89 | 0.90 | 0.30 | 0.40 | 0.84 | 0.49 | 0.88 | 0.82 | 1.08 | 0.56 |
| Avail Cap(c_a), veh/h | 313 | 328 | 209 | 607 | 974 | 424 | 926 | 1605 | 491 | 767 | 953 | 416 |
| 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 | 49.3 | 43.4 | 43.6 | 44.0 | 31.1 | 32.0 | 43.7 | 30.9 | 36.0 | 45.7 | 39.6 | 34.1 |
| Incr Delay (d2), s/veh | 8.0 | 20.8 | 34.9 | 16.0 | 0.1 | 0.2 | 3.7 | 0.2 | 16.9 | 3.6 | 54.1 | 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 | 2.8 | 9.3 | 6.9 | 8.0 | 3.0 | 3.7 | 6.3 | 5.2 | 12.7 | 4.8 | 19.0 | 5.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 57.3 | 64.2 | 78.5 | 60.0 | 31.2 | 32.2 | 47.4 | 31.1 | 52.8 | 49.4 | 93.7 | 35.7 |
| LnGrp LOS | E | E | E | E | C | C | D | C | D | D | F | D |
| Approach Vol, veh/h | | 563 | | | 992 | | | 1644 | | | 1632 | |
| Approach Delay, s/veh | | 67.8 | | | 46.7 | | | 41.4 | | | 75.4 | |
| Approach LOS | | E | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.2 | 38.7 | 13.7 | 35.6 | 23.9 | 35.0 | 24.4 | 25.0 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Max Green Setting (Gmax), s | 24.0 | 34.0 | 19.0 | 19.0 | 29.0 | 29.0 | 19.0 | 19.0 |
| Max Q Clear Time (g_c+I1), s | 13.2 | 29.5 | 7.5 | 11.6 | 16.5 | 31.0 | 18.2 | 18.6 |
| Green Ext Time (p_c), s | 0.9 | 2.5 | 0.1 | 0.2 | 1.4 | 0.0 | 0.2 | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 57.0 |
| HCM 6th LOS | E |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/24/2024

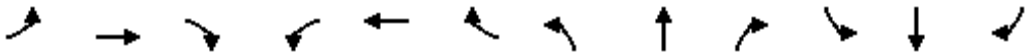
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 1145 | 62 | 64 | 1554 | 123 |
| Future Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 1145 | 62 | 64 | 1554 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 3505 | | 1770 | 3493 | |
| Flt Permitted | | 0.37 | 1.00 | | 0.51 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 686 | 1583 | | 959 | 1563 | 1770 | 3505 | | 1770 | 3493 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 183 | 5 | 158 | 256 | 18 | 16 | 217 | 1301 | 70 | 73 | 1766 | 140 |
| RTOR Reduction (vph) | 0 | 0 | 74 | 0 | 0 | 12 | 0 | 2 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 188 | 84 | 0 | 274 | 4 | 217 | 1369 | 0 | 73 | 1901 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 30.8 | 30.8 | | 30.8 | 30.8 | 18.7 | 60.2 | | 8.8 | 50.3 | |
| Effective Green, g (s) | | 30.8 | 30.8 | | 30.8 | 30.8 | 18.7 | 60.2 | | 8.8 | 50.3 | |
| Actuated g/C Ratio | | 0.27 | 0.27 | | 0.27 | 0.27 | 0.16 | 0.52 | | 0.08 | 0.43 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 182 | 421 | | 255 | 415 | 285 | 1822 | | 134 | 1517 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.39 | | 0.04 | c0.54 | |
| v/s Ratio Perm | | 0.27 | 0.05 | | c0.29 | 0.00 | | | | | | |
| v/c Ratio | | 1.03 | 0.20 | | 1.07 | 0.01 | 0.76 | 0.75 | | 0.54 | 1.25 | |
| Uniform Delay, d1 | | 42.5 | 32.9 | | 42.5 | 31.3 | 46.4 | 21.9 | | 51.6 | 32.8 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 75.6 | 0.2 | | 77.5 | 0.0 | 11.4 | 1.8 | | 4.5 | 119.6 | |
| Delay (s) | | 118.1 | 33.2 | | 120.0 | 31.3 | 57.8 | 23.7 | | 56.0 | 152.4 | |
| Level of Service | | F | C | | F | C | E | C | | E | F | |
| Approach Delay (s) | | 79.3 | | | 115.1 | | | 28.3 | | | 148.8 | |
| Approach LOS | | E | | | F | | | C | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 95.3 | HCM 2000 Level of Service | F |
| HCM 2000 Volume to Capacity ratio | 1.11 | | |
| Actuated Cycle Length (s) | 115.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 91.0% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 78 | 43 | 31 | 140 | 70 | 76 | 21 | 1205 | 62 | 175 | 1675 | 68 |
| Future Volume (veh/h) | 78 | 43 | 31 | 140 | 70 | 76 | 21 | 1205 | 62 | 175 | 1675 | 68 |
| 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 | | 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 | 88 | 48 | 35 | 157 | 79 | 85 | 24 | 1354 | 70 | 197 | 1882 | 76 |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 113 | 90 | 65 | 200 | 113 | 121 | 37 | 2004 | 621 | 243 | 2557 | 103 |
| Arrive On Green | 0.06 | 0.09 | 0.09 | 0.11 | 0.14 | 0.14 | 0.02 | 0.39 | 0.39 | 0.14 | 0.51 | 0.51 |
| Sat Flow, veh/h | 1781 | 1002 | 731 | 1781 | 817 | 879 | 1781 | 5106 | 1581 | 1781 | 5030 | 203 |
| Grp Volume(v), veh/h | 88 | 0 | 83 | 157 | 0 | 164 | 24 | 1354 | 70 | 197 | 1273 | 685 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1733 | 1781 | 0 | 1696 | 1781 | 1702 | 1581 | 1781 | 1702 | 1829 |
| Q Serve(g_s), s | 3.8 | 0.0 | 3.6 | 6.7 | 0.0 | 7.2 | 1.0 | 17.1 | 2.2 | 8.4 | 22.9 | 23.0 |
| Cycle Q Clear(g_c), s | 3.8 | 0.0 | 3.6 | 6.7 | 0.0 | 7.2 | 1.0 | 17.1 | 2.2 | 8.4 | 22.9 | 23.0 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.52 | 1.00 | | 1.00 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 113 | 0 | 155 | 200 | 0 | 234 | 37 | 2004 | 621 | 243 | 1731 | 930 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.54 | 0.79 | 0.00 | 0.70 | 0.65 | 0.68 | 0.11 | 0.81 | 0.74 | 0.74 |
| Avail Cap(c_a), veh/h | 183 | 0 | 178 | 571 | 0 | 652 | 571 | 3141 | 973 | 571 | 2094 | 1125 |
| 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 | 36.0 | 0.0 | 34.0 | 33.7 | 0.0 | 32.1 | 37.9 | 19.6 | 15.1 | 32.7 | 15.1 | 15.1 |
| Incr Delay (d2), s/veh | 10.8 | 0.0 | 2.9 | 6.6 | 0.0 | 3.8 | 17.4 | 0.4 | 0.1 | 6.3 | 1.1 | 2.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.0 | 0.0 | 1.6 | 3.2 | 0.0 | 3.2 | 0.6 | 6.1 | 0.8 | 3.8 | 7.7 | 8.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.7 | 0.0 | 36.8 | 40.4 | 0.0 | 35.9 | 55.3 | 20.0 | 15.1 | 39.0 | 16.2 | 17.2 |
| LnGrp LOS | D | A | D | D | A | D | E | B | B | D | B | B |
| Approach Vol, veh/h | | 171 | | | 321 | | | 1448 | | | 2155 | |
| Approach Delay, s/veh | | 41.9 | | | 38.1 | | | 20.3 | | | 18.6 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.7 | 36.6 | 13.8 | 12.0 | 6.6 | 45.7 | 10.0 | 15.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 10.4 | 19.1 | 8.7 | 5.6 | 3.0 | 25.0 | 5.8 | 9.2 |
| Green Ext Time (p_c), s | 0.4 | 11.4 | 0.4 | 0.1 | 0.0 | 14.7 | 0.0 | 0.9 |

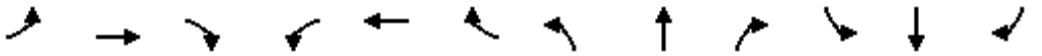
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 21.7 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 418 | 1094 | 209 | 547 | 943 | 198 | 266 | 739 | 192 | 265 | 1268 | 354 |
| Future Volume (veh/h) | 418 | 1094 | 209 | 547 | 943 | 198 | 266 | 739 | 192 | 265 | 1268 | 354 |
| 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 | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 778 | 202 | 279 | 1335 | 373 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 497 | 1682 | 405 | 597 | 1868 | 452 | 339 | 2085 | 506 | 334 | 2075 | 508 |
| Arrive On Green | 0.14 | 0.26 | 0.26 | 0.17 | 0.29 | 0.29 | 0.10 | 0.32 | 0.32 | 0.10 | 0.32 | 0.32 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1557 | 3456 | 6434 | 1562 | 3456 | 6434 | 1576 |
| Grp Volume(v), veh/h | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 778 | 202 | 279 | 1335 | 373 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1557 | 1728 | 1609 | 1562 | 1728 | 1609 | 1576 |
| Q Serve(g_s), s | 18.1 | 23.3 | 17.7 | 23.9 | 18.7 | 15.8 | 11.5 | 13.5 | 14.5 | 11.5 | 25.7 | 30.4 |
| Cycle Q Clear(g_c), s | 18.1 | 23.3 | 17.7 | 23.9 | 18.7 | 15.8 | 11.5 | 13.5 | 14.5 | 11.5 | 25.7 | 30.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 497 | 1682 | 405 | 597 | 1868 | 452 | 339 | 2085 | 506 | 334 | 2075 | 508 |
| V/C Ratio(X) | 0.89 | 0.68 | 0.54 | 0.96 | 0.53 | 0.46 | 0.82 | 0.37 | 0.40 | 0.84 | 0.64 | 0.73 |
| Avail Cap(c_a), veh/h | 597 | 3112 | 749 | 597 | 3112 | 753 | 597 | 3112 | 756 | 478 | 3112 | 762 |
| 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 | 60.8 | 48.1 | 46.0 | 59.4 | 43.1 | 42.1 | 64.0 | 37.6 | 38.0 | 64.2 | 41.9 | 43.5 |
| Incr Delay (d2), s/veh | 13.1 | 0.5 | 1.1 | 28.2 | 0.2 | 0.7 | 5.1 | 0.1 | 0.5 | 8.5 | 0.3 | 2.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 8.7 | 9.3 | 6.9 | 12.7 | 7.4 | 6.1 | 5.3 | 5.3 | 5.6 | 5.4 | 10.1 | 12.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 73.9 | 48.6 | 47.1 | 87.6 | 43.3 | 42.8 | 69.1 | 37.7 | 38.5 | 72.8 | 42.3 | 45.6 |
| LnGrp LOS | E | D | D | F | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 1812 | | | 1777 | | | 1260 | | | 1987 | |
| Approach Delay, s/veh | | 54.5 | | | 57.6 | | | 44.8 | | | 47.2 | |
| Approach LOS | | D | | | E | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 19.0 | 52.9 | 30.0 | 42.8 | 19.2 | 52.7 | 25.8 | 47.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 13.5 | 16.5 | 25.9 | 25.3 | 13.5 | 32.4 | 20.1 | 20.7 |
| Green Ext Time (p_c), s | 0.5 | 6.9 | 0.0 | 11.3 | 0.7 | 14.3 | 0.7 | 9.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 51.4 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 8: Caywood Dr & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 14 | 908 | 103 | 70 | 840 | 36 | 22 | 0 | 86 | 105 | 2 | 86 |
| Future Volume (vph) | 14 | 908 | 103 | 70 | 840 | 36 | 22 | 0 | 86 | 105 | 2 | 86 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | | 0.89 | | 1.00 | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.99 | |
| Satd. Flow (prot) | 1770 | 4971 | | 1770 | 5085 | 1583 | | 1645 | | 1681 | 1530 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.99 | |
| Satd. Flow (perm) | 1770 | 4971 | | 1770 | 5085 | 1583 | | 1645 | | 1681 | 1530 | |
| Peak-hour factor, PHF | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Adj. Flow (vph) | 15 | 998 | 113 | 77 | 923 | 40 | 24 | 0 | 95 | 115 | 2 | 95 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 20 | 0 | 111 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 15 | 1099 | 0 | 77 | 923 | 20 | 0 | 8 | 0 | 103 | 27 | 0 |
| Confl. Peds. (#/hr) | | | 26 | 26 | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 1.1 | 30.1 | | 7.0 | 36.0 | 36.0 | | 4.7 | | 10.1 | 10.1 | |
| Effective Green, g (s) | 1.1 | 30.1 | | 7.0 | 36.0 | 36.0 | | 4.7 | | 10.1 | 10.1 | |
| Actuated g/C Ratio | 0.02 | 0.41 | | 0.10 | 0.49 | 0.49 | | 0.06 | | 0.14 | 0.14 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 26 | 2052 | | 169 | 2511 | 781 | | 106 | | 232 | 211 | |
| v/s Ratio Prot | 0.01 | c0.22 | | c0.04 | 0.18 | | | c0.00 | | c0.06 | 0.02 | |
| v/s Ratio Perm | | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.58 | 0.54 | | 0.46 | 0.37 | 0.03 | | 0.07 | | 0.44 | 0.13 | |
| Uniform Delay, d1 | 35.7 | 16.1 | | 31.1 | 11.4 | 9.5 | | 32.1 | | 28.8 | 27.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 27.4 | 0.3 | | 1.9 | 0.1 | 0.0 | | 0.3 | | 1.4 | 0.3 | |
| Delay (s) | 63.1 | 16.4 | | 33.1 | 11.5 | 9.5 | | 32.3 | | 30.2 | 27.8 | |
| Level of Service | E | B | | C | B | A | | C | | C | C | |
| Approach Delay (s) | | 17.0 | | | 13.0 | | | 32.3 | | | 29.0 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 17.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 72.9 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 50.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

# HCM Signalized Intersection Capacity Analysis
## 9: Cherbourg Wy & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 28 | 1016 | 55 | 154 | 888 | 36 | 8 | 0 | 130 | 343 | 2 | 50 |
| Future Volume (vph) | 28 | 1016 | 55 | 154 | 888 | 36 | 8 | 0 | 130 | 343 | 2 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.87 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | 0.95 | 0.96 | |
| Satd. Flow (prot) | 1770 | 5031 | | 1770 | 5085 | 1583 | | 1621 | | 1681 | 1642 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | 0.95 | 0.96 | |
| Satd. Flow (perm) | 1770 | 5031 | | 1770 | 5085 | 1583 | | 1621 | | 1681 | 1642 | |
| Peak-hour factor, PHF | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| Adj. Flow (vph) | 31 | 1142 | 62 | 173 | 998 | 40 | 9 | 0 | 146 | 385 | 2 | 56 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 22 | 0 | 144 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 31 | 1199 | 0 | 173 | 998 | 18 | 0 | 11 | 0 | 223 | 208 | 0 |
| Confl. Peds. (#/hr) | | | 16 | 16 | | | | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 4.4 | 29.5 | | 13.8 | 38.9 | 38.9 | | 6.5 | | 17.5 | 17.5 | |
| Effective Green, g (s) | 4.4 | 29.5 | | 13.8 | 38.9 | 38.9 | | 6.5 | | 17.5 | 17.5 | |
| Actuated g/C Ratio | 0.05 | 0.33 | | 0.16 | 0.44 | 0.44 | | 0.07 | | 0.20 | 0.20 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 88 | 1680 | | 276 | 2240 | 697 | | 119 | | 333 | 325 | |
| v/s Ratio Prot | 0.02 | c0.24 | | c0.10 | 0.20 | | | c0.01 | | c0.13 | 0.13 | |
| v/s Ratio Perm | | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.35 | 0.71 | | 0.63 | 0.45 | 0.03 | | 0.10 | | 0.67 | 0.64 | |
| Uniform Delay, d1 | 40.6 | 25.7 | | 34.8 | 17.2 | 14.0 | | 38.2 | | 32.7 | 32.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.4 | 1.5 | | 4.4 | 0.1 | 0.0 | | 0.4 | | 5.0 | 4.1 | |
| Delay (s) | 43.0 | 27.2 | | 39.2 | 17.3 | 14.0 | | 38.5 | | 37.8 | 36.6 | |
| Level of Service | D | C | | D | B | B | | D | | D | D | |
| Approach Delay (s) | | 27.6 | | | 20.4 | | | 38.5 | | | 37.2 | |
| Approach LOS | | C | | | C | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 26.7 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 88.3 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 66.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 35.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 14 | 1439 | 36 | 74 | 972 | 80 | 24 | 0 | 119 | 0 | 0 | 82 |
| Future Vol, veh/h | 14 | 1439 | 36 | 74 | 972 | 80 | 24 | 0 | 119 | 0 | 0 | 82 |
| Conflicting Peds, #/hr | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 16 | 1673 | 42 | 86 | 1130 | 93 | 28 | 0 | 138 | 0 | 0 | 95 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1223 | 0 | 0 | 1724 | 0 | 0 | 2359 | 3130 | 867 | - | - | 565 |
| Stage 1 | - | - | - | - | - | - | 1735 | 1735 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 624 | 1395 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 305 | - | - | 172 | - | - | 38 | 11 | 254 | 0 | 0 | 401 |
| Stage 1 | - | - | - | - | - | - | 60 | 140 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 401 | 207 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 305 | - | - | 171 | - | - | ~ 17 | 5 | 252 | - | - | 401 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | ~ 17 | 5 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 56 | 131 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 152 | 103 | - | - | - | - |

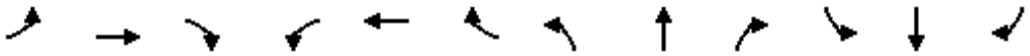
| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 3 | $ 663.3 | 16.8 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 76 | 305 | - | - | 171 | - | - | 401 |
| HCM Lane V/C Ratio | 2.188 | 0.053 | - | - | 0.503 | - | - | 0.238 |
| HCM Control Delay (s) | $ 663.3 | 17.5 | - | - | 45.7 | - | - | 16.8 |
| HCM Lane LOS | F | C | - | - | E | - | - | C |
| HCM 95th %tile Q(veh) | 15.3 | 0.2 | - | - | 2.5 | - | - | 0.9 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 162 | 1241 | 155 | 94 | 884 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Future Volume (veh/h) | 162 | 1241 | 155 | 94 | 884 | 303 | 140 | 53 | 101 | 207 | 68 | 102 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 0.95 | 1.00 | | 0.98 | 1.00 | | 0.90 |
| 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 | 184 | 1410 | 176 | 107 | 1005 | 344 | 159 | 60 | 115 | 235 | 77 | 116 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 219 | 1656 | 207 | 136 | 1119 | 476 | 194 | 124 | 237 | 270 | 164 | 248 |
| Arrive On Green | 0.12 | 0.36 | 0.36 | 0.08 | 0.31 | 0.31 | 0.11 | 0.22 | 0.22 | 0.15 | 0.26 | 0.26 |
| Sat Flow, veh/h | 1781 | 4580 | 571 | 1781 | 3554 | 1512 | 1781 | 567 | 1087 | 1781 | 631 | 951 |
| Grp Volume(v), veh/h | 184 | 1048 | 538 | 107 | 1005 | 344 | 159 | 0 | 175 | 235 | 0 | 193 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1747 | 1781 | 1777 | 1512 | 1781 | 0 | 1655 | 1781 | 0 | 1581 |
| Q Serve(g_s), s | 11.0 | 31.0 | 31.0 | 6.4 | 29.5 | 22.0 | 9.5 | 0.0 | 10.1 | 14.1 | 0.0 | 11.2 |
| Cycle Q Clear(g_c), s | 11.0 | 31.0 | 31.0 | 6.4 | 29.5 | 22.0 | 9.5 | 0.0 | 10.1 | 14.1 | 0.0 | 11.2 |
| Prop In Lane | 1.00 | | 0.33 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 219 | 1231 | 632 | 136 | 1119 | 476 | 194 | 0 | 361 | 270 | 0 | 412 |
| V/C Ratio(X) | 0.84 | 0.85 | 0.85 | 0.78 | 0.90 | 0.72 | 0.82 | 0.00 | 0.48 | 0.87 | 0.00 | 0.47 |
| Avail Cap(c_a), veh/h | 571 | 1231 | 632 | 571 | 1172 | 499 | 653 | 0 | 531 | 408 | 0 | 507 |
| 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 | 46.8 | 32.1 | 32.1 | 49.5 | 35.7 | 33.2 | 47.6 | 0.0 | 37.3 | 45.3 | 0.0 | 34.0 |
| Incr Delay (d2), s/veh | 8.3 | 5.9 | 10.8 | 9.5 | 9.2 | 4.9 | 8.3 | 0.0 | 1.0 | 12.5 | 0.0 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.2 | 13.0 | 14.2 | 3.1 | 13.5 | 8.7 | 4.7 | 0.0 | 4.2 | 7.2 | 0.0 | 4.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 55.1 | 38.1 | 43.0 | 59.0 | 44.9 | 38.0 | 55.9 | 0.0 | 38.3 | 57.8 | 0.0 | 34.8 |
| LnGrp LOS | E | D | D | E | D | D | E | A | D | E | A | C |
| Approach Vol, veh/h | | 1770 | | | 1456 | | | 334 | | | 428 | |
| Approach Delay, s/veh | | 41.3 | | | 44.3 | | | 46.7 | | | 47.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.4 | 45.5 | 16.9 | 33.4 | 18.4 | 40.4 | 21.5 | 28.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 8.4 | 33.0 | 11.5 | 13.2 | 13.0 | 31.5 | 16.1 | 12.1 |
| Green Ext Time (p_c), s | 0.3 | 2.3 | 0.4 | 1.2 | 0.5 | 2.9 | 0.5 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 43.5 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 245 | 1049 | 255 | 160 | 767 | 223 | 226 | 199 | 91 | 304 | 429 | 288 |
| Future Volume (veh/h) | 245 | 1049 | 255 | 160 | 767 | 223 | 226 | 199 | 91 | 304 | 429 | 288 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 263 | 1128 | 274 | 172 | 825 | 240 | 243 | 214 | 98 | 327 | 461 | 310 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 301 | 1334 | 404 | 207 | 1066 | 322 | 279 | 1065 | 325 | 361 | 1299 | 396 |
| Arrive On Green | 0.17 | 0.26 | 0.26 | 0.12 | 0.21 | 0.21 | 0.16 | 0.21 | 0.21 | 0.20 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1781 | 5106 | 1547 | 1781 | 5106 | 1540 | 1781 | 5106 | 1560 | 1781 | 5106 | 1557 |
| Grp Volume(v), veh/h | 263 | 1128 | 274 | 172 | 825 | 240 | 243 | 214 | 98 | 327 | 461 | 310 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1547 | 1781 | 1702 | 1540 | 1781 | 1702 | 1560 | 1781 | 1702 | 1557 |
| Q Serve(g_s), s | 15.0 | 21.8 | 16.5 | 9.8 | 15.9 | 15.2 | 13.9 | 3.6 | 5.5 | 18.7 | 7.7 | 19.3 |
| Cycle Q Clear(g_c), s | 15.0 | 21.8 | 16.5 | 9.8 | 15.9 | 15.2 | 13.9 | 3.6 | 5.5 | 18.7 | 7.7 | 19.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 301 | 1334 | 404 | 207 | 1066 | 322 | 279 | 1065 | 325 | 361 | 1299 | 396 |
| V/C Ratio(X) | 0.87 | 0.85 | 0.68 | 0.83 | 0.77 | 0.75 | 0.87 | 0.20 | 0.30 | 0.91 | 0.35 | 0.78 |
| Avail Cap(c_a), veh/h | 514 | 1374 | 417 | 428 | 1178 | 355 | 428 | 2356 | 720 | 428 | 2356 | 719 |
| 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 | 42.2 | 36.4 | 34.5 | 45.0 | 38.8 | 38.6 | 42.8 | 34.0 | 34.8 | 40.5 | 31.8 | 36.1 |
| Incr Delay (d2), s/veh | 8.5 | 5.0 | 4.2 | 8.3 | 3.0 | 7.6 | 11.7 | 0.1 | 0.5 | 20.5 | 0.2 | 3.4 |
| 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 | 7.0 | 9.2 | 6.5 | 4.7 | 6.7 | 6.2 | 6.8 | 1.4 | 2.1 | 9.9 | 3.1 | 7.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 50.7 | 41.4 | 38.7 | 53.3 | 41.8 | 46.2 | 54.5 | 34.1 | 35.3 | 61.1 | 31.9 | 39.5 |
| LnGrp LOS | D | D | D | D | D | D | D | C | D | E | C | D |
| Approach Vol, veh/h | | 1665 | | | 1237 | | | 555 | | | 1098 | |
| Approach Delay, s/veh | | 42.4 | | | 44.3 | | | 43.3 | | | 42.8 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 26.1 | 27.7 | 17.1 | 33.2 | 21.3 | 32.5 | 22.6 | 27.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 20.7 | 7.5 | 11.8 | 23.8 | 15.9 | 21.3 | 17.0 | 17.9 |
| Green Ext Time (p_c), s | 0.4 | 1.7 | 0.3 | 2.8 | 0.4 | 4.1 | 0.6 | 3.1 |

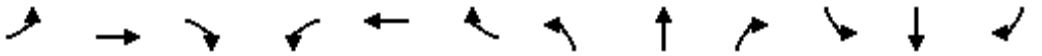
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 43.1 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 61 | 1318 | 65 | 58 | 901 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Future Volume (veh/h) | 61 | 1318 | 65 | 58 | 901 | 31 | 87 | 7 | 83 | 64 | 22 | 90 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 66 | 1417 | 70 | 62 | 969 | 33 | 94 | 8 | 89 | 69 | 24 | 97 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 85 | 1976 | 858 | 80 | 2803 | 95 | 282 | 250 | 211 | 296 | 250 | 208 |
| Arrive On Green | 0.05 | 0.56 | 0.56 | 0.04 | 0.55 | 0.55 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Sat Flow, veh/h | 1781 | 3554 | 1543 | 1781 | 5070 | 172 | 1266 | 1870 | 1581 | 1296 | 1870 | 1556 |
| Grp Volume(v), veh/h | 66 | 1417 | 70 | 62 | 650 | 352 | 94 | 8 | 89 | 69 | 24 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1543 | 1781 | 1702 | 1838 | 1266 | 1870 | 1581 | 1296 | 1870 | 1556 |
| Q Serve(g_s), s | 2.1 | 16.6 | 1.2 | 1.9 | 6.0 | 6.0 | 4.0 | 0.2 | 2.9 | 2.8 | 0.6 | 3.3 |
| Cycle Q Clear(g_c), s | 2.1 | 16.6 | 1.2 | 1.9 | 6.0 | 6.0 | 4.6 | 0.2 | 2.9 | 3.0 | 0.6 | 3.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.09 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 85 | 1976 | 858 | 80 | 1882 | 1016 | 282 | 250 | 211 | 296 | 250 | 208 |
| V/C Ratio(X) | 0.77 | 0.72 | 0.08 | 0.78 | 0.35 | 0.35 | 0.33 | 0.03 | 0.42 | 0.23 | 0.10 | 0.47 |
| Avail Cap(c_a), veh/h | 789 | 3021 | 1312 | 757 | 2894 | 1563 | 651 | 795 | 672 | 674 | 795 | 662 |
| 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 | 26.6 | 9.3 | 5.8 | 26.7 | 7.0 | 7.0 | 23.5 | 21.3 | 22.5 | 22.6 | 21.5 | 22.6 |
| Incr Delay (d2), s/veh | 13.8 | 0.5 | 0.0 | 15.0 | 0.1 | 0.2 | 0.7 | 0.1 | 1.3 | 0.4 | 0.2 | 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 | 1.1 | 4.4 | 0.3 | 1.1 | 1.5 | 1.7 | 1.2 | 0.1 | 1.1 | 0.8 | 0.3 | 1.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 40.3 | 9.8 | 5.9 | 41.7 | 7.1 | 7.2 | 24.2 | 21.3 | 23.8 | 23.0 | 21.6 | 24.2 |
| LnGrp LOS | D | A | A | D | A | A | C | C | C | C | C | C |
| Approach Vol, veh/h | | 1553 | | | 1064 | | | 191 | | | 190 | |
| Approach Delay, s/veh | | 10.9 | | | 9.1 | | | 23.9 | | | 23.4 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.5 | 36.4 | | 12.5 | 7.7 | 36.2 | | 12.5 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 3.9 | 18.6 | | 5.3 | 4.1 | 8.0 | | 6.6 | | | | |
| Green Ext Time (p_c), s | 0.1 | 12.8 | | 0.6 | 0.1 | 7.4 | | 0.6 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.9 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 178 | 1254 | 33 | 17 | 825 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| Future Volume (veh/h) | 178 | 1254 | 33 | 17 | 825 | 83 | 57 | 20 | 62 | 54 | 5 | 108 |
| 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 | | 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 | 189 | 1334 | 35 | 18 | 878 | 88 | 61 | 21 | 66 | 57 | 5 | 115 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 7 | 156 |
| Arrive On Green | 0.10 | 0.67 | 0.67 | 0.02 | 0.59 | 0.59 | 0.04 | 0.11 | 0.11 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 3554 | 1548 | 1781 | 3554 | 1580 | 1781 | 1870 | 1576 | 1781 | 66 | 1529 |
| Grp Volume(v), veh/h | 189 | 1334 | 35 | 18 | 878 | 88 | 61 | 21 | 66 | 57 | 0 | 120 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1548 | 1781 | 1777 | 1580 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 12.0 | 24.9 | 1.0 | 1.3 | 16.8 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Cycle Q Clear(g_c), s | 12.0 | 24.9 | 1.0 | 1.3 | 16.8 | 3.0 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 171 | 2376 | 1035 | 33 | 2101 | 934 | 79 | 196 | 166 | 74 | 0 | 163 |
| V/C Ratio(X) | 1.11 | 0.56 | 0.03 | 0.54 | 0.42 | 0.09 | 0.77 | 0.11 | 0.40 | 0.77 | 0.00 | 0.74 |
| Avail Cap(c_a), veh/h | 171 | 2376 | 1035 | 171 | 2101 | 934 | 171 | 588 | 495 | 171 | 0 | 498 |
| 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) | 0.68 | 0.68 | 0.68 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 56.5 | 11.0 | 7.0 | 60.8 | 13.9 | 11.1 | 59.1 | 50.6 | 52.2 | 59.3 | 0.0 | 54.5 |
| Incr Delay (d2), s/veh | 87.9 | 0.7 | 0.0 | 13.1 | 0.6 | 0.2 | 14.8 | 0.2 | 1.5 | 15.6 | 0.0 | 6.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.5 | 9.0 | 0.3 | 0.7 | 6.5 | 1.1 | 2.3 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 144.4 | 11.6 | 7.1 | 74.0 | 14.5 | 11.3 | 73.9 | 50.9 | 53.8 | 74.9 | 0.0 | 60.8 |
| LnGrp LOS | F | B | A | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1558 | | | 984 | | | 148 | | | 177 | |
| Approach Delay, s/veh | | 27.6 | | | 15.3 | | | 61.7 | | | 65.3 | |
| Approach LOS | | C | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 89.8 | 9.8 | 18.5 | 16.6 | 80.1 | 10.1 | 18.2 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 41.2 | 12.0 | * 39 | 12.0 | * 42 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 26.9 | 6.0 | 6.9 | 14.0 | 18.8 | 6.2 | 11.1 |
| Green Ext Time (p_c), s | 0.0 | 7.9 | 0.0 | 0.3 | 0.0 | 6.4 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 27.5 |
| HCM 6th LOS | C |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM Signalized Intersection Capacity Analysis
## 15: West Ln & Marlette Rd

05/24/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 304 | 14 | 973 | 80 | 45 | 1142 |
| Future Volume (vph) | 304 | 14 | 973 | 80 | 45 | 1142 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3539 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 330 | 15 | 1058 | 87 | 49 | 1241 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 49 | 0 | 0 |
| Lane Group Flow (vph) | 330 | 4 | 1058 | 38 | 49 | 1241 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 18.1 | 18.1 | 29.5 | 29.5 | 4.5 | 39.0 |
| Effective Green, g (s) | 18.1 | 18.1 | 29.5 | 29.5 | 4.5 | 39.0 |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.43 | 0.43 | 0.07 | 0.57 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 470 | 420 | 1533 | 685 | 116 | 2026 |
| v/s Ratio Prot | | | c0.30 | | 0.03 | c0.35 |
| v/s Ratio Perm | c0.19 | 0.00 | | 0.02 | | |
| v/c Ratio | 0.70 | 0.01 | 0.69 | 0.06 | 0.42 | 0.61 |
| Uniform Delay, d1 | 22.6 | 18.4 | 15.6 | 11.2 | 30.6 | 9.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 4.7 | 0.0 | 1.4 | 0.0 | 2.5 | 0.6 |
| Delay (s) | 27.3 | 18.4 | 17.0 | 11.2 | 33.0 | 10.1 |
| Level of Service | C | B | B | B | C | B |
| Approach Delay (s) | 26.9 | | 16.5 | | | 11.0 |
| Approach LOS | C | | B | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 15.2 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 68.1 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 61.2% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 7.9 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1126 | 1040 | 119 | 212 |
| Demand Flow Rate, veh/h | 1148 | 1061 | 121 | 216 |
| Vehicles Circulating, veh/h | 198 | 39 | 1150 | 1044 |
| Vehicles Exiting, veh/h | 1062 | 1232 | 196 | 56 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 26 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 8.7 | 6.5 | 10.0 | 9.4 |
| Approach LOS | A | A | A | A |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.528 | 0.472 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 540 | 608 | 499 | 562 | 121 | 114 | 102 |
| Cap Entry Lane, veh/h | 1125 | 1200 | 1302 | 1374 | 534 | 517 | 585 |
| Entry HV Adj Factor | 0.980 | 0.982 | 0.979 | 0.980 | 0.983 | 0.985 | 0.977 |
| Flow Entry, veh/h | 529 | 597 | 489 | 551 | 119 | 112 | 100 |
| Cap Entry, veh/h | 1103 | 1178 | 1275 | 1347 | 525 | 509 | 571 |
| V/C Ratio | 0.480 | 0.507 | 0.383 | 0.409 | 0.226 | 0.221 | 0.174 |
| Control Delay, s/veh | 8.6 | 8.7 | 6.5 | 6.6 | 10.0 | 10.2 | 8.5 |
| LOS | A | A | A | A | A | B | A |
| 95th %tile Queue, veh | 3 | 3 | 2 | 2 | 1 | 1 | 1 |

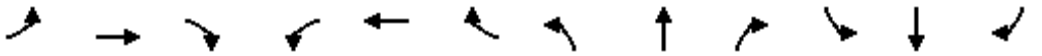
| Intersection | |
|---|---|
| Intersection Delay, s/veh | 14.7 |
| Intersection LOS | B |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1235 | 1211 | 155 | 443 |
| Demand Flow Rate, veh/h | 1260 | 1235 | 158 | 452 |
| Vehicles Circulating, veh/h | 571 | 41 | 1590 | 1203 |
| Vehicles Exiting, veh/h | 1084 | 1707 | 241 | 73 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 20.3 | 7.4 | 19.5 | 17.4 |
| Approach LOS | C | A | C | C |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 592 | 668 | 580 | 655 | 158 | 240 | 212 |
| Cap Entry Lane, veh/h | 798 | 874 | 1300 | 1371 | 368 | 446 | 511 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.981 | 0.980 | 0.981 | 0.978 | 0.982 |
| Flow Entry, veh/h | 581 | 655 | 569 | 642 | 155 | 235 | 208 |
| Cap Entry, veh/h | 783 | 856 | 1276 | 1344 | 361 | 437 | 502 |
| V/C Ratio | 0.742 | 0.764 | 0.446 | 0.478 | 0.430 | 0.538 | 0.415 |
| Control Delay, s/veh | 20.3 | 20.2 | 7.3 | 7.5 | 19.5 | 20.1 | 14.3 |
| LOS | C | C | A | A | C | C | B |
| 95th %tile Queue, veh | 7 | 7 | 2 | 3 | 2 | 3 | 2 |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 227 | 666 | 407 | 240 | 691 | 22 | 356 | 579 | 115 | 16 | 499 | 119 |
| Future Volume (veh/h) | 227 | 666 | 407 | 240 | 691 | 22 | 356 | 579 | 115 | 16 | 499 | 119 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 234 | 687 | 294 | 247 | 712 | 23 | 367 | 597 | 119 | 16 | 514 | 123 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 267 | 812 | 362 | 280 | 838 | 374 | 400 | 1295 | 570 | 32 | 561 | 250 |
| Arrive On Green | 0.15 | 0.23 | 0.23 | 0.16 | 0.24 | 0.24 | 0.22 | 0.36 | 0.36 | 0.02 | 0.16 | 0.16 |
| Sat Flow, veh/h | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 | 1781 | 3554 | 1565 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 234 | 687 | 294 | 247 | 712 | 23 | 367 | 597 | 119 | 16 | 514 | 123 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 | 1781 | 1777 | 1565 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 12.2 | 17.6 | 16.7 | 12.9 | 18.2 | 1.1 | 19.1 | 12.2 | 5.0 | 0.8 | 13.5 | 6.7 |
| Cycle Q Clear(g_c), s | 12.2 | 17.6 | 16.7 | 12.9 | 18.2 | 1.1 | 19.1 | 12.2 | 5.0 | 0.8 | 13.5 | 6.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 267 | 812 | 362 | 280 | 838 | 374 | 400 | 1295 | 570 | 32 | 561 | 250 |
| V/C Ratio(X) | 0.88 | 0.85 | 0.81 | 0.88 | 0.85 | 0.06 | 0.92 | 0.46 | 0.21 | 0.50 | 0.92 | 0.49 |
| Avail Cap(c_a), veh/h | 281 | 898 | 401 | 300 | 935 | 417 | 431 | 1295 | 570 | 94 | 561 | 250 |
| 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 | 39.5 | 35.1 | 34.7 | 39.1 | 34.7 | 28.1 | 36.0 | 23.0 | 20.8 | 46.2 | 39.4 | 36.5 |
| Incr Delay (d2), s/veh | 24.5 | 7.0 | 11.1 | 23.8 | 6.9 | 0.1 | 23.4 | 0.3 | 0.2 | 11.3 | 19.9 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.9 | 7.9 | 7.1 | 7.2 | 8.2 | 0.4 | 10.3 | 4.7 | 1.7 | 0.5 | 7.4 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 64.0 | 42.1 | 45.8 | 63.0 | 41.6 | 28.2 | 59.3 | 23.3 | 20.9 | 57.5 | 59.2 | 38.0 |
| LnGrp LOS | E | D | D | E | D | C | E | C | C | E | E | D |
| Approach Vol, veh/h | | 1215 | | | 982 | | | 1083 | | | 653 | |
| Approach Delay, s/veh | | 47.2 | | | 46.6 | | | 35.3 | | | 55.2 | |
| Approach LOS | | D | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 19.9 | 27.7 | 26.3 | 21.0 | 19.2 | 28.4 | 6.7 | 40.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 16.0 | 24.0 | 23.0 | 15.0 | 15.0 | 25.0 | 5.0 | 33.0 |
| Max Q Clear Time (g_c+I1), s | 14.9 | 19.6 | 21.1 | 15.5 | 14.2 | 20.2 | 2.8 | 14.2 |
| Green Ext Time (p_c), s | 0.1 | 2.1 | 0.2 | 0.0 | 0.1 | 1.9 | 0.0 | 3.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 45.1 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/24/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 70 | 102 | 1198 | 119 | 223 | 1048 |
| Future Volume (vph) | 70 | 102 | 1198 | 119 | 223 | 1048 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 76 | 111 | 1302 | 129 | 242 | 1139 |
| RTOR Reduction (vph) | 0 | 99 | 0 | 79 | 0 | 0 |
| Lane Group Flow (vph) | 76 | 12 | 1302 | 50 | 242 | 1139 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 6.5 | 6.5 | 23.0 | 23.0 | 13.3 | 41.3 |
| Effective Green, g (s) | 6.5 | 6.5 | 23.0 | 23.0 | 13.3 | 41.3 |
| Actuated g/C Ratio | 0.11 | 0.11 | 0.39 | 0.39 | 0.23 | 0.70 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 195 | 174 | 1989 | 619 | 400 | 2485 |
| v/s Ratio Prot | | | c0.26 | | c0.14 | 0.32 |
| v/s Ratio Perm | c0.04 | 0.01 | | 0.03 | | |
| v/c Ratio | 0.39 | 0.07 | 0.65 | 0.08 | 0.60 | 0.46 |
| Uniform Delay, d1 | 24.3 | 23.4 | 14.6 | 11.3 | 20.4 | 3.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 0.2 | 0.8 | 0.1 | 2.6 | 0.1 |
| Delay (s) | 25.6 | 23.6 | 15.4 | 11.3 | 23.0 | 4.0 |
| Level of Service | C | C | B | B | C | A |
| Approach Delay (s) | 24.4 | | 15.1 | | | 7.3 |
| Approach LOS | C | | B | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 12.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 58.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 53.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 27 | 1290 | 55 | 0 | 1118 |
| Future Vol, veh/h | 0 | 27 | 1290 | 55 | 0 | 1118 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 29 | 1402 | 60 | 0 | 1215 |

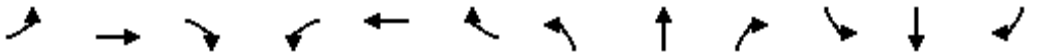
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 701 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 327 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 327 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 17.1 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 327 | - |
| HCM Lane V/C Ratio | - | - | 0.09 | - |
| HCM Control Delay (s) | - | - | 17.1 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0.3 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 66 | 81 | 57 | 459 | 76 | 207 | 94 | 1072 | 528 | 225 | 844 | 49 |
| Future Volume (veh/h) | 66 | 81 | 57 | 459 | 76 | 207 | 94 | 1072 | 528 | 225 | 844 | 49 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.92 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 69 | 84 | 59 | 478 | 79 | 216 | 98 | 1117 | 550 | 234 | 879 | 51 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 106 | 241 | 188 | 585 | 790 | 348 | 160 | 1875 | 575 | 316 | 1465 | 651 |
| Arrive On Green | 0.06 | 0.13 | 0.13 | 0.17 | 0.22 | 0.22 | 0.05 | 0.37 | 0.37 | 0.09 | 0.41 | 0.41 |
| Sat Flow, veh/h | 1781 | 1870 | 1456 | 3456 | 3554 | 1564 | 3456 | 5106 | 1565 | 3456 | 3554 | 1579 |
| Grp Volume(v), veh/h | 69 | 84 | 59 | 478 | 79 | 216 | 98 | 1117 | 550 | 234 | 879 | 51 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1456 | 1728 | 1777 | 1564 | 1728 | 1702 | 1565 | 1728 | 1777 | 1579 |
| Q Serve(g_s), s | 3.5 | 3.8 | 3.4 | 12.3 | 1.6 | 11.5 | 2.6 | 16.4 | 31.7 | 6.1 | 17.9 | 1.8 |
| Cycle Q Clear(g_c), s | 3.5 | 3.8 | 3.4 | 12.3 | 1.6 | 11.5 | 2.6 | 16.4 | 31.7 | 6.1 | 17.9 | 1.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 106 | 241 | 188 | 585 | 790 | 348 | 160 | 1875 | 575 | 316 | 1465 | 651 |
| V/C Ratio(X) | 0.65 | 0.35 | 0.31 | 0.82 | 0.10 | 0.62 | 0.61 | 0.60 | 0.96 | 0.74 | 0.60 | 0.08 |
| Avail Cap(c_a), veh/h | 462 | 485 | 378 | 953 | 922 | 406 | 336 | 1878 | 575 | 523 | 1499 | 666 |
| 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 | 42.5 | 36.7 | 36.6 | 37.0 | 28.6 | 32.4 | 43.3 | 23.7 | 28.5 | 40.9 | 21.2 | 16.5 |
| Incr Delay (d2), s/veh | 2.5 | 0.9 | 0.9 | 2.9 | 0.0 | 1.2 | 3.8 | 0.5 | 27.1 | 3.4 | 0.6 | 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 | 1.6 | 1.8 | 1.3 | 5.2 | 0.7 | 4.4 | 1.2 | 6.3 | 15.8 | 2.6 | 6.7 | 0.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 45.0 | 37.6 | 37.5 | 39.9 | 28.6 | 33.6 | 47.0 | 24.2 | 55.6 | 44.4 | 21.9 | 16.6 |
| LnGrp LOS | D | D | D | D | C | C | D | C | E | D | C | B |
| Approach Vol, veh/h | | 212 | | | 773 | | | 1765 | | | 1164 | |
| Approach Delay, s/veh | | 40.0 | | | 37.0 | | | 35.3 | | | 26.2 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.4 | 39.9 | 11.5 | 26.6 | 10.3 | 44.1 | 20.1 | 17.9 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 |
| Max Green Setting (Gmax), s | 14.0 | 34.0 | 24.0 | 24.0 | 9.0 | 39.0 | 25.5 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 8.1 | 33.7 | 5.5 | 13.5 | 4.6 | 19.9 | 14.3 | 5.8 |
| Green Ext Time (p_c), s | 0.4 | 0.2 | 0.0 | 0.1 | 0.1 | 5.5 | 1.3 | 0.6 |

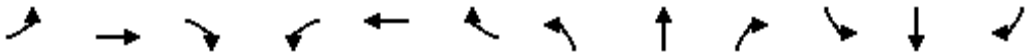
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 33.2 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/24/2024



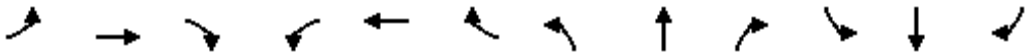
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1573 | 134 | 37 | 1227 | 70 |
| Future Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1573 | 134 | 37 | 1227 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 3490 | | 1770 | 3506 | |
| Flt Permitted | | 0.57 | 1.00 | | 0.61 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1063 | 1583 | | 1133 | 1563 | 1770 | 3490 | | 1770 | 3506 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 124 | 6 | 94 | 135 | 9 | 8 | 156 | 1639 | 140 | 39 | 1278 | 73 |
| RTOR Reduction (vph) | 0 | 0 | 68 | 0 | 0 | 7 | 0 | 4 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 26 | 0 | 144 | 1 | 156 | 1775 | 0 | 39 | 1348 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 18.0 | 18.0 | | 18.0 | 18.0 | 14.1 | 57.7 | | 4.8 | 48.4 | |
| Effective Green, g (s) | | 18.0 | 18.0 | | 18.0 | 18.0 | 14.1 | 57.7 | | 4.8 | 48.4 | |
| Actuated g/C Ratio | | 0.19 | 0.19 | | 0.19 | 0.19 | 0.15 | 0.60 | | 0.05 | 0.50 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 198 | 295 | | 211 | 291 | 258 | 2086 | | 88 | 1758 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.51 | | 0.02 | 0.38 | |
| v/s Ratio Perm | | 0.12 | 0.02 | | c0.13 | 0.00 | | | | | | |
| v/c Ratio | | 0.66 | 0.09 | | 0.68 | 0.01 | 0.60 | 0.85 | | 0.44 | 0.77 | |
| Uniform Delay, d1 | | 36.4 | 32.5 | | 36.6 | 32.0 | 38.6 | 15.9 | | 44.6 | 19.5 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 7.6 | 0.1 | | 8.8 | 0.0 | 4.0 | 3.6 | | 3.5 | 2.1 | |
| Delay (s) | | 44.0 | 32.6 | | 45.4 | 32.0 | 42.6 | 19.4 | | 48.1 | 21.5 | |
| Level of Service | | D | C | | D | C | D | B | | D | C | |
| Approach Delay (s) | | 39.2 | | | 44.7 | | | 21.3 | | | 22.3 | |
| Approach LOS | | D | | | D | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 23.7 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 96.5 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 79.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 89 | 43 | 29 | 119 | 52 | 83 | 63 | 1722 | 83 | 128 | 1270 | 49 |
| Future Volume (veh/h) | 89 | 43 | 29 | 119 | 52 | 83 | 63 | 1722 | 83 | 128 | 1270 | 49 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 93 | 45 | 30 | 124 | 54 | 86 | 66 | 1794 | 86 | 133 | 1323 | 51 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 119 | 102 | 68 | 160 | 78 | 125 | 87 | 2402 | 728 | 170 | 2607 | 100 |
| Arrive On Green | 0.07 | 0.10 | 0.10 | 0.09 | 0.12 | 0.12 | 0.05 | 0.47 | 0.47 | 0.10 | 0.52 | 0.52 |
| Sat Flow, veh/h | 1781 | 1044 | 696 | 1781 | 649 | 1033 | 1781 | 5106 | 1547 | 1781 | 5039 | 194 |
| Grp Volume(v), veh/h | 93 | 0 | 75 | 124 | 0 | 140 | 66 | 1794 | 86 | 133 | 894 | 480 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1740 | 1781 | 0 | 1681 | 1781 | 1702 | 1547 | 1781 | 1702 | 1830 |
| Q Serve(g_s), s | 4.4 | 0.0 | 3.5 | 5.8 | 0.0 | 6.8 | 3.1 | 24.4 | 2.7 | 6.2 | 14.6 | 14.6 |
| Cycle Q Clear(g_c), s | 4.4 | 0.0 | 3.5 | 5.8 | 0.0 | 6.8 | 3.1 | 24.4 | 2.7 | 6.2 | 14.6 | 14.6 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.61 | 1.00 | | 1.00 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 119 | 0 | 170 | 160 | 0 | 203 | 87 | 2402 | 728 | 170 | 1761 | 947 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.44 | 0.78 | 0.00 | 0.69 | 0.76 | 0.75 | 0.12 | 0.78 | 0.51 | 0.51 |
| Avail Cap(c_a), veh/h | 167 | 0 | 170 | 522 | 0 | 592 | 522 | 2876 | 871 | 522 | 1917 | 1030 |
| 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 | 39.2 | 0.0 | 36.2 | 37.9 | 0.0 | 35.9 | 40.1 | 18.4 | 12.7 | 37.7 | 13.5 | 13.5 |
| Incr Delay (d2), s/veh | 14.3 | 0.0 | 1.8 | 7.8 | 0.0 | 4.1 | 12.9 | 0.9 | 0.1 | 7.6 | 0.2 | 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 | 2.4 | 0.0 | 1.5 | 2.9 | 0.0 | 3.0 | 1.6 | 8.7 | 0.9 | 3.0 | 4.9 | 5.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 53.4 | 0.0 | 38.0 | 45.7 | 0.0 | 40.1 | 52.9 | 19.3 | 12.7 | 45.3 | 13.7 | 13.9 |
| LnGrp LOS | D | A | D | D | A | D | D | B | B | D | B | B |
| Approach Vol, veh/h | | 168 | | | 264 | | | 1946 | | | 1507 | |
| Approach Delay, s/veh | | 46.6 | | | 42.7 | | | 20.2 | | | 16.5 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.1 | 46.1 | 12.7 | 13.3 | 9.1 | 50.1 | 10.7 | 15.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 8.0 | 25.0 | 48.0 | 8.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 8.2 | 26.4 | 7.8 | 5.5 | 5.1 | 16.6 | 6.4 | 8.8 |
| Green Ext Time (p_c), s | 0.3 | 13.7 | 0.3 | 0.1 | 0.1 | 10.9 | 0.0 | 0.8 |

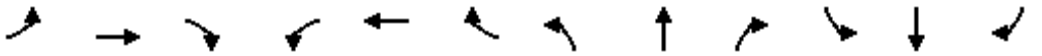
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 21.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 573 | 1257 | 187 | 409 | 1107 | 169 | 478 | 1273 | 259 | 230 | 956 | 309 |
| Future Volume (veh/h) | 573 | 1257 | 187 | 409 | 1107 | 169 | 478 | 1273 | 259 | 230 | 956 | 309 |
| 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 | | 0.97 |
| 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 | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1326 | 270 | 240 | 996 | 322 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 577 | 1822 | 438 | 481 | 1642 | 397 | 545 | 2269 | 557 | 293 | 1800 | 432 |
| Arrive On Green | 0.17 | 0.28 | 0.28 | 0.14 | 0.26 | 0.26 | 0.16 | 0.35 | 0.35 | 0.08 | 0.28 | 0.28 |
| Sat Flow, veh/h | 3456 | 6434 | 1548 | 3456 | 6434 | 1556 | 3456 | 6434 | 1580 | 3456 | 6434 | 1544 |
| Grp Volume(v), veh/h | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1326 | 270 | 240 | 996 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1548 | 1728 | 1609 | 1556 | 1728 | 1609 | 1580 | 1728 | 1609 | 1544 |
| Q Serve(g_s), s | 25.0 | 27.4 | 15.5 | 18.1 | 24.3 | 14.2 | 21.2 | 25.2 | 20.0 | 10.2 | 19.7 | 28.4 |
| Cycle Q Clear(g_c), s | 25.0 | 27.4 | 15.5 | 18.1 | 24.3 | 14.2 | 21.2 | 25.2 | 20.0 | 10.2 | 19.7 | 28.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 577 | 1822 | 438 | 481 | 1642 | 397 | 545 | 2269 | 557 | 293 | 1800 | 432 |
| V/C Ratio(X) | 1.03 | 0.72 | 0.44 | 0.89 | 0.70 | 0.44 | 0.91 | 0.58 | 0.48 | 0.82 | 0.55 | 0.75 |
| Avail Cap(c_a), veh/h | 577 | 3009 | 724 | 577 | 3009 | 728 | 577 | 3009 | 739 | 462 | 3009 | 722 |
| 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 | 62.3 | 48.3 | 44.0 | 63.3 | 50.6 | 46.8 | 62.0 | 39.5 | 37.8 | 67.4 | 45.9 | 49.1 |
| Incr Delay (d2), s/veh | 46.6 | 0.5 | 0.7 | 13.6 | 0.6 | 0.8 | 18.6 | 0.2 | 0.7 | 6.4 | 0.3 | 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 | 14.6 | 10.9 | 6.0 | 8.8 | 9.8 | 5.6 | 10.6 | 9.9 | 7.8 | 4.7 | 7.9 | 11.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 108.9 | 48.8 | 44.7 | 76.8 | 51.1 | 47.6 | 80.6 | 39.7 | 38.5 | 73.7 | 46.2 | 51.6 |
| LnGrp LOS | F | D | D | E | D | D | F | D | D | E | D | D |
| Approach Vol, veh/h | | 2101 | | | 1755 | | | 2094 | | | 1558 | |
| Approach Delay, s/veh | | 65.5 | | | 57.0 | | | 49.3 | | | 51.6 | |
| Approach LOS | | E | | | E | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.7 | 58.8 | 25.8 | 47.4 | 28.6 | 47.9 | 30.0 | 43.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 | 25.0 | 70.0 |
| Max Q Clear Time (g_c+I1), s | 12.2 | 27.2 | 20.1 | 29.4 | 23.2 | 30.4 | 27.0 | 26.3 |
| Green Ext Time (p_c), s | 0.5 | 13.9 | 0.7 | 13.0 | 0.4 | 9.8 | 0.0 | 10.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 56.1 |
| HCM 6th LOS | E |

# HCM Signalized Intersection Capacity Analysis
## 8: Caywood Dr & Morada Ln

05/24/2024

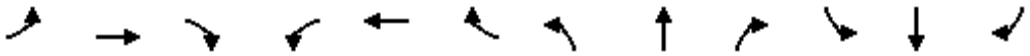
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 54 | 758 | 44 | 47 | 685 | 127 | 18 | 2 | 36 | 75 | 2 | 67 |
| Future Volume (vph) | 54 | 758 | 44 | 47 | 685 | 127 | 18 | 2 | 36 | 75 | 2 | 67 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.91 | | 1.00 | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.98 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 5030 | | 1770 | 5085 | 1583 | | 1653 | | 1681 | 1529 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.98 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 5030 | | 1770 | 5085 | 1583 | | 1653 | | 1681 | 1529 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 57 | 806 | 47 | 50 | 729 | 135 | 19 | 2 | 38 | 80 | 2 | 71 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 0 | 82 | 0 | 36 | 0 | 0 | 63 | 0 |
| Lane Group Flow (vph) | 57 | 847 | 0 | 50 | 729 | 53 | 0 | 23 | 0 | 72 | 18 | 0 |
| Confl. Peds. (#/hr) | | | 16 | 16 | | | | | | | | |
| Confl. Bikes (#/hr) | | | 2 | | | | | | 2 | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 4.1 | 23.3 | | 4.0 | 23.2 | 23.2 | | 3.6 | | 6.7 | 6.7 | |
| Effective Green, g (s) | 4.1 | 23.3 | | 4.0 | 23.2 | 23.2 | | 3.6 | | 6.7 | 6.7 | |
| Actuated g/C Ratio | 0.07 | 0.40 | | 0.07 | 0.40 | 0.40 | | 0.06 | | 0.11 | 0.11 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 123 | 1999 | | 120 | 2013 | 626 | | 101 | | 192 | 174 | |
| v/s Ratio Prot | c0.03 | c0.17 | | 0.03 | 0.14 | | | c0.01 | | c0.04 | 0.01 | |
| v/s Ratio Perm | | | | | | 0.03 | | | | | | |
| v/c Ratio | 0.46 | 0.42 | | 0.42 | 0.36 | 0.09 | | 0.23 | | 0.38 | 0.10 | |
| Uniform Delay, d1 | 26.2 | 12.8 | | 26.2 | 12.5 | 11.1 | | 26.2 | | 24.0 | 23.3 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.7 | 0.1 | | 2.3 | 0.1 | 0.1 | | 1.2 | | 1.2 | 0.3 | |
| Delay (s) | 28.9 | 12.9 | | 28.5 | 12.6 | 11.1 | | 27.4 | | 25.2 | 23.5 | |
| Level of Service | C | B | | C | B | B | | C | | C | C | |
| Approach Delay (s) | | 13.9 | | | 13.2 | | | 27.4 | | | 24.3 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 14.8 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.40 | | |
| Actuated Cycle Length (s) | 58.6 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 43.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis
## 9: Cherbourg Wy & Morada Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 117 | 690 | 62 | 88 | 789 | 128 | 32 | 3 | 73 | 244 | 2 | 38 |
| Future Volume (vph) | 117 | 690 | 62 | 88 | 789 | 128 | 32 | 3 | 73 | 244 | 2 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Lane Util. Factor | 1.00 | 0.91 | | 1.00 | 0.91 | 1.00 | | 1.00 | | 0.95 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | | 0.91 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.97 | |
| Satd. Flow (prot) | 1770 | 5003 | | 1770 | 5085 | 1583 | | 1668 | | 1681 | 1639 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 0.99 | | 0.95 | 0.97 | |
| Satd. Flow (perm) | 1770 | 5003 | | 1770 | 5085 | 1583 | | 1668 | | 1681 | 1639 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 126 | 742 | 67 | 95 | 848 | 138 | 34 | 3 | 78 | 262 | 2 | 41 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 0 | 96 | 0 | 70 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 126 | 798 | 0 | 95 | 848 | 42 | 0 | 45 | 0 | 155 | 138 | 0 |
| Confl. Peds. (#/hr) | | | 13 | 13 | | | 1 | | | | | |
| Confl. Bikes (#/hr) | | | 1 | | | | | | | | | |
| Turn Type | Prot | NA | | Prot | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 2 | 2 | | 6 | 6 | |
| Permitted Phases | | | | | | 8 | | | | | | |
| Actuated Green, G (s) | 8.6 | 22.6 | | 7.5 | 21.5 | 21.5 | | 5.6 | | 13.3 | 13.3 | |
| Effective Green, g (s) | 8.6 | 22.6 | | 7.5 | 21.5 | 21.5 | | 5.6 | | 13.3 | 13.3 | |
| Actuated g/C Ratio | 0.12 | 0.32 | | 0.11 | 0.31 | 0.31 | | 0.08 | | 0.19 | 0.19 | |
| Clearance Time (s) | 5.0 | 6.0 | | 5.0 | 6.0 | 6.0 | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 217 | 1615 | | 189 | 1561 | 486 | | 133 | | 319 | 311 | |
| v/s Ratio Prot | c0.07 | 0.16 | | 0.05 | c0.17 | | | c0.03 | | c0.09 | 0.08 | |
| v/s Ratio Perm | | | | | | 0.03 | | | | | | |
| v/c Ratio | 0.58 | 0.49 | | 0.50 | 0.54 | 0.09 | | 0.34 | | 0.49 | 0.44 | |
| Uniform Delay, d1 | 29.0 | 19.1 | | 29.5 | 20.2 | 17.3 | | 30.4 | | 25.3 | 25.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.9 | 0.2 | | 2.1 | 0.4 | 0.1 | | 1.5 | | 1.2 | 1.0 | |
| Delay (s) | 32.9 | 19.3 | | 31.6 | 20.6 | 17.3 | | 32.0 | | 26.5 | 26.1 | |
| Level of Service | C | B | | C | C | B | | C | | C | C | |
| Approach Delay (s) | | 21.2 | | | 21.1 | | | 32.0 | | | 26.3 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 22.3 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.51 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 49.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 47 | 908 | 52 | 86 | 903 | 291 | 42 | 0 | 62 | 0 | 0 | 60 |
| Future Vol, veh/h | 47 | 908 | 52 | 86 | 903 | 291 | 42 | 0 | 62 | 0 | 0 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 51 | 976 | 56 | 92 | 971 | 313 | 45 | 0 | 67 | 0 | 0 | 65 |

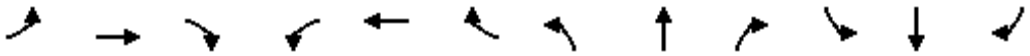
| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1284 | 0 | 0 | 1043 | 0 | 0 | 1689 | 2585 | 527 | - | - | 486 |
| Stage 1 | - | - | - | - | - | - | 1117 | 1117 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 572 | 1468 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 285 | - | - | 373 | - | - | 99 | 25 | 424 | 0 | 0 | 451 |
| Stage 1 | - | - | - | - | - | - | 165 | 281 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 431 | 190 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 285 | - | - | 369 | - | - | 59 | 15 | 420 | - | - | 451 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 59 | 15 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 134 | 228 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 277 | 143 | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.9 | 1.2 | 130.2 | 14.3 |
| HCM LOS | | | F | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 121 | 285 | - | - | 369 | - | - | 451 |
| HCM Lane V/C Ratio | 0.924 | 0.177 | - | - | 0.251 | - | - | 0.143 |
| HCM Control Delay (s) | 130.2 | 20.3 | - | - | 18 | - | - | 14.3 |
| HCM Lane LOS | F | C | - | - | C | - | - | B |
| HCM 95th %tile Q(veh) | 5.9 | 0.6 | - | - | 1 | - | - | 0.5 |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/24/2024



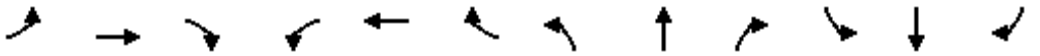
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 33 | 880 | 57 | 42 | 1178 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| Future Volume (veh/h) | 33 | 880 | 57 | 42 | 1178 | 68 | 42 | 6 | 41 | 91 | 11 | 60 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.95 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 38 | 1000 | 65 | 48 | 1339 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 53 | 2184 | 142 | 62 | 1604 | 710 | 123 | 30 | 202 | 136 | 35 | 199 |
| Arrive On Green | 0.03 | 0.45 | 0.45 | 0.03 | 0.45 | 0.45 | 0.07 | 0.14 | 0.14 | 0.08 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 4890 | 317 | 1781 | 3554 | 1573 | 1781 | 210 | 1407 | 1781 | 233 | 1320 |
| Grp Volume(v), veh/h | 38 | 696 | 369 | 48 | 1339 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1803 | 1781 | 1777 | 1573 | 1781 | 0 | 1617 | 1781 | 0 | 1553 |
| Q Serve(g_s), s | 1.5 | 10.0 | 10.0 | 1.9 | 23.3 | 2.0 | 1.8 | 0.0 | 2.1 | 4.0 | 0.0 | 3.2 |
| Cycle Q Clear(g_c), s | 1.5 | 10.0 | 10.0 | 1.9 | 23.3 | 2.0 | 1.8 | 0.0 | 2.1 | 4.0 | 0.0 | 3.2 |
| Prop In Lane | 1.00 | | 0.18 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 53 | 1520 | 805 | 62 | 1604 | 710 | 123 | 0 | 232 | 136 | 0 | 235 |
| V/C Ratio(X) | 0.72 | 0.46 | 0.46 | 0.78 | 0.83 | 0.11 | 0.39 | 0.00 | 0.23 | 0.76 | 0.00 | 0.34 |
| Avail Cap(c_a), veh/h | 887 | 1743 | 923 | 887 | 1819 | 805 | 1013 | 0 | 805 | 633 | 0 | 773 |
| 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 | 33.8 | 13.5 | 13.5 | 33.7 | 17.0 | 11.1 | 31.3 | 0.0 | 26.7 | 31.8 | 0.0 | 26.7 |
| Incr Delay (d2), s/veh | 16.4 | 0.2 | 0.4 | 18.7 | 3.2 | 0.1 | 2.0 | 0.0 | 0.5 | 8.2 | 0.0 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 3.2 | 3.5 | 1.1 | 8.4 | 0.7 | 0.8 | 0.0 | 0.8 | 2.0 | 0.0 | 1.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 50.2 | 13.8 | 14.0 | 52.4 | 20.2 | 11.2 | 33.3 | 0.0 | 27.2 | 40.0 | 0.0 | 27.6 |
| LnGrp LOS | D | B | B | D | C | B | C | A | C | D | A | C |
| Approach Vol, veh/h | | 1103 | | | 1464 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 15.1 | | | 20.8 | | | 30.1 | | | 34.6 | |
| Approach LOS | | B | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.4 | 37.4 | 9.9 | 15.6 | 7.1 | 37.7 | 10.4 | 15.1 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 35.0 | 36.0 | 40.0 | 35.0 | 35.0 | 36.0 | 25.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 3.9 | 12.0 | 3.8 | 5.2 | 3.5 | 25.3 | 6.0 | 4.1 |
| Green Ext Time (p_c), s | 0.1 | 6.9 | 0.1 | 0.5 | 0.1 | 6.4 | 0.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 19.8 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/24/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 182 | 688 | 142 | 142 | 938 | 255 | 185 | 337 | 177 | 168 | 245 | 165 |
| Future Volume (veh/h) | 182 | 688 | 142 | 142 | 938 | 255 | 185 | 337 | 177 | 168 | 245 | 165 |
| 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 | | 1.00 | 1.00 | | 0.99 | 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 | 190 | 717 | 148 | 148 | 977 | 266 | 193 | 351 | 184 | 175 | 255 | 172 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 238 | 1502 | 459 | 190 | 1364 | 422 | 241 | 916 | 280 | 221 | 860 | 266 |
| Arrive On Green | 0.13 | 0.29 | 0.29 | 0.11 | 0.27 | 0.27 | 0.14 | 0.18 | 0.18 | 0.12 | 0.17 | 0.17 |
| Sat Flow, veh/h | 1781 | 5106 | 1562 | 1781 | 5106 | 1580 | 1781 | 5106 | 1562 | 1781 | 5106 | 1582 |
| Grp Volume(v), veh/h | 190 | 717 | 148 | 148 | 977 | 266 | 193 | 351 | 184 | 175 | 255 | 172 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1562 | 1781 | 1702 | 1580 | 1781 | 1702 | 1562 | 1781 | 1702 | 1582 |
| Q Serve(g_s), s | 7.7 | 8.6 | 5.5 | 6.0 | 12.9 | 11.0 | 7.8 | 4.5 | 8.2 | 7.1 | 3.3 | 7.6 |
| Cycle Q Clear(g_c), s | 7.7 | 8.6 | 5.5 | 6.0 | 12.9 | 11.0 | 7.8 | 4.5 | 8.2 | 7.1 | 3.3 | 7.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 238 | 1502 | 459 | 190 | 1364 | 422 | 241 | 916 | 280 | 221 | 860 | 266 |
| V/C Ratio(X) | 0.80 | 0.48 | 0.32 | 0.78 | 0.72 | 0.63 | 0.80 | 0.38 | 0.66 | 0.79 | 0.30 | 0.65 |
| Avail Cap(c_a), veh/h | 718 | 1921 | 587 | 598 | 1646 | 509 | 598 | 3292 | 1007 | 598 | 3292 | 1020 |
| 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 | 31.3 | 21.6 | 20.5 | 32.4 | 24.7 | 24.0 | 31.2 | 26.9 | 28.4 | 31.7 | 27.1 | 28.9 |
| Incr Delay (d2), s/veh | 6.0 | 0.2 | 0.4 | 6.7 | 1.2 | 1.8 | 6.1 | 0.3 | 2.6 | 6.3 | 0.2 | 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 | 3.4 | 3.1 | 1.9 | 2.8 | 4.9 | 4.0 | 3.5 | 1.7 | 3.0 | 3.2 | 1.2 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 37.3 | 21.8 | 20.9 | 39.1 | 25.9 | 25.8 | 37.3 | 27.2 | 31.0 | 38.0 | 27.3 | 31.5 |
| LnGrp LOS | D | C | C | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 1055 | | | 1391 | | | 728 | | | 602 | |
| Approach Delay, s/veh | | 24.5 | | | 27.3 | | | 30.8 | | | 31.6 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.2 | 19.4 | 13.0 | 27.9 | 15.1 | 18.5 | 15.0 | 25.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 48.0 | 25.0 | 28.0 | 25.0 | 48.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 9.1 | 10.2 | 8.0 | 10.6 | 9.8 | 9.6 | 9.7 | 14.9 |
| Green Ext Time (p_c), s | 0.4 | 2.9 | 0.3 | 4.7 | 0.4 | 2.2 | 0.5 | 4.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 27.9 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 71 | 928 | 34 | 101 | 1285 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| Future Volume (veh/h) | 71 | 928 | 34 | 101 | 1285 | 63 | 27 | 15 | 91 | 50 | 15 | 35 |
| 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 | | 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 | 76 | 998 | 37 | 109 | 1382 | 68 | 29 | 16 | 98 | 54 | 16 | 38 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 98 | 1702 | 743 | 145 | 2518 | 124 | 298 | 210 | 177 | 291 | 210 | 177 |
| Arrive On Green | 0.06 | 0.48 | 0.48 | 0.08 | 0.51 | 0.51 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1781 | 3554 | 1551 | 1781 | 4984 | 245 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Grp Volume(v), veh/h | 76 | 998 | 37 | 109 | 944 | 506 | 29 | 16 | 98 | 54 | 16 | 38 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1551 | 1781 | 1702 | 1826 | 1347 | 1870 | 1581 | 1276 | 1870 | 1581 |
| Q Serve(g_s), s | 1.9 | 9.3 | 0.6 | 2.7 | 8.7 | 8.7 | 0.9 | 0.4 | 2.7 | 1.8 | 0.4 | 1.0 |
| Cycle Q Clear(g_c), s | 1.9 | 9.3 | 0.6 | 2.7 | 8.7 | 8.7 | 1.3 | 0.4 | 2.7 | 2.2 | 0.4 | 1.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 98 | 1702 | 743 | 145 | 1720 | 922 | 298 | 210 | 177 | 291 | 210 | 177 |
| V/C Ratio(X) | 0.77 | 0.59 | 0.05 | 0.75 | 0.55 | 0.55 | 0.10 | 0.08 | 0.55 | 0.19 | 0.08 | 0.21 |
| Avail Cap(c_a), veh/h | 972 | 3724 | 1625 | 933 | 3567 | 1913 | 852 | 980 | 828 | 816 | 980 | 828 |
| 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 | 21.4 | 8.6 | 6.4 | 20.6 | 7.8 | 7.8 | 18.8 | 18.2 | 19.2 | 19.2 | 18.2 | 18.5 |
| Incr Delay (d2), s/veh | 12.1 | 0.3 | 0.0 | 7.6 | 0.3 | 0.5 | 0.1 | 0.2 | 2.7 | 0.3 | 0.2 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 2.3 | 0.1 | 1.3 | 2.0 | 2.2 | 0.3 | 0.1 | 1.0 | 0.5 | 0.1 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 33.4 | 9.0 | 6.4 | 28.2 | 8.0 | 8.3 | 18.9 | 18.4 | 21.9 | 19.5 | 18.4 | 19.1 |
| LnGrp LOS | C | A | A | C | A | A | B | B | C | B | B | B |
| Approach Vol, veh/h | | 1111 | | | 1559 | | | 143 | | | 108 | |
| Approach Delay, s/veh | | 10.6 | | | 9.5 | | | 20.9 | | | 19.2 | |
| Approach LOS | | B | | | A | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.7 | 26.9 | | 10.1 | 7.5 | 28.1 | | 10.1 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 24.0 | 48.0 | | 24.0 | 25.0 | 48.0 | | 24.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.7 | 11.3 | | 4.2 | 3.9 | 10.7 | | 4.7 | | | | |
| Green Ext Time (p_c), s | 0.2 | 8.2 | | 0.3 | 0.1 | 12.4 | | 0.4 | | | | |

| Intersection Summary | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HCM 6th Ctrl Delay | | | 10.8 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/24/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 213 | 813 | 43 | 49 | 1173 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Future Volume (veh/h) | 213 | 813 | 43 | 49 | 1173 | 171 | 25 | 15 | 28 | 133 | 16 | 251 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 227 | 865 | 46 | 52 | 1248 | 182 | 27 | 16 | 30 | 141 | 17 | 267 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 251 | 2066 | 921 | 67 | 1699 | 755 | 42 | 258 | 215 | 158 | 19 | 305 |
| Arrive On Green | 0.14 | 0.58 | 0.58 | 0.04 | 0.48 | 0.48 | 0.02 | 0.14 | 0.14 | 0.09 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1781 | 3554 | 1584 | 1781 | 3554 | 1578 | 1781 | 1870 | 1557 | 1781 | 96 | 1502 |
| Grp Volume(v), veh/h | 227 | 865 | 46 | 52 | 1248 | 182 | 27 | 16 | 30 | 141 | 0 | 284 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1584 | 1781 | 1777 | 1578 | 1781 | 1870 | 1557 | 1781 | 0 | 1597 |
| Q Serve(g_s), s | 16.9 | 18.2 | 1.7 | 3.9 | 38.1 | 9.2 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Cycle Q Clear(g_c), s | 16.9 | 18.2 | 1.7 | 3.9 | 38.1 | 9.2 | 2.0 | 1.0 | 2.3 | 10.6 | 0.0 | 23.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 251 | 2066 | 921 | 67 | 1699 | 755 | 42 | 258 | 215 | 158 | 0 | 325 |
| V/C Ratio(X) | 0.90 | 0.42 | 0.05 | 0.77 | 0.73 | 0.24 | 0.64 | 0.06 | 0.14 | 0.89 | 0.00 | 0.87 |
| Avail Cap(c_a), veh/h | 269 | 2066 | 921 | 158 | 1699 | 755 | 158 | 544 | 453 | 158 | 0 | 461 |
| 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) | 0.88 | 0.88 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 57.1 | 15.6 | 12.2 | 64.4 | 28.3 | 20.8 | 65.3 | 50.6 | 51.1 | 60.8 | 0.0 | 52.1 |
| Incr Delay (d2), s/veh | 27.4 | 0.6 | 0.1 | 16.9 | 2.9 | 0.8 | 15.2 | 0.1 | 0.3 | 41.5 | 0.0 | 12.6 |
| 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 | 9.4 | 7.2 | 0.6 | 2.1 | 16.3 | 3.6 | 1.1 | 0.5 | 0.9 | 6.6 | 0.0 | 10.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 84.5 | 16.2 | 12.3 | 81.3 | 31.2 | 21.5 | 80.6 | 50.7 | 51.4 | 102.4 | 0.0 | 64.7 |
| LnGrp LOS | F | B | B | F | C | C | F | D | D | F | A | E |
| Approach Vol, veh/h | | 1138 | | | 1482 | | | 73 | | | 425 | |
| Approach Delay, s/veh | | 29.7 | | | 31.8 | | | 62.1 | | | 77.2 | |
| Approach LOS | | C | | | C | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.7 | 84.7 | 16.6 | 24.0 | 23.6 | 70.8 | 7.8 | 32.8 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 12.0 | 51.2 | 12.0 | * 39 | 20.4 | * 43 | 12.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 5.9 | 20.2 | 12.6 | 4.3 | 18.9 | 40.1 | 4.0 | 25.3 |
| Green Ext Time (p_c), s | 0.0 | 6.6 | 0.0 | 0.1 | 0.1 | 2.3 | 0.0 | 1.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 37.9 |
| HCM 6th LOS | D |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM Signalized Intersection Capacity Analysis
## 15: West Ln & Marlette Rd

05/24/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 180 | 6 | 1165 | 135 | 55 | 1091 |
| Future Volume (vph) | 180 | 6 | 1165 | 135 | 55 | 1091 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 3539 | 1583 | 1770 | 3539 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 3539 | 1583 | 1770 | 3539 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 196 | 7 | 1266 | 147 | 60 | 1186 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 72 | 0 | 0 |
| Lane Group Flow (vph) | 196 | 1 | 1266 | 75 | 60 | 1186 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 12.9 | 12.9 | 35.2 | 35.2 | 5.1 | 45.3 |
| Effective Green, g (s) | 12.9 | 12.9 | 35.2 | 35.2 | 5.1 | 45.3 |
| Actuated g/C Ratio | 0.19 | 0.19 | 0.51 | 0.51 | 0.07 | 0.65 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 329 | 295 | 1800 | 805 | 130 | 2316 |
| v/s Ratio Prot | | | c0.36 | | 0.03 | c0.34 |
| v/s Ratio Perm | c0.11 | 0.00 | | 0.05 | | |
| v/c Ratio | 0.60 | 0.00 | 0.70 | 0.09 | 0.46 | 0.51 |
| Uniform Delay, d1 | 25.8 | 22.9 | 13.0 | 8.8 | 30.7 | 6.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 2.9 | 0.0 | 1.3 | 0.1 | 2.6 | 0.2 |
| Delay (s) | 28.7 | 22.9 | 14.3 | 8.8 | 33.3 | 6.4 |
| Level of Service | C | C | B | A | C | A |
| Approach Delay (s) | 28.5 | | 13.7 | | | 7.7 |
| Approach LOS | C | | B | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 12.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 69.2 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 59.7% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.5 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 910 | 914 | 59 | 153 |
| Demand Flow Rate, veh/h | 928 | 933 | 60 | 156 |
| Vehicles Circulating, veh/h | 135 | 79 | 962 | 814 |
| Vehicles Exiting, veh/h | 835 | 943 | 101 | 198 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 6.7 | 6.2 | 6.9 | 6.8 |
| Approach LOS | A | A | A | A |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.471 | 0.529 | 1.000 | 0.532 | 0.468 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 436 | 492 | 439 | 494 | 60 | 83 | 73 |
| Cap Entry Lane, veh/h | 1192 | 1266 | 1255 | 1328 | 627 | 638 | 711 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.979 | 0.981 | 0.983 | 0.977 | 0.985 |
| Flow Entry, veh/h | 428 | 482 | 430 | 485 | 59 | 81 | 72 |
| Cap Entry, veh/h | 1169 | 1241 | 1229 | 1303 | 616 | 624 | 700 |
| V/C Ratio | 0.366 | 0.389 | 0.350 | 0.372 | 0.096 | 0.130 | 0.103 |
| Control Delay, s/veh | 6.7 | 6.7 | 6.2 | 6.3 | 6.9 | 7.3 | 6.2 |
| LOS | A | A | A | A | A | A | A |
| 95th %tile Queue, veh | 2 | 2 | 2 | 2 | 0 | 0 | 0 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 8.9 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 935 | 1081 | 115 | 305 |
| Demand Flow Rate, veh/h | 954 | 1103 | 118 | 311 |
| Vehicles Circulating, veh/h | 366 | 167 | 1153 | 997 |
| Vehicles Exiting, veh/h | 942 | 1104 | 167 | 273 |
| Ped Vol Crossing Leg, #/h | 1 | 0 | 13 | 0 |
| Ped Cap Adj | 0.999 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 9.3 | 8.0 | 10.0 | 10.3 |
| Approach LOS | A | A | B | B |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 448 | 506 | 518 | 585 | 118 | 165 | 146 |
| Cap Entry Lane, veh/h | 964 | 1040 | 1158 | 1232 | 533 | 539 | 608 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.981 | 0.979 | 0.974 | 0.980 | 0.982 |
| Flow Entry, veh/h | 440 | 496 | 508 | 573 | 115 | 162 | 143 |
| Cap Entry, veh/h | 945 | 1018 | 1135 | 1207 | 519 | 528 | 597 |
| V/C Ratio | 0.465 | 0.487 | 0.447 | 0.475 | 0.221 | 0.306 | 0.240 |
| Control Delay, s/veh | 9.4 | 9.3 | 7.9 | 8.0 | 10.0 | 11.3 | 9.1 |
| LOS | A | A | A | A | B | B | A |
| 95th %tile Queue, veh | 3 | 3 | 2 | 3 | 1 | 1 | 1 |

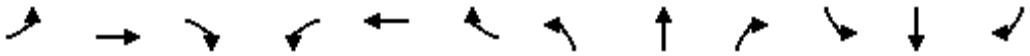
BTC
BARRIOS
TRANSPORTATION CONSULTING

# Appendix I: Background Conditions Queue Worksheets

# Queues

## 1: West Ln & Eight Mile Rd

05/24/2024



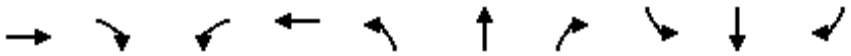
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 216 | 728 | 454 | 235 | 646 | 27 | 319 | 400 | 106 | 56 | 509 | 161 |
| v/c Ratio | 0.80 | 0.85 | 0.63 | 0.88 | 0.76 | 0.05 | 0.84 | 0.35 | 0.17 | 0.42 | 0.88 | 0.38 |
| Control Delay | 62.1 | 46.6 | 7.8 | 72.9 | 41.7 | 0.2 | 57.0 | 26.8 | 2.6 | 53.7 | 58.2 | 5.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.1 | 46.6 | 7.8 | 72.9 | 41.7 | 0.2 | 57.0 | 26.8 | 2.6 | 53.7 | 58.2 | 5.7 |
| Queue Length 50th (ft) | 133 | 234 | 3 | 149 | 205 | 0 | 192 | 103 | 0 | 35 | 169 | 0 |
| Queue Length 95th (ft) | #245 | #330 | 88 | #286 | 271 | 0 | #323 | 145 | 20 | 75 | #264 | 34 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 295 | 884 | 730 | 276 | 853 | 531 | 424 | 1172 | 612 | 147 | 589 | 426 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.73 | 0.82 | 0.62 | 0.85 | 0.76 | 0.05 | 0.75 | 0.34 | 0.17 | 0.38 | 0.86 | 0.38 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/24/2024



| Lane Group | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 362 | 265 | 282 | 470 | 477 | 703 | 363 | 369 | 938 | 214 |
| v/c Ratio | 1.19 | 0.86 | 0.58 | 0.95 | 0.76 | 1.06 | 0.88 | 1.15 | 1.41 | 0.66 |
| Control Delay | 173.2 | 71.0 | 62.8 | 95.3 | 84.8 | 122.4 | 65.4 | 161.1 | 244.6 | 64.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 173.2 | 71.0 | 62.8 | 95.3 | 84.8 | 122.4 | 65.4 | 161.1 | 244.6 | 64.5 |
| Queue Length 50th (ft) | ~552 | 218 | 324 | 607 | 301 | ~503 | 277 | ~548 | ~827 | 188 |
| Queue Length 95th (ft) | #863 | #433 | 433 | 778 | 405 | #724 | #514 | #860 | #1077 | 319 |
| Internal Link Dist (ft) | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | | | 250 | | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 305 | 308 | 1666 | 1644 | 625 | 666 | 414 | 322 | 666 | 326 |
| 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 | 1.19 | 0.86 | 0.17 | 0.29 | 0.76 | 1.06 | 0.88 | 1.15 | 1.41 | 0.66 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/24/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 183 | 158 | 274 | 16 | 217 | 1271 | 73 | 1589 |
| v/c Ratio | 1.00 | 0.32 | 1.05 | 0.03 | 0.75 | 0.69 | 0.47 | 1.06 |
| Control Delay | 109.9 | 15.0 | 110.9 | 0.1 | 62.4 | 24.0 | 60.3 | 73.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 109.9 | 15.0 | 110.9 | 0.1 | 62.4 | 24.0 | 60.3 | 73.8 |
| Queue Length 50th (ft) | ~138 | 30 | ~223 | 0 | 153 | 363 | 52 | ~673 |
| Queue Length 95th (ft) | #289 | 86 | #394 | 0 | 239 | 495 | 102 | #894 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 183 | 501 | 261 | 473 | 386 | 1839 | 386 | 1498 |
| 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 | 1.00 | 0.32 | 1.05 | 0.03 | 0.56 | 0.69 | 0.19 | 1.06 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/24/2024

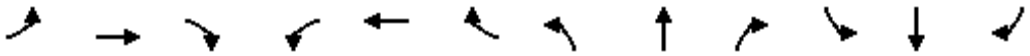
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 83 | 83 | 157 | 160 | 24 | 1264 | 70 | 181 | 1677 |
| v/c Ratio | 0.56 | 0.38 | 0.49 | 0.47 | 0.18 | 0.72 | 0.11 | 0.64 | 0.64 |
| Control Delay | 66.3 | 39.7 | 49.6 | 33.0 | 57.8 | 33.2 | 0.4 | 54.9 | 22.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 66.3 | 39.7 | 49.6 | 33.0 | 57.8 | 33.2 | 0.4 | 54.9 | 22.3 |
| Queue Length 50th (ft) | 48 | 35 | 87 | 68 | 14 | 226 | 0 | 100 | 205 |
| Queue Length 95th (ft) | #196 | 98 | 227 | 149 | 56 | 489 | 0 | 259 | 608 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 152 | 315 | 477 | 629 | 477 | 2635 | 867 | 477 | 2814 |
| 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 | 0.55 | 0.26 | 0.33 | 0.25 | 0.05 | 0.48 | 0.08 | 0.38 | 0.60 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/24/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 419 | 1152 | 220 | 576 | 993 | 194 | 280 | 729 | 202 | 238 | 1196 | 303 |
| v/c Ratio | 0.69 | 0.67 | 0.40 | 0.95 | 0.58 | 0.37 | 0.65 | 0.38 | 0.33 | 0.63 | 0.66 | 0.49 |
| Control Delay | 64.6 | 49.8 | 10.6 | 84.2 | 47.7 | 14.6 | 69.5 | 41.1 | 6.4 | 71.6 | 48.1 | 11.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.6 | 49.8 | 10.6 | 84.2 | 47.7 | 14.6 | 69.5 | 41.1 | 6.4 | 71.6 | 48.1 | 11.2 |
| Queue Length 50th (ft) | 191 | 279 | 18 | 277 | 233 | 33 | 129 | 156 | 0 | 110 | 285 | 32 |
| Queue Length 95th (ft) | #330 | 376 | 96 | #532 | 318 | 113 | 210 | 215 | 61 | 187 | 384 | 130 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 608 | 3181 | 864 | 608 | 3181 | 844 | 608 | 3408 | 923 | 487 | 3181 | 899 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 0.36 | 0.25 | 0.95 | 0.31 | 0.23 | 0.46 | 0.21 | 0.22 | 0.49 | 0.38 | 0.34 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

05/24/2024

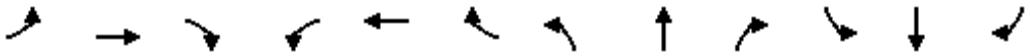
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 1077 | 107 | 832 | 344 | 159 | 175 | 235 | 193 |
| v/c Ratio | 0.69 | 0.64 | 0.57 | 0.79 | 0.57 | 0.66 | 0.46 | 0.73 | 0.47 |
| Control Delay | 66.0 | 38.0 | 67.5 | 48.9 | 17.6 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 66.0 | 38.0 | 67.5 | 48.9 | 17.6 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Length 50th (ft) | 147 | 275 | 86 | 339 | 70 | 127 | 82 | 182 | 102 |
| Queue Length 95th (ft) | 234 | 364 | 153 | #503 | 186 | 208 | 157 | #316 | 194 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 510 | 1675 | 510 | 1050 | 601 | 583 | 719 | 364 | 484 |
| 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 | 0.36 | 0.64 | 0.21 | 0.79 | 0.57 | 0.27 | 0.24 | 0.65 | 0.40 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/24/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 232 | 719 | 232 | 172 | 687 | 240 | 228 | 214 | 98 | 327 | 461 | 299 |
| v/c Ratio | 0.72 | 0.57 | 0.42 | 0.65 | 0.63 | 0.46 | 0.72 | 0.28 | 0.31 | 0.77 | 0.43 | 0.53 |
| Control Delay | 57.9 | 39.1 | 7.4 | 59.1 | 43.1 | 8.4 | 58.8 | 42.2 | 10.8 | 55.3 | 40.5 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 57.9 | 39.1 | 7.4 | 59.1 | 43.1 | 8.4 | 58.8 | 42.2 | 10.8 | 55.3 | 40.5 | 8.4 |
| Queue Length 50th (ft) | 140 | 145 | 0 | 104 | 145 | 0 | 137 | 47 | 0 | 194 | 100 | 0 |
| Queue Length 95th (ft) | 325 | 275 | 68 | 252 | 274 | 73 | #364 | 87 | 47 | #597 | 176 | 77 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 511 | 1511 | 622 | 426 | 1266 | 564 | 426 | 2352 | 774 | 426 | 2352 | 880 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.45 | 0.48 | 0.37 | 0.40 | 0.54 | 0.43 | 0.54 | 0.09 | 0.13 | 0.77 | 0.20 | 0.34 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 13: Maranatha Dr & Morada Ln

05/24/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 66 | 1009 | 70 | 62 | 864 | 94 | 8 | 89 | 69 | 24 | 97 |
| v/c Ratio | 0.25 | 0.50 | 0.08 | 0.24 | 0.30 | 0.32 | 0.02 | 0.22 | 0.23 | 0.06 | 0.24 |
| Control Delay | 33.3 | 14.7 | 4.5 | 33.5 | 12.0 | 26.9 | 23.7 | 7.8 | 25.6 | 24.0 | 7.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.3 | 14.7 | 4.5 | 33.5 | 12.0 | 26.9 | 23.7 | 7.8 | 25.6 | 24.0 | 7.7 |
| Queue Length 50th (ft) | 21 | 137 | 0 | 20 | 71 | 29 | 2 | 0 | 21 | 7 | 0 |
| Queue Length 95th (ft) | 84 | 348 | 26 | 80 | 176 | 89 | 15 | 36 | 69 | 31 | 37 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 870 | 2877 | 1253 | 835 | 4064 | 673 | 907 | 807 | 682 | 907 | 809 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.08 | 0.35 | 0.06 | 0.07 | 0.21 | 0.14 | 0.01 | 0.11 | 0.10 | 0.03 | 0.12 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/24/2024

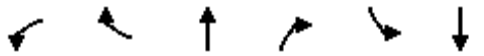
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 930 | 35 | 18 | 741 | 88 | 61 | 21 | 66 | 57 | 120 |
| v/c Ratio | 0.64 | 0.39 | 0.03 | 0.19 | 0.41 | 0.11 | 0.46 | 0.10 | 0.25 | 0.44 | 0.45 |
| Control Delay | 59.9 | 14.8 | 0.1 | 60.2 | 22.6 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.9 | 14.8 | 0.1 | 60.2 | 22.6 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Length 50th (ft) | 142 | 120 | 0 | 14 | 180 | 0 | 48 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | #323 | 421 | 0 | 39 | 333 | 30 | 93 | 32 | 9 | 89 | 47 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 296 | 2360 | 1061 | 169 | 1793 | 830 | 169 | 585 | 564 | 169 | 576 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.39 | 0.03 | 0.11 | 0.41 | 0.11 | 0.36 | 0.04 | 0.12 | 0.34 | 0.21 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/24/2024



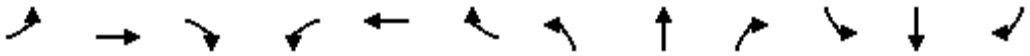
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 330 | 15 | 860 | 87 | 49 | 1175 |
| v/c Ratio | 0.66 | 0.03 | 0.56 | 0.12 | 0.23 | 0.60 |
| Control Delay | 29.2 | 10.6 | 17.2 | 4.4 | 33.5 | 10.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.2 | 10.6 | 17.2 | 4.4 | 33.5 | 10.9 |
| Queue Length 50th (ft) | 117 | 0 | 146 | 0 | 18 | 143 |
| Queue Length 95th (ft) | 242 | 13 | 243 | 26 | 57 | 238 |
| Internal Link Dist (ft) | 1070 | | 2537 | | | 2672 |
| Turn Bay Length (ft) | 400 | | | 400 | 400 | |
| Base Capacity (vph) | 756 | 685 | 2116 | 981 | 756 | 3267 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.44 | 0.02 | 0.41 | 0.09 | 0.06 | 0.36 |

Intersection Summary

# Queues

## 1: West Ln & Eight Mile Rd

05/24/2024



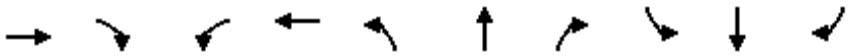
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 234 | 687 | 347 | 223 | 712 | 23 | 326 | 520 | 104 | 16 | 381 | 123 |
| v/c Ratio | 0.86 | 0.81 | 0.54 | 0.80 | 0.83 | 0.04 | 0.84 | 0.39 | 0.15 | 0.17 | 0.73 | 0.31 |
| Control Delay | 69.5 | 43.0 | 7.0 | 61.7 | 43.5 | 0.1 | 56.2 | 23.6 | 2.3 | 49.8 | 48.6 | 2.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 69.5 | 43.0 | 7.0 | 61.7 | 43.5 | 0.1 | 56.2 | 23.6 | 2.3 | 49.8 | 48.6 | 2.7 |
| Queue Length 50th (ft) | 148 | 218 | 0 | 138 | 224 | 0 | 197 | 113 | 0 | 10 | 123 | 0 |
| Queue Length 95th (ft) | #286 | #287 | 71 | #255 | 294 | 0 | #334 | 184 | 19 | 32 | 174 | 7 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 284 | 910 | 664 | 303 | 948 | 567 | 436 | 1370 | 692 | 94 | 568 | 419 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.82 | 0.75 | 0.52 | 0.74 | 0.75 | 0.04 | 0.75 | 0.38 | 0.15 | 0.17 | 0.67 | 0.29 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/24/2024



| Lane Group | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 103 | 59 | 292 | 309 | 98 | 961 | 347 | 234 | 817 | 41 |
| v/c Ratio | 0.41 | 0.19 | 0.87 | 0.86 | 0.45 | 1.18 | 0.79 | 0.58 | 0.58 | 0.06 |
| Control Delay | 60.2 | 13.0 | 87.4 | 71.5 | 80.2 | 142.9 | 54.5 | 63.4 | 42.4 | 7.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 60.2 | 13.0 | 87.4 | 71.5 | 80.2 | 142.9 | 54.5 | 63.4 | 42.4 | 7.4 |
| Queue Length 50th (ft) | 92 | 0 | 333 | 287 | 54 | ~700 | 264 | 235 | 390 | 0 |
| Queue Length 95th (ft) | 162 | 41 | 455 | 416 | 91 | #900 | #467 | 356 | 513 | 25 |
| Internal Link Dist (ft) | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | | | 250 | | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 367 | 430 | 1681 | 1562 | 791 | 815 | 438 | 407 | 1401 | 640 |
| 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 | 0.14 | 0.17 | 0.20 | 0.12 | 1.18 | 0.79 | 0.57 | 0.58 | 0.06 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/24/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 112 | 94 | 144 | 8 | 156 | 1438 | 39 | 1134 |
| v/c Ratio | 0.51 | 0.24 | 0.60 | 0.02 | 0.55 | 0.71 | 0.24 | 0.73 |
| Control Delay | 43.4 | 9.3 | 45.6 | 0.1 | 44.9 | 17.4 | 47.2 | 23.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 43.4 | 9.3 | 45.6 | 0.1 | 44.9 | 17.4 | 47.2 | 23.6 |
| Queue Length 50th (ft) | 58 | 0 | 76 | 0 | 83 | 301 | 21 | 242 |
| Queue Length 95th (ft) | 131 | 43 | 162 | 0 | 174 | 518 | 62 | 435 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 377 | 600 | 418 | 580 | 558 | 2344 | 558 | 2301 |
| 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 | 0.30 | 0.16 | 0.34 | 0.01 | 0.28 | 0.61 | 0.07 | 0.49 |

Intersection Summary

# Queues
## 6: West Ln & Knickerbocker Dr

05/24/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 75 | 75 | 124 | 123 | 66 | 1489 | 86 | 121 | 1183 |
| v/c Ratio | 0.49 | 0.33 | 0.52 | 0.38 | 0.37 | 0.71 | 0.12 | 0.51 | 0.48 |
| Control Delay | 62.7 | 37.7 | 53.9 | 28.1 | 55.4 | 29.2 | 0.7 | 53.8 | 22.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.7 | 37.7 | 53.9 | 28.1 | 55.4 | 29.2 | 0.7 | 53.8 | 22.2 |
| Queue Length 50th (ft) | 43 | 31 | 70 | 43 | 37 | 256 | 0 | 68 | 175 |
| Queue Length 95th (ft) | #168 | 87 | 182 | 104 | 113 | 574 | 3 | 179 | 400 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 160 | 329 | 502 | 652 | 502 | 2771 | 901 | 502 | 2817 |
| 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 | 0.47 | 0.23 | 0.25 | 0.19 | 0.13 | 0.54 | 0.10 | 0.24 | 0.42 |

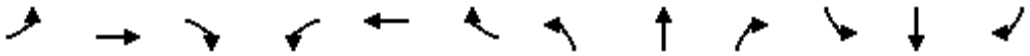
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 7: West Ln & Hammer Ln

05/24/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 513 | 1309 | 195 | 426 | 1153 | 127 | 498 | 1154 | 270 | 211 | 896 | 271 |
| v/c Ratio | 0.88 | 0.71 | 0.35 | 0.73 | 0.62 | 0.25 | 0.85 | 0.60 | 0.42 | 0.61 | 0.61 | 0.50 |
| Control Delay | 78.2 | 50.0 | 12.8 | 68.9 | 47.9 | 17.2 | 75.9 | 47.0 | 8.6 | 74.5 | 53.4 | 11.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.2 | 50.0 | 12.8 | 68.9 | 47.9 | 17.2 | 75.9 | 47.0 | 8.6 | 74.5 | 53.4 | 11.4 |
| Queue Length 50th (ft) | 245 | 318 | 29 | 197 | 271 | 30 | 237 | 278 | 15 | 100 | 227 | 21 |
| Queue Length 95th (ft) | #447 | 412 | 102 | #335 | 356 | 91 | #429 | 370 | 96 | 167 | 293 | 109 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 583 | 3049 | 812 | 583 | 3049 | 781 | 583 | 3267 | 915 | 466 | 3049 | 858 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.88 | 0.43 | 0.24 | 0.73 | 0.38 | 0.16 | 0.85 | 0.35 | 0.30 | 0.45 | 0.29 | 0.32 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

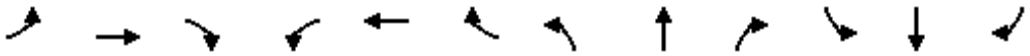
05/24/2024

| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 38 | 703 | 48 | 718 | 77 | 48 | 54 | 103 | 81 |
| v/c Ratio | 0.21 | 0.36 | 0.25 | 0.51 | 0.12 | 0.22 | 0.15 | 0.40 | 0.17 |
| Control Delay | 45.6 | 22.4 | 45.1 | 25.1 | 2.6 | 44.3 | 12.0 | 43.4 | 10.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 22.4 | 45.1 | 25.1 | 2.6 | 44.3 | 12.0 | 43.4 | 10.2 |
| Queue Length 50th (ft) | 17 | 87 | 22 | 138 | 0 | 22 | 3 | 46 | 6 |
| Queue Length 95th (ft) | 59 | 182 | 70 | 292 | 15 | 70 | 33 | 122 | 40 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 886 | 2578 | 886 | 1822 | 830 | 1013 | 1145 | 633 | 823 |
| 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 | 0.04 | 0.27 | 0.05 | 0.39 | 0.09 | 0.05 | 0.05 | 0.16 | 0.10 |

Intersection Summary

# Queues
## 12: Holman Rd & Morada Ln

05/24/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 169 | 433 | 120 | 148 | 494 | 266 | 144 | 351 | 184 | 175 | 255 | 135 |
| v/c Ratio | 0.56 | 0.39 | 0.28 | 0.52 | 0.48 | 0.50 | 0.52 | 0.39 | 0.43 | 0.58 | 0.26 | 0.33 |
| Control Delay | 45.9 | 32.2 | 8.8 | 46.7 | 34.1 | 8.4 | 46.9 | 34.8 | 9.2 | 46.9 | 32.7 | 9.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.9 | 32.2 | 8.8 | 46.7 | 34.1 | 8.4 | 46.9 | 34.8 | 9.2 | 46.9 | 32.7 | 9.0 |
| Queue Length 50th (ft) | 74 | 65 | 0 | 65 | 76 | 0 | 63 | 56 | 0 | 77 | 39 | 0 |
| Queue Length 95th (ft) | 236 | 161 | 51 | 212 | 187 | 73 | 208 | 132 | 62 | 246 | 98 | 53 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 670 | 1937 | 668 | 558 | 1635 | 681 | 558 | 3082 | 1019 | 558 | 3082 | 1000 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.25 | 0.22 | 0.18 | 0.27 | 0.30 | 0.39 | 0.26 | 0.11 | 0.18 | 0.31 | 0.08 | 0.14 |

Intersection Summary

# Queues
## 13: Maranatha Dr & Morada Ln

05/24/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 705 | 37 | 109 | 951 | 29 | 16 | 98 | 54 | 16 | 38 |
| v/c Ratio | 0.26 | 0.42 | 0.05 | 0.33 | 0.35 | 0.10 | 0.04 | 0.25 | 0.19 | 0.04 | 0.10 |
| Control Delay | 28.1 | 16.3 | 2.1 | 27.4 | 12.8 | 20.3 | 19.5 | 6.8 | 21.3 | 19.5 | 2.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.1 | 16.3 | 2.1 | 27.4 | 12.8 | 20.3 | 19.5 | 6.8 | 21.3 | 19.5 | 2.5 |
| Queue Length 50th (ft) | 19 | 81 | 0 | 27 | 71 | 7 | 4 | 0 | 14 | 4 | 0 |
| Queue Length 95th (ft) | 84 | 238 | 8 | 109 | 198 | 31 | 20 | 33 | 48 | 20 | 9 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 957 | 3151 | 1385 | 918 | 4435 | 746 | 999 | 883 | 746 | 999 | 869 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.08 | 0.22 | 0.03 | 0.12 | 0.21 | 0.04 | 0.02 | 0.11 | 0.07 | 0.02 | 0.04 |

Intersection Summary

# Queues
## 14: Diamond Bar Pl & Morada Ln

05/24/2024

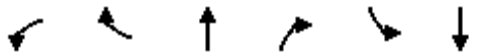
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 227 | 576 | 46 | 52 | 754 | 182 | 27 | 16 | 30 | 141 | 284 |
| v/c Ratio | 0.80 | 0.26 | 0.05 | 0.43 | 0.41 | 0.21 | 0.27 | 0.09 | 0.11 | 0.90 | 0.62 |
| Control Delay | 74.9 | 15.4 | 0.1 | 70.8 | 23.8 | 8.7 | 67.2 | 49.6 | 0.8 | 109.5 | 12.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.9 | 15.4 | 0.1 | 70.8 | 23.8 | 8.7 | 67.2 | 49.6 | 0.8 | 109.5 | 12.9 |
| Queue Length 50th (ft) | 190 | 106 | 0 | 45 | 198 | 21 | 23 | 14 | 0 | 125 | 14 |
| Queue Length 95th (ft) | #335 | 248 | 0 | 88 | 371 | 92 | 55 | 29 | 0 | #254 | 80 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 294 | 2211 | 1002 | 158 | 1839 | 863 | 157 | 542 | 551 | 157 | 649 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.77 | 0.26 | 0.05 | 0.33 | 0.41 | 0.21 | 0.17 | 0.03 | 0.05 | 0.90 | 0.44 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/24/2024



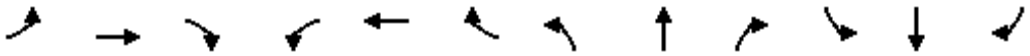
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 196 | 7 | 1126 | 147 | 60 | 943 |
| v/c Ratio | 0.54 | 0.02 | 0.61 | 0.16 | 0.28 | 0.42 |
| Control Delay | 30.9 | 14.5 | 14.9 | 3.1 | 32.5 | 6.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.9 | 14.5 | 14.9 | 3.1 | 32.5 | 6.6 |
| Queue Length 50th (ft) | 74 | 0 | 180 | 0 | 23 | 80 |
| Queue Length 95th (ft) | 146 | 10 | 305 | 30 | 61 | 141 |
| Internal Link Dist (ft) | 1070 | | 2537 | | | 2672 |
| Turn Bay Length (ft) | 400 | | | 400 | 400 | |
| Base Capacity (vph) | 713 | 642 | 1997 | 957 | 713 | 3301 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.27 | 0.01 | 0.56 | 0.15 | 0.08 | 0.29 |

Intersection Summary

# Queues

## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 216 | 728 | 476 | 241 | 646 | 27 | 381 | 511 | 128 | 56 | 546 | 161 |
| v/c Ratio | 0.81 | 0.87 | 0.67 | 0.91 | 0.77 | 0.05 | 0.94 | 0.43 | 0.21 | 0.43 | 0.95 | 0.38 |
| Control Delay | 64.3 | 48.8 | 9.6 | 78.5 | 43.0 | 0.2 | 71.3 | 27.8 | 4.5 | 54.5 | 70.5 | 5.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.3 | 48.8 | 9.6 | 78.5 | 43.0 | 0.2 | 71.3 | 27.8 | 4.5 | 54.5 | 70.5 | 5.8 |
| Queue Length 50th (ft) | 133 | 234 | 16 | 153 | 205 | 0 | 240 | 137 | 0 | 35 | 184 | 0 |
| Queue Length 95th (ft) | #245 | #330 | 112 | #297 | 271 | 0 | #418 | 187 | 34 | 75 | #292 | 34 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 286 | 857 | 720 | 268 | 837 | 524 | 411 | 1197 | 622 | 142 | 572 | 419 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.76 | 0.85 | 0.66 | 0.90 | 0.77 | 0.05 | 0.93 | 0.43 | 0.21 | 0.39 | 0.95 | 0.38 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

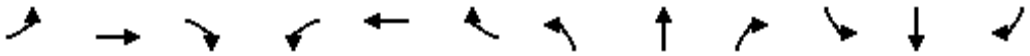
05/28/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 109 | 159 | 986 | 38 | 66 | 1505 |
| v/c Ratio | 0.37 | 0.40 | 0.40 | 0.05 | 0.27 | 0.68 |
| Control Delay | 25.3 | 8.2 | 11.4 | 4.6 | 26.1 | 8.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 25.3 | 8.2 | 11.4 | 4.6 | 26.1 | 8.7 |
| Queue Length 50th (ft) | 28 | 0 | 82 | 0 | 17 | 132 |
| Queue Length 95th (ft) | 84 | 45 | 136 | 15 | 60 | 236 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 662 | 692 | 3238 | 1021 | 331 | 3181 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.16 | 0.23 | 0.30 | 0.04 | 0.20 | 0.47 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 93 | 284 | 265 | 527 | 296 | 169 | 477 | 749 | 418 | 369 | 1031 | 232 |
| v/c Ratio | 0.21 | 0.62 | 0.49 | 0.62 | 0.34 | 0.33 | 0.89 | 0.63 | 0.64 | 0.85 | 1.43 | 0.50 |
| Control Delay | 52.6 | 63.1 | 8.7 | 59.9 | 53.4 | 8.4 | 88.5 | 60.1 | 12.9 | 89.3 | 248.0 | 17.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.6 | 63.1 | 8.7 | 59.9 | 53.4 | 8.4 | 88.5 | 60.1 | 12.9 | 89.3 | 248.0 | 17.4 |
| Queue Length 50th (ft) | 84 | 288 | 0 | 275 | 145 | 0 | 271 | 273 | 39 | 210 | ~788 | 42 |
| Queue Length 95th (ft) | 141 | 401 | 83 | 345 | 196 | 65 | 340 | 326 | 160 | 272 | #940 | 132 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 438 | 461 | 538 | 851 | 877 | 506 | 601 | 1188 | 651 | 498 | 719 | 460 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.21 | 0.62 | 0.49 | 0.62 | 0.34 | 0.33 | 0.79 | 0.63 | 0.64 | 0.74 | 1.43 | 0.50 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/28/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 188 | 158 | 274 | 16 | 217 | 1371 | 73 | 1906 |
| v/c Ratio | 1.03 | 0.32 | 1.07 | 0.03 | 0.75 | 0.75 | 0.47 | 1.27 |
| Control Delay | 116.4 | 15.5 | 116.3 | 0.1 | 62.4 | 25.7 | 60.3 | 157.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 116.4 | 15.5 | 116.3 | 0.1 | 62.4 | 25.7 | 60.3 | 157.4 |
| Queue Length 50th (ft) | ~150 | 32 | ~226 | 0 | 153 | 411 | 52 | ~932 |
| Queue Length 95th (ft) | #299 | 88 | #398 | 0 | 239 | 556 | 102 | #1170 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 183 | 499 | 257 | 473 | 386 | 1839 | 386 | 1500 |
| 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 | 1.03 | 0.32 | 1.07 | 0.03 | 0.56 | 0.75 | 0.19 | 1.27 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 6: West Ln & Knickerbocker Dr

05/28/2024

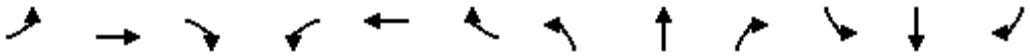
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 88 | 83 | 157 | 164 | 24 | 1354 | 70 | 197 | 1958 |
| v/c Ratio | 0.63 | 0.40 | 0.51 | 0.50 | 0.20 | 0.71 | 0.11 | 0.69 | 0.72 |
| Control Delay | 72.9 | 41.2 | 52.1 | 34.6 | 59.9 | 33.4 | 0.3 | 59.0 | 23.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 72.9 | 41.2 | 52.1 | 34.6 | 59.9 | 33.4 | 0.3 | 59.0 | 23.7 |
| Queue Length 50th (ft) | 54 | 37 | 93 | 74 | 14 | 256 | 0 | 116 | 265 |
| Queue Length 95th (ft) | #208 | 98 | 227 | 152 | 56 | 533 | 0 | 281 | #781 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 141 | 296 | 441 | 588 | 441 | 2436 | 812 | 441 | 2738 |
| 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 | 0.62 | 0.28 | 0.36 | 0.28 | 0.05 | 0.56 | 0.09 | 0.45 | 0.72 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 778 | 202 | 279 | 1335 | 373 |
| v/c Ratio | 0.77 | 0.69 | 0.40 | 1.01 | 0.59 | 0.40 | 0.68 | 0.39 | 0.32 | 0.70 | 0.67 | 0.57 |
| Control Delay | 73.1 | 54.0 | 11.5 | 102.6 | 51.7 | 15.6 | 75.8 | 41.6 | 5.9 | 77.7 | 48.2 | 17.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 73.1 | 54.0 | 11.5 | 102.6 | 51.7 | 15.6 | 75.8 | 41.6 | 5.9 | 77.7 | 48.2 | 17.3 |
| Queue Length 50th (ft) | 219 | 301 | 21 | ~311 | 251 | 38 | 139 | 177 | 0 | 138 | 335 | 91 |
| Queue Length 95th (ft) | #403 | 408 | 102 | #592 | 345 | 126 | 227 | 234 | 60 | 234 | 444 | 226 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 570 | 2982 | 820 | 570 | 2982 | 806 | 570 | 3194 | 878 | 456 | 2982 | 859 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.77 | 0.39 | 0.27 | 1.01 | 0.33 | 0.26 | 0.49 | 0.24 | 0.23 | 0.61 | 0.45 | 0.43 |

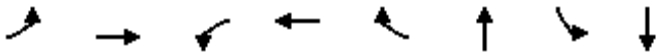
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/28/2024

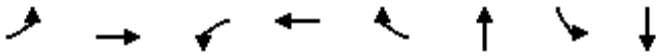


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 15 | 1111 | 77 | 923 | 40 | 119 | 103 | 109 |
| v/c Ratio | 0.09 | 0.56 | 0.33 | 0.34 | 0.04 | 0.42 | 0.41 | 0.35 |
| Control Delay | 36.4 | 19.5 | 35.7 | 11.4 | 0.1 | 9.9 | 35.7 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 19.5 | 35.7 | 11.4 | 0.1 | 9.9 | 35.7 | 13.3 |
| Queue Length 50th (ft) | 6 | 138 | 30 | 72 | 0 | 0 | 42 | 5 |
| Queue Length 95th (ft) | 28 | 230 | 83 | 169 | 0 | 37 | 108 | 54 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 277 | 2652 | 415 | 3153 | 1031 | 377 | 526 | 544 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.42 | 0.19 | 0.29 | 0.04 | 0.32 | 0.20 | 0.20 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 31 | 1204 | 173 | 998 | 40 | 155 | 223 | 220 |
| v/c Ratio | 0.21 | 0.76 | 0.61 | 0.44 | 0.05 | 0.54 | 0.66 | 0.64 |
| Control Delay | 45.2 | 31.9 | 45.8 | 19.3 | 0.1 | 12.2 | 42.7 | 39.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.2 | 31.9 | 45.8 | 19.3 | 0.1 | 12.2 | 42.7 | 39.5 |
| Queue Length 50th (ft) | 16 | 203 | 88 | 139 | 0 | 0 | 118 | 108 |
| Queue Length 95th (ft) | 50 | #347 | 177 | 237 | 0 | 43 | 217 | 205 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 210 | 1736 | 420 | 2408 | 812 | 350 | 599 | 594 |
| 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 | 0.15 | 0.69 | 0.41 | 0.41 | 0.05 | 0.44 | 0.37 | 0.37 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 1586 | 107 | 1005 | 344 | 159 | 175 | 235 | 193 |
| v/c Ratio | 0.69 | 0.94 | 0.57 | 0.96 | 0.60 | 0.66 | 0.46 | 0.73 | 0.47 |
| Control Delay | 66.0 | 52.5 | 67.5 | 63.7 | 22.6 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 66.0 | 52.5 | 67.5 | 63.7 | 22.6 | 66.3 | 32.8 | 64.5 | 35.9 |
| Queue Length 50th (ft) | 147 | 472 | 86 | ~441 | 103 | 127 | 82 | 182 | 102 |
| Queue Length 95th (ft) | 234 | #654 | 153 | #678 | 228 | 208 | 157 | #316 | 194 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 510 | 1690 | 510 | 1050 | 572 | 583 | 719 | 364 | 484 |
| 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 | 0.36 | 0.94 | 0.21 | 0.96 | 0.60 | 0.27 | 0.24 | 0.65 | 0.40 |

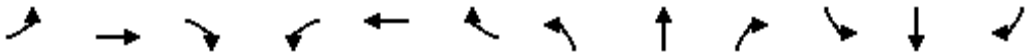
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 263 | 1128 | 274 | 172 | 825 | 240 | 243 | 214 | 98 | 327 | 461 | 310 |
| v/c Ratio | 0.78 | 0.79 | 0.47 | 0.67 | 0.69 | 0.45 | 0.76 | 0.28 | 0.31 | 0.82 | 0.47 | 0.56 |
| Control Delay | 62.1 | 44.4 | 14.5 | 62.5 | 45.3 | 10.4 | 63.2 | 43.8 | 10.8 | 62.3 | 43.4 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.1 | 44.4 | 14.5 | 62.5 | 45.3 | 10.4 | 63.2 | 43.8 | 10.8 | 62.3 | 43.4 | 8.8 |
| Queue Length 50th (ft) | 169 | 261 | 39 | 112 | 191 | 11 | 155 | 49 | 0 | 210 | 106 | 0 |
| Queue Length 95th (ft) | #389 | 457 | 151 | 252 | 334 | 94 | #400 | 87 | 47 | #597 | 176 | 79 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 478 | 1446 | 581 | 398 | 1194 | 530 | 398 | 2201 | 731 | 398 | 2201 | 849 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.78 | 0.47 | 0.43 | 0.69 | 0.45 | 0.61 | 0.10 | 0.13 | 0.82 | 0.21 | 0.37 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 13: Maranatha Dr & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 66 | 1417 | 70 | 62 | 1002 | 94 | 8 | 89 | 69 | 24 | 97 |
| v/c Ratio | 0.33 | 0.72 | 0.08 | 0.32 | 0.36 | 0.40 | 0.03 | 0.26 | 0.29 | 0.08 | 0.28 |
| Control Delay | 41.7 | 18.6 | 4.2 | 41.7 | 12.2 | 35.5 | 28.6 | 8.9 | 32.9 | 29.1 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.7 | 18.6 | 4.2 | 41.7 | 12.2 | 35.5 | 28.6 | 8.9 | 32.9 | 29.1 | 8.8 |
| Queue Length 50th (ft) | 29 | 243 | 0 | 27 | 89 | 41 | 3 | 0 | 29 | 10 | 0 |
| Queue Length 95th (ft) | 86 | #582 | 26 | 82 | 207 | 92 | 16 | 36 | 71 | 32 | 38 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 602 | 2363 | 1041 | 579 | 3309 | 472 | 637 | 593 | 479 | 637 | 597 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.11 | 0.60 | 0.07 | 0.11 | 0.30 | 0.20 | 0.01 | 0.15 | 0.14 | 0.04 | 0.16 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/28/2024

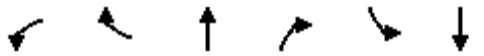
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 1334 | 35 | 18 | 878 | 88 | 61 | 21 | 66 | 57 | 120 |
| v/c Ratio | 0.64 | 0.57 | 0.03 | 0.19 | 0.49 | 0.11 | 0.46 | 0.10 | 0.25 | 0.44 | 0.45 |
| Control Delay | 59.9 | 17.4 | 0.1 | 60.2 | 23.9 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.9 | 17.4 | 0.1 | 60.2 | 23.9 | 4.1 | 66.0 | 45.1 | 3.5 | 65.4 | 13.3 |
| Queue Length 50th (ft) | 142 | 204 | 0 | 14 | 225 | 0 | 48 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | #323 | #757 | 0 | 39 | 408 | 30 | 93 | 32 | 9 | 89 | 47 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 296 | 2360 | 1061 | 169 | 1793 | 830 | 169 | 585 | 564 | 169 | 576 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.57 | 0.03 | 0.11 | 0.49 | 0.11 | 0.36 | 0.04 | 0.12 | 0.34 | 0.21 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/28/2024



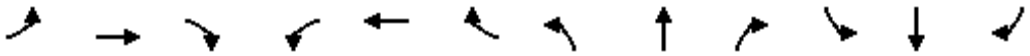
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 330 | 15 | 1058 | 87 | 49 | 1241 |
| v/c Ratio | 0.68 | 0.03 | 0.67 | 0.12 | 0.24 | 0.63 |
| Control Delay | 30.8 | 10.0 | 20.1 | 4.8 | 34.3 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.8 | 10.0 | 20.1 | 4.8 | 34.3 | 12.4 |
| Queue Length 50th (ft) | 134 | 0 | 197 | 0 | 21 | 163 |
| Queue Length 95th (ft) | 227 | 13 | 345 | 28 | 56 | 294 |
| Internal Link Dist (ft) | 770 | | 1985 | | | 2672 |
| Turn Bay Length (ft) | 400 | | | 400 | 400 | |
| Base Capacity (vph) | 939 | 847 | 1698 | 805 | 573 | 2945 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.35 | 0.02 | 0.62 | 0.11 | 0.09 | 0.42 |

Intersection Summary

# Queues

## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 234 | 687 | 420 | 247 | 712 | 23 | 367 | 597 | 119 | 16 | 514 | 123 |
| v/c Ratio | 0.88 | 0.83 | 0.61 | 0.88 | 0.83 | 0.04 | 0.92 | 0.43 | 0.17 | 0.18 | 0.94 | 0.30 |
| Control Delay | 74.4 | 45.5 | 7.4 | 72.0 | 44.6 | 0.1 | 66.5 | 24.2 | 3.4 | 50.2 | 69.2 | 2.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.4 | 45.5 | 7.4 | 72.0 | 44.6 | 0.1 | 66.5 | 24.2 | 3.4 | 50.2 | 69.2 | 2.6 |
| Queue Length 50th (ft) | 148 | 218 | 0 | 156 | 224 | 0 | 228 | 133 | 0 | 10 | 173 | 0 |
| Queue Length 95th (ft) | #286 | #287 | 78 | #294 | 294 | 0 | #395 | 213 | 27 | 32 | #280 | 7 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 273 | 873 | 707 | 291 | 909 | 552 | 419 | 1387 | 699 | 91 | 545 | 410 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 0.79 | 0.59 | 0.85 | 0.78 | 0.04 | 0.88 | 0.43 | 0.17 | 0.18 | 0.94 | 0.30 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

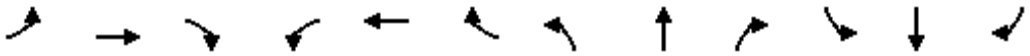
05/28/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 111 | 1302 | 129 | 242 | 1139 |
| v/c Ratio | 0.31 | 0.35 | 0.65 | 0.18 | 0.59 | 0.43 |
| Control Delay | 28.1 | 9.6 | 18.1 | 4.5 | 27.3 | 4.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.1 | 9.6 | 18.1 | 4.5 | 27.3 | 4.8 |
| Queue Length 50th (ft) | 25 | 0 | 138 | 0 | 78 | 79 |
| Queue Length 95th (ft) | 64 | 39 | 232 | 33 | 147 | 134 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 378 | 425 | 2015 | 705 | 945 | 3329 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.20 | 0.26 | 0.65 | 0.18 | 0.26 | 0.34 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 69 | 84 | 59 | 478 | 79 | 216 | 98 | 1117 | 550 | 234 | 879 | 51 |
| v/c Ratio | 0.56 | 0.20 | 0.13 | 0.74 | 0.07 | 0.34 | 0.37 | 0.75 | 0.65 | 0.60 | 0.67 | 0.08 |
| Control Delay | 76.0 | 37.0 | 0.6 | 54.2 | 26.2 | 5.1 | 62.4 | 43.8 | 7.5 | 60.1 | 40.1 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.0 | 37.0 | 0.6 | 54.2 | 26.2 | 5.1 | 62.4 | 43.8 | 7.5 | 60.1 | 40.1 | 0.2 |
| Queue Length 50th (ft) | 61 | 54 | 0 | 209 | 22 | 0 | 43 | 347 | 0 | 103 | 385 | 0 |
| Queue Length 95th (ft) | 111 | 98 | 0 | 272 | 41 | 52 | 74 | 412 | 106 | 151 | #485 | 0 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | |
| Base Capacity (vph) | 433 | 594 | 578 | 891 | 1337 | 725 | 314 | 1761 | 901 | 489 | 1406 | 700 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.16 | 0.14 | 0.10 | 0.54 | 0.06 | 0.30 | 0.31 | 0.63 | 0.61 | 0.48 | 0.63 | 0.07 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/28/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 130 | 94 | 144 | 8 | 156 | 1779 | 39 | 1351 |
| v/c Ratio | 0.64 | 0.26 | 0.67 | 0.02 | 0.59 | 0.83 | 0.27 | 0.79 |
| Control Delay | 52.6 | 11.7 | 53.3 | 0.1 | 49.5 | 22.1 | 50.6 | 26.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.6 | 11.7 | 53.3 | 0.1 | 49.5 | 22.1 | 50.6 | 26.0 |
| Queue Length 50th (ft) | 73 | 5 | 81 | 0 | 89 | 472 | 23 | 339 |
| Queue Length 95th (ft) | 152 | 49 | 166 | 0 | 174 | #827 | 62 | 565 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 313 | 525 | 333 | 511 | 482 | 2133 | 482 | 1992 |
| 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 | 0.42 | 0.18 | 0.43 | 0.02 | 0.32 | 0.83 | 0.08 | 0.68 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

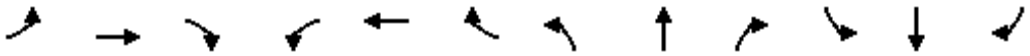
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 93 | 75 | 124 | 140 | 66 | 1794 | 86 | 133 | 1374 |
| v/c Ratio | 0.68 | 0.37 | 0.47 | 0.46 | 0.42 | 0.80 | 0.11 | 0.59 | 0.54 |
| Control Delay | 77.4 | 40.3 | 54.0 | 29.3 | 60.1 | 31.7 | 0.7 | 59.1 | 22.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 77.4 | 40.3 | 54.0 | 29.3 | 60.1 | 31.7 | 0.7 | 59.1 | 22.7 |
| Queue Length 50th (ft) | 60 | 35 | 78 | 52 | 42 | 342 | 0 | 83 | 213 |
| Queue Length 95th (ft) | #218 | 89 | 185 | 114 | 114 | #828 | 3 | 194 | 483 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 137 | 291 | 427 | 570 | 427 | 2358 | 788 | 427 | 2549 |
| 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 | 0.68 | 0.26 | 0.29 | 0.25 | 0.15 | 0.76 | 0.11 | 0.31 | 0.54 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1326 | 270 | 240 | 996 | 322 |
| v/c Ratio | 1.07 | 0.71 | 0.35 | 0.76 | 0.62 | 0.33 | 0.89 | 0.67 | 0.42 | 0.67 | 0.62 | 0.57 |
| Control Delay | 118.5 | 52.3 | 13.4 | 74.2 | 50.2 | 18.0 | 83.8 | 49.7 | 8.7 | 79.3 | 53.7 | 17.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 118.5 | 52.3 | 13.4 | 74.2 | 50.2 | 18.0 | 83.8 | 49.7 | 8.7 | 79.3 | 53.7 | 17.0 |
| Queue Length 50th (ft) | ~346 | 344 | 32 | 216 | 294 | 46 | 258 | 345 | 17 | 122 | 263 | 64 |
| Queue Length 95th (ft) | #614 | 446 | 109 | #380 | 385 | 125 | #479 | 444 | 97 | 202 | 334 | 178 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 557 | 2913 | 783 | 557 | 2913 | 767 | 557 | 3122 | 884 | 445 | 2913 | 831 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.07 | 0.45 | 0.25 | 0.76 | 0.40 | 0.23 | 0.89 | 0.42 | 0.31 | 0.54 | 0.34 | 0.39 |

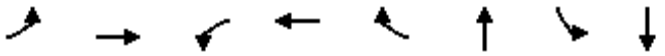
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/28/2024

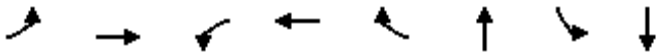


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 57 | 853 | 50 | 729 | 135 | 59 | 72 | 81 |
| v/c Ratio | 0.21 | 0.35 | 0.19 | 0.30 | 0.16 | 0.23 | 0.26 | 0.26 |
| Control Delay | 28.7 | 15.6 | 28.6 | 15.4 | 4.7 | 17.8 | 28.2 | 12.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.7 | 15.6 | 28.6 | 15.4 | 4.7 | 17.8 | 28.2 | 12.1 |
| Queue Length 50th (ft) | 19 | 94 | 17 | 79 | 0 | 7 | 25 | 3 |
| Queue Length 95th (ft) | 58 | 156 | 53 | 132 | 36 | 42 | 71 | 43 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 383 | 3773 | 383 | 3814 | 1221 | 388 | 728 | 703 |
| 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 | 0.15 | 0.23 | 0.13 | 0.19 | 0.11 | 0.15 | 0.10 | 0.12 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 126 | 809 | 95 | 848 | 138 | 115 | 155 | 150 |
| v/c Ratio | 0.42 | 0.49 | 0.36 | 0.54 | 0.24 | 0.44 | 0.48 | 0.46 |
| Control Delay | 36.5 | 21.8 | 37.1 | 23.8 | 5.9 | 21.9 | 35.8 | 32.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.5 | 21.8 | 37.1 | 23.8 | 5.9 | 21.9 | 35.8 | 32.6 |
| Queue Length 50th (ft) | 52 | 105 | 39 | 117 | 0 | 16 | 66 | 56 |
| Queue Length 95th (ft) | 126 | 182 | 103 | 201 | 42 | 76 | 153 | 140 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 595 | 3312 | 446 | 3097 | 1018 | 343 | 565 | 561 |
| 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 | 0.21 | 0.24 | 0.21 | 0.27 | 0.14 | 0.34 | 0.27 | 0.27 |

Intersection Summary

# Queues
## 11: Glacier Point Dr & Morada Ln

05/28/2024

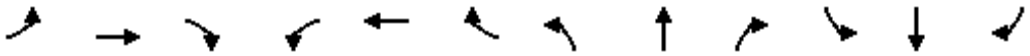
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 38 | 1065 | 48 | 1339 | 77 | 48 | 54 | 103 | 81 |
| v/c Ratio | 0.25 | 0.46 | 0.29 | 0.81 | 0.10 | 0.27 | 0.17 | 0.47 | 0.19 |
| Control Delay | 48.6 | 22.6 | 48.5 | 31.6 | 2.4 | 47.5 | 12.5 | 47.9 | 10.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.6 | 22.6 | 48.5 | 31.6 | 2.4 | 47.5 | 12.5 | 47.9 | 10.8 |
| Queue Length 50th (ft) | 19 | 146 | 24 | 332 | 0 | 24 | 3 | 51 | 6 |
| Queue Length 95th (ft) | 60 | 288 | 71 | #728 | 14 | 71 | 34 | 123 | 41 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 727 | 2345 | 727 | 1654 | 764 | 830 | 969 | 519 | 687 |
| 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 | 0.05 | 0.45 | 0.07 | 0.81 | 0.10 | 0.06 | 0.06 | 0.20 | 0.12 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 190 | 717 | 148 | 148 | 977 | 266 | 193 | 351 | 184 | 175 | 255 | 172 |
| v/c Ratio | 0.64 | 0.47 | 0.26 | 0.58 | 0.69 | 0.46 | 0.67 | 0.43 | 0.45 | 0.63 | 0.33 | 0.45 |
| Control Delay | 51.8 | 31.8 | 7.1 | 52.9 | 37.7 | 12.8 | 54.8 | 39.4 | 9.7 | 53.9 | 38.9 | 10.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.8 | 31.8 | 7.1 | 52.9 | 37.7 | 12.8 | 54.8 | 39.4 | 9.7 | 53.9 | 38.9 | 10.0 |
| Queue Length 50th (ft) | 98 | 118 | 0 | 77 | 177 | 25 | 100 | 67 | 0 | 91 | 48 | 0 |
| Queue Length 95th (ft) | 264 | 271 | 56 | 217 | 398 | 140 | 279 | 135 | 62 | 254 | 101 | 60 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 573 | 1680 | 614 | 477 | 1409 | 580 | 477 | 2635 | 898 | 477 | 2635 | 892 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.43 | 0.24 | 0.31 | 0.69 | 0.46 | 0.40 | 0.13 | 0.20 | 0.37 | 0.10 | 0.19 |

Intersection Summary

# Queues
## 13: Maranatha Dr & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 998 | 37 | 109 | 1450 | 29 | 16 | 98 | 54 | 16 | 38 |
| v/c Ratio | 0.30 | 0.51 | 0.04 | 0.37 | 0.50 | 0.12 | 0.05 | 0.28 | 0.22 | 0.05 | 0.12 |
| Control Delay | 35.3 | 16.1 | 1.5 | 34.4 | 14.1 | 27.4 | 26.5 | 8.7 | 28.8 | 26.5 | 2.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 35.3 | 16.1 | 1.5 | 34.4 | 14.1 | 27.4 | 26.5 | 8.7 | 28.8 | 26.5 | 2.9 |
| Queue Length 50th (ft) | 25 | 136 | 0 | 35 | 131 | 9 | 5 | 0 | 18 | 5 | 0 |
| Queue Length 95th (ft) | 97 | 366 | 7 | 126 | 333 | 38 | 25 | 39 | 60 | 25 | 9 |
| Internal Link Dist (ft) | | 1519 | | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 793 | 2768 | 1224 | 762 | 3897 | 619 | 829 | 750 | 619 | 829 | 733 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.36 | 0.03 | 0.14 | 0.37 | 0.05 | 0.02 | 0.13 | 0.09 | 0.02 | 0.05 |

Intersection Summary

# Queues

## 14: Diamond Bar Pl & Morada Ln

05/28/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 227 | 865 | 46 | 52 | 1248 | 182 | 27 | 16 | 30 | 141 | 284 |
| v/c Ratio | 0.80 | 0.39 | 0.05 | 0.43 | 0.68 | 0.21 | 0.27 | 0.09 | 0.11 | 0.90 | 0.62 |
| Control Delay | 74.9 | 17.1 | 0.1 | 70.8 | 29.1 | 8.7 | 67.2 | 49.6 | 0.8 | 109.5 | 12.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.9 | 17.1 | 0.1 | 70.8 | 29.1 | 8.7 | 67.2 | 49.6 | 0.8 | 109.5 | 12.9 |
| Queue Length 50th (ft) | 190 | 177 | 0 | 45 | 399 | 21 | 23 | 14 | 0 | 125 | 14 |
| Queue Length 95th (ft) | #335 | 398 | 0 | 88 | #792 | 92 | 55 | 29 | 0 | #254 | 80 |
| Internal Link Dist (ft) | | 790 | | | 329 | | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 180 | 100 | | 110 | 65 | | 65 | 150 | |
| Base Capacity (vph) | 294 | 2211 | 1002 | 158 | 1839 | 863 | 157 | 542 | 551 | 157 | 649 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.77 | 0.39 | 0.05 | 0.33 | 0.68 | 0.21 | 0.17 | 0.03 | 0.05 | 0.90 | 0.44 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/28/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 196 | 7 | 1266 | 147 | 60 | 1186 |
| v/c Ratio | 0.58 | 0.02 | 0.68 | 0.16 | 0.29 | 0.52 |
| Control Delay | 32.0 | 13.7 | 17.3 | 3.3 | 32.0 | 7.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 32.0 | 13.7 | 17.3 | 3.3 | 32.0 | 7.9 |
| Queue Length 50th (ft) | 75 | 0 | 218 | 0 | 23 | 114 |
| Queue Length 95th (ft) | 140 | 9 | #411 | 32 | 59 | 203 |
| Internal Link Dist (ft) | 770 | | 1985 | | | 2672 |
| Turn Bay Length (ft) | 400 | | | 400 | 400 | |
| Base Capacity (vph) | 878 | 789 | 1857 | 900 | 532 | 2980 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.22 | 0.01 | 0.68 | 0.16 | 0.11 | 0.40 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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# Appendix J: Cumulative and Cumulative Plus Project Signal Warrant Worksheets

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Caywood Drive |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Cumulative No Project |
| Peak Hour | AM |

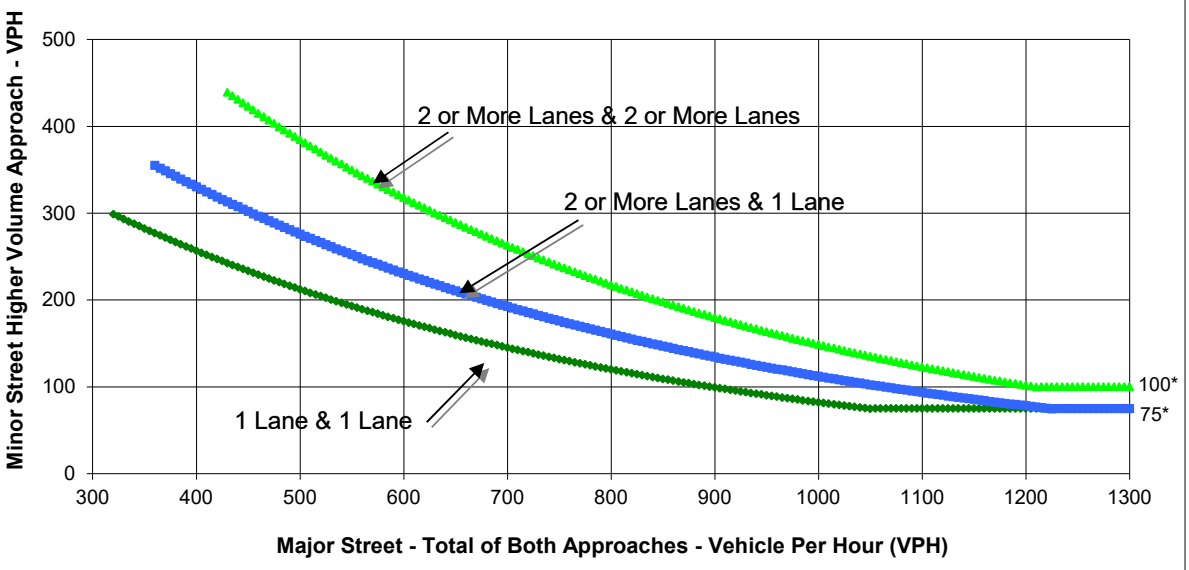
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 23 | 0 | 0 | 73 |
| Through | 0 | 0 | 1,282 | 876 |
| Right | 0 | 0 | 107 | 0 |
| Total | 23 | 0 | 1,389 | 949 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,338** | **23** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive | Scenario | Cumulative No Project |
| | | Peak Hour | PM |

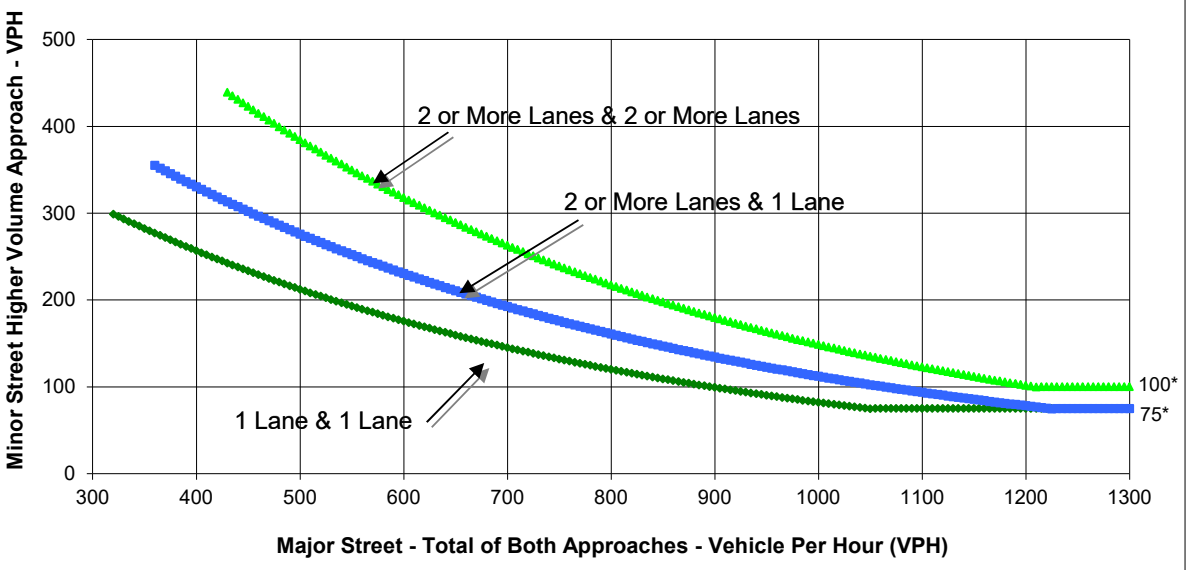
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 19 | 0 | 0 | 49 |
| Through | 0 | 0 | 874 | 1,045 |
| Right | 0 | 0 | 46 | 0 |
| Total | 19 | 0 | 920 | 1,094 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,014** | **19** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | |
|---|---|
| Major Street | Morada Lane |
| Minor Street | Cherbourg Way |

| | |
|---|---|
| Project | Bear Creek South Residential |
| Scenario | Cumulative No Project |
| Peak Hour | AM |

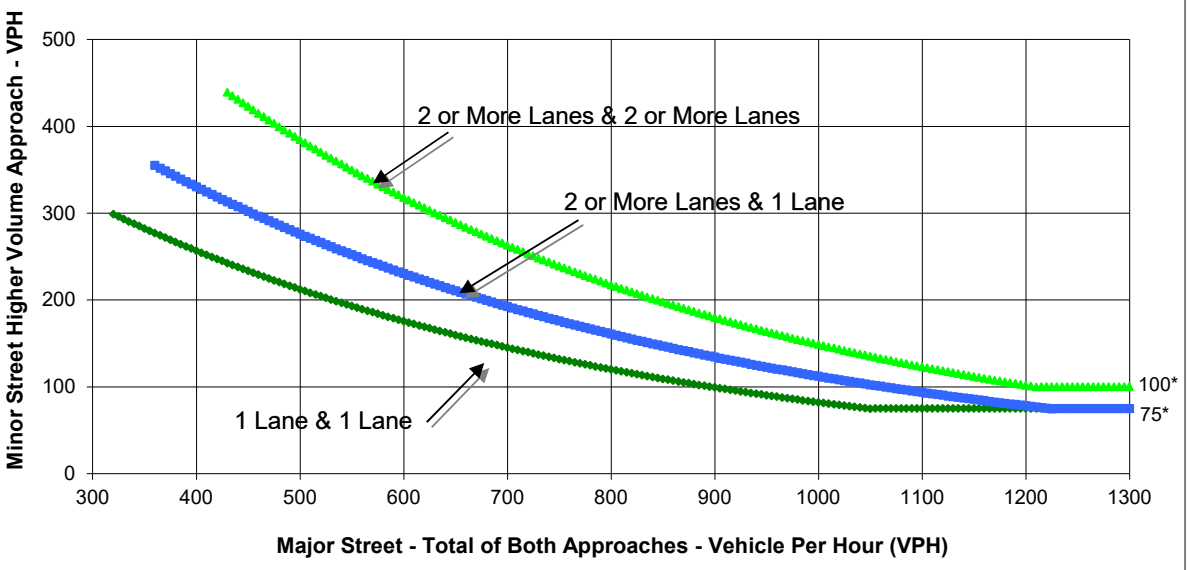
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 0 | 0 | 161 |
| Through | 0 | 0 | 1,315 | 941 |
| Right | 0 | 0 | 57 | 0 |
| Total | 8 | 0 | 1,372 | 1,102 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,474** | **8** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way | Scenario | Cumulative No Project |
| | | Peak Hour | PM |

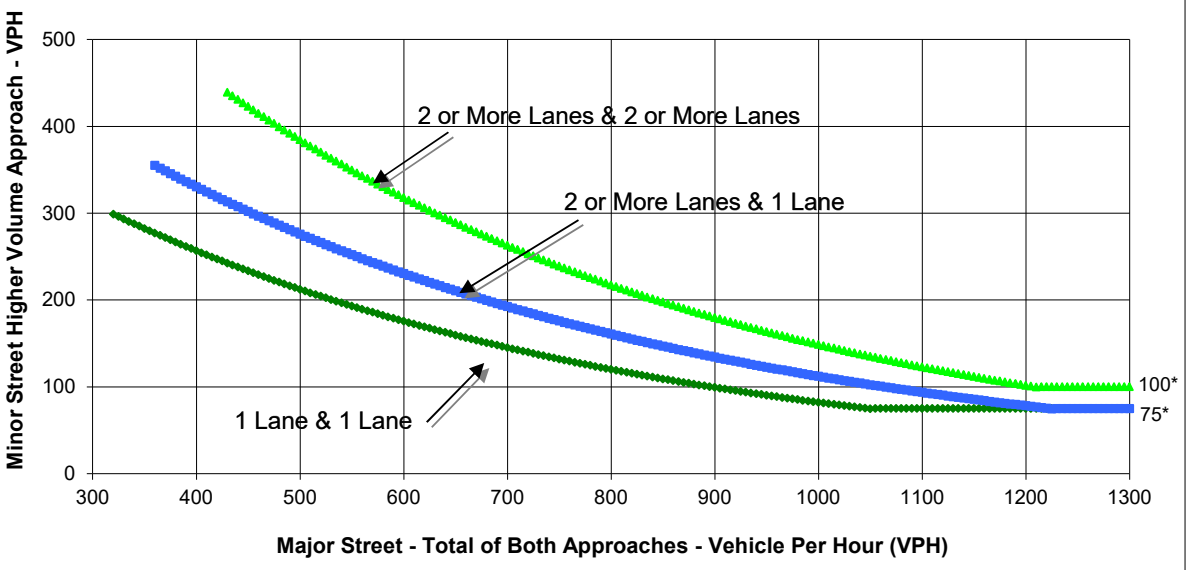
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 33 | 0 | 0 | 92 |
| Through | 0 | 0 | 847 | 1,061 |
| Right | 0 | 0 | 65 | 0 |
| Total | 33 | 0 | 912 | 1,153 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,065** | **33** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive | Scenario | Cumulative No Project |
| | | Peak Hour | AM |

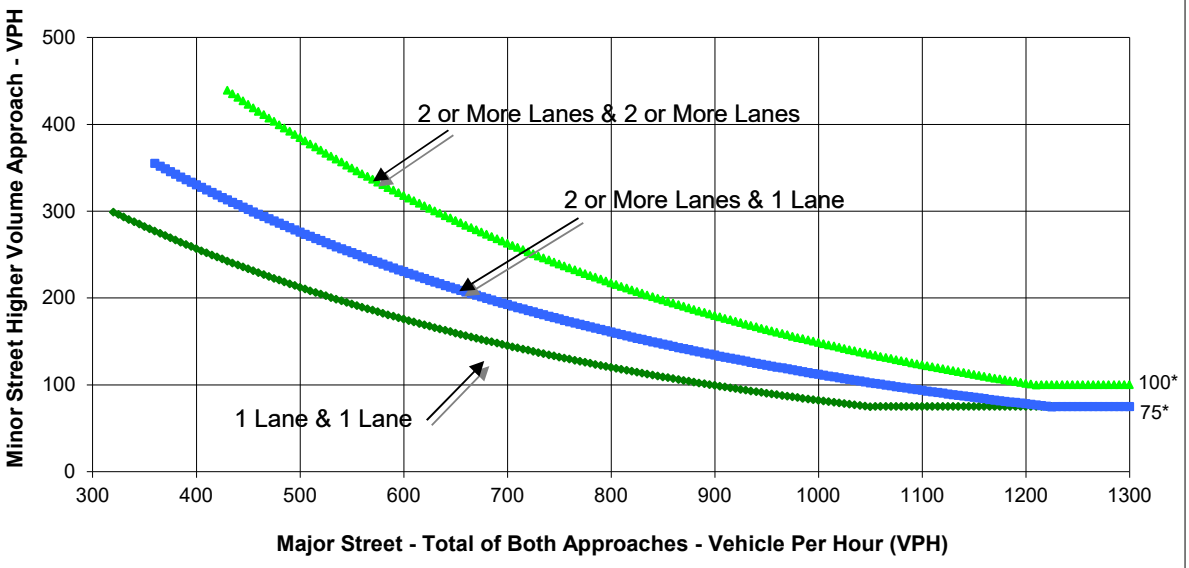
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 25 | 0 | 0 | 77 |
| Through | 0 | 0 | 1,413 | 1,077 |
| Right | 0 | 0 | 38 | 0 |
| Total | 25 | 0 | 1,451 | 1,154 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | **Major Street** | **Minor Street** | **Warrant Met** |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,605** | **25** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive | Scenario | Cumulative No Project |
| | | Peak Hour | PM |

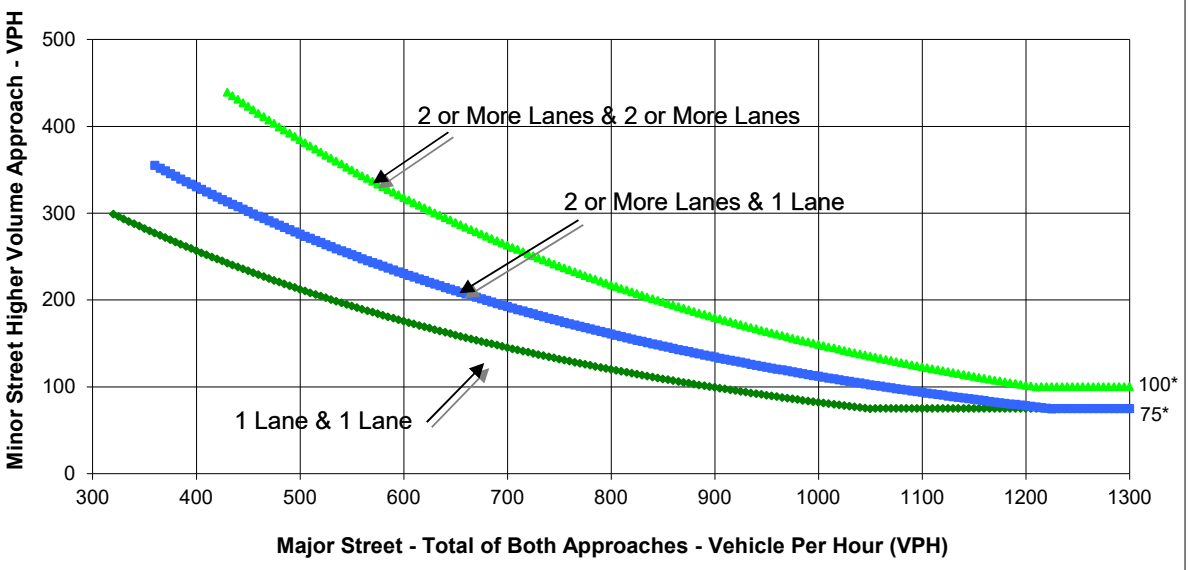
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 44 | 0 | 0 | 90 |
| Through | 0 | 0 | 869 | 1,109 |
| Right | 0 | 0 | 54 | 0 |
| Total | 44 | 0 | 923 | 1,199 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive | |
| **Number of Approach Lanes** | **2** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **2,122** | **44** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Cumulative Plus Project |
| | | Peak Hour | AM |

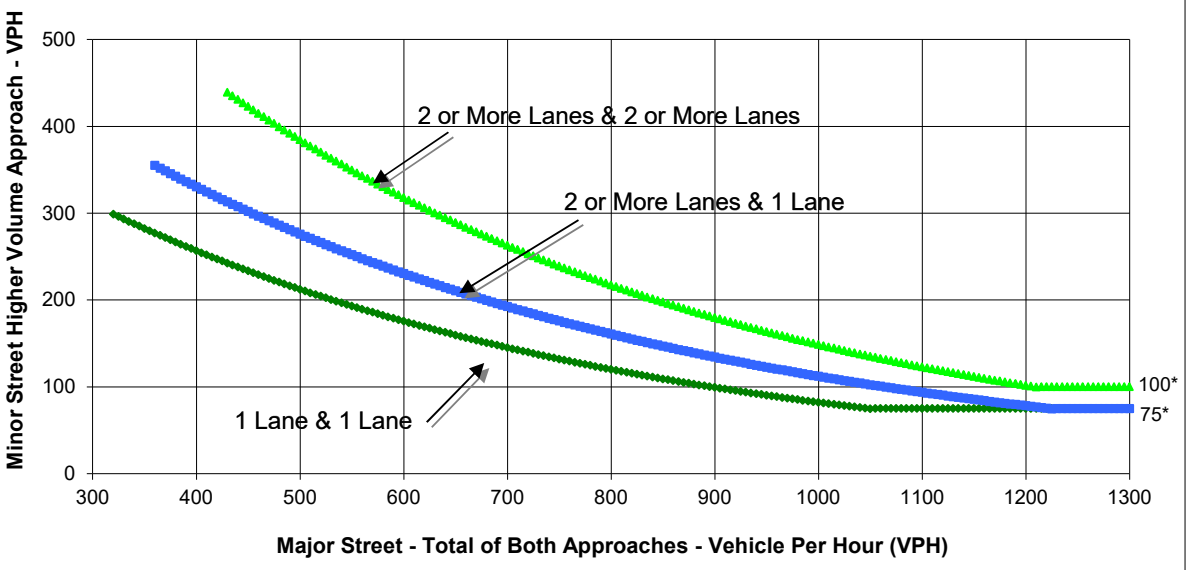
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 61 | 0 | 100 |
| Through | 1,220 | 1,859 | 0 | 0 |
| Right | 35 | 0 | 0 | 146 |
| Total | 1,255 | 1,920 | 0 | 246 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **3,175** | **246** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

| | | | |
|---|---|---|---|
| Major Street | West Lane | Project | Bear Creek South Residential |
| Minor Street | Project Driveway #1 | Scenario | Cumulative Plus Project |
| | | Peak Hour | PM |

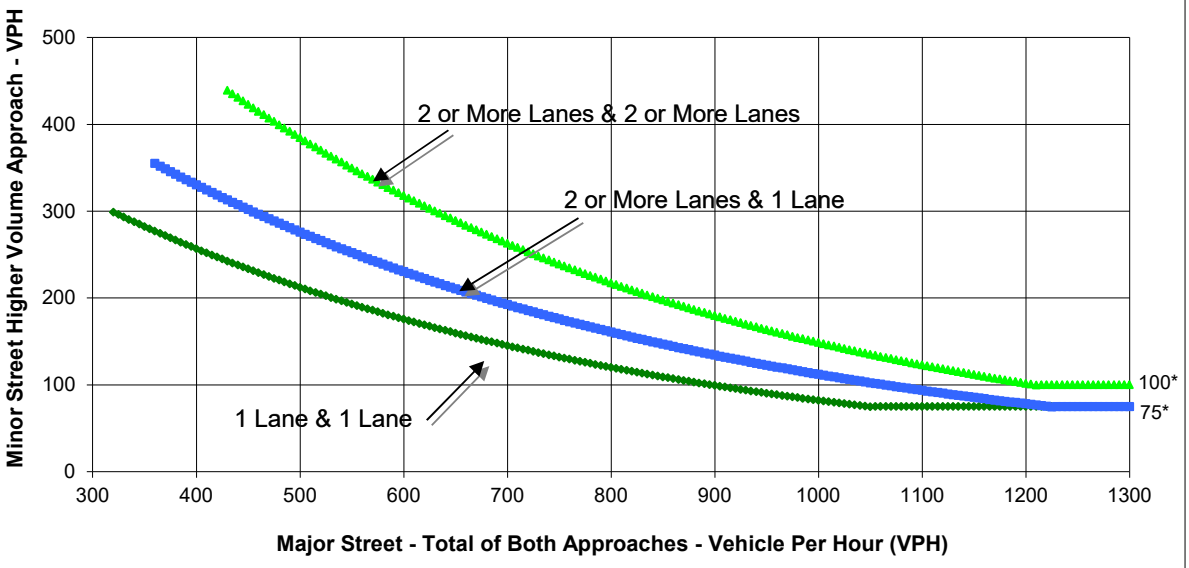
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 0 | 223 | 0 | 70 |
| Through | 1,768 | 1,473 | 0 | 0 |
| Right | 119 | 0 | 0 | 102 |
| Total | 1,887 | 1,696 | 0 | 172 |

Major Street Direction

| | |
|---|---|
| x | North/South |
| | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | **Major Street** | **Minor Street** | **Warrant Met** |
|---|---|---|---|
| | West Lane | Project Driveway #1 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **3,583** | **172** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive/Project Driveway #3 | Scenario | Cumulative Plus Project |
| | | Peak Hour | AM |

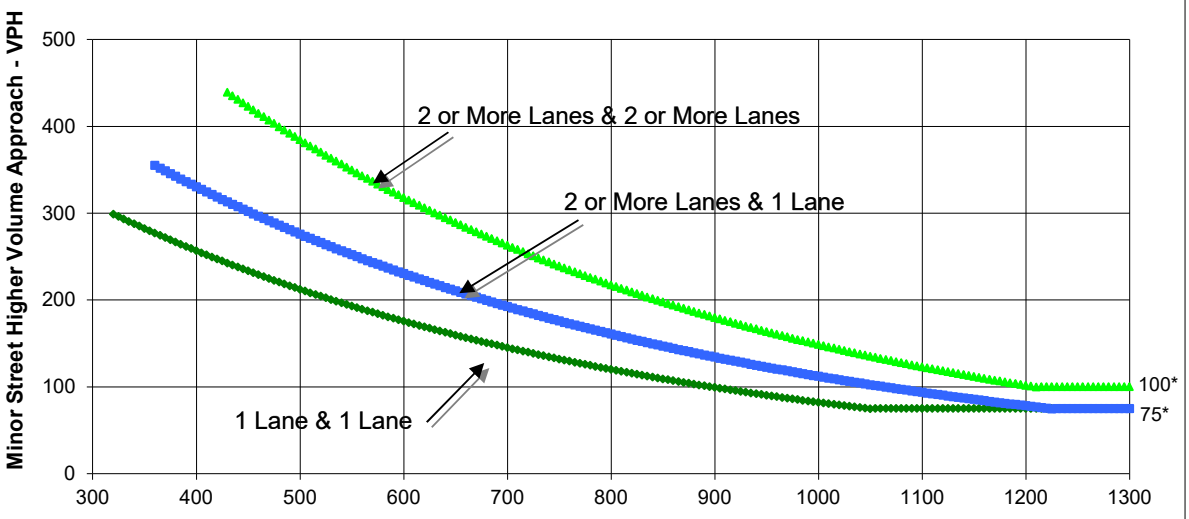
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 23 | 105 | 14 | 73 |
| Through | 0 | 2 | 1,324 | 1,008 |
| Right | 0 | 86 | 107 | 36 |
| Total | 23 | 193 | 1,445 | 1,117 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,562** | **193** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Caywood Drive/Project Driveway #3 | Scenario | Cumulative Plus Project |
| | | Peak Hour | PM |

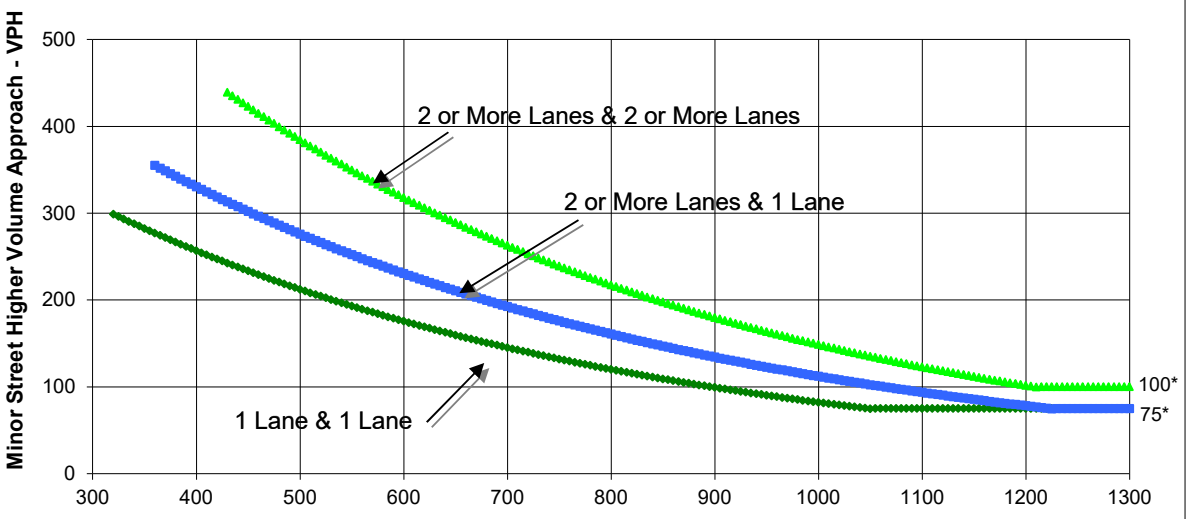
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 19 | 75 | 54 | 49 |
| Through | 2 | 2 | 1,038 | 1,143 |
| Right | 0 | 67 | 46 | 127 |
| Total | 21 | 144 | 1,138 | 1,319 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Caywood Drive/Project Driveway #3 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,457** | **144** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Cumulative Plus Project |
| | | Peak Hour | AM |

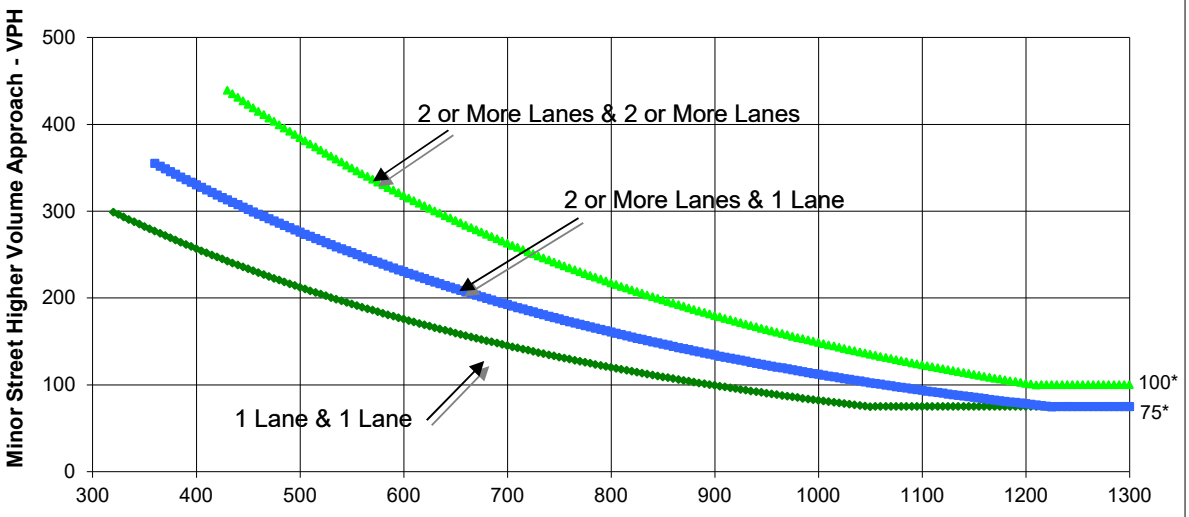
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 8 | 343 | 28 | 161 |
| Through | 0 | 2 | 1,434 | 1,059 |
| Right | 0 | 50 | 57 | 36 |
| Total | 8 | 395 | 1,519 | 1,256 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,775** | **395** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Cherbourg Way/Project Driveway #4 | Scenario | Cumulative Plus Project |
| | | Peak Hour | PM |

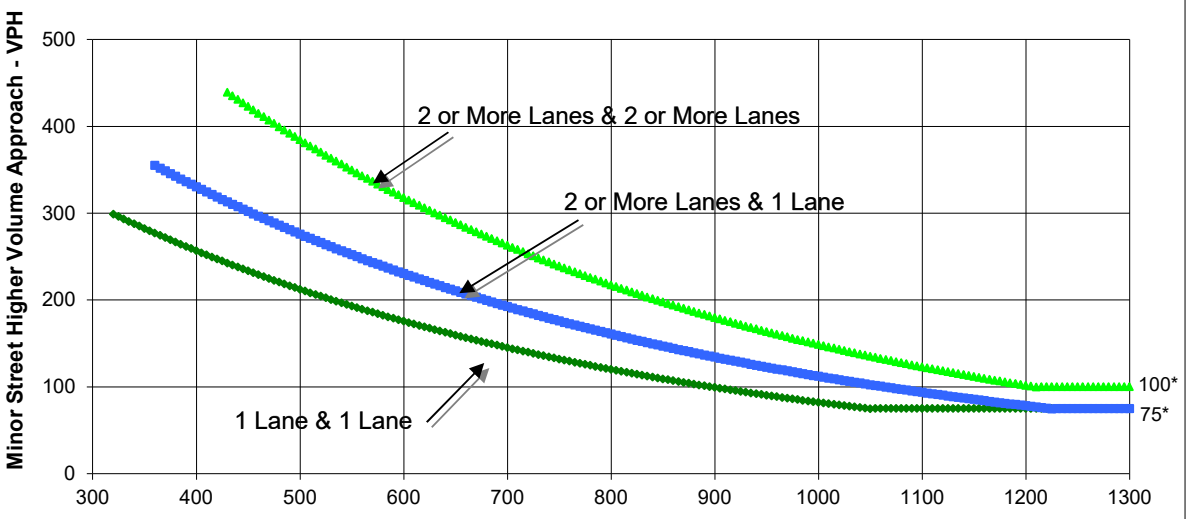
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 33 | 244 | 117 | 92 |
| Through | 3 | 2 | 969 | 1,248 |
| Right | 0 | 38 | 65 | 128 |
| Total | 36 | 284 | 1,151 | 1,468 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Cherbourg Way/Project Driveway #4 | |
| **Number of Approach Lanes** | **3** | **2** | **YES** |
| **Traffic Volume (VPH) *** | **2,619** | **284** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Cumulative Plus Project |
| | | Peak Hour | AM |

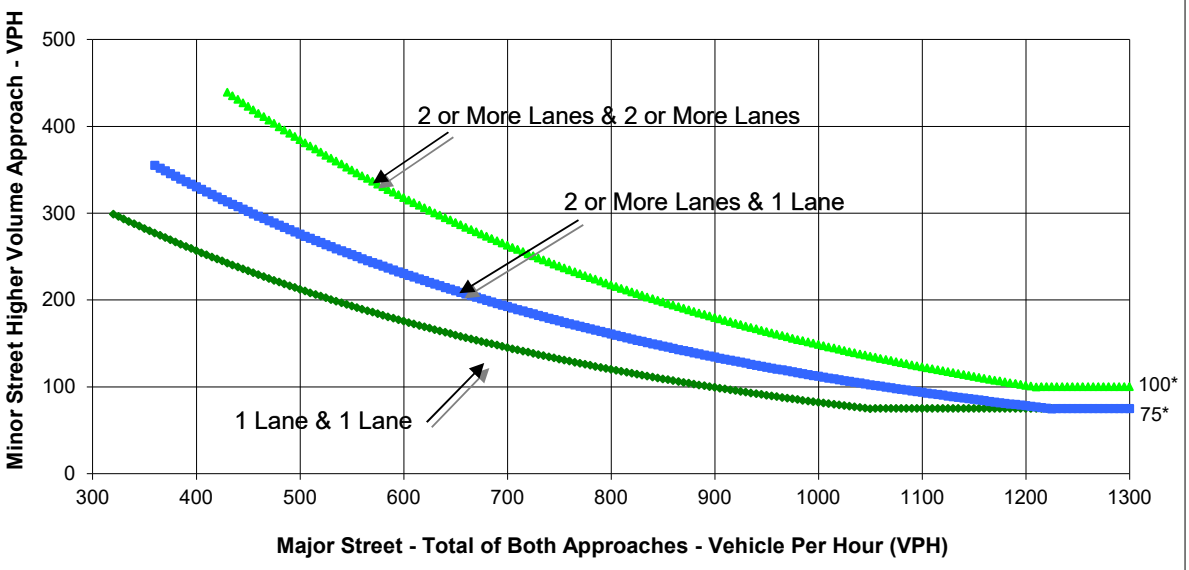
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 25 | 0 | 14 | 77 |
| Through | 0 | 0 | 1,861 | 1,149 |
| Right | 0 | 0 | 38 | 80 |
| Total | 25 | 0 | 1,913 | 1,306 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **3,219** | **25** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

** NB Approach is wide enough to accommodate left-turning and right-turning vehicles at the same time.*
*Right-turning vehicles removed from NB Approach per signal warrant analysis standard practice.*

| | | | |
|---|---|---|---|
| Major Street | Morada Lane | Project | Bear Creek South Residential |
| Minor Street | Fox Creek Drive/Project Driveway #5 | Scenario | Cumulative Plus Project |
| | | Peak Hour | PM |

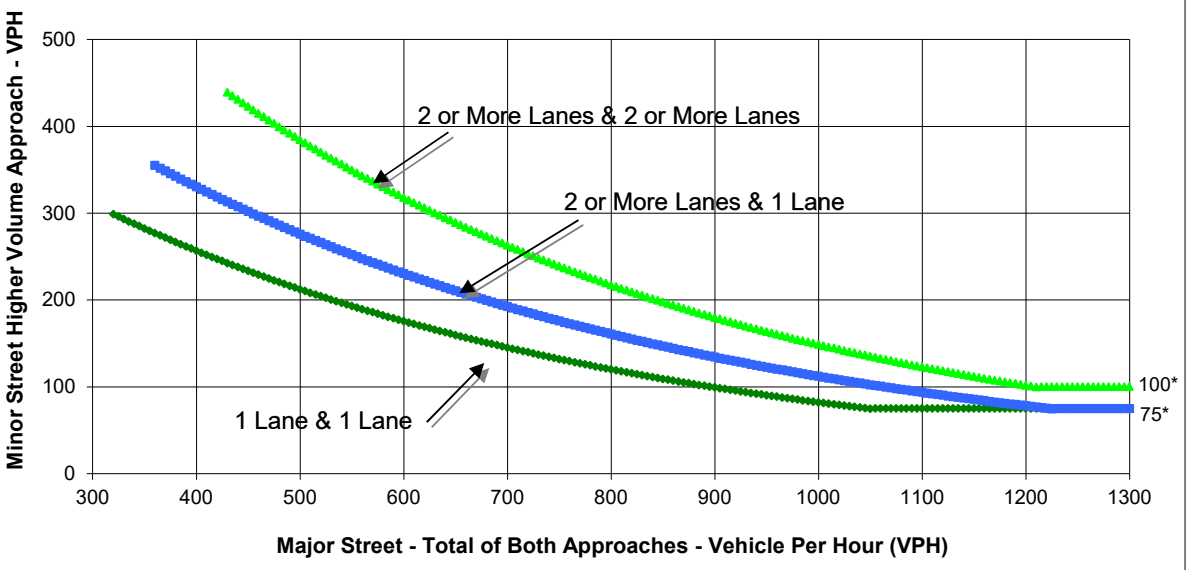
Turn Movement Volumes

| | NB | SB | EB | WB |
|---|---|---|---|---|
| Left | 44 | 0 | 47 | 90 |
| Through | 0 | 0 | 1,188 | 1,364 |
| Right | 0 | 0 | 54 | 291 |
| Total | 44 | 0 | 1,289 | 1,745 |

Major Street Direction

| | |
|---|---|
| | North/South |
| x | East/West |

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**
**(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)**




* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2014

| | Major Street | Minor Street | Warrant Met |
|---|---|---|---|
| | Morada Lane | Fox Creek Drive/Project Driveway #5 | |
| **Number of Approach Lanes** | **3** | **1** | **NO** |
| **Traffic Volume (VPH) *** | **3,034** | **44** | |

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

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# Appendix K: Cumulative and Cumulative Plus Project LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/29/2024

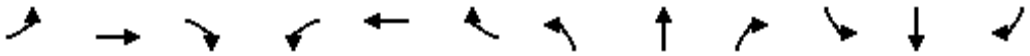
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 208 | 982 | 469 | 332 | 1058 | 50 | 347 | 509 | 285 | 55 | 548 | 182 |
| Future Volume (veh/h) | 208 | 982 | 469 | 332 | 1058 | 50 | 347 | 509 | 285 | 55 | 548 | 182 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 221 | 1045 | 349 | 353 | 1126 | 53 | 369 | 541 | 303 | 59 | 583 | 194 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 259 | 1472 | 457 | 434 | 1371 | 426 | 456 | 1038 | 457 | 77 | 723 | 322 |
| Arrive On Green | 0.15 | 0.29 | 0.29 | 0.13 | 0.27 | 0.27 | 0.13 | 0.29 | 0.29 | 0.04 | 0.20 | 0.20 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5106 | 1585 | 3456 | 3554 | 1564 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 221 | 1045 | 349 | 353 | 1126 | 53 | 369 | 541 | 303 | 59 | 583 | 194 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1585 | 1728 | 1777 | 1564 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 10.6 | 16.1 | 17.6 | 8.7 | 18.2 | 2.2 | 9.1 | 11.2 | 14.9 | 2.9 | 13.7 | 9.7 |
| Cycle Q Clear(g_c), s | 10.6 | 16.1 | 17.6 | 8.7 | 18.2 | 2.2 | 9.1 | 11.2 | 14.9 | 2.9 | 13.7 | 9.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 259 | 1472 | 457 | 434 | 1371 | 426 | 456 | 1038 | 457 | 77 | 723 | 322 |
| V/C Ratio(X) | 0.85 | 0.71 | 0.76 | 0.81 | 0.82 | 0.12 | 0.81 | 0.52 | 0.66 | 0.76 | 0.81 | 0.60 |
| Avail Cap(c_a), veh/h | 325 | 1687 | 524 | 512 | 1513 | 470 | 591 | 1134 | 499 | 162 | 850 | 379 |
| 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 | 36.6 | 27.9 | 28.5 | 37.4 | 30.1 | 24.3 | 37.0 | 25.9 | 27.3 | 41.5 | 33.3 | 31.7 |
| Incr Delay (d2), s/veh | 16.2 | 1.2 | 5.8 | 8.4 | 3.5 | 0.1 | 6.4 | 0.4 | 2.9 | 14.2 | 5.0 | 2.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.5 | 6.2 | 6.8 | 4.0 | 7.3 | 0.8 | 4.0 | 4.4 | 5.4 | 1.6 | 6.3 | 3.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 52.8 | 29.1 | 34.3 | 45.8 | 33.6 | 24.4 | 43.4 | 26.4 | 30.2 | 55.7 | 38.3 | 33.7 |
| LnGrp LOS | D | C | C | D | C | C | D | C | C | E | D | C |
| Approach Vol, veh/h | | 1615 | | | 1532 | | | 1213 | | | 836 | |
| Approach Delay, s/veh | | 33.5 | | | 36.1 | | | 32.5 | | | 38.5 | |
| Approach LOS | | C | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.0 | 31.3 | 16.6 | 23.9 | 17.8 | 29.6 | 8.8 | 31.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 13.0 | 29.0 | 15.0 | 21.0 | 16.0 | 26.0 | 8.0 | 28.0 |
| Max Q Clear Time (g_c+I1), s | 10.7 | 19.6 | 11.1 | 15.7 | 12.6 | 20.2 | 4.9 | 16.9 |
| Green Ext Time (p_c), s | 0.3 | 5.2 | 0.5 | 2.1 | 0.2 | 3.4 | 0.0 | 3.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 34.8 |
| HCM 6th LOS | C |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 197 | 562 | 404 | 296 | 362 | 196 | 505 | 791 | 344 | 432 | 1176 | 251 |
| Future Volume (veh/h) | 197 | 562 | 404 | 296 | 362 | 196 | 505 | 791 | 344 | 432 | 1176 | 251 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.83 | 1.00 | | 0.97 | 1.00 | | 0.99 | 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 | 214 | 611 | 307 | 322 | 393 | 213 | 549 | 860 | 374 | 470 | 1278 | 273 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 474 | 946 | 350 | 392 | 248 | 135 | 369 | 1260 | 386 | 369 | 1260 | 383 |
| Arrive On Green | 0.27 | 0.27 | 0.27 | 0.22 | 0.22 | 0.22 | 0.11 | 0.25 | 0.25 | 0.11 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1781 | 3554 | 1316 | 1781 | 1129 | 612 | 3456 | 5106 | 1563 | 3456 | 5106 | 1550 |
| Grp Volume(v), veh/h | 214 | 611 | 307 | 322 | 0 | 606 | 549 | 860 | 374 | 470 | 1278 | 273 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1316 | 1781 | 0 | 1740 | 1728 | 1702 | 1563 | 1728 | 1702 | 1550 |
| Q Serve(g_s), s | 15.0 | 22.8 | 33.5 | 25.8 | 0.0 | 33.0 | 16.0 | 22.9 | 35.5 | 16.0 | 37.0 | 24.1 |
| Cycle Q Clear(g_c), s | 15.0 | 22.8 | 33.5 | 25.8 | 0.0 | 33.0 | 16.0 | 22.9 | 35.5 | 16.0 | 37.0 | 24.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.35 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 474 | 946 | 350 | 392 | 0 | 383 | 369 | 1260 | 386 | 369 | 1260 | 383 |
| V/C Ratio(X) | 0.45 | 0.65 | 0.88 | 0.82 | 0.00 | 1.58 | 1.49 | 0.68 | 0.97 | 1.27 | 1.01 | 0.71 |
| Avail Cap(c_a), veh/h | 475 | 948 | 351 | 392 | 0 | 383 | 369 | 1260 | 386 | 369 | 1260 | 383 |
| 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 | 45.9 | 48.7 | 52.6 | 55.6 | 0.0 | 58.5 | 67.0 | 51.1 | 55.9 | 67.0 | 56.5 | 51.6 |
| Incr Delay (d2), s/veh | 0.7 | 1.5 | 21.1 | 12.3 | 0.0 | 274.1 | 233.8 | 1.5 | 37.6 | 143.0 | 28.9 | 6.2 |
| 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 | 6.9 | 10.5 | 13.2 | 12.7 | 0.0 | 43.4 | 19.0 | 9.8 | 17.8 | 14.2 | 18.8 | 9.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.5 | 50.3 | 73.8 | 67.9 | 0.0 | 332.5 | 300.7 | 52.7 | 93.5 | 209.9 | 85.3 | 57.8 |
| LnGrp LOS | D | D | E | E | A | F | F | D | F | F | F | E |
| Approach Vol, veh/h | | 1132 | | | 928 | | | 1783 | | | 2021 | |
| Approach Delay, s/veh | | 55.9 | | | 240.7 | | | 137.6 | | | 110.6 | |
| Approach LOS | | E | | | F | | | F | | | F | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 22.0 | 43.0 | | 39.0 | 22.0 | 43.0 | | 45.9 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 37.0 | | 33.0 | 16.0 | 37.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 18.0 | 37.5 | | 35.0 | 18.0 | 39.0 | | 35.5 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | | 2.5 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 128.8 | |
| HCM 6th LOS | | F | |

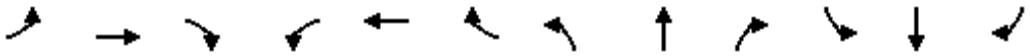
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/29/2024



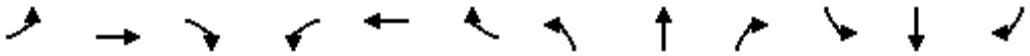
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 164 | 4 | 145 | 235 | 17 | 15 | 199 | 1285 | 65 | 66 | 1779 | 113 |
| Future Volume (vph) | 164 | 4 | 145 | 235 | 17 | 15 | 199 | 1285 | 65 | 66 | 1779 | 113 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 5038 | | 1770 | 5032 | |
| Flt Permitted | | 0.33 | 1.00 | | 0.50 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 608 | 1583 | | 933 | 1563 | 1770 | 5038 | | 1770 | 5032 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 178 | 4 | 158 | 255 | 18 | 16 | 216 | 1397 | 71 | 72 | 1934 | 123 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 0 | 12 | 0 | 4 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 0 | 182 | 82 | 0 | 273 | 4 | 216 | 1464 | 0 | 72 | 2051 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 26.7 | 26.7 | | 26.7 | 26.7 | 18.6 | 64.2 | | 8.7 | 54.3 | |
| Effective Green, g (s) | | 26.7 | 26.7 | | 26.7 | 26.7 | 18.6 | 64.2 | | 8.7 | 54.3 | |
| Actuated g/C Ratio | | 0.23 | 0.23 | | 0.23 | 0.23 | 0.16 | 0.56 | | 0.08 | 0.47 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 140 | 365 | | 215 | 361 | 284 | 2797 | | 133 | 2363 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.29 | | 0.04 | c0.41 | |
| v/s Ratio Perm | | c0.30 | 0.05 | | 0.29 | 0.00 | | | | | | |
| v/c Ratio | | 1.30 | 0.22 | | 1.27 | 0.01 | 0.76 | 0.52 | | 0.54 | 0.87 | |
| Uniform Delay, d1 | | 44.4 | 36.1 | | 44.4 | 34.3 | 46.4 | 16.1 | | 51.5 | 27.4 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 177.4 | 0.3 | | 152.7 | 0.0 | 11.4 | 0.2 | | 4.4 | 3.7 | |
| Delay (s) | | 221.8 | 36.4 | | 197.2 | 34.3 | 57.7 | 16.3 | | 56.0 | 31.1 | |
| Level of Service | | F | D | | F | C | E | B | | E | C | |
| Approach Delay (s) | | 135.7 | | | 188.2 | | | 21.6 | | | 31.9 | |
| Approach LOS | | F | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 46.1 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 115.6 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 82.1% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 77 | 45 | 32 | 146 | 73 | 75 | 22 | 1358 | 65 | 168 | 1935 | 56 |
| Future Volume (veh/h) | 77 | 45 | 32 | 146 | 73 | 75 | 22 | 1358 | 65 | 168 | 1935 | 56 |
| 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 | | 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 | 84 | 49 | 35 | 159 | 79 | 82 | 24 | 1476 | 71 | 183 | 2103 | 61 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 109 | 80 | 57 | 197 | 107 | 111 | 36 | 2311 | 716 | 224 | 2846 | 82 |
| Arrive On Green | 0.06 | 0.08 | 0.08 | 0.11 | 0.13 | 0.13 | 0.02 | 0.45 | 0.45 | 0.13 | 0.56 | 0.56 |
| Sat Flow, veh/h | 1781 | 1011 | 722 | 1781 | 833 | 865 | 1781 | 5106 | 1582 | 1781 | 5097 | 147 |
| Grp Volume(v), veh/h | 84 | 0 | 84 | 159 | 0 | 161 | 24 | 1476 | 71 | 183 | 1403 | 761 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1734 | 1781 | 0 | 1698 | 1781 | 1702 | 1582 | 1781 | 1702 | 1840 |
| Q Serve(g_s), s | 4.2 | 0.0 | 4.2 | 7.9 | 0.0 | 8.3 | 1.2 | 20.1 | 2.3 | 9.1 | 28.0 | 28.2 |
| Cycle Q Clear(g_c), s | 4.2 | 0.0 | 4.2 | 7.9 | 0.0 | 8.3 | 1.2 | 20.1 | 2.3 | 9.1 | 28.0 | 28.2 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.51 | 1.00 | | 1.00 | 1.00 | | 0.08 |
| Lane Grp Cap(c), veh/h | 109 | 0 | 137 | 197 | 0 | 218 | 36 | 2311 | 716 | 224 | 1901 | 1027 |
| V/C Ratio(X) | 0.77 | 0.00 | 0.61 | 0.81 | 0.00 | 0.74 | 0.67 | 0.64 | 0.10 | 0.82 | 0.74 | 0.74 |
| Avail Cap(c_a), veh/h | 295 | 0 | 402 | 394 | 0 | 488 | 118 | 2311 | 716 | 610 | 2332 | 1260 |
| 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 | 41.9 | 0.0 | 40.3 | 39.3 | 0.0 | 38.0 | 44.1 | 19.1 | 14.2 | 38.5 | 15.0 | 15.1 |
| Incr Delay (d2), s/veh | 10.8 | 0.0 | 4.4 | 7.7 | 0.0 | 4.9 | 19.8 | 0.6 | 0.1 | 7.1 | 1.0 | 1.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.2 | 0.0 | 2.0 | 3.9 | 0.0 | 3.7 | 0.7 | 7.3 | 0.8 | 4.2 | 9.5 | 10.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 52.6 | 0.0 | 44.7 | 47.0 | 0.0 | 42.8 | 63.8 | 19.7 | 14.3 | 45.6 | 16.0 | 16.9 |
| LnGrp LOS | D | A | D | D | A | D | E | B | B | D | B | B |
| Approach Vol, veh/h | | 168 | | | 320 | | | 1571 | | | 2347 | |
| Approach Delay, s/veh | | 48.7 | | | 44.9 | | | 20.1 | | | 18.6 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.4 | 47.0 | 15.0 | 12.2 | 6.8 | 56.5 | 10.5 | 16.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 31.0 | 37.0 | 20.0 | 21.0 | 6.0 | 62.0 | 15.0 | 26.0 |
| Max Q Clear Time (g_c+I1), s | 11.1 | 22.1 | 9.9 | 6.2 | 3.2 | 30.2 | 6.2 | 10.3 |
| Green Ext Time (p_c), s | 0.4 | 8.8 | 0.3 | 0.3 | 0.0 | 20.3 | 0.1 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 22.2 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 432 | 1140 | 218 | 570 | 983 | 224 | 277 | 850 | 200 | 313 | 1476 | 350 |
| Future Volume (veh/h) | 432 | 1140 | 218 | 570 | 983 | 224 | 277 | 850 | 200 | 313 | 1476 | 350 |
| 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 | 455 | 1200 | 229 | 600 | 1035 | 236 | 292 | 895 | 211 | 329 | 1554 | 368 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 521 | 1623 | 391 | 657 | 1876 | 454 | 341 | 1941 | 471 | 379 | 2012 | 493 |
| Arrive On Green | 0.15 | 0.25 | 0.25 | 0.19 | 0.29 | 0.29 | 0.10 | 0.30 | 0.30 | 0.11 | 0.31 | 0.31 |
| Sat Flow, veh/h | 3456 | 6434 | 1549 | 3456 | 6434 | 1557 | 3456 | 6434 | 1562 | 3456 | 6434 | 1576 |
| Grp Volume(v), veh/h | 455 | 1200 | 229 | 600 | 1035 | 236 | 292 | 895 | 211 | 329 | 1554 | 368 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1549 | 1728 | 1609 | 1557 | 1728 | 1609 | 1562 | 1728 | 1609 | 1576 |
| Q Serve(g_s), s | 18.5 | 24.6 | 18.6 | 24.4 | 19.5 | 18.2 | 11.9 | 16.2 | 15.7 | 13.4 | 31.4 | 30.0 |
| Cycle Q Clear(g_c), s | 18.5 | 24.6 | 18.6 | 24.4 | 19.5 | 18.2 | 11.9 | 16.2 | 15.7 | 13.4 | 31.4 | 30.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 521 | 1623 | 391 | 657 | 1876 | 454 | 341 | 1941 | 471 | 379 | 2012 | 493 |
| V/C Ratio(X) | 0.87 | 0.74 | 0.59 | 0.91 | 0.55 | 0.52 | 0.86 | 0.46 | 0.45 | 0.87 | 0.77 | 0.75 |
| Avail Cap(c_a), veh/h | 722 | 1883 | 453 | 722 | 1883 | 456 | 385 | 2197 | 533 | 433 | 2287 | 560 |
| 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 | 59.6 | 49.3 | 47.1 | 57.0 | 42.9 | 42.5 | 63.7 | 40.7 | 40.5 | 62.9 | 44.7 | 44.2 |
| Incr Delay (d2), s/veh | 8.6 | 1.3 | 1.5 | 15.3 | 0.3 | 1.0 | 15.8 | 0.2 | 0.7 | 15.4 | 1.5 | 4.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 8.6 | 9.9 | 7.3 | 11.9 | 7.7 | 7.1 | 5.9 | 6.4 | 6.1 | 6.7 | 12.5 | 12.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 68.2 | 50.7 | 48.5 | 72.2 | 43.3 | 43.5 | 79.4 | 40.8 | 41.1 | 78.2 | 46.2 | 49.0 |
| LnGrp LOS | E | D | D | E | D | D | E | D | D | E | D | D |
| Approach Vol, veh/h | | 1884 | | | 1871 | | | 1398 | | | 2251 | |
| Approach Delay, s/veh | | 54.6 | | | 52.6 | | | 48.9 | | | 51.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.7 | 49.3 | 32.3 | 41.2 | 19.2 | 50.9 | 26.6 | 46.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 18.0 | 49.0 | 30.0 | 42.0 | 16.0 | 51.0 | 30.0 | 42.0 |
| Max Q Clear Time (g_c+I1), s | 15.4 | 18.2 | 26.4 | 26.6 | 13.9 | 33.4 | 20.5 | 21.5 |
| Green Ext Time (p_c), s | 0.3 | 7.6 | 0.9 | 7.8 | 0.2 | 11.3 | 1.2 | 7.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 52.0 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 7.5 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1282 | 107 | 73 | 876 | 23 | 90 |
| Future Vol, veh/h | 1282 | 107 | 73 | 876 | 23 | 90 |
| Conflicting Peds, #/hr | 0 | 26 | 26 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1393 | 116 | 79 | 952 | 25 | 98 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1535 | 0 | 2111 | 781 |
| Stage 1 | - | - | - | - | 1477 | - |
| Stage 2 | - | - | - | - | 634 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 429 | - | 44 | 338 |
| Stage 1 | - | - | - | - | 176 | - |
| Stage 2 | - | - | - | - | 491 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 418 | - | 35 | 330 |
| Mov Cap-2 Maneuver | - | - | - | - | 35 | - |
| Stage 1 | - | - | - | - | 172 | - |
| Stage 2 | - | - | - | - | 398 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.2 | 151.7 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 122 | - | - | 418 | - |
| HCM Lane V/C Ratio | 1.007 | - | - | 0.19 | - |
| HCM Control Delay (s) | 151.7 | - | - | 15.6 | - |
| HCM Lane LOS | F | - | - | C | - |
| HCM 95th %tile Q(veh) | 6.8 | - | - | 0.7 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.8 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1315 | 57 | 161 | 941 | 8 | 136 |
| Future Vol, veh/h | 1315 | 57 | 161 | 941 | 8 | 136 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1429 | 62 | 175 | 1023 | 9 | 148 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1507 | 0 | 2338 | 762 |
| Stage 1 | - | - | - | - | 1476 | - |
| Stage 2 | - | - | - | - | 862 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 440 | - | 31 | 347 |
| Stage 1 | - | - | - | - | 176 | - |
| Stage 2 | - | - | - | - | 374 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 433 | - | 18 | 342 |
| Mov Cap-2 Maneuver | - | - | - | - | 18 | - |
| Stage 1 | - | - | - | - | 173 | - |
| Stage 2 | - | - | - | - | 223 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 2.8 | 102.1 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 171 | - | - | 433 | - |
| HCM Lane V/C Ratio | 0.915 | - | - | 0.404 | - |
| HCM Control Delay (s) | 102.1 | - | - | 18.8 | - |
| HCM Lane LOS | F | - | - | C | - |
| HCM 95th %tile Q(veh) | 6.8 | - | - | 1.9 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 18.8 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1413 | 38 | 77 | 1077 | 25 | 124 |
| Future Vol, veh/h | 1413 | 38 | 77 | 1077 | 25 | 124 |
| Conflicting Peds, #/hr | 0 | 9 | 9 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1536 | 41 | 84 | 1171 | 27 | 135 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1586 | 0 | 2320 | 798 |
| Stage 1 | - | - | - | - | 1566 | - |
| Stage 2 | - | - | - | - | 754 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 410 | - | 32 | 329 |
| Stage 1 | - | - | - | - | 158 | - |
| Stage 2 | - | - | - | - | 425 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 406 | - | ~ 25 | 326 |
| Mov Cap-2 Maneuver | - | - | - | - | ~ 25 | - |
| Stage 1 | - | - | - | - | 157 | - |
| Stage 2 | - | - | - | - | 337 | - |

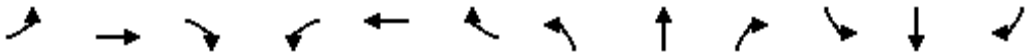
| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.1 | $ 338.2 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 108 | - | - | 406 | - |
| HCM Lane V/C Ratio | 1.5 | - | - | 0.206 | - |
| HCM Control Delay (s) | $ 338.2 | - | - | 16.2 | - |
| HCM Lane LOS | F | - | - | C | - |
| HCM 95th %tile Q(veh) | 11.9 | - | - | 0.8 | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 169 | 1206 | 162 | 98 | 902 | 316 | 146 | 55 | 105 | 216 | 71 | 106 |
| Future Volume (veh/h) | 169 | 1206 | 162 | 98 | 902 | 316 | 146 | 55 | 105 | 216 | 71 | 106 |
| 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 | | 0.95 | 1.00 | | 0.98 | 1.00 | | 0.90 |
| 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 | 184 | 1311 | 176 | 107 | 980 | 343 | 159 | 60 | 114 | 235 | 77 | 115 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 216 | 1675 | 225 | 133 | 1647 | 488 | 187 | 122 | 232 | 268 | 165 | 246 |
| Arrive On Green | 0.12 | 0.37 | 0.37 | 0.07 | 0.32 | 0.32 | 0.11 | 0.21 | 0.21 | 0.15 | 0.26 | 0.26 |
| Sat Flow, veh/h | 1781 | 4535 | 609 | 1781 | 5106 | 1513 | 1781 | 571 | 1084 | 1781 | 634 | 947 |
| Grp Volume(v), veh/h | 184 | 984 | 503 | 107 | 980 | 343 | 159 | 0 | 174 | 235 | 0 | 192 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1740 | 1781 | 1702 | 1513 | 1781 | 0 | 1655 | 1781 | 0 | 1582 |
| Q Serve(g_s), s | 11.1 | 28.1 | 28.1 | 6.5 | 17.7 | 21.8 | 9.6 | 0.0 | 10.1 | 14.2 | 0.0 | 11.2 |
| Cycle Q Clear(g_c), s | 11.1 | 28.1 | 28.1 | 6.5 | 17.7 | 21.8 | 9.6 | 0.0 | 10.1 | 14.2 | 0.0 | 11.2 |
| Prop In Lane | 1.00 | | 0.35 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 216 | 1257 | 642 | 133 | 1647 | 488 | 187 | 0 | 354 | 268 | 0 | 411 |
| V/C Ratio(X) | 0.85 | 0.78 | 0.78 | 0.81 | 0.60 | 0.70 | 0.85 | 0.00 | 0.49 | 0.88 | 0.00 | 0.47 |
| Avail Cap(c_a), veh/h | 325 | 1644 | 840 | 146 | 1954 | 579 | 195 | 0 | 362 | 373 | 0 | 505 |
| 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 | 47.2 | 30.7 | 30.7 | 50.0 | 31.2 | 32.6 | 48.2 | 0.0 | 37.9 | 45.6 | 0.0 | 34.2 |
| Incr Delay (d2), s/veh | 12.9 | 1.9 | 3.6 | 25.4 | 0.4 | 3.1 | 27.3 | 0.0 | 1.1 | 15.5 | 0.0 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.5 | 11.2 | 11.7 | 3.7 | 7.0 | 8.4 | 5.7 | 0.0 | 4.2 | 7.4 | 0.0 | 4.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 60.1 | 32.6 | 34.3 | 75.4 | 31.5 | 35.7 | 75.5 | 0.0 | 38.9 | 61.1 | 0.0 | 35.1 |
| LnGrp LOS | E | C | C | E | C | D | E | A | D | E | A | D |
| Approach Vol, veh/h | | 1671 | | | 1430 | | | 333 | | | 427 | |
| Approach Delay, s/veh | | 36.1 | | | 35.8 | | | 56.4 | | | 49.4 | |
| Approach LOS | | D | | | D | | | E | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.2 | 46.5 | 16.5 | 33.5 | 18.3 | 41.4 | 21.5 | 28.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 9.0 | 53.0 | 12.0 | 35.0 | 20.0 | 42.0 | 23.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 8.5 | 30.1 | 11.6 | 13.2 | 13.1 | 23.8 | 16.2 | 12.1 |
| Green Ext Time (p_c), s | 0.0 | 10.4 | 0.0 | 1.2 | 0.3 | 7.4 | 0.4 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 39.2 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 241 | 1038 | 248 | 167 | 793 | 229 | 229 | 204 | 95 | 312 | 441 | 294 |
| Future Volume (veh/h) | 241 | 1038 | 248 | 167 | 793 | 229 | 229 | 204 | 95 | 312 | 441 | 294 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 259 | 1116 | 267 | 180 | 853 | 246 | 246 | 219 | 102 | 335 | 474 | 316 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 298 | 1329 | 403 | 217 | 1098 | 331 | 285 | 971 | 297 | 375 | 1228 | 374 |
| Arrive On Green | 0.17 | 0.26 | 0.26 | 0.12 | 0.22 | 0.22 | 0.16 | 0.19 | 0.19 | 0.21 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 5106 | 1547 | 1781 | 5106 | 1541 | 1781 | 5106 | 1560 | 1781 | 5106 | 1557 |
| Grp Volume(v), veh/h | 259 | 1116 | 267 | 180 | 853 | 246 | 246 | 219 | 102 | 335 | 474 | 316 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1547 | 1781 | 1702 | 1541 | 1781 | 1702 | 1560 | 1781 | 1702 | 1557 |
| Q Serve(g_s), s | 14.4 | 21.0 | 15.6 | 10.0 | 16.0 | 15.1 | 13.6 | 3.7 | 5.7 | 18.5 | 7.9 | 19.6 |
| Cycle Q Clear(g_c), s | 14.4 | 21.0 | 15.6 | 10.0 | 16.0 | 15.1 | 13.6 | 3.7 | 5.7 | 18.5 | 7.9 | 19.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 298 | 1329 | 403 | 217 | 1098 | 331 | 285 | 971 | 297 | 375 | 1228 | 374 |
| V/C Ratio(X) | 0.87 | 0.84 | 0.66 | 0.83 | 0.78 | 0.74 | 0.86 | 0.23 | 0.34 | 0.89 | 0.39 | 0.84 |
| Avail Cap(c_a), veh/h | 527 | 1329 | 403 | 527 | 1209 | 365 | 615 | 1460 | 446 | 615 | 1460 | 445 |
| 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 | 41.1 | 35.5 | 33.5 | 43.5 | 37.5 | 37.2 | 41.5 | 34.7 | 35.6 | 38.9 | 32.2 | 36.7 |
| Incr Delay (d2), s/veh | 7.7 | 5.0 | 4.0 | 7.9 | 3.0 | 7.2 | 7.6 | 0.1 | 0.7 | 9.5 | 0.2 | 12.1 |
| 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 | 6.7 | 8.8 | 6.1 | 4.8 | 6.7 | 6.2 | 6.3 | 1.5 | 2.2 | 8.7 | 3.1 | 8.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 48.9 | 40.4 | 37.5 | 51.4 | 40.5 | 44.4 | 49.0 | 34.9 | 36.3 | 48.4 | 32.4 | 48.8 |
| LnGrp LOS | D | D | D | D | D | D | D | C | D | D | C | D |
| Approach Vol, veh/h | | 1642 | | | 1279 | | | 567 | | | 1125 | |
| Approach Delay, s/veh | | 41.3 | | | 42.8 | | | 41.3 | | | 41.8 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 26.4 | 25.3 | 17.4 | 32.4 | 21.2 | 30.4 | 21.9 | 27.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 35.0 | 29.0 | 30.0 | 24.0 | 35.0 | 29.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 20.5 | 7.7 | 12.0 | 23.0 | 15.6 | 21.6 | 16.4 | 18.0 |
| Green Ext Time (p_c), s | 0.8 | 1.5 | 0.4 | 0.8 | 0.6 | 2.4 | 0.6 | 3.2 |

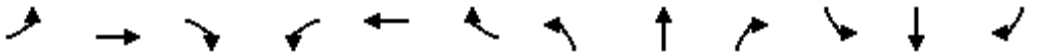
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 41.8 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 64 | 1313 | 68 | 60 | 932 | 32 | 91 | 7 | 87 | 67 | 23 | 94 |
| Future Volume (veh/h) | 64 | 1313 | 68 | 60 | 932 | 32 | 91 | 7 | 87 | 67 | 23 | 94 |
| 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 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 69 | 1412 | 73 | 65 | 1002 | 34 | 98 | 8 | 94 | 72 | 25 | 101 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 88 | 2496 | 129 | 85 | 2540 | 86 | 317 | 277 | 234 | 331 | 277 | 230 |
| Arrive On Green | 0.05 | 0.50 | 0.50 | 0.05 | 0.50 | 0.50 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 4963 | 257 | 1781 | 5071 | 172 | 1261 | 1870 | 1582 | 1290 | 1870 | 1557 |
| Grp Volume(v), veh/h | 69 | 968 | 517 | 65 | 672 | 364 | 98 | 8 | 94 | 72 | 25 | 101 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1816 | 1781 | 1702 | 1838 | 1261 | 1870 | 1582 | 1290 | 1870 | 1557 |
| Q Serve(g_s), s | 1.9 | 9.8 | 9.8 | 1.8 | 6.1 | 6.1 | 3.6 | 0.2 | 2.7 | 2.5 | 0.6 | 2.9 |
| Cycle Q Clear(g_c), s | 1.9 | 9.8 | 9.8 | 1.8 | 6.1 | 6.1 | 4.2 | 0.2 | 2.7 | 2.7 | 0.6 | 2.9 |
| Prop In Lane | 1.00 | | 0.14 | 1.00 | | 0.09 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 88 | 1712 | 913 | 85 | 1705 | 921 | 317 | 277 | 234 | 331 | 277 | 230 |
| V/C Ratio(X) | 0.78 | 0.57 | 0.57 | 0.77 | 0.39 | 0.39 | 0.31 | 0.03 | 0.40 | 0.22 | 0.09 | 0.44 |
| Avail Cap(c_a), veh/h | 716 | 3557 | 1897 | 716 | 3557 | 1921 | 966 | 1240 | 1049 | 996 | 1240 | 1033 |
| 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 | 23.4 | 8.6 | 8.6 | 23.4 | 7.7 | 7.7 | 20.1 | 18.1 | 19.2 | 19.3 | 18.3 | 19.3 |
| Incr Delay (d2), s/veh | 13.7 | 0.3 | 0.6 | 13.3 | 0.1 | 0.3 | 0.5 | 0.0 | 1.1 | 0.3 | 0.1 | 1.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 2.5 | 2.7 | 1.0 | 1.5 | 1.7 | 1.0 | 0.1 | 1.0 | 0.7 | 0.2 | 1.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 37.1 | 8.9 | 9.1 | 36.7 | 7.9 | 8.0 | 20.7 | 18.2 | 20.3 | 19.6 | 18.4 | 20.6 |
| LnGrp LOS | D | A | A | D | A | A | C | B | C | B | B | C |
| Approach Vol, veh/h | | 1554 | | | 1101 | | | 200 | | | 198 | |
| Approach Delay, s/veh | | 10.2 | | | 9.6 | | | 20.4 | | | 20.0 | |
| Approach LOS | | B | | | A | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.4 | 30.0 | | 12.4 | 7.5 | 29.9 | | 12.4 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 20.0 | 52.0 | | 33.0 | 20.0 | 52.0 | | 33.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 3.8 | 11.8 | | 4.9 | 3.9 | 8.1 | | 6.2 | | | | |
| Green Ext Time (p_c), s | 0.1 | 13.2 | | 0.7 | 0.1 | 7.9 | | 0.7 | | | | |

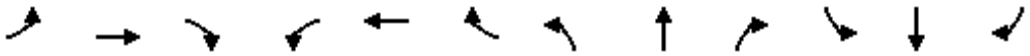
| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.3 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 186 | 1247 | 34 | 18 | 852 | 87 | 59 | 21 | 65 | 56 | 5 | 113 |
| Future Volume (veh/h) | 186 | 1247 | 34 | 18 | 852 | 87 | 59 | 21 | 65 | 56 | 5 | 113 |
| 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 | | 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 | 198 | 1327 | 36 | 19 | 906 | 93 | 63 | 22 | 69 | 60 | 5 | 120 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 229 | 3372 | 91 | 35 | 2594 | 265 | 82 | 193 | 162 | 78 | 6 | 155 |
| Arrive On Green | 0.13 | 0.66 | 0.66 | 0.02 | 0.55 | 0.55 | 0.05 | 0.10 | 0.10 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 5107 | 139 | 1781 | 4704 | 481 | 1781 | 1870 | 1576 | 1781 | 64 | 1531 |
| Grp Volume(v), veh/h | 198 | 884 | 479 | 19 | 655 | 344 | 63 | 22 | 69 | 60 | 0 | 125 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1842 | 1781 | 1702 | 1782 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 13.1 | 14.3 | 14.3 | 1.3 | 12.8 | 12.9 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.2 |
| Cycle Q Clear(g_c), s | 13.1 | 14.3 | 14.3 | 1.3 | 12.8 | 12.9 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.2 |
| Prop In Lane | 1.00 | | 0.08 | 1.00 | | 0.27 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 229 | 2248 | 1216 | 35 | 1877 | 982 | 82 | 193 | 162 | 78 | 0 | 161 |
| V/C Ratio(X) | 0.86 | 0.39 | 0.39 | 0.55 | 0.35 | 0.35 | 0.77 | 0.11 | 0.42 | 0.77 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h | 377 | 2248 | 1216 | 154 | 1877 | 982 | 229 | 388 | 327 | 229 | 0 | 327 |
| 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) | 0.81 | 0.81 | 0.81 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.3 | 9.4 | 9.4 | 58.3 | 15.0 | 15.0 | 56.6 | 48.8 | 50.5 | 56.8 | 0.0 | 52.6 |
| Incr Delay (d2), s/veh | 9.1 | 0.4 | 0.8 | 12.6 | 0.5 | 1.0 | 14.1 | 0.3 | 1.8 | 14.7 | 0.0 | 7.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.3 | 4.9 | 5.4 | 0.7 | 4.8 | 5.2 | 2.2 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 60.3 | 9.8 | 10.1 | 70.9 | 15.5 | 16.0 | 70.8 | 49.1 | 52.2 | 71.5 | 0.0 | 60.4 |
| LnGrp LOS | E | A | B | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1561 | | | 1018 | | | 154 | | | 185 | |
| Approach Delay, s/veh | | 16.3 | | | 16.7 | | | 59.4 | | | 64.0 | |
| Approach LOS | | B | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 85.4 | 9.8 | 17.8 | 20.0 | 72.4 | 10.1 | 17.5 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 10.4 | 48.8 | 15.4 | * 25 | 25.4 | * 34 | 15.4 | 24.6 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 16.3 | 6.0 | 6.9 | 15.1 | 14.9 | 6.2 | 11.2 |
| Green Ext Time (p_c), s | 0.0 | 10.9 | 0.1 | 0.2 | 0.4 | 6.2 | 0.1 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 21.7 |
| HCM 6th LOS | C |

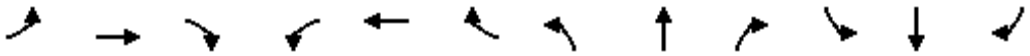
**Notes**

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 238 | 68 | 332 | 304 | 16 | 14 | 173 | 931 | 80 | 45 | 1223 | 102 |
| Future Volume (veh/h) | 238 | 68 | 332 | 304 | 16 | 14 | 173 | 931 | 80 | 45 | 1223 | 102 |
| 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 | 259 | 74 | 361 | 330 | 17 | 15 | 188 | 1012 | 87 | 49 | 1329 | 111 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 303 | 381 | 322 | 374 | 223 | 197 | 262 | 1649 | 512 | 69 | 1459 | 453 |
| Arrive On Green | 0.17 | 0.20 | 0.20 | 0.21 | 0.24 | 0.24 | 0.08 | 0.32 | 0.32 | 0.04 | 0.29 | 0.29 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 916 | 809 | 3456 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 259 | 74 | 361 | 330 | 0 | 32 | 188 | 1012 | 87 | 49 | 1329 | 111 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1725 | 1728 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g_s), s | 13.2 | 3.1 | 19.0 | 16.8 | 0.0 | 1.3 | 5.0 | 15.6 | 3.7 | 2.5 | 23.5 | 5.0 |
| Cycle Q Clear(g_c), s | 13.2 | 3.1 | 19.0 | 16.8 | 0.0 | 1.3 | 5.0 | 15.6 | 3.7 | 2.5 | 23.5 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.47 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 303 | 381 | 322 | 374 | 0 | 421 | 262 | 1649 | 512 | 69 | 1459 | 453 |
| V/C Ratio(X) | 0.86 | 0.19 | 1.12 | 0.88 | 0.00 | 0.08 | 0.72 | 0.61 | 0.17 | 0.71 | 0.91 | 0.25 |
| Avail Cap(c_a), veh/h | 629 | 381 | 322 | 629 | 0 | 421 | 370 | 1649 | 512 | 134 | 1476 | 458 |
| 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 | 37.7 | 30.8 | 37.2 | 35.8 | 0.0 | 27.2 | 42.2 | 26.7 | 22.6 | 44.4 | 32.2 | 25.6 |
| Incr Delay (d2), s/veh | 6.9 | 0.2 | 86.3 | 7.9 | 0.0 | 0.1 | 3.9 | 0.7 | 0.2 | 12.9 | 8.7 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.2 | 1.4 | 14.9 | 8.0 | 0.0 | 0.6 | 2.2 | 6.3 | 1.4 | 1.4 | 10.6 | 1.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.6 | 31.1 | 123.5 | 43.7 | 0.0 | 27.3 | 46.1 | 27.4 | 22.8 | 57.3 | 41.0 | 25.9 |
| LnGrp LOS | D | C | F | D | A | C | D | C | C | E | D | C |
| Approach Vol, veh/h | | 694 | | | 362 | | | 1287 | | | 1489 | |
| Approach Delay, s/veh | | 84.2 | | | 42.2 | | | 29.8 | | | 40.4 | |
| Approach LOS | | F | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.6 | 36.2 | 24.6 | 24.0 | 12.1 | 32.7 | 20.9 | 27.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 7.0 | 30.0 | 33.0 | 19.0 | 10.0 | 27.0 | 33.0 | 19.0 |
| Max Q Clear Time (g_c+I1), s | 4.5 | 17.6 | 18.8 | 21.0 | 7.0 | 25.5 | 15.2 | 3.3 |
| Green Ext Time (p_c), s | 0.0 | 5.8 | 0.9 | 0.0 | 0.2 | 1.2 | 0.7 | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.9 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/29/2024

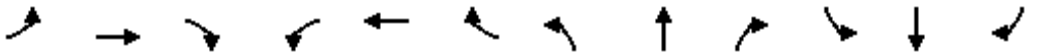
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 235 | 949 | 413 | 428 | 1186 | 22 | 352 | 609 | 242 | 17 | 515 | 124 |
| Future Volume (veh/h) | 235 | 949 | 413 | 428 | 1186 | 22 | 352 | 609 | 242 | 17 | 515 | 124 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 242 | 978 | 298 | 441 | 1223 | 23 | 363 | 628 | 249 | 18 | 531 | 128 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 276 | 1554 | 482 | 524 | 1537 | 477 | 437 | 1047 | 461 | 35 | 668 | 298 |
| Arrive On Green | 0.16 | 0.30 | 0.30 | 0.15 | 0.30 | 0.30 | 0.13 | 0.29 | 0.29 | 0.02 | 0.19 | 0.19 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5106 | 1585 | 3456 | 3554 | 1565 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 242 | 978 | 298 | 441 | 1223 | 23 | 363 | 628 | 249 | 18 | 531 | 128 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1585 | 1728 | 1777 | 1565 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 12.7 | 15.8 | 15.4 | 11.9 | 21.1 | 1.0 | 9.8 | 14.5 | 12.8 | 1.0 | 13.7 | 6.8 |
| Cycle Q Clear(g_c), s | 12.7 | 15.8 | 15.4 | 11.9 | 21.1 | 1.0 | 9.8 | 14.5 | 12.8 | 1.0 | 13.7 | 6.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 276 | 1554 | 482 | 524 | 1537 | 477 | 437 | 1047 | 461 | 35 | 668 | 298 |
| V/C Ratio(X) | 0.88 | 0.63 | 0.62 | 0.84 | 0.80 | 0.05 | 0.83 | 0.60 | 0.54 | 0.51 | 0.79 | 0.43 |
| Avail Cap(c_a), veh/h | 316 | 1758 | 546 | 649 | 1811 | 562 | 505 | 1112 | 490 | 130 | 853 | 380 |
| 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 | 39.6 | 28.7 | 28.6 | 39.5 | 30.8 | 23.8 | 40.9 | 29.0 | 28.4 | 46.5 | 37.2 | 34.4 |
| Incr Delay (d2), s/veh | 21.2 | 0.6 | 1.7 | 8.1 | 2.2 | 0.0 | 10.0 | 0.8 | 1.0 | 10.9 | 4.1 | 1.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.9 | 6.1 | 5.6 | 5.4 | 8.4 | 0.4 | 4.6 | 5.8 | 4.6 | 0.5 | 6.2 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 60.8 | 29.3 | 30.3 | 47.7 | 33.0 | 23.8 | 50.9 | 29.8 | 29.4 | 57.4 | 41.2 | 35.4 |
| LnGrp LOS | E | C | C | D | C | C | D | C | C | E | D | D |
| Approach Vol, veh/h | | 1518 | | | 1687 | | | 1240 | | | 677 | |
| Approach Delay, s/veh | | 34.5 | | | 36.7 | | | 35.9 | | | 40.6 | |
| Approach LOS | | C | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 19.5 | 35.2 | 17.1 | 24.0 | 19.9 | 34.8 | 6.9 | 34.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 18.0 | 33.0 | 14.0 | 23.0 | 17.0 | 34.0 | 7.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 13.9 | 17.8 | 11.8 | 15.7 | 14.7 | 23.1 | 3.0 | 16.5 |
| Green Ext Time (p_c), s | 0.6 | 6.5 | 0.3 | 2.3 | 0.2 | 5.7 | 0.0 | 3.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 36.4 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 127 | 260 | 161 | 323 | 398 | 315 | 270 | 1299 | 347 | 291 | 1009 | 173 |
| Future Volume (veh/h) | 127 | 260 | 161 | 323 | 398 | 315 | 270 | 1299 | 347 | 291 | 1009 | 173 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.94 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 132 | 271 | 168 | 336 | 415 | 328 | 281 | 1353 | 361 | 303 | 1051 | 180 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 364 | 727 | 306 | 435 | 235 | 186 | 205 | 1568 | 481 | 230 | 1606 | 496 |
| Arrive On Green | 0.20 | 0.20 | 0.20 | 0.24 | 0.24 | 0.24 | 0.06 | 0.31 | 0.31 | 0.07 | 0.31 | 0.31 |
| Sat Flow, veh/h | 1781 | 3554 | 1497 | 1781 | 962 | 760 | 3456 | 5106 | 1565 | 3456 | 5106 | 1577 |
| Grp Volume(v), veh/h | 132 | 271 | 168 | 336 | 0 | 743 | 281 | 1353 | 361 | 303 | 1051 | 180 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1497 | 1781 | 0 | 1722 | 1728 | 1702 | 1565 | 1728 | 1702 | 1577 |
| Q Serve(g_s), s | 8.6 | 8.9 | 13.6 | 23.8 | 0.0 | 33.0 | 8.0 | 33.8 | 28.1 | 9.0 | 24.0 | 11.9 |
| Cycle Q Clear(g_c), s | 8.6 | 8.9 | 13.6 | 23.8 | 0.0 | 33.0 | 8.0 | 33.8 | 28.1 | 9.0 | 24.0 | 11.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.44 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 364 | 727 | 306 | 435 | 0 | 420 | 205 | 1568 | 481 | 230 | 1606 | 496 |
| V/C Ratio(X) | 0.36 | 0.37 | 0.55 | 0.77 | 0.00 | 1.77 | 1.37 | 0.86 | 0.75 | 1.32 | 0.65 | 0.36 |
| Avail Cap(c_a), veh/h | 527 | 1052 | 443 | 435 | 0 | 420 | 205 | 1662 | 509 | 230 | 1700 | 525 |
| 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 | 46.2 | 46.3 | 48.2 | 47.6 | 0.0 | 51.1 | 63.6 | 44.1 | 42.2 | 63.1 | 40.0 | 35.8 |
| Incr Delay (d2), s/veh | 0.6 | 0.3 | 1.5 | 7.6 | 0.0 | 355.1 | 196.1 | 4.7 | 5.8 | 169.9 | 0.8 | 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 | 3.9 | 4.0 | 5.3 | 11.2 | 0.0 | 55.3 | 9.0 | 14.6 | 11.4 | 9.3 | 9.8 | 4.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.8 | 46.6 | 49.7 | 55.2 | 0.0 | 406.2 | 259.7 | 48.9 | 48.0 | 233.0 | 40.8 | 36.3 |
| LnGrp LOS | D | D | D | E | A | F | F | D | D | F | D | D |
| Approach Vol, veh/h | | 571 | | | 1079 | | | 1995 | | | 1534 | |
| Approach Delay, s/veh | | 47.6 | | | 296.9 | | | 78.4 | | | 78.3 | |
| Approach LOS | | D | | | F | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.0 | 47.5 | | 39.0 | 14.0 | 48.5 | | 33.7 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 9.0 | 44.0 | | 33.0 | 8.0 | 45.0 | | 40.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 11.0 | 35.8 | | 35.0 | 10.0 | 26.0 | | 15.6 | | | | |
| Green Ext Time (p_c), s | 0.0 | 5.8 | | 0.0 | 0.0 | 7.1 | | 2.9 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 120.5 | |
| HCM 6th LOS | | F | |

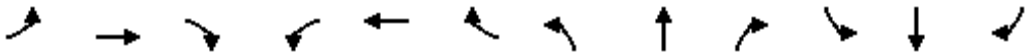
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/29/2024



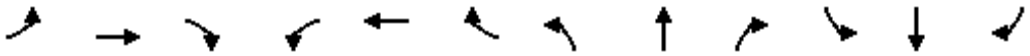
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 106 | 6 | 94 | 136 | 9 | 8 | 156 | 1808 | 140 | 39 | 1368 | 60 |
| Future Volume (vph) | 106 | 6 | 94 | 136 | 9 | 8 | 156 | 1808 | 140 | 39 | 1368 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 5020 | | 1770 | 5048 | |
| Flt Permitted | | 0.57 | 1.00 | | 0.66 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1065 | 1583 | | 1223 | 1563 | 1770 | 5020 | | 1770 | 5048 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 110 | 6 | 98 | 142 | 9 | 8 | 162 | 1883 | 146 | 41 | 1425 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 77 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 116 | 21 | 0 | 151 | 2 | 163 | 2023 | 0 | 41 | 1484 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 17.3 | 17.3 | | 17.3 | 17.3 | 14.2 | 52.1 | | 4.6 | 42.5 | |
| Effective Green, g (s) | | 17.3 | 17.3 | | 17.3 | 17.3 | 14.2 | 52.1 | | 4.6 | 42.5 | |
| Actuated g/C Ratio | | 0.19 | 0.19 | | 0.19 | 0.19 | 0.16 | 0.58 | | 0.05 | 0.47 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 204 | 304 | | 235 | 300 | 279 | 2906 | | 90 | 2383 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.40 | | 0.02 | 0.29 | |
| v/s Ratio Perm | | 0.11 | 0.01 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.57 | 0.07 | | 0.64 | 0.01 | 0.58 | 0.70 | | 0.46 | 0.62 | |
| Uniform Delay, d1 | | 33.0 | 29.8 | | 33.5 | 29.4 | 35.2 | 13.4 | | 41.5 | 17.8 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 3.6 | 0.1 | | 5.9 | 0.0 | 3.1 | 0.7 | | 3.6 | 0.5 | |
| Delay (s) | | 36.6 | 29.9 | | 39.4 | 29.4 | 38.3 | 14.1 | | 45.1 | 18.3 | |
| Level of Service | | D | C | | D | C | D | B | | D | B | |
| Approach Delay (s) | | 33.5 | | | 38.9 | | | 15.9 | | | 19.0 | |
| Approach LOS | | C | | | D | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 18.9 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 69.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 75 | 45 | 30 | 124 | 54 | 69 | 66 | 1997 | 87 | 121 | 1438 | 39 |
| Future Volume (veh/h) | 75 | 45 | 30 | 124 | 54 | 69 | 66 | 1997 | 87 | 121 | 1438 | 39 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 78 | 47 | 31 | 129 | 56 | 72 | 69 | 2080 | 91 | 126 | 1498 | 41 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 102 | 81 | 53 | 165 | 84 | 107 | 89 | 2462 | 746 | 162 | 2670 | 73 |
| Arrive On Green | 0.06 | 0.08 | 0.08 | 0.09 | 0.11 | 0.11 | 0.05 | 0.48 | 0.48 | 0.09 | 0.52 | 0.52 |
| Sat Flow, veh/h | 1781 | 1048 | 691 | 1781 | 742 | 954 | 1781 | 5106 | 1547 | 1781 | 5105 | 140 |
| Grp Volume(v), veh/h | 78 | 0 | 78 | 129 | 0 | 128 | 69 | 2080 | 91 | 126 | 999 | 540 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1740 | 1781 | 0 | 1696 | 1781 | 1702 | 1547 | 1781 | 1702 | 1841 |
| Q Serve(g_s), s | 3.5 | 0.0 | 3.5 | 5.8 | 0.0 | 5.9 | 3.1 | 29.1 | 2.6 | 5.6 | 16.2 | 16.2 |
| Cycle Q Clear(g_c), s | 3.5 | 0.0 | 3.5 | 5.8 | 0.0 | 5.9 | 3.1 | 29.1 | 2.6 | 5.6 | 16.2 | 16.2 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.56 | 1.00 | | 1.00 | 1.00 | | 0.08 |
| Lane Grp Cap(c), veh/h | 102 | 0 | 134 | 165 | 0 | 191 | 89 | 2462 | 746 | 162 | 1780 | 963 |
| V/C Ratio(X) | 0.77 | 0.00 | 0.58 | 0.78 | 0.00 | 0.67 | 0.77 | 0.84 | 0.12 | 0.78 | 0.56 | 0.56 |
| Avail Cap(c_a), veh/h | 327 | 0 | 426 | 393 | 0 | 478 | 218 | 2565 | 777 | 436 | 2127 | 1150 |
| 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 | 37.9 | 0.0 | 36.4 | 36.2 | 0.0 | 34.8 | 38.3 | 18.5 | 11.6 | 36.3 | 13.1 | 13.1 |
| Incr Delay (d2), s/veh | 11.3 | 0.0 | 4.0 | 7.8 | 0.0 | 4.0 | 13.2 | 2.7 | 0.1 | 7.8 | 0.3 | 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 | 1.8 | 0.0 | 1.6 | 2.8 | 0.0 | 2.6 | 1.6 | 10.4 | 0.9 | 2.7 | 5.4 | 5.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 49.3 | 0.0 | 40.4 | 44.0 | 0.0 | 38.8 | 51.5 | 21.2 | 11.7 | 44.1 | 13.4 | 13.7 |
| LnGrp LOS | D | A | D | D | A | D | D | C | B | D | B | B |
| Approach Vol, veh/h | | 156 | | | 257 | | | 2240 | | | 1665 | |
| Approach Delay, s/veh | | 44.8 | | | 41.4 | | | 21.7 | | | 15.8 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.4 | 45.4 | 12.6 | 11.3 | 9.1 | 48.7 | 9.7 | 14.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 41.0 | 18.0 | 20.0 | 10.0 | 51.0 | 15.0 | 23.0 |
| Max Q Clear Time (g_c+I1), s | 7.6 | 31.1 | 7.8 | 5.5 | 5.1 | 18.2 | 5.5 | 7.9 |
| Green Ext Time (p_c), s | 0.2 | 8.3 | 0.2 | 0.3 | 0.0 | 13.0 | 0.1 | 0.6 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 21.5 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 565 | 1468 | 195 | 426 | 1154 | 215 | 498 | 1498 | 270 | 263 | 1090 | 304 |
| Future Volume (veh/h) | 565 | 1468 | 195 | 426 | 1154 | 215 | 498 | 1498 | 270 | 263 | 1090 | 304 |
| 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 | | 0.97 |
| 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 | 589 | 1529 | 203 | 444 | 1202 | 224 | 519 | 1560 | 281 | 274 | 1135 | 317 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 639 | 1829 | 440 | 499 | 1568 | 379 | 539 | 2158 | 530 | 324 | 1757 | 421 |
| Arrive On Green | 0.18 | 0.28 | 0.28 | 0.14 | 0.24 | 0.24 | 0.16 | 0.34 | 0.34 | 0.09 | 0.27 | 0.27 |
| Sat Flow, veh/h | 3456 | 6434 | 1548 | 3456 | 6434 | 1555 | 3456 | 6434 | 1579 | 3456 | 6434 | 1543 |
| Grp Volume(v), veh/h | 589 | 1529 | 203 | 444 | 1202 | 224 | 519 | 1560 | 281 | 274 | 1135 | 317 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1548 | 1728 | 1609 | 1555 | 1728 | 1609 | 1579 | 1728 | 1609 | 1543 |
| Q Serve(g_s), s | 24.7 | 32.9 | 15.9 | 18.6 | 25.6 | 18.8 | 22.0 | 31.4 | 21.2 | 11.5 | 23.0 | 27.7 |
| Cycle Q Clear(g_c), s | 24.7 | 32.9 | 15.9 | 18.6 | 25.6 | 18.8 | 22.0 | 31.4 | 21.2 | 11.5 | 23.0 | 27.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 639 | 1829 | 440 | 499 | 1568 | 379 | 539 | 2158 | 530 | 324 | 1757 | 421 |
| V/C Ratio(X) | 0.92 | 0.84 | 0.46 | 0.89 | 0.77 | 0.59 | 0.96 | 0.72 | 0.53 | 0.85 | 0.65 | 0.75 |
| Avail Cap(c_a), veh/h | 679 | 1919 | 462 | 586 | 1745 | 422 | 539 | 2312 | 567 | 398 | 2050 | 492 |
| 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 | 59.1 | 49.6 | 43.5 | 62.0 | 51.9 | 49.3 | 61.8 | 43.0 | 39.6 | 65.8 | 47.3 | 49.1 |
| Incr Delay (d2), s/veh | 17.5 | 3.3 | 0.8 | 14.1 | 1.9 | 1.8 | 29.6 | 1.1 | 0.8 | 13.1 | 0.6 | 5.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 12.2 | 13.4 | 6.2 | 9.1 | 10.4 | 7.4 | 11.8 | 12.5 | 8.3 | 5.6 | 9.2 | 11.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 76.6 | 52.8 | 44.2 | 76.1 | 53.8 | 51.1 | 91.4 | 44.1 | 40.5 | 79.0 | 47.9 | 54.5 |
| LnGrp LOS | E | D | D | E | D | D | F | D | D | E | D | D |
| Approach Vol, veh/h | | 2321 | | | 1870 | | | 2360 | | | 1726 | |
| Approach Delay, s/veh | | 58.1 | | | 58.7 | | | 54.1 | | | 54.0 | |
| Approach LOS | | E | | | E | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.8 | 55.5 | 26.3 | 46.9 | 28.0 | 46.3 | 32.3 | 40.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 17.0 | 53.0 | 25.0 | 44.0 | 23.0 | 47.0 | 29.0 | 40.0 |
| Max Q Clear Time (g_c+I1), s | 13.5 | 33.4 | 20.6 | 34.9 | 24.0 | 29.7 | 26.7 | 27.6 |
| Green Ext Time (p_c), s | 0.3 | 11.8 | 0.7 | 6.5 | 0.0 | 8.3 | 0.6 | 6.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 56.2 |
| HCM 6th LOS | E |

**Notes**

User approved pedestrian interval to be less than phase max green.

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 874 | 46 | 49 | 1045 | 19 | 38 |
| Future Vol, veh/h | 874 | 46 | 49 | 1045 | 19 | 38 |
| Conflicting Peds, #/hr | 0 | 16 | 16 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 240 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 930 | 49 | 52 | 1112 | 20 | 40 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 995 | 0 | 1631 | 506 |
| Stage 1 | - | - | - | - | 971 | - |
| Stage 2 | - | - | - | - | 660 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 691 | - | 92 | 512 |
| Stage 1 | - | - | - | - | 328 | - |
| Stage 2 | - | - | - | - | 476 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 680 | - | 84 | 504 |
| Mov Cap-2 Maneuver | - | - | - | - | 84 | - |
| Stage 1 | - | - | - | - | 323 | - |
| Stage 2 | - | - | - | - | 440 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.5 | 32.8 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 189 | - | - | 680 | - |
| HCM Lane V/C Ratio | 0.321 | - | - | 0.077 | - |
| HCM Control Delay (s) | 32.8 | - | - | 10.7 | - |
| HCM Lane LOS | D | - | - | B | - |
| HCM 95th %tile Q(veh) | 1.3 | - | - | 0.2 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.7 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 847 | 65 | 92 | 1061 | 33 | 76 |
| Future Vol, veh/h | 847 | 65 | 92 | 1061 | 33 | 76 |
| Conflicting Peds, #/hr | 0 | 13 | 13 | 0 | 1 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 180 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 911 | 70 | 99 | 1141 | 35 | 82 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 994 | 0 | 1729 | 504 |
| Stage 1 | - | - | - | - | 959 | - |
| Stage 2 | - | - | - | - | 770 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 692 | - | 79 | 513 |
| Stage 1 | - | - | - | - | 333 | - |
| Stage 2 | - | - | - | - | 417 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 683 | - | 67 | 507 |
| Mov Cap-2 Maneuver | - | - | - | - | 67 | - |
| Stage 1 | - | - | - | - | 329 | - |
| Stage 2 | - | - | - | - | 356 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.9 | 63.3 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 170 | - | - | 683 | - |
| HCM Lane V/C Ratio | 0.689 | - | - | 0.145 | - |
| HCM Control Delay (s) | 63.3 | - | - | 11.2 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 4.1 | - | - | 0.5 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.8 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 869 | 54 | 90 | 1109 | 44 | 65 |
| Future Vol, veh/h | 869 | 54 | 90 | 1109 | 44 | 65 |
| Conflicting Peds, #/hr | 0 | 11 | 11 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 934 | 58 | 97 | 1192 | 47 | 70 |

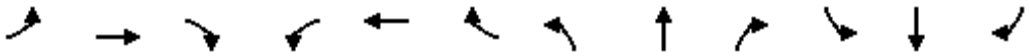
| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1003 | 0 | 1764 | 507 |
| Stage 1 | - | - | - | - | 974 | - |
| Stage 2 | - | - | - | - | 790 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 686 | - | 75 | 511 |
| Stage 1 | - | - | - | - | 327 | - |
| Stage 2 | - | - | - | - | 408 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 679 | - | 64 | 506 |
| Mov Cap-2 Maneuver | - | - | - | - | 64 | - |
| Stage 1 | - | - | - | - | 324 | - |
| Stage 2 | - | - | - | - | 350 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.8 | 110.3 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 134 | - | - | 679 | - |
| HCM Lane V/C Ratio | 0.875 | - | - | 0.143 | - |
| HCM Control Delay (s) | 110.3 | - | - | 11.2 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 5.7 | - | - | 0.5 | - |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 34 | 841 | 59 | 44 | 1092 | 71 | 44 | 6 | 43 | 95 | 11 | 63 |
| Future Volume (veh/h) | 34 | 841 | 59 | 44 | 1092 | 71 | 44 | 6 | 43 | 95 | 11 | 63 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.95 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 37 | 914 | 64 | 48 | 1187 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 55 | 1801 | 126 | 66 | 1922 | 591 | 131 | 34 | 228 | 136 | 39 | 219 |
| Arrive On Green | 0.03 | 0.37 | 0.37 | 0.04 | 0.38 | 0.38 | 0.07 | 0.16 | 0.16 | 0.08 | 0.17 | 0.17 |
| Sat Flow, veh/h | 1781 | 4863 | 339 | 1781 | 5106 | 1570 | 1781 | 210 | 1407 | 1781 | 234 | 1324 |
| Grp Volume(v), veh/h | 37 | 639 | 339 | 48 | 1187 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1798 | 1781 | 1702 | 1570 | 1781 | 0 | 1617 | 1781 | 0 | 1558 |
| Q Serve(g_s), s | 1.2 | 8.6 | 8.7 | 1.6 | 11.2 | 1.9 | 1.5 | 0.0 | 1.7 | 3.4 | 0.0 | 2.7 |
| Cycle Q Clear(g_c), s | 1.2 | 8.6 | 8.7 | 1.6 | 11.2 | 1.9 | 1.5 | 0.0 | 1.7 | 3.4 | 0.0 | 2.7 |
| Prop In Lane | 1.00 | | 0.19 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 55 | 1261 | 666 | 66 | 1922 | 591 | 131 | 0 | 262 | 136 | 0 | 257 |
| V/C Ratio(X) | 0.67 | 0.51 | 0.51 | 0.73 | 0.62 | 0.13 | 0.37 | 0.00 | 0.21 | 0.76 | 0.00 | 0.31 |
| Avail Cap(c_a), veh/h | 270 | 2066 | 1091 | 390 | 3444 | 1059 | 390 | 0 | 818 | 601 | 0 | 972 |
| 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 | 28.4 | 14.5 | 14.5 | 28.3 | 15.0 | 12.1 | 26.1 | 0.0 | 21.5 | 26.8 | 0.0 | 21.8 |
| Incr Delay (d2), s/veh | 13.5 | 0.3 | 0.6 | 14.4 | 0.3 | 0.1 | 1.7 | 0.0 | 0.4 | 8.2 | 0.0 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 2.7 | 3.0 | 0.9 | 3.5 | 0.6 | 0.7 | 0.0 | 0.6 | 1.7 | 0.0 | 1.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.9 | 14.8 | 15.1 | 42.7 | 15.4 | 12.2 | 27.8 | 0.0 | 21.9 | 35.0 | 0.0 | 22.5 |
| LnGrp LOS | D | B | B | D | B | B | C | A | C | D | A | C |
| Approach Vol, veh/h | | 1015 | | | 1312 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 15.9 | | | 16.2 | | | 24.7 | | | 29.5 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.2 | 28.0 | 9.4 | 14.8 | 6.8 | 28.3 | 9.5 | 14.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 13.0 | 36.0 | 13.0 | 37.0 | 9.0 | 40.0 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 3.6 | 10.7 | 3.5 | 4.7 | 3.2 | 13.2 | 5.4 | 3.7 |
| Green Ext Time (p_c), s | 0.0 | 6.3 | 0.0 | 0.5 | 0.0 | 9.1 | 0.2 | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 17.3 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 179 | 665 | 135 | 148 | 885 | 262 | 169 | 346 | 185 | 173 | 251 | 153 |
| Future Volume (veh/h) | 179 | 665 | 135 | 148 | 885 | 262 | 169 | 346 | 185 | 173 | 251 | 153 |
| 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 | | 1.00 | 1.00 | | 0.99 | 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 | 186 | 693 | 141 | 154 | 922 | 273 | 176 | 360 | 193 | 180 | 261 | 159 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 232 | 1511 | 462 | 197 | 1410 | 436 | 221 | 909 | 278 | 226 | 922 | 286 |
| Arrive On Green | 0.13 | 0.30 | 0.30 | 0.11 | 0.28 | 0.28 | 0.12 | 0.18 | 0.18 | 0.13 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1781 | 5106 | 1562 | 1781 | 5106 | 1580 | 1781 | 5106 | 1562 | 1781 | 5106 | 1582 |
| Grp Volume(v), veh/h | 186 | 693 | 141 | 154 | 922 | 273 | 176 | 360 | 193 | 180 | 261 | 159 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1562 | 1781 | 1702 | 1580 | 1781 | 1702 | 1562 | 1781 | 1702 | 1582 |
| Q Serve(g_s), s | 7.7 | 8.4 | 5.3 | 6.4 | 12.2 | 11.5 | 7.3 | 4.7 | 8.8 | 7.5 | 3.4 | 7.0 |
| Cycle Q Clear(g_c), s | 7.7 | 8.4 | 5.3 | 6.4 | 12.2 | 11.5 | 7.3 | 4.7 | 8.8 | 7.5 | 3.4 | 7.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 232 | 1511 | 462 | 197 | 1410 | 436 | 221 | 909 | 278 | 226 | 922 | 286 |
| V/C Ratio(X) | 0.80 | 0.46 | 0.31 | 0.78 | 0.65 | 0.63 | 0.80 | 0.40 | 0.69 | 0.80 | 0.28 | 0.56 |
| Avail Cap(c_a), veh/h | 585 | 2011 | 615 | 585 | 2011 | 622 | 585 | 1877 | 574 | 585 | 1877 | 582 |
| 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 | 32.2 | 21.8 | 20.8 | 33.0 | 24.4 | 24.1 | 32.4 | 27.7 | 29.4 | 32.3 | 27.0 | 28.4 |
| Incr Delay (d2), s/veh | 6.3 | 0.2 | 0.4 | 6.7 | 0.5 | 1.5 | 6.4 | 0.3 | 3.1 | 6.4 | 0.2 | 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 | 3.5 | 3.1 | 1.8 | 3.0 | 4.6 | 4.1 | 3.3 | 1.8 | 3.3 | 3.4 | 1.3 | 2.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 38.5 | 22.1 | 21.1 | 39.7 | 24.9 | 25.6 | 38.8 | 28.0 | 32.5 | 38.7 | 27.1 | 30.1 |
| LnGrp LOS | D | C | C | D | C | C | D | C | C | D | C | C |
| Approach Vol, veh/h | | 1020 | | | 1349 | | | 729 | | | 600 | |
| Approach Delay, s/veh | | 24.9 | | | 26.7 | | | 31.8 | | | 31.4 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.7 | 19.6 | 13.4 | 28.5 | 14.5 | 19.8 | 14.9 | 27.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 28.0 | 25.0 | 30.0 | 25.0 | 28.0 | 25.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 9.5 | 10.8 | 8.4 | 10.4 | 9.3 | 9.0 | 9.7 | 14.2 |
| Green Ext Time (p_c), s | 0.4 | 2.6 | 0.3 | 4.7 | 0.4 | 1.9 | 0.4 | 6.4 |

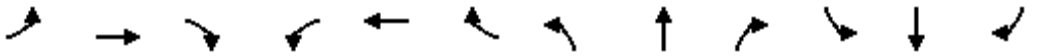
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 28.0 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 74 | 914 | 35 | 105 | 1243 | 66 | 28 | 16 | 95 | 52 | 16 | 36 |
| Future Volume (veh/h) | 74 | 914 | 35 | 105 | 1243 | 66 | 28 | 16 | 95 | 52 | 16 | 36 |
| 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 | | 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 | 80 | 983 | 38 | 113 | 1337 | 71 | 30 | 17 | 102 | 56 | 17 | 39 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 103 | 2373 | 92 | 150 | 2466 | 131 | 305 | 222 | 187 | 297 | 222 | 187 |
| Arrive On Green | 0.06 | 0.47 | 0.47 | 0.08 | 0.50 | 0.50 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Sat Flow, veh/h | 1781 | 5040 | 195 | 1781 | 4963 | 264 | 1345 | 1870 | 1581 | 1270 | 1870 | 1581 |
| Grp Volume(v), veh/h | 80 | 664 | 357 | 113 | 917 | 491 | 30 | 17 | 102 | 56 | 17 | 39 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1830 | 1781 | 1702 | 1822 | 1345 | 1870 | 1581 | 1270 | 1870 | 1581 |
| Q Serve(g_s), s | 2.0 | 5.9 | 5.9 | 2.9 | 8.5 | 8.5 | 0.9 | 0.4 | 2.8 | 1.9 | 0.4 | 1.0 |
| Cycle Q Clear(g_c), s | 2.0 | 5.9 | 5.9 | 2.9 | 8.5 | 8.5 | 1.3 | 0.4 | 2.8 | 2.3 | 0.4 | 1.0 |
| Prop In Lane | 1.00 | | 0.11 | 1.00 | | 0.14 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 103 | 1603 | 862 | 150 | 1692 | 906 | 305 | 222 | 187 | 297 | 222 | 187 |
| V/C Ratio(X) | 0.77 | 0.41 | 0.41 | 0.75 | 0.54 | 0.54 | 0.10 | 0.08 | 0.54 | 0.19 | 0.08 | 0.21 |
| Avail Cap(c_a), veh/h | 775 | 3927 | 2111 | 775 | 3927 | 2102 | 1082 | 1303 | 1101 | 1031 | 1303 | 1101 |
| 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 | 21.3 | 8.0 | 8.0 | 20.6 | 8.0 | 8.0 | 18.6 | 18.0 | 19.1 | 19.0 | 18.0 | 18.3 |
| Incr Delay (d2), s/veh | 11.5 | 0.2 | 0.3 | 7.4 | 0.3 | 0.5 | 0.1 | 0.1 | 2.5 | 0.3 | 0.1 | 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 | 1.1 | 1.4 | 1.6 | 1.3 | 2.0 | 2.2 | 0.3 | 0.2 | 1.1 | 0.5 | 0.2 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.8 | 8.2 | 8.3 | 28.0 | 8.2 | 8.5 | 18.7 | 18.2 | 21.5 | 19.3 | 18.2 | 18.8 |
| LnGrp LOS | C | A | A | C | A | A | B | B | C | B | B | B |
| Approach Vol, veh/h | | 1101 | | | 1521 | | | 149 | | | 112 | |
| Approach Delay, s/veh | | 10.0 | | | 9.8 | | | 20.6 | | | 19.0 | |
| Approach LOS | | B | | | A | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.9 | 26.6 | | 10.4 | 7.7 | 27.8 | | 10.4 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 20.0 | 53.0 | | 32.0 | 20.0 | 53.0 | | 32.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.9 | 7.9 | | 4.3 | 4.0 | 10.5 | | 4.8 | | | | |
| Green Ext Time (p_c), s | 0.2 | 7.7 | | 0.4 | 0.1 | 12.3 | | 0.5 | | | | |

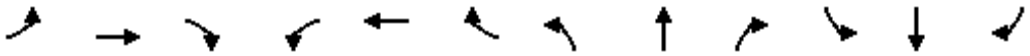
| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 10.8 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 222 | 794 | 45 | 51 | 1126 | 178 | 26 | 16 | 29 | 139 | 17 | 262 |
| Future Volume (veh/h) | 222 | 794 | 45 | 51 | 1126 | 178 | 26 | 16 | 29 | 139 | 17 | 262 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 236 | 845 | 48 | 54 | 1198 | 189 | 28 | 17 | 31 | 148 | 18 | 279 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 267 | 2719 | 154 | 70 | 1953 | 308 | 45 | 258 | 215 | 177 | 21 | 318 |
| Arrive On Green | 0.15 | 0.55 | 0.55 | 0.04 | 0.44 | 0.44 | 0.03 | 0.14 | 0.14 | 0.10 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1781 | 4944 | 280 | 1781 | 4444 | 701 | 1781 | 1870 | 1557 | 1781 | 97 | 1501 |
| Grp Volume(v), veh/h | 236 | 581 | 312 | 54 | 918 | 469 | 28 | 17 | 31 | 148 | 0 | 297 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1820 | 1781 | 1702 | 1740 | 1781 | 1870 | 1557 | 1781 | 0 | 1598 |
| Q Serve(g_s), s | 15.6 | 11.1 | 11.2 | 3.6 | 24.8 | 24.8 | 1.9 | 0.9 | 2.1 | 9.8 | 0.0 | 21.6 |
| Cycle Q Clear(g_c), s | 15.6 | 11.1 | 11.2 | 3.6 | 24.8 | 24.8 | 1.9 | 0.9 | 2.1 | 9.8 | 0.0 | 21.6 |
| Prop In Lane | 1.00 | | 0.15 | 1.00 | | 0.40 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 267 | 1872 | 1001 | 70 | 1496 | 765 | 45 | 258 | 215 | 177 | 0 | 339 |
| V/C Ratio(X) | 0.88 | 0.31 | 0.31 | 0.77 | 0.61 | 0.61 | 0.62 | 0.07 | 0.14 | 0.84 | 0.00 | 0.88 |
| Avail Cap(c_a), veh/h | 377 | 1872 | 1001 | 154 | 1496 | 765 | 154 | 388 | 323 | 303 | 0 | 461 |
| 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) | 0.94 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 50.0 | 14.7 | 14.7 | 57.1 | 25.8 | 25.8 | 57.9 | 45.0 | 45.5 | 53.1 | 0.0 | 45.7 |
| Incr Delay (d2), s/veh | 15.5 | 0.4 | 0.8 | 16.4 | 1.9 | 3.7 | 13.2 | 0.1 | 0.3 | 9.8 | 0.0 | 13.4 |
| 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 | 8.0 | 4.2 | 4.6 | 1.9 | 10.0 | 10.6 | 1.0 | 0.5 | 0.8 | 4.9 | 0.0 | 9.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 65.5 | 15.1 | 15.4 | 73.5 | 27.7 | 29.5 | 71.1 | 45.1 | 45.8 | 62.9 | 0.0 | 59.1 |
| LnGrp LOS | E | B | B | E | C | C | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1129 | | | 1441 | | | 76 | | | 445 | |
| Approach Delay, s/veh | | 25.7 | | | 30.0 | | | 55.0 | | | 60.4 | |
| Approach LOS | | C | | | C | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.3 | 72.2 | 16.5 | 22.0 | 22.6 | 58.9 | 7.6 | 30.9 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 10.4 | 43.8 | 20.4 | * 25 | 25.4 | * 29 | 10.4 | 34.6 |
| Max Q Clear Time (g_c+I1), s | 5.6 | 13.2 | 11.8 | 4.1 | 17.6 | 26.8 | 3.9 | 23.6 |
| Green Ext Time (p_c), s | 0.0 | 6.2 | 0.2 | 0.1 | 0.4 | 1.7 | 0.0 | 1.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 33.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 182 | 55 | 225 | 180 | 44 | 6 | 461 | 1145 | 135 | 55 | 1068 | 145 |
| Future Volume (veh/h) | 182 | 55 | 225 | 180 | 44 | 6 | 461 | 1145 | 135 | 55 | 1068 | 145 |
| 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 | 198 | 60 | 245 | 196 | 48 | 7 | 501 | 1245 | 147 | 60 | 1161 | 158 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 235 | 329 | 279 | 233 | 279 | 41 | 609 | 2139 | 664 | 77 | 1462 | 454 |
| Arrive On Green | 0.13 | 0.18 | 0.18 | 0.13 | 0.17 | 0.17 | 0.18 | 0.42 | 0.42 | 0.04 | 0.29 | 0.29 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1596 | 233 | 3456 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 198 | 60 | 245 | 196 | 0 | 55 | 501 | 1245 | 147 | 60 | 1161 | 158 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1828 | 1728 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g_s), s | 9.9 | 2.5 | 13.7 | 9.8 | 0.0 | 2.3 | 12.7 | 17.0 | 5.4 | 3.0 | 19.1 | 7.2 |
| Cycle Q Clear(g_c), s | 9.9 | 2.5 | 13.7 | 9.8 | 0.0 | 2.3 | 12.7 | 17.0 | 5.4 | 3.0 | 19.1 | 7.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 235 | 329 | 279 | 233 | 0 | 319 | 609 | 2139 | 664 | 77 | 1462 | 454 |
| V/C Ratio(X) | 0.84 | 0.18 | 0.88 | 0.84 | 0.00 | 0.17 | 0.82 | 0.58 | 0.22 | 0.77 | 0.79 | 0.35 |
| Avail Cap(c_a), veh/h | 314 | 370 | 314 | 314 | 0 | 362 | 951 | 2528 | 785 | 196 | 1685 | 523 |
| 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 | 38.5 | 31.9 | 36.5 | 38.6 | 0.0 | 31.9 | 36.1 | 20.3 | 16.9 | 43.0 | 30.0 | 25.7 |
| Incr Delay (d2), s/veh | 14.4 | 0.3 | 22.0 | 14.1 | 0.0 | 0.3 | 3.4 | 0.3 | 0.2 | 15.0 | 2.4 | 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 | 5.2 | 1.1 | 6.9 | 5.1 | 0.0 | 1.0 | 5.3 | 6.0 | 1.9 | 1.6 | 7.4 | 2.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 52.9 | 32.2 | 58.5 | 52.7 | 0.0 | 32.2 | 39.5 | 20.5 | 17.1 | 58.1 | 32.3 | 26.2 |
| LnGrp LOS | D | C | E | D | A | C | D | C | B | E | C | C |
| Approach Vol, veh/h | | 503 | | | 251 | | | 1893 | | | 1379 | |
| Approach Delay, s/veh | | 53.2 | | | 48.2 | | | 25.3 | | | 32.8 | |
| Approach LOS | | D | | | D | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.0 | 44.1 | 16.9 | 21.0 | 21.0 | 32.0 | 17.0 | 20.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 10.0 | 45.0 | 16.0 | 18.0 | 25.0 | 30.0 | 16.0 | 18.0 |
| Max Q Clear Time (g_c+I1), s | 5.0 | 19.0 | 11.8 | 15.7 | 14.7 | 21.1 | 11.9 | 4.3 |
| Green Ext Time (p_c), s | 0.0 | 9.6 | 0.2 | 0.3 | 1.3 | 4.9 | 0.2 | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 32.8 |
| HCM 6th LOS | C |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 208 | 982 | 489 | 338 | 1058 | 50 | 405 | 613 | 305 | 55 | 583 | 182 |
| Future Volume (veh/h) | 208 | 982 | 489 | 338 | 1058 | 50 | 405 | 613 | 305 | 55 | 583 | 182 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 221 | 1045 | 364 | 360 | 1126 | 53 | 431 | 652 | 324 | 59 | 620 | 194 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 257 | 1443 | 448 | 435 | 1349 | 419 | 507 | 1104 | 486 | 76 | 735 | 328 |
| Arrive On Green | 0.14 | 0.28 | 0.28 | 0.13 | 0.26 | 0.26 | 0.15 | 0.31 | 0.31 | 0.04 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5106 | 1585 | 3456 | 3554 | 1564 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 221 | 1045 | 364 | 360 | 1126 | 53 | 431 | 652 | 324 | 59 | 620 | 194 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1585 | 1728 | 1777 | 1564 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 11.2 | 17.0 | 19.7 | 9.4 | 19.2 | 2.3 | 11.2 | 14.3 | 16.6 | 3.0 | 15.5 | 10.2 |
| Cycle Q Clear(g_c), s | 11.2 | 17.0 | 19.7 | 9.4 | 19.2 | 2.3 | 11.2 | 14.3 | 16.6 | 3.0 | 15.5 | 10.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 257 | 1443 | 448 | 435 | 1349 | 419 | 507 | 1104 | 486 | 76 | 735 | 328 |
| V/C Ratio(X) | 0.86 | 0.72 | 0.81 | 0.83 | 0.83 | 0.13 | 0.85 | 0.59 | 0.67 | 0.78 | 0.84 | 0.59 |
| Avail Cap(c_a), veh/h | 309 | 1604 | 498 | 487 | 1438 | 446 | 562 | 1104 | 486 | 154 | 809 | 361 |
| 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 | 38.6 | 29.9 | 30.8 | 39.4 | 32.1 | 25.9 | 38.4 | 26.9 | 27.7 | 43.7 | 35.2 | 33.1 |
| Incr Delay (d2), s/veh | 18.5 | 1.5 | 9.1 | 10.4 | 4.2 | 0.1 | 11.1 | 0.8 | 3.5 | 15.4 | 7.6 | 2.2 |
| 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 | 6.0 | 6.7 | 8.0 | 4.4 | 7.9 | 0.8 | 5.2 | 5.7 | 6.1 | 1.6 | 7.3 | 3.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 57.1 | 31.3 | 40.0 | 49.8 | 36.3 | 26.0 | 49.5 | 27.7 | 31.1 | 59.2 | 42.7 | 35.3 |
| LnGrp LOS | E | C | D | D | D | C | D | C | C | E | D | D |
| Approach Vol, veh/h | | 1630 | | | 1539 | | | 1407 | | | 873 | |
| Approach Delay, s/veh | | 36.8 | | | 39.1 | | | 35.1 | | | 42.2 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.6 | 32.1 | 18.5 | 25.1 | 18.3 | 30.4 | 8.9 | 34.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 13.0 | 29.0 | 15.0 | 21.0 | 16.0 | 26.0 | 8.0 | 28.0 |
| Max Q Clear Time (g_c+I1), s | 11.4 | 21.7 | 13.2 | 17.5 | 13.2 | 21.2 | 5.0 | 18.6 |
| Green Ext Time (p_c), s | 0.2 | 4.3 | 0.3 | 1.6 | 0.2 | 2.9 | 0.0 | 3.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 37.9 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/29/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 100 | 146 | 1220 | 35 | 61 | 1859 |
| Future Volume (vph) | 100 | 146 | 1220 | 35 | 61 | 1859 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 5085 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 5085 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 109 | 159 | 1326 | 38 | 66 | 2021 |
| RTOR Reduction (vph) | 0 | 135 | 0 | 18 | 0 | 0 |
| Lane Group Flow (vph) | 109 | 24 | 1326 | 20 | 66 | 2021 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 9.3 | 9.3 | 32.2 | 32.2 | 5.0 | 42.2 |
| Effective Green, g (s) | 9.3 | 9.3 | 32.2 | 32.2 | 5.0 | 42.2 |
| Actuated g/C Ratio | 0.15 | 0.15 | 0.52 | 0.52 | 0.08 | 0.68 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 263 | 235 | 2619 | 815 | 141 | 3433 |
| v/s Ratio Prot | | | 0.26 | | 0.04 | c0.40 |
| v/s Ratio Perm | c0.06 | 0.01 | | 0.01 | | |
| v/c Ratio | 0.41 | 0.10 | 0.51 | 0.02 | 0.47 | 0.59 |
| Uniform Delay, d1 | 24.1 | 23.0 | 9.9 | 7.4 | 27.5 | 5.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.1 | 0.2 | 0.2 | 0.0 | 2.4 | 0.3 |
| Delay (s) | 25.2 | 23.2 | 10.1 | 7.4 | 29.9 | 5.7 |
| Level of Service | C | C | B | A | C | A |
| Approach Delay (s) | 24.0 | | 10.0 | | | 6.5 |
| Approach LOS | C | | B | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 9.0 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 62.5 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 50.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 36 | 1219 | 15 | 0 | 1959 |
| Future Vol, veh/h | 0 | 36 | 1219 | 15 | 0 | 1959 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 39 | 1325 | 16 | 0 | 2129 |

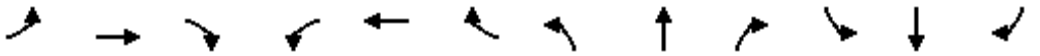
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 663 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 346 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 346 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 16.7 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 346 | - |
| HCM Lane V/C Ratio | - | - | 0.113 | - |
| HCM Control Delay (s) | - | - | 16.7 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0.4 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 205 | 568 | 404 | 491 | 385 | 196 | 505 | 833 | 394 | 432 | 1260 | 267 |
| Future Volume (veh/h) | 205 | 568 | 404 | 491 | 385 | 196 | 505 | 833 | 394 | 432 | 1260 | 267 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.74 | 1.00 | | 0.97 | 1.00 | | 0.99 | 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 | 223 | 617 | 307 | 534 | 418 | 213 | 549 | 905 | 428 | 470 | 1370 | 290 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 254 | 604 | 200 | 596 | 709 | 307 | 639 | 1517 | 465 | 550 | 1386 | 422 |
| Arrive On Green | 0.14 | 0.17 | 0.17 | 0.17 | 0.20 | 0.20 | 0.19 | 0.30 | 0.30 | 0.16 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1781 | 3554 | 1175 | 3456 | 3554 | 1540 | 3456 | 5106 | 1564 | 3456 | 5106 | 1554 |
| Grp Volume(v), veh/h | 223 | 617 | 307 | 534 | 418 | 213 | 549 | 905 | 428 | 470 | 1370 | 290 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1175 | 1728 | 1777 | 1540 | 1728 | 1702 | 1564 | 1728 | 1702 | 1554 |
| Q Serve(g_s), s | 13.7 | 19.0 | 19.0 | 16.9 | 11.9 | 14.4 | 17.2 | 16.9 | 29.6 | 14.8 | 29.9 | 18.7 |
| Cycle Q Clear(g_c), s | 13.7 | 19.0 | 19.0 | 16.9 | 11.9 | 14.4 | 17.2 | 16.9 | 29.6 | 14.8 | 29.9 | 18.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 254 | 604 | 200 | 596 | 709 | 307 | 639 | 1517 | 465 | 550 | 1386 | 422 |
| V/C Ratio(X) | 0.88 | 1.02 | 1.54 | 0.90 | 0.59 | 0.69 | 0.86 | 0.60 | 0.92 | 0.85 | 0.99 | 0.69 |
| Avail Cap(c_a), veh/h | 327 | 604 | 200 | 634 | 709 | 307 | 896 | 1553 | 475 | 742 | 1386 | 422 |
| 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 | 47.0 | 46.4 | 46.4 | 45.3 | 40.6 | 41.6 | 44.1 | 33.6 | 38.0 | 45.7 | 40.6 | 36.5 |
| Incr Delay (d2), s/veh | 18.8 | 42.3 | 265.2 | 14.9 | 0.9 | 5.6 | 6.1 | 0.6 | 23.1 | 7.3 | 21.4 | 4.6 |
| 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 | 7.4 | 12.0 | 20.3 | 8.2 | 5.1 | 6.0 | 7.7 | 6.9 | 14.3 | 6.6 | 14.5 | 7.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 65.8 | 88.7 | 311.6 | 60.2 | 41.5 | 47.1 | 50.3 | 34.2 | 61.1 | 53.1 | 62.0 | 41.1 |
| LnGrp LOS | E | F | F | E | D | D | D | C | E | D | E | D |
| Approach Vol, veh/h | | 1147 | | | 1165 | | | 1882 | | | 2130 | |
| Approach Delay, s/veh | | 143.9 | | | 51.1 | | | 45.0 | | | 57.2 | |
| Approach LOS | | F | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 23.8 | 39.2 | 20.5 | 28.3 | 26.7 | 36.3 | 23.8 | 25.0 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 |
| Max Green Setting (Gmax), s | 24.0 | 34.0 | 20.5 | 19.0 | 29.0 | 29.0 | 20.5 | 19.0 |
| Max Q Clear Time (g_c+I1), s | 16.8 | 31.6 | 15.7 | 16.4 | 19.2 | 31.9 | 18.9 | 21.0 |
| Green Ext Time (p_c), s | 1.0 | 1.6 | 0.3 | 0.2 | 1.5 | 0.0 | 0.4 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 68.2 |
| HCM 6th LOS | E |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/29/2024

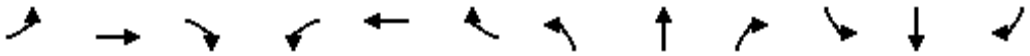
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 168 | 4 | 145 | 235 | 17 | 15 | 199 | 1373 | 65 | 66 | 2044 | 127 |
| Future Volume (vph) | 168 | 4 | 145 | 235 | 17 | 15 | 199 | 1373 | 65 | 66 | 2044 | 127 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 5041 | | 1770 | 5033 | |
| Flt Permitted | | 0.32 | 1.00 | | 0.49 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 601 | 1583 | | 910 | 1563 | 1770 | 5041 | | 1770 | 5033 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 183 | 4 | 158 | 255 | 18 | 16 | 216 | 1492 | 71 | 72 | 2222 | 138 |
| RTOR Reduction (vph) | 0 | 0 | 74 | 0 | 0 | 12 | 0 | 4 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 187 | 84 | 0 | 273 | 4 | 216 | 1559 | 0 | 72 | 2355 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 26.7 | 26.7 | | 26.7 | 26.7 | 18.7 | 65.2 | | 8.8 | 55.3 | |
| Effective Green, g (s) | | 26.7 | 26.7 | | 26.7 | 26.7 | 18.7 | 65.2 | | 8.8 | 55.3 | |
| Actuated g/C Ratio | | 0.23 | 0.23 | | 0.23 | 0.23 | 0.16 | 0.56 | | 0.08 | 0.47 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 137 | 362 | | 208 | 357 | 283 | 2816 | | 133 | 2384 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.31 | | 0.04 | c0.47 | |
| v/s Ratio Perm | | c0.31 | 0.05 | | 0.30 | 0.00 | | | | | | |
| v/c Ratio | | 1.36 | 0.23 | | 1.31 | 0.01 | 0.76 | 0.55 | | 0.54 | 0.99 | |
| Uniform Delay, d1 | | 45.0 | 36.6 | | 45.0 | 34.8 | 46.9 | 16.5 | | 52.0 | 30.4 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 203.8 | 0.3 | | 170.6 | 0.0 | 11.5 | 0.2 | | 4.4 | 15.5 | |
| Delay (s) | | 248.8 | 37.0 | | 215.6 | 34.8 | 58.4 | 16.7 | | 56.4 | 45.8 | |
| Level of Service | | F | D | | F | C | E | B | | E | D | |
| Approach Delay (s) | | 151.8 | | | 205.6 | | | 21.8 | | | 46.2 | |
| Approach LOS | | F | | | F | | | C | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 54.2 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 1.04 | | |
| Actuated Cycle Length (s) | 116.7 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 87.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 81 | 45 | 32 | 146 | 73 | 79 | 22 | 1438 | 65 | 182 | 2172 | 70 |
| Future Volume (veh/h) | 81 | 45 | 32 | 146 | 73 | 79 | 22 | 1438 | 65 | 182 | 2172 | 70 |
| 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 | | 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 | 88 | 49 | 35 | 159 | 79 | 86 | 24 | 1563 | 71 | 198 | 2361 | 76 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 113 | 84 | 60 | 194 | 104 | 113 | 35 | 2365 | 733 | 237 | 2928 | 94 |
| Arrive On Green | 0.06 | 0.08 | 0.08 | 0.11 | 0.13 | 0.13 | 0.02 | 0.46 | 0.46 | 0.13 | 0.58 | 0.58 |
| Sat Flow, veh/h | 1781 | 1012 | 723 | 1781 | 811 | 883 | 1781 | 5106 | 1582 | 1781 | 5078 | 163 |
| Grp Volume(v), veh/h | 88 | 0 | 84 | 159 | 0 | 165 | 24 | 1563 | 71 | 198 | 1578 | 859 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1734 | 1781 | 0 | 1694 | 1781 | 1702 | 1582 | 1781 | 1702 | 1837 |
| Q Serve(g_s), s | 4.8 | 0.0 | 4.6 | 8.6 | 0.0 | 9.3 | 1.3 | 23.4 | 2.5 | 10.7 | 36.2 | 36.8 |
| Cycle Q Clear(g_c), s | 4.8 | 0.0 | 4.6 | 8.6 | 0.0 | 9.3 | 1.3 | 23.4 | 2.5 | 10.7 | 36.2 | 36.8 |
| Prop In Lane | 1.00 | | 0.42 | 1.00 | | 0.52 | 1.00 | | 1.00 | 1.00 | | 0.09 |
| Lane Grp Cap(c), veh/h | 113 | 0 | 144 | 194 | 0 | 217 | 35 | 2365 | 733 | 237 | 1963 | 1059 |
| V/C Ratio(X) | 0.78 | 0.00 | 0.59 | 0.82 | 0.00 | 0.76 | 0.69 | 0.66 | 0.10 | 0.84 | 0.80 | 0.81 |
| Avail Cap(c_a), veh/h | 270 | 0 | 368 | 360 | 0 | 445 | 108 | 2365 | 733 | 558 | 2133 | 1151 |
| 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 | 45.6 | 0.0 | 43.7 | 43.1 | 0.0 | 41.7 | 48.2 | 20.5 | 14.9 | 41.9 | 16.5 | 16.7 |
| Incr Delay (d2), s/veh | 10.7 | 0.0 | 3.7 | 8.3 | 0.0 | 5.4 | 21.6 | 0.7 | 0.1 | 7.6 | 2.2 | 4.2 |
| 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 | 2.5 | 0.0 | 2.1 | 4.3 | 0.0 | 4.2 | 0.8 | 8.7 | 0.9 | 5.1 | 12.8 | 14.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 56.3 | 0.0 | 47.5 | 51.4 | 0.0 | 47.1 | 69.8 | 21.2 | 15.0 | 49.5 | 18.7 | 20.8 |
| LnGrp LOS | E | A | D | D | A | D | E | C | B | D | B | C |
| Approach Vol, veh/h | | 172 | | | 324 | | | 1658 | | | 2635 | |
| Approach Delay, s/veh | | 52.0 | | | 49.2 | | | 21.7 | | | 21.7 | |
| Approach LOS | | D | | | D | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 18.2 | 51.8 | 15.8 | 13.2 | 6.9 | 63.1 | 11.3 | 17.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 31.0 | 37.0 | 20.0 | 21.0 | 6.0 | 62.0 | 15.0 | 26.0 |
| Max Q Clear Time (g_c+I1), s | 12.7 | 25.4 | 10.6 | 6.6 | 3.3 | 38.8 | 6.8 | 11.3 |
| Green Ext Time (p_c), s | 0.5 | 7.7 | 0.3 | 0.3 | 0.0 | 18.3 | 0.1 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 24.7 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 452 | 1140 | 218 | 570 | 983 | 238 | 277 | 896 | 200 | 352 | 1608 | 416 |
| Future Volume (veh/h) | 452 | 1140 | 218 | 570 | 983 | 238 | 277 | 896 | 200 | 352 | 1608 | 416 |
| 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 | 476 | 1200 | 229 | 600 | 1035 | 251 | 292 | 943 | 211 | 371 | 1693 | 438 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 538 | 1589 | 382 | 651 | 1798 | 435 | 338 | 1961 | 476 | 413 | 2100 | 515 |
| Arrive On Green | 0.16 | 0.25 | 0.25 | 0.19 | 0.28 | 0.28 | 0.10 | 0.30 | 0.30 | 0.12 | 0.33 | 0.33 |
| Sat Flow, veh/h | 3456 | 6434 | 1548 | 3456 | 6434 | 1556 | 3456 | 6434 | 1562 | 3456 | 6434 | 1576 |
| Grp Volume(v), veh/h | 476 | 1200 | 229 | 600 | 1035 | 251 | 292 | 943 | 211 | 371 | 1693 | 438 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1548 | 1728 | 1609 | 1556 | 1728 | 1609 | 1562 | 1728 | 1609 | 1576 |
| Q Serve(g_s), s | 20.1 | 25.8 | 19.5 | 25.5 | 20.6 | 20.7 | 12.4 | 17.8 | 16.2 | 15.8 | 35.9 | 38.7 |
| Cycle Q Clear(g_c), s | 20.1 | 25.8 | 19.5 | 25.5 | 20.6 | 20.7 | 12.4 | 17.8 | 16.2 | 15.8 | 35.9 | 38.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 538 | 1589 | 382 | 651 | 1798 | 435 | 338 | 1961 | 476 | 413 | 2100 | 515 |
| V/C Ratio(X) | 0.88 | 0.76 | 0.60 | 0.92 | 0.58 | 0.58 | 0.86 | 0.48 | 0.44 | 0.90 | 0.81 | 0.85 |
| Avail Cap(c_a), veh/h | 694 | 1809 | 435 | 694 | 1809 | 438 | 370 | 2111 | 512 | 416 | 2197 | 538 |
| 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 | 61.7 | 52.1 | 49.7 | 59.5 | 46.2 | 46.2 | 66.4 | 42.3 | 41.7 | 64.9 | 46.0 | 46.9 |
| Incr Delay (d2), s/veh | 10.8 | 1.6 | 1.8 | 17.3 | 0.4 | 1.9 | 17.6 | 0.2 | 0.6 | 21.7 | 2.2 | 12.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9.5 | 10.5 | 7.7 | 12.6 | 8.2 | 8.2 | 6.3 | 7.1 | 6.3 | 8.1 | 14.4 | 16.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 72.5 | 53.7 | 51.5 | 76.9 | 46.6 | 48.1 | 84.0 | 42.5 | 42.4 | 86.5 | 48.2 | 58.9 |
| LnGrp LOS | E | D | D | E | D | D | F | D | D | F | D | E |
| Approach Vol, veh/h | | 1905 | | | 1886 | | | 1446 | | | 2502 | |
| Approach Delay, s/veh | | 58.1 | | | 56.4 | | | 50.9 | | | 55.8 | |
| Approach LOS | | E | | | E | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 22.8 | 51.5 | 33.1 | 41.9 | 19.6 | 54.8 | 28.3 | 46.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 18.0 | 49.0 | 30.0 | 42.0 | 16.0 | 51.0 | 30.0 | 42.0 |
| Max Q Clear Time (g_c+I1), s | 17.8 | 19.8 | 27.5 | 27.8 | 14.4 | 40.7 | 22.1 | 22.7 |
| Green Ext Time (p_c), s | 0.0 | 8.0 | 0.6 | 7.5 | 0.2 | 8.0 | 1.1 | 7.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 55.6 |
| HCM 6th LOS | E |

# HCM 6th Signalized Intersection Summary
## 8: Caywood Dr & Morada Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 14 | 1324 | 107 | 73 | 1008 | 36 | 23 | 0 | 90 | 105 | 2 | 86 |
| Future Volume (veh/h) | 14 | 1324 | 107 | 73 | 1008 | 36 | 23 | 0 | 90 | 105 | 2 | 86 |
| 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 | | 0.97 | 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 | 15 | 1439 | 116 | 79 | 1096 | 39 | 25 | 0 | 98 | 104 | 15 | 93 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 33 | 2003 | 161 | 104 | 2335 | 704 | 32 | 0 | 124 | 185 | 23 | 145 |
| Arrive On Green | 0.02 | 0.42 | 0.42 | 0.06 | 0.46 | 0.46 | 0.10 | 0.00 | 0.10 | 0.10 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 4803 | 387 | 1781 | 5106 | 1540 | 330 | 0 | 1292 | 1781 | 225 | 1394 |
| Grp Volume(v), veh/h | 15 | 1020 | 535 | 79 | 1096 | 39 | 123 | 0 | 0 | 104 | 0 | 108 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1786 | 1781 | 1702 | 1540 | 1621 | 0 | 0 | 1781 | 0 | 1619 |
| Q Serve(g_s), s | 0.5 | 16.1 | 16.1 | 2.8 | 9.6 | 0.9 | 4.8 | 0.0 | 0.0 | 3.6 | 0.0 | 4.1 |
| Cycle Q Clear(g_c), s | 0.5 | 16.1 | 16.1 | 2.8 | 9.6 | 0.9 | 4.8 | 0.0 | 0.0 | 3.6 | 0.0 | 4.1 |
| Prop In Lane | 1.00 | | 0.22 | 1.00 | | 1.00 | 0.20 | | 0.80 | 1.00 | | 0.86 |
| Lane Grp Cap(c), veh/h | 33 | 1419 | 745 | 104 | 2335 | 704 | 155 | 0 | 0 | 185 | 0 | 168 |
| V/C Ratio(X) | 0.46 | 0.72 | 0.72 | 0.76 | 0.47 | 0.06 | 0.79 | 0.00 | 0.00 | 0.56 | 0.00 | 0.64 |
| Avail Cap(c_a), veh/h | 275 | 1789 | 939 | 413 | 3079 | 929 | 251 | 0 | 0 | 551 | 0 | 501 |
| 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 | 0.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.4 | 15.7 | 15.7 | 30.0 | 12.1 | 9.8 | 28.6 | 0.0 | 0.0 | 27.6 | 0.0 | 27.8 |
| Incr Delay (d2), s/veh | 9.8 | 1.0 | 2.0 | 10.6 | 0.1 | 0.0 | 8.7 | 0.0 | 0.0 | 2.7 | 0.0 | 4.1 |
| 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 | 5.2 | 5.7 | 1.4 | 2.9 | 0.3 | 2.2 | 0.0 | 0.0 | 1.6 | 0.0 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.3 | 16.7 | 17.7 | 40.6 | 12.3 | 9.8 | 37.3 | 0.0 | 0.0 | 30.2 | 0.0 | 31.9 |
| LnGrp LOS | D | B | B | D | B | A | D | A | A | C | A | C |
| Approach Vol, veh/h | | 1570 | | | 1214 | | | 123 | | | 212 | |
| Approach Delay, s/veh | | 17.3 | | | 14.0 | | | 37.3 | | | 31.1 | |
| Approach LOS | | B | | | B | | | D | | | C | |

| Timer - Assigned Phs | 2 | 3 | 4 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 11.2 | 8.8 | 33.0 | 11.7 | 6.2 | 35.6 |
| Change Period (Y+Rc), s | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 10.0 | 15.0 | 34.0 | 20.0 | 10.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 6.8 | 4.8 | 18.1 | 6.1 | 2.5 | 11.6 |
| Green Ext Time (p_c), s | 0.2 | 0.1 | 8.8 | 0.7 | 0.0 | 8.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 17.7 |
| HCM 6th LOS | B |

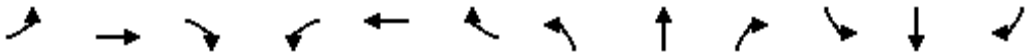
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM 6th Signalized Intersection Summary
## 9: Cherbourg Wy & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 28 | 1434 | 57 | 161 | 1059 | 36 | 8 | 0 | 136 | 343 | 2 | 50 |
| Future Volume (veh/h) | 28 | 1434 | 57 | 161 | 1059 | 36 | 8 | 0 | 136 | 343 | 2 | 50 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.96 | 1.00 | | 0.98 | 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 | 30 | 1559 | 62 | 175 | 1151 | 39 | 9 | 0 | 148 | 425 | 0 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 53 | 1850 | 74 | 215 | 2342 | 714 | 11 | 0 | 174 | 544 | 286 | 0 |
| Arrive On Green | 0.03 | 0.37 | 0.37 | 0.12 | 0.46 | 0.46 | 0.12 | 0.00 | 0.12 | 0.15 | 0.00 | 0.00 |
| Sat Flow, veh/h | 1781 | 5028 | 200 | 1781 | 5106 | 1557 | 91 | 0 | 1504 | 3563 | 1870 | 0 |
| Grp Volume(v), veh/h | 30 | 1055 | 566 | 175 | 1151 | 39 | 157 | 0 | 0 | 425 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1824 | 1781 | 1702 | 1557 | 1595 | 0 | 0 | 1781 | 1870 | 0 |
| Q Serve(g_s), s | 1.4 | 24.5 | 24.6 | 8.3 | 13.6 | 1.2 | 8.3 | 0.0 | 0.0 | 9.9 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 1.4 | 24.5 | 24.6 | 8.3 | 13.6 | 1.2 | 8.3 | 0.0 | 0.0 | 9.9 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.11 | 1.00 | | 1.00 | 0.06 | | 0.94 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 53 | 1252 | 671 | 215 | 2342 | 714 | 185 | 0 | 0 | 544 | 286 | 0 |
| V/C Ratio(X) | 0.57 | 0.84 | 0.84 | 0.82 | 0.49 | 0.05 | 0.85 | 0.00 | 0.00 | 0.78 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 206 | 1340 | 718 | 412 | 2600 | 793 | 185 | 0 | 0 | 1031 | 541 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 41.4 | 25.0 | 25.0 | 37.1 | 16.3 | 13.0 | 37.5 | 0.0 | 0.0 | 35.2 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 9.2 | 4.8 | 8.6 | 7.3 | 0.2 | 0.0 | 29.5 | 0.0 | 0.0 | 2.5 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 9.7 | 11.1 | 3.8 | 4.7 | 0.4 | 4.7 | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 50.6 | 29.8 | 33.6 | 44.4 | 16.5 | 13.0 | 67.0 | 0.0 | 0.0 | 37.7 | 0.0 | 0.0 |
| LnGrp LOS | D | C | C | D | B | B | E | A | A | D | A | A |
| Approach Vol, veh/h | | 1651 | | | 1365 | | | 157 | | | 425 | |
| Approach Delay, s/veh | | 31.5 | | | 20.0 | | | 67.0 | | | 37.7 | |
| Approach LOS | | C | | | B | | | E | | | D | |

| Timer - Assigned Phs | | 2 | 3 | 4 | | 6 | 7 | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 15.0 | 15.4 | 37.8 | | 18.2 | 7.6 | 45.6 | | | | |
| Change Period (Y+Rc), s | | 5.0 | 5.0 | 6.0 | | 5.0 | 5.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 10.0 | 20.0 | 34.0 | | 25.0 | 10.0 | 44.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 10.3 | 10.3 | 26.6 | | 11.9 | 3.4 | 15.6 | | | | |
| Green Ext Time (p_c), s | | 0.0 | 0.3 | 5.2 | | 1.3 | 0.0 | 8.8 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 29.4 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

| Intersection | |
|---|---|
| Int Delay, s/veh | 95.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 14 | 1861 | 38 | 77 | 1149 | 80 | 25 | 0 | 124 | 0 | 0 | 82 |
| Future Vol, veh/h | 14 | 1861 | 38 | 77 | 1149 | 80 | 25 | 0 | 124 | 0 | 0 | 82 |
| Conflicting Peds, #/hr | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 15 | 2023 | 41 | 84 | 1249 | 87 | 27 | 0 | 135 | 0 | 0 | 89 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1336 | 0 | 0 | 2073 | 0 | 0 | 2751 | 3587 | 1041 | - | - | 625 |
| Stage 1 | - | - | - | - | - | - | 2083 | 2083 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 668 | 1504 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 268 | - | - | 115 | - | - | ~ 21 | 5 | 195 | 0 | 0 | 367 |
| Stage 1 | - | - | - | - | - | - | 33 | 94 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 377 | 183 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 268 | - | - | 114 | - | - | ~ 6 | 1 | 193 | - | - | 367 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | ~ 6 | 1 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 31 | 88 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 75 | 48 | - | - | - | - |

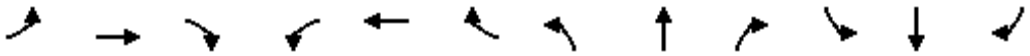
| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 5.6 | $ 2156.3 | 17.9 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 31 | 268 | - | - | 114 | - | - | 367 |
| HCM Lane V/C Ratio | 5.224 | 0.057 | - | - | 0.734 | - | - | 0.243 |
| HCM Control Delay (s) | $ 2156.3 | 19.2 | - | - | 95.1 | - | - | 17.9 |
| HCM Lane LOS | F | C | - | - | F | - | - | C |
| HCM 95th %tile Q(veh) | 19.5 | 0.2 | - | - | 4 | - | - | 0.9 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/29/2024



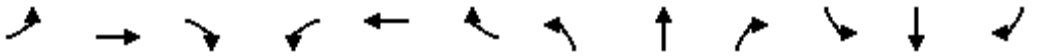
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 169 | 1654 | 162 | 98 | 1054 | 316 | 146 | 55 | 105 | 216 | 71 | 106 |
| Future Volume (veh/h) | 169 | 1654 | 162 | 98 | 1054 | 316 | 146 | 55 | 105 | 216 | 71 | 106 |
| 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 | | 0.96 | 1.00 | | 0.98 | 1.00 | | 0.90 |
| 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 | 184 | 1798 | 176 | 107 | 1146 | 343 | 159 | 60 | 114 | 235 | 77 | 115 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 212 | 1977 | 193 | 130 | 1903 | 566 | 173 | 109 | 206 | 264 | 152 | 228 |
| Arrive On Green | 0.12 | 0.42 | 0.42 | 0.07 | 0.37 | 0.37 | 0.10 | 0.19 | 0.19 | 0.15 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 4718 | 460 | 1781 | 5106 | 1518 | 1781 | 571 | 1084 | 1781 | 631 | 943 |
| Grp Volume(v), veh/h | 184 | 1295 | 679 | 107 | 1146 | 343 | 159 | 0 | 174 | 235 | 0 | 192 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1774 | 1781 | 1702 | 1518 | 1781 | 0 | 1655 | 1781 | 0 | 1575 |
| Q Serve(g_s), s | 12.6 | 44.1 | 44.6 | 7.3 | 22.5 | 22.7 | 10.9 | 0.0 | 11.8 | 16.0 | 0.0 | 13.0 |
| Cycle Q Clear(g_c), s | 12.6 | 44.1 | 44.6 | 7.3 | 22.5 | 22.7 | 10.9 | 0.0 | 11.8 | 16.0 | 0.0 | 13.0 |
| Prop In Lane | 1.00 | | 0.26 | 1.00 | | 1.00 | 1.00 | | 0.66 | 1.00 | | 0.60 |
| Lane Grp Cap(c), veh/h | 212 | 1426 | 743 | 130 | 1903 | 566 | 173 | 0 | 315 | 264 | 0 | 380 |
| V/C Ratio(X) | 0.87 | 0.91 | 0.91 | 0.83 | 0.60 | 0.61 | 0.92 | 0.00 | 0.55 | 0.89 | 0.00 | 0.51 |
| Avail Cap(c_a), veh/h | 288 | 1459 | 760 | 130 | 1903 | 566 | 173 | 0 | 321 | 331 | 0 | 446 |
| 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 | 53.5 | 33.7 | 33.8 | 56.6 | 31.4 | 31.4 | 55.4 | 0.0 | 45.3 | 51.7 | 0.0 | 40.5 |
| Incr Delay (d2), s/veh | 18.4 | 8.5 | 15.3 | 33.5 | 0.5 | 1.9 | 46.0 | 0.0 | 2.0 | 21.2 | 0.0 | 1.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.6 | 18.8 | 21.2 | 4.4 | 9.0 | 8.7 | 7.2 | 0.0 | 5.1 | 8.8 | 0.0 | 5.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 71.9 | 42.2 | 49.1 | 90.0 | 31.9 | 33.3 | 101.4 | 0.0 | 47.3 | 72.9 | 0.0 | 41.6 |
| LnGrp LOS | E | D | D | F | C | C | F | A | D | E | A | D |
| Approach Vol, veh/h | | 2158 | | | 1596 | | | 333 | | | 427 | |
| Approach Delay, s/veh | | 46.9 | | | 36.1 | | | 73.1 | | | 58.8 | |
| Approach LOS | | D | | | D | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.0 | 57.8 | 17.0 | 34.9 | 19.7 | 52.1 | 23.3 | 28.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 9.0 | 53.0 | 12.0 | 35.0 | 20.0 | 42.0 | 23.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 9.3 | 46.6 | 12.9 | 15.0 | 14.6 | 24.7 | 18.0 | 13.8 |
| Green Ext Time (p_c), s | 0.0 | 5.2 | 0.0 | 1.2 | 0.2 | 8.3 | 0.3 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 46.2 |
| HCM 6th LOS | D |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 270 | 1418 | 287 | 167 | 921 | 229 | 243 | 204 | 95 | 312 | 441 | 304 |
| Future Volume (veh/h) | 270 | 1418 | 287 | 167 | 921 | 229 | 243 | 204 | 95 | 312 | 441 | 304 |
| 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 | | 0.97 | 1.00 | | 0.98 | 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 | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 325 | 1412 | 428 | 214 | 1094 | 330 | 297 | 1003 | 307 | 371 | 1216 | 371 |
| Arrive On Green | 0.18 | 0.28 | 0.28 | 0.12 | 0.21 | 0.21 | 0.17 | 0.20 | 0.20 | 0.21 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 5106 | 1548 | 1781 | 5106 | 1541 | 1781 | 5106 | 1560 | 1781 | 5106 | 1557 |
| Grp Volume(v), veh/h | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1548 | 1781 | 1702 | 1541 | 1781 | 1702 | 1560 | 1781 | 1702 | 1557 |
| Q Serve(g_s), s | 17.6 | 30.7 | 20.0 | 11.0 | 21.0 | 16.6 | 15.9 | 4.0 | 6.2 | 20.3 | 8.6 | 22.5 |
| Cycle Q Clear(g_c), s | 17.6 | 30.7 | 20.0 | 11.0 | 21.0 | 16.6 | 15.9 | 4.0 | 6.2 | 20.3 | 8.6 | 22.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 325 | 1412 | 428 | 214 | 1094 | 330 | 297 | 1003 | 307 | 371 | 1216 | 371 |
| V/C Ratio(X) | 0.89 | 1.08 | 0.72 | 0.84 | 0.90 | 0.74 | 0.88 | 0.22 | 0.33 | 0.90 | 0.39 | 0.88 |
| Avail Cap(c_a), veh/h | 482 | 1412 | 428 | 482 | 1105 | 333 | 562 | 1335 | 408 | 562 | 1335 | 407 |
| 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 | 44.3 | 40.1 | 36.3 | 47.7 | 42.5 | 40.7 | 45.1 | 37.4 | 38.3 | 42.8 | 35.5 | 40.7 |
| Incr Delay (d2), s/veh | 13.5 | 48.8 | 5.9 | 8.6 | 10.5 | 8.7 | 8.2 | 0.1 | 0.6 | 12.7 | 0.2 | 18.6 |
| 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 | 8.7 | 18.6 | 8.0 | 5.3 | 9.6 | 6.9 | 7.4 | 1.6 | 2.4 | 9.9 | 3.5 | 10.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 57.8 | 88.9 | 42.1 | 56.3 | 53.0 | 49.5 | 53.3 | 37.5 | 38.9 | 55.5 | 35.7 | 59.3 |
| LnGrp LOS | E | F | D | E | D | D | D | D | D | E | D | E |
| Approach Vol, veh/h | | 2124 | | | 1416 | | | 582 | | | 1136 | |
| Approach Delay, s/veh | | 77.9 | | | 52.8 | | | 44.8 | | | 48.3 | |
| Approach LOS | | E | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 28.1 | 27.8 | 18.3 | 36.7 | 23.5 | 32.4 | 25.2 | 29.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 35.0 | 29.0 | 30.0 | 24.0 | 35.0 | 29.0 | 30.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 22.3 | 8.2 | 13.0 | 32.7 | 17.9 | 24.5 | 19.6 | 23.0 |
| Green Ext Time (p_c), s | 0.8 | 1.5 | 0.4 | 0.0 | 0.6 | 1.7 | 0.6 | 0.7 |

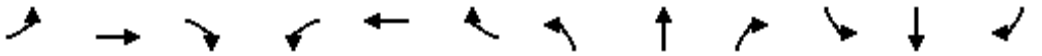
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 61.1 |
| HCM 6th LOS | E |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 64 | 1693 | 68 | 60 | 1060 | 32 | 91 | 7 | 87 | 67 | 23 | 94 |
| Future Volume (veh/h) | 64 | 1693 | 68 | 60 | 1060 | 32 | 91 | 7 | 87 | 67 | 23 | 94 |
| 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 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 69 | 1820 | 73 | 65 | 1140 | 34 | 98 | 8 | 94 | 72 | 25 | 101 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 89 | 2867 | 115 | 84 | 2888 | 86 | 277 | 259 | 219 | 291 | 259 | 216 |
| Arrive On Green | 0.05 | 0.57 | 0.57 | 0.05 | 0.57 | 0.57 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| Sat Flow, veh/h | 1781 | 5030 | 201 | 1781 | 5094 | 152 | 1260 | 1870 | 1582 | 1290 | 1870 | 1557 |
| Grp Volume(v), veh/h | 69 | 1231 | 662 | 65 | 762 | 412 | 98 | 8 | 94 | 72 | 25 | 101 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1828 | 1781 | 1702 | 1842 | 1260 | 1870 | 1582 | 1290 | 1870 | 1557 |
| Q Serve(g_s), s | 2.3 | 15.0 | 15.0 | 2.2 | 7.7 | 7.7 | 4.5 | 0.2 | 3.3 | 3.1 | 0.7 | 3.7 |
| Cycle Q Clear(g_c), s | 2.3 | 15.0 | 15.0 | 2.2 | 7.7 | 7.7 | 5.2 | 0.2 | 3.3 | 3.4 | 0.7 | 3.7 |
| Prop In Lane | 1.00 | | 0.11 | 1.00 | | 0.08 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 89 | 1940 | 1042 | 84 | 1930 | 1044 | 277 | 259 | 219 | 291 | 259 | 216 |
| V/C Ratio(X) | 0.77 | 0.63 | 0.64 | 0.77 | 0.39 | 0.39 | 0.35 | 0.03 | 0.43 | 0.25 | 0.10 | 0.47 |
| Avail Cap(c_a), veh/h | 580 | 2883 | 1548 | 580 | 2883 | 1560 | 780 | 1005 | 850 | 806 | 1005 | 837 |
| 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 | 8.9 | 8.9 | 28.9 | 7.4 | 7.4 | 25.4 | 22.9 | 24.2 | 24.3 | 23.1 | 24.4 |
| Incr Delay (d2), s/veh | 13.0 | 0.3 | 0.6 | 14.0 | 0.1 | 0.2 | 0.8 | 0.0 | 1.3 | 0.4 | 0.2 | 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 | 1.2 | 4.0 | 4.3 | 1.2 | 2.0 | 2.2 | 1.4 | 0.1 | 1.3 | 1.0 | 0.3 | 1.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 41.8 | 9.2 | 9.5 | 42.9 | 7.6 | 7.7 | 26.1 | 22.9 | 25.5 | 24.8 | 23.2 | 25.9 |
| LnGrp LOS | D | A | A | D | A | A | C | C | C | C | C | C |
| Approach Vol, veh/h | | 1962 | | | 1239 | | | 200 | | | 198 | |
| Approach Delay, s/veh | | 10.5 | | | 9.4 | | | 25.7 | | | 25.2 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.9 | 40.0 | | 13.5 | 8.1 | 39.8 | | 13.5 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 20.0 | 52.0 | | 33.0 | 20.0 | 52.0 | | 33.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 4.2 | 17.0 | | 5.7 | 4.3 | 9.7 | | 7.2 | | | | |
| Green Ext Time (p_c), s | 0.1 | 18.0 | | 0.7 | 0.1 | 9.3 | | 0.7 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.8 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 186 | 1627 | 34 | 18 | 980 | 87 | 59 | 21 | 65 | 56 | 5 | 113 |
| Future Volume (veh/h) | 186 | 1627 | 34 | 18 | 980 | 87 | 59 | 21 | 65 | 56 | 5 | 113 |
| 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 | | 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 | 198 | 1731 | 36 | 19 | 1043 | 93 | 63 | 22 | 69 | 60 | 5 | 120 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 229 | 3397 | 71 | 35 | 2631 | 234 | 82 | 193 | 162 | 78 | 6 | 155 |
| Arrive On Green | 0.13 | 0.66 | 0.66 | 0.02 | 0.55 | 0.55 | 0.05 | 0.10 | 0.10 | 0.04 | 0.10 | 0.10 |
| Sat Flow, veh/h | 1781 | 5145 | 107 | 1781 | 4771 | 425 | 1781 | 1870 | 1576 | 1781 | 64 | 1531 |
| Grp Volume(v), veh/h | 198 | 1145 | 622 | 19 | 744 | 392 | 63 | 22 | 69 | 60 | 0 | 125 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1848 | 1781 | 1702 | 1792 | 1781 | 1870 | 1576 | 1781 | 0 | 1595 |
| Q Serve(g_s), s | 13.1 | 20.7 | 20.7 | 1.3 | 15.1 | 15.1 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.2 |
| Cycle Q Clear(g_c), s | 13.1 | 20.7 | 20.7 | 1.3 | 15.1 | 15.1 | 4.2 | 1.3 | 4.9 | 4.0 | 0.0 | 9.2 |
| Prop In Lane | 1.00 | | 0.06 | 1.00 | | 0.24 | 1.00 | | 1.00 | 1.00 | | 0.96 |
| Lane Grp Cap(c), veh/h | 229 | 2248 | 1220 | 35 | 1877 | 988 | 82 | 193 | 162 | 78 | 0 | 161 |
| V/C Ratio(X) | 0.86 | 0.51 | 0.51 | 0.55 | 0.40 | 0.40 | 0.77 | 0.11 | 0.42 | 0.77 | 0.00 | 0.78 |
| Avail Cap(c_a), veh/h | 377 | 2248 | 1220 | 154 | 1877 | 988 | 229 | 388 | 327 | 229 | 0 | 327 |
| 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) | 0.73 | 0.73 | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.3 | 10.4 | 10.4 | 58.3 | 15.5 | 15.5 | 56.6 | 48.8 | 50.5 | 56.8 | 0.0 | 52.6 |
| Incr Delay (d2), s/veh | 8.3 | 0.6 | 1.1 | 12.6 | 0.6 | 1.2 | 14.1 | 0.3 | 1.8 | 14.7 | 0.0 | 7.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.2 | 7.1 | 7.9 | 0.7 | 5.7 | 6.2 | 2.2 | 0.6 | 2.0 | 2.1 | 0.0 | 4.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 59.5 | 11.0 | 11.5 | 70.9 | 16.1 | 16.7 | 70.8 | 49.1 | 52.2 | 71.5 | 0.0 | 60.4 |
| LnGrp LOS | E | B | B | E | B | B | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1965 | | | 1155 | | | 154 | | | 185 | |
| Approach Delay, s/veh | | 16.1 | | | 17.2 | | | 59.4 | | | 64.0 | |
| Approach LOS | | B | | | B | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 6.9 | 85.4 | 9.8 | 17.8 | 20.0 | 72.4 | 10.1 | 17.5 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 10.4 | 48.8 | 15.4 | * 25 | 25.4 | * 34 | 15.4 | 24.6 |
| Max Q Clear Time (g_c+I1), s | 3.3 | 22.7 | 6.0 | 6.9 | 15.1 | 17.1 | 6.2 | 11.2 |
| Green Ext Time (p_c), s | 0.0 | 14.0 | 0.1 | 0.2 | 0.4 | 6.8 | 0.1 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 20.9 |
| HCM 6th LOS | C |

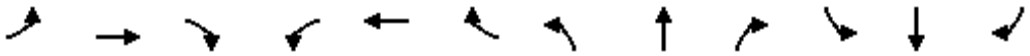
**Notes**

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 238 | 68 | 332 | 304 | 16 | 14 | 173 | 1113 | 80 | 45 | 1284 | 102 |
| Future Volume (veh/h) | 238 | 68 | 332 | 304 | 16 | 14 | 173 | 1113 | 80 | 45 | 1284 | 102 |
| 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 | 259 | 74 | 361 | 330 | 17 | 15 | 188 | 1210 | 87 | 49 | 1396 | 111 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 302 | 379 | 321 | 374 | 223 | 196 | 262 | 1660 | 515 | 68 | 1470 | 456 |
| Arrive On Green | 0.17 | 0.20 | 0.20 | 0.21 | 0.24 | 0.24 | 0.08 | 0.33 | 0.33 | 0.04 | 0.29 | 0.29 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 916 | 809 | 3456 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 259 | 74 | 361 | 330 | 0 | 32 | 188 | 1210 | 87 | 49 | 1396 | 111 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1725 | 1728 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g_s), s | 13.3 | 3.1 | 19.0 | 16.8 | 0.0 | 1.3 | 5.0 | 19.7 | 3.7 | 2.6 | 25.1 | 5.0 |
| Cycle Q Clear(g_c), s | 13.3 | 3.1 | 19.0 | 16.8 | 0.0 | 1.3 | 5.0 | 19.7 | 3.7 | 2.6 | 25.1 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.47 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 302 | 379 | 321 | 374 | 0 | 419 | 262 | 1660 | 515 | 68 | 1470 | 456 |
| V/C Ratio(X) | 0.86 | 0.20 | 1.12 | 0.88 | 0.00 | 0.08 | 0.72 | 0.73 | 0.17 | 0.72 | 0.95 | 0.24 |
| Avail Cap(c_a), veh/h | 627 | 379 | 321 | 627 | 0 | 419 | 368 | 1660 | 515 | 133 | 1470 | 456 |
| 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 | 37.8 | 31.1 | 37.4 | 35.9 | 0.0 | 27.4 | 42.4 | 28.0 | 22.6 | 44.6 | 32.7 | 25.6 |
| Incr Delay (d2), s/veh | 6.9 | 0.2 | 88.2 | 8.0 | 0.0 | 0.1 | 4.0 | 1.7 | 0.2 | 13.0 | 13.4 | 0.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.3 | 1.4 | 15.1 | 8.0 | 0.0 | 0.6 | 2.3 | 8.0 | 1.4 | 1.4 | 11.9 | 1.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.8 | 31.3 | 125.6 | 44.0 | 0.0 | 27.5 | 46.3 | 29.7 | 22.8 | 57.6 | 46.1 | 25.9 |
| LnGrp LOS | D | C | F | D | A | C | D | C | C | E | D | C |
| Approach Vol, veh/h | | 694 | | | 362 | | | 1485 | | | 1556 | |
| Approach Delay, s/veh | | 85.4 | | | 42.5 | | | 31.4 | | | 45.1 | |
| Approach LOS | | F | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.6 | 36.5 | 24.7 | 24.0 | 12.1 | 33.0 | 20.9 | 27.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 7.0 | 30.0 | 33.0 | 19.0 | 10.0 | 27.0 | 33.0 | 19.0 |
| Max Q Clear Time (g_c+I1), s | 4.6 | 21.7 | 18.8 | 21.0 | 7.0 | 27.1 | 15.3 | 3.3 |
| Green Ext Time (p_c), s | 0.0 | 5.2 | 0.9 | 0.0 | 0.2 | 0.0 | 0.7 | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 46.7 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 11.0 |
| Intersection LOS | B |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1570 | 1214 | 123 | 209 |
| Demand Flow Rate, veh/h | 1601 | 1239 | 126 | 213 |
| Vehicles Circulating, veh/h | 199 | 40 | 1599 | 1224 |
| Vehicles Exiting, veh/h | 1238 | 1684 | 201 | 55 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 26 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 13.3 | 7.4 | 17.1 | 11.4 |
| Approach LOS | B | A | C | B |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 752 | 849 | 582 | 657 | 126 | 113 | 100 |
| Cap Entry Lane, veh/h | 1124 | 1199 | 1301 | 1373 | 365 | 438 | 502 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.980 | 0.979 | 0.976 | 0.980 | 0.982 |
| Flow Entry, veh/h | 738 | 832 | 571 | 643 | 123 | 111 | 98 |
| Cap Entry, veh/h | 1103 | 1175 | 1276 | 1344 | 356 | 429 | 493 |
| V/C Ratio | 0.669 | 0.708 | 0.447 | 0.479 | 0.345 | 0.258 | 0.199 |
| Control Delay, s/veh | 12.9 | 13.7 | 7.3 | 7.5 | 17.1 | 12.6 | 10.1 |
| LOS | B | B | A | A | C | B | B |
| 95th %tile Queue, veh | 5 | 6 | 2 | 3 | 2 | 1 | 1 |

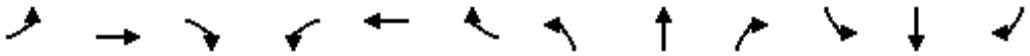
| Intersection | |
|---|---|
| Intersection Delay, s/veh | 31.7 |
| Intersection LOS | D |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1651 | 1365 | 157 | 429 |
| Demand Flow Rate, veh/h | 1684 | 1392 | 160 | 437 |
| Vehicles Circulating, veh/h | 560 | 40 | 2001 | 1361 |
| Vehicles Exiting, veh/h | 1238 | 2121 | 243 | 71 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 53.0 | 8.3 | 37.7 | 21.8 |
| Approach LOS | F | A | E | C |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 791 | 893 | 654 | 738 | 160 | 232 | 205 |
| Cap Entry Lane, veh/h | 806 | 882 | 1301 | 1373 | 259 | 386 | 447 |
| Entry HV Adj Factor | 0.981 | 0.980 | 0.981 | 0.980 | 0.981 | 0.980 | 0.983 |
| Flow Entry, veh/h | 776 | 875 | 642 | 723 | 157 | 227 | 202 |
| Cap Entry, veh/h | 791 | 864 | 1276 | 1346 | 254 | 378 | 439 |
| V/C Ratio | 0.981 | 1.012 | 0.503 | 0.538 | 0.617 | 0.601 | 0.459 |
| Control Delay, s/veh | 50.2 | 55.6 | 8.1 | 8.4 | 37.7 | 25.9 | 17.3 |
| LOS | F | F | A | A | E | D | C |
| 95th %tile Queue, veh | 16 | 19 | 3 | 3 | 4 | 4 | 2 |

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 235 | 949 | 483 | 452 | 1186 | 22 | 392 | 684 | 256 | 17 | 644 | 124 |
| Future Volume (veh/h) | 235 | 949 | 483 | 452 | 1186 | 22 | 392 | 684 | 256 | 17 | 644 | 124 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 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 | 242 | 978 | 349 | 466 | 1223 | 23 | 404 | 705 | 264 | 18 | 664 | 128 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 273 | 1472 | 457 | 536 | 1482 | 460 | 463 | 1156 | 509 | 35 | 749 | 334 |
| Arrive On Green | 0.15 | 0.29 | 0.29 | 0.16 | 0.29 | 0.29 | 0.13 | 0.33 | 0.33 | 0.02 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5106 | 1585 | 3456 | 3554 | 1565 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 242 | 978 | 349 | 466 | 1223 | 23 | 404 | 705 | 264 | 18 | 664 | 128 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1585 | 1728 | 1777 | 1565 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 13.8 | 17.5 | 20.9 | 13.7 | 23.2 | 1.1 | 11.9 | 17.3 | 14.2 | 1.0 | 18.8 | 7.2 |
| Cycle Q Clear(g_c), s | 13.8 | 17.5 | 20.9 | 13.7 | 23.2 | 1.1 | 11.9 | 17.3 | 14.2 | 1.0 | 18.8 | 7.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 273 | 1472 | 457 | 536 | 1482 | 460 | 463 | 1156 | 509 | 35 | 749 | 334 |
| V/C Ratio(X) | 0.89 | 0.66 | 0.76 | 0.87 | 0.83 | 0.05 | 0.87 | 0.61 | 0.52 | 0.52 | 0.89 | 0.38 |
| Avail Cap(c_a), veh/h | 292 | 1622 | 504 | 599 | 1671 | 519 | 466 | 1156 | 509 | 120 | 787 | 351 |
| 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 | 43.1 | 32.5 | 33.7 | 42.9 | 34.4 | 26.5 | 44.1 | 29.5 | 28.4 | 50.4 | 39.8 | 35.2 |
| Incr Delay (d2), s/veh | 25.4 | 0.9 | 6.2 | 12.1 | 3.2 | 0.0 | 16.3 | 0.9 | 0.9 | 11.4 | 11.6 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 7.8 | 7.0 | 8.3 | 6.5 | 9.5 | 0.4 | 5.9 | 7.0 | 5.1 | 0.6 | 9.3 | 2.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 68.5 | 33.4 | 40.0 | 54.9 | 37.6 | 26.6 | 60.4 | 30.4 | 29.4 | 61.9 | 51.3 | 35.9 |
| LnGrp LOS | E | C | D | D | D | C | E | C | C | E | D | D |
| Approach Vol, veh/h | | 1569 | | | 1712 | | | 1373 | | | 810 | |
| Approach Delay, s/veh | | 40.3 | | | 42.2 | | | 39.1 | | | 49.1 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 21.1 | 35.9 | 18.9 | 27.9 | 20.9 | 36.2 | 7.0 | 39.8 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 18.0 | 33.0 | 14.0 | 23.0 | 17.0 | 34.0 | 7.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 15.7 | 22.9 | 13.9 | 20.8 | 15.8 | 25.2 | 3.0 | 19.3 |
| Green Ext Time (p_c), s | 0.4 | 5.2 | 0.0 | 1.1 | 0.1 | 4.9 | 0.0 | 3.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 41.9 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 2: West Ln & Project Rd (Full Access)

05/29/2024

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 70 | 102 | 1768 | 119 | 223 | 1473 |
| Future Volume (vph) | 70 | 102 | 1768 | 119 | 223 | 1473 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Lane Util. Factor | 1.00 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | 1.00 | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (prot) | 1770 | 1583 | 5085 | 1583 | 1770 | 5085 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Satd. Flow (perm) | 1770 | 1583 | 5085 | 1583 | 1770 | 5085 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 76 | 111 | 1922 | 129 | 242 | 1601 |
| RTOR Reduction (vph) | 0 | 99 | 0 | 75 | 0 | 0 |
| Lane Group Flow (vph) | 76 | 12 | 1922 | 54 | 242 | 1601 |
| Turn Type | Perm | Perm | NA | Perm | Prot | NA |
| Protected Phases | | | 2 | | 1 | 6 |
| Permitted Phases | 8 | 8 | | 2 | | |
| Actuated Green, G (s) | 6.6 | 6.6 | 24.2 | 24.2 | 13.3 | 42.5 |
| Effective Green, g (s) | 6.6 | 6.6 | 24.2 | 24.2 | 13.3 | 42.5 |
| Actuated g/C Ratio | 0.11 | 0.11 | 0.40 | 0.40 | 0.22 | 0.71 |
| Clearance Time (s) | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 194 | 173 | 2047 | 637 | 391 | 3595 |
| v/s Ratio Prot | | | c0.38 | | c0.14 | 0.31 |
| v/s Ratio Perm | c0.04 | 0.01 | | 0.03 | | |
| v/c Ratio | 0.39 | 0.07 | 0.94 | 0.09 | 0.62 | 0.45 |
| Uniform Delay, d1 | 24.9 | 24.0 | 17.2 | 11.1 | 21.1 | 3.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.3 | 0.2 | 9.0 | 0.1 | 2.9 | 0.1 |
| Delay (s) | 26.2 | 24.2 | 26.3 | 11.2 | 24.0 | 3.9 |
| Level of Service | C | C | C | B | C | A |
| Approach Delay (s) | 25.0 | | 25.3 | | | 6.5 |
| Approach LOS | C | | C | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 16.8 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.76 | | |
| Actuated Cycle Length (s) | 60.1 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 64.0% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.2 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 27 | 1860 | 55 | 0 | 1543 |
| Future Vol, veh/h | 0 | 27 | 1860 | 55 | 0 | 1543 |
| 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 | - | 200 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 29 | 2022 | 60 | 0 | 1677 |

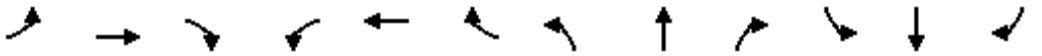
| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 1011 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 204 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 204 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 25.6 | 0 | 0 |
| HCM LOS | D | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 204 | - |
| HCM Lane V/C Ratio | - | - | 0.144 | - |
| HCM Control Delay (s) | - | - | 25.6 | - |
| HCM Lane LOS | - | - | D | - |
| HCM 95th %tile Q(veh) | - | - | 0.5 | - |

# HCM 6th Signalized Intersection Summary
## 4: Morada Ln & West Ln

05/30/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 152 | 283 | 161 | 471 | 415 | 315 | 270 | 1448 | 542 | 291 | 1069 | 183 |
| Future Volume (veh/h) | 152 | 283 | 161 | 471 | 415 | 315 | 270 | 1448 | 542 | 291 | 1069 | 183 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.94 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 158 | 295 | 168 | 491 | 432 | 328 | 281 | 1508 | 565 | 303 | 1114 | 191 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 193 | 621 | 259 | 584 | 836 | 368 | 302 | 1684 | 516 | 374 | 1791 | 553 |
| Arrive On Green | 0.11 | 0.17 | 0.17 | 0.17 | 0.24 | 0.24 | 0.09 | 0.33 | 0.33 | 0.11 | 0.35 | 0.35 |
| Sat Flow, veh/h | 1781 | 3554 | 1485 | 3456 | 3554 | 1565 | 3456 | 5106 | 1565 | 3456 | 5106 | 1578 |
| Grp Volume(v), veh/h | 158 | 295 | 168 | 491 | 432 | 328 | 281 | 1508 | 565 | 303 | 1114 | 191 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1485 | 1728 | 1777 | 1565 | 1728 | 1702 | 1565 | 1728 | 1702 | 1578 |
| Q Serve(g_s), s | 8.9 | 7.7 | 10.9 | 14.2 | 10.9 | 20.9 | 8.3 | 29.0 | 34.0 | 8.8 | 18.7 | 9.2 |
| Cycle Q Clear(g_c), s | 8.9 | 7.7 | 10.9 | 14.2 | 10.9 | 20.9 | 8.3 | 29.0 | 34.0 | 8.8 | 18.7 | 9.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 193 | 621 | 259 | 584 | 836 | 368 | 302 | 1684 | 516 | 374 | 1791 | 553 |
| V/C Ratio(X) | 0.82 | 0.48 | 0.65 | 0.84 | 0.52 | 0.89 | 0.93 | 0.90 | 1.09 | 0.81 | 0.62 | 0.35 |
| Avail Cap(c_a), veh/h | 441 | 827 | 346 | 855 | 836 | 368 | 302 | 1684 | 516 | 469 | 1932 | 597 |
| 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 | 45.0 | 38.3 | 39.6 | 41.5 | 34.3 | 38.1 | 46.7 | 32.8 | 34.5 | 44.9 | 27.8 | 24.7 |
| Incr Delay (d2), s/veh | 8.2 | 0.6 | 2.7 | 5.0 | 0.3 | 22.0 | 34.2 | 6.7 | 67.8 | 8.3 | 0.6 | 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 | 4.4 | 3.4 | 4.2 | 6.2 | 4.5 | 10.2 | 4.9 | 12.4 | 22.4 | 4.0 | 7.1 | 3.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 53.2 | 38.9 | 42.3 | 46.5 | 34.6 | 60.2 | 81.0 | 39.5 | 102.4 | 53.3 | 28.3 | 25.1 |
| LnGrp LOS | D | D | D | D | C | E | F | D | F | D | C | C |
| Approach Vol, veh/h | | 621 | | | 1251 | | | 2354 | | | 1608 | |
| Approach Delay, s/veh | | 43.4 | | | 46.0 | | | 59.6 | | | 32.7 | |
| Approach LOS | | D | | | D | | | E | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.1 | 40.0 | 15.7 | 30.3 | 15.0 | 42.1 | 21.9 | 24.0 |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 |
| Max Green Setting (Gmax), s | 14.0 | 34.0 | 25.5 | 24.0 | 9.0 | 39.0 | 25.5 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 10.8 | 36.0 | 10.9 | 22.9 | 10.3 | 20.7 | 16.2 | 12.9 |
| Green Ext Time (p_c), s | 0.3 | 0.0 | 0.3 | 0.1 | 0.0 | 7.4 | 1.2 | 2.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 47.5 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/29/2024

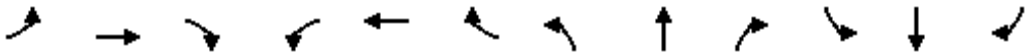
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 123 | 6 | 94 | 136 | 9 | 8 | 156 | 2135 | 140 | 39 | 1564 | 72 |
| Future Volume (vph) | 123 | 6 | 94 | 136 | 9 | 8 | 156 | 2135 | 140 | 39 | 1564 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 5030 | | 1770 | 5047 | |
| Flt Permitted | | 0.56 | 1.00 | | 0.60 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1044 | 1583 | | 1124 | 1563 | 1770 | 5030 | | 1770 | 5047 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 128 | 6 | 98 | 142 | 9 | 8 | 162 | 2224 | 146 | 41 | 1629 | 75 |
| RTOR Reduction (vph) | 0 | 0 | 70 | 0 | 0 | 6 | 0 | 4 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 0 | 134 | 28 | 0 | 151 | 2 | 163 | 2366 | 0 | 41 | 1700 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 18.6 | 18.6 | | 18.6 | 18.6 | 14.4 | 56.2 | | 4.9 | 46.7 | |
| Effective Green, g (s) | | 18.6 | 18.6 | | 18.6 | 18.6 | 14.4 | 56.2 | | 4.9 | 46.7 | |
| Actuated g/C Ratio | | 0.19 | 0.19 | | 0.19 | 0.19 | 0.15 | 0.59 | | 0.05 | 0.49 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 202 | 307 | | 218 | 303 | 266 | 2953 | | 90 | 2462 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.47 | | 0.02 | 0.34 | |
| v/s Ratio Perm | | 0.13 | 0.02 | | c0.13 | 0.00 | | | | | | |
| v/c Ratio | | 0.66 | 0.09 | | 0.69 | 0.01 | 0.61 | 0.80 | | 0.46 | 0.69 | |
| Uniform Delay, d1 | | 35.7 | 31.6 | | 35.9 | 31.1 | 38.0 | 15.4 | | 44.1 | 18.9 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 7.9 | 0.1 | | 9.1 | 0.0 | 4.1 | 1.6 | | 3.6 | 0.9 | |
| Delay (s) | | 43.6 | 31.7 | | 45.0 | 31.1 | 42.2 | 17.0 | | 47.7 | 19.8 | |
| Level of Service | | D | C | | D | C | D | B | | D | B | |
| Approach Delay (s) | | 38.6 | | | 44.3 | | | 18.7 | | | 20.4 | |
| Approach LOS | | D | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 21.2 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.78 | | |
| Actuated Cycle Length (s) | 95.7 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 76.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 6: West Ln & Knickerbocker Dr

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 92 | 45 | 30 | 124 | 54 | 86 | 66 | 2290 | 87 | 133 | 1610 | 51 |
| Future Volume (veh/h) | 92 | 45 | 30 | 124 | 54 | 86 | 66 | 2290 | 87 | 133 | 1610 | 51 |
| 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 | | 1.00 | 1.00 | | 0.98 | 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 | 96 | 47 | 31 | 129 | 56 | 90 | 69 | 2385 | 91 | 139 | 1677 | 53 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 125 | 101 | 67 | 164 | 76 | 122 | 89 | 2408 | 730 | 175 | 2642 | 83 |
| Arrive On Green | 0.07 | 0.10 | 0.10 | 0.09 | 0.12 | 0.12 | 0.05 | 0.47 | 0.47 | 0.10 | 0.52 | 0.52 |
| Sat Flow, veh/h | 1781 | 1049 | 692 | 1781 | 645 | 1036 | 1781 | 5106 | 1547 | 1781 | 5080 | 160 |
| Grp Volume(v), veh/h | 96 | 0 | 78 | 129 | 0 | 146 | 69 | 2385 | 91 | 139 | 1123 | 607 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1741 | 1781 | 0 | 1681 | 1781 | 1702 | 1547 | 1781 | 1702 | 1837 |
| Q Serve(g_s), s | 4.6 | 0.0 | 3.7 | 6.2 | 0.0 | 7.3 | 3.3 | 40.3 | 2.9 | 6.6 | 20.5 | 20.6 |
| Cycle Q Clear(g_c), s | 4.6 | 0.0 | 3.7 | 6.2 | 0.0 | 7.3 | 3.3 | 40.3 | 2.9 | 6.6 | 20.5 | 20.6 |
| Prop In Lane | 1.00 | | 0.40 | 1.00 | | 0.62 | 1.00 | | 1.00 | 1.00 | | 0.09 |
| Lane Grp Cap(c), veh/h | 125 | 0 | 167 | 164 | 0 | 199 | 89 | 2408 | 730 | 175 | 1770 | 955 |
| V/C Ratio(X) | 0.77 | 0.00 | 0.47 | 0.79 | 0.00 | 0.73 | 0.77 | 0.99 | 0.12 | 0.79 | 0.63 | 0.63 |
| Avail Cap(c_a), veh/h | 348 | 0 | 401 | 369 | 0 | 406 | 205 | 2408 | 730 | 410 | 1997 | 1078 |
| 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 | 39.7 | 0.0 | 37.2 | 38.6 | 0.0 | 37.0 | 40.8 | 22.8 | 12.9 | 38.3 | 14.9 | 14.9 |
| Incr Delay (d2), s/veh | 9.6 | 0.0 | 2.0 | 8.1 | 0.0 | 5.2 | 13.2 | 16.0 | 0.1 | 7.8 | 0.6 | 1.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.3 | 0.0 | 1.7 | 3.0 | 0.0 | 3.3 | 1.7 | 17.6 | 1.0 | 3.2 | 7.0 | 7.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 49.3 | 0.0 | 39.2 | 46.7 | 0.0 | 42.2 | 53.9 | 38.8 | 13.0 | 46.1 | 15.5 | 16.0 |
| LnGrp LOS | D | A | D | D | A | D | D | D | B | D | B | B |
| Approach Vol, veh/h | | 174 | | | 275 | | | 2545 | | | 1869 | |
| Approach Delay, s/veh | | 44.8 | | | 44.3 | | | 38.3 | | | 17.9 | |
| Approach LOS | | D | | | D | | | D | | | B | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 13.6 | 47.0 | 13.0 | 13.4 | 9.4 | 51.2 | 11.1 | 15.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 20.0 | 41.0 | 18.0 | 20.0 | 10.0 | 51.0 | 17.0 | 21.0 |
| Max Q Clear Time (g_c+I1), s | 8.6 | 42.3 | 8.2 | 5.7 | 5.3 | 22.6 | 6.6 | 9.3 |
| Green Ext Time (p_c), s | 0.2 | 0.0 | 0.2 | 0.3 | 0.0 | 14.3 | 0.1 | 0.6 |

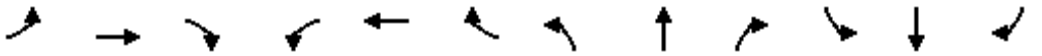
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 31.0 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 7: West Ln & Hammer Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 646 | 1468 | 195 | 426 | 1154 | 262 | 498 | 1663 | 270 | 290 | 1186 | 353 |
| Future Volume (veh/h) | 646 | 1468 | 195 | 426 | 1154 | 262 | 498 | 1663 | 270 | 290 | 1186 | 353 |
| 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 | | 0.97 |
| 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 | 673 | 1529 | 203 | 444 | 1202 | 273 | 519 | 1732 | 281 | 302 | 1235 | 368 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 653 | 1835 | 442 | 492 | 1535 | 371 | 518 | 2156 | 529 | 347 | 1838 | 441 |
| Arrive On Green | 0.19 | 0.29 | 0.29 | 0.14 | 0.24 | 0.24 | 0.15 | 0.34 | 0.34 | 0.10 | 0.29 | 0.29 |
| Sat Flow, veh/h | 3456 | 6434 | 1548 | 3456 | 6434 | 1555 | 3456 | 6434 | 1579 | 3456 | 6434 | 1544 |
| Grp Volume(v), veh/h | 673 | 1529 | 203 | 444 | 1202 | 273 | 519 | 1732 | 281 | 302 | 1235 | 368 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1609 | 1548 | 1728 | 1609 | 1555 | 1728 | 1609 | 1579 | 1728 | 1609 | 1544 |
| Q Serve(g_s), s | 29.0 | 34.2 | 16.6 | 19.4 | 26.8 | 24.9 | 23.0 | 37.6 | 22.1 | 13.2 | 26.0 | 34.3 |
| Cycle Q Clear(g_c), s | 29.0 | 34.2 | 16.6 | 19.4 | 26.8 | 24.9 | 23.0 | 37.6 | 22.1 | 13.2 | 26.0 | 34.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 653 | 1835 | 442 | 492 | 1535 | 371 | 518 | 2156 | 529 | 347 | 1838 | 441 |
| V/C Ratio(X) | 1.03 | 0.83 | 0.46 | 0.90 | 0.78 | 0.74 | 1.00 | 0.80 | 0.53 | 0.87 | 0.67 | 0.83 |
| Avail Cap(c_a), veh/h | 653 | 1886 | 454 | 540 | 1677 | 405 | 518 | 2222 | 545 | 383 | 1970 | 473 |
| 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 | 62.2 | 51.4 | 45.1 | 64.8 | 54.7 | 54.0 | 65.2 | 46.4 | 41.3 | 68.0 | 48.5 | 51.4 |
| Incr Delay (d2), s/veh | 43.3 | 3.3 | 0.7 | 17.4 | 2.3 | 6.3 | 40.1 | 2.2 | 0.9 | 17.8 | 0.8 | 11.6 |
| 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 | 16.5 | 14.0 | 6.4 | 9.7 | 11.0 | 10.3 | 12.9 | 15.1 | 8.7 | 6.7 | 10.5 | 14.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 105.6 | 54.7 | 45.9 | 82.2 | 57.0 | 60.2 | 105.3 | 48.6 | 42.2 | 85.9 | 49.3 | 63.0 |
| LnGrp LOS | F | D | D | F | E | E | F | D | D | F | D | E |
| Approach Vol, veh/h | | 2405 | | | 1919 | | | 2532 | | | 1905 | |
| Approach Delay, s/veh | | 68.2 | | | 63.3 | | | 59.5 | | | 57.7 | |
| Approach LOS | | E | | | E | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.4 | 57.4 | 26.9 | 48.8 | 28.0 | 49.9 | 34.0 | 41.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 17.0 | 53.0 | 24.0 | 45.0 | 23.0 | 47.0 | 29.0 | 40.0 |
| Max Q Clear Time (g_c+I1), s | 15.2 | 39.6 | 21.4 | 36.2 | 25.0 | 36.3 | 31.0 | 28.8 |
| Green Ext Time (p_c), s | 0.2 | 9.8 | 0.5 | 6.3 | 0.0 | 6.7 | 0.0 | 6.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 62.3 |
| HCM 6th LOS | E |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 8: Caywood Dr & Morada Ln

05/29/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 54 | 1038 | 46 | 49 | 1143 | 127 | 19 | 2 | 38 | 75 | 2 | 67 |
| Future Volume (veh/h) | 54 | 1038 | 46 | 49 | 1143 | 127 | 19 | 2 | 38 | 75 | 2 | 67 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.96 | 1.00 | | 0.98 | 1.00 | | 0.98 | 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 | 57 | 1104 | 49 | 52 | 1216 | 135 | 20 | 2 | 40 | 76 | 7 | 71 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 96 | 2053 | 91 | 90 | 2080 | 633 | 30 | 3 | 60 | 151 | 12 | 124 |
| Arrive On Green | 0.05 | 0.41 | 0.41 | 0.05 | 0.41 | 0.41 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 | 0.08 |
| Sat Flow, veh/h | 1781 | 5002 | 222 | 1781 | 5106 | 1554 | 527 | 53 | 1054 | 1781 | 144 | 1463 |
| Grp Volume(v), veh/h | 57 | 751 | 402 | 52 | 1216 | 135 | 62 | 0 | 0 | 76 | 0 | 78 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1819 | 1781 | 1702 | 1554 | 1633 | 0 | 0 | 1781 | 0 | 1607 |
| Q Serve(g_s), s | 1.7 | 8.8 | 8.8 | 1.5 | 9.8 | 3.0 | 2.0 | 0.0 | 0.0 | 2.2 | 0.0 | 2.5 |
| Cycle Q Clear(g_c), s | 1.7 | 8.8 | 8.8 | 1.5 | 9.8 | 3.0 | 2.0 | 0.0 | 0.0 | 2.2 | 0.0 | 2.5 |
| Prop In Lane | 1.00 | | 0.12 | 1.00 | | 1.00 | 0.32 | | 0.65 | 1.00 | | 0.91 |
| Lane Grp Cap(c), veh/h | 96 | 1397 | 747 | 90 | 2080 | 633 | 92 | 0 | 0 | 151 | 0 | 136 |
| V/C Ratio(X) | 0.60 | 0.54 | 0.54 | 0.58 | 0.58 | 0.21 | 0.67 | 0.00 | 0.00 | 0.50 | 0.00 | 0.57 |
| Avail Cap(c_a), veh/h | 337 | 2514 | 1344 | 337 | 3771 | 1148 | 309 | 0 | 0 | 675 | 0 | 609 |
| 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 | 0.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.4 | 11.8 | 11.8 | 24.5 | 12.2 | 10.2 | 24.4 | 0.0 | 0.0 | 23.1 | 0.0 | 23.2 |
| Incr Delay (d2), s/veh | 5.8 | 0.3 | 0.6 | 5.7 | 0.3 | 0.2 | 8.1 | 0.0 | 0.0 | 2.6 | 0.0 | 3.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 2.5 | 2.7 | 0.7 | 2.8 | 0.8 | 0.9 | 0.0 | 0.0 | 0.9 | 0.0 | 1.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 30.3 | 12.1 | 12.4 | 30.3 | 12.4 | 10.3 | 32.6 | 0.0 | 0.0 | 25.7 | 0.0 | 27.0 |
| LnGrp LOS | C | B | B | C | B | B | C | A | A | C | A | C |
| Approach Vol, veh/h | | 1210 | | | 1403 | | | 62 | | | 154 | |
| Approach Delay, s/veh | | 13.0 | | | 12.9 | | | 32.6 | | | 26.3 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer - Assigned Phs | 2 | 3 | 4 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 8.0 | 7.7 | 27.7 | 9.5 | 7.8 | 27.5 |
| Change Period (Y+Rc), s | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 10.0 | 10.0 | 39.0 | 20.0 | 10.0 | 39.0 |
| Max Q Clear Time (g_c+I1), s | 4.0 | 3.5 | 10.8 | 4.5 | 3.7 | 11.8 |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 8.0 | 0.5 | 0.0 | 9.7 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 14.1 |
| HCM 6th LOS | B |

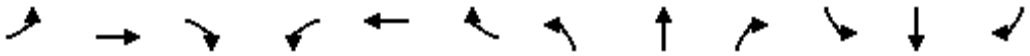
**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

# HCM 6th Signalized Intersection Summary
## 9: Cherbourg Wy & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 117 | 969 | 65 | 92 | 1248 | 128 | 33 | 3 | 76 | 244 | 2 | 38 |
| Future Volume (veh/h) | 117 | 969 | 65 | 92 | 1248 | 128 | 33 | 3 | 76 | 244 | 2 | 38 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.96 | 1.00 | | 0.98 | 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 | 126 | 1042 | 70 | 99 | 1342 | 138 | 35 | 3 | 82 | 302 | 0 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 164 | 1997 | 134 | 129 | 1991 | 608 | 44 | 4 | 104 | 434 | 228 | 0 |
| Arrive On Green | 0.09 | 0.41 | 0.41 | 0.07 | 0.39 | 0.39 | 0.09 | 0.09 | 0.09 | 0.12 | 0.00 | 0.00 |
| Sat Flow, veh/h | 1781 | 4874 | 327 | 1781 | 5106 | 1559 | 478 | 41 | 1121 | 3563 | 1870 | 0 |
| Grp Volume(v), veh/h | 126 | 727 | 385 | 99 | 1342 | 138 | 120 | 0 | 0 | 302 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1797 | 1781 | 1702 | 1559 | 1640 | 0 | 0 | 1781 | 1870 | 0 |
| Q Serve(g_s), s | 4.8 | 11.1 | 11.2 | 3.8 | 15.1 | 4.1 | 5.0 | 0.0 | 0.0 | 5.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 4.8 | 11.1 | 11.2 | 3.8 | 15.1 | 4.1 | 5.0 | 0.0 | 0.0 | 5.6 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.18 | 1.00 | | 1.00 | 0.29 | | 0.68 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 164 | 1395 | 736 | 129 | 1991 | 608 | 152 | 0 | 0 | 434 | 228 | 0 |
| V/C Ratio(X) | 0.77 | 0.52 | 0.52 | 0.77 | 0.67 | 0.23 | 0.79 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 514 | 2160 | 1140 | 385 | 2872 | 877 | 237 | 0 | 0 | 1028 | 540 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 30.7 | 15.4 | 15.4 | 31.6 | 17.5 | 14.2 | 30.8 | 0.0 | 0.0 | 29.2 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 7.3 | 0.3 | 0.6 | 9.1 | 0.4 | 0.2 | 9.1 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.2 | 3.7 | 3.9 | 1.8 | 5.0 | 1.3 | 2.3 | 0.0 | 0.0 | 2.4 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 38.0 | 15.7 | 15.9 | 40.6 | 17.9 | 14.3 | 39.8 | 0.0 | 0.0 | 31.2 | 0.0 | 0.0 |
| LnGrp LOS | D | B | B | D | B | B | D | A | A | C | A | A |
| Approach Vol, veh/h | | 1238 | | | 1579 | | | 120 | | | 302 | |
| Approach Delay, s/veh | | 18.0 | | | 19.0 | | | 39.8 | | | 31.2 | |
| Approach LOS | | B | | | B | | | D | | | C | |

| Timer - Assigned Phs | | 2 | 3 | 4 | | 6 | 7 | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 11.4 | 10.0 | 34.4 | | 13.4 | 11.4 | 33.0 | | | | |
| Change Period (Y+Rc), s | | 5.0 | 5.0 | 6.0 | | 5.0 | 5.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | | 10.0 | 15.0 | 44.0 | | 20.0 | 20.0 | 39.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 7.0 | 5.8 | 13.2 | | 7.6 | 6.8 | 17.1 | | | | |
| Green Ext Time (p_c), s | | 0.2 | 0.1 | 7.9 | | 0.8 | 0.2 | 10.0 | | | | |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 20.5 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

| Intersection | |
|---|---|
| Int Delay, s/veh | 30.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 47 | 1188 | 54 | 90 | 1364 | 291 | 44 | 0 | 65 | 0 | 0 | 60 |
| Future Vol, veh/h | 47 | 1188 | 54 | 90 | 1364 | 291 | 44 | 0 | 65 | 0 | 0 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 250 | - | - | 300 | - | 250 | - | - | - | - | - | 0 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 51 | 1277 | 58 | 97 | 1467 | 313 | 47 | 0 | 70 | 0 | 0 | 65 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1780 | 0 | 0 | 1346 | 0 | 0 | 2200 | 3393 | 679 | - | - | 734 |
| Stage 1 | - | - | - | - | - | - | 1419 | 1419 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 781 | 1974 | - | - | - | - |
| Critical Hdwy | 5.34 | - | - | 5.34 | - | - | 6.44 | 6.54 | 7.14 | - | - | 7.14 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 7.34 | 5.54 | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.74 | 5.54 | - | - | - | - |
| Follow-up Hdwy | 3.12 | - | - | 3.12 | - | - | 3.82 | 4.02 | 3.92 | - | - | 3.92 |
| Pot Cap-1 Maneuver | 162 | - | - | 265 | - | - | 48 | 7 | 338 | 0 | 0 | 311 |
| Stage 1 | - | - | - | - | - | - | 101 | 201 | - | 0 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 321 | 106 | - | 0 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 162 | - | - | 262 | - | - | ~ 21 | 3 | 334 | - | - | 311 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | ~ 21 | 3 | - | - | - | - |
| Stage 1 | - | - | - | - | - | - | 68 | 136 | - | - | - | - |
| Stage 2 | - | - | - | - | - | - | 160 | 67 | - | - | - | - |

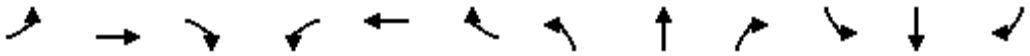
| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 1.3 | 1.4 | $ 837.6 | 19.6 |
| HCM LOS | | | F | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 48 | 162 | - | - | 262 | - | - | 311 |
| HCM Lane V/C Ratio | 2.442 | 0.312 | - | - | 0.369 | - | - | 0.207 |
| HCM Control Delay (s) | $ 837.6 | 37 | - | - | 26.6 | - | - | 19.6 |
| HCM Lane LOS | F | E | - | - | D | - | - | C |
| HCM 95th %tile Q(veh) | 12.2 | 1.2 | - | - | 1.6 | - | - | 0.8 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 11: Glacier Point Dr & Morada Ln

05/29/2024



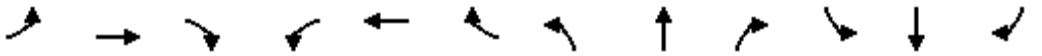
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 34 | 1160 | 59 | 44 | 1638 | 71 | 44 | 6 | 43 | 95 | 11 | 63 |
| Future Volume (veh/h) | 34 | 1160 | 59 | 44 | 1638 | 71 | 44 | 6 | 43 | 95 | 11 | 63 |
| 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 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.95 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 37 | 1261 | 64 | 48 | 1780 | 77 | 48 | 7 | 47 | 103 | 12 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 52 | 2296 | 117 | 61 | 2386 | 735 | 121 | 29 | 197 | 135 | 34 | 195 |
| Arrive On Green | 0.03 | 0.46 | 0.46 | 0.03 | 0.47 | 0.47 | 0.07 | 0.14 | 0.14 | 0.08 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 4969 | 252 | 1781 | 5106 | 1573 | 1781 | 210 | 1407 | 1781 | 233 | 1319 |
| Grp Volume(v), veh/h | 37 | 864 | 461 | 48 | 1780 | 77 | 48 | 0 | 54 | 103 | 0 | 80 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1817 | 1781 | 1702 | 1573 | 1781 | 0 | 1617 | 1781 | 0 | 1552 |
| Q Serve(g_s), s | 1.5 | 13.3 | 13.3 | 2.0 | 20.8 | 2.0 | 1.9 | 0.0 | 2.2 | 4.1 | 0.0 | 3.4 |
| Cycle Q Clear(g_c), s | 1.5 | 13.3 | 13.3 | 2.0 | 20.8 | 2.0 | 1.9 | 0.0 | 2.2 | 4.1 | 0.0 | 3.4 |
| Prop In Lane | 1.00 | | 0.14 | 1.00 | | 1.00 | 1.00 | | 0.87 | 1.00 | | 0.85 |
| Lane Grp Cap(c), veh/h | 52 | 1573 | 840 | 61 | 2386 | 735 | 121 | 0 | 226 | 135 | 0 | 229 |
| V/C Ratio(X) | 0.72 | 0.55 | 0.55 | 0.79 | 0.75 | 0.10 | 0.40 | 0.00 | 0.24 | 0.76 | 0.00 | 0.35 |
| Avail Cap(c_a), veh/h | 220 | 1680 | 897 | 317 | 2799 | 862 | 317 | 0 | 665 | 488 | 0 | 787 |
| 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 | 35.1 | 14.1 | 14.1 | 35.0 | 15.9 | 10.9 | 32.6 | 0.0 | 27.9 | 33.1 | 0.0 | 27.9 |
| Incr Delay (d2), s/veh | 17.0 | 0.3 | 0.6 | 19.9 | 0.9 | 0.1 | 2.1 | 0.0 | 0.5 | 8.5 | 0.0 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.9 | 4.3 | 4.7 | 1.1 | 6.8 | 0.7 | 0.9 | 0.0 | 0.9 | 2.1 | 0.0 | 1.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 52.1 | 14.5 | 14.8 | 54.9 | 16.8 | 10.9 | 34.6 | 0.0 | 28.5 | 41.5 | 0.0 | 28.8 |
| LnGrp LOS | D | B | B | D | B | B | C | A | C | D | A | C |
| Approach Vol, veh/h | | 1362 | | | 1905 | | | 102 | | | 183 | |
| Approach Delay, s/veh | | 15.6 | | | 17.6 | | | 31.4 | | | 36.0 | |
| Approach LOS | | B | | | B | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.5 | 39.7 | 10.0 | 15.8 | 7.1 | 40.1 | 10.5 | 15.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 13.0 | 36.0 | 13.0 | 37.0 | 9.0 | 40.0 | 20.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 4.0 | 15.3 | 3.9 | 5.4 | 3.5 | 22.8 | 6.1 | 4.2 |
| Green Ext Time (p_c), s | 0.0 | 8.5 | 0.0 | 0.5 | 0.0 | 11.3 | 0.2 | 0.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.1 |
| HCM 6th LOS | B |

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 199 | 937 | 162 | 148 | 1349 | 262 | 216 | 346 | 185 | 173 | 251 | 188 |
| Future Volume (veh/h) | 199 | 937 | 162 | 148 | 1349 | 262 | 216 | 346 | 185 | 173 | 251 | 188 |
| 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 | | 1.00 | 1.00 | | 0.99 | 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 | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 247 | 1762 | 539 | 191 | 1603 | 496 | 265 | 961 | 294 | 219 | 828 | 257 |
| Arrive On Green | 0.14 | 0.35 | 0.35 | 0.11 | 0.31 | 0.31 | 0.15 | 0.19 | 0.19 | 0.12 | 0.16 | 0.16 |
| Sat Flow, veh/h | 1781 | 5106 | 1562 | 1781 | 5106 | 1581 | 1781 | 5106 | 1562 | 1781 | 5106 | 1582 |
| Grp Volume(v), veh/h | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1562 | 1781 | 1702 | 1581 | 1781 | 1702 | 1562 | 1781 | 1702 | 1582 |
| Q Serve(g_s), s | 10.5 | 14.4 | 7.4 | 7.9 | 24.2 | 13.3 | 11.5 | 5.7 | 10.6 | 9.2 | 4.2 | 11.0 |
| Cycle Q Clear(g_c), s | 10.5 | 14.4 | 7.4 | 7.9 | 24.2 | 13.3 | 11.5 | 5.7 | 10.6 | 9.2 | 4.2 | 11.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 247 | 1762 | 539 | 191 | 1603 | 496 | 265 | 961 | 294 | 219 | 828 | 257 |
| V/C Ratio(X) | 0.84 | 0.55 | 0.31 | 0.81 | 0.88 | 0.55 | 0.85 | 0.37 | 0.66 | 0.82 | 0.32 | 0.76 |
| Avail Cap(c_a), veh/h | 478 | 1762 | 539 | 478 | 1646 | 509 | 478 | 1536 | 470 | 478 | 1536 | 476 |
| 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 | 39.1 | 24.7 | 22.4 | 40.6 | 30.2 | 26.5 | 38.6 | 33.0 | 35.0 | 39.8 | 34.4 | 37.3 |
| Incr Delay (d2), s/veh | 7.4 | 0.4 | 0.3 | 7.7 | 5.6 | 1.2 | 7.4 | 0.2 | 2.5 | 7.5 | 0.2 | 4.7 |
| 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 | 4.9 | 5.4 | 2.6 | 3.7 | 10.1 | 4.9 | 5.3 | 2.3 | 4.1 | 4.3 | 1.7 | 4.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 46.5 | 25.1 | 22.7 | 48.3 | 35.8 | 27.7 | 46.0 | 33.2 | 37.5 | 47.3 | 34.6 | 42.0 |
| LnGrp LOS | D | C | C | D | D | C | D | C | D | D | C | D |
| Approach Vol, veh/h | | 1352 | | | 1832 | | | 778 | | | 637 | |
| Approach Delay, s/veh | | 28.0 | | | 35.7 | | | 38.0 | | | 40.5 | |
| Approach LOS | | C | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.4 | 23.5 | 15.0 | 38.1 | 18.9 | 21.1 | 17.9 | 35.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 28.0 | 25.0 | 30.0 | 25.0 | 28.0 | 25.0 | 30.0 |
| Max Q Clear Time (g_c+I1), s | 11.2 | 12.6 | 9.9 | 16.4 | 13.5 | 13.0 | 12.5 | 26.2 |
| Green Ext Time (p_c), s | 0.4 | 2.5 | 0.3 | 5.7 | 0.5 | 1.9 | 0.4 | 2.9 |

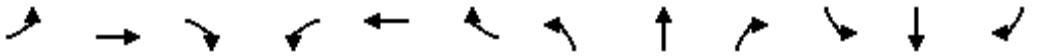
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 34.5 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 74 | 1186 | 35 | 105 | 1707 | 66 | 28 | 16 | 95 | 52 | 16 | 36 |
| Future Volume (veh/h) | 74 | 1186 | 35 | 105 | 1707 | 66 | 28 | 16 | 95 | 52 | 16 | 36 |
| 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 | | 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 | 80 | 1275 | 38 | 113 | 1835 | 71 | 30 | 17 | 102 | 56 | 17 | 39 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 105 | 2837 | 85 | 149 | 2937 | 114 | 255 | 204 | 172 | 248 | 204 | 172 |
| Arrive On Green | 0.06 | 0.56 | 0.56 | 0.08 | 0.58 | 0.58 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1781 | 5091 | 152 | 1781 | 5044 | 195 | 1344 | 1870 | 1581 | 1270 | 1870 | 1581 |
| Grp Volume(v), veh/h | 80 | 852 | 461 | 113 | 1238 | 668 | 30 | 17 | 102 | 56 | 17 | 39 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1839 | 1781 | 1702 | 1835 | 1344 | 1870 | 1581 | 1270 | 1870 | 1581 |
| Q Serve(g_s), s | 2.7 | 8.9 | 8.9 | 3.7 | 14.3 | 14.4 | 1.2 | 0.5 | 3.7 | 2.5 | 0.5 | 1.4 |
| Cycle Q Clear(g_c), s | 2.7 | 8.9 | 8.9 | 3.7 | 14.3 | 14.4 | 1.7 | 0.5 | 3.7 | 3.0 | 0.5 | 1.4 |
| Prop In Lane | 1.00 | | 0.08 | 1.00 | | 0.11 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 105 | 1897 | 1025 | 149 | 1982 | 1068 | 255 | 204 | 172 | 248 | 204 | 172 |
| V/C Ratio(X) | 0.76 | 0.45 | 0.45 | 0.76 | 0.62 | 0.63 | 0.12 | 0.08 | 0.59 | 0.23 | 0.08 | 0.23 |
| Avail Cap(c_a), veh/h | 594 | 3007 | 1625 | 594 | 3007 | 1621 | 826 | 998 | 843 | 787 | 998 | 843 |
| 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 | 27.8 | 7.8 | 7.8 | 26.9 | 8.2 | 8.2 | 24.8 | 24.0 | 25.5 | 25.4 | 24.0 | 24.4 |
| Incr Delay (d2), s/veh | 10.9 | 0.2 | 0.3 | 7.6 | 0.3 | 0.6 | 0.2 | 0.2 | 3.2 | 0.5 | 0.2 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.4 | 2.3 | 2.6 | 1.8 | 3.6 | 4.0 | 0.4 | 0.2 | 1.5 | 0.8 | 0.2 | 0.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 38.7 | 8.0 | 8.2 | 34.5 | 8.5 | 8.8 | 25.0 | 24.2 | 28.7 | 25.8 | 24.2 | 25.1 |
| LnGrp LOS | D | A | A | C | A | A | C | C | C | C | C | C |
| Approach Vol, veh/h | | 1393 | | | 2019 | | | 149 | | | 112 | |
| Approach Delay, s/veh | | 9.8 | | | 10.1 | | | 27.4 | | | 25.3 | |
| Approach LOS | | A | | | B | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 10.0 | 38.4 | | 11.5 | 8.5 | 39.9 | | 11.5 | | | | |
| Change Period (Y+Rc), s | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 20.0 | 53.0 | | 32.0 | 20.0 | 53.0 | | 32.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 5.7 | 10.9 | | 5.0 | 4.7 | 16.4 | | 5.7 | | | | |
| Green Ext Time (p_c), s | 0.2 | 11.0 | | 0.4 | 0.1 | 18.6 | | 0.5 | | | | |

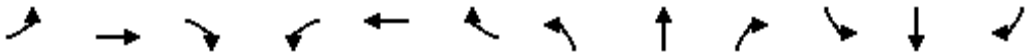
| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 11.2 | |
| HCM 6th LOS | | B | |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 14: Diamond Bar Pl & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 222 | 1066 | 45 | 51 | 1590 | 178 | 26 | 16 | 29 | 139 | 17 | 262 |
| Future Volume (veh/h) | 222 | 1066 | 45 | 51 | 1590 | 178 | 26 | 16 | 29 | 139 | 17 | 262 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 236 | 1134 | 48 | 54 | 1691 | 189 | 28 | 17 | 31 | 148 | 18 | 279 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 267 | 2763 | 117 | 70 | 2047 | 228 | 45 | 258 | 215 | 177 | 21 | 318 |
| Arrive On Green | 0.15 | 0.55 | 0.55 | 0.04 | 0.44 | 0.44 | 0.03 | 0.14 | 0.14 | 0.10 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1781 | 5023 | 213 | 1781 | 4659 | 519 | 1781 | 1870 | 1557 | 1781 | 97 | 1501 |
| Grp Volume(v), veh/h | 236 | 768 | 414 | 54 | 1234 | 646 | 28 | 17 | 31 | 148 | 0 | 297 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1832 | 1781 | 1702 | 1774 | 1781 | 1870 | 1557 | 1781 | 0 | 1598 |
| Q Serve(g_s), s | 15.6 | 15.7 | 15.8 | 3.6 | 38.3 | 38.5 | 1.9 | 0.9 | 2.1 | 9.8 | 0.0 | 21.6 |
| Cycle Q Clear(g_c), s | 15.6 | 15.7 | 15.8 | 3.6 | 38.3 | 38.5 | 1.9 | 0.9 | 2.1 | 9.8 | 0.0 | 21.6 |
| Prop In Lane | 1.00 | | 0.12 | 1.00 | | 0.29 | 1.00 | | 1.00 | 1.00 | | 0.94 |
| Lane Grp Cap(c), veh/h | 267 | 1872 | 1008 | 70 | 1496 | 780 | 45 | 258 | 215 | 177 | 0 | 339 |
| V/C Ratio(X) | 0.88 | 0.41 | 0.41 | 0.77 | 0.82 | 0.83 | 0.62 | 0.07 | 0.14 | 0.84 | 0.00 | 0.88 |
| Avail Cap(c_a), veh/h | 377 | 1872 | 1008 | 154 | 1496 | 780 | 154 | 388 | 323 | 303 | 0 | 461 |
| 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) | 0.89 | 0.89 | 0.89 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 50.0 | 15.7 | 15.7 | 57.1 | 29.6 | 29.6 | 57.9 | 45.0 | 45.5 | 53.1 | 0.0 | 45.7 |
| Incr Delay (d2), s/veh | 14.8 | 0.6 | 1.1 | 16.4 | 5.3 | 9.9 | 13.2 | 0.1 | 0.3 | 9.8 | 0.0 | 13.4 |
| 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 | 7.9 | 5.9 | 6.5 | 1.9 | 15.9 | 17.7 | 1.0 | 0.5 | 0.8 | 4.9 | 0.0 | 9.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 64.8 | 16.3 | 16.8 | 73.5 | 34.9 | 39.5 | 71.1 | 45.1 | 45.8 | 62.9 | 0.0 | 59.1 |
| LnGrp LOS | E | B | B | E | C | D | E | D | D | E | A | E |
| Approach Vol, veh/h | | 1418 | | | 1934 | | | 76 | | | 445 | |
| Approach Delay, s/veh | | 24.5 | | | 37.5 | | | 55.0 | | | 60.4 | |
| Approach LOS | | C | | | D | | | D | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.3 | 72.2 | 16.5 | 22.0 | 22.6 | 58.9 | 7.6 | 30.9 |
| Change Period (Y+Rc), s | 4.6 | 6.2 | 4.6 | * 5.4 | 4.6 | * 6.2 | 4.6 | 5.4 |
| Max Green Setting (Gmax), s | 10.4 | 43.8 | 20.4 | * 25 | 25.4 | * 29 | 10.4 | 34.6 |
| Max Q Clear Time (g_c+I1), s | 5.6 | 17.8 | 11.8 | 4.1 | 17.6 | 40.5 | 3.9 | 23.6 |
| Green Ext Time (p_c), s | 0.0 | 8.4 | 0.2 | 0.1 | 0.4 | 0.0 | 0.0 | 1.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 35.7 |
| HCM 6th LOS | D |

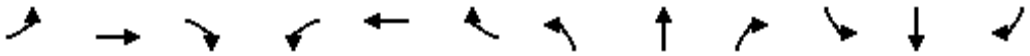
**Notes**

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# HCM 6th Signalized Intersection Summary
## 15: West Ln & Marlette Rd

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 182 | 55 | 225 | 180 | 44 | 6 | 461 | 1274 | 135 | 55 | 1291 | 145 |
| Future Volume (veh/h) | 182 | 55 | 225 | 180 | 44 | 6 | 461 | 1274 | 135 | 55 | 1291 | 145 |
| 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 | 198 | 60 | 245 | 196 | 48 | 7 | 501 | 1385 | 147 | 60 | 1403 | 158 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 233 | 325 | 275 | 231 | 275 | 40 | 601 | 2225 | 691 | 78 | 1559 | 484 |
| Arrive On Green | 0.13 | 0.17 | 0.17 | 0.13 | 0.17 | 0.17 | 0.17 | 0.44 | 0.44 | 0.04 | 0.31 | 0.31 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1596 | 233 | 3456 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 198 | 60 | 245 | 196 | 0 | 55 | 501 | 1385 | 147 | 60 | 1403 | 158 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1828 | 1728 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g_s), s | 10.5 | 2.6 | 14.6 | 10.4 | 0.0 | 2.5 | 13.5 | 20.3 | 5.6 | 3.2 | 25.4 | 7.4 |
| Cycle Q Clear(g_c), s | 10.5 | 2.6 | 14.6 | 10.4 | 0.0 | 2.5 | 13.5 | 20.3 | 5.6 | 3.2 | 25.4 | 7.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 233 | 325 | 275 | 231 | 0 | 315 | 601 | 2225 | 691 | 78 | 1559 | 484 |
| V/C Ratio(X) | 0.85 | 0.18 | 0.89 | 0.85 | 0.00 | 0.17 | 0.83 | 0.62 | 0.21 | 0.77 | 0.90 | 0.33 |
| Avail Cap(c_a), veh/h | 295 | 349 | 296 | 295 | 0 | 341 | 895 | 2380 | 739 | 185 | 1587 | 493 |
| 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 | 41.0 | 34.1 | 39.0 | 41.1 | 0.0 | 34.1 | 38.5 | 21.1 | 16.9 | 45.7 | 32.1 | 25.9 |
| Incr Delay (d2), s/veh | 17.0 | 0.3 | 25.6 | 16.7 | 0.0 | 0.3 | 4.4 | 0.5 | 0.2 | 14.9 | 7.3 | 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 | 5.7 | 1.2 | 7.5 | 5.6 | 0.0 | 1.1 | 5.7 | 7.3 | 2.0 | 1.7 | 11.2 | 2.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 58.1 | 34.3 | 64.6 | 57.8 | 0.0 | 34.3 | 42.9 | 21.5 | 17.1 | 60.6 | 39.4 | 26.3 |
| LnGrp LOS | E | C | E | E | A | C | D | C | B | E | D | C |
| Approach Vol, veh/h | | 503 | | | 251 | | | 2033 | | | 1621 | |
| Approach Delay, s/veh | | 58.4 | | | 52.7 | | | 26.5 | | | 38.9 | |
| Approach LOS | | E | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.2 | 48.1 | 17.5 | 21.8 | 21.8 | 35.5 | 17.6 | 21.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 5.0 |
| Max Green Setting (Gmax), s | 10.0 | 45.0 | 16.0 | 18.0 | 25.0 | 30.0 | 16.0 | 18.0 |
| Max Q Clear Time (g_c+I1), s | 5.2 | 22.3 | 12.4 | 16.6 | 15.5 | 27.4 | 12.5 | 4.5 |
| Green Ext Time (p_c), s | 0.0 | 10.2 | 0.2 | 0.2 | 1.3 | 2.1 | 0.2 | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 36.2 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.0 |
| Intersection LOS | A |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1210 | 1403 | 62 | 153 |
| Demand Flow Rate, veh/h | 1234 | 1431 | 63 | 156 |
| Vehicles Circulating, veh/h | 137 | 80 | 1266 | 1313 |
| Vehicles Exiting, veh/h | 1332 | 1249 | 105 | 198 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 16 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 8.5 | 9.1 | 9.3 | 11.4 |
| Approach LOS | A | A | A | B |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.532 | 0.468 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 580 | 654 | 673 | 758 | 63 | 83 | 73 |
| Cap Entry Lane, veh/h | 1190 | 1264 | 1254 | 1327 | 484 | 403 | 465 |
| Entry HV Adj Factor | 0.980 | 0.981 | 0.980 | 0.981 | 0.984 | 0.977 | 0.985 |
| Flow Entry, veh/h | 569 | 641 | 659 | 743 | 62 | 81 | 72 |
| Cap Entry, veh/h | 1167 | 1239 | 1228 | 1301 | 476 | 394 | 458 |
| V/C Ratio | 0.487 | 0.517 | 0.537 | 0.571 | 0.130 | 0.206 | 0.157 |
| Control Delay, s/veh | 8.4 | 8.6 | 9.0 | 9.2 | 9.3 | 12.5 | 10.1 |
| LOS | A | A | A | A | A | B | B |
| 95th %tile Queue, veh | 3 | 3 | 3 | 4 | 0 | 1 | 1 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 13.5 |
| Intersection LOS | B |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 2 | 2 | 1 | 2 |
| Conflicting Circle Lanes | 2 | 2 | 2 | 2 |
| Adj Approach Flow, veh/h | 1238 | 1579 | 120 | 305 |
| Demand Flow Rate, veh/h | 1263 | 1611 | 123 | 311 |
| Vehicles Circulating, veh/h | 370 | 168 | 1459 | 1506 |
| Vehicles Exiting, veh/h | 1447 | 1414 | 174 | 273 |
| Ped Vol Crossing Leg, #/h | 1 | 0 | 13 | 0 |
| Ped Cap Adj | 0.999 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 13.0 | 12.6 | 14.3 | 20.1 |
| Approach LOS | B | B | B | C |

| Lane | Left | Right | Left | Right | Left | Left | Right |
|---|---|---|---|---|---|---|---|
| Designated Moves | LT | TR | LT | TR | LTR | L | LTR |
| Assumed Moves | LT | TR | LT | TR | LTR | L | LTR |
| RT Channelized | | | | | | | |
| Lane Util | 0.470 | 0.530 | 0.470 | 0.530 | 1.000 | 0.531 | 0.469 |
| Follow-Up Headway, s | 2.667 | 2.535 | 2.667 | 2.535 | 2.535 | 2.667 | 2.535 |
| Critical Headway, s | 4.645 | 4.328 | 4.645 | 4.328 | 4.328 | 4.645 | 4.328 |
| Entry Flow, veh/h | 594 | 669 | 757 | 854 | 123 | 165 | 146 |
| Cap Entry Lane, veh/h | 960 | 1037 | 1157 | 1231 | 411 | 338 | 395 |
| Entry HV Adj Factor | 0.980 | 0.981 | 0.980 | 0.980 | 0.975 | 0.980 | 0.982 |
| Flow Entry, veh/h | 582 | 656 | 742 | 837 | 120 | 162 | 143 |
| Cap Entry, veh/h | 940 | 1016 | 1134 | 1207 | 401 | 331 | 388 |
| V/C Ratio | 0.619 | 0.646 | 0.655 | 0.694 | 0.299 | 0.488 | 0.370 |
| Control Delay, s/veh | 12.9 | 13.0 | 12.2 | 12.9 | 14.3 | 23.3 | 16.5 |
| LOS | B | B | B | B | B | C | C |
| 95th %tile Queue, veh | 4 | 5 | 5 | 6 | 1 | 3 | 2 |

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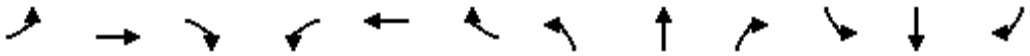
# Appendix L: Cumulative and Cumulative Plus Project Queue Worksheets

# Queues

## 1: West Ln & Eight Mile Rd

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 221 | 1045 | 499 | 353 | 1126 | 53 | 369 | 541 | 303 | 59 | 583 | 194 |
| v/c Ratio | 0.80 | 0.72 | 0.78 | 0.78 | 0.85 | 0.09 | 0.74 | 0.51 | 0.44 | 0.44 | 0.80 | 0.40 |
| Control Delay | 62.7 | 34.4 | 23.9 | 54.8 | 41.3 | 0.3 | 49.8 | 31.0 | 5.7 | 54.5 | 45.7 | 7.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.7 | 34.4 | 23.9 | 54.8 | 41.3 | 0.3 | 49.8 | 31.0 | 5.7 | 54.5 | 45.7 | 7.6 |
| Queue Length 50th (ft) | 137 | 217 | 136 | 113 | 250 | 0 | 117 | 153 | 0 | 36 | 186 | 0 |
| Queue Length 95th (ft) | #253 | 267 | 271 | #179 | 305 | 0 | 166 | 207 | 62 | 78 | 248 | 55 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 297 | 1548 | 668 | 468 | 1388 | 574 | 540 | 1070 | 684 | 148 | 780 | 502 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.74 | 0.68 | 0.75 | 0.75 | 0.81 | 0.09 | 0.68 | 0.51 | 0.44 | 0.40 | 0.75 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 214 | 611 | 439 | 290 | 638 | 549 | 860 | 374 | 470 | 1278 | 273 |
| v/c Ratio | 0.45 | 0.64 | 0.80 | 0.79 | 1.71 | 1.51 | 0.69 | 0.56 | 1.29 | 1.03 | 0.48 |
| Control Delay | 49.2 | 52.0 | 31.6 | 72.1 | 362.9 | 287.3 | 55.2 | 7.7 | 202.3 | 87.6 | 9.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.2 | 52.0 | 31.6 | 72.1 | 362.9 | 287.3 | 55.2 | 7.7 | 202.3 | 87.6 | 9.6 |
| Queue Length 50th (ft) | 176 | 281 | 173 | 287 | ~963 | ~386 | 284 | 0 | ~303 | ~490 | 13 |
| Queue Length 95th (ft) | 259 | 348 | 328 | #430 | #1223 | #506 | 336 | 88 | #419 | #587 | 93 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 400 | | 400 | | | 300 | | 300 | 320 | | 320 |
| Base Capacity (vph) | 480 | 960 | 551 | 367 | 374 | 363 | 1245 | 664 | 363 | 1245 | 568 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.45 | 0.64 | 0.80 | 0.79 | 1.71 | 1.51 | 0.69 | 0.56 | 1.29 | 1.03 | 0.48 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/29/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 182 | 158 | 273 | 16 | 216 | 1468 | 72 | 2057 |
| v/c Ratio | 1.28 | 0.36 | 1.26 | 0.04 | 0.75 | 0.52 | 0.46 | 0.88 |
| Control Delay | 208.3 | 17.8 | 185.5 | 0.2 | 63.0 | 17.5 | 60.9 | 33.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 208.3 | 17.8 | 185.5 | 0.2 | 63.0 | 17.5 | 60.9 | 33.9 |
| Queue Length 50th (ft) | ~176 | 35 | ~261 | 0 | 152 | 235 | 51 | 475 |
| Queue Length 95th (ft) | #328 | 98 | #438 | 0 | 256 | 356 | 106 | #730 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 142 | 445 | 217 | 420 | 388 | 2825 | 388 | 2390 |
| 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 | 1.28 | 0.36 | 1.26 | 0.04 | 0.56 | 0.52 | 0.19 | 0.86 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 84 | 84 | 159 | 161 | 24 | 1476 | 71 | 183 | 2164 |
| v/c Ratio | 0.49 | 0.37 | 0.66 | 0.53 | 0.24 | 0.71 | 0.10 | 0.65 | 0.76 |
| Control Delay | 62.7 | 39.7 | 62.9 | 40.3 | 65.0 | 32.3 | 0.3 | 57.3 | 24.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.7 | 39.7 | 62.9 | 40.3 | 65.0 | 32.3 | 0.3 | 57.3 | 24.3 |
| Queue Length 50th (ft) | 60 | 42 | 112 | 88 | 17 | 300 | 0 | 129 | 440 |
| Queue Length 95th (ft) | 135 | 92 | 227 | 159 | 56 | #664 | 0 | 242 | #878 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 260 | 413 | 347 | 499 | 103 | 2083 | 716 | 538 | 3078 |
| 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 | 0.32 | 0.20 | 0.46 | 0.32 | 0.23 | 0.71 | 0.10 | 0.34 | 0.70 |

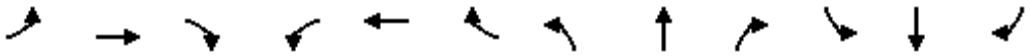
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 7: West Ln & Hammer Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 455 | 1200 | 229 | 600 | 1035 | 236 | 292 | 895 | 211 | 329 | 1554 | 368 |
| v/c Ratio | 0.81 | 0.75 | 0.43 | 0.92 | 0.59 | 0.41 | 0.84 | 0.46 | 0.34 | 0.84 | 0.76 | 0.49 |
| Control Delay | 73.5 | 56.3 | 13.0 | 81.2 | 49.9 | 10.9 | 88.7 | 43.9 | 6.3 | 86.5 | 50.0 | 6.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 73.5 | 56.3 | 13.0 | 81.2 | 49.9 | 10.9 | 88.7 | 43.9 | 6.3 | 86.5 | 50.0 | 6.0 |
| Queue Length 50th (ft) | 238 | 333 | 32 | 320 | 269 | 23 | 156 | 218 | 0 | 176 | 423 | 0 |
| Queue Length 95th (ft) | 296 | 377 | 110 | #436 | 319 | 101 | #236 | 255 | 62 | #257 | 472 | 79 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 679 | 1777 | 565 | 679 | 1824 | 589 | 362 | 2073 | 647 | 408 | 2158 | 767 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.67 | 0.68 | 0.41 | 0.88 | 0.57 | 0.40 | 0.81 | 0.43 | 0.33 | 0.81 | 0.72 | 0.48 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

05/29/2024

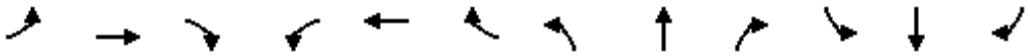
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 1487 | 107 | 980 | 343 | 159 | 174 | 235 | 192 |
| v/c Ratio | 0.73 | 0.78 | 0.75 | 0.60 | 0.49 | 0.84 | 0.49 | 0.79 | 0.44 |
| Control Delay | 68.1 | 35.1 | 87.9 | 36.4 | 5.8 | 89.0 | 32.9 | 68.0 | 29.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 68.1 | 35.1 | 87.9 | 36.4 | 5.8 | 89.0 | 32.9 | 68.0 | 29.2 |
| Queue Length 50th (ft) | 143 | 378 | 86 | 247 | 0 | 129 | 76 | 181 | 86 |
| Queue Length 95th (ft) | 231 | 436 | #203 | 301 | 70 | #279 | 156 | #305 | 165 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 316 | 2355 | 142 | 1908 | 771 | 189 | 422 | 363 | 539 |
| 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 | 0.58 | 0.63 | 0.75 | 0.51 | 0.44 | 0.84 | 0.41 | 0.65 | 0.36 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/29/2024



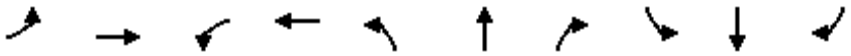
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 259 | 1116 | 267 | 180 | 853 | 246 | 246 | 219 | 102 | 335 | 474 | 316 |
| v/c Ratio | 0.77 | 0.81 | 0.47 | 0.65 | 0.71 | 0.45 | 0.73 | 0.31 | 0.34 | 0.82 | 0.53 | 0.59 |
| Control Delay | 62.6 | 46.9 | 14.8 | 60.3 | 46.5 | 9.7 | 59.2 | 46.4 | 12.1 | 60.7 | 45.6 | 9.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.6 | 46.9 | 14.8 | 60.3 | 46.5 | 9.7 | 59.2 | 46.4 | 12.1 | 60.7 | 45.6 | 9.8 |
| Queue Length 50th (ft) | 164 | 254 | 32 | 114 | 194 | 6 | 155 | 50 | 0 | 210 | 108 | 0 |
| Queue Length 95th (ft) | #419 | #543 | 155 | 270 | 373 | 90 | 354 | 96 | 51 | #549 | 196 | 84 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 497 | 1370 | 564 | 497 | 1228 | 550 | 580 | 1460 | 520 | 580 | 1460 | 672 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.52 | 0.81 | 0.47 | 0.36 | 0.69 | 0.45 | 0.42 | 0.15 | 0.20 | 0.58 | 0.32 | 0.47 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 69 | 1485 | 65 | 1036 | 98 | 8 | 94 | 72 | 25 | 101 |
| v/c Ratio | 0.31 | 0.59 | 0.29 | 0.41 | 0.38 | 0.02 | 0.25 | 0.27 | 0.07 | 0.27 |
| Control Delay | 37.7 | 15.5 | 37.9 | 13.5 | 31.8 | 26.6 | 8.5 | 29.6 | 26.7 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 37.7 | 15.5 | 37.9 | 13.5 | 31.8 | 26.6 | 8.5 | 29.6 | 26.7 | 8.4 |
| Queue Length 50th (ft) | 25 | 149 | 23 | 93 | 34 | 3 | 0 | 25 | 8 | 0 |
| Queue Length 95th (ft) | 92 | 338 | 87 | 216 | 100 | 16 | 39 | 77 | 35 | 40 |
| Internal Link Dist (ft) | | 1519 | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 549 | 3947 | 549 | 3956 | 706 | 954 | 846 | 717 | 954 | 848 |
| 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 | 0.13 | 0.38 | 0.12 | 0.26 | 0.14 | 0.01 | 0.11 | 0.10 | 0.03 | 0.12 |

Intersection Summary

# Queues
## 14: Diamond Bar Pl & Morada Ln

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 1363 | 19 | 999 | 63 | 22 | 69 | 60 | 125 |
| v/c Ratio | 0.72 | 0.40 | 0.19 | 0.38 | 0.45 | 0.13 | 0.24 | 0.43 | 0.50 |
| Control Delay | 62.6 | 12.7 | 57.5 | 20.7 | 61.8 | 47.3 | 2.0 | 61.6 | 15.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.6 | 12.7 | 57.5 | 20.7 | 61.8 | 47.3 | 2.0 | 61.6 | 15.7 |
| Queue Length 50th (ft) | 148 | 123 | 14 | 153 | 47 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | 217 | 352 | 39 | 300 | 92 | 36 | 0 | 88 | 53 |
| Internal Link Dist (ft) | | 790 | | 329 | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 100 | | 65 | | 65 | 150 | |
| Base Capacity (vph) | 374 | 3396 | 153 | 2624 | 227 | 393 | 452 | 227 | 427 |
| 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 | 0.53 | 0.40 | 0.12 | 0.38 | 0.28 | 0.06 | 0.15 | 0.26 | 0.29 |

Intersection Summary

# Queues

## 15: West Ln & Marlette Rd

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 259 | 74 | 361 | 330 | 32 | 188 | 1012 | 87 | 49 | 1329 | 111 |
| v/c Ratio | 0.52 | 0.28 | 0.84 | 0.78 | 0.12 | 0.55 | 0.53 | 0.13 | 0.39 | 0.89 | 0.20 |
| Control Delay | 36.4 | 40.5 | 32.2 | 47.2 | 22.9 | 49.6 | 27.8 | 3.0 | 55.5 | 42.9 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 40.5 | 32.2 | 47.2 | 22.9 | 49.6 | 27.8 | 3.0 | 55.5 | 42.9 | 6.4 |
| Queue Length 50th (ft) | 147 | 40 | 67 | 187 | 8 | 56 | 189 | 0 | 29 | 284 | 0 |
| Queue Length 95th (ft) | 244 | 89 | #215 | 299 | 36 | 104 | 289 | 21 | 74 | #475 | 39 |
| Internal Link Dist (ft) | | 1914 | | | 1844 | | 1957 | | | 2672 | |
| Turn Bay Length (ft) | 300 | | 300 | 300 | | 300 | | 300 | 300 | | 300 |
| Base Capacity (vph) | 635 | 384 | 518 | 633 | 396 | 372 | 1913 | 669 | 134 | 1489 | 547 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 0.19 | 0.70 | 0.52 | 0.08 | 0.51 | 0.53 | 0.13 | 0.37 | 0.89 | 0.20 |

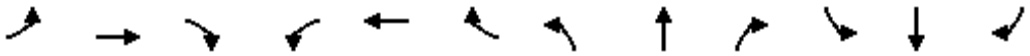
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 1: West Ln & Eight Mile Rd

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 242 | 978 | 426 | 441 | 1223 | 23 | 363 | 628 | 249 | 18 | 531 | 128 |
| v/c Ratio | 0.87 | 0.64 | 0.68 | 0.80 | 0.80 | 0.04 | 0.81 | 0.53 | 0.36 | 0.17 | 0.76 | 0.28 |
| Control Delay | 73.6 | 34.4 | 20.9 | 54.7 | 38.3 | 0.1 | 60.4 | 31.9 | 5.7 | 52.5 | 47.9 | 3.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 73.6 | 34.4 | 20.9 | 54.7 | 38.3 | 0.1 | 60.4 | 31.9 | 5.7 | 52.5 | 47.9 | 3.3 |
| Queue Length 50th (ft) | 170 | 218 | 121 | 155 | 286 | 0 | 130 | 173 | 0 | 12 | 185 | 0 |
| Queue Length 95th (ft) | #313 | 267 | 238 | #223 | 343 | 0 | #204 | 269 | 60 | 36 | 246 | 18 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 291 | 1627 | 660 | 599 | 1676 | 641 | 465 | 1175 | 685 | 120 | 789 | 492 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.83 | 0.60 | 0.65 | 0.74 | 0.73 | 0.04 | 0.78 | 0.53 | 0.36 | 0.15 | 0.67 | 0.26 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 132 | 271 | 168 | 302 | 777 | 281 | 1353 | 361 | 303 | 1051 | 180 |
| v/c Ratio | 0.85 | 0.33 | 0.35 | 0.77 | 1.95 | 1.46 | 0.89 | 0.52 | 1.40 | 0.67 | 0.30 |
| Control Delay | 93.5 | 45.8 | 8.6 | 67.3 | 463.5 | 276.0 | 56.4 | 9.6 | 249.7 | 46.5 | 6.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 93.5 | 45.8 | 8.6 | 67.3 | 463.5 | 276.0 | 56.4 | 9.6 | 249.7 | 46.5 | 6.5 |
| Queue Length 50th (ft) | 119 | 111 | 4 | 301 | ~1257 | ~200 | 473 | 29 | ~211 | 337 | 0 |
| Queue Length 95th (ft) | #228 | 153 | 63 | #461 | #1528 | #297 | #538 | 123 | #312 | 390 | 58 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 400 | | 400 | | | 300 | | 300 | 320 | | 320 |
| Base Capacity (vph) | 190 | 1012 | 549 | 391 | 399 | 193 | 1577 | 706 | 217 | 1613 | 616 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 0.27 | 0.31 | 0.77 | 1.95 | 1.46 | 0.86 | 0.51 | 1.40 | 0.65 | 0.29 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/29/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 116 | 98 | 151 | 8 | 163 | 2029 | 41 | 1488 |
| v/c Ratio | 0.56 | 0.25 | 0.63 | 0.02 | 0.58 | 0.68 | 0.26 | 0.65 |
| Control Delay | 47.3 | 10.2 | 49.0 | 0.1 | 46.7 | 15.6 | 48.6 | 20.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.3 | 10.2 | 49.0 | 0.1 | 46.7 | 15.6 | 48.6 | 20.7 |
| Queue Length 50th (ft) | 66 | 2 | 87 | 0 | 96 | 308 | 24 | 225 |
| Queue Length 95th (ft) | 139 | 46 | 173 | 0 | 178 | 445 | 64 | 348 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 308 | 526 | 354 | 505 | 534 | 3412 | 534 | 3359 |
| 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 | 0.38 | 0.19 | 0.43 | 0.02 | 0.31 | 0.59 | 0.08 | 0.44 |

Intersection Summary

# Queues
## 6: West Ln & Knickerbocker Dr

05/29/2024

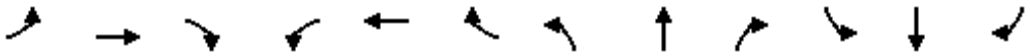
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 78 | 78 | 129 | 128 | 69 | 2080 | 91 | 126 | 1539 |
| v/c Ratio | 0.44 | 0.33 | 0.58 | 0.44 | 0.45 | 0.95 | 0.12 | 0.56 | 0.60 |
| Control Delay | 55.2 | 33.8 | 56.0 | 29.7 | 58.9 | 40.1 | 0.3 | 54.4 | 23.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.2 | 33.8 | 56.0 | 29.7 | 58.9 | 40.1 | 0.3 | 54.4 | 23.5 |
| Queue Length 50th (ft) | 45 | 31 | 74 | 45 | 40 | 431 | 0 | 72 | 253 |
| Queue Length 95th (ft) | 120 | 79 | 180 | 108 | 113 | #987 | 0 | 173 | 511 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 280 | 428 | 336 | 488 | 186 | 2200 | 753 | 373 | 2758 |
| 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 | 0.18 | 0.38 | 0.26 | 0.37 | 0.95 | 0.12 | 0.34 | 0.56 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 589 | 1529 | 203 | 444 | 1202 | 224 | 519 | 1560 | 281 | 274 | 1135 | 317 |
| v/c Ratio | 0.92 | 0.85 | 0.37 | 0.85 | 0.76 | 0.44 | 1.00 | 0.75 | 0.40 | 0.77 | 0.64 | 0.48 |
| Control Delay | 82.8 | 58.0 | 12.6 | 79.6 | 57.2 | 16.9 | 102.7 | 48.8 | 5.7 | 82.9 | 50.3 | 6.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 82.8 | 58.0 | 12.6 | 79.6 | 57.2 | 16.9 | 102.7 | 48.8 | 5.7 | 82.9 | 50.3 | 6.7 |
| Queue Length 50th (ft) | 318 | 445 | 30 | 235 | 340 | 48 | ~304 | 420 | 0 | 145 | 297 | 0 |
| Queue Length 95th (ft) | #434 | 493 | 102 | #311 | 384 | 131 | #424 | 464 | 68 | 198 | 338 | 76 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 657 | 1861 | 565 | 566 | 1692 | 532 | 521 | 2241 | 728 | 385 | 1988 | 697 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.90 | 0.82 | 0.36 | 0.78 | 0.71 | 0.42 | 1.00 | 0.70 | 0.39 | 0.71 | 0.57 | 0.45 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

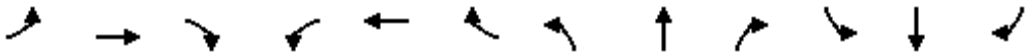
05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 37 | 978 | 48 | 1187 | 77 | 48 | 54 | 103 | 80 |
| v/c Ratio | 0.18 | 0.39 | 0.22 | 0.46 | 0.09 | 0.19 | 0.14 | 0.36 | 0.20 |
| Control Delay | 47.1 | 21.7 | 45.5 | 22.0 | 0.2 | 44.6 | 12.8 | 42.7 | 11.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.1 | 21.7 | 45.5 | 22.0 | 0.2 | 44.6 | 12.8 | 42.7 | 11.1 |
| Queue Length 50th (ft) | 16 | 124 | 20 | 158 | 0 | 20 | 3 | 43 | 5 |
| Queue Length 95th (ft) | 62 | 272 | 73 | 331 | 0 | 73 | 36 | 128 | 43 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 273 | 3072 | 395 | 3309 | 1044 | 395 | 859 | 607 | 1004 |
| 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 | 0.14 | 0.32 | 0.12 | 0.36 | 0.07 | 0.12 | 0.06 | 0.17 | 0.08 |

Intersection Summary

# Queues
## 12: Holman Rd & Morada Ln

05/29/2024

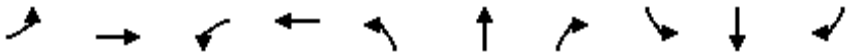


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 186 | 693 | 141 | 154 | 922 | 273 | 176 | 360 | 193 | 180 | 261 | 159 |
| v/c Ratio | 0.65 | 0.47 | 0.26 | 0.59 | 0.66 | 0.44 | 0.63 | 0.43 | 0.46 | 0.64 | 0.31 | 0.40 |
| Control Delay | 54.4 | 32.7 | 7.5 | 53.5 | 36.7 | 6.9 | 54.1 | 39.6 | 9.5 | 54.3 | 38.4 | 9.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 54.4 | 32.7 | 7.5 | 53.5 | 36.7 | 6.9 | 54.1 | 39.6 | 9.5 | 54.3 | 38.4 | 9.6 |
| Queue Length 50th (ft) | 103 | 119 | 0 | 86 | 172 | 0 | 98 | 72 | 0 | 100 | 51 | 0 |
| Queue Length 95th (ft) | 261 | 264 | 55 | 219 | 359 | 74 | 248 | 134 | 63 | 253 | 100 | 57 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 481 | 1732 | 624 | 481 | 1713 | 706 | 481 | 1636 | 633 | 481 | 1636 | 610 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.39 | 0.40 | 0.23 | 0.32 | 0.54 | 0.39 | 0.37 | 0.22 | 0.30 | 0.37 | 0.16 | 0.26 |

Intersection Summary

# Queues
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 80 | 1021 | 113 | 1408 | 30 | 17 | 102 | 56 | 17 | 39 |
| v/c Ratio | 0.31 | 0.37 | 0.38 | 0.50 | 0.12 | 0.05 | 0.29 | 0.23 | 0.05 | 0.12 |
| Control Delay | 34.7 | 13.9 | 34.0 | 14.3 | 27.0 | 26.1 | 8.5 | 28.4 | 26.1 | 3.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 34.7 | 13.9 | 34.0 | 14.3 | 27.0 | 26.1 | 8.5 | 28.4 | 26.1 | 3.7 |
| Queue Length 50th (ft) | 26 | 87 | 36 | 127 | 9 | 5 | 0 | 18 | 5 | 0 |
| Queue Length 95th (ft) | 100 | 228 | 129 | 323 | 39 | 25 | 39 | 62 | 25 | 12 |
| Internal Link Dist (ft) | | 1519 | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 624 | 4227 | 624 | 4218 | 784 | 1052 | 926 | 784 | 1052 | 910 |
| 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 | 0.13 | 0.24 | 0.18 | 0.33 | 0.04 | 0.02 | 0.11 | 0.07 | 0.02 | 0.04 |

Intersection Summary

# Queues
## 14: Diamond Bar Pl & Morada Ln

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 236 | 893 | 54 | 1387 | 28 | 17 | 31 | 148 | 297 |
| v/c Ratio | 0.78 | 0.29 | 0.43 | 0.57 | 0.26 | 0.11 | 0.10 | 0.66 | 0.64 |
| Control Delay | 64.8 | 15.4 | 63.2 | 26.4 | 58.7 | 48.1 | 0.7 | 63.7 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.8 | 15.4 | 63.2 | 26.4 | 58.7 | 48.1 | 0.7 | 63.7 | 12.4 |
| Queue Length 50th (ft) | 175 | 123 | 41 | 274 | 21 | 13 | 0 | 111 | 13 |
| Queue Length 95th (ft) | 256 | 234 | 83 | #551 | 51 | 31 | 0 | 174 | 79 |
| Internal Link Dist (ft) | | 790 | | 329 | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 100 | | 65 | | 65 | 150 | |
| Base Capacity (vph) | 374 | 3029 | 153 | 2430 | 153 | 386 | 479 | 300 | 655 |
| 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 | 0.63 | 0.29 | 0.35 | 0.57 | 0.18 | 0.04 | 0.06 | 0.49 | 0.45 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 60 | 245 | 196 | 55 | 501 | 1245 | 147 | 60 | 1161 | 158 |
| v/c Ratio | 0.60 | 0.33 | 0.65 | 0.71 | 0.30 | 0.71 | 0.55 | 0.19 | 0.38 | 0.76 | 0.27 |
| Control Delay | 46.5 | 45.6 | 14.3 | 53.4 | 41.3 | 40.8 | 21.0 | 3.9 | 49.6 | 33.4 | 5.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.5 | 45.6 | 14.3 | 53.4 | 41.3 | 40.8 | 21.0 | 3.9 | 49.6 | 33.4 | 5.2 |
| Queue Length 50th (ft) | 112 | 34 | 0 | 111 | 28 | 145 | 201 | 0 | 34 | 222 | 0 |
| Queue Length 95th (ft) | #240 | 77 | 72 | #235 | 68 | 215 | 283 | 37 | 82 | 328 | 42 |
| Internal Link Dist (ft) | | 1914 | | | 1844 | | 1957 | | | 2672 | |
| Turn Bay Length (ft) | 300 | | 300 | 300 | | 300 | | 300 | 300 | | 300 |
| Base Capacity (vph) | 341 | 376 | 515 | 317 | 373 | 963 | 2569 | 872 | 198 | 1713 | 645 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.58 | 0.16 | 0.48 | 0.62 | 0.15 | 0.52 | 0.48 | 0.17 | 0.30 | 0.68 | 0.24 |

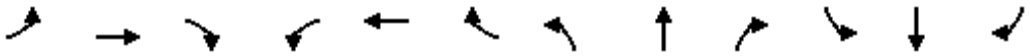
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 1: West Ln & Eight Mile Rd

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 221 | 1045 | 520 | 360 | 1126 | 53 | 431 | 652 | 324 | 59 | 620 | 194 |
| v/c Ratio | 0.81 | 0.73 | 0.82 | 0.81 | 0.85 | 0.10 | 0.84 | 0.60 | 0.46 | 0.44 | 0.84 | 0.40 |
| Control Delay | 63.6 | 34.9 | 27.3 | 56.6 | 42.0 | 0.3 | 56.3 | 32.7 | 5.6 | 54.8 | 49.0 | 7.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 63.6 | 34.9 | 27.3 | 56.6 | 42.0 | 0.3 | 56.3 | 32.7 | 5.6 | 54.8 | 49.0 | 7.5 |
| Queue Length 50th (ft) | 137 | 217 | 155 | 116 | 250 | 0 | 139 | 193 | 0 | 36 | 200 | 0 |
| Queue Length 95th (ft) | #253 | 267 | #333 | #185 | 305 | 0 | #216 | 255 | 64 | 78 | #286 | 55 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 293 | 1526 | 660 | 462 | 1369 | 569 | 532 | 1087 | 704 | 146 | 769 | 497 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.75 | 0.68 | 0.79 | 0.78 | 0.82 | 0.09 | 0.81 | 0.60 | 0.46 | 0.40 | 0.81 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

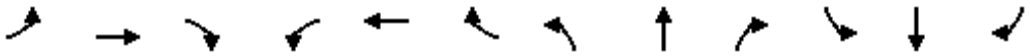
05/29/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 109 | 159 | 1326 | 38 | 66 | 2021 |
| v/c Ratio | 0.40 | 0.42 | 0.49 | 0.04 | 0.29 | 0.60 |
| Control Delay | 28.7 | 8.8 | 11.6 | 4.3 | 29.3 | 6.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.7 | 8.8 | 11.6 | 4.3 | 29.3 | 6.9 |
| Queue Length 50th (ft) | 34 | 0 | 123 | 0 | 21 | 121 |
| Queue Length 95th (ft) | 87 | 47 | 193 | 14 | 63 | 194 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 595 | 637 | 2992 | 947 | 297 | 4189 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.18 | 0.25 | 0.44 | 0.04 | 0.22 | 0.48 |

Intersection Summary

# Queues
## 4: Morada Ln & West Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 223 | 617 | 439 | 534 | 418 | 213 | 549 | 905 | 428 | 470 | 1370 | 290 |
| v/c Ratio | 0.94 | 0.60 | 0.67 | 1.08 | 0.39 | 0.35 | 0.88 | 0.70 | 0.64 | 0.89 | 1.18 | 0.51 |
| Control Delay | 107.3 | 47.5 | 14.8 | 119.5 | 42.4 | 6.8 | 73.7 | 51.5 | 12.1 | 78.2 | 138.9 | 8.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 107.3 | 47.5 | 14.8 | 119.5 | 42.4 | 6.8 | 73.7 | 51.5 | 12.1 | 78.2 | 138.9 | 8.0 |
| Queue Length 50th (ft) | 205 | 259 | 55 | ~282 | 164 | 0 | 254 | 285 | 43 | 218 | ~577 | 0 |
| Queue Length 95th (ft) | #381 | 348 | 197 | #432 | 232 | 65 | #339 | 335 | 156 | #320 | #649 | 77 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | 320 |
| Base Capacity (vph) | 255 | 1020 | 651 | 495 | 1059 | 607 | 700 | 1324 | 680 | 579 | 1157 | 573 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.87 | 0.60 | 0.67 | 1.08 | 0.39 | 0.35 | 0.78 | 0.68 | 0.63 | 0.81 | 1.18 | 0.51 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/29/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 187 | 158 | 273 | 16 | 216 | 1563 | 72 | 2360 |
| v/c Ratio | 1.35 | 0.36 | 1.30 | 0.04 | 0.76 | 0.55 | 0.47 | 1.00 |
| Control Delay | 233.5 | 18.4 | 203.6 | 0.2 | 63.8 | 18.0 | 61.1 | 49.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 233.5 | 18.4 | 203.6 | 0.2 | 63.8 | 18.0 | 61.1 | 49.4 |
| Queue Length 50th (ft) | ~185 | 37 | ~265 | 0 | 152 | 257 | 51 | 608 |
| Queue Length 95th (ft) | #340 | 100 | #443 | 0 | 256 | 388 | 106 | #923 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 139 | 439 | 210 | 417 | 384 | 2843 | 384 | 2363 |
| 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 | 1.35 | 0.36 | 1.30 | 0.04 | 0.56 | 0.55 | 0.19 | 1.00 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/29/2024

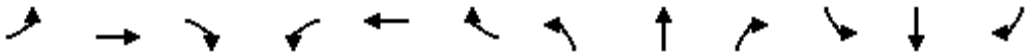
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 88 | 84 | 159 | 165 | 24 | 1563 | 71 | 198 | 2437 |
| v/c Ratio | 0.52 | 0.38 | 0.69 | 0.56 | 0.25 | 0.73 | 0.10 | 0.69 | 0.83 |
| Control Delay | 64.4 | 39.7 | 65.5 | 41.5 | 65.9 | 33.1 | 0.3 | 59.3 | 26.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.4 | 39.7 | 65.5 | 41.5 | 65.9 | 33.1 | 0.3 | 59.3 | 26.8 |
| Queue Length 50th (ft) | 62 | 42 | 112 | 90 | 17 | 333 | 0 | 139 | 549 |
| Queue Length 95th (ft) | 141 | 92 | 227 | 161 | 56 | #745 | 0 | 257 | #1073 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 246 | 395 | 329 | 478 | 98 | 2140 | 732 | 510 | 2920 |
| 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 | 0.36 | 0.21 | 0.48 | 0.35 | 0.24 | 0.73 | 0.10 | 0.39 | 0.83 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/29/2024



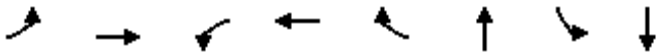
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 476 | 1200 | 229 | 600 | 1035 | 251 | 292 | 943 | 211 | 371 | 1693 | 438 |
| v/c Ratio | 0.82 | 0.75 | 0.44 | 0.93 | 0.60 | 0.44 | 0.84 | 0.48 | 0.34 | 0.93 | 0.81 | 0.58 |
| Control Delay | 74.9 | 57.1 | 13.2 | 82.9 | 51.3 | 13.3 | 90.2 | 44.6 | 6.3 | 96.9 | 52.1 | 10.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.9 | 57.1 | 13.2 | 82.9 | 51.3 | 13.3 | 90.2 | 44.6 | 6.3 | 96.9 | 52.1 | 10.2 |
| Queue Length 50th (ft) | 248 | 333 | 33 | 320 | 271 | 38 | 156 | 232 | 0 | 201 | 475 | 44 |
| Queue Length 95th (ft) | 310 | 377 | 111 | #436 | 319 | 124 | #236 | 270 | 62 | #308 | 526 | 155 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 668 | 1748 | 559 | 668 | 1772 | 576 | 356 | 2039 | 640 | 401 | 2122 | 768 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.71 | 0.69 | 0.41 | 0.90 | 0.58 | 0.44 | 0.82 | 0.46 | 0.33 | 0.93 | 0.80 | 0.57 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/29/2024

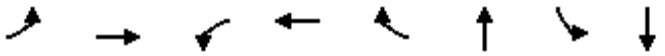


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 15 | 1555 | 79 | 1096 | 39 | 123 | 103 | 106 |
| v/c Ratio | 0.10 | 0.72 | 0.39 | 0.39 | 0.04 | 0.46 | 0.46 | 0.38 |
| Control Delay | 39.1 | 22.3 | 40.2 | 11.9 | 0.1 | 11.5 | 40.6 | 14.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 39.1 | 22.3 | 40.2 | 11.9 | 0.1 | 11.5 | 40.6 | 14.1 |
| Queue Length 50th (ft) | 7 | 225 | 37 | 91 | 0 | 0 | 50 | 6 |
| Queue Length 95th (ft) | 28 | 361 | 86 | 208 | 0 | 40 | 109 | 54 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 232 | 2241 | 349 | 2925 | 966 | 339 | 442 | 470 |
| 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 | 0.06 | 0.69 | 0.23 | 0.37 | 0.04 | 0.36 | 0.23 | 0.23 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 30 | 1621 | 175 | 1151 | 39 | 157 | 216 | 213 |
| v/c Ratio | 0.22 | 0.87 | 0.65 | 0.46 | 0.05 | 0.56 | 0.70 | 0.68 |
| Control Delay | 48.1 | 35.7 | 50.4 | 18.4 | 0.1 | 13.3 | 49.1 | 45.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.1 | 35.7 | 50.4 | 18.4 | 0.1 | 13.3 | 49.1 | 45.5 |
| Queue Length 50th (ft) | 17 | 314 | 97 | 168 | 0 | 0 | 125 | 114 |
| Queue Length 95th (ft) | 51 | #550 | 185 | 271 | 0 | 47 | 227 | 214 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 191 | 1855 | 382 | 2550 | 853 | 334 | 454 | 453 |
| 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 | 0.16 | 0.87 | 0.46 | 0.45 | 0.05 | 0.47 | 0.48 | 0.47 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 11: Glacier Point Dr & Morada Ln

05/29/2024

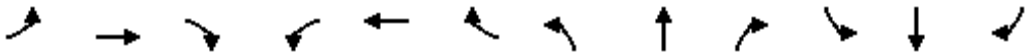
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 184 | 1974 | 107 | 1146 | 343 | 159 | 174 | 235 | 192 |
| v/c Ratio | 0.76 | 0.93 | 0.82 | 0.63 | 0.46 | 0.92 | 0.52 | 0.81 | 0.46 |
| Control Delay | 72.8 | 44.4 | 101.7 | 36.6 | 5.4 | 106.9 | 35.0 | 72.7 | 31.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 72.8 | 44.4 | 101.7 | 36.6 | 5.4 | 106.9 | 35.0 | 72.7 | 31.0 |
| Queue Length 50th (ft) | 150 | 585 | 91 | 304 | 0 | 136 | 81 | 191 | 92 |
| Queue Length 95th (ft) | 231 | #704 | #203 | 362 | 70 | #279 | 156 | #305 | 165 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 289 | 2168 | 130 | 1824 | 752 | 173 | 386 | 333 | 498 |
| 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 | 0.64 | 0.91 | 0.82 | 0.63 | 0.46 | 0.92 | 0.45 | 0.71 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| v/c Ratio | 0.81 | 1.07 | 0.55 | 0.66 | 0.84 | 0.48 | 0.76 | 0.31 | 0.33 | 0.83 | 0.54 | 0.61 |
| Control Delay | 65.5 | 85.8 | 23.1 | 62.4 | 52.8 | 14.2 | 61.9 | 47.2 | 11.9 | 63.2 | 47.3 | 10.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 65.5 | 85.8 | 23.1 | 62.4 | 52.8 | 14.2 | 61.9 | 47.2 | 11.9 | 63.2 | 47.3 | 10.0 |
| Queue Length 50th (ft) | 192 | ~434 | 78 | 121 | 249 | 25 | 174 | 52 | 0 | 222 | 114 | 0 |
| Queue Length 95th (ft) | #496 | #881 | 252 | 270 | 442 | 127 | 376 | 96 | 51 | #549 | 196 | 86 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 477 | 1426 | 557 | 477 | 1182 | 513 | 556 | 1404 | 504 | 556 | 1404 | 666 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.61 | 1.07 | 0.55 | 0.38 | 0.84 | 0.48 | 0.47 | 0.16 | 0.20 | 0.60 | 0.34 | 0.49 |

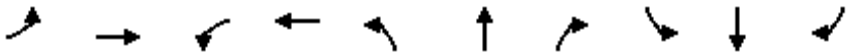
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 13: Maranatha Dr & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 69 | 1893 | 65 | 1174 | 98 | 8 | 94 | 72 | 25 | 101 |
| v/c Ratio | 0.35 | 0.66 | 0.34 | 0.41 | 0.42 | 0.03 | 0.27 | 0.31 | 0.08 | 0.29 |
| Control Delay | 44.1 | 16.1 | 44.1 | 12.7 | 38.1 | 30.4 | 9.2 | 35.2 | 31.1 | 9.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.1 | 16.1 | 44.1 | 12.7 | 38.1 | 30.4 | 9.2 | 35.2 | 31.1 | 9.1 |
| Queue Length 50th (ft) | 33 | 223 | 31 | 113 | 46 | 4 | 0 | 33 | 11 | 0 |
| Queue Length 95th (ft) | 91 | 480 | 88 | 252 | 100 | 16 | 39 | 77 | 35 | 41 |
| Internal Link Dist (ft) | | 1519 | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 461 | 3423 | 461 | 3431 | 593 | 801 | 725 | 602 | 801 | 728 |
| 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 | 0.15 | 0.55 | 0.14 | 0.34 | 0.17 | 0.01 | 0.13 | 0.12 | 0.03 | 0.14 |

Intersection Summary

# Queues
## 14: Diamond Bar Pl & Morada Ln

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 1767 | 19 | 1136 | 63 | 22 | 69 | 60 | 125 |
| v/c Ratio | 0.72 | 0.52 | 0.19 | 0.43 | 0.45 | 0.13 | 0.24 | 0.43 | 0.50 |
| Control Delay | 62.6 | 14.4 | 57.5 | 21.5 | 61.8 | 47.3 | 2.0 | 61.6 | 15.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 62.6 | 14.4 | 57.5 | 21.5 | 61.8 | 47.3 | 2.0 | 61.6 | 15.7 |
| Queue Length 50th (ft) | 148 | 179 | 14 | 180 | 47 | 17 | 0 | 45 | 4 |
| Queue Length 95th (ft) | 217 | 503 | 39 | 349 | 92 | 36 | 0 | 88 | 53 |
| Internal Link Dist (ft) | | 790 | | 329 | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 100 | | 65 | | 65 | 150 | |
| Base Capacity (vph) | 374 | 3400 | 153 | 2629 | 227 | 393 | 452 | 227 | 427 |
| 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 | 0.53 | 0.52 | 0.12 | 0.43 | 0.28 | 0.06 | 0.15 | 0.26 | 0.29 |

Intersection Summary

# Queues

## 15: West Ln & Marlette Rd

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 259 | 74 | 361 | 330 | 32 | 188 | 1210 | 87 | 49 | 1396 | 111 |
| v/c Ratio | 0.52 | 0.28 | 0.84 | 0.78 | 0.12 | 0.55 | 0.63 | 0.13 | 0.39 | 0.94 | 0.20 |
| Control Delay | 36.4 | 40.5 | 32.2 | 47.2 | 22.9 | 49.6 | 29.7 | 3.0 | 55.5 | 47.4 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 40.5 | 32.2 | 47.2 | 22.9 | 49.6 | 29.7 | 3.0 | 55.5 | 47.4 | 6.4 |
| Queue Length 50th (ft) | 147 | 40 | 67 | 187 | 8 | 56 | 239 | 0 | 29 | 304 | 0 |
| Queue Length 95th (ft) | 244 | 89 | #215 | 299 | 36 | 104 | 357 | 21 | 74 | #512 | 39 |
| Internal Link Dist (ft) | | 1462 | | | 1414 | | 1985 | | | 2672 | |
| Turn Bay Length (ft) | 300 | | 300 | 300 | | 300 | | 300 | 300 | | 300 |
| Base Capacity (vph) | 635 | 384 | 518 | 633 | 396 | 372 | 1913 | 669 | 134 | 1489 | 547 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 0.19 | 0.70 | 0.52 | 0.08 | 0.51 | 0.63 | 0.13 | 0.37 | 0.94 | 0.20 |

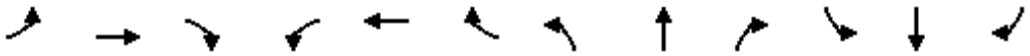
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 1: West Ln & Eight Mile Rd

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 242 | 978 | 498 | 466 | 1223 | 23 | 404 | 705 | 264 | 18 | 664 | 128 |
| v/c Ratio | 0.89 | 0.66 | 0.81 | 0.84 | 0.81 | 0.04 | 0.90 | 0.58 | 0.37 | 0.17 | 0.89 | 0.27 |
| Control Delay | 78.0 | 35.9 | 31.6 | 58.6 | 39.6 | 0.1 | 70.4 | 32.8 | 5.5 | 52.9 | 57.4 | 3.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.0 | 35.9 | 31.6 | 58.6 | 39.6 | 0.1 | 70.4 | 32.8 | 5.5 | 52.9 | 57.4 | 3.2 |
| Queue Length 50th (ft) | 170 | 218 | 191 | 165 | 286 | 0 | 147 | 199 | 0 | 12 | 241 | 0 |
| Queue Length 95th (ft) | #313 | 267 | #348 | #243 | 343 | 0 | #239 | 307 | 61 | 36 | #345 | 18 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 282 | 1573 | 638 | 579 | 1620 | 626 | 450 | 1219 | 711 | 116 | 762 | 481 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 0.62 | 0.78 | 0.80 | 0.75 | 0.04 | 0.90 | 0.58 | 0.37 | 0.16 | 0.87 | 0.27 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 2: West Ln & Project Rd (Full Access)

05/29/2024

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 76 | 111 | 1922 | 129 | 242 | 1601 |
| v/c Ratio | 0.32 | 0.36 | 0.93 | 0.18 | 0.61 | 0.42 |
| Control Delay | 28.3 | 9.8 | 30.2 | 4.7 | 27.9 | 4.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.3 | 9.8 | 30.2 | 4.7 | 27.9 | 4.5 |
| Queue Length 50th (ft) | 25 | 0 | ~250 | 1 | 78 | 76 |
| Queue Length 95th (ft) | 64 | 39 | #456 | 34 | 147 | 120 |
| Internal Link Dist (ft) | 1942 | | 1387 | | | 472 |
| Turn Bay Length (ft) | | | | 250 | 340 | |
| Base Capacity (vph) | 364 | 414 | 2077 | 720 | 911 | 4783 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.21 | 0.27 | 0.93 | 0.18 | 0.27 | 0.33 |

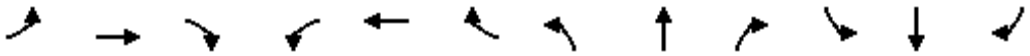
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 4: Morada Ln & West Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 158 | 295 | 168 | 491 | 432 | 328 | 281 | 1508 | 565 | 303 | 1114 | 191 |
| v/c Ratio | 0.71 | 0.35 | 0.34 | 0.92 | 0.79 | 0.63 | 1.29 | 1.01 | 0.72 | 0.74 | 0.63 | 0.29 |
| Control Delay | 61.9 | 40.7 | 7.9 | 78.5 | 64.7 | 11.3 | 206.1 | 70.4 | 15.6 | 68.3 | 38.2 | 5.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.9 | 40.7 | 7.9 | 78.5 | 64.7 | 11.3 | 206.1 | 70.4 | 15.6 | 68.3 | 38.2 | 5.7 |
| Queue Length 50th (ft) | 124 | 110 | 3 | 231 | 203 | 0 | ~180 | ~586 | 90 | 140 | 323 | 0 |
| Queue Length 95th (ft) | 206 | 152 | 58 | #334 | 265 | 93 | #275 | #683 | 251 | 192 | 376 | 55 |
| Internal Link Dist (ft) | | 738 | | | 1289 | | | 2542 | | | 590 | |
| Turn Bay Length (ft) | 200 | | | 300 | | 300 | 300 | | 300 | 320 | | 320 |
| Base Capacity (vph) | 301 | 1143 | 601 | 602 | 620 | 544 | 218 | 1499 | 780 | 465 | 1864 | 691 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.52 | 0.26 | 0.28 | 0.82 | 0.70 | 0.60 | 1.29 | 1.01 | 0.72 | 0.65 | 0.60 | 0.28 |

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 5: West Ln & W Ln Frontage Rd

05/29/2024

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 134 | 98 | 151 | 8 | 163 | 2370 | 41 | 1704 |
| v/c Ratio | 0.65 | 0.26 | 0.68 | 0.02 | 0.60 | 0.79 | 0.28 | 0.72 |
| Control Delay | 51.5 | 11.4 | 52.3 | 0.1 | 49.1 | 19.4 | 50.4 | 23.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.5 | 11.4 | 52.3 | 0.1 | 49.1 | 19.4 | 50.4 | 23.2 |
| Queue Length 50th (ft) | 74 | 5 | 84 | 0 | 92 | 413 | 23 | 280 |
| Queue Length 95th (ft) | 155 | 49 | 170 | 0 | 182 | 647 | 66 | 458 |
| Internal Link Dist (ft) | 308 | | 219 | | | 1238 | | 2542 |
| Turn Bay Length (ft) | | 50 | | 50 | 415 | | 400 | |
| Base Capacity (vph) | 334 | 565 | 359 | 549 | 488 | 3019 | 488 | 2787 |
| 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 | 0.40 | 0.17 | 0.42 | 0.01 | 0.33 | 0.79 | 0.08 | 0.61 |

Intersection Summary

# Queues
## 6: West Ln & Knickerbocker Dr

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 96 | 78 | 129 | 146 | 69 | 2385 | 91 | 139 | 1730 |
| v/c Ratio | 0.50 | 0.33 | 0.59 | 0.50 | 0.46 | 1.08 | 0.12 | 0.60 | 0.67 |
| Control Delay | 57.0 | 34.2 | 58.2 | 31.4 | 61.2 | 76.8 | 0.3 | 56.9 | 25.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 57.0 | 34.2 | 58.2 | 31.4 | 61.2 | 76.8 | 0.3 | 56.9 | 25.1 |
| Queue Length 50th (ft) | 58 | 32 | 77 | 53 | 42 | ~623 | 0 | 83 | 308 |
| Queue Length 95th (ft) | 142 | 79 | 182 | 119 | 115 | #1212 | 0 | 191 | #624 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 309 | 423 | 327 | 451 | 181 | 2199 | 753 | 363 | 2693 |
| 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 | 0.31 | 0.18 | 0.39 | 0.32 | 0.38 | 1.08 | 0.12 | 0.38 | 0.64 |

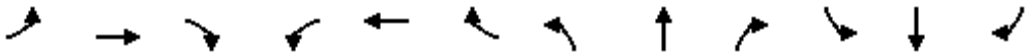
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 673 | 1529 | 203 | 444 | 1202 | 273 | 519 | 1732 | 281 | 302 | 1235 | 368 |
| v/c Ratio | 1.06 | 0.84 | 0.37 | 0.88 | 0.77 | 0.51 | 1.03 | 0.82 | 0.40 | 0.84 | 0.67 | 0.55 |
| Control Delay | 111.0 | 58.3 | 12.2 | 84.9 | 58.9 | 17.5 | 111.2 | 52.2 | 5.6 | 89.5 | 51.3 | 10.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 111.0 | 58.3 | 12.2 | 84.9 | 58.9 | 17.5 | 111.2 | 52.2 | 5.6 | 89.5 | 51.3 | 10.6 |
| Queue Length 50th (ft) | ~404 | 441 | 29 | 237 | 340 | 59 | ~304 | 484 | 0 | 162 | 330 | 36 |
| Queue Length 95th (ft) | #532 | 489 | 100 | #323 | 384 | 154 | #424 | 530 | 68 | #236 | 372 | 135 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 637 | 1846 | 563 | 527 | 1641 | 548 | 505 | 2174 | 714 | 373 | 1928 | 688 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.06 | 0.83 | 0.36 | 0.84 | 0.73 | 0.50 | 1.03 | 0.80 | 0.39 | 0.81 | 0.64 | 0.53 |

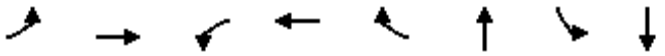
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 8: Caywood Dr & Morada Ln

05/29/2024

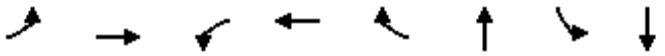


| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 57 | 1153 | 52 | 1216 | 135 | 62 | 72 | 81 |
| v/c Ratio | 0.24 | 0.41 | 0.23 | 0.43 | 0.14 | 0.26 | 0.29 | 0.28 |
| Control Delay | 36.0 | 14.8 | 36.0 | 15.2 | 3.8 | 21.5 | 35.1 | 14.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.0 | 14.8 | 36.0 | 15.2 | 3.8 | 21.5 | 35.1 | 14.4 |
| Queue Length 50th (ft) | 23 | 142 | 21 | 154 | 0 | 9 | 30 | 4 |
| Queue Length 95th (ft) | 69 | 222 | 64 | 238 | 33 | 50 | 84 | 48 |
| Internal Link Dist (ft) | | 1289 | | 1260 | | 552 | | 170 |
| Turn Bay Length (ft) | 300 | | 300 | | 250 | | 250 | |
| Base Capacity (vph) | 328 | 3413 | 328 | 3440 | 1114 | 339 | 623 | 612 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.17 | 0.34 | 0.16 | 0.35 | 0.12 | 0.18 | 0.12 | 0.13 |

Intersection Summary

# Queues
## 9: Cherbourg Wy & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 126 | 1112 | 99 | 1342 | 138 | 120 | 155 | 150 |
| v/c Ratio | 0.52 | 0.52 | 0.47 | 0.72 | 0.21 | 0.55 | 0.59 | 0.56 |
| Control Delay | 46.2 | 21.5 | 47.2 | 26.9 | 4.9 | 28.5 | 46.6 | 41.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.2 | 21.5 | 47.2 | 26.9 | 4.9 | 28.5 | 46.6 | 41.5 |
| Queue Length 50th (ft) | 66 | 170 | 52 | 226 | 0 | 22 | 85 | 73 |
| Queue Length 95th (ft) | 139 | 261 | 117 | 346 | 40 | 86 | 172 | 155 |
| Internal Link Dist (ft) | | 1260 | | 1170 | | 828 | | 237 |
| Turn Bay Length (ft) | 350 | | 350 | | 250 | | 300 | |
| Base Capacity (vph) | 420 | 2629 | 315 | 2356 | 807 | 266 | 399 | 400 |
| 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 | 0.30 | 0.42 | 0.31 | 0.57 | 0.17 | 0.45 | 0.39 | 0.38 |

Intersection Summary

# Queues
## 11: Glacier Point Dr & Morada Ln

05/29/2024

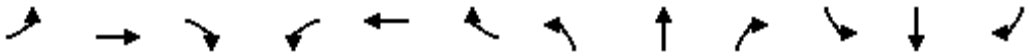
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 37 | 1325 | 48 | 1780 | 77 | 48 | 54 | 103 | 80 |
| v/c Ratio | 0.25 | 0.49 | 0.30 | 0.65 | 0.09 | 0.26 | 0.17 | 0.48 | 0.20 |
| Control Delay | 50.9 | 23.1 | 50.0 | 25.5 | 0.2 | 48.7 | 13.0 | 49.8 | 11.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 50.9 | 23.1 | 50.0 | 25.5 | 0.2 | 48.7 | 13.0 | 49.8 | 11.1 |
| Queue Length 50th (ft) | 19 | 187 | 25 | 282 | 0 | 25 | 4 | 53 | 6 |
| Queue Length 95th (ft) | 62 | 393 | 73 | #617 | 0 | 73 | 36 | 128 | 43 |
| Internal Link Dist (ft) | | 1050 | | 631 | | | 505 | | 258 |
| Turn Bay Length (ft) | 310 | | 215 | | | 100 | | | |
| Base Capacity (vph) | 188 | 2692 | 271 | 2749 | 893 | 271 | 606 | 417 | 728 |
| 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 | 0.20 | 0.49 | 0.18 | 0.65 | 0.09 | 0.18 | 0.09 | 0.25 | 0.11 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| v/c Ratio | 0.72 | 0.58 | 0.27 | 0.62 | 0.90 | 0.45 | 0.75 | 0.45 | 0.47 | 0.67 | 0.37 | 0.51 |
| Control Delay | 59.6 | 34.0 | 6.8 | 56.8 | 45.3 | 15.0 | 60.1 | 42.0 | 9.7 | 58.0 | 42.5 | 10.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.6 | 34.0 | 6.8 | 56.8 | 45.3 | 15.0 | 60.1 | 42.0 | 9.7 | 58.0 | 42.5 | 10.6 |
| Queue Length 50th (ft) | 122 | 181 | 0 | 91 | 305 | 41 | 132 | 77 | 0 | 106 | 56 | 0 |
| Queue Length 95th (ft) | 290 | 383 | 60 | 219 | #669 | 167 | #336 | 134 | 63 | 253 | 100 | 62 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 439 | 1678 | 628 | 439 | 1567 | 607 | 439 | 1500 | 596 | 439 | 1500 | 599 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.58 | 0.27 | 0.35 | 0.90 | 0.45 | 0.51 | 0.24 | 0.32 | 0.41 | 0.17 | 0.33 |

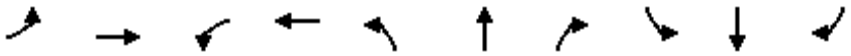
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

13: Maranatha Dr & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 80 | 1313 | 113 | 1906 | 30 | 17 | 102 | 56 | 17 | 39 |
| v/c Ratio | 0.37 | 0.47 | 0.45 | 0.59 | 0.15 | 0.06 | 0.32 | 0.27 | 0.06 | 0.14 |
| Control Delay | 43.3 | 13.9 | 42.7 | 14.7 | 33.8 | 32.3 | 10.0 | 36.1 | 32.3 | 4.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 43.3 | 13.9 | 42.7 | 14.7 | 33.8 | 32.3 | 10.0 | 36.1 | 32.3 | 4.1 |
| Queue Length 50th (ft) | 36 | 127 | 50 | 209 | 13 | 7 | 0 | 25 | 7 | 0 |
| Queue Length 95th (ft) | 105 | 309 | 135 | 496 | 41 | 27 | 41 | 65 | 27 | 12 |
| Internal Link Dist (ft) | | 1519 | | 790 | | 491 | | | 364 | |
| Turn Bay Length (ft) | 300 | | 310 | | 90 | | 90 | 90 | | 90 |
| Base Capacity (vph) | 483 | 3587 | 483 | 3578 | 607 | 814 | 740 | 607 | 814 | 719 |
| 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 | 0.17 | 0.37 | 0.23 | 0.53 | 0.05 | 0.02 | 0.14 | 0.09 | 0.02 | 0.05 |

Intersection Summary

# Queues
## 14: Diamond Bar Pl & Morada Ln

05/29/2024

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 236 | 1182 | 54 | 1880 | 28 | 17 | 31 | 148 | 297 |
| v/c Ratio | 0.78 | 0.39 | 0.43 | 0.77 | 0.26 | 0.11 | 0.10 | 0.66 | 0.64 |
| Control Delay | 64.8 | 16.6 | 63.2 | 30.7 | 58.7 | 48.1 | 0.7 | 63.7 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.8 | 16.6 | 63.2 | 30.7 | 58.7 | 48.1 | 0.7 | 63.7 | 12.4 |
| Queue Length 50th (ft) | 175 | 176 | 41 | 434 | 21 | 13 | 0 | 111 | 13 |
| Queue Length 95th (ft) | 256 | 325 | 83 | #849 | 51 | 31 | 0 | 174 | 79 |
| Internal Link Dist (ft) | | 790 | | 329 | | 528 | | | 581 |
| Turn Bay Length (ft) | 180 | | 100 | | 65 | | 65 | 150 | |
| Base Capacity (vph) | 374 | 3034 | 153 | 2440 | 153 | 386 | 479 | 300 | 655 |
| 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 | 0.63 | 0.39 | 0.35 | 0.77 | 0.18 | 0.04 | 0.06 | 0.49 | 0.45 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 15: West Ln & Marlette Rd

05/29/2024

| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 198 | 60 | 245 | 196 | 55 | 501 | 1385 | 147 | 60 | 1403 | 158 |
| v/c Ratio | 0.62 | 0.34 | 0.66 | 0.73 | 0.30 | 0.73 | 0.59 | 0.18 | 0.39 | 0.85 | 0.25 |
| Control Delay | 48.3 | 46.1 | 14.6 | 55.7 | 41.7 | 42.3 | 21.5 | 3.8 | 50.3 | 37.2 | 5.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.3 | 46.1 | 14.6 | 55.7 | 41.7 | 42.3 | 21.5 | 3.8 | 50.3 | 37.2 | 5.0 |
| Queue Length 50th (ft) | 112 | 34 | 0 | 111 | 28 | 145 | 232 | 0 | 34 | 287 | 0 |
| Queue Length 95th (ft) | #240 | 77 | 72 | #235 | 68 | 215 | 324 | 37 | 82 | #458 | 42 |
| Internal Link Dist (ft) | | 1462 | | | 1414 | | 1985 | | | 2672 | |
| Turn Bay Length (ft) | 300 | | 300 | 300 | | 300 | | 300 | 300 | | 300 |
| Base Capacity (vph) | 326 | 361 | 504 | 305 | 359 | 925 | 2508 | 855 | 190 | 1645 | 626 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.61 | 0.17 | 0.49 | 0.64 | 0.15 | 0.54 | 0.55 | 0.17 | 0.32 | 0.85 | 0.25 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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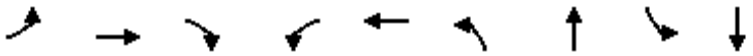
# Appendix M: Existing Plus Project (Mitigated) Queue Worksheets

# Queues
## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 116 | 446 | 441 | 166 | 410 | 319 | 543 | 38 | 702 |
| v/c Ratio | 0.57 | 0.85 | 0.63 | 0.66 | 0.71 | 0.70 | 0.43 | 0.37 | 0.82 |
| Control Delay | 61.6 | 56.4 | 13.4 | 60.6 | 43.8 | 57.9 | 29.7 | 66.5 | 48.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.6 | 56.4 | 13.4 | 60.6 | 43.8 | 57.9 | 29.7 | 66.5 | 48.8 |
| Queue Length 50th (ft) | 88 | 326 | 56 | 125 | 279 | 124 | 168 | 29 | 260 |
| Queue Length 95th (ft) | 152 | #541 | 180 | 200 | 423 | 184 | 240 | 70 | 358 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 4736 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 398 | 587 | 737 | 398 | 621 | 526 | 1310 | 111 | 976 |
| 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 | 0.29 | 0.76 | 0.60 | 0.42 | 0.66 | 0.61 | 0.41 | 0.34 | 0.72 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

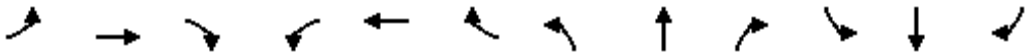
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 88 | 83 | 157 | 164 | 24 | 1157 | 70 | 197 | 1640 |
| v/c Ratio | 0.52 | 0.36 | 0.48 | 0.49 | 0.18 | 0.72 | 0.11 | 0.63 | 0.65 |
| Control Delay | 60.8 | 37.6 | 47.4 | 32.2 | 55.2 | 34.6 | 0.4 | 50.4 | 22.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 60.8 | 37.6 | 47.4 | 32.2 | 55.2 | 34.6 | 0.4 | 50.4 | 22.7 |
| Queue Length 50th (ft) | 47 | 33 | 82 | 66 | 13 | 201 | 0 | 102 | 196 |
| Queue Length 95th (ft) | #186 | 94 | 217 | 144 | 54 | #460 | 0 | 259 | 589 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 178 | 241 | 595 | 632 | 495 | 2107 | 746 | 713 | 2799 |
| 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 | 0.49 | 0.34 | 0.26 | 0.26 | 0.05 | 0.55 | 0.09 | 0.28 | 0.59 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



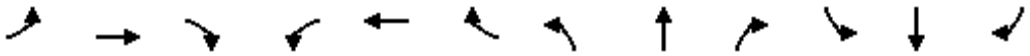
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 594 | 202 | 279 | 1037 | 373 |
| v/c Ratio | 0.76 | 0.69 | 0.40 | 0.82 | 0.52 | 0.35 | 0.72 | 0.36 | 0.37 | 0.72 | 0.63 | 0.55 |
| Control Delay | 63.4 | 47.5 | 10.2 | 62.3 | 40.9 | 8.3 | 70.8 | 41.6 | 7.1 | 70.8 | 46.0 | 7.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 63.4 | 47.5 | 10.2 | 62.3 | 40.9 | 8.3 | 70.8 | 41.6 | 7.1 | 70.8 | 46.0 | 7.2 |
| Queue Length 50th (ft) | 191 | 265 | 15 | 248 | 208 | 9 | 123 | 126 | 0 | 123 | 238 | 1 |
| Queue Length 95th (ft) | 287 | 356 | 91 | 372 | 294 | 78 | #219 | 168 | 61 | #218 | 300 | 83 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 769 | 2079 | 635 | 848 | 2240 | 669 | 424 | 2425 | 716 | 424 | 2425 | 819 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.57 | 0.55 | 0.35 | 0.68 | 0.44 | 0.31 | 0.66 | 0.24 | 0.28 | 0.66 | 0.43 | 0.46 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



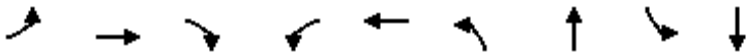
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 229 | 1085 | 269 | 172 | 788 | 157 | 240 | 130 | 98 | 209 | 292 | 270 |
| v/c Ratio | 0.56 | 0.87 | 0.41 | 0.69 | 0.41 | 0.23 | 0.57 | 0.28 | 0.33 | 0.74 | 0.35 | 0.56 |
| Control Delay | 51.7 | 42.3 | 13.3 | 61.0 | 28.2 | 6.2 | 51.5 | 42.8 | 8.9 | 60.8 | 39.5 | 9.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.7 | 42.3 | 13.3 | 61.0 | 28.2 | 6.2 | 51.5 | 42.8 | 8.9 | 60.8 | 39.5 | 9.1 |
| Queue Length 50th (ft) | 71 | 330 | 38 | 104 | 129 | 0 | 75 | 41 | 0 | 126 | 62 | 0 |
| Queue Length 95th (ft) | 148 | #771 | 157 | #251 | 282 | 56 | 154 | 75 | 36 | #311 | 100 | 66 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 670 | 1254 | 664 | 345 | 1909 | 678 | 670 | 1096 | 558 | 380 | 1675 | 694 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.34 | 0.87 | 0.41 | 0.50 | 0.41 | 0.23 | 0.36 | 0.12 | 0.18 | 0.55 | 0.17 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 189 | 426 | 380 | 102 | 445 | 321 | 641 | 12 | 632 |
| v/c Ratio | 0.70 | 0.69 | 0.50 | 0.55 | 0.84 | 0.69 | 0.49 | 0.15 | 0.81 |
| Control Delay | 61.7 | 39.2 | 6.3 | 63.0 | 53.7 | 56.9 | 30.5 | 63.0 | 50.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.7 | 39.2 | 6.3 | 63.0 | 53.7 | 56.9 | 30.5 | 63.0 | 50.2 |
| Queue Length 50th (ft) | 137 | 276 | 12 | 74 | 314 | 119 | 174 | 9 | 227 |
| Queue Length 95th (ft) | 233 | 407 | 84 | 142 | 467 | 187 | 301 | 32 | #340 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | 4736 | | 2544 |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 375 | | 410 | |
| Base Capacity (vph) | 364 | 836 | 907 | 248 | 713 | 546 | 1370 | 82 | 916 |
| 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 | 0.52 | 0.51 | 0.42 | 0.41 | 0.62 | 0.59 | 0.47 | 0.15 | 0.69 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

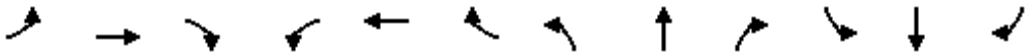
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 93 | 75 | 124 | 140 | 66 | 1498 | 86 | 133 | 1087 |
| v/c Ratio | 0.50 | 0.32 | 0.53 | 0.45 | 0.38 | 0.73 | 0.12 | 0.54 | 0.45 |
| Control Delay | 59.2 | 36.5 | 54.2 | 29.4 | 55.7 | 30.2 | 0.8 | 53.8 | 21.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.2 | 36.5 | 54.2 | 29.4 | 55.7 | 30.2 | 0.8 | 53.8 | 21.9 |
| Queue Length 50th (ft) | 54 | 32 | 72 | 49 | 39 | 264 | 0 | 78 | 158 |
| Queue Length 95th (ft) | #161 | 84 | 179 | 114 | 111 | #620 | 4 | 188 | 359 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 237 | 326 | 573 | 636 | 494 | 2501 | 827 | 494 | 2589 |
| 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 | 0.39 | 0.23 | 0.22 | 0.22 | 0.13 | 0.60 | 0.10 | 0.27 | 0.42 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



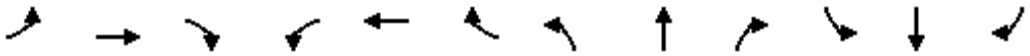
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1030 | 270 | 240 | 709 | 322 |
| v/c Ratio | 0.85 | 0.69 | 0.33 | 0.80 | 0.74 | 0.35 | 0.83 | 0.56 | 0.42 | 0.66 | 0.51 | 0.55 |
| Control Delay | 66.0 | 45.9 | 8.0 | 69.7 | 52.1 | 11.6 | 68.6 | 42.7 | 6.2 | 71.1 | 47.9 | 8.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 66.0 | 45.9 | 8.0 | 69.7 | 52.1 | 11.6 | 68.6 | 42.7 | 6.2 | 71.1 | 47.9 | 8.0 |
| Queue Length 50th (ft) | 251 | 284 | 5 | 179 | 260 | 12 | 212 | 230 | 0 | 103 | 164 | 0 |
| Queue Length 95th (ft) | #421 | 401 | 70 | #324 | 375 | 83 | #400 | 294 | 67 | 179 | 211 | 80 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 827 | 2205 | 653 | 595 | 1770 | 542 | 621 | 2608 | 794 | 440 | 2270 | 754 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.72 | 0.59 | 0.30 | 0.72 | 0.65 | 0.32 | 0.80 | 0.39 | 0.34 | 0.55 | 0.31 | 0.43 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 156 | 703 | 146 | 148 | 916 | 174 | 189 | 219 | 184 | 114 | 156 | 139 |
| v/c Ratio | 0.42 | 0.70 | 0.27 | 0.57 | 0.56 | 0.28 | 0.46 | 0.37 | 0.44 | 0.50 | 0.17 | 0.35 |
| Control Delay | 45.4 | 33.4 | 6.2 | 48.2 | 26.1 | 5.3 | 44.1 | 34.5 | 8.8 | 49.2 | 31.3 | 7.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.4 | 33.4 | 6.2 | 48.2 | 26.1 | 5.3 | 44.1 | 34.5 | 8.8 | 49.2 | 31.3 | 7.1 |
| Queue Length 50th (ft) | 38 | 164 | 0 | 70 | 136 | 0 | 46 | 54 | 0 | 54 | 25 | 0 |
| Queue Length 95th (ft) | 104 | 346 | 47 | 195 | 268 | 49 | 120 | 106 | 54 | 158 | 52 | 40 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 425 | 1473 | 737 | 372 | 2557 | 871 | 510 | 1928 | 934 | 306 | 2896 | 955 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.48 | 0.20 | 0.40 | 0.36 | 0.20 | 0.37 | 0.11 | 0.20 | 0.37 | 0.05 | 0.15 |

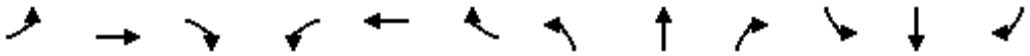
Intersection Summary

# Appendix N: Background Plus Project (Mitigated) Queue Worksheets

# Queues

## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 216 | 728 | 476 | 241 | 646 | 27 | 381 | 511 | 128 | 56 | 546 | 161 |
| v/c Ratio | 0.77 | 0.81 | 0.65 | 0.84 | 0.72 | 0.05 | 0.66 | 0.50 | 0.23 | 0.40 | 0.88 | 0.37 |
| Control Delay | 56.0 | 41.1 | 8.9 | 64.6 | 37.0 | 0.2 | 41.6 | 30.1 | 4.9 | 50.0 | 54.6 | 5.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.0 | 41.1 | 8.9 | 64.6 | 37.0 | 0.2 | 41.6 | 30.1 | 4.9 | 50.0 | 54.6 | 5.5 |
| Queue Length 50th (ft) | 120 | 209 | 14 | 138 | 183 | 0 | 109 | 137 | 0 | 32 | 166 | 0 |
| Queue Length 95th (ft) | #234 | #313 | 109 | #285 | 261 | 0 | 155 | 188 | 35 | 73 | #278 | 34 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 310 | 932 | 744 | 291 | 906 | 551 | 867 | 1213 | 628 | 155 | 621 | 439 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.70 | 0.78 | 0.64 | 0.83 | 0.71 | 0.05 | 0.44 | 0.42 | 0.20 | 0.36 | 0.88 | 0.37 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

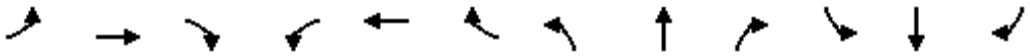
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 88 | 83 | 157 | 164 | 24 | 1354 | 70 | 197 | 1958 |
| v/c Ratio | 0.57 | 0.38 | 0.52 | 0.51 | 0.19 | 0.74 | 0.10 | 0.67 | 0.73 |
| Control Delay | 64.9 | 38.8 | 50.2 | 34.0 | 56.8 | 34.1 | 0.3 | 54.3 | 24.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.9 | 38.8 | 50.2 | 34.0 | 56.8 | 34.1 | 0.3 | 54.3 | 24.0 |
| Queue Length 50th (ft) | 52 | 37 | 91 | 73 | 14 | 248 | 0 | 114 | 258 |
| Queue Length 95th (ft) | #186 | 94 | 217 | 144 | 54 | #615 | 0 | 259 | #815 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 163 | 228 | 544 | 586 | 453 | 1927 | 698 | 652 | 2691 |
| 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 | 0.54 | 0.36 | 0.29 | 0.28 | 0.05 | 0.70 | 0.10 | 0.30 | 0.73 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



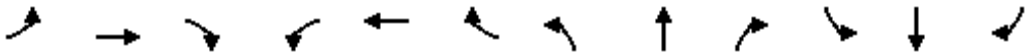
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 440 | 1152 | 220 | 576 | 993 | 208 | 280 | 778 | 202 | 279 | 1335 | 373 |
| v/c Ratio | 0.78 | 0.72 | 0.41 | 0.85 | 0.55 | 0.36 | 0.78 | 0.41 | 0.33 | 0.77 | 0.70 | 0.51 |
| Control Delay | 69.8 | 52.9 | 11.2 | 70.4 | 45.9 | 8.8 | 80.1 | 41.8 | 6.4 | 80.1 | 47.7 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 69.8 | 52.9 | 11.2 | 70.4 | 45.9 | 8.8 | 80.1 | 41.8 | 6.4 | 80.1 | 47.7 | 6.4 |
| Queue Length 50th (ft) | 221 | 308 | 20 | 287 | 242 | 10 | 143 | 180 | 0 | 142 | 343 | 1 |
| Queue Length 95th (ft) | 289 | 359 | 95 | #375 | 297 | 79 | #221 | 220 | 61 | #219 | 400 | 83 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 700 | 1893 | 593 | 772 | 2037 | 626 | 386 | 2209 | 670 | 386 | 2209 | 779 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.63 | 0.61 | 0.37 | 0.75 | 0.49 | 0.33 | 0.73 | 0.35 | 0.30 | 0.72 | 0.60 | 0.48 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 263 | 1128 | 274 | 172 | 825 | 240 | 243 | 214 | 98 | 327 | 461 | 310 |
| v/c Ratio | 0.65 | 0.97 | 0.45 | 0.73 | 0.47 | 0.35 | 0.64 | 0.45 | 0.30 | 0.83 | 0.37 | 0.50 |
| Control Delay | 61.2 | 61.6 | 18.6 | 71.4 | 34.7 | 6.0 | 62.6 | 51.1 | 4.8 | 66.1 | 39.3 | 7.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.2 | 61.6 | 18.6 | 71.4 | 34.7 | 6.0 | 62.6 | 51.1 | 4.8 | 66.1 | 39.3 | 7.2 |
| Queue Length 50th (ft) | 100 | 437 | 67 | 127 | 175 | 0 | 92 | 83 | 0 | 238 | 111 | 3 |
| Queue Length 95th (ft) | 177 | #856 | 199 | #261 | 312 | 69 | 169 | 123 | 21 | #551 | 153 | 72 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 564 | 1163 | 608 | 305 | 1751 | 688 | 479 | 1172 | 604 | 392 | 2102 | 822 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.97 | 0.45 | 0.56 | 0.47 | 0.35 | 0.51 | 0.18 | 0.16 | 0.83 | 0.22 | 0.38 |

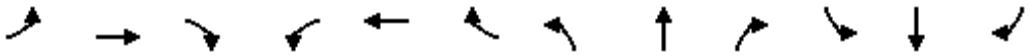
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues

## 1: West Ln & Eight Mile Rd

05/28/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 234 | 687 | 420 | 247 | 712 | 23 | 367 | 597 | 119 | 16 | 514 | 123 |
| v/c Ratio | 0.82 | 0.78 | 0.59 | 0.82 | 0.78 | 0.04 | 0.65 | 0.49 | 0.19 | 0.16 | 0.86 | 0.29 |
| Control Delay | 61.1 | 39.0 | 7.0 | 59.4 | 38.2 | 0.1 | 41.1 | 26.0 | 3.7 | 46.8 | 53.8 | 2.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 61.1 | 39.0 | 7.0 | 59.4 | 38.2 | 0.1 | 41.1 | 26.0 | 3.7 | 46.8 | 53.8 | 2.5 |
| Queue Length 50th (ft) | 133 | 193 | 0 | 140 | 198 | 0 | 104 | 133 | 0 | 9 | 155 | 0 |
| Queue Length 95th (ft) | #271 | 273 | 75 | #280 | 281 | 0 | 150 | 215 | 28 | 31 | #265 | 8 |
| Internal Link Dist (ft) | | 3966 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 297 | 952 | 732 | 317 | 992 | 584 | 885 | 1327 | 675 | 99 | 595 | 429 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.79 | 0.72 | 0.57 | 0.78 | 0.72 | 0.04 | 0.41 | 0.45 | 0.18 | 0.16 | 0.86 | 0.29 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 6: West Ln & Knickerbocker Dr

05/28/2024

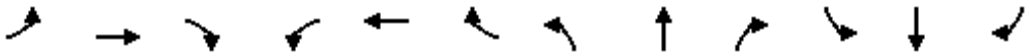
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 93 | 75 | 124 | 140 | 66 | 1794 | 86 | 133 | 1374 |
| v/c Ratio | 0.68 | 0.37 | 0.47 | 0.46 | 0.42 | 0.80 | 0.11 | 0.59 | 0.54 |
| Control Delay | 77.4 | 40.3 | 54.0 | 29.3 | 60.1 | 31.7 | 0.7 | 59.1 | 22.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 77.4 | 40.3 | 54.0 | 29.3 | 60.1 | 31.7 | 0.7 | 59.1 | 22.7 |
| Queue Length 50th (ft) | 60 | 35 | 78 | 52 | 42 | 342 | 0 | 83 | 213 |
| Queue Length 95th (ft) | #218 | 89 | 185 | 114 | 114 | #828 | 3 | 194 | 483 |
| Internal Link Dist (ft) | | 509 | | 757 | | 551 | | | 600 |
| Turn Bay Length (ft) | 140 | | 70 | | 275 | | 130 | 260 | |
| Base Capacity (vph) | 137 | 291 | 427 | 570 | 427 | 2358 | 788 | 427 | 2549 |
| 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 | 0.68 | 0.26 | 0.29 | 0.25 | 0.15 | 0.76 | 0.11 | 0.31 | 0.54 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 7: West Ln & Hammer Ln

05/28/2024



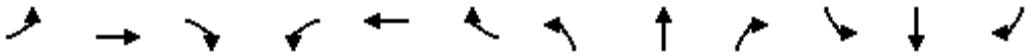
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 597 | 1309 | 195 | 426 | 1153 | 176 | 498 | 1326 | 270 | 240 | 996 | 322 |
| v/c Ratio | 0.87 | 0.71 | 0.34 | 0.84 | 0.76 | 0.36 | 0.88 | 0.66 | 0.40 | 0.69 | 0.63 | 0.52 |
| Control Delay | 70.6 | 48.8 | 8.1 | 75.9 | 55.7 | 11.8 | 76.8 | 45.3 | 5.9 | 75.3 | 50.1 | 7.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 70.6 | 48.8 | 8.1 | 75.9 | 55.7 | 11.8 | 76.8 | 45.3 | 5.9 | 75.3 | 50.1 | 7.3 |
| Queue Length 50th (ft) | 285 | 322 | 6 | 206 | 300 | 14 | 245 | 331 | 0 | 116 | 253 | 0 |
| Queue Length 95th (ft) | #426 | 404 | 71 | #327 | 378 | 83 | #403 | 392 | 67 | 179 | 302 | 79 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 777 | 2071 | 625 | 558 | 1663 | 519 | 582 | 2448 | 762 | 412 | 2131 | 727 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.77 | 0.63 | 0.31 | 0.76 | 0.69 | 0.34 | 0.86 | 0.54 | 0.35 | 0.58 | 0.47 | 0.44 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Queues
## 12: Holman Rd & Morada Ln

05/28/2024



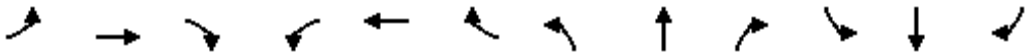
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 190 | 717 | 148 | 148 | 977 | 266 | 193 | 351 | 184 | 175 | 255 | 172 |
| v/c Ratio | 0.49 | 0.67 | 0.27 | 0.59 | 0.58 | 0.41 | 0.49 | 0.57 | 0.44 | 0.64 | 0.23 | 0.37 |
| Control Delay | 49.4 | 36.7 | 11.1 | 53.6 | 31.1 | 10.2 | 49.4 | 43.0 | 9.3 | 53.6 | 33.5 | 7.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.4 | 36.7 | 11.1 | 53.6 | 31.1 | 10.2 | 49.4 | 43.0 | 9.3 | 53.6 | 33.5 | 7.6 |
| Queue Length 50th (ft) | 55 | 195 | 13 | 83 | 175 | 25 | 56 | 103 | 0 | 98 | 46 | 0 |
| Queue Length 95th (ft) | 126 | 393 | 78 | 199 | 327 | 117 | 127 | 195 | 62 | 229 | 89 | 56 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 1064 | 1106 | 568 | 457 | 1685 | 653 | 887 | 1755 | 867 | 457 | 2522 | 862 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.18 | 0.65 | 0.26 | 0.32 | 0.58 | 0.41 | 0.22 | 0.20 | 0.21 | 0.38 | 0.10 | 0.20 |

Intersection Summary

# Appendix O: Cumulative Plus Project (Mitigated) Queue Worksheets

# Lanes, Volumes, Timings
## 1: West Ln & Eight Mile Rd

05/29/2024



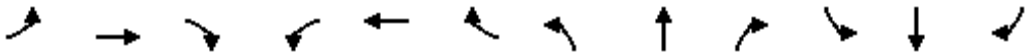
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 221 | 1045 | 520 | 360 | 1126 | 53 | 431 | 652 | 324 | 59 | 620 | 194 |
| v/c Ratio | 0.81 | 0.73 | 0.82 | 0.81 | 0.85 | 0.10 | 0.84 | 0.60 | 0.46 | 0.44 | 0.84 | 0.40 |
| Control Delay | 63.6 | 34.9 | 27.3 | 56.6 | 42.0 | 0.3 | 56.3 | 32.7 | 5.6 | 54.8 | 49.0 | 7.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 63.6 | 34.9 | 27.3 | 56.6 | 42.0 | 0.3 | 56.3 | 32.7 | 5.6 | 54.8 | 49.0 | 7.5 |
| Queue Length 50th (ft) | 137 | 217 | 155 | 116 | 250 | 0 | 139 | 193 | 0 | 36 | 200 | 0 |
| Queue Length 95th (ft) | #253 | 267 | #333 | #185 | 305 | 0 | #216 | 255 | 64 | 78 | #286 | 55 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 293 | 1526 | 660 | 462 | 1369 | 569 | 532 | 1087 | 704 | 146 | 769 | 497 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.75 | 0.68 | 0.79 | 0.78 | 0.82 | 0.09 | 0.81 | 0.60 | 0.46 | 0.40 | 0.81 | 0.39 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
7: West Ln & Hammer Ln

05/29/2024



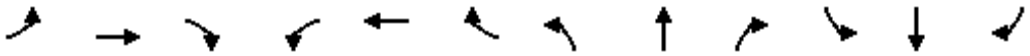
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 476 | 1200 | 229 | 600 | 1035 | 251 | 292 | 943 | 211 | 371 | 1693 | 438 |
| v/c Ratio | 0.74 | 0.90 | 0.42 | 0.94 | 0.51 | 0.40 | 0.86 | 0.48 | 0.34 | 0.95 | 0.83 | 0.58 |
| Control Delay | 73.8 | 66.9 | 13.6 | 86.6 | 45.2 | 11.5 | 93.4 | 45.8 | 6.3 | 102.9 | 53.9 | 10.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 73.8 | 66.9 | 13.6 | 86.6 | 45.2 | 11.5 | 93.4 | 45.8 | 6.3 | 102.9 | 53.9 | 10.3 |
| Queue Length 50th (ft) | 173 | 447 | 36 | 322 | 255 | 35 | 157 | 234 | 0 | 202 | 478 | 45 |
| Queue Length 95th (ft) | 209 | 509 | 115 | #436 | 304 | 117 | #236 | 270 | 62 | #308 | 526 | 155 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 948 | 1352 | 547 | 652 | 2041 | 633 | 348 | 1988 | 629 | 391 | 2070 | 758 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.50 | 0.89 | 0.42 | 0.92 | 0.51 | 0.40 | 0.84 | 0.47 | 0.34 | 0.95 | 0.82 | 0.58 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
12: Holman Rd & Morada Ln

05/29/2024



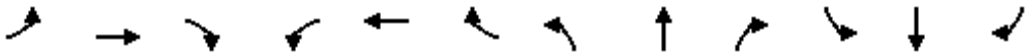
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| v/c Ratio | 0.68 | 0.99 | 0.40 | 0.57 | 0.69 | 0.34 | 0.77 | 0.33 | 0.25 | 0.88 | 0.68 | 0.65 |
| Control Delay | 63.0 | 56.8 | 14.3 | 64.2 | 36.6 | 10.4 | 72.3 | 45.4 | 3.5 | 80.8 | 52.0 | 19.0 |
| Queue Delay | 0.0 | 10.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 63.0 | 67.7 | 14.3 | 64.2 | 36.6 | 10.4 | 72.3 | 45.4 | 3.5 | 80.8 | 52.0 | 19.0 |
| Queue Length 50th (ft) | 117 | 633 | 73 | 73 | 344 | 33 | 107 | 82 | 0 | 140 | 192 | 61 |
| Queue Length 95th (ft) | 188 | #1053 | 191 | 127 | 557 | 120 | #208 | 122 | 18 | #280 | 254 | 163 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 571 | 1542 | 766 | 407 | 1429 | 730 | 353 | 991 | 537 | 380 | 1020 | 620 |
| Starvation Cap Reductn | 0 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.51 | 1.03 | 0.40 | 0.44 | 0.69 | 0.34 | 0.74 | 0.22 | 0.19 | 0.88 | 0.46 | 0.53 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# Lanes, Volumes, Timings
## 1: West Ln & Eight Mile Rd

05/29/2024



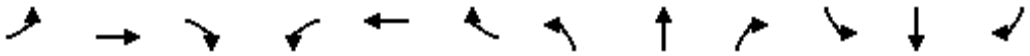
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 242 | 978 | 498 | 466 | 1223 | 23 | 404 | 705 | 264 | 18 | 664 | 128 |
| v/c Ratio | 0.89 | 0.66 | 0.81 | 0.84 | 0.81 | 0.04 | 0.90 | 0.58 | 0.37 | 0.17 | 0.89 | 0.27 |
| Control Delay | 78.0 | 35.9 | 31.6 | 58.6 | 39.6 | 0.1 | 70.4 | 32.8 | 5.5 | 52.9 | 57.4 | 3.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.0 | 35.9 | 31.6 | 58.6 | 39.6 | 0.1 | 70.4 | 32.8 | 5.5 | 52.9 | 57.4 | 3.2 |
| Queue Length 50th (ft) | 170 | 218 | 191 | 165 | 286 | 0 | 147 | 199 | 0 | 12 | 241 | 0 |
| Queue Length 95th (ft) | #313 | 267 | #348 | #243 | 343 | 0 | #239 | 307 | 61 | 36 | #345 | 18 |
| Internal Link Dist (ft) | | 546 | | | 4053 | | | 2672 | | | 2544 | |
| Turn Bay Length (ft) | 240 | | 240 | 165 | | 165 | 375 | | 375 | 410 | | 410 |
| Base Capacity (vph) | 282 | 1573 | 638 | 579 | 1620 | 626 | 450 | 1219 | 711 | 116 | 762 | 481 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 0.62 | 0.78 | 0.80 | 0.75 | 0.04 | 0.90 | 0.58 | 0.37 | 0.16 | 0.87 | 0.27 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
7: West Ln & Hammer Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 673 | 1529 | 203 | 444 | 1202 | 273 | 519 | 1732 | 281 | 302 | 1235 | 368 |
| v/c Ratio | 0.82 | 1.05 | 0.38 | 0.88 | 0.70 | 0.48 | 1.04 | 0.82 | 0.40 | 0.84 | 0.67 | 0.55 |
| Control Delay | 72.7 | 91.6 | 18.5 | 85.6 | 55.1 | 16.8 | 113.4 | 52.6 | 5.6 | 90.3 | 51.6 | 10.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 72.7 | 91.6 | 18.5 | 85.6 | 55.1 | 16.8 | 113.4 | 52.6 | 5.6 | 90.3 | 51.6 | 10.6 |
| Queue Length 50th (ft) | 243 | ~646 | 56 | 237 | 333 | 58 | ~304 | 484 | 0 | 162 | 330 | 36 |
| Queue Length 95th (ft) | 287 | #743 | 133 | #323 | 384 | 154 | #424 | 530 | 68 | #236 | 372 | 135 |
| Internal Link Dist (ft) | | 1522 | | | 1363 | | | 1435 | | | 492 | |
| Turn Bay Length (ft) | 265 | | 265 | 340 | | 190 | 390 | | 390 | 390 | | 330 |
| Base Capacity (vph) | 919 | 1454 | 536 | 523 | 1719 | 564 | 501 | 2158 | 711 | 370 | 1914 | 685 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.73 | 1.05 | 0.38 | 0.85 | 0.70 | 0.48 | 1.04 | 0.80 | 0.40 | 0.82 | 0.65 | 0.54 |

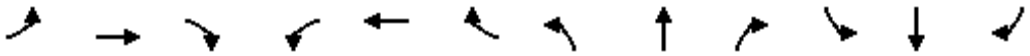
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
12: Holman Rd & Morada Ln

05/29/2024



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| v/c Ratio | 0.63 | 0.63 | 0.22 | 0.51 | 0.92 | 0.36 | 0.68 | 0.57 | 0.44 | 0.57 | 0.42 | 0.46 |
| Control Delay | 59.2 | 28.2 | 6.7 | 56.2 | 41.7 | 12.0 | 60.5 | 44.2 | 8.2 | 57.4 | 41.6 | 10.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.2 | 28.2 | 6.7 | 56.2 | 41.7 | 12.0 | 60.5 | 44.2 | 8.2 | 57.4 | 41.6 | 10.3 |
| Queue Length 50th (ft) | 71 | 266 | 10 | 53 | 468 | 49 | 78 | 124 | 0 | 61 | 87 | 8 |
| Queue Length 95th (ft) | #142 | 473 | 65 | 103 | #864 | 150 | #161 | 168 | 55 | 118 | 124 | 64 |
| Internal Link Dist (ft) | | 631 | | | 1519 | | | 1612 | | | 1594 | |
| Turn Bay Length (ft) | 250 | | 225 | 300 | | 215 | 315 | | 215 | 300 | | 225 |
| Base Capacity (vph) | 346 | 1551 | 764 | 346 | 1526 | 760 | 346 | 1277 | 687 | 346 | 1277 | 680 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.60 | 0.63 | 0.22 | 0.45 | 0.92 | 0.36 | 0.65 | 0.28 | 0.28 | 0.52 | 0.20 | 0.29 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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# Appendix P: Existing Plus Project Conditions (COA) LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/28/2024

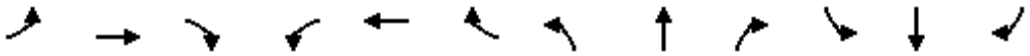
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 109 | 419 | 415 | 156 | 379 | 7 | 300 | 426 | 85 | 36 | 509 | 151 |
| Future Volume (veh/h) | 109 | 419 | 415 | 156 | 379 | 7 | 300 | 426 | 85 | 36 | 509 | 151 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 116 | 446 | 441 | 166 | 403 | 7 | 319 | 453 | 90 | 38 | 541 | 161 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 147 | 578 | 490 | 202 | 623 | 11 | 399 | 958 | 189 | 58 | 654 | 194 |
| Arrive On Green | 0.08 | 0.31 | 0.31 | 0.11 | 0.34 | 0.34 | 0.12 | 0.33 | 0.33 | 0.03 | 0.24 | 0.24 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1833 | 32 | 3456 | 2946 | 581 | 1781 | 2702 | 801 |
| Grp Volume(v), veh/h | 116 | 446 | 441 | 166 | 0 | 410 | 319 | 272 | 271 | 38 | 355 | 347 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1865 | 1728 | 1777 | 1750 | 1781 | 1777 | 1726 |
| Q Serve(g_s), s | 6.4 | 21.6 | 26.6 | 9.1 | 0.0 | 18.6 | 9.0 | 12.2 | 12.4 | 2.1 | 18.9 | 19.1 |
| Cycle Q Clear(g_c), s | 6.4 | 21.6 | 26.6 | 9.1 | 0.0 | 18.6 | 9.0 | 12.2 | 12.4 | 2.1 | 18.9 | 19.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.33 | 1.00 | | 0.46 |
| Lane Grp Cap(c), veh/h | 147 | 578 | 490 | 202 | 0 | 634 | 399 | 578 | 569 | 58 | 430 | 418 |
| V/C Ratio(X) | 0.79 | 0.77 | 0.90 | 0.82 | 0.00 | 0.65 | 0.80 | 0.47 | 0.48 | 0.65 | 0.82 | 0.83 |
| Avail Cap(c_a), veh/h | 445 | 654 | 554 | 445 | 0 | 652 | 587 | 728 | 717 | 125 | 550 | 535 |
| 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 | 45.0 | 31.4 | 33.1 | 43.4 | 0.0 | 28.0 | 43.1 | 26.9 | 27.0 | 47.9 | 35.9 | 36.0 |
| Incr Delay (d2), s/veh | 8.9 | 5.0 | 16.4 | 8.1 | 0.0 | 2.1 | 4.9 | 0.6 | 0.6 | 11.8 | 7.9 | 8.5 |
| 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 | 3.1 | 10.0 | 11.7 | 4.3 | 0.0 | 8.2 | 3.9 | 4.9 | 4.9 | 1.1 | 9.0 | 8.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 54.0 | 36.4 | 49.5 | 51.5 | 0.0 | 30.1 | 48.0 | 27.5 | 27.6 | 59.7 | 43.9 | 44.5 |
| LnGrp LOS | D | D | D | D | A | C | D | C | C | E | D | D |
| Approach Vol, veh/h | | 1003 | | | 576 | | | 862 | | | 740 | |
| Approach Delay, s/veh | | 44.2 | | | 36.3 | | | 35.1 | | | 45.0 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.3 | 36.9 | 16.6 | 30.2 | 13.3 | 40.0 | 8.3 | 38.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 25.0 | 35.0 | 17.0 | 31.0 | 25.0 | 35.0 | 7.0 | 41.0 |
| Max Q Clear Time (g_c+I1), s | 11.1 | 28.6 | 11.0 | 21.1 | 8.4 | 20.6 | 4.1 | 14.4 |
| Green Ext Time (p_c), s | 0.3 | 2.3 | 0.6 | 3.2 | 0.2 | 1.9 | 0.0 | 2.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 40.5 |
| HCM 6th LOS | D |

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 970 | 62 | 64 | 1271 | 123 |
| Future Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 970 | 62 | 64 | 1271 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 5027 | | 1770 | 5006 | |
| Flt Permitted | | 0.41 | 1.00 | | 0.54 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 760 | 1583 | | 1006 | 1563 | 1770 | 5027 | | 1770 | 5006 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 183 | 5 | 158 | 256 | 18 | 16 | 217 | 1102 | 70 | 73 | 1444 | 140 |
| RTOR Reduction (vph) | 0 | 0 | 82 | 0 | 0 | 11 | 0 | 6 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 0 | 188 | 76 | 0 | 274 | 5 | 217 | 1166 | 0 | 73 | 1575 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 34.0 | 34.0 | | 34.0 | 34.0 | 18.6 | 52.9 | | 8.5 | 42.8 | |
| Effective Green, g (s) | | 34.0 | 34.0 | | 34.0 | 34.0 | 18.6 | 52.9 | | 8.5 | 42.8 | |
| Actuated g/C Ratio | | 0.31 | 0.31 | | 0.31 | 0.31 | 0.17 | 0.47 | | 0.08 | 0.38 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 231 | 483 | | 307 | 477 | 295 | 2387 | | 135 | 1923 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.23 | | 0.04 | c0.31 | |
| v/s Ratio Perm | | 0.25 | 0.05 | | c0.27 | 0.00 | | | | | | |
| v/c Ratio | | 0.81 | 0.16 | | 0.89 | 0.01 | 0.74 | 0.49 | | 0.54 | 0.82 | |
| Uniform Delay, d1 | | 35.8 | 28.2 | | 37.0 | 27.0 | 44.1 | 20.0 | | 49.6 | 30.8 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 19.3 | 0.2 | | 26.1 | 0.0 | 9.2 | 0.2 | | 4.4 | 2.8 | |
| Delay (s) | | 55.1 | 28.4 | | 63.0 | 27.0 | 53.2 | 20.2 | | 53.9 | 33.7 | |
| Level of Service | | E | C | | E | C | D | C | | D | C | |
| Approach Delay (s) | | 42.9 | | | 61.0 | | | 25.3 | | | 34.6 | |
| Approach LOS | | D | | | E | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 33.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 111.4 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 71.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 6th Signalized Intersection Summary
## 1: West Ln & Eight Mile Rd

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 183 | 413 | 369 | 99 | 423 | 9 | 311 | 550 | 72 | 12 | 494 | 119 |
| Future Volume (veh/h) | 183 | 413 | 369 | 99 | 423 | 9 | 311 | 550 | 72 | 12 | 494 | 119 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.98 | 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 | 189 | 426 | 380 | 102 | 436 | 9 | 321 | 567 | 74 | 12 | 509 | 123 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 229 | 620 | 525 | 131 | 504 | 10 | 414 | 1045 | 136 | 26 | 643 | 155 |
| Arrive On Green | 0.13 | 0.33 | 0.33 | 0.07 | 0.28 | 0.28 | 0.12 | 0.33 | 0.33 | 0.01 | 0.23 | 0.23 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 1781 | 1826 | 38 | 3456 | 3153 | 410 | 1781 | 2841 | 683 |
| Grp Volume(v), veh/h | 189 | 426 | 380 | 102 | 0 | 445 | 321 | 319 | 322 | 12 | 317 | 315 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1870 | 1585 | 1781 | 0 | 1864 | 1728 | 1777 | 1786 | 1781 | 1777 | 1747 |
| Q Serve(g_s), s | 9.1 | 17.4 | 18.6 | 5.0 | 0.0 | 20.1 | 8.0 | 12.9 | 13.0 | 0.6 | 14.9 | 15.0 |
| Cycle Q Clear(g_c), s | 9.1 | 17.4 | 18.6 | 5.0 | 0.0 | 20.1 | 8.0 | 12.9 | 13.0 | 0.6 | 14.9 | 15.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.02 | 1.00 | | 0.23 | 1.00 | | 0.39 |
| Lane Grp Cap(c), veh/h | 229 | 620 | 525 | 131 | 0 | 515 | 414 | 589 | 592 | 26 | 402 | 395 |
| V/C Ratio(X) | 0.82 | 0.69 | 0.72 | 0.78 | 0.00 | 0.86 | 0.78 | 0.54 | 0.54 | 0.47 | 0.79 | 0.80 |
| Avail Cap(c_a), veh/h | 444 | 1016 | 861 | 302 | 0 | 865 | 665 | 805 | 809 | 101 | 563 | 554 |
| 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 | 37.5 | 25.6 | 26.0 | 40.2 | 0.0 | 30.4 | 37.7 | 24.1 | 24.1 | 43.2 | 32.2 | 32.3 |
| Incr Delay (d2), s/veh | 7.3 | 1.4 | 1.9 | 9.4 | 0.0 | 4.9 | 3.2 | 0.8 | 0.8 | 12.6 | 5.0 | 5.4 |
| 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 | 4.2 | 7.3 | 6.6 | 2.4 | 0.0 | 9.0 | 3.3 | 5.0 | 5.1 | 0.3 | 6.8 | 6.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.8 | 26.9 | 27.9 | 49.6 | 0.0 | 35.3 | 40.9 | 24.8 | 24.9 | 55.8 | 37.2 | 37.7 |
| LnGrp LOS | D | C | C | D | A | D | D | C | C | E | D | D |
| Approach Vol, veh/h | | 995 | | | 547 | | | 962 | | | 644 | |
| Approach Delay, s/veh | | 30.7 | | | 38.0 | | | 30.2 | | | 37.8 | |
| Approach LOS | | C | | | D | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 11.5 | 35.3 | 15.6 | 26.0 | 16.4 | 30.4 | 6.3 | 35.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 15.0 | 48.0 | 17.0 | 28.0 | 22.0 | 41.0 | 5.0 | 40.0 |
| Max Q Clear Time (g_c+I1), s | 7.0 | 20.6 | 10.0 | 17.0 | 11.1 | 22.1 | 2.6 | 15.0 |
| Green Ext Time (p_c), s | 0.1 | 3.9 | 0.6 | 3.0 | 0.3 | 2.3 | 0.0 | 3.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 33.3 |
| HCM 6th LOS | C |

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1289 | 134 | 37 | 952 | 70 |
| Future Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1289 | 134 | 37 | 952 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 5001 | | 1770 | 5025 | |
| Flt Permitted | | 0.64 | 1.00 | | 0.65 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1183 | 1583 | | 1207 | 1563 | 1770 | 5001 | | 1770 | 5025 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 124 | 6 | 94 | 135 | 9 | 8 | 156 | 1343 | 140 | 39 | 992 | 73 |
| RTOR Reduction (vph) | 0 | 0 | 63 | 0 | 0 | 6 | 0 | 9 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 31 | 0 | 144 | 2 | 156 | 1474 | 0 | 39 | 1057 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 16.0 | 16.0 | | 16.0 | 16.0 | 12.7 | 37.1 | | 4.4 | 28.8 | |
| Effective Green, g (s) | | 16.0 | 16.0 | | 16.0 | 16.0 | 12.7 | 37.1 | | 4.4 | 28.8 | |
| Actuated g/C Ratio | | 0.22 | 0.22 | | 0.22 | 0.22 | 0.17 | 0.50 | | 0.06 | 0.39 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 257 | 344 | | 262 | 340 | 305 | 2524 | | 105 | 1968 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.29 | | 0.02 | 0.21 | |
| v/s Ratio Perm | | 0.11 | 0.02 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.51 | 0.09 | | 0.55 | 0.01 | 0.51 | 0.58 | | 0.37 | 0.54 | |
| Uniform Delay, d1 | | 25.3 | 22.9 | | 25.5 | 22.5 | 27.6 | 12.8 | | 33.2 | 17.2 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.6 | 0.1 | | 2.4 | 0.0 | 1.4 | 0.3 | | 2.2 | 0.3 | |
| Delay (s) | | 26.8 | 23.0 | | 27.9 | 22.5 | 29.0 | 13.1 | | 35.4 | 17.5 | |
| Level of Service | | C | C | | C | C | C | B | | D | B | |
| Approach Delay (s) | | 25.2 | | | 27.6 | | | 14.6 | | | 18.1 | |
| Approach LOS | | C | | | C | | | B | | | B | |

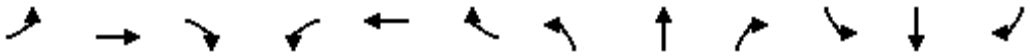
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 17.3 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.59 | | |
| Actuated Cycle Length (s) | 73.5 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 59.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# Appendix Q: Background Plus Project Conditions (COA) LOS Worksheets

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024



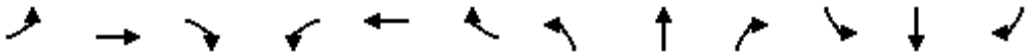
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 1145 | 62 | 64 | 1554 | 123 |
| Future Volume (vph) | 161 | 4 | 139 | 225 | 16 | 14 | 191 | 1145 | 62 | 64 | 1554 | 123 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1776 | 1583 | | 1780 | 1563 | 1770 | 5036 | | 1770 | 5019 | |
| Flt Permitted | | 0.40 | 1.00 | | 0.53 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 746 | 1583 | | 996 | 1563 | 1770 | 5036 | | 1770 | 5019 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 183 | 5 | 158 | 256 | 18 | 16 | 217 | 1301 | 70 | 73 | 1766 | 140 |
| RTOR Reduction (vph) | 0 | 0 | 75 | 0 | 0 | 11 | 0 | 4 | 0 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 0 | 188 | 83 | 0 | 274 | 5 | 217 | 1367 | 0 | 73 | 1899 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 6 | | | 2 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 34.1 | 34.1 | | 34.1 | 34.1 | 18.7 | 55.3 | | 8.7 | 45.3 | |
| Effective Green, g (s) | | 34.1 | 34.1 | | 34.1 | 34.1 | 18.7 | 55.3 | | 8.7 | 45.3 | |
| Actuated g/C Ratio | | 0.30 | 0.30 | | 0.30 | 0.30 | 0.16 | 0.48 | | 0.08 | 0.40 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 222 | 473 | | 297 | 467 | 290 | 2440 | | 134 | 1992 | |
| v/s Ratio Prot | | | | | | | c0.12 | 0.27 | | 0.04 | c0.38 | |
| v/s Ratio Perm | | 0.25 | 0.05 | | c0.28 | 0.00 | | | | | | |
| v/c Ratio | | 0.85 | 0.18 | | 0.92 | 0.01 | 0.75 | 0.56 | | 0.54 | 0.95 | |
| Uniform Delay, d1 | | 37.5 | 29.6 | | 38.7 | 28.1 | 45.5 | 20.8 | | 50.8 | 33.4 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 24.6 | 0.2 | | 32.6 | 0.0 | 10.1 | 0.3 | | 4.5 | 11.1 | |
| Delay (s) | | 62.1 | 29.8 | | 71.3 | 28.1 | 55.6 | 21.1 | | 55.3 | 44.5 | |
| Level of Service | | E | C | | E | C | E | C | | E | D | |
| Approach Delay (s) | | 47.4 | | | 68.9 | | | 25.8 | | | 44.9 | |
| Approach LOS | | D | | | E | | | C | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 39.5 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.90 | | |
| Actuated Cycle Length (s) | 114.1 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 76.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis
## 5: West Ln & W Ln Frontage Rd

05/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1573 | 134 | 37 | 1227 | 70 |
| Future Volume (vph) | 119 | 6 | 90 | 130 | 9 | 8 | 150 | 1573 | 134 | 37 | 1227 | 70 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.91 | | 1.00 | 0.91 | |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.95 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1778 | 1583 | | 1779 | 1563 | 1770 | 5014 | | 1770 | 5038 | |
| Flt Permitted | | 0.60 | 1.00 | | 0.64 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1126 | 1583 | | 1193 | 1563 | 1770 | 5014 | | 1770 | 5038 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 124 | 6 | 94 | 135 | 9 | 8 | 156 | 1639 | 140 | 39 | 1278 | 73 |
| RTOR Reduction (vph) | 0 | 0 | 67 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 0 | 130 | 27 | 0 | 144 | 2 | 156 | 1773 | 0 | 39 | 1346 | 0 |
| Confl. Peds. (#/hr) | | | | | | 1 | | | 3 | | | 1 |
| Confl. Bikes (#/hr) | | | | | | | | | 2 | | | 1 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | | Prot | NA | |
| Protected Phases | | 4 | | | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 4 | | 4 | | | | | | |
| Actuated Green, G (s) | | 16.9 | 16.9 | | 16.9 | 16.9 | 13.4 | 46.4 | | 4.5 | 37.5 | |
| Effective Green, g (s) | | 16.9 | 16.9 | | 16.9 | 16.9 | 13.4 | 46.4 | | 4.5 | 37.5 | |
| Actuated g/C Ratio | | 0.20 | 0.20 | | 0.20 | 0.20 | 0.16 | 0.55 | | 0.05 | 0.45 | |
| Clearance Time (s) | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 6.0 | | 5.0 | 6.0 | |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 227 | 319 | | 240 | 315 | 283 | 2776 | | 95 | 2254 | |
| v/s Ratio Prot | | | | | | | c0.09 | c0.35 | | 0.02 | 0.27 | |
| v/s Ratio Perm | | 0.12 | 0.02 | | c0.12 | 0.00 | | | | | | |
| v/c Ratio | | 0.57 | 0.08 | | 0.60 | 0.01 | 0.55 | 0.64 | | 0.41 | 0.60 | |
| Uniform Delay, d1 | | 30.2 | 27.2 | | 30.4 | 26.7 | 32.4 | 12.9 | | 38.4 | 17.5 | |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 3.5 | 0.1 | | 4.0 | 0.0 | 2.3 | 0.5 | | 2.9 | 0.4 | |
| Delay (s) | | 33.7 | 27.3 | | 34.4 | 26.7 | 34.7 | 13.4 | | 41.2 | 17.9 | |
| Level of Service | | C | C | | C | C | C | B | | D | B | |
| Approach Delay (s) | | 31.0 | | | 34.0 | | | 15.1 | | | 18.5 | |
| Approach LOS | | C | | | C | | | B | | | B | |

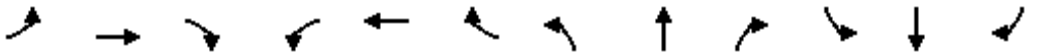
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 18.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 83.8 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 64.9% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# Appendix R: Cumulative Plus Project Conditions (COA) LOS Worksheets

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 270 | 1418 | 287 | 167 | 921 | 229 | 243 | 204 | 95 | 312 | 441 | 304 |
| Future Volume (veh/h) | 270 | 1418 | 287 | 167 | 921 | 229 | 243 | 204 | 95 | 312 | 441 | 304 |
| 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 | | 0.98 | 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 | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 355 | 1525 | 667 | 238 | 1405 | 614 | 314 | 786 | 345 | 377 | 851 | 373 |
| Arrive On Green | 0.10 | 0.43 | 0.43 | 0.07 | 0.40 | 0.40 | 0.09 | 0.22 | 0.22 | 0.11 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3456 | 3554 | 1555 | 3456 | 3554 | 1552 | 3456 | 3554 | 1561 | 3456 | 3554 | 1557 |
| Grp Volume(v), veh/h | 290 | 1525 | 309 | 180 | 990 | 246 | 261 | 219 | 102 | 335 | 474 | 327 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1777 | 1555 | 1728 | 1777 | 1552 | 1728 | 1777 | 1561 | 1728 | 1777 | 1557 |
| Q Serve(g_s), s | 10.5 | 55.0 | 18.2 | 6.6 | 29.9 | 14.6 | 9.5 | 6.6 | 7.0 | 12.3 | 15.0 | 25.9 |
| Cycle Q Clear(g_c), s | 10.5 | 55.0 | 18.2 | 6.6 | 29.9 | 14.6 | 9.5 | 6.6 | 7.0 | 12.3 | 15.0 | 25.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 355 | 1525 | 667 | 238 | 1405 | 614 | 314 | 786 | 345 | 377 | 851 | 373 |
| V/C Ratio(X) | 0.82 | 1.00 | 0.46 | 0.76 | 0.70 | 0.40 | 0.83 | 0.28 | 0.30 | 0.89 | 0.56 | 0.88 |
| Avail Cap(c_a), veh/h | 566 | 1525 | 667 | 404 | 1405 | 614 | 351 | 943 | 414 | 377 | 970 | 425 |
| 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 | 56.3 | 36.6 | 26.1 | 58.6 | 32.5 | 27.8 | 57.3 | 41.4 | 41.6 | 56.3 | 42.8 | 46.9 |
| Incr Delay (d2), s/veh | 5.0 | 23.0 | 0.5 | 4.9 | 1.6 | 0.4 | 14.2 | 0.2 | 0.5 | 21.7 | 0.6 | 16.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.7 | 27.3 | 6.6 | 3.0 | 12.8 | 5.4 | 4.7 | 2.8 | 2.7 | 6.4 | 6.5 | 11.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 61.4 | 59.6 | 26.6 | 63.5 | 34.1 | 28.3 | 71.5 | 41.6 | 42.1 | 78.0 | 43.3 | 63.8 |
| LnGrp LOS | E | F | C | E | C | C | E | D | D | E | D | E |
| Approach Vol, veh/h | | 2124 | | | 1416 | | | 582 | | | 1136 | |
| Approach Delay, s/veh | | 55.1 | | | 36.8 | | | 55.1 | | | 59.4 | |
| Approach LOS | | E | | | D | | | E | | | E | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 19.0 | 34.3 | 13.8 | 61.0 | 16.7 | 36.7 | 18.2 | 56.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 14.0 | 34.0 | 15.0 | 55.0 | 13.0 | 35.0 | 21.0 | 49.0 |
| Max Q Clear Time (g_c+I1), s | 14.3 | 9.0 | 8.6 | 57.0 | 11.5 | 27.9 | 12.5 | 31.9 |
| Green Ext Time (p_c), s | 0.0 | 1.5 | 0.3 | 0.0 | 0.1 | 2.4 | 0.6 | 7.1 |

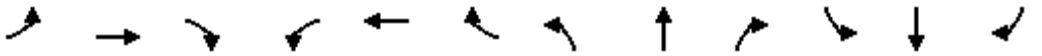
| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 51.1 |
| HCM 6th LOS | D |

**Notes**

User approved pedestrian interval to be less than phase max green.

# HCM 6th Signalized Intersection Summary
## 12: Holman Rd & Morada Ln

05/29/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 199 | 937 | 162 | 148 | 1349 | 262 | 216 | 346 | 185 | 173 | 251 | 188 |
| Future Volume (veh/h) | 199 | 937 | 162 | 148 | 1349 | 262 | 216 | 346 | 185 | 173 | 251 | 188 |
| 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 | | 1.00 | 1.00 | | 0.99 | 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 | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 278 | 1646 | 724 | 224 | 1590 | 708 | 296 | 627 | 276 | 251 | 581 | 259 |
| Arrive On Green | 0.08 | 0.46 | 0.46 | 0.06 | 0.45 | 0.45 | 0.09 | 0.18 | 0.18 | 0.07 | 0.16 | 0.16 |
| Sat Flow, veh/h | 3456 | 3554 | 1563 | 3456 | 3554 | 1582 | 3456 | 3554 | 1562 | 3456 | 3554 | 1582 |
| Grp Volume(v), veh/h | 207 | 976 | 169 | 154 | 1405 | 273 | 225 | 360 | 193 | 180 | 261 | 196 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1777 | 1563 | 1728 | 1777 | 1582 | 1728 | 1777 | 1562 | 1728 | 1777 | 1582 |
| Q Serve(g_s), s | 5.8 | 20.1 | 6.4 | 4.3 | 35.7 | 11.4 | 6.3 | 9.2 | 11.5 | 5.0 | 6.5 | 11.7 |
| Cycle Q Clear(g_c), s | 5.8 | 20.1 | 6.4 | 4.3 | 35.7 | 11.4 | 6.3 | 9.2 | 11.5 | 5.0 | 6.5 | 11.7 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 278 | 1646 | 724 | 224 | 1590 | 708 | 296 | 627 | 276 | 251 | 581 | 259 |
| V/C Ratio(X) | 0.74 | 0.59 | 0.23 | 0.69 | 0.88 | 0.39 | 0.76 | 0.57 | 0.70 | 0.72 | 0.45 | 0.76 |
| Avail Cap(c_a), veh/h | 385 | 1692 | 744 | 385 | 1692 | 753 | 385 | 1404 | 617 | 385 | 1404 | 625 |
| 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 | 44.4 | 19.6 | 15.9 | 45.2 | 24.9 | 18.2 | 44.1 | 37.2 | 38.2 | 44.8 | 37.3 | 39.4 |
| Incr Delay (d2), s/veh | 5.0 | 0.5 | 0.2 | 3.8 | 5.7 | 0.3 | 6.3 | 0.8 | 3.2 | 3.8 | 0.5 | 4.5 |
| 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 | 2.6 | 7.6 | 2.2 | 1.9 | 15.0 | 4.0 | 2.8 | 3.9 | 4.5 | 2.2 | 2.8 | 4.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 49.3 | 20.1 | 16.1 | 48.9 | 30.6 | 18.6 | 50.5 | 38.1 | 41.4 | 48.6 | 37.8 | 43.9 |
| LnGrp LOS | D | C | B | D | C | B | D | D | D | D | D | D |
| Approach Vol, veh/h | | 1352 | | | 1832 | | | 778 | | | 637 | |
| Approach Delay, s/veh | | 24.1 | | | 30.4 | | | 42.5 | | | 42.7 | |
| Approach LOS | | C | | | C | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.2 | 23.4 | 11.4 | 51.7 | 13.5 | 22.1 | 12.9 | 50.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 |
| Max Green Setting (Gmax), s | 11.0 | 39.0 | 11.0 | 47.0 | 11.0 | 39.0 | 11.0 | 47.0 |
| Max Q Clear Time (g_c+I1), s | 7.0 | 13.5 | 6.3 | 22.1 | 8.3 | 13.7 | 7.8 | 37.7 |
| Green Ext Time (p_c), s | 0.2 | 2.8 | 0.2 | 7.5 | 0.2 | 2.1 | 0.2 | 6.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 32.3 |
| HCM 6th LOS | C |

**Notes**

User approved pedestrian interval to be less than phase max green.

# Appendix F: Water Supply Assessment

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ATTACHMENT E

FINAL REPORT | NOVEMBER 2024

# Bear Creek South Residential Project
# Water Supply Assessment

**PREPARED FOR**

City of Stockton

CITY OF STOCKTON

# Bear Creek South Residential Project
# Water Supply Assessment

**Prepared for**

## City of Stockton

**Project No. 129-60-24-60**

Prepared by: Whitney Jones, PE — November 20, 2024 (Date)

QA/QC Review: Elizabeth T. Drayer, PE — November 20, 2024 (Date)

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AF | Acre-Feet |
| AFY | Acre-Feet Per Year |
| Cal Water | California Water Service |
| City | City of Stockton |
| COSMUD | City of Stockton Municipal Utilities Department |
| Delta | Sacramento-San Joaquin Delta |
| DJWWTP | Dr. Joe Waidhofer Water Treatment Plant |
| DU | Dwelling Unit |
| DWR | California Department of Water Resources |
| DWTP | Delta Water Treatment Plant |
| EIR | Environmental Impact Report |
| ETo | Evapotranspiration |
| °F | Fahrenheit |
| gpd | Gallons Per Day |
| GPU | General Plan Update |
| GSP | Groundwater Sustainability Plan |
| GWA | Eastern San Joaquin Groundwater Authority |
| LDF | Low Density Residential |
| mgd | Million Gallons Per Day |
| Proposed Project | Bear Creek South Residential Project |
| SB | Senate Bill |
| SEWD | Stockton East Water District |
| sf | Square Feet |
| SGMA | Sustainable Groundwater Management Act |
| SMC | Stockton Municipal Code |
| SOI | Sphere of Influence |
| SOI/MSR | City of Stockton Sphere of Influence Plan/Municipal Service Review |
| State Water Board | State Water Resources Control Board |
| USBR | United States Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| Water Code | California Water Code |
| WID | Woodbridge Irrigation District |
| WSA | Water Supply Assessment |
| WSCP | Water Shortage Contingency Plan |

# EXECUTIVE SUMMARY

## Purpose of Water Supply Assessment

The purpose of this Water Supply Assessment (WSA) is to perform the evaluation required by California Water Code Sections 10910 through 10915, as established by Senate Bill (SB) 610, and verification of sufficient water supply, as established by SB 221, in connection with the proposed Bear Creek South Residential Project (Proposed Project). The Project Site consists of 530.18 acres, which includes a development area of 503.89 acres and a non-development area of 26.29 acres. The Project Site is located in the northern portion of the City of Stockton Metropolitan Area, within the unincorporated area of San Joaquin County. The Project Site is adjacent to the City of Stockton's northern city limits, within the City of Stockton (City) Sphere of Influence (SOI), and within the City of Stockton Urban Services Boundary. The Project Site would be annexed into the City and the Proposed Project would receive potable water supply from the City of Stockton Municipal Utilities Department (COSMUD).

This WSA evaluates the adequacy and sufficiency of the COSMUD total projected water supplies, including existing water supplies and future planned water supplies, to meet the existing and projected future water demands, including those future water demands associated with the Proposed Project, under all hydrologic conditions (normal years, single dry years, and multiple dry years).

## Proposed Project Overview

The Project Site is immediately northeast of the intersection of West Lane and Morada Lane and is bounded on the north by Bear Creek, on the west by West Lane (an existing regional arterial), on the south by Morada Lane, and on the east by the Union Pacific Railroad right-of-way. The Proposed Project will include development of up to 2,241 residential units, five parks, an open space area along Bear Creek and public infrastructure.

With its 2,241 dwelling units, the Proposed Project meets the definition of a "Project" per California Water Code Sections 10910 through 10915, as established by SB 610 in 2001, thus requiring the preparation of this WSA.

## Potable and Recycled Water Demands and Supply Availability

Projected potable demands for buildout of the Proposed Project total approximately 717 acre-feet per year (AFY). No recycled water demand is expected for the Proposed Project. The demands associated with the Proposed Project were not included in the City's 2020 Urban Water Management Plan (UWMP).

It is anticipated that potable water demands for the Proposed Project, if approved by the City, would be served by the COSMUD existing and future water supplies. The inclusion of existing and planned future water supplies is specifically allowed by the California Water Code:

> *California Water Code Section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*

Pursuant to California Water Code Section 10910(4) and based on the technical analyses described in this WSA, this WSA demonstrates that the COSMUD existing and additional planned future water supplies are

sufficient to meet the COSMUD existing water demands, including those future water demands associated with the Proposed Project.

## Determination of Water Supply Sufficiency

As described in Section 7, this WSA demonstrates water supply sufficiency per the requirements of SB 610. Water demand within the COSMUD water service area is not expected to exceed the COSMUD water supplies at buildout under any hydrologic condition through 2045. To remain conservative in planning, the City's 2020 UWMP assumes no reduction in water demand during dry years. However, water conservation and demand reduction methods detailed in the adopted Water Shortage Contingency Plan, included in Appendix I of the City's 2020 UWMP, can reduce demands by up to and greater than 50 percent under water supply shortage conditions and other emergencies.

Section 8 of this WSA also provides written verification of supply sufficiency per the requirements of SB 221 by demonstrating that water supplies available during normal, single dry and multiple dry years within a 20-year projection will meet the projected demand associated with the Proposed Project, in addition to existing and planned future uses, including, but not limited to, agriculture and industrial uses.

# 1.0 INTRODUCTION

## 1.1 Legal Requirement for Water Supply Assessment

California Senate Bill (SB) 610 amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 sought to promote more collaborative planning between local water suppliers and cities and counties. It requires detailed information regarding water supply availability to be provided to the city and county decision-makers prior to approval of specified large development projects. The purpose of this coordination is to ensure that prudent water supply planning has been conducted, and that planned water supplies are adequate to meet existing demands, anticipated demands from approved projects and tentative maps, and the demands of proposed projects.

SB 610 amended California Water Code (Water Code) Sections 10910 through 10915 (inclusive) to require land use lead agencies to:

- Identify any public water purveyor that may supply water for a proposed development project
- Request a Water Supply Assessment (WSA) from the identified water purveyor

The purpose of the WSA is to demonstrate the sufficiency of the purveyor's water supplies to satisfy the water demands of the proposed project, while still meeting the water purveyor's existing and planned future uses. Water Code Sections 10910 through 10915 delineate the specific information that must be included in the WSA.

## 1.2 Need for and Purpose of Water Supply Assessment

The purpose of this WSA is to perform the evaluation required by Water Code Sections 10910 through 10915 in connection with the Bear Creek South Residential Project (Proposed Project). It is not to reserve water, or to function as a "will serve" letter or any other form of commitment to supply water (see Water Code Section 10914). The provision of water service will continue to be undertaken in a manner consistent with applicable policies and procedures, consistent with existing law.

## 1.3 Water Supply Assessment Preparation, Format and Organization

The format of this WSA is intended to follow Water Code Sections 10910 through 10915 to clearly delineate compliance with the specific requirements for a WSA. The WSA includes the following sections:

- Section 1: Introduction
- Section 2: Description of Proposed Project
- Section 3: Required Determinations
- Section 4: City of Stockton Municipal Utilities Department Water Service Area
- Section 5: City of Stockton Municipal Utilities Department Water Demands
- Section 6: City of Stockton Municipal Utilities Department Water Supplies
- Section 7: Determination of Water Supply Sufficiency Based on the Requirements of SB 610
- Section 8: Verification of Sufficient Water Supply Based on the Requirements of SB 221

- Section 9: Water Supply Assessment Approval Process
- Section 10: References

Relevant citations of Water Code Sections 10910 through 10915 are included throughout this WSA in *italics* to demonstrate compliance with the specific requirements of SB 610.

# 2.0 DESCRIPTION OF PROPOSED PROJECT

The Proposed Project location, description, and projected water demands are discussed below. This information is based on the Project Description for the Proposed Project.[1]

## 2.1 Proposed Project Location and Existing Use

The Project Site consists of 530.18 acres, which includes a development area of 503.89 acres and a non-development area of 26.29 acres. The Project Site is located in the northern portion of the City of Stockton Metropolitan Area, within the unincorporated area of San Joaquin County. The Project Site is adjacent to the City of Stockton's northern city limits, within the City of Stockton (City) Sphere of Influence (SOI), and within the City of Stockton Urban Services Boundary. The Project Site would be annexed into the City and the Proposed Project would receive potable water supply from the City of Stockton Municipal Utilities Department (COSMUD).

The Project Site is immediately northeast of the intersection of West Lane and Morada Lane and is bounded on the north by Bear Creek, on the west by West Lane (an existing regional arterial), on the south by Morada Lane, and on the east by the Union Pacific Railroad right-of-way. The location of the Proposed Project is shown on Figure 2-1.

The Project Site is currently predominantly comprised of agricultural uses and related facilities such as associated agricultural equipment and irrigation ditches. The entire Project Site is surrounded by the City of Stockton. Lands to the east and north are designated as Low Density Residential. Lands to the south are designated as Commercial, Low Density Residential, and Medium Density Residential. Lands to the west are designated as Parks and Recreation, and Institutional. A vicinity map for the Proposed Project is presented on Figure 2-2.

## 2.2 Proposed Land Uses and Projected Water Demand

The Proposed Project consists of 2,241 single-family residential units dispersed throughout multiple neighborhoods, linked by a system of parks and open spaces. Approximately 27.7 acres of parks, five in total, are proposed around a centrally located park/basin, which provides each neighborhood an opportunity to access these spaces through a network of enhanced walkways, also referred to as wellness walks. Approximately 28.9 acres of open spaces are included within the Project Site. The open space is utilized for detention (6.6 acres) and a linear buffer area along Bear Creek (22.3 acres), of which 0.7 acres is planned to be landscaped. A map of the Proposed Project is presented on Figure 2-3.

To determine the projected water demand for the Proposed Project, the updated water use factors from the City's 2021 Water Master Plan Update were used. These water use factors are based on recent water consumption trends within the COSMUD service area. The total projected water demand for the Proposed Project is 717 acre-feet/year (AFY) as shown in Table 2-1. All the water demands from the Proposed Project are anticipated to be served by the COSMUD North Stockton water system.

[1] City of Stockton, 2024. Project Description – Bear Creek South Residential Project, July 2024.

**Table 2-1. Total Projected Water Demand**

| Land Use Type[a] | Dwelling Units, DU | Gross Area, acres | Water Use Factor[b] | Non-Revenue Water[c], percent | Projected Water Demand[d], AFY |
|---|---|---|---|---|---|
| Low Density Residential (LDR) | 2,241 | - | 242 gpd/DU<br>0.27 AFY/DU | 8 | 660.3 |
| Parks | - | 27.7 | 1.85 AFY/acre | 8 | 55.7 |
| Bear Creek Open Space (landscaped area) | - | 0.74 | 1.85 AFY/acre | 8 | 1.5 |
| | | | | **Total** | **717** |

(a) Includes only land use types within the Project Site that have an associated water demand.

(b) Water use factors are from the City of Stockton 2021 Water Master Plan Update.

(c) Non-revenue water is 8 percent of the total water demand, with the total water demand including the non-revenue water itself. This assumption is based on the City of Stockton 2021 Water Master Plan Update.

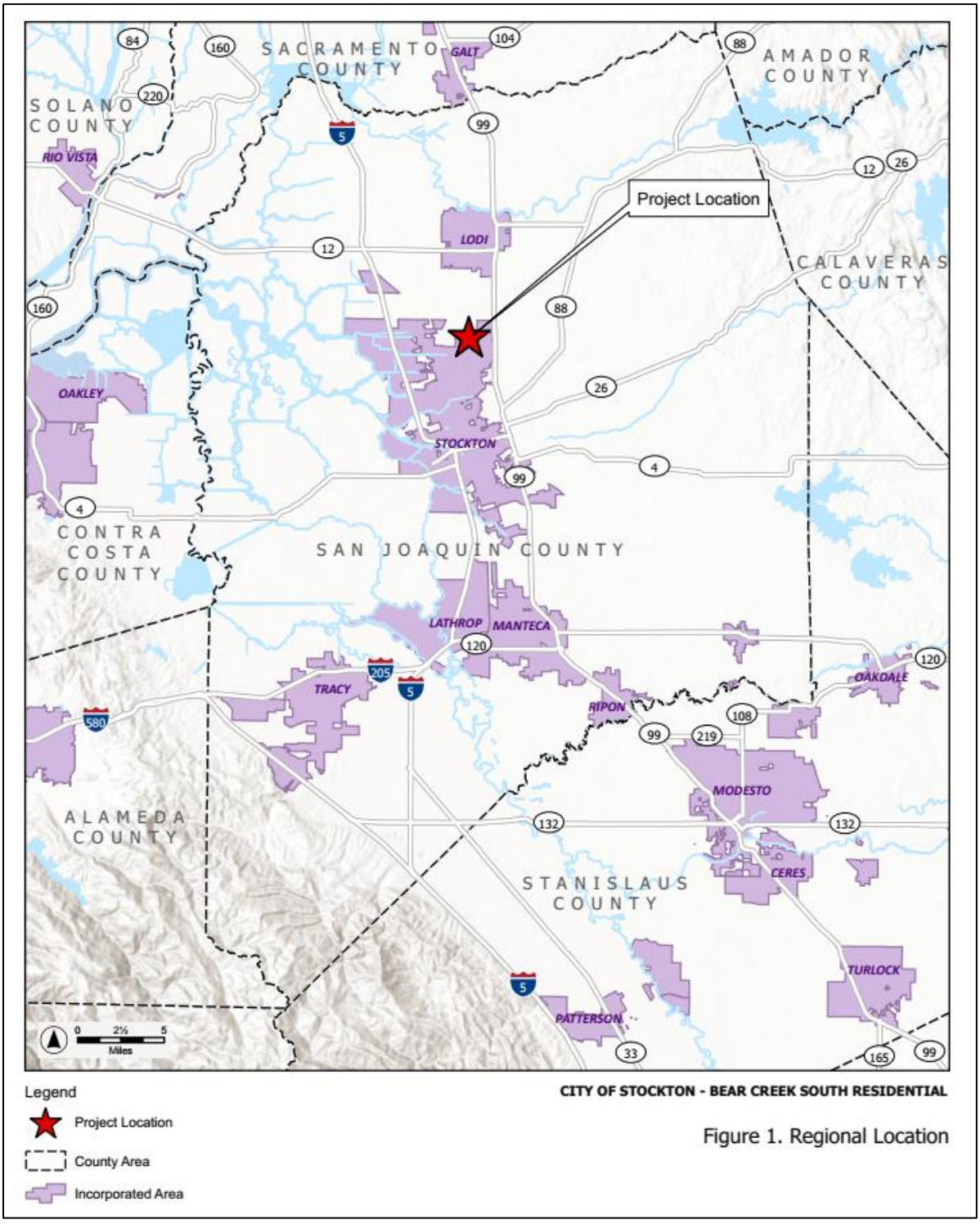
(d) The projected water demand was determined by multiplying the dwelling units or gross acres by the water use factor for each land use type and then adding 8 percent non-revenue water.

gpd/DU = gallons per day per dwelling unit; AFY/DU = acre-feet per year per dwelling unit

## 2.3 Projected Water Supply

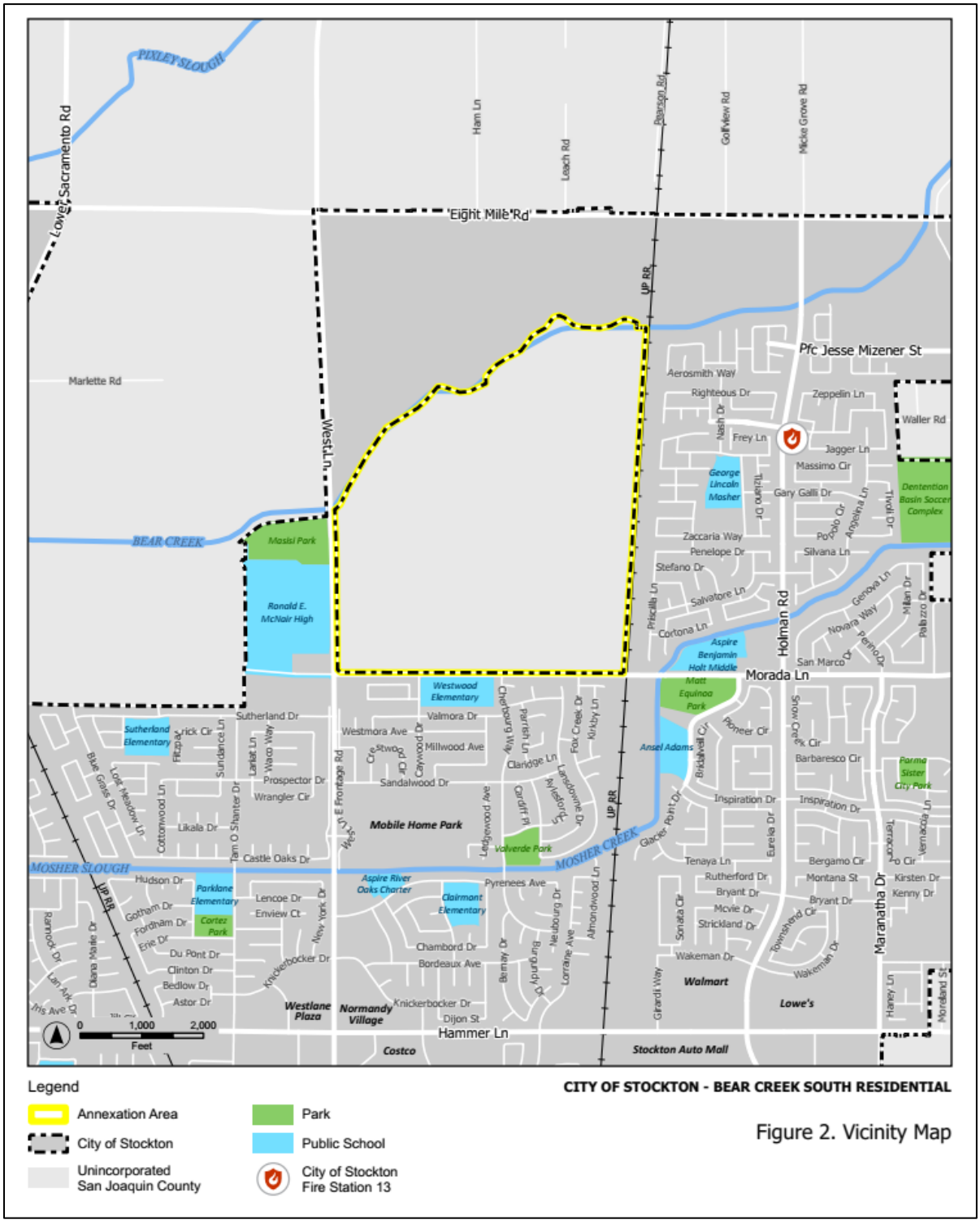
Water demands for the Proposed Project will be served using the COSMUD existing and future portfolio of water supplies discussed in Section 6. The inclusion of existing and planned future water supplies is specifically allowed by the Water Code:

> *Water Code Section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*



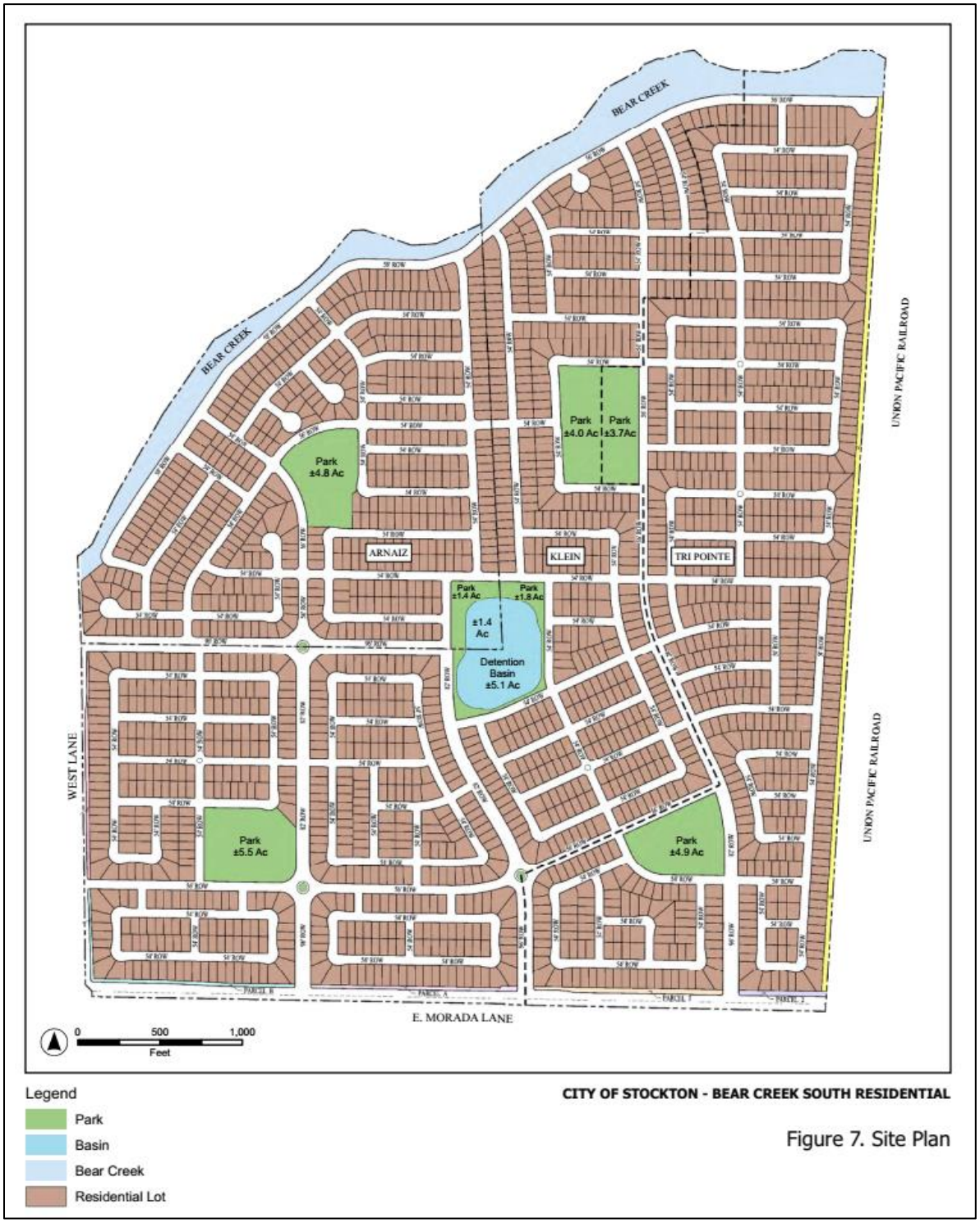

*Source: City of Stockton, 2024. Project Description for Bear Creek South Residential Project.*

**Figure 2-1. Proposed Project Location**




*Source: City of Stockton, 2024. Project Description for Bear Creek South Residential Project.*

**Figure 2-2. Proposed Project Vicinity Map**




*Source: City of Stockton, 2024. Project Description for Bear Creek South Residential Project.*

**Figure 2-3. Proposed Project**

# 3.0 REQUIRED DETERMINATIONS

## 3.1 Does SB 610 apply to the Proposed Project?

*Water Code Section 10910 (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.*

*Water Code Section 10912 (a) "Project" means any of the following:*

*(1) A proposed residential development of more than 500 dwelling units.*

*(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*

*(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*

*(4) A proposed hotel or motel, or both, having more than 500 rooms.*

*(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*

*(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*

*(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.*

Based on the following facts, SB 610 does apply to the Proposed Project.

- The City has determined that the Proposed Project is subject to the California Environmental Quality Act and that an Environmental Impact Report (EIR) is required.
- The Proposed Project, with 2,241 dwelling units, meets the definition of a "project" as specified in Water Code Section 10912(a) paragraph (1) as defined for a residential development.

The Proposed Project has not been the subject of a previously adopted WSA and has not been included in an adopted WSA for a larger project. Therefore, according to Water Code Section 10910(a), a WSA is required for the Proposed Project.

## 3.2 Does SB 221 apply to the Proposed Project?

In 2001, SB 221 amended State law to require that approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply. Per California Government Code Section 66473.7(a)(1), a subdivision means a proposed residential development of more than 500 dwelling units. The Proposed Project, with its proposed 2,241 residential dwelling units, is therefore subject to the requirements of SB 221. Section 8 of this WSA provides the required written verification of sufficient water supply.

## 3.3 Who is the Identified Public Water System?

> *Water Code Section 10910(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined by Section 10912, that may supply water for the project.*
>
> *Water Code Section 10912 (c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections…*

The Proposed Project is located within the City's Sphere of Influence and would be annexed into the City of Stockton and served by the COSMUD. Therefore, the COSMUD is the identified public water system for the Proposed Project.

## 3.4 Does the City have an adopted Urban Water Management Plan (UWMP) and does the UWMP include the projected water demand for the Proposed Project?

> *Water Code Section 10910(c)(1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).*

The most recent COSMUD UWMP (2020 UWMP) was adopted by City Council in June 2021 and is incorporated by reference into this WSA.[2] The 2020 UWMP included water demand projections for current water demands within the COSMUD water service area (baseline demand) and anticipated water demands associated with future development projects and planning areas within the COSMUD water service area through 2045. However, the Proposed Project was not included in the future development projects and planning areas considered in the 2020 UWMP, therefore, the projected water demand for the Proposed Project was not included in the 2020 UWMP.

Therefore, for the purposes of this WSA, the projected water demand for the Proposed Project has been added to the projected water demands included in the 2020 UWMP to evaluate the ability of the COSMUD to meet the projected water demands for the Proposed Project.

[2] West Yost. June 2021. City of Stockton 2020 Urban Water Management Plan.

# 4.0 CITY OF STOCKTON MUNICIPAL UTILITIES DEPARTMENT WATER SERVICE AREA

## 4.1 Water Service Area

The City is located in north-central California, approximately 70 miles east of the San Francisco Bay Area and 50 miles south of Sacramento. California State Highway 99 and Interstate 5 run north and south through the City on the east and west boundaries, respectively, and California State Highway 4 (the Crosstown Freeway) connects the two. The San Joaquin River flows from the south and terminates at the Delta area of Central Stockton.

The COSMUD provides water service to North and South Stockton while the central portion of the City is served by California Water Service (Cal Water). North Stockton is primarily residential, and South Stockton is largely comprised of residential (on the west side), industrial and agricultural land uses. The COSMUD water service area extends beyond the City Limits into unincorporated San Joaquin County, in conjunction with the City's General Plan. The COSMUD provides water service as new developments are approved within its water service area and/or annexed into the City.

## 4.2 Population

The existing (2020) population for the COSMUD water service area was estimated in the 2020 UWMP to be 184,402 people. Population projections for 2025 through 2040 presented in the 2020 UWMP were estimated in the City's 2021 Water Master Plan Update[3]. These projections through 2040 were based on future land uses as defined in the City's 2040 General Plan Update (GPU) and the April 2020 *City of Stockton Sphere of Influence Plan/Municipal Service Review* (SOI/MSR). Finally, as 2045 is outside of the SOI/MSR Report and 2021 Water Master Plan Update planning horizon, an annualized growth rate of 1.44 percent was used to estimate the 2045 projected population for the 2020 UWMP.

Table 4-1 shows the COSMUD historical and projected population in five-year increments from 1995 to 2045.

**Table 4-1. Historical and Projected Population for the COSMUD Water Service Area**

| Time Frame | Year | Population |
|---|---|---|
| Historical[(a)] | 1995 | 117,303 |
| | 2000 | 135,716 |
| | 2005 | 177,127 |
| | 2010 | 178,387 |
| | 2015 | 170,417 |
| Projected[(b)] | 2020 | 184,402 |
| | 2025 | 188,601 |
| | 2030 | 192,800 |
| | 2035 | 239,380 |
| | 2040 | 285,960 |
| | 2045 | 307,150 |

(a) City of Stockton 2015 UWMP, Table 2-2, July 2016.
(b) City of Stockton 2020 UWMP, Table 3-2, June 2021.

[3] West Yost. January 2021. City of Stockton 2021 Water Master Plan Update Chapter 3.

## 4.3 Climate

The COSMUD water service area is located in the Central Valley of California and generally experiences hot, dry summers with daytime temperatures well over 100 degrees Fahrenheit (°F). Winter temperatures can drop to 30°F but are generally mild. A majority of the annual average 10.4 inches of rainfall generally falls from November through March. The average reference evapotranspiration (ETo) is 52.6 inches.

Table 4-2 summarizes the average temperature and rainfall data for the COSMUD water service area.

**Table 4-2. Monthly Average Climate Data Summary**

| Month[(a)] | Standard Monthly Average ET, inches | Average Total Rainfall, inches | Average Temperature, degrees Fahrenheit | |
|---|---|---|---|---|
| | | | Maximum | Minimum |
| Manteca (CIMIS Station No. 70, WRCC Station No. 045303)[(a)] | | | | |
| January | 1.11 | 1.65 | 53.7 | 36.3 |
| February | 1.96 | 1.35 | 61.1 | 39.3 |
| March | 3.54 | 1.52 | 66.3 | 42.1 |
| April | 5.09 | 0.95 | 72.4 | 45.2 |
| May | 6.77 | 0.21 | 80.9 | 50.5 |
| June | 7.73 | 0.09 | 88.6 | 55.9 |
| July | 8.01 | 0.12 | 93.2 | 59.2 |
| August | 7.04 | 0.23 | 91.5 | 58.5 |
| September | 5.16 | 0.24 | 87.7 | 55.9 |
| October | 3.41 | 0.97 | 77.7 | 49.2 |
| November | 1.70 | 1.58 | 61.1 | 40.4 |
| December | 1.05 | 1.51 | 53.8 | 35.4 |
| **Totals** | **52.57** | **10.41** | - | - |

*Source: City of Stockton 2020 UWMP, Table 3-1, June 2021.*

(a) Period of record is 1971 to 2000.

# 5.0 CITY OF STOCKTON MUNICIPAL UTILITIES DEPARTMENT WATER DEMANDS

*Water Code Section 10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).*

The descriptions provided below for the COSMUD water demands have been taken, for the most part, from the 2020 UWMP, which was adopted in June 2021.

## 5.1 Historical and Existing Water Demand

The COSMUD water demand decreased significantly from 2012 to 2015 due to drought conditions and associated conservation measures. However, water demands have rebounded somewhat in recent years with the end of drought conditions.

Table 5-1 shows the COSMUD historical water demand from 2012 to 2020.

**Table 5-1. Historical Potable Water Demand (includes Non-Revenue Water), AFY**

| Condition | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020[(b)] |
|---|---|---|---|---|---|---|---|---|---|
| Total Water Demand | 37,100 | 36,692 | 31,603 | 26,312 | 27,845 | 29,241 | 30,103 | 30,684 | 34,404 |

(a) 2012 through 2019 source: City of Stockton 2021 Water Master Plan Update, Table 3-1, January 2021.
(b) 2020 source: City of Stockton 2020 UWMP, Table 4-2, June 2021.

## 5.2 Future Water Demand

Projected future water demands presented in the City's 2020 UWMP used land-use based water demand projections developed for the City's 2021 Water Master Plan Update. Water demand projections were based on the anticipated growth within the COSMUD water service area as defined by City's 2040 GPU and confirmed with the City's Community Development Department. Projected water demands for 2045 were assumed to be the same as projected water demands in 2040 since the development of future planned developments beyond 2040 is not defined in the City's 2040 GPU. However, as described in Section 3.4 of this WSA, the Proposed Project was not included in these projections, so projected water demands for the Proposed Project have been added to the 2020 UWMP water demand projections for the purposes of this WSA, assuming that buildout of the Proposed Project occurs by 2030.

Projected water demands for the COSMUD water service area, including projected water demands for the Proposed Project, are summarized in Table 5-2 and indicate a 43 percent increase in water demand from 2020 to 2045.

**Table 5-2. Summary of Future Water Demand (includes Non-Revenue Water), AFY**

| Demand Projection Source | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| 2020 UWMP[(a)] | 34,789 | 37,878 | 43,161 | 48,444 | 48,444 |
| Proposed Project (see Table 2-1) | -- | 717 | 717 | 717 | 717 |
| **Total (including Proposed Project)** | **34,789** | **38,595** | **43,878** | **49,161** | **49,161** |

(a) Source: City of Stockton 2020 UWMP, Table 4-3, June 2021.

## 5.3 Dry Year Water Demand

For planning purposes, and to be conservative, the COSMUD assumes no reduction in water demand during dry years. The adopted Water Shortage Contingency Plan, outlined in Appendix I of the 2020 UWMP, includes a six-stage plan describing specific actions to reduce water demand by up to and greater than 50 percent in the event of a water supply shortage or other emergency.

# 6.0 CITY OF STOCKTON MUNICIPAL UTILITIES DEPARTMENT WATER SUPPLIES

*Water Code Section 10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f) and (g).*

*Water Code Section 10910(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.*

*Water Code Section 10910(d)(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:*

*(A) Written contracts or other proof of entitlement to an identified water supply.*

*(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.*

*(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.*

*(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.*

*Water Code Section 10910(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract-holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.*

The Proposed Project, if approved by the City, is anticipated to be served from the COSMUD's existing and future portfolio of water supplies. The inclusion of existing and planned future water supplies is specifically allowed by the Water Code:

*Water Code Section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*

The water supply for the Proposed Project will have the same water supply reliability and water quality as the water supply available to the other COSMUD existing and future water customers. Proponents of the Proposed Project will provide their proportionate share of required funding to the COSMUD for the acquisition and delivery of treated potable water supplies to the Proposed Project area.

The water supplies needed to serve the Proposed Project (together with existing water demands and planned future uses) are predominantly described in the City's 2020 UWMP. When relevant, the descriptions provided below have been updated with information provided by COSMUD staff.

## 6.1 Existing Potable Water Supplies

The COSMUD currently receives water supply from the following sources:

- Surface water from the San Joaquin River that is diverted at the Intake Pump Station on Empire Tract located in the Sacramento-San Joaquin Delta (Delta) and treated at the City's Delta Water Treatment Plant (DWTP), supplemented by surface water from the Mokelumne River diverted and conveyed by Woodbridge Irrigation District (WID), and treated at the City's DWTP, when the City's San Joaquin River supplies are curtailed;
- Surface water from the Mokelumne River diverted and conveyed by WID, and treated at the City's DWTP;
- Potable water purchased from Stockton East Water District (SEWD); and
- Groundwater pumped from City owned and operated wells from the underlying Eastern San Joaquin Groundwater Subbasin.

Water from SEWD can be conveyed to both the North and South Stockton distribution systems. SEWD also supplies the COSMUD Walnut Plant service area that is surrounded by the Cal Water system through two interconnects. Cal Water conveys SEWD supply to the Walnut Plant service area via a wheeling agreement with COSMUD. Water supplies from local groundwater wells are used to supply both the COSMUD North and South Stockton water service areas. The Proposed Project will be served by the North Stockton water system.

To improve water supply resiliency and enhance water supply availability, the City plans to explore the potential of surface water/stormwater capture for the Groundwater Recharge Improvement Project. The COSMUD may pursue additional water resource exchanges or transfers. The COSMUD has no sources of ocean water, brackish water, or groundwater that provide a viable opportunity for development of desalinated water as a long-term supply.

Each of the COSMUD existing water supplies is described in more detail below. Table 6-1 shows the COSMUD source of its existing water supplies and actual volume used in 2020.

**Table 6-1. Existing (2020) Water Supplies**

| Supply Source | Additional Detail on Water Supply | Actual Volume, AFY |
|---|---|---|
| Purchased Water (treated surface water) | SEWD | 6,939 |
| Purchased Water (untreated surface water) | WID | 8,657 |
| Surface Water (untreated) | San Joaquin River | 9,970 |
| Groundwater | Eastern San Joaquin Subbasin | 8,662 |
| | **Total** | **34,228** |

*Source: City of Stockton 2020 UWMP, Table 6-13, June 2021.*

### *6.1.1 Purchased Water*

The City purchases treated potable water from SEWD and untreated surface water from WID as described below.

#### 6.1.1.1 Stockton East Water District

SEWD is a wholesale water supplier that provides treated potable water to the urban water retailers within the Stockton Metropolitan Area, including COSMUD, Cal Water, and two small maintenance districts in the County (Urban Contractors). SEWD receives and treats surface water from New Melones Reservoir and New Hogan Reservoir through agreements with the United States Bureau of Reclamation (USBR). SEWD has filed several water right applications to divert excess wet weather flow from Calaveras River, Littlejohns Creek, and other tributaries. The applications are currently undergoing the permitting process with the State Water Resources Control Board (State Water Board).

To alleviate severe groundwater overdraft in the region, SEWD constructed the Dr. Joe Waidhofer Water Treatment Plant (DJWWTP) with a capacity of 30 million gallons per day (mgd) in the mid-1970s. Since then, the DJWWTP has been expanded to a current capacity of 65 mgd.

#### 6.1.1.2 Woodbridge Irrigation District

WID provides agricultural water supply north of the City boundaries. When the DWTP is curtailed from diverting water from the San Joaquin River, the COSMUD obtains untreated surface water from WID to supplement its water supply. WID's water supply is from the Mokelumne River.

In 2008, COSMUD executed a 40-year purchase agreement with WID for 6,500 AFY for municipal and industrial water use. This water augments supply to the DWTP when supply from the San Joaquin River is not available due to environmental restrictions. The water is conveyed to the DWTP through WID's Wilkerson Canal system and Pixley lateral pipeline for treatment and conveyance to the COSMUD water service area.

The COSMUD 2008 contract with WID includes a provision for increase in water supply as WID-served agricultural lands in the northern part of the City are annexed to the City for municipal and industrial use. Under this contract, an additional 6,500 AFY of WID supply will become available to the City at a rate of 3.0 AFY per acre annexed. WID supply may potentially increase from 6,500 AFY to 13,000 AFY by 2030.

### *6.1.2 Surface Water*

Water supply from the San Joaquin River is a recent addition to the COSMUD water supply portfolio since the completion of the DWTP in 2012 and currently provides a significant portion of existing water supplies. The City has a water right to Delta water because portions of the COSMUD water service area fall within the legally defined Delta and area of origin. Water supply from the San Joaquin River and substantially all of the groundwater that the COSMUD pumps are delivered primarily to the North Stockton water system.

#### 6.1.2.1 Water Right Permit

The City's water right Application 30531A with the State Water Board proposed diversions of up to 33,600 AFY from the Delta and the Place of Use was confined to the City's 1990 General Plan boundary. Through this application, the City was granted a water right permit under Water Code Section 1485. The City's water right permit from the State Water Board was issued on March 8, 2006, under Water Right Permit 21176.

Under Water Code Section 1485, Water Right Permit 21176 allows the City to divert from the San Joaquin River as much water as the City's wastewater treatment plant discharges into the San Joaquin River under an indirect potable reuse strategy. The quantity is permitted up to 33,600 AFY from the San Joaquin River under Water Right Permit 21176. However, Section 1485 water is subject to pumping restriction in some months due to environmental restrictions.

The City's supply from the San Joaquin River is curtailed annually from February 15th to June 15th due to U.S. Department of Fish and Wildlife Service, California Department of Fish and Wildlife, and National Marine Fisheries Service restrictions. When water diversion is curtailed, COSMUD obtains supplemental water supply from WID.

#### 6.1.2.2 Delta Water Treatment Plant

Subsequent to the State Water Board water right permit issuance for Application 30531A, the COSMUD proceeded with Phase 1 of its Delta Water Supply Project with an initial treatment plant capacity of 30 mgd. The DWTP and associated water supply facilities were completed and commenced operation in 2012. Since completion of the DWTP, the City has exercised its water right to divert water through its intake facility on the San Joaquin River.

Surface water curtailments are possible in dry years and can be offset with additional groundwater use and/or demand reduction through implementation of the City's Water Shortage Contingency Plan.

### *6.1.3 Groundwater*

*Water Code Section 10910(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment.*

*Water Code Section 10910(f)(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.*

*Water Code Section 10910(f)(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.*

*Water Code Section 10910(f)(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.*

*A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.*

*Water Code Section 10910(f)(4) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.*

*A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.*

### 6.1.3.1 Groundwater Overview

The COSMUD has groundwater wells located in the North Stockton and South Stockton water systems. These wells are used conjunctively to meet peak summer demands or during dry years when available surface water supplies may be limited. The City has partnered with other users through the Eastern San Joaquin Groundwater Authority (GWA) to manage the groundwater basin.

The City has determined that the sustainable groundwater yield is 0.75 AFY/acre, or approximately 50,000 AFY for the overall City area. To establish the projected groundwater supply that is reasonably available within the COSMUD service area, COSMUD assumes that the reasonably available groundwater supply for the current water service area (approximately 38,500 acres) is pumped at 0.6 AFY/acre, equivalent to an annual groundwater supply of 23,100 AFY.

### 6.1.3.2 Groundwater Basin Management

The groundwater basin underlying the City is the San Joaquin Valley Basin, Eastern San Joaquin Subbasin (5-22.01, Subbasin). The Subbasin is defined by the areal extent of unconsolidated to semi consolidated sedimentary deposits that are bounded by the Mokelumne River on the north and northwest; San Joaquin River on the west; Stanislaus River on the south; and consolidated bedrock on the east.

In 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA) in response to continued overdraft of California's groundwater resources. The Subbasin is one of 21 basins and subbasins identified by the California Department of Water Resources (DWR) as being in a state of critical overdraft. SGMA requires preparation of a groundwater sustainability plan to address measures necessary to attain sustainable conditions in the Subbasin. Sustainability is generally defined as long-term reliability of the groundwater supply and the absence of undesirable results from over pumping.

The City, along with fifteen other groundwater users and groundwater sustainability agencies, formed a GWA in 2017 in response to SGMA. In 2019, the GWA completed the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (GSP) to help achieve groundwater sustainability in the Subbasin by 2040. In general, the GSP shows that groundwater elevations have declined since the 1950s. Water quality issues were detected on the west side of the Subbasin, some of which are from wells underlying the City. The GSP outlined the need to reduce overdraft conditions and identified 23 projects for potential development, along with management actions, that either replace groundwater use or supplement groundwater supplies to meet current and future water demands. The list of 23 potential projects included in the GSP represent a variety of project types including direct and in-lieu recharge, intra-basin water transfers, demand conservation, water recycling, and stormwater reuse to be undertaken by the member agencies. The GSP determined an estimated pumping offset and/or recharge

need of 78,000 AFY Subbasin-wide to achieve sustainability. This amount may be reevaluated after additional data are collected and analyzed.[4]

From 2020 to 2045, members of the GWA, including the City, will be monitoring and reporting their progress on implementing projects and studies and the impacts of their outreach. Evaluation will be conducted every five years.

#### 6.1.3.3 Groundwater Use

The COSMUD uses groundwater conjunctively with its surface water supply sources, with groundwater generally used to meet increased water demands primarily in the summer months or during dry years when available surface water supplies may be limited. Wells are also depended on for emergency supply in the event of surface water supply interruptions.

Historically, the local groundwater basin provided 100 percent of the COSMUD water supply. However, with SEWD surface water deliveries beginning in the 1980s and the completion and dedication of the DWTP and associated water supply infrastructure in 2012, the reliance on groundwater has significantly reduced. The annual volume of groundwater pumped by the COSMUD is shown in Table 6-2. Groundwater supply provided an average of 4,320 AFY, approximately 14 percent of the total COSMUD water supply between 2016 and 2020.

**Table 6-2. Historical Groundwater Volume Pumped by the COSMUD, AFY**

| Supply Source | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| Groundwater | 3,394 | 4,085 | 7,228 | 6,619 | 3,748 | 2,965 | 3,236 | 3,778 | 8,662 |

*Source: City of Stockton 2020 UWMP, Table 6-3, June 2021.*

#### 6.1.3.4 Groundwater as a Future Water Supply

In the future, the COSMUD plans to use less groundwater in wet and average years. It plans to continue groundwater use to meet peak demand and in dry years to make up for reductions in surface water deliveries.

## 6.2 Additional Planned Future Potable Water Supplies

In addition to the existing potable water supplies described above, the COSMUD has additional planned future potable water supplies to meet existing and projected future water demands, including those associated with the Proposed Project. The inclusion of planned future water supplies in this WSA is specifically allowed by the Water Code:

> *Water Code Section 10631(b): Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).*

[4] Eastern San Joaquin Groundwater Authority, Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan, November 2019, Section 6.

As discussed above, the City's application for an additional water right from the San Joaquin River for up to 92,300 AFY, is currently unpermitted. The City plans to pursue this application in the future to meet the COSMUD ultimate water demand. Pursuant to the grant of this additional water right by the State Water Board, several expansion projects are planned for the DWTP, as needed, from the current capacity of 30 mgd, up to 160 mgd.

As discussed in Section 6.1.1.2, the City expects an additional 6,500 AFY of WID supply will become available to the City at a rate of 3.0 AFY per acre annexed, per the City's 2008 contract with WID. This WID supply may potentially increase from 6,500 AFY to 13,000 AFY by 2030.

## 6.3 Summary of Existing and Additional Planned Future Water Supplies

Table 6-3 provides a summary of the COSMUD projected water supply entitlements. A discussion of the future anticipated availability of these existing and additional planned future water supplies during dry years is provided in the next section.

**Table 6-3. Projected Water Supplies[(a)]**

| Supply Source | Additional Detail on Water Supply | Reasonably Available Volume, AFY | | | | |
|---|---|---|---|---|---|---|
| | | 2025 | 2030 | 2035 | 2040 | 2045 |
| Purchased Water (treated surface water) | SEWD | 24,300 | 24,300 | 24,300 | 24,300 | 24,300 |
| Purchased Water (untreated surface water) | WID | 6,500 | 13,000 | 13,000 | 13,000 | 13,000 |
| Surface Water (untreated) | San Joaquin River | 23,400 | 24,800 | 25,000 | 25,000 | 25,000 |
| Groundwater | Eastern San Joaquin Subbasin | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Total** | | **77,300** | **85,200** | **85,400** | **85,400** | **85,400** |

*Source: City of Stockton 2020 UWMP, Table 6-14, June 2021*

(a) A normal year is assumed.

## 6.4 Water Supply Availability and Reliability

Water Code Section 10910 (c)(4) requires that a WSA include a discussion with regard to "whether total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses." Accordingly, this WSA addresses these three hydrologic conditions through the year 2045. The reliability discussion presented in this section reflects Chapter 7 of the City's 2020 UWMP.

Factors contributing to potential reductions in the COSMUD water supplies include legal limitations due to water rights and contracts that may limit the quantity of water available, environmental constraints, and reductions in availability due to climatic factors. The surface water supplies delivered to the COSMUD are subject to reductions during single and multiple dry years (seasonal and climatic shortages) as discussed below.

Also, in response to drought conditions and the State of Emergency proclaimed by Governor Brown, first in January 2014 and again in April 2015, this WSA provides a discussion of the availability and reliability of the COSMUD available water supplies to meet water demands in the event that the COSMUD surface water supplies are limited under emergency water supply conditions.

### *6.4.1 Reliability by Water Source*

#### 6.4.1.1 SEWD Supply

Review of SEWD's water deliveries from Fiscal Years 2012 through 2018 show that COSMUD received approximately one-third of the total SEWD water supply to the Urban Contractors.[5] SEWD estimated that approximately 72,800 acre-feet (AF) will be available to the Urban Contractors. Thus, the normal year volume entered for the COSMUD water service area is estimated to be 24,300 AF, approximately one-third of 72,800 AF.

Per the Second Amended Contract, SEWD is required to deliver a minimum of 20,000 AF to the Urban Contractors. Thus, the water supply availability for the City during the single dry year is assumed to be approximately one-third of the SEWD contractual minimum volume of 20,000 AF.

The water supply availability for the five-consecutive-dry years reflects the City's deliveries from SEWD during the most recent Statewide drought. Available water supplies for the first and fifth years of the five-consecutive-year drought are estimated to be normal year supplies. Available SEWD supplies are reduced in the second year, and then further reduced to minimum deliveries (one-third on the contractual minimum volume) in the third and fourth years.

#### 6.4.1.2 San Joaquin River Supply

Under Water Code Section 1485, Water Right Permit 21176 allows the City to divert from the San Joaquin River as much water as the City's wastewater treatment plant discharges into the San Joaquin River. The quantity is permitted up to 33,600 AFY from the San Joaquin River under Water Right Permit 21176. However, Section 1485 water is subject to pumping restrictions in some months due to environmental restrictions. The City's Water Right Permit summarizes San Joaquin River water available for diversion based on the City's wastewater treatment plant discharge and pumping restrictions due to the environmental restrictions for 2012 through 2040.

Since the Petition for Extension of Time was completed prior to 2020, the volumes for 2020 through 2040 are projections of the anticipated volume available for diversion from the San Joaquin River and are based on the historical volumes available under similar hydrologic years, as shown in Table 6-4.

[5] Stockton East Water District. Fiscal Years 2012/2013 to 2018/2019. Schedule D.

**Table 6-4. Anticipated San Joaquin River Water Supplies**

| Year Type | Base Year | Volume Available, AFY | Percent of Average Supply |
|---|---|---|---|
| Normal Year | 2018 | 20,500 | 100 |
| Single-Dry Year | 2015 | 19,100 | 93 |
| Consecutive Dry Year 1st Year | 2013 | 18,300 | 89 |
| Consecutive Dry Year 2nd Year | 2014 | 19,000 | 93 |
| Consecutive Dry Year 3rd Year | 2015 | 19,100 | 93 |
| Consecutive Dry Year 4th Year | 2016 | 18,100 | 88 |
| Consecutive Dry Year 5th Year | 2017 | 21,400 | 104 |

*Source: City of Stockton 2020 UWMP, Table 7-3, June 2021.*

#### 6.4.1.3 WID Supply

Raw water from WID augments supply to the DWTP if the San Joaquin River water is not available due to environmental restrictions. Consistent with the 2020 UWMP, a slight supply reduction from 6,500 AF to 4,500 AF is assumed during a single dry year and the third and fourth years of the five-consecutive-year drought.

#### 6.4.1.4 Groundwater Supply

COSMUD plans to use its groundwater supply conjunctively with the available treated surface water supplies and purchased water supplies. Available groundwater supply is based on the projected groundwater supply that is reasonably available. COSMUD assumes that the reasonably available groundwater for the current water service area (approximately 38,500 acres) is pumped at 0.6 AFY/ac, equivalent to an annual groundwater supply of 23,100 AFY. This volume is assumed to be available under all year types.

### *6.4.2 Summary of Available Water Supplies Under Normal, Single Dry, and Multiple Dry Years*

The reliability of each of the COSMUD existing and additional planned water supplies and their projected availability during normal, single dry, and multiple dry years, as described in Chapter 7 of the 2020 UWMP, is summarized in Tables 6-5, 6-6, and 6-7, respectively.

**Table 6-5. Normal Year Water Supply, AFY**

| Supply Source | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| SEWD | 24,300 | 24,300 | 24,300 | 24,300 | 24,300 |
| WID | 6,500 | 13,000 | 13,000 | 13,000 | 13,000 |
| San Joaquin River | 23,400 | 24,800 | 25,000 | 25,000 | 25,000 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Total** | **77,300** | **85,200** | **85,400** | **85,400** | **85,400** |

*Source: City of Stockton 2020 UWMP, Table 7-6, June 2021.*

**Table 6-6. Single Dry Year Water Supply, AFY**

| Supply Source | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| SEWD | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 |
| WID | 4,500 | 9,000 | 9,000 | 9,000 | 9,000 |
| San Joaquin River | 21,800 | 23,100 | 23,300 | 23,300 | 23,300 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Total** | **56,100** | **61,900** | **62,100** | **62,100** | **62,100** |

*Source: City of Stockton 2020 UWMP, Table 7-7, June 2021.*

**Table 6-7. Multiple Dry Years Water Supply, AFY**

| Supply | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|
| First Year | | | | | |
| SEWD | 24,300 | 24,300 | 24,300 | 24,300 | 24,300 |
| WID | 6,500 | 13,000 | 13,000 | 13,000 | 13,000 |
| San Joaquin River | 20,900 | 22,100 | 22,300 | 22,300 | 22,300 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Supply Total** | **74,800** | **82,500** | **82,700** | **82,700** | **82,700** |
| Second Year | | | | | |
| SEWD | 15,500 | 15,500 | 15,500 | 15,500 | 15,500 |
| WID | 6,500 | 13,000 | 13,000 | 13,000 | 13,000 |
| San Joaquin River | 21,700 | 23,000 | 23,200 | 23,200 | 23,200 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Supply Total** | **66,800** | **74,600** | **74,800** | **74,800** | **74,800** |
| Third Year | | | | | |
| SEWD | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 |
| WID | 4,500 | 9,000 | 9,000 | 9,000 | 9,000 |
| San Joaquin River | 21,800 | 23,100 | 23,300 | 23,300 | 23,300 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Supply Total** | **56,100** | **61,900** | **62,100** | **62,100** | **62,100** |
| Fourth Year | | | | | |
| SEWD | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 |
| WID | 4,500 | 9,000 | 9,000 | 9,000 | 9,000 |
| San Joaquin River | 20,700 | 21,900 | 22,100 | 22,100 | 22,100 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Supply Total** | **55,000** | **60,700** | **60,900** | **60,900** | **60,900** |
| Fifth Year | | | | | |
| SEWD | 24,300 | 24,300 | 24,300 | 24,300 | 24,300 |
| WID | 6,500 | 13,000 | 13,000 | 13,000 | 13,000 |
| San Joaquin River | 24,400 | 25,900 | 26,100 | 26,100 | 26,100 |
| Groundwater | 23,100 | 23,100 | 23,100 | 23,100 | 23,100 |
| **Supply Total** | **78,300** | **86,300** | **86,500** | **86,500** | **86,500** |

*Source: City of Stockton 2020 UWMP, Table 7-9, June 2021.*

# 7.0 DETERMINATION OF WATER SUPPLY SUFFICIENCY BASED ON THE REQUIREMENTS OF SB 610

Water Code Section 10910 states:

> *10910(c)(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

Table 7-1 summarizes the projected availability of the COSMUD existing and planned future potable water supplies compared with projected water demands in normal, single dry and multiple dry years through buildout. As stated in Section 3.4, the Proposed Project's water demands were not included in future water demand projections presented in the 2020 UWMP, so they have been added to the water demands shown in Table 7-1.

Pursuant to Water Code Section 10910(c)(4) and based on the technical analyses described in this WSA, the total projected water supplies determined to be available for the Proposed Project during normal, single dry, and multiple dry years during a 20-year projection will meet the projected water demand associated with the Proposed Project, in addition to existing and planned future uses.

**Table 7-1. Summary of Water Demand Versus Water Supply During Various Hydrologic Conditions**

| Hydrologic Condition | | Normal, Single Dry, and Multiple Dry Years, AFY | | | | |
|---|---|---|---|---|---|---|
| | | 2025 | 2030 | 2035 | 2040 | 2045 |
| Normal Year | | | | | | |
| Available Water Supply[(a)] | | 77,300 | 85,200 | 85,400 | 85,400 | 85,400 |
| Total Water Demand[(b)] | | 34,789 | 38,595 | 43,878 | 49,161 | 49,161 |
| Potential Surplus (Deficit) | | 42,511 | 46,605 | 41,522 | 36,239 | 36,239 |
| Percent Shortfall of Demand | | -- | -- | -- | -- | -- |
| Single Dry Year | | | | | | |
| Available Water Supply[(c)] | | 56,100 | 61,900 | 62,100 | 62,100 | 62,100 |
| Total Water Demand[(b)] | | 34,789 | 38,595 | 43,878 | 49,161 | 49,161 |
| Potential Surplus (Deficit) | | 21,311 | 23,305 | 18,222 | 12,939 | 12,939 |
| Percent Shortfall of Demand | | -- | -- | -- | -- | -- |
| Multiple Dry Years | | | | | | |
| Multiple Dry Year 1 | Available Water Supply[(d)] | 74,800 | 82,500 | 82,700 | 82,700 | 82,700 |
| | Total Water Demand[(b)] | 34,789 | 38,595 | 43,878 | 49,161 | 49,161 |
| | Potential Surplus (Deficit) | 40,011 | 43,905 | 38,822 | 33,539 | 33,539 |
| | Percent Shortfall of Demand | -- | -- | -- | -- | -- |
| Multiple Dry Year 2 | Available Water Supply[(d)] | 66,800 | 74,600 | 74,800 | 74,800 | 74,800 |
| | Total Water Demand[(b)] | 35,550 | 39,652 | 44,935 | 49,161 | 49,161 |
| | Potential Surplus (Deficit) | 31,250 | 34,948 | 29,865 | 25,639 | 25,639 |
| | Percent Shortfall of Demand | -- | -- | -- | -- | -- |
| Multiple Dry Year 3 | Available Water Supply[(d)] | 56,100 | 61,900 | 62,100 | 62,100 | 62,100 |
| | Total Water Demand[(b)] | 36,311 | 40,708 | 45,991 | 49,161 | 49,161 |
| | Potential Surplus (Deficit) | 19,789 | 21,192 | 16,109 | 12,939 | 12,939 |
| | Percent Shortfall of Demand | -- | -- | -- | -- | -- |
| Multiple Dry Year 4 | Available Water Supply[(d)] | 55,000 | 60,700 | 60,900 | 60,900 | 60,900 |
| | Total Water Demand[(b)] | 37,073 | 41,765 | 47,048 | 49,161 | 49,161 |
| | Potential Surplus (Deficit) | 17,927 | 18,935 | 13,852 | 11,739 | 11,739 |
| | Percent Shortfall of Demand | -- | -- | -- | -- | -- |
| Multiple Dry Year 5 | Available Water Supply[(d)] | 78,300 | 86,300 | 86,500 | 86,500 | 86,500 |
| | Total Water Demand[(b)] | 37,834 | 42,821 | 48,104 | 49,161 | 49,161 |
| | Potential Surplus (Deficit) | 40,466 | 43,479 | 38,396 | 37,339 | 37,339 |
| | Percent Shortfall of Demand | -- | -- | -- | -- | -- |

(a) Refer to Table 6-5.

(b) Refer to Table 5-2; includes projected water demands for the Proposed Project. For each year shown, multiple dry year demands for years 2 through 5 reflect linear increases in demand between the five-year increments. For example, Multiple Dry Year 2 for 2025 represents the demand for 2026, Multiple Dry Year 3 represents the demand for 2027, etc.

(c) Refer to Table 6-6.

(d) Refer to Table 6-7.

# 8.0 VERIFICATION OF SUFFICIENT WATER SUPPLY BASED ON THE REQUIREMENTS OF SB 221

The Proposed Project, with up to 2,241 residential dwelling units, is also subject to the requirements of SB 221 (Government Code section 66473.7). SB 221 applies to projects with residential subdivisions with more than 500 dwelling units (such as the Proposed Project) and requires that the water supplier (COSMUD) provide a written verification that the water supply for the Proposed Project is sufficient.

Verification must demonstrate supply sufficiency by showing that water supplies available during normal, single dry and multiple dry years within a 20-year projection will meet the projected demand associated with the Proposed Project, in addition to existing and planned future uses, including, but not limited to, agriculture and industrial uses.

Per the requirements of SB 221, the following must be considered:

- Historical Water Deliveries
- Supply Reduction for Specific Water Use Sectors
- Urban Water Shortage Contingency Analysis Prepared for the UWMP
- Amount of Water Expected from Specified Supply Projects

The 2020 UWMP and this WSA for the Proposed Project provide the documentation required to comply with SB 221 and demonstrate that COSMUD's supplies are sufficient to meet the projected demand associated with the Proposed Project, in addition to existing and planned future uses. The specific considerations to be evaluated for the SB 221 verification are described below and reference applicable sections of the 2020 UWMP and this WSA.

## 8.1 Historical Water Deliveries

COSMUD's historical and current water supplies are summarized in Section 6 of this WSA and described in detail in Chapter 6 of the 2020 UWMP. The use of these supplies will continue into the future as described in Section 6 of this WSA and as shown in Table 6-3 of this WSA.

Water supply availability and reliability during normal, single dry and multiple dry years is summarized in Section 6 of this WSA and described in detail in Chapter 7 of the 2020 UWMP.

## 8.2 Projected Water Demand by Customer Sector

Projected potable water demands in COSMUD's water service area are described in Section 5 of this WSA based on information provided in Chapter 4 of the 2020 UWMP updated to include the projected water demands for the Proposed Project. Projected water demand by customer sector within COSMUD's water service area is documented in the 2020 UWMP and is summarized in Table 8-1.

**Table 8-1. Actual and Projected Water Demands by Customer Sector**

| Water Source | 2020 (actual)[a] | 2025[b] | 2030[b] | 2035[b] | 2040[b] | 2045[b] |
|---|---|---|---|---|---|---|
| Potable Water, AFY | | | | | | |
| Single Family Residential | 15,758 | 15,782 | 16,674 | 19,867 | 23,059 | 23,059 |
| Multi-Family Residential | 3,030 | 2,927 | 2,976 | 3,494 | 4,012 | 4,012 |
| Commercial | 4,700 | 4,793 | 4,856 | 5,149 | 5,442 | 5,442 |
| Industrial | 709 | 3,397 | 5,797 | 6,076 | 6,355 | 6,355 |
| Landscape | 3,255 | 3,162 | 3,260 | 3,838 | 4,415 | 4,415 |
| Sales to Other Agencies | 1,830 | 1,830 | 1,830 | 1,830 | 1,830 | 1,830 |
| Other | 132 | 0 | 0 | 0 | 0 | 0 |
| Losses | 4,991 | 2,898 | 3,202 | 3,625 | 4,048 | 4,048 |
| **Potable Water Demand Total** | **34,404** | **34,789** | **38,595** | **43,878** | **49,161** | **49,161** |

(a) From Table 4-2 in the City of Stockton 2020 UWMP.

(b) From Table 4-3 in the City of Stockton 2020 UWMP with projected water demands for the Proposed Project added to Single Family Residential, Landscape and Losses starting in 2030.

## 8.3 Water Shortage Contingency Analysis

The City's Water Shortage Contingency Plan (WSCP), included as an appendix to the City's 2020 UWMP, describes the City's strategic plan in preparation for and responses to water shortages. It includes water shortage stages and associated actions that will be implemented in the event of a water supply shortage, including situations when catastrophic water supply interruptions occur due to regional power outage, earthquake, or other disasters; and when drought occurs. As part of the WSCP, the City's legal authorities, communication protocols, compliance and enforcement, and monitoring and reporting are included. Stockton Municipal Code (SMC) Chapter 13.28 Water Conservation and SMC Chapter 13.32 Water Shortage Emergencies supports the City's WSCP actions.

The six Stages of Action outlined in the City's WSCP are intended to promote the proper management and distribution of water supplies during a drought or emergency situation. Each of the six stages describes specific actions to be taken by individual water customer sectors to achieve the water conservation requirement of that particular stage. All of the stages allow for adequate water supply to protect public health and safety and satisfy the fire protection needs of the City. Each of the six stages corresponds to a specific water demand reduction goal. These potable water demand reduction goals are based on the potential supply cutbacks during times of drought, with up to and greater than a 50 percent supply reduction as mandated by the UWMP Act.

If an emergency were to occur, or if drought conditions occurred, requiring the City to implement its WSCP, all of COSMUD's water customers, including those within the Proposed Project, would be subject to the same water conservation measures and water use restrictions as included in City's WSCP.

## 8.4 Future Water Supplies to Serve Water Demands Associated with Buildout of the Proposed Project

As described in this WSA, the following water supplies will be used to serve the projected COSMUD water demands, including the projected water demands associated with buildout of the Proposed Project:

- Surface water from the San Joaquin River that is diverted at the Intake Pump Station on Empire Tract located in the Delta and treated at the City's DWTP, supplemented by surface water from the Mokelumne River diverted and conveyed by WID, and treated at the City's DWTP, when the City's San Joaquin River supplies are curtailed;
- Surface water from the Mokelumne River diverted and conveyed by WID, and treated at the City's DWTP;
- Potable water purchased from SEWD; and
- Groundwater pumped from City owned and operated wells from the underlying Eastern San Joaquin Groundwater Subbasin.

The availability and reliability of these supplies are described in Section 6 of this WSA.

## 8.5 Verification of Sufficient Water Supply

As described in Section 7 of this WSA, the total projected water supplies determined to be available for the Proposed Project during normal, single dry, and multiple dry years during a 20-year projection will meet the projected water demand associated with the Proposed Project, in addition to existing and planned future uses, including, but not limited to, agriculture and industrial uses.

## 9.0 WATER SUPPLY ASSESSMENT APPROVAL PROCESS

*Water Code Section 10910 (g)(1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.*

*Water Code Section 10911 (b) The city or county shall include the water supply assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.*

As the approving agency for the Proposed Project, the City must adopt this WSA at a regular or special meeting. Furthermore, the City must include this WSA in the EIR that is being prepared for the Proposed Project.

## 10.0 REFERENCES

City of Stockton. December 2018. *Envision Stockton 2040 General Plan.*

City of Stockton. July 2024. *Project Description – Bear Creek South Residential Project*.

Eastern San Joaquin Groundwater Basin Authority. November 2019. *Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan*.

Stockton East Water District. Fiscal Years 2012/2013 to 2018/2019. Schedule D.

West Yost. January 2021. *City of Stockton Water Master Plan Update*.

West Yost. June 2021. *City of Stockton 2020 Urban Water Management Plan*.

# Appendix G: Examination of Bear Creek South Project relative to the General Plan and General Plan EIR

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April 16, 2025

**SUBJECT: Examination of Bear Creek South Project relative to the General Plan and General Plan EIR**

Following our Zoom discussion on March 11, 2025, we have examined the City of Stockton's General Plan EIR for purposes of tiering and review of a "subsequent activity" implemented under the General Plan. More specifically, we have examined these documents for applicability in processing the Bear Creek South Project (hereinafter "Project") under CEQA Guidelines Section 15183 (as well as 15152, 15162, and 15168(c)) of the CEQA Guidelines.

De Novo prepared a scoping memo in May 2024 to discuss the potential that the Bear Creek South Project may be statutorily exempt. The memo concluded that a full examination of the Project is necessary to determine the appropriate CEQA document, but that the preliminary presumption is that the Project qualifies for a statutory exemption under Section 15183 pending a full analysis. The original scoping conclusion was based on an interpretation of the statutory language set forth in Public Resources Code Section 21083.3 as further defined in Section 15183 (as well as 15152, 15162, and 15168(c)) as it relates to the Project and the General Plan and General Plan EIR. Specifically, CEQA Guidelines Section 15183 states: "*CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the project or its site. This streamlines the review of such projects and reduces the need to prepare repetitive environmental studies.*"

Section 15168(c) addresses "Use with Later Activities" and indicates that "*…That later analysis may tier from the program EIR as provided in Section 15152. If the agency finds that pursuant to Section 15162, no subsequent EIR would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required. Whether a later activity is within the scope of a program EIR is a factual question that the lead agency determines based on substantial evidence in the record. Factors that an agency may consider in making that determination include, but are not limited to, consistency of the later activity with the type of allowable land use, overall planned density and building intensity, geographic area analyzed for environmental impacts, and covered infrastructure, as described in the program EIR…*"

The scoping process involved consultation with numerous members of City staff, outside counsel, and consultants. Our analysis documented that the Initial Study would be required to validate a decision confirming the appropriate CEQA document for the Project. This memo is intended to provide a more formal examination of the City of Stockton's General Plan EIR for purposes of tiering of a "subsequent activity" under the General Plan, and application of the Section 15183 (as well as 15152, 15162, and 15168(c)) to the Project. This analysis is intended to provide substantial evidence to support a decision that the Project does in fact meet the requirement for a Public Resources Code Section 21083.3 and CEQA Guidelines 15183 statutory exemption.

SUMMARY OF FACTS AND SUBSTANTIAL EVIDENCE

The following outlines a set of facts that, when combined with the information provided in the Initial Study, is intended to provide substantial evidence that the Project meets the requirements of the statutory exemption defined under Section 15183 of the CEQA Guidelines.

1) **Residential Land Use (Existing):** The applicant proposes to develop uses that are consistent with the uses allowed under the current General Plan land use designation for the Project site (See Attachment A). It is noteworthy that the land use designation in the current Stockton General Plan for the Project site is the same land use designation that the City applied to the Project site in previous Stockton General Plans (including, but not limited to, the Stockton General Plan 2035 [City of Stockton, 2007]). This means that there were no land use modifications to the Project site under the most recent Stockton General Plan Update (Envision Stockton 2040 General Plan [City of Stockton, 2018]), and there have been no recent amendments to the land use for the Project site prior to the most recent General Plan Update. In addition, it is also noteworthy that the County has designated the Project site for residential land uses in its General Plan (San Joaquin County General Plan Policy Document [San Joaquin County, 2016]), which is consistent with the City's anticipated residential use of the Project site. The residential land uses in these General Plans reflect the expectation from both the City and County that the Project site would be developed with residential housing. There is nothing peculiar about the land use designation, and there is no request to modify or amend the land use designation. The above facts meet the statutory requirements set forth in Public Resources Code section 21083.3 and further implemented in CEQA Guidelines Section 15183.

2) **Densities (Existing)**: The Project is consistent with the General Plan land use densities. Specifically, the Low Density Residential (LDR) designation allows for single-family residential units, duplexes, triplexes, semi-detached patio homes, town homes, public and quasi-public uses, second units, and other similar and compatible uses. The maximum density allowed by the LDR designation is 6.1 units per acre (based on gross acreage) and 8.7 units per acre (based on net acreage). The proposed Project residential density would be approximately 4.45 units per acre (2,241 units proposed on the 503.89-acre Development Area). The Project is consistent with the allowed uses and density for the existing LDR designation. There is nothing peculiar about the Project as it relates to densities. The above facts meet the statutory requirements set forth in Public Resources Code section 21083.3 and further implemented in CEQA Guidelines Section 15183.

3) **General Plan Baseline Report - Major Development Project Map (2016)**: The Stockton General Plan includes a Baseline Conditions Report dated August 2015. Page 22 of the document includes a map entitled "Major Development Projects" that identifies two categories of projects, Applications Approved, and Applications Active (Attachment B). This map depicts the Project site as "*Bear Creek South – 510 acres 2941 HU."* This means that the Project was established as a Baseline Condition for the General Plan at the beginning of the General Plan process in 2015. The City did not change the baseline condition, instead they adopted the General Plan Update with the same land uses that existed in the Baseline Condition. There is nothing peculiar about the Project as it relates to the Baseline Conditions at the beginning of the General Plan Update process. The above facts meet the requirements outlined in Section 15183.

4) **General Plan Technical Memorandum Report - Major Development Project Map (2017)**: The Stockton General Plan included a Technical Memorandum prepared for Land Use in 2017 about a year before the General Plan was approved. On page 13 of the document a map entitled "Existing General Plan Land Use"

is provided (see Attachment C). The map is consistent with the General Plan Baseline Report published in 2015, as well as the adopted General Plan Land Use Map adopted in 2018. The map depicts the Project site with the residential land use consistent with what is currently proposed. In addition, in the same Technical Memorandum on page 31 a map entitled "Major Development Projects" shows the Project site as "*Bear Creek South"* (see Attachment D). Here again, the City has reiterated what was established as a Baseline Condition for the Project site. The City established residential uses as baseline condition for the Project site, and reiterated that land use in a Technical Memorandum for the General Plan during the General Plan Update process. These maps establish an expectation that the Project site is part of the development assumption for the General Plan even before the General Plan was adopted in 2018, which is later reflected in the General Plan that was adopted. There is nothing peculiar about the Project as it relates to the anticipated land use and development assumptions for the Project site throughout the General Plan Update process leading into the adoption of the General Plan, and the certification of the EIR. The above facts meet the statutory requirements outlined in Sections 21083.3/ 15183.

5) **General Plan EIR Study Area**: The Stockton General Plan EIR (See General Plan Draft EIR, pp. 3-4) states "*this EIR focuses on the analysis of potential changes within the SOI (i.e., the "EIR Study Area").*" The General Plan EIR provides Figure 3-1, Regional Location (See General Plan Draft EIR, pp. 3-3), which depicts the Project site within the boundary of the SOI, which is defined as *EIR Study Area*. This means that the physical location of the Project site is within the physical and spatial limits of the area that was studied in the General Plan EIR. There is nothing peculiar about the physical and spatial limits of the Project site, it is clearly depicted as being within the boundary of the General Plan EIR Study Area. The above facts meet the statutory requirements outlined in Sections 21083.3/ 15183.

6) **General Plan Development Projection:** The Stockton General Plan EIR (the EIR) provides the Development Projections that are used in the EIR (See General Plan Draft EIR, pp. 3-20). The EIR explains that it uses a "horizon-year projection," which is based on an estimate of the amount of development that would occur by 2040. The EIR also uses a Buildout Projection which represents full buildout of the General Plan, but with a date uncertain. Each projection is described below:

   The horizon-year projection includes the following (See General Plan Draft EIR, pp. 3-20):

   - 40,900 new dwelling units, including:
     - 26,300 new single-family units
     - 14,600 new multi-family units
   - 132,200 new residents
   - 13.8 million square feet of new commercial and office space
   - 35.6 million square feet of new industrial space

   The full buildout projection includes the following (See General Plan Draft EIR, pp. 3-22):

   - 119,700 new dwelling units, including:
     - 43,800 new single-family units
     - 75,900 new multi-family units
   - 386,700 new residents
   - 50.9 million square feet of new commercial and office space
   - 242.4 million square feet of new industrial space

The EIR indicates that there are almost 7,000 acres of vacant within the SOI (i.e. the EIR Study Area) (See General Plan Draft EIR, pp.3-22), which specifically includes the 530.18-acre Project site. The EIR indicates that a land use demand forecast (prepared as part of a Market Analysis that supports the projections for the General Plan) for Stockton in 2040 results in between 19,800 and 41,000 new housing units, including between 13,800 and 28,700 new single-family units and between 5,900 and 12,300 new multi-family units (See General Plan Draft EIR, pp. 3-24). These projections are based in part on the land use inventory from the General Plan land use map, in addition to market and economic factors that drive growth. The Project site provides approximately 5% of the total housing demand through the Horizon-Year Projection, and approximately 1.8% of the total housing demand through the Full Buildout Projection. There is nothing peculiar about the Project as it relates to house capacity/demand provided in the Horizon-Year Projection, Full Buildout Projection, or the Market Study Projections. The above facts meet the requirements outlined in Section 15183.

7) **Actual Development vs Projections:** As shown in the bullet above, the Stockton General Plan EIR assumes 40,900 new residential units to be constructed through the Horizon Year of 2040. This represents an estimated 1,859 units that should be constructed each year for a total of 9,295 units constructed during the first five-year period. However, a review of building permits in the first five-year period (2019-2023) shows that an average of 661 units has been constructed each year for a total of 3,305 units (see table below).

| | **2019** | **2020** | **2021** | **2022** | **2023** |
|---|---|---|---|---|---|
| **Total Units** | **464** | **736** | **855** | **759** | **491** |
| Single Family | 302 | 518 | 548 | 451 | 491 |
| Multifamily | 162 | 218 | 307 | 308 | 0 |

This actual development rate represents an overestimate in the General Plan EIR of 5,990 units during the first five-year period for the EIR analysis. Using the actual build rate during the first five-year period extrapolated out to the 2040 horizon year, there is an estimated 14,542 residential units that would be constructed, whereas the EIR analysis assumed 40,900 units would be constructed. This represents an overestimate in the environmental analysis of approximately 181%. The number of units within the Project are assumed within the Development Projection presented in Bullet 6, and are well within the actual development that can be anticipated through 2040 based on the build rate through the first five years of the General Plan. Additionally, as described in the environmental checklist completed for the Project, all impacts related to utilities and service systems would be less than significant.

There is nothing peculiar about the Project as it relates to development projections from the General Plan EIR, or revised development projections estimated with actual build rates for housing in the first five years. The above facts meet the requirements outlined in Section 15183.

8) **General Plan EIR Evaluation**: The EIR states "*All of the analyses in this EIR are based on a consistent interpretation of the proposed General Plan land use map and policies, and the type and amount of growth that the General Plan would allow…*" (See General Plan Draft EIR, pp. 3-28). There are two different types of data inputs in the EIR; some require spatial inputs only and some require both quantitative and spatial inputs. Each are discussed below:

- Analyses in the General Plan EIR that are based on spatial location include aesthetics, agriculture, exposure to localized air pollution and noise, biological resources, cultural resources, geology, hazards and safety, hydrology and water quality, and land use (See General Plan Draft EIR, pp. 3-28). For these analyses, the question is not how much development the General Plan would allow, but where that development could potentially be located. Therefore, all potential development allowed by the land use map was evaluated in the General Plan EIR to assess impacts in these topics (i.e., full buildout of the proposed General Plan). This means that the Project site, which falls within the EIR Study Area, is within the geographical/spatial location for the General Plan analysis for each of these topics. A site-specific supplemental analysis has been performed and documented in the Initial Study for the Project to determine if there are any site-specific conditions that are peculiar and not consistent with the analysis in the General Plan EIR. As described in the environmental checklist completed for the Project, all impacts related to utilities and service systems would be less than significant. The Initial Study confirms that there are no peculiar conditions present on the Project site.

- Analyses in the General Plan EIR that require a quantitative estimate of growth include topics such as traffic generation, air pollution emissions, greenhouse gas emissions, etc. Impacts in these areas are generated by an increase in the number of people living and working in Stockton, which generates consequent increases in traffic, noise, emissions, and use of services. Therefore, a reliable analysis depends on a reasonable, quantitative estimate of new population and employment. For these analyses, the horizon-year projection (i.e., the projected amount of development that could occur under the proposed General Plan through its horizon year of 2040) was considered "reasonably foreseeable" and was used in the analysis. The development projections from Bullet 6 above (i.e. 40,900) were used. It can be confirmed that in Appendix B from the General Plan EIR, the model inputs are consistent with the development projections (see page 682 of the Draft EIR). For air quality modeling, for example, as stated on page 6 of Appendix B from the General Plan EIR, and as also described in Table 4.3-7 of the General Plan EIR:

    - Transportation emissions were modeled based on on-road VMT provided by Fehr & Peers and modeled using EMFAC2014-PL. EMFAC2014-PL provided the future year emissions rates, based on location and year;

    - Energy emissions were based on energy use data provided by the PG&E. Emissions forecasts were estimated based on changes in population (residential energy), employment (nonresidential energy). These emissions were based on a three-year average (2014-2016) of energy data as provided by PG&E.

    - Area source (Landscaping, Lighting, and Commercial Equipment) emissions were estimated using the OFFROAD2007 model to calculate emission rates for commercial equipment. Emissions forecasts were estimated based on population (Landscaping) and employment (Light Commercial Equipment) for the City of Stockton as a percentage of San Joaquin County.

    - Area source (Consumer Product) emissions were estimated using CalEEMod, following a methodology utilized to calculate VOC emissions from use of household consumer

cleaning products. Emissions forecasts account for the correct number of residential units in the SOI by 2040 (40,900 new units) (see page 187 of the Appendix).

- Other (Construction and Agricultural Equipment) emissions were estimated utilized the OFFROAD2007 model to agricultural equipment rates for construction and agricultural equipment. Agricultural equipment emissions are based on the proportion of farmland within the City of Stockton compared to San Joaquin County; emissions forecasts for agricultural equipment are based on the decrease in agricultural land, based on forecasted rate of change for the County of San Joaquin for years from 2000 to 2014). Construction emissions estimated based on housing permit data for San Joaquin County and City of Stockton from the US Census.

This is also consistent with the GP EIR's description of what was analyzed quantitatively in the EIR, which is defined as all land within the SOI (i.e. the EIR Study Area). The Bear Creek South project is within the SOI and it represents approximately 5% of the total units anticipated to be built in the Horizon Project Year 2040. Additionally, as further confirmation that the Bear Creek South project was modeled within the General Plan EIR, City staff confirmed with Placeworks (i.e. the consultants who developed the GP EIR) that these model inputs were carried out through all the modeling (per. Communication Nicole Moore March 14, 2025). In addition, it was confirmed with Fehr and Peers (per. Communication Ian Barns March 17, 2025) that the VMT modeling assumed *"+40,000 household was in fact used to populate VMT metrics in the model*." While much of the General Plan EIR focuses on more detailed LOS analysis by roadway, the VMT analysis is focused on total VMT in the aggregate based on a service population and average trip length. The service population is calculated based on the assumed development projection of over 40,000 new households within the Horizon Year. However, as shown in Bullet 7 above, this represents an overestimate in the environmental analysis of approximately 181%. Nevertheless, the number of units within the Project are assumed within the Development Projection presented in Bullet 6, and are well within the actual development that can be anticipated through 2040 based on the build rate through the first five years of the General Plan. There is nothing peculiar about the Project as it relates to development projections from the General Plan EIR that were used for the original modeling, and those projections are proving to be a very large overestimate of development. The Initial Study confirms that there are no peculiar conditions present on the Project site.
The above facts meet the requirements outlined in Section 15183.

9) **Applicability Statutes Regarding Subsequent Analysis:** Section 15162 addresses scenarios where subsequent analysis would be warranted for the approval of subsequent projects consistent with the General Plan evaluated in the prior the General Plan EIR. This includes scenarios where there are "*Substantial changes*" proposed, or that have occurred, that warrant revisions to the previous environmental document (Section 15162(a)(1-2). Another scenario where subsequent analysis would be warranted includes "*New Information*" that has become available that shows a new or more severe significant environmental effect, or new mitigation or alternatives have become feasible that would significantly reduce an environmental effect (Section 15162(a)(3). The Project does not trigger the criteria for subsequent environmental review under Section 15162 t. The Project does not propose changes to the General Plan, and there are no relevant mitigation or alternatives that require subsequent analysis. There is nothing peculiar about the Project as it relates to CEQA's requirements triggering subsequent environmental review. The above facts meet the requirements outlined in Section 15183.

10) **Applicability of Statutes Regarding Use with Later Activities:** Section 15168(c) provides that "*If the agency finds that pursuant to Section 15162, no subsequent EIR would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required*." The Project does not propose changes to the General Plan, and there are no relevant mitigation or alternatives that require subsequent analysis under Section 15162, as discussed above. Section 15168(c) states "*Whether a later activity is within the scope of a program EIR is a factual question that the lead agency determines based on substantial evidence in the record. Factors that an agency may consider in making that determination include, but are not limited to, consistency of the later activity with the type of allowable land use, overall planned density and building intensity, geographic area analyzed for environmental impacts, and covered infrastructure, as described in the program EIR*." As has been discussed earlier in this memo, the Project is consistent with: 1) the allowable land use, 2) overall planned density and building intensity, 3) the geographic area analyzed in the General Plan EIR, and 4) covered infrastructure as described in the General Plan EIR. The Project is also within the Development Projections included in the EIR, and only represents 5% of the Horizon-year Projection and 1.8% of the Full Buildout Projection. There is nothing peculiar about the Project as it relates to the "*Use with Later Activities*" CEQA provisions. The above facts meet the requirements outlined in Section 15183.

11) **Uniformly Applied Development Policies or Standards**: Section 15168(c) requires that the "*agency shall incorporate feasible mitigation measures and alternatives developed in the program EIR into later activities in the program*." The City has adopted General Plan policies, and various design and engineering standards that function as "*uniformly applied development policies or standards."* All projects in Stockton, including the Project, are conditioned to comply with these existing uniformly applied development policies or standards, which collectively are designed to minimize and/or avoid environmental impacts. The Project will also comply with these existing policies and standards. There is nothing peculiar about the Project as it relates to existing policies and standards. The above facts meet the requirements outlined in Section 15183.

12) **Existing Conditions**: The existing Project site conditions consist of predominantly agricultural uses and related facilities such as associated agricultural equipment and irrigation ditches. There are six dirt/gravel roadways that bisect the Project site, including three dirt roadways extending south to north from Morada Lane, and three other dirt roadways trending west to east, including one along the base of the Bear Creek levee. The irrigation canals are operated by the Woodbridge Irrigation District (WID) and run along the northeast and central portions of the Project site. Outside of the Project site to the east is the Union Pacific Railroad right-of-way, which is a rail line that has existed for over 100 years and bisects the City of Stockton. The existing conditions are not peculiar to the area; instead, they represent typical agricultural crops/orchards with irrigation ditches, and have no natural wetlands or other sensitive habitats. As such, there is nothing peculiar about the Project as it relates to the existing conditions. The above facts meet the requirements outlined in Section 15183.

13) **Adopted SOI**: San Joaquin County LAFCo has adopted a Sphere of Influence Map for the City of Stockton, which reflects a revision date of February 22, 2022 by Placerworks, the author of the GP EIR. The document is labeled as Figure 7-10 and is titled "*10-year Planning Horizon Annexation Areas.*" The map labels two categories of land within the SOI. Areas in yellow are within the SOI, but not within the 10-year planning horizon, and areas with orange are within the SOI, and within the 10-year planning horizon. The Project is labeled with the orange, depicting that is within the 10-year planning horizon. This reflects the fact that the Project is anticipated to be annexed and developed in the reasonably foreseeable future (i.e.

10-year horizon). When you combine this fact, with the fact that GP EIR (Page 3-4) states "*this EIR focuses on the analysis of potential changes within the SOI (i.e., the "EIR Study Area"),"* and the fact that the GP EIR provides Figure 3-1 depicting the Project site within *EIR Study Area,* it can be concluded that the Project is in fact included in both spatial and quantitative analysis in the GP EIR. There is nothing peculiar about the Project as it relates to City's adopted SOI and the expectation that the Project will be developed within the 10-year horizon. The above facts meet CEQA's requirements outlined in Section 15183.

14) **Adopted MSR**: San Joaquin County LAFCo has adopted a Municipal Service Review for the City of Stockton, which reflects a date of April 23, 2020 by Placerworks, the author of the GP EIR. The document is consistent with the information reflected in the City's SOI, which shows the Project site as being within the "*10-year Planning Horizon Annexation Areas.*" This again reflects the fact that the Project is anticipated to be annexed and developed in the reasonably foreseeable future. There is nothing peculiar about the Project as it relates to City's adopted MSR and the expectation that the Project will be developed within the 10-year horizon. The above facts meet the requirements outlined in Section 15183.

In conclusion, a full examination of the Project in the Initial Study, combined with the examination of the Project within the context of the General Plan supporting documents, the adopted General Plan, the certified General Plan EIR, adopted Sphere of Influence, and adopted Municipal Service Review as summarized herein, confirms our opinion that the Project qualifies for a statutory exemption under Public Resources Code Section 21083.3 and CEQA Guidelines Section 15183. If you have any questions, please feel free to contact me.

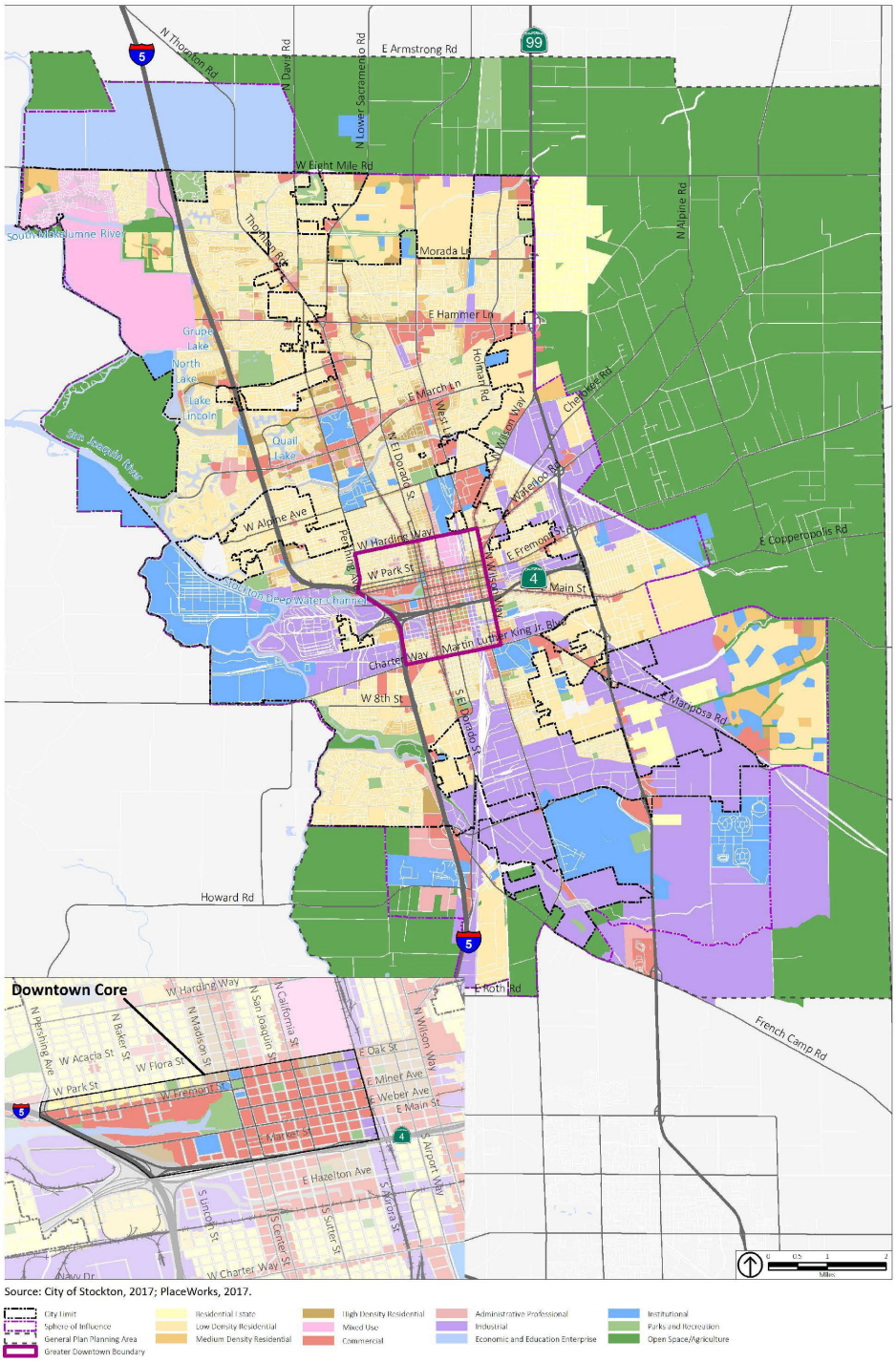
Sincerely,

DE NOVO PLANNING GROUP
Steve McMurtry, Principal

Attachments
A - General Plan Land Use Map (2018)
Attachment B – General Plan Baseline Report – Major Development Projects (2015)
B - General Plan Baseline Conditions Report – Major Development Projects (2015)
C – General Plan Existing Conditions Technical Memorandum Existing General Plan Land Use Map (2016)
D – General Plan Existing Conditions Technical Memorandum Major Development Projects (2016)

Attachment A – General Plan Land Use Map (2018)

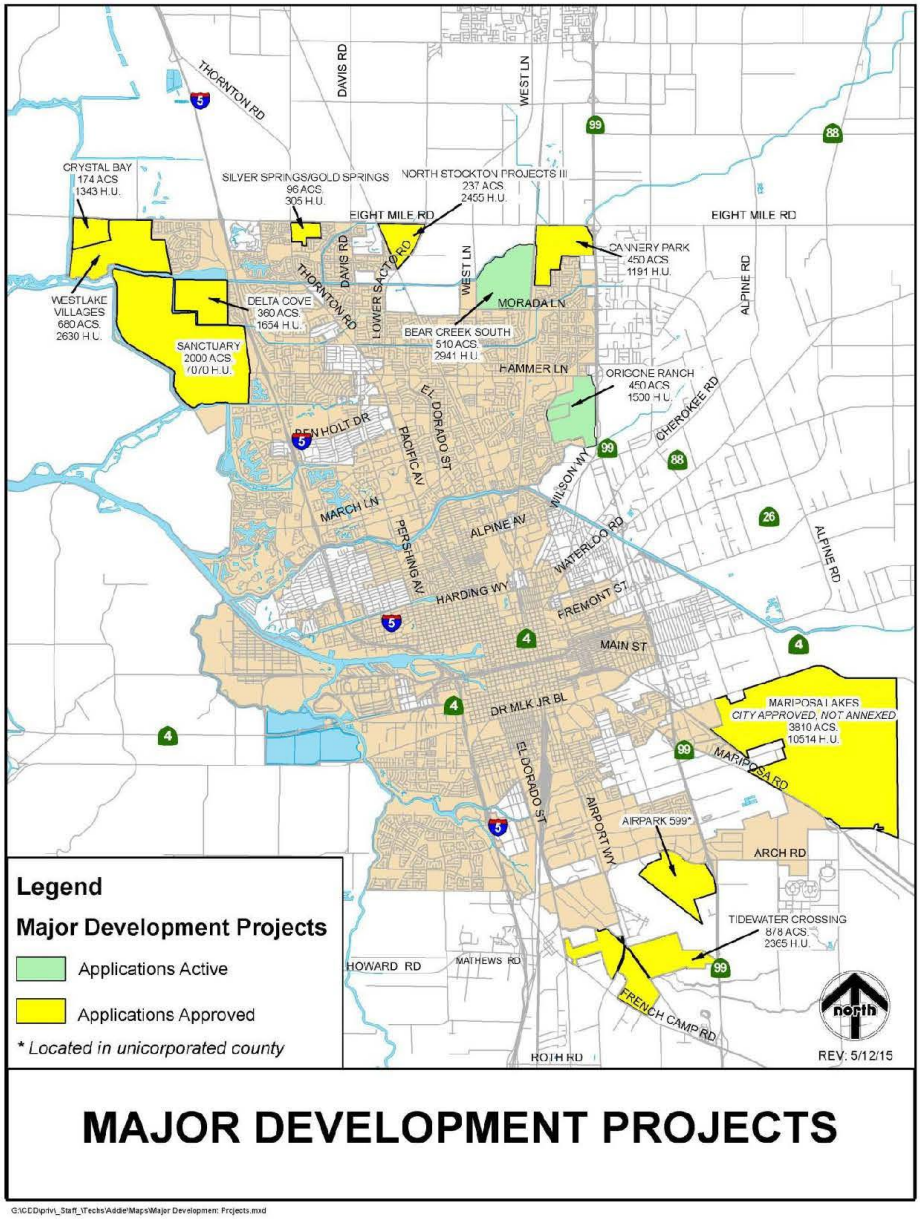
**Figure 2-8**
**General Plan Land Use Map**



Attachment B – General Plan Baseline Report – Major Development Projects (2015)



## Major Projects

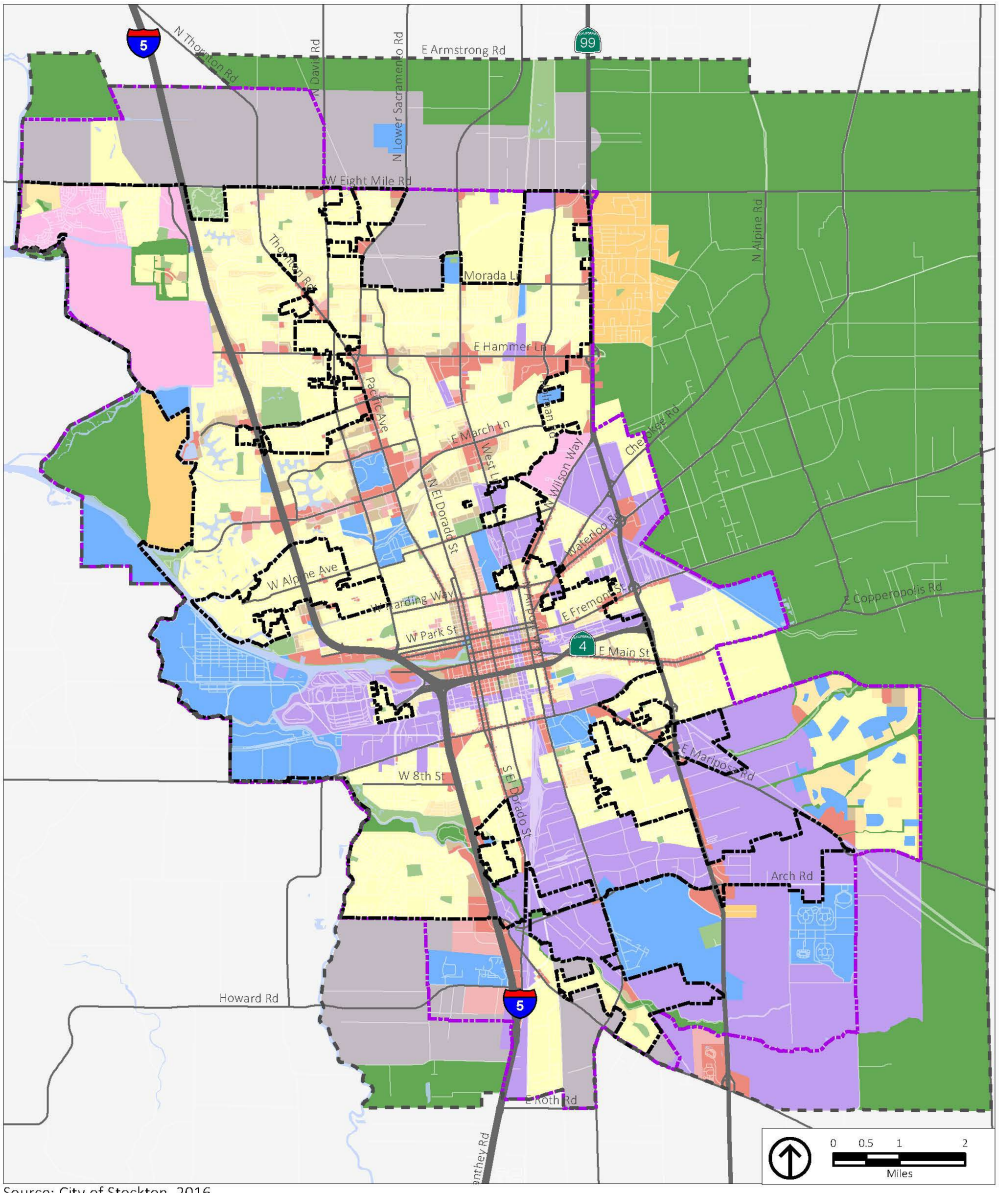


Attachment C – Existing Conditions Technical Memorandum Existing General Plan Land Use Map (2016)

ENVISION STOCKTON

STOCKTON 2040 GENERAL PLAN UPDATE
CITY OF STOCKTON

EXISTING CONDITIONS TECHNICAL MEMORANDUM: LAND USE




Source: City of Stockton, 2016.

Residential
- Residential Estate
- Low Density Residential
- Medium Density Residential
- High Density Residential

Mixed Use
- Village
- Mixed Use

Business and Industry
- Commercial
- Administrative Professional
- Industrial

Public Facilities & Open Space
- Institutional
- Parks and Recreation
- Open Space/Agriculture

- City Limit
- Sphere of Influence
- General Plan Planning Area

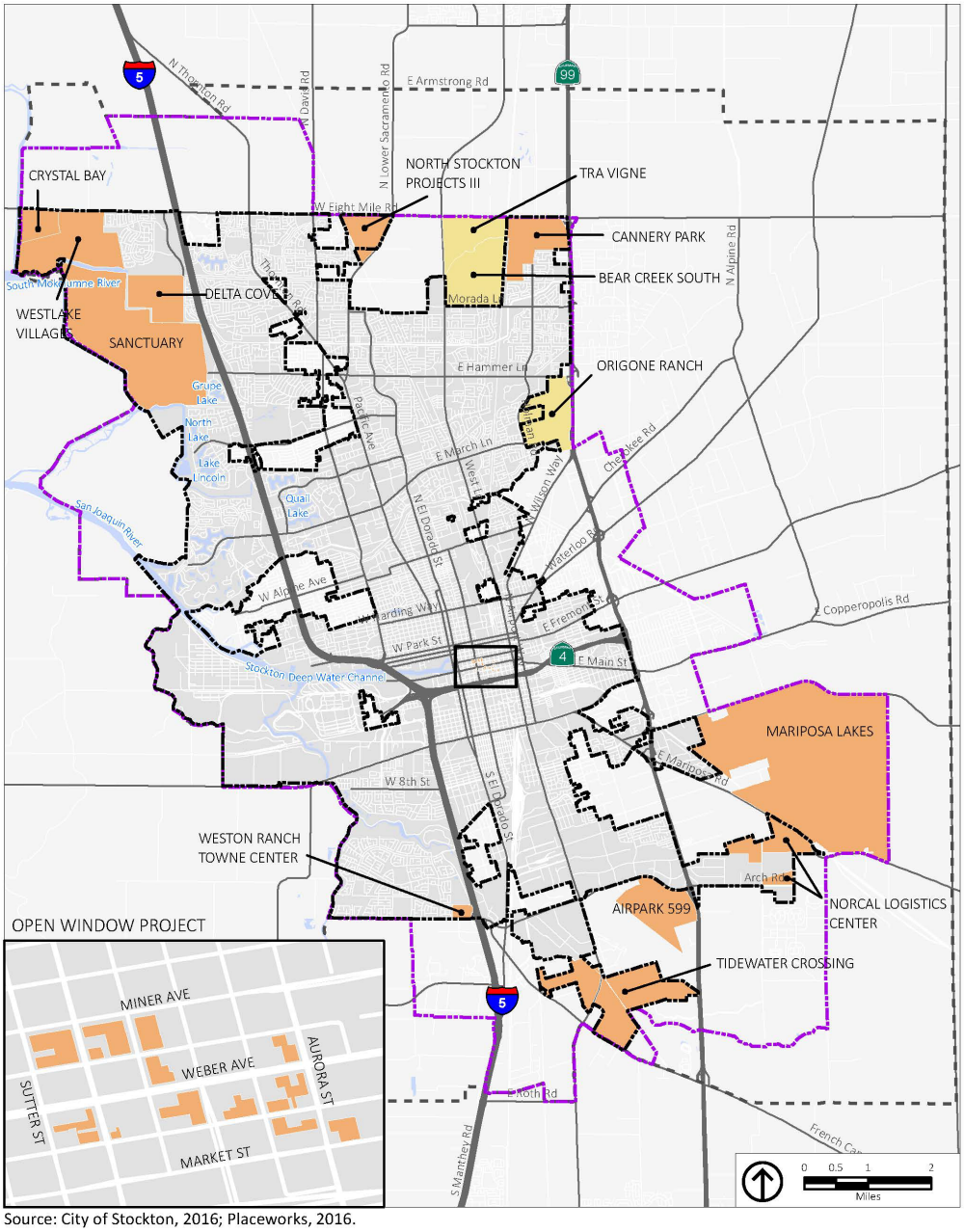
Figure 3
Existing General Plan Land Use Map

Attachment D – Existing Conditions Technical Memorandum Major Development Projects (2016)

ENVISION STOCKTON

STOCKTON 2040 GENERAL PLAN UPDATE
CITY OF STOCKTON

EXISTING CONDITIONS TECHNICAL MEMORANDUM: LAND USE




Source: City of Stockton, 2016; Placeworks, 2016.

Approved Applications
Active Applications
City Limit
Sphere of Influence
General Plan Planning Area

Figure 8
Major Development Projects