# Appendix J

Traffic Impact Analysis

# TRAFFIC IMPACT ANALYSIS

## LONG BEACH BUSINESS PARK PROJECT

## LONG BEACH, CALIFORNIA

This Traffic Impact Study has been prepared under the supervision of
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July 2019

# TRAFFIC IMPACT ANALYSIS

## LONG BEACH BUSINESS PARK PROJECT

## LONG BEACH, CALIFORNIA

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July 2019

## EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) has prepared this Traffic Impact Analysis (TIA) to identify the short-term traffic impacts resulting from the development of the proposed Long Beach Business Park Project (project) in Long Beach, California. LSA has prepared this analysis with the objectives and methodologies set forth in the City of Long Beach TIA Guidelines, the 2010 Congestion Management Program for Los Angeles County, and applicable provisions of the California Environmental Quality Act.

The project is located east of Studebaker Road and Loynes Drive in Long Beach, California. The project proposes a total of approximately 139,500 square feet (sf), including warehouse (118,500 sf) and office use (21,000 sf) within two buildings on the project site. Access to the project site will be provided via a new driveway, creating the fourth leg of the signalized intersection of Studebaker Road/Loynes Drive, and a second access driveway along Studebaker Road that is right in and right out only. The project is proposed for construction by 2020.

This study analyzes the a.m. and p.m. peak-hour levels of service during a typical weekday the study area intersections. Project impacts were determined based on the analysis of the following scenarios, consistent with City of Long Beach (City) requirements:

1. Existing
2. Existing Plus Project
3. Project Build-Out Year (2020) Plus Cumulative Projects
4. Project Build-Out Year (2020) Plus Cumulative Projects Plus Project

Based on the results of this TIA, the proposed project would not significantly affect the study area intersections in either the existing or project build-out year (cumulative) horizon, based on the City's performance criteria.

An evaluation of the project build-out year conditions was also made based on the City's proposed road diet along Loynes Avenue. As a result, the project would not significantly impact the study area intersections with Loynes Avenue that have been reduced from four lanes to two lanes.

The project proposes the following project design features:

- Provide one single-lane ingress and egress at the project driveway at the Studebaker Road/Loynes Drive intersection. In addition, a southbound left-turn pocket and left-turn lane on Studebaker Road would be constructed. The inside eastbound right-turn lane on Loynes Drive would be converted to an eastbound through lane for vehicles entering the project site from Loynes Drive. The existing outer right turn lane on Loynes Drive will remain a right-turn lane.

- Provide one right-in/right-out only driveway at the northern end of the project, providing access to Studebaker Road.

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# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| Caltrans | California Department of Transportation |
| CEQA | California Environmental Quality Act |
| City | City of Long Beach |
| CMP | Congestion Management Program |
| HCM | Highway Capacity Manual |
| ICU | Intersection Capacity Utilization |
| LOS | level(s) of service |
| mph | miles per hour |
| OCTA | Orange County Transportation Authority |
| PCE | passenger car equivalent |
| PCH | East Pacific Coast Highway |
| project | Long Beach Business Park Project |
| sf | square feet |
| SR-22 | State Route 22 |
| TIA | Traffic Impact Analysis |
| v/c | volume to capacity |
| vph | vehicles per hour |

# INTRODUCTION

The purpose of this Traffic Impact Analysis (TIA) is to identify the potential circulation impacts associated with the development of the Long Beach Business Park Project in Long Beach, California. Figure 1 shows the location of the project site and the study area intersection analyzed in this report.

Issues addressed in this analysis include the operation of the existing roadway system in the area, local off-site intersection impacts, site access, and internal circulation. The traffic analysis for the proposed project examines four scenarios:

1. Existing
2. Existing Plus Project
3. Project Build-Out Year (2020) Plus Cumulative Projects
4. Project Build-Out Year (2020) Plus Cumulative Projects Plus Project

In addition, an alternative project build-out year analysis was conducted to evaluate the project's impact based on a City-proposed road diet along Loynes Drive.

LSA prepared the TIA based on the City of Long Beach's (City) general requirements for traffic studies.

## Project Description

The proposed project considers the development of 139,500 square feet (sf) of warehouse use (118,500 sf) and office use (21,000 sf) within two buildings on the east side of Studebaker Road at Loynes Drive. Figure 2 shows the site plan for the proposed business park project.

The Long Beach Business Park Project would create a four-leg signalized intersection at Studebaker Road/Loynes Drive. This intersection would consist of a new protected left-turn phase in the southbound direction with a new southbound left-turn pocket along Studebaker Road. A second access driveway that would be right in and right out only would also be created on the north end of the project site.

# METHODOLOGY

This TIA's format is consistent with the objectives and methodologies set forth in the City of Long Beach TIA Guidelines, the 2010 Congestion Management Program (CMP) for Los Angeles County, and applicable provisions of the California Environmental Quality Act (CEQA).

The City's Traffic Engineer reviewed and approved the scope of work, including the project study area, prior to the preparation of this analysis.

## Intersection Capacity Utilization

LSA used the Intersection Capacity Utilization (ICU) methodology using Traffix (Version 8.0) software to calculate the levels of service (LOS) for the signalized study area intersection, consistent with the City's requirements. This methodology compares the volume-to-capacity (v/c) ratios of conflicting

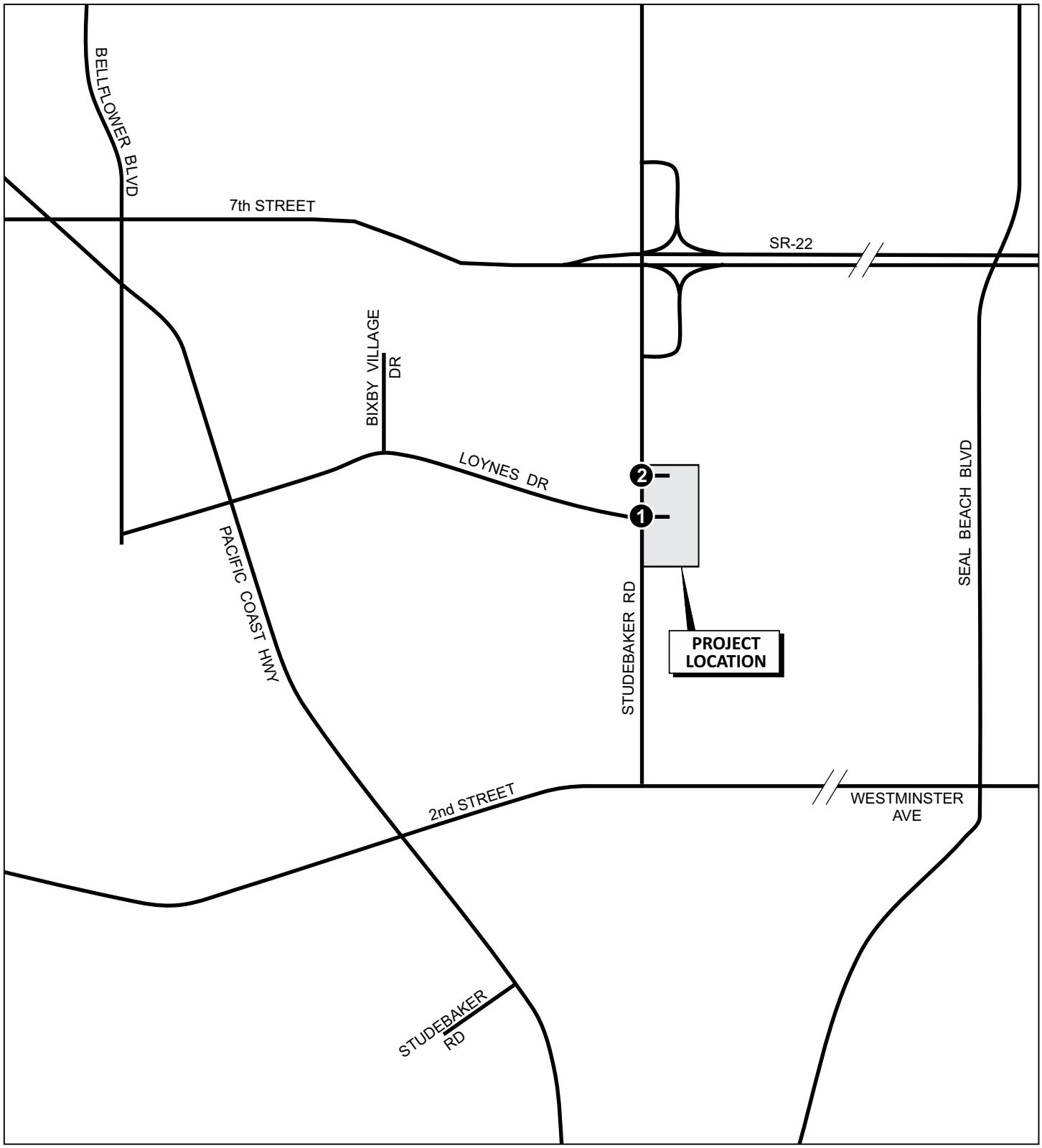


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FIGURE 1

LEGEND

1 - Study Area Intersections

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SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Project Location and Study Area Intersections

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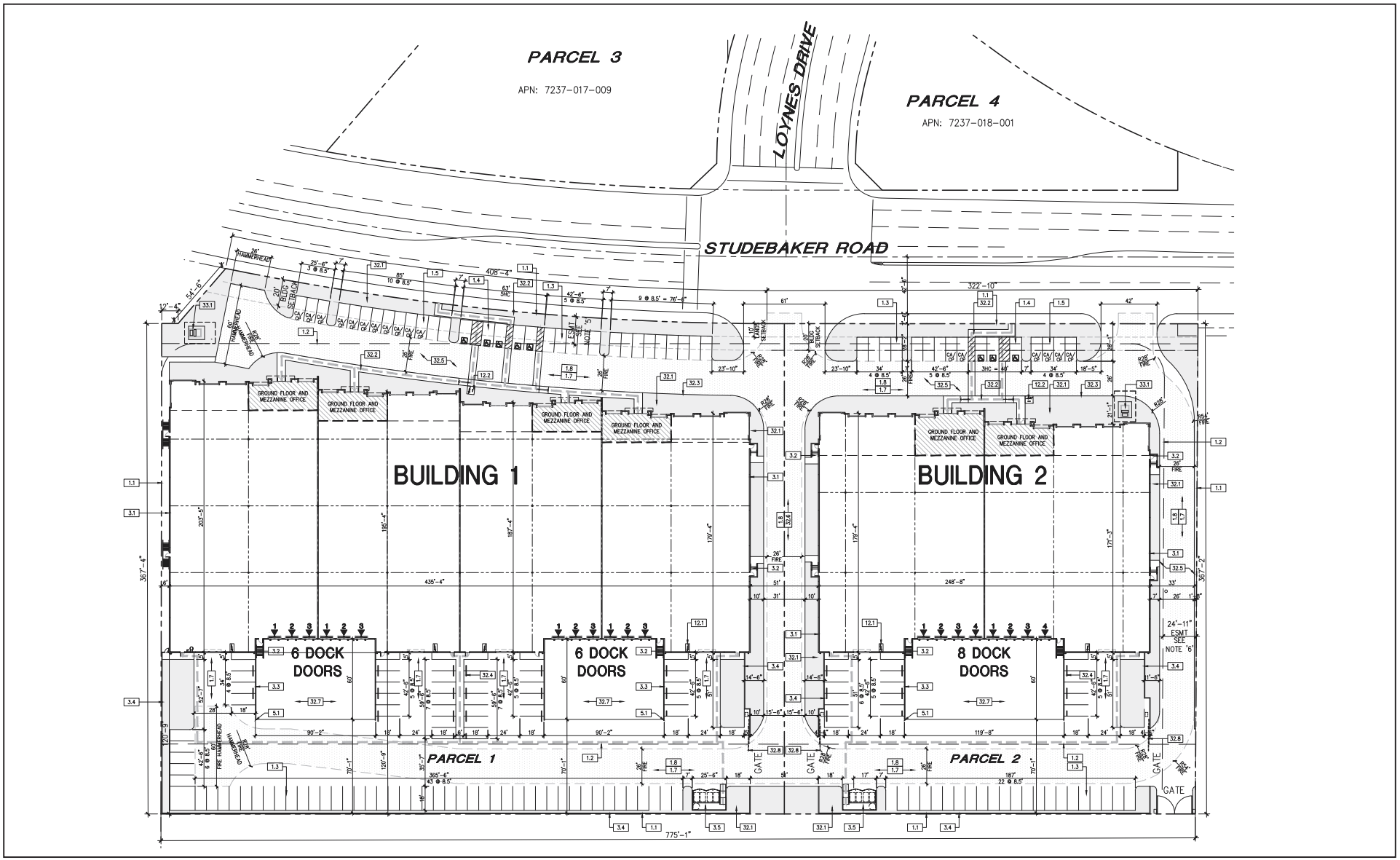


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FIGURE 2

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0 35 70
FEET

SOURCE: GAA Architects

*Long Beach Business Park*
Site Plan

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turn movements at an intersection, sums these critical conflicting v/c ratios for each intersection approach, and determines the overall ICU. The resulting ICU is expressed in terms of LOS, where LOS A represents free-flow activity, and LOS F represents overcapacity operation. LOS is a qualitative assessment of the quantitative effects of such factors as traffic volume, roadway geometrics, speed, delay, and maneuverability on roadway and intersection operations. The following presents LOS criteria for signalized intersections using the ICU methodology.

| LOS | Description |
|---|---|
| A | No approach phase is fully utilized by traffic, and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily, and nearly all drivers find freedom of operation. |
| B | This service level represents stable operation, where an occasional approach phase is fully utilized, and a substantial number are nearing full use. Many drivers begin to feel restricted within platoons of vehicles. |
| C | This level still represents stable operating conditions. Occasionally, drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so. |
| D | This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups. |
| E | Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is attained no matter how great the demand. |
| F | This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially, and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, speed can drop to zero. |

LOS = level of service

The relationship between LOS and the ICU value (i.e., v/c ratio) is as follows:

| Level of Service | Intersection Capacity Utilization |
|---|---|
| A | < 0.601 |
| B | 0.601–0.700 |
| C | 0.701–0.800 |
| D | 0.801–0.900 |
| E | 0.901–1.000 |
| F | > 1.000 |

Consistent with the City's requirements, the ICU calculations use a lane capacity value of 1,600 vehicles per hour (vph) per lane, and a dual turn lane capacity of 2,880 vph. Based on the City's requirements, a clearance adjustment factor of 0.10 was added to each LOS calculation.

The City considers intersections with an ICU of 0.90 (LOS D) as the upper limit of satisfactory operations. A project impact at an intersection is considered significant if the intersection operates at an unsatisfactory LOS (LOS E or F) and the project increases the ICU by 2 percent or higher (ICU > 0.02), or the project traffic causes the intersection to deteriorate from LOS D to LOS E or F.

### Highway Capacity Manual (HCM) Methodology

LSA used the *Highway Capacity Manual Sixth Edition* (HCM) methodology using Synchro (Version 10) software to determine intersection LOS at the signalized intersection at Studebaker Road and Loynes Drive and for the unsignalized intersection at Studebaker Road and Driveway 2. The HCM analysis was used to evaluate new signal timing and potential queuing of the new southbound left-turn lane on Studebaker Road. The HCM signalized intersection methodology describes LOS in terms of overall control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The relationship between LOS and the delay (in seconds) at signalized and unsignalized intersections is as follows:

| Level of Service | Signalized Intersection Delay (seconds) | Unsignalized Intersection Delay (seconds) |
|---|---|---|
| A | ≤10.0 | ≤10.0 |
| B | >10.0 and ≤20.0 | >10.0 and ≤15.0 |
| C | >20.0 and ≤35.0 | >15.0 and ≤25.0 |
| D | >35.0 and ≤55.0 | >25.0 and ≤35.0 |
| E | >55.0 and ≤80.0 | >35.0 and ≤50.0 |
| F | >80.0 | >50.0 |

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

### Study Intersections

Intersections at which the project would contribute a total of 50 or more peak-hour trips should be included in the study area, based on the City's TIA guidelines. The project would not contribute 50 or more peak-hour trips to any intersections north, south, or west of the project driveway.

The study area analyzed in this report includes the following intersections per the City Traffic Engineer:

1. Studebaker Road/Loynes Drive
2. Studebaker Road/Driveway Access 2

Figure 3 provides the existing geometrics and traffic control devices at the study intersection.

## EXISTING CONDITIONS

### Existing Circulation System

Key roadways in the vicinity of the proposed project are as follows:

- **State Route 22.** The freeway portion of State Route 22 (SR-22) runs northeast of the project site. This extension of 7th Street becomes a state route at PCH and extends through Orange County. Access to the project site from the SR-22 freeway is provided via eastbound and westbound on/off-ramps at Studebaker Road. SR-22 is also classified as a State Freeway in the 2010 CMP for Los Angeles County.

- **Pacific Coast Highway.** PCH is west of the project site and is a Regional Corridor that extends throughout Los Angeles and Orange counties. Access to the project site from PCH is provided via 2nd Street and Loynes Drive. This arterial is classified as a Regional Corridor in the City's Transportation Element. PCH is also classified as a State Highway (Arterial) in the 2010 CMP for Los Angeles County.

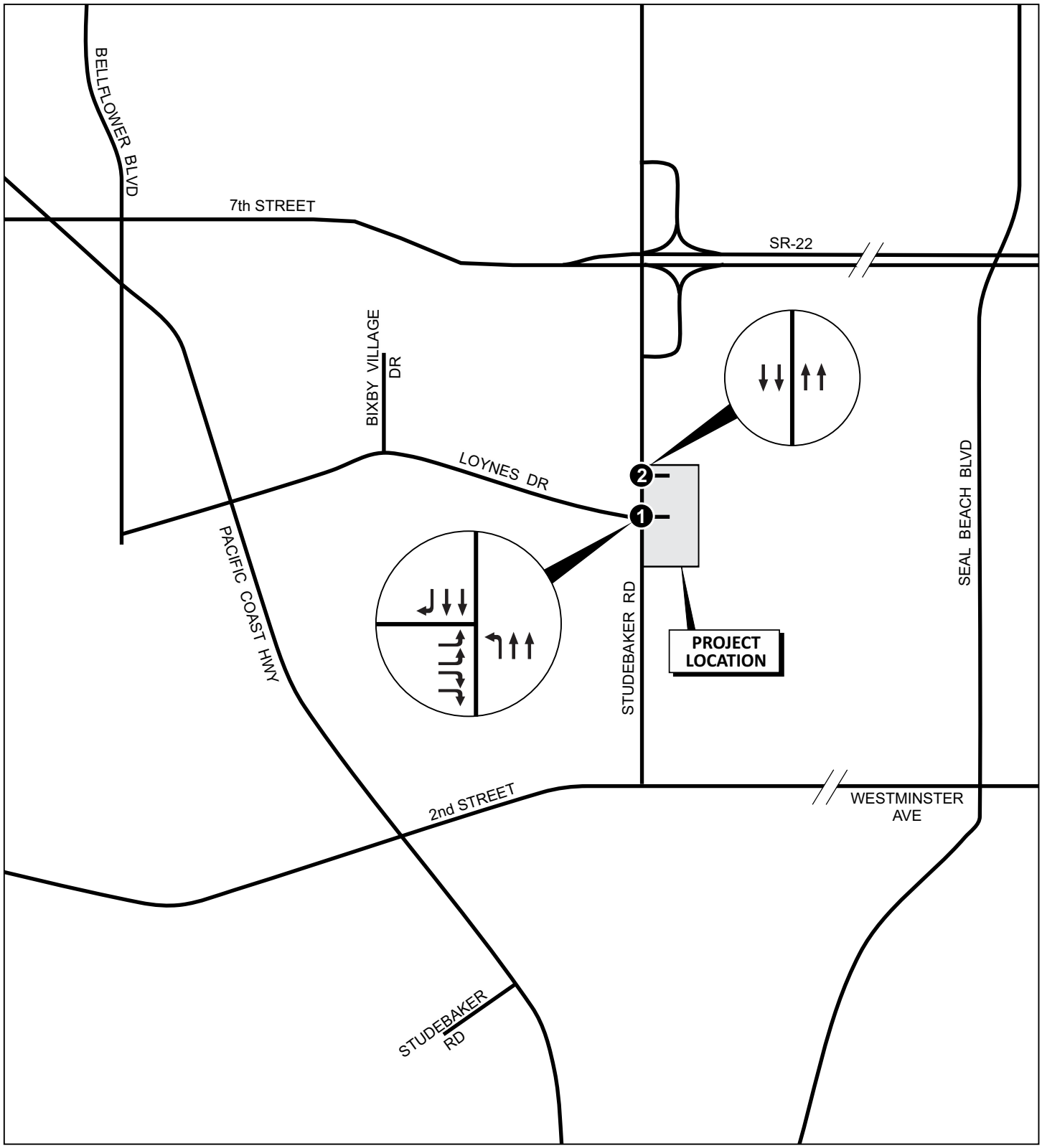


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FIGURE 3

LEGEND

1 - Study Area Intersections

- Directional Travel Lane

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*Long Beach Business Park*

Existing Intersection Geometry

I:\ULL1801\G\Existing Geometrics.cdr (10/17/2018)

- **Studebaker Road:** Studebaker Road is a four-lane, north-south roadway abutting the project and parallel to the Los Cerritos Channel. The route is classified as a Major Arterial by the City of Long Beach Mobility Element. The roadway also provides direct access to Interstate 405 and SR-22. Studebaker Road begins at 2nd Street in Long Beach and extends to Los Coyotes Diagonal south of Lakewood.
- **Loynes Drive:** Loynes Drive is an east-west roadway adjacent to and west of the project that spans from Studebaker Road to Bellflower Boulevard in Long Beach. Within the study area, Loynes Drive will provide access to the project site at the signalized T-intersection of Studebaker Road and Loynes Drive.
- **2nd Street:** 2nd Street is a six-lane east-west arterial south of the project site. It is classified as a Major Arterial (Scenic Route) within the city limits. This arterial's name changes to Westminster Avenue at the Orange County line.
- **Bellflower Boulevard.** Bellflower Boulevard is a six-lane north-south arterial northwest of the project site. The City's Transportation Element classifies this roadway as a Major Arterial.
- **7th Street**: 7th Street is a six-lane east-west arterial northwest of the project site. This arterial transitions into SR-22 east of PCH and is classified as a Major Arterial.

## Existing Traffic Volumes

National Data and Surveying Services collected the weekday peak-hour intersection turn volumes for the study intersection of Studebaker Road and Loynes Drive in September 2018. Vehicle classification counts were conducted for the study area intersection on Loynes Drive and Studebaker Road, which included passenger cars, two-axle trucks, three-axle trucks, four-axle trucks, bicycles, and pedestrians. Figure 4 presents the existing a.m. and p.m. peak-hour volumes in passenger car equivalent (PCE) for the study area intersections. Appendix A provides the existing count data.

## Existing Intersection Level of Service Analysis

Table A summarizes the results of the existing a.m. and p.m. peak-hour LOS analysis for the signalized study area intersection using the ICU and HCM methodologies. Appendix B provides the existing LOS calculation worksheets. As the table indicates, the study area intersection operates at an acceptable LOS during the a.m. and p.m. peak hours under both methodologies.

### Table A: Existing Intersection LOS Summary

| Intersection | Analysis Method | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | | V/C or Delay | LOS | V/C or Delay | LOS |
| Studebaker Road/Loynes Drive | ICU | 0.68 | B | 0.72 | C |
| | HCM | 10.8 | B | 13.2 | B |

Delay is reported in seconds (for HCM)
HCM = *Highway Capacity Manual*
ICU = Intersection Capacity Utilization
LOS = level of service
V/C = volume-to-capacity ratio (for ICU)

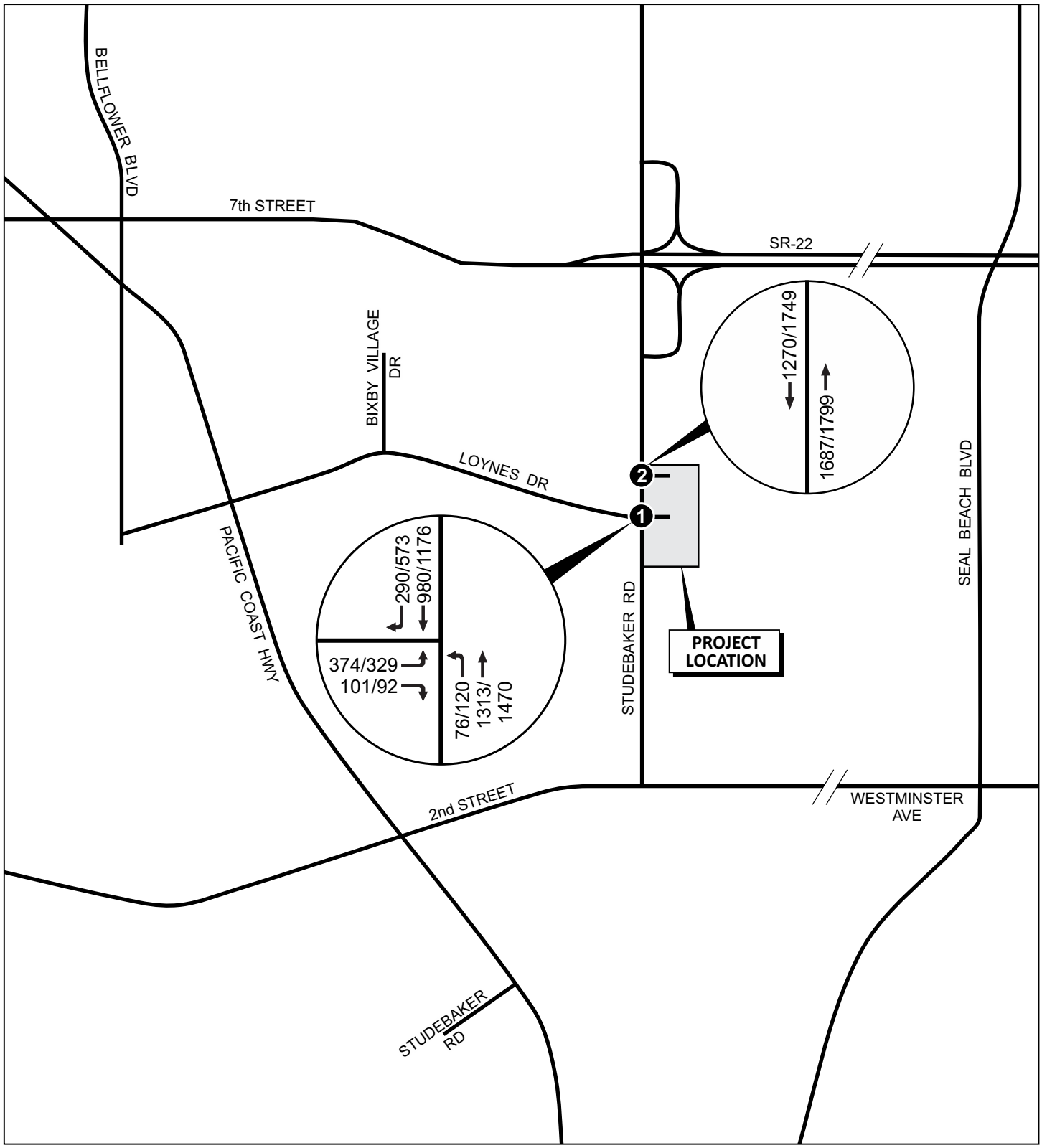


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FIGURE 4

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

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*Long Beach Business Park*

Existing Peak Hour Traffic Volumes

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## PROJECT BUILD-OUT YEAR (2020) CONDITIONS

According to the project applicant, the project is proposed for completion by 2020. To develop a cumulative (2020) project opening condition, traffic volumes for other committed and/or approved (cumulative) developments within this time frame were added to the existing baseline traffic volumes. LSA contacted the City to identify pending projects and committed improvements that could be constructed prior to the year 2020.

One cumulative project was identified in the cumulative condition based on discussions with the City of Long Beach Planning Department: the 2nd & PCH Project. This project proposes the development of a 245,000 sf shopping center consisting of 150,000 sf of retail, 70,000 sf of restaurant, and 25,000 sf of commercial personal service uses at the intersection of 2nd Street/PCH, southwest of the project site. Traffic generated by the project was assigned to Studebaker Road/Loynes Drive intersection using trip distribution assumptions as included in the 2nd Street + PCH Project Traffic Impact Analysis prepared by LLG (March 2017).

Table B shows the project trip generation for the pending project provided by the City. Figure 5 illustrates the cumulative project trip assignment.

### Table B: Cumulative Project Trip Generation Summary

| Land Use | Size | Unit | ADT | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | In | Out | Total | In | Out | Total |
| **Trip Rates[1]** | | | | | | | | | |
| Shopping Center (820) | | TE/1,000 sf | 43 | 0.60 | 0.36 | 0.96 | 1.78 | 1.93 | 3.71 |
| Quality Restaurant (931) | | TE/1,000 sf | 90 | 0.41 | 0.41 | 0.81 | 5.02 | 2.47 | 7.49 |
| High-Turnover (Sit-Down) Restaurant (932) | | TE/1,000 sf | 127 | 5.95 | 5.95 | 10.81 | 5.91 | 3.94 | 9.85 |
| **Project Trip Generation** | | | | | | | | | |
| 1. 2nd Street + PCH Project | | | | | | | | | |
| Retail (820) | 180 | TE/1,000 sf | 9,951 | 138 | 85 | 223 | 426 | 462 | 888 |
| Quality Restaurant (931) | 40 | TE/1,000 sf | 3,598 | 16 | 16 | 32 | 201 | 99 | 300 |
| High-Turnover Restaurant (932) | 25 | TE/1,000 sf | 3,179 | 149 | 121 | 270 | 148 | 99 | 246 |
| Pass-By Reduction[2] – Retail | | | -995 | -14 | -9 | -23 | -145 | -157 | -302 |
| Pass-By Reduction[2] – Quality Restaurant | | | -360 | 0 | 0 | 0 | -88 | -44 | -132 |
| Pass-By Reduction[2] – High-Turnover Restaurant | | | -318 | 0 | 0 | 0 | -64 | -42 | -106 |
| **Total** | | | **15,055** | **289** | **213** | **502** | **478** | **416** | **894** |

[1] Trip rates referenced from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition (2012).

[2] Trip rates referenced from the Institute of Transportation Engineers (ITE) Trip Generation Handbook (2012). Pass-by reductions for the retail, quality restaurant and high-turnover restaurant project are as follows:

- Retail: Weekday (Daily: 10%, AM: 10% and PM: 34%)
- Quality Restaurant: Weekday (Daily: 10%, AM: 0% and PM: 44%)
- High-Turnover Restaurant: Weekday (Daily: 0%, AM: 10% and PM: 43%)

Land Use Code (820) – Shopping Center
Land Use Code (931) – Quality Restaurant
Land Use Code (932) – High-Turnover (Sit-Down) Restaurant

ADT = average daily trips TE/1000 sf = Trip end per 1000 SF of development

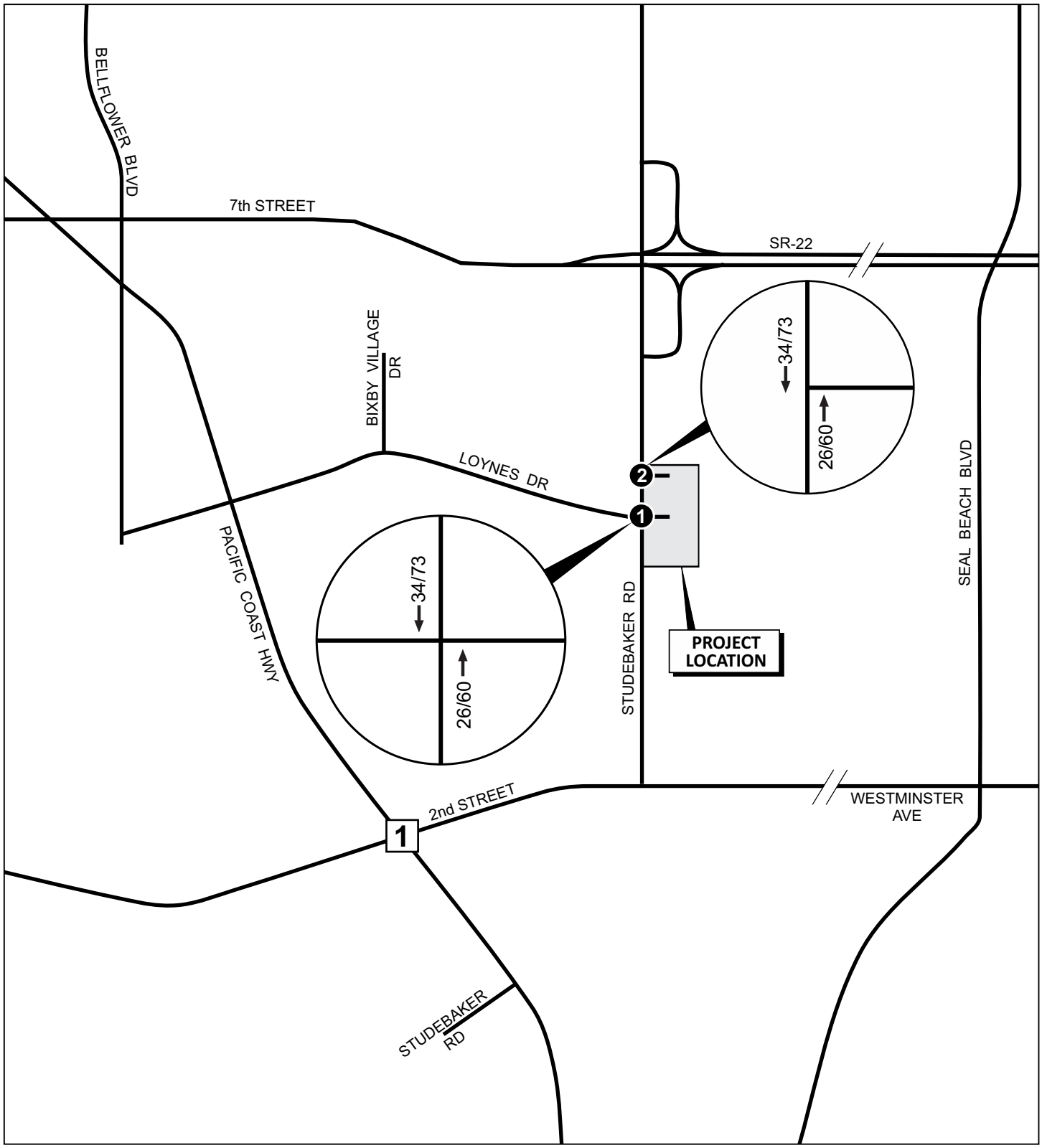


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FIGURE 5

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

CUMULATIVE PROJECTS:

1 - 2nd Street/PCH Project

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*Long Beach Business Park*

Cumulative Project Trips

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To determine the project build-out year without project traffic conditions, traffic generated by the approved/pending project was added to existing traffic PCE volumes at the study area intersection. An ambient growth rate of 1.52 percent per year for 2 years (3.04 percent) was also added to existing baseline traffic volumes to develop the cumulative conditions. The growth rate for this region was identified in the CMP for Los Angeles County (Appendix C). Figure 6 shows the resulting project build-out year without project a.m. and p.m. peak-hour traffic volumes.

Table C summarizes the results of the project build-out year a.m. and p.m. peak-hour LOS analysis for the signalized study area intersection using the ICU and HCM methodologies. The cumulative LOS calculation worksheets are contained in Appendix D. As this table indicates, all study area intersections are forecast to operate at an acceptable LOS (LOS D or better) in the peak hours.

### Table C: Project Build-Out Year (2020) Level of Service Summary

| Intersection | Analysis Method | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | | ICU / Delay | LOS | ICU / Delay | LOS |
| Studebaker Road/Loynes Drive | ICU | 0.71 | C | 0.76 | C |
| | *HCM* | 11.3 | B | 13.8 | B |

Delay is reported in seconds (for HCM).
HCM = *Highway Capacity Manual*
ICU = Intersection Capacity Utilization
V/C = Volume-to-Capacity ratio (for ICU)

## PROJECT CONDITION

### Trip Generation

The daily and peak-hour trips for the proposed project were generated using trip rates from the Institute of Transportation Engineers *ITE Trip Generation Manual*, Tenth Edition (2017). It should be noted that the resulting project trips were converted to trucks and passenger vehicles based on the South Coast Air Quality Management District requirements for warehouse projects. The PCE volume is determined through application of a PCE factor to heavy vehicles. The PCE factor is a multiplier that is applied to the number of truck axles and can vary depending on the size of the truck. The PCE factors that were applied for this study were: 1.5 for two-axle trucks, 2.0 for three-axle trucks, and 3.0 for four or more-axle trucks (City of Fontana Truck Trip Generation Study, 2003). Using the ITE rates and PCE factors, the proposed project would generate 538 average daily trips, 57 a.m. peak-hour trips (46 in and 11 out), and 60 p.m. peak-hour trips (12 in and 48 out) in PCEs. Table D presents the resulting trip generation.

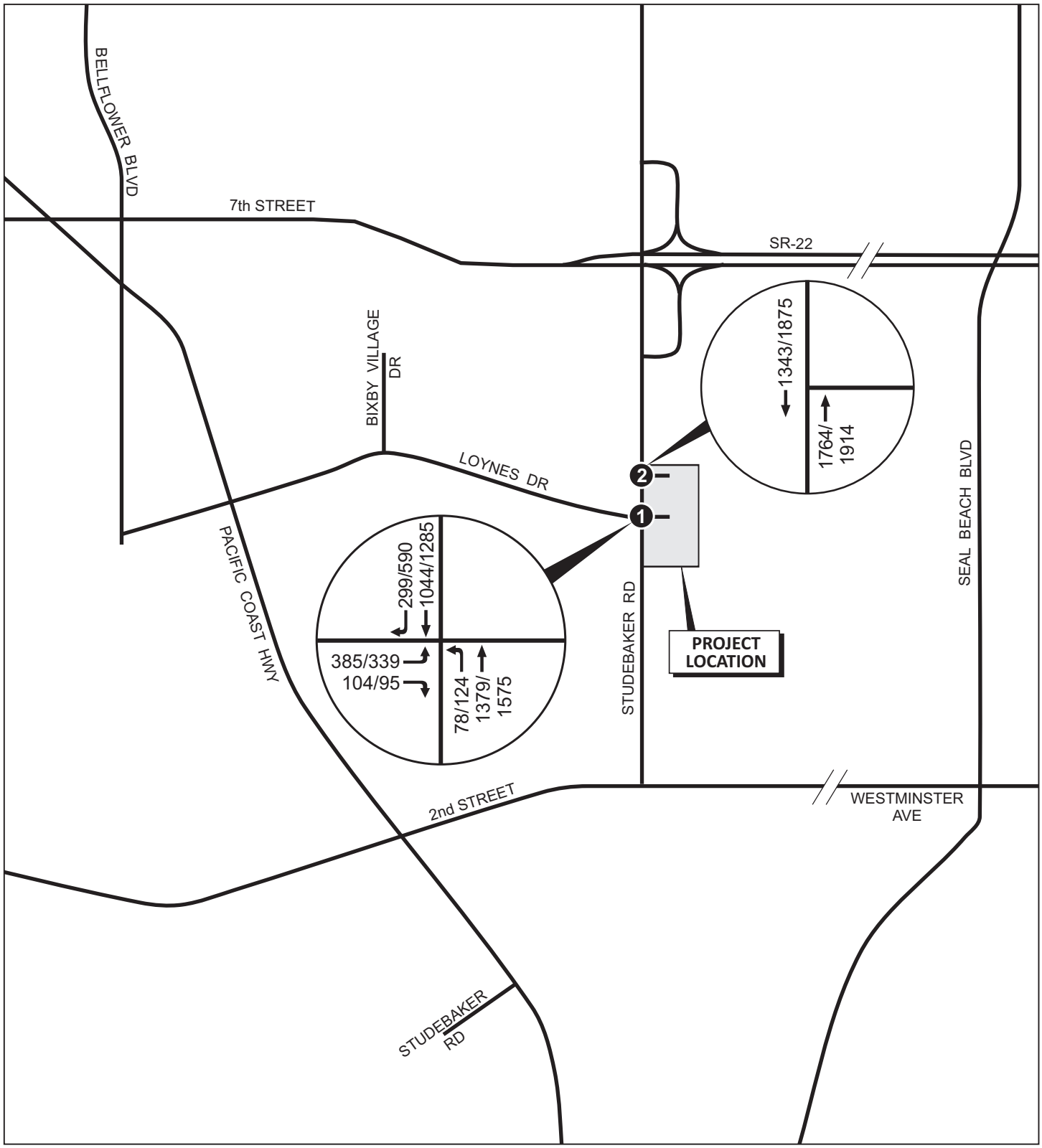


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FIGURE 6

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

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SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Project Build-Out Year Plus Cumulative Projects Peak Hour Traffic Volumes

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## Table D: Project Trip Generation

| Land Uses | Units | | A.M. Peak Hour | | | P.M. Peak Hour | | | Daily |
|---|---|---|---|---|---|---|---|---|---|
| | | | In | Out | Total | In | Out | Total | |
| **Warehouse**[1] | **118.500** | **TSF** | | | | | | | |
| Trips/Unit (Cars) | | | 0.077 | 0.025 | 0.102 | 0.029 | 0.085 | 0.114 | 1.044 |
| Trips/Unit (2-Axle Trucks) | | | 0.009 | 0.003 | 0.012 | 0.004 | 0.009 | 0.013 | 0.118 |
| Trips/Unit (3-Axle Trucks) | | | 0.012 | 0.003 | 0.015 | 0.005 | 0.012 | 0.017 | 0.158 |
| Trips/Unit (4+ Axle Trucks) | | | 0.032 | 0.009 | 0.041 | 0.012 | 0.034 | 0.046 | 0.420 |
| *Trips/Unit (Total)* | | | *0.130* | *0.040* | *0.170* | *0.050* | *0.140* | *0.190* | *1.740* |
| Trip Generation (Cars) | | | 9 | 3 | 12 | 3 | 11 | 14 | 124 |
| Trip Generation (2-Axle Trucks) | | | 1 | 0 | 1 | 0 | 2 | 2 | 14 |
| Trip Generation (3-Axle Trucks) | | | 1 | 1 | 2 | 1 | 1 | 2 | 19 |
| Trip Generation (4+ Axle Trucks) | | | 4 | 1 | 5 | 1 | 4 | 5 | 50 |
| *Trip Generation (Total)* | | | *15* | *5* | *20* | *5* | *18* | *23* | *207* |
| Trip Generation (Cars) | | | 9 | 3 | 12 | 3 | 11 | 14 | 124 |
| PCE Trip Generation (2-Axle Trucks) | | | 2 | 0 | 2 | 0 | 3 | 3 | 21 |
| PCE Trip Generation (3-Axle Trucks) | | | 2 | 2 | 4 | 2 | 2 | 4 | 38 |
| PCE Trip Generation (4+ Axle Trucks) | | | 12 | 3 | 15 | 3 | 12 | 15 | 150 |
| **PCE Trip Generation (Total)** | | | **25** | **8** | **33** | **8** | **28** | **36** | **333** |
| **Office** | **21.000** | **TSF** | | | | | | | |
| *Trips/Unit (Total)* | | | 1.000 | 0.160 | 1.160 | 0.180 | 0.970 | 1.150 | 9.740 |
| **Trip Generation (Total)** | | | **21** | **3** | **24** | **4** | **20** | **24** | **205** |
| **Total Project** | **139.500** | **TSF** | | | | | | | |
| **PCE Trip Generation** | | | **46** | **11** | **57** | **12** | **48** | **60** | **538** |

Note: Trip rates referenced from the Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 10th Edition (2017). Land Use Codes 150 (Warehousing) and 710 (General Office Building).

[1] The resulting trips were converted to trucks and passenger vehicles based on the South Coast Air Quality Management District (SCAQMD) requirements for warehouse projects. As such, 40% of warehouse traffic will be trucks. Based on the City of Fontana *Truck Trip Generation Study,* dated August 2003, the truck mix was considered as 60.34% 4-axle, 22.71% 3-axle, and 16.95% 2-axle trucks. Furthermore, all truck trips were converted to passenger car equivalents (PCEs) using a 1.5 PCE factor for 2-axle trucks, 2.0 for 3-axle trucks, and 3.0 for 4- and more axle trucks.

TSF = thousand square-feet

### Project Trip Distribution and Assignment

Trip distribution for the proposed project was based on logical travel corridors and minimum time paths. Project traffic volumes for vehicles both entering and exiting the project site were distributed and assigned to the adjacent street system based on the proximity to major arterials (i.e., SR-22, PCH, and Bellflower Boulevard) and residential neighborhoods.

As illustrated on Figure 7, approximately 70 percent of the trips would be north via Studebaker Road; 15 percent south via Studebaker Road; and 15 percent west via Loynes Drive. It should be noted that no trucks were assigned on Loynes Drive. The project traffic volumes were assigned to the adjacent street system based on the trip distribution percentages and total trip generation.

## EXISTING PLUS PROJECT CONDITIONS

To determine existing plus project conditions, traffic generated by the proposed project was added to existing traffic volumes at the study area intersections. Figure 8 shows the roadway geometry in the plus project conditions. Figure 9 shows the resulting existing plus project a.m. and p.m. peak-hour traffic volumes at the study area intersection.

Table E summarizes the results of the existing plus project a.m. and p.m. peak hour LOS analysis for the study area intersections using the ICU and HCM methodologies. Appendix E provides the existing plus project LOS calculation worksheets.

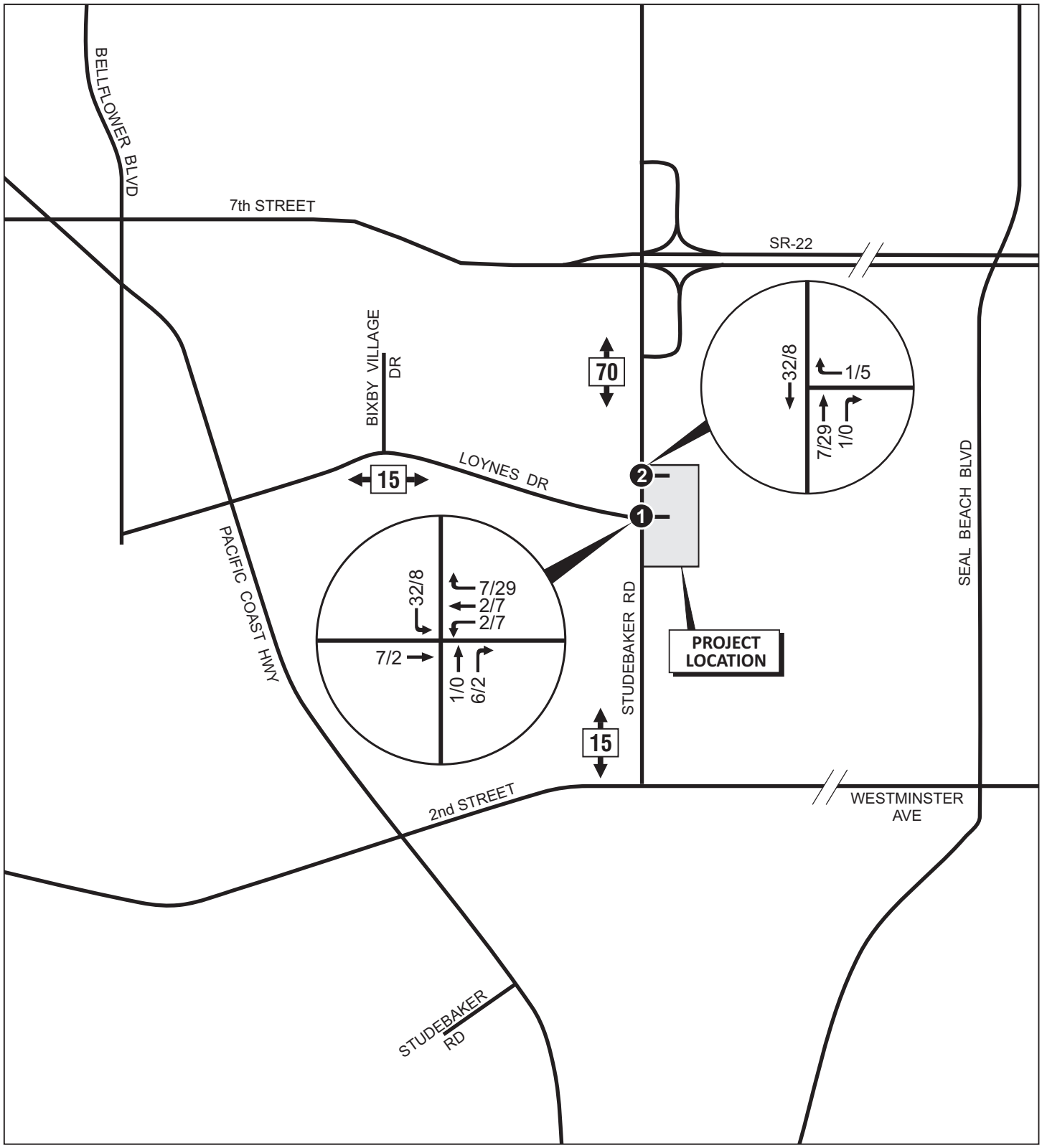
This information is for disclosure purposes only. Project impacts and mitigation measures if any at these locations are identified for the project build-out year condition.

## PROJECT BUILD-OUT YEAR (2020) PLUS PROJECT CONDITIONS

To determine project build-out year plus project conditions, traffic generated by the proposed project, cumulative projects, and an ambient growth factor were added to existing traffic volumes at the study area intersections. Figure 10 shows the resulting project build-out year with project a.m. and p.m. peak-hour traffic volumes at the study area intersections.

Table F summarizes the results of the project build-out year with project a.m. and p.m. peak-hour LOS analysis for all signalized study area intersections using the ICU and HCM methodologies. As this table indicates, the study intersection is forecast to operate at an acceptable LOS during the peak hours. The proposed project would not significantly impact the intersection of Studebaker Road/ Loynes Drive during the weekday a.m. and p.m. peak hour under project build out plus project conditions.

The proposed project would include constructing the main access driveway at Studebaker Road/Loynes Drive. The project improvements would include the installation of one lane entering and exiting the main driveway. In addition, an additional southbound left turn pocket and left-turn lane would be constructed on Studebaker road. The existing inside eastbound right-turn lane on Loynes Drive would be converted to an eastbound through lane for vehicles entering the project site.




LSA

FIGURE 7

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

YY - Project Trip Distribution Percentages

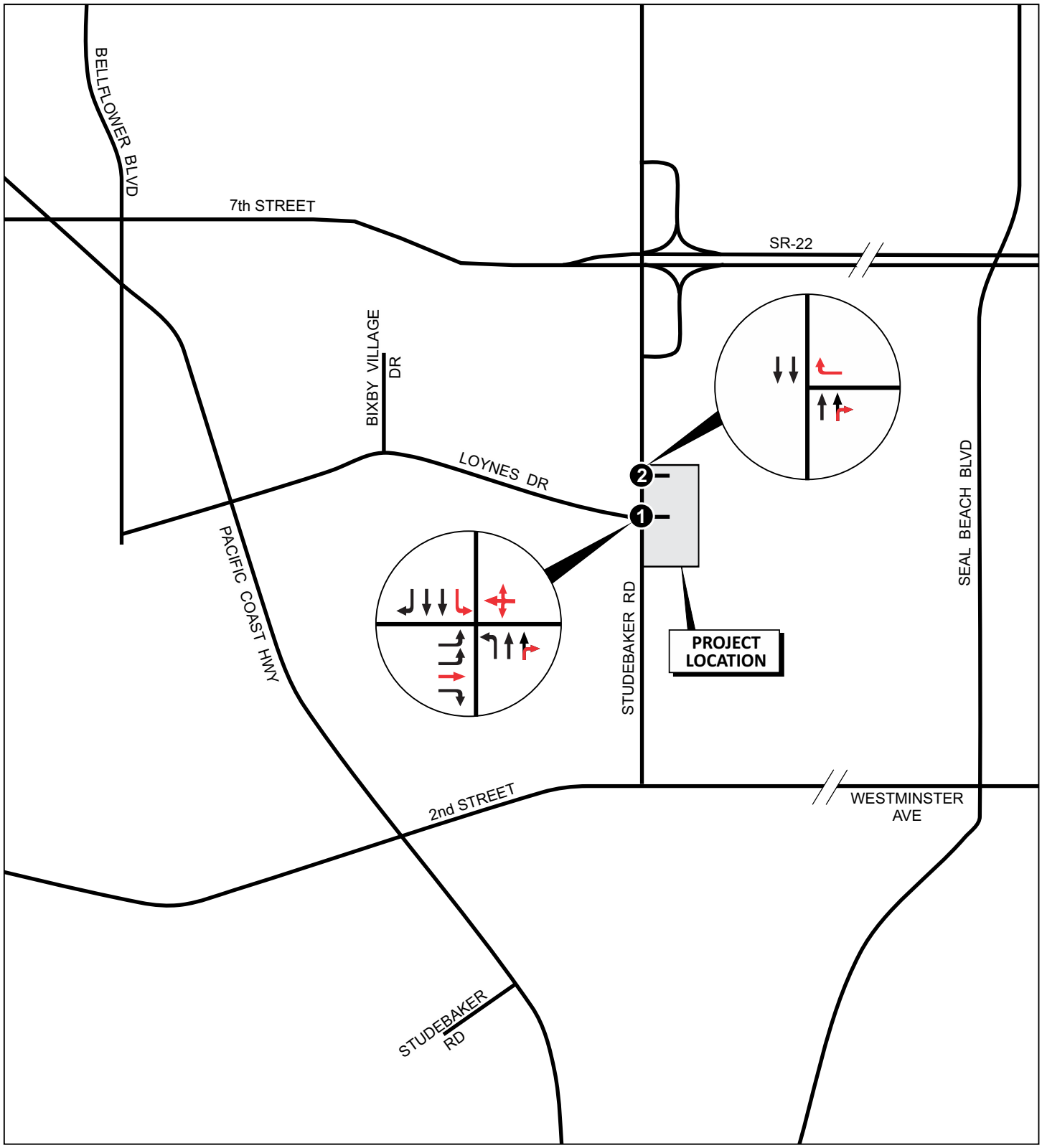
N

SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Project Trip Distribution and Assignment

I:\ULL1801\G\Trip Dist&Assignment.cdr (4/25/2019)




LSA

FIGURE 8

LEGEND

1 - Study Area Intersections

- Directional Travel Lane

- Added in the Plus Project Condition

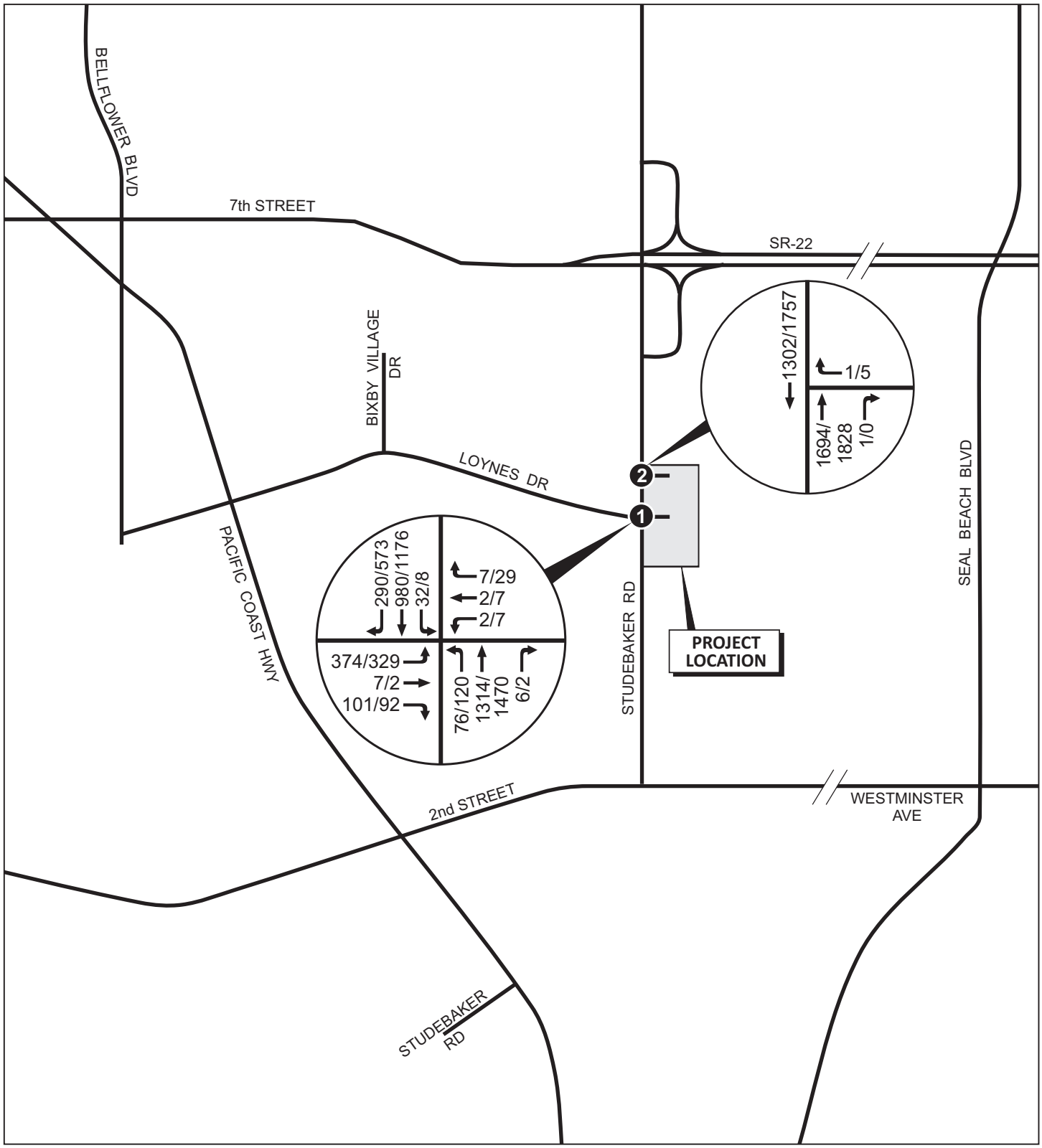
N

SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Plus Project Intersection Geometry

I:\ULL1801\G\Project Geometrics.cdr (10/17/2018)




LSA

FIGURE 9

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

N

SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

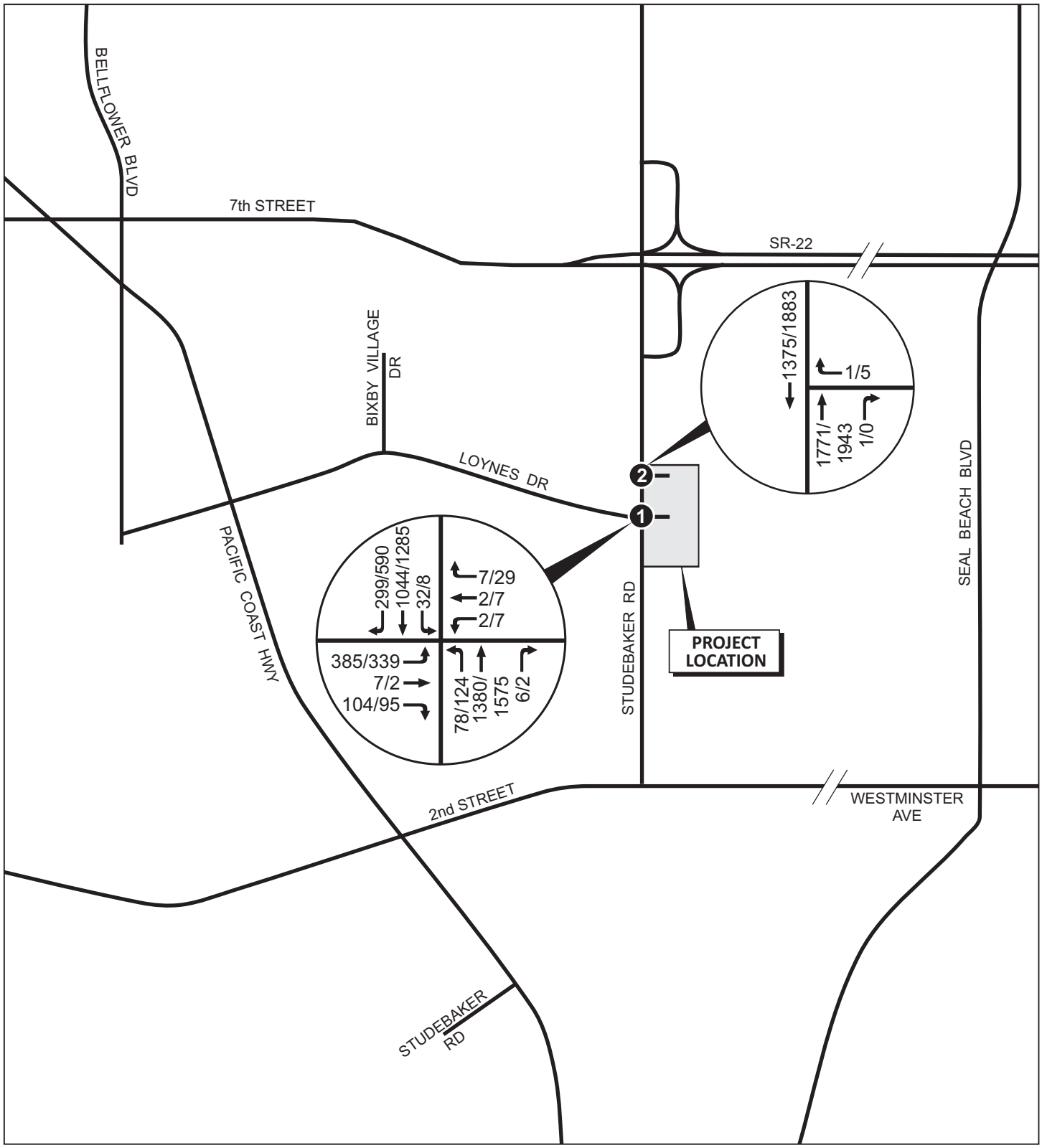
Existing Plus Project Peak Hour Traffic Volumes

I:\ULL1801\G\Existing+Project Volumes.cdr (4/25/2019)

## Table E: Existing Plus Project Intersection Levels of Service Summary

| Intersection | Existing Conditions | | | | Existing Plus Project Conditions | | | | Peak-Hour Δ | | Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | ICU or Delay | | |
| | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | AM | PM | |
| Studebaker Road/Loynes Drive | 0.68 | B | 0.72 | C | 0.71 | C | 0.76 | C | 0.03 | 0.04 | No |
| *HCM* | *10.8* | *B* | *13.2* | *B* | *18.2* | *B* | *22.2* | *C* | *7.4* | *9.0* | *N/A* |
| Studebaker Road/Driveway 2 | | | | | | | | | | | |
| *HCM - Unsignalized* | *–* | *–* | *–* | *–* | *18.2* | *C* | *20.1* | *C* | *–* | *–* | *N/A* |

Notes: Delay is reported in seconds per vehicle.
Δ = change
HCM = *Highway Capacity Manual*
ICU = Intersection Capacity Utilization
LOS = level of service
N/A = not applicable




LSA

FIGURE 10

LEGEND

1 - Study Area Intersections

XX/YY - AM/PM Peak Hour Volumes

N

SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Project Build-Out Year Plus Cumulative Projects
Plus Project Peak Hour Traffic Volumes

I:\ULL1801\G\Build-Out+Cumulative+Project Volumes.cdr (4/30/2019)

## Table F: Project Build-Out (2020) Plus Project Intersection Levels of Service Summary

| Intersection | Project Build-Out (2020) Conditions | | | | Project Build-Out (2020) Plus Project Conditions | | | | Peak-Hour Δ ICU or Delay | | Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | | | |
| | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | AM | PM | |
| Studebaker Road/Loynes Drive | 0.71 | C | 0.76 | C | 0.74 | C | 0.80 | C | 0.03 | 0.04 | No |
| *HCM* | *11.3* | *B* | *13.8* | *B* | *19.0* | *B* | *24.4* | *C* | *7.7* | *10.6* | *N/A* |
| *Studebaker Road/Driveway 2* | | | | | | | | | | | |
| *HCM - Unsignalized* | *–* | *–* | *–* | *–* | *19.1* | *C* | *21.6* | *C* | *–* | *–* | *N/A* |

Notes: Delay is reported in seconds per vehicle.
Δ = change
HCM = *Highway Capacity Manual*
ICU = Intersection Capacity Utilization
LOS = level of service
N/A = not applicable

## PROJECT BUILD-OUT YEAR (2020) CONDITIONS WITH LOYNES DRIVE ROAD DIET

The City is proposing implementation of a road diet along Loynes Drive between Bellflower Boulevard and Studebaker Road in the near future, which would alter the roadway geometry at the intersection of Studebaker Road/Loynes Drive. This section will analyze an alternative project build-out year condition with the proposed road diet geometry along Loynes Drive in the no project and plus project conditions. The segment of Loynes Drive from Bellflower Boulevard to PCH is expected to be completed this year. However, there currently is no funding identified by the City for the segment of Loynes Drive from PCH to Studebaker Road.

Along the segment of Loynes Drive from Bellflower Boulevard to Studebaker Road, the proposed road diet will reduce the current four-lane roadway (two lanes in each direction) to a two-lane roadway (one lane in each direction). As a result, the lane configuration of Loynes Drive at the intersection of Loynes Drive/Studebaker Road will be altered from the current condition of two eastbound left-turn lanes and two eastbound right-turn lanes to the proposed condition of two eastbound left-turn lanes and one eastbound right-turn lane. For purposes of the alternative scenario, this is considered the no project condition.

With implementation of the project in this alternative condition, the geometry at the intersection of Loynes Drive/Studebaker Road, will become one eastbound left-turn lane, one eastbound shared left-turn lane/through lane, and one eastbound right-turn lane. Figure 11 illustrates the lane geometry with the Loynes Drive road diet alternative in both the no project and plus project conditions.

Table G summarizes the results of the project build-out year with Loynes Drive road diet alternative LOS. Appendix F provides the LOS calculation worksheets for the Loynes Drive road diet alternative. As this table indicates, the study area intersections are forecast to operate at an acceptable LOS during the peak hours. The proposed project would not significantly impact the intersection of Studebaker Road/Loynes Drive during the weekday a.m. and p.m. peak hours under project build out plus project conditions with the City's proposed Loynes Drive road diet.

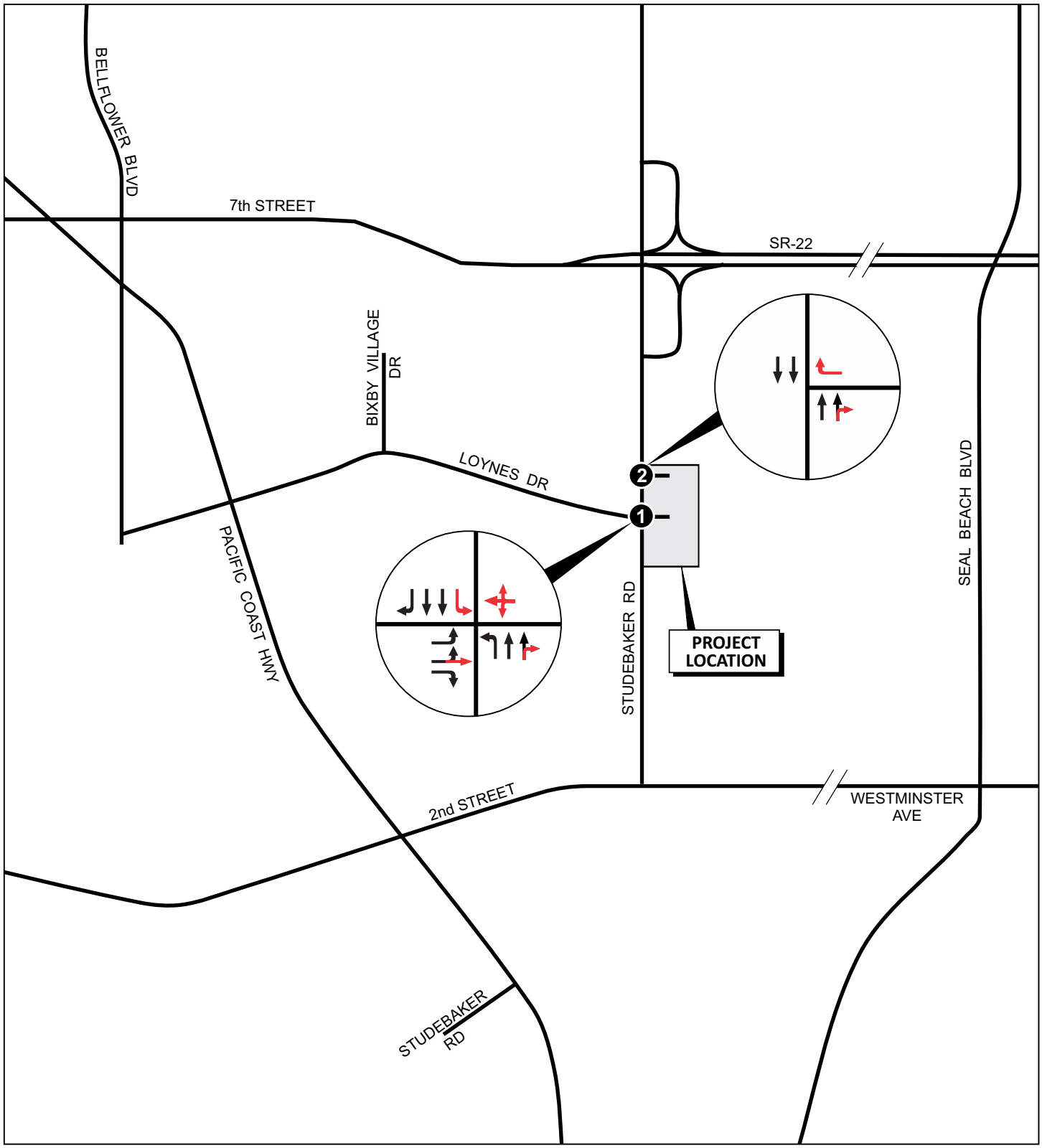
## CONGESTION MANAGEMENT PROGRAM ANALYSIS

Based on the TIA guidelines from the 2010 CMP for Los Angeles County, the geographic area examined in this TIA must include the following:

1. All CMP arterial monitoring intersections, including monitored freeway on-/off-ramp intersections, where the proposed project would add 50 or more trips during either the a.m. or p.m. weekday peak hours.

2. Mainline freeway monitoring locations where the project would add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.

Upon review of the study area the project does not take direct access to a CMP facility (i.e., PCH). Therefore, a CMP-level analysis is not required, and no further highway or freeway analysis is required beyond the LOS analysis presented in this TIA for the project study area.




LSA

FIGURE 11

LEGEND

1 - Study Area Intersections

- Directional Travel Lane

- Added in the Plus Project Condition

N

SCHEMATIC - NOT TO SCALE

*Long Beach Business Park*

Project Build-Out Conditions with Loynes Drive Road Diet Lane Geometry

I:\ULL1801\G\Diet Lane Geometrics.cdr (10/17/2018)

## Table G: Project Build-Out (2020) Conditions with Loynes Drive Road Diet Intersection Levels of Service Summary

| Intersection | Project Build-Out (2020) Conditions | | | | Project Build-Out (2020) Plus Project Conditions | | | | Peak-Hour Δ | | Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | ICU or Delay | | |
| | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | ICU/Delay | LOS | AM | PM | |
| Studebaker Road/Loynes Drive | 0.71 | C | 0.76 | C | 0.73 | C | 0.79 | C | 0.02 | 0.03 | No |
| *HCM* | *11.3* | *B* | *13.9* | *B* | *18.9* | *B* | *24.1* | *C* | *7.6* | *10.2* | *N/A* |
| *Studebaker Road/Driveway 2* | | | | | | | | | | | |
| *HCM – Unsignalized* | *–* | *–* | *–* | *–* | *19.1* | *C* | *21.6* | *C* | *–* | *–* | *N/A* |

Notes: Delay is reported in seconds per vehicle.
Δ = change
HCM = *Highway Capacity Manual*
ICU = Intersection Capacity Utilization
LOS = level of service
N/A = not applicable

## TRANSIT ANALYSIS

As required by the 2010 CMP for Los Angeles County, LSA reviewed existing transit services within the project area. One Orange County Transportation Authority (OCTA) bus route (Route 1) exists along Studebaker Road. Based on the 2009 CMP Transit Monitoring Network (Exhibit 3-2 in the CMP for Los Angeles County), there are no CMP transit routes within the project site.

To estimate transit trip generation for the project, the project trip generation (Table D) was adjusted by the values set forth in the CMP (i.e., person trips equal 1.4 times vehicle trips, and transit trips equal 3.5 percent of total person trips). Based on this methodology, the proposed project is forecast to generate approximately 26 daily transit trips, 3 a.m. peak-hour transit trips (2 inbound and 1 outbound), and 3 p.m. peak-hour transit trips (1 inbound and 2 outbound).

It is anticipated that the existing transit services within the project area would be able to accommodate the project-generated transit trips. OCTA provides coastal fixed-route bus service in the project vicinity. A bus stop for Route 1 is located adjacent to the project site on Studebaker Road. OCTA operates Route 1 from Long Beach to San Clemente. Long Beach Transit, however, does not provide service adjacent to the project site.

## ACCESS ANALYSIS AND ON-SITE CIRCULATION

As indicated on the conceptual site plan (Figure 2), access to the project site is proposed at two locations (via full-access driveway on Studebaker Road/Loynes Drive) and a secondary right in and right out driveway (via Studebaker Road north of the project site). As a project design feature, a southbound left-turn pocket and left-turn lane on Studebaker Road would be constructed to allow access to the site. In addition, the inside eastbound right-turn lane on Loynes Drive would be converted to an eastbound through lane for vehicles entering the project site from Loynes Drive.

The signalized Studebaker Road/Loynes Drive driveway will have one outbound lane for drivers to exit (i.e., shared through/left/right-turn lane). The secondary Studebaker Road driveway will have a single outbound lane (i.e., right-turn only). The proposed signal at Studebaker Road and Loynes Drive –Project Driveway will have a left-turn pocket to allow southbound traffic to make safe left turns into the site.

An LOS analysis has been conducted for each driveway as previously discussed in this TIA. Based on the results of this analysis, all project driveways are forecast to operate at satisfactory LOS D or better for Existing Plus Project, Project Build-Out Year Plus Cumulative Projects, and Project Build-Out Year Plus Cumulative Projects Plus Project during both the a.m. and p.m. peak hours.

The project takes into account all modes of transportation. It does not conflict with any plans, ordinances, policies, or programs regarding public transit, bicycle, or pedestrian facilities. Mass transit would not be affected. The project would provide pedestrian/bicycle connectivity to/from the local circulation network while ensuring the safety of motorists, pedestrians, and bicyclists.

## Truck Access

To determine the adequacy and ability for large trucks to circulate on site, truck turning templates for large trucks (wheelbase 50 feet) have been overlaid onto the project site plan by GAA Architects, as illustrated on Figures 12a and 12b. Based on the truck turning analysis, trucks would be able to make safe turns in/out of the signalized access of Studebaker Road/Loynes Drive and navigate through the internal drive aisle to the loading docks at the rear of the project site. Therefore, the proposed design and operation of the drive aisle and delivery locations would not affect access and circulation on site.

LSA used the HCM methodology to determine the vehicle queues in the new southbound left-turn lane under existing plus project and project build-out year plus cumulative project plus project conditions. The HCM queue calculation is a function of volume and stop control (i.e., traffic signal). Based on this analysis a storage length of 50 feet (two passenger cars) is required. To accommodate truck vehicles entering the project site, it is recommended that a minimum storage length of 100 feet (two 50 ft trucks) be provided. According to Section 405.2 of the California Department of Transportation (Caltrans) Highway Design Manual, 6th Edition (2018), in urban areas a 90 foot taper would typically be used, so the total length of the left-turn pocket would be 190 feet.

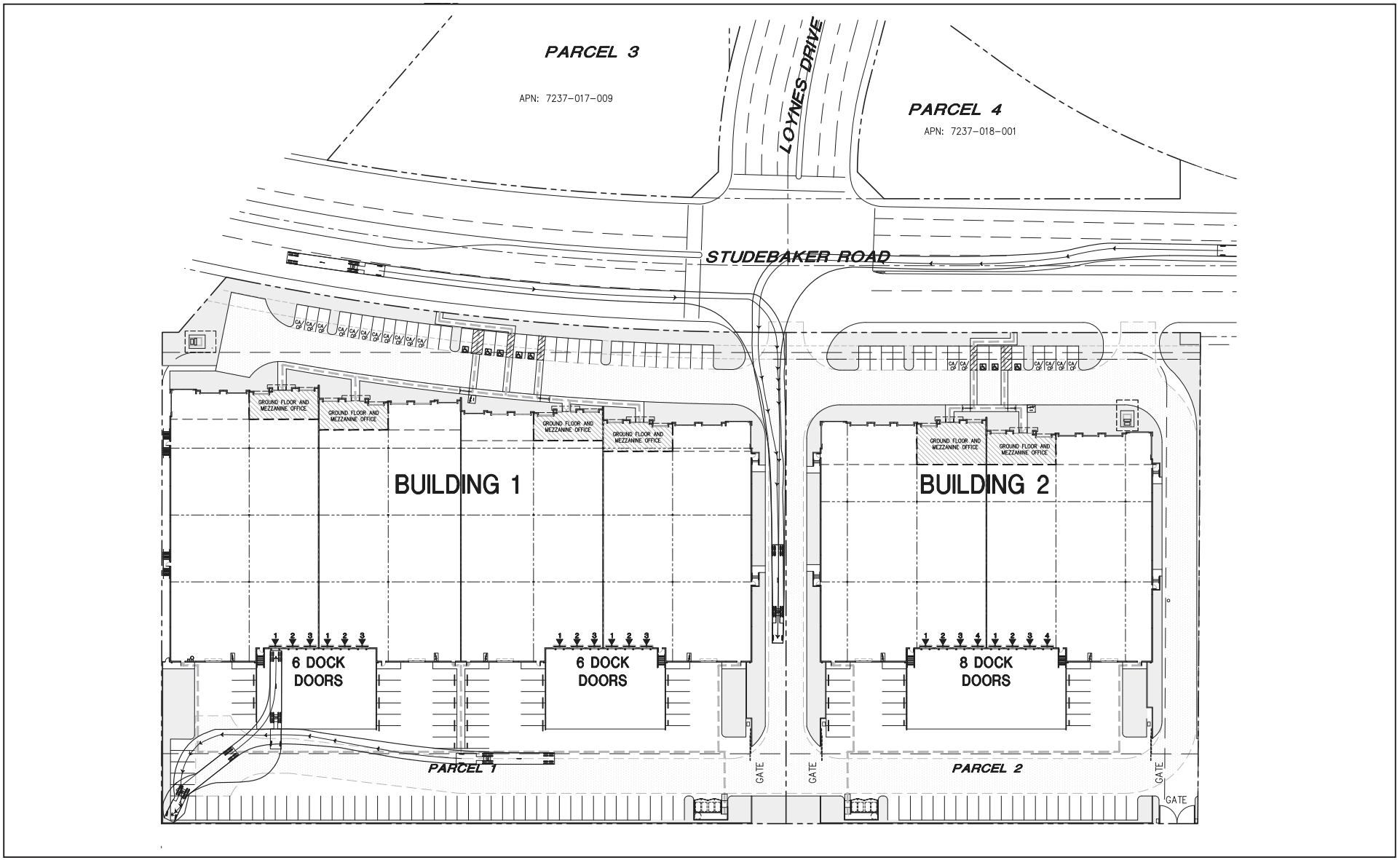
## Sight Distance

A sight distance analysis was conducted along Studebaker Road and Loynes Drive at the proposed location of the main project driveway to ensure driver visibility and safety. In the project vicinity, the speed limit along Studebaker Road is 45 miles per hour (mph) and along Loynes Drive is 35 mph. According to Table 405.1A of the Caltrans Highway Design Manual, the corner sight distance for a roadway with the speed limit of 45 mph is 495 ft and for a speed limit of 35 mph is 385 ft.

There are no sight distance obstructions at the proposed project driveways. As shown in Figure 13, the sight distance at the main project driveway exceeds 495 ft in the south direction (left of the driveway), enabling a right turn on red without any visual obstruction. In the westward direction (straight out of the main driveway), the sight distance at the project driveway exceeds 385 ft. The sight distance at the right-in/right-out only driveway exceeds 495 ft in the south direction (left of the driveway), enabling a right turn at the stop without any visual obstruction. Therefore, the project driveways would meet the minimum sight distance requirements specified in the Caltrans Highway Design Manual.

## Parking

To determine whether the site would provide adequate parking, LSA generated the parking requirement for the proposed business park project in accordance with Table 41-1C of City Municipal Code Section 21.41.216 (2018a). The parking rate for warehouse use under the code is 1 space per 1,000 sf. The proposed 139,500 sf Long Beach Business Park Project would require 140 spaces. The proposed project would provide a total parking supply of 167 spaces (i.e., 159 standard parking spaces plus 8 handicap-accessible spaces). Therefore, the project would provide parking consistent with City Zoning Code requirements. The project parking layout is illustrated on the site plan (Figure 2).




LSA

FIGURE 12a

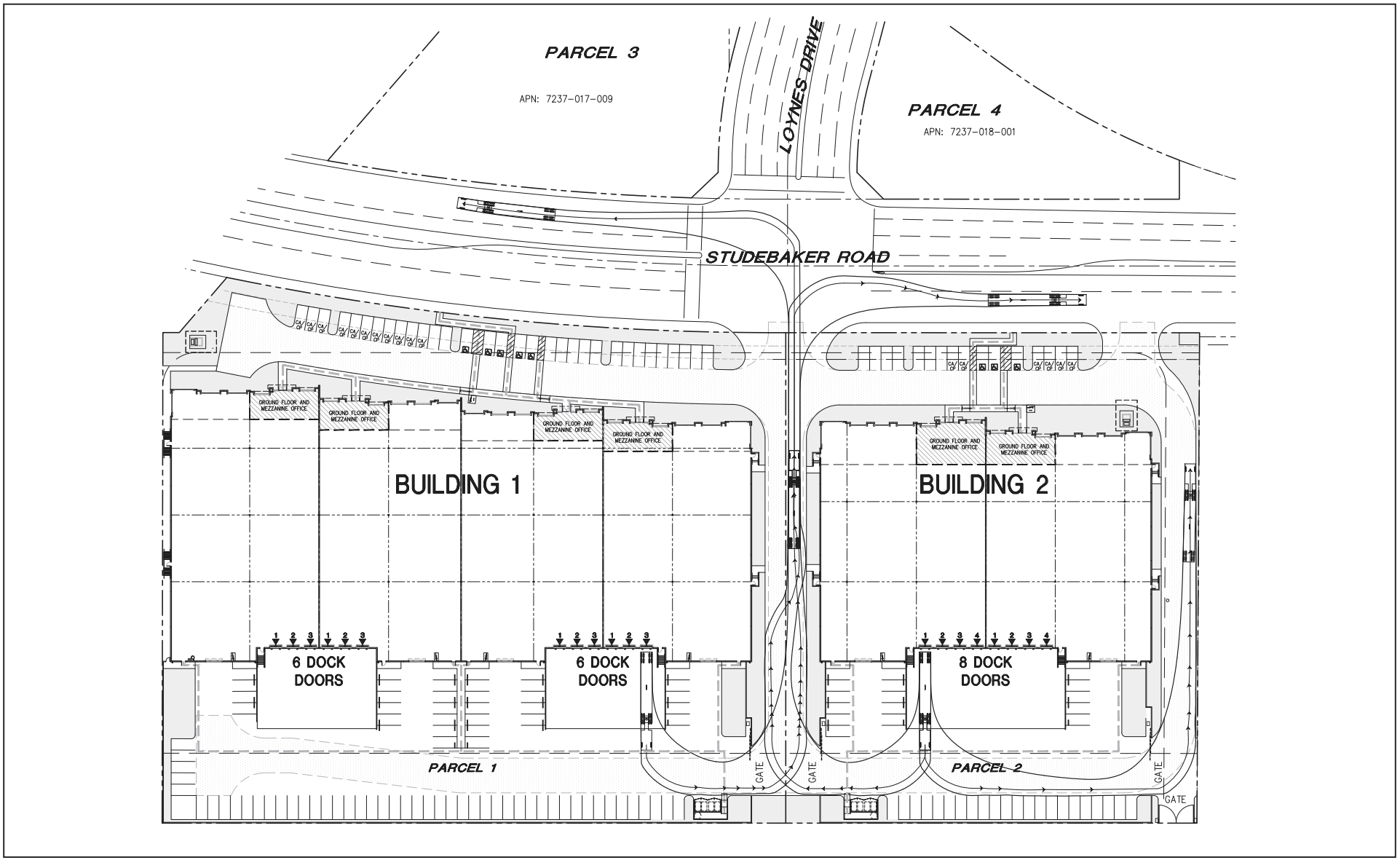
N

0 35 70
FEET

SOURCE: GAA Architects

*Long Beach Business Park*
Truck Access - Inbound

I:\ULL1801\G\Truck Access-Inbound.cdr (4/23/2019)




LSA

FIGURE 12b

N

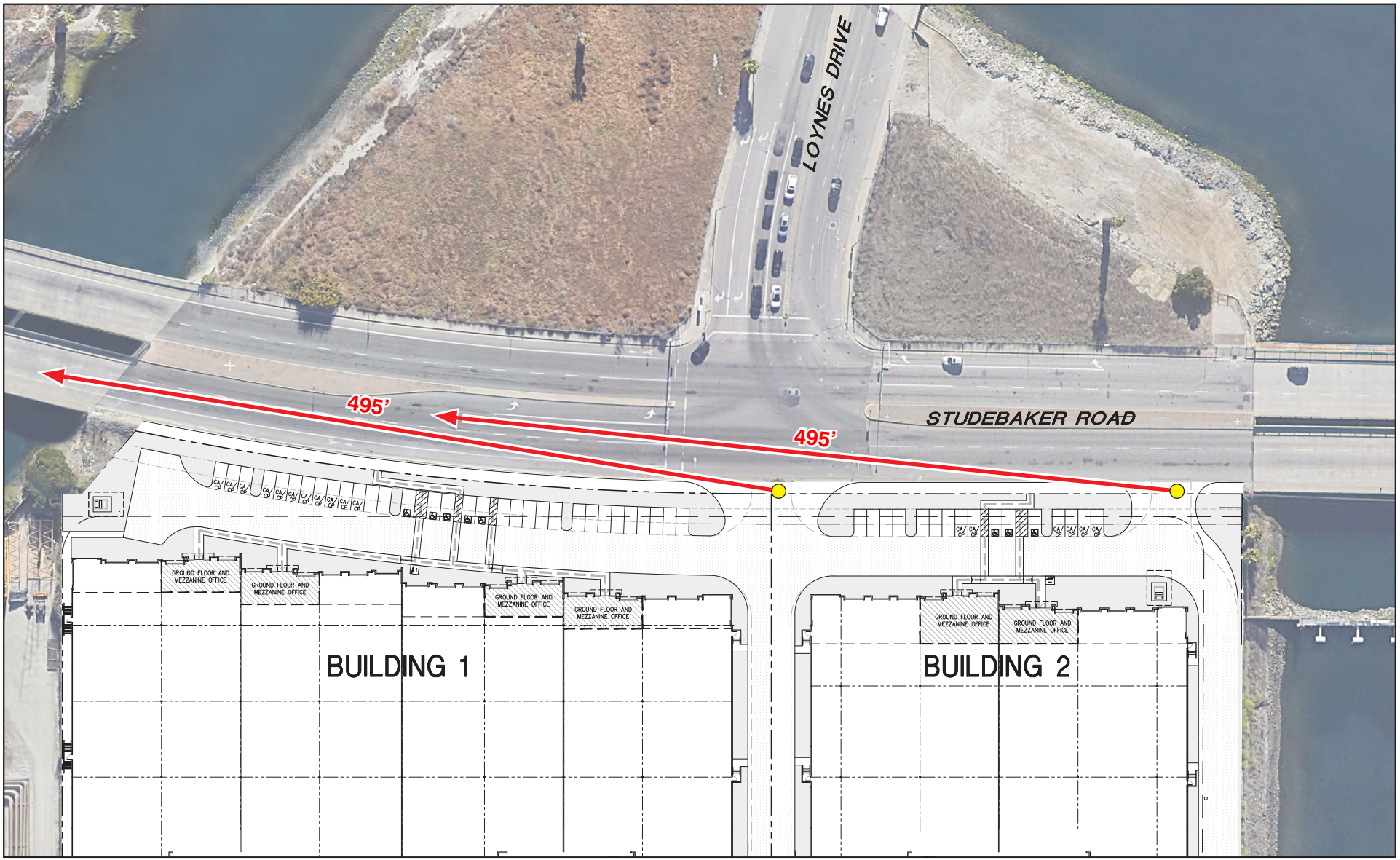
0 35 70
FEET

SOURCE: GAA Architects

*Long Beach Business Park*

Truck Access - Outbound

I:\ULL1801\G\Truck Access-Outbound.cdr (4/23/2019)




LSA

FIGURE 13

N

0 50 100
FEET

SOURCE: Google Earth

*Long Beach Business Park*
Sight Distance

I:\ULL1801\G\Sight Distance.cdr (7/10/2019)

## CONSTRUCTION ANALYSIS

As shown in the table below, project construction will consist of six different phases and take up to 239 days to complete.

| Phase | Duration (days) | No. of Workers | No. of Trucks/Day |
|---|---|---|---|
| Demolition | 20 | 8 | 1 |
| Site Preparation | 22 | 9 | 0 |
| Grading | 43 | 8 | 3 |
| Building Construction | 154 | 70 | 1 |
| Paving[1] | 66 | 8 | 0 |
| Architectural Coating[1] | 44 | 44 | 0 |
| **Total** | **239** | -- | -- |

[1]Paving and Architectural Coating would overlap with Building Construction.

Based on the City's Municipal Code (Sections 8.80202A through 202C), permitted construction hours are from 7:00 a.m. to 7:00 p.m., Monday through Friday, and from 9:00 a.m. to 6:00 p.m. on Saturday. No construction hours are permitted on a Sunday. According to the project applicant, typical construction hours for this project would be 7:00 a.m. to 3:00 p.m. Workers are expected at arrive at the site before 7:00 a.m. (outside of the a.m. peak hour) and depart from the site before 4:00 p.m. (outside the p.m. peak hour). Because construction trips would occur outside of the a.m. and p.m. peak hours, no further analysis is required.

## CONCLUSIONS

Based on the results of this analysis, implementation of the Long Beach Business Park Project would not result in any significant impacts to the surrounding roadway system. The evaluation of the study area intersection LOS shows that the addition of project traffic would not cause an intersection operation to deteriorate below the City's performance threshold.

Based on the site plan layout, adequate access and on-site circulation would be provided for all vehicle types.

Based on the proposed parking supply and City Zoning Code parking requirements, the Long Beach Business Park Project would provide adequate parking.

Because construction trips would occur outside of the peak-hour periods, the project would not result in any temporary circulation impacts.

## REFERENCES

City of Fontana. 2003. *Truck Trip Generation Study*.

City of Long Beach Municipal Code. 2018a. Chapter 21.41.216 – Required Number of Parking Spaces. Table 41- 1C: Required Number of Parking Spaces for Commercial, Industrial/Manufacturing, and All Other Uses.

_____. 2018b. Title 21 – Zoning, Chapter 21.41 – Off-Street Parking and Loading Requirements

Institute of Transportation Engineers. 2017. *ITE Trip Generation Manual, 10th Edition*.

LLG. 2017. 2nd Street + PCH Development Traffic Impact Analysis.

Los Angeles County Metropolitan Transportation Authority. 2010. Congestion Management Program.

The California Department of Transportation (Caltrans). 2018. *Highway Design Manual*. Sixth Edition. Sacramento.

# APPENDIX A

# EXISTING TRAFFIC VOLUME DATA

## National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

**Total**

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 6 | 262 | 0 | 0 | 0 | 195 | 29 | 0 | 53 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 556 |
| 7:15 AM | 14 | 363 | 0 | 0 | 0 | 205 | 43 | 0 | 54 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 693 |
| 7:30 AM | 18 | 321 | 0 | 0 | 0 | 223 | 65 | 0 | 93 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 742 |
| 7:45 AM | 23 | 297 | 0 | 0 | 0 | 282 | 100 | 0 | 84 | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 821 |
| 8:00 AM | 18 | 322 | 0 | 0 | 0 | 231 | 70 | 0 | 104 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 768 |
| 8:15 AM | 13 | 341 | 0 | 0 | 0 | 210 | 52 | 0 | 82 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 719 |
| 8:30 AM | 9 | 282 | 0 | 1 | 0 | 198 | 77 | 0 | 67 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 657 |
| 8:45 AM | 7 | 272 | 0 | 0 | 0 | 211 | 70 | 0 | 67 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 643 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 108 | 2460 | 0 | 1 | 0 | 1755 | 506 | 0 | 604 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 5599 |
| **APPROACH %'s :** | 4.20% | 95.76% | 0.00% | 0.04% | 0.00% | 77.62% | 22.38% | 0.00% | 78.54% | 0.00% | 21.46% | 0.00% | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 72 | 1281 | 0 | 0 | 0 | 946 | 287 | 0 | 363 | 0 | 101 | 0 | 0 | 0 | 0 | 0 | 3050 |
| **PEAK HR FACTOR :** | 0.783 | 0.939 | 0.000 | 0.000 | 0.000 | 0.839 | 0.718 | 0.000 | 0.873 | 0.000 | 0.721 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.929 |
| | 0.956 | | | | 0.807 | | | | 0.913 | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 25 | 300 | 0 | 0 | 0 | 316 | 118 | 0 | 89 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 866 |
| 4:15 PM | 26 | 388 | 0 | 0 | 0 | 293 | 116 | 0 | 99 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 947 |
| 4:30 PM | 13 | 387 | 0 | 0 | 0 | 277 | 109 | 0 | 83 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 890 |
| 4:45 PM | 29 | 335 | 0 | 1 | 0 | 277 | 127 | 0 | 88 | 0 | 19 | 1 | 0 | 0 | 0 | 0 | 877 |
| 5:00 PM | 37 | 417 | 0 | 1 | 0 | 293 | 170 | 0 | 76 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 1020 |
| 5:15 PM | 39 | 324 | 0 | 0 | 0 | 328 | 165 | 0 | 78 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 960 |
| 5:30 PM | 33 | 319 | 0 | 0 | 0 | 277 | 125 | 0 | 102 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 879 |
| 5:45 PM | 34 | 297 | 0 | 0 | 0 | 283 | 158 | 0 | 89 | 0 | 16 | 1 | 0 | 0 | 0 | 0 | 878 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 236 | 2767 | 0 | 2 | 0 | 2344 | 1088 | 0 | 704 | 0 | 174 | 2 | 0 | 0 | 0 | 0 | 7317 |
| **APPROACH %'s :** | 7.85% | 92.08% | 0.00% | 0.07% | 0.00% | 68.30% | 31.70% | 0.00% | 80.00% | 0.00% | 19.77% | 0.23% | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 118 | 1463 | 0 | 2 | 0 | 1175 | 571 | 0 | 325 | 0 | 92 | 1 | 0 | 0 | 0 | 0 | 3747 |
| **PEAK HR FACTOR :** | 0.756 | 0.877 | 0.000 | 0.500 | 0.000 | 0.896 | 0.840 | 0.000 | 0.923 | 0.000 | 0.885 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.918 |
| | 0.870 | | | | 0.885 | | | | 0.968 | | | | | | | | |

National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

**Cars**

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 6 | 257 | 0 | 0 | 0 | 190 | 29 | 0 | 53 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 546 |
| 7:15 AM | 14 | 360 | 0 | 0 | 0 | 200 | 43 | 0 | 54 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 685 |
| 7:30 AM | 17 | 317 | 0 | 0 | 0 | 217 | 62 | 0 | 92 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 727 |
| 7:45 AM | 22 | 292 | 0 | 0 | 0 | 279 | 99 | 0 | 82 | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 809 |
| 8:00 AM | 17 | 314 | 0 | 0 | 0 | 223 | 70 | 0 | 102 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 749 |
| 8:15 AM | 12 | 330 | 0 | 0 | 0 | 204 | 51 | 0 | 81 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 699 |
| 8:30 AM | 9 | 275 | 0 | 1 | 0 | 191 | 76 | 0 | 64 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 639 |
| 8:45 AM | 7 | 270 | 0 | 0 | 0 | 205 | 70 | 0 | 65 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 633 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 104 | 2415 | 0 | 1 | 0 | 1709 | 500 | 0 | 593 | 0 | 165 | 0 | 0 | 0 | 0 | 0 | 5487 |
| **APPROACH %'s :** | 4.13% | 95.83% | 0.00% | 0.04% | 0.00% | 77.37% | 22.63% | 0.00% | 78.23% | 0.00% | 21.77% | 0.00% | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 68 | 1253 | 0 | 0 | 0 | 923 | 282 | 0 | 357 | 0 | 101 | 0 | 0 | 0 | 0 | 0 | 2984 |
| **PEAK HR FACTOR :** | 0.77 | 0.949 | 0.000 | 0.000 | 0.000 | 0.827 | 0.712 | 0.000 | 0.875 | 0.000 | 0.721 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.922 |
| | 0.966 | | | | 0.797 | | | | 0.916 | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 25 | 295 | 0 | 0 | 0 | 314 | 117 | 0 | 86 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 855 |
| 4:15 PM | 26 | 385 | 0 | 0 | 0 | 292 | 116 | 0 | 98 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 942 |
| 4:30 PM | 13 | 383 | 0 | 0 | 0 | 276 | 108 | 0 | 82 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 883 |
| 4:45 PM | 29 | 334 | 0 | 1 | 0 | 277 | 126 | 0 | 88 | 0 | 19 | 1 | 0 | 0 | 0 | 0 | 875 |
| 5:00 PM | 37 | 415 | 0 | 1 | 0 | 292 | 170 | 0 | 75 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 1016 |
| 5:15 PM | 39 | 321 | 0 | 0 | 0 | 328 | 164 | 0 | 78 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 956 |
| 5:30 PM | 33 | 317 | 0 | 0 | 0 | 277 | 125 | 0 | 101 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 876 |
| 5:45 PM | 34 | 296 | 0 | 0 | 0 | 281 | 158 | 0 | 89 | 0 | 16 | 1 | 0 | 0 | 0 | 0 | 875 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 236 | 2746 | 0 | 2 | 0 | 2337 | 1084 | 0 | 697 | 0 | 174 | 2 | 0 | 0 | 0 | 0 | 7278 |
| **APPROACH %'s :** | 7.91% | 92.02% | 0.00% | 0.07% | 0.00% | 68.31% | 31.69% | 0.00% | 79.84% | 0.00% | 19.93% | 0.23% | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 118 | 1453 | 0 | 2 | 0 | 1173 | 568 | 0 | 323 | 0 | 92 | 1 | 0 | 0 | 0 | 0 | 3730 |
| **PEAK HR FACTOR :** | 0.76 | 0.875 | 0.000 | 0.500 | 0.000 | 0.894 | 0.835 | 0.000 | 0.918 | 0.000 | 0.885 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.918 |
| | 0.868 | | | | 0.885 | | | | 0.963 | | | | | | | | |

National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

**2axle**

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 0 | 2 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 7:15 AM | 0 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 7:30 AM | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 7:45 AM | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 8:00 AM | 1 | 3 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 8:15 AM | 1 | 7 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 8:30 AM | 0 | 1 | 0 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 8:45 AM | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 3 | 19 | 0 | 0 | 0 | 21 | 6 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 |
| **APPROACH %'s :** | 13.64% | 86.36% | 0.00% | 0.00% | 0.00% | 77.78% | 22.22% | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 3 | 13 | 0 | 0 | 0 | 6 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| **PEAK HR FACTOR :** | 0.750 | 0.464 | 0.000 | 0.000 | 0.000 | 0.375 | 0.417 | 0.000 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.700 |
| | 0.500 | | | | 0.688 | | | | 0.250 | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 0 | 4 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 4:15 PM | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 4:30 PM | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 4:45 PM | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 5:00 PM | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 5:15 PM | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 5:30 PM | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 5:45 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 0 | 16 | 0 | 0 | 0 | 7 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 |
| **APPROACH %'s :** | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | 63.64% | 36.36% | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 8 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| **PEAK HR FACTOR :** | 0.00 | 0.667 | 0.000 | 0.000 | 0.000 | 0.500 | 0.750 | 0.000 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.700 |
| | 0.667 | | | | 0.625 | | | | 0.250 | | | | | | | | |

National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

**3axle**

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 7:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 AM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 7:45 AM | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 8:00 AM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 8:15 AM | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 8:30 AM | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 8:45 AM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 0 | 10 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| **APPROACH %'s :** | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | 0.00% | | | | | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| **PEAK HR FACTOR :** | 0.000 | 0.417 | 0.000 | 0.000 | 0.000 | 0.750 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.500 |
| | | 0.417 | | | | 0.750 | | | | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:15 PM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:30 PM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:45 PM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| **APPROACH %'s :** | 0.00% | 100.00% | 0.00% | 0.00% | | | | | | | | | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **PEAK HR FACTOR :** | 0.00 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.250 |
| | | 0.250 | | | | | | | | | | | | | | | |

National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

**4axle**

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 7:15 AM | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 7:30 AM | 1 | 3 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 7:45 AM | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 8:00 AM | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 8:15 AM | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 8:30 AM | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 8:45 AM | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 1 | 16 | 0 | 0 | 0 | 20 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| **APPROACH %'s :** | 5.88% | 94.12% | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 1 | 10 | 0 | 0 | 0 | 14 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| **PEAK HR FACTOR :** | 0.250 | 0.625 | 0.000 | 0.000 | 0.000 | 0.700 | 0.000 | 0.000 | 0.625 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.750 |
| | 0.688 | | | | 0.700 | | | | 0.625 | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:30 PM | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| **APPROACH %'s :** | 0.00% | 100.00% | 0.00% | 0.00% | | | | | 100.00% | 0.00% | 0.00% | 0.00% | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| **PEAK HR FACTOR :** | 0.00 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.500 |
| | 0.250 | | | | | | | | 0.250 | | | | | | | | |

National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach
**Control:** Signalized

**Project ID:** 18-05595-001
**Date:** 9/12/2018

## Bikes

| NS/EW Streets: | Studebaker Rd | | | | Studebaker Rd | | | | Loynes Dr | | | | Loynes Dr | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 7:00 AM | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 7:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 8:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:45 AM | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| **APPROACH %'s :** | 100.00% | 0.00% | 0.00% | 0.00% | | | | | 100.00% | 0.00% | 0.00% | 0.00% | | | | | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **PEAK HR FACTOR :** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.250 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.250 |
| | | | | | | | | | 0.250 | | | | | | | | |

| **PM** | NORTHBOUND | | | | SOUTHBOUND | | | | EASTBOUND | | | | WESTBOUND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| 4:00 PM | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 4:15 PM | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:30 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5:45 PM | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | NL | NT | NR | NU | SL | ST | SR | SU | EL | ET | ER | EU | WL | WT | WR | WU | TOTAL |
| **TOTAL VOLUMES :** | 1 | 2 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 11 |
| **APPROACH %'s :** | 33.33% | 66.67% | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| **PEAK HR FACTOR :** | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.500 |
| | | | | | | 0.500 | | | | | | | | | | | |

# National Data & Surveying Services

# Intersection Turning Movement Count

**Location:** Studebaker Rd & Loynes Dr
**City:** Long Beach

**Project ID:** 18-05595-001
**Date:** 9/12/2018

## Pedestrians (Crosswalks)

| **NS/EW Streets:** | Studebaker Rd | | Studebaker Rd | | Loynes Dr | | Loynes Dr | | |
|---|---|---|---|---|---|---|---|---|---|
| **AM** | NORTH LEG | | SOUTH LEG | | EAST LEG | | WEST LEG | | |
| | EB | WB | EB | WB | NB | SB | NB | SB | TOTAL |
| 7:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 8:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | EB | WB | EB | WB | NB | SB | NB | SB | TOTAL |
| **TOTAL VOLUMES :** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| **APPROACH %'s :** | | | | | | | 100.00% | 0.00% | |
| **PEAK HR :** | 07:30 AM - 08:30 AM | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| **PEAK HR FACTOR :** | | | | | | | 0.250 | | 0.250 |
| | | | | | | | 0.250 | | |

| **PM** | NORTH LEG | | SOUTH LEG | | EAST LEG | | WEST LEG | | |
|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | EB | WB | NB | SB | NB | SB | TOTAL |
| 4:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | EB | WB | EB | WB | NB | SB | NB | SB | TOTAL |
| **TOTAL VOLUMES :** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **APPROACH %'s :** | | | | | | | | | |
| **PEAK HR :** | 04:30 PM - 05:30 PM | | | | | | | | TOTAL |
| **PEAK HR VOL :** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **PEAK HR FACTOR :** | | | | | | | | | |

Prepared by National Data & Surveying Services

# Studebaker Rd & Loynes Dr

## Peak Hour Turning Movement Count

**ID:** 18-05595-001
**City:** Long Beach

**Day:** Wednesday
**Date:** 09/12/2018

**PEAK HOURS**

| | |
|---|---|
| AM | 07:30 AM - 08:30 AM |
| NOON | NONE |
| PM | 04:30 PM - 05:30 PM |

**COUNT PERIODS**

| | |
|---|---|
| AM | 07:00 AM - 09:00 AM |
| NOON | NONE |
| PM | 04:00 PM - 06:00 PM |

### Studebaker Rd — SOUTHBOUND

| | | | | | |
|---|---|---|---|---|---|
| AM | 287 | 946 | 0 | 0 | 1644 |
| NOON | 0 | 0 | 0 | 0 | 0 |
| PM | 571 | 1175 | 0 | 0 | 1788 |
| | 1 | 2 | 0 | 0 | |

### Loynes Dr — EASTBOUND

| AM | NOON | PM | |
|---|---|---|---|
| 359 | 0 | 690 | |
| 0 | 0 | 1 | 0 |
| 363 | 0 | 325 | 2 |
| 0 | 0 | 0 | 0 |
| 101 | 0 | 92 | 2 |

### Loynes Dr — WESTBOUND

| | PM | NOON | AM |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 |

### CONTROL

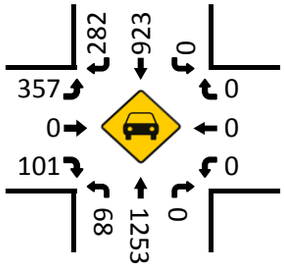
Signalized

| | | | |
|---|---|---|---|
| TEV | 3050 | 0 | 3747 |
| | AM | NOON | PM |
| PHF | 0.93 | | 0.92 |

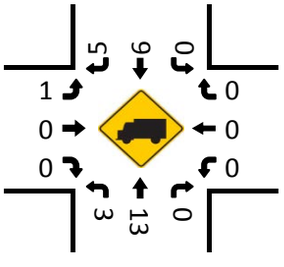
### Studebaker Rd — NORTHBOUND

| | | | | | |
|---|---|---|---|---|---|
| PM | 1269 | 2 | 118 | 1463 | 0 |
| NOON | 0 | 0 | 0 | 0 | 0 |
| AM | 1047 | 0 | 72 | 1281 | 0 |
| | | 0 | 1 | 2 | 0 |

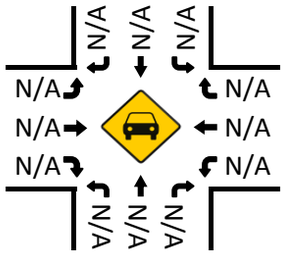
**Cars (AM)**



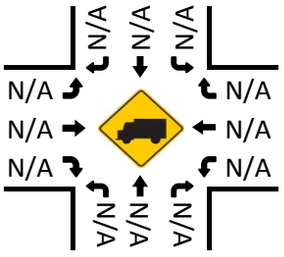

**2axle (AM)**



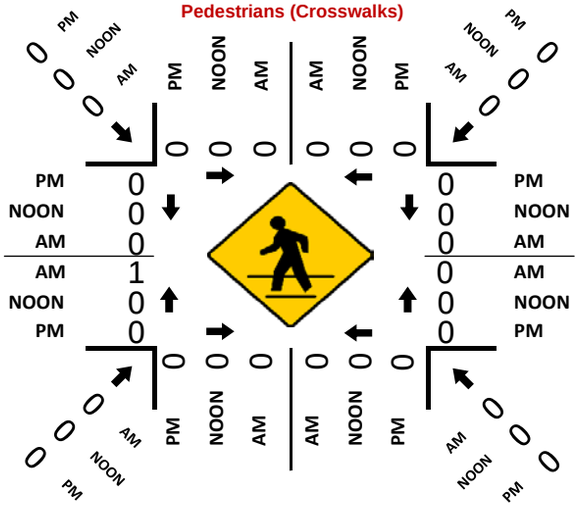

**Cars (NOON)**



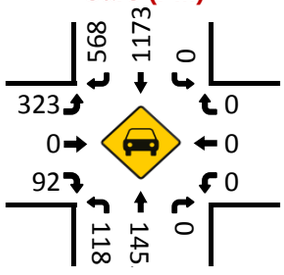

**2axle (NOON)**



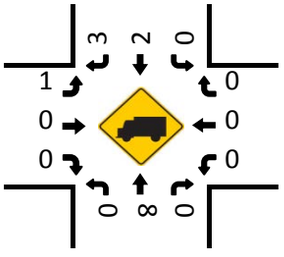

**Pedestrians (Crosswalks)**




**Cars (PM)**




**2axle (PM)**



# APPENDIX B

# EXISTING LEVEL OF SERVICE WORKSHEETS

Long Beach Business Park
ULL1801
Existing AM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.681 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 48 | Level Of Service: | B |

| Approach: | North Bound | | | | South Bound | | | | East Bound | | | | West Bound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | - T | - R | | L | - T | - R | | L | - T | - R | | L | - T | - R | |
| Control: | Protected | | | | Protected | | | | Protected | | | | Protected | | | |
| Rights: | Include | | | | Include | | | | Include | | | | Include | | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 | 0 2 | 0 | 0 | 0 | 0 2 | 0 | 1 | 2 | 0 | 0 | 0 2 | 0 | 0 | 0 | 0 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | | | | | |
| Base Vol: | 76 | 1313 | 0 | 0 | 980 | 290 | 374 | 0 | 101 | 0 | 0 | 0 | | | | |
| Growth 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 | | | | |
| Initial Bse: | 76 | 1313 | 0 | 0 | 980 | 290 | 374 | 0 | 101 | 0 | 0 | 0 | | | | |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Initial Fut: | 76 | 1313 | 0 | 0 | 980 | 290 | 374 | 0 | 101 | 0 | 0 | 0 | | | | |
| User 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 | | | | |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | | | | |
| PHF Volume: | 82 | 1412 | 0 | 0 | 1054 | 312 | 402 | 0 | 109 | 0 | 0 | 0 | | | | |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Reduced Vol: | 82 | 1412 | 0 | 0 | 1054 | 312 | 402 | 0 | 109 | 0 | 0 | 0 | | | | |
| PCE 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 | | | | |
| MLF 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 | | | | |
| FinalVolume: | 82 | 1412 | 0 | 0 | 1054 | 312 | 402 | 0 | 109 | 0 | 0 | 0 | | | | |
| Saturation Flow Module: | | | | | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | | | | |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 | | | | |
| Capacity Analysis Module: | | | | | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.44 | 0.00 | 0.00 | 0.33 | 0.19 | 0.14 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | | | | |
| Crit Moves: | | **** | | **** | | | **** | | | | | | | | | |

Long Beach Business Park
ULL1801
Existing PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.723 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 53 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Protected | | | Protected | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 2 0 | 0 | 0 0 | 2 0 | 1 | 2 0 | 0 0 | 2 | 0 0 | 0 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 120 | 1470 | 0 | 0 | 1176 | 573 | 329 | 0 | 92 | 0 | 0 | 0 |
| Growth 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 |
| Initial Bse: | 120 | 1470 | 0 | 0 | 1176 | 573 | 329 | 0 | 92 | 0 | 0 | 0 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 120 | 1470 | 0 | 0 | 1176 | 573 | 329 | 0 | 92 | 0 | 0 | 0 |
| User 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 |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| PHF Volume: | 130 | 1598 | 0 | 0 | 1278 | 623 | 358 | 0 | 100 | 0 | 0 | 0 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 130 | 1598 | 0 | 0 | 1278 | 623 | 358 | 0 | 100 | 0 | 0 | 0 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 130 | 1598 | 0 | 0 | 1278 | 623 | 358 | 0 | 100 | 0 | 0 | 0 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.50 | 0.00 | 0.00 | 0.40 | 0.39 | 0.12 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| Crit Moves: | | **** | | **** | | | **** | | | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 374 | 101 | 76 | 1313 | 980 | 290 |
| Future Volume (veh/h) | 374 | 101 | 76 | 1313 | 980 | 290 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 402 | 109 | 82 | 1412 | 1054 | 312 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 609 | 491 | 120 | 2300 | 1747 | 779 |
| Arrive On Green | 0.18 | 0.18 | 0.07 | 0.65 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3456 | 2790 | 1781 | 3647 | 3647 | 1585 |
| Grp Volume(v), veh/h | 402 | 109 | 82 | 1412 | 1054 | 312 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1395 | 1781 | 1777 | 1777 | 1585 |
| Q Serve(g_s), s | 5.5 | 1.7 | 2.3 | 11.9 | 10.9 | 6.4 |
| Cycle Q Clear(g_c), s | 5.5 | 1.7 | 2.3 | 11.9 | 10.9 | 6.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 609 | 491 | 120 | 2300 | 1747 | 779 |
| V/C Ratio(X) | 0.66 | 0.22 | 0.68 | 0.61 | 0.60 | 0.40 |
| Avail Cap(c_a), veh/h | 1220 | 985 | 192 | 2300 | 1747 | 779 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.6 | 18.0 | 23.2 | 5.3 | 9.4 | 8.2 |
| Incr Delay (d2), s/veh | 1.2 | 0.2 | 6.7 | 1.2 | 1.6 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.1 | 1.4 | 1.1 | 2.9 | 3.6 | 2.0 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 20.8 | 18.2 | 29.9 | 6.5 | 10.9 | 9.7 |
| LnGrp LOS | C | B | C | A | B | A |
| Approach Vol, veh/h | 511 | | | 1494 | 1366 | |
| Approach Delay, s/veh | 20.3 | | | 7.8 | 10.6 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | | 2 | | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 37.5 | | 13.5 | 7.9 | 29.6 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | | 33.0 | | 18.0 | 5.5 | 23.0 |
| Max Q Clear Time (g_c+I1), s | | 13.9 | | 7.5 | 4.3 | 12.9 |
| Green Ext Time (p_c), s | | 10.6 | | 1.5 | 0.0 | 5.9 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 10.8 |
| HCM 6th LOS | B |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 329 | 92 | 120 | 1470 | 1176 | 573 |
| Future Volume (veh/h) | 329 | 92 | 120 | 1470 | 1176 | 573 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 358 | 100 | 130 | 1598 | 1278 | 623 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 541 | 436 | 166 | 2424 | 1806 | 805 |
| Arrive On Green | 0.16 | 0.16 | 0.09 | 0.68 | 0.51 | 0.51 |
| Sat Flow, veh/h | 3456 | 2790 | 1781 | 3647 | 3647 | 1585 |
| Grp Volume(v), veh/h | 358 | 100 | 130 | 1598 | 1278 | 623 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1395 | 1781 | 1777 | 1777 | 1585 |
| Q Serve(g_s), s | 5.4 | 1.7 | 4.0 | 14.5 | 15.4 | 17.7 |
| Cycle Q Clear(g_c), s | 5.4 | 1.7 | 4.0 | 14.5 | 15.4 | 17.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 541 | 436 | 166 | 2424 | 1806 | 805 |
| V/C Ratio(X) | 0.66 | 0.23 | 0.78 | 0.66 | 0.71 | 0.77 |
| Avail Cap(c_a), veh/h | 1116 | 901 | 208 | 2424 | 1806 | 805 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.1 | 20.6 | 24.7 | 5.1 | 10.5 | 11.1 |
| Incr Delay (d2), s/veh | 1.4 | 0.3 | 14.1 | 1.4 | 2.4 | 7.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.1 | 0.0 | 2.2 | 3.5 | 5.3 | 6.5 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 23.5 | 20.8 | 38.8 | 6.5 | 12.9 | 18.2 |
| LnGrp LOS | C | C | D | A | B | B |
| Approach Vol, veh/h | 458 | | | 1728 | 1901 | |
| Approach Delay, s/veh | 22.9 | | | 9.0 | 14.6 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | | 2 | | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 42.5 | | 13.2 | 9.7 | 32.8 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | | 38.0 | | 18.0 | 6.5 | 27.0 |
| Max Q Clear Time (g_c+I1), s | | 16.5 | | 7.4 | 6.0 | 19.7 |
| Green Ext Time (p_c), s | | 13.1 | | 1.3 | 0.0 | 5.6 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.2 |
| HCM 6th LOS | B |

# APPENDIX C

# CMP FOR LOS ANGELES COUNTY (2010) GROWTH FACTORS

Exhibit 2-4

# 2009 CMP HIGHWAY AND ROADWAY SYSTEM

| State Route | FREEWAY/Arterial Name |
|---|---|
| 1 | Pacific Coast Hwy, Lincoln Bl, Sepulveda Bl |
| 2 | Santa Monica Bl, Alvarado St. Glendale Bl. GLENDALE FWY, Angeles Crest Hwy (excluding sections of Santa Monica Bl. Between I-10 to Bundy Dr and I-405 and La Brea Ave.) |
| 5 | SANTA ANA FWY, GOLDEN STATE FWY |
| 10 | SANTA MONICA FWY, SAN BERNARDINO FWY |
| 14 | ANTELOPE VALLEY FWY |
| 18 | Pearblossom Hwy |
| 19/164 | Lakewood Bl., Rosemead Bl. (excluding section of Lakewood Bl/Rosemead Bl. Between Route 1 and Del Amo Bl, Gardendale and Grand Ave, and Grand Ave. to Foothill Bl.) |
| 22 | 7th St., GARDEN GROVE FWY |
| 23 | Decker Canyon Rd |
| 27 | Topanga Canyon Rd. |
| 39 | Azusa Av, San Gabriel Canyon Rd |
| 47 | Vincent Thomas Bridge, Henry Ford Av, Alameda St. |
| 57 | ORANGE FWY |
| 60 | POMONA FWY |
| 66 | Foothill Bl |
| 71 | Corona Expy |
| 72 | Whittier Bl (excluding a sectionn of Whittier Bl between Esperanza and Via Clement) |
| 90 | Marina Expy, MARINA FWY |
| 91 | Artesia Bl, GARDENA FWY, ARTESIA FWY (excluding a section of Artesia Bl. Between PCH and Vermond Ave.) |
| 101 | SANTA ANA FWY (SPUR), HOLLYWOOD FWY, VENTURA FWY |
| 103 | TERMINAL ISLAND FWY (excluding a sectionn of the Terminal Island Fwy between PCH and Willow St.) |
| 105 | GLENN ANDERSON FWY |
| 107 | Hawthorn Bl |
| 110 | Gaffey st, HARBOR FWY, PASADENA FWY, Arroyo Pkwy (excluding a section of Arroyo Pkwy between Glenarm St. and Colorado Bl.) |
| 118 | SIMI VALLEY FWY, SAN FERNANDO VALLEY FWY |
| 126 | Henry Mayo Dr, Magic Mountain Pkwy, San Fernando Rd (excluding a section of Magic Mountain Pkwy/San Fernando Rd between I-5 to SR-14. |
| 134 | VENTURA FWY |
| 138 | Lancaster Rd, Avenue "D", ANTELOPE VALLEY FWY, Palmdale Bl, 47th St. East, Fort Tejon Rd. Pearblossom Hwy, Antelope Hwy |
| 170 | Highland Ave, HOLLYWOOD FWY |
| 187 | Venice Bl |
| 210 | FOOTHILL FWY |

| State Route | FREEWAY/Arterial Name |
|---|---|
| 213 | Western Av |
| 405 | SAN DIEGO FWY |
| 605 | SAN GABRIEL RIVER FWY |
| 710 | LONG BEACH FWY, Pasadena Av, St. John Av |

| Principal Arterial | Limits |
|---|---|
| Alameda St | Port of Los Angeles to Route 101 |
| Alamitos Av | Ocean Bl to Pacific Coast Hwy |
| Arrow Hwy | I-210 to San Bernardino County |
| Arroyo Pkwy | Glenarm st. to Colorado Bl |
| Artesia Bl | Pacific Coast Hwy to Vermont Ave. |
| Azusa Av/San Gabriel Ave | Colima Rd to just south of the Los Angeles National Forest Boundary |
| Colima Rd | Hacienda Bl to Azusa Av |
| Fremont Av | Valley Bl to Columbia St |
| Grand Av | SR-57 to San Bernardino County |
| Hacienda Bl | Orange County to Colima Rd |
| Imperial Hwy | I- 5 to Orange County |
| La Cienega Bl | I-405 to I-10 |
| Lakewood Bl./Rosemead Bl. | Route 1 to Del Amo Bl, Gardendale to Gallatin Rd., and Grand Ave. to Foothill Bl. |
| Santa Monica Bl | I-10 to Bundy Dr. and I-405 to La Brea Ave. |
| Magic Mountain Pkwy/San Fernando Rd | I-5 to Route 14 |
| Manchester/Firestone Bl | I-710 to Lincoln Bl |
| Seventh St | Alamitos Av to Pacific Coast Hwy |
| Sierra Hwy | SR-126 to SR-14 (at Red Rover Mine Rd) |
| Shoreline Dr | I- 710 to Ocean Bl |
| Terminal Island Frwy | Pacific Coast Hwy and Willow |
| Valley Bl | I- 710 to Fremont Av |
| Ventura Bl | Topanga Canyon Bl to Lankershiem Bl |
| Victory Bl | Topanga Canyon Bl to SR-170 |
| Whittier Bl | Esperanza to Via Clement |
| Wilshire Bl. | Ocean Bl to I-110 |

# APPENDIX D

# PROJECT BUILD-OUT LOS CALCULATION WORKSHEETS

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project AM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.707 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 51 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Protected | | | Protected | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 2 0 | 0 | 0 0 | 2 0 | 1 | 2 0 | 0 0 | 2 | 0 0 | 0 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| Growth 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 |
| Initial Bse: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| User 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 |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| PHF Volume: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.46 | 0.00 | 0.00 | 0.35 | 0.20 | 0.14 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| Crit Moves: | | **** | | **** | | | **** | | | | | |

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.763 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 59 | Level Of Service: | C |

| Approach: | North Bound | | | | South Bound | | | | East Bound | | | | West Bound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | - T | - R | | L | - T | - R | | L | - T | - R | | L | - T | - R | |
| Control: | Protected | | | | Protected | | | | Protected | | | | Protected | | | |
| Rights: | Include | | | | Include | | | | Include | | | | Include | | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 | 0 2 | 0 | 0 | 0 | 0 2 | 0 | 1 | 2 | 0 | 0 | 0 2 | 0 | 0 | 0 | 0 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | | | | | |
| Base Vol: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| Growth 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 | | | | |
| Initial Bse: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Initial Fut: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| User 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 | | | | |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | | |
| PHF Volume: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Reduced Vol: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| PCE 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 | | | | |
| MLF 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 | | | | |
| FinalVolume: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| Saturation Flow Module: | | | | | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | | | | |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 | | | | |
| Capacity Analysis Module: | | | | | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.53 | 0.00 | 0.00 | 0.44 | 0.40 | 0.13 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | | | | |
| Crit Moves: | | **** | | **** | | | **** | | | | | | | | | |

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project + Project AM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.738 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 55 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 | 1 0 | 1 0 | 2 0 | 1 | 2 0 | 1 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| Growth 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 |
| Initial Bse: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| User 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 |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| PHF Volume: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.18 | 0.18 | 0.64 |
| Final Sat.: | 1600 | 3186 | 14 | 1600 | 3200 | 1600 | 2880 | 1600 | 1600 | 291 | 291 | 1018 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.47 | 0.47 | 0.02 | 0.35 | 0.20 | 0.14 | 0.00 | 0.07 | 0.01 | 0.01 | 0.01 |
| Crit Moves: | | **** | | **** | | | **** | | | | | **** |

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project + Project PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.798 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 66 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 | 1 0 | 1 0 | 2 0 | 1 | 2 0 | 1 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| Growth 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 |
| Initial Bse: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| User 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 |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| PHF Volume: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.16 | 0.16 | 0.68 |
| Final Sat.: | 1600 | 3196 | 4 | 1600 | 3200 | 1600 | 2880 | 1600 | 1600 | 260 | 260 | 1079 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.54 | 0.54 | 0.01 | 0.44 | 0.40 | 0.13 | 0.00 | 0.06 | 0.03 | 0.03 | 0.03 |
| Crit Moves: | | **** | | **** | | | **** | | | | **** | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 385 | 104 | 78 | 1379 | 1044 | 299 |
| Future Volume (veh/h) | 385 | 104 | 78 | 1379 | 1044 | 299 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 414 | 112 | 84 | 1483 | 1123 | 322 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 621 | 502 | 121 | 2290 | 1736 | 774 |
| Arrive On Green | 0.18 | 0.18 | 0.07 | 0.64 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3456 | 2790 | 1781 | 3647 | 3647 | 1585 |
| Grp Volume(v), veh/h | 414 | 112 | 84 | 1483 | 1123 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1395 | 1781 | 1777 | 1777 | 1585 |
| Q Serve(g_s), s | 5.7 | 1.8 | 2.4 | 13.0 | 12.1 | 6.7 |
| Cycle Q Clear(g_c), s | 5.7 | 1.8 | 2.4 | 13.0 | 12.1 | 6.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 621 | 502 | 121 | 2290 | 1736 | 774 |
| V/C Ratio(X) | 0.67 | 0.22 | 0.69 | 0.65 | 0.65 | 0.42 |
| Avail Cap(c_a), veh/h | 1215 | 981 | 177 | 2290 | 1736 | 774 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.6 | 17.9 | 23.3 | 5.6 | 9.8 | 8.4 |
| Incr Delay (d2), s/veh | 1.2 | 0.2 | 6.9 | 1.4 | 1.9 | 1.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.2 | 0.0 | 1.1 | 3.2 | 4.1 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 20.8 | 18.2 | 30.2 | 7.0 | 11.7 | 10.1 |
| LnGrp LOS | C | B | C | A | B | B |
| Approach Vol, veh/h | 526 | | | 1567 | 1445 | |
| Approach Delay, s/veh | 20.2 | | | 8.2 | 11.3 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | | 2 | | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 37.5 | | 13.7 | 8.0 | 29.5 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | | 33.0 | | 18.0 | 5.1 | 23.4 |
| Max Q Clear Time (g_c+I1), s | | 15.0 | | 7.7 | 4.4 | 14.1 |
| Green Ext Time (p_c), s | | 10.8 | | 1.5 | 0.0 | 5.8 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 11.3 |
| HCM 6th LOS | B |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 339 | 95 | 124 | 1575 | 1285 | 590 |
| Future Volume (veh/h) | 339 | 95 | 124 | 1575 | 1285 | 590 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 368 | 103 | 135 | 1712 | 1397 | 641 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 533 | 430 | 172 | 2486 | 1883 | 840 |
| Arrive On Green | 0.15 | 0.15 | 0.10 | 0.70 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3456 | 2790 | 1781 | 3647 | 3647 | 1585 |
| Grp Volume(v), veh/h | 368 | 103 | 135 | 1712 | 1397 | 641 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1395 | 1781 | 1777 | 1777 | 1585 |
| Q Serve(g_s), s | 6.2 | 2.0 | 4.6 | 17.2 | 18.7 | 19.6 |
| Cycle Q Clear(g_c), s | 6.2 | 2.0 | 4.6 | 17.2 | 18.7 | 19.6 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 533 | 430 | 172 | 2486 | 1883 | 840 |
| V/C Ratio(X) | 0.69 | 0.24 | 0.79 | 0.69 | 0.74 | 0.76 |
| Avail Cap(c_a), veh/h | 1012 | 817 | 217 | 2486 | 1883 | 840 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.6 | 22.8 | 27.2 | 5.4 | 11.2 | 11.4 |
| Incr Delay (d2), s/veh | 1.6 | 0.3 | 13.7 | 1.6 | 2.7 | 6.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 1.6 | 2.5 | 4.3 | 6.6 | 7.1 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 26.2 | 23.1 | 40.8 | 6.9 | 13.9 | 17.9 |
| LnGrp LOS | C | C | D | A | B | B |
| Approach Vol, veh/h | 471 | | | 1847 | 2038 | |
| Approach Delay, s/veh | 25.5 | | | 9.4 | 15.2 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | | 2 | | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 47.5 | | 14.0 | 10.4 | 37.1 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | | 43.0 | | 18.0 | 7.5 | 31.0 |
| Max Q Clear Time (g_c+I1), s | | 19.2 | | 8.2 | 6.6 | 21.6 |
| Green Ext Time (p_c), s | | 15.2 | | 1.3 | 0.0 | 7.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.8 |
| HCM 6th LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 385 | 7 | 104 | 2 | 2 | 7 | 78 | 1380 | 6 | 32 | 1044 | 299 |
| Future Volume (veh/h) | 385 | 7 | 104 | 2 | 2 | 7 | 78 | 1380 | 6 | 32 | 1044 | 299 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 414 | 8 | 112 | 2 | 2 | 8 | 84 | 1484 | 6 | 34 | 1123 | 322 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 547 | 296 | 251 | 4 | 4 | 16 | 108 | 2000 | 8 | 60 | 1863 | 831 |
| Arrive On Green | 0.16 | 0.16 | 0.16 | 0.01 | 0.01 | 0.01 | 0.06 | 0.55 | 0.55 | 0.03 | 0.52 | 0.52 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 276 | 276 | 1105 | 1781 | 3630 | 15 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 414 | 8 | 112 | 12 | 0 | 0 | 84 | 726 | 764 | 34 | 1123 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1870 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1868 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 8.5 | 0.3 | 4.8 | 0.5 | 0.0 | 0.0 | 3.5 | 23.1 | 23.1 | 1.4 | 16.4 | 9.0 |
| Cycle Q Clear(g_c), s | 8.5 | 0.3 | 4.8 | 0.5 | 0.0 | 0.0 | 3.5 | 23.1 | 23.1 | 1.4 | 16.4 | 9.0 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.01 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 547 | 296 | 251 | 24 | 0 | 0 | 108 | 979 | 1029 | 60 | 1863 | 831 |
| V/C Ratio(X) | 0.76 | 0.03 | 0.45 | 0.49 | 0.00 | 0.00 | 0.78 | 0.74 | 0.74 | 0.56 | 0.60 | 0.39 |
| Avail Cap(c_a), veh/h | 836 | 453 | 383 | 401 | 0 | 0 | 175 | 979 | 1029 | 120 | 1863 | 831 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.9 | 26.5 | 28.4 | 36.4 | 0.0 | 0.0 | 34.4 | 12.7 | 12.7 | 35.4 | 12.3 | 10.6 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 1.2 | 14.4 | 0.0 | 0.0 | 11.2 | 5.1 | 4.8 | 8.0 | 1.5 | 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 | 3.6 | 0.1 | 1.8 | 0.3 | 0.0 | 0.0 | 1.8 | 9.2 | 9.6 | 0.7 | 6.1 | 3.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.1 | 26.5 | 29.6 | 50.8 | 0.0 | 0.0 | 45.7 | 17.7 | 17.5 | 43.4 | 13.8 | 11.9 |
| LnGrp LOS | C | C | C | D | A | A | D | B | B | D | B | B |
| Approach Vol, veh/h | | 534 | | | 12 | | | 1574 | | | 1479 | |
| Approach Delay, s/veh | | 31.5 | | | 50.8 | | | 19.1 | | | 14.0 | |
| Approach LOS | | C | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.0 | 45.5 | | 16.3 | 9.0 | 43.5 | | 5.6 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 7.3 | 38.7 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 3.4 | 25.1 | | 10.5 | 5.5 | 18.4 | | 2.5 |
| Green Ext Time (p_c), s | 0.0 | 9.5 | | 1.3 | 0.0 | 9.7 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 19.0 |
| HCM 6th LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 339 | 2 | 95 | 7 | 7 | 29 | 124 | 1575 | 2 | 8 | 1285 | 590 |
| Future Volume (veh/h) | 339 | 2 | 95 | 7 | 7 | 29 | 124 | 1575 | 2 | 8 | 1285 | 590 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 368 | 2 | 103 | 8 | 8 | 32 | 135 | 1712 | 2 | 9 | 1397 | 641 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 493 | 267 | 226 | 11 | 11 | 46 | 169 | 2084 | 2 | 20 | 1738 | 775 |
| Arrive On Green | 0.14 | 0.14 | 0.14 | 0.04 | 0.04 | 0.04 | 0.09 | 0.57 | 0.57 | 0.01 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 276 | 276 | 1105 | 1781 | 3642 | 4 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 368 | 2 | 103 | 48 | 0 | 0 | 135 | 835 | 879 | 9 | 1397 | 641 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1870 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1870 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 7.9 | 0.1 | 4.6 | 2.2 | 0.0 | 0.0 | 5.8 | 29.4 | 29.4 | 0.4 | 25.7 | 26.9 |
| Cycle Q Clear(g_c), s | 7.9 | 0.1 | 4.6 | 2.2 | 0.0 | 0.0 | 5.8 | 29.4 | 29.4 | 0.4 | 25.7 | 26.9 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 493 | 267 | 226 | 69 | 0 | 0 | 169 | 1017 | 1070 | 20 | 1738 | 775 |
| V/C Ratio(X) | 0.75 | 0.01 | 0.46 | 0.70 | 0.00 | 0.00 | 0.80 | 0.82 | 0.82 | 0.44 | 0.80 | 0.83 |
| Avail Cap(c_a), veh/h | 802 | 434 | 368 | 385 | 0 | 0 | 186 | 1017 | 1070 | 115 | 1738 | 775 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.9 | 28.5 | 30.5 | 36.7 | 0.0 | 0.0 | 34.4 | 13.4 | 13.4 | 38.1 | 16.7 | 17.0 |
| Incr Delay (d2), s/veh | 2.3 | 0.0 | 1.4 | 11.9 | 0.0 | 0.0 | 19.9 | 7.4 | 7.1 | 14.5 | 4.1 | 9.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.4 | 0.0 | 1.8 | 1.1 | 0.0 | 0.0 | 3.4 | 12.1 | 12.6 | 0.2 | 10.3 | 10.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.2 | 28.5 | 31.9 | 48.6 | 0.0 | 0.0 | 54.3 | 20.8 | 20.5 | 52.6 | 20.7 | 26.9 |
| LnGrp LOS | C | C | C | D | A | A | D | C | C | D | C | C |
| Approach Vol, veh/h | | 473 | | | 48 | | | 1849 | | | 2047 | |
| Approach Delay, s/veh | | 33.7 | | | 48.6 | | | 23.1 | | | 22.8 | |
| Approach LOS | | C | | | D | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 5.4 | 48.9 | | 15.5 | 11.8 | 42.4 | | 7.7 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 8.1 | 37.9 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 2.4 | 31.4 | | 9.9 | 7.8 | 28.9 | | 4.2 |
| Green Ext Time (p_c), s | 0.0 | 7.3 | | 1.1 | 0.0 | 7.1 | | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 24.4 |
| HCM 6th LOS | C |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 1 | 1771 | 1 | 0 | 1375 |
| Future Vol, veh/h | 0 | 1 | 1771 | 1 | 0 | 1375 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 1 | 1925 | 1 | 0 | 1495 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 963 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 256 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 256 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 19.1 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 256 | - |
| HCM Lane V/C Ratio | - | - | 0.004 | - |
| HCM Control Delay (s) | - | - | 19.1 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 5 | 1943 | 0 | 0 | 1883 |
| Future Vol, veh/h | 0 | 5 | 1943 | 0 | 0 | 1883 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 5 | 2112 | 0 | 0 | 2047 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 1056 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 222 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 222 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 21.6 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 222 | - |
| HCM Lane V/C Ratio | - | - | 0.024 | - |
| HCM Control Delay (s) | - | - | 21.6 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0.1 | - |

| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 414 | 8 | 112 | 12 | 84 | 1490 | 34 | 1123 | 322 |
| v/c Ratio | 0.62 | 0.02 | 0.28 | 0.08 | 0.49 | 0.69 | 0.28 | 0.59 | 0.32 |
| Control Delay | 32.9 | 26.4 | 7.9 | 26.0 | 46.2 | 14.9 | 43.0 | 15.6 | 2.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 32.9 | 26.4 | 7.9 | 26.0 | 46.2 | 14.9 | 43.0 | 15.6 | 2.8 |
| Queue Length 50th (ft) | 90 | 3 | 0 | 2 | 38 | 169 | 15 | 178 | 0 |
| Queue Length 95th (ft) | 157 | 16 | 41 | 19 | #106 | #553 | 49 | 343 | 46 |
| Internal Link Dist (ft) | | 316 | | 24 | | 461 | | 199 | |
| Turn Bay Length (ft) | 130 | | | | 110 | | | | |
| Base Capacity (vph) | 844 | 457 | 475 | 419 | 176 | 2163 | 120 | 1897 | 998 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.49 | 0.02 | 0.24 | 0.03 | 0.48 | 0.69 | 0.28 | 0.59 | 0.32 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 368 | 2 | 103 | 48 | 135 | 1714 | 9 | 1397 | 641 |
| v/c Ratio | 0.62 | 0.01 | 0.28 | 0.29 | 0.75 | 0.79 | 0.08 | 0.83 | 0.62 |
| Control Delay | 36.4 | 29.5 | 7.5 | 24.0 | 65.7 | 19.1 | 41.9 | 26.3 | 6.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 29.5 | 7.5 | 24.0 | 65.7 | 19.1 | 41.9 | 26.3 | 6.0 |
| Queue Length 50th (ft) | 94 | 1 | 0 | 8 | 72 | 353 | 5 | 351 | 26 |
| Queue Length 95th (ft) | 143 | 7 | 35 | 42 | #183 | #721 | 20 | #554 | 126 |
| Internal Link Dist (ft) | | 316 | | 52 | | 461 | | 199 | |
| Turn Bay Length (ft) | 130 | | | | 110 | | | | |
| Base Capacity (vph) | 772 | 419 | 445 | 403 | 179 | 2160 | 110 | 1676 | 1042 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.48 | 0.00 | 0.23 | 0.12 | 0.75 | 0.79 | 0.08 | 0.83 | 0.62 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# APPENDIX E

# EXISTING PLUS PROJECT LOS CALCULATION WORKSHEETS

Long Beach Business Park
ULL1801
Existing Plus Project AM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.712 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 52 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 | 1 0 | 1 0 | 2 0 | 1 | 2 0 | 1 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 76 | 1314 | 6 | 32 | 980 | 290 | 374 | 7 | 101 | 2 | 2 | 7 |
| Growth 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 |
| Initial Bse: | 76 | 1314 | 6 | 32 | 980 | 290 | 374 | 7 | 101 | 2 | 2 | 7 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 76 | 1314 | 6 | 32 | 980 | 290 | 374 | 7 | 101 | 2 | 2 | 7 |
| User 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 |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| PHF Volume: | 82 | 1413 | 6 | 34 | 1054 | 312 | 402 | 8 | 109 | 2 | 2 | 8 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 82 | 1413 | 6 | 34 | 1054 | 312 | 402 | 8 | 109 | 2 | 2 | 8 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 82 | 1413 | 6 | 34 | 1054 | 312 | 402 | 8 | 109 | 2 | 2 | 8 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.18 | 0.18 | 0.64 |
| Final Sat.: | 1600 | 3185 | 15 | 1600 | 3200 | 1600 | 2880 | 1600 | 1600 | 291 | 291 | 1018 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.44 | 0.44 | 0.02 | 0.33 | 0.19 | 0.14 | 0.00 | 0.07 | 0.01 | 0.01 | 0.01 |
| Crit Moves: | | **** | | **** | | | **** | | | | | **** |

Long Beach Business Park
ULL1801
Existing Plus Project PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.759 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 59 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 1 | 0 | 1 0 | 2 0 | 1 | 2 0 | 1 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 120 | 1470 | 2 | 8 | 1176 | 573 | 329 | 2 | 92 | 7 | 7 | 29 |
| Growth 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 |
| Initial Bse: | 120 | 1470 | 2 | 8 | 1176 | 573 | 329 | 2 | 92 | 7 | 7 | 29 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 120 | 1470 | 2 | 8 | 1176 | 573 | 329 | 2 | 92 | 7 | 7 | 29 |
| User 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 |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| PHF Volume: | 130 | 1598 | 2 | 9 | 1278 | 623 | 358 | 2 | 100 | 8 | 8 | 32 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 130 | 1598 | 2 | 9 | 1278 | 623 | 358 | 2 | 100 | 8 | 8 | 32 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 130 | 1598 | 2 | 9 | 1278 | 623 | 358 | 2 | 100 | 8 | 8 | 32 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.16 | 0.16 | 0.68 |
| Final Sat.: | 1600 | 3196 | 4 | 1600 | 3200 | 1600 | 2880 | 1600 | 1600 | 260 | 260 | 1079 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.50 | 0.50 | 0.01 | 0.40 | 0.39 | 0.12 | 0.00 | 0.06 | 0.03 | 0.03 | 0.03 |
| Crit Moves: | | **** | | **** | | | **** | | | | **** | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 374 | 7 | 101 | 2 | 2 | 7 | 76 | 1314 | 6 | 32 | 980 | 290 |
| Future Volume (veh/h) | 374 | 7 | 101 | 2 | 2 | 7 | 76 | 1314 | 6 | 32 | 980 | 290 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 402 | 8 | 109 | 2 | 2 | 8 | 82 | 1413 | 6 | 34 | 1054 | 312 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 535 | 290 | 246 | 4 | 4 | 16 | 106 | 2008 | 9 | 61 | 1877 | 837 |
| Arrive On Green | 0.15 | 0.15 | 0.15 | 0.01 | 0.01 | 0.01 | 0.06 | 0.55 | 0.55 | 0.03 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 276 | 276 | 1105 | 1781 | 3629 | 15 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 402 | 8 | 109 | 12 | 0 | 0 | 82 | 692 | 727 | 34 | 1054 | 312 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1870 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1868 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 8.2 | 0.3 | 4.6 | 0.5 | 0.0 | 0.0 | 3.4 | 21.1 | 21.1 | 1.4 | 14.7 | 8.6 |
| Cycle Q Clear(g_c), s | 8.2 | 0.3 | 4.6 | 0.5 | 0.0 | 0.0 | 3.4 | 21.1 | 21.1 | 1.4 | 14.7 | 8.6 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.01 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 535 | 290 | 246 | 24 | 0 | 0 | 106 | 983 | 1033 | 61 | 1877 | 837 |
| V/C Ratio(X) | 0.75 | 0.03 | 0.44 | 0.49 | 0.00 | 0.00 | 0.78 | 0.70 | 0.70 | 0.56 | 0.56 | 0.37 |
| Avail Cap(c_a), veh/h | 840 | 454 | 385 | 403 | 0 | 0 | 176 | 983 | 1033 | 120 | 1877 | 837 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.9 | 26.6 | 28.4 | 36.2 | 0.0 | 0.0 | 34.4 | 12.1 | 12.1 | 35.2 | 11.7 | 10.3 |
| Incr Delay (d2), s/veh | 2.1 | 0.0 | 1.3 | 14.4 | 0.0 | 0.0 | 11.5 | 4.2 | 4.0 | 7.9 | 1.2 | 1.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.5 | 0.1 | 1.8 | 0.3 | 0.0 | 0.0 | 1.8 | 8.3 | 8.6 | 0.7 | 5.4 | 2.9 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.1 | 26.6 | 29.7 | 50.6 | 0.0 | 0.0 | 45.8 | 16.3 | 16.1 | 43.2 | 13.0 | 11.5 |
| LnGrp LOS | C | C | C | D | A | A | D | B | B | D | B | B |
| Approach Vol, veh/h | | 519 | | | 12 | | | 1501 | | | 1400 | |
| Approach Delay, s/veh | | 31.5 | | | 50.6 | | | 17.8 | | | 13.4 | |
| Approach LOS | | C | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.0 | 45.5 | | 16.0 | 8.9 | 43.6 | | 5.6 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 7.3 | 38.7 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 3.4 | 23.1 | | 10.2 | 5.4 | 16.7 | | 2.5 |
| Green Ext Time (p_c), s | 0.0 | 9.7 | | 1.2 | 0.0 | 9.4 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.2 |
| HCM 6th LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 1 | 1694 | 1 | 0 | 1302 |
| Future Vol, veh/h | 0 | 1 | 1694 | 1 | 0 | 1302 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 1 | 1841 | 1 | 0 | 1415 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 921 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 273 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 273 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 18.2 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 273 | - |
| HCM Lane V/C Ratio | - | - | 0.004 | - |
| HCM Control Delay (s) | - | - | 18.2 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0 | - |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 329 | 2 | 92 | 7 | 7 | 29 | 120 | 1470 | 2 | 8 | 1176 | 573 |
| Future Volume (veh/h) | 329 | 2 | 92 | 7 | 7 | 29 | 120 | 1470 | 2 | 8 | 1176 | 573 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 358 | 2 | 100 | 8 | 8 | 32 | 130 | 1598 | 2 | 9 | 1278 | 623 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 483 | 262 | 222 | 12 | 12 | 46 | 163 | 2087 | 3 | 20 | 1751 | 781 |
| Arrive On Green | 0.14 | 0.14 | 0.14 | 0.04 | 0.04 | 0.04 | 0.09 | 0.57 | 0.57 | 0.01 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 276 | 276 | 1105 | 1781 | 3642 | 5 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 358 | 2 | 100 | 48 | 0 | 0 | 130 | 780 | 820 | 9 | 1278 | 623 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1870 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1870 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 7.6 | 0.1 | 4.5 | 2.2 | 0.0 | 0.0 | 5.5 | 25.7 | 25.7 | 0.4 | 21.9 | 25.3 |
| Cycle Q Clear(g_c), s | 7.6 | 0.1 | 4.5 | 2.2 | 0.0 | 0.0 | 5.5 | 25.7 | 25.7 | 0.4 | 21.9 | 25.3 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 483 | 262 | 222 | 69 | 0 | 0 | 163 | 1018 | 1071 | 20 | 1751 | 781 |
| V/C Ratio(X) | 0.74 | 0.01 | 0.45 | 0.69 | 0.00 | 0.00 | 0.80 | 0.77 | 0.77 | 0.44 | 0.73 | 0.80 |
| Avail Cap(c_a), veh/h | 809 | 438 | 371 | 388 | 0 | 0 | 188 | 1018 | 1071 | 116 | 1751 | 781 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.7 | 28.5 | 30.4 | 36.4 | 0.0 | 0.0 | 34.2 | 12.5 | 12.5 | 37.8 | 15.5 | 16.3 |
| Incr Delay (d2), s/veh | 2.3 | 0.0 | 1.4 | 11.8 | 0.0 | 0.0 | 18.6 | 5.5 | 5.2 | 14.5 | 2.7 | 8.3 |
| 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 | 3.2 | 0.0 | 1.7 | 1.1 | 0.0 | 0.0 | 3.2 | 10.2 | 10.7 | 0.2 | 8.6 | 10.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.0 | 28.5 | 31.8 | 48.2 | 0.0 | 0.0 | 52.8 | 18.0 | 17.7 | 52.3 | 18.2 | 24.6 |
| LnGrp LOS | C | C | C | D | A | A | D | B | B | D | B | C |
| Approach Vol, veh/h | | 460 | | | 48 | | | 1730 | | | 1910 | |
| Approach Delay, s/veh | | 33.5 | | | 48.2 | | | 20.5 | | | 20.4 | |
| Approach LOS | | C | | | D | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 5.4 | 48.6 | | 15.3 | 11.6 | 42.4 | | 7.7 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 8.1 | 37.9 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 2.4 | 27.7 | | 9.6 | 7.5 | 27.3 | | 4.2 |
| Green Ext Time (p_c), s | 0.0 | 9.0 | | 1.1 | 0.0 | 7.8 | | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 22.2 |
| HCM 6th LOS | C |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 5 | 1828 | 0 | 0 | 1757 |
| Future Vol, veh/h | 0 | 5 | 1828 | 0 | 0 | 1757 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 5 | 1987 | 0 | 0 | 1910 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 994 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 244 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 244 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 20.1 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 244 | - |
| HCM Lane V/C Ratio | - | - | 0.022 | - |
| HCM Control Delay (s) | - | - | 20.1 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0.1 | - |

| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 402 | 8 | 109 | 12 | 82 | 1419 | 34 | 1054 | 312 |
| v/c Ratio | 0.62 | 0.02 | 0.28 | 0.08 | 0.48 | 0.65 | 0.28 | 0.55 | 0.31 |
| Control Delay | 33.0 | 26.6 | 7.7 | 25.9 | 45.3 | 13.8 | 42.7 | 14.7 | 2.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.0 | 26.6 | 7.7 | 25.9 | 45.3 | 13.8 | 42.7 | 14.7 | 2.7 |
| Queue Length 50th (ft) | 87 | 3 | 0 | 2 | 36 | 153 | 15 | 162 | 0 |
| Queue Length 95th (ft) | 152 | 16 | 39 | 19 | #102 | #467 | 49 | 314 | 45 |
| Internal Link Dist (ft) | | 316 | | 24 | | 461 | | 199 | |
| Turn Bay Length (ft) | 130 | | | | 110 | | | | |
| Base Capacity (vph) | 848 | 460 | 478 | 422 | 177 | 2175 | 121 | 1908 | 997 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.02 | 0.23 | 0.03 | 0.46 | 0.65 | 0.28 | 0.55 | 0.31 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 368 | 2 | 100 | 48 | 130 | 1600 | 9 | 1278 | 623 |
| v/c Ratio | 0.62 | 0.01 | 0.27 | 0.29 | 0.73 | 0.74 | 0.08 | 0.76 | 0.59 |
| Control Delay | 36.4 | 29.5 | 7.1 | 24.0 | 62.9 | 17.5 | 41.9 | 23.4 | 4.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 29.5 | 7.1 | 24.0 | 62.9 | 17.5 | 41.9 | 23.4 | 4.7 |
| Queue Length 50th (ft) | 94 | 1 | 0 | 8 | 70 | 309 | 5 | 304 | 10 |
| Queue Length 95th (ft) | 143 | 7 | 33 | 42 | #175 | #647 | 20 | #446 | 85 |
| Internal Link Dist (ft) | | 316 | | 52 | | 461 | | 199 | |
| Turn Bay Length (ft) | 130 | | | | 110 | | | | |
| Base Capacity (vph) | 772 | 419 | 445 | 403 | 179 | 2160 | 110 | 1676 | 1060 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.48 | 0.00 | 0.22 | 0.12 | 0.73 | 0.74 | 0.08 | 0.76 | 0.59 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# APPENDIX F

# LOYNES DRIVE ROAD DIET LOS CALCULATION WORKSHEETS

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project + Road Diet AM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.707 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 51 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Protected | | | Protected | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 2 0 | 0 | 0 0 | 2 0 | 1 | 2 0 | 0 0 | 2 | 0 0 | 0 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| Growth 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 |
| Initial Bse: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 78 | 1379 | 0 | 0 | 1044 | 299 | 385 | 0 | 104 | 0 | 0 | 0 |
| User 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 |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| PHF Volume: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 84 | 1483 | 0 | 0 | 1123 | 322 | 414 | 0 | 112 | 0 | 0 | 0 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.46 | 0.00 | 0.00 | 0.35 | 0.20 | 0.14 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| Crit Moves: | | **** | | **** | | | **** | | | | | |

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project + Road Diet PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.763 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 59 | Level Of Service: | C |

| Approach: | North Bound | | | | South Bound | | | | East Bound | | | | West Bound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | - T | - R | | L | - T | - R | | L | - T | - R | | L | - T | - R | |
| Control: | Protected | | | | Protected | | | | Protected | | | | Protected | | | |
| Rights: | Include | | | | Include | | | | Include | | | | Include | | | |
| Min. Green: | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Y+R: | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | |
| Lanes: | 1 | 0 2 | 0 | 0 | 0 | 0 2 | 0 | 1 | 2 | 0 | 0 | 0 2 | 0 | 0 | 0 | 0 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | | | | | |
| Base Vol: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| Growth 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 | | | | |
| Initial Bse: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Initial Fut: | 124 | 1575 | 0 | 0 | 1285 | 590 | 339 | 0 | 95 | 0 | 0 | 0 | | | | |
| User 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 | | | | |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | | | | |
| PHF Volume: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Reduced Vol: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| PCE 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 | | | | |
| MLF 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 | | | | |
| FinalVolume: | 135 | 1712 | 0 | 0 | 1397 | 641 | 368 | 0 | 103 | 0 | 0 | 0 | | | | |
| Saturation Flow Module: | | | | | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | | | | |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | |
| Lanes: | 1.00 | 2.00 | 0.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | | | | |
| Final Sat.: | 1600 | 3200 | 0 | 0 | 3200 | 1600 | 2880 | 0 | 3200 | 0 | 0 | 0 | | | | |
| Capacity Analysis Module: | | | | | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.53 | 0.00 | 0.00 | 0.44 | 0.40 | 0.13 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | | | | |
| Crit Moves: | | **** | | **** | | | **** | | | | | | | | | |

Long Beach Business Park
ULL1801
Project Build-Out (2020) + Project AM with Road Diet

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.726 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 54 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 1 | 0 | 1 0 | 2 0 | 1 | 1 1 | 0 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| Growth 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 |
| Initial Bse: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 78 | 1380 | 6 | 32 | 1044 | 299 | 385 | 7 | 104 | 2 | 2 | 7 |
| User 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 |
| PHF Adj: | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| PHF Volume: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 84 | 1484 | 6 | 34 | 1123 | 322 | 414 | 8 | 112 | 2 | 2 | 8 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 1.96 | 0.04 | 1.00 | 0.18 | 0.18 | 0.64 |
| Final Sat.: | 1600 | 3186 | 14 | 1600 | 3200 | 1600 | 3143 | 57 | 1600 | 291 | 291 | 1018 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.05 | 0.47 | 0.47 | 0.02 | 0.35 | 0.20 | 0.13 | 0.13 | 0.07 | 0.01 | 0.01 | 0.01 |
| Crit Moves: | | **** | | **** | | | | **** | | | | **** |

Long Beach Business Park
ULL1801
2020 Build-Out + Cumulative Project + Project + Road Diet PM

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Studebaker Rd/Loynes Dr

| | | | |
|---|---|---|---|
| Cycle (sec): | 100 | Critical Vol./Cap.(X): | 0.786 |
| Loss Time (sec): | 10 | Average Delay (sec/veh): | xxxxxx |
| Optimal Cycle: | 64 | Level Of Service: | C |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L - | T - | R | L - | T - | R | L - | T - | R | L - | T - | R |
| Control: | Protected | | | Protected | | | Split Phase | | | Split Phase | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Min. Green: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Y+R: | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Lanes: | 1 0 | 1 1 | 0 | 1 0 | 2 0 | 1 | 1 1 | 0 0 | 1 | 0 0 | 1! 0 | 0 |
| Volume Module: >> Count Date: 12 Sep 2018 << | | | | | | | | | | | | |
| Base Vol: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| Growth 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 |
| Initial Bse: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| Added Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Fut: | 124 | 1575 | 2 | 8 | 1285 | 590 | 339 | 2 | 95 | 7 | 7 | 29 |
| User 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 |
| PHF Adj: | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| PHF Volume: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| PCE 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 |
| MLF 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 |
| FinalVolume: | 135 | 1712 | 2 | 9 | 1397 | 641 | 368 | 2 | 103 | 8 | 8 | 32 |
| Saturation Flow Module: | | | | | | | | | | | | |
| Sat/Lane: | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 1.00 | 1.99 | 0.01 | 1.00 | 2.00 | 1.00 | 1.99 | 0.01 | 1.00 | 0.16 | 0.16 | 0.68 |
| Final Sat.: | 1600 | 3196 | 4 | 1600 | 3200 | 1600 | 3181 | 19 | 1600 | 260 | 260 | 1079 |
| Capacity Analysis Module: | | | | | | | | | | | | |
| Vol/Sat: | 0.08 | 0.54 | 0.54 | 0.01 | 0.44 | 0.40 | 0.12 | 0.12 | 0.06 | 0.03 | 0.03 | 0.03 |
| Crit Moves: | | **** | | **** | | | | **** | | | **** | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 385 | 104 | 78 | 1379 | 1044 | 299 |
| Future Volume (veh/h) | 385 | 104 | 78 | 1379 | 1044 | 299 |
| Number | 7 | 14 | 5 | 2 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h | 414 | 112 | 84 | 1483 | 1123 | 322 |
| Adj No. of Lanes | 2 | 1 | 1 | 2 | 2 | 1 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 618 | 284 | 121 | 2282 | 1730 | 774 |
| Arrive On Green | 0.18 | 0.18 | 0.07 | 0.64 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3442 | 1583 | 1774 | 3632 | 3632 | 1583 |
| Grp Volume(v), veh/h | 414 | 112 | 84 | 1483 | 1123 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1583 | 1774 | 1770 | 1770 | 1583 |
| Q Serve(g_s), s | 5.7 | 3.2 | 2.4 | 13.1 | 12.2 | 6.7 |
| Cycle Q Clear(g_c), s | 5.7 | 3.2 | 2.4 | 13.1 | 12.2 | 6.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 618 | 284 | 121 | 2282 | 1730 | 774 |
| V/C Ratio(X) | 0.67 | 0.39 | 0.70 | 0.65 | 0.65 | 0.42 |
| Avail Cap(c_a), veh/h | 1210 | 557 | 177 | 2282 | 1730 | 774 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.6 | 18.5 | 23.3 | 5.6 | 9.8 | 8.4 |
| Incr Delay (d2), s/veh | 1.3 | 0.9 | 7.0 | 1.5 | 1.9 | 1.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.8 | 3.0 | 1.4 | 6.6 | 6.2 | 7.3 |
| LnGrp Delay(d),s/veh | 20.9 | 19.4 | 30.3 | 7.0 | 11.7 | 10.0 |
| LnGrp LOS | C | B | C | A | B | B |
| Approach Vol, veh/h | 526 | | | 1567 | 1445 | |
| Approach Delay, s/veh | 20.6 | | | 8.3 | 11.3 | |
| Approach LOS | C | | | A | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | | 37.5 | | 13.7 | 8.0 | 29.5 | | |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 | | |
| Max Green Setting (Gmax), s | | 33.0 | | 18.0 | 5.1 | 23.4 | | |
| Max Q Clear Time (g_c+I1), s | | 15.1 | | 7.7 | 4.4 | 14.2 | | |
| Green Ext Time (p_c), s | | 10.7 | | 1.4 | 0.0 | 5.8 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 11.3 |
| HCM 2010 LOS | B |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 339 | 95 | 124 | 1575 | 1285 | 590 |
| Future Volume (veh/h) | 339 | 95 | 124 | 1575 | 1285 | 590 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | | | No | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 368 | 103 | 135 | 1712 | 1397 | 641 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 531 | 244 | 172 | 2487 | 1884 | 840 |
| Arrive On Green | 0.15 | 0.15 | 0.10 | 0.70 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3456 | 1585 | 1781 | 3647 | 3647 | 1585 |
| Grp Volume(v), veh/h | 368 | 103 | 135 | 1712 | 1397 | 641 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1585 | 1781 | 1777 | 1777 | 1585 |
| Q Serve(g_s), s | 6.2 | 3.6 | 4.6 | 17.1 | 18.7 | 19.6 |
| Cycle Q Clear(g_c), s | 6.2 | 3.6 | 4.6 | 17.1 | 18.7 | 19.6 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 1.00 |
| Lane Grp Cap(c), veh/h | 531 | 244 | 172 | 2487 | 1884 | 840 |
| V/C Ratio(X) | 0.69 | 0.42 | 0.79 | 0.69 | 0.74 | 0.76 |
| Avail Cap(c_a), veh/h | 1012 | 464 | 217 | 2487 | 1884 | 840 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.6 | 23.5 | 27.1 | 5.3 | 11.2 | 11.4 |
| Incr Delay (d2), s/veh | 1.6 | 1.2 | 13.7 | 1.6 | 2.7 | 6.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 0.1 | 2.5 | 4.3 | 6.6 | 7.0 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 26.3 | 24.7 | 40.8 | 6.9 | 13.8 | 17.9 |
| LnGrp LOS | C | C | D | A | B | B |
| Approach Vol, veh/h | 471 | | | 1847 | 2038 | |
| Approach Delay, s/veh | 25.9 | | | 9.4 | 15.1 | |
| Approach LOS | C | | | A | B | |

| Timer - Assigned Phs | | 2 | | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | | 47.5 | | 13.9 | 10.4 | 37.1 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | | 43.0 | | 18.0 | 7.5 | 31.0 |
| Max Q Clear Time (g_c+I1), s | | 19.1 | | 8.2 | 6.6 | 21.6 |
| Green Ext Time (p_c), s | | 15.2 | | 1.2 | 0.0 | 7.4 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 13.9 |
| HCM 6th LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 385 | 7 | 104 | 2 | 2 | 7 | 78 | 1380 | 6 | 32 | 1044 | 299 |
| Future Volume (veh/h) | 385 | 7 | 104 | 2 | 2 | 7 | 78 | 1380 | 6 | 32 | 1044 | 299 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 420 | 0 | 112 | 2 | 2 | 8 | 84 | 1484 | 6 | 34 | 1123 | 322 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 558 | 0 | 248 | 4 | 4 | 16 | 108 | 2005 | 8 | 60 | 1867 | 833 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.01 | 0.01 | 0.06 | 0.55 | 0.55 | 0.03 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3563 | 0 | 1585 | 276 | 276 | 1105 | 1781 | 3630 | 15 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 420 | 0 | 112 | 12 | 0 | 0 | 84 | 726 | 764 | 34 | 1123 | 322 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1868 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 8.4 | 0.0 | 4.8 | 0.5 | 0.0 | 0.0 | 3.5 | 23.0 | 23.0 | 1.4 | 16.3 | 9.0 |
| Cycle Q Clear(g_c), s | 8.4 | 0.0 | 4.8 | 0.5 | 0.0 | 0.0 | 3.5 | 23.0 | 23.0 | 1.4 | 16.3 | 9.0 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.01 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 558 | 0 | 248 | 24 | 0 | 0 | 108 | 981 | 1031 | 60 | 1867 | 833 |
| V/C Ratio(X) | 0.75 | 0.00 | 0.45 | 0.49 | 0.00 | 0.00 | 0.78 | 0.74 | 0.74 | 0.56 | 0.60 | 0.39 |
| Avail Cap(c_a), veh/h | 864 | 0 | 384 | 402 | 0 | 0 | 175 | 981 | 1031 | 120 | 1867 | 833 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.9 | 0.0 | 28.4 | 36.3 | 0.0 | 0.0 | 34.4 | 12.6 | 12.6 | 35.3 | 12.2 | 10.5 |
| Incr Delay (d2), s/veh | 2.1 | 0.0 | 1.3 | 14.4 | 0.0 | 0.0 | 11.2 | 5.0 | 4.8 | 7.9 | 1.4 | 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 | 3.6 | 0.0 | 1.8 | 0.3 | 0.0 | 0.0 | 1.8 | 9.2 | 9.6 | 0.7 | 6.1 | 3.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 32.0 | 0.0 | 29.7 | 50.7 | 0.0 | 0.0 | 45.6 | 17.6 | 17.4 | 43.3 | 13.7 | 11.8 |
| LnGrp LOS | C | A | C | D | A | A | D | B | B | D | B | B |
| Approach Vol, veh/h | | 532 | | | 12 | | | 1574 | | | 1479 | |
| Approach Delay, s/veh | | 31.5 | | | 50.7 | | | 19.0 | | | 13.9 | |
| Approach LOS | | C | | | D | | | B | | | B | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 7.0 | 45.5 | | 16.1 | 9.0 | 43.5 | | 5.6 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 7.3 | 38.7 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 3.4 | 25.0 | | 10.4 | 5.5 | 18.3 | | 2.5 |
| Green Ext Time (p_c), s | 0.0 | 9.5 | | 1.3 | 0.0 | 9.7 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 18.9 |
| HCM 6th LOS | B |

**Notes**

User approved volume balancing among the lanes for turning movement.

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 1 | 1771 | 1 | 0 | 1375 |
| Future Vol, veh/h | 0 | 1 | 1771 | 1 | 0 | 1375 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 1 | 1925 | 1 | 0 | 1495 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 963 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 256 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 256 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 19.1 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 256 | - |
| HCM Lane V/C Ratio | - | - | 0.004 | - |
| HCM Control Delay (s) | - | - | 19.1 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0 | - |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 339 | 2 | 95 | 7 | 7 | 29 | 124 | 1575 | 2 | 8 | 1285 | 590 |
| Future Volume (veh/h) | 339 | 2 | 95 | 7 | 7 | 29 | 124 | 1575 | 2 | 8 | 1285 | 590 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 369 | 0 | 103 | 8 | 8 | 32 | 135 | 1712 | 2 | 9 | 1397 | 641 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 499 | 0 | 222 | 11 | 11 | 46 | 169 | 2090 | 2 | 20 | 1743 | 778 |
| Arrive On Green | 0.14 | 0.00 | 0.14 | 0.04 | 0.04 | 0.04 | 0.09 | 0.57 | 0.57 | 0.01 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3563 | 0 | 1585 | 276 | 276 | 1105 | 1781 | 3642 | 4 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 369 | 0 | 103 | 48 | 0 | 0 | 135 | 835 | 879 | 9 | 1397 | 641 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1585 | 1658 | 0 | 0 | 1781 | 1777 | 1870 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 7.7 | 0.0 | 4.6 | 2.2 | 0.0 | 0.0 | 5.7 | 29.2 | 29.2 | 0.4 | 25.5 | 26.7 |
| Cycle Q Clear(g_c), s | 7.7 | 0.0 | 4.6 | 2.2 | 0.0 | 0.0 | 5.7 | 29.2 | 29.2 | 0.4 | 25.5 | 26.7 |
| Prop In Lane | 1.00 | | 1.00 | 0.17 | | 0.67 | 1.00 | | 0.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 499 | 0 | 222 | 69 | 0 | 0 | 169 | 1020 | 1073 | 20 | 1743 | 778 |
| V/C Ratio(X) | 0.74 | 0.00 | 0.46 | 0.70 | 0.00 | 0.00 | 0.80 | 0.82 | 0.82 | 0.44 | 0.80 | 0.82 |
| Avail Cap(c_a), veh/h | 830 | 0 | 369 | 386 | 0 | 0 | 187 | 1020 | 1073 | 115 | 1743 | 778 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.9 | 0.0 | 30.6 | 36.5 | 0.0 | 0.0 | 34.3 | 13.2 | 13.2 | 37.9 | 16.5 | 16.8 |
| Incr Delay (d2), s/veh | 2.2 | 0.0 | 1.5 | 11.9 | 0.0 | 0.0 | 19.8 | 7.3 | 7.0 | 14.5 | 4.0 | 9.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.4 | 0.0 | 1.8 | 1.1 | 0.0 | 0.0 | 3.3 | 12.0 | 12.5 | 0.2 | 10.2 | 10.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 34.0 | 0.0 | 32.1 | 48.4 | 0.0 | 0.0 | 54.0 | 20.5 | 20.2 | 52.5 | 20.5 | 26.5 |
| LnGrp LOS | C | A | C | D | A | A | D | C | C | D | C | C |
| Approach Vol, veh/h | | 472 | | | 48 | | | 1849 | | | 2047 | |
| Approach Delay, s/veh | | 33.6 | | | 48.4 | | | 22.8 | | | 22.5 | |
| Approach LOS | | C | | | D | | | C | | | C | |

| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 5.4 | 48.8 | | 15.3 | 11.8 | 42.4 | | 7.7 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 5.0 | 41.0 | | 18.0 | 8.1 | 37.9 | | 18.0 |
| Max Q Clear Time (g_c+I1), s | 2.4 | 31.2 | | 9.7 | 7.7 | 28.7 | | 4.2 |
| Green Ext Time (p_c), s | 0.0 | 7.5 | | 1.1 | 0.0 | 7.2 | | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 24.1 |
| HCM 6th LOS | C |

Notes

User approved volume balancing among the lanes for turning movement.

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 5 | 1943 | 0 | 0 | 1883 |
| Future Vol, veh/h | 0 | 5 | 1943 | 0 | 0 | 1883 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 5 | 2112 | 0 | 0 | 2047 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | - | 1056 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 6.94 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.32 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 222 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | - | 222 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 21.6 | 0 | 0 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | 222 | - |
| HCM Lane V/C Ratio | - | - | 0.024 | - |
| HCM Control Delay (s) | - | - | 21.6 | - |
| HCM Lane LOS | - | - | C | - |
| HCM 95th %tile Q(veh) | - | - | 0.1 | - |