
# *Appendix 9.11*
# *Transportation Data*

# Gardena TOD Specific Plan

(12850 Crenshaw Boulevard)

## Local Transportation Assessment

Prepared for:
Din/Cal 4, Inc.

Revised November 3, 2020

LB20-0010

FEHR PEERS

# Table of Contents

# Appendices



# List of Figures



# List of Tables

# 1. Executive Summary

This report presents the results of the Local Transportation Assessment (LTA) for the Transit Oriented Development (TOD) Specific Plan project (project) located at 12850 Crenshaw Boulevard in Gardena. The LTA was prepared in accordance with the City of Gardena Transportation Analysis Updates. The intent of an LTA is to assess a project's effects on the local transportation system and inform decision makers. The study locations and methodology were determined based on consultation with City of Gardena staff.

*Project Description*. The project includes up to 265-units of mid-rise, multi-family housing located approximately 500 feet south of the intersection of Crenshaw Boulevard and El Segundo Boulevard and near several transit service routes. Access to the site will be provided on Crenshaw Boulevard. The project is expected to be completed and occupied in 2023.

*Study Methodology*. The study evaluates Existing, Opening Year 2023 No Project, and Opening Year 2023 Plus Project scenarios at two (2) study intersections based on level of service (LOS) operation ratings. The project's effect on pedestrian, bicycle and transit facilities and services was also evaluated.

*Vehicle Trip Generation*. The project is forecast to generate approximately 1,370 new weekday daily vehicle trips, including 91 AM peak hour and 111 PM peak hour trips. To maintain a conservative analysis, no trip generation credit was applied from the existing auto-parts warehouse currently occupying the site.

*Intersection Analysis*. The transportation analysis evaluated two (2) study intersections pursuant to guidelines established by the City of Gardena. The City's analysis criteria for signalized intersections is to maintain LOS E or better during peak travel hours under Existing and Opening Year Conditions.

> Existing Conditions: Both intersections currently operate at LOS D or better operating conditions during both peak hours.
> Opening Year 2023 No Project and Plus Project Conditions. Both intersections are forecast to operate at LOS E or better during the Opening Year 2023 peak hours, under without and with project conditions. The project does not exceed the City's analysis criteria, and therefore, is not expected to have a negative effect on operations in the study area.

*Project Effects on Transportation Facilities*. LOS does not degrade beyond LOS E during the peak hours; therefore, no improvements are recommended for the study intersections. Similarly, the project is not expected to negatively affect the nearby pedestrian, bicycle, or transit facilities.

# 2. Introduction

This report presents the results of the Local Transportation Assessment (LTA) conducted by Fehr & Peers for the proposed TOD Specific Plan project ("project") in the City of Gardena. The analysis identifies the effects of the proposed project on the surrounding transportation system. This LTA was conducted in accordance with the requirements of the City of Gardena's Senate Bill 743 Implementation Transportation Analysis Updates. While CEQA requirements have changed and level of service (LOS) no longer constitutes CEQA impacts, an LTA may inform decision makers on the overall effects of a project.

## 2.1 Project Description

The proposed Gardena TOD Specific Plan residential project is located at 12850 Crenshaw Boulevard, approximately 500 feet south(east) of the intersection at Crenshaw Boulevard/El Segundo Boulevard, within close proximity to several transit service routes and high-quality transit. The proposed project will replace the prior auto parts warehouse with a new residential building with multi-modal amenities that promote walking, biking, and transit use. The project will consist of up to 265 multi-family dwelling units. Site access will be provided by a right-in right-out (RIRO) driveway along the east side of Crenshaw Boulevard. **Figure 1** illustrates the study area for the proposed project. **Figure 2** illustrates the proposed ground floor site plan, including the project access points.

## 2.2 Project Study Area

The transportation assessment focused on evaluating the project's effect on vehicle operations at two (2) existing intersections in the vicinity of the proposed project. The analyzed intersections are listed below and are shown on **Figure 1**:

1. Crenshaw Boulevard/El Segundo Boulevard
2. Crenshaw Boulevard/West 135$^{th}$ Street

The study intersections were evaluated during the highest one-hour of travel demand of the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak periods. Due to the impact of COVID-19 on travel patterns starting in March 2020, new traffic counts were not collected at the study intersections. Alternatively, existing 2020 volumes were developed using traffic counts collected in November 2015 in the study area and grown by one percent per year, consistent with the average traffic growth in the study area.

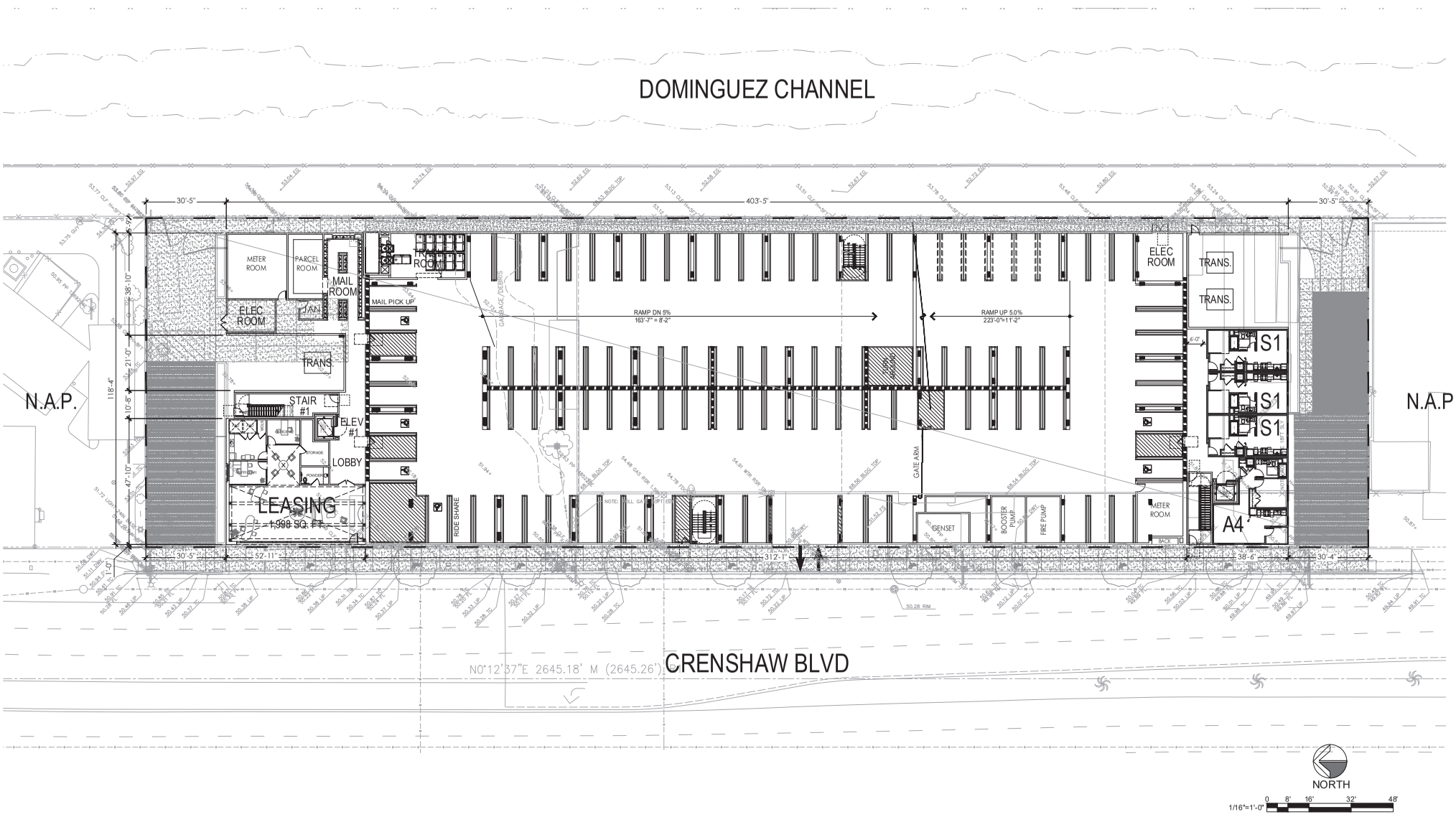

Project Site

Study Intersections

City Boundaries

Figure 1

## Study Area




BUILDING PLANS
GROUND LEVEL

A-2.0

DATE: 03-26-2020
JOB NO.: 2019-446

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Figure 2

Site Plan

## 2.3 Intersection Analysis Scenarios

The operations of the study intersections were evaluated during the weekday AM and PM peak hours for the following scenarios:

- Existing (2020) Conditions – The analysis of existing traffic conditions was based on 2015 intersection traffic counts which were grown by one percent per year to forecast 2020 traffic conditions. Existing conditions is assumed to include the current auto-parts warehouse use occupying the site. The existing conditions analysis includes a description of key area streets and highways and an assessment of bicycle, pedestrian, and transit facilities and services in the study area.

- Opening Year (2023) No Project Conditions – Future traffic volumes for the anticipated opening year of the project were projected by increasing the Existing (2020) traffic volumes using an annual growth factor of one percent per year to account for ambient growth in the area. This scenario does not include any project-generated traffic.

- Opening Year (2023) Plus Project Conditions – Traffic projections from Opening Year (2023) No Project Conditions plus the addition of project-generated traffic. To maintain a conservative analysis, no trip generation credit was applied from the existing auto-parts warehouse currently occupying the site.

## 2.4 Traffic Analysis Methodology

The analysis of roadway operations performed for this study is based on procedures presented in the *Highway Capacity Manual 6th Edition* (HCM 6), published by the Transportation Research Board in 2016. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, which is the least congested operating conditions, to LOS F, which is the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodologies for signalized and unsignalized intersections are described below.

At the time this analysis was completed, Los Angeles County was in the process of updating the Transportation Analysis Guidelines with HCM as the preferred analysis methodology for intersection analysis. LA County no longer has significant impact thresholds for intersection LOS in compliance with SB743.

### 2.4.1 Signalized Intersections

The method described in Chapter 19 of HCM 6 was used to prepare the LOS calculations for the signalized study intersections. This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections was calculated using the Synchro 10.0 analysis software and is correlated to a LOS designation as shown in **Table 1**.

**Table 1: Signalized Intersection Level of Service Criteria**

| Level of Service | Description | Average Control Delay per Vehicle (Seconds) |
|---|---|---|
| A | EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used. | ≤ 10.0 |
| B | VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles. | > 10.0 to 20.0 |
| C | GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles. | > 20.0 to 35.0 |
| D | FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups. | > 35.0 to 55.0 |
| E | POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles. | > 55.0 to 80.0 |
| F | FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths. | > 80.0 |

Source: *Highway Capacity Manual 6th Edition*, Transportation Research Board, 2016.

### 2.4.2 Analysis Criteria

The analysis of future conditions compares the "no project" condition against conditions that include project-generated traffic assuming full build-out and occupancy. This approach determines whether the addition of project traffic is expected to worsen delay beyond the City's LOS requirements on the local roadways. The City of Gardena's analysis criteria for signalized intersections is as follows:

- To the extent feasible, maintain traffic flows at nonresidential, signalized intersections at LOS E during peak rush hours.

- To the extent feasible, maintain traffic flows at residential signalized intersections at LOS D during peak rush hours.

The study intersections evaluated in this LTA are considered nonresidential, signalized intersections.

Also, the City requires that projects be reviewed for potential conflicts with plans and policies related to active transportation modes (walking, biking, transit).

# 3. Existing Conditions

This chapter describes the study area's existing transportation network and includes a discussion of the roadway, bicycle, pedestrian, and transit facilities in the study area. The assessment of the existing conditions relevant to this study establishes the scenario against which the opening year operations and proposed project changes may be compared.

## 3.1 Surrounding Roadway Network

The key roadways providing access to the site are described below. Overall, the major and arterial roadway network surrounding the project site comprises of a comprehensive grid network between Interstates 105, 110, and 405 freeways and adjacent communities.

***Crenshaw Boulevard*** is a six-lane arterial which connects Gardena to Torrance and the Palos Verdes peninsula to the south, and Inglewood and Los Angeles to the north. It connects the project site to both I-405 and I-105. In the immediate vicinity of the project site, no stopping is allowed at any time along Crenshaw Boulevard in both directions. South of the project site, starting from approximately 500 feet south of the Crenshaw Boulevard/El Segundo Boulevard intersection, parking is allowed in the curbside lane except during the peak period of the direction of travel (i.e. northbound in the AM peak period and southbound in the PM peak period). The posted speed limit is 40 miles per hour (mph) with the exception of southbound Crenshaw Boulevard south of 132$^{nd}$ Street where the posted speed limit is 35 miles per hour.

Crenshaw Boulevard is designated as a Disaster Route in the Los Angeles County Operational Area. Per the department of public works for Los Angeles County: "Disaster Routes are freeway, highway or arterial routes pre-identified for use during times of crisis. These routes are utilized to bring in emergency personnel, equipment, and supplies to impacted areas in order to save lives, protect property and minimize impact to the environment. During a disaster, these routes have priority for clearing, repairing and restoration over all other roads.

Note: Disaster Routes are NOT Evacuation Routes. Although an emergency may warrant a road be used as both a disaster and evacuation route, they are completely different. An evacuation route is used to move the affected population out of an impacted area."

***El Segundo Boulevard*** is a six-lane arterial which connects Gardena to Hawthorne and El Segundo to the west and Compton, the Harbor Gateway portion of Los Angeles, and the unincorporated community of

Willowbrook to the east. It connects the project site to both I-405 and I-110. The posted speed limit is 40 mph. El Segundo Boulevard is designated as a truck route within the City of Gardena.

***West 135th Street*** east of Crenshaw Boulevard is a four-lane major collector running through Gardena, the Harbor Gateway portion of Los Angeles, and into Compton. It runs parallel to both El Segundo Boulevard and Rosecrans Avenue but does not provide direct access to I-110. The posted speed limit is 40 mph. West of Crenshaw Boulevard, West 135th Street is a two-lane road providing access to neighborhoods in Hawthorne and Hawthorne's unincorporated sphere of influence and connects to Prairie Avenue. The posted speed limit is 25 mph.

## 3.2 Transit Facilities

The project site is located within a quarter mile of nine bus stops and is well-served by transit service via LA Metro, Torrance Transit, and the City of Gardena's Transit Service, GTrans. Access to light rail is also available at the Green Line Station, located less than one mile north of the project at Crenshaw Boulevard/Interstate 105. The following bus routes provide service within walking distance of the project site:

- **Route 5 (GTrans)**: connects to Metro buses on El Segundo Boulevard and to Metro Rail at the Imperial and Aviation Stations. Popular destinations on this bus route include Centennial High School, Hawthorne High School, Hawthorne Memorial Center, Hawthorne Sports Center, MLK Community Hospital and Magic Johnson Park.
- **Route 2 (Torrance Transit)**: runs along Crenshaw Boulevard between Pacific Coast Highway in Torrance and I-105.
- **Route 10 (Torrance Transit)**: connects to the Del Amo Fashion Center in Torrance and Harbor Freeway Transit Station via Crenshaw Boulevard and El Segundo Boulevard.
- **Route 126 (Metro)**: connects to Manhattan Beach – Hawthorne Metro Rail Station via El Camino College.
- **Route 210 (Metro)**: connects to Hollywood/Vine Station – South Bay Galleria via Crenshaw Boulevard.
- **Route 710 (Metro)**: connects to Wilshire Center – South Bay Galleria via Crenshaw Boulevard.

## 3.3 Pedestrian Facilities

Existing sidewalks are provided along the project frontage and within a continuous and complete pedestrian network in the surrounding area. Marked crosswalks, curb ramps, and pedestrian signals are provided on all legs of the nearest intersection of Crenshaw Boulevard and El Segundo Boulevard, which provides direct access to transit stops and surrounding land uses. However, curb ramps are not ADA complaint on at least two corners of the Crenshaw Boulevard and El Segundo Boulevard intersection.

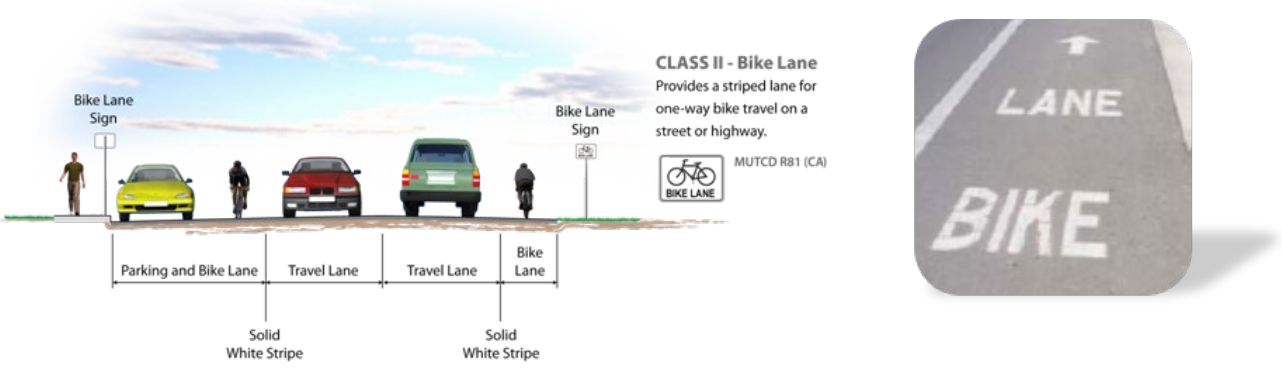
Sidewalk is discontinuous along the east side of Crenshaw Boulevard for the short segment between just south of the project site and 131st Street.

## 3.4 Bicycle Facilities

Bicycle facilities generally consist of four types of facilities, which are outlined below:

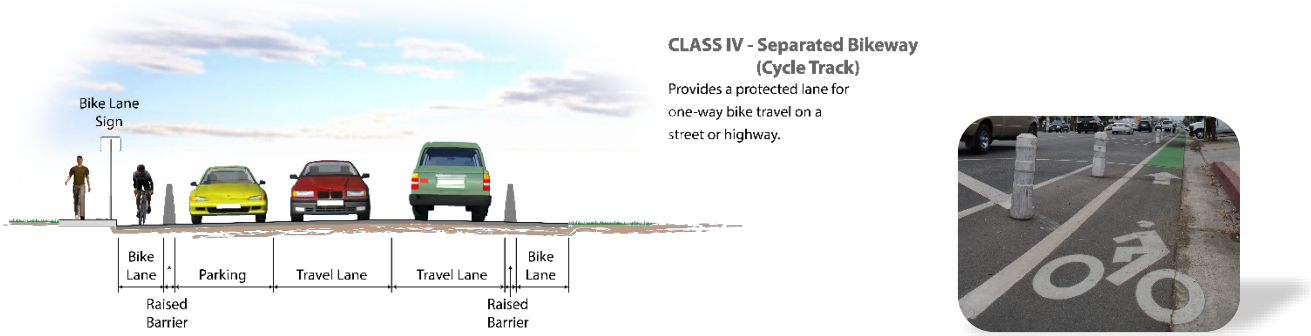
- *Bike or Shared Use Paths* provide a separate right-of-way and are designated for the exclusive use of bicycles and pedestrians (or exclusively bicycles) with vehicle and pedestrian cross-flow minimized. Generally, the recommended pavement width for a two-directional bike or multi-use path is ten (10) feet.


- *Bike Lanes* provide a restricted right-of-way and are designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.




- *Bike Route or Signed Shared Roadways* provide for a right-of-way designated by signs or shared lane pavement markings, or "sharrows," for shared use with pedestrians or motor vehicles.

- *Separated Bikeways or Cycle Tracks* provide a restricted right-of-way with physical separation and are designated for the use of bicycles in or directly adjacent to a roadway with a raised barrier such as curbs or bollards. Separated bikeways are typically at least five (5) feet wide with a minimum three (3) foot minimum horizontal separation from an adjacent vehicle parking or travel lane (although a two (2) foot median could be used next to a travel lane with lower vehicle speeds). Adjacent vehicle parking is permitted, and vehicle/pedestrian cross-flow is restricted to selected locations (e.g., driveways) indicated by breaks in the barrier and buffer.




An existing bike path (Class I) is provided along the Laguna Dominguez Trail behind the project site on the east side of the waterway channel. The Laguna Dominguez Trail spans almost three miles between Lawndale and Hawthorne. It provides direct bicycle access between the project site and the Green Line Station.

Separated or protected bicycle facilities are not currently provided along Crenshaw Boulevard near the project site. However, the following two bike lane projects are recommended in the South Bay Bicycle Master Plan as prioritized projects in Gardena and may be constructed by the City in the future:

- Crenshaw Boulevard from El Segundo Boulevard to Redondo Beach Boulevard
- El Segundo Boulevard from Crenshaw Boulevard to Vermont Avenue

El Segundo Boulevard west of Crenshaw Boulevard is designated as a bike route (Class III).

## 3.5 Existing Intersection Level of Service

For the study intersections, the AM peak hour of traffic generally occurs from 7:30 AM to 8:30AM, while the PM peak hour of traffic occurs from 5:00 PM to 6:00 PM. Existing lane configurations and signal controls were obtained through field observations as well as from information provided by Los Angeles County Department of Public Works.

**Figure 3** presents the Existing AM and PM peak hour turning movement volumes, corresponding lane configurations (at the time of field observations), and traffic control devices. Traffic count data sheets are provided in **Appendix A**. Existing peak-hour vehicle volumes and lane configurations were used to

calculate levels of service for each of the study intersections. The results of the existing LOS analysis are presented below in **Table 2**. Corresponding LOS calculation sheets are included in **Appendix C**. The results of the LOS calculations indicate that both study intersections operate at LOS D or better during the weekday AM and PM peak hours.

**Table 2: Existing Intersection Level of Service**

| Intersection | Traffic Control | Peak Hour | Delay (sec/veh) | LOS[1] |
|---|---|---|---|---|
| 1. Crenshaw Blvd/El Segundo Blvd | Signalized | AM | 44.0 | D |
| | | PM | 52.9 | D |
| 2. Crenshaw Blvd/W. 135th St | Signalized | AM | 44.9 | D |
| | | PM | 24.9 | C |

Source: Fehr & Peers.
Notes: [1]LOS calculations performed using the HCM 6 method. Unacceptable seconds of delay per vehicle and LOS highlighted in **bold**.

## 3.6 Field Observations

Field observations conducted for the project on May 21st, 2020 showed that traffic moves fairly well throughout the study area, albeit near capacity during the AM and PM peak hours. Longer queues were noted on eastbound El Segundo Boulevard during the PM peak hour, as well as on the 135th Street eastbound left during the AM peak hour and 135th Street westbound left during and PM peak hours. All observed queues were able to clear during a single signal cycle. Overall, the existing peak hour LOS at the study intersections shown in **Table 2** are generally consistent or slightly worse observed field conditions. This is expected given observations were taken during the COVID-19 pandemic, and there were likely fewer vehicles on the road when field observations were taken.

Pedestrian activity was observed to be fairly regular, with pedestrian calls usually occurring every cycle or every other cycle. Bicycling activity was minimal during both peak hours along Crenshaw Boulevard and El Segundo Boulevard, where no separated bicycle facilities are provided.


Project Site

Study Intersections

City Boundaries

XX(XX) AM(PM) Peak Hour Volumes

LOS: AM PM | A-C | D | E | F

Figure 3

## Peak Hour Traffic Volumes and Lane Configurations Existing Conditions (2020)

# 4. Opening Year (2023) No Project Conditions

To evaluate the potential effects of traffic generated by the proposed project on the surrounding street system, Opening Year (2023) No Project traffic volumes were developed to reflect traffic increases due to regional and local growth. Opening Year (2023) future traffic conditions also consider traffic generated by other projects which are proposed, approved, or under construction within the vicinity of the Project site.

## 4.1 Opening Year (2023) No Project Intersection Level of Service

A growth factor of one percent per year was applied to the existing traffic volumes to account for future growth within the study area. This factor is consistent with the rate of growth of background traffic observed and used for traffic analysis in Gardena and other nearby jurisdictions, including the City of Hawthorne. The growth rates were compounded over a three-year timeframe (2020 to 2023) and applied to the Existing (2020) intersection traffic volumes. The resulting volumes were rounded to the nearest ten (10).

As previously discussed, travel restrictions related to the COVD-19 pandemic prevented the ability to collect new traffic data for this project. Therefore, traffic data at the study intersections from 2015 were grown by one percent per year to establish Existing (2020) conditions volumes. Based on the compounded growth rate applied to Existing (2015-2020) and Opening Year (2020-2023) traffic volumes, the Opening Year (2023) volumes reflect approximately 13 percent growth from the 2015 traffic count data.

Development of the forecasted Opening Year (2023) traffic volumes considered additional or cumulative traffic generated by other projects that are proposed, approved, or under construction within the vicinity of the Project study area. The list of cumulative projects considered is included in **Appendix B**. For the purpose of this Local Transportation Assessment, projects within one mile were reviewed, including the Green Line Mixed Use Specific Plan and an industrial warehouse located at 12515 Cerise in the City of Hawthorne. Traffic-related information was reviewed for both projects and compared with the Opening Year (2023) No Project traffic volume forecast. Upon review it was determined that the 13 percent growth forecasted between the 2015 traffic count data and Opening Year (2023) traffic volumes captured adequate growth including traffic generated by the cumulative projects in the vicinity.

**Figure 4** illustrates the forecasted peak hour traffic volumes for the Opening Year (2023) No Project Conditions.

LOS calculations were conducted to evaluate the operating levels of the study intersections under Opening Year (2023) No Project Conditions. The results of the LOS analysis are presented in **Table 3**. The corresponding LOS calculation sheets are included in **Appendix C**. The analysis results indicate that both study intersections are forecast to continue operating at LOS E or better under Opening Year (2023) No Project Conditions.

**Table 3: Opening Year (2023) No Project Intersection Level of Service**

| Intersection | Traffic Control | Peak Hour | Delay (sec/veh) | LOS[1] |
|---|---|---|---|---|
| 1. Crenshaw Blvd/El Segundo Blvd | Signalized | AM | 45.6 | D |
| | | PM | 57.5 | E |
| 2. Crenshaw Blvd/W. 135th St. | Signalized | AM | 51.1 | D |
| | | PM | 27.8 | C |

Source: Fehr & Peers.
Notes: [1] LOS calculations performed using the HCM 6 method. Unacceptable seconds of delay per vehicle and LOS highlighted in **bold**.


Project Site

Study Intersections

City Boundaries

XX(XX) AM(PM) Peak Hour Volumes

LOS: AM PM | A-C | D | E | F

Figure 4

Peak Hour Traffic Volumes and Lane Configurations
Opening Year (2023) No Project

# 5. Project Traffic Estimates

This chapter describes the anticipated number of vehicle trips and directionality of trips that would result from implementation of the proposed project. Future traffic added to the roadway system by the project is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic which will be added to the roadway network. The second step identifies the direction of travel to and from the project site and the proportion of traffic on each potential travel path. The new trips are assigned to specific street segments and intersection turning movements during the third step.

## 5.1 Trip Generation

The vehicle trip generation for the proposed project was estimated using standard trip rates published in the *Trip Generation Manual* (10th Edition, 2017) by the Institute of Transportation Engineers (ITE). To reflect the project location within a Transit Priority Area and proximity to high-quality transit, a five percent multimodal trip reduction was applied to the forecasted trip generation. To maintain a conservative analysis, no trip generation credit was applied from the existing 24,000 square foot auto parts warehouse occupying the site, which generates an estimated 1,329 daily trips based on ITE trip rates.

As shown in **Table 4**, the proposed project is expected to generate a total of 1,442 gross new daily vehicle trips, including 96 gross new vehicle trips during the AM peak hour (25 inbound/72 outbound) and 117 gross new vehicle trips during the PM peak hour (72 inbound/45 outbound). Of these trips, a reduction of approximately 5% of trips is estimated to account for other modes of travel (i.e., walk, bike, or take transit). The result is a total of 1,370 net new daily vehicle trips, including 91 net new vehicle trips during the AM peak hour (24 inbound/67 outbound) and 111 gross net new vehicle trips during the PM peak hour (68 inbound/43 outbound).

**Table 4: Project Vehicle Trip Generation Estimates**

| Land Use | Units | Daily[1] | AM | | | PM | | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | In | Out | Total | In | Out |
| Multi-family Housing, Mid-Rise | 265 dwelling units | 1,442 | 96 | 25 | 72 | 117 | 72 | 45 |
| 5% Walk, Bike, and Transit Reduction | | -72 | -5 | -1 | -4 | -6 | -4 | -2 |
| **NET NEW TRIPS** | | ***1,370*** | ***91*** | ***24*** | ***67*** | ***111*** | ***68*** | ***43*** |

Source: Fehr & Peers.
Notes: [1] Multi-family (mid-rise) trip rates based on Land Use Code 221 from *ITE Trip Generation Manual (10th Edition, 2017).*
Daily: 5.44; AM: 0.36, In 26% / Out 74%; PM: 0.44, In 61% / Out 39%

## 5.2 Trip Distribution and Trip Assignment

The geographic distribution of trips generated by the proposed project is dependent on characteristics of the street system serving the project site; the level of accessibility of routes to and from the project site; and non-residential areas to which local residents would be drawn, such as job centers, shopping destinations, services, and schools.

The forecasted project trip distribution pattern was primarily developed by assuming no significant changes in the characteristics of the existing systems. The resulting trip distribution pattern estimates for the peak hour project-generated traffic are as follows:

- 40% to/from along Crenshaw Boulevard north of El Segundo Boulevard
- 10% to/from along Crenshaw Boulevard south of 135th Street
- 20% outbound and 10% inbound to/from El Segundo Boulevard west of Crenshaw Boulevard
- 20% outbound and 10% inbound to/from El Segundo Boulevard east of Crenshaw Boulevard
- 5% outbound and 15% inbound to/from 135th Street west of Crenshaw Boulevard
- 5% outbound and 15% inbound to/from 135th Street east of Crenshaw Boulevard

Using the estimated trip generation and the distribution patterns discussed above, the traffic generated by the proposed project was assigned to the individual turning movements at the study intersections.

Project access will be restricted to right-in, right-out only with no left-turn permitted. Therefore, the trip assignments assumed u-turns and travel patterns to account for the proposed access. Approximately half of the inbound vehicles from El Segundo Boulevard and 10% of the inbound vehicles from Crenshaw Boulevard to the north are assumed to take El Segundo Boulevard and traverse through the local grid network to access the project site. All other inbound vehicles from El Segundo Boulevard or Crenshaw Boulevard to the north were assumed to split 50/50 between making a southbound u-turn at 135th Street or making a southbound u-turn approximately 500 feet north of 135th Street along Crenshaw Boulevard from an existing unsignalized left-turn lane. There are additional median openings along Crenshaw Boulevard that do not prohibit u-turns, therefore the trip distribution for u-turns at 135th Street is considered conservative. All outbound traffic heading south of the project site was assumed to make a u-turn at the Crenshaw Boulevard/El Segundo Boulevard intersection.

**Figure 5** details the project's trip distribution and trip assignment.

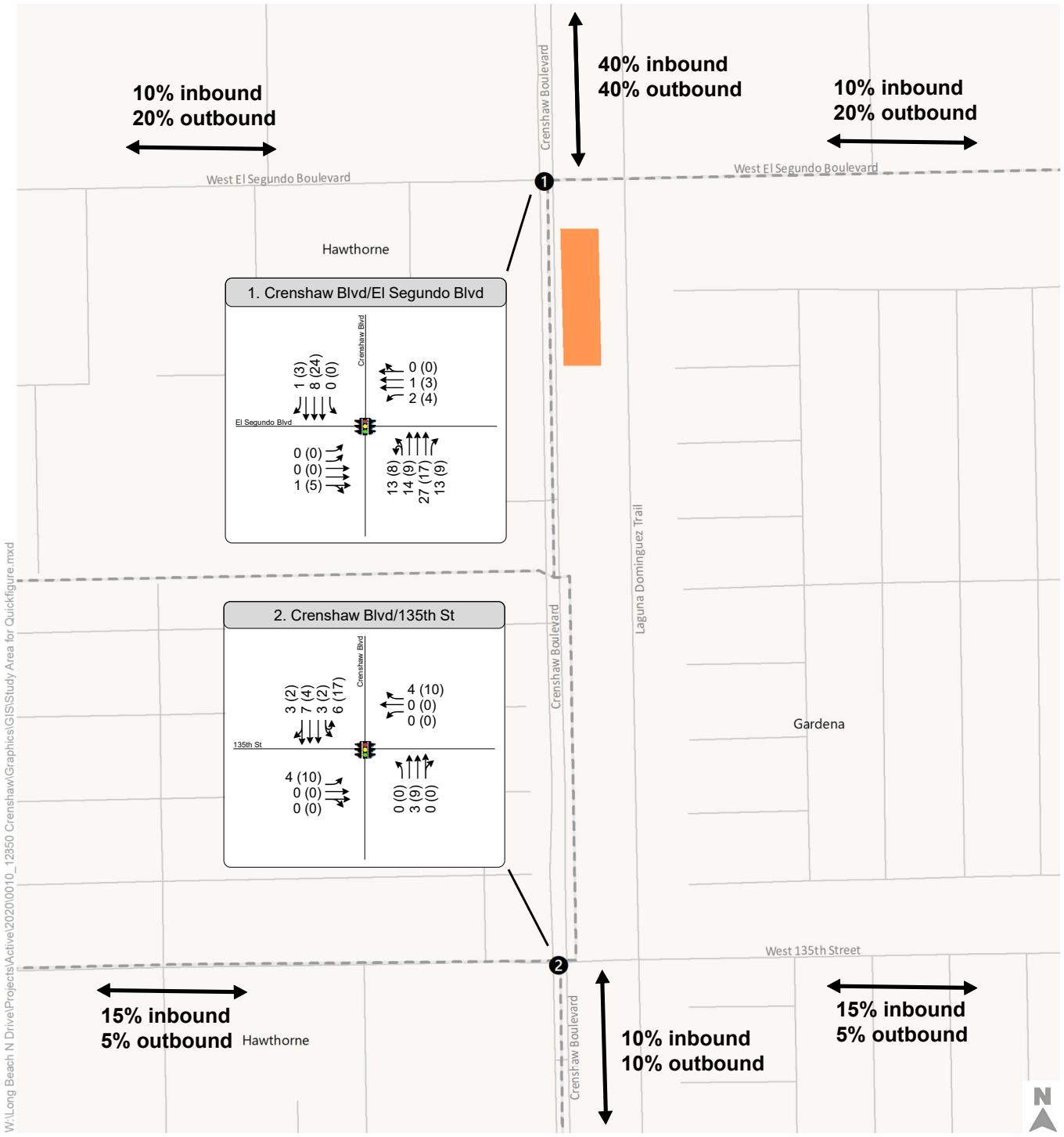



Figure 5

Project Trip Distribution and Peak Hour Project Trip Assignment

# 6. Opening Year (2023) Plus Project Conditions

This section describes the analysis of potential effects on the roadway system due to future increases in traffic plus traffic generated by the project. The Opening Year (2023) Plus Project roadway network is the same network assumed under the Opening Year (2023) No Project scenario.

## 6.1 Project Site Access and Parking

Vehicular access will be provided along the northbound side of Crenshaw Boulevard at one driveway located approximately at the center of the project site. An existing raised median along Crenshaw Boulevard limits access to northbound right-turn entry/right-turn exit only and no left-turns will be permitted. The proposed project will replace an auto-parts warehouse and surface lots with perpendicular parking areas and several curb cuts that interrupt the sidewalk. The proposed single vehicle access point will improve the frontage along Crenshaw Boulevard and will significantly reduce the number of curb cuts and potential conflict points between vehicles and pedestrians. A continuous fire access lane is proposed around the perimeter of the site.

Section 18.40.00 of the Gardena Municipal Code requires two (2) parking spaces per dwelling unit. The Specific Plan proposes one (1) space per unit based on the project's close proximity to employment centers and transit stations, including the Metro Green Line Crenshaw Station. A Parking Study for the project was completed by Linscott Law & Greenspan to address the proposed reduction in parking rates and is provided in **Appendix D**. On-site parking will be provided in an enclosed garage consisting of two-and-a-half vertical floors, starting at the ground level. The parking garage will provide 267 parking spaces and is designed to permit two-way travel between the various levels with adequate circulation.

## 6.2 Opening Year (2023) Plus Project Intersection Level of Service

To forecast the peak hour operating conditions at each study intersection, the project trip assignment was superimposed on Opening Year (2023) No Project traffic volumes to yield Opening Year (2023) Plus Project volumes. **Figure 6** presents the forecasted Opening Year (2023) Plus Project AM and PM peak hour volumes. The LOS analysis results for the study intersections under Opening Year (2023) Plus Project conditions are presented in **Table 5**. Detailed LOS results for intersection movements and corresponding LOS calculation sheets are included in **Appendix C**.

**Table 5: Opening Year (2023) Plus Project Intersection Level of Service**

| Intersection | Traffic Control | Peak Hour | Opening Year (2023) No Project Conditions | | Opening Year (2023) Plus Project Conditions | | Delay Change (sec/veh) | Meets City LOS Criteria? |
|---|---|---|---|---|---|---|---|---|
| | | | Delay (sec/veh) | LOS[1] | Delay (sec/veh) | LOS[1] | | |
| 1. Crenshaw Blvd/ El Segundo Blvd | Signalized | AM | 45.6 | D | 47.3 | D | 1.7 | Yes |
| | | PM | 57.5 | E | 58.9 | E | 1.4 | Yes |
| 2. Crenshaw Blvd/ W. 135th Street | Signalized | AM | 51.1 | D | 52.5 | D | 1.4 | Yes |
| | | PM | 27.8 | C | 31.5 | C | 3.7 | Yes |

Source: Fehr & Peers.
Notes: [1] LOS calculations performed using the HCM 6 method. Unacceptable seconds of delay per vehicle and LOS highlighted in **bold**.

As shown, both study intersections are anticipated to continue to operate at LOS E or better during the AM and PM peak hours with the addition of project-generated traffic. The forecasted intersection levels of service meet the City's criteria of maintaining traffic flows of LOS E or better during peak rush hours.


Project Site

Study Intersections

City Boundaries

XX(XX) AM(PM) Peak Hour Volumes

LOS: AM PM | A-C | D | E | F

Figure 6

Peak Hour Traffic Volumes and Lane Configurations
Opening Year (2023) Plus Project

## 6.3 Effects on Active Transportation

Pedestrian access to the project site will be provided on the ground floor with primary pedestrian access located at the building lobby located on the northern portion of the site. Additional restricted pedestrian access will also be provided to residential units on the southern end of the site. On-site pedestrian circulation will consist of a network of pathway connections between residential units, common areas, and the parking garage. The project design provides for adequate pedestrian access to the existing sidewalks provided along the project frontage. Project traffic and site design is not anticipated to deteriorate or effect existing pedestrian facilities in the study area. The proposed single vehicle access point will improve the frontage along Crenshaw Boulevard and will significantly reduce the number of curb cuts and potential conflict points between vehicles and pedestrians.

The project includes amenities for bicyclists which should encourage use of existing or planned bicycle facilities in the study area. Long-term, enclosed bike storage will also be provided in the enclosed garage.

The Laguna Dominguez Trail is an existing multi-use path located directly adjacent to the project site on the east side of the Dominguez Channel waterway. The Laguna Dominguez Trail spans almost three miles between Lawndale and Hawthorne. Pedestrian access from the project site to the Laguna Dominguez Trail is provided via continuous paved sidewalks along the east side of Crenshaw Boulevard and south side El Segundo Boulevard, at a distance of approximately 500-feet between the project site and the southern point of entry. For project residents traveling northbound by foot or bike, individuals may cross the east leg of the Crenshaw Boulevard and El Segundo Boulevard intersection via the existing marked crosswalk then traverse easterly approximately 200' to the trail entrance to head north. The trail's north end terminates on the south side of West 120$^{th}$ Street, approximately one block from the Crenshaw Green Line Station. A continuous path of paved sidewalks and marked crosswalks are provided between the trail and the Green Line Station platform.

Separated or protected bicycle facilities are not currently provided along Crenshaw Boulevard near the project site. However, the following two bike lane projects are recommended in the South Bay Bicycle Master Plan as prioritized projects in Gardena and may be constructed by the City in the future:

- Crenshaw Boulevard from El Segundo Boulevard to Redondo Beach Boulevard
- El Segundo Boulevard from Crenshaw Boulevard to Vermont Avenue

Implementation of the proposed project will not conflict with any existing bicycle facilities, and it will not preclude the implementation of any other potential enhancements to planned facilities. Similarly, bicycle trips will be generated by the project, but development of the project is not expected to conflict with any

existing or planned bicycle facility. Modifications to roadway capacity on Crenshaw Boulevard or El Segundo Boulevard are not anticipated with the planned bicycle improvements.

The proposed project is expected to generate bicycle and pedestrian trips to and from the project site, with some of those trips including the use of transit. The adjacent land uses with retail, service, and employment opportunities are close enough where walking and bicycling would be feasible. While sidewalks are adequate surrounding the project site (with the exception of the short segment south of the project site to 131st Street along the east curb of Crenshaw Boulevard), separated bicycle facilities are not provided on Crenshaw Boulevard or El Segundo Boulevard. The addition of bicyclists along the roadways may result in people biking along the roadway or choosing to bike on the sidewalk, which could result in a potential safety issue. To address this issue and to encourage non-automobile travel and provide greater connectivity to nearby retail and employment uses, the planned bicycle facilities along Crenshaw Boulevard and El Segundo Boulevard are recommended for installation.

## 6.4 Effects on Transit

The project site is located within a quarter mile of nine bus stops and is well-served by transit service via LA Metro, Torrance Transit, and the City of Gardena's Transit Service, GTrans. Access to light rail is also available at the Green Line Station, located less than one mile north of the project at Crenshaw Boulevard/Interstate 105. Project traffic and the design of the project site is not expected to effect access or operations of these services.

## 6.5 Impacts to Emergency Access

Construction of the Project would require temporarily closing one lane of traffic on the northbound side of Crenshaw Boulevard for the duration of 20 months of construction (est. October 2021 through June 2023) and closure of the sidewalk for 22 months (est. October through September 2023). Increased traffic congestion and access disruptions caused by closures during construction could affect emergency access and response times resulting in a temporary significant impact. Existing access and parking for the adjacent properties will be maintained.

The implementation of the following mitigation measure would provide emergency vehicle access to the construction work site and adjacent land uses and would require that construction activities be coordinated with City law enforcement and fire department officials prior to implementation.

Mitigation to Emergency Vehicle Access Impact: Emergency vehicle access will be maintained at all times to the construction work site and adjacent businesses. Emergency vehicle access will be maintained at all times to and from fire stations, hospitals, and medical facilities near the construction site and along the haul routes. Construction activities, road closures, and lane closures will be coordinated with local law

enforcement and fire department officials prior to implementation. The implementation of these measures would provide emergency vehicle access to the construction work site and adjacent businesses and require that construction activities be coordinated with City law enforcement and fire department officials prior to implementation.

Following construction, the Project would not change nor impact emergency access in the study area.

## 6.6 Transportation Demand Management (TDM) Strategies

Transportation Demand Management (TDM) strategies are also proposed as part of the project features to reduce single-occupant auto travel and encourage alternate, multi-modal means of transportation. The project will implement TDM strategies to complement and support the site's proximity to large employment centers, transit services, and bicycle and pedestrian facilities. The following applicable TDM strategies shall be provided by the developer:

Unbundled Parking. There shall be a charge for parking spaces. The property owner shall unbundle automobile parking charges from the rents or other fees charged for leasing residential units.

Pre-Leasing for Area Employees. Residential units shall be marketed exclusively for a thirty-day period to employees working within a one-half mile radius of the development, before the units are offered for rent to the general public.

Transit Information. To ensure that residential tenants are aware of transit options and TDM programs available to them, an information board or kiosk shall be posted in a central location in the building.

One-time Free Monthly Transit Pass. The developer shall offer future residents a one-time monthly Metro transit pass to encourage and help facilitate a culture of transit use by Project residents.

On-site Residential Bicycle Parking. One bicycle parking space shall be provided per every two (2) residential units (located in secured facilities accessible only by residents). All bicycle parking shall be located in a safe, convenient location, encouraging the use of bicycle transportation by residents and guests.

Ride-Sharing Pick-Up/Drop-Off. A designated loading area will be signed and distinguished (e.g., with paving and/or paint) so that it may be utilized as a pick-up and drop-off zone for ride-sharing services.

# Appendix A: Traffic Counts

# ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

## *Crenshaw Blvd and El Segundo Blvd , Hawthorne*

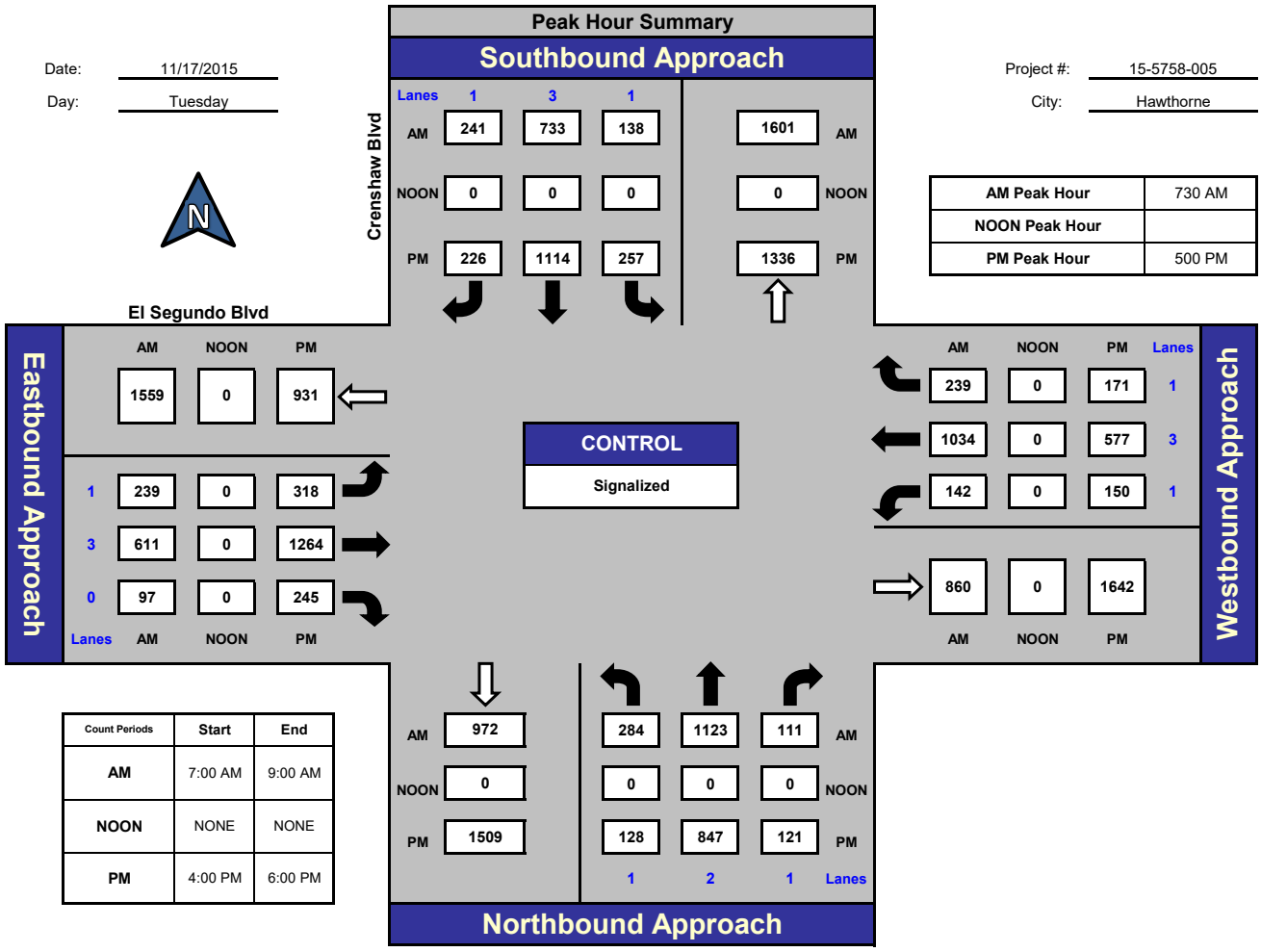
Date: 11/17/2015

Day: Tuesday

Project #: 15-5758-005

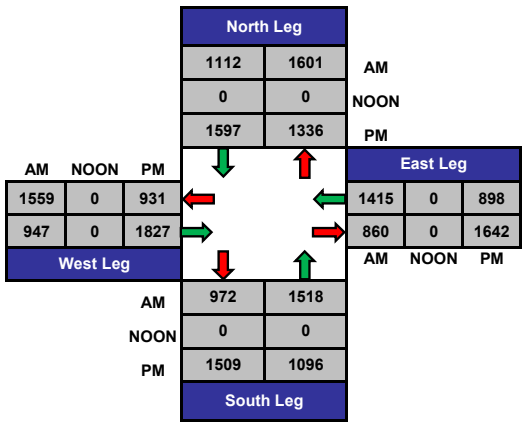
City: Hawthorne

| | |
|---|---|
| AM Peak Hour | 730 AM |
| NOON Peak Hour | |
| PM Peak Hour | 500 PM |

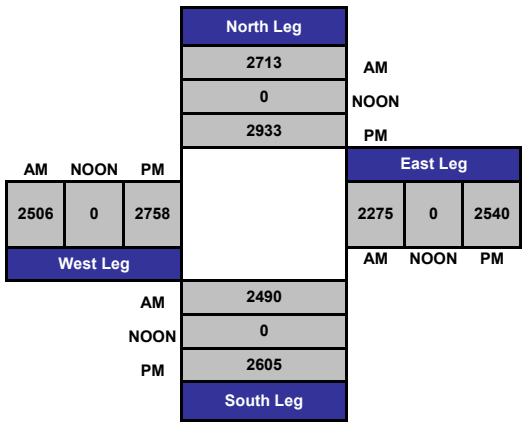



| Count Periods | Start | End |
|---|---|---|
| AM | 7:00 AM | 9:00 AM |
| NOON | NONE | NONE |
| PM | 4:00 PM | 6:00 PM |

### Total Ins & Outs




### Total Volume Per Leg



# ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

## *Crenshaw Blvd and 135th St , Hawthorne*

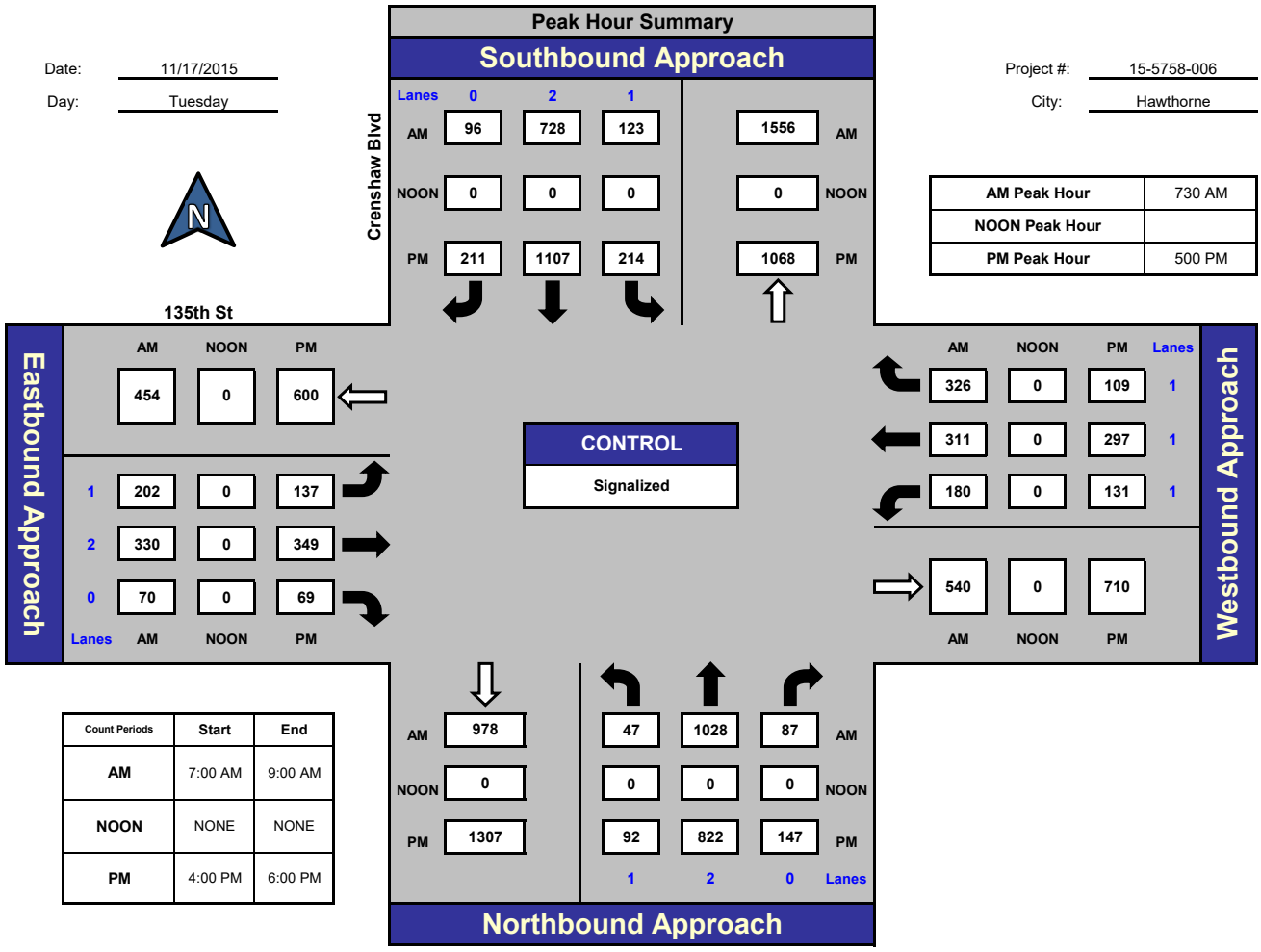
Date: 11/17/2015

Day: Tuesday

Project #: 15-5758-006

City: Hawthorne

| | |
|---|---|
| AM Peak Hour | 730 AM |
| NOON Peak Hour | |
| PM Peak Hour | 500 PM |




| Count Periods | Start | End |
|---|---|---|
| AM | 7:00 AM | 9:00 AM |
| NOON | NONE | NONE |
| PM | 4:00 PM | 6:00 PM |

### Total Ins & Outs

| | North Leg | | |
|---|---|---|---|
| | 947 | 1556 | AM |
| | 0 | 0 | NOON |
| | 1532 | 1068 | PM |

| West Leg AM | West Leg NOON | West Leg PM | | East Leg AM | East Leg NOON | East Leg PM |
|---|---|---|---|---|---|---|
| 454 | 0 | 600 | | 817 | 0 | 537 |
| 602 | 0 | 555 | | 540 | 0 | 710 |

| | South Leg | |
|---|---|---|
| AM | 978 | 1162 |
| NOON | 0 | 0 |
| PM | 1307 | 1061 |

### Total Volume Per Leg

| | North Leg | |
|---|---|---|
| AM | 2503 | |
| NOON | 0 | |
| PM | 2600 | |

| West Leg AM | West Leg NOON | West Leg PM | | East Leg AM | East Leg NOON | East Leg PM |
|---|---|---|---|---|---|---|
| 1056 | 0 | 1155 | | 1357 | 0 | 1247 |

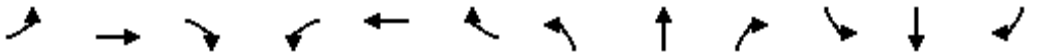
| | South Leg |
|---|---|
| AM | 2140 |
| NOON | 0 |
| PM | 2368 |

# Appendix B: Cumulative Project List

# GARDENA TOD CUMULATIVE PROJECTS LIST

| Type | Location (Project Name) | Project Description | Status |
|---|---|---|---|
| **CITY OF GARDENA** | | | |
| Residential | 1333 West 168th Street | 3 DU, Condominiums | Entitlements Received |
| Mixed-Use | 1112 Gardena Boulevard | 12 DU, Apartments & 3,986 SF Commercial | Entitlements Received |
| Residential | 1932 West 145th Street | 4 DU, Apartments, with 2 DU existing | Building & Safety Plan Check |
| Residential | 1348 West 168th Street (Normandie Courtyard Project) | 9 DU, Small Lot Subdivision, 3-story | Entitlements received |
| Residential | 1017 West 141st Street & 14031 South Vermont Avenue (KB Home Stonefield Project) | 63 DU, Townhomes, 3-story | Under Construction |
| Residential | 13919 Normandie Avenue | 20 DU, Single-Room Occupancy | Building & Safety Plan Check |
| Mixed-Use | 1341 West Gardena Boulevard | 14 DU, Townhomes & 3,385 SF Retail/Office | Under Construction |
| Residential | 16819 Normandie Avenue | 63 DU, Single-Room Occupancy | Entitlements Received (Not submitted B & S) |
| Mixed-Use | 14321 Van Ness Avenue | 35 DU, Townhomes & 5 DU Live/Work with 1,835 SF Commercial | Under Construction |
| Industrial | 1528 West 134th Street | 62,960 SF Industrial | Building & Safety Plan Check |
| Commercial | 2169 West Redondo Beach Boulevard | 3,486 SF Commercial (drive thru restaurant) | Planning Review |
| Residential | 1938 West 146th Street | 6 DU, Townhomes | Planning Review |
| Residential | 1621 West 147th Street | 6 DU, Townhome, Three-story | Planning Review |
| Residential | 1335 West 141st Street | 50 DU, Townhomes, Three-story | Planning Review |
| Residential | 1515 West 178th Street (Melia 178th St. Townhomes Project) | 114 DU, Townhomes | Building & Safety Plan Check |
| Residential | 13615, 13619, 13633 Vermont Avenue | 84 DU, Townhomes (2 DU affordable) | Planning Review |
| Mixed-Use | 2129 West Rosecrans Avenue (Rosecrans Place Project) | 113 DU Townhomes, 3-Story, including 15 Live/Work with 3,969 SF Commercial | Planning Review |
| **CITY OF HAWTHORNE** | | | |
| Mixed-Use | 3670 Imperial Highway | 96 DU and approximately 6,200 SF Commercial (retail and office) | Under Construction |
| Mixed-Use | Greenline Mixed Use<br>12540 Crenshaw Boulevard | 230 DU and approximately 3,100 SF of restaurant space | Under Construction |
| Mixed-Use | 14128 Kornblum | 100 DU and approximately 15,000 SF of Commercial (retail and office space) | Grading |
| Industrial | 12515 Cerise | 62,000 SF Warehouse | Finalizing Plan Check |

# Appendix C: LOS Worksheets



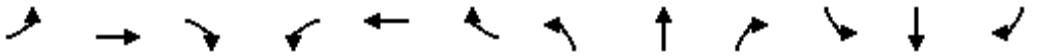
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 260 | 650 | 110 | 150 | 1090 | 260 | 300 | 1190 | 120 | 150 | 780 | 260 |
| Future Volume (veh/h) | 260 | 650 | 110 | 150 | 1090 | 260 | 300 | 1190 | 120 | 150 | 780 | 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 | | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 274 | 684 | 97 | 158 | 1147 | 180 | 316 | 1253 | 60 | 158 | 821 | 211 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 325 | 1353 | 190 | 183 | 1515 | 461 | 379 | 1791 | 709 | 240 | 1589 | 633 |
| Arrive On Green | 0.09 | 0.30 | 0.30 | 0.10 | 0.30 | 0.30 | 0.04 | 0.12 | 0.12 | 0.08 | 0.31 | 0.31 |
| Sat Flow, veh/h | 3428 | 4477 | 628 | 1767 | 5066 | 1541 | 1767 | 5066 | 1546 | 1767 | 5066 | 1542 |
| Grp Volume(v), veh/h | 274 | 514 | 267 | 158 | 1147 | 180 | 316 | 1253 | 60 | 158 | 821 | 211 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1728 | 1767 | 1689 | 1541 | 1767 | 1689 | 1546 | 1767 | 1689 | 1542 |
| Q Serve(g_s), s | 10.2 | 16.3 | 16.6 | 11.4 | 26.7 | 9.3 | 14.9 | 30.9 | 3.8 | 7.8 | 17.3 | 3.2 |
| Cycle Q Clear(g_c), s | 10.2 | 16.3 | 16.6 | 11.4 | 26.7 | 9.3 | 14.9 | 30.9 | 3.8 | 7.8 | 17.3 | 3.2 |
| Prop In Lane | 1.00 | | 0.36 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 325 | 1021 | 522 | 183 | 1515 | 461 | 379 | 1791 | 709 | 240 | 1589 | 633 |
| V/C Ratio(X) | 0.84 | 0.50 | 0.51 | 0.87 | 0.76 | 0.39 | 0.83 | 0.70 | 0.08 | 0.66 | 0.52 | 0.33 |
| Avail Cap(c_a), veh/h | 409 | 1143 | 585 | 211 | 1715 | 522 | 379 | 1791 | 709 | 310 | 1589 | 633 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 57.9 | 37.3 | 37.4 | 57.4 | 41.3 | 21.5 | 29.6 | 50.8 | 27.6 | 30.6 | 36.5 | 10.7 |
| Incr Delay (d2), s/veh | 10.1 | 0.7 | 1.3 | 24.4 | 2.1 | 0.9 | 14.1 | 2.3 | 0.2 | 1.4 | 1.2 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.8 | 6.7 | 7.1 | 6.3 | 11.2 | 3.4 | 8.4 | 14.4 | 1.5 | 3.3 | 7.2 | 2.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 68.0 | 38.0 | 38.8 | 81.8 | 43.4 | 22.4 | 43.6 | 53.1 | 27.8 | 32.0 | 37.7 | 12.1 |
| LnGrp LOS | E | D | D | F | D | C | D | D | C | C | D | B |
| Approach Vol, veh/h | | 1055 | | | 1485 | | | 1629 | | | 1190 | |
| Approach Delay, s/veh | | 46.0 | | | 44.9 | | | 50.3 | | | 32.4 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 14.8 | 52.0 | 17.9 | 45.3 | 20.0 | 46.8 | 18.3 | 44.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 9.8 | 32.9 | 13.4 | 18.6 | 16.9 | 19.3 | 12.2 | 28.7 |
| Green Ext Time (p_c), s | 0.1 | 0.7 | 0.0 | 8.3 | 0.0 | 4.5 | 0.1 | 10.2 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.0 |
| HCM 6th LOS | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



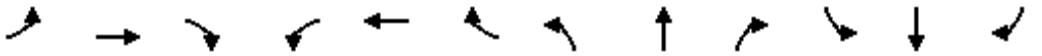
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 220 | 350 | 80 | 190 | 330 | 350 | 50 | 1090 | 100 | 130 | 770 | 110 |
| Future Volume (veh/h) | 220 | 350 | 80 | 190 | 330 | 350 | 50 | 1090 | 100 | 130 | 770 | 110 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1870 |
| Adj Flow Rate, veh/h | 227 | 361 | 67 | 196 | 340 | 187 | 52 | 1124 | 95 | 134 | 794 | 78 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Cap, veh/h | 155 | 822 | 151 | 222 | 514 | 431 | 92 | 2433 | 205 | 156 | 1877 | 836 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.05 | 0.51 | 0.51 | 0.18 | 1.00 | 1.00 |
| Sat Flow, veh/h | 866 | 2968 | 545 | 948 | 1856 | 1555 | 1767 | 4756 | 402 | 1767 | 3526 | 1570 |
| Grp Volume(v), veh/h | 227 | 213 | 215 | 196 | 340 | 187 | 52 | 798 | 421 | 134 | 794 | 78 |
| Grp Sat Flow(s),veh/h/ln | 866 | 1763 | 1750 | 948 | 1856 | 1555 | 1767 | 1689 | 1780 | 1767 | 1763 | 1570 |
| Q Serve(g_s), s | 14.9 | 12.9 | 13.2 | 22.8 | 21.1 | 12.8 | 3.7 | 19.6 | 19.7 | 9.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 12.9 | 13.2 | 36.0 | 21.1 | 12.8 | 3.7 | 19.6 | 19.7 | 9.6 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.31 | 1.00 | | 1.00 | 1.00 | | 0.23 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 155 | 488 | 485 | 222 | 514 | 431 | 92 | 1727 | 911 | 156 | 1877 | 836 |
| V/C Ratio(X) | 1.47 | 0.44 | 0.44 | 0.88 | 0.66 | 0.43 | 0.56 | 0.46 | 0.46 | 0.86 | 0.42 | 0.09 |
| Avail Cap(c_a), veh/h | 155 | 488 | 485 | 222 | 514 | 431 | 190 | 1727 | 911 | 217 | 1877 | 836 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 60.2 | 38.7 | 38.7 | 55.3 | 41.6 | 38.6 | 60.2 | 20.3 | 20.3 | 52.7 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 241.8 | 0.6 | 0.6 | 31.5 | 3.2 | 0.7 | 2.0 | 0.9 | 1.7 | 16.1 | 0.7 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 15.6 | 5.8 | 5.8 | 8.4 | 9.9 | 4.9 | 1.7 | 7.7 | 8.3 | 4.5 | 0.2 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 302.0 | 39.3 | 39.4 | 86.8 | 44.8 | 39.3 | 62.2 | 21.2 | 22.0 | 68.8 | 0.7 | 0.2 |
| LnGrp LOS | F | D | D | F | D | D | E | C | C | E | A | A |
| Approach Vol, veh/h | | 655 | | | 723 | | | 1271 | | | 1006 | |
| Approach Delay, s/veh | | 130.4 | | | 54.7 | | | 23.1 | | | 9.7 | |
| Approach LOS | | F | | | D | | | C | | | A | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.5 | 72.5 | | 42.0 | 12.8 | 75.2 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 11.6 | 21.7 | | 38.0 | 5.7 | 2.0 | | 38.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 14.9 | | 0.0 | 0.0 | 10.0 | | 0.0 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 44.9 |
| HCM 6th LOS | | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



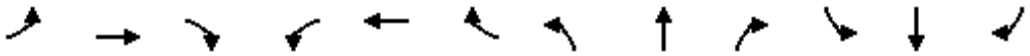
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 340 | 1330 | 260 | 160 | 610 | 180 | 140 | 900 | 130 | 280 | 1180 | 240 |
| Future Volume (veh/h) | 340 | 1330 | 260 | 160 | 610 | 180 | 140 | 900 | 130 | 280 | 1180 | 240 |
| 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 358 | 1400 | 252 | 168 | 642 | 55 | 147 | 947 | 65 | 295 | 1242 | 191 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 746 | 1455 | 262 | 192 | 1103 | 333 | 227 | 1378 | 590 | 312 | 1587 | 825 |
| Arrive On Green | 0.22 | 0.34 | 0.34 | 0.11 | 0.22 | 0.22 | 0.02 | 0.09 | 0.09 | 0.12 | 0.31 | 0.31 |
| Sat Flow, veh/h | 3428 | 4303 | 774 | 1767 | 5066 | 1529 | 1767 | 5066 | 1538 | 1767 | 5066 | 1542 |
| Grp Volume(v), veh/h | 358 | 1098 | 554 | 168 | 642 | 55 | 147 | 947 | 65 | 295 | 1242 | 191 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1700 | 1767 | 1689 | 1529 | 1767 | 1689 | 1538 | 1767 | 1689 | 1542 |
| Q Serve(g_s), s | 11.9 | 41.5 | 41.6 | 12.2 | 14.8 | 2.8 | 7.7 | 23.6 | 4.3 | 15.0 | 29.0 | 2.1 |
| Cycle Q Clear(g_c), s | 11.9 | 41.5 | 41.6 | 12.2 | 14.8 | 2.8 | 7.7 | 23.6 | 4.3 | 15.0 | 29.0 | 2.1 |
| Prop In Lane | 1.00 | | 0.46 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 746 | 1142 | 575 | 192 | 1103 | 333 | 227 | 1378 | 590 | 312 | 1587 | 825 |
| V/C Ratio(X) | 0.48 | 0.96 | 0.96 | 0.87 | 0.58 | 0.17 | 0.65 | 0.69 | 0.11 | 0.94 | 0.78 | 0.23 |
| Avail Cap(c_a), veh/h | 746 | 1143 | 575 | 211 | 1715 | 518 | 299 | 1378 | 590 | 312 | 1587 | 825 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 42.2 | 42.2 | 57.0 | 45.5 | 22.9 | 35.4 | 53.8 | 32.8 | 32.9 | 40.6 | 6.1 |
| Incr Delay (d2), s/veh | 0.2 | 18.3 | 28.6 | 27.3 | 0.8 | 0.4 | 1.2 | 2.8 | 0.4 | 35.9 | 3.9 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.0 | 19.6 | 21.4 | 6.8 | 6.2 | 1.4 | 3.5 | 11.1 | 1.7 | 9.6 | 12.4 | 1.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.6 | 60.4 | 70.8 | 84.3 | 46.4 | 23.2 | 36.5 | 56.6 | 33.2 | 68.8 | 44.6 | 6.8 |
| LnGrp LOS | D | E | E | F | D | C | D | E | C | E | D | A |
| Approach Vol, veh/h | | 2010 | | | 865 | | | 1159 | | | 1728 | |
| Approach Delay, s/veh | | 60.5 | | | 52.3 | | | 52.7 | | | 44.5 | |
| Approach LOS | | E | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 41.4 | 18.7 | 50.0 | 14.7 | 46.7 | 34.3 | 34.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 17.0 | 25.6 | 14.2 | 43.6 | 9.7 | 31.0 | 13.9 | 16.8 |
| Green Ext Time (p_c), s | 0.0 | 3.5 | 0.0 | 0.4 | 0.1 | 2.0 | 0.1 | 7.6 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 52.9 |
| HCM 6th LOS | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



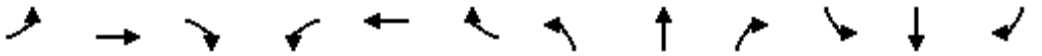
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 150 | 370 | 80 | 140 | 320 | 120 | 100 | 870 | 160 | 230 | 1170 | 230 |
| Future Volume (veh/h) | 150 | 370 | 80 | 140 | 320 | 120 | 100 | 870 | 160 | 230 | 1170 | 230 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 155 | 381 | 68 | 144 | 330 | 32 | 103 | 897 | 117 | 237 | 1206 | 216 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 177 | 827 | 146 | 214 | 514 | 431 | 126 | 3526 | 1568 | 217 | 4473 | 801 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.07 | 1.00 | 1.00 | 0.25 | 1.00 | 1.00 |
| Sat Flow, veh/h | 1008 | 2988 | 528 | 930 | 1856 | 1555 | 1767 | 3526 | 1568 | 1767 | 4316 | 773 |
| Grp Volume(v), veh/h | 155 | 223 | 226 | 144 | 330 | 32 | 103 | 897 | 117 | 237 | 944 | 478 |
| Grp Sat Flow(s),veh/h/ln | 1008 | 1763 | 1754 | 930 | 1856 | 1555 | 1767 | 1763 | 1568 | 1767 | 1689 | 1712 |
| Q Serve(g_s), s | 15.7 | 13.6 | 13.9 | 19.8 | 20.3 | 2.0 | 7.5 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 13.6 | 13.9 | 33.7 | 20.3 | 2.0 | 7.5 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.30 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.45 |
| Lane Grp Cap(c), veh/h | 177 | 488 | 486 | 214 | 514 | 431 | 126 | 3526 | 1568 | 217 | 3500 | 1774 |
| V/C Ratio(X) | 0.88 | 0.46 | 0.46 | 0.67 | 0.64 | 0.07 | 0.82 | 0.25 | 0.07 | 1.09 | 0.27 | 0.27 |
| Avail Cap(c_a), veh/h | 177 | 488 | 486 | 214 | 514 | 431 | 190 | 3526 | 1568 | 217 | 3500 | 1774 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 58.9 | 38.9 | 39.0 | 53.0 | 41.3 | 34.7 | 59.5 | 0.0 | 0.0 | 49.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 35.6 | 0.7 | 0.7 | 8.1 | 2.7 | 0.1 | 9.0 | 0.2 | 0.1 | 87.0 | 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 | 6.9 | 6.1 | 6.2 | 5.0 | 9.5 | 0.8 | 3.6 | 0.1 | 0.0 | 11.2 | 0.1 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 94.4 | 39.6 | 39.7 | 61.1 | 44.1 | 34.8 | 68.5 | 0.2 | 0.1 | 136.0 | 0.2 | 0.4 |
| LnGrp LOS | F | D | D | E | D | C | E | A | A | F | A | A |
| Approach Vol, veh/h | | 604 | | | 506 | | | 1117 | | | 1659 | |
| Approach Delay, s/veh | | 53.7 | | | 48.3 | | | 6.5 | | | 19.6 | |
| Approach LOS | | D | | | D | | | A | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 138.0 | | 42.0 | 15.3 | 142.7 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 18.0 | 2.0 | | 38.0 | 9.5 | 2.0 | | 35.7 | | | | |
| Green Ext Time (p_c), s | 0.0 | 12.3 | | 0.0 | 0.0 | 21.4 | | 0.0 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 24.9 | |
| HCM 6th LOS | | C | |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



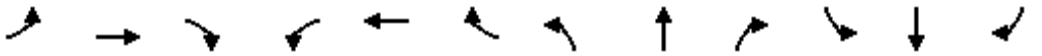
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 270 | 670 | 120 | 160 | 1130 | 270 | 310 | 1230 | 130 | 160 | 810 | 270 |
| Future Volume (veh/h) | 270 | 670 | 120 | 160 | 1130 | 270 | 310 | 1230 | 130 | 160 | 810 | 270 |
| 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 284 | 705 | 106 | 168 | 1189 | 192 | 326 | 1295 | 70 | 168 | 853 | 221 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 335 | 1356 | 202 | 192 | 1546 | 471 | 364 | 1722 | 696 | 236 | 1544 | 623 |
| Arrive On Green | 0.10 | 0.31 | 0.31 | 0.11 | 0.31 | 0.31 | 0.04 | 0.11 | 0.11 | 0.08 | 0.30 | 0.30 |
| Sat Flow, veh/h | 3428 | 4438 | 660 | 1767 | 5066 | 1542 | 1767 | 5066 | 1545 | 1767 | 5066 | 1542 |
| Grp Volume(v), veh/h | 284 | 535 | 276 | 168 | 1189 | 192 | 326 | 1295 | 70 | 168 | 853 | 221 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1721 | 1767 | 1689 | 1542 | 1767 | 1689 | 1545 | 1767 | 1689 | 1542 |
| Q Serve(g_s), s | 10.6 | 17.0 | 17.3 | 12.2 | 27.7 | 9.8 | 15.0 | 32.2 | 4.4 | 8.4 | 18.3 | 3.3 |
| Cycle Q Clear(g_c), s | 10.6 | 17.0 | 17.3 | 12.2 | 27.7 | 9.8 | 15.0 | 32.2 | 4.4 | 8.4 | 18.3 | 3.3 |
| Prop In Lane | 1.00 | | 0.38 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 335 | 1032 | 526 | 192 | 1546 | 471 | 364 | 1722 | 696 | 236 | 1544 | 623 |
| V/C Ratio(X) | 0.85 | 0.52 | 0.53 | 0.87 | 0.77 | 0.41 | 0.90 | 0.75 | 0.10 | 0.71 | 0.55 | 0.35 |
| Avail Cap(c_a), veh/h | 409 | 1143 | 583 | 211 | 1715 | 522 | 364 | 1722 | 696 | 298 | 1544 | 623 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 37.2 | 37.3 | 57.0 | 41.0 | 20.9 | 32.5 | 52.4 | 28.2 | 31.8 | 37.8 | 11.1 |
| Incr Delay (d2), s/veh | 11.2 | 0.7 | 1.4 | 27.3 | 2.3 | 1.0 | 22.9 | 3.1 | 0.3 | 3.6 | 1.4 | 1.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.0 | 7.0 | 7.4 | 6.8 | 11.6 | 3.6 | 9.7 | 15.1 | 1.7 | 3.7 | 7.6 | 2.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 68.9 | 37.9 | 38.7 | 84.3 | 43.3 | 21.8 | 55.5 | 55.5 | 28.5 | 35.4 | 39.2 | 12.7 |
| LnGrp LOS | E | D | D | F | D | C | E | E | C | D | D | B |
| Approach Vol, veh/h | | 1095 | | | 1549 | | | 1691 | | | 1242 | |
| Approach Delay, s/veh | | 46.2 | | | 45.1 | | | 54.4 | | | 34.0 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.4 | 50.2 | 18.7 | 45.7 | 20.0 | 45.6 | 18.7 | 45.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 10.4 | 34.2 | 14.2 | 19.3 | 17.0 | 20.3 | 12.6 | 29.7 |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 0.0 | 8.6 | 0.0 | 4.5 | 0.1 | 10.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 45.6 |
| HCM 6th LOS | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



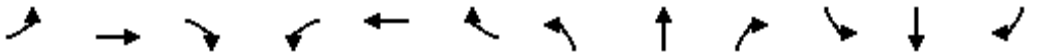
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 230 | 370 | 90 | 200 | 340 | 370 | 60 | 1130 | 110 | 140 | 800 | 120 |
| Future Volume (veh/h) | 230 | 370 | 90 | 200 | 340 | 370 | 60 | 1130 | 110 | 140 | 800 | 120 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1870 |
| Adj Flow Rate, veh/h | 237 | 381 | 77 | 206 | 351 | 210 | 62 | 1165 | 105 | 144 | 825 | 89 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Cap, veh/h | 146 | 809 | 162 | 210 | 514 | 431 | 97 | 2391 | 215 | 166 | 1867 | 832 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.05 | 0.51 | 0.51 | 0.19 | 1.00 | 1.00 |
| Sat Flow, veh/h | 840 | 2921 | 584 | 922 | 1856 | 1555 | 1767 | 4727 | 426 | 1767 | 3526 | 1570 |
| Grp Volume(v), veh/h | 237 | 228 | 230 | 206 | 351 | 210 | 62 | 832 | 438 | 144 | 825 | 89 |
| Grp Sat Flow(s),veh/h/ln | 840 | 1763 | 1743 | 922 | 1856 | 1555 | 1767 | 1689 | 1776 | 1767 | 1763 | 1570 |
| Q Serve(g_s), s | 14.1 | 14.0 | 14.3 | 21.7 | 21.9 | 14.7 | 4.5 | 21.0 | 21.0 | 10.3 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 14.0 | 14.3 | 36.0 | 21.9 | 14.7 | 4.5 | 21.0 | 21.0 | 10.3 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.34 | 1.00 | | 1.00 | 1.00 | | 0.24 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 146 | 488 | 483 | 210 | 514 | 431 | 97 | 1708 | 898 | 166 | 1867 | 832 |
| V/C Ratio(X) | 1.62 | 0.47 | 0.48 | 0.98 | 0.68 | 0.49 | 0.64 | 0.49 | 0.49 | 0.87 | 0.44 | 0.11 |
| Avail Cap(c_a), veh/h | 146 | 488 | 483 | 210 | 514 | 431 | 190 | 1708 | 898 | 217 | 1867 | 832 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 39.0 | 39.1 | 56.9 | 41.9 | 39.3 | 60.2 | 21.1 | 21.1 | 52.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 308.2 | 0.7 | 0.7 | 57.1 | 3.7 | 0.9 | 2.6 | 1.0 | 1.9 | 19.8 | 0.8 | 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 | 17.4 | 6.2 | 6.3 | 10.1 | 10.4 | 5.6 | 2.0 | 8.2 | 8.9 | 5.0 | 0.2 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 368.9 | 39.7 | 39.9 | 114.0 | 45.6 | 40.1 | 62.7 | 22.1 | 23.0 | 71.8 | 0.8 | 0.3 |
| LnGrp LOS | F | D | D | F | D | D | E | C | C | E | A | A |
| Approach Vol, veh/h | | 695 | | | 767 | | | 1332 | | | 1058 | |
| Approach Delay, s/veh | | 152.0 | | | 62.5 | | | 24.2 | | | 10.4 | |
| Approach LOS | | F | | | E | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 16.2 | 71.8 | | 42.0 | 13.1 | 74.9 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 12.3 | 23.0 | | 38.0 | 6.5 | 2.0 | | 38.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 15.7 | | 0.0 | 0.0 | 10.7 | | 0.0 | | | | |

| 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.



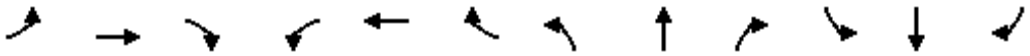
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 360 | 1380 | 270 | 170 | 630 | 190 | 150 | 930 | 140 | 290 | 1220 | 250 |
| Future Volume (veh/h) | 360 | 1380 | 270 | 170 | 630 | 190 | 150 | 930 | 140 | 290 | 1220 | 250 |
| 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 379 | 1453 | 262 | 179 | 663 | 64 | 158 | 979 | 75 | 305 | 1284 | 205 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 758 | 1456 | 262 | 203 | 1118 | 338 | 223 | 1346 | 589 | 303 | 1529 | 813 |
| Arrive On Green | 0.22 | 0.34 | 0.34 | 0.12 | 0.22 | 0.22 | 0.03 | 0.09 | 0.09 | 0.12 | 0.30 | 0.30 |
| Sat Flow, veh/h | 3428 | 4303 | 774 | 1767 | 5066 | 1530 | 1767 | 5066 | 1537 | 1767 | 5066 | 1541 |
| Grp Volume(v), veh/h | 379 | 1140 | 575 | 179 | 663 | 64 | 158 | 979 | 75 | 305 | 1284 | 205 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1700 | 1767 | 1689 | 1530 | 1767 | 1689 | 1537 | 1767 | 1689 | 1541 |
| Q Serve(g_s), s | 12.6 | 43.8 | 44.0 | 13.0 | 15.3 | 3.3 | 8.3 | 24.5 | 5.0 | 15.0 | 30.8 | 2.3 |
| Cycle Q Clear(g_c), s | 12.6 | 43.8 | 44.0 | 13.0 | 15.3 | 3.3 | 8.3 | 24.5 | 5.0 | 15.0 | 30.8 | 2.3 |
| Prop In Lane | 1.00 | | 0.46 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 758 | 1143 | 575 | 203 | 1118 | 338 | 223 | 1346 | 589 | 303 | 1529 | 813 |
| V/C Ratio(X) | 0.50 | 1.00 | 1.00 | 0.88 | 0.59 | 0.19 | 0.71 | 0.73 | 0.13 | 1.01 | 0.84 | 0.25 |
| Avail Cap(c_a), veh/h | 758 | 1143 | 575 | 211 | 1715 | 518 | 287 | 1346 | 589 | 303 | 1529 | 813 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 42.9 | 43.0 | 56.6 | 45.4 | 22.8 | 36.5 | 54.7 | 32.9 | 34.9 | 42.4 | 6.4 |
| Incr Delay (d2), s/veh | 0.2 | 25.9 | 37.5 | 30.2 | 0.9 | 0.5 | 3.3 | 3.5 | 0.4 | 53.1 | 5.7 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.3 | 21.8 | 23.8 | 7.4 | 6.4 | 1.7 | 3.9 | 11.5 | 2.0 | 11.3 | 13.3 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.5 | 68.9 | 80.5 | 86.9 | 46.3 | 23.2 | 39.8 | 58.2 | 33.3 | 88.0 | 48.2 | 7.1 |
| LnGrp LOS | D | E | F | F | D | C | D | E | C | F | D | A |
| Approach Vol, veh/h | | 2094 | | | 906 | | | 1212 | | | 1794 | |
| Approach Delay, s/veh | | 67.6 | | | 52.7 | | | 54.2 | | | 50.2 | |
| Approach LOS | | E | | | D | | | D | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 40.5 | 19.5 | 50.0 | 15.3 | 45.2 | 34.8 | 34.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 17.0 | 26.5 | 15.0 | 46.0 | 10.3 | 32.8 | 14.6 | 17.3 |
| Green Ext Time (p_c), s | 0.0 | 3.3 | 0.0 | 0.0 | 0.1 | 0.9 | 0.1 | 7.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 57.5 |
| HCM 6th LOS | E |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



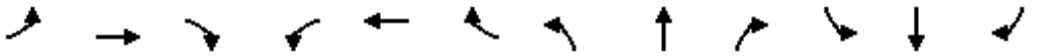
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 160 | 390 | 90 | 150 | 330 | 130 | 110 | 900 | 170 | 240 | 1210 | 240 |
| Future Volume (veh/h) | 160 | 390 | 90 | 150 | 330 | 130 | 110 | 900 | 170 | 240 | 1210 | 240 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 165 | 402 | 78 | 155 | 340 | 35 | 113 | 928 | 124 | 247 | 1247 | 225 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 170 | 815 | 157 | 201 | 514 | 431 | 137 | 3526 | 1568 | 217 | 4441 | 801 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.08 | 1.00 | 1.00 | 0.25 | 1.00 | 1.00 |
| Sat Flow, veh/h | 996 | 2943 | 566 | 904 | 1856 | 1555 | 1767 | 3526 | 1568 | 1767 | 4310 | 778 |
| Grp Volume(v), veh/h | 165 | 239 | 241 | 155 | 340 | 35 | 113 | 928 | 124 | 247 | 977 | 495 |
| Grp Sat Flow(s),veh/h/ln | 996 | 1763 | 1746 | 904 | 1856 | 1555 | 1767 | 1763 | 1568 | 1767 | 1689 | 1711 |
| Q Serve(g_s), s | 14.9 | 14.8 | 15.0 | 21.0 | 21.1 | 2.2 | 8.2 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 14.8 | 15.0 | 36.0 | 21.1 | 2.2 | 8.2 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.32 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.45 |
| Lane Grp Cap(c), veh/h | 170 | 488 | 484 | 201 | 514 | 431 | 137 | 3526 | 1568 | 217 | 3480 | 1763 |
| V/C Ratio(X) | 0.97 | 0.49 | 0.50 | 0.77 | 0.66 | 0.08 | 0.83 | 0.26 | 0.08 | 1.14 | 0.28 | 0.28 |
| Avail Cap(c_a), veh/h | 170 | 488 | 484 | 201 | 514 | 431 | 190 | 3526 | 1568 | 217 | 3480 | 1763 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 59.8 | 39.3 | 39.4 | 55.1 | 41.6 | 34.8 | 59.1 | 0.0 | 0.0 | 49.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 60.9 | 0.8 | 0.8 | 16.6 | 3.2 | 0.1 | 13.6 | 0.2 | 0.1 | 102.4 | 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 | 8.4 | 6.6 | 6.6 | 6.0 | 9.9 | 0.8 | 4.1 | 0.1 | 0.0 | 12.1 | 0.1 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 120.7 | 40.1 | 40.2 | 71.7 | 44.8 | 34.8 | 72.7 | 0.2 | 0.1 | 151.4 | 0.2 | 0.4 |
| LnGrp LOS | F | D | D | E | D | C | E | A | A | F | A | A |
| Approach Vol, veh/h | | 645 | | | 530 | | | 1165 | | | 1719 | |
| Approach Delay, s/veh | | 60.8 | | | 52.0 | | | 7.2 | | | 22.0 | |
| Approach LOS | | E | | | D | | | A | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 138.0 | | 42.0 | 16.0 | 142.0 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 18.0 | 2.0 | | 38.0 | 10.2 | 2.0 | | 38.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 13.0 | | 0.0 | 0.0 | 22.7 | | 0.0 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 27.8 |
| HCM 6th LOS | | C |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



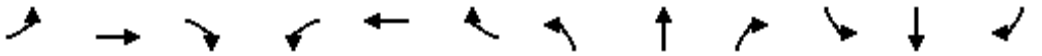
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 270 | 670 | 121 | 162 | 1131 | 270 | 337 | 1257 | 143 | 160 | 818 | 271 |
| Future Volume (veh/h) | 270 | 670 | 121 | 162 | 1131 | 270 | 337 | 1257 | 143 | 160 | 818 | 271 |
| 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 284 | 705 | 106 | 171 | 1191 | 192 | 355 | 1323 | 84 | 168 | 861 | 222 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 335 | 1350 | 201 | 195 | 1547 | 471 | 362 | 1720 | 698 | 232 | 1542 | 623 |
| Arrive On Green | 0.10 | 0.30 | 0.30 | 0.11 | 0.31 | 0.31 | 0.04 | 0.11 | 0.11 | 0.08 | 0.30 | 0.30 |
| Sat Flow, veh/h | 3428 | 4438 | 660 | 1767 | 5066 | 1542 | 1767 | 5066 | 1545 | 1767 | 5066 | 1542 |
| Grp Volume(v), veh/h | 284 | 535 | 276 | 171 | 1191 | 192 | 355 | 1323 | 84 | 168 | 861 | 222 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1721 | 1767 | 1689 | 1542 | 1767 | 1689 | 1545 | 1767 | 1689 | 1542 |
| Q Serve(g_s), s | 10.6 | 17.0 | 17.3 | 12.4 | 27.8 | 9.8 | 15.0 | 33.0 | 5.3 | 8.4 | 18.5 | 3.4 |
| Cycle Q Clear(g_c), s | 10.6 | 17.0 | 17.3 | 12.4 | 27.8 | 9.8 | 15.0 | 33.0 | 5.3 | 8.4 | 18.5 | 3.4 |
| Prop In Lane | 1.00 | | 0.38 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 335 | 1027 | 524 | 195 | 1547 | 471 | 362 | 1720 | 698 | 232 | 1542 | 623 |
| V/C Ratio(X) | 0.85 | 0.52 | 0.53 | 0.88 | 0.77 | 0.41 | 0.98 | 0.77 | 0.12 | 0.72 | 0.56 | 0.36 |
| Avail Cap(c_a), veh/h | 409 | 1143 | 583 | 211 | 1715 | 522 | 362 | 1720 | 698 | 295 | 1542 | 623 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 37.4 | 37.5 | 56.9 | 41.0 | 20.8 | 35.4 | 52.8 | 28.4 | 32.0 | 37.9 | 11.2 |
| Incr Delay (d2), s/veh | 11.2 | 0.7 | 1.4 | 28.1 | 2.3 | 1.0 | 41.7 | 3.4 | 0.4 | 4.1 | 1.5 | 1.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.0 | 7.0 | 7.4 | 7.0 | 11.6 | 3.6 | 8.4 | 15.5 | 2.1 | 3.8 | 7.7 | 2.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 68.9 | 38.1 | 38.9 | 85.0 | 43.3 | 21.8 | 77.2 | 56.1 | 28.7 | 36.1 | 39.3 | 12.7 |
| LnGrp LOS | E | D | D | F | D | C | E | E | C | D | D | B |
| Approach Vol, veh/h | | 1095 | | | 1554 | | | 1762 | | | 1251 | |
| Approach Delay, s/veh | | 46.3 | | | 45.3 | | | 59.1 | | | 34.2 | |
| Approach LOS | | D | | | D | | | E | | | C | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 15.4 | 50.1 | 18.9 | 45.5 | 20.0 | 45.6 | 18.7 | 45.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 10.4 | 35.0 | 14.4 | 19.3 | 17.0 | 20.5 | 12.6 | 29.8 |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 0.0 | 8.6 | 0.0 | 4.5 | 0.1 | 10.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 47.3 |
| HCM 6th LOS | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



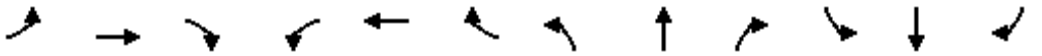
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 234 | 370 | 90 | 200 | 340 | 374 | 60 | 1133 | 110 | 149 | 807 | 123 |
| Future Volume (veh/h) | 234 | 370 | 90 | 200 | 340 | 374 | 60 | 1133 | 110 | 149 | 807 | 123 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1870 |
| Adj Flow Rate, veh/h | 241 | 381 | 77 | 206 | 351 | 215 | 62 | 1168 | 105 | 154 | 832 | 92 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Cap, veh/h | 146 | 809 | 162 | 210 | 514 | 431 | 97 | 2365 | 213 | 176 | 1867 | 832 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.05 | 0.50 | 0.50 | 0.20 | 1.00 | 1.00 |
| Sat Flow, veh/h | 836 | 2921 | 584 | 922 | 1856 | 1555 | 1767 | 4728 | 425 | 1767 | 3526 | 1570 |
| Grp Volume(v), veh/h | 241 | 228 | 230 | 206 | 351 | 215 | 62 | 834 | 439 | 154 | 832 | 92 |
| Grp Sat Flow(s),veh/h/ln | 836 | 1763 | 1743 | 922 | 1856 | 1555 | 1767 | 1689 | 1776 | 1767 | 1763 | 1570 |
| Q Serve(g_s), s | 14.1 | 14.0 | 14.3 | 21.7 | 21.9 | 15.1 | 4.5 | 21.3 | 21.3 | 11.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 14.0 | 14.3 | 36.0 | 21.9 | 15.1 | 4.5 | 21.3 | 21.3 | 11.0 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.34 | 1.00 | | 1.00 | 1.00 | | 0.24 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 146 | 488 | 483 | 210 | 514 | 431 | 97 | 1689 | 888 | 176 | 1867 | 832 |
| V/C Ratio(X) | 1.65 | 0.47 | 0.48 | 0.98 | 0.68 | 0.50 | 0.64 | 0.49 | 0.49 | 0.87 | 0.45 | 0.11 |
| Avail Cap(c_a), veh/h | 146 | 488 | 483 | 210 | 514 | 431 | 190 | 1689 | 888 | 217 | 1867 | 832 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 39.0 | 39.1 | 56.9 | 41.9 | 39.4 | 60.2 | 21.6 | 21.6 | 51.2 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 322.0 | 0.7 | 0.7 | 57.1 | 3.7 | 0.9 | 2.6 | 1.0 | 2.0 | 23.2 | 0.8 | 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 | 17.9 | 6.2 | 6.3 | 10.1 | 10.4 | 5.8 | 2.0 | 8.4 | 9.0 | 5.5 | 0.2 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 382.7 | 39.7 | 39.9 | 114.0 | 45.6 | 40.3 | 62.7 | 22.6 | 23.5 | 74.4 | 0.8 | 0.3 |
| LnGrp LOS | F | D | D | F | D | D | E | C | C | E | A | A |
| Approach Vol, veh/h | | 699 | | | 772 | | | 1335 | | | 1078 | |
| Approach Delay, s/veh | | 158.0 | | | 62.4 | | | 24.8 | | | 11.3 | |
| Approach LOS | | F | | | E | | | C | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 17.0 | 71.0 | | 42.0 | 13.1 | 74.9 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 13.0 | 23.3 | | 38.0 | 6.5 | 2.0 | | 38.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 15.7 | | 0.0 | 0.0 | 10.8 | | 0.0 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 6th Ctrl Delay | | 52.5 |
| HCM 6th LOS | | D |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



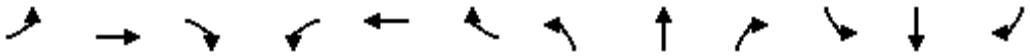
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 360 | 1380 | 275 | 174 | 633 | 190 | 167 | 947 | 149 | 290 | 1244 | 253 |
| Future Volume (veh/h) | 360 | 1380 | 275 | 174 | 633 | 190 | 167 | 947 | 149 | 290 | 1244 | 253 |
| 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 379 | 1453 | 266 | 183 | 666 | 64 | 176 | 997 | 85 | 305 | 1309 | 213 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 765 | 1452 | 265 | 207 | 1120 | 338 | 228 | 1335 | 589 | 299 | 1480 | 801 |
| Arrive On Green | 0.22 | 0.34 | 0.34 | 0.12 | 0.22 | 0.22 | 0.03 | 0.09 | 0.09 | 0.12 | 0.29 | 0.29 |
| Sat Flow, veh/h | 3428 | 4291 | 784 | 1767 | 5066 | 1530 | 1767 | 5066 | 1537 | 1767 | 5066 | 1540 |
| Grp Volume(v), veh/h | 379 | 1143 | 576 | 183 | 666 | 64 | 176 | 997 | 85 | 305 | 1309 | 213 |
| Grp Sat Flow(s),veh/h/ln | 1714 | 1689 | 1698 | 1767 | 1689 | 1530 | 1767 | 1689 | 1537 | 1767 | 1689 | 1540 |
| Q Serve(g_s), s | 12.6 | 44.0 | 44.0 | 13.3 | 15.3 | 3.3 | 9.3 | 25.0 | 5.6 | 15.0 | 32.1 | 2.6 |
| Cycle Q Clear(g_c), s | 12.6 | 44.0 | 44.0 | 13.3 | 15.3 | 3.3 | 9.3 | 25.0 | 5.6 | 15.0 | 32.1 | 2.6 |
| Prop In Lane | 1.00 | | 0.46 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 765 | 1143 | 575 | 207 | 1120 | 338 | 228 | 1335 | 589 | 299 | 1480 | 801 |
| V/C Ratio(X) | 0.50 | 1.00 | 1.00 | 0.88 | 0.59 | 0.19 | 0.77 | 0.75 | 0.14 | 1.02 | 0.88 | 0.27 |
| Avail Cap(c_a), veh/h | 765 | 1143 | 575 | 211 | 1715 | 518 | 278 | 1335 | 589 | 299 | 1480 | 801 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 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 | 44.1 | 43.0 | 43.0 | 56.5 | 45.4 | 22.7 | 36.9 | 55.1 | 33.1 | 35.4 | 43.9 | 6.6 |
| Incr Delay (d2), s/veh | 0.2 | 26.6 | 38.2 | 31.3 | 0.9 | 0.5 | 8.1 | 3.8 | 0.5 | 57.1 | 8.1 | 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 | 5.3 | 22.0 | 23.9 | 7.6 | 6.4 | 1.7 | 4.7 | 11.8 | 2.2 | 11.6 | 14.2 | 1.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 44.3 | 69.6 | 81.2 | 87.8 | 46.3 | 23.2 | 44.9 | 59.0 | 33.6 | 92.5 | 52.0 | 7.4 |
| LnGrp LOS | D | E | F | F | D | C | D | E | C | F | D | A |
| Approach Vol, veh/h | | 2098 | | | 913 | | | 1258 | | | 1827 | |
| Approach Delay, s/veh | | 68.2 | | | 53.0 | | | 55.3 | | | 53.6 | |
| Approach LOS | | E | | | D | | | E | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 40.3 | 19.7 | 50.0 | 16.3 | 44.0 | 35.0 | 34.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | 4.5 | 6.0 | 5.0 | 6.0 | 6.0 | * 6 |
| Max Green Setting (Gmax), s | 15.0 | 34.0 | 15.5 | 44.0 | 15.0 | 34.0 | 15.5 | * 44 |
| Max Q Clear Time (g_c+I1), s | 17.0 | 27.0 | 15.3 | 46.0 | 11.3 | 34.1 | 14.6 | 17.3 |
| Green Ext Time (p_c), s | 0.0 | 3.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 7.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 58.9 |
| HCM 6th LOS | E |

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 170 | 390 | 90 | 150 | 330 | 140 | 110 | 909 | 170 | 259 | 1214 | 242 |
| Future Volume (veh/h) | 170 | 390 | 90 | 150 | 330 | 140 | 110 | 909 | 170 | 259 | 1214 | 242 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 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 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 | 1856 |
| Adj Flow Rate, veh/h | 175 | 402 | 78 | 155 | 340 | 38 | 113 | 937 | 126 | 267 | 1252 | 227 |
| 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, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 169 | 815 | 157 | 201 | 514 | 431 | 137 | 3526 | 1568 | 217 | 4438 | 805 |
| Arrive On Green | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.08 | 1.00 | 1.00 | 0.25 | 1.00 | 1.00 |
| Sat Flow, veh/h | 993 | 2943 | 566 | 904 | 1856 | 1555 | 1767 | 3526 | 1568 | 1767 | 4307 | 781 |
| Grp Volume(v), veh/h | 175 | 239 | 241 | 155 | 340 | 38 | 113 | 937 | 126 | 267 | 982 | 497 |
| Grp Sat Flow(s),veh/h/ln | 993 | 1763 | 1746 | 904 | 1856 | 1555 | 1767 | 1763 | 1568 | 1767 | 1689 | 1710 |
| Q Serve(g_s), s | 14.9 | 14.8 | 15.0 | 21.0 | 21.1 | 2.4 | 8.2 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 36.0 | 14.8 | 15.0 | 36.0 | 21.1 | 2.4 | 8.2 | 0.0 | 0.0 | 16.0 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.32 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.46 |
| Lane Grp Cap(c), veh/h | 169 | 488 | 484 | 201 | 514 | 431 | 137 | 3526 | 1568 | 217 | 3480 | 1763 |
| V/C Ratio(X) | 1.03 | 0.49 | 0.50 | 0.77 | 0.66 | 0.09 | 0.83 | 0.27 | 0.08 | 1.23 | 0.28 | 0.28 |
| Avail Cap(c_a), veh/h | 169 | 488 | 484 | 201 | 514 | 431 | 190 | 3526 | 1568 | 217 | 3480 | 1763 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| 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 | 60.0 | 39.3 | 39.4 | 55.1 | 41.6 | 34.8 | 59.1 | 0.0 | 0.0 | 49.0 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 78.3 | 0.8 | 0.8 | 16.6 | 3.2 | 0.1 | 13.6 | 0.2 | 0.1 | 136.0 | 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 | 9.3 | 6.6 | 6.6 | 6.0 | 9.9 | 0.9 | 4.1 | 0.1 | 0.0 | 14.1 | 0.1 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 138.3 | 40.1 | 40.2 | 71.7 | 44.8 | 34.9 | 72.7 | 0.2 | 0.1 | 185.0 | 0.2 | 0.4 |
| LnGrp LOS | F | D | D | E | D | C | E | A | A | F | A | A |
| Approach Vol, veh/h | | 655 | | | 533 | | | 1176 | | | 1746 | |
| Approach Delay, s/veh | | 66.4 | | | 51.9 | | | 7.1 | | | 28.5 | |
| Approach LOS | | E | | | D | | | A | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 20.0 | 138.0 | | 42.0 | 16.0 | 142.0 | | 42.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 6.0 | | * 6 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 16.0 | 64.0 | | * 36 | 14.0 | 64.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 18.0 | 2.0 | | 38.0 | 10.2 | 2.0 | | 38.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 13.2 | | 0.0 | 0.0 | 22.9 | | 0.0 | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 6th Ctrl Delay | | 31.5 | |
| HCM 6th LOS | | C | |

**Notes**

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

# Appendix D: Parking Study

# MEMORANDUM

| | | | |
|---|---|---|---|
| To: | Dave Rand<br>Armbruster Goldsmith & Delvac LLP | Date: | September 15, 2020 |
| From: | David S. Shender, P.E.<br>Linscott, Law & Greenspan, Engineers | LLG Ref: | 5-20-0518-1 |
| Subject: | **Parking Study for the Proposed Residential Project at 12850 Crenshaw Boulevard**<br>City of Gardena | | |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This memorandum has been prepared by Linscott, Law & Greenspan, Engineers (LLG) to provide a comprehensive parking study related to the proposed residential project at 12850 Crenshaw Boulevard in the City of Gardena ("the Project"). The Project proposes the development of 265 multi-family residential units. A total of 267 vehicle parking spaces are proposed to be provided on-site. A Specific Plan is proposed to regulate development at the Project site.

The Project site is located approximately two-thirds of a mile walking distance to the nearby Metro Green Line station. As such, the Project site is located adjacent to a Transit Priority Area[1] (TPA) as defined by the Southern California Association of Governments (SCAG). In addition, many of the Project residents are expected to be employed at nearby businesses, including the SpaceX facility located across El Segundo Boulevard from the Project site. The proposed Specific Plan includes a Transportation Demand Management (TDM) Plan. To reduce vehicular trips and on-site parking demands, the TDM Plan requires an exclusive 30-day pre-leasing period targeted for employees who work within a one-half mile radius of the Project Site (e.g., SpaceX).

The Specific Plan's proposes two development standards related to off-street parking that differ from the Gardena Municipal Code:

- Number of Parking Spaces Required (Section 18.40.040). The Project proposes to provide parking at a rate that differs from those defined by Section 18.40.040 of the Gardena Municipal Code. As the characteristics of the Specific Plan are unique to the Project, it is anticipated that parking demand will be less than the rates established by Section 18.40.040. The parking analysis has been prepared to evaluate the proposed parking for the Project using Specific Plan parking rates. Details of the parking demand analysis prepared for the Project are provided in a following section.

[1] A TPA is defined the area located within one-half mile of major transit stops, including an existing rail transit station.

- Size of Parking Spaces (Section 18.40.050). The Project proposes dimensions related to the parking area that differ from Section 18.40.050 of the Gardena Municipal Code. The width of the parcel on which the Project is located makes it impractical to provide parking lot dimensions that comply with the Gardena Municipal Code. The dimensions proposed for the Specific Plan, however, are consistent with parking design standards utilized by other jurisdictions and, therefore are considered to be safe and efficient as described in a following section.

**Project Description**

The Project consists of a residential development featuring 265 apartment units. A total of 267 vehicle parking spaces are proposed to be provided on-site. Specific components of the Project development plan are as follows:

- Residential with 265 units:
  - 95 Studio apartments
  - 132 1-bedroom units
  - 38 2-bedroom units

**Specific Plan Parking Calculation**

As previously noted, the Project is proposed to be developed as part of a Specific Plan and proposes off-street parking rates differing from those defined in the Municipal Code. For example, the Section 18.40.040 of the Gardena Municipal Code requires two parking spaces per each unit (i.e., studio units, 1-bedroom units, and 2-bedroom units). The Specific Plan proposes one parking space for each unit (i.e., studio units, 1-bedroom units, and 2-bedroom units). In addition to the 265 parking spaces for the residential units, the Project will provide two (2) additional parking spaces that would serve leasing, mail, and shared ride use (e.g., Uber/Lyft).[2]

**Transportation Demand Management**

The Specific Plan includes a TDM Plan to reduce single-occupant automobile travel and take advantage of the Project site's proximity to large employment centers, transit services, and bicycle and pedestrian facilities.

[2] It is noted that additional parking spaces would be available as-needed on-site for daytime use by other non-resident vehicles such as the on-site manager, maintenance/contractors, etc. because: 1) not every resident will choose to rent a parking space; and 2) parking spaces will be available during the day as some residents are at work or school.

TDM measures include the following:

**Pre-Leasing for Area Employees.** Residential units within the Specific Plan area shall be marketed exclusively for a thirty-day period to employees working within a one mile radius of the development, before the units are offered for rent to the general public. The developer shall submit a pre-leasing marketing plan to the Director of Community Development for review and approval prior to issuance of a temporary certificate of occupancy. The developer must then demonstrate compliance with the approved thirty-day exclusive marketing plan prior to issuance of a final certificate of occupancy.

**Transit Information.** To ensure that residential tenants and guests are aware of transit options and TDM programs available to them, an information board or kiosk shall be posted in a central location within the Specific Plan area.

**One-time Free Monthly Transit Pass.** Given the Specific Plan area's location within walking distance (approximately two-thirds of a mile) to the Crenshaw Station, the developer shall offer future residents who commence a 12-month lease a one-time monthly Metro transit pass. These one-time monthly transit passes shall be offered to new residents for a 24-month period ("Free Pass Period") commencing after issuance of any temporary or final certificate of occupancy. The Developer shall demonstrate compliance with this requirement to the satisfaction of the Director of Community Development. In the event the Director of Community Development determines the developer failed to satisfy this requirement, the developer shall be given seven days to demonstrate compliance ("Cure Period"). In the event the developer fails to demonstrate compliance during the Cure Period, the City may extend the Free Pass Period by one week for each resident denied a Metro transit pass. This would encourage and help facilitate a culture of transit use by Project residents.

**Unbundled Parking.** The Specific Plan requires that the rent for a parking space at the Project be charged separate from the rent of the residential unit. This unbundling of the charge for a parking space brings visibility to the cost of vehicle ownership and allows residents to choose between renting a parking space or using a portion of these funds for other uses, such as purchasing a transit pass and/or maintaining a bicycle. Residents who choose to not rent a parking space must commit in their leases that they will not park a personal vehicle at the Project site or nearby area.

**On-site Residential Bicycle Parking.** The Specific Plan requires one (1) bicycle parking space per residential unit (located in secured facilities accessible only by residents). All bicycle parking shall be located in a safe, convenient location, encouraging the use of bicycle transportation by residents and residential guests.

**Ride-Sharing Pick-Up/Drop-Off.** A designated loading zone within the Specific Plan area shall be signed and distinguished (e.g., with paving and/or paint) so that it is utilized as pick-up and drop-off zones for ride-sharing services.

**Transit Oriented Development Parking Demand Research**

As previously noted, the Project proposes to provide off-street parking based on the rate established as part of a Specific Plan. It is anticipated that many of the Project's residents will be employed at nearby businesses and/or utilize transit options in the area, including the Metro Green Line. As stated above, the Specific Plan TDM Plan requires an exclusive 30-day pre-leasing period targeted for employees who work within a one-half mile radius of the Project Site (e.g., SpaceX employees). As this development is transit-oriented, a parking rate providing fewer spaces than those established in the Municipal Code is proposed. Parking demand research for Transit Oriented Developments ("TODs") was conducted as part of this parking review and is summarized in the following paragraphs.

*TOD Letters in Support of the Project*

LLG understands the City of Gardena will prepare a Draft Environmental Impact Report (Draft EIR) for the Specific Plan. In conjunction with the preparation of the Draft EIR, the City recently issued a Notice of Preparation to affected government agencies and nearby stakeholders. In response, the City has received two letters from government agencies in support of reduced parking for the Specific Plan based on the TOD aspect of the Project.

Caltrans submitted a letter in response to the NOP to the City[3] in support of the TOD nature of Project, including the statement, "Caltrans acknowledges and supports infill development that prioritizes nearby transit service, promotes active transportation, and provides a mixture of land uses that keep the goods and services people need in close proximity to where they work and live." Further the Caltrans letter supports reduced on-site parking for TOD projects including, "Caltrans still recommends reducing the total amount of parking whenever possible, as research on parking suggests that abundant parking enables and encourages driving. Research looking at the relationship between land-use, parking, and transportation indicates that the amount of car parking supplied can undermine a project's ability to encourage public transportation and active modes of transportation."

[3] Letter to John Signo, City of Gardena, signed by Miya Edmonson, IGR/CEQA Branch Chief of Caltrans, September 10, 2020.

In addition, the Los Angeles County Metropolitan Transportation Authority (Metro) also submitted a letter[4] to the City in response to the NOP. Within the letter, Metro states, "Metro encourages the incorporation of transit-oriented, pedestrian-oriented parking provision strategies such as the *reduction or removal of minimum parking requirements* [emphasis added] and the exploration of shared parking opportunities. These strategies could be pursued to reduce automobile-orientation in design and travel demand."

In summary, the Draft EIR NOP letters submitted to the City by Caltrans and Metro support reduced parking for the Specific Plan based on the TOD characteristics of the Project.

*TOD Research*

LLG conducted a review of studies related to parking demand and recommended parking ratios for residential TOD projects. Below is a summary of two recent studies relevant to the analysis of parking for the Project:

- City of Palo Alto Study. In 2018, the City of Palo Alto reviewed potential adjustments to its parking ratios for multi-family housing, including for market-rate residential projects. The City commissioned a parking study[5] which included parking utilization counts at existing market-rate residential sites. At the project located a half-mile from a Caltrain station, the peak parking demand rate was observed to be 0.79 spaces per unit. At an additional project located 1.2 miles from a Caltrain station, the peak parking demand rate was observed to be 1.0 spaces per unit. Accordingly, as the Project is located approximately two-thirds of a mile from a Green Line station, it is reasonable to foresee that the expected parking demand will likely fall between the 0.79 spaces and 1.0 spaces per unit observed in the Palo Alto study.

- BART TOD Guidelines. In May 2017, Bay Area Rapid Transit (BART) issued a study[6] providing suggested parking supply guidelines for residential projects constructed within a half-mile of its transit stations. The BART TOD guidelines recommend that agencies adopt no minimum parking requirements for residential projects located within a half-mile of transit stations, a maximum of one parking space per unit for residential projects that are a minimum of five stories in height, and 0.5 spaces per unit for projects that are a minimum of seven stories in height. The Project proposes to provide 5.5 levels of residential uses. Accordingly, the parking ratio recommendations in

[4] Letter to John Signo, City of Gardena, signed by Shine Ling, Manager, Transit Oriented Communities, Metro, September 18, 2020
[5] *City of Palo Alto Multi-Family Parking Demand Rates*, Fehr & Peers, April 2018.
[6] *BART Transit-Oriented Development Guidelines*, May 2017.

the BART document for residential projects are consistent with those provided in the proposed Specific Plan.

*TOD Ordinances in Other Jurisdictions*

Parking requirements at specific TOD projects, as well as jurisdictional requirements, were reviewed as part of this parking study. Many jurisdictions have recognized that residential projects in areas with high levels of transit service experience less parking demand as compared to developments in areas where nearly all travel is done by private automobile.

***Table 1*** provides a summary of residential parking requirements in TOD areas located in California. *Table 1* provides a breakdown of residential parking requirements for studio, 1-bedroom, and 2-bedroom units, as well as any residential guest parking rates, with a comparison to the Specific Plan residential parking rate.

**Table 1**
**Residential Parking Examples from Other Jurisdictions**

| Project/Jurisdiction | Location | Minimum Parking Requirements | | | |
|---|---|---|---|---|---|
| | | Studio | Bedroom | 2-Bedroom | Guest Parking |
| **Proposed Project** | | | | | |
| Proposed Specific Plan | Gardena | 1 sp/unit | 1 sp/unit | 1 sp/unit | 0 sp/unit |
| **Other Jurisdictions** | | | | | |
| L.A. County Metro[7] | L.A County | 0 sp/unit | 0 sp/unit | 0 sp/unit | 0 sp/unit |
| Willowbrook TOD Plan | Los Angeles | .6 sp/unit | .9 sp/unit | 1.2 sp/unit | .15 sp/unit |
| Vermont/Western TOD | Los Angeles | 1 sp/unit | 1 sp/unit | 1 sp/unit | .25 sp/unit |
| San Diego TPA | San Diego | 0 sp/unit | 0 sp/unit | 0 sp/unit | 0 sp/unit |
| City of Oakland[8] | Oakland | 1 sp/unit | 1 sp/unit | 1 sp/unit | 0 sp/unit |
| City of Berkeley | Berkeley | 1 sp/unit | 1 sp/unit | 1 sp/unit | 0 sp/unit |

[7] Per the Metro NOP letter, Metro suggests reduction or removal of minimum parking requirements for TOD projects.
[8] Parking rates apply Citywide except in Central Business District, Broadway Valdez District and Coliseum Area District which have reduced parking requirements for multi-family residential.

As shown in *Table 1*, the proposed Specific Plan provides a similar or greater parking rate for residential units as the other existing TOD plans/ordinances. The Willowbrook TOD Plan shown on *Table 1* was recently enacted by the County of Los Angeles. The plan area is located in the vicinity of the Willowbrook station along the Metro Green Line.

In summary, the residential parking rates proposed for the Project as part of the Specific Plan will result in a parking supply that will exceed the existing TOD plans and ordinances adopted by other agencies in California.

**Parking Dimensions**

The Specific Plan proposes parking space dimensions that vary from Section 18.40.050 of the Gardena Municipal Code. ***Table 2*** provides a comparison of the parking space dimensions required by the Gardena Municipal Code and the corresponding dimensions proposed in conjunction with the Specific Plan.

**Table 2**
**Comparison of Parking Stall Dimensions**
**Gardena Municipal Code vs. Proposed Specific Plan**

| Issue Area[9] | Gardena Municipal Code (Section 18.40.050) | Proposed Specific Plan |
|---|---|---|
| Standard Parking Stall Dimensions[10] | 9 x 18 feet | 9 x 18 feet |
| Compact Parking Stall Dimensions | 8 x 17 feet | 9 x 16 feet |
| Drive Aisle Width | 26 feet | 24 feet |
| Proportion of Compact Spaces to Overall Number of Required Spaces | Up to 25%[11] | Up to 50% |

[9] Based on 90-degree parking spaces
[10] Section 18.40.050 (B) of the Gardena Municipal Code stipulates that parking spaces adjacent to a wall or any obstruction shall have a minimum dimension of 10 feet by 20 feet. The Specific Plan proposes no additional adjustment to the standard and compact space dimensions.
[11] Section 18.40.050 (C) of the Gardena Municipal Code stipulates that compact parking spaces cannot be used to satisfy the required parking supply for residential uses. The Specific Plan proposes that compact spaces may be used to satisfy the required parking supply for residential uses.

The on-site parking garage proposed at the Project provides two "bays" of 90-degree parking spaces. That is, two two-way drive aisles with a row of 90-degree parking spaces located along each side of the both drive aisles. Each bay of parking is proposed to be 58 feet in width consisting of one row of compact spaces (16 feet in length) and one row of standard spaces (18 feet in length) separated by a two-way drive aisle (24 feet in width). In no circumstance will two rows of compact-sized parking spaces be provided within a single parking bay, except in the limited circumstances where a parking space in the row of standard-sized spaces is located adjacent to a wall or other obstruction (in which case it will be designated as a compact space).

Based on the Municipal Code parking dimension requirements (assuming standard size parking spaces), the overall width of the garage would need to be 124 feet: four rows of 90-degree parking spaces that are each 18 feet in length (72 feet overall) and two drive aisles that are 26 feet in width (52 feet overall). However, the existing width of the Project site parcel only permits construction of a parking garage that provides an overall width of 116 feet (i.e., eight feet less than the "standard" width of two bays of parking). Accordingly, the Specific Plan proposes adjustments to the Municipal Code parking dimensions as follows:

- Reduce the width of the drive aisle from 26 feet to 24 feet (resulting in a "savings" of four feet across the two bays of parking); and

- Provide two rows compact parking spaces (which are not permitted to satisfy required residential parking per the Municipal Code) and reduce the stall length from 18 feet to 16 feet (resulting in a "savings" of four feet).

Two additional adjustments to the Municipal Code parking dimensions are proposed based on the limited size of the Project site parcel:

- Allow up to 50% of the parking supply to be designated as compact spaces, instead of the maximum 25% of the supply of parking spaces that may be designated as compact spaces in the Municipal Code[12]; and

- Maintain the proposed parking stall length and width adjacent to walls and obstructions instead of adding additional length and width to the parking space dimensions per the Municipal Code.

[12] As currently designed, approximately 41.2% of the parking supply (110 of the proposed supply of 267 spaces) are proposed to be compact spaces. The Specific Plan provision for designating up to 50% of the parking supply as compact spaces allows for changes to the final parking layout that may be needed at the time of preparation of construction documents.

Justifications for the parking dimensions proposed under the Specific Plan are as follows:

- The proposed parking stall width and length, as well as the drive aisle width are consistent with or exceed the requirements of other jurisdictions. As noted, the Project proposes standard parking stall and compact parking stall dimensions that are 9 x 18 feet and 9 x 16 feet, respectively. In addition, a drive aisle width of 24 feet is proposed.

    - City of Los Angeles.[13] The parking stall dimensions proposed at the Project meet or exceed the minimum standard parking stall (8'-8" x 18 feet) and compact parking stall (7 x 15 feet) dimensions for the City of Los Angeles. In addition, for drive aisles, the City of Los Angeles requires 25'-4" adjacent to standard size stalls[14] and 20 feet adjacent to compact size stalls. The drive aisles proposed within the Project (24 feet) will closely match the City of Los Angeles requirement adjacent to standard size stalls and will exceed the requirement adjacent to compact size stalls by four feet.

    - County of Los Angeles.[15] The parking stall dimensions proposed at the Project exceed the County of Los Angeles minimum standard (8.5 feet) and compact (eight feet) parking width requirement. In addition, for drive aisles, the County requires 26 feet adjacent to standard size stalls and 23 feet adjacent to compact size stalls. The drive aisles proposed within the Project (24 feet) will closely match the County of Los Angeles requirement adjacent to standard size stalls and will exceed the requirement adjacent to compact size stalls by one foot.

- The Project characteristics allow for a deviation of typical parking dimension standards. The Project is a residential development and its vehicle parking area will be used almost exclusively by residents of the Project. Unlike other parking facilities, the parking area will be used by persons who are highly familiar with the layout of the garage. Further, the trip generation characteristics of residential projects are typically highly directional: outbound trips during the weekday morning commuter peak period and inbound trips during the weekday afternoon commuter peak period. Further, there is very little turnover of parking spaces during the course of a typical day. Thus, motorists driving through the garage will have little, if any conflict with other vehicles, including oncoming traffic.

[13] City of Los Angeles Ordinance No. 142306
[14] The City of Los Angeles requires a drive aisle width of 25'-4" adjacent to standard size parking spaces that are nine feet in width.
[15] County Code Section 22.112.080

- Vehicle characteristics support smaller parking spaces. The relatively higher proportion of parking spaces that are 16 feet in length can be provided without adverse impacts to vehicle circulation in the Project garage because vehicle dimensions are generally smaller as compared to prior years. Below is the vehicle length for the five highest selling vehicles in California in 2019[16]:

    - Honda Civic: 15'-3"
    - Tesla Model 3: 15'-5"
    - Honda Accord: 16'-0"
    - Toyota Camry: 16'-0"
    - Toyota RAV4: 15'-2"

    All of the vehicles listed above can be accommodated within the compact parking spaces that are proposed at the Project. Further, the proposal to provide a nine-foot width for the compact spaces at the Project (instead of the minimum eight-foot width for compact spaces permitted by the Gardena Municipal Code) ensures that motorists will be able to readily maneuver to and from the parking spaces with minimal delay. Therefore, the proposal in the Specific Plan to allow up to approximately 50% of the parking stalls at the Project to be designated as compact spaces will not adversely affect the safe and efficient flow of vehicle traffic through the garage. Further, the proposal to designate up to 50% of the parking stalls as compact parking spaces is similar to other jurisdictions, such as the previously referenced City of Los Angeles parking design standards which permit up to 40% of required parking spaces to be designated as compact parking stalls.

- Additional width is not required for parking spaces adjacent to walls or obstructions. The Specific Plan does not propose any additional or length for parking stalls adjacent to walls or obstructions within the Project's parking garage. As previously noted, all parking spaces (standard and compact) will be nine feet in width. This exceeds the City's required width for a compact parking space. Further, as previously noted, the trend in California for smaller-size vehicles, which can readily be accommodated within a nine-foot wide stall, even when located adjacent to a wall or obstruction. Finally, the Project proposes that any parking space adjacent to a wall or obstruction be designated as a compact space. No additional width is required for parking spaces located adjacent to walls or obstructions within the Project's parking garage.

[16] Source: https://www.edmunds.com/most-popular-cars/

**Conclusions**

Based on the Project's close proximity to employment centers and transit stations, including the Metro Green Line's Crenshaw Station, as well as research of existing parking demand rates and requirements at TOD projects, the 267 parking spaces will adequately serve the Project. In addition, the parking space dimensions as proposed within the Specific Plan will provide for the safe and efficient flow of vehicular traffic within the Project's parking garage.

cc: File

Kimley»Horn

# TECHNICAL MEMORANDUM

To: Ray Barragan and Lisa Kranitz, City of Gardena

From: Sowmya Chandrasekhar and Rita Garcia

Date: January 14, 2021

Subject: **Gardena Transit Oriented Development Specific Plan, 12850 and 12900 Crenshaw Boulevard, Local Transportation Assessment Peer Review**

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Kimley-Horn has conducted a follow-up third-party peer review of the Project's Local Transportation Assessment (Fehr & Peers, November 2020) on behalf of the City of Gardena to verify that Kimley-Horn's October 29, 2020 third-party peer review Technical Memo (TM) recommendations have been incorporated. The revised November 2020 report addressed the third-party peer review comments and thus is in compliance with the TM recommendations. The analysis, as revised, meets the applicable provisions of CEQA and the State CEQA Guidelines and is adequate for inclusion in the Project EIR.

Please do not hesitate to contact Sowmya Chandrasekhar at 213.354.9400 or sowmya.chandrasekhar@kimley-horn.com with any questions.

FEHR PEERS

# Technical Memorandum

Date: August 14, 2020

To: Ray Barragan, Community Development Manager, City of Gardena

From: Stephanie Cheng and Andrew Scher, Fehr & Peers

**Subject: CEQA Transportation Analysis for 12850 Crenshaw Boulevard Project**

*LB20-0010*

This technical memorandum documents the Vehicle Miles Traveled (VMT) analysis of the 12850 Crenshaw Boulevard project (Project). The Project is located in the City of Gardena, approximately 500' southeast of the intersection of Crenshaw Boulevard & El Segundo Boulevard. The proposed project will provide up to 265 multi-family residential dwelling units, replacing an existing auto-parts warehouse and adjacent surface parking lots. The proposed project will replace the prior land use with a new residential building with multi-modal amenities located near several transit service routes.

This VMT analysis is part of an environmental impact report (EIR) being prepared for the proposed project and follows the California Environmental Quality Act (CEQA) guidance for determining transportation impacts in accordance with Senate Bill (SB) 743.

The VMT analysis begins with a review of the baseline VMT metrics and VMT impact thresholds developed in conjunction with the City of Gardena. The project is then evaluated under three VMT analysis screening options to determine if it may have a VMT impact and require further evaluation.

The City of Gardena has prepared SB 743 Implementation Transportation Analysis Guidelines to address the VMT impact criteria and analysis methodology for development projects in the City. The most recent May 2020 version of the guidelines were applied to the proposed project.

## Baseline VMT

On September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 into law, which initiated a process to change transportation impact analyses completed in support of CEQA documentation. SB 743 eliminates level of service (LOS) as a basis for determining significant transportation impacts under CEQA and establishes VMT as a new performance metric. As a result, the State is shifting from measuring a project's impact to drivers (LOS) to measuring the impact of driving (VMT) as it

relates to achieving State goals of reducing greenhouse gas (GHG) emissions, encouraging infill development, and improving public health through active transportation.

The Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) trip-based model was used to estimate the baseline VMT for the City of Gardena. The current SCAG model has 2012 as the base year and 2040 as the forecast year.

This baseline VMT methodology includes vehicle trips within the SCAG model to generate the following metrics:

1. Home-based VMT per Capita: Home-based vehicle trips are traced back to the residence of the trip-maker (non-home-based trips are excluded) and then divided by the residential population within the geographic area. This metric is used to estimate VMT for residential land uses.
2. Home-based Work VMT per Employee: Vehicle trips between home and work are counted, and then divided by the number of employees within the geographic area. This metric is used to estimate VMT for office, retail, and other commercial land uses.

The City's baseline VMT for each metric is shown in Table 1.

**Table 1: Baseline VMT for City of Gardena**

| VMT Metrics | | Baseline VMT |
|---|---|---|
| | | Year 2020 |
| **Home-Based VMT** | Baseline Home-Based VMT per Capita | **11.00** |
| **Home-Based Work VMT** | Baseline Home-Based Work VMT per Employee | **16.22** |

## VMT Impact Thresholds

Following guidance from the Office of Planning and Research[1] (OPR), the City of Gardena identified a 15% reduction from the baseline regional average VMT as the impact threshold for land use development projects in the City. If the project would generate VMT higher than the threshold, then it would be expected to have a VMT impact, and if the project would generate VMT lower than the threshold, then it would not be expected to have a VMT impact. The regional baseline VMT and City's VMT impact thresholds are summarized in Table 2.

[1] Governor's Office of Planning and Research, *Technical Advisory on Evaluating Transportation Impacts in CEQA*, 2018.

**Table 2: Baseline Regional VMT and City of Gardena VMT Impact Thresholds**

| VMT Metrics | Year 2020 | |
|---|---|---|
| | Baseline VMT | VMT Impact Threshold* |
| **Baseline Regional Home-Based VMT per Capita** | 14.35 | 12.20 |

* The VMT Impact Threshold for is 15% below the respective Baseline VMT.

## VMT Screening

The first step of a VMT analysis is to determine what type of analysis, if any, is needed. The City of Gardena identified three screening criteria to assess if a VMT analysis would be required for the proposed project as recommended by OPR's *Technical Advisory*[2]. The three screening criteria are detailed below and applied to determine if the Project has the potential to result in a VMT impact.

### Screening Criteria 1: Project Type

Land use projects that generate less than 110 daily trips and local-serving retail projects, defined as commercial projects with local-serving retail uses less than 50 thousand square feet (ksf), are presumed to have less than significant VMT impacts absent substantial evidence to the contrary. Therefore, these projects are screened out from completing a VMT analysis based on project size. Residential projects that are 100% affordable are also screened out.

*Based on the ITE Trip Generation Manual (10th Edition) trip rate for multi-family mid-rise projects, or 5.44 trips per unit, the Project's proposed 265 residential units is expected to generate more than 110 daily trips and is not 100% affordable housing. Therefore, the Project is not screened out from VMT analysis under this screening criteria.*

### Screening Criteria 2: Low VMT Area Screening

Residential projects located within a low VMT generating area may be presumed to have a less than significant impact absent substantial evidence to the contrary. Based on the VMT impact threshold as identified by the City of Gardena, low VMT for residential projects is defined as an area that generates VMT on a per capita basis that is 15% or more below the baseline VMT. In the City of Gardena, a low VMT area for residential projects generates no more than 12.20 VMT per capita as shown above in Table 2. The traffic analysis zones (TAZ) contained in the SCAG model can be used to identify the low VMT areas in the City of Gardena.

*The Project is located in a TAZ estimated to generate 11.56 VMT per capita, which is 19.5% below the SCAG regional baseline VMT. Therefore, the Project is in an area with low residential VMT, which*

[2] Governor's Office of Planning and Research, *Technical Advisory on Evaluating Transportation Impacts in CEQA*, 2018, 12-14.

*means the Project is presumed to have a less than significant VMT impact and can be screened out from further VMT analysis.*

In addition, OPR's Technical Advisory suggests that a project in a low VMT area is presumed to have a less than significant VMT impact if the project incorporates similar features as other development in the vicinity, such as similar density, similar mix of uses, and similar transit access. The TAZ contains primarily residential land uses to the southeast of the Project, with more than 1,100 in population according to socioeconomic data. The proposed Project brings higher density housing than other housing developments in the vicinity, which are mainly single-family homes. The higher density housing generates lower VMT than the adjacent residential uses. The location of the Project also provides better access to transit on Crenshaw Boulevard and El Segundo Boulevard than the rest of the residential uses in the TAZ.

### Screening Criteria 3: Transit Proximity Screening

Projects located in proximity to high quality transit may also be exempt from VMT analysis because they are presumed to have a less than significant impact absent substantial evidence to the contrary. Transit Priority Areas, or TPAs, are defined in the OPR technical advisory as a ½ mile radius around an existing or planned major transit stop or an existing stop along a high-quality transit corridor (HQTC). A HQTC is defined as a corridor with fixed route bus service frequency of no longer than 15 minutes during peak commute hours. For this analysis, the morning and afternoon peak commute hours are defined as 6:00 to 9:00 AM and 3:00 to 6:00 PM, respectively. A map of the City of Gardena's Transit Priority Screening Areas showing the frequent bus routes is shown in Figure 1.

*The Project site is less than half a mile from several bus stops near the intersection of Crenshaw Boulevard & El Segundo Boulevard which have headways of less than 15 minutes during peak commute hours, including Metro routes 210 and 710.*

The presumption that a project in a TPA will have a less than significant impact absent substantial evidence to the contrary may not be appropriate if the project:

1. Has a Floor Area Ratio (FAR) of less than 0.75 (for office, retail, hotel, and industrial projects) or fewer than 20 units per acre (for residential projects);
2. Includes more parking for use by residents, customers, or employees of the project than required by the jurisdiction (if the jurisdiction requires the project to supply parking);
3. Is inconsistent with the applicable Sustainable Communities Strategy (as determined by the lead agency, with input from the Metropolitan Planning Organization); or
4. Replaces affordable residential units with a smaller number of moderate- or high-income residential units.

*The Project includes a density of more than 20 units per acre, does not provide more parking than required, is consistent with the SCS, and does not replace affordable residential units.*

*It is anticipated that SCAG will release a new model following the upcoming adoption of the 2020 RTP/SCS. The VMT results for the Project are not expected to change given that the residential uses in Gardena are expected to remain well below the regional average. Therefore, the Project is presumed to have a less than significant VMT impact and can be screened out from further VMT analysis.*

## VMT Analysis for Cumulative Conditions

For baseline conditions, the Project is screened out from further VMT analysis based on its location in a low VMT area and proximity to high quality transit service. For cumulative conditions, a project that is below the VMT impact thresholds and does not have a VMT impact under baseline conditions would also not have a cumulative impact as long as it is aligned with long-term State environmental goals, such as reducing GHG emissions, and relevant plans, such as the SCAG RTP/SCS. The Project supports long-term environmental goals as an in-fill residential project that provides housing near commercial and employment areas[3]. The Project is also aligned with the SCAG RTP/SCS because the Project is located within a TPA and provides housing development in a TAZ with downward trending VMT per capita, which is consistent with the goals of the RTP/SCS.

## Conclusions

Based on Gardena's SB 743 Implementation Transportation Analysis Guidelines, a project can be screened from VMT analysis and presumed to have a less than significant transportation impact under CEQA if the project meets any of the City's VMT screening criteria.

As summarized in Table 3, the proposed project meets two of the City's screening criteria:

1. The Project is screened from VMT analysis because it is in a low VMT area, which is any TAZ that generates VMT per capita that is greater than 15% below the baseline VMT. Based on the SCAG Model, the Project site is located in a TAZ that is 19.5% below the SCAG regional average. Therefore, the Project meets the low VMT screening criteria.
2. The Project is also screened from VMT analysis because it is in a high-quality transit area. The Project site is less than half a mile from bus stops near the intersection of Crenshaw Boulevard & El Segundo Boulevard which have headways of less than 15 minutes during peak commute hours. It is consistent with the RTP/SCS and provides 267 parking spaces, which does not exceed the parking required by the City. Per the Project's Specific Plan the parking ratio is one (1) space per unit, which is less than the City's standard for multi-family residential units. The Project will also provide bicycle parking and Transportation Demand Management (TDM) strategies to reduce single-occupant auto travel and encourage alternate means of transportation. Project TDM strategies that will be provided include unbundled parking, pre-leasing for area employees who work within a one-half mile radius,

[3] The SCAG Tier 1 TAZ 21223000 includes a growth of 450 households between 2012 and 2040. The size of the proposed project is consistent with the SCAG RTP and is accommodated within the forecasted growth

transit information kiosks, on-site bicycle parking, and ride-sharing pick-up/drop-off loading areas.

**Table 3: VMT Screening Options for Land Use Projects**

| Screening Category | Screening Criteria | Project Screened Out? |
|---|---|---|
| Project type screening | Presumed less than significant impact for 100 percent affordable projects, local serving retail projects (defined as less than 50 ksf per OPR's Technical Advisory) and projects that generate less than 110 daily trips. | No |
| Low VMT area screening | Presumed less than significant VMT impact for projects located in low VMT generating traffic analysis zones (TAZs). These TAZs generate total daily VMT per capita or per employee that is 15% less than the baseline level for the region. | **Yes** |
| Transit proximity screening | Presumed less than significant VMT impact for projects located in high-quality transit areas. | **Yes** |

Source: SB 743 Implementation Transportation Analysis Guidelines, City of Gardena (May 2020)

*Based on the City of Gardena's transportation guidelines and impact thresholds, the Project can be screened out from a full VMT analysis and is presumed to result in a less than significant transportation impact.*

## Local Transportation Assessment Summary

A Local Transportation Assessment (LTA) was prepared to inform decision makers on the overall effects of a project. While not required under CEQA, the LTA evaluated existing and future conditions with the addition of project-generated traffic, addressing both vehicular and non-vehicular facilities. The key findings regarding project site access and pedestrian, bicycle, and transit facilities surrounding the project site are summarized below.

*Project Site Access*

Vehicular access will be provided along the northbound side of Crenshaw Boulevard at one driveway located approximately at the center of the project site. An existing raised median along Crenshaw Boulevard limits access to northbound right-turn entry/right-turn exit only and no left-turns will be permitted. The proposed single vehicle access point will improve the frontage along Crenshaw Boulevard and will significantly reduce the number of existing curb cuts and potential conflict points between vehicles and pedestrians.

On-site parking will be provided in an enclosed garage consisting of two-and-a-half vertical floors, starting at the ground level. The parking garage will provide 267 parking spaces and is designed to permit two-way travel between the various levels with adequate circulation. A continuous fire access lane is proposed around the perimeter of the site to provide adequate emergency access.

*Pedestrian Facilities*

Existing sidewalks are provided along the project frontage and within a continuous and complete pedestrian network in the surrounding area. Sidewalk along the east side of Crenshaw Boulevard is discontinuous for a short segment from just south of the project side to 131st Street. Marked crosswalks, curb ramps, and pedestrian signals are provided on all legs of the nearest intersection of Crenshaw Boulevard and El Segundo Boulevard, which provides direct access to transit stops and surrounding land uses. However, curb ramps are not ADA-compliant on at least two corners of the Crenshaw Boulevard and El Segundo Boulevard intersection.

Pedestrian access to the project site will be provided on the ground floor with primary pedestrian access located at the building lobby located on the northern portion of the site. Additional restricted pedestrian access will also be provided to residential units on the southern end of the site. On-site pedestrian circulation will consist of a network of pathway connections between residential units, common areas, and the parking garage. The project design provides for adequate pedestrian access to the existing sidewalks provided along the project frontage. Project traffic and site design is not anticipated to deteriorate or effect existing pedestrian facilities in the study area.

*Bicycle Facilities*

The project includes amenities for bicyclists which should encourage use of existing or planned bicycle facilities in the study area. Enclosed bike storage will also be provided in the enclosed garage.

Separated or protected bicycle facilities are not currently provided along Crenshaw Boulevard near the project site. El Segundo Boulevard west of Crenshaw Boulevard is designated as a bike route (Class III). An existing bike path is provided along the Laguna Dominguez Trail behind the project site on the east side of the waterway channel. The Laguna Dominguez Trail spans almost three miles between Lawndale and Hawthorne. It provides direct bicycle access between the project site and the Green Line Station.

The following two bike lane projects are recommended in the South Bay Bicycle Master Plan as prioritized projects in Gardena and may be constructed by the City in the future:

- Crenshaw Boulevard from El Segundo Boulevard to Redondo Beach Boulevard
- El Segundo Boulevard from Crenshaw Boulevard to Vermont Avenue

Implementation of the proposed project will not conflict with any existing bicycle facilities, and it will not preclude the implementation of any other potential enhancements to planned facilities. Similarly, bicycle trips will be generated by the project, but development of the project is not expected to conflict with any existing or planned bicycle facility.

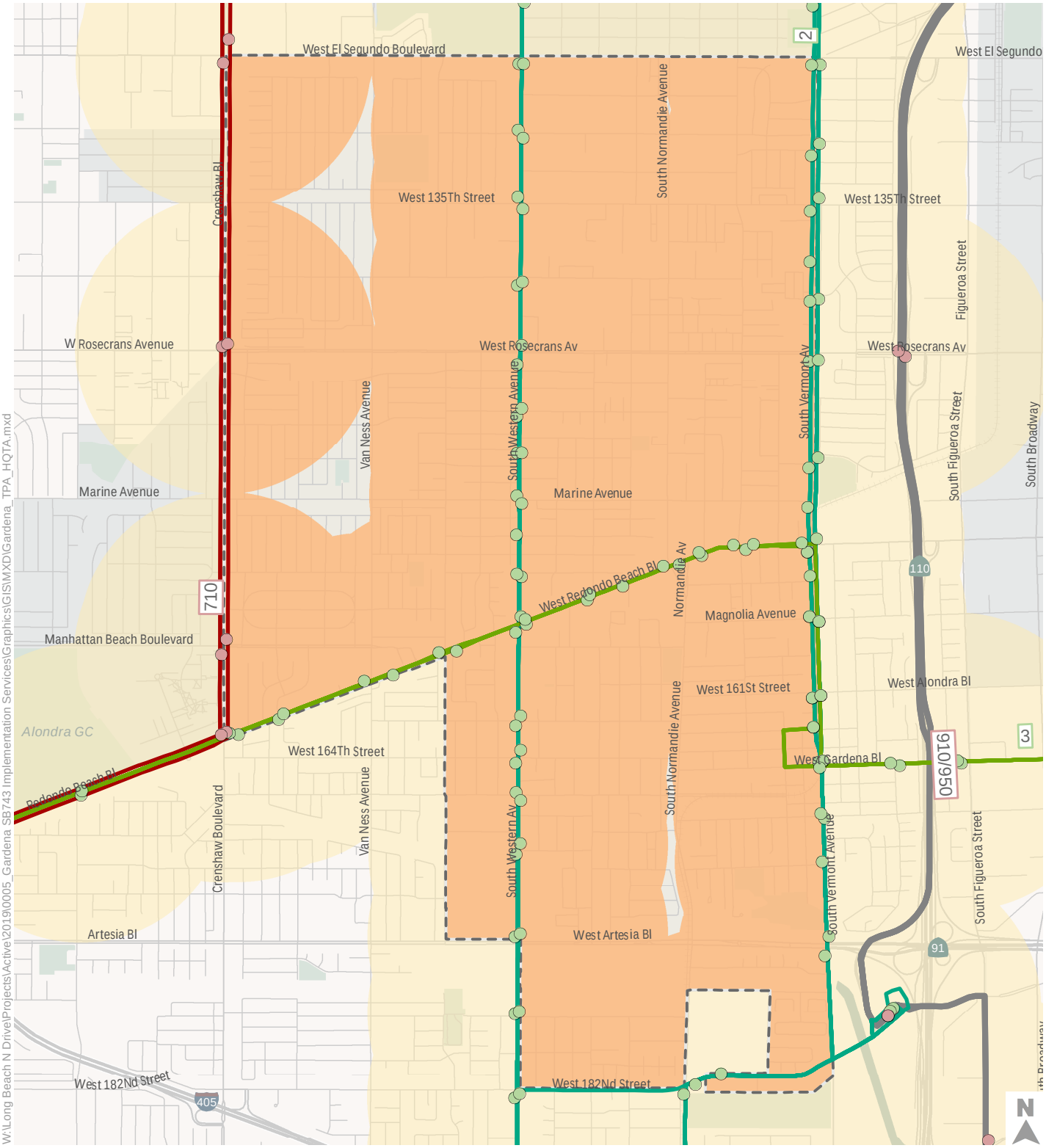
*Transit Facilities*

The project site is located within a quarter mile of nine bus stops and is well-served by transit service via LA Metro and the City of Gardena's Transit Service, GTrans. Access to light rail is also available at the Green Line Station, located less than one mile north of the project at Crenshaw Boulevard/Interstate 105. The following bus routes provide service within walking distance of the project site:

- **Route 5 (GTrans)**: connects to Metro buses on El Segundo Boulevard and to Metro Rail at the Imperial and Aviation Stations. Popular destinations on this bus route include Centennial High School, Hawthorne High School, Hawthorne Memorial Center, Hawthorne Sports Center, MLK Community Hospital and Magic Johnson Park.
- **Route 2 (Torrance Transit)**: runs along Crenshaw Boulevard between Pacific Coast Highway in Torrance and I-105.
- **Route 10 (Torrance Transit)**: connects to the Del Amo Fashion Center in Torrance and Harbor Freeway Transit Station via Crenshaw Boulevard and El Segundo Boulevard.

- **Route 126 (Metro)**: connects to Manhattan Beach – Hawthorne Metro Rail Station via El Camino College
- **Route 210 (Metro)**: connects to Hollywood/Vine Station – South Bay Galleria via Crenshaw Boulevard
- **Route 710 (Metro)**: connects to Wilshire Center – South Bay Galleria via Crenshaw Boulevard

Project traffic and the design of the project site is not expected to effect access or operations of these services.




Gardena

Transit Priority Area in Gardena

Transit Priority Area Near Gardena

Frequent Bus Routes

GTrans 2

GTrans 3

Metro Bus 710

Metro Silver Line 910/950

## Transit Priority Screening Areas

**Figure 1**

Kimley»Horn

# TECHNICAL MEMORANDUM

To: Ray Barragan and Lisa Kranitz, City of Gardena

From: Sowmya Chandrasekhar and Rita Garcia

Date: January 14, 2021

Subject: **Gardena Transit Oriented Development Specific Plan, 12850 and 12900 Crenshaw Boulevard, Vehicle Miles Traveled (VMT) Peer Review**

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Kimley-Horn has conducted a follow-up third-party peer review of the Project's Vehicle Miles Traveled (VMT) *CEQA Transportation Analysis for 12850 Crenshaw Boulevard Project Technical Memorandum* (Fehr & Peers, August 2020) on behalf of the City of Gardena to verify that Kimley-Horn's July 27, 2020 third-party peer review Technical Memo (TM) recommendations have been incorporated. The revised August 2020 memo addressed the third-party peer review comments and thus is in compliance with the TM recommendations. The analysis, as revised, meets the applicable provisions of CEQA and the State CEQA Guidelines and is adequate for inclusion in the Project EIR.

Please do not hesitate to contact Sowmya Chandrasekhar at 213.354.9400 or sowmya.chandrasekhar@kimley-horn.com with any questions.