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LOCAL MOBILITY ANALYSIS

2020 SEAWORLD MASTER PLAN

San Diego, California
June 10, 2022
PTS# 646353

LLG Ref. 3-19-3077

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EXECUTIVE SUMMARY

Linscott, Law & Greenspan, Engineers (LLG) has prepared this Local Mobility Analysis (LMA)Report for the 2020 SeaWorld Master Plan (hereby referred to as the "Project" or "2020 Master Plan"). The 2020 Master Plan contemplates that SeaWorld will remain a marine mammal theme park and does not include any new development of uses from those already proposed in the previous 2002 Master Plan. In addition, the proposed Project would update the 2002 Master Plan since many of the projects previously listed as "future projects" have now been completed, downsized, or are no longer anticipated.

Under the previous 2002 Master Plan, SeaWorld had projected an annual growth rate of 1.3 percent resulting in 4.4 million annual attendees by the Year 2020, and a Year 2020 traffic projection of 23,000 ADT with a maximum traffic generation envelope of 30,300 ADT. The analysis resulted in 18 significant transportation impacts.

However, traffic count data shows SeaWorld generated 12,205 ADT for the Year 2019, significantly less than the 23,000 ADT projected in 2002 for the Year 2020. Based on traffic count data, attendance trends, and SeaWorld's own attendance projections based on the AECOM and Themed Entertainment Association (TEA) Theme and Museum Index: The Global Attractions Attendance Report (the TEA study), growth from the 2020 Master Plan is projected to increase at 1.0 percent annually to result in 22,340 ADT by the Year 2040. This is less than the previous Year 2020 traffic projection of 23,000 ADT and significantly less than the maximum traffic generation envelope of 30,300 ADT, which was used as the basis for the previous traffic impact analysis.

Between the 10 years of traffic volume and attendance data collected prior to preparation of the previous 2002 Master Plan and the 18 years of traffic volume and attendance data collected since that time, over 28 years of historical daily traffic counts at the SeaWorld entry/exit points have shown that there is no statistical correlation between buildout of the SeaWorld Master Plan projects, attendance, and traffic volumes. Volumes have gone up and down, with an overall net decrease in trips between 2002 and 2019.

While Level of Service (LOS) analysis is no longer used to determine CEQA transportation impact significance, this report provides analysis evaluating the proposed Project under the thresholds used for the 2002 Master Plan EIR. As demonstrated in this report, the level of service analysis for the revised Project, would result in no new impacts (under the threshold used in the 2002 report) and in many cases, previously identified impacts would not occur.

Separately, the City still requires LOS analysis, among other criteria such as queuing and systemic safety, to determine whether a project would trigger traffic improvements, according the City's *Transportation Study Manual* (September 2020) which was adopted by City Council on November 9, 2020 as part of the Complete Communities: Mobility Choices program. Evaluation of the Project per the Local Mobility Analysis (LMA) guidelines in the *TSM* is also provided in this report.

Several network improvements have been completed in the study area to reduce congestion or improve traffic conditions off site, many of which are consistent with mitigation measures recommended in the previous 2002 Master Plan EIR, such as the W. Mission Bay Drive bridge.

Transportation impacts associated with the additional 6,295 ADT at 2040 buildout anticipated with the proposed 2020 Master Plan would be substantially less than those assessed in the previous 2002 Master Plan EIR. The analysis presented in this report demonstrates that there would be significant transportation impacts at two (2) intersections, three (3) street segments, and one (1) freeway on-ramp. These six (6) significant impacts were all identified in the 2002 Master Plan EIR and no new significant transportation impacts would result from revisions to the previously adopted 2002 Master Plan and no additional mitigation measures are required.

Although no longer considered significant under CEQA guidelines, SeaWorld will continue to provide a parking monitoring program to time parking supply improvements.

Additionally, off-site improvements were identified based on *TSM* criteria including three (3) intersection hotspots based on systemic safety review, signal timing improvements at one (1) intersection, turn pocket extensions at one (1) intersection, and three (3) street segments. SeaWorld will also provide active transportation (pedestrian, bicycle, and transit) improvements consistent with *TSM* guidelines.

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LOCAL MOBILITY ANALYSIS

2020 SEAWORLD MASTER PLAN

San Diego, California
June 10, 2022

1.0 INTRODUCTION

Linscott, Law & Greenspan, Engineers (LLG) has prepared this Local Mobility Analysis (LMA) Report for the 2020 SeaWorld Master Plan (hereby referred to as the "Project" or "2020 Master Plan"). The 2020 Master Plan contemplates that SeaWorld will remain a marine mammal theme park and does not include any new uses different from those already proposed in the approved 2002 Master Plan. In addition, the proposed Project would update the 2002 Master Plan since many of the projects previously listed as "future projects" have now been completed, downsized, or are no longer anticipated. A detailed description of the Project is included in Project description section of this report.

This report provides analysis to determine the significant transportation impacts caused by the Project consistent with the 2002 Master Plan EIR. This report also includes an LMA to evaluate the effects of the Project on mobility, access, circulation, and related safety elements in the proximate area of the Project per the City of San Diego's *Transportation Study Manual* (*TSM,* September 2020). While Level of Service (LOS) analysis is not used to determine CEQA transportation impacts in the *TSM*, the City still uses LOS to determine the need for traffic improvements triggered by the Project in the LMA framework.

In addition to the vehicular mode analyses, the multi-modal network in the influence of the Project study area was also reviewed. This included Pedestrian, Bicycle, and Transit mobility. Collectively, vehicular mobility combined with multi-modal networks were reviewed to help promote local and regional mobility without auto-dependency.

The report is organized as follows:

Section 1.0	Introduction
Section 2.0	Project Description
Section 3.0	Study Area, Analysis Approach & Methodology
Section 4.0	Existing Conditions Discussion
Section 5.0	Significance Criteria
Section 6.0	Analysis of Existing Conditions
Section 7.0	Trip Generation, Distribution & Assignment
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Section 12.0 Pedestrian Mobility
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Section 14.0 Transit Mobility
Section 15.0 Intelligent Transportation Systems (ITS)
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Section 17.0 Entry/Exit Operations
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Section 19.0 Significance of Impacts, Mitigation Measures, & Recommendations

2.0 Project Description

2.1 Project Location

SeaWorld San Diego (SeaWorld) is located along the south perimeter of Mission Bay Park in a commercial-oriented recreation area, as set forth in the Mission Bay Park Master Plan (MBPMP). The south and west boundaries are defined by SeaWorld Drive, Perez Cove Way, and Ingraham Street. To the south beyond SeaWorld Drive is the West Mission Bay Drive/Sunset Cliffs Boulevard/SeaWorld Drive interchange system and the San Diego River. To the east of West Mission Bay Drive is the Quivira Basin commercial recreation area. The eastern boundary of the SeaWorld site extends to South Shores Park Road, which provides access to a boat launch. The northern boundary of the SeaWorld leasehold generally conforms to the Mission Bay shoreline, except on the west side of the park where 17 acres of open water area for the SeaWorld Marina, Waterfront Stadium, and Bayside Skyride are included in the leasehold. To the north lies Fiesta Island, which forms the northern boundary of the South Pacific Passage, and the open waters of Mission Bay Park.

SeaWorld is located within a 2035 Transit Priority Area (TPA). TPAs are defined in California Senate Bill 743 as areas located within one-half mile from a major transit stop that is either existing or planned, if the planned "major transit stop" is scheduled to be completed within the planning horizon included in the SANDAG Regional Transportation Improvement Program. A "major transit stop" is defined in the California Public Resources Code 21064.3 as "a site containing an existing rail station, ferry terminal served by either bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods." SeaWorld is currently served by MTS Route 9 buses which typically arrive at a 20-minute frequency Monday-Saturday and 30-minute frequency on Sundays. Route 9 connects to the Old Town Transit Center thus providing regional access via the trolley system. See *Section 14.0* of this report for a detailed discussion of Route 9 service, frequency, and hours of operation.

Figure 2–1 shows the Project Vicinity Map. ***Figure 2–2*** shows a more proximate location of the Project illustrated in the Project Area Map. ***Figure 2–3*** shows the existing SeaWorld facilities and site map.

2.2 Project Description

2.2.1 *Background*

The purpose of the proposed 2020 Master Plan is to set forth the long-range conceptual development program, development parameters, and Project review procedures for the future renovation of the entire leasehold area for SeaWorld for the next 20 to 25 years. The proposed 2020 Master Plan serves as the "Development Plan" described in the lease between SeaWorld and the City of San Diego. The proposed 2020 Master Plan is also part of the City's Local Coastal Program for Mission Bay Park. An important goal of the proposed 2020 Master Plan is to transition from a "site-specific" development paradigm to an "area-specific" development paradigm that more closely matches SeaWorld's future renovation needs. In meeting this goal, the objectives are (1) to maintain the same level of environmental and coastal resource protection provided under the 2002 Master Plan, (2) to ensure that the concerns identified in the community outreach process continue to be addressed, and (3) to address any new environmental concerns identified in the environmental document for the proposed 2020 Master Plan. These objectives are based on experience gained under the 2002 Master Plan, which has served to minimize visual and other environmental impacts. Site-specific projects completed under the previous 2002 Master Plan include the Journey to Atlantis splashdown ride, an educational facility, and a front gate renovation. All other projects have been approved under the 2002 Master Plan's general development criteria.

The SeaWorld Master Plan is an addendum to and incorporated into the MBPMP in 2002. The MBPMP is managed by the Mission Bay Park Committee, who advise the Park and Recreation Board on the development, utilization, and policies regarding Mission Bay Park. The MBPMP is the City's Community Plan for Mission Bay Park and the City and Coastal Commission certified Local Coastal Program (LCP) Land Use Plan (LUP) for Mission Bay Park pursuant to the Coastal Act. The Fiesta Island Amendment to the MBPMP to modify land uses in the southwestern portion of the island focusing on the off-leash dog area was adopted by City Council on June 17, 2019. The De Anza Cove Amendment to the MBPMP proposes to reimagine, repurpose, and revitalize the northeast corner of Mission Bay Park. The City of San Diego released an updated proposal for the redevelopment of De Anza Cove in January 2022 and is currently soliciting initial public input. While De Anza Cove Amendment has yet to be finalized, given its location relative to SeaWorld and study area analyzed in this report, it would not be expected to substantially affect any conclusions with respect to traffic conditions or operations as presented in this report.

The City Council approvals required as part of the 2020 Master Plan process are a Community Plan Amendment, an LCP/LUP Amendment, and a new Development Plan for the lease. For any SeaWorld Master Plan approved by City Council to be effective, the Coastal Commission must certify it is consistent with the applicable Coastal Act Chapter 3 Coastal Resources Planning and Management Policies.

2.2.2 *2020 Master Plan Projects*

The proposed 2020 Master Plan is intended to guide development, redevelopment, and expansion throughout the SeaWorld leasehold area. Accordingly, the proposed 2020 Master Plan contains land use and development criteria for the entire leasehold and retains the five (5) planning areas that were established in the previous 2002 Master Plan. Planning area boundaries are shown in ***Figure 2–4, Planning Area Boundaries.*** The planning areas are identified below:

Area 1: SeaWorld Theme Park

The SeaWorld Theme Park area is developed with a variety of marine-related attractions and support facilities. Future allowed uses in Area 1 may include the following:

- Aquariums
- Special- effects theaters
- Land-based adventure rides
- Pelagic fish exhibits (large fish)
- Water play attractions
- Themed track or water rides

- Special format projection attractions
- Playgrounds
- Performance venues
- Boat rides
- Historic reenactment presentations
- Research facilities
- Animal habitat
- Rescue conservation/ wildlife rehabilitation facilities
- Special event centers and facilities
- Educational facilities
- Culinary facilities
- Gifts shops
- Restrooms
- Support facilities
- Multi-media facilities
- Surface parking and access ways
- Other uses consistent with the intent and purpose of this 2020 Master Plan as determined by the City and the CCC during review of any project Coastal Development Permit application

Area 2: Guest Parking

Future allowed uses in Area 2 may include surface parking, temporary events and associated structures, outdoor educational activities, and operations yards. Reconfiguration and restriping of surface parking shall be allowed in response to operational needs. SeaWorld is committed to working with San Diego Metropolitan Transit System (MTS) to accommodate a new transit station by providing reasonable right-of-way within the Area 2 parking lot and a limited financial contribution for siting, design, installation, and construction per the terms of the SeaWorld Lease (Article XXXII [I]), when the opportunity arises.

Area 3: Administration and Support

Future allowed uses in Area 3 may include offices, water treatment, storage, maintenance, parking, and similar types of theme park support facilities.

Area 4: SeaWorld Marina

Future allowed uses in Area 4 may include marina operations, boat mooring, boat storage, dry storage facilities, boat loading, restrooms, lounge facilities, bayside café, and parking. As provided in the previous 2002 Master Plan, the proposed 2020 Master Plan proposes a future expansion of the existing marina by extending the three existing docks and adding a fourth dock to the west. The marina expansion would add 115 water berths for a total of 315 berths. This entitlement has been carried forward in the proposed 2020 Master Plan as a future conceptual development.

Area 5: Perez Cove Shoreline

Future allowed uses in Area 5 may include parking, a hotel, including associated ancillary commercial uses, research and meeting facilities, and parkland. As provided in the 2002 Master

Plan, the 2020 Master Plan includes a future 300-room hotel (see ***Figure 2–5, Conceptual Hotel and Marina Site Plan***). The conceptual proposal includes a ballroom, meeting rooms, surface parking, and a parking structure. A small landing dock for hotel guests will be built in the Perez Cove Shoreline directly behind the hotel. Additional access from the shoreline to the marina docks will be provided on the north side of the site.

2.2.3 *Attendance Trends*

The previous 2002 Master Plan EIR Traffic Study evaluated a 10-year period of attendance trends (1990 – 2000) and concluded that no measurable increase in attendance was observed. During that period, new rides and attractions were implemented which showed that rides and attractions alone are not the primary cause in increasing park attendance. A review of the historical daily traffic counts at the SeaWorld entrance/exit points at that time did not provide a clear correlation to new shows or attractions. The purpose of comparing the implementation of rides and attractions to attendance and daily traffic volumes is that it illustrates that it does not appear that a new ride or attraction directly increases attendance, which in turn would directly increase SeaWorld traffic. Changes in consumer preferences require the ability to shift priorities within a short timeframe, and to maintain long-term economic viability SeaWorld must continue to improve and provide facilities that meet the public's needs and desires.

With the adoption of the previous 2002 Master Plan, SeaWorld was required to perform annual monitoring of daily traffic volumes at the SeaWorld entrance. The purpose of this monitoring program was to ensure that traffic mitigation measures would be implemented as significance thresholds were reached. These 17 years of monitoring (2002 – 2018) resulted in the completion of several of the previous 2002 Master Plan projects and traffic mitigation measures. Annual daily traffic volumes have been up and down, with an overall net decrease between 2002 and 2019, as shown in ***Figure 2–6, Historical SeaWorld Trip Generation***. The data collected since the previous 2002 Master Plan adoption confirms the original study findings that there is no direct correlation between rides and attractions and SeaWorld attendance. As shown in the graph on *Figure 2–6*, the previous 2002 Master Plan started with a baseline of 15,000 ADT and projected a maximum traffic generation envelope of 30,300 ADT. Growth within the 20-year period was forecast to reach 23,000 ADT by Year 2020 using a compound average annual growth rate of 1.3 percent based on attendance data sourced to SeaWorld at that time. However, the current 2019 traffic counts show Sea World generates approximately 12,205 ADT. Further details on the historical and current trip generation are provided in *Section 6.0* of this report.

To forecast future attendance and traffic volumes for the 2040 horizon year for the proposed 2020 Master Plan, a general increase in attendance was used based on statistical research. The Themed Entertainment Association (TEA) prepares an annual attendance study for the themed entertainment and museum industries. The most recent approved 2018 study found that on average, a 2 percent compound average annual growth rate in attendance was observed among the 20 largest theme parks in North America between 2007 – 2017. For purposes of this study, SeaWorld assumes a one percent compound average growth rate in attendance which is 50 percent of the 10-year compound average growth rate in attendance of the 20 largest theme parks in North America from 2007-2017 per data from AECOM and TEA Theme and Museum Index: The Global Attractions Attendance Report.

This one percent attendance growth rate was included in SeaWorld's 2020 Financial Goal presentation to investors on August 6, 2018.

For purposes of projecting future traffic volumes using the historical average from the TEA study, a one percent annual increase in SeaWorld traffic generation will be applied to baseline traffic counts collected at the SeaWorld entrance.

Appendix A contains a copy of the 2018 TEA study and the 2020 Financial Goal presentation.

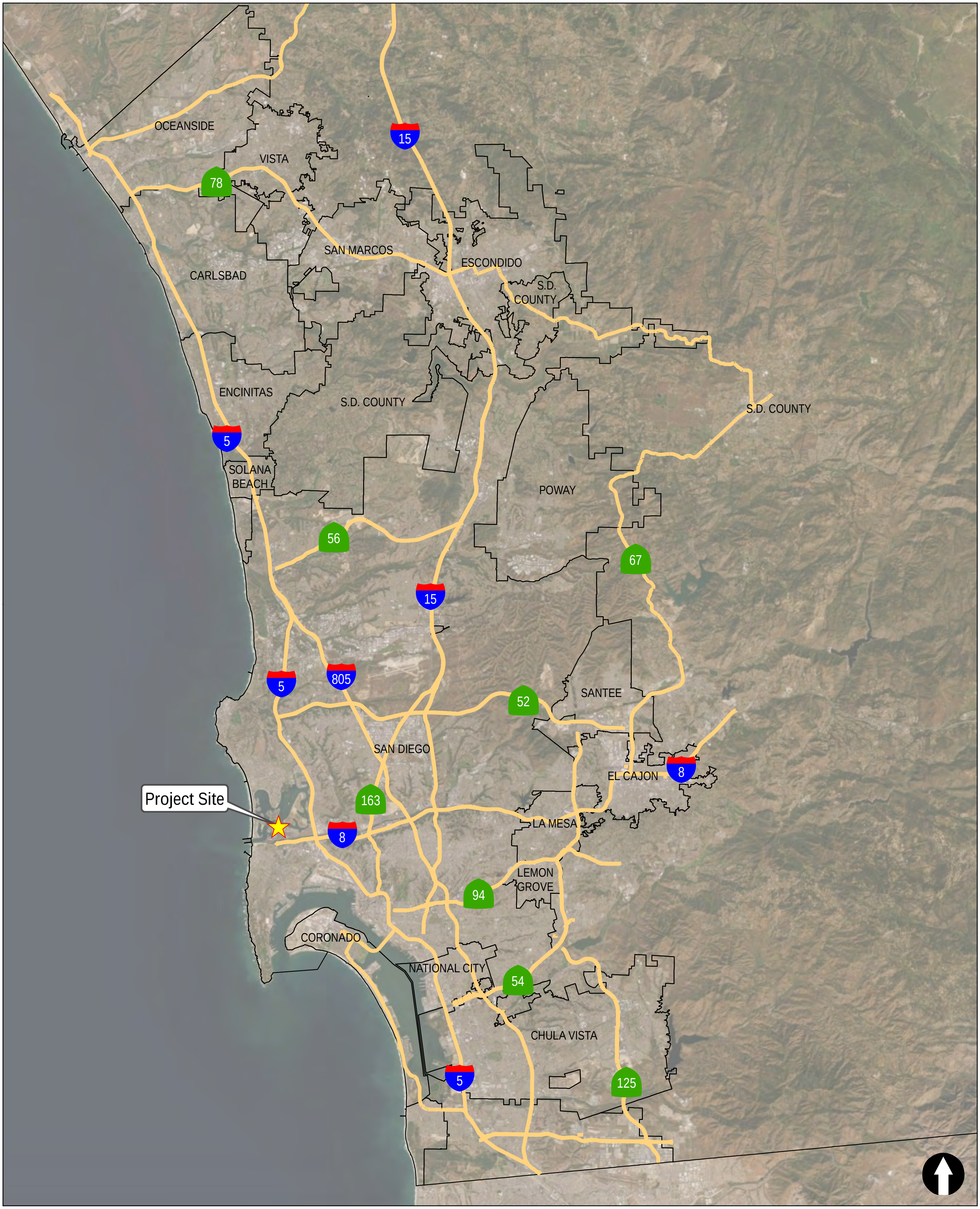

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Figure 2-1

Vicinity Map

2020 SeaWorld Master Plan

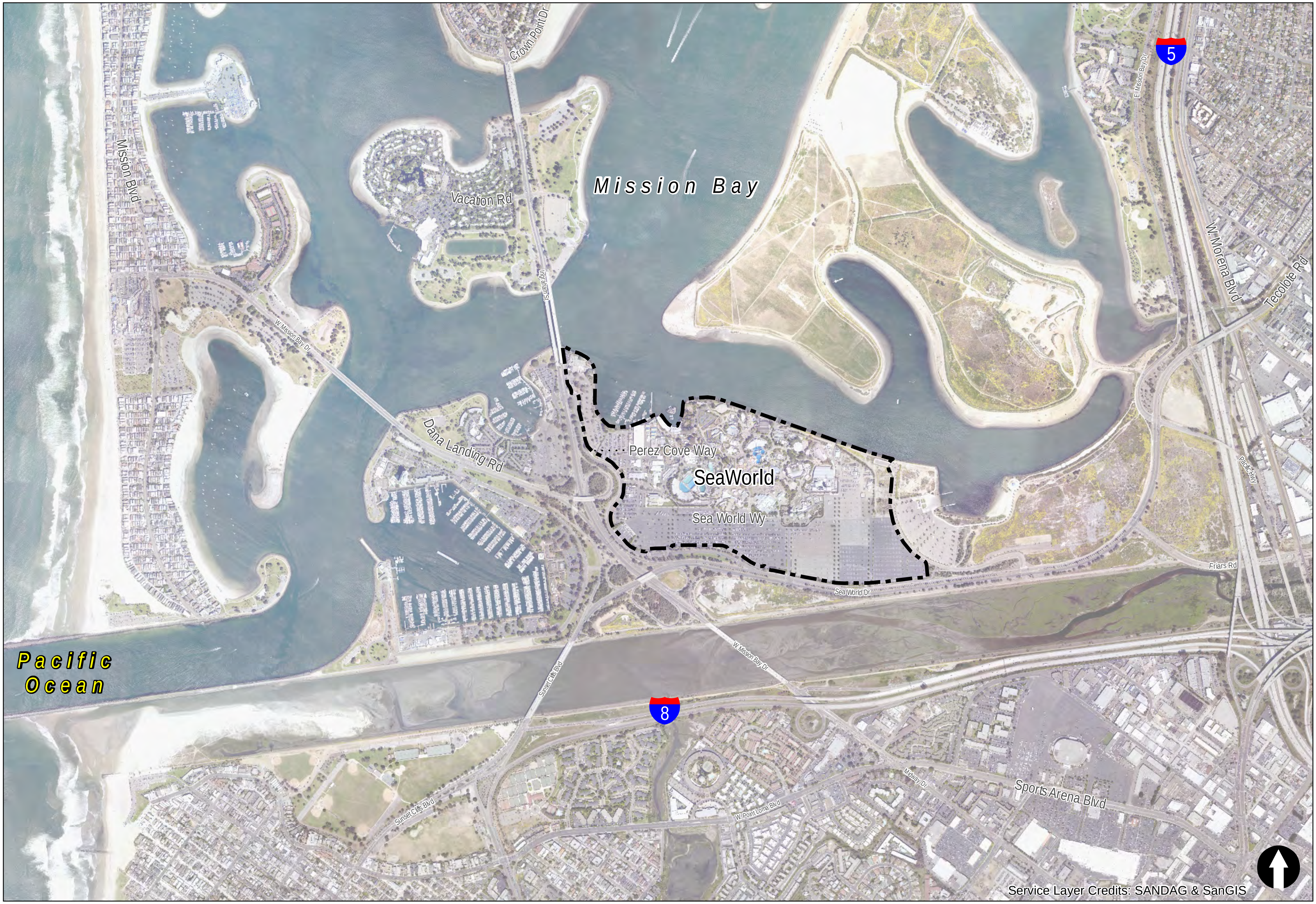

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Figure 2-2
Project Area Map

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Figure 2-3
Existing SeaWorld Facilities and Site Map

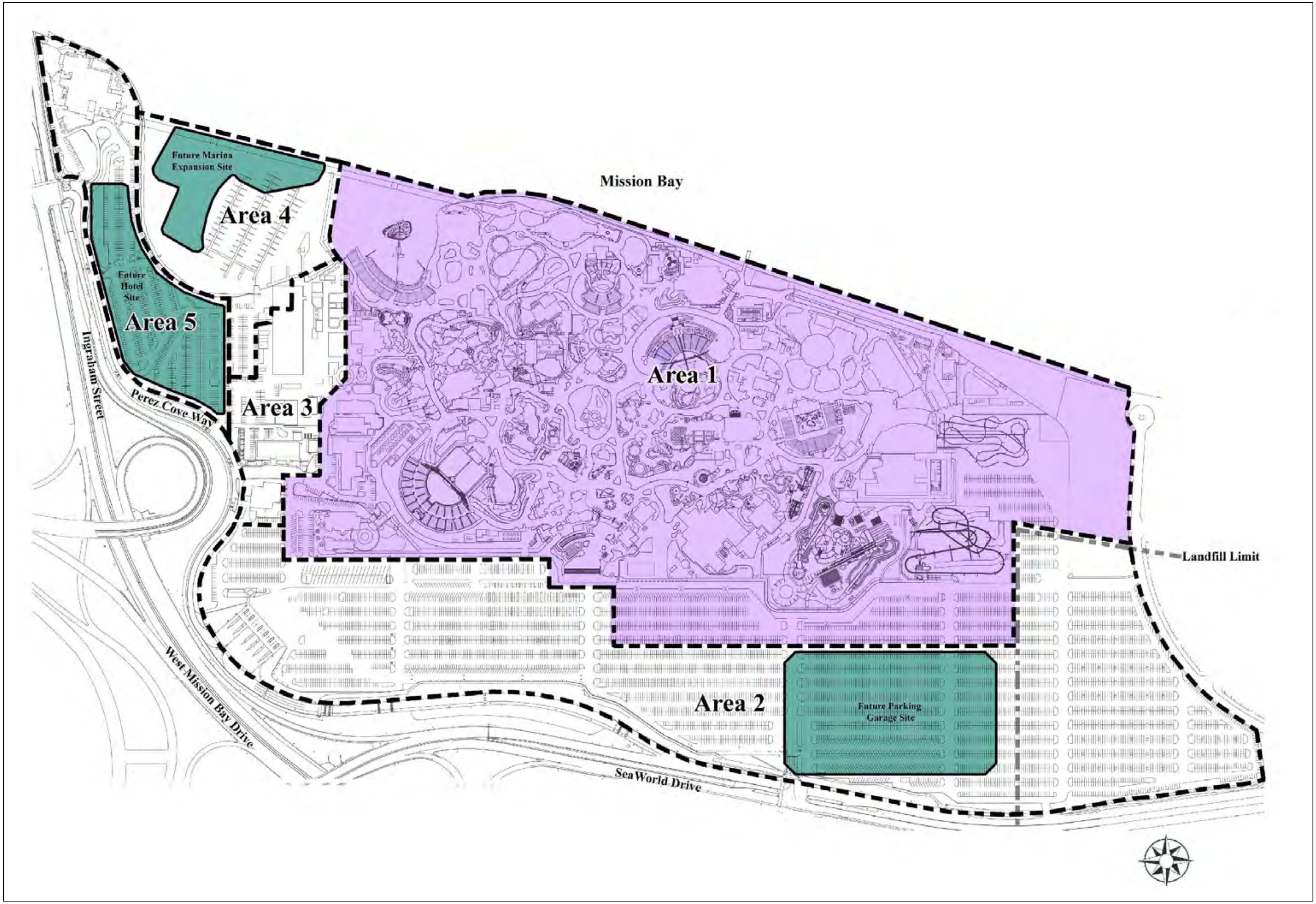

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Figure 2-4
Planning Area Boundaries

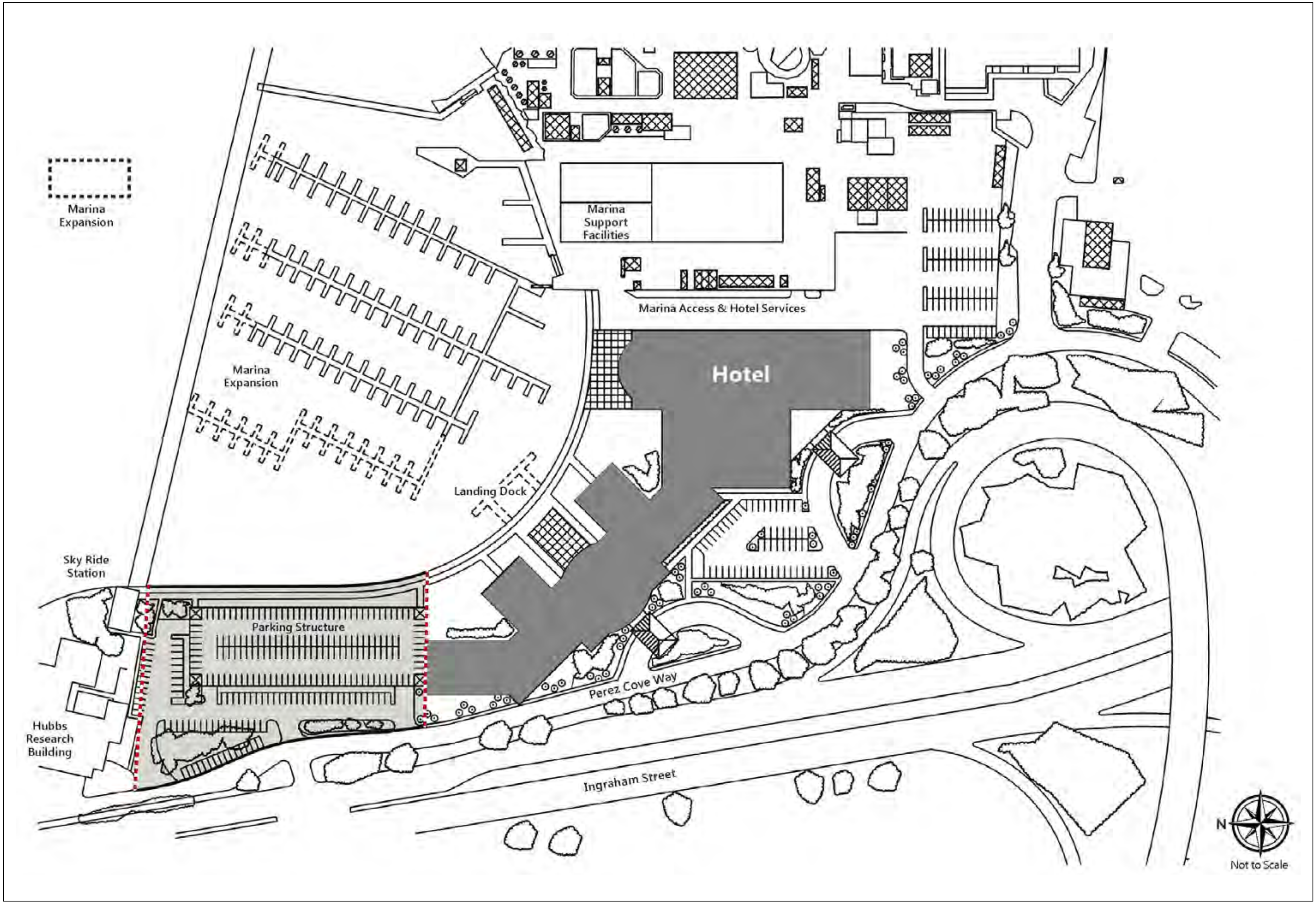
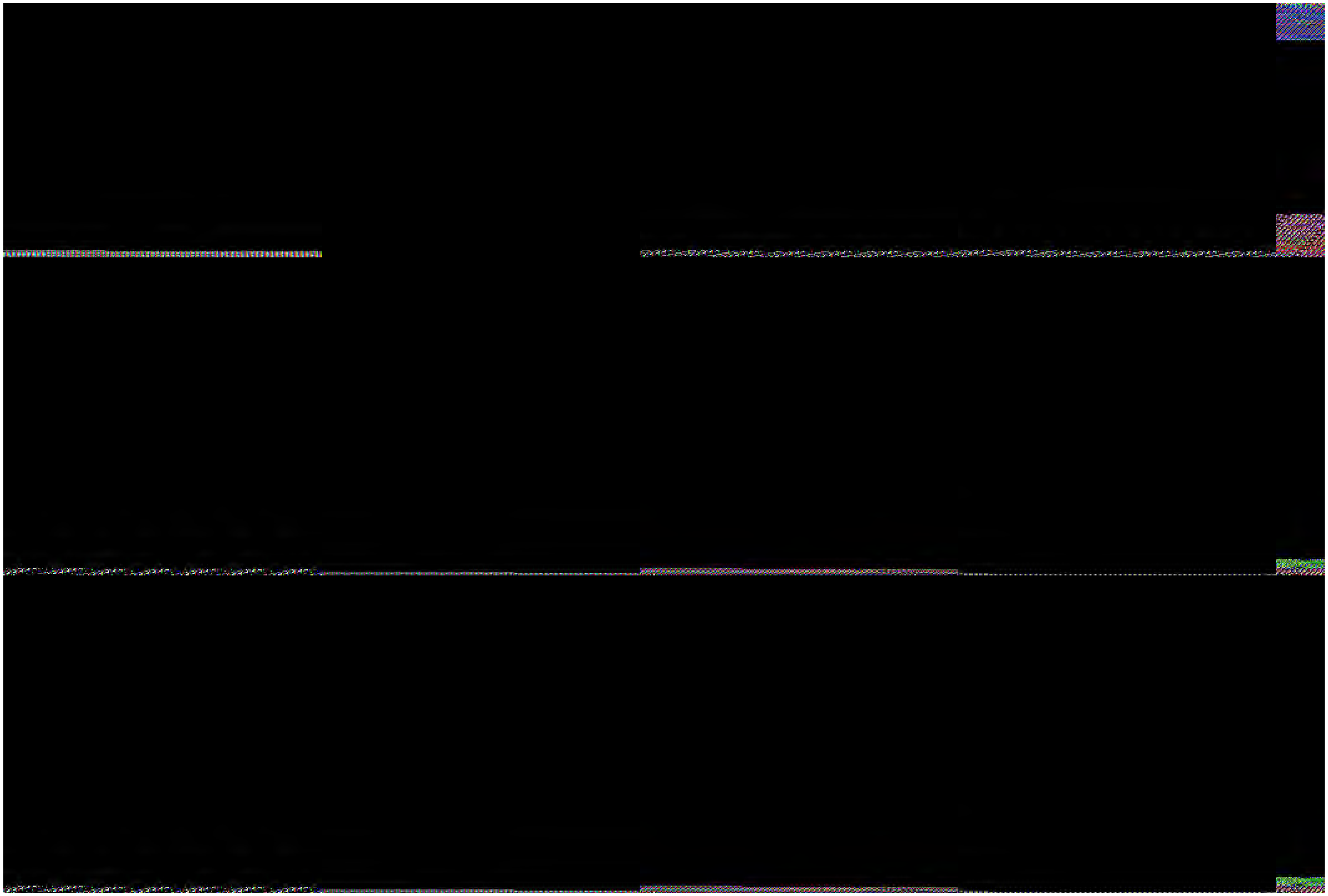


Figure 2-5

Conceptual Hotel and Marina Site Plan



Notes:
- Master Plan Traffic Baseline represents the SeaWorld trip generation in the Year 2000. The trip generation was based on traffic counts counted in June/July 2000.
- Master Plan CEQA Traffic Envelope represents the SeaWorld Traffic projects, Resort Hotel, and Marina Expansion in the Year 2020. This traffic envelope was used to determine traffic impacts in the 2002 Master Plan EIR.
- SeaWorld Traffic Projection represents the estimated trip generation the Year 2020 (without the planned hotel or marina expansion.
- SeaWorld Historical ADT represents SeaWorld's historical trip generation based on MMRP traffic counts.
- U.S. recessions indicated in grayscale. (Early 2000s recession Mar. 2001 - Nov. 2001 and Great Recession Dec. 2007 - June 2009.)

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Figure 2-6
Historical SeaWorld Trip Generation

3.0 EXISTING CONDITIONS

Effective evaluation of the traffic impacts associated with the 2020 Master Plan requires an understanding of the existing transportation system within the Project area. ***Figure 3–1*** shows an existing conditions diagram, including signalized intersections and lane configurations within the Project study area.

3.1 Existing Roadway Conditions

The following is a description of the existing street network in the study area.

SeaWorld Drive is currently built as a five-lane roadway from Interstate 5 (I-5) to Pacific Highway with two (2) lanes traveling in the northeast direction to I-5 and three (3) in the southwest direction to Pacific Highway and functions as a Five-Lane Major Arterial.

From Pacific Highway to SeaWorld Way two lanes eastbound and two lanes westbound are provided. From Pacific Highway to Friars Road the roadway is divided by a wide center striped median and from Friars Road to SeaWorld Way by a raised median. Both segments function as a Four-Lane Major Arterial due to the observed traffic levels and operations and lack of on-street parking or land uses fronting the roadway.

From SeaWorld Way to West Mission Bay Drive, SeaWorld Drive functions as a Five-Lane Major Arterial. The posted speed limit is 40 mph from I-5 to Friars Road and 55 mph from Friars Road to W. Mission Bay Drive. On-street parking is prohibited on either side of Sea World Drive. Class II Bike lanes are provided on both sides of the street and there are no sidewalks on either side of the street. Bus stops are not provided on SeaWorld Drive.

Pacific Highway is currently built as a two-lane roadway from Sea World Drive to I-5 and functions as a Two-Lane Collector Road. It has a total of two lanes of travel with one east bound and one westbound. The posted speed limit is 45 mph and on street parking is prohibited from Sea World Drive to I-5. Class II Bike lanes are provided on both sides of the street and there are no sidewalks on either side of the street. Bus stops are not provided on Pacific Highway.

Friars Road is currently built as a four-lane roadway from Pacific Highway to Sea World Drive and functions as a Four-Lane Major Arterial. It has a total of four lanes of travel with two east bound and two westbound, separated by a wide striped center median. The posted speed limit is 45 mph and on-street parking is prohibited within the study area. There are no sidewalks on either side of Friars for approximately 600 feet and 700 feet south of Sea World Drive, on the north and south sides of the street. After 600 and 700 feet, sidewalks are provided on both sides of the street. A two-way cycle track exists on the south side of Friars Road and a Class II bicycle lane is provided on the north side of the street. Bus stops are not provided on either side of the street.

West Mission Bay Drive is currently built as a four-lane roadway from Dana Landing Road to Ingraham Street and functions as a Four-Lane Major Arterial. It generally has two travel lanes in each direction separated by a raised median. From Ingraham to SeaWorld Drive and from I-8 Ramps to Sports Arena Boulevard, it is currently built as a six-lane roadway and functions as a Six-Lane

Primary Arterial. The posted speed limit is 45 mph and on-street parking is prohibited within study area. Sidewalks are provided on both sides of the street from Sports Arena Boulevard to the end of W. Mission Bay Drive Bridge. Bus stops and bike lanes are not provided on either side of the street. The W. Mission Bay Drive Bridge is currently under construction to widen SeaWorld Drive to Interstate 8 (I-8) to six (6) lanes. A more detailed discussion of the bridge widening is provided below in *Section 3.1.1*.

Perez Cove Way is generally a three-lane collector roadway from Ingraham Street to Sea World Drive. This road begins at Ingraham Street with two (2) northbound travel lanes and one (1) south bound travel lane. After 500 feet, the road transitions into one (1) northbound travel lane and two (2) south bound travel lane. This road serves as an access road to SeaWorld's main entrance. The posted limit is 25 mph within the project area. A two-way cycle track exists on the west side of Perez Cove Way and sidewalks are generally on both sides of the street. There is a bus stop at the beginning of Perez Cove Way on the north side.

Ingraham Street is currently built as a four-lane roadway from Crown Point Drive to West Mission Bay Drive and functions as a Four-Lane Major Arterial. It has two travel lanes in each direction separated by a raised median. The posted speed limit is 45 mph and on-street parking is prohibited on either side of the street. Sidewalks and Class II Bike Lanes exists on both sides of the streets. Bus stops are provided on the northbound and southbound direction of Ingraham Street.

Sunset Cliffs Boulevard is currently built as a four-lane roadway from West Mission Bay Drive to Nimitz Boulevard and functions as a Four-Lane Major Arterial. The posted speed limit is 45 mph and on-street parking is prohibited on either side of the street. There are sidewalks generally on both sides of the streets. Bus stops and bike lanes are not provided on either side of the street.

3.1.1 *West Mission Bay Drive Bridge Replacement Project*

At the time this report was prepared, the West Mission Bay Drive Bridge Replacement Project was under construction with an expected completion date of Mid-Year 2022. The bridge project is identified in the City's Capital Improvements Program (CIP) Project No. S-00871 (previously Project No. 52-643) and is currently widening the West Mission Bay Drive Bridge to six (6) lanes and widening southbound West Mission Bay Drive to three (3) lanes between the bridge and the I-8 Eastbound On-Ramp. In conducting the operational analysis in this report, the four-lane condition was assumed in the existing analysis, while the six-lane improvements were assumed to be completed and included in the near-term (2025) and long-term (2040) analyses.

It should be noted the bridge widening is being constructed using a technique that allows for normal operation of the existing four-lane bridge. Further details on the CIP project are included in *Section 8.2* of this report.

3.2 Existing Vehicular Traffic Volumes

Weekday summer existing traffic volumes were obtained during the peak summer months, when park attendance is at its highest. 24-hour daily street segment counts were conducted over a three-day period, Tuesday through Thursday August 6th, 7th, and 8th, 2019. The three-day average volumes during the three days were used in the analysis. Intersection counts were conducted on Wednesday August 14th, 2019, during the 7:00-9:00AM and 4:00-6:00PM peak hour periods.

Additional ADT tube counts were collected at SeaWorld entrances and exits to establish existing SeaWorld trip generation. Counts for trip generation purposes were collected over a two-week period in August 2019, when attendance is at its highest during the year. Trip generation counts are discussed in greater detail beginning in *Section 6.1*.

Freeway ADT volumes were taken from the most recently available Caltrans Traffic Census data, Year 2018 and grown to Year 2019 volumes using five years of historical Caltrans traffic volume data. The peak hour traffic volumes at the freeway ramps were derived from the ramp peak hour intersection turning movement counts conducted by LLG. Ramp volumes were validated against those provided directly by Caltrans and from the Caltrans Performance Measurement System (PeMS).

Table 3–1 is a summary of daily traffic volumes used in the analysis. ***Figure 3–2*** shows the Existing Traffic Volumes for intersections, street segments, and freeways. ***Appendix B*** contains the raw traffic count data.

TABLE 3–1
EXISTING TRAFFIC VOLUMES

Street Segment	ADT [a]	Date [b]	Source
SeaWorld Drive			
1. I-5 Ramps to Pacific Highway	39,140	August 6-8, 2019	LLG
2. Pacific Highway to Friars Road	34,630	August 6-8, 2019	LLG
3. Friars Road to SeaWorld Way	38,830	August 6-8, 2019	LLG
4. SeaWorld Way to W. Mission Bay Drive	38,670	August 6-8, 2019	LLG
Friars Road			
5. Pacific Highway to SeaWorld Drive	13,360	August 6-8, 2019	LLG
West Mission Bay Drive			
6. Dana Landing Road to Ingraham Street	38,380	August 6-8, 2019	LLG
7. Ingraham Street to SeaWorld Drive	71,570	August 6-8, 2019	LLG
8. SeaWorld Drive to I-8 Ramps (bridge)	56,900	August 6-8, 2019	LLG
9. I-8 Ramps to Sports Arena Boulevard	35,990	August 6-8, 2019	LLG
Perez Cove Way			
10. Ingraham Street to SeaWorld Main Entrance	7,600	August 6-8, 2019	LLG
11. SeaWorld Main Entrance to SeaWorld Drive	2,320	August 6-8, 2019	LLG
Ingraham Street			
12. Crown Point Drive to Vacation Road	36,470	August 6-8, 2019	LLG
13. Vacation Road to Perez Cove Way (bridge)	39,330	August 6-8, 2019	LLG
14. Perez Cove Way to W. Mission Bay Drive	50,170	August 6-8, 2019	LLG
Sunset Cliffs Boulevard			
15. W. Mission Bay Drive to I-8 Ramps (bridge)	37,560	August 6-8, 2019	LLG
16. I-8 Ramps to Nimitz Boulevard/ W. Point Loma Boulevard	39,610	August 6-8, 2019	LLG

Footnotes:

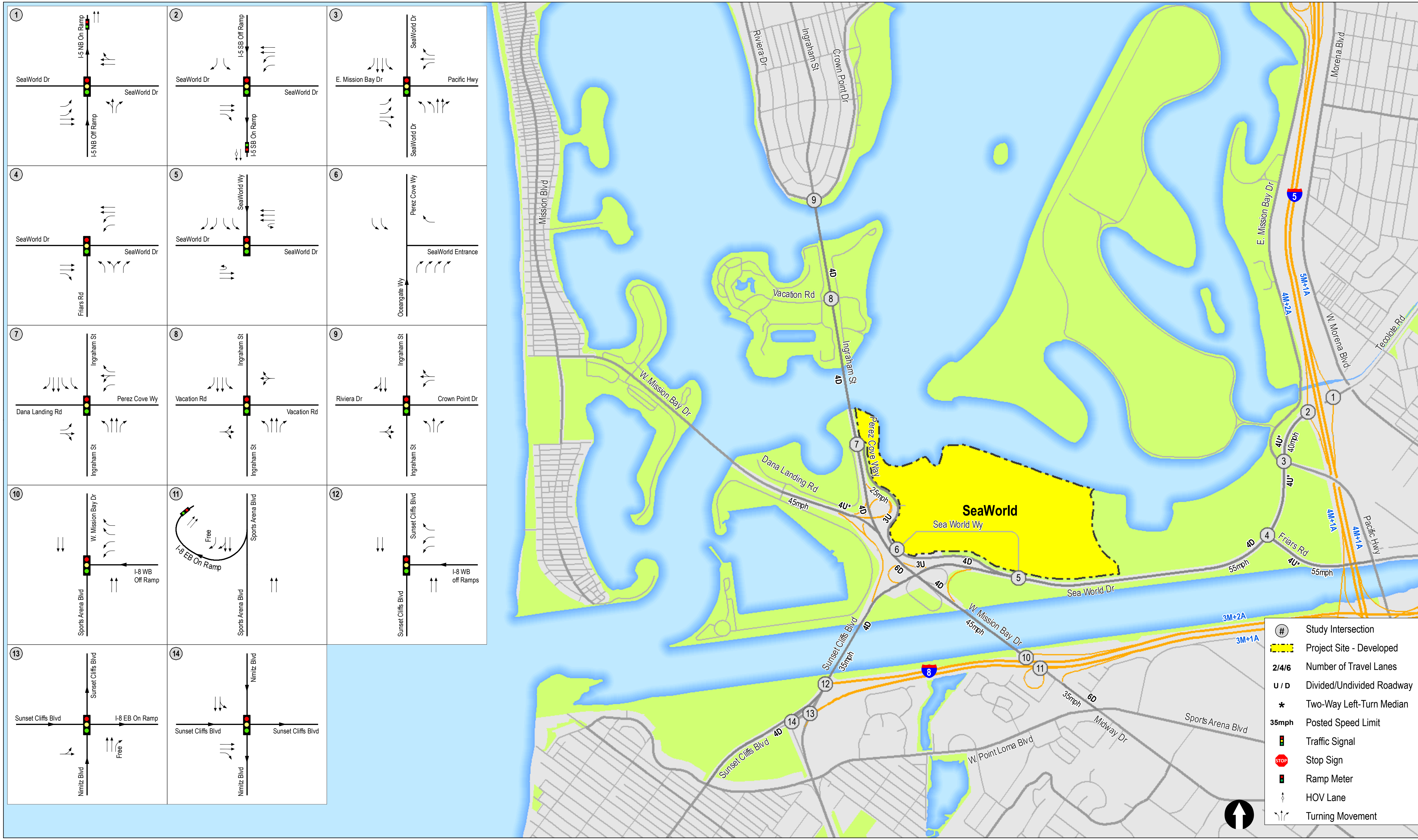
a. Average Daily Traffic Volumes.
b. August 6,7,8: Tuesday, Wednesday, Thursday

3.3 Existing Pedestrian & Bicycle Activity

Existing AM peak hour (7:00-9:00 AM) and PM peak hour (and 4:00-6:00 PM) pedestrian crossing and bicycle volumes were conducted at the same time the vehicular peak hour traffic counts were conducted. Pedestrian crossing volumes were collected for each leg of each intersection where a crosswalk is provided. Similarly, bicycle crossing volumes were collected. *Sections 12.0* and *13.0* provide additional details on pedestrian and bicycle activity, respectively.

3.4 Existing Transit Conditions

Transit conditions for the public transit types within the Project study area, (MTS Bus Services) were documented. In addition to obtaining transit service information, bus stop amenities in the Project area were also documented. *Section 14.0* provides detailed information on the Transit Mobility in the area.



LINSCOTT LAW & GREENSPAN engineers

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Figure 3-1
Existing Conditions Diagram

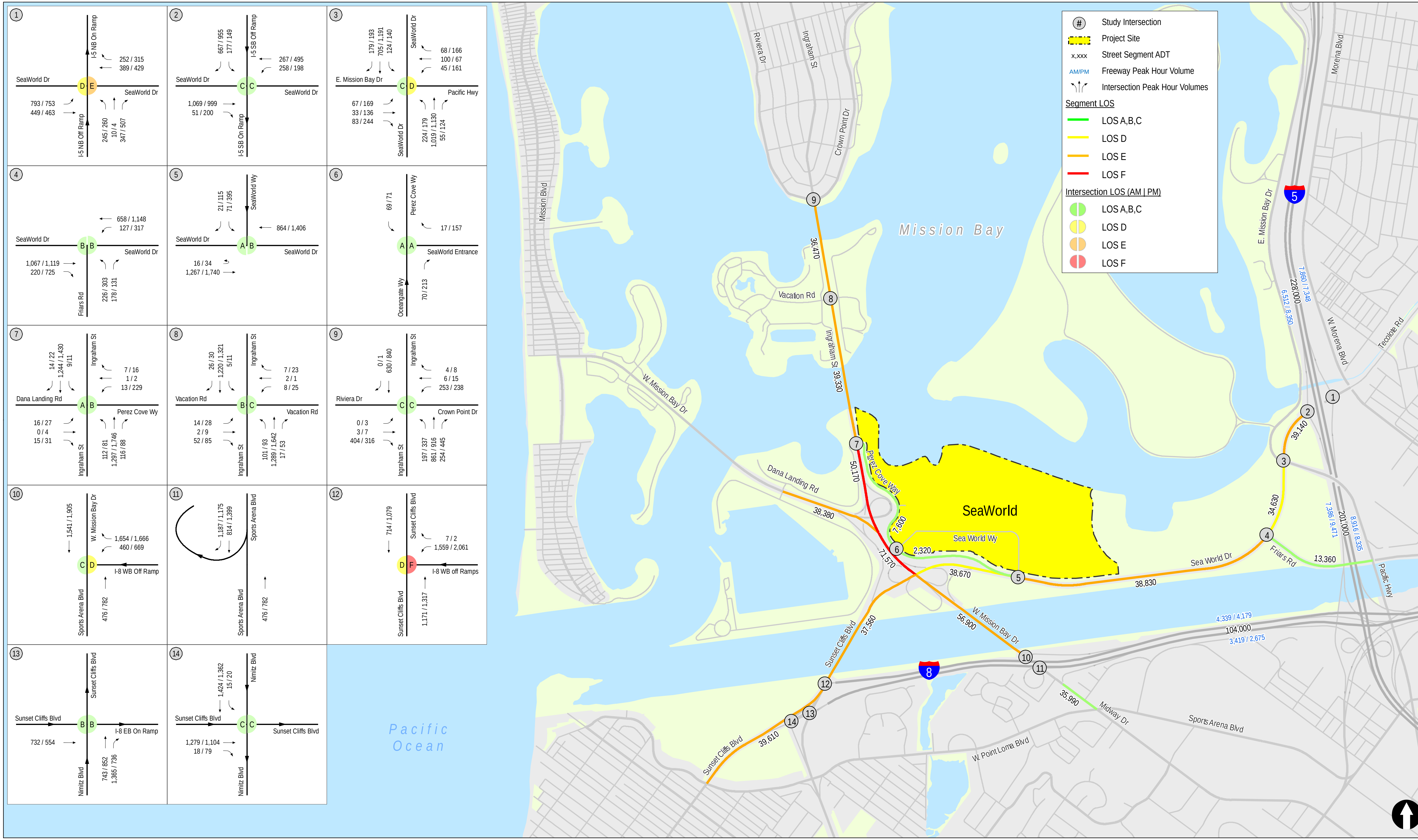

Figure 3-2

Existing Traffic Volumes

2020 SeaWorld Master Plan

4.0 STUDY AREA, ANALYSIS APPROACH AND METHODOLOGY

4.1 Study Area

The study area was based on the criteria identified in the City of San Diego *Traffic Impact Study Manual*, the previously adopted 2002 Master Plan EIR Traffic Study, as well as collaboration with the City of San Diego staff. Based on these criteria, the study area shown in ***Table 4–1*** includes the following locations:

TABLE 4–1
STUDY AREA LOCATIONS

Intersections	
1. SeaWorld Drive/ I-5 Northbound Ramps	8. Ingraham Street/ Vacation Road
2. SeaWorld Drive/ I-5 Southbound Ramps	9. Ingraham Street/ Crown Point Drive
3. SeaWorld Drive/ Pacific Highway/ E. Mission Bay Drive	10. W. Mission Bay Drive/ I-8 Westbound Off-Ramp
4. SeaWorld Drive/ Friars Road	11. Sports Arena Boulevard/ I-8 Eastbound On-Ramp
5. SeaWorld Drive/ SeaWorld Way	12. Sunset Cliffs Boulevard/ I-8 Westbound Off-Ramp
6. Perez Cove Way/ SeaWorld Entrance	13. Sunset Cliffs Boulevard/ I-8 Eastbound On-Ramp
7. Ingraham Street/ Perez Cove Way/ Dana Landing Road	14. Sunset Cliffs Boulevard/ Nimitz Boulevard
Street Segments	
SeaWorld Drive	**Perez Cove Way**
1. I-5 Ramps to Pacific Highway/ E. Mission Bay Drive	10. Ingraham Street to SeaWorld Entrance
2. Pacific Highway/ E. Mission Bay Drive to Friars Road	11. SeaWorld Entrance to Sea World Drive
3. Friars Road to SeaWorld Way	**Ingraham Street**
4. SeaWorld Way to W. Mission Bay Drive	12. Crown Point Drive to Vacation Road (bridge)
Friars Road	13. Vacation Road to Perez Cove Way (bridge)
5. Pacific Highway to Sea World Drive	14. Perez Cove Way to W. Mission Bay Drive
W. Mission Bay Drive	**Sunset Cliffs Boulevard**
6. Dana Landing Road to Ingraham Street	15. W. Mission Bay Drive to I-8 Ramps (bridge)
7. Ingraham Street to SeaWorld Drive	16. I-8 Ramps to Nimitz Boulevard
8. SeaWorld Drive to I-8 Ramps (bridge)	
9. I-8 Ramps to Sports Arena Boulevard	
Freeway Mainline Segments	
Interstate 5	**Interstate 8**
1. Clairemont Drive to SeaWorld Drive	3. W. Mission Bay Drive to Interstate 5
2. SeaWorld Drive to Interstate 8	
Freeway On-Ramps	
Interstate 5	**Interstate 8**
1. SeaWorld Drive to I-5 Northbound	3. Southbound Mission Bay Drive to I-8 Eastbound
2. SeaWorld Drive to I-5 Southbound	

4.2 Analysis Approach

This report analyzes the effects on the transportation system of the projected increase in attendance, and thus traffic volumes, with implementation of the 2020 Master Plan. As previously mentioned in *Section 2.0* of this report, the 2020 Master Plan sets forth the long-range conceptual development and renovation for the next 20 to 25 years. As such, Project components will be built over time, and any such Project component does not have a direct correlation to an increase in attendance and traffic volumes. Given this observation, as discussed in *Section 2.2.3*, an overall compound annual average growth rate in attendance will be applied to baseline traffic counts to forecast future SeaWorld trips. In compliance with City of San Diego guidelines, existing, near-term and horizon year conditions are evaluated in this report. The scenarios analyzed with the buildout of the 2020 Master Plan are listed below:

- Existing (Year 2019)
- Near-Term (Opening day Year 2025) Without Project
- Near-Term (Opening day Year 2025) With Project
- Horizon Year (Year 2040) Without Project
- Horizon Year (Year 2040) With Project

SeaWorld anticipates that construction of the first Master Plan projects would commence in 2024 with completion the following the year. Therefore, Year 2025 was selected for the Near-Term scenarios. The Near-Term (Opening day Year 2025) condition evaluates the street system with six (6) years of growth in attendance. By Horizon Year (Year 2040), the 2020 Master Plan horizon year, the street system is analyzed with 21 years of growth and includes the completion of the hotel and marina expansion.

4.3 Methodology

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis considering factors such as roadway geometries, signal phasing, speed, travel delay, and freedom to maneuver. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of service designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

4.3.1 *Intersections*

Signalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 19 of the *Highway Capacity Manual 6th Edition (HCM 6),* with the assistance of the *Synchro* (version 10) computer software. The delay values (represented in seconds) were qualified with a corresponding intersection LOS. City of San Diego and Caltrans location-specific signal timing information such as minimum greens, cycle lengths, splits for the freeway interchanges and real-time peak hour field observations were included in the analysis, where available.

Synchro provides the option to report methodologies for both the HCM 6 and HCM 2000 editions of the HCM. The HCM 6 version is similar to the 2000 HCM methodologies but focused more on specific controller setups. Due to the changes in the HCM 6, there are several limitations within Synchro that do not allow results to be produced for an intersection. Some of these limitations include:

- Exclusive pedestrian phases
- Exclusive U-turn phases
- Right turn overlaps with through movements
- Permissive left turns yielding to pedestrians at a T-intersection
- Clustered intersections with a single controller
- Split phasing

Four (4) of the intersections within the study area would not be able to produce results using the HCM 6 methodology:

10. W. Mission Bay Drive/ Sports Arena Boulevard/ I-8 Westbound Off-Ramp (overlaps)
12. Sunset Cliffs Boulevard/ I-8 Westbound On-Ramp (coordinated to cluster)
13. Sunset Cliffs Boulevard/ I-8 Eastbound On-Ramp (clustered)
14. Sunset Cliffs Boulevard/ Nimitz Boulevard (clustered)

Therefore, HCM 2000 methodology was used in the analysis of the above intersections. HCM 6 methodology was used in the analysis of the remaining 10 intersections.

Unsignalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay and LOS was determined based upon the procedures found in Chapters 20 and 21 of the *HCM 6* with the assistance of the *Synchro* (version 10) computer software.

The Arterial Class is calculated automatically based on the distances between intersections and the link speeds. The speed is the total distance divided by the total travel time. The segment distance is the total distance divided by the number of segments. The Flow Speed is the free flow speed or link speed input for each link.

4.3.2 *Intersection Queueing*

Study area intersection turn pocket queueing was evaluated using the 95th percentile maximum back of the queue length calculated with the assistance of the *SimTraffic* (version 10) computer software with parameters and methods consistent with City of San Diego guidance.

4.3.3 *Street Segments*

Street segment analysis is based upon the comparison of daily traffic volumes (ADTs) to the City of San Diego's *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics.

A copy of the City of San Diego roadway classification table is attached in ***Appendix C.***

Per City of San Diego methodology and practice, an alternative street segment analysis can be provided if a Project's impacts are calculated to exceed the City's V/C threshold on a segment that is built to its ultimate classification. For such a segment, if it is determined that 1) the intersections at both ends of the segment will operate at an acceptable LOS with the project; and 2) a peak hour HCM arterial analysis for the same segment shows that the segment operates at an acceptable LOS with the project, then the project impacts are determined to be less than significant, and no mitigation is required.

Peak Hour Arterials – Peak hour arterial segment analysis is based upon comparison of the pre-and-post project arterial running speed (by direction) through a series of signalized intersections. The speed of vehicles on urban streets is influenced by three main factors: street environment, interaction among vehicles, and traffic control. As a result, these factors affect quality of service. There is a distinct set of urban street LOS for each urban street class. LOS based on prevailing speeds and class of arterials determine the operations of arterials. The Arterial Class is calculated based upon the procedures found in Chapter 10 of the *HCM 2000* with the assistance of the Synchro (Version 10) software using the distances between intersections and the link speeds.

Table 4–2 is based on information in the *HCM 6* that shows longer running times on networks with short segments. This would cause longer travel times and lower LOS than using the free flow speeds.

- Travel Time = Running Time + Signal Delay (intersection delay)
- Arterial Speed = Total Distance / Total Travel Time
- Segment Distance = Total Distance / Number of Segments
- Flow Speed = Free Flow Speed (FFS) / Link

TABLE 4–2
ARTERIAL ANALYSIS DEFINITIONS

Speed (mph)	Segment Distance	Class
1 to 29	any	IV
30 to 35	< 2000 ft.	IV
30 to 35	>/= 2000 ft.	III
36 to 45	any	II
above 45	any	I

Source: HCM 2000

4.3.4 *Freeway Mainline Segments*

Freeway segments were analyzed under AM and PM peak hour based on the standards outlined in the *Caltrans Guide for the Preparation of Traffic Impact Studies using Highway Capacity Manual* (*HCM 6th Edition*). The freeway analyses were conducted using the *Highway Capacity Software* (HCS version 7.3). The freeway analysis is based on assessing freeway operations based on traffic volumes, freeway network and other segment specific characteristics and reporting freeway volume to capacity ratio, speed, and density. Freeway density is a measurement of the flow rate (in passenger cars, per hour, per lane) over the average passenger-car speed in mph which results in freeway LOS. ***Table 4–3*** presents the freeway segment criteria based on density.

TABLE 4–3
FREEWAY SEGMENT LOS CRITERIA

LOS	Volume-to-Capacity (v/c)	Density Range (pc/mi/ln)
A	0.00 – 0.30	0 – 11
B	0.31 – 0.50	> 11 – 18
C	0.51 – 0.70	> 18 – 26
D	0.71 – 0.89	> 26 – 35
E	0.90 – 1.00	> 35 – 45
F	> 1.00	> 45

General Notes:

- *Source: Caltrans Guide for the Preparation of Traffic Impact Studies, December 2002*
- pc/mi/ln– Passenger car per mile per lane

Per the City's guidelines, the freeway analyses significance criteria may use the "Volume to Capacity" ratio (V/C) or "Speed" as the measure of effectiveness (MOE) to determine impacts on freeways. While freeway density and the corresponding LOS have been reported in the analyses, V/C was used as the MOE to determine significant project impacts on freeways given the software limitations in reporting speeds at congested conditions (i.e., LOS F).

4.3.5 *Metered Freeway On-Ramps*

The measure of effectiveness (MOE) for the metered freeway ramp analysis is delay in minutes. Ramp meter flows characteristically vary throughout the peak hour based on the performance of the freeway mainline. As the mainline becomes more congested, the ramp meter rates decline, allowing fewer vehicles onto the freeway in the same period.

The ramp meters were analyzed using the Fixed Rate method. With the Fixed Rate method, using the most restrictive flow rate during the peak hour, the total discharge and delay (in minutes) are calculated, and the corresponding queue lengths are calculated. The meter rates are dynamic and fluctuate between the most conservative (restrictive) and most aggressive (permissive) intervals assigned to a metered ramp. The regional standard of practice is to use the longest, restrictive rates to ensure a conservative analysis.

The metering information was obtained from Caltrans for the ramps within the Project study area and is included in *Appendix B*.

To provide calibration for this analysis, field observations were conducted Wednesday November 13, 2019 between the peak one-hour timeframe during AM and PM periods. Multiple driving runs were conducted through each on-ramp. The amount of time it took from entering the ramp from its intersection with main roadway to passing through the ramp meter was recorded. *Appendix B* also contains the field observation data.

4.3.6 *Freeway Interchange Analysis*

Freeway interchange analysis focuses on off-ramp queueing spillbacks onto the freeway mainline. The study documents off-ramp maximum queues and identifies queues that spill back onto the mainline due to, or exacerbated by, the addition of project traffic. The 95^{th} percentile maximum back of queue length of calculated with the assistance of the *SimTraffic* (version 10) micro simulation software.

5.0 SIGNIFICANCE CRITERIA AND CRITERIA FOR IDENTIFYING OFF-SITE IMPROVEMENTS

5.1 CEQA Significance Determination Thresholds

According to the City of San Diego's *Significance Determination Thresholds* dated July 2016, a project is considered to have a significant impact is project traffic would decrease the operations of surrounding roadways by a defined threshold. For projects deemed complete on or after January 1, 2007, the City-defined thresholds are shown in ***Table 5–1***.

The impact is designated either a "direct" or "cumulative" impact. According to the City's *Significance Determination Thresholds*,

> "*Direct* traffic impacts are those projected to occur at the time a proposed development becomes operational, including other developments not presently operational but which are anticipated to be operational at that time (near term)."
>
> "*Cumulative* traffic impacts are those projected to occur at some point after a proposed development becomes operational, such as during subsequent phases of a project and when additional proposed developments in the area become operational (short-term cumulative) or when affected community plan area reaches full planned buildout (long-term cumulative)."
>
> It is possible that a project's near term (direct) impacts may be reduced in the long term, as future projects develop and provide additional roadway improvements (for instance, through implementation of traffic phasing plans). In such a case, the project may have direct impacts but not contribute considerably to a cumulative impact."
>
> For intersections and roadway segments affected by a project, level of service (LOS) D or better is considered acceptable under both direct and cumulative conditions."

If the project exceeds the thresholds in *Table 5–1*, then the project is considered to have a significant "direct" or "cumulative" project impact. A significant impact can also occur if a project causes the Level of Service to degrade from D to E, even if the allowable increases in *Table 5–1* are not exceeded. A feasible mitigation measure will need to be identified to return the impact within the City thresholds, or the impact will be considered significant and unmitigated.

TABLE 5–1
CITY OF SAN DIEGO
TRAFFIC IMPACT SIGNIFICANT THRESHOLDS

Level of Service with Project [b]	Allowable Increase Due to Project Impacts [a]					
	Freeways		Roadway Segments		Intersections	Ramp Metering [c]
	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec.)	Delay (min.)
E	0.010	1.0	0.02	1.0	2.0	2.0
F	0.005	0.5	0.01	0.5	1.0	1.0

Footnotes:

a. If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are determined to be significant. The project applicant shall then identify feasible improvements (within the Traffic Impact Study) that will restore/and maintain the traffic facility at an acceptable LOS. If the LOS with the proposed project becomes unacceptable (see note b), or if the project adds a significant number of peak-hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, the project applicant shall be responsible for mitigating the project's direct significant and/or cumulatively considerable traffic impacts.

b. All LOS measurements are based upon Highway Capacity Manual procedures for peak-hour conditions. However, V/C ratios for roadway segments are estimated on an ADT/24-hour traffic volume basis (using Table 2 of the City's Traffic Impact Study Manual). The acceptable LOS for freeways, roadways, and intersections is generally "D" ("C" for undeveloped locations). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive.

c. The allowable increase in delay at a ramp meter with more than 15 minutes delay and freeway LOS E is 2 minutes. The allowable increase in delay at a ramp meter with more than 15 minutes delay and freeway LOS F is 1 minute.

General Notes:

- Delay = Average control delay per vehicle measured in seconds for intersections or minutes for ramp meters
- LOS = Level of Service
- V/C = Volume to Capacity ratio
- Speed = Arterial speed measured in miles per hour

5.2 TSM Criteria for Identifying Roadway Improvements

According to the City of San Diego's *Transportation Study Manual* (September 2020), off-site improvements to accommodate Project traffic that address, access, circulation, and safety for all modes should be determined using the following criteria for each type of improvements:

5.2.1 *Pedestrian Facilities*

- Closing Sidewalk Gaps/Removing Obstructions:
  - The project should construct sidewalks to close sidewalk gaps adjacent to the project site.
  - The project should remove sidewalk obstructions that constrain pedestrian access routes adjacent to the project site to less than four feet.
  - The project should construct curb ramps/meet accessibility standards for any intersections adjacent to the project site.
- Accommodating Pedestrian Demand:
  - The project should consider adding traffic calming and pedestrian-related signal timing changes (such as pedestrian hybrid beacons, leading pedestrian interval signal

timing, etc.) to accommodate an increase in pedestrian demand on roadways and intersections adjacent to the project site.

5.2.2 *Bicycle Facilities*

- Accommodating Bicycle Demand
  - The project should construct (or reserve space for) any planned bicycle facility per the Community Plan or Bicycle Master Plan.
  - The project should consider upgrading adjacent bicycle facilities by adding upgraded treatments (such as green bike lane paint, buffers, etc., where appropriate) to accommodate an increase in bicycle demand.

5.2.3 *Transit Facilities*

- Transit Priority Treatments/Improvements
  - The project should consider transit priority treatments when operational analysis determines a transit movement would experience LOS E or worse.
  - The project should consider transit priority treatments identified within the Community Plan for the study area.
- Proposed Transit Stops:
  - The project should consider accommodating transit stops to serve existing or proposed transit services, including those identified in the Community Plan, RTIP, and/or RTP within the study area. The project should coordinate any identified transit stops with SANDAG, the Metropolitan Transit System (MTS) and/or the North County Transit District (NCTD).
- Transit Stop Amenities
  - The project should coordinate with MTS and/or NCTD, as applicable, to determine additional or upgraded transit stop amenities.

5.2.4 *Signalized Intersections*

- Adding or lengthening a turn lane:
  - Left-turn lane:
    - Where no left-turn lane exists, if the project adds traffic to an individual left turn movement where no left-turn lane exists, causing the total number of peak hour left turns to exceed 100, consider adding a left-turn lane.
    - Where a single left-turn lane exists, if the project adds traffic to an individual left turn movement causing the total number of peak hour left turns to exceed 300, consider adding a second left turn lane.
  - Right-turn lane – If the addition of a right turn lane will not negatively affect other roadway users, will maintain a comfortable roadway environment, AND the

following volume thresholds are met, the addition of a right turn lane should be considered:

        - No Existing Right-Turn Lane: If the project adds traffic to an individual right turn movement causing the total number of peak hour right turns to exceed 500, consider adding a right turn lane.
        - Existing Single Right-Turn Lane: If the project adds traffic to an individual right turn movement causing the total number of peak hour right turns to exceed 800, consider adding a second right turn lane. In addition to the considerations previously stated, dual-right turn (or more) treatments may require supplementary improvements including but not limited to no right-turn on red with blank-out signs, lead pedestrian intervals (LPIs) for pedestrians and cycle track treatment for bicyclists.
    - Lengthening a turn pocket:
        - If the project adds traffic to a turning movement and causes the 95th percentile queue to exceed the available turn pocket length, consider lengthening the turn pocket.
- Signal Timing Improvements/Signal Modifications
    - Determined based on intersection operations analysis as follows:
        - Within ½ mile path of travel of a Major Transit Stop: If the project causes an intersection to degrade to LOS F, or if the project adds traffic to a signal already operating at LOS F.
        - Outside of a ½ mile path of travel of a Major Transit Stop: If the project causes an intersection to degrade to LOS E or F, or if the project adds traffic to a signal already operating at LOS E or F.
    - Types of signal improvements that can be considered are:
        - Updating signal split times
        - Transit signal priority improvements
        - Right turn overlap phasing
        - Signal phasing changes
        - Intelligent Transportation Systems (ITS) improvements

5.2.5 *Unsignalized Intersections*

If the project causes the operations at an all-way stop-controlled or side-street stop-controlled intersection to degrade (see below), perform an intersection control evaluation that includes a signal warrant analysis and a roundabout LOS analysis.

<table>
<tr><td></td><td colspan="3">Unsignalized Intersection Type</td></tr>
<tr><td rowspan="3">Transit Stop Proximity</td><td></td><td>All-Way Stop Controlled</td><td>Side-Street Stop-Controlled</td></tr>
<tr><td>Within ½ mile of Major Transit Stop</td><td>Project causes intersection to degrade to LOS F, or adds traffic to intersection already operating at LOS F</td><td>Project causes worst movement of an intersection to degrade to LOS F, or adds traffic the worst movement already operating at LOS F</td></tr>
<tr><td>Outside of ½ mile of Major Transit stop</td><td>Project causes intersection to degrade to LOS E or F, or adds traffic to intersection already operating at LOS E or F</td><td>Project causes worst movement of an intersection to degrade to LOS E or F, or adds traffic the worst movement already operating at LOS E or F</td></tr>
</table>

When considering intersection improvements for circulation, access, and safety for all modes, factors that should be considered include, but are not limited to, conflicting pedestrian movements, existing and proposed bicycle facilities, transit priority, protected or permissive turn movement phasing, number of lanes, speed of prevailing traffic, and expected queue lengths.

5.2.6 *Roadway Segments*

- Improvements identified in the community plan (including upgrading to ultimate classification):
    - If the project adds greater than 50% of total daily vehicle trips on the segment, the project should consider implementing the improvement as identified in the community plan.
    - If the project adds less than or equal to 50% of total daily vehicle trips on the segment, the project should evaluate its fair share towards the improvement.
- Planned new circulation element roadways:
    - If the project adds greater than 50% of the total daily vehicle trips on the segment, the project should consider constructing the roadway segment as identified in the community plan.
    - If the project adds less than or equal to 50% of total daily vehicle trips on the segment, the project should evaluate its fair share toward the improvement.

6.0 TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

SeaWorld is a unique land use and requires site-specific information to accurately identify the property's trip generation. SeaWorld attendance fluctuates by time of year, and on an annual basis, depending on several outside contributing factors, i.e., weather, tourism, economic trends, etc. The first step in the process of determining the trip generation for the proposed 2020 Master Plan was to develop the existing site trip generation.

6.1 Existing SeaWorld Trip Generation

To calculate the existing SeaWorld trip generation, ADT tube counts were collected near the tollbooth entrance and exit ways. To capture all entrance trips, road tubes were placed on Perez Cove Way in two (2) locations. For visitor trips, tubes were placed north of the tollbooth visitor entrance and south of the employee entrance. For employee/marina trips, tubes were placed south of the Hubbs access driveway and north of the employee/marina access. By placing tubes in each location, the employee/marina trips were separated from the total counts, allowing for a distinction in trip generation between visitors and employee/marina trips. The exit tube counts were collected on the north leg (exit) of the SeaWorld Way/SeaWorld Drive intersection, as well as the northbound volumes on Perez Cove Way (where an exit lane is provided near the main entrance). The Perez Cove Way northbound trips were used to separate visitor from employee/marina trips. The inset figure below illustrates these count locations.

Existing Trip Generation Count Locations

Counts for trip generation purposes were collected over a two-week period in August 2019, when attendance is at its highest during the year. Six (6) days of data were collected on Tuesday, Wednesday, Thursday – August 6, 7, 8; and Tuesday, Wednesday, Thursday – August 13, 14, 15. From the existing counts, daily, AM peak hour (ins and outs), and PM peak hour (ins and outs), traffic volumes were developed.

Daily counts were averaged over the six (6) days to derive the existing SeaWorld ADT. For peak hour volumes, the 7-9AM peak period was broken in two (2) hour long periods: 7-8AM and 8-9AM. Similarly, the 4-6PM peak period was divided into 4-5PM and 5-6PM. For six (6) days of data, the method provided 12 hourly volumes for each of the AM and PM peak periods. Of the 12 volumes for each peak period, the highest six (6) volumes during the AM and PM peak periods, regardless of day, were averaged to arrive at the AM and PM existing trip generation. As shown in the detailed trip generation count data in ***Appendix D***, both hours of a given peak period can be included in the average if they are among the top six hours over the six days of counts. Generally, though not in all cases, the 8-9AM hour was higher during the AM peak period, while there was more variability during the PM peak period.

Table 6–1 shows a summary of the existing SeaWorld trip generation.

TABLE 6–1
EXISTING SEAWORLD TRIP GENERATION

SeaWorld	Size [a]	Daily Trip Ends (ADTs) [b]		AM Peak Hour [c]					PM Peak Hour [c]				
		Rate	Volume	% of ADT	In:Out Split	Volume In	Volume Out	Volume Total	% of ADT	In:Out Split	Volume In	Volume Out	Volume Total
Visitors	97.2 acres	—	10,986	2.26%	56:44	139	109	248	8.66%	30:70	284	667	951
Employees	97.2 acres	—	1,219	4.92%	93:7	56	4	60	10.01%	26:74	32	90	122
Total	**97.2 acres**	**—**	**12,205**	**2.52%**	**63:37**	**195**	**113**	**308**	**8.79%**	**29:71**	**316**	**757**	**1,073**

Footnotes:

a. The SeaWorld Theme Park area consists of 97.2 acres of land area bounded by the South Pacific Passage channel of Mission Bay to the north, the Administration and Support area to the west, the South Shores area of Mission Bay Park to the east, and the Guest Parking area to the south.

b. Existing ADT tube counts collected Tuesday – Thursday, August 6-8 and August 13-15, 2019. The average of the six (6) days was used to develop the daily trip generation.

c. Total AM and PM ins/outs derived from the August 2019 counts. The average of the maximum volumes from each of the six (6) days were used to develop the AM and PM trips. The % of ADT and In:Out Splits were calculated from the raw data.

6.2 Previous 2002 SeaWorld Master Plan Trip Generation

The trip generation calculated in the previously approved 2002 Master Plan EIR Traffic Study utilized existing ADT counts at the tollbooth entrance gate to develop the existing Year 2000 baseline condition. For forecast conditions, an assumed 1.3 percent compound annual growth rate in attendance was used for future trip generation. For the planned hotel and marina expansion, driveway traffic generation rates from the City of San Diego Trip Generation Manual, September 1998 were used.

The base year 2000 was established using the existing counts, and the Year 2005 and Year 2020 were forecasted using the growth in attendance over existing counts. The hotel and marina expansion were then added to the Year 2020 forecast volumes to arrive at the projected trip generation with buildout of the previous 2002 Master Plan. ***Table 6–2*** shows the previously forecasted 2002 Master Plan trip generation.

TABLE 6–2
PREVIOUS 2002 SEAWORLD MASTER PLAN
TRIP GENERATION

SeaWorld	Size		Daily Trip Ends (ADTs) [a]		AM Peak Hour					PM Peak Hour				
			Rate	Volume	% of ADT	In:Out Split	Volume			% of ADT	In:Out Split	Volume		
							In	Out	Total			In	Out	Total
NEAR-TERM (YEAR 2005)														
SeaWorld (Near-Term Year 2005)	84.5	acres	—	17,000	4.77%	66:34	532	278	810	6.39%	13:87	146	940	1,086
SeaWorld (Baseline Year 2000) [a]	84.5	acres	—	15,000	4.77%	66:34	(470)	(245)	(715)	6.39%	13:87	(129)	(829)	(958)
Total Near-Term Growth (Project Trips)	**84.5**	**acres**	**—**	**2,000**	**—**	**—**	**62**	**33**	**95**	**—**	**—**	**17**	**111**	**128**
HORIZON YEAR (YEAR 2020)														
SeaWorld (Horizon Year 2020)	84.5	acres	—	23,000	4.77%	66:34	725	375	1,100	6.39%	13:87	190	1,280	1,470
SeaWorld (Baseline Year 2000)	84.5	acres	—	15,000	4.77%	66:34	(470)	(245)	(715)	6.39%	13:87	(129)	(829)	(958)
Total Horizon Year Growth	**84.5**	**acres**	**—**	**8,000**	**—**	**—**	**255**	**130**	**385**	**—**	**—**	**61**	**451**	**412**
Resort	650	rooms	10 /room	6,500	6%	60:40	234	156	390	8%	60:40	312	208	520
Marina	200	berths	4 /berth	800	3%	30:70	7	17	24	7%	60:40	34	22	56
Total Horizon Year Net Increase in Project Trips	**—**		**—**	**15,300**	**—**	**—**	**496**	**303**	**799**	**—**	**—**	**407**	**681**	**1,088**

Source:

2002 SeaWorld Master Plan EIR.

Footnotes:

a. ADT = Average daily trips.

6.3 Proposed 2020 SeaWorld Master Plan Trip Generation

For the proposed 2020 SeaWorld Master Plan, the Project trip generation was calculated by using the average annual compound growth factor obtained from SeaWorld and the TEA study (a one percent increase in annual attendance). A detailed discussion of attendance trends was provided earlier in *Section 2.2.3* of this report.

For Year 2025 conditions, the one percent growth factor was applied to the existing SeaWorld trip generation for a period of six (6) years. For Year 2040 conditions, the one percent growth factor was applied to the existing SeaWorld trip generation for a period of 21 years. In addition, by Year 2040, the hotel and marina expansion were assumed to be completed. The trip generation rates for "hotel" and "marina" taken from the *City of San Diego Trip generation Manual, May 2003*, were used to in the calculations.

The net Project trip generation was calculated by subtracting the existing SeaWorld trip generation from the expected growth by the near-term and horizon year scenarios.

Table 6–3 tabulates the net near-term (Year 2025) and horizon year (Year 2040) Project traffic generation. The near-term growth from the 2020 Master Plan is calculated to generate approximately 755 ADT with 19 AM peak hour trips (12 inbound/7 outbound) and 66 PM peak hour trips (19 inbound/47 outbound). By the Year 2040, growth from the 2020 Master Plan and the development of the hotel and marina is calculated to generate approximately 6,295 ADT with 266 AM peak hour trips (158 inbound/108 outbound) and 521 PM peak hour trips (236 inbound/285 outbound).

TABLE 6–3
PROPOSED 2020 SEAWORLD MASTER PLAN
TRIP GENERATION

SeaWorld	Size		Daily Trip Ends (ADTs) [a]		AM Peak Hour [b]					PM Peak Hour [b]				
			Rate	Volume	% of ADT	In:Out Split	Volume In	Volume Out	Volume Total	% of ADT	In:Out Split	Volume In	Volume Out	Volume Total
NEAR-TERM (YEAR 2025)														
SeaWorld (Near-Term Year 2025)	97.2	acres	— [c]	12,960	2.52%	63:37	207	120	327	8.79%	29:71	335	804	1,139
SeaWorld (Baseline Year 2019)	97.2	acres	—	12,205	2.52%	63:37	195	113	308	8.79%	29:71	316	757	1,073
Total Near-Term Growth (Project Trips)	**97.2**	**acres**	**—**	**755**	**—**	**—**	**12**	**7**	**19**	**—**	**—**	**19**	**47**	**66**
HORIZON YEAR (YEAR 2040)														
SeaWorld (Horizon Year 2040)	97.2	acres	— [c]	15,040	2.52%	63:37	241	139	380	8.79%	29:71	389	933	1,322
SeaWorld (Baseline Year 2019)	97.2	acres	—	12,205	2.52%	63:37	195	113	308	8.79%	29:71	316	757	1,073
Total Horizon Year Growth	**97.2**	**acres**	**—**	**2,835**	**—**	**—**	**46**	**26**	**72**	**—**	**—**	**73**	**176**	**249**
Resort [d]	300	rooms	10 /room	3,000	6%	60:40	108	72	180	8%	60:40	144	96	240
Marina [e]	115	berths	4 /berth	460	3%	30:70	4	10	14	7%	60:40	19	13	32
Total Horizon Year Net Increase in Project Trips	**—**		**—**	**6,295**	**—**	**—**	**158**	**108**	**266**	**—**	**—**	**236**	**285**	**521**

Footnotes:

a. Existing ADT tube counts collected Tuesday – Thursday, August 6-8, and August 13-15, 2019. The average of the six (6) days was used to develop the existing 2019 daily trip generation. Volumes include combination of visitors, employees, and marina trips.

b. Total AM and PM ins/outs derived from the August 2019 counts. The average of the maximum volumes from each of the six (6) days were used to develop the AM and PM trips. The % of ADT and In:Out Splits were calculated from the raw data.

c. SeaWorld forecast volume for near-term Year 2025 and horizon Year 2040 interpolated from the Themed Entertainment Association (TEA) report documenting annual growth in theme park attendance for the ten-year period between 2007-2017. An average annual growth factor of approximately 1% per year applied to baseline Year 2019 volumes. Overall increase in projected traffic volumes proportional includes an increase in employee trips.

d. Trip rate sourced to City of San Diego Trip Generation Manual, May 2003. The “Hotel (with convention facilities/restaurant)” rate was applied.

e. Trip rate sourced to City of San Diego Trip Generation Manual, May 2003. The “Marina” rate was applied.

6.4 Trip Generation Comparison

As shown in *Table 6–2*, the previous Year 2020 trip generation was forecasted at 23,000 ADT, without the completion of the hotel or marina expansion. The existing Year 2019 existing trip generation from *Table 6–1*, which is only one year less than the forecast year previously analyzed shows SeaWorld is currently generating 12,205 ADT (also without completion of the hotel or marina expansion), which is fewer trips than the 15,000 ADT generated in the previous 2002 Master Plan base Year 2000. With the addition of hotel and marina expansion trips, the previously forecasted Year 2020 Master Plan traffic generation amounted to a net increase of 15,300 ADT, where the proposed 2020 Master Plan projections for Year 2040 are a net increase of 6,295 ADT (shown in *Table 6–3*).

Table 6–4 shows a summary of the daily trips from each scenario.

TABLE 6–4
SEAWORLD MASTER PLAN TRIP GENERATION COMPARISON

Master Plan Condition	Average Daily Trips
2002 Master Plan – Previous Trip Generation	
Year 2000	15,000
Year 2005	17,000
Near-Term Increase with Project	***2,000***
Year 2000	15,000
Year 2020	30,300
Horizon Year Increase with Project	***15,300***
2020 Master Plan – Proposed Trip Generation	
Year 2019	12,205
Year 2025	12,960
Near-Term Increase with Project	***755***
Year 2019	12,205
Year 2040	18,500
Horizon Year Increase with Project	***6,295***

6.5 Trip Distribution/Assignment

At the time of completion of the previous 2002 Master Plan EIR Traffic Study, a custom SANDAG Select Zone Assignment (SZA) traffic model was prepared to review the distribution it provided. The SZA was not capable of accurately predicting trip distribution, therefore, the model results were adjusted using existing traffic data patterns at the source of entry/exit and was modified to reflect the source of visitor residency, which was provided by SeaWorld staff.

Significant roadway improvements have been completed since the 2002 Master Plan EIR Traffic Study including signal coordination on SeaWorld Drive from Friars Road to I-5 and the widening of the West Mission Bay Drive bridge, currently underway. However, these improvements help to accommodate demand on existing roadways. These improvements do not entail new links in the roadway network, new interchanges at area freeways, or other changes that would substantially alter established travel patterns. Therefore, the trip distribution from the previous 2002 Master Plan EIR Traffic Study was used in this report. The percentages from that exercise are still considered valid for use in the proposed 2020 Master Plan distribution of SeaWorld trips.

Separate distributions were used for the expected attendance growth, the hotel trips, and the marina trips. Generally, attendance growth was oriented with 45 percent to/from I-5, 20 percent to/from I-8, with the remaining 35 percent of trips using local roadways. ***Figures 6–1 and 6–2*** show the near-term and horizon year growth distributions, respectively.

Hotel trips were distributed to the I-5 and I-8 freeways at 30 percent and 35 percent, respectively. The remaining 35 percent of trips would be expected to use local roadways. ***Figure 6–3*** shows the hotel trip distribution.

Marina trips were distributed to the I-5 and I-8 freeways at 25 percent and 35 percent, respectively. The remaining 40 percent of trips would be expected to use local roadways. ***Figure 6–4*** shows the marina trip distribution.

Figures 6–5 through 6–9 show the traffic volumes for all the Project components listed above.

The hotel and marina trips were added to the Horizon Year (Year 2040) growth trips to arrive at the total trips generated by Year 2040.

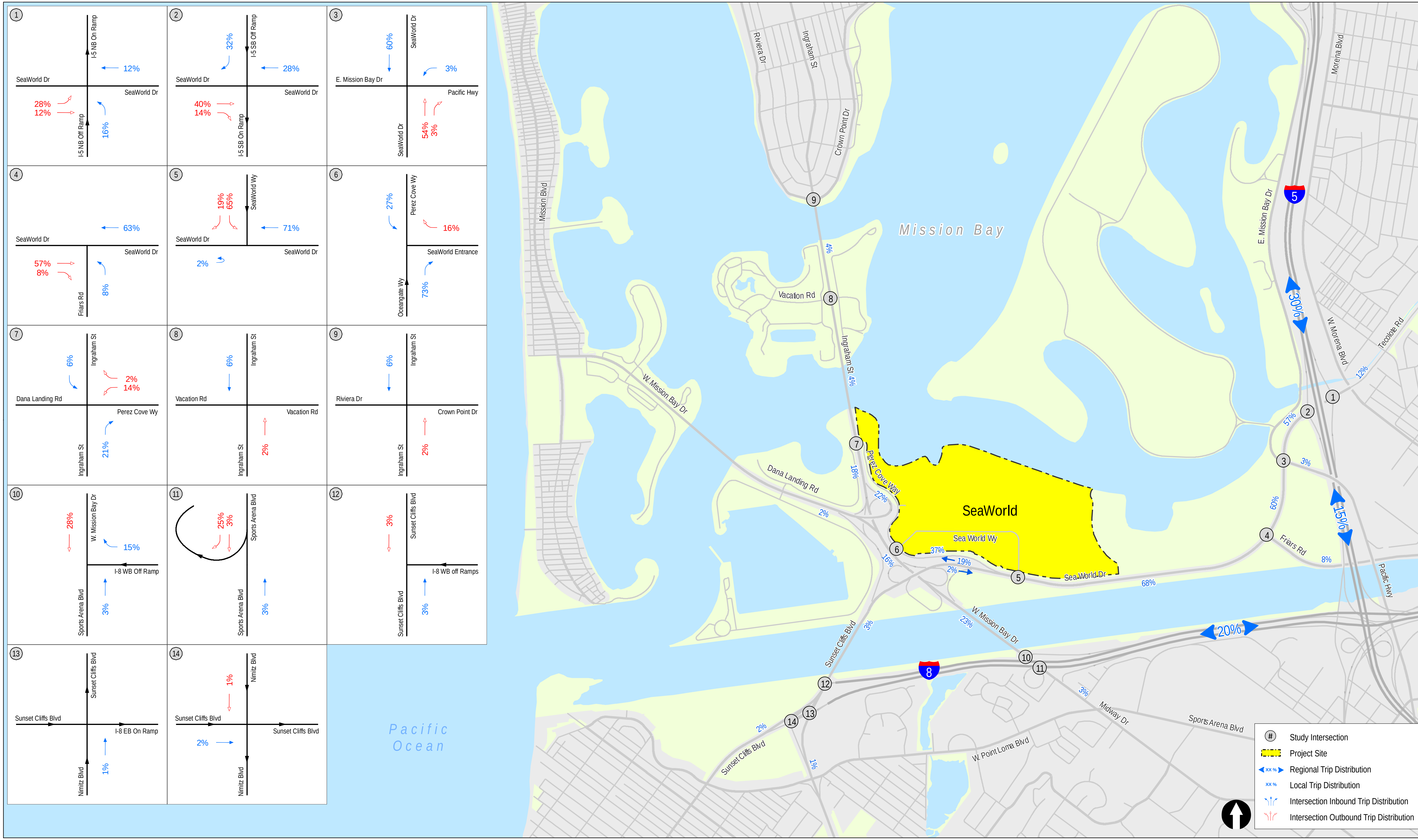

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Figure 6-1
Project Traffic Distribution - Near-Term (Year 2025) Growth

2020 SEAWORLD MASTER PLAN

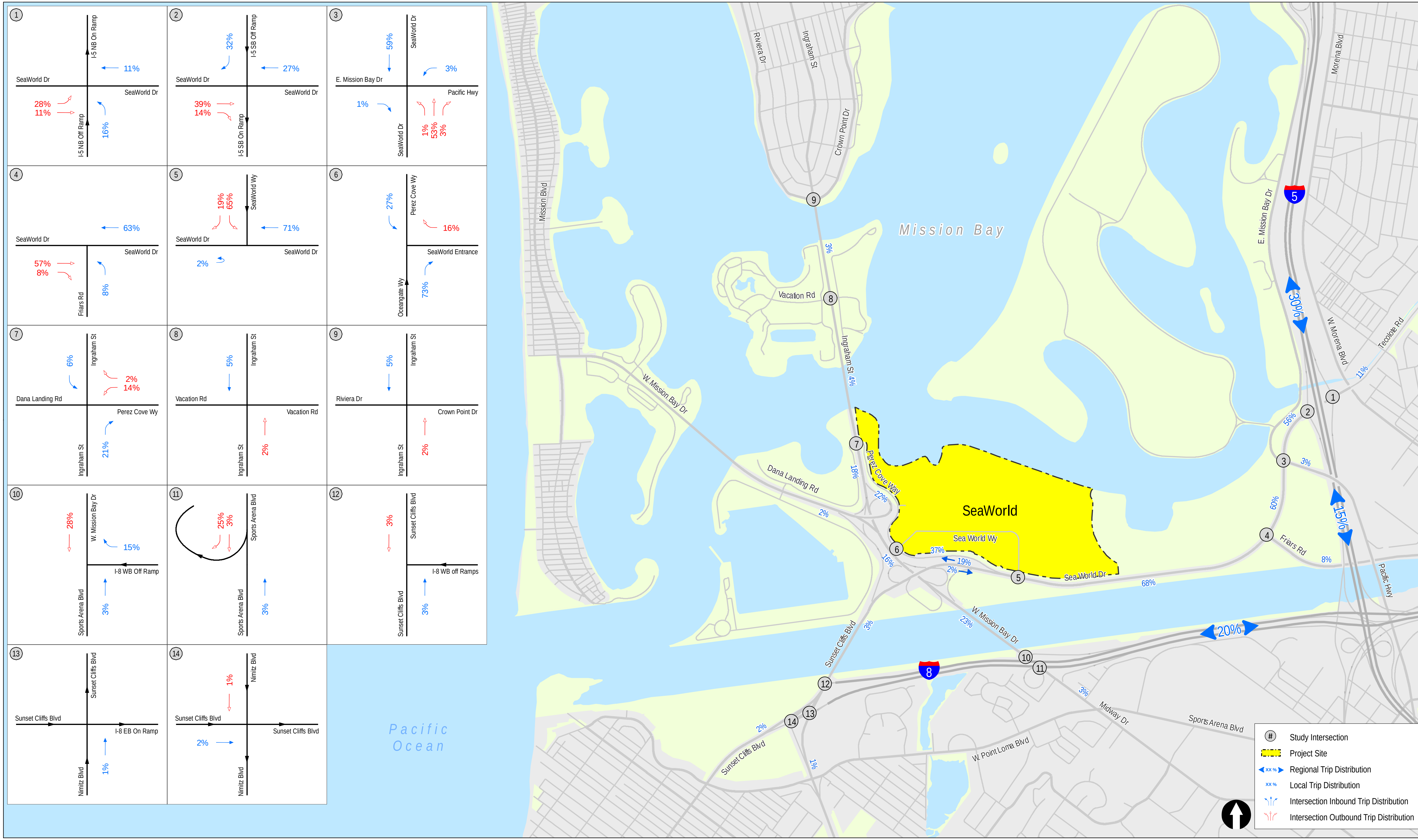

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Figure 6-2

Project Traffic Distribution - Horizon Year (Year 2040) Growth

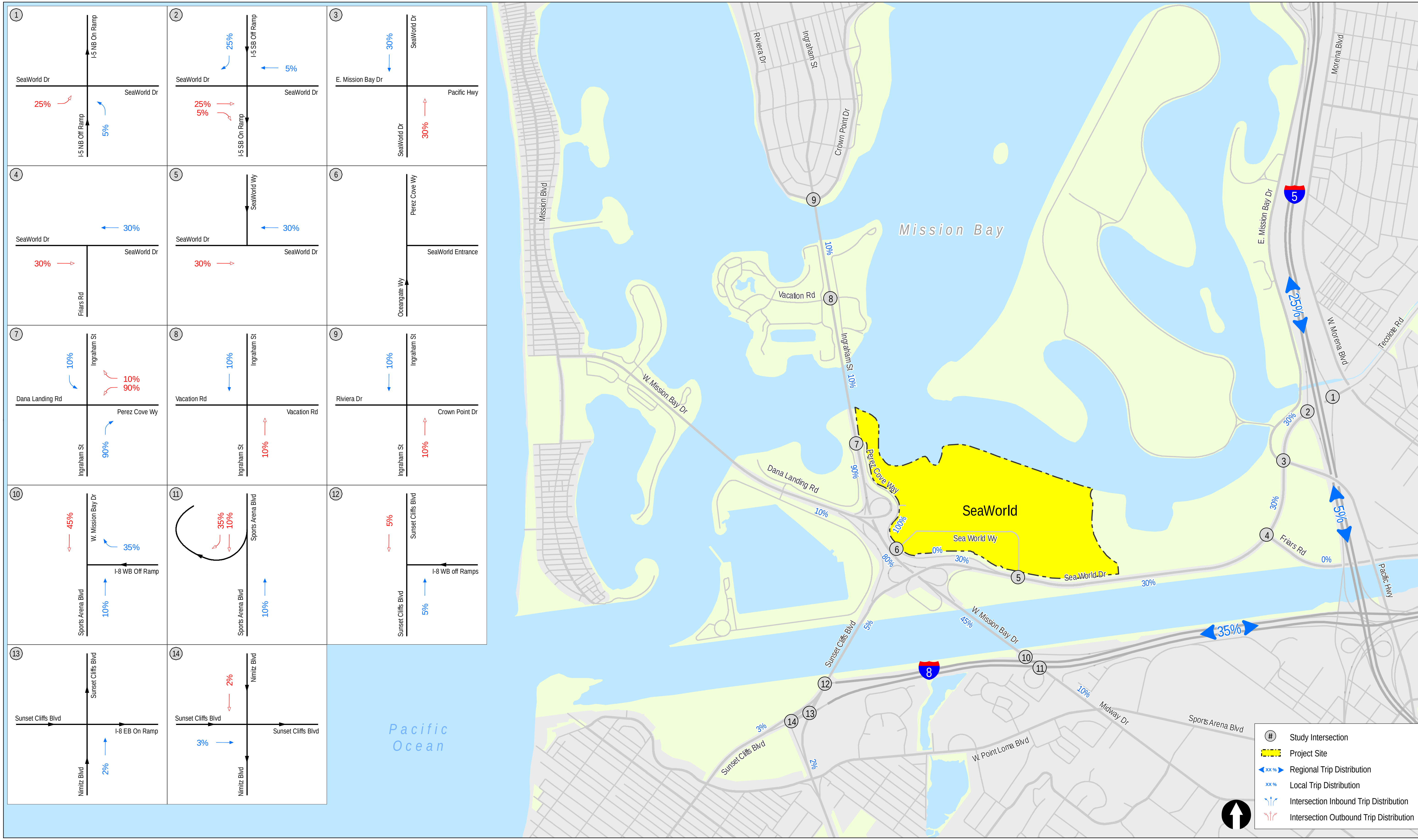

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Figure 6-3
Project Traffic Distribution - Hotel

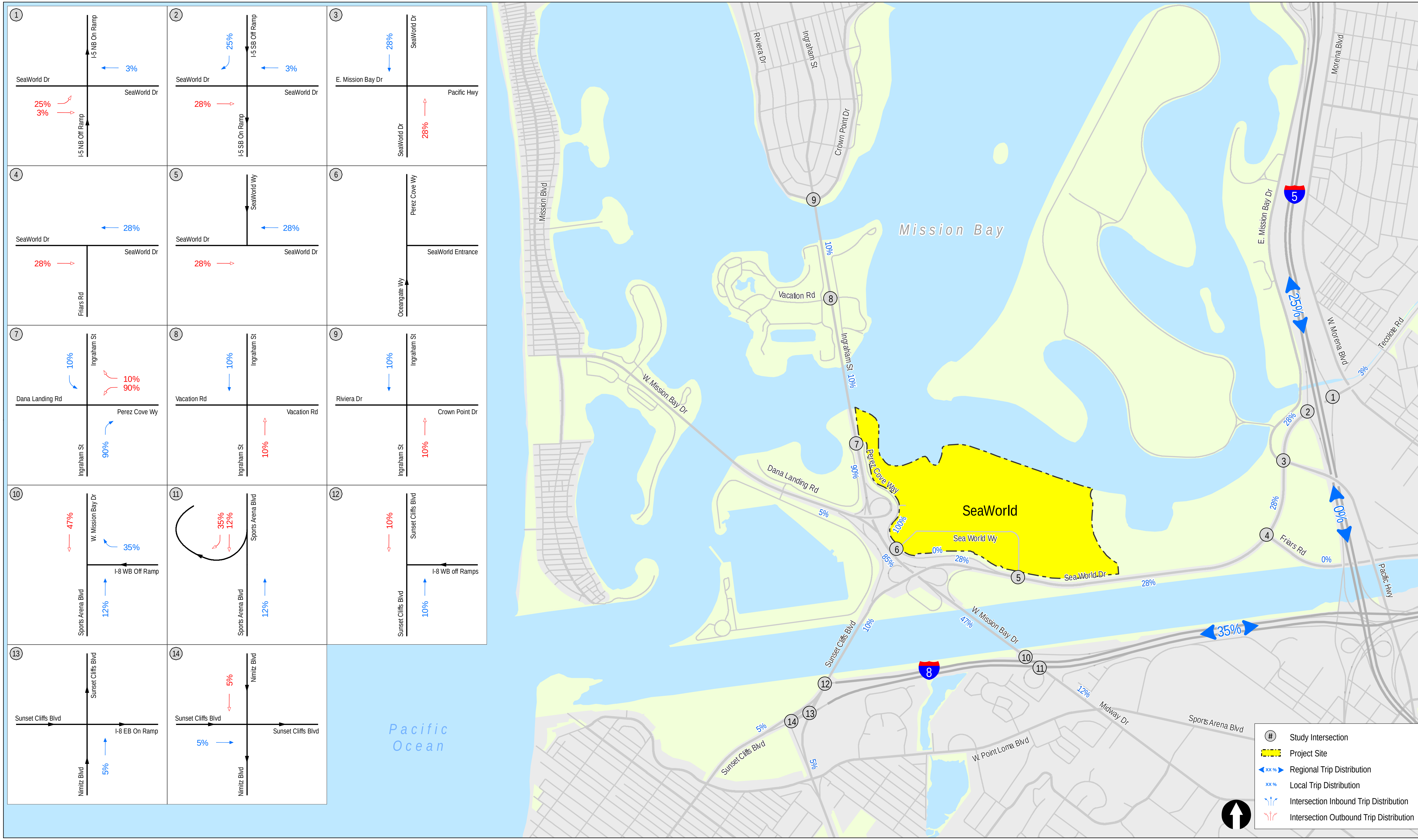

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Figure 6-4
Project Traffic Distribution - Marina

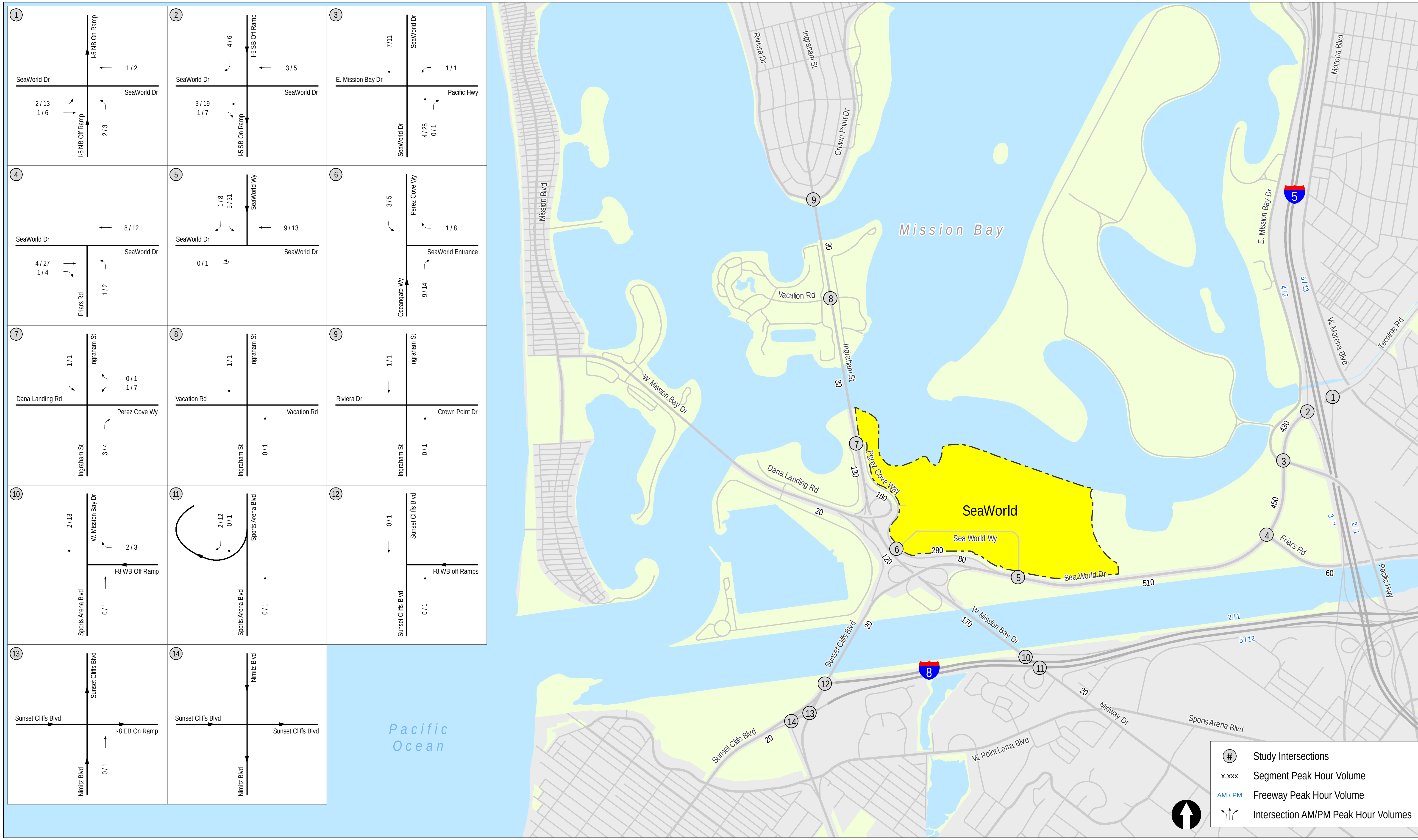

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Figure 6-5

Project Traffic Volumes - Near-Term (Year 2025) Growth

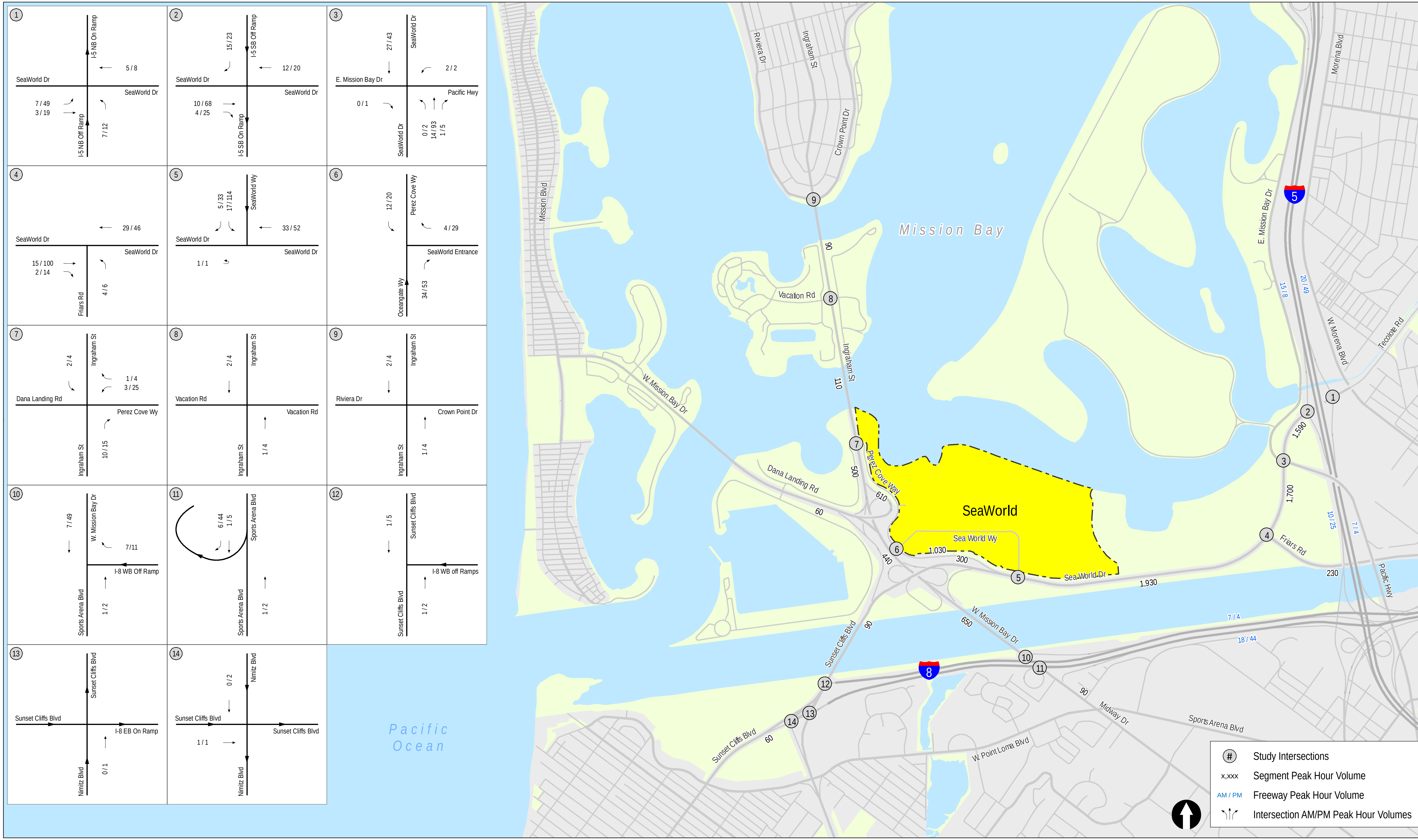

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Figure 6-6

Project Traffic Volumes - Horizon Year (Year 2040) Growth

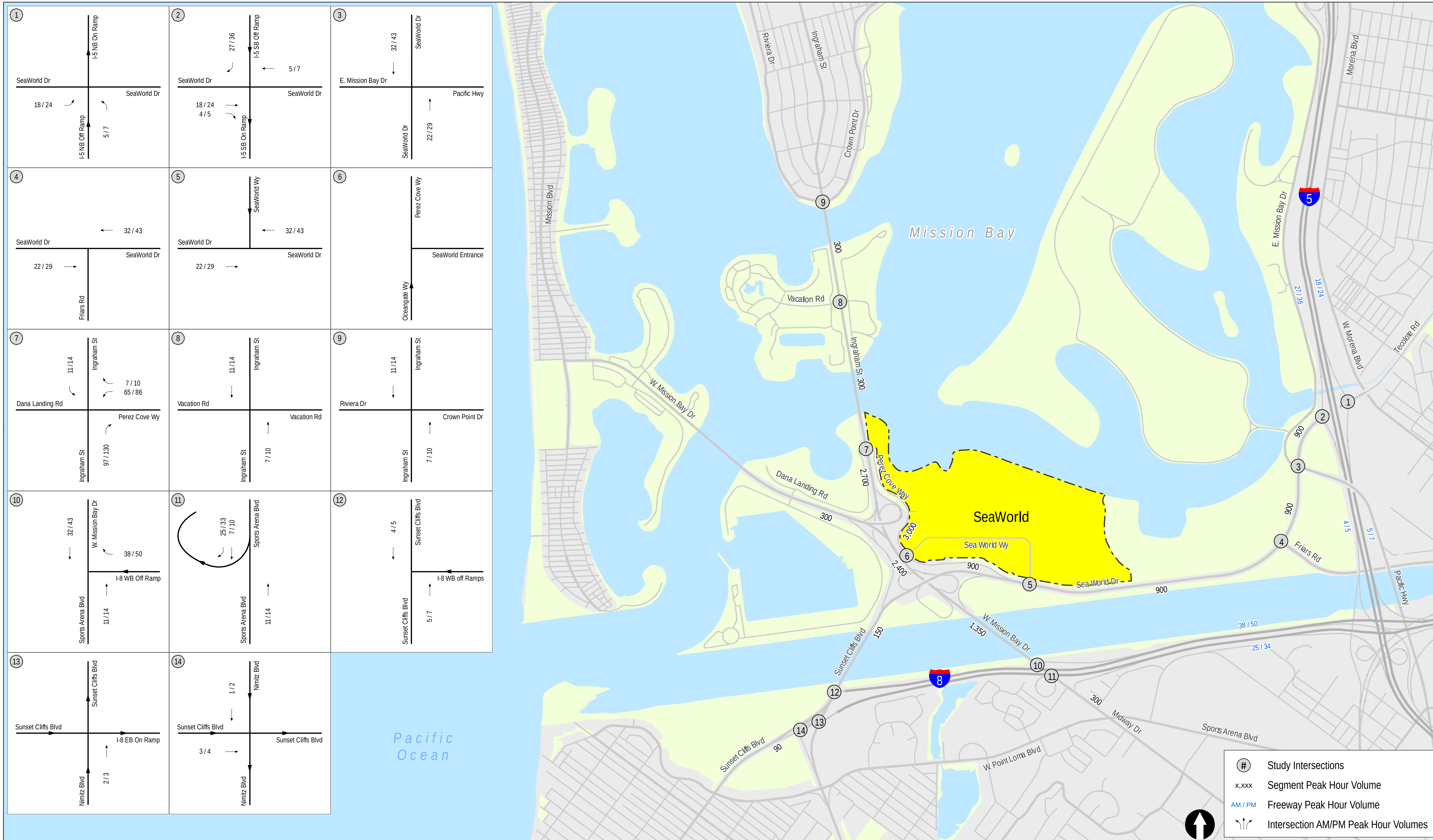

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Figure 6-7
Project Traffic Volumes - Hotel

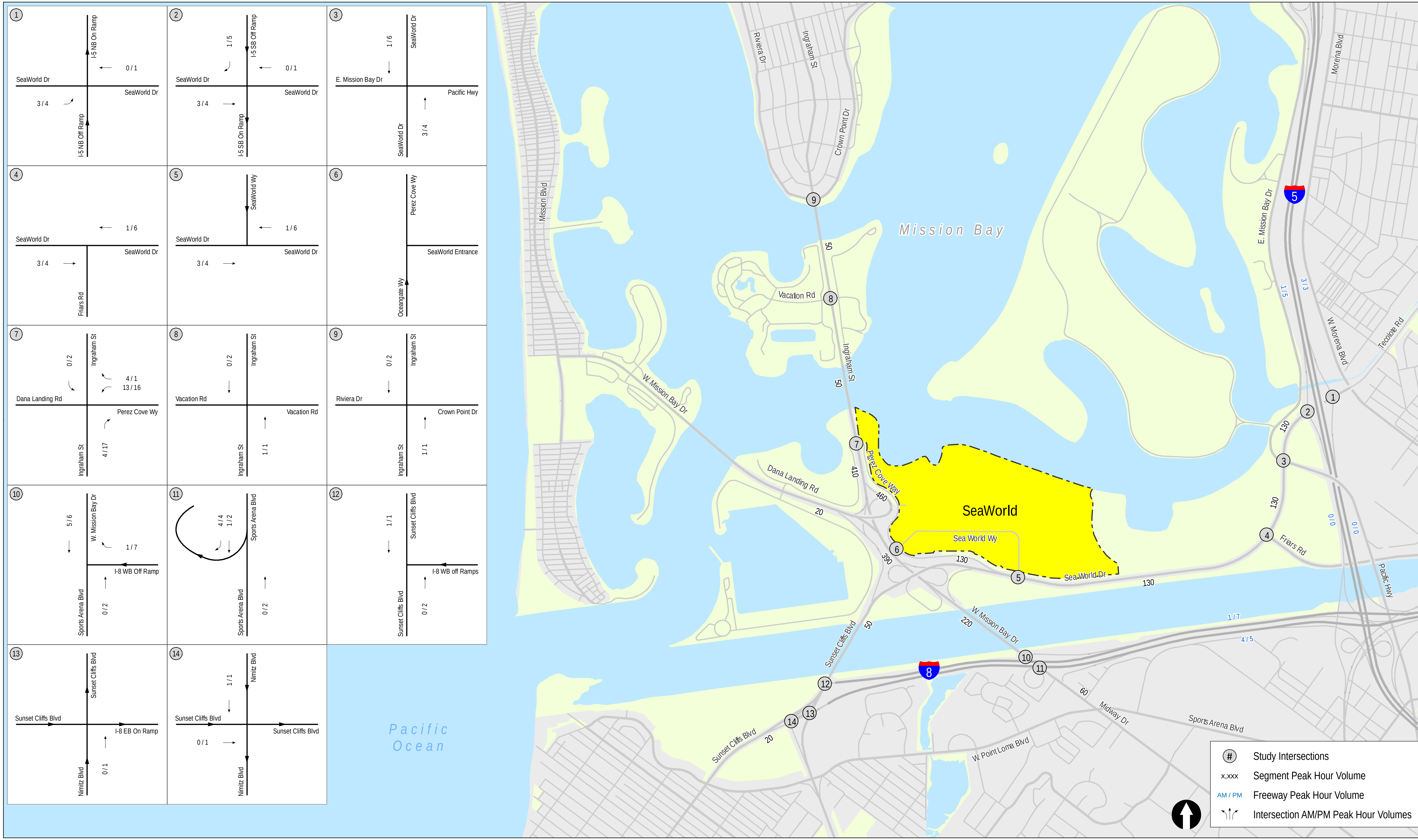

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Figure 6-8

Project Traffic Volumes - Marina

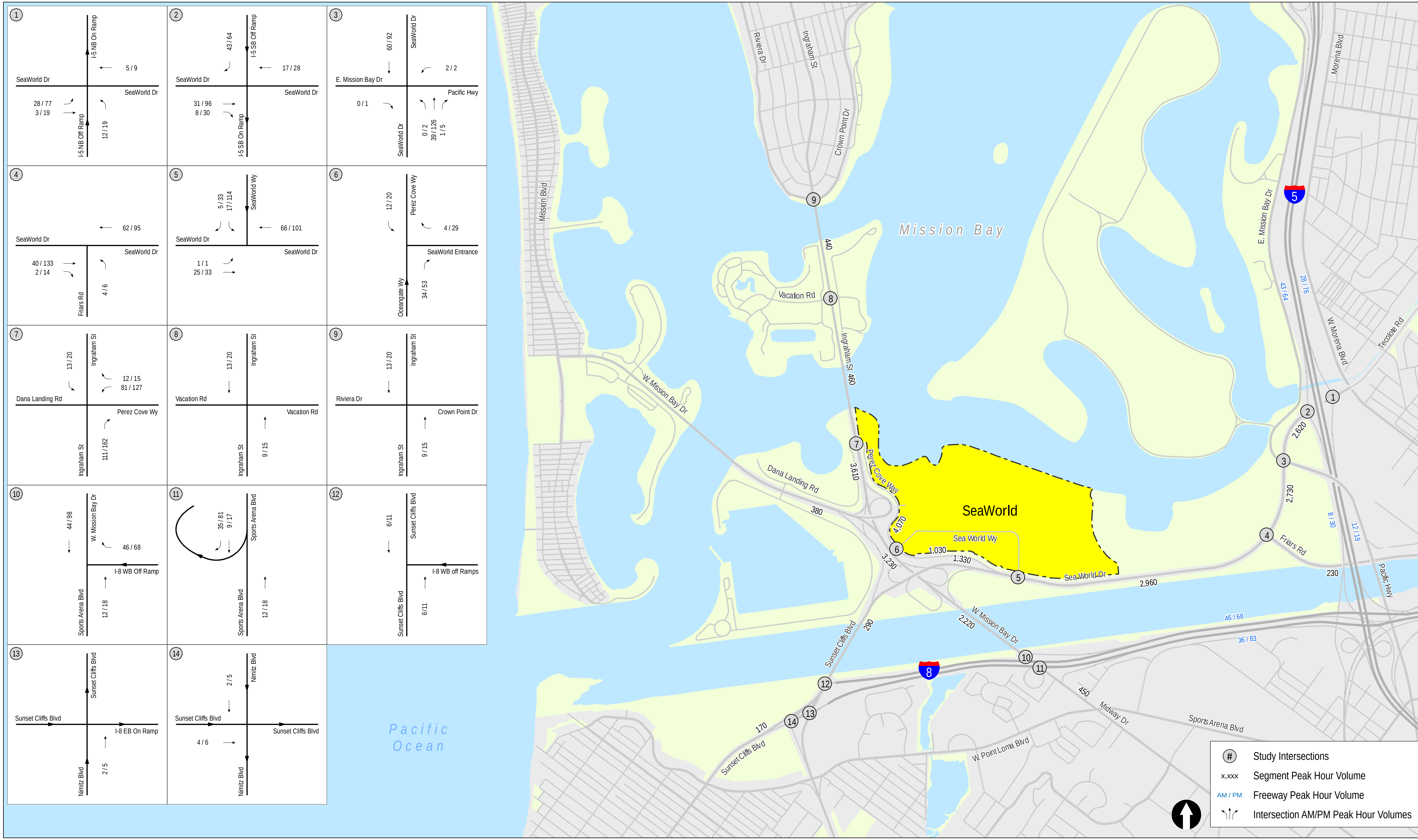

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Figure 6-9

Total Project Traffic Volumes - Horizon Year (Year 2040)

7.0 ANALYSIS OF EXISTING CONDITIONS

The following section presents the analysis of existing study area locations. Given growth in the study area has been relatively stagnant over the past almost 20 years as observed in traffic volumes from the previously studied existing baseline Year 2000 from the 2002 Master Plan and the current Year 2019 existing condition, results of the existing analysis are similar to, and in some cases better than, those analyzed in the previous study.

7.1 Peak Hour Intersection Operations

7.1.1 *Intersection LOS*

Table 7–1a summarizes the Existing intersections LOS. As seen in *Table 7–1a*, all intersections are calculated to currently operate at the acceptable LOS D or better except for the following:

- Intersection #1. Sea World Drive / I-5 NB Ramps – LOS E during the PM peak hour
- Intersection #12. Sunset Cliffs Boulevard / I-8 WB Off-Ramp – LOS F during the PM peak hour

Appendix E contains the Existing intersection analysis worksheets.

7.1.2 *Intersection Queuing*

Table 7–1b presents the existing 95th percentile peak hour queue length for intersection turn pockets within the study area. As shown in *Table 7-1b,* all existing peak hour queues are contained within existing turn pockets except for:

- Intersection #1. Sea World Drive / I-5 Northbound Ramps –
  - Eastbound left turn (AM/PM peak hour)
- Intersection #2. Sea World Drive / I-5 Southbound Ramps –
  - Southbound right turn (PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway –
  - Westbound left turn (PM peak hour)
  - Northbound left turn (PM peak hour)
- Intersection #4. Sea World Drive / Friars Road –
  - Eastbound right turn (AM/PM peak hour)
- Intersection #5. Sea World Drive / Sea World Way –
  - Eastbound left turn (PM peak hour)

Appendix F contains the Existing queuing analysis worksheets.

7.1.3 *Intersection Turn Lane Evaluation*

Table 7–1b also shows the turn lane volumes for the same study area turn pockets. These volumes were compared to the criteria for consideration of an additional turn lane presented in *Section 5.2.4*.

As shown in *Table 7–1b*, the following turn movement meets the traffic volume criteria for an additional turn lane under Existing conditions:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
  - Southbound right turn (PM peak hour)

It should be noted that the current intersection configuration provides this turn movement a dedicated lane as it enters SeaWorld Drive as well as a green arrow for most of the traffic signal cycle. This turn movement is only stopped when pedestrians activate the push button to cross the north leg of this intersection. As such, the traffic volume criteria for signalized intersections shown in *Section 5.2.4* may not be an accurate indicator of the need for an additional turn lane for this turning movement.

7.1.4 *Freeway Interchange Operations*

Table 7–1c presents the existing 95th percentile peak hour queue lengths for freeway off-ramps within the study area. As shown in *Table 7-1c*, all existing off-ramp queues are contained within the available storage except for the following:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
  - Southbound left turn (PM peak hour)
  - Southbound right turn (PM peak hour)

Appendix F also contains the Existing freeway off-ramp queue analysis worksheets.

7.2 Daily Street Segment Operations

Table 7–2 summarizes the Existing roadway segment operations. As seen in *Table 7–2*, the following study area segments are calculated to operate at LOS E or F:

- Segment #1. Sea World Drive: I-5 Ramps to Pacific Highway/E. Mission Bay Drive – LOS E
- Segment #3. Sea World Drive: Friars Road to Sea World Way – LOS E
- Segment #6. W. Mission Bay Drive: Dana Landing Road to Ingraham Street – LOS E
- Segment #7. W. Mission Bay Drive: Ingraham Street to Sea World Drive – LOS F
- Segment #8. W. Mission Bay Drive: Sea World Drive to I-8 Ramps – LOS F
- Segment #12. Ingraham Street: Crown Point Drive to Vacation Road (bridge) – LOS E
- Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/Dana Landing Road (bridge)– LOS E
- Segment #14. Ingraham Street: Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive – LOS F
- Segment #15. Sunset Cliffs Boulevard: W. Mission Bay Drive to I-8 Ramps (bridge) – LOS E
- Segment #16. Sunset Cliffs Boulevard: I-8 Ramps to Nimitz Boulevard – LOS E

7.3 Peak Hour Freeway Mainline Operations

Table 7–3 summarizes the Existing freeway mainline segment operations. As seen in *Table 7–3*, the study area freeway mainline segments of I-5 and I-8 are calculated to currently operate at LOS D or better under Existing conditions except for the following:

- Mainline #2. I-5: SeaWorld Drive to Clairemont Drive
  - Northbound – LOS E (AM peak hours)
  - Southbound – LOS E (PM peak hour)

Appendix G contains the Existing HCS freeway analysis sheets.

7.4 Metered Freeway On-Ramp Operations

The Existing operations of the on-ramp meters were analyzed using the fixed rate analysis methodology and the observed queues/delays. The fixed rate approach generally tends to produce unrealistic queue lengths and delays. The results are theoretical and based on the most restrictive ramp meter rate. Because ramp meter rates are not constant, even within the peak hours, the analysis was conducted using the most restrictive meter rates. The meter rates dynamically adjust based on the level of traffic on the freeway mainlines. Furthermore, the fixed rate approach does not take into account driver behavior such as "ramp shopping" or trip diversion. To account for the inaccuracy of the methodology, queuing observations were conducted to calibrate the analysis and best reflect current operations.

7.4.1 *Field Observation Delay*

Field observations were conducted during September and November, 2019 to validate the calculated queues. Multiple travel time surveys were conducted during the one-hour peak period for each ramp. The results of the field observations were used to calibrate meter rates used in the analysis. ***Table 7–4a*** shows the date, time, and results of the existing on-ramp field observations. The maximum queues observed at each ramp were all contained within the existing storage.

7.4.2 *Freeway On-Ramp Analysis Results*

The ramp meter rates were calibrated to represent observed conditions at each location. ***Table 7–4b*** summarizes the existing operations of study area on-ramp meters using both the fixed rate methodology and the calibrated results based on field observations.

As seen in *Table 7–4b*, the calibrated results of the ramp meter analysis are as follows:

- #1. SeaWorld Drive/ I-5 Northbound On-Ramp – 0.0 minutes/0.0 minutes of delay in the AM/PM peak hours
- #2. SeaWorld Drive/ I-5 Southbound On-Ramp – 0.7 minutes/1.4 minutes of delay in the AM/PM peak hours
- #3. Southbound W. Mission Bay Drive/ I-8 Eastbound On-Ramp – 0.0 minutes of delay in the PM peak hour

TABLE 7–1a
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			Delay [a]	LOS [b]
1. SeaWorld Drive/ I-5 Northbound Ramps	Signal	AM PM	40.5 56.4	D E
2. SeaWorld Drive/ I-5 Southbound Ramps	Signal	AM PM	20.4 23.7	C C
3. SeaWorld Drive/ Pacific Highway/ E. Mission Bay Drive	Signal	AM PM	20.7 47.3	C D
4. SeaWorld Drive/ Friars Road	Signal	AM PM	12.5 20.0	B B
5. SeaWorld Drive/ SeaWorld Way (exit)	Signal	AM PM	6.2 10.6	A B
6. Perez Cove Way/ SeaWorld Entrance	Free	AM PM	— —	— —
7. Ingraham Street/ Perez Cove Way/ Dana Landing Road	Signal	AM PM	9.8 16.3	A B
8. Ingraham Street/ Vacation Road	Signal	AM PM	19.1 26.9	B C
9. Ingraham Street/ Crown Point Drive	Signal	AM PM	24.7 30.2	C C
10. W. Mission Bay Drive/ I-8 Westbound Off-Ramp	Signal	AM PM	37.5 41.2	D D
11. Sports Arena Boulevard/ I-8 Eastbound On-Ramp	Free	AM PM	— —	— —
12. Sunset Cliffs Boulevard/ I-8 Westbound Off-Ramp	Signal	AM PM	45.7 102.6	D F
13. Sunset Cliffs Boulevard/ I-8 Eastbound On-Ramp	Signal	AM PM	18.8 12.9	B B
14. Sunset Cliffs Boulevard/ Nimitz Boulevard	Signal	AM PM	32.4 31.2	C C

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Level of Service.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 7–1b
EXISTING INTERSECTION QUEUING

Intersection	Movement	Turn Lanes	Storage (ft)	Peak Hour	Existing	
					Queue (ft) [a]	Volume
1. Sea World Drive / I-5 Northbound Ramps	NBL	1	1000	AM PM	209 249	245 260
	EBL	2	220	AM PM	**256** **276**	793 753
2. Sea World Drive / I-5 Southbound Ramps	SBR	1	150	AM PM	112 **176**	667 **955**
	EBR	1	400	AM PM	36 61	51 200
3. Clairemont Mesa Blvd / SR-163 Northbound Ramps	WBL	1	155	AM PM	52 **189**	45 161
	NBR	0	[b]	AM PM	[b] [b]	55 124
	NBL	2	310	AM PM	287 **412**	224 179
	EBR	1	250	AM PM	21 133	83 244
4. Sea World Drive / Friars Road	NBL	2	850	AM PM	118 151	226 303
	EBR	1	215	AM PM	**265** **241**	220 725
5. Sea World Drive / Sea World Way	SBR	2	600	AM PM	32 61	21 115
	SBL	2	600	AM PM	51 159	71 395
	EBL	1	110	AM PM	64 **126**	16 34

Continued on Next Page

TABLE 7–1b
EXISTING INTERSECTION QUEUING

Intersection	Movement	Turn Lanes	Storage (ft)	Peak Hour	Existing	
					Queue (ft) [a]	Volume
Continued from Previous Page						
7. Ingraham Street / Dana Landing Way / Perez Cove Way	SBL	2	180	AM PM	30 54	9 11
	WBR	1	55	AM PM	28 53	7 16
	WBL	2	520	AM PM	34 135	13 229
	NBR	1	180	AM PM	109 175	116 88
10. W. Mission Bay Drive / I-8 Westbound Off-Ramp	WBR	2	1,530	AM PM	941 922	1,654 1,666

Footnotes:

a. 95th percentile queue length.
b. Shared turn movement lane. Turn movement queue not separately calculated.

General Notes:

- **Bold** typeface and shading in queue column indicate queue is calculated to exceed available storage.
- **Bold** typeface and shading in volume column indicate turn volume exceeds threshold for consideration of an additional turn lane.
- Ft = Feet
- SBR = Direction/Turn Lane, e.g., southbound right-turn lane.

TABLE 7–1C
EXISTING FREEWAY INTERCHANGE OPERATIONS

Intersection	Movement	Storage (ft)	Peak Hour	Existing Queue (ft) [a]
1. Sea World Drive / I-5 NB Off Ramp	NBL	1000	AM	209
			PM	249
	NBR	1000	AM	130
			PM	257
2. SeaWorld Drive / I-5 SB Off Ramp	SBL	150	AM	**182**
			PM	303
	SBR	150	AM	112
			PM	**176**
10. W. Mission Bay Drive / I-8 WB Off Ramp	WBR	1,530	AM	941
			PM	922
	WBL	1,530	AM	977
			PM	915
12. Sunset Cliffs Boulevard / I-8 WB Off Ramp	WBR	n/a	AM	48
			PM	28
	WBL	n/a	AM	830
			PM	757

Footnotes:

a. 95th percentile queue length.

General Notes:

- **Bold** typeface and shading indicate queue is calculated to exceed available storage.
- Ft = Feet
- SBR = Direction/Turn Lane; e.g. southbound right-turn lane.
- n/a = not applicable due to Freeway terminating at this location.

TABLE 7–2
EXISTING DAILY STREET SEGMENT OPERATIONS

Street Segment	Currently Built As	Capacity (LOS E) [a]	ADT [b]	LOS [c]	V/C [d]
SeaWorld Drive					
1. I-5 Ramps to Pacific Highway/ E. Mission Bay Drive	5-Lane Major Arterial	45,000	39,140	E	0.870
2. Pacific Highway/ E. Mission Bay Drive to Friars Road	4-Lane Major Arterial	40,000	34,630	D	0.866
3. Friars Road to SeaWorld Way	4-Lane Major Arterial	40,000	38,830	E	0.971
4. SeaWorld Way to W. Mission Bay Drive	5-Lane Major Arterial	45,000	38,670	D	0.859
Friars Road					
5. Pacific Highway to SeaWorld Drive	4-Lane Major Arterial	40,000	13,360	A	0.334
West Mission Bay Drive					
6. Dana Landing Road to Ingraham Street	4-Lane Major Arterial	40,000	38,380	E	0.960
7. Ingraham Street to SeaWorld Drive	6-Lane Primary Arterial	60,000	71,570	F	1.193
8. SeaWorld Drive to I-8 Ramps (bridge) [e]	4-Lane Major Arterial	60,000	56,900	E	0.948
9. I-8 Ramps to Sports Arena Boulevard	6-Lane Primary Arterial	60,000	35,990	C	0.600
Perez Cove Way					
10. Ingraham Street to SeaWorld Entrance	3-Lane Collector	15,000	7,600	C	0.507
11. SeaWorld Entrance to SeaWorld Drive	4-Lane Collector (one-way)	15,000	2,320	A	0.155
Ingraham Street					
12. Crown Point Drive to Vacation Road (bridge)	4-Lane Major Arterial	40,000	36,470	E	0.912
13. Vacation Road to Perez Cove Way/ Dana Landing Road (bridge)	4-Lane Major Arterial	40,000	39,330	E	0.983
14. Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive	4-Lane Major Arterial	40,000	50,170	F	1.254
Sunset Cliffs Boulevard					
15. W. Mission Bay Drive to I-8 Ramps (bridge)	4-Lane Major Arterial	40,000	37,560	E	0.939
16. I-8 Ramps to Nimitz Boulevard	4-Lane Major Arterial	40,000	39,610	E	0.990

Footnotes:

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. At the time of data collection, the West Mission Bay Drive bridge was under construction to be improved to six (6) lanes. Construction is currently expected to be complete in Mid 2022.

TABLE 7–3
EXISTING FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir	# of Lanes [a]	Volume [b]	%K [c]		%D [c]		Truck Factor	Peak Hour Volume [c]		Flow Rate (pc/h/ln)		Adj. Capacity (pc/h/ln)	V/C [d]		Density [e]		LOS [f]	
				AM	PM	AM	PM		AM	PM	AM	PM		AM	PM	AM	PM	AM	PM
Interstate 5																			
1. Interstate 8 to Sea World Drive	NB	5M+1A	201,000	7.15%	7.81%	54.69%	46.81%	3.40%	7,860	7,348	1,441	1,347	2,166	0.665	0.622	23.3	21.7	C	C
	SB	4M+2A		7.15%	7.81%	45.31%	53.19%	3.40%	6,512	8,350	1,194	1,531	2,011	0.594	0.761	19.3	26.2	C	D
2. Sea World Drive to Clairemont Drive	NB	4M+1A	228,000	7.15%	7.81%	54.69%	46.81%	3.40%	8,916	8,335	1,962	1,834	2,140	0.917	0.857	36.9	32.6	E	D
	SB	4M+1A		7.15%	7.81%	45.31%	53.19%	3.40%	7,386	9,471	1,625	2,084	2,140	0.759	0.974	27.0	42.2	D	E
Interstate 8																			
3. W. Mission Bay Drive to Interstate 5	EB	3M+1A	104,000	7.46%	6.59%	44.07%	39.03%	1.20%	3,419	2,675	920	720	2,090	0.440	0.344	14.8	11.6	B	B
	WB	3M+2A		7.46%	6.59%	55.93%	60.97%	1.20%	4,339	4,179	934	900	1,961	0.476	0.459	14.7	14.2	B	B

Footnotes:

a. Lane geometry taken from PeMS lane configurations at corresponding postmile.
b. Existing ADT volumes from most recent Caltrans Traffic Census Program (2018) and grown to Year 2019 using five years of historical Caltrans data.
c. Peak hour volumes calculated from K and D factors provided in most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
d. V/C = (Peak Hour Volume/Hourly Capacity)
e. Density measures passenger cars per mile per lane. Density = Flow Rate (passenger-cars/hour/lane) ÷ Speed (average passenger-car speed in mph).
f. LOS = Level of Service

LOS	Density Range (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

General Note:

- M = Mainline
- A = Auxiliary
- Truck factor sourced to most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
- "—" Indicates density exceeds the maximum threshold for LOS F.

TABLE 7–4a
EXISTING RAMP METER OBSERVATIONS

Location	Storage (ft)	Peak Hour	Date	Max Queue (ft)	Max Delay (sec)	Storage Exceeded?
1. I-5 Northbound On-Ramp from SeaWorld Drive (2 SOV)	570	7:30-8:30AM	Wednesday, September 11, 2019	245	40	No
		4:30-5:30PM	Tuesday, September 10, 2019	170	30	No
2. I-5 Southbound On-Ramp from SeaWorld Drive (1 SOV + 1 HOV)	360	7:00-8:00AM	Wednesday, November 13, 2019	270	45	No
		5:00-6:00PM	Wednesday, November 13, 2019	345	83	No
3. I-8 Eastbound On-Ramp from Southbound W. Mission Bay Drive (2 SOV) [a]	790	5:00-6:00PM	Wednesday, November 13, 2019	0	0	No

Footnotes:

a. Ramp meter does not operate during AM peak period.

TABLE 7–4b
EXISTING RAMP METER OPERATIONS

Location/Condition	Peak Hour [a]	Peak Hour Volume	SOV Demand [b] (veh/hr/ln)	Ramp Meter Rate [c] (veh/hr/ln)	Excess Demand (veh/hr/ln) [d]	Delay per Lane [e]	Queue per Lane [f]
▪ **I-5 Northbound On-Ramp from SeaWorld Drive (2 SOV)**							
Existing	AM	1,055	528	*Restrictive:* 965	0	0.0	0
				Observed: 774	0	0.0	0
	PM	1,072	536	*Restrictive:* 972	0	0.0	0
				Observed: 612	0	0.0	0
▪ **I-5 Southbound On-Ramp from SeaWorld Drive (1 SOV + 1HOV)**							
Existing	AM	309	278	*Restrictive:* 318	0	0.0	0
				Observed: 275	3	0.7	75
	PM	398	358	*Restrictive:* 318	40	7.5	1,000
				Observed: 350	8	1.4	200
▪ **I-8 Eastbound On-Ramp from Southbound W. Mission Bay Drive/Sports Arena Boulevard (2 SOV)**							
Existing	PM	1,175	588	*Restrictive:* 696	0	0.0	0
				Observed: 696	0	0.0	0

Footnotes:

a. Selected peak hour based on period when ramp meter is operating.
b. Peak hour demand in vehicles/hour/lane for single-occupancy vehicle (SOV) lanes. 10% HOV reduction obtained from PeMS data collected along the mainline, where available.
c. Meter rate "R" is the most restrictive rate at which the ramp meter (signal) discharges traffic onto the freeway (obtained from Caltrans). The discharge rate varies depending on the mainline volumes. While meter rates were obtained from Caltrans, the rates were revised to reflect existing ramp meter observations discussed in *Section 7.4*.
d. Excess Demand on hourly basis. If SOV Demand > Ramp Meter Rate, Excess Demand = SOV Demand – Ramp Meter Rate.
e. Delay expressed in minutes per lane. If Excess Demand > 0, Delay = Excess Demand ÷ Ramp Meter Rate * 60 minutes/hour.
f. Queue in feet calculated assuming vehicle length of 25 feet. If Excess Demand > 0, Queue = Excess Demand * 25 feet.

General Notes:

- SOV = Single-Occupancy Vehicles; HOV = High-Occupancy Vehicles

8.0 NEAR-TERM (YEAR 2025) CUMULATIVE CONDITIONS

8.1 Summary of Cumulative Projects

Cumulative projects are other reasonably foreseeable projects in the study area that will add traffic to the local circulation system or alter the transportation network in the near future. LLG reviewed the City's Open DSD website to identify relevant, pending cumulative projects in the study area expected in the near-term Year 2025 condition. Based on this research, the following cumulative projects were considered.

Table 8–1 provides a summary of the cumulative project trip generation summary.

1. The ***Mission Beach Residences (PTS# 366139)*** project is located north of W. Mission Bay Drive, east of Mission Boulevard. This cumulative project proposes to develop 51 total units comprised of one (1) single family unit, four (4) duplex, 30 triplex, and 16 four-plex units. This project is calculated to generate 306 daily trips with 24 AM peak hour trips (5 inbound / 19 outbound) and 27 PM peak hour trips (19 inbound / 8 outbound). Trip generation, distribution, and assignment assumptions were obtained from the transportation study prepared by Urban Systems Associates. The project completed construction in 2021 and was included in the near-term Year 2025 analysis.
2. The ***Santa Barbara Place Residences (PTS# 361595)*** project is also located north of W. Mission Bay Drive, east of Mission Boulevard. The project proposes to develop 12 four-plex units. This project is calculated to generate 72 daily trips with 6 AM peak hour trips (1 inbound / 5 outbound) and 6 PM peak hour trips (4 inbound / 2 outbound). Trip generation, distribution, and assignment assumptions were obtained from the transportation study prepared by Urban Systems Associates. The project completed construction in 2021 and was included in the near-term Year 2025 analysis.
3. The ***Fairfield Morena Boulevard (PTS# 526167)*** project proposes to redevelop an existing short-term rental "RV Park" and accompanying storage yard, which is adjacent to W. Morena Boulevard to the west, and bound by Tonopah Avenue to the north, Morena Boulevard to the south, and Frankfort Street to the east. Site development for the approximately 6-acre property has been proposed at 150 market-rate apartment units. The project is approved by City Council, site development permit issued on January 8th, 2019, and is under construction in 2021. This project is calculated to generate 900 daily trips with 72 AM peak hour trips (14 inbound / 58 outbound) and 81 PM peak hour trips (57 inbound / 24 outbound). Trip generation, distribution, and assignment assumptions were obtained from the April 2018 transportation study prepared by LLG. The project was included in the near-term Year 2025 analysis.
4. The ***Bahia Resort Hotel Expansion*** is located at 998 W. Mission Bay Drive in the City of San Diego. The project proposes the redevelopment of the site and many of the existing rooms. The ultimate goal is the expansion by 285 rooms to a total of 600 rooms. This project is calculated to generate 2,850 daily trips with 171 AM peak hour trips (103 inbound / 68 outbound) and 228 PM peak hour trips (137 inbound / 91 outbound). Trip generation,

distribution and assignment assumptions were obtained from the transportation study prepared by LLG. The Bahia Resort Hotel Expansion is accounted for in the Mission Bay Park Master Plan (January 2018) but has yet to go forward for approval to City Council. For these reasons, the project was not included in the near-term analysis, but is accounted for in the horizon year condition.

5. The ***Mariner's Cove (PTS#663418)*** project is located at the existing Mariner's Cove residential development on West Point Loma Drive in the Community of Ocean Beach. The project proposes the redevelopment of the site to increase the number of apartment units from 500 units to 772 units. This project is calculated to generate a net 1,928 daily trips with 155 AM peak hour trips (37 inbound / 118 outbound) and 172 PM peak hour trips (119 inbound / 53 outbound). LLG is currently conducting the transportation study for this project. Trip generation, distribution and assignment assumptions were obtained from that study.

6. The ***Balboa Avenue Station Area Specific Plan*** was conceived as part of the Mid-Coast Trolley Project and was adopted by City Council on September 10, 2019. The Mid-Coast Trolley will extend Blue Line Trolley service from Santa Fe Depot in Downtown San Diego to the University City Community and is expected to be operation beginning in late 2021. The Balboa Avenue station is located south of Balboa Avenue, east of Interstate 5 and west of Morena Boulevard; near the border of the Pacific Beach and Clairemont communities in the City of San Diego, California. Access is provided off Morena Boulevard. The City-approved Transportation Impact Study (TIS) prepared by Kimley Horn, December 2017, was reviewed to determine if this project would have any effective change on transportation operations in the immediate vicinity of the SeaWorld study area under near-term conditions. Based on our review of the TIS, no changes to near-term conditions at study area locations were assumed in this analysis.

7. The ***Morena Corridor Specific Plan (PC-19-008)*** proposes to redevelop an auto-oriented commercial corridor into a pedestrian-oriented village with employment areas, retail, and residential uses adjacent to the Tecolote and Morena/Linda Vista trolley stations in the Linda Vista community. The Specific Plan area is approximately 280 acres along Morena Boulevard and West Morena Boulevard between Clairemont Drive and Friars Road. The Adoption of Morena Corridor Specific Plan was approved by the City in September 2019 and has been reviewed to determine if this project would change transportation operations in the vicinity of the SeaWorld study area under near-term conditions. Based on our review, no changes to near-term conditions at study area locations were assumed in this analysis.

8. The ***Fiesta Island/Mission Bay Park Master Plan Amendment*** proposes changes to the current Master Plan to modify land uses in the southwestern portion of the island focusing on the off-leash dog area and was adopted by City Council on June 17, 2019. The project proposes changes to the roadway configuration, modifications to parking, integrated pedestrian and bicycle paths, and increased pedestrian access through the interior of the island. Given this project is a long-range Master Plan Amendment, changes to the mobility system were assumed under horizon year conditions only.

9. The ***De Anza Cove/Mission Bay Park Master Plan Amendment*** proposes to reimagine, repurpose, and revitalize the northeast corner of Mission Bay Park. The Master Plan would allow for any one, or all, of the following uses in the De Anza Special Study area: guest housing, regional parkland, beach, non-motorized boating concessions, wetlands, wetland-related hydrologic improvements, and paths and trails. The City of San Diego released an updated proposal for the redevelopment of De Anza Cove in January 2022 and is currently soliciting initial public input. Given this project is a long-range Master Plan Amendment and is not yet approved by City Council or Coastal Commission, no changes to the mobility system were assumed under horizon year conditions only.

10. The ***4200 Tonopah Avenue*** (PTS #512890) project proposes to construct 13 condominium units, including one affordable unit on a 0.61-acre site. The project site development permit was issued in December 2020. This project is calculated to generate 78 daily trips with 6 AM peak hour trips (1 in / 5 out) and 7 PM peak hour trips (5 in / 2 out). The project was included in the near-term Year 2025 analysis.

Figure 8–1 shows the locations of the cumulative projects.

TABLE 8–1
CUMULATIVE DEVELOPMENT PROJECTS SUMMARY

No.	Name	Project	ADT [a]	AM		PM		Status
				In	Out	In	Out	
1	Mission Beach Residences PTS# 366139	51 MFDU	306	5	19	19	8	Approved and Built
2	Santa Barbara Place Residences PTS# 361595	12 MFDU	72	1	5	4	2	Approved and Built
3	Fairfield Morena Boulevard PTS# 526167	150 apartments	900	14	58	57	24	Approved and Under Construction
4	Bahia Resort Expansion	Expansion of 285 hotel rooms, conference space, restaurants, retail spaces, fitness amenities	2,850	103	68	137	91	Not Yet Approved
5	Mariner's Cove PTS# 634513	252 additional apartments	1,512	24	97	95	41	Under Review
6	Balboa Avenue Station Specific Plan	Trolley Station, Land Use & Network Changes	—	—	—	—	—	Approved
7	Morena Corridor Specific Plan	Land Use & Network Changes	—	—	—	—	—	Approved
8	Mission Bay Park Master Plan Fiesta Island Amendment	Land Use & Network Changes	—	—	—	—	—	Not Yet Approved
9	Mission Bay Park Master Plan De Anza Cove	Land Use & Network Changes	—	—	—	—	—	Not Yet Approved
10	4200 Tonopah Avenue PTS# 512890	13 MFDU	78	1	5	5	2	Approved
Total Cumulative Projects			**5,718**	**148**	**252**	**317**	**168**	–

Footnotes:

a. Average daily traffic.

General Note:

- "—" indicates project entails land use and/or mobility network changes but does not generate new vehicle traffic.

8.2 Network Conditions

A review of the City's planning documents was completed to identify potential network improvements. The Public Facilities Financing Plans (PFFPs) and Capital Improvement Project (CIP) lists were reviewed for the surrounding communities of Mission Bay Park, Linda Vista, Clairemont, Peninsula, Midway-Pacific, and Ocean Beach. One (1) infrastructure improvement was identified for inclusion in the Near-Term (Year 2025) analysis.

The City of San Diego is currently constructing the West Mission Bay Drive Bridge Replacement Project (CIP S-00871). The bridge was previously constructed with four (4) travel lanes (2 in each direction), five-foot sidewalks, and a concrete median barrier. The daily capacity of the bridge as a four-lane roadway is currently exceeded by existing traffic volumes. Thus, the replacement project to widen the bridge to six (6) lanes is currently underway. This infrastructure project is located on West Mission Bay Drive between Interstate 8 and SeaWorld Drive, approximately 1.25 miles west of the Interstate 5/Interstate 8 (I-5/I-8) interchange within the City of San Diego. Once complete, the project will replace the existing four-lane bridge with two separate three-lane structures, providing an improved transportation link across the San Diego River. The improvements include:

- Two new parallel bridge structures with three travel lanes in each direction
- A Class 1 bike path on both bridges
- Roadway widening and improvements along Sports Arena Boulevard, West Mission Bay Drive, and the Westbound I-8 Off-Ramp
- Additional architectural features
- Environmental mitigation

Construction commenced in Summer 2018 and is expected to be complete by mid-Year 2022 (per the City's website). Therefore, this infrastructure improvement was included in the near-term Year 2025 analysis. It should be noted the bridge widening is being constructed using a technique that allows for normal operation of the existing four-lane bridge.

A review of the Mission Bay Park Master Plan found improvements to circulation within the study area, but none were contemplated or completed by the near-term condition. No other infrastructure improvement projects were assumed in the Near-Term (Year 2025) condition.

8.3 Traffic Volumes

Recently, the Mission Bay Park Master Plan – Fiesta Island Amendment Final EIR was approved by City staff. The Fiesta Island Amendment evaluates changes to circulation and land use on the island expected to occur over time. The changes to Fiesta Island would not be expected prior to the Near-Term (Year 2025) conditions analyzed in this report; however, the method for forecasting future traffic conditions was deemed appropriate for use in this analysis.

The Mobility Assessment conducted for the Fiesta Island Amendment used the SANDAG Series 12 travel demand forecast model to calculate future traffic volumes in the general vicinity near Fiesta Island. This model included land use assumptions consistent with those in the MBPMP. For purposes of being consistent with this document, this same approach was used to forecast (Near-Term) Year 2025 traffic volumes and ultimately, Horizon Year (Year 2040) traffic volumes.

To determine the (Near-Term) Year 2025 daily volumes, compound annual growth by segment was calculated using the SANDAG Series 12 forecast volumes. The growth rate between years 2008 and 2050 was applied for a period of six (6) years to the ground count volumes collected in 2019 to determine the (Near-Term) Year 2025 daily traffic volumes. Based on the model volumes, the growth rate on the study area segments between years 2008 and 2050 ranged from a low of 0.43% on Ingraham Street near Vacation Road to a high of 1.76% on Friars Road near SeaWorld Drive.

The (Near-Term) Year 2025 peak hour volumes were then calculated using the (Near-Term) Year 2025 daily volumes in the study area. The existing ratio of peak hour volume to existing daily traffic volume was applied to the (Near-Term) Year 2025 ADT volume to determine the near-term peak hour intersection volumes weekday AM/PM peak periods. The (Near-Term) Year 2025 peak hour intersection volumes were then converted to turning movement volumes using the existing intersection turning movement patterns for each peak period.

The cumulative projects listed above in *Section 8.1*, except for the Bahia Resort Expansion project, are captured in the general growth forecasted by (Near-Term) Year 2025.

Figure 8–1 shows the location of the individual cumulative projects. ***Figure 8–2*** depicts the Near-Term (Year 2025) Without Project traffic volumes on the street network. ***Figure 8–3*** depicts the Near-Term (Year 2025) With Project traffic volumes on the street network.

Appendix H contains the Near-Term (Year 2025) traffic forecast methodology using the SANDAG Series 12 Mission Bay Park Master Plan Fiesta Island Amendment Year 2050 traffic model.

TABLE 8–2
YEAR 2025 TRAFFIC VOLUME GROWTH

Street Segment	2019 ADT [a]	Annual Growth (2008-2050)	2025 with Project ADT [c]
SeaWorld Drive			
1. I-5 Ramps to Pacific Highway	39,140	1.00%	41,500
2. Pacific Highway to Friars Road	34,630	1.19%	37,200
3. Friars Road to SeaWorld Way	38,830	1.19%	41,700
4. SeaWorld Way to W. Mission Bay Drive	38,670	0.84%	40,700
Friars Road			
5. Pacific Highway to SeaWorld Drive	13,360	1.76%	14,800
West Mission Bay Drive			
6. Dana Landing Road to Ingraham Street	38,380	0.59%	39,700
7. Ingraham Street to SeaWorld Drive	71,570	0.80%	75,100
8. SeaWorld Drive to I-8 Ramps (bridge)	56,900	0.65%	59,200
9. I-8 Ramps to Sports Arena Boulevard	35,990	0.86%	37,900
Perez Cove Way			
10. Ingraham Street to SeaWorld Main Entrance	7,600	n/a [b]	7,760
11. SeaWorld Main Entrance to SeaWorld Drive	2,320	n/a [b]	2,600
Ingraham Street			
12. Crown Point Drive to Vacation Road	36,470	0.43%	37,400
13. Vacation Road to Perez Cove Way (bridge)	39,330	0.59%	40,700
14. Perez Cove Way to W. Mission Bay Drive	50,170	0.51%	51,700
Sunset Cliffs Boulevard			
15. W. Mission Bay Drive to I-8 Ramps (bridge)	37,560	0.60%	38,900
16. I-8 Ramps to Nimitz Boulevard/ W. Point Loma Boulevard	39,610	0.48%	40,800

Footnotes:

a. Average Daily Traffic Volumes.
b. Only project-related growth on Segments 10-11 which provide access to Project site.
c. 2025 ADT calculated using compound annual growth rate shown for a period of six (6) years from 2019 to 2025, rounded to nearest 100 ADT. For example, Segment #1: 39,140 * $(1.0100)^6$ = 41,500.

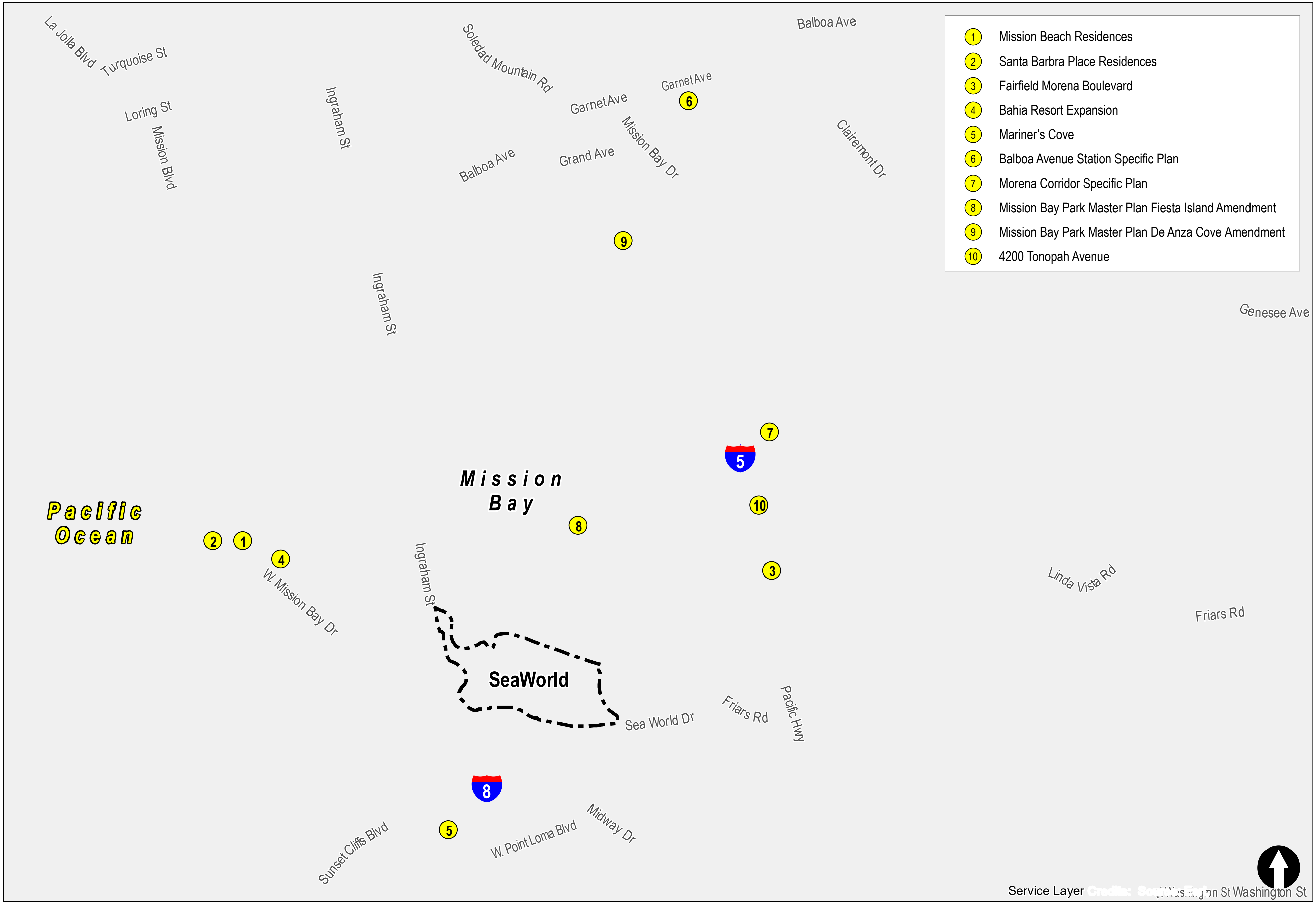

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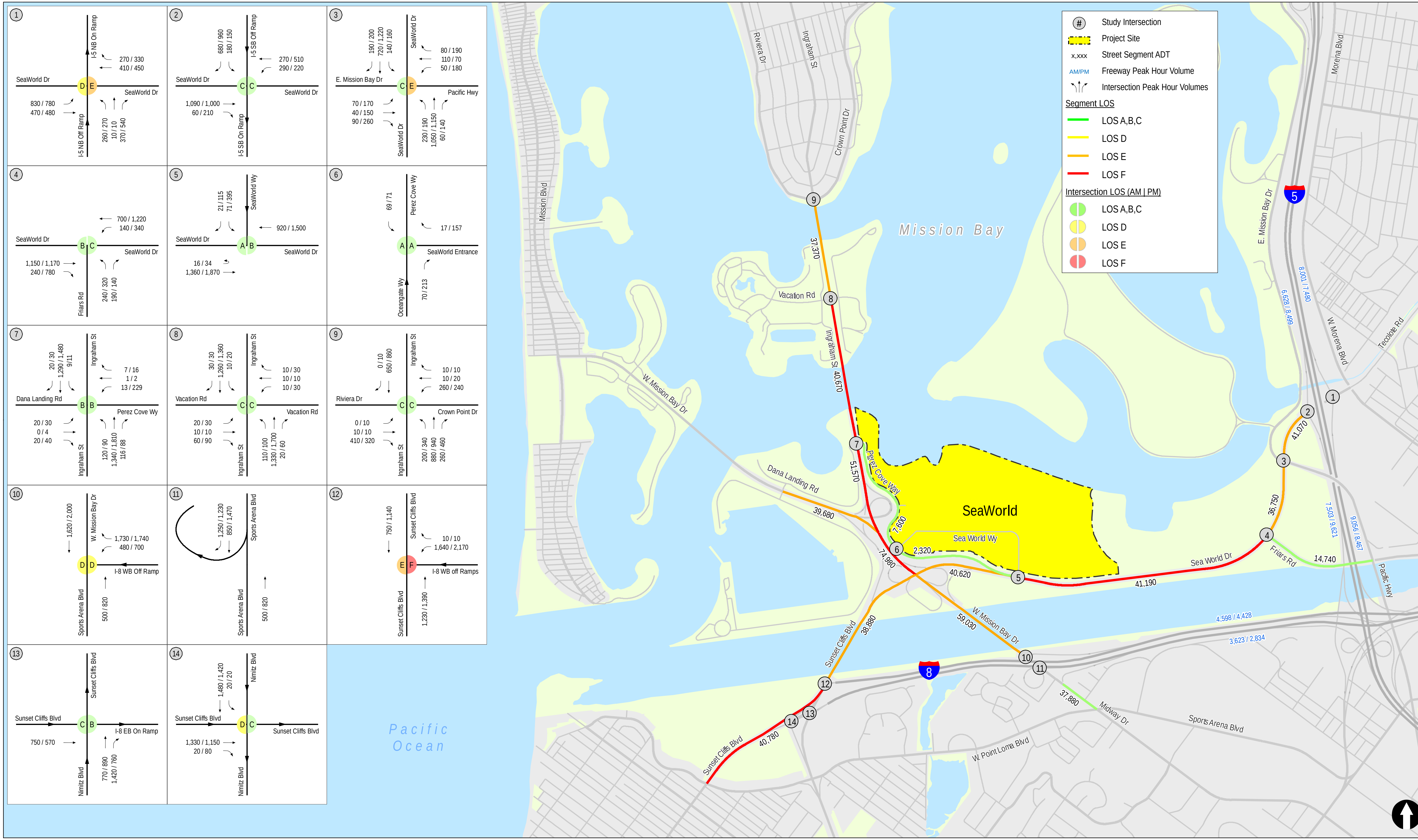
Figure 8-1
Cumulative Project Location Map



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Linscott Law & Greenspan engineers

Figure 8-2

Near-Term (Year 2025) Without Project Traffic Volumes

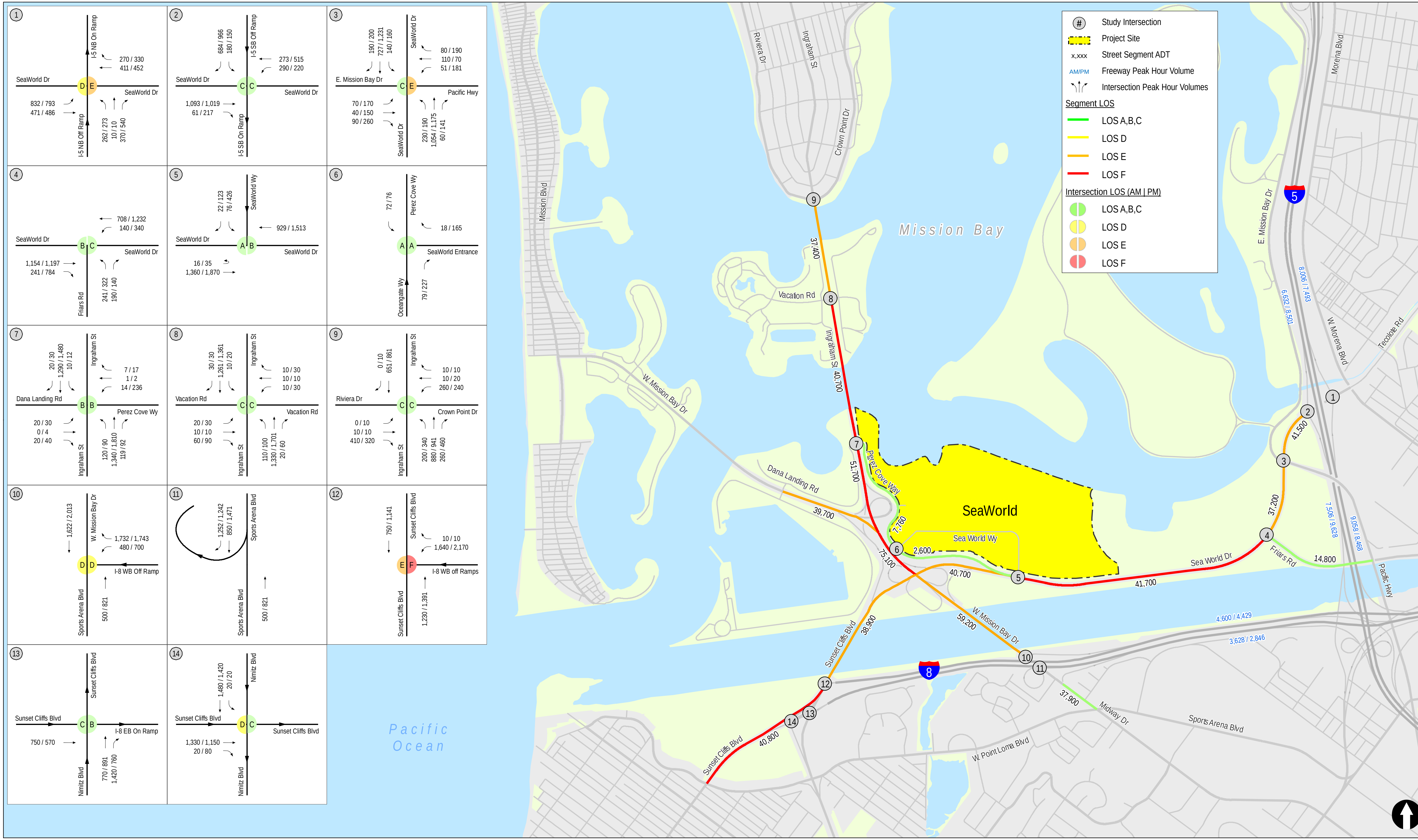

Figure 8-3

Near-Term (Year 2025) With Project Traffic Volumes

9.0 ANALYSIS OF NEAR-TERM (YEAR 2025) SCENARIOS

The following section presents the analysis of study area locations under two scenarios. The Near-Term (Year 2025) Without Project condition includes nearby reasonably foreseeable cumulative development projects, but not the Project. Both scenarios assume completion of the Mission Bay Drive Bridge Replacement Project. Otherwise, existing lane geometrics are assumed.

9.1 Near-Term (Year 2025) Without Project

9.1.1 *Peak Hour Intersection Analysis - LOS*

Table 9–1a summarizes the peak hour intersection operations for the Near-Term (Year 2025) Without Project condition. As seen in *Table 9–1a*, under Near-Term (Year 2025) Without Project conditions, all intersections are calculated to operate at acceptable LOS D or better except for the following:

- Intersection #1. Sea World Drive / I-5 NB Ramps – LOS E during the PM peak hour
- Intersection #3. Sea World Drive / Pacific Highway – LOS E during the PM peak hour
- Intersection #12. Sunset Cliffs Boulevard / I-8 WB Off-Ramp – LOS E during the AM peak hour and LOS F during the PM peak hour

Appendix I contains the peak hour intersection analysis worksheets for the Near-Term (Year 2025) Without Project condition.

9.1.2 *Peak Hour Intersection Analysis – Queuing*

Table 9–1b presents the 95th percentile peak hour queue lengths for intersection turn pockets where the Project adds traffic within the study area for the Near-Term (Year 2025) scenario. As shown in *Table 9–1b*, all near-term peak hour queues are expected to be contained within existing turn pockets except for:

- Intersection #1. Sea World Drive / I-5 Northbound Ramps –
  - Eastbound left turn (AM/PM peak hour)
- Intersection #2. Sea World Drive / I-5 Southbound Ramps –
  - Southbound right turn (PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway –
  - Westbound left turn (PM peak hour)
  - Northbound left turn (AM/PM peak hour)
- Intersection #4. Sea World Drive / Friars Road –
  - Eastbound right turn (AM/PM peak hour)
- Intersection #5. Sea World Drive / Sea World Way –
  - Eastbound left turn (PM peak hour)

Appendix J contains the peak hour queuing analysis worksheets for the Near-Term (Year 2025) Without Project condition.

9.1.3 *Peak Hour Intersection Turn Lane Evaluation*

Table 9–1b also shows the turn lane volumes for the same study area turn pockets. These volumes were compared to the criteria for consideration of an additional turn lane presented in *Section 5.2.4*. As shown in *Table 9–1b*, the following turn movement meets the criteria for an additional turn lane under Near-Term (Year 2025) conditions:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
    - Southbound right turn (PM peak hour)

It should be noted that the current intersection configuration provides this turn movement a dedicated lane as it enters SeaWorld Drive as well as a green arrow for most of the traffic signal cycle. This turn movement is only stopped when pedestrians activate the push button to cross the north leg of this intersection. As such, the traffic volume criteria for signalized intersections shown in *Section 5.2.4* may not be an accurate indicator of the need for an additional turn lane for this turning movement.

9.1.4 *Peak Hour Freeway Interchange Operations*

Table 9–1c presents the 95th percentile peak hour queue lengths for freeway off-ramps within the study area for the Near-Term (Year 2025) scenario. As shown in *Table 9-1c*, all near term off-ramp queues are contained within the available storage except for the following:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
    - Southbound left turn (PM peak hour)
    - Southbound right turn (PM peak hour)

Appendix J also contains the Near-Term (Year 2025) Without Project freeway off-ramp queue analysis worksheets.

9.1.5 *Segment Operations*

Table 9–2 summarizes the key segment operations in the study area for the Near-Term (Year 2025) Without Project condition. As seen in *Table 9–2*, under Near-Term (Year 2025) Without Project conditions, the following segments are calculated to operate at unacceptable LOS E or F:

- Segment #1. Sea World Drive: I-5 Ramps to Pacific Highway/ E. Mission Bay Drive – LOS E
- Segment #2. Sea World Drive: Pacific Highway/ E. Mission Bay Drive to Friars Road – LOS E
- Segment #3. Sea World Drive: Friars Road to Sea World Way – LOS F
- Segment #4. Sea World Drive: Sea World Way to W. Mission Bay Drive – LOS E
- Segment #6. W. Mission Bay Drive: Dana Landing Road to Ingraham Street – LOS E
- Segment #7. W. Mission Bay Drive: Ingraham Street to Sea World Drive – LOS F
- Segment #8. W. Mission Bay Drive: Sea World Drive to I-8 Ramps (bridge) – LOS E
- Segment #12. Ingraham Street: Crown Point Drive to Vacation Road (bridge) – LOS E

- Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/ Dana Landing Road (bridge) – LOS F
- Segment #14. Ingraham Street: Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive – LOS F
- Segment #15. Sunset Cliffs Boulevard: W. Mission Bay Drive to I-8 Ramps (bridge) – LOS E
- Segment #16. Sunset Cliffs Boulevard: I-8 Ramps to Nimitz Boulevard – LOS F

9.1.6 *Peak Hour Freeway Mainline Operations*

Table 9–3a shows the volume/capacity freeway mainline analyses for the Near-Term (Year 2025) Without Project freeway operations. As seen in *Table 9–3*, the following study area freeway mainline segments are calculated to operate at LOS E or F during both the AM and PM peak hours.

- Mainline #2. I-5 from SeaWorld Drive to Clairemont Drive
  - Northbound – LOS E (AM peak hour)
  - Southbound – LOS E (PM peak hour)

Appendix K contains the Near Term (Year 2025) Without Project HCS freeway analysis sheets.

9.1.7 *Metered Freeway On-Ramp Operations*

Table 9–4 summarizes the peak hour ramp meter operations for Near-Term (Year 2025) Without Project conditions. Using the calibrated meter flow rate based on observed queue conditions, delays are as follows:

- #1. SeaWorld Drive/ I-5 Northbound On-Ramp – 0.0 minutes/0.0 minutes of delay in the AM/PM peak hours
- #2. SeaWorld Drive/ I-5 Southbound On-Ramp – 8.7 minutes/6.3 minutes of delay in the AM/PM peak hours
- #3. Southbound W. Mission Bay Drive/ I-8 Eastbound On-Ramp – 0.0 minutes of delay in the PM peak hour

9.2 Near-Term (Year 2025) With Project

9.2.1 *Peak Hour Intersection Analysis - LOS*

Table 9–1a summarizes the peak hour intersection operations for Near-Term (Year 2025) With Project conditions. As seen in *Table 9–1a*, under Near-Term (Year 2025) With Project conditions, all intersections are calculated to continue to operate at acceptable LOS D or better except for the following:

- Intersection #1. Sea World Drive / I-5 NB Ramps – LOS E during the PM peak hour
- Intersection #3. Sea World Drive / Pacific Highway – LOS E during the PM peak hour
- Intersection #12. Sunset Cliffs Boulevard / I-8 WB Off-Ramp – LOS E during the AM peak hour and LOS F during the PM peak hour

The Project-related increase in delay at the above-listed intersections is less than the allowable 2.0/1.0 second(s) for LOS E/F-operating intersections. The near-term trip generation is modest, particularly during the AM peak hour. The project's near-term effect on study area intersections is generally minimal and in some cases does not measurably affect pre-project delay.

Appendix L contains the peak hour intersection analysis worksheets for the Near-Term (Year 2025) With Project condition.

9.2.2 *Peak Hour Intersection Analysis – Queuing*

Table 9–1b presents the 95th percentile peak hour queue lengths for intersection turn pockets where the Project adds traffic within the study area for the Near-Term (Year 2025) With Project scenario. As shown in *Table 9-1b*, all near-term peak hour queues, with the addition of Project traffic, are contained within existing turn pockets except:

- Intersection #1. Sea World Drive / I-5 Northbound Ramps –
  - Eastbound left turn (AM/PM peak hour)
- Intersection #2. Sea World Drive / I-5 Southbound Ramps –
  - Southbound right turn (PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway –
  - Westbound left turn (PM peak hour)
  - Northbound left turn (AM/PM peak hour)
- Intersection #4. Sea World Drive / Friars Road –
  - Eastbound right turn (AM/PM peak hour)
- Intersection #5. Sea World Drive / Sea World Way –
  - Eastbound left turn (PM peak hour)

Appendix M contains the peak hour queuing analysis worksheets for the Near-Term (Year 2025) With Project condition.

9.2.3 *Peak Hour Intersection Turn Lane Evaluation*

Table 9–1b also shows the turn lane volumes for the same study area turn pockets. These volumes were compared to the criteria for consideration of an additional turn lane presented in *Section 5.2.4*. As shown in *Table 9–1b*, the following turn movement meets the criteria for an additional turn lane under Near-Term (Year 2025) With Project conditions:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
  - Southbound right turn (PM peak hour)

It should be noted that the current intersection configuration provides this turn movement a dedicated lane as it enters SeaWorld Drive as well as a green arrow for most of the traffic signal cycle. This turn movement is only stopped when pedestrians activate the push button to cross the north leg of this intersection. As such, the traffic volume criteria for signalized intersections shown in *Section 5.2.4* may not be an accurate indicator of the need for an additional turn lane for this turning movement.

9.2.4 *Peak Hour Freeway Interchange Operations*

Table 9–1c presents the 95th percentile peak hour queue lengths for freeway off-ramps within the study area for the Near-Term (Year 2025) With Project. As shown in *Table 9-1c*, all near term off-ramp queues, with addition of Project traffic, are contained within the available storage except for the following:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
    - Southbound left turn (AM/PM peak hour)
    - Southbound right turn (PM peak hour)

Appendix M contains the Near-Term (Year 2025) With Project freeway off-ramp queue analysis worksheets.

9.2.5 *Daily Street Segment Operations*

Table 9–2 summarizes the key segment operations in the study area for the Near-Term (Year 2025) With Project conditions. As seen in *Table 9–2*, under Near-Term (Year 2025) With Project conditions, the following study area segments are calculated to operate at unacceptable LOS E or F:

- Segment #1. Sea World Drive: I-5 Ramps to Pacific Highway/ E. Mission Bay Drive – LOS E
- Segment #2. Sea World Drive: Pacific Highway/ E. Mission Bay Drive to Friars Road – LOS E
- **<u>Segment #3. Sea World Drive: Friars Road to Sea World Way – LOS F</u>**
- Segment #4. Sea World Drive: Sea World Way to W. Mission Bay Drive – LOS E
- Segment #6. W. Mission Bay Drive: Dana Landing Road to Ingraham Street – LOS E
- Segment #7. W. Mission Bay Drive: Ingraham Street to Sea World Drive – LOS F
- Segment #8. W. Mission Bay Drive: Sea World Drive to I-8 Ramps (bridge) – LOS E
- Segment #12. Ingraham Street: Crown Point Drive to Vacation Road (bridge) – LOS E
- Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/ Dana Landing Road (bridge) – LOS F
- Segment #14. Ingraham Street: Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive – LOS F
- Segment #15. Sunset Cliffs Boulevard: W. Mission Bay Drive to I-8 Ramps (bridge) – LOS E
- Segment #16. Sunset Cliffs Boulevard: I-8 Ramps to Nimitz Boulevard – LOS F

Based on City of San Diego significance criteria, **<u>one (1) significant direct impact</u>** was calculated at the segment **bolded** and <u>underlined</u> above since the Project-related increase to the v/c ratio exceeds the 0.01 allowed for a LOS F-operating segment.

9.2.6 *Peak Hour Freeway Mainline Operations*

Table 9–3b shows the volume/capacity freeway segment analyses for the Near-Term (Year 2025) With Project freeway mainline operations. As seen in *Table 9–3b*, with the addition of Project traffic, the following study area freeway mainline segments are calculated to operate at LOS E or F during both the AM and PM peak hours.

- Mainline #2. I-5 from SeaWorld Drive to Clairemont Drive
  - Northbound – LOS E (AM peak hour)
  - Southbound – LOS E (PM peak hour)

Based on the established significance criteria, **no significant direct impacts** were calculated with the addition of Project traffic on the freeway. ***Appendix N*** contains the HCS freeway analysis sheets.

9.2.7 *Metered Freeway On-Ramp Operations*

Table 9–4 summarizes the peak hour ramp meter operations for Near-Term (Year 2025) With Project conditions. Using the calibrated meter flow rate based on observed queue conditions, delays are as follows:

- #1. SeaWorld Drive/ I-5 Northbound On-Ramp – 0.0 minutes/0.0 minutes of delay in the AM/PM peak hours
- #2. SeaWorld Drive/ I-5 Southbound On-Ramp – 8.9 minutes/7.4 minutes of delay in the AM/PM peak hours
- #3. Southbound W. Mission Bay Drive/ I-8 Eastbound On-Ramp – 0.0 minutes of delay in the PM peak hour

Based on the established significance criteria, **no significant direct impacts** were calculated with the addition of Project traffic to the freeway on-ramps.

TABLE 9–1a
NEAR-TERM (YEAR 2025) INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Near-Term (Year 2025) Without Project		Near-Term (Year 2025) With Project		Delay Δ [c]	Sig?
			Delay [a]	LOS [b]	Delay	LOS		
1. SeaWorld Drive/ I-5 Northbound Ramps	Signal	AM PM	46.5 62.7	D E	46.6 62.8	D E	0.1 0.1	No
2. SeaWorld Drive/ I-5 Southbound Ramps	Signal	AM PM	20.7 23.3	C C	20.7 23.3	C C	0.0 0.0	No
3. SeaWorld Drive/ Pacific Highway/ E. Mission Bay Drive	Signal	AM PM	22.5 57.8	C E	22.6 59.6	C E	0.1 1.8	No
4. SeaWorld Drive/ Friars Road	Signal	AM PM	13.6 24.1	B C	13.6 24.4	B C	0.0 0.3	No
5. SeaWorld Drive/ SeaWorld Way (exit)	Signal	AM PM	6.3 11.4	A B	6.4 12.1	A B	0.1 0.7	No
6. Perez Cove Way/ SeaWorld Entrance	Free	AM PM	— —	— —	— —	— —	— —	—
7. Ingraham Street/ Perez Cove Way/ Dana Landing Road	Signal	AM PM	10.7 18.0	B B	10.8 18.2	B B	0.1 0.2	No
8. Ingraham Street/ Vacation Road	Signal	AM PM	20.1 27.6	C C	20.1 27.6	C C	0.0 0.0	No
9. Ingraham Street/ Crown Point Drive	Signal	AM PM	28.3 28.4	C C	28.3 28.4	C C	0.0 0.0	No
10. W. Mission Bay Drive/ I-8 Westbound Off-Ramp	Signal	AM PM	46.1 45.8	D D	46.3 46.0	D D	0.2 0.2	No
11. Sports Arena Boulevard/ I-8 Eastbound On-Ramp	Free	AM PM	— —	— —	— —	— —	— —	—
12. Sunset Cliffs Boulevard/ I-8 Westbound Off-Ramp	Signal	AM PM	56.9 127.0	E F	56.9 127.2	E F	0.0 0.2	No
13. Sunset Cliffs Boulevard/ I-8 Eastbound On-Ramp	Signal	AM PM	22.3 13.4	C B	22.3 13.4	C B	0.0 0.0	No
14. Sunset Cliffs Boulevard/ Nimitz Boulevard	Signal	AM PM	35.8 33.3	D C	35.8 33.3	D C	0.0 0.0	No

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Δ denotes the increase in delay due to Project. No measurable increase in delay at certain locations where a limited number of trips are added to non-critical movements.

General Notes:

- Sig = Significant impact, yes or no.
- **Bold** typeface and shading represent a significant impact.

SIGNALIZED DELAY/LOS THRESHOLDS Delay	LOS	UNSIGNALIZED DELAY/LOS THRESHOLDS Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 9–1b
NEAR-TERM (OPENING YEAR 2025) INTERSECTION QUEUING

Intersection	Movement [a]	Turn Lanes	Storage (ft)	Peak Hour	Near Term (Opening Year 2025) Without Project		Near Term (Opening Year 2025) With Project	
					Queue (ft) [b]	Volume	Queue (ft)	Volume
1. SeaWorld Drive / I-5 Northbound Ramps	NBL	1	1000	AM	246	260	246	262
				PM	270	270	270	273
	EBL	2	250	AM	**260**	830	**260**	832
				PM	**275**	780	**275**	793
2. SeaWorld Drive / I-5 Southbound Ramps	SBR	1	150	AM	147	680	147	684
				PM	**166**	**960**	**192**	**966**
	EBR	1	400	AM	37	60	37	61
				PM	64	210	64	217
3. SeaWorld Drive / Pacific Highway	WBL	1	155	AM	75	50	75	51
				PM	**210**	180	**210***	181
	NBR	0	[c]	AM	[c]	60	[c]	60
				PM	[c]	140	[c]	141
	NBL	2	310	AM	**392**	230	**392**	230
				PM	**440**	190	**440***	190
	EBR	1	250	AM	26	90	29	90
				PM	177	260	177	260
4. SeaWorld Drive / Friars Road	NBL	2	850	AM	117	240	122	241
				PM	157	320	157	322
	EBR	1	215	AM	**325**	240	**325**	241
				PM	**240**	780	**241**	784
5. SeaWorld Drive / SeaWorld Way	SBR	2	600	AM	34	21	34	22
				PM	60	115	60	123
	SBL	2	600	AM	49	71	53	76
				PM	155	395	176	426
	EBL	1	110	AM	78	16	78	16
				PM	**119**	34	**129**	35

Continued on Next Page

TABLE 9–1b
NEAR-TERM (OPENING YEAR 2025) INTERSECTION QUEUING

Intersection	Movement [a]	Turn Lanes	Storage (ft)	Peak Hour	Near Term (Opening Year 2025) Without Project		Near Term (Opening Year 2025) With Project	
					Queue (ft) [b]	Volume	Queue (ft)	Volume
Continued from Previous Page								
7. Ingraham Street / Dana Landing Way / Perez Cove Way	SBL	2	180	AM	46	9	46	10
				PM	46	11	46	12
	WBR	1	55	AM	32	7	32	7
				PM	52	16	56	17
	WBL	2	520	AM	32	13	33	14
				PM	174	229	174	236
	NBR	1	180	AM	105	116	147	119
				PM	146	88	157	92
10. W. Mission Bay Drive / I-8 Westbound Off-Ramp	WBR	2	1,530	AM	948	1,730	948	1,732
				PM	920	1,740	922	1,743

Footnotes:

a. The Project will add trips to turning movements shown.
b. 95th percentile queue length.
c. Shared turn movement lane. Turn movement queue not separately calculated. Criteria for adding a turn lane are assessed in Section 9.2.1.

General Notes:

- **Bold** typeface and shading in queue column indicate queue is calculated to exceed available storage.
- **Bold** typeface and shading in volume column indicate volume exceeds threshold for consideration of an additional turn lane.
- Ft = Feet
- SBR = Direction/Turn Lane, e.g., southbound right-turn lane.
- If a turning movement is served by multiple lanes, queue length shown reflects the longest queue in either lane.

TABLE 9–1C
NEAR-TERM (OPENING YEAR 2025) FREEWAY INTERCHANGE OPERATIONS

Intersection	Movement	Storage (ft)	Peak Hour	Near Term (Opening Year 2025) Without Project	Near Term (Opening Year 2025) With Project
				Queue (ft) [a]	Queue (ft)
1. Sea World Drive / I-5 NB Off Ramp	NBL	1000	AM	246	232
			PM	270	269
	NBR	1000	AM	168	146
			PM	153	272
2. SeaWorld Drive / I-5 SB Off Ramp	SBL	150	AM	122	**223**
			PM	**318**	**417**
	SBR	150	AM	34	135
			PM	**166**	**192**
10. W. Mission Bay Drive / I-8 WB Off Ramp	WBR	1,530	AM	948	923
			PM	920	922
	WBL	1,530	AM	994	978
			PM	930	926
12. Sunset Cliffs Boulevard / I-8 WB Off Ramp	WBR	n/a	AM	59	67
			PM	58	62
	WBL	n/a	AM	853	835
			PM	758	755

Footnotes:
- 95th percentile queue length.

General Notes:
- **Bold** typeface and shading indicate queue is calculated to exceed available storage.
- Ft = Feet
- SBR = Direction/Turn Lane; e.g. southbound right-turn lane.
- n/a = not applicable due to freeway terminating at this location

TABLE 9–2
NEAR-TERM (YEAR 2025) STREET SEGMENT OPERATIONS

Street Segment	Capacity (LOS E)[a]	Near-Term (Year 2025) Without Project			Near-Term (Year 2025) With Project			Δ [e]	Sig?
		ADT [b]	LOS [c]	V/C [d]	ADT	LOS	V/C		
SeaWorld Drive									
1. I-5 Ramps to Pacific Highway/ E. Mission Bay Drive	45,000	41,070	E	0.913	41,500	E	0.922	0.010	No
2. Pacific Highway/ E. Mission Bay Drive to Friars Road	40,000	36,750	E	0.919	37,200	E	0.930	0.011	No
3. Friars Road to SeaWorld Way	40,000	41,190	F	1.030	**41,700**	**F**	**1.043**	**0.013**	**Yes**
4. SeaWorld Way to W. Mission Bay Drive	45,000	40,620	E	0.903	40,700	E	0.904	0.002	No
Friars Road									
5. Pacific Highway to SeaWorld Drive	40,000	14,740	A	0.369	14,800	A	0.370	0.002	No
West Mission Bay Drive									
6. Dana Landing Road to Ingraham Street	40,000	39,680	E	0.992	39,700	E	0.993	0.001	No
7. Ingraham Street to SeaWorld Drive	60,000	74,980	F	1.250	75,100	F	1.252	0.002	No
8. SeaWorld Drive to I-8 Ramps (bridge) [e]	60,000 [e]	59,030	E	0.984	59,200	E	0.987	0.003	No
9. I-8 Ramps to Sports Arena Boulevard	60,000	37,880	C	0.631	37,900	C	0.632	0.000	No
Perez Cove Way									
10. Ingraham Street to SeaWorld Entrance	15,000	7,600	C	0.507	7,760	C	0.517	0.011	No
11. SeaWorld Entrance to SeaWorld Drive	15,000	2,320	A	0.155	2,600	A	0.173	0.019	No
Ingraham Street									
12. Crown Point Drive to Vacation Road (bridge)	40,000	37,370	E	0.934	37,400	E	0.935	0.001	No
13. Vacation Road to Perez Cove Way/ Dana Landing Road (bridge)	40,000	40,670	F	1.017	40,700	F	1.018	0.001	No
14. Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive	40,000	51,570	F	1.289	51,700	F	1.293	0.003	No
Sunset Cliffs Boulevard									
15. W. Mission Bay Drive to I-8 Ramps (bridge)	40,000	38,880	E	0.972	38,900	E	0.973	0.001	No
16. I-8 Ramps to Nimitz Boulevard	40,000	40,780	F	1.020	40,800	F	1.020	0.000	No

Footnotes:

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. The W. Mission Bay Drive bridge widening to six (6) lanes is assumed to be completed and fully operational by Year 2025.

General Notes:

- Sig = Significant impact, yes or no.
- **Bold** typeface and shading represent a significant impact.

TABLE 9–3a
NEAR-TERM (YEAR 2025) WITHOUT PROJECT FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir	# of Lanes [a]	Volume [b]	%K [c]		%D [c]		Truck Factor	Peak Hour Volume [c]		Flow Rate (pc/h/ln)		Adj. Capacity (pc/h/ln)	V/C [d]		Density [e]		LOS [f]	
				AM	PM	AM	PM		AM	PM	AM	PM		AM	PM	AM	PM	AM	PM
Interstate 5																			
1. Interstate 8 to Sea World Drive	NB	5M+1A	204,600	7.15%	7.81%	54.69%	46.81%	3.40%	8,001	7,480	1,467	1,372	2,166	0.677	0.633	23.7	22.1	C	C
	SB	4M+2A		7.15%	7.81%	45.31%	53.19%	3.40%	6,628	8,499	1,215	1,558	2,011	0.604	0.775	19.7	26.9	C	D
2. Sea World Drive to Clairemont Drive	NB	4M+1A	231,600	7.15%	7.81%	54.69%	46.81%	3.40%	9,056	8,467	1,993	1,863	2,140	0.931	0.871	38.2	33.5	E	D
	SB	4M+1A		7.15%	7.81%	45.31%	53.19%	3.40%	7,503	9,621	1,651	2,117	2,140	0.771	0.989	27.7	43.8	D	E
Interstate 8																			
3. W. Mission Bay Drive to Interstate 5	EB	3M+1A	110,200	7.46%	6.59%	44.07%	39.03%	1.20%	3,623	2,834	975	763	2,090	0.467	0.365	15.7	12.3	B	B
	WB	3M+2A		7.46%	6.59%	55.93%	60.97%	1.20%	4,598	4,428	990	954	1,961	0.505	0.486	15.6	15.0	B	B

Footnotes:

a. Lane geometry taken from PeMS lane configurations at corresponding postmile.
b. Existing volume calculated from most recent Caltrans *Traffic Census Program* Peak Hour Volume Data (2018) and grown against the Fiesta Island Amendment traffic model forecast volumes to reach Near-Term (Year 2025) conditions.
c. Peak hour volumes calculated from K and D factors provided in most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
d. V/C = (Peak Hour Volume/Hourly Capacity)
e. Density measures passenger cars per mile per lane. Density = Flow Rate (passenger-cars/hour/lane) ÷ Speed (average passenger-car speed in mph).
f. LOS = Level of Service

LOS	Density Range (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

General Note:

- M = Mainline
- A = Auxiliary
- Truck factor sourced to most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
- "—" Indicates density exceeds the maximum threshold for LOS F.

TABLE 9–3b
NEAR-TERM (YEAR 2025) WITH PROJECT FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir	# of Lanes [a]	Volume [b]	%K [c]		%D [c]		Truck Factor	Peak Hour Volume [c]		Flow Rate (pc/h/ln)		Adj. Capacity (pc/h/ln)	V/C [d]		Density [e]		LOS [f]		Δ V/C [g]		Sig?
				AM	PM	AM	PM		AM	PM	AM	PM		AM	PM	AM	PM	AM	PM	AM	PM	
Interstate 5																						
1. Interstate 8 to Sea World Drive	NB	5M+1A	204,827	7.15%	7.81%	54.69%	46.81%	3.40%	8,006	7,493	1,468	1,374	2,166	0.678	0.634	23.8	22.1	C	C	0.001	0.001	No
	SB	4M+2A		7.15%	7.81%	45.31%	53.19%	3.40%	6,632	8,501	1,216	1,559	2,011	0.605	0.775	19.7	26.9	C	D	0.001	0.000	No
2. Sea World Drive to Clairemont Drive	NB	4M+1A	231,713	7.15%	7.81%	54.69%	46.81%	3.40%	9,058	8,468	1,993	1,863	2,140	0.931	0.871	38.2	33.5	E	D	0.000	0.000	No
	SB	4M+1A		7.15%	7.81%	45.31%	53.19%	3.40%	7,506	9,628	1,652	2,118	2,140	0.772	0.990	27.7	43.9	D	E	0.001	0.001	No
Interstate 8																						
3. W. Mission Bay Drive to Interstate 5	EB	3M+1A	110,351	7.46%	6.59%	44.07%	39.03%	1.20%	3,628	2,846	976	766	2,090	0.467	0.367	15.7	12.3	B	B	0.000	0.002	No
	WB	3M+2A		7.46%	6.59%	55.93%	60.97%	1.20%	4,600	4,429	991	954	1,961	0.505	0.486	15.6	15.0	B	B	0.000	0.000	No

Footnotes:

a. Lane geometry taken from PeMS lane configurations at corresponding postmile.
b. Existing volume calculated from most recent Caltrans *Traffic Census Program* Peak Hour Volume Data (2018) and grown against the Fiesta Island Amendment traffic model forecast volumes to reach Near-Term (Year 2025) conditions.
c. Baseline peak hour volumes calculated from K and D factors provided in most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016). Project volumes added to baseline using calculated project peak hour assignment (see *Figure 6–5*), **not** K and D factors.
d. V/C = (Peak Hour Volume/Hourly Capacity)
e. Density measures passenger cars per mile per lane. Density = Flow Rate (passenger-cars/hour/lane) ÷ Speed (average passenger-car speed in mph).
f. LOS = Level of Service
g. "Δ" denotes the Project-induced increase in V/C. Per City Guidelines, a significant impact occurs when the V/C is increased by greater than 0.01 for LOS E or 0.005 for LOS F.

LOS	Density Range (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

General Note:

- M = Mainline
- A = Auxiliary
- Truck factor sourced to most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
- "—" Indicates density exceeds the maximum threshold for LOS F.
- Sig? = Significant Impact, yes or no.

TABLE 9–4
NEAR TERM (YEAR 2025) RAMP METER OPERATIONS

Location/Condition	Peak Hour [a]	Peak Hour Volume	SOV Demand [b] (veh/hr/ln)	Ramp Meter Rate [c] (veh/hr/ln)	Excess Demand (veh/hr/ln) [d]	Delay per Lane [e]	Queue per Lane [f]
▪ **I-5 Northbound On-Ramp from SeaWorld Drive (2 SOV)**							
Near-Term (Year 2025) Without Project	AM	1110	555	*Observed:* 774	0	0.0	0
	PM	1120	560	*Observed:* 612	0	0.0	0
Near-Term (Year 2025) With Project	AM	1112	556	*Observed:* 774	0	0.0	0
	PM	1133	567	*Observed:* 612	0	0.0	0
Project Increase	AM	2	1	—	0	0.0	0
	PM	13	7	—	0	0.0	0
▪ **I-5 Southbound On-Ramp from SeaWorld Drive (1 SOV + 1HOV)**							
Near-Term (Year 2025) Without Project	AM	350	315	*Observed: 275*	40	8.7	1,000
	PM	430	387	*Observed: 350*	37	6.3	925
Near-Term (Year 2025) With Project	AM	351	316	*Observed: 275*	41	8.9	1,025
	PM	437	393	*Observed: 350*	43	7.4	1,075
Project Increase	AM	1	1	—	0	0.0	0
	PM	7	6	—	6	1.1	150
▪ **I-8 Eastbound On-Ramp from Southbound W. Mission Bay Drive/Sports Arena Boulevard (2 SOV)**							
Near-Term (Year 2025) Without Project	PM	1,230	615	*Observed: 696*	0	0.0	0
Near-Term (Year 2025) With Project	PM	1,242	621	*Observed: 696*	0	0.0	0
Project Increase	PM	12	6	—	0	0.0	0

Footnotes:

a. Selected peak hour based on period when ramp meter is operating.
b. Peak hour demand in vehicles/hour/lane for single-occupancy vehicle (SOV) lanes. 10% HOV reduction obtained from PeMS data collected along the mainline, where available.
c. Meter rate "R" is the most restrictive rate at which the ramp meter (signal) discharges traffic onto the freeway (obtained from Caltrans). The discharge rate varies depending on the mainline volumes. While meter rates were obtained from Caltrans, the rates were revised to reflect existing ramp meter observations discussed in *Section 7.4*.
d. Excess Demand on hourly basis. If SOV Demand > Ramp Meter Rate, Excess Demand = SOV Demand – Ramp Meter Rate.
e. Delay expressed in minutes per lane. If Excess Demand > 0, Delay = Excess Demand ÷ Ramp Meter Rate * 60 minutes/hour.
f. Queue in feet calculated assuming vehicle length of 25 feet. If Excess Demand > 0, Queue = Excess Demand * 25 feet.

General Notes:

- SOV = Single-Occupancy Vehicles; HOV = High-Occupancy Vehicles

10.0 HORIZON YEAR (YEAR 2040) CONDITIONS

10.1 Horizon Year (Year 2040) Network Conditions

The Year 2050 street network in the Fiesta Island Amendment forecast model includes changes to the roadway system in the immediate vicinity of the Project. Specifics on these network components are mentioned below:

- SeaWorld Drive as a Six-Lane facility (City CIP No. S-00889 (previously 52-706)) – Not funded nor scheduled.
- SeaWorld Drive/I-5 Northbound Interchange Loop Ramp (City CIP Project S00888) – Project Study Report (PSR) completed in 2011. Improvements not funded nor scheduled.
- I-5 from I-8 to La Jolla Village Drive: Two (2) Managed Lanes – Not funded nor scheduled.

Sources for the network changes listed above include the SANDAG 2050 Regional Transportation Plan, Keep San Diego Moving I-5/I-8 Connector Project, and City of San Diego website. A review of the Mission Bay Park Master Plan found improvements to circulation within the study area, but none were assumed to be completed by the horizon year condition.

The timeframe for implementation and funding source for the network changes included above are currently unknown. Therefore, no street segment, intersection, or freeway improvements over existing on-the-ground conditions were assumed in the Year 2040 analyses of study area locations included in this report, other than completion of the West Mission Bay Drive Bridge Replacement Project, as previously assumed in Near-Term (Year 2025) condition since it is currently under construction and scheduled for completion in 2022.

10.2 Horizon Year (Year 2040) Traffic Volumes

Section 8.0 of this report discusses the approach taken to arrive at forecast traffic volumes. The same methodology used in developing the Near-Term (Year 2025) condition was followed to forecast Year 2040. The Mobility Assessment prepared for the Mission Bay Park Master Plan Fiesta Island Amendment, approved by City Council in December 2018 used the SANDAG Series 12 travel demand forecast model to calculate future traffic volumes in the general vicinity near Fiesta Island. For purposes of being consistent with this document, this same approach was used to forecast Near-Term (Year 2025) traffic volumes and ultimately, Horizon Year (Year 2040) traffic volumes.

To determine the Horizon Year (Year 2040) daily volumes, a compound growth rate by segment was calculated using the SANDAG Series 12 2008 and 2050 forecast volumes, as previously done for the Near-Term (Year 2025) condition.

The growth rate was then applied for a period of 21 years to the ground count volumes collected in 2019 to determine the Horizon Year (Year 2040) daily traffic volumes. Based on the model volumes, the growth rate on the segments between years 2008 and 2050 ranged from a low of 0.43% on Ingraham Street near Vacation Road to a high of 1.76% on Friars Road near SeaWorld Drive.

The Horizon Year (Year 2040) peak hour volumes were then calculated using the Horizon Year (Year 2040) daily volumes in the study area. The existing ratio of peak hour volume to existing daily traffic volume was applied to the Horizon Year (Year 2040) ADT volume to determine the near-term peak hour intersection volumes weekday AM/PM peak periods. The Horizon Year (Year 2040) peak hour intersection volumes were then converted to turning movement volumes using the existing intersection turning movement patterns for each peak period.

The peak hour turning movement volumes at an intersection were estimated from future ADT volumes using the relationship between existing peak hour turning movements and the existing ADT volumes. This same relationship can be assumed to generally continue in the future.

The increase in traffic with the expected growth in attendance, completion of the hotel, and the marina expansion was then added to the baseline Year 2040 traffic volumes to arrive at Horizon Year (Year 2040) With Project conditions.

Figure 10–1 depicts the Horizon Year (Year 2040) Without Project traffic volumes. ***Figure 10–2*** depicts the Horizon Year (Year 2040) With Project traffic volumes.

Appendix O contains the Horizon Year (Year 2040) traffic forecast methodology using the SANDAG Series 12 Mission Bay Park Master Plan Fiesta Island Amendment Year 2050 traffic model.

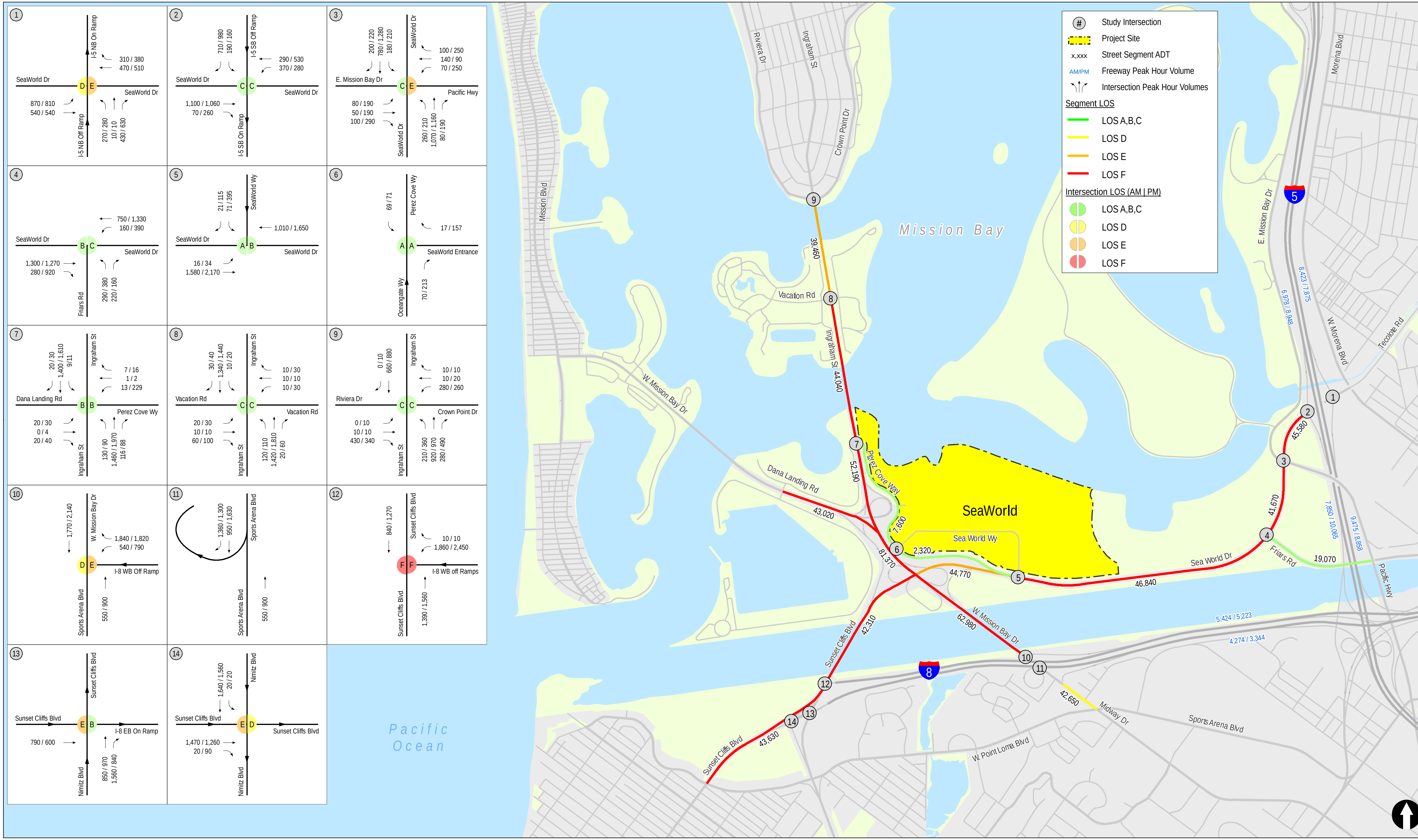

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Figure 10-1

Horizon Year (Year 2040) Without Project Traffic Volumes

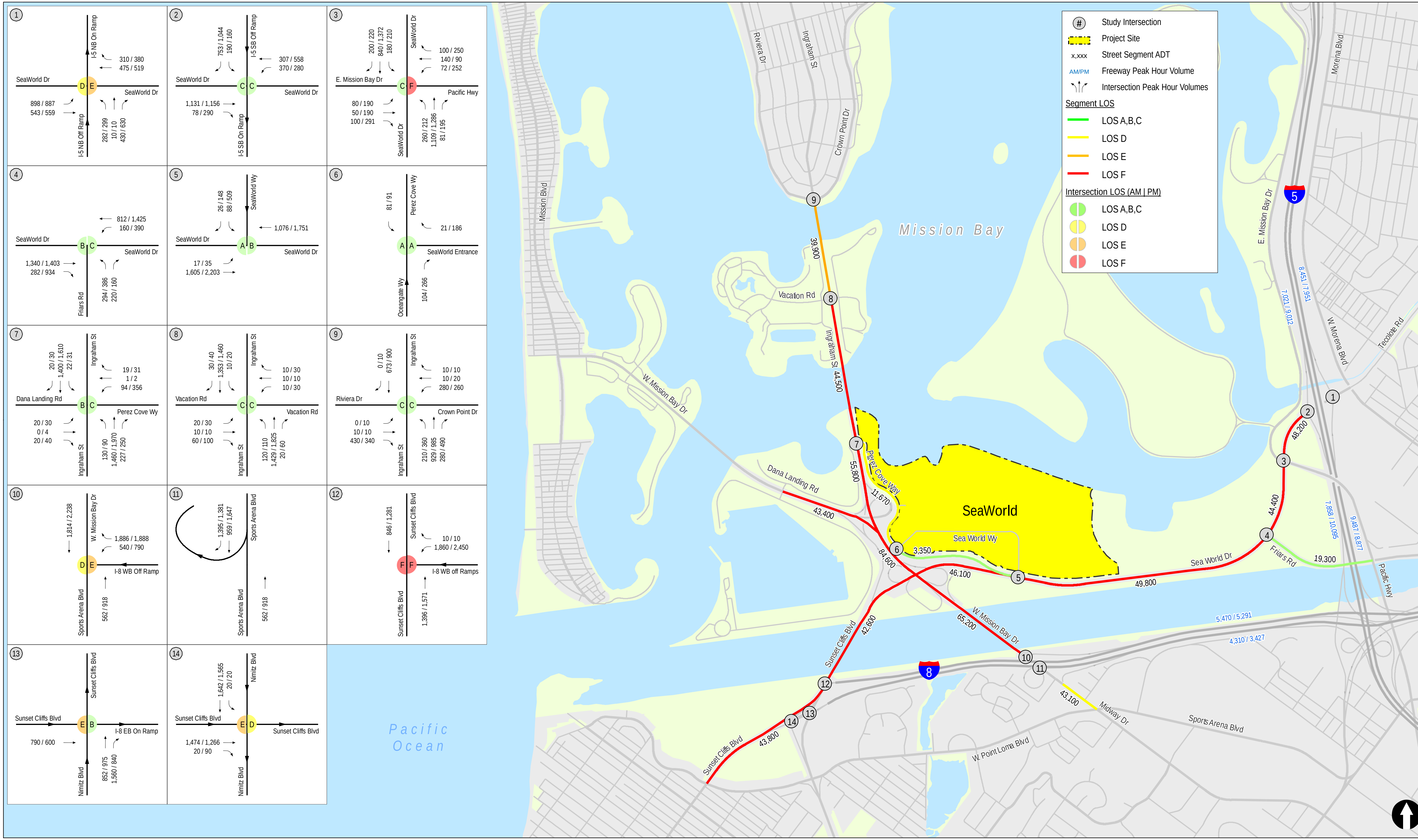

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Figure 10-2

Horizon Year (Year 2040) With Project Traffic Volumes

11.0 ANALYSIS OF HORIZON YEAR (YEAR 2040) SCENARIOS

11.1 Horizon Year (Year 2040) Without Project

11.1.1 *Peak Hour Intersection Analysis – LOS*

Table 11–1a summarizes the Horizon Year (Year 2040) Without Project intersection operations. As seen in *Table 11–1*, the following study area intersections are calculated to operate at LOS E or F under Year 2040 Baseline conditions:

- Intersection #1. I-5 NB Ramps/ SeaWorld Drive – LOS E (PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway/ E. Mission Bay Drive – LOS E (PM peak hour)
- Intersection #10. Mission Bay Drive / Sports Arena / I-8 WB Off Ramp – LOS E (PM peak hour)
- Intersection #12. I-8 Westbound Off-Ramp/ Sunset Cliffs Boulevard – LOS F (AM/PM peak hours)
- Intersection #13. I-8 Eastbound On-Ramp/ Sunset Cliffs Boulevard – LOS E (AM peak hour)
- Intersection #14. Sunset Cliffs Boulevard / Nimitz Boulevard – LOS E (AM peak hour)

Appendix P contains the Horizon Year (Year 2040) Without Project peak hour intersection calculation worksheets.

11.1.2 *Peak Hour Intersection Analysis – Queuing*

Table 11–1b presents the 95th percentile peak hour queue lengths for intersection turn pockets where the Project adds traffic within the study area for the Horizon Year (Year 2040) Without Project scenario. As shown in *Table 11-1b*, all horizon year peak hour queues are expected to be contained within existing turn pockets except for:

- Intersection #1. Sea World Drive / I-5 Northbound Ramps –
  - Eastbound left turn (AM/PM peak hour)
- Intersection #2. Sea World Drive / I-5 Southbound Ramps –
  - Southbound right turn (AM/PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway –
  - Westbound left turn (PM peak hour)
  - Northbound left turn (AM/PM peak hour)
- Intersection #4. Sea World Drive / Friars Road –
  - Eastbound right turn (AM/PM peak hour)
- Intersection #5. Sea World Drive / Sea World Way –
  - Eastbound left turn (PM peak hour)

Appendix Q contains the Horizon Year (Year 2040) Without Project queuing analysis worksheets.

11.1.3 *Peak Hour Freeway Interchange Operations*

Table 11–1c presents the 95th percentile peak hour queue lengths for freeway off-ramps within the study area for the Horizon Year (Year 2040) Without Project scenario. As shown in *Table 11-1c*, all horizon year off-ramp queues are contained within the available storage except for the following:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
    - Southbound left turn (PM peak hour)
    - Southbound right turn (PM peak hour)

Appendix Q contains the Horizon Year (Year 2040) With Project freeway off-ramp queue analysis worksheets.

11.1.4 *Daily Street Segment Operations*

Table 11–2 summarizes the Horizon Year (Year 2040) Without Project street segment operations. As seen in *Table 11–2*, the following study area street segments are calculated to operate at LOS E or F under Horizon Year (Year 2040) Without Project conditions:

- Segment #1. Sea World Drive: I-5 Ramps to Pacific Highway/ E. Mission Bay Drive – LOS F
- Segment #2. Sea World Drive: Pacific Highway/ E. Mission Bay Drive to Friars Road – LOS F
- Segment #3. Sea World Drive: Friars Road to Sea World Way – LOS F
- Segment #4. Sea World Drive: Sea World Way to W. Mission Bay Drive – LOS E
- Segment #6. W. Mission Bay Drive: Dana Landing Road to Ingraham Street – LOS F
- Segment #7. W. Mission Bay Drive: Ingraham Street to Sea World Drive – LOS F
- Segment #8. W. Mission Bay Drive: Sea World Drive to I-8 Ramps (bridge) – LOS F
- Segment #12. Ingraham Street: Crown Point Drive to Vacation Road (bridge) – LOS E
- Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/ Dana Landing Road (bridge) – LOS F
- Segment #14. Ingraham Street: Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive – LOS F
- Segment #15. Sunset Cliffs Boulevard: W. Mission Bay Drive to I-8 Ramps (bridge) – LOS F
- Segment #16. Sunset Cliffs Boulevard: I-8 Ramps to Nimitz Boulevard – LOS F

11.1.5 *Peak Hour Freeway Mainline Operations*

Table 11–4a summarizes the Horizon Year (Year 2040) Without Project freeway mainline segment operations. As seen in *Table 11–4a*, the following study area freeway mainline segments are calculated to operate at LOS E or F under Horizon Year (Year 2040) Without Project conditions:

- Mainline #2: I-5 from SeaWorld Drive to Clairemont Drive
    - Northbound: LOS E – AM/PM peak hours
    - Southbound: LOS F – PM peak hour

Appendix R contains the Horizon Year (Year 2040) Without Project peak hour HCS freeway analysis sheets.

11.1.6 *Metered Freeway On-Ramp Operations*

Table 11–5 summarizes the peak hour ramp meter operations for Horizon Year (Year 2040) Without Project conditions. Using the most restrictive fixed rate analysis method, delays are as follows:

- #1. SeaWorld Drive/ I-5 Northbound On-Ramp – 0.0 minutes/0.0 minutes of delay in the AM/PM peak hours
- #2. SeaWorld Drive/ I-5 Southbound On-Ramp – 26.4 minutes/23.3 minutes of delay in the AM/PM peak hours
- #3. Southbound W. Mission Bay Drive/ I-8 Eastbound On-Ramp – 0.0 minutes of delay in the PM peak hour

11.2 Horizon Year (Year 2040) With Project

11.2.1 *Peak Hour Intersection Analysis – LOS*

Table 11–1a summarizes the Horizon Year (Year 2040) With Project intersection operations. As seen in *Table 11–1a*, the following study area intersections are calculated to operate at LOS E or F conditions with the addition of Project traffic:

- Intersection #1. Sea World Drive / I-5 NB Ramps – LOS E (PM peak hour)
- <u>**Intersection #3. Sea World Drive / Pacific Highway – LOS F (PM peak hour)**</u>
- <u>**Intersection #10. W. Mission Bay Drive / I-8 Westbound Ramps – LOS E (PM peak hour)**</u>
- Intersection #12. Sunset Cliffs Boulevard / I-8 Westbound Off-Ramp – LOS F (AM/PM peak hours)
- Intersection #13. Sunset Cliffs Boulevard / I-8 Eastbound On-Ramp – LOS E (AM peak hour)
- Intersection #14. Sunset Cliffs Boulevard / Nimitz Boulevard – LOS E (AM peak hour)

Based on the established significance criteria, <u>**two (2) significant cumulative impacts**</u> were calculated with the addition of Project traffic at the study area locations **bolded** and <u>underlined</u> above since the Project-induced change in delay is greater than 2.0 seconds for LOS E or F operating intersections. The Project-related change in delay is below the significance threshold for the remaining intersections listed above.

Appendix S contains the Horizon Year (Year 2040) With Project peak hour intersection calculation worksheets.

11.2.2 *Peak Hour Intersection Analysis – Queuing*

Table 11–1b presents the 95th percentile peak hour queue lengths for intersection turn pockets where the Project adds traffic within the study area for the Horizon Year (Year 2040) With Project scenario. As shown in *Table 11–1b*, all horizon year peak hour queues, with addition of Project traffic, are expected to be contained within existing turn pockets except for:

- Intersection #1. Sea World Drive / I-5 Northbound Ramps –
  - Eastbound left turn (AM/PM peak hour)
- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
  - Southbound right turn (AM/PM peak hour)
- Intersection #3. Sea World Drive / Pacific Highway –
  - Westbound left turn (PM peak hour)
- Intersection #4. Sea World Drive / Friars Road –
  - Eastbound right turn (PM peak hour)

Appendix T contains the Horizon Year (Year 2040) With Project queuing analysis worksheets.

11.2.3 *Peak Hour Freeway Interchange Operations*

Table 11–1c presents the 95th percentile peak hour queue lengths for freeway off-ramps within the study area for the Horizon Year (Year 2040) With Project scenario. As shown in *Table 11-1c*, all horizon year off-ramp queues, with addition of Project traffic, are contained within the available storage except for the following:

- Intersection #2. SeaWorld Drive / I-5 Southbound Ramps –
  - Southbound left turn (AM/PM peak hour)
  - Southbound right turn (AM/PM peak hour)

Appendix T contains the Horizon Year (Year 2040) With Project freeway off-ramp queue analysis worksheets.

11.2.4 *Daily Street Segment Operations*

Table 11–2 summarizes the Horizon Year (Year 2040) With Project street segment operations. As seen in *Table 11–2*, the following study area street segments are calculated to continue to operate at LOS E or F conditions with the addition of Project traffic:

- **Segment #1. SeaWorld Drive: I-5 Ramps to Pacific Highway/ E. Mission Bay Drive – LOS F**
- **Segment #2. SeaWorld Drive: Pacific Highway/ E. Mission Bay Drive to Friars Road – LOS F**
- **Segment #3. SeaWorld Drive: Friars Road to SeaWorld Way – LOS F**
- Segment #4. SeaWorld Drive: SeaWorld Way to W. Mission Bay Drive – LOS F *
- Segment #6. W. Mission Bay Drive: Dana Landing Road to Ingraham Street – LOS F

- Segment #7. W. Mission Bay Drive: Ingraham Street to SeaWorld Drive – LOS F *
- Segment #8. W. Mission Bay Drive: SeaWorld Drive to I-8 (bridge) – LOS F *
- Segment #12. Ingraham Street: Crown Point Drive to Vacation Road (bridge) – LOS E
- Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/ Dana Landing Road (bridge) – LOS F *
- Segment #14. Ingraham Street: Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive – LOS F *
- Segment #15. Sunset Cliffs Boulevard: W. Mission Bay Drive to I-8 Ramps (bridge) – LOS F
- Segment #16: Sunset Cliffs Boulevard: I-8 Ramps to Nimitz Boulevard – LOS F

Based on the established significance criteria, **three (3) significant cumulative impacts** were calculated with the addition of Project traffic at study area locations above since the Project-induced change in V/C is greater than 0.02 for the LOS E segments and 0.01 for LOS F segments.

The Project-related increase in V/C ratio also exceeds 0.02 on Segments #4, #7, #8, #13 and #14. To establish when such a roadway segment is less than significant and does not require mitigation, the City's secondary criteria was applied as follows. 1) These segments of SeaWorld Drive, W. Mission Bay Drive and Ingraham Street are built to their ultimate classifications, 2) the intersections, if any, at either end of the segments are calculated to operate at LOS D or better with the Project, and 3) peak hour arterial analysis shown in *Section 11.2.4* below shows that the segments operate at acceptable LOS D or better with the Project. Therefore, no significant impacts are calculated based on the City's significance criteria.

11.2.5 *Peak Hour Arterial Analysis*

Certain segments above identified as operating at LOS E or F with the addition of Project traffic exceed the threshold for significance using the volume-to-capacity (V/C) analysis approach. The intersection calculations are based on complex computerized traffic models utilizing methodology from the HCM that has been refined over decades. By contrast, the V/C segment analysis is comprised of two variables; volume obtained from a 24-hour traffic count, and capacity based on the City's published guidelines, which necessarily present a homogenized, "one-size fits all" summary of theoretical capacities for roads based generally on the roadway width, number of lanes and presence of parking maneuvers.

Table 11–3 summarizes the Horizon Year (Year 2040) With Project peak hour segment operations along Segments #4 and #8. As shown, using the peak hour arterial method, these roadways are calculated to operate at LOS D or better during the AM and PM peak hours.

Appendix U provides the Horizon Year (Year 2040) With Project peak hour arterial analysis worksheets.

11.2.6 *Peak Hour Freeway Mainline Operations*

Table 11–4b summarizes the Horizon Year (Year 2040) With Project freeway mainline segment operations. As seen in *Table 11–4b*, the following study area freeway mainline segments are calculated to operate at LOS E or F conditions with the addition of Project:

- Mainline #2. I-5 from SeaWorld Drive to Clairemont Drive
  - Northbound: LOS E – AM/PM peak hours
  - Southbound: LOS F – PM peak hour

Appendix V contains the Year 2040 With Project peak hour HCS freeway sheets.

Based on the established significance criteria, **no significant cumulative impacts** were calculated with the addition of Project traffic at study area freeway mainline segments.

11.2.7 *Metered Freeway On-Ramp Operations*

Table 11–5 summarizes the peak hour ramp meter operations for Horizon Year (Year 2040) With Project conditions. Using the most restrictive fixed rate analysis method, delays are as follows:

- #1. SeaWorld Drive/ I-5 Northbound On-Ramp – 0.0 minutes/2.6 minutes of delay in the AM/PM peak hours
- **#2. SeaWorld Drive/ I-5 Southbound On-Ramp – 27.9 minutes/27.9 minutes of delay in the AM/PM peak hours**
- #3. Southbound W. Mission Bay Drive/ I-8 Eastbound On-Ramp – 0.0 minutes of delay in the PM peak hour

Based on the established significance criteria, **one (1) significant cumulative impact** was calculated with the addition of Project traffic to the freeway on-ramps since the increase in delay is greater than 2.0 minutes for locations exceeding 15-minute delays.

TABLE 11–1a
HORIZON YEAR (YEAR 2040) INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Horizon Year (Year 2040) Without Project		Horizon Year (Year 2040) With Project		Delay Δ [c]	Sig?
			Delay [a]	LOS [b]	Delay	LOS		
1. SeaWorld Drive/ I-5 Northbound Ramps	Signal	AM PM	49.8 68.3	D E	50.0 69.4	D E	0.2 1.1	No
2. SeaWorld Drive/ I-5 Southbound Ramps	Signal	AM PM	26.0 23.8	C C	27.5 24.9	C C	1.5 1.1	No
3. SeaWorld Drive/ Pacific Highway/ E. Mission Bay Drive	Signal	AM PM	24.2 69.8	C E	25.0 **84.1**	C **F**	0.8 **14.3**	**Yes**
4. SeaWorld Drive/ Friars Road	Signal	AM PM	16.3 30.2	B C	16.7 34.8	B C	0.4 4.6	No
5. SeaWorld Drive/ SeaWorld Way (exit)	Signal	AM PM	6.4 12.4	A B	7.0 16.7	A B	0.6 4.3	No
6. Perez Cove Way/ SeaWorld Entrance	Free	AM PM	— —	— —	— —	— —	— —	—
7. Ingraham Street/ Perez Cove Way/ Dana Landing Road	Signal	AM PM	11.2 19.9	B B	13.8 25.0	B C	2.6 5.0	No
8. Ingraham Street/ Vacation Road	Signal	AM PM	20.8 28.5	C C	23.1 28.6	C C	2.3 0.1	No
9. Ingraham Street/ Crown Point Drive	Signal	AM PM	28.7 31.7	C C	29.6 32.0	C C	0.9 0.3	No
10. W. Mission Bay Drive/ I-8 Westbound Off-Ramp	Signal	AM PM	40.8 57.0	D E	44.4 **62.8**	D **E**	4.1 **5.8**	**Yes**
11. Sports Arena Boulevard/ I-8 Eastbound On-Ramp	Free	AM PM	— —	— —	— —	— —	— —	—
12. Sunset Cliffs Boulevard/ I-8 Westbound Off-Ramp	Signal	AM PM	80.6 161.6	F F	80.7 161.7	F F	0.1 0.1	No
13. Sunset Cliffs Boulevard/ I-8 Eastbound On-Ramp	Signal	AM PM	64.5 15.2	E B	64.5 15.3	E B	0.0 0.1	No
14. Sunset Cliffs Boulevard/ Nimitz Boulevard	Signal	AM PM	56.7 42.1	E D	56.8 42.6	E D	0.1 0.5	No

Footnotes:
a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Δ denotes the increase in delay due to Project.

General Notes:
- Sig = Significant impact, yes or no.
- **Bold** typeface and shading represent a significant impact.

SIGNALIZED DELAY/LOS THRESHOLDS Delay	LOS	UNSIGNALIZED DELAY/LOS THRESHOLDS Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

TABLE 11–1b
HORIZON YEAR (YEAR 2040) INTERSECTION QUEUING

Intersection	Movement [a]	Turn Lanes	Storage (ft)	Peak Hour	Horizon Year (Year 2040) Without Project		Horizon Year (Year 2040) With Project	
					Queue (ft) [b]	Volume	Queue (ft)	Volume
1. SeaWorld Drive / I-5 Northbound Ramps	NBL	1	1000	AM	303	270	314	289
				PM	314	280	334	308
	EBL	2	250	AM	**277**	870	**278**	920
				PM	**270**	810	**273**	916
2. SeaWorld Drive / I-5 Southbound Ramps	SBR	1	150	AM	**196**	710	**209**	785
				PM	**253**	980	**219**	1090
	EBR	1	400	AM	40	70	45	82
				PM	70	260	72	295
3. SeaWorld Drive / Pacific Highway	WBL	1	155	AM	86	70	92	72
				PM	**207**	250	**211**	252
	NBR	0	c	AM	c	80	c	81
				PM	c	190	c	195
	NBL	2	310	AM	**337**	260	**363**	260
				PM	**443**	210	**456**	212
	EBR	1	250	AM	41	100	34	100
				PM	208	290	208	291
4. SeaWorld Drive / Friars Road	NBL	2	850	AM	147	290	147	294
				PM	173	380	174	386
	EBR	1	215	AM	**297**	280	**302**	282
				PM	**241**	920	**241**	934
5. SeaWorld Drive / SeaWorld Way	SBR	2	600	AM	33	21	39	26
				PM	68	115	72	148
	SBL	2	600	AM	51	71	54	88
				PM	104	395	197	509
	EBL	1	110	AM	78	16	78*	17
				PM	**119**	34	**119**	35

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TABLE 11–1b
HORIZON YEAR (YEAR 2040) INTERSECTION QUEUING

Intersection	Movement [a]	Turn Lanes	Storage (ft)	Peak Hour	Horizon Year (Year 2040) Without Project		Horizon Year (Year 2040) With Project	
					Queue (ft) [b]	Volume	Queue (ft)	Volume
Continued from Previous Page								
7. Ingraham Street / Dana Landing Way / Perez Cove Way	SBL	2	180	AM	37	9	55	35
				PM	54	11	86	49
	WBR	1	55	AM	30	7	46	26
				PM	52	16	**62**	43
	WBL	2	520	AM	26	13	64	171
				PM	177	229	181	461
	NBR	1	180	AM	108	116	124	343
				PM	154	88	**253**	415
10. W. Mission Bay Drive / I-8 Westbound Off-Ramp	WBR	2	1,530	AM	842	1,840	842	1,931
				PM	896	1,820	906	1,952

Footnotes:

a. The Project will add trips to turning movements shown.
b. 95th percentile queue length.
c. Shared turn movement lane. Turn movement queue not separately calculated. Criteria for adding a turn lane are assessed in Section 9.2.1.

General Notes:

- **Bold** typeface and shading in queue column indicate queue is calculated to exceed available storage.
- **Bold** typeface and shading in volume column indicate volume exceeds threshold for consideration of an additional turn lane.
- Ft = Feet
- SBR = Direction/Turn Lane, e.g., southbound right-turn lane.
- If a turning movement is served by multiple lanes, queue length shown reflects the longest distance.

TABLE 11–1C
HORIZON YEAR (YEAR 2040) FREEWAY INTERCHANGE OPERATIONS

Intersection	Movement	Storage (ft)	Peak Hour	Horizon Year (Year 2040) Without Project	Horizon Year (Year 2040) With Project
				Queue (ft) [a]	Queue (ft)
1. Sea World Drive / I-5 NB Off Ramp	NBL	1000	AM	303	314
			PM	314	336
	NBR	1000	AM	199	231
			PM	383	376
2. SeaWorld Drive / I-5 SB Off Ramp	SBL	150	AM	**399**	**419**
			PM	**609**	**579**
	SBR	150	AM	**196**	**209**
			PM	**253**	**219**
10. W. Mission Bay Drive / I-8 WB Off Ramp	WBR	1,530	AM	842	823
			PM	896	906
	WBL	1,530	AM	819	821
			PM	904	916
12. Sunset Cliffs Boulevard / I-8 WB Off Ramp	WBR	n/a	AM	51	44
			PM	43	19
	WBL	n/a	AM	782	781
			PM	756	755

Footnotes:

- 95th percentile queue length.

General Notes:

- **Bold** typeface and shading indicate queue is calculated to exceed available storage.
- Ft = Feet
- SBR = Direction/Turn Lane; e.g. southbound right-turn lane.
- n/a = not applicable due to freeway terminating at this location.

TABLE 11–2
HORIZON YEAR (YEAR 2040) STREET SEGMENT OPERATIONS

Street Segment	Capacity (LOS E)[a]	Horizon Year (Year 2040) Without Project			Horizon Year (Year 2040) With Project			Δ [e]	Sig?
		ADT [b]	LOS [c]	V/C [d]	ADT	LOS	V/C		
SeaWorld Drive									
1. I-5 Ramps to Pacific Highway/ E. Mission Bay Drive	45,000	45,580	F	1.013	**48,200**	**F**	**1.071**	**0.058**	**Yes**
2. Pacific Highway/ E. Mission Bay Drive to Friars Road	40,000	41,670	F	1.042	**44,400**	**F**	**1.110**	**0.068**	**Yes**
3. Friars Road to SeaWorld Way	40,000	46,840	F	1.171	**49,800**	**F**	**1.245**	**0.074**	**Yes**
4. SeaWorld Way to W. Mission Bay Drive	45,000	44,770	E	0.995	46,100	F	1.024	0.030	No [f]
Friars Road									
5. Pacific Highway to SeaWorld Drive	40,000	19,070	B	0.477	19,300	B	0.483	0.006	No
West Mission Bay Drive									
6. Dana Landing Road to Ingraham Street	40,000	43,020	F	1.076	43,400	F	1.085	0.010	No
7. Ingraham Street to SeaWorld Drive	60,000	81,370	F	1.356	84,600	F	1.410	0.054	No[f]
8. SeaWorld Drive to I-8 Ramps (bridge) [e]	60,000 [e]	62,980	F	1.050	65,200	F	1.087	0.037	No[f]
9. I-8 Ramps to Sports Arena Boulevard	60,000	42,650	D	0.711	43,100	D	0.718	0.008	No
Perez Cove Way									
10. Ingraham Street to SeaWorld Entrance	15,000	7,600	C	0.507	11,670	D	0.778	0.271	No
11. SeaWorld Entrance to SeaWorld Drive	15,000	2,320	A	0.155	3,350	A	0.223	0.069	No
Ingraham Street									
12. Crown Point Drive to Vacation Road (bridge)	40,000	39,460	E	0.987	39,900	E	0.998	0.011	No
13. Vacation Road to Perez Cove Way/ Dana Landing Road (bridge)	40,000	44,040	F	1.101	44,500	F	1.113	0.012	No[f]
14. Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive	40,000	52,190	F	1.305	55,800	F	1.395	0.090	No[f]
Sunset Cliffs Boulevard									
15. W. Mission Bay Drive to I-8 Ramps (bridge)	40,000	42,340	F	1.058	42,600	F	1.065	0.007	No
16. I-8 Ramps to Nimitz Boulevard	40,000	43,540	F	1.091	43,800	F	1.095	0.004	No

Footnotes:

a. Capacities based on City of San Diego Roadway Classification Table.
b. Average Daily Traffic Volumes.
c. Level of Service.
d. Volume to Capacity.
e. The W. Mission Bay Drive bridge widening to six (6) lanes is assumed to be completed and fully operational by Year 2025.
f. Ultimate classification with intersections and HCM arterial analysis showing acceptable LOS.

General Notes:

- Sig = Significant impact, yes or no.
- **Bold** typeface and shading represent a significant impact.

TABLE 11–3
HORIZON YEAR (YEAR 2040) PEAK HOUR ARTERIAL ANALYSIS

Street Segment	Direction	Class	Horizon Year (Year 2040) With Project			
			AM		PM	
			Speed [a]	LOS [b]	Speed	LOS
Segment #4. SeaWorld Drive: SeaWorld Way to W. Mission Bay Drive	EB	I	44.3	A	34.2	B
	WB [c]	I	—	—	—	—
Segment #7: W. Mission Bay Drive: Ingraham Street to SeaWorld Drive	NB [d]	II	36.2	A	29.8	B
	SB [d]	II	41.4	A	38.3	A
Segment #8. W. Mission Bay Drive: SeaWorld Drive to I-8 Ramps (bridge)	NB [d]	II	36.2	A	29.8	B
	SB [d]	II	41.4	A	38.3	A
Segment #13. Ingraham Street: Vacation Road to Perez Cove Way/ Dana Landing Road (bridge)	NB	II	28.0	B	28.4	B
	SB	II	23.0	C	23.2	C
Segment #14. Ingraham Street: Perez Cove Way to W. Mission Bay Drive	NB [d]	II	36.2	A	29.8	B
	SB [d]	II	41.4	A	38.3	A

Footnotes:

a. Speed measured in miles per hour.
b. LOS = Level of Service
c. In the westbound direction of travel on SeaWorld Drive, the intersection with W. Mission Bay Drive is grade separated and there is no control delay.
d. Street segments #7, #8, and #14 are analyzed as single arterial segment, as the intersections between the traffic signals at Ingraham Street / Perez Cove Way and W. Mission Bay / I-8 Ramps are grade separated and hence no control delay. The results for the overall arterial are shown for each segment.

TABLE 11–4a
HORIZON YEAR (YEAR 2040) WITHOUT PROJECT FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir	# of Lanes [a]	Volume [b]	%K [c]		%D [c]		Truck Factor	Peak Hour Volume [c]		Flow Rate (pc/h/ln)		Adj. Capacity (pc/h/ln)	V/C [d]		Density [e]		LOS [f]	
				AM	PM	AM	PM		AM	PM	AM	PM		AM	PM	AM	PM	AM	PM
Interstate 5																			
1. Interstate 8 to Sea World Drive	NB	5M+1A	215,400	7.15%	7.81%	54.69%	46.81%	3.40%	8,423	7,875	1,544	1,444	2,166	0.713	0.667	25.2	23.3	C	C
	SB	4M+2A		7.15%	7.81%	45.31%	53.19%	3.40%	6,978	8,948	1,280	1,641	2,011	0.636	0.816	20.8	29.1	C	D
2. Sea World Drive to Clairemont Drive	NB	4M+1A	242,300	7.15%	7.81%	54.69%	46.81%	3.40%	9,475	8,858	2,085	1,949	2,140	0.974	0.911	42.2	36.5	E	E
	SB	4M+1A		7.15%	7.81%	45.31%	53.19%	3.40%	7,850	10,065	1,727	2,215	2,140	0.807	1.035	29.6	—	D	F
Interstate 8																			
3. W. Mission Bay Drive to Interstate 5	EB	3M+1A	130,000	7.46%	6.59%	44.07%	39.03%	1.20%	4,274	3,344	1,150	900	2,090	0.550	0.431	18.5	14.5	C	B
	WB	3M+2A		7.46%	6.59%	55.93%	60.97%	1.20%	5,424	5,223	1,168	1,125	1,961	0.596	0.574	18.5	17.8	C	B

Footnotes:

a. Lane geometry taken from PeMS lane configurations at corresponding postmile.
b. Existing volume calculated from most recent Caltrans *Traffic Census Program* Peak Hour Volume Data (2018) and grown against the Fiesta Island Amendment traffic model forecast volumes to reach Horizon Year (Year 2040) conditions.
c. Peak hour volumes calculated from K and D factors provided in most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
d. V/C = (Peak Hour Volume/Hourly Capacity)
e. Density measures passenger cars per mile per lane. Density = Flow Rate (passenger-cars/hour/lane) ÷ Speed (average passenger-car speed in mph).
f. LOS = Level of Service

LOS	Density Range (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

General Note:

- M = Mainline
- A = Auxiliary
- Truck factor sourced to most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
- "—" Indicates density exceeds the maximum threshold for LOS F.

TABLE 11–4b
HORIZON YEAR (YEAR 2040) WITH PROJECT FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir	# of Lanes [a]	Volume [b]	%K [c]		%D [c]		Truck Factor	Peak Hour Volume [c]		Flow Rate (pc/h/ln)		Adj. Capacity (pc/h/ln)	V/C [d]		Density [e]		LOS [f]		Δ V/C [g]		Sig?
				AM	PM	AM	PM		AM	PM	AM	PM		AM	PM	AM	PM	AM	PM	AM	PM	
Interstate 5																						
1. Interstate 8 to Sea World Drive	NB	5M+1A	217,116	7.15%	7.81%	54.69%	46.81%	3.40%	8,451	7,951	1,550	1,458	2,166	0.716	0.673	25.4	23.6	C	C	0.003	0.006	No
	SB	4M+2A		7.15%	7.81%	45.31%	53.19%	3.40%	7,021	9,012	1,287	1,652	2,011	0.640	0.821	21.0	29.5	C	D	0.003	0.005	No
2. Sea World Drive to Clairemont Drive	NB	4M+1A	242,875	7.15%	7.81%	54.69%	46.81%	3.40%	9,487	8,877	2,087	1,953	2,140	0.975	0.913	42.3	36.6	E	E	0.001	0.002	No
	SB	4M+1A		7.15%	7.81%	45.31%	53.19%	3.40%	7,858	10,095	1,729	2,221	2,140	0.808	1.038	29.6	—	D	F	0.001	0.003	No
Interstate 8																						
3. W. Mission Bay Drive to Interstate 5	EB	3M+1A	131,778	7.46%	6.59%	44.07%	39.03%	1.20%	4,310	3,427	1,160	922	2,090	0.555	0.441	18.6	14.8	C	B	0.005	0.011	No
	WB	3M+2A		7.46%	6.59%	55.93%	60.97%	1.20%	5,470	5,291	1,178	1,139	1,961	0.601	0.581	18.7	18.1	C	C	0.005	0.007	No

LOS	Density Range (pc/mi/ln)
A	0 – 11
B	> 11 – 18
C	> 18 – 26
D	> 26 – 35
E	> 35 – 45
F	> 45

Footnotes:

a. Lane geometry taken from PeMS lane configurations at corresponding postmile.
b. Existing volume calculated from most recent Caltrans *Traffic Census Program* Peak Hour Volume Data (2018) and grown against the Fiesta Island Amendment traffic model forecast volumes to reach Near-Term (Year 2025) conditions.
c. Baseline peak hour volumes calculated from K and D factors provided in most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016). Project volumes added to baseline using calculated project peak hour assignment (see *Figure 6–9*), **not** K and D factors.
d. V/C = (Peak Hour Volume/Hourly Capacity)
e. Density measures passenger cars per mile per lane. Density = Flow Rate (passenger-cars/hour/lane) ÷ Speed (average passenger-car speed in mph).
f. LOS = Level of Service
g. "Δ" denotes the Project-induced increase in V/C. Per City Guidelines, a significant impact occurs when the V/C is increased by greater than 0.01 for LOS E or 0.005 for LOS F.

General Note:

- M = Mainline
- A = Auxiliary
- Truck factor sourced to most recent Caltrans Traffic Census Program *Peak Hour Volume Data* (2016).
- "—" Indicates density exceeds the maximum threshold for LOS F.
- Sig? = Significant impact, yes or no.

TABLE 11–5
HORIZON YEAR (YEAR 2040) WITHOUT AND WITH PROJECT RAMP METER OPERATIONS

Location/Condition	Peak Hour [a]	Peak Hour Volume	SOV Demand [b] (veh/hr/ln)	Ramp Meter Rate [c] (veh/hr/ln)	Excess Demand (veh/hr/ln) [d]	Delay per Lane [e]	Queue per Lane [f]
▪ **I-5 Northbound On-Ramp from SeaWorld Drive (2 SOV)**							
Horizon Year (Year 2040) Without Project	AM	1,190	595	*Observed:* 774	0	0.0	0
	PM	1,200	600	*Observed:* 612	0	0.0	0
Horizon Year (Year 2040) With Project	AM	1,218	609	*Observed:* 774	0	0.0	0
	PM	1,277	639	*Observed:* 612	27	2.6	675
Project Increase	AM	28	14	—	0	0.0	0
	PM	77	39	—	27	2.6	675
▪ **I-5 Southbound On-Ramp from SeaWorld Drive (1 SOV + 1HOV)**							
Horizon Year (Year 2040) Without Project	AM	440	396	*Observed: 275*	121	26.4	3,025
	PM	540	486	*Observed: 350*	136	23.3	3,400
Horizon Year (Year 2040) With Project	AM	448	403	*Observed: 275*	128	27.9	3,200
	PM	570	513	*Observed: 350*	163	27.9	4,075
Project Increase	AM	8	7	—	**7**	**1.5**	**175**
	PM	30	27	—	**27**	**4.6**	**675**
▪ **I-8 Eastbound On-Ramp from Southbound W. Mission Bay Drive/Sports Arena Boulevard (2 SOV)**							
Horizon Year (Year 2040) Without Project	PM	1,300	650	*Observed: 696*	0	0.0	0
Horizon Year (Year 2040) With Project	PM	1,381	691	*Observed: 696*	0	0.0	0
Project Increase	PM	81	41	—	0	0.0	0

Footnotes:

a. Selected peak hour based on period when ramp meter is operating.
b. Peak hour demand in vehicles/hour/lane for single-occupancy vehicle (SOV) lanes. 10% HOV reduction obtained from PeMS data collected along the mainline, where available.
c. Meter rate "R" is the most restrictive rate at which the ramp meter (signal) discharges traffic onto the freeway (obtained from Caltrans). The discharge rate varies depending on the mainline volumes. While meter rates were obtained from Caltrans, the rates were revised to reflect existing ramp meter observations discussed in *Section 7.4*.
d. Excess Demand on hourly basis. If SOV Demand > Ramp Meter Rate, Excess Demand = SOV Demand – Ramp Meter Rate.
e. Delay expressed in minutes per lane. If Excess Demand > 0, Delay = Excess Demand ÷ Ramp Meter Rate * 60 minutes/hour.
f. Queue in feet calculated assuming vehicle length of 25 feet. If Excess Demand > 0, Queue = Excess Demand * 25 feet.

General Notes:

- SOV = Single-Occupancy Vehicles; HOV = High-Occupancy Vehicles

12.0 PEDESTRIAN MOBILITY

This section presents the pedestrian conditions in the Project study area. The *City of San Diego Pedestrian Master Pla*n (2006) and the *General Plan Mobility Element (2008)* establish guidelines for a complete, functional, and interconnected pedestrian network, that is accessible to pedestrians of all abilities. Various sources were reviewed to identify future planned pedestrian improvements in the Project study area, including the *Mission Bay Park Master Plan*. Project pedestrian improvements are also presented, where proposed.

12.1 Existing Pedestrian Conditions

A pedestrian network inventory was conducted along street segments, which included documenting missing sidewalks, pedestrian barriers, and pedestrian pathways within the Project's sphere of influence. ***Figure 12–1*** shows the existing pedestrian network.

Within the SeaWorld leasehold, the following pedestrian conditions are noted.

In 1993 SeaWorld began construction of a 10-foot-wide bicycle path along the south and west boundaries of the leasehold to provide a continuous link to the system of paths within Mission Bay Park. The approximately 5,000-foot curvilinear pathway was required by the City of San Diego as mitigation for the 1985 SeaWorld Master Plan because of lack of a waterfront pathway through the leasehold. Prior to construction of the pathway, the adjacent links of the area-wide bike circulation were discontinuous.

In 2005, enhancements to the bicycle/pedestrian pathway were constructed that increased the pathway width, where feasible, to 17 feet: 9 feet dedicated for bicycles and skaters (and service emergency vehicles) and 8 feet for pedestrians; inclusion of a 4- to 10-foot-wide landscaped median to separate the two sections; functional markings for each pathway type; and directional signage at key junctions with other pathways.

Since 2005, SeaWorld has constructed two major improvements to enhance public access to the shoreline: Off-Site Bicycle/Pedestrian Path Improvements and a Pedestrian Promenade. ***Figure 12–2***, Shoreline Access Improvements depicts these improvements, which are designed to provide continuous shoreline access from SeaWorld's leasehold to Fiesta Island (approximately 4,700 feet), as well as future pedestrian upgrades proposed as part of the Project. The existing improvements are described in further detail below:

> *Off-Site Bicycle/Pedestrian Path Improvements*
>
> A 10-foot-wide landscaped pathway running from the northeast corner of the leasehold along the waterfront to the south shores boat ramp and from the existing turn-around on the east side of the South Shores embayment, along the waterfront to the Fiesta Island causeway.

Pedestrian Promenade along the South Shores Shoreline

A 50-foot-wide public promenade, designed in substantial conformance with the promenade depicted in Figure 31, South Shores Concept Plan, of the certified Mission Bay Park Master Plan and described as Item 112 of that plan.

12.1.1 *Walkshed Analysis*

In this study, a walkshed analysis was performed to evaluate Project site connectivity. The walkshed analysis was performed by identifying four access points to/from the SeaWorld site. From each access point, areas outside SeaWorld that could be reached by walking both 0.25 miles and 0.5 miles were identified. Walking routes from each access point consider the existence of crosswalks, sidewalks, pedestrian bridges, pedestrian pathways, etc. As such, while some areas are within 0.25-miles and/or 0.5-miles of the site, they may not be reached by walking due to lack of facilities. After creating the walkshed network, the area that could be captured by walking was measured. A larger walkshed area (walkshed network) means higher connectivity between SeaWorld and nearby areas.

Figure 12–3 illustrates the walkshed analysis for SeaWorld depicting the area within 0.25/0.5 miles walking distance from four pedestrian access points on Perez Cove Way, SeaWorld Drive, and S. Shores Parkway. It is recognized that once on property the ticket entrance is located another 0.25-miles or more from the public street.

12.1.2 *Existing Pedestrian Activity*

Existing pedestrian activity was measured at every intersection in the Project study area during the commuter AM/PM peak hours. The AM and PM pedestrian activity was categorized as Low, Medium, or High for each intersection. This represents a measure of pedestrian activity near the Project site. The scale is area-specific and assumed the following:

Activity Level	Pedestrians per Hour
Low	< 10
Medium	> 10–30
High	> 30

General Notes:
- Scale based on observed peak hour pedestrian volumes in study area.
- Low = <20% of maximum observed pedestrian volumes; Medium = 20-60%; High = >60%.

Figure 12–4 shows the existing pedestrian activity in and around the study area for the AM and PM peak hours.

The following lists the intersections within the 0.25-mile SeaWorld walkshed area. The pedestrian activity level is noted next to each location. Bold typeface indicates medium to high activity levels. The highlighted locations represent the most critical locations where the Project may add activity.

- **Intersection #5. SeaWorld Drive/ SeaWorld Way** (*Medium* – AM peak hour, *Low* – PM peak hour)

- Intersection #6. Perez Cove Way/ SeaWorld Entrance (*Low* – AM/PM peak hours)
- **Intersection #7. Ingraham Street/ Perez Cove Way/ Dana Landing Road** (*Medium* – AM/PM peak hours)
- **Pedestrian/Bicycle Signalized Crossing on Perez Cove Way** (*Medium* – AM peak hour, *Low* – PM peak hour)

12.2 Future Pedestrian Conditions

Several local planning documents were reviewed to determine if any proposed pedestrian enhancing projects are forthcoming. A review of the *Mission Bay Park Master Plan*, *Fiesta Island Amendment, Ocean Beach Community Plan, Peninsula Community Plan, Midway-Pacific Community Plan*, and the *City of San Diego Pedestrian Master Plan* were reviewed. However, these documents provide speculative improvements that are not currently funded or identified for completion in a particular timeframe. There is currently not a Capital Improvement Project (CIP) list or Public Facilities Financing Plan (PFFP) project list for any pending pedestrian improvements in the Project vicinity.

Table 12–1 shows the planned pedestrian improvements that were identified within the study area outside of the SeaWorld leasehold area. ***Figure 12–5*** shows the planned pedestrian improvements outside of the SeaWorld leasehold area. While not within the SeaWorld leasehold area; however, these improvements will be considered as part of the evaluation of the Project study area per *TSM* criteria.

TABLE 12–1
PLANNED IMPROVEMENTS – PEDESTRIAN

Project Name	Source	Improvements	Schedule/ Funding
P1: Sidewalks	Fiesta Island/Mission Bay Park Master Plan Amendment	Complete sidewalk on Friars Road from SeaWorld Drive to the end of the existing sidewalk. Construct ADA compliant curb ramps at the Friars Road/ SeaWorld Drive intersection. Restripe all crosswalks to meet current City of San Diego standard crosswalks (continental crossways with four-foot stop line set back).	Unidentified
P2: Sidewalks	Fiesta Island/Mission Bay Park Master Plan Amendment	Complete sidewalk along the west side of SeaWorld Drive from Friars Road to E. Mission Bay Drive-Pacific Highway. Construct ADA compliant curb ramps on the northeast and southeast corners at Sea World Drive/E. Mission Bay Drive-Pacific Highway. Install current City of San Diego standard crosswalks on all legs of this intersection.	Unidentified
P3: Sidewalks	Fiesta Island/Mission Bay Park Master Plan Amendment	Complete sidewalk along the west side of Sea World Drive from E. Mission Bay Drive-Pacific Highway to the I-5 freeway southbound ramps.	Unidentified

General Note:

- Improvements shown in this table are not programmed with funding and timelines for completion. They are recommendations from their respective planning documents sourced in this table.

12.3 Recommended Pedestrian Improvements

Based on the review of the pedestrian network, walkshed evaluation, and City planning documents, the following pedestrian related improvements, as illustrated in *Figure 12–2*, are recommended to be implemented by SeaWorld:

- Provide a minimum 10-foot-wide public accessway (vertical access) from Perez Cove Way to the shoreline somewhere between the existing Skyride station and the driveway/aisle at the southern end of the north employee parking lot (a distance of 550 feet), with the final location to be determined when the final plans are submitted for review.
- Maintain the existing pedestrian paths along the Perez Cove shoreline to enhance the waterfront experience for the general public.
- Enhance the shoreline access with future expansion of the marina and hotel development.
- Continue to provide ongoing maintenance of the existing pedestrian/bicycle pathways within the site.

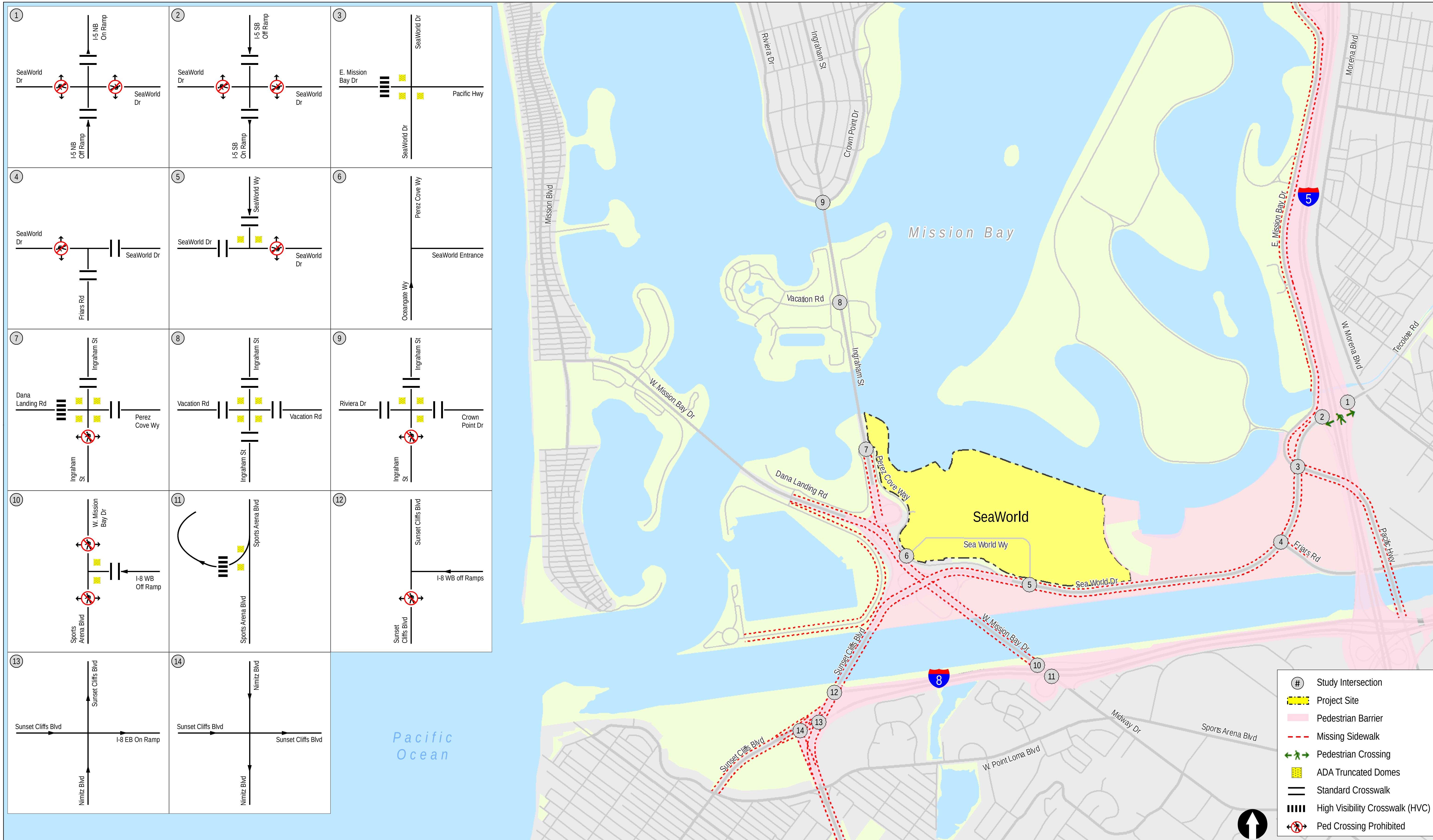

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Figure 12-1
Existing Pedestrian Network

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Figure 12-2

Shoreline Access Improvements

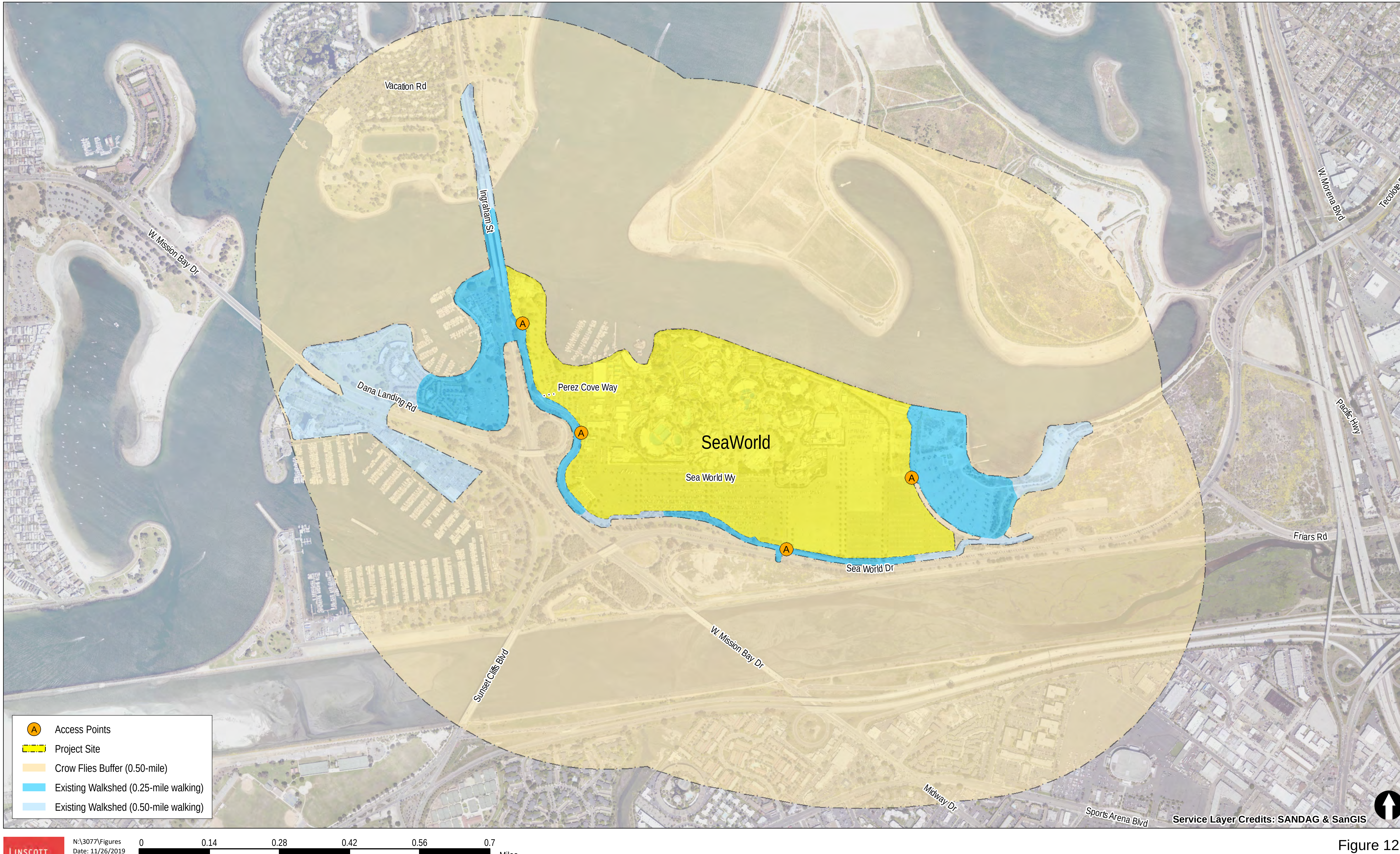

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Figure 12-3

Walkshed Analysis

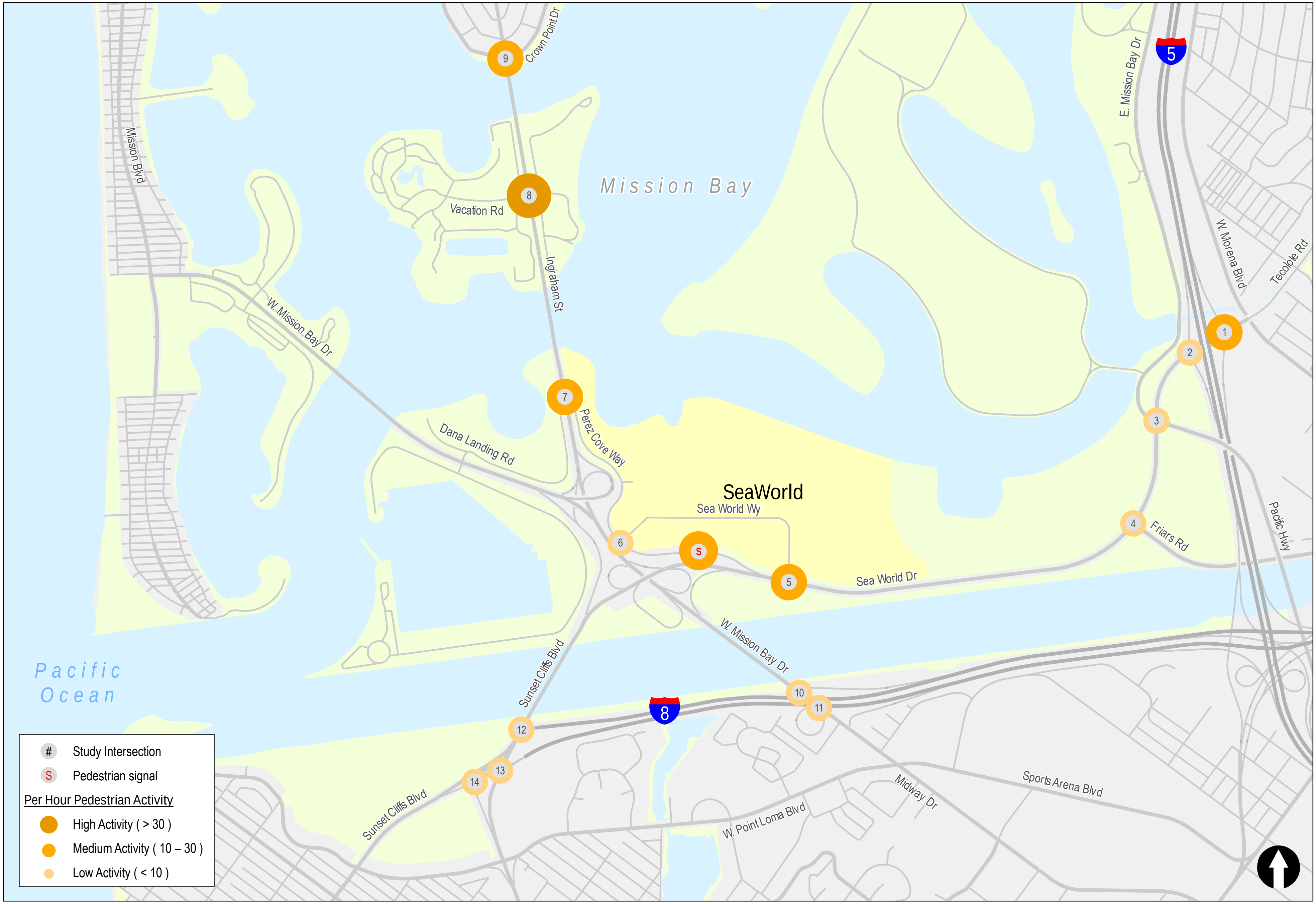

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Figure 12-4

Existing Pedestrian Demand (AM Peak Hour)

(Page 1 of 2)

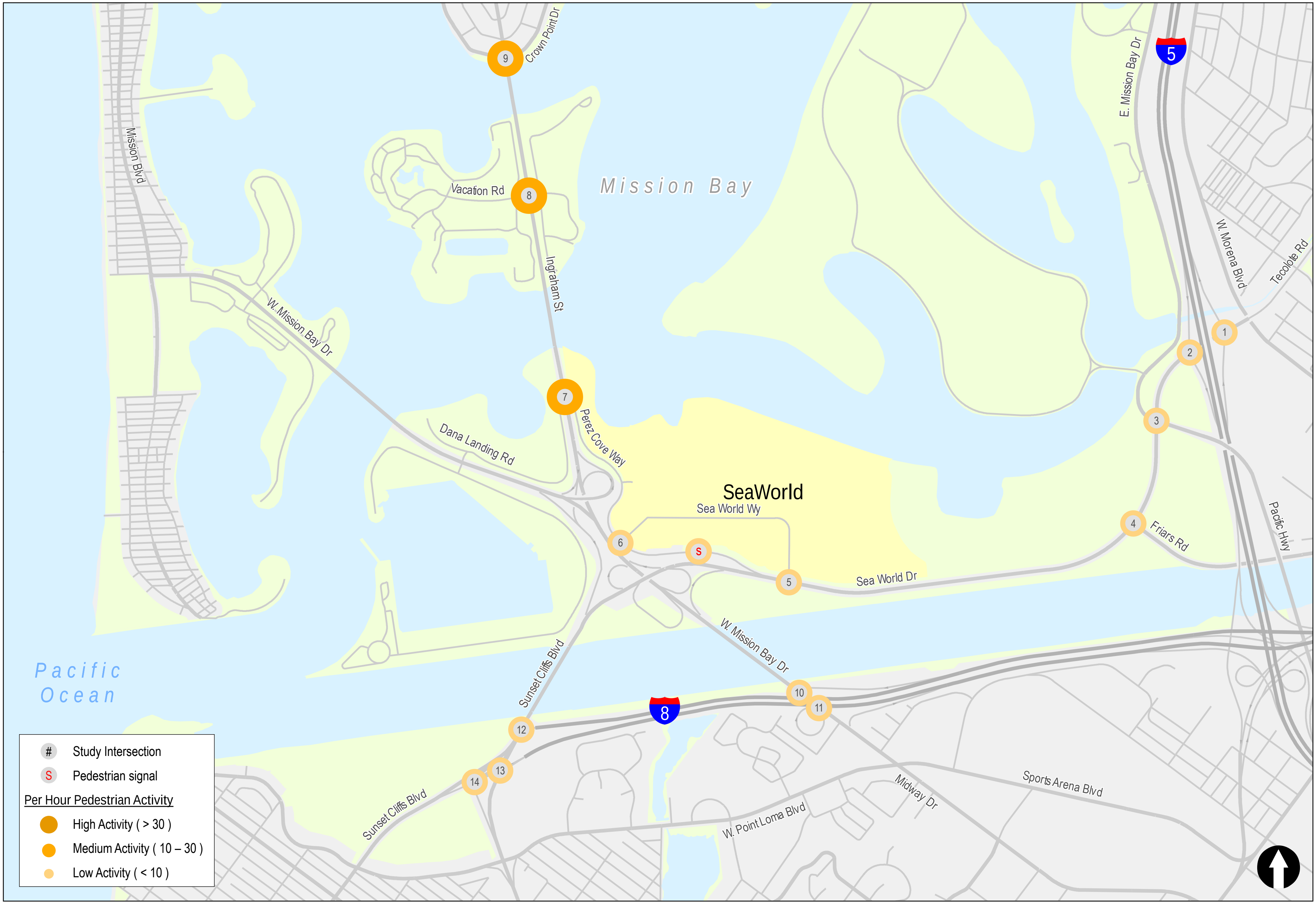

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Figure 12-4

Existing Pedestrian Demand (PM Peak Hour)

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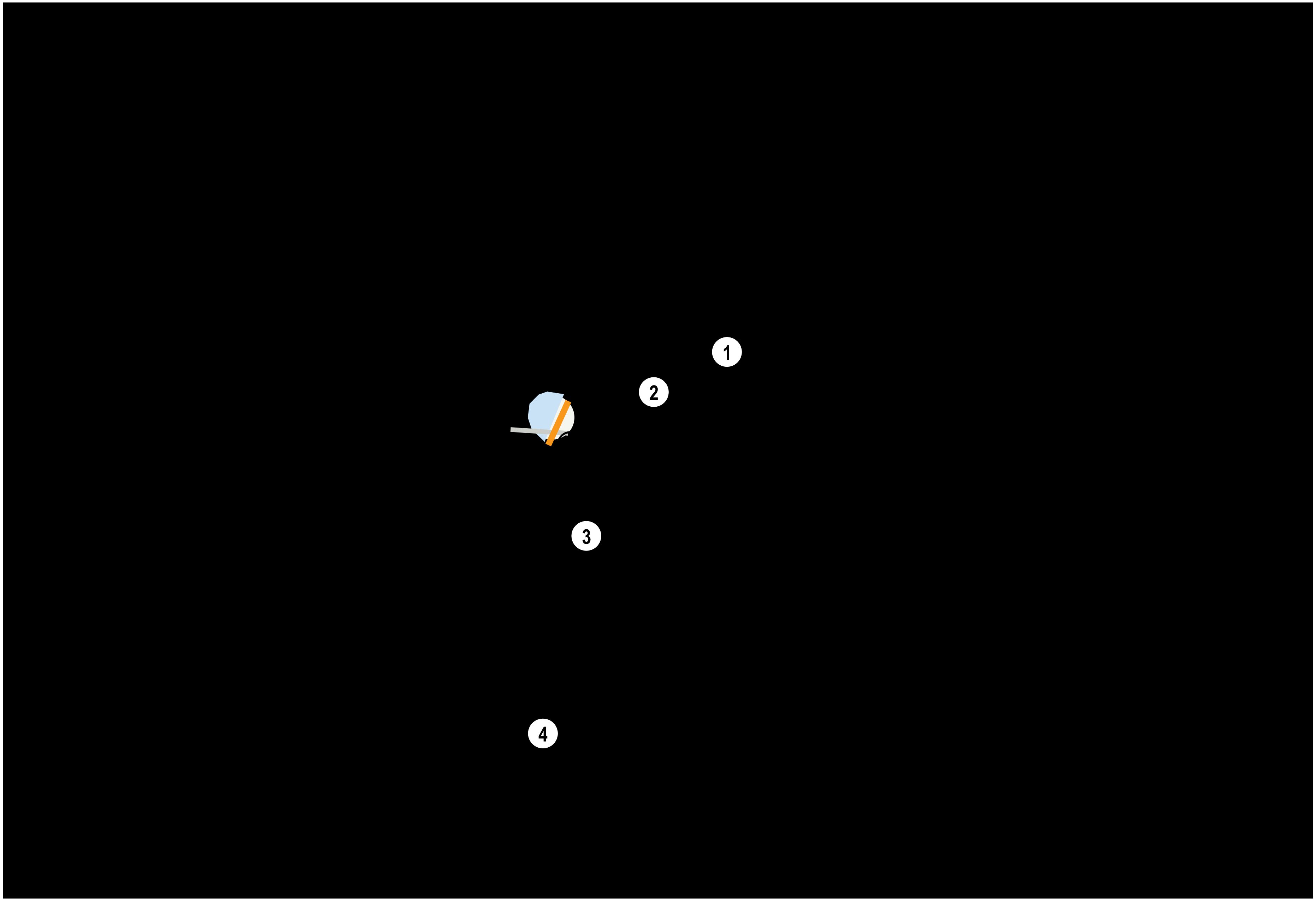

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Figure 12-5

Planned Pedestrian & Bicycle Improvements

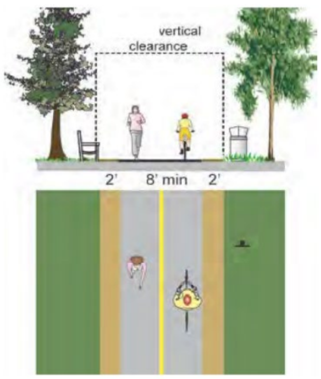
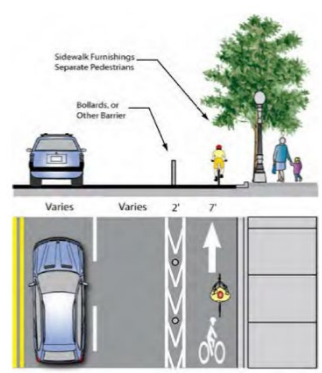
13.0 BICYCLE MOBILITY

This section presents the bicycle mobility in the Project study area. In addition, the section also presents a review of the future bike infrastructure in the area based on the *City of San Diego Bicycle Master Plan,* the *City of San Diego General Plan - Mobility Element,* the *SANDAG San Diego Regional Bike Plan*, *Mission Bay Park Master Plan*, *Fiesta Island Amendment, Ocean Beach Community Plan, Peninsula Community Plan,* and *Midway-Pacific Community Plan*.

13.1 Bicycle Classifications

There are four (4) different bicycle classifications – Class I, Class II, Class III and Class IV as shown in ***Table 13–1.***

TABLE 13–1
CALIFORNIA BIKEWAY CLASSIFICATION SYSTEM

Class I – Bike Path Bike paths, also termed shared-use or multi-use paths, are paved right-of-way for exclusive use by bicyclists, pedestrians, and those using non-motorized modes of travel. They are physically separated from vehicular traffic and can be constructed in roadway right-of-way or exclusive right-of-way. Bike paths provide critical connections in the city where roadways are absent or are not conducive to bicycle travel. 	*Class II – Bike Lane* Bike lanes are defined by pavement striping and signage used to allocate a portion of a roadway for exclusive or preferential bicycle travel. Bike lanes are one-way facilities on either side of a roadway. Whenever possible, Bike Lanes should be enhanced with treatments that improve safety and connectivity by addressing site-specific issues, such as additional warning or wayfinding signage. 
Class III – Bike Route Bike routes provide shared use with motor vehicle traffic within the same travel lane. Designated by signs, Bike Routes provide continuity to other bike facilities or designate preferred routes through corridors with high demand. Whenever possible, Bike Routes should be enhanced with treatments that improve safety and connectivity, such as the use of "sharrows" or shared lane markings to delineate that the road is a shared-use facility. 	*Class IV – Cycle Track* A Cycle Track is a hybrid type bicycle facility that combines the experience of a separated path with the on-street infrastructure of a conventional Bike Lane. Cycle tracks are bikeways located in roadway right-of-way but separated from vehicle lanes by physical barriers or buffers. Cycle tracks provide for one-way bicycle travel in each direction adjacent to vehicular travel lanes and are exclusively for bicycle use. Cycle tracks are not recognized by Caltrans Highway Design Manual as a bikeway facility. To provide bicyclists with the option of riding outside of the Cycle Track to position themselves for a left or right turn, parallel bikeways should be added adjacent to Cycle Track facilities whenever feasible. 

Source: *City of San Diego Bicycle Master Plan (2013)*

13.2 Existing Bicycle Conditions

A detailed bicycle network inventory was conducted for the surrounding study area. ***Table 13–2*** summarizes the existing bicycle classifications found on the study street segments. As shown in *Table 13–2*, roadways that currently do not provide their classified bicycle facilities are shown in bold typeface in the table below. It would be expected that these roadways will be improved to provide their classified bicycle facilities sometime in the future. *Section 13.3* below details the future bicycle improvements in the study area.

Within the SeaWorld leasehold, a shoreline shared bicycle/pedestrian access pathway was constructed in 1993 and upgraded in 2005. *Section 12.1* discussing the existing pedestrian conditions provides further details on the existing on-site bicycle facilities.

Figure 13–1 shows the existing bicycle network in the Project study area. *Figure 12–2* in the previous section illustrated the improvements to bicycle mobility completed by SeaWorld.

TABLE 13–2
BICYCLE MOBILITY

Street Segment	Existing Classification	Future Classification
SeaWorld Drive		
1. I-5 Ramps to Pacific Highway	Class III	**Class II or III**
2. Pacific Highway to Friars Road	Class II	**Class II or III**
3. Friars Road to SeaWorld Way	Class I, Class II	Class I, Class II
4. SeaWorld Way to W. Mission Bay Drive	None	None
Friars Road		
5. Pacific Highway to SeaWorld Drive	Class II (north side) Class I (south side)	Class II (north side) Class I (south side)
West Mission Bay Drive		
6. Dana Landing Road to Ingraham Street	None	None
7. Ingraham Street to SeaWorld Drive	None	None
8. SeaWorld Drive to I-8 Ramps (bridge) [a]	Class I	Class I
9. I-8 Ramps to Sports Arena Boulevard	Class III	**Class I or II**
Perez Cove Way		
10. Ingraham Street to SeaWorld Main Entrance	Class I	Class I
11. SeaWorld Main Entrance to SeaWorld Drive	Class I	Class I
Ingraham Street		
12. Crown Point Drive to Vacation Road (bridge)	Class II (west side)	**Class II (both sides)**
13. Vacation Road to Perez Cove Way (bridge)	Class II	Class II
14. Perez Cove Way to W. Mission Bay Drive	None	None

(Continued on Next Page)

TABLE 13–2
BICYCLE MOBILITY

Street Segment	Existing Classification	Future Classification
(Continued from Previous Page)		
Sunset Cliffs Boulevard		
15. W. Mission Bay Drive to I-8 Ramps (bridge)	Class II	**Class I**
16. I-8 Ramps to Nimitz Boulevard/ W. Point Loma Boulevard	Class II	**Class I**

Footnotes:

a. West Mission Bay Drive Bridge Replacement Project is currently constructing a Class I Bike Path on both bridges in each direction of travel.

General Notes:

- Improved conditions in the future shown in **bold** typeface.

13.2.1 *Bikeshed Analysis*

In this study, a bikeshed analysis was performed to evaluate site connectivity. This analysis also identifies potential locations where providing bicycle facilities could improve Project site's connectivity to surrounding area.

The bikeshed analysis was performed by identifying access points to/from SeaWorld. Locations selected were the primary access locations along Perez Cove Way and the SeaWorld perimeter along SeaWorld Drive.

From each access point, areas outside SeaWorld that could be reached by bicycling for a one-mile (or approximately 10 minutes) and 1.5-mile (or approximately 15 minutes) were identified. Selected bicycle routes from each access point consider the existence of bike routes, lanes, dedicated pathways, intersection crosswalks, bicycle/pedestrian bridges, etc. In this regard, while some areas are within the bike buffer around the site, they may not be reached by bike due to lack of facilities. The bikeshed analysis was conducted under existing conditions. A larger bikeshed area (bikeshed network) means higher connectivity between the site and nearby areas.

As shown in ***Figure 13–2*** illustrating the bikeshed analysis, the Project site, in general, has good connectivity to the surrounding community. This can be attributed to a good bicycle network both currently in place within the Mission Bay Park Master Plan area and surrounding beach communities.

Notably, the recently opened Tecolote Trolley Station at the intersection of Tecolote Road and Morena Boulevard lies within the 1.5-mile bike buffer, creating transit-to-microtransit opportunities between SeaWorld and the Tecolote Road transit station. Further details on the Tecolote Station are provided in *Section 14.1.2* of this report.

13.2.2 *Existing Bicycle Activity*

Existing bicycle activity was measured at every intersection in the Project study area during the commuter AM/PM peak hours. The AM/PM bicycle activity was categorized as Low, Medium, or High at each intersection. The scale is area-specific and assumed the following:

Activity Level	Cyclists per Hour
Low	< 10
Medium	> 10 – 30
High	> 30

General Notes:

- Scale based on observed peak hour bicycle volumes in study area.
- Low = <20% of maximum observed bicycle volumes; Medium = 20-60%; High = >60%.

Figure 13–3 shows the existing bicycle activity in and around the study area for the AM and PM peak hours.

The following lists the intersections within the 1.0-mile SeaWorld bikeshed area. The bicycle activity level is noted next to each location. Bold typeface indicates medium to high activity levels. The highlighted locations represent the most critical locations where the Project may add activity.

- **Intersection #3. SeaWorld Drive/ Pacific Highway** (*High* – AM/PM peak hours)
- Intersection #4. SeaWorld Drive/ Friars Road (*Low* – AM/PM peak hours)
- **Intersection #5. SeaWorld Drive/ SeaWorld Way** (*Medium* – AM Peak hour, *High* – PM peak hour)
- Intersection #6. Perez Cove Way/ SeaWorld Entrance (*Low* – AM/PM peak hours)
- **Intersection #7. Ingraham Street/ Dana Landing Road/ Perez Cove Way** (*High* – AM/PM peak hours)
- **Intersection #8. Ingraham Street/ Vacation Road** (*Medium* – AM peak hour, *High* – PM peak hour)
- **Intersection #9. Ingraham Street/ Crown Point Drive** (*Medium* – AM/PM peak hours)
- Intersection #10. W. Mission Bay Drive/ I-8 Westbound Off-Ramp (*Low* – AM/PM peak hours)
- **Intersection #11. W. Mission Bay Drive/ I-8 Eastbound On-Ramp** (*Low* – AM peak hour, *Medium* – PM peak hour)
- **Pedestrian/Bicycle Signalized Crossing on Perez Cove Way** (*Medium* – AM Peak hour, *High* – PM peak hour)

13.3 Future Bicycle Conditions

Several local planning documents were reviewed to determine if any proposed bicycle enhancing projects are forthcoming, including the *Mission Bay Park Master Plan*, *Fiesta Island Amendment, Ocean Beach Community Plan, Peninsula Community Plan, Midway-Pacific Community Plan*, and the *City of San Diego Bicycle Master Plan*. The proposed bicycle network from the San Diego

Bicycle Master Plan is included in ***Appendix W***. However, these documents provide speculative improvements that are not currently funded or identified for completion in a particular timeframe. There is currently not a Capital Improvement Project (CIP) list or Public Facilities Financing Plan (PFFP) project list for any pending bicycle improvements in the Project vicinity.

Table 13–3 shows the planned improvements that were identified within the study area. For locations in which funding sources and completion schedules are unknown, improvements were not considered in the existing bike mobility analysis. *Figure 12–5* provided previously in *Section 12.2* of this report also shows the planned bicycle improvements.

None of the planned bicycle improvements shown in *Table 13–3* are within the SeaWorld leasehold area; however, they will be considered as part of the evaluation of the Project study area per *TSM* criteria.

TABLE 13–3
PLANNED IMPROVEMENTS – BICYCLE

Corridor	Source	Project	Improvements	Schedule/ Funding
B1 – SeaWorld Drive	Fiesta Island/Mission Bay Park Master Plan Amendment [a]	Sea World Drive Buffered Bicycle Lanes Project (Friars Road to Entrance to Class I Bicycle Path near Sea World Entrance)	Restripe existing bicycle lanes to include a minimum three (3) foot buffer between the travel lane and the bicycle lane. Provide bicycle detection and painted bicycle detection location indicators at the signalized intersections of Sea World Drive/South Shores Parkway and Sea World Drive/Sea World Way if bicycle detection is not currently present.	Unidentified
B2 – SeaWorld Drive	Fiesta Island/Mission Bay Park Master Plan Amendment [a]	Sea World Drive Buffered Bicycle Lanes Project (E. Mission Bay Drive - Pacific Highway to Friars Road)	Restripe existing bicycle lanes to include a minimum three (3) foot buffer between the travel lane and the bicycle lane. Provide bicycle detection and painted bicycle detection location indicators at the signalized intersections of Sea World Drive and E. Mission Bay Drive/Pacific Highway and Sea World Drive and Friars Road if bicycle detection is not currently present.	Unidentified
B3 – SeaWorld Drive	Fiesta Island/Mission Bay Park Master Plan Amendment [a]	Sea World Drive Bicycle Lanes and Bicycle Connections from E. Mission Bay Drive-Pacific Highway to I-5 SB Ramps	Where feasible, restripe to provide buffered bicycle lanes. Widening projects on Sea World Drive through this section should include integration of buffered bicycle lanes. In the near term, where buffered bicycle lanes are not feasible add sharrows and post “Share the Road” signs.	Unidentified
B4 – SeaWorld Drive	Fiesta Island/Mission Bay Park Master Plan Amendment [a]	Sea World Drive Bicycle Connection Over I-5	Work with Caltrans to identify long-term improvements on the bridge crossing over I-5 to improve bicycle connectivity. In the near-term, stripe sharrows and post “Share the Road” signs as appropriate between ramp intersections.	Unidentified

General Note:

- Improvements shown in this table are not programmed with funding and timelines for completion. They are recommendations from their respective planning documents sourced in this table.

13.4 Recommended Bicycle Improvements

Based on the review of the bicycle network, bikeshed analysis, and planning documents, the following bicycle related improvements are recommended to be implemented by SeaWorld:

- Maintain the bicycle racks provided on-site (currently 27 slots) at the main entrance. Monitor demand for bicycle parking and provide additional spaces as demand increases.
- Maintain the employee bicycle racks at both the west security (currently 18 spaces) and east security (currently 10 spaces) employee entrances. Monitor demand for employee bicycle parking and provide additional spaces as demand increases.
- Enhance the shoreline access with future expansion of the marina and hotel development.
- Provide plug-in stations at the bicycle storage area for electric bikes or other micro mobility vehicles, as demand warrants it.
- Reserve space for parking alternative and micro mobility vehicles such as shared use bikes, scooters, and similar services. The space will be publicly accessible, provide electricity, and be provided to one or more micromobility service providers. If space set aside for micromobility devices is not utilized by micromobility devices/services, this space will be used to provide additional bicycle racks as demand increases.
- Continue to provide ongoing maintenance of existing pedestrian/bicycle pathways within the project site.

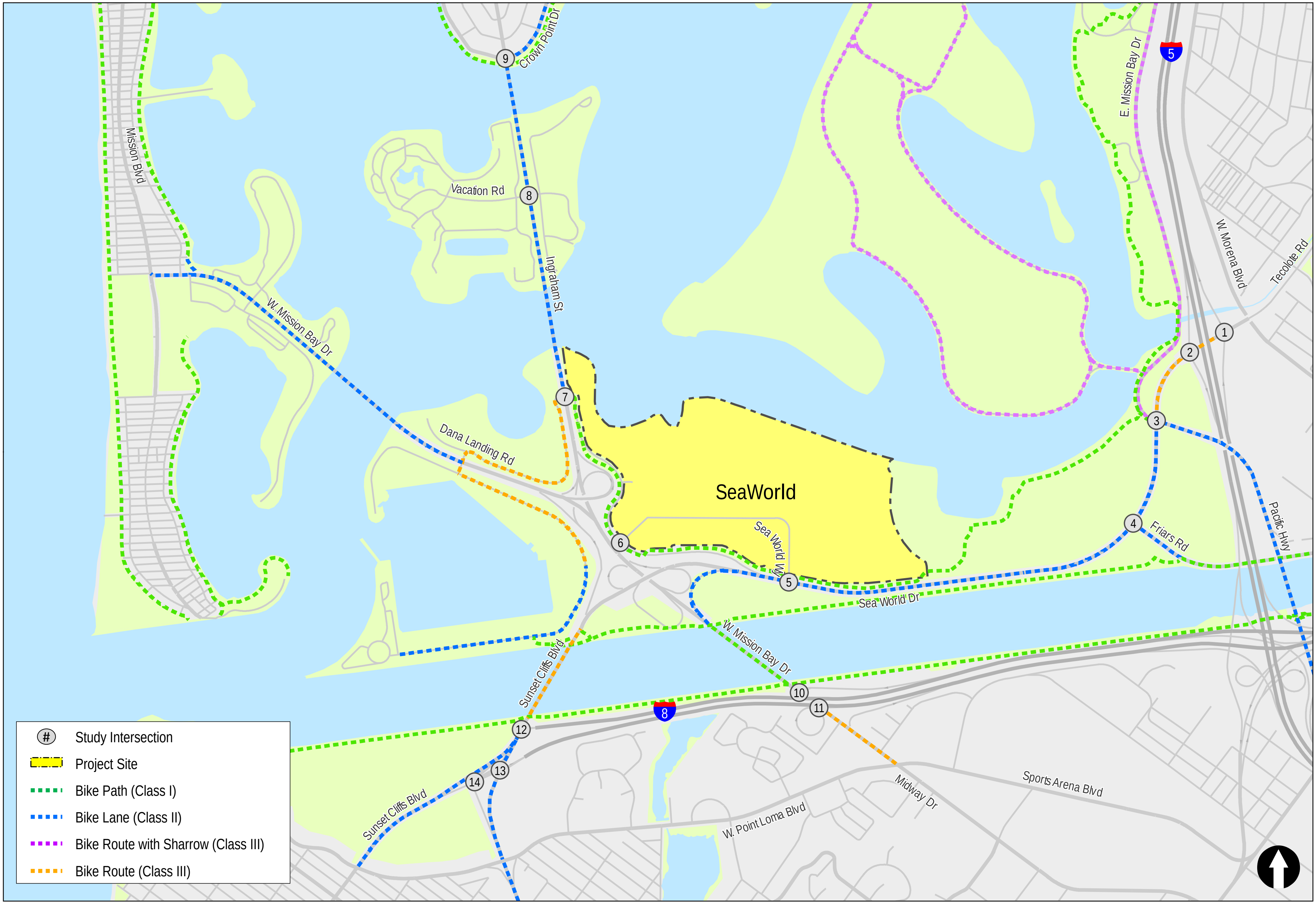


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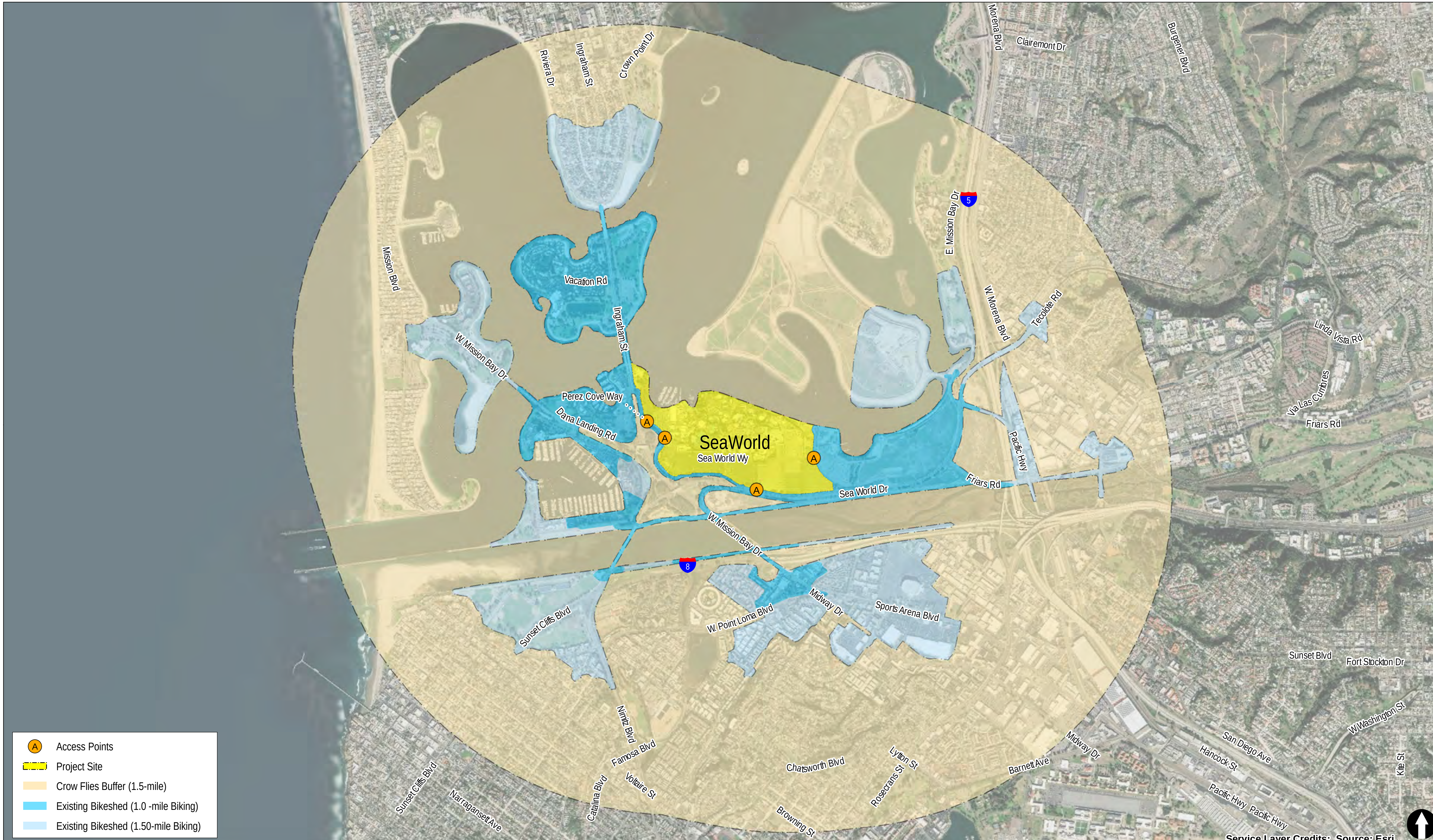
Figure 13-1
Existing Bicycle Network



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0 0.3 0.6 0.9 1.2 1.5 Miles

Figure 13-2
Bikeshed Analysis

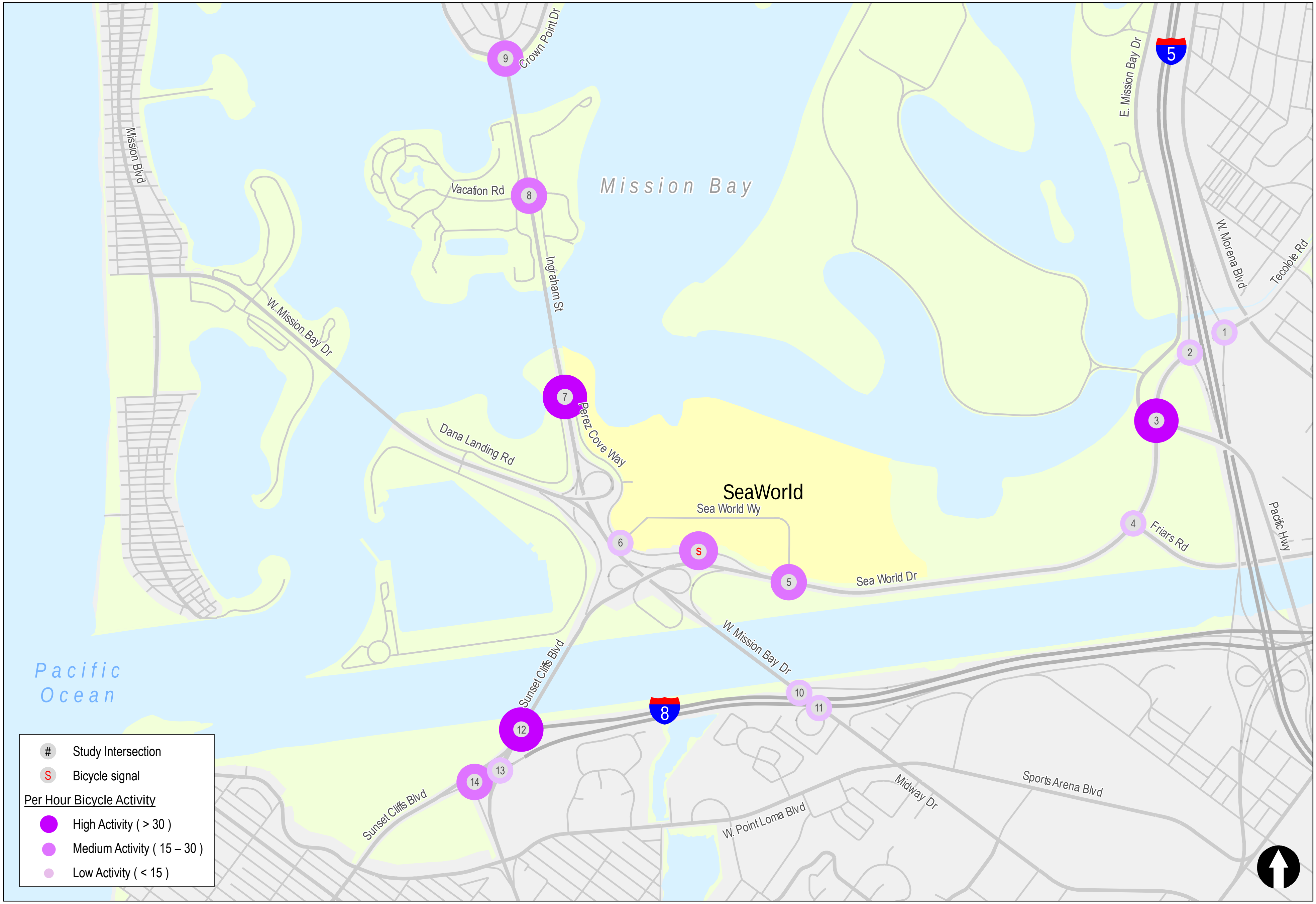

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Figure 13-3

Existing Bicycle Activity (AM Peak Hour)

(Page 1 of 2)

2020 SEAWORLD MASTER PLAN

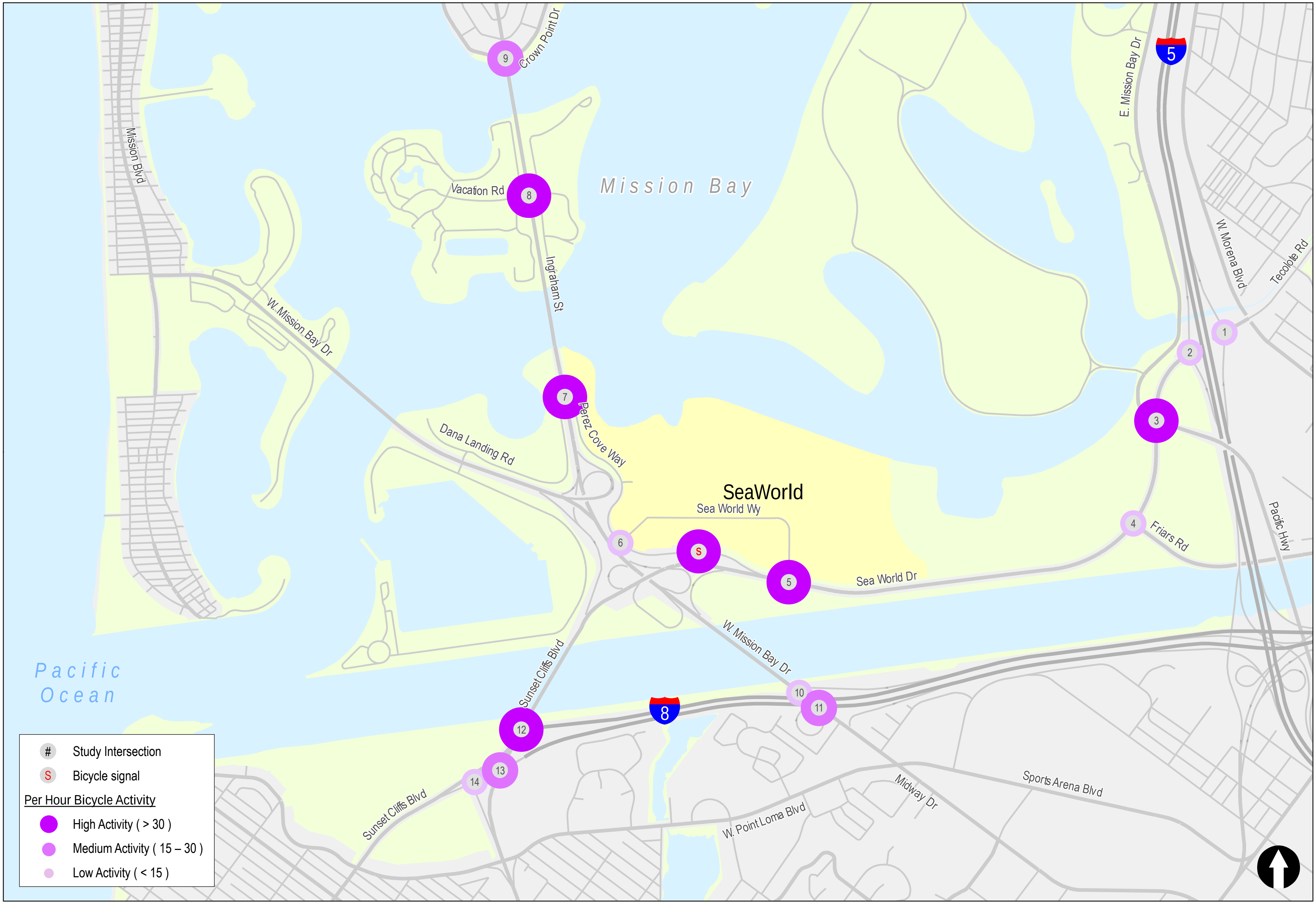

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Figure 13-3

Existing Bicycle Activity (PM Peak Hour)

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14.0 TRANSIT MOBILITY

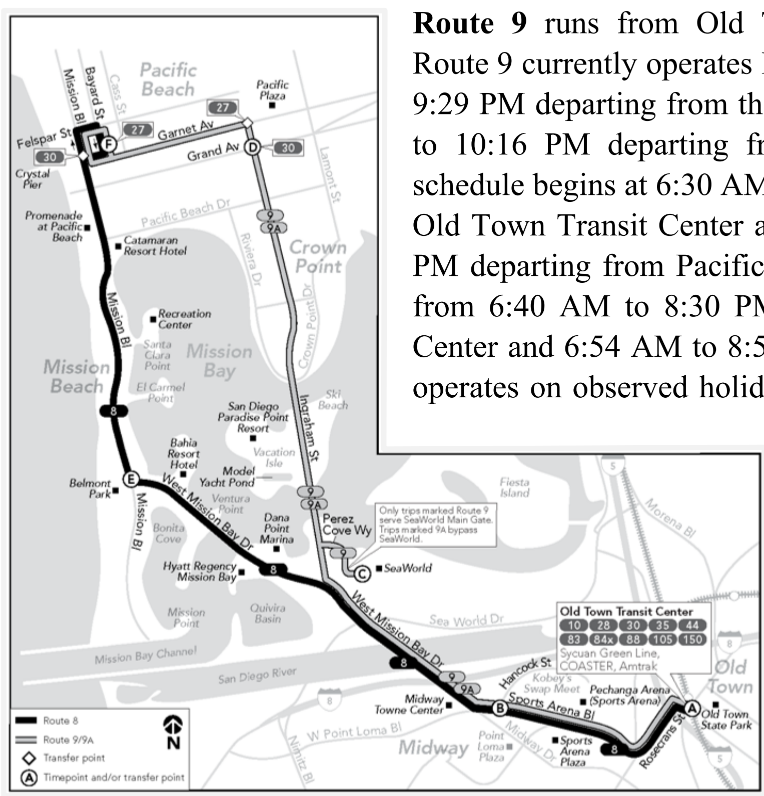
In this section, transit mobility is reviewed for the existing and future transit condition. In addition, potential improvements are also discussed. Public transportation improves mobility and reduces congestion in the community and the region.

14.1 Existing Transit Conditions

Bus transportation is the main mode of public transit around the Project area. The Project site is served by MTS Route 9. A detailed description of Route 9 operations is provided below.

14.1.1 *Route Summaries*

SeaWorld is served by the existing Route 9 bus service with a stop at SeaWorld. This section provides a detailed description of this route.



Route 9 runs from Old Town Transit Center to Pacific Beach. Route 9 currently operates Monday through Friday from 6:00 AM to 9:29 PM departing from the Old Town Transit Center and 5:44 AM to 10:16 PM departing from Pacific Beach. The Saturday route schedule begins at 6:30 AM and runs till 9:30 PM departing from the Old Town Transit Center and begins at 6:21 AM running till 10:16 PM departing from Pacific Beach. The Sunday route schedule runs from 6:40 AM to 8:30 PM departing from the Old Town Transit Center and 6:54 AM to 8:59 PM departing from SeaWorld. Route 9 operates on observed holidays with a Saturday or Sunday schedule. Weekdays and Saturday schedule headways are 15 minutes from approximately 9:00 AM to 7:00 PM and 30 minutes during the remaining operating hours. Sunday schedule headways are 15 minutes from approximately 10:30 AM to 6:00 PM and around 30 minutes throughout the remaining operating hours. Trips designated Route 9A do not have direct service to SeaWorld but stop at the Ingraham Street / Perez Cove Way stop. Every other departure from approximately 3:00 PM to 7:00 PM, as well as all departures prior to 7:00 AM on the Monday-Friday and Saturday schedules are designated Route 9A. All remaining trips enter SeaWorld directly.

14.1.2 *Transit Centers*

Transit centers (or hubs) are the interchange of various transit routes and travel modes. The following transit center is in the vicinity of the study area. A brief description is provided below:

Old Town Transit Center – Located near Taylor Street / Pacific Highway with direct bus service to SeaWorld via MTS Route 9, Old Town Station mainly serves MTS networks. The following routes have stops at this transit center:

- Route 8 Pacific Beach via Mission Beach ↔ Old Town via Mission Beach
- **Route 9 Pacific Beach via SeaWorld ↔ Old Town via SeaWorld (Bus Stop at SeaWorld)**
- Route 10 University & College ↔ Old Town Transit Center
- Route 28 Shelter Island ↔ Old Town Transit Center
- Route 30 UTC / VA Medical Center ↔ Downtown
- Route 35 Old Town Transit Center ↔ Ocean Beach
- Route 44 Old Town ↔ Clairemont Square
- Route 83 Old Town ↔ Downtown
- Route 84 Cabrillo Monument ↔ Sub Base
- Route 88 Fashion Valley Transit Center ↔ Old Town Transit Center
- Route 105 Old Town Transit Center ↔ UTC
- Route 150 UTC / VA Hospital ↔ Downtown
- Trolley Green Line Santee ↔ 12th & Imperial (Downtown)
- Trolley Blue Line San Ysidro ↔ American Plaza ↔ UTC

Tecolote Road Station – Located off W. Morena Boulevard near Tecolote Road, Tecolote Road Station serves the Trolley Blue Line. On November 21, 2021, the UC San Diego Blue Line light trail extension opened and expanded the San Diego Trolley system from Downtown San Diego to the UTC Transit Center, serving nine new trolley stations including Tecolote Road Station.

Tecolote Road Station
Source: keepsandiegomoving.com

Figure 14–1 shows existing transit network and transit routes serving the study area.

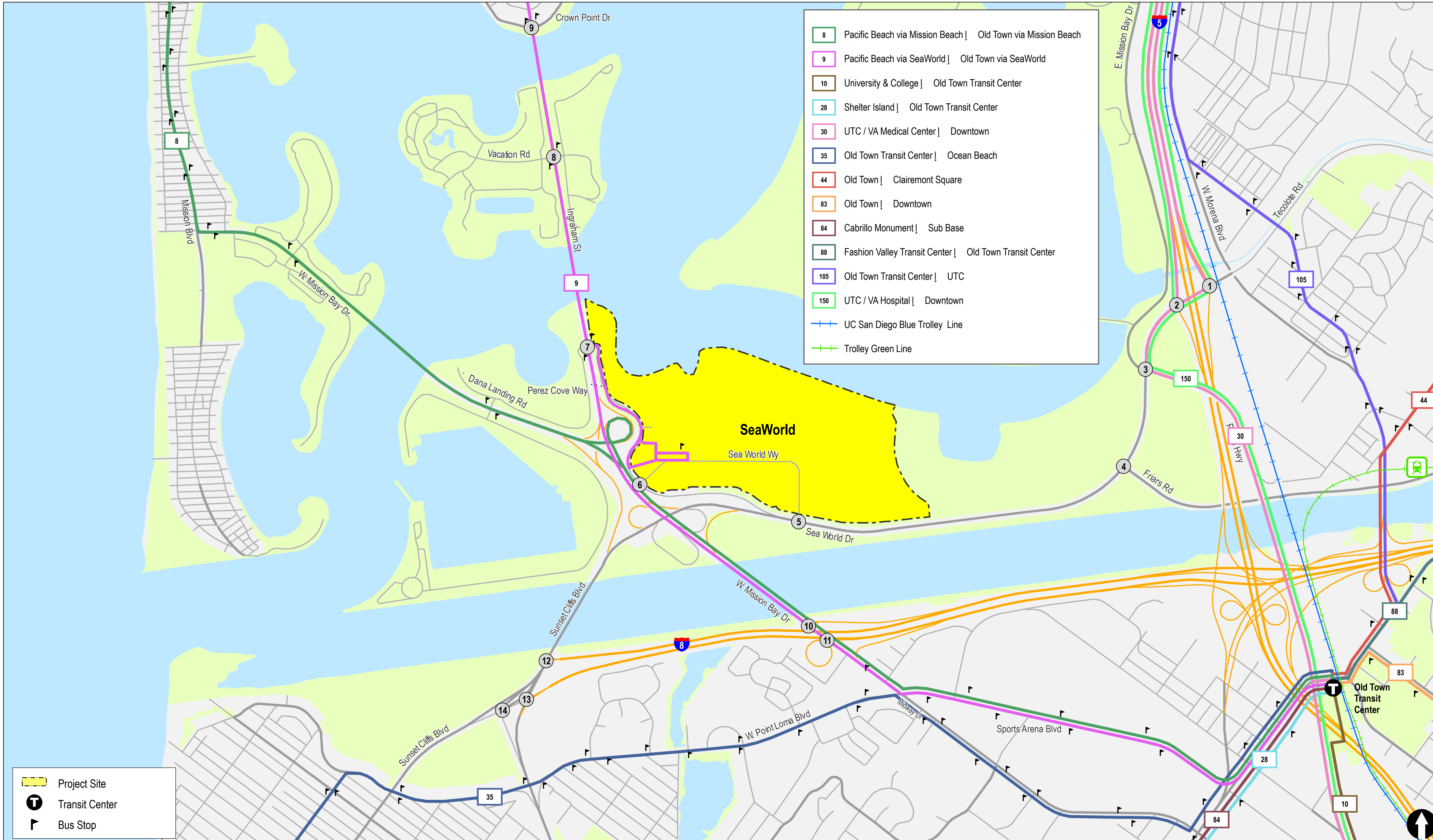


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Figure 14-1
Existing Transit Network

14.1.3 *Existing Ridership*

Data for the Route 9 SeaWorld transit stop was obtained from SANDAG for an average weekday ridership during the summer 2019 schedule period from June 9 – August 31, 2019. ***Table 14–2*** shows the existing average daily summer ridership for this stop.

TABLE 14–1
SUMMER 2019 BUS RIDERSHIP

MTS Route 9 Transit Stop	Weekday Daily Boardings	Weekday Daily Alightings	Total Weekday Daily Ridership [b]
Stop ID 13059: SeaWorld [a]	197	240	437
Stop ID 12650: Ingraham St & Perez Cove Way	8	16	24
Stop ID 11896: Ingraham St & Dana Landing Road	7	11	18

Footnotes:

a. Weekday daily boardings include boardings from both northbound and southbound travel.

b. Total Ridership = Daily boardings + Daily alightings.

14.2 Transit Mobility Review

As discussed in *Section 12.3.1* of this study, a walkshed analysis was performed to evaluate Project site connectivity. The walkshed analysis also identifies pedestrian accessibility to transit and locations where providing pedestrian access could improve Project site connectivity to the transit network.

In addition, amenities at stations within the Project walkshed are reviewed. Amenities were identified based on the *MTS Design for Transit – A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area, February 2018*. Per Table 4-1 of the manual, a summary of desired bus stop features is provided based on the daily passenger boardings. Using the daily ridership data provided in *Table 14–1* above, ***Table 14–2*** lists the desired amenities for the bus station located in the SeaWorld parking near the entrance, as well as the two (2) other stops within the walkshed located near the Ingraham Street / Perez Cove Way / Dana Landing Road intersection..

TABLE 14–2
AMENITIES AT BUS STATIONS
WITHIN PROJECT WALKSHED

Stop Amenities	MTS Design Guidance		Provided at Stop (Yes/No)		
	<50 Passenger Boardings	201-500 Passenger Boardings	Stop ID 13059: SeaWorld [a]	Stop ID 12650: Ingraham St & Perez Cove Way [b]	Stop ID 11896: Ingraham St & Dana Landing Rd [c]
Sign and Pole	S	S	Yes	Yes	Yes
Built-In Sign	—	O	No	No	No
Expanded Sidewalk	O	S	Yes	No	No
ADA Accessible	S	S	Yes	Yes	Yes
Seating	O	S	Yes	Yes	Yes
Passenger Shelter	O	S	**No**	No	No
Route Designations	S	S	Yes	Yes	Yes
Schedule Display	O	S	Yes	No	No
Route Map	O	S	**No**	No	No
System Map	—	O	No	No	No
Trash/Recycling Receptacle	O	S	Yes	No	No
Real Time Digital Display	—	O	No	No	No
Bus Pads (street)*	*	*	Yes	No	No
Red Curbs	S	S	N/A	Yes	Yes

Footnotes:

a. Current daily ridership is 197 passenger boardings. Criteria for 201-500 daily boardings used.
b. Current daily ridership is 8 passenger boardings. Criteria for >50 daily boardings used.
c. Current daily ridership is 7 passenger boardings. Criteria for >50 daily boardings used.

General Notes:

- S = Standard
- O = Optional
- * = Required for stops with four or more buses per hour. Bus pads (street) are a specification of the jurisdiction that controls the right-of-way.
- **BOLD** and SHADING indicate standard amenity for ridership level not currently provided.

14.3 Transit Priority Area

SeaWorld is located within a 2035 Transit Priority Area (TPA). A TPA is defined as an area within one-half mile from a major transit stop that is either existing or planned, if the planned "major transit stop" is scheduled to be completed within the planning horizon included in the SANDAG Regional Transportation Improvement Program (RTIP). A "major transit stop" is defined as an existing rail station, ferry terminal served by either bus or rail transit service, or the intersection of two or more major bus routes with morning and afternoon peak hour frequency of 15 minutes or less.

14.4 Recommended Transit Improvements

The following transit improvements are recommended for SeaWorld to implement:

- Improve the amenities at the existing SeaWorld bus stop (Stop ID 13059) to meet all standard MTS design criteria for 201-500 passenger boardings, which will require the following stop amenities not currently provided:
  - Passenger Shelter
  - Route Map
- Coordinate with MTS regarding Route 9 service to the SeaWorld bus stop to extend the existing span of service, currently 9:06 AM to 4:08 PM, to match SeaWorld's hours of operation.
- Coordinate with SANDAG, City of San Diego and MTS to accommodate a Transit Station within the Area 2 parking lot per the terms of the SeaWorld lease, if and when the opportunity arises. Design of the future parking structure, if necessary, should accommodate a transit station, if feasible.

15.0 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

Achieving optimal and sustainable mobility for different modes of transportation requires a comprehensive traffic signal system that utilizes a variety of operations and Intelligent Transportation Systems (ITS) technologies. The use of ITS can provide many benefits to a mobility network, including improved travel time, providing transit bypass methods, helping relay valuable traffic-related information to vehicular and non-vehicular / emergency users, and providing guidance to key destinations. Some ITS applications are included below:

- Traffic Signal Coordination
- Emergency Vehicle Preemption (EVP)
- Transit Signal Priority (TSP)
- Adaptive Traffic Signal Control (ATSC)
- Regional Arterial Management System (R.A.M.S)
- Integrated Corridor Management (ICM)

15.1 ITS Applications

15.1.1 *Traffic Signal Coordination*

Coordinated traffic signals are an example of an ITS strategy that helps improve roadway operations and can be found in the Mission Bay Park Master Plan Area. Traffic signals have coordinated timing plans and information is relayed between traffic signals in real-time. The traffic signals typically communicate using underground copper or fiber optic interconnects. Having traffic signals coordinated helps to maximize the efficiency of the traffic signal system on that roadway.

The following corridors currently have traffic signal coordination based on a review of the traffic signal timing plans:

- SeaWorld Drive
- Sunset Cliffs Boulevard
- West Mission Bay Drive
- Ingraham Street

Although the timing plans indicate certain intersection controls are coordinated along the corridors above, the City of San Diego Traffic Signal Communications Master Plan (TSCMP), 2014. Identifies SeaWorld Drive, Sunset Cliffs Boulevard, and West Mission Bay Drive as having "deficiencies" in their ITS communications. *Section 15.2* discusses this in further detail.

15.1.2 *Emergency Vehicle Preemption (EVP)*

Emergency Vehicle Preemption technology is utilized to override signal operations and provide priority to approaching emergency responders. Standard traffic signals design in the City of San Diego includes EVP.

15.1.3 *Transit Signal Priority (TSP)*

Transit signal priority is an ITS strategy that allows public transit vehicles, such as an MTS bus, to communicate with traffic signals to advance transition to a green phase for its approach. Objectives of TSP include improved schedule adherence and improved transit time efficiency while minimizing impacts to normal traffic operations.

Given SeaWorld is located within a 2035 TPA with one bus route and there is potential for the site to accommodate a transit station, SeaWorld would benefit from the installation of TSPs along the major arterials in the study area such as SeaWorld Drive, West Mission Bay, and Ingraham Street.

15.1.4 *Adaptive Traffic Signal Control (ATSC)*

Adaptive Traffic Signal Controls (ATSC) are an established solution for mobility along unpredictable and fluctuating traffic patterns of arterials. Adaptive traffic signals or “Smart” traffic signals communicate with each other and dynamically adjust signal timings, memorize traffic patterns, improve traffic flow, and reduce vehicle stops.

The City of San Diego has already implemented adaptive traffic signals on several corridors including Rosecrans Street, Mira Mesa Boulevard, Lusk Boulevard, Friars Road, La Jolla Parkway and Vista Sorrento Parkway. In 2017, the City of San Diego installed 12 “Adaptive Traffic Systems” along the Rosecrans Street corridor. There is a project in progress that would install an adaptive system on Mission Bay Drive in Pacific Beach.

There are currently no Adaptive Traffic Signals Control in the study area.

15.1.5 *Regional Arterial Management System (R.A.M.S)*

The Regional Arterial Management System allows operators to monitor the status of traffic controllers maintained by other agencies. The regional operations include the ability to establish a common time source for all traffic controllers in the County in addition to coordinating regional events which can override the normal operations of traffic signals across jurisdictions.

15.1.6 *Integrated Corridor Management (ICM)*

Integrated Corridor Management combines the functionality of several ITS elements to synchronize a calculated event-driven response to live traffic conditions.

15.2 ITS Communication Systems

The communication system is an integral part of ITS functionality and effectiveness. ITS communication occurs between traffic signals, transit/emergency vehicle preemptions and the Traffic Management Center (TMC). Per the Traffic Signal Communications Master Plan, which was adopted in 2015, communication deficiencies at the following intersections were identified:

- Ingraham Street/ Crown Point Drive/ Riviera Drive
- Ingraham Street/ Perez Cove Way
- Ingraham Street/ Vacation Road

- SeaWorld Drive/ SeaWorld Way
- SeaWorld Drive/ Friars Road
- SeaWorld Drive/ Pacific Highway

As noted in *Section 15.1.1*, ITS signal-to-signal communication/coordination have been installed along SeaWorld Drive, Ingraham Street, and West Mission Bay Drive based on timing plans and field observations.

Figure 15–1 illustrates the Existing ITS traffic signal communication conditions. *Figure 15–1* illustrates only the communication infrastructure and does not depict all other ITS applications described in this section, such as ATSC, which may have been installed in the area. LLG has verified with the City of San Diego that this diagram remains accurate as of the date of the writing.

15.3 SeaWorld ITS Mobility Recommendations

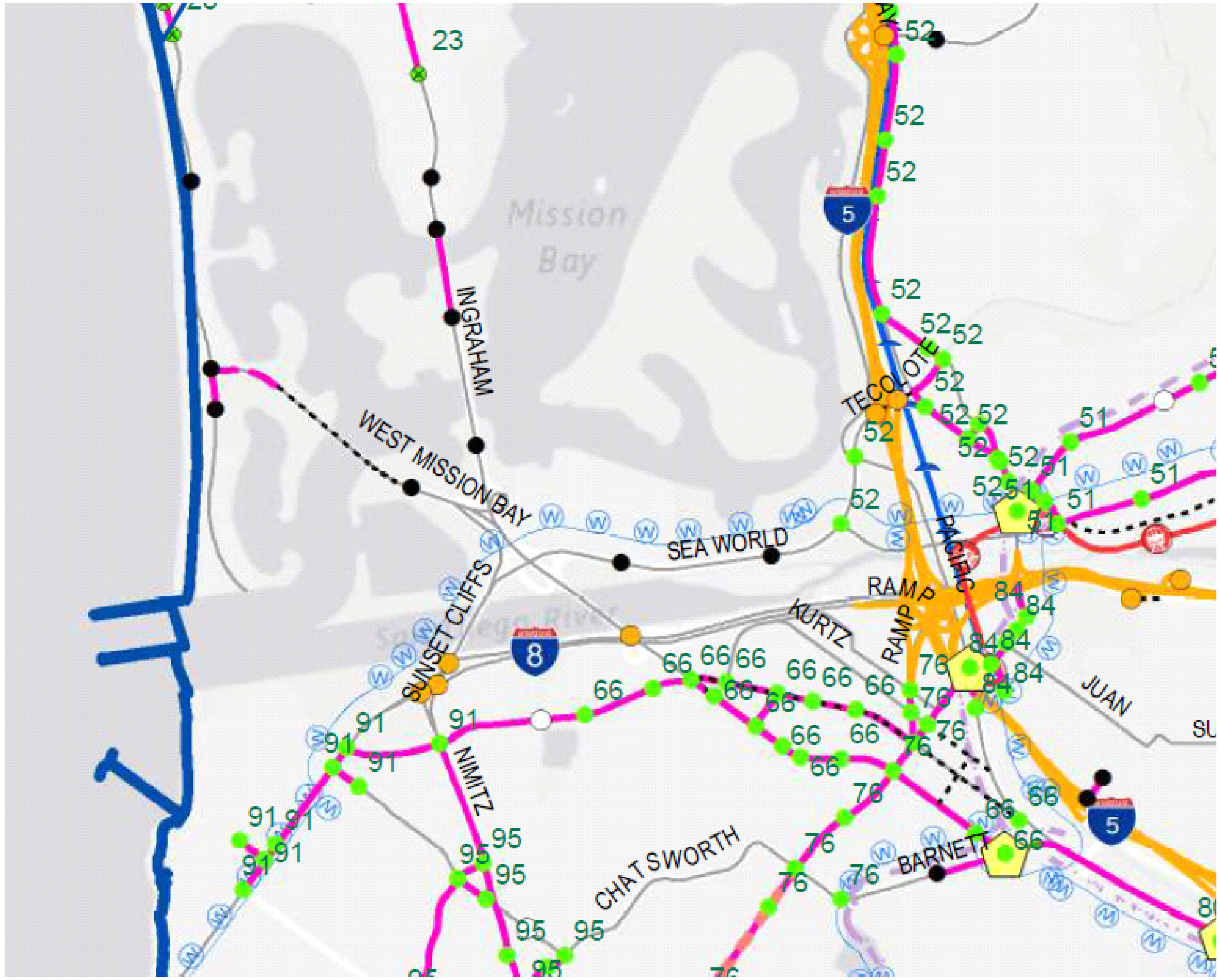
The proposed Project will consider Intelligent Transportation Systems (ITS) strategies including traffic signal coordination, EVP, detection sensors, Adaptive Traffic Signal Control, and Transit Signal Priority to address street system deficiencies identified by the analysis presented elsewhere in this report. ITS strategies will be considered especially in cases where physical widening is infeasible or would have an adverse effect on other roadway users. Proposed improvements are discussed in *Section 19.0*.

Implementation of ITS strategies must be according to the City of San Diego requirements and may require communications upgrades between the traffic signals, upgrades to vehicle detection and system implementation at the controller cabinets. Remote link to Traffic Management Centers (TMCs) may also be required.

Locations where opportunities for ITS strategy implementation are consistent with the locations where deficiencies are noted from the Traffic Signal Communications Master Plan. Both Ingraham Street and SeaWorld Drive would benefit from implementation of ITS strategies.

Legend

- Dial Up Field Masters
- Local Field Masters
- Traffic Signal Communication Repair Issue
- Traffic Signal Communication Gap
- Traffic Signal
- Changeable Message Signs
- Fiber Traffic Termination Cabinet
- Copper Traffic Termination Cabinet
- Caltrans Traffic Signal
- Future Traffic Signal
- Existing Traffic Communication Hub
- City Operations Building (Main Hub)
- Traffic Communication Line Break
- Existing Traffic Wireless Interconnect
- Future Traffic Interconnect
- Future Road Widening
- Existing Traffic Fiber Interconnect
- Existing Traffic Copper Interconnect
- MWWD Fiber
- Police Department Fiber
- SafetyNet Fiber
- MTS Fiber
- City of San Diego
- Caltrans Fiber
- Communication-Field Master Address
- Future MTS Fiber
- Future Traffic Fiber
- Municipal Boundaries



Source: City of San Diego Communication Master Plan (2014)

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Figure 15-1

Existing ITS Traffic Signal Communications Condition

16.0 PARKING ASSESSMENT

16.1 Existing Parking Supply

The total SeaWorld leasehold area provides parking for guests and others (employees, vendors, and the Perez Cove marina and shoreline). There are five (5) Areas of the leasehold (see *Figure 2–4* provided earlier in this report). Access to guest parking area is through the main vehicular entryway located in the southwest corner taking access from Perez Cove Way. The guest parking exit is in the central southern part of Area 2 at the SeaWorld Way/SeaWorld Drive signalized intersection. Bus, taxi, and ridesharing services are also available within the area. A total of 7,362 guest parking spaces are provided in Area 2. The number varies depending on how the parking lot is striped and managed.

Additionally, other parking for administration, support, and the Perez Cove marina and shoreline are provided in Areas 3 through 5 with 855 spaces (140 + 65 + 650 = 855 spaces as shown on *Figure 2–4*). Access to Areas 3 through 5 is through Perez Cove Way. This results in a total paved parking supply of 8,217 spaces. ***Table 16–1*** shows a summary of the existing parking supply.

TABLE 16–1
EXISTING SEAWORLD PARKING SUPPLY

ID	Parking Area Description	Existing Supply
A	*Area 2:* Guest Parking	7,362
B	*Area 3:* Administration & Support	140
C	*Area 4:* Perez Cove Marina	65
D	*Area 5:* Perez Cove Shoreline [a]	650
I	***Subtotal Non-Guest Areas (B+C+D)***	***855***
	Total Parking *(A+B+C+D)*	**8,217**

Source: SeaWorld, 2019
Footnotes:
a. Also used for employee overflow.

16.2 Existing Parking Demand

The usable parking supply is taken at 95 percent of the 7,362 paved guest parking spaces. This translates to about 6,993 spaces. On busy days, vehicles are directed to the southeast corner and directed to park in sequence to best fill the parking area. However, after the lot is filled, remaining vehicles must circulate the entire facility in search of the last few spaces or spaces that have become available. To account for this phenomenon, the parking area is considered "full" at 95 percent occupancy.

Subject to the requirements of the MMRP, a parking demand study is conducted annually to determine if the existing parking lot supply is exceeded, thus requiring the paving of additional spaces and/or the construction of the proposed parking structure. The results of the 2018 MMRP parking demand study (using the most recently available parking data provided between January 1, 2018 – December 31, 2018) concluded that the usable paved parking supply of 6,993 spaces was never exceeded and the peak demand for guest parking was 3,948 spaces, or about 50% of the total supply, on September 2, 2018.

16.3 Future Parking Supply

With development of the SeaWorld leasehold, surface parking areas will be reduced to accommodate the theme park expansion and construction of the hotel premises. Redevelopment of the parking areas would occur over time based on marketing trends and the timeline for creating new attractions. The boundaries of Area 1 would be expanded to encompass 1,228 existing parking spaces in Area 2. These 1,228 existing parking spaces would be lost due to the development of planned future attractions. With the loss of these spaces, the total guest supply would decrease from 7,362 spaces to 6,134 spaces.

Additionally, the loss of 650 existing surface parking spaces in Areas 4 and 5 is anticipated with buildout of the hotel. However, the conceptual proposal per the Master Plan includes new surface parking and a parking structure which would offset the loss of these spaces. Adequate parking and access shall be provided as a condition of the hotel and marina expansion plans.

16.3.1 *Guest Parking Garage (Area 2)*

Within Area 2, the proposed Project indicates that a future parking garage is a proposed long-term Special Project. This parking garage would be located in the western part of the existing parking lot, between the Main Entrance and the Front Gate (See *Figure 2–4*). The parking garage would be up to four (4) levels in height, with half of the first level approximately six (6) feet below grade. The parking garage would not be needed until future park attendance and parking demand justifies the additional parking capacity.

16.4 Future Parking Demand

With the expected growth in attendance at SeaWorld forecasted in the proposed 2020 Master Plan, an assessment of the future demand was conducted. Future guest parking demand is determined by 1) calculating the usable parking supply; 2) assuming a design parking supply; and 3) forecasting the visitor demand over the next twenty plus years for future demand needs.

As previously mentioned, the usable parking supply is taken at 95 percent of the existing 7,362 paved guest parking spaces, or about 6,990 spaces. A typical parking design day accounts for about 85 percent of the parking demand. This is typical of many uses where the demand can be very high on holidays or weekends; however, to meet 100% of the parking demand can be cost prohibitive. Additionally, many land uses can use adjacent on-street parking or other nearby parking areas. SeaWorld does not have the luxury of nearby on-street parking or other parking areas. Therefore, the guest parking demand would translate to a 100% parking design percentage. As shown in ***Figure 16–1***, the parking demand for SeaWorld has a distinct weekday trend with peaks occurring mostly on weekends (denoted by the pairs of spikes) and the maximum observed demand was 3,948 vehicles, or 57% of the usable paved supply. Therefore, 100% of current peak parking demand is estimated to be about 4,000 spaces.

Assuming all parking variables remain relatively constant over the next 20 years, then the future visitor parking demand can be forecasted by projecting the current demand by a compound annual growth rate of 1%, as provided by SeaWorld. Assuming a visitor parking demand for 100% usable occupancy and an annual growth rate of 1%, the future parking demand in 20 years is forecasted to be about 4,980 spaces (calculated from the existing demand of about 4,000 spaces from above multiplied by the compounded growth $(1+0.01)^{22}$ to obtain a growth factor of 1.2447 amounting to about 4,980 spaces.

The exact point in time when additional visitor parking will be necessary depends on several factors including future vehicle occupancy rates, use of the existing overflow parking area, expansion of the park into existing parking area, encroachment of the planned hotel onto the employee parking area, and the schedule of the proposed parking structure (discussed above in *Section 16.3.1*). Assuming the general parking demand characteristics remain the same, then the future parking demand of 4,980 spaces would not exceed the existing total usable visitor parking of about 6,990 spaces (95% of 7,362), as shown in ***Figure 16–2*.**

Within the guest parking area (Area 2), the reduction in parking would be 1,228 spaces which would become a part of Area 1. Using the same parking design methodology discussed above, the usable guest parking supply would decrease from 6,990 spaces (95% of 7,362) to 5,830 spaces (95% of 6,134). The future demand calculated above shows a forecast guest parking demand of 4,980 spaces, which continues to be below the future supply. ***Table 16–2*** shows the tabulation of existing and future parking supply and demand.

TABLE 16–2
EXISTING & FUTURE GUEST PARKING SUPPLY ADEQUACY

Parking Type	Existing (2019) Conditions				Future Conditions					
	Total Supply [a]	Usable Supply [b]	Demand [c]	Surplus/ Deficit	Total Supply [d]	Usable Supply [b]	Year 2025 Demand		Year 2040 Demand	
							Demand [e]	Surplus/ Deficit	Demand [e]	Surplus/ Deficit
Total Guest Parking	***7,362***	***6,990***	***4,000***	***2,990***	***6,134***	***5,830***	***4,290***	***1,540***	***4,980***	***850***

Footnotes:

a. See *Table 16–1*.
b. Usable supply is taken at 95% of total spaces, rounded to nearest 10.
c. Existing demand rounded up to nearest 100.
d. 1,228 parking spaces lost in Area 2 due to development of future attractions. This area would become a part of Area 1.
e. Future demand based on 1% compound annual growth rate from existing.

16.4.1 *Transportation Network Companies*

Transportation Network Companies (TNCs) are companies that use an online-enabled platform to connect passengers with drivers using their personal, non-commercial vehicles. Commonly referred to as "ridesharing" or "ride-hailing" services, familiar brands in the industry are Uber and Lyft. Over the last few years, TNCs have grown rapidly. The effects on parking demand with the introduction of rail-hailing services is dependent on parking fee rates and the convenience of parking at destination locations, such as SeaWorld. There has been a phenomenon observed called the "ride-hailing effect" across entertainment, leisure, and travel categories. Hotel parking demand seems to have decreased in many places due to TNC use by travelers; travelers are choosing to use TNCs instead of rental cars, to get to and from a hotel. Entertainment and hotel properties are taking advantage of market trends by accommodating ride-hailing services both in terms of their operations and guest services.

TNCs could continue to be a significant part of the mobility landscape and will continue to influence consumer behavior impacting the transportation planning and parking industry.

16.4.2 *Conclusions*

For the Year 2025, the minimum guest parking requirements were forecasted at about 4,290 spaces (see *Figure 16–2*), while the current usable supply is about 6,990 spaces. For the Year 2040, the minimum guest parking requirements were forecasted at about 4,980 spaces (see *Figure 16–2*), which continued to remain under the current usable supply of about 6,990 spaces and the potential future usable supply of 5,830 spaces, with redevelopment of the Area 2 parking area that will become a part of Area 1.

While existing surface parking spaces in Areas 4 and 5 would be lost with development of the hotel, additional surface parking and a parking structure are planned which would offset the loss of these spaces. Adequate parking in these areas will be ensured at the time of hotel and marina expansion development. Because the exact number of parking spaces that will be available with the planned parking structure in Area 2 is not known, and the increase in TNC usage could have a lowering effect on parking demand, it is recommended that the parking monitoring program continue to be implemented for purposes of determining a need for the potential parking structure. The details of the parking monitoring program are outlined later in this report in *Section 19.3.4*.

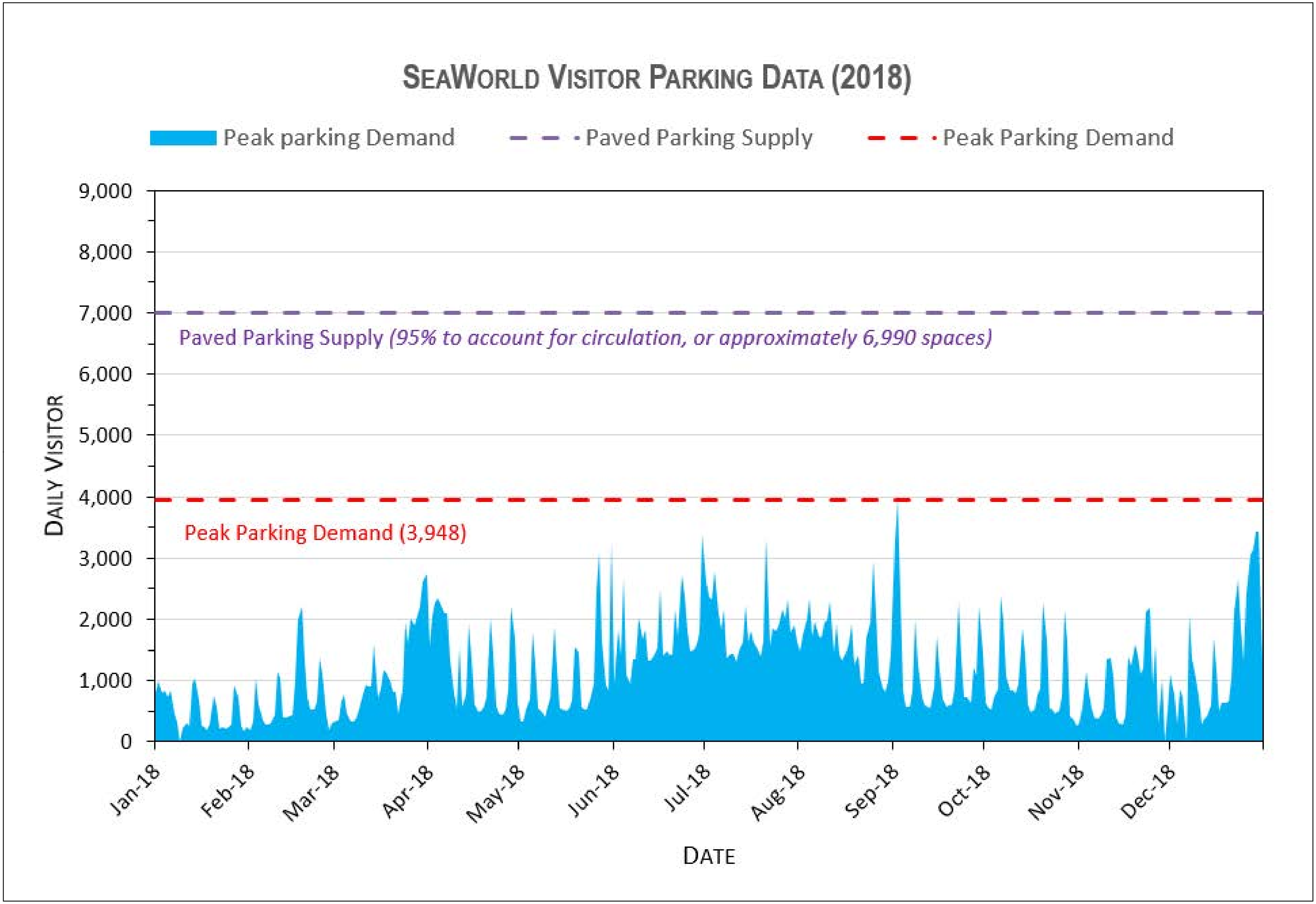

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Figure 16-1
Existing SeaWorld Parking Demand

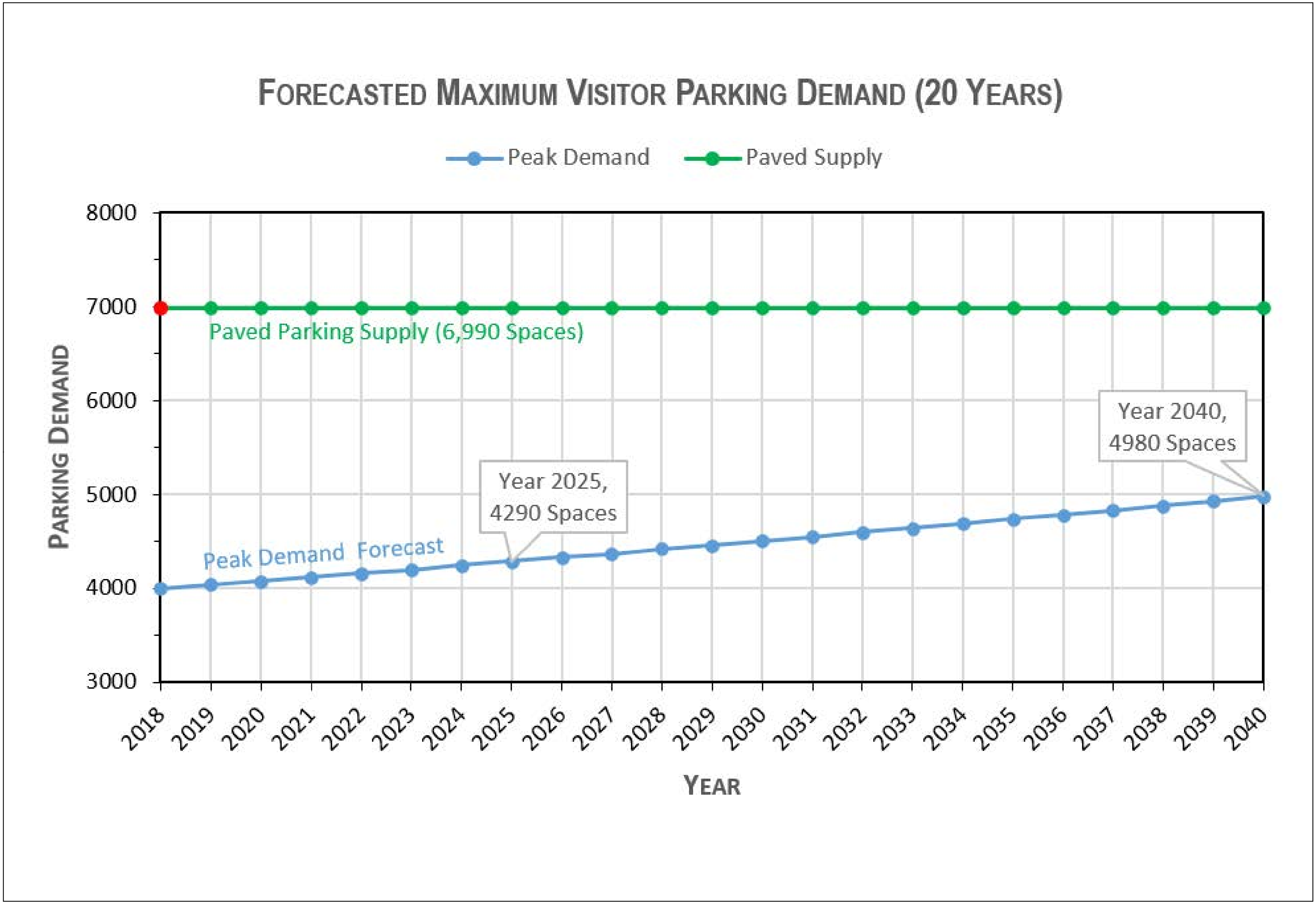

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Figure 16-2
Future SeaWorld Parking Demand

17.0 ENTRY/EXIT OPERATIONS

17.1 Existing Operations

The previous 2002 Master Plan EIR Traffic Study conducted a queue analysis of the entry and exit points for SeaWorld. Data was collected in 1999 on three (3) summer holiday weekends (Memorial Day, Fourth of July, Labor Day) and on one non-holiday weekend in August 1999. According to the data collected at that time, the highest day for park entry/exit vehicles was the non-holiday August Saturday. Per the results of that analysis, no excessive queues were observed during the peak summer period.

Since completion of the previous 2002 Master Plan EIR Traffic Study, traffic volumes have decreased at the SeaWorld entry and exit locations. For this assessment, a non-holiday August Saturday was selected for observation representing the peak day of a typical summer weekend (and that observed in the previous study). Queues were observed on Saturday August 10, 2019 at the entrance (toll plaza) and exit (SeaWorld Way) during the AM inbound and PM outbound peaks. These counts were conducted between 10:00 AM – 12:00 PM at the entrance and 5:00 PM – 7:00 PM at the exit. Queue counts were recorded in fifteen- and five-minute intervals, respectively.

Appendix X contains the queue count sheets and calculations.

Table 17–1 shows the average and maximum queues for both the entrance and the exit on the summer non-holiday Saturday. There are fourteen (14) entrance booths processing inbound vehicles. The maximum queues per lane at the entrance ranged from six (6) vehicles to 17 vehicles in the longest lane, equivalent to 374 feet averaging the industry standard of 22 feet per vehicle. The distance to SeaWorld Drive from the entrance tollgate is approximately just over 1/3-mile, or 1,840 feet. The maximum queues observed at the entrance were predominately at the tollgates nearest the curbs on each side. Maximum queues at the exit were observed to back up about 11 vehicles (222 feet) from the SeaWorld Way/SeaWorld Drive intersection where there is approximately 600 feet of storage per exit lane. It should be noted that this queue was observed at the inside southbound left-turn lane.

Knowing the average queue and entering volumes, an average service rate of 98 vehicles/hour/gate was calculated at the entrance.

TABLE 17–1
EXISTING ENTRY / EXIT QUEUE SUMMARY

Location	Non-Holiday Summer Weekend (Saturday August 10, 2019)
Entrance	
Entering AM Peak Volumes (veh/hr) [a]	1,257
Average Queue (veh/hr/gate) [a, b]	5
Maximum Queue Observed (veh in one lane) [a, c]	17
Coefficient of Utilization [d]	0.99
Calculated Service Rate (veh/hr/gate) [d]	98
Exit	
Exiting PM Peak Volumes (veh/hr) [a]	701
Average Queue (veh/hr/ln) [a, b]	2
Maximum Queue Observed (veh in one lane) [a, c]	11

Footnotes:

a. Peak traffic counts obtained Saturday August 10, 2019 (see *Appendix X*).
b. Average queue represents average number of queued vehicles at any gate/in any lane during each observed timeframe.
c. Maximum queue represents maximum number of queued vehicles at any gate/in any lane during each observed timeframe.
d. Service rate calculated using queue graphs (see *Appendix X*).

Observations and calculations show that the current entry-exit system can adequately handle the existing summer weekend traffic with queues not anticipated to reach SeaWorld Drive.

17.2 Future Operations

Consistent with the trip generation and parking assumptions, a 1% compound annual growth factor was applied to the entering/exiting volumes at the SeaWorld access points. Assuming the general toll booth demand characteristics remain the same (not accounting for the effect of TNCs on the entry/exit/parking demand-related behavior), the current entry-exit system is anticipated to adequately accommodate future queues, avoiding SeaWorld Drive.

Table 17–2 shows the expected increases in volumes for the Near-Term (Year 2025) and Horizon Year (Year 2040) conditions.

TABLE 17–2
FUTURE ENTRY / EXIT QUEUE SUMMARY

Location	Near-Term (Year 2025) With Project	Horizon Year (Year 2040) With Project
Entrance		
Entering AM Peak Volumes (veh/hr) [a]	1,334	1,549
Average Queue (veh/hr/gate) [a, b]	5	6
Maximum Queue Expected (veh in one lane) [a, c]	18	21
Coefficient of Utilization [d]	0.99	0.99
Calculated Service Rate (veh/hr/gate) [d]	104	120
Exit		
Exiting PM Peak Volumes (veh/hr) [a]	744	864
Average Queue (veh/hr/ln) [a, b]	2	2
Maximum Queue Expected (veh in one lane) [a, c]	12	14

Footnotes:

a. Existing peak traffic counts obtained Saturday August 10, 2019. Year 2025 and Year 2040 entering and exiting volumes assume a 1% compound annual growth factor for a period of six years and 21 years, respectively.
b. Average queue represents average number of queued vehicles at any gate/in any lane expected during the AM/PM timeframe.
c. Maximum queue represents maximum number of queued vehicles at any gate/in any lane expected during the AM/PM timeframe.
d. Service rate calculated using queue graphs (see *Appendix R*).

18.0 SYSTEMIC SAFETY REVIEW

18.1 Introduction

This section provides a systemic safety review of the Project study area per *TSM* guidelines. Traditional safety review focuses on historical accident data to identify safety deficiencies. However, the crash causality is rarely based on a single factor, has elements of randomness, and accident data may be sparse when reviewing a focused area.

Conversely, Systemic Safety is a data-driven, predictive approach. This approach groups locations that have similar traits (systemic). In lieu of deciphering location-specific patterns, crash types across a larger geographical area helps identity common physical features and correlates it to crash patterns. These are referred to as safety hotspots.

It should be noted that systemic safety is not expected to replace historical crash data review that focuses on specific locations, but rather supplements it.

18.2 Systemic Safety Review

According to the City of San Diego's Systemic Safety intersection hotspot map, provided in ***Appendix Y***, the following three (3) study intersections were identified as Bicycle Intersection hotspots:

- Intersection #1: SeaWorld Drive / I-5 NB Ramps
- Intersection #2: SeaWorld Drive / I-5 SB Ramps
- Intersection #9: Ingraham Street / Riviera Drive

Each hotspot was reviewed in more detail based on the *City of San Diego's Systemic Safety; The Data-Driven Path to Vision Zero (April 2019)* guidelines. The guidelines provide measures to classify and prioritize intersection hotspots in the City of San Diego based on intersection footprint (i.e., configuration, control type, roadway properties, and volumes). The objective of this review is to determine the hotspot type (pedestrian, bicycle, or vehicle hotspot) and potential crash scenario associated with the hotspot.

Table 18–1 shows the injury collision scenarios and footprint matrix for each travel mode based on the City of San Diego's systemic safety guidelines. ***Table 18–2*** summarizes the study intersection systemic hotspots, hotspot type, and potential crash scenarios. *Appendix Y* also includes sections from the City of San Diego's *Systemic Safety* guidelines.

For the study area and according to *Table 18–2*, a crash scenario may occur at signalized intersections where a bicyclist approaching a red light continues through the intersection rather than making a full stop (bicyclists may be inclined to take the risk of crossing traffic during a red light to avoid stopping and regaining momentum in next cycle) at the three (3) identified intersections.

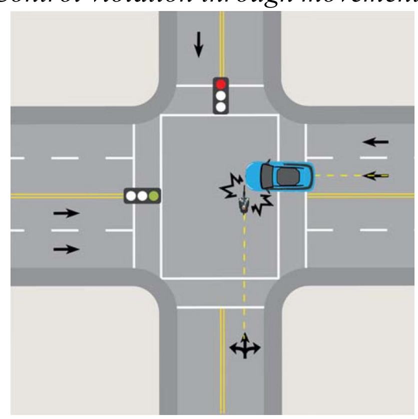
TABLE 18–1

PEDESTRIAN, BICYCLE, AND VEHICLE INJURY COLLISIONS BASED ON INTERSECTION FOOTPRINT

Crash scenario	Roadway environment
Pedestrian Injury	
Failure to yield – crossing in crosswalk at intersection – Making Left-Turn	Signalized intersection Primary road ADT 7,001 to 15,000 3-lane (1-way) Intersects 3-lane (1-way) or 3-lane (1-way) Intersects 4-lane (2-way)
Failure to yield – crossing in crosswalk at intersection – Making Left-Turn	Signalized intersection Primary Road ADT 7,001-25,000 4-lane (2-way) Intersects 2-lane (2-way)
Failure to yield – crossing in crosswalk at intersection – Making Right-Turn	Signalized intersection Primary Road ADT 15,001-25,000 2-lane (2-way) intersects 4-Lane (2-way)
Bicycle Injury	
Bicyclist at Fault – Control Violation Through Movement	Signalized intersection, 4-lane intersects 2-lane
Bicyclist at Fault – Control Violation Through Movement	Signalized intersection, 4-lane intersects 4-lane
Bicyclist at Fault – Control Violation Through Movement	Intersection with side-street stop, 2-lane intersects 2-lane
Vehicle Injury	
Broadside - Control Violation Through Movement	Signalized intersection, Primary road ADT >15,000, Secondary road ADT ≤7,000, 4-lane (2-way) intersects 2-lane (2-way)
Broadside - Control Violation Through Movement	Signalized intersection, Primary road ADT >15,000, Secondary road ADT >7,000, 6-lane (2-way) intersects 4-lane (2-way)
Broadside - Control Violation Through Movement	Signalized intersection, Secondary road ADT >7,000, 4-lane (2-way) intersects 4-lane (2-way)
Broadside - Control Violation Through Movement	Signalized intersection, Primary road ADT ≤15,000, Secondary road ADT >7,000, 3-lane (One-way) intersects 3-lane (One-way)

Source: City of San Diego Systemic Safety: The Data-Driven Path to Vision Zero, April 2019

TABLE 18–2
STUDY INTERSECTION SYSTEMIC HOTSPOTS

Intersection	Roadway environment	Hotspot type	Crash scenario
Intersection #1: *SeaWorld Drive / I-5 NB Ramps* Intersection #2: *SeaWorld Drive / I-5 SB Ramps* Intersection #9: *Ingraham Street / Riviera Drive*	Signalized, 4-lane intersects 2-lane (Case 1)	Bicycle Hotspot	Party at fault: *Bicyclist* Violation code: *Control violation through movement* 

General Note:

- Identified hotspots based on City of San Diego's intersection hotspot map. Independent or supplemental review to validate or identify additional facilities was not conducted.

18.3 Countermeasures

Based on City of San Diego's Systemic Safety Guidelines, following countermeasures may be considered to reduce the crash risk at the identified hotspots.

Short-Term Systemic Countermeasures:

The countermeasure listed below is low cost, highly effective, and can be implemented systemically with relative ease. The following countermeasure has been identified by the City of San Diego to enhance safety for all users at signalized intersections. This is achieved by decreasing the amount of time people/bicyclists wait for a green signal indication, enhancing compliance and safety.

- **Traffic Signal Loop Detection:** If loop detection is not provided or requires maintenance, provide or maintain loop detectors for vehicles and bikes help to enhance compliance at signalized intersections. When a signalized intersection does not have loop detectors or the loops require maintenance, the signal is placed into recall mode for vehicles and bikes. In these cases, users on the main street may get used to a traffic signal serving the side street or left turns when there is no traffic present. This situation can lead to non-compliance, which can lead to injury collisions. Robust loop detectors enhance signal operations and decrease driver and cyclist frustration. The implementation of robust loop detectors and a program to fix broken systems quickly and efficiently will reduce delay at signalized intersections, enhancing compliance and safety.

Based on field observations, no bicycle loop detection is currently provided at any of the three (3) hotspot intersections. SeaWorld will implement loop detection for vehicles and bicycles in both directions of travel (on SeaWorld Drive and on Ingraham Street) at each of the three (3) hotspot intersections.

19.0 SIGNIFICANCE IMPACTS, MITIGATION MEASURES, AND RECOMMENDATIONS

19.1 Significant Impacts and Mitigation Measures Summary

Under the previous 2002 Master Plan, SeaWorld had projected an annual growth rate of 1.3 percent resulting in 4.4 million attendees by the Year 2020, and a Year 2020 traffic projection of 23,000 ADT with a maximum traffic generation envelope of 30,300 ADT. The analysis resulted in 18 significant transportation impacts.

However, traffic count data shows SeaWorld generated 12,205 ADT for the Year 2019, significantly less than the 23,000 ADT projected for the following Year 2020. Based on traffic count data, attendance trends, and SeaWorld's presentation regarding attendance based on the TEA study, growth from the 2020 Master Plan is projected to result in 22,340 ADT by the Year 2040. This is less than the previous Year 2020 traffic projection of 23,000 ADT and significantly less than the maximum traffic generation envelope of 30,300 ADT, which was used as the basis for the previous traffic impact analysis.

Between the 10 years of traffic volume and attendance data collected prior to preparation of the previous 2002 Master Plan and the 18 years of traffic volume and attendance data collected since that time, over 28 years of historical daily traffic counts at the SeaWorld entry/exit points have shown that there is not statistical correlation between buildout of the SeaWorld Master Plan projects, attendance, and traffic volumes. Volumes have gone up and down, with an overall net decrease in trips, as shown previously in this report on *Figure 2–6, Historical SeaWorld Trip Generation.*

As demonstrated in this report, the level of service analysis for the revised Project, would result in no new CEQA LOS impacts. Several network improvements have been completed in the study area to reduce congestion or improve traffic conditions off site, many of which are consistent with mitigation measures recommended in the previous 2002 Master Plan EIR, such as the W. Mission Bay Drive bridge replacement and the installation of signal coordination on SeaWorld Drive.

Transportation impacts associated with the additional 6,295 ADT at 2040 buildout anticipated with the proposed 2020 Master Plan would be substantially less than those assessed in the previous 2002 Master Plan EIR. The analysis presented in this report demonstrates that no new significant CEQA LOS transportation impacts would result from revisions to the previously adopted 2002 Master Plan. Six (6) CEQA LOS transportation impacts were identified in this analysis, all of which were previously identified in the 2002 Master Plan EIR. ***Figure 19–1*** illustrates the CEQA LOS transportation impacts associated with the proposed Project. ***Figure 19–2*** provides a comparison between the proposed and previous Master Plan impacts. Mitigation measures identified for these six remaining CEQA LOS transportation impacts will continue to apply and be monitored as part of SeaWorld's Mitigation Monitoring and Reporting Program (MMRP) to determine when the significance threshold is met. Significant impacts identified as part of the 2002 Master Plan which have not been triggered to date and are determined to be less than significant in this analysis would no longer be a part of the MMRP following adoption of the 2020 Master Plan because the 2020 Master Plan uses Vehicle Miles Traveled (VMT) as the metric for CEQA traffic impacts.

Additionally, a Local Mobility Analysis was performed and documented in this report according to the City of San Diego's current *Transportation Study Manual*. Four (4) off-site improvements have been identified per *TSM* criteria. Appropriate improvements based on both sets of criteria are listed below.

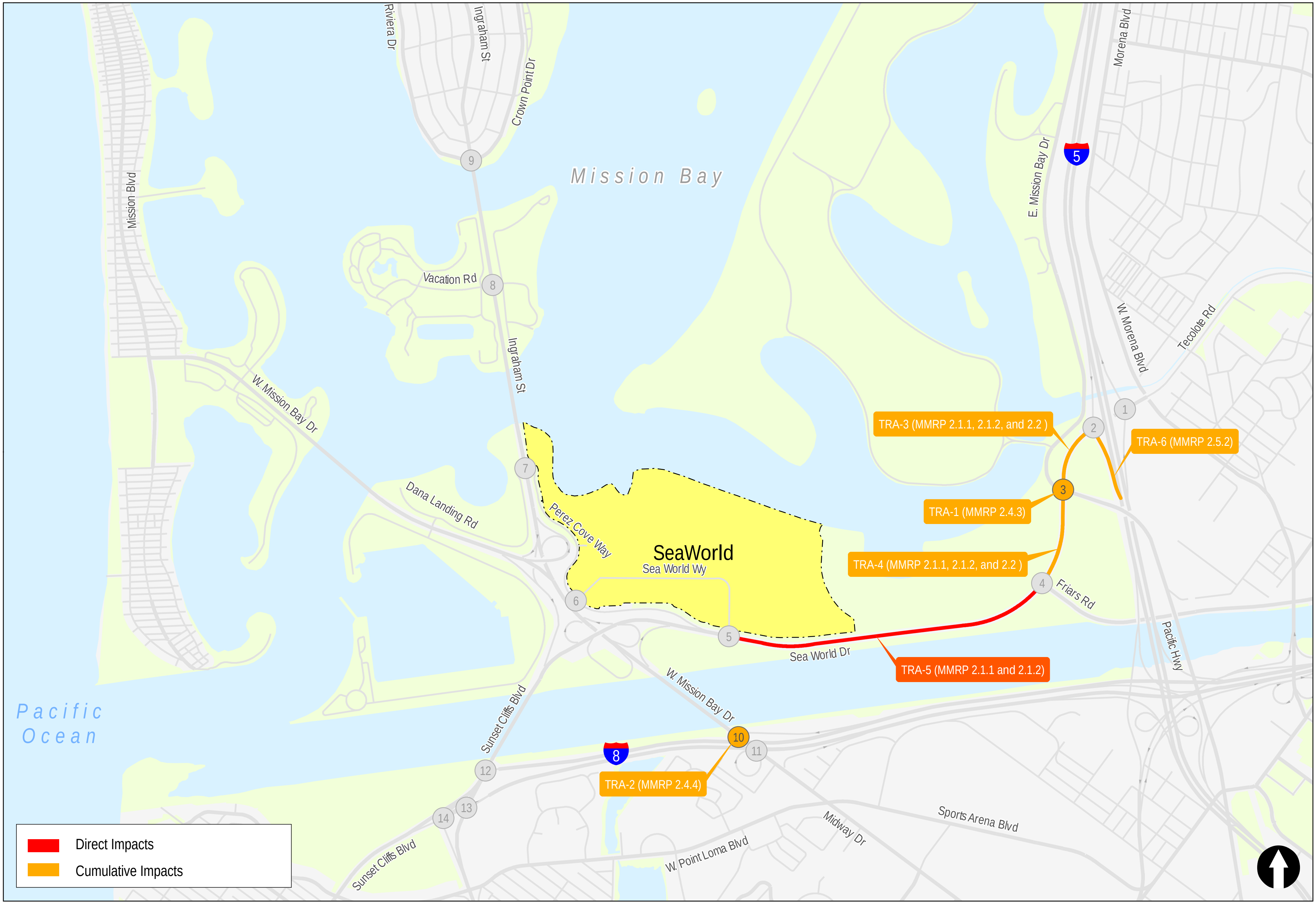


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Figure 19-1
Significant Impacts

2020 SeaWorld Master Plan

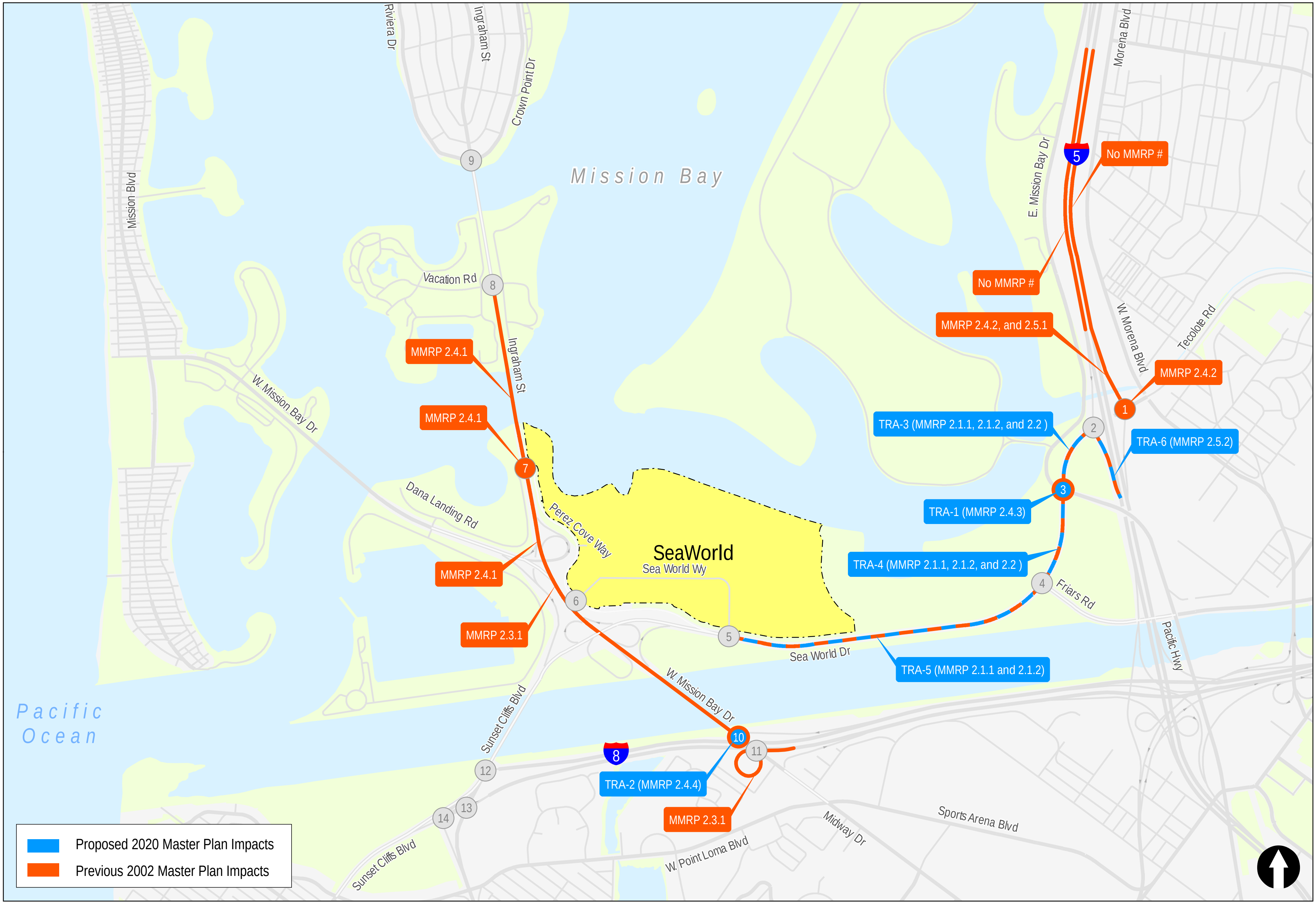

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Figure 19-2
Master Plan Impact Comparison

19.2 Auto Improvements

Per the CEQA significance criteria and *TSM* criteria for identifying roadway improvements in *Sections 5.0*, the following auto-oriented improvements to study area facilities are recommended.

19.2.1 *Intersections*

1. **Intersection #1. SeaWorld Drive / I-5 Northbound Ramps:** Provide loop detectors for vehicles and bikes in both directions of travel on SeaWorld Drive. Loop detectors can enhance signal operations and decrease driver and cyclist frustration at this intersection which has been identified on the City of San Diego's Systemic Safety hotspot map.

   SeaWorld shall assure this improvement by permit and bond satisfactory to the City Engineer and Caltrans prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan. The improvements shall be constructed prior to the issuance of the first certificate of occupancy.

2. **Intersection #2. SeaWorld Drive / I-5 Southbound Ramps:** Provide loop detectors for vehicles and bikes in both directions of travel on SeaWorld Drive. Loop detectors can enhance signal operations and decrease driver and cyclist frustration at this intersection which has been identified on the City of San Diego's Systemic Safety hotspot map.

   SeaWorld shall assure this improvement by permit and bond satisfactory to the City Engineer and Caltrans prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan. The improvements shall be constructed prior to the issuance of the first certificate of occupancy.

3. **Intersection #3. SeaWorld Drive / Pacific Highway:** Provide right-turn overlap (RTOL) phasing in the eastbound (E. Mission Bay Drive) and westbound (Pacific Highway) approaches. This improvement would reduce this CEQA LOS impact to less than significant as well as address the *TSM* requirements for signal timing improvements or modifications. ***Table 19–1*** shows the post-mitigation intersection operations.

   SeaWorld shall assure this improvement by permit and bond satisfactory to the City Engineer prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan. The improvements shall be constructed prior to the issuance of the first certificate of occupancy.

4. **Intersection #7. Ingraham Street / Dana Landing Road / Perez Cove Way:** At the westbound right turn lane, extend the existing 55-foot right-turn pocket striping within the existing curb-to-curb width to provide a minimum of 70 feet of storage length. At the northbound right turn lane, extend the existing 180-foot right-turn pocket striping within the existing curb-to-curb width to provide a minimum of 260 feet of storage. No physical widening is proposed. A conceptual drawing of the proposed turn pocket extensions is provided in ***Figure 19–3***.

   SeaWorld shall assure this improvement by permit and bond satisfactory to the City Engineer prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan. The improvements shall be constructed prior to the issuance of the first certificate of occupancy.

5. **Intersection #9. Ingraham Street / Riviera Drive / Crown Point Drive:** Provide loop detectors for vehicles and bikes in both directions of travel on Ingraham Street. Loop

detectors can enhance signal operations and decrease driver and cyclist frustration at this intersection which has been identified on the City of San Diego's Systemic Safety hotspot map.

SeaWorld shall assure this improvement by permit and bond satisfactory to the City Engineer prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan. The improvements shall be constructed prior to the issuance of the first certificate of occupancy.

6. **Intersection #10. W. Mission Bay Drive / I-8 Westbound Off-Ramps:** Provision of a 3rd westbound right turn lane, consistent with the mitigation measure identified in the 2002 Master Plan EIR, would reduce this CEQA LOS impact to less than significant. SeaWorld has contributed a fair share amount as identified in the 2002 Master Plan EIR and no further contributions are required. *Table 19–1* shows the post-mitigation intersection operations.

Appendix Z contains the post-mitigation intersection analysis worksheets.

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Figure 19-3

Ingraham Street / Dana Landing Road / Perez Cove Way Concept Improvements

TABLE 19–1
POST-MITIGATION INTERSECTION ANALYSIS

Intersection	Control Type	Peak Hour	Horizon Year (Year 2040) Without Project		Horizon Year (Year 2040) With Project		Horizon Year (Year 2040) With Project + Mitigation	
			Delay[a]	LOS[b]	Delay	LOS	Delay	LOS
3. SeaWorld Drive / Pacific Highway [c]	Signal	AM	24.2	C	25.0	C	24.4	C
		PM	69.8	E	84.1	F	77.6	E
10. W. Mission Bay Drive / I-8 WB Off-Ramp	Signal	AM	40.3	D	44.4	D	23.7	C
		PM	57.0	E	62.8	E	40.6	D

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. SeaWorld has contributed a fair share payment to the widening of SeaWorld Drive between I-5 and SeaWorld Way which would further improve operations at Intersection #3 but is not accounted for in the analysis shown here.

SIGNALIZED

DELAY/LOS THRESHOLDS

Delay	LOS
0.0 ≤ 10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
≥ 80.1	F

19.2.2 *Street Segments*

7. **Segment #1. SeaWorld Drive: I-5 Ramps to Pacific Highway/E. Mission Bay Drive:** Widening of SeaWorld Drive to six lanes, consistent with the mitigation measure identified in the 2002 Master Plan EIR, would reduce this CEQA LOS impact to less than significant. SeaWorld has contributed a fair share amount as identified in the 2002 Master Plan EIR and lease agreement and no further contributions are required. Per *TSM* criteria, a project adding less than 50% of total daily vehicle trips on a segment should evaluate its fair share toward planned improvements, including upgrading to ultimate classification. The previously mentioned fair share payment would also address *TSM* requirements. ***Table 19–2*** shows the post-mitigation street segment operations.

8. **Segment #2. SeaWorld Drive: Pacific Highway/E. Mission Bay Drive to Friars Road:** Widening of SeaWorld Drive to six lanes, consistent with the mitigation measure identified in the 2002 Master Plan EIR, would reduce this CEQA LOS impact to less than significant. SeaWorld has contributed a fair share amount as identified in the 2002 Master Plan EIR and no further contributions are required. Per *TSM* criteria, a project adding less than 50% of total daily vehicle trips on a segment should evaluate its fair share toward planned improvements, including upgrading to ultimate classification. The previously mentioned fair share payment would also address *TSM* requirements. *Table 19–2* shows the post-mitigation street segment operations.

9. **Segment #3. SeaWorld Drive: Friars Road to SeaWorld Way:** Widening of SeaWorld Drive to six lanes, consistent with the mitigation measure identified in the 2002 Master Plan EIR, would reduce this CEQA LOS impact to less than significant. SeaWorld has contributed a fair share amount as identified in the 2002 Master Plan EIR and no further contributions are required. Per *TSM* criteria, a project adding less than 50% of total daily vehicle trips on a segment should evaluate its fair share toward planned improvements, including upgrading to ultimate classification. The previously mentioned fair share payment would also address *TSM* requirements. *Table 19–2* shows the post-mitigation street segment operations.

TABLE 19–2
POST-MITIGATION STREET SEGMENT OPERATIONS

Street Segment	Without Mitigation								With Mitigation			
	Classification	Capacity (LOS E) [a]	Horizon Year (Year 2040) Without Project			Horizon Year (Year 2040) With Project			Classification	Capacity (LOS E)	Horizon Year (Year 2040) With Project + Mitigation [e]	
			ADT[b]	LOS [c]	V/C [d]	ADT	LOS	V/C			LOS	V/C
SeaWorld Drive												
I-5 Ramps to Pacific Highway	4-Lane Major Arterial	40,000	45,580	F	1.013	48,200	F	1.071	6-Lane Primary Arterial	60,000	C	0.803
Pacific Highway to Friars Road	4-Lane Major Arterial	40,000	41,670	F	1.042	44,400	F	1.110	6-Lane Primary Arterial	60,000	C	0.740
Friars Road to SeaWorld Way	4-Lane Major Arterial	40,000	46,840	F	1.171	49,800	F	1.024	6-Lane Primary Arterial	60,000	C	0.830

Footnotes:

a. Capacity based on roadway classification operating at LOS E.
b. Average Daily Traffic.
c. Level of Service.
d. Volume to Capacity.
e. There is no active CIP for this improvement. SeaWorld has contributed a fair share but cannot guarantee the improvement will be constructed.

▪

19.2.3 *Freeway On-Ramps*

10. **Freeway On-Ramp #2. I-5 Southbound On-Ramp from SeaWorld Drive:** Mitigation identified consistent with the 2002 Master Plan EIR would reduce this CEQA impact by providing additional lanes or loop ramps as part of the planned SeaWorld Drive / I-5 Interchange CIP. This mitigation measure has not been triggered in any previous iteration of the Mitigation Monitoring and Reporting Program for the 2002 Master Plan EIR. Mitigation monitoring will continue for this location and SeaWorld shall provide a fair share contribution when the significance threshold is met.

A summary of impacts and mitigation measures/TSM improvements is provided in the following tables. ***Table 19–3*** provides the intersection summary, ***Table 19–4*** provides the street segment summary, and ***Table 19–5*** presents the summary for freeway segments and on-ramps. ***Table 19–6*** summarizes other impacts identified in the 2002 Master Plan EIR.

TABLE 19–3
SIGNIFICANT IMPACT & MITIGATION MEASURES SUMMARY - INTERSECTIONS

Intersection	2002 Master Plan EIR			2020 Master Plan Update			
	Significant CEQA LOS Impact?	Mitigation Measures	Mitigated? (fair share paid or improvement completed per MMRP)	Significant CEQA LOS Impact?	TSM		Improvements
					Improvement Triggered?	Nexus/Criteria	
1. SeaWorld Dr / I-5 NB Ramps	**Yes**	WB right turn lane & NB dual left turn lanes; SeaWorld cost participation 29%. City of SD to initiate a I-5 interchange CIP.	No – significance threshold not met per MMRP	No	**Yes**	**Hot Spot**	Provide loop detection for vehicles and bikes in both directions of travel on SeaWorld Drive.
2. SeaWorld Dr / I-5 SB Ramps	No	N/A	No	No	**Yes**	**Hot Spot**	Provide loop detection for vehicles and bikes in both directions of travel on SeaWorld Drive.
3. SeaWorld Dr / Pacific Hwy	**Yes**	Three SB thru lanes on SeaWorld Dr; SeaWorld cost participation = 36%. Three NB thru lanes on SeaWorld Dr; SeaWorld cost participation = 100%.	No – significance threshold not met per MMRP	**Yes**	**Yes**	**LOS -Signal Timing Improvements**	Provide right-turn overlap (RTOL) phasing for the eastbound (E. Mission Bay Drive) and westbound (Pacific Highway) approaches.
4. SeaWorld Dr / Friars Rd	No	N/A	N/A	No	No	N/A	N/A
5. SeaWorld Dr / SeaWorld Way	No	N/A	N/A	No	No	N/A	N/A
6. Perez Cove Way / SeaWorld Entrance	No	N/A	N/A	No	No	N/A	N/A
7. Ingraham St / Dana Landing Rd / Perez Cove Way	**Yes**	Re-construct and re-stripe EB leg to dual left, one thru, one right and re-phase signal to EB/WB protected.	No – significance threshold not met per MMRP	No	**Yes**	**Queue Length**	Extend the westbound right-turn lane to provide a minimum 70 feet of storage. Extend the northbound right-turn lane to provide a minimum 260 feet of storage.
8. Ingraham St / Vacation Rd	No	N/A	N/A	No	No	N/A	N/A
9. Ingraham St / Crown Point Dr	No	N/A	N/A	No	**Yes**	**Hot Spot**	Provide loop detection for vehicles and bikes in both directions of travel on Ingraham Street.
10. W. Mission Bay Dr / I-8 WB Off-Ramps	**Yes**	Add a third WB right turn lane. Improvements can only be implemented if W. Mission Bay Dr is widened; SeaWorld cost participation = 28%.	Yes – Fair share paid	**Yes**	No [a]*	N/A	Provide mitigation consistent with 2002 EIR. The Project's fair share contribution has been paid and no further mitigation is required.
11. Sports Arena / I-8 EB On-Ramp	No	N/A	N/A	No	No	N/A	N/A
12. Sunset Cliffs Blvd / I-8 WB Off-Ramp	No	N/A	N/A	No	No	N/A	N/A
13. Sunset Cliffs Blvd / I-8 EB On-Ramp	No	N/A	N/A	No	No	N/A	N/A
14. Sunset Cliffs Blvd /Nimitz Blvd	No	N/A	N/A	No	No	N/A	N/A

Footnotes:

a. The identified mitigation would improve the intersection to LOS D or better and alleviate the need for the any further improvements per TSM criteria.

TABLE 19–4
SIGNIFICANT IMPACT & MITIGATION MEASURES SUMMARY – STREET SEGMENTS

Street Segment	2002 MP EIR			2020 Master Plan Update			
	Significant CEQA LOS Impact	Improvement	Mitigated (fair share paid or improvement completed per MMRP)?	Significant CEQA LOS Impact	TSM Trigger [a]		Improvements
					Ultimate Class.	+/- 50% of total ADT	
SeaWorld Drive							
1. I-5 Ramps to Pacific Highway/ E. Mission Bay Drive	**Yes**	Widen to 6 lanes; SeaWorld cost participation = 44%	Yes – Fair share paid; improvements incomplete.	**Yes**	**No**	<50%	Provide mitigation consistent with 2002 EIR. The Project's fair share contribution has been paid and no further mitigation is required.
2. Pacific Highway/ E. Mission Bay Drive to Friars Road	**Yes**			**Yes**	**No**	<50%	
3. Friars Road to SeaWorld Way	**Yes**			**Yes**	**No**	<50%	
4. SeaWorld Way to W. Mission Bay Drive	No	N/A	N/A	No [b]	Yes	N/A	N/A
Friars Road							
5. Pacific Highway to SeaWorld Drive	No	N/A	N/A	No	Yes	N/A	N/A
West Mission Bay Drive							
6. Dana Landing Road to Ingraham Street	No	N/A	N/A	No	Yes	N/A	N/A
7. Ingraham Street to SeaWorld Drive	No [b]	N/A	N/A	No [b]	Yes	N/A	N/A
8. SeaWorld Drive to I-8 Ramps (bridge)	**Yes**	Widen to 6 lanes; SeaWorld cost participation = 47% of the City's 20%, which is 9.4%	Yes – Fair share paid; improvements under construction.	No [b]	Yes	N/A	N/A
9. I-8 Ramps to Sports Arena Boulevard	No	N/A	N/A	No	Yes	N/A	N/A
Perez Cove Way							
10. Ingraham Street to SeaWorld Entrance	No	N/A	N/A	No	Yes	N/A	N/A
11. SeaWorld Entrance to SeaWorld Drive	No	N/A	N/A	No	Yes	N/A	N/A
Ingraham Street							
12. Crown Point Drive to Vacation Road (bridge)	No	N/A	N/A	No	Yes	N/A	N/A
13. Vacation Road to Perez Cove Way/ Dana Landing Road (bridge)	No [b]	N/A	N/A	No [b]	Yes	N/A	N/A
14. Perez Cove Way/ Dana Landing Road to W. Mission Bay Drive	No	N/A	N/A	No	Yes	N/A	N/A
Sunset Cliffs Boulevard							
15. W. Mission Bay Drive to I-8 Ramps (bridge)	No	N/A	N/A	No	Yes	N/A	N/A
16. I-8 Ramps to Nimitz Boulevard	No	N/A	N/A	No	Yes	N/A	N/A

Footnotes:

a. Improvements identified in Community Plan (including upgrade to ultimate classification). Project ADT greater than 50% of total = project implements; less than 50% = fair share.
b. Ultimate classification with intersections and HCM arterial analysis showing acceptable LOS.

TABLE 19–5
SIGNIFICANT IMPACT & MITIGATION MEASURES SUMMARY – FREEWAY SEGMENTS AND ON-RAMPS

Location		2002 Master Plan EIR			2020 Master Plan Update	
		Significant CEQA LOS Impact	Improvement	Mitigated (fair share paid or improvement completed per MMRP)?	Significant CEQA LOS Impact	Improvement
Freeway Segments						
1	**NB Interstate 5: Interstate 8 to Sea World Drive**	No	N/A	N/A	No	N/A
	SB Interstate 5: Sea World Drive to Interstate 8	No	N/A	N/A	No	N/A
2	**NB Interstate 5: Sea World Drive to Clairemont Drive**	**Yes**	Unmitigated; Cost prohibitive/Caltrans jurisdiction	No	No	N/A
	SB Interstate 5: Clairemont Drive to Sea World Drive	**Yes**	Unmitigated; Cost prohibitive/Caltrans jurisdiction	No	No	N/A
3	**EB Interstate 8: W. Mission Bay Drive to Interstate 5**	No	N/A	N/A	No	N/A
	WB Interstate 8: Interstate 5 to W. Mission Bay Drive	No	N/A	N/A	No	N/A
Freeway On-Ramps						
1	**I-5 Northbound On-Ramp from SeaWorld Drive**	**Yes**	Increase vehicle storage by adding additional lanes or by providing loop ramps as part of the planned I-5 Interchange CIP; however, if this CIP is not funded, then SeaWorld's impact will be significant and unmitigated. SeaWorld cost participation = 50%	No – significance threshold not met per MMRP	No	N/A
2	**I-5 Southbound On-Ramp from SeaWorld Drive**	**Yes**	Increase vehicle storage by adding additional lanes or by providing loop ramps as part of the planned I-5 Interchange CIP; however, if this CIP is not funded, then SeaWorld's impact will be significant and unmitigated. SeaWorld cost participation = 27%	No – significance threshold not met per MMRP	**Yes**	Continue mitigation monitoring and provide mitigation consistent with 2002 EIR when threshold met.
3	**I-8 Eastbound On-Ramp from Southbound W. Mission Bay Drive/Sports Arena Boulevard**	**Yes**	Increase vehicle storage through intersection improvements, which will be part of CIP 52-643; however, if this CIP is not funded then SeaWorld's impact will be significant and unmitigated.	Yes – improvements under construction	No	N/A

General Note:

a. City of San Diego Transportation Study Manual does not apply to freeway segment and metered freeway on-ramp analyses.

TABLE 19–6
SIGNIFICANT IMPACT & MITIGATION MEASURES SUMMARY – OTHER MITIGATION

Location	2002 Master Plan EIR			2020 Master Plan Update	
	Significant CEQA LOS Impact	Improvement	Mitigated (fair share paid or improvement completed per MMRP)?	Significant CEQA LOS Impact	Improvement
1 SeaWorld Drive: Friars Road to I-5 Northbound Ramp	Yes [a]	Install signal coordination.	Yes – signal coordination design work was completed in December 2009. Implementation was completed in Fall 2010. (100% SeaWorld cost participation).	No [b]	N/A
2 I-5 / SeaWorld Drive interchange	Yes [a]	Provide Traffic officers during busy days	Yes – on busy days, such as the 4th of July, SeaWorld has used Community Service Officers to control intersections along SeaWorld Drive from I-5 to Ocean Beach and along Ingraham from I-8 to Crown Point. (100% SeaWorld cost participation).	No [c]	N/A
3 SeaWorld Entrance Gates	Yes [a]	Improve lane management at the entrance gates to maximize vehicle storage as well as help visitors waiting in line determine which lanes are open or shorter.	To increase efficiency and queuing at the entrance gates on busy days such as July 4th, SeaWorld implements the following: • Provide an additional inbound lane off Perez Cove for ingress closer to the Perez Cove turn-in. • Provide additional directional signage for employees, marina tenants, and park guests. • Provide traffic directors during peak arrival time to ensure cars are stacked as closely as possible and distributed as evenly as possible.	No [c]	N/A
4 SeaWorld Park	Yes [a]	Distribute promotional material to employees and repeat patrons that would promote I-8 or Ingraham Street as alternative routes to SeaWorld.	Employee information bulletins are distributed outlining alternative routes and modes of transportation. Use of a direct email system to pass members describing alternate routes is in place. Alternate routes to large events such as the Rock and Roll Marathon are provided on the SeaWorld website.	No [c]	N/A
5 Parking	Yes [a]	1) Pave the existing unpaved guest overflow parking area located in the southwest corner of the SeaWorld Master Plan Update Area. 2) Implement off-site parking or shuttle/MTS transit options. 3) Construct the planned parking structure.	1) Yes – The California Coastal Commission approved the paving of the overflow lot in February 2007. The paving project was completed in 2011. 2) No – significance threshold not yet met per MMRP. 3) No – significance threshold not yet met per MMRP.	No [d]	N/A

Footnotes:

a. Per 2002 EIR traffic study, these impacts cannot be measured through intersection, segment, or arterial analyses. Impact based on engineering judgment.

b. Signal coordination complete. Other intersection and roadway improvements evaluated per City criteria as shown previously in *Section 19.2*.

c. These measures are ongoing and will continue to be provided as described.

d. Although no longer a CEQA impact, SeaWorld will continue to monitor parking demand to plan future parking supply expansions, as necessary.

19.3 Active Transportation Recommendations

19.3.1 *Pedestrian Improvements*

The following pedestrian improvements are Project Design Features incorporated as development and design criteria in the 2020 Master Plan. The implementation of these features will be assured through the project review process for individual development projects proposed under the 2020 Master Plan. All proposed SeaWorld Master Plan development projects will be reviewed by the City of San Diego and the California Coastal Commission.

PI-1. Provide a minimum 10-foot-wide public accessway (vertical access) from Perez Cove Way to the shoreline somewhere between the existing Skyride station and the driveway/aisle at the southern end of the north employee parking lot (approximately 550 feet), with the final location to be determined when the final plans are submitted for review.

PI-2. Enhance the existing pedestrian paths along the Perez Cove shoreline by providing a minimum 10-foot-wide landscaped public walkway (lateral shoreline access) incorporated into the marina expansion design.

PI-3. Enhance the shoreline access by providing a minimum 10-foot-wide landscaped public shoreline walkway (lateral shoreline access) along that waterfront incorporated into the hotel expansion plan.

PI-4. Continue to provide ongoing maintenance of the existing pedestrian/bicycle pathways within the project site.

19.3.2 *Bicycle Improvements*

The following bicycle improvements are Project Design Features incorporated as development and design criteria in the 2020 Master Plan. The implementation of these features will be assured through the project review process for individual development projects proposed under the 2020 Master Plan. All proposed SeaWorld Master Plan development projects will be reviewed by the City of San Diego and the California Coastal Commission.

BI-1. Maintain the bicycle racks provided on-site (currently 27 spaces) at the main entrance. Monitor demand for bicycle parking and provide additional spaces as demand increases.

BI-2. Maintain the employee bicycle racks at both the west security (currently 18 spaces) and east security (currently 10 spaces) employee entrances. Monitor demand for employee bicycle parking and provide additional spaces as demand increases.

BI-3. Enhance the shoreline access with future expansion of the marina and hotel development.

BI-4. Provide plug-in stations at the bicycle storage area for electric bikes or other micro mobility vehicles, as demand warrants it.

BI-5. Reserve space for parking alternative and micromobility vehicles such as shared use bikes, scooters, and similar services. The space will be publicly accessible, provide electricity, and be provided to one or more micromobility service providers. If space set aside for micromobility devices is not utilized by micromobility devices/services, this space will be used to provide additional bicycle racks as demand increases. Continue to provide ongoing maintenance of the existing pedestrian/bicycle pathways within the project site.

19.3.3 *Transit Improvements*

Prior to the issuance of the first development permit for a SeaWorld development project under the 2020 Master Plan, SeaWorld shall assure the provision of the following transit improvements to the satisfaction of MTS:

TI-1. Improve the amenities at the existing SeaWorld bus stop (Stop ID 13059) to meet all standard MTS design criteria for 201-500 daily passenger boardings, which will require the following stop amenities not currently provided.

- Passenger Shelter
- Route Map

The following transit improvements are Project Design Features incorporated as development and design criteria in the 2020 Master Plan. The implementation of these features will be assured through the project review process for individual development projects proposed under the 2020 Master Plan. All proposed SeaWorld Master Plan development projects will be reviewed by the City of San Diego and the California Coastal Commission.

TI-2. Coordinate with MTS regarding Route 9 service to the SeaWorld bus stop prior to extend the existing span of service, currently 9:06 AM to 4:08 PM, to match SeaWorld's hours of operation.

TI-3. Coordinate with SANDAG, City of San Diego and MTS to accommodate a Transit Station within the Area 2 parking lot per the terms of the SeaWorld lease, if and when the opportunity arises. Design of the future parking structure, if necessary, should accommodate a transit station, if feasible.

19.3.4 *Parking Monitoring Program*

Although no longer considered a significant impact per CEQA guidelines, it is recommended that SeaWorld monitor guest parking demand to time parking supply improvements to planned expansion projects. Consistent with Mitigation Measure 2.7.1 from the 2002 MMRP, the following is recommended to avoid deficiencies in parking supply:

PMP-1. Generate an annual summer parking demand parking report using SeaWorld's vehicular toll booth and patron data.

PMP-2. Identify the encroachment impacts of all planned park attractions upon the existing parking supply.

PMP-3. Identify the parking structure supply.

PMP-4. Identify the parking demand thresholds to trigger the provision of alternative/satellite parking and/or the construction of the parking structure.

PMP-5. Explore and implement alternative/satellite parking locations and shuttle/MTS transit operations as appropriate to meet the parking demand; and

End of Report

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TECHNICAL APPENDICES

2020 SEAWORLD MASTER PLAN

San Diego, California
June 10, 2022

LLG Ref. 3-19-3077

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APPENDICES

APPENDIX

APPENDIX A

AECOM AND TEA THEME AND MUSEUM INDEX: THE GLOBAL ATTRACTIONS REPORT, 2018 AND 2020 SEAWORLD FINANCIAL GOAL PRESENTATION

THEME INDEX MUSEUM INDEX 2018

GLOBAL ATTRACTIONS ATTENDANCE REPORT

AECOM

TEA THEMED ENTERTAINMENT ASSOCIATION

Cover image:
Chimelong Ocean Kingdom's Journey Of Lights Parade — Zhuhai, China
Photo courtesy of Miziker Entertainment

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THEME INDEX MUSEUM INDEX 2018

GLOBAL ATTRACTIONS ATTENDANCE REPORT

The definitive annual attendance study for the themed entertainment and museum industries.

Published by the Themed Entertainment Association (TEA) and the Economics practice at AECOM.

1.9m

Thermas Water Park, São Pedro, Brazil, attendance 2018

CONTENTS

Thermas Water Park, São Pedro, Brazil

THE BIG PICTURE

5.4%

Top 10 theme park groups worldwide attendance growth 2017–18

501.2m

Top 10 theme park groups worldwide attendance 2018

475.8m

Top 10 theme park groups worldwide attendance 2017

JOHN ROBINETT

Senior Vice President – Economics

—

2018 HAS BEEN A MILESTONE YEAR FOR THE THEMED ENTERTAINMENT INDUSTRY

Attendance at themed attractions at the major operators has exceeded half a billion visits for the first time in history. This is equivalent to almost 7% of the world population. And not only that, but this number keeps growing. Just five years ago, the market capture of the industry was only 5% of the global population.

This noteworthy achievement has been accomplished by focused capital investment, technology enhanced products, intellectual property based stories, and destination tourism development.

7.9%

Tokyo Disneyland at Tokyo Disney Resort, Tokyo, Japan, attendance growth 2017–18

Tokyo Disneyland at Tokyo Disney Resort Tokyo, Japan

This year also showed strong and steady business volume through most regions and attraction types. In an unusual alignment, theme park attendance grew by roughly 4% in all major markets. Waterparks' attendance rose at 2.5% globally, with North America at 5.8% and EMEA showing strong growth of 6.7%. The top museums were relatively flat this year.

We have observed a number of phenomena that have led to this and other strong years' performance in the business. These include the addition of second gates, the continued leveraging of blockbuster IP's, and the building of resort hotels adjacent to park properties.

Honorable mentions are in order this year for a number of players including: SeaWorld Parks & Entertainment which turned around from a 5% drop last year to an almost 9% increase this year; and several individual parks with double digit increases including: Chimelong Paradise in Guangzhou, Parque Warner in Madrid, Parque Xcaret in Mexico, and Changzhou Dinosaur Park in China.

Overall, it's been an outstanding year, as the themed entertainment industry has matured and been recognized not only as a significant driver of international development, economic impact, and tourism, but as a common shared global experience. We're looking forward to what next year brings with several special new attractions coming on line such as Disney's Star Wars: Galaxy's Edge, opening in both California and Florida.

18.8%

Parque Warner, Madrid, Spain attendance growth 2017–18

Parque Warner, Madrid, Spain
© Parque Warner

TOP 10 THEME PARK GROUPS WORLDWIDE

RANK	GROUP NAME	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	WALT DISNEY ATTRACTIONS	4.9%	157,311,000	150,014,000
2	MERLIN ENTERTAINMENTS GROUP	1.5%	67,000,000	66,000,000
3	UNIVERSAL PARKS AND RESORTS	1.2%	50,068,000	49,458,000
4	OCT PARKS CHINA	15.1%	49,350,000	42,880,000
5	FANTAWILD	9.3%	42,074,000	38,495,000
6	CHIMELONG GROUP	9.6%	34,007,000	31,031,000
7	SIX FLAGS INC.	5.3%	32,024,000	30,421,000*
8	CEDAR FAIR ENTERTAINMENT COMPANY	0.7%	25,912,000	25,723,000*
9	SEAWORLD PARKS & ENTERTAINMENT	8.6%	22,582,000	20,798,000*
10	PARQUES REUNIDOS	1.5%	20,900,000	20,600,000
	TOP 10 ATTENDANCE GROWTH 2017–18	5.4%	501,228,000	475,767,000*

* Adjustment versus the figure we published in last year's report

5.4%
Top 10 theme park groups worldwide attendance growth 2017–18

501.2m
Top 10 theme park groups worldwide attendance 2018

475.8m*
Top 10 theme park groups worldwide attendance 2017

TOP 25 AMUSEMENT/THEME PARKS WORLDWIDE

RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	MAGIC KINGDOM THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	2.0%	20,859,000	20,450,000
2	DISNEYLAND PARK AT DISNEYLAND RESORT, ANAHEIM, CA, U.S.	2.0%	18,666,000	18,300,000
3	TOKYO DISNEYLAND AT TOKYO DISNEY RESORT, TOKYO, JAPAN	7.9%	17,907,000	16,600,000
4	TOKYO DISNEYSEA AT TOKYO DISNEY RESORT, TOKYO, JAPAN	8.5%	14,651,000	13,500,000
5	UNIVERSAL STUDIOS JAPAN, OSAKA, JAPAN	-4.3%	14,300,000	14,935,000
6	DISNEY'S ANIMAL KINGDOM THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	10.0%	13,750,000	12,500,000
7	EPCOT THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	2.0%	12,444,000	12,200,000
8	SHANGHAI DISNEYLAND, SHANGHAI, CHINA	7.3%	11,800,000	11,000,000
9	DISNEY'S HOLLYWOOD STUDIOS AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	5.0%	11,258,000	10,722,000
10	CHIMELONG OCEAN KINGDOM, HENGQIN, CHINA	10.6%	10,830,000	9,788,000
11	UNIVERSAL STUDIOS FLORIDA THEME PARK AT UNIVERSAL ORLANDO RESORT, FL, U.S.	5.0%	10,708,000	10,198,000
12	DISNEY CALIFORNIA ADVENTURE PARK AT DISNEYLAND RESORT, ANAHEIM, CA, U.S.	3.0%	9,861,000	9,574,000

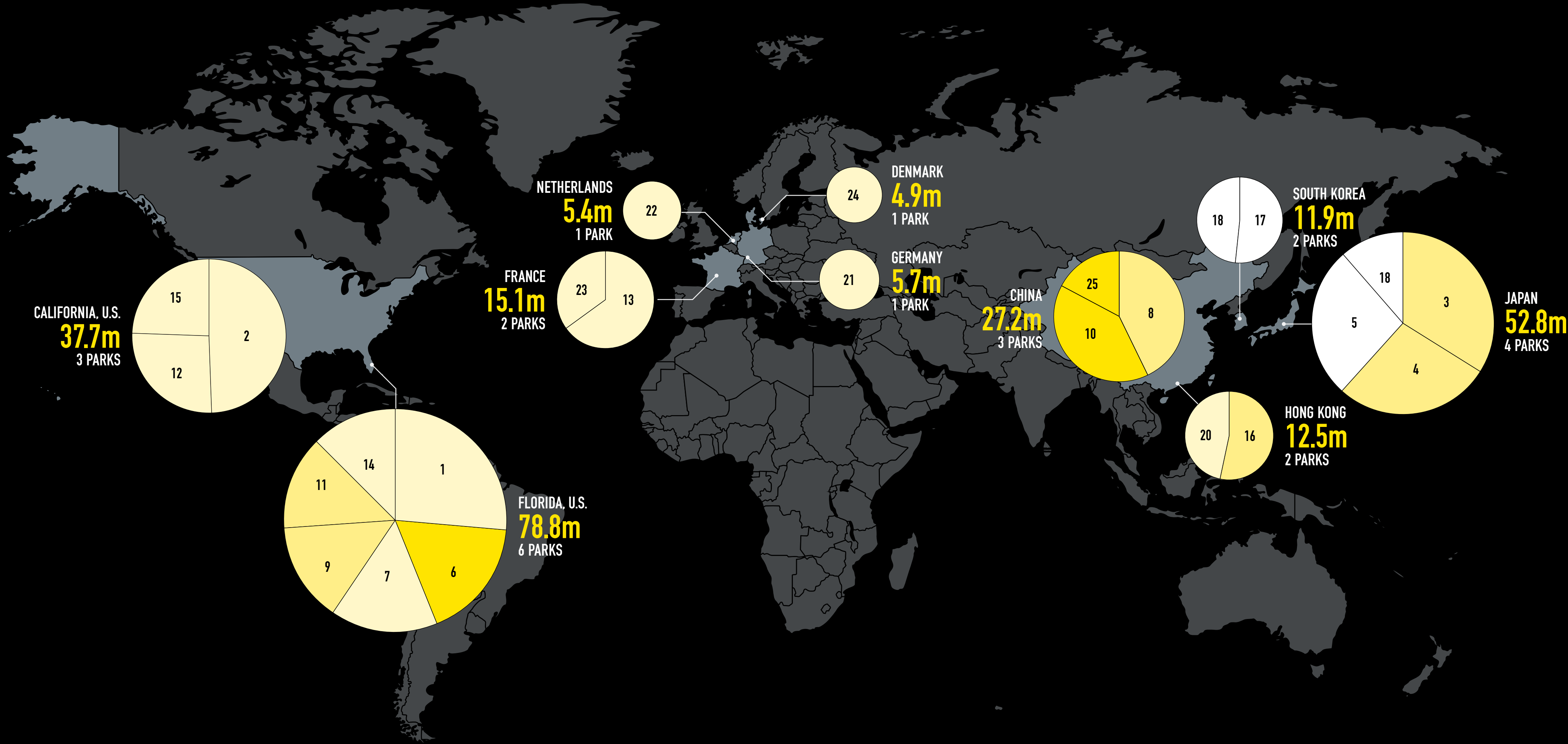
RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
13	DISNEYLAND PARK AT DISNEYLAND PARIS, MARNE-LA-VALLEE, FRANCE	1.9%	9,843,000	9,660,000
14	UNIVERSAL'S ISLANDS OF ADVENTURE THEME PARK AT UNIVERSAL ORLANDO RESORT, FL, U.S.	2.5%	9,788,000	9,549,000
15	UNIVERSAL STUDIOS HOLLYWOOD, UNIVERSAL CITY, CA, U.S.	1.0%	9,147,000	9,056,000
16	HONG KONG DISNEYLAND, HONG KONG SAR	8.1%	6,700,000	6,200,000
17	LOTTE WORLD, SEOUL, SOUTH KOREA	-11.2%	5,960,000	6,714,000
18	NAGASHIMA SPA LAND, KUWANA, JAPAN	-0.2%	5,920,000	5,930,000
19	EVERLAND, GYEONGGI-DO, SOUTH KOREA	-7.3%	5,850,000	6,310,000
20	OCEAN PARK, HONG KONG SAR	0.0%	5,800,000	5,800,000
21	EUROPA PARK, RUST, GERMANY	0.4%	5,720,000	5,700,000
22	DE EFTELING, KAATSHEUVEL, NETHERLANDS	4.2%	5,400,000	5,180,000
23	WALT DISNEY STUDIOS PARK AT DISNEYLAND PARIS, MARNE-LA-VALLEE, FRANCE	1.9%	5,298,000	5,200,000
24	TIVOLI GARDENS, COPENHAGEN, DENMARK	4.5%	4,850,000	4,640,000
25	CHIMELONG PARADISE, GUANGZHOU, CHINA	11.9%	4,680,000	4,181,000
	TOP 25 TOTAL ATTENDANCE 2018		251,490,000	243,887,000
	TOP 25 ATTENDANCE GROWTH 2017–18	3.3%	251,990,000	243,926,000

3.3%
Top 25 amusement/theme parks worldwide attendance growth 2017–18

252.0m
Top 25 amusement/theme parks worldwide attendance 2018

243.9m
Top 25 amusement/theme parks worldwide attendance 2017

TOP 25
AMUSEMENT/THEME PARKS
WORLDWIDE

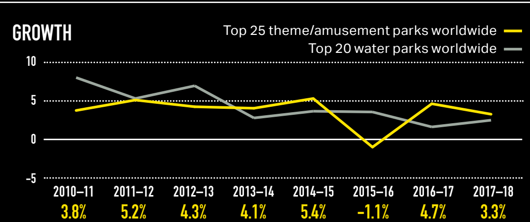


MAP KEY

< 0% | 0%–4.9% | 5%–9.9% | 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH



3.3%
Top 25 amusement/theme parks worldwide attendance growth 2017–18

252.0m
Top 25 amusement/theme parks worldwide attendance 2018

243.9m
Top 25 amusement/theme parks worldwide attendance 2017

© 2019 TEA / AECOM

TOP 20 WATER PARKS WORLDWIDE

RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	CHIMELONG WATER PARK, GUANGZHOU, CHINA	1.9%	2,740,000	2,690,000
2	TYPHOON LAGOON WATER PARK AT WALT DISNEY WORLD RESORT, ORLANDO, FL, U.S.	5.0%	2,271,000	2,163,000
3	DISNEY'S BLIZZARD BEACH WATER PARK AT WALT DISNEY WORLD RESORT, ORLANDO, FL, U.S.	3.0%	2,003,000	1,945,000
4	PARQUE AQUÁTICO THERMAS DOS LARANJAIS, OLIMPIA, BRAZIL	-1.8%	1,971,000	2,007,000
5	AQUAVENTURE ATLANTIS BAHAMAS WATERPARK, PARADISE ISLAND, BAHAMAS	0.0%	1,831,000	1,831,000
6	VOLCANO BAY WATER THEME PARK AT UNIVERSAL ORLANDO RESORT, ORLANDO, FL, U.S.	15.0%	1,725,000	1,500,000
7	AQUATICA ORLANDO, ORLANDO, FL, U.S.	8.5%	1,556,000	1,434,000*
8	THERME ERDING, ERDING, GERMANY	13.6%	1,500,000	1,320,000
9	HOT PARK RIO QUENTE, CALDAS NOVAS, BRAZIL	-3.2%	1,433,000	1,481,000
10	AQUAVENTURE WATER PARK, DUBAI, U.A.E.	3.5%	1,397,000	1,350,000
11	WUHU FANTAWILD WATER PARK, WUHU, CHINA	13.3%	1,360,000	1,200,000
12	KAIFENG YINJI WATER PARK, KAIFENG, CHINA	3.8%	1,350,000	1,300,000
13	SUNWAY LAGOON, KUALA LUMPUR, MALAYSIA	0.0%	1,300,000	1,300,000
14	AQUAPALACE, PRAGUE, CZECH REPUBLIC	6.0%	1,288,000	1,215,000
15	OCEAN WORLD, GANGWON-DO, SOUTH KOREA	-5.0%	1,264,000	1,330,000
16	SIAM PARK, SANTA CRUZ DE TENERIFE, SPAIN	0.1%	1,210,000	1,209,000
17	CARIBBEAN BAY, GYEONGGI-DO, SOUTH KOREA	-13.0%	1,200,000	1,380,000
	SHENYANG ROYAL OCEAN PARK — WATER WORLD, FUSHUN, CHINA	0.0%	1,200,000	1,200,000
	TROPICAL ISLANDS, KRAUSNICK, GERMANY	2.7%	1,200,000	1,168,000
20	WET 'N' WILD GOLD COAST, GOLD COAST, AUSTRALIA	-5.1%	1,120,000	1,180,000
	TOP 20 TOTAL ATTENDANCE 2018		30,919,000	30,203,000
	TOP 20 ATTENDANCE GROWTH 2017–18	2.5%	30,919,000	30,155,000

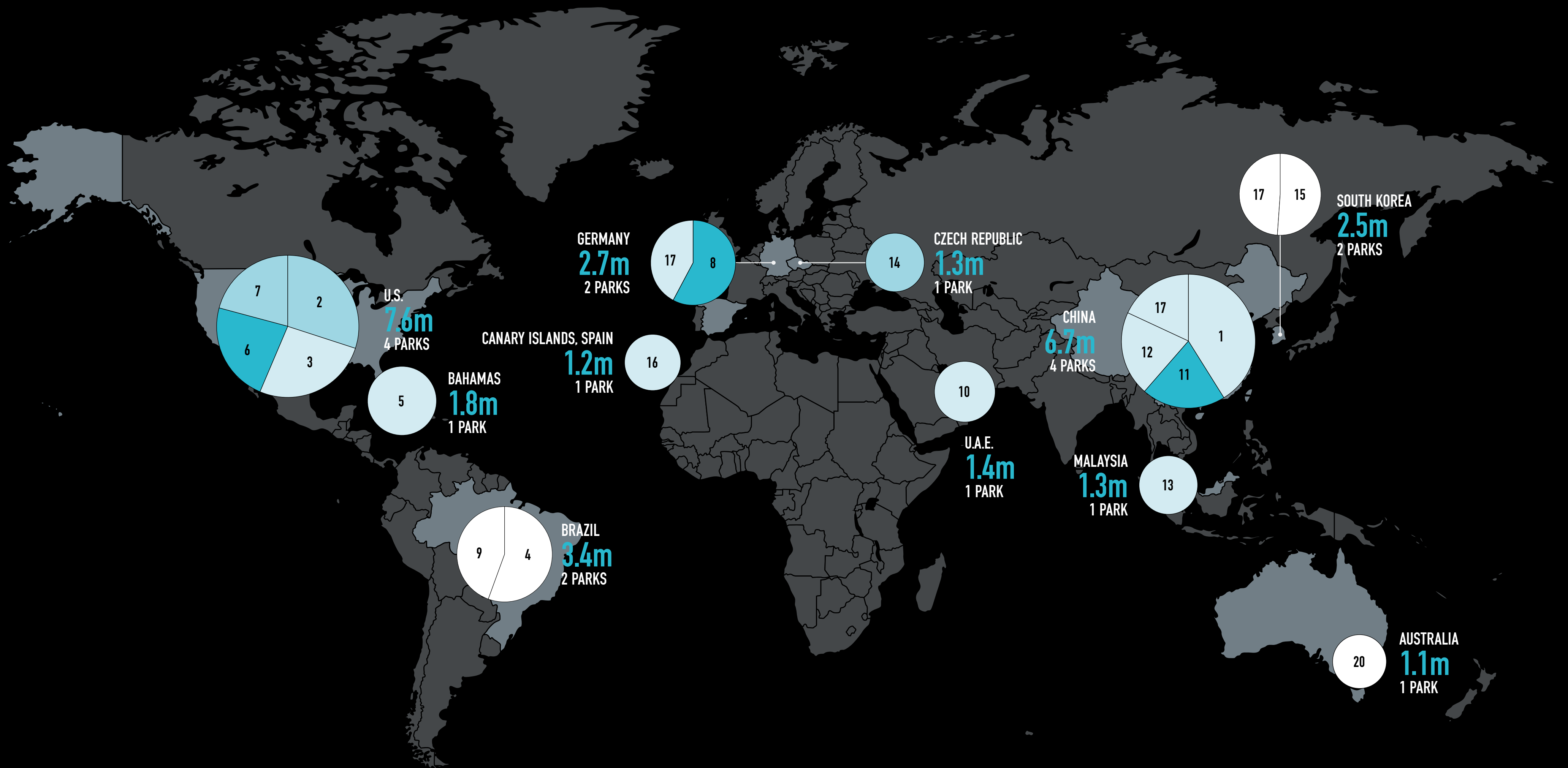
* Adjustment versus the figure we published in last year's report

2.5%
Top 20 water parks worldwide attendance growth 2017–18

30.9m
Top 20 water parks worldwide attendance 2018

30.2m
Top 20 water parks worldwide attendance 2017

TOP 20 WATER PARKS WORLDWIDE

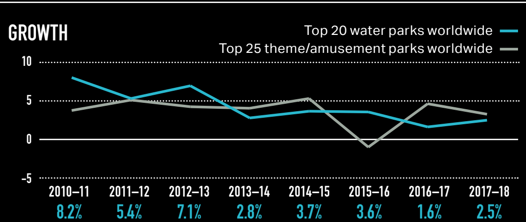


MAP KEY

< 0% 0%–4.9% 5%–9.9% 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH



2.5%
Top 20 water parks worldwide attendance growth 2017–18

30.9m
Top 20 water parks worldwide attendance 2018

30.2m
Top 20 water parks worldwide attendance 2017

TOP 20 MUSEUMS WORLDWIDE

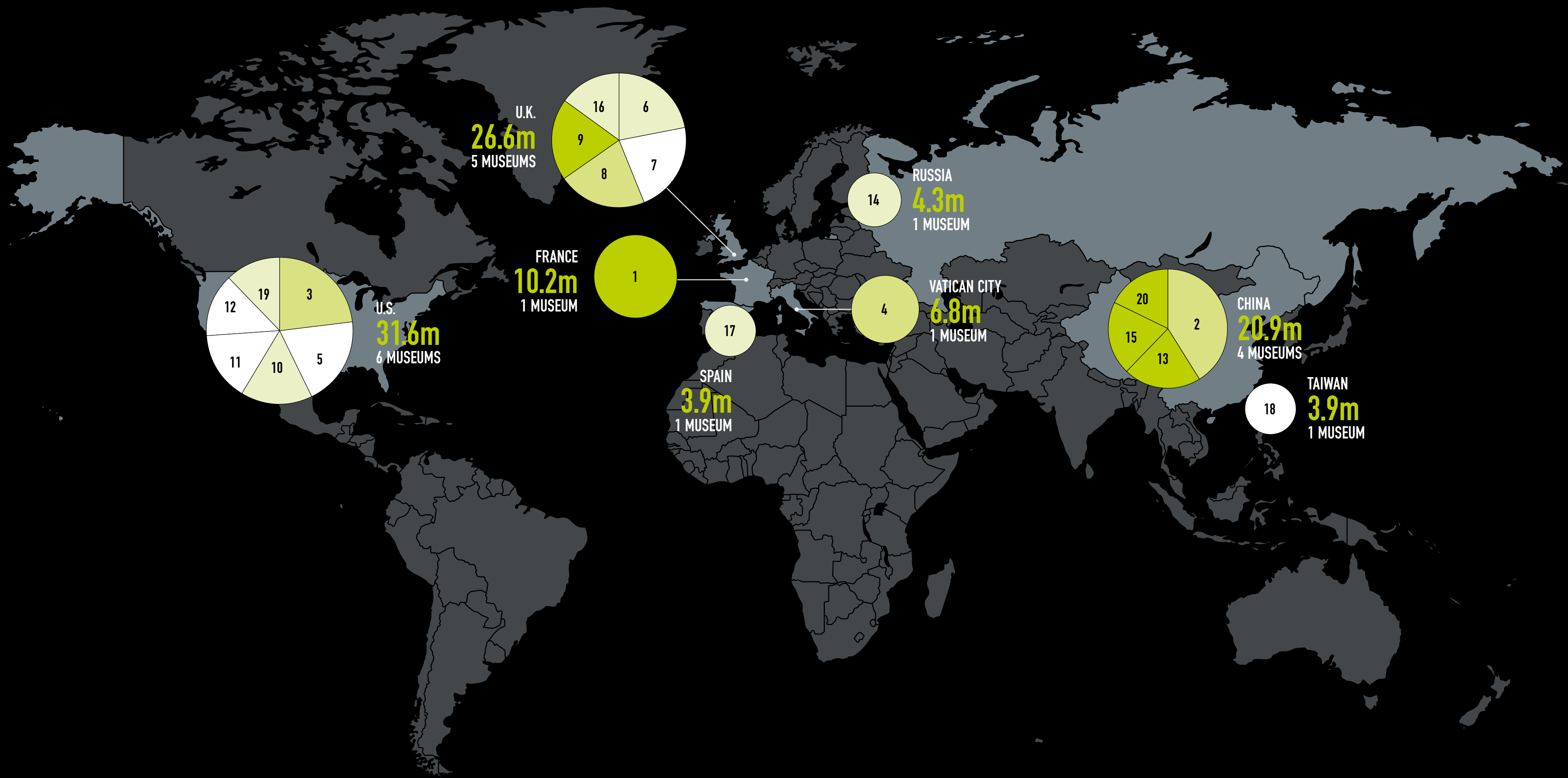
RANK	MUSEUM LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017	FREE/PAID
1	LOUVRE, PARIS, FRANCE	25.9%	10,200,000	8,100,000	P
2	NATIONAL MUSEUM OF CHINA, BEIJING, CHINA	6.8%	8,610,000	8,063,000	F
3	THE METROPOLITAN MUSEUM OF ART, NEW YORK, NY, U.S.	5.1%	7,360,000	7,000,000	P
4	VATICAN MUSEUMS, VATICAN, VATICAN CITY	5.1%	6,756,000	6,427,000	P
5	NATIONAL AIR AND SPACE MUSEUM, WASHINGTON, DC, U.S.	-11.4%	6,200,000	7,000,000	F
6	BRITISH MUSEUM, LONDON, U.K.	3.8%	5,869,000	5,656,000	F
7	TATE MODERN, LONDON, U.K.	-1.3%	5,829,000	5,907,000	F
8	NATIONAL GALLERY, LONDON, U.K.	9.7%	5,736,000	5,229,000	F
9	NATURAL HISTORY MUSEUM, LONDON, U.K.	17.8%	5,226,000	4,435,000	F
10	AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK, NY, U.S.	0.0%	5,000,000	5,000,000	P
11	NATIONAL MUSEUM OF NATURAL HISTORY, WASHINGTON, DC, U.S.	-20.0%	4,800,000	6,000,000	F
12	NATIONAL GALLERY OF ART, WASHINGTON, DC, U.S.	-15.8%	4,404,000	5,232,000	F
13	CHINA SCIENCE TECHNOLOGY MUSEUM, BEIJING, CHINA	10.5%	4,400,000	3,983,000	P
14	STATE HERMITAGE, ST PETERSBURG, RUSSIA	1.8%	4,294,000	4,220,000	P
15	ZHEJIANG MUSEUM, HANGZHOU, CHINA	14.4%	4,200,000	3,670,000	F
16	VICTORIA & ALBERT MUSEUM, LONDON, U.K.	4.7%	3,968,000	3,790,000	P
17	REINA SOFÍA, MADRID, SPAIN	0.0%	3,898,000	3,897,000	F
18	NATIONAL PALACE MUSEUM (TAIWAN), TAIPEI, TAIWAN	-13.0%	3,860,000	4,436,000	P
19	NATIONAL MUSEUM OF AMERICAN HISTORY, WASHINGTON, DC, U.S.	0.0%	3,800,000	3,800,000	F
20	NANJING MUSEUM, NANJING, CHINA	11.2%	3,670,000	3,300,000	F
	TOP 20 TOTAL ATTENDANCE 2018		108,080,000	105,145,000	
	TOP 20 ATTENDANCE GROWTH 2017–18	0.1%	108,080,000	107,967,000	

0.1%
Top 20 museums worldwide attendance growth 2017–18

108.1m
Top 20 museums worldwide attendance 2018

108.0m
Top 20 museums worldwide attendance 2017

TOP 20 MUSEUMS WORLDWIDE

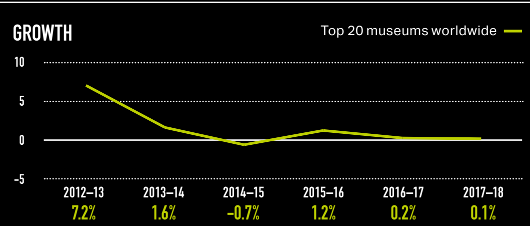


MAP KEY

< 0%
0%–4.9%
5%–9.9%
10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked museum indicated by number. Shading indicates attendance growth at the ranked museum versus all other ranked museums.

GROWTH



0.1%
Top 20 museums worldwide attendance growth 2017–18

108.1m
Top 20 museums worldwide attendance 2018

108.0m
Top 20 museums worldwide attendance 2017

© 2019 TEA / AECOM

THE AMERICAS

4.0%

Top 20 amusement/ theme parks North America attendance growth 2017–18

157.5m

Top 20 amusement/ theme parks North America attendance 2018

151.4m

Top 20 amusement/ theme parks North America attendance 2017

BRIAN SANDS

Vice President / Director – Economics, Americas

—

KATHLEEN LACLAIR

Associate Principal – Economics, Americas

—

16.0%

SeaWorld Orlando, FL, U.S., attendance growth 2017–18

Theme parks

BIG GROWTH IS IP-DRIVEN

Attendance at the Top 20 North American Theme Parks grew by 4% overall in 2018, a substantial increase for this mature market, representing growth of 6.1 million visits. This was notably higher than the previous two years' increases (2.3% in 2017 and 1.2% in 2016).

—

The increase of more than 6 million visits at North American parks was led by growth among top operators Disney, Universal and SeaWorld, with particularly good performance from Disney's Animal Kingdom, SeaWorld Orlando and SeaWorld San Diego, Disney's Hollywood Studios, and Universal Studios in Florida. The Six Flags chain also showed increases for 2018, largely driven by the acquisition of five new parks bringing about 2 million in additional attendance.

The biggest growth is IP-driven. Innovative experiences, rides and programming are also important drivers. The big players are in a position to command the big IP. They have full awareness to the power of these franchises and to what good, creative use of IP in a storytelling environment — made immersive with state-of-the-art technology — enables them to do.

SeaWorld Orlando, FL, U.S.
© SeaWorld Orlando

Disney and Universal

For the biggest operators, even a modest year-over-year increase represents a lot of visitation, as evidenced by what our charts show for Disney and Universal parks in Florida and California.

Speaking of big IPs, since first bringing the Avatar IP to life on the theme park platform in May 2017 at Disney's Animal Kingdom (Orlando), Pandora — The World of Avatar continued to be a strong attendance driver in 2018. Toy Story Land, the latest iteration of which opened at Disney's Hollywood Studios in June 2018, was another driver. The Toy Story franchise continues to capture a new generation of children every time a new movie comes out while older fans stay fans.

Looking ahead, we can expect that next year's numbers will likely show massive attendance impact for Disney in North America, from the 2019 openings of Star Wars: Galaxy's Edge at Disneyland in May and at Walt Disney World in August. Attendance at Disney's Typhoon Lagoon and Blizzard Beach water parks bounced back in 2018 after a decline in 2017 attributed to poor weather — these water parks continue to be the most visited in North America.

Universal Studios parks in North America earned modest attendance increases overall in 2018, with the biggest growth at Volcano Bay, Universal's new water theme park, open since May 2017 and recipient of a TEA Thea Award in 2019.

18.7m

Disneyland Park, Anaheim, CA, U.S., attendance 2018

Pixar Play Parade, Disneyland Park, Disneyland Resort, Anaheim, CA, U.S.
© Joshua Sudock/Disneyland Resort

9.1m

Universal Studios Hollywood, Universal City, CA, U.S., attendance 2018

Kung Fu Panda, Universal Studios Hollywood, Universal City, CA, U.S.
© Universal Studios Hollywood

In Orlando, Universal is continuing to build, having acquired new real estate and with a new gate, new land, and Nintendo theming among the coming developments at Universal Studios Florida as the area rebounds from tourism lost due to hurricanes in 2017. In Universal City, California, attendance growth at Universal Studios Hollywood was about 1%, attributable to overall growth of the market supported by reinvestment such as the park's new Kung Fu Panda attraction.

SeaWorld

SeaWorld parks had been moving down our charts for several years but 2018 attendance numbers show a nice comeback with room for more regrowth. Globally — referencing our Top 25 Theme Park Groups Worldwide chart — SeaWorld 2018 attendance ranks below that of North American regional chains Six Flags and Cedar Fair, but more change is in the wind as SeaWorld starts to become an international brand.

The 2018 SeaWorld Parks attendance figures recoup the previous year's decline and surpass it, helped by significant increases at SeaWorld Orlando and SeaWorld San Diego as well as a modest increase at Busch Gardens Tampa.

SeaWorld's good performance is creditable to investments in new rides and programming and leveraging the Sesame Street IP, in addition to working actively to change the conversation about the parks — internally and externally — and making other positive changes.

Staying competitive: IP, immersion and expansion

The level of immersion that our industry is now able to deliver is other-worldly, thanks to digital technology. The past few years have seen Universal and Disney each roll out unique, super-rich IP-based environments, in the form of the Harry Potter worlds (Universal) and Avatar realm (Disney), whose tremendous success has reset the entire industry. Looking forward, Disney's soon-to-open Star Wars: Galaxy's Edge lands are expected to take things to a whole new level of immersion.

20.1%

SeaWorld San Diego, CA, U.S., attendance growth 2017–18

SeaWorld San Diego, CA, U.S.
© SeaWorld San Diego

This trend has enabled the high levels of investment we're now seeing and will continue to see as operators mine the riches of their IP and creatives explore the possibilities of available technology. There will be more, great and game-changing, new out-of-home guest experiences coming our way. The big parks have the resources to create and deliver experiences people can't get at home. And it's important to note that immersive environments aren't just about what you do — they're also elaborate photo backdrops, providing guests with settings that facilitate their online personae.

> **"THERE WILL BE MORE, GREAT AND GAME-CHANGING, NEW OUT-OF-HOME GUEST EXPERIENCES COMING OUR WAY. THE BIG PARKS HAVE THE RESOURCES TO CREATE AND DELIVER EXPERIENCES PEOPLE CAN'T GET AT HOME.**

That said, everyone is paying attention to the dramatic growth of the video games industry along with the rise of competitive video gaming/esports as an industry, and the power of both. Fortnite is a compelling example of a gaming platform that's also a social platform. But parks have the ability to deliver shared, real-world immersive experiences with broad appeal, and are collaborating with IP owners to leverage multi-channel marketing.

Regionality

For smaller parks to also serve up magically immersive experiences is more within reach than it was 20 years ago — or even five years ago—because of the accessibility of technology. The big question is, what IPs will they have access to? However, we do see operators other than Disney and Universal working with the IP model: Cedar Fair and Snoopy (Peanuts), SeaWorld and Sesame Street, Six Flags and DC Comics. The challenges to do so include making licensing arrangements with the IP holder, which can be costly, and all the subsequent steps of creating the built environment and experience that are true to the IP.

Or will regional parks note the Meow Wolf model and bring in the local art collective instead? We've seen that happen recently at Elitch Gardens and spark a lot of interest on social media and mainstream media. Emphasizing the flavor of one's particular region can be a powerful differentiator, and North American regional parks could do well to take a page from European parks' success on that front.

Expansion, hospitality and season passes are all methods of increasing attendance. Adding a second gate and adding hotels transform a park into a resort and a day trip into a longer stay. The recent Six Flags acquisitions have been part of a strategy to add existing water parks located near the chain's existing theme parks. Giving guests the option to buy a multi-park pass that lets them enjoy two different experiences in the same metro area encourages the overnight stay and gives people more things to do.

LATIN AMERICA AND MEXICO — A LOCALIZED FOCUS

The top theme parks in Latin America enjoyed aggregate attendance growth of more than 4%, which is excellent. As with North America, this growth is partly due to recovery from the prior year's bad weather (the numbers were down by 2% in 2017), and partly a testament to the benefits of reinvesting and season extension. An unfortunate exception is Hopi Hari, which in the past held a high ranking but recently spiraled into bankruptcy and slipped off the list of top theme parks in Latin America.

Parks in these regions cater primarily to residents and domestic tourists. Success comes from understanding those markets and serving them with unique, tailored experiences that play to the region's unique character.

Along the coast near Cancun, Mexico's Grupo Xcaret is one for all regional operators to watch and learn from, as it has continued to grow its signature innovative offerings and attendance, year over year. In terms of sophisticated, regional authenticity and consistency this operator is outstanding, knowing and serving local and residential tourist markets, in naturalistic settings with water features and historical and geological elements. Each is within driving distance of the others,and offered on a standalone or package basis. Each is a unique, picturesque park or experience with its own identity and mix of activities, including cultural programs, historic components, underwater cave swimming, luxurious dining on a lake, swimming with dolphins and more. Two hotels are now part of the Xcaret mix, located adjacent to Parque Xcaret, pushing its attendance up by a remarkable 25%. This exemplifies regionally tailored, multi-gate, multi-day destination resort development at its best.

6.4%

Parque del Café, Quindio, Colombia, attendance growth 2017–18

Parque del Café, Quindio, Colombia
© Parque del Café

> **“ SUCCESS COMES FROM UNDERSTANDING THOSE MARKETS AND SERVING THEM WITH UNIQUE, TAILORED EXPERIENCES THAT PLAY TO THE REGION'S UNIQUE CHARACTER.**

In the Mexico City area, Six Flags México and La Feria de Chapultepec both prosper by making the most of serving residential and regional markets with earmarks of regional culture that look and feel authentic.

In Bogota, Salitre Mágico extends its calendar with the Festival of Terror, a scare experience featuring sinister clowns. Outside Bogota, Parque del Café is themed on coffee. Fantasilandia has extended its operating season.

Water parks

NORTH AMERICA: BETTER WEATHER AND BETTER NUMBERS

It's heartening to see that the 2018 water park attendance numbers show recovery and then some from the weather-related dip of the previous year. The top North American water parks showed attendance growth of nearly 6% for 2018. Some parks benefited from substantial increases, reflecting new attractions as well as recovery from the previous year's weather including Zoombezi Bay (Powell, OH), Typhoon Texas, Adventure Island in Tampa and Splish Splash (Calverton, NY). Reinvestment helped in addition to better weather: Typhoon Texas added three new pools and Splish Splash added two new rides. Disney's Orlando water parks Typhoon Lagoon and Blizzard Beach retained their positions at the top.

7.9%

Typhoon Texas Waterpark, Katy, TX, U.S., attendance growth 2017–18

Typhoon Texas Waterpark, Katy, Texas, U.S.
© Typhoon Texas

Universal's Volcano Bay, a unique newcomer settling into its market, drew excellent attendance, up 15% versus its first year. As a separate-gate offering, Volcano Bay is a valuable addition to Universal's continued expansion and diversification of its Orlando property as a destination resort.

Under the SeaWorld umbrella, Aquatica in Orlando bounced back with visitation growth of about 125,000. Recently repositioned as a second gate to SeaWorld San Antonio, the Aquatica park in that city also did well in 2018.

LATIN AMERICA: NEW TRENDS AND PLAYERS

The top water parks in Latin America had essentially flat attendance in 2018, with up and down fluctuations and some parks making their first appearance on the list.

In Olimpia, Brazil, Parque Aquático – Thermas dos Laranjais attendance numbers were down by nearly 2% for 2018. The park maintained its first-place position on our list of the Top 10 Water Parks in Latin America and is in fourth place on our list of Top 20 Water Parks Worldwide; however, it faces new competition from nearby Hot Beach, which recently zoomed onto the scene and has changed the local landscape. Parque Aquático – Thermas dos Laranjais — a massive, busy property — has enjoyed a large market share for many years with its low- to mid-priced offerings targeted to guests who primarily visit by automobile from São Paulo. Hot Beach has differentiated itself and shown there's a market among upper-middle-class air travelers, who also avail themselves of the park's integrated hotels, also higher-end than Thermas' adjoining hotel towers.

“

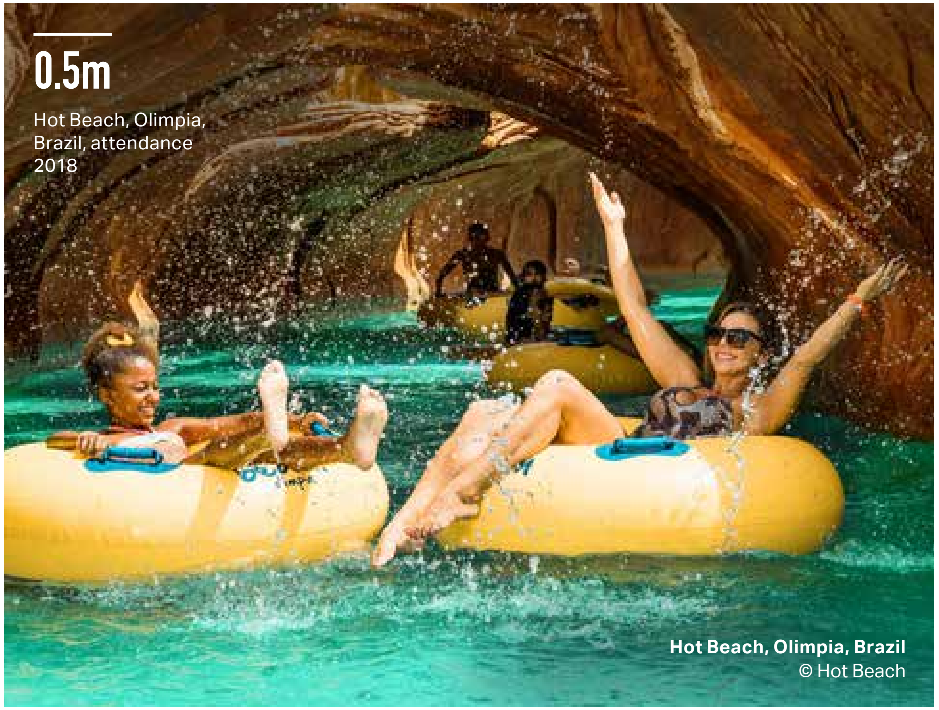
SUCCESS COMES WHEN OPERATORS HAVE A CLEAR SENSE OF THEIR MARKETS AND HOW TO SERVE THEM WITH GOOD OPERATIONS AND, OF COURSE, SMART REINVESTMENT

In São Pedro, Thermas Water Park has shown significant attendance growth for the past two years (more than 18% in 2017 and more than 22% in 2018). The park added nearly 500 rooms with its new hotel/ vacation club property that opened in late 2017 and has further strengthened its position through reinvestment and growing its market via strategic alliances with national tourism agencies.

Wet 'n Wild São Paolo posted a modest increase of about 5%. This water park, which serves the same market as did Hopi Hari before the latter collapsed, reinvested with a new ride and new drop slide. Numbers were relatively flat for Piscilago (Bogota), Parque Acuático Xocomil (Guatemala) and El Rollo Parque Acuatico (Mexico).

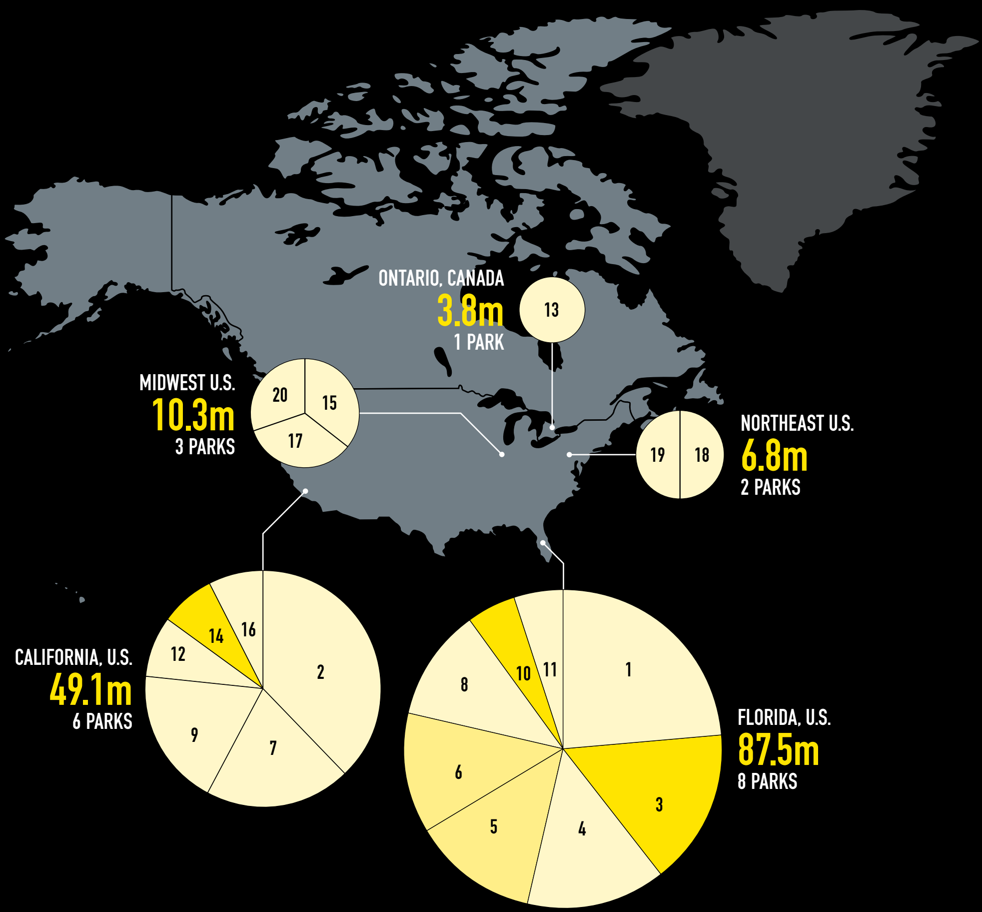
Ups and downs in the water park sector generally can be traced to weather, economic and/or political situations, reinvestment or lack thereof, and challenges from the competition. Success comes when operators have a clear sense of their markets and how to serve them with good operations and, of course, smart reinvestment.

Zoombezi Bay, Powell, OH, U.S.
© Grahm S. Jones, Columbus Zoo and Aquarium



Hot Beach, Olimpia, Brazil
© Hot Beach

TOP 20
AMUSEMENT/THEME PARKS
NORTH AMERICA



RANK	PARK LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	MAGIC KINGDOM THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	2.0%	20,859,000	20,450,000
2	DISNEYLAND PARK AT DISNEYLAND RESORT, ANAHEIM, CA, U.S.	2.0%	18,666,000	18,300,000
3	DISNEY'S ANIMAL KINGDOM THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	10.0%	13,750,000	12,500,000
4	EPCOT THEME PARK AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	2.0%	12,444,000	12,200,000
5	DISNEY'S HOLLYWOOD STUDIOS AT WALT DISNEY WORLD RESORT, LAKE BUENA VISTA, FL, U.S.	5.0%	11,258,000	10,722,000
6	UNIVERSAL STUDIOS FLORIDA THEME PARK AT UNIVERSAL ORLANDO RESORT, FL, U.S.	5.0%	10,708,000	10,198,000
7	DISNEY CALIFORNIA ADVENTURE PARK AT DISNEYLAND RESORT, ANAHEIM, CA, U.S.	3.0%	9,861,000	9,574,000
8	UNIVERSAL'S ISLANDS OF ADVENTURE THEME PARK AT UNIVERSAL ORLANDO RESORT, FL, U.S.	2.5%	9,788,000	9,549,000
9	UNIVERSAL STUDIOS HOLLYWOOD, UNIVERSAL CITY, CA, U.S.	1.0%	9,147,000	9,056,000
10	SEAWORLD ORLANDO, ORLANDO, FL, U.S.	16.0%	4,594,000	3,962,000
11	BUSCH GARDENS TAMPA BAY, TAMPA, FL, U.S.	4.5%	4,139,000	3,961,000
12	KNOTT'S BERRY FARM, BUENA PARK, CA, U.S.	2.0%	4,115,000	4,034,000
13	CANADA'S WONDERLAND, MAPLE, ONTARIO, CANADA	1.0%	3,798,000	3,760,000
14	SEAWORLD SAN DIEGO, SAN DIEGO, CA, U.S.	20.1%	3,723,000	3,100,000
15	CEDAR POINT SHORES WATERPARK, SANDUSKY, OH, U.S.	2.0%	3,676,000	3,604,000
16	SIX FLAGS MAGIC MOUNTAIN, VALENCIA, CA, U.S.	2.6%	3,592,000	3,500,000*
17	KINGS ISLAND, KINGS ISLAND, OH, U.S.	0.5%	3,486,000	3,469,000
18	SIX FLAGS GREAT ADVENTURE, JACKSON, NJ, U.S.	0.0%	3,400,000	3,400,000*
19	HERSHEYPARK, HERSHEY, PA, U.S.	2.0%	3,367,000	3,301,000
20	SIX FLAGS GREAT AMERICA, GURNEE, IL, U.S.	0.0%	3,107,000	3,107,000*
	TOP 20 TOTAL ATTENDANCE 2018		157,478,000	151,747,000
	TOP 20 ATTENDANCE GROWTH 2017–18	4.0%	157,478,000	151,380,000

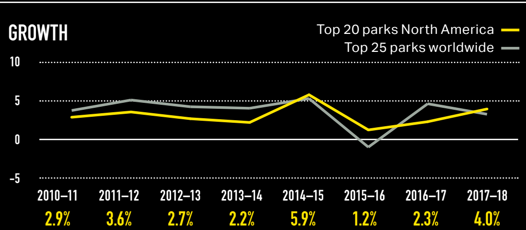
* Adjustment versus the figure we published in last year's report

KEY

< 0% | 0%–4.9% | 5%–9.9% | 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH

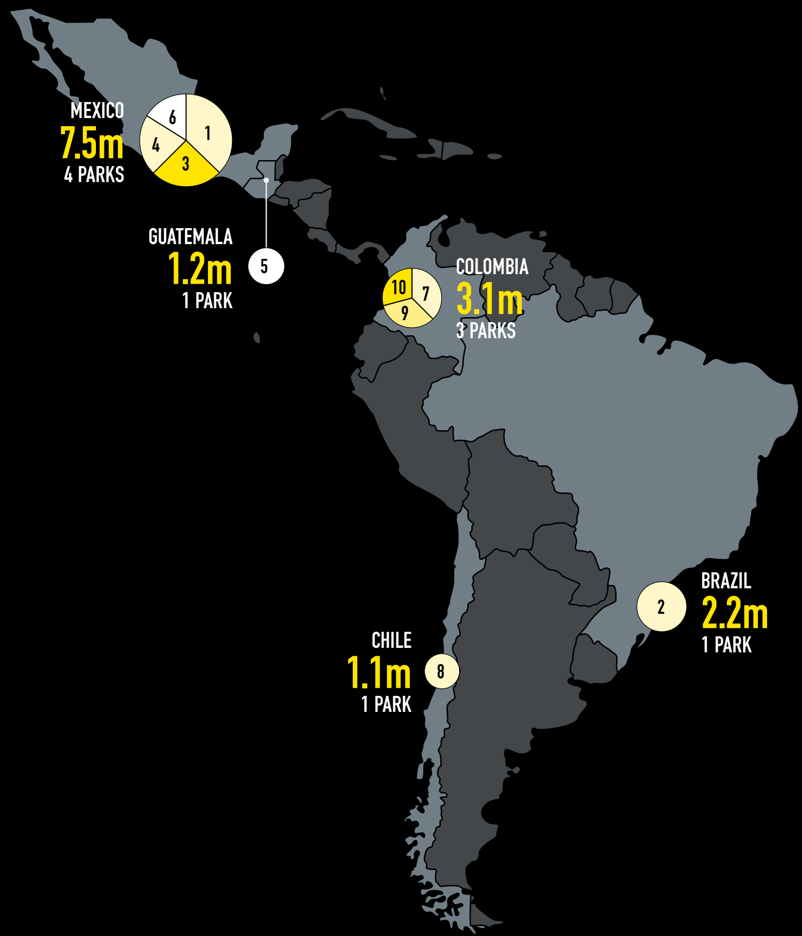


4.0%
Top 20 amusement/theme parks North America attendance growth 2017–18

157.5m
Top 20 amusement/theme parks North America attendance 2018

151.4m
Top 20 amusement/theme parks North America attendance 2017

TOP 10
AMUSEMENT/THEME PARKS
LATIN AMERICA



RANK	PARK LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	SIX FLAGS MÉXICO, MEXICO CITY, MEXICO	2.0%	2,789,000	2,734,000*
2	BETO CARRERO WORLD, SANTA CATARINA, BRAZIL	3.7%	2,200,000	2,122,000
3	PARQUE XCARET, CANCUN, MEXICO	25.2%	1,885,000	1,505,000
4	LA FERIA DE CHAPULTEPEC, MEXICO CITY, MEXICO	0.1%	1,593,000	1,591,000
5	MUNDO PETAPA, GUATEMALA CITY, GUATEMALA	-1.0%	1,226,000	1,239,000
6	PARQUE PLAZA SÉSAMO, MONTERREY, MEXICO	-1.0%	1,185,000	1,197,000
7	PARQUE MUNDO AVENTURA, BOGOTÁ, COLOMBIA	0.4%	1,158,000	1,153,000
8	FANTASIALANDIA, SANTIAGO, CHILE	4.8%	1,100,000	1,050,000
9	PARQUE DEL CAFÉ, QUINDIO, COLOMBIA	6.4%	1,028,000	966,000
10	SALITRE MÁGICO, BOGOTÁ, COLOMBIA	18.4%	900,000	760,000
	TOP 10 TOTAL ATTENDANCE 2018		15,064,000	14,317,000
	TOP 10 ATTENDANCE GROWTH 2017–18	4.2%	15,064,000	14,461,000

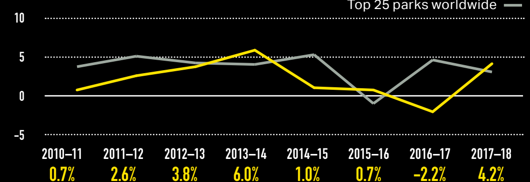
* Adjustment versus the figure we published in last year's report

KEY

< 0% | 0%–4.9% | 5%–9.9% | 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH

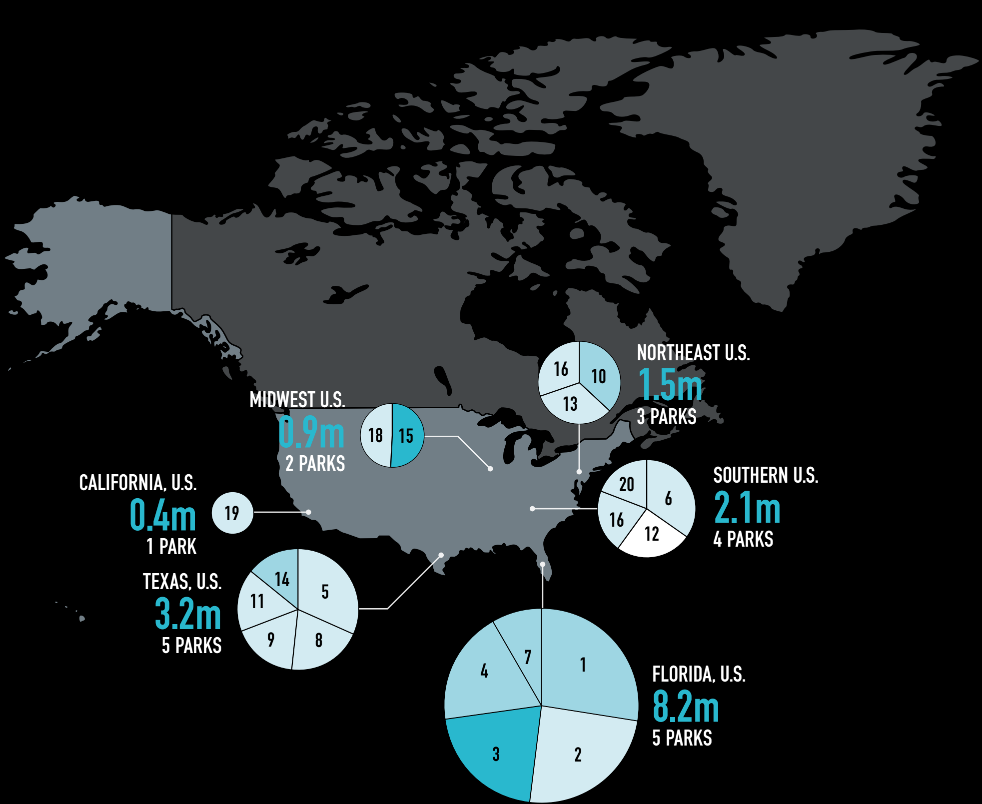


4.2%
Top 10 amusement/theme parks Latin America attendance growth 2017–18

15.1m
Top 10 amusement/theme parks Latin America attendance 2018

14.5m
Top 10 amusement/theme parks Latin America attendance 2017

TOP 20
WATER PARKS
NORTH AMERICA



RANK	PARK LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	TYPHOON LAGOON WATER PARK AT WALT DISNEY WORLD RESORT, ORLANDO, FL, U.S.	5.0%	2,271,000	2,163,000
2	DISNEY'S BLIZZARD BEACH WATER PARK AT WALT DISNEY WORLD RESORT, ORLANDO, FL, U.S.	3.0%	2,003,000	1,945,000
3	VOLCANO BAY WATER THEME PARK AT UNIVERSAL ORLANDO RESORT, ORLANDO, FL, U.S.	15.0%	1,725,000	1,500,000
4	AQUATICA ORLANDO, ORLANDO, FL, U.S.	8.5%	1,556,000	1,434,000*
5	SCHLITTERBAHN WATER PARK AND RESORT NEW BRAUNFELS, NEW BRAUNFELS, TX, U.S.	1.0%	1,016,000	1,006,000
6	WATER COUNTRY USA, WILLIAMSBURG, VA, U.S.	2.5%	729,000	711,000
7	ADVENTURE ISLAND, TAMPA, FL, U.S.	6.0%	669,000	631,000
8	AQUATICA SAN ANTONIO, SAN ANTONIO, TX, U.S.	3.2%	645,000	625,000
9	SCHLITTERBAHN WATERPARK GALVESTON, GALVESTON, TX, U.S.	2.6%	559,000	545,000
10	SPLISH SPASH, CALVERTON, NY, U.S.	5.1%	539,000	513,000
11	SIX FLAGS HURRICANE HARBOR ARLINGTON, ARLINGTON, TX, U.S.	0.0%	533,000	533,000
12	SIX FLAGS WHITE WATER ATLANTA, MARIETTA, GA, U.S.	-5.0%	531,000	559,000
13	SIX FLAGS HURRICANE HARBOR NEW JERSEY, JACKSON, NJ, U.S.	0.0%	475,000	475,000*
14	TYPHOON TEXAS WATERPARK, KATY, TX, U.S.	7.9%	451,000	418,000
15	ZOOMBEZI BAY, POWELL, OH, U.S.	13.5%	438,000	386,000
16	CAMELBEACH MOUNTAIN WATERPARK, TANNERSVILLE, PA, U.S.	3.1%	437,000	424,000
	DOLLYWOOD'S SPLASH COUNTRY WATER ADVENTURE PARK, PIGEON FORGE, TN, U.S.	3.1%	437,000	424,000
18	CEDAR POINT SHORES WATERPARK, SANDUSKY, OH, U.S.	1.9%	420,000	412,000
19	KNOTT'S SOAK CITY WATER PARK, BUENA PARK, CA, U.S.	1.5%	405,000	399,000
20	WET 'N WILD EMERALD POINTE, GREENSBORO, NC, U.S.	0.0%	398,000	398,000
	TOP 20 TOTAL ATTENDANCE 2018		16,237,000	15,501,000
	TOP 20 ATTENDANCE GROWTH 2017–18	5.8%	16,237,000	15,346,000

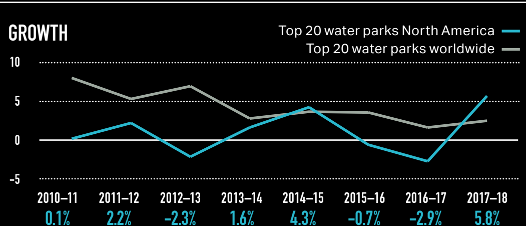
* Adjustment versus the figure we published in last year's report

KEY

< 0% · 0%–4.9% · 5%–9.9% · 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH

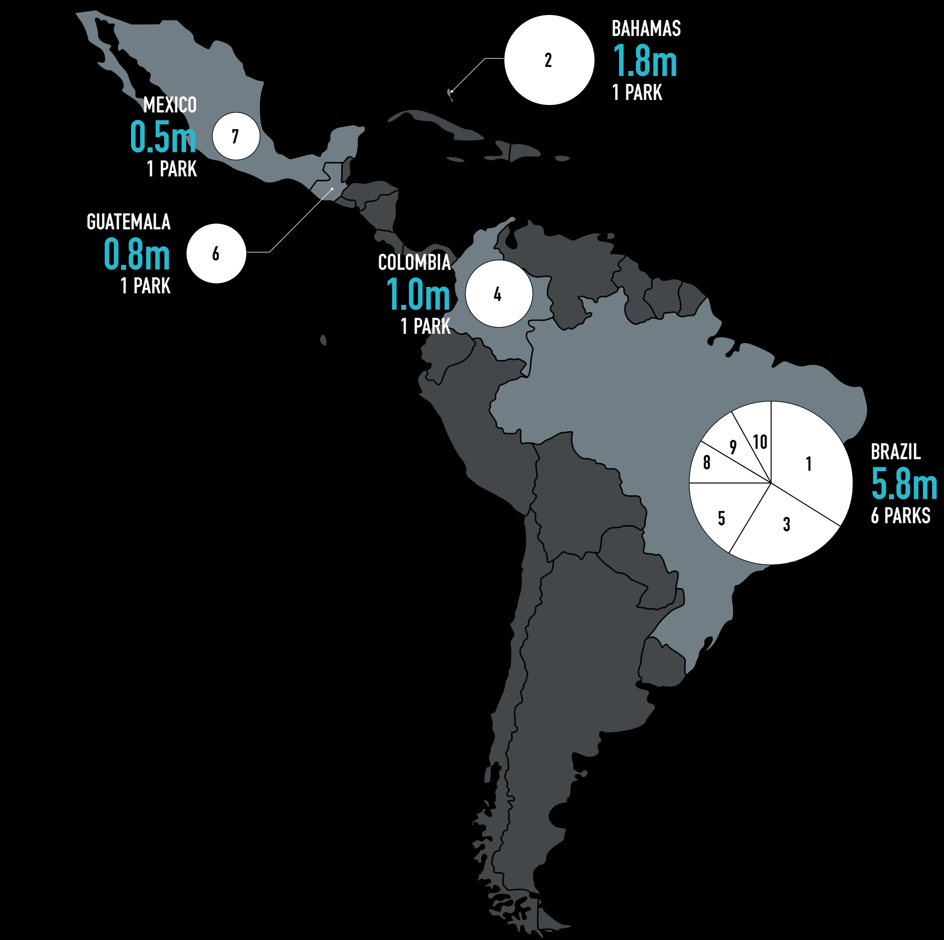


5.8%
Top 20 water parks North America attendance growth 2017–18

16.2m
Top 20 water parks North America attendance 2018

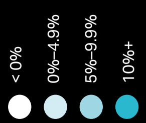
15.3m
Top 20 water parks North America attendance 2017

TOP 10 WATER PARKS LATIN AMERICA



RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	PARQUE AQUÁTICO THERMAS DOS LARANJAIS, OLIMPIA, BRAZIL	-1.8%	1,971,000	2,007,000
2	AQUAVENTURE ATLANTIS BAHAMAS WATERPARK, PARADISE ISLAND, BAHAMAS	0.0%	1,831,000	1,831,000
3	HOT PARK RIO QUENTE, CALDAS NOVAS, BRAZIL	-3.2%	1,433,000	1,481,000
4	PISCILAGO, GIRARDOT (BOGOTÁ), COLOMBIA	0.1%	990,000	989,000
5	BEACH PARK, AQUIRAZ, BRAZIL	-7.6%	950,000	1,028,000
6	PARQUE ACUÁTICO XOCOMIL, SAN MARTÍN ZAPOTITLÁN, RETALHULEU, GUATEMALA	1.6%	840,000	827,000
7	EL ROLLO PARQUE ACUÁTICO, MORELOS, MEXICO	0.0%	530,000	530,000
8	WET 'N WILD, SÃO PAULO, BRAZIL	5.0%	500,000	476,000
9	THERMAS WATER PARK, SÃO PEDRO, BRAZIL	22.7%	481,000	392,000
10	HOT BEACH, OLIMPIA, BRAZIL	90.1%	462,000	243,000
	TOP 10 TOTAL ATTENDANCE 2018		9,988,000	9,804,000
	TOP 10 ATTENDANCE GROWTH 2017–18	0.6%	9,988,000	9,933,000

KEY



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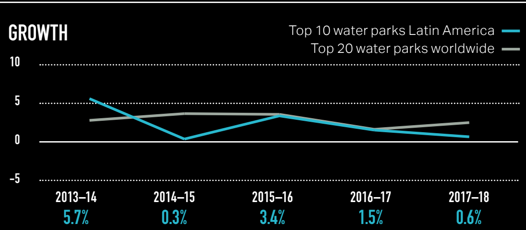
GROWTH



0.6%
Top 10 water parks Latin America attendance growth 2017–18

10.0m
Top 10 water parks Latin America attendance 2018

9.9m
Top 10 water parks Latin America attendance 2017

ASIA-PACIFIC

3.6%

Top 20 amusement/theme parks Asia-Pacific attendance growth 2017–18

139.1m

Top 20 amusement/theme parks Asia-Pacific attendance 2018

134.2m

Top 20 amusement/theme parks Asia-Pacific attendance 2017

CHRIS YOSHII
Vice President – Economics, Asia-Pacific

BETH CHANG
Executive Director – Economics, Asia-Pacific

27.9%

Changzhou China Dinosaurs Park, Changzhou, China, attendance growth 2017–18

Theme parks

ASIA-PACIFIC GROWTH STEADY AT 4%

Theme parks are big

Overall attendance growth was 3.6% in 2018 for the Top 20 Asian theme parks. While exhibiting the volatility of a young industry, the sector is doing very well. The big parks are getting bigger: The larger parks with higher attendance continue to grow fairly rapidly. To make it onto our Top 20 chart, a park needs a minimum of 3.1 million annual attendance, which is substantial.

Negative results in 2018 were often weather-related, or due to a decline in tourism from China. Big increases were attributable to special occasions, new attractions and good marketing strategies.

Regionally and internationally, Disney has readily maintained its position at the top of the list. Disney parks across Asia had a very strong year overall. Tokyo Disneyland and Tokyo DisneySea enjoyed substantial attendance increases in 2018 on top of the previous year's good numbers. The former, in conjunction with its 35th anniversary, rolled out a grand new parade, "Happiest Celebration"; the latter drew visitors with major festivals and seasonal activities such as "Disney Pirates Summer."

Changzhou China Dinosaurs Park
© Changzhou China Dinosaurs Park

Fantawild Asian Legend, Nanning, China
© Fantawild

Hong Kong Disneyland and Shanghai Disneyland also enjoyed substantial growth. The Shanghai park launched programs to help draw in more of the resident market, including its first annual pass. A season pass is a relatively new thing to the market in China, but there are signs that other parks will follow suit.

Behind the numbers: Disney and Chimelong

In the two years since its opening, Shanghai Disneyland has quickly become a standard-bearer for Asia and particularly China. It has set the example for and shown the benefits of high-quality design and content, as well as good operations, and wise management that includes investment in new attractions and programmatic activities. Its influence has led other parks to upgrade their offerings and guest experience, though for the most part, a significant gap remains.

Hong Kong Disneyland opened a new show "Moana: A Homecoming Celebration," but its attendance increase of 8% for 2018 is also due to a pair of infrastructure improvements that have greatly expanded public access. One is a new high-speed rail line from China to the Hong Kong city center, and the other is the new Hong Kong-Macau-Zhuhai bridge. These new passages also helped stabilize attendance numbers at Ocean Park Hong Kong. Visitors availed themselves of tourist packages that bundled transportation with park admission.

Chimelong Group was another operator whose numbers tell the story of significant growth. In Zhuhai, several factors may be credited for Chimelong Ocean Kingdom's 2018 attendance increase of over 10%. The park's nighttime spectacle — the Journey of Lights parade, which was honored with a Thea Award in 2018 — is quite popular.

Ocean Kingdom also opened a new land, reaped exposure from a Chinese New Year TV special shot on-site, and fostered more two-day visits and off-season visits by bundling overnight stays with park admission (the Ocean Kingdom resort has some 4,588 hotel rooms on site.) The new bridge mentioned above was also a significant new gateway to the park.

Chimelong Paradise in Guangzhou, which was one of the earlier Chimelong parks to be built and opened in 2006, has instituted significant upgrades and introduced Halloween events, and been rewarded with a significant (12%) increase in attendance.

> **A SEASON PASS IS A RELATIVELY NEW THING TO THE MARKET IN CHINA, BUT THERE ARE SIGNS THAT OTHER PARKS WILL FOLLOW SUIT.**

7.3%
Shanghai Disneyland, Shanghai, China, attendance growth 2017–18

Shanghai Disneyland, Shanghai, China
© Disney

Hero Island, Chimelong Ocean Kingdom, Hengqin, China
© Chimelong

New infrastructure and shifting development models

The past 18 months or so have brought a sharp slowdown in new construction projects and the development of new parks in China. This has to do with bank financing and liquidity problems connected to changes in government policy and other economic factors.

In the past, much theme park development in China has been tied to mixed-use real estate projects that involved other elements such as hospitality, retail and residential. The central government recently de-linked park development from residential development, mostly in connection with new projects. The result is that new theme park projects need to be financed on their own; fundamentally a sensible move, but one that has stalled or canceled numerous projects that had been in the pipeline.

The move grew out of concern that theme park projects were being proposed or built simply in order to get approval for residential development.

While these shifts have slowed down new projects for the time being, the promise contained within the change is that new and better development models will emerge that will be good for the industry. Meanwhile, existing parks are doing well.

Ups and downs

Lotte World and Samsung Everland both suffered significant attendance drops, along with other parks in Korea. The reason cited across the board was a decline in tourism from China; for political reasons, Korea has fallen out of favor as a destination from this source market.

Changzhou China Dinosaurs Park (China) raised interest with a recorded 28% jump in attendance. The park is establishing itself as a resort destination with newly developed hotel, RDE commercial and a hot spring spa attraction.

OCT parks generally saw an attendance increase, driven by a first-ever "Cultural Tourism Festival" featuring special events held at OCT attractions across 50 Chinese cities. Looking at the three leading Chinese theme park groups on our charts, OCT shows a 15% attendance jump for 2018, approaching Universal Studios numbers; however, the OCT business model is unique and dependent on this government-owned company's continued acquisition of small parks and attractions as well as new construction.

Attendance growth follows a more organic pattern at top operators Chimelong and Fantawild. The latter's attendance numbers jumped by about 9%, supported by opening of two new Fantawild parks in 2017 that have now been operating for a full year. Chimelong has some new parks in the pipeline that we'll be watching in the near future. Both Chimelong and Fantawild were TEA Thea Awards recipients in 2019.

Water parks

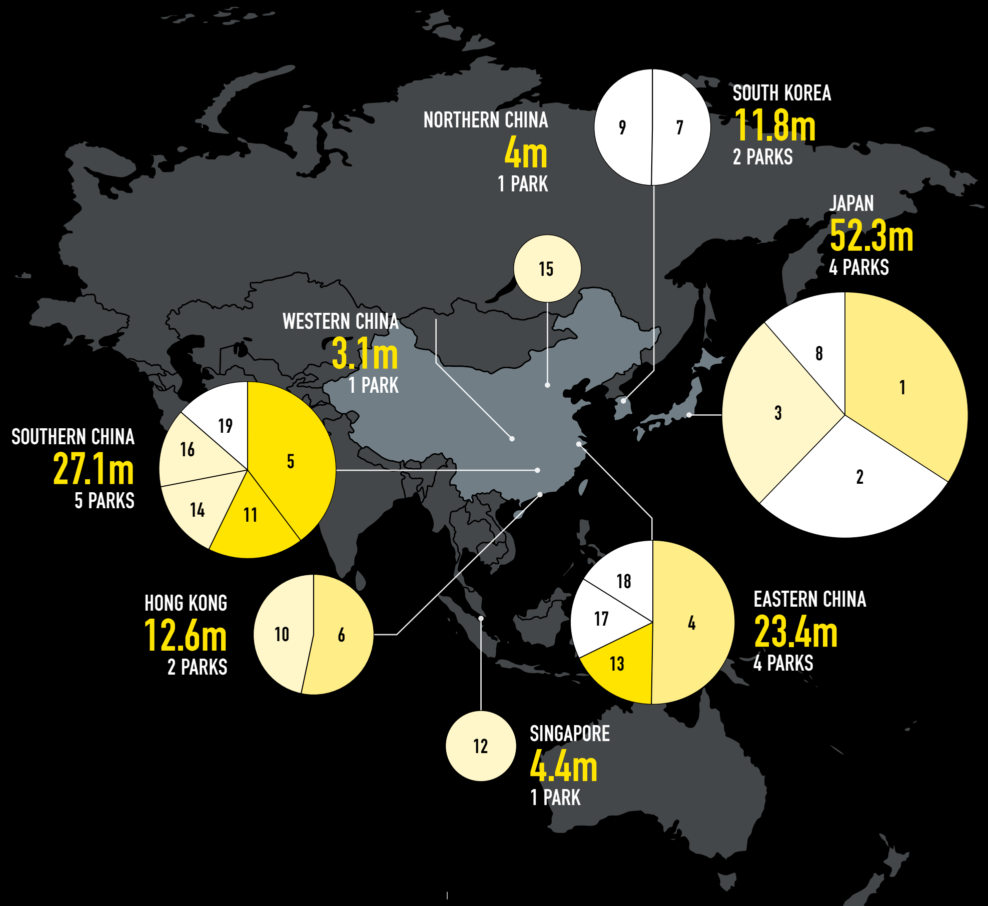
Overall, water park attendance was flat for 2018 in Asia. In this sector, weather is a big factor influencing attendance and there were some big jumps as well as some fairly large drops. Water parks in Korea suffered declines from the slowdown in tourism from China mentioned above.

For those water parks that did especially well, discounts and passes played a notable part. OCT offered a popular, cross-visitation, multiple-admission pass — a one-price ticket that admitted the customer to any and all of the OCT water parks and theme parks. This led to a rise in attendance.

NEW OPENING

OCT Tianjin Playa Maya, Tianjin, China
© OCT

TOP 20
AMUSEMENT/THEME PARKS
ASIA-PACIFIC



RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	TOKYO DISNEYLAND AT TOKYO DISNEY RESORT, TOKYO, JAPAN	7.9%	17,907,000	16,600,000
2	TOKYO DISNEYSEA AT TOKYO DISNEY RESORT, TOKYO, JAPAN	8.5%	14,651,000	13,500,000
3	UNIVERSAL STUDIOS JAPAN, OSAKA, JAPAN	-4.3%	14,300,000	14,395,000
4	SHANGHAI DISNEYLAND, SHANGHAI, CHINA	7.3%	11,800,000	11,000,000
5	CHIMELONG OCEAN KINGDOM, HENGQIN, CHINA	10.6%	10,830,000	9,788,000
6	HONG KONG DISNEYLAND, HONG KONG SAR	8.1%	6,700,000	6,200,000
7	LOTTE WORLD, SEOUL, SOUTH KOREA	-11.2%	5,960,000	6,714,000
8	NAGASHIMA SPA LAND, KUWANA, JAPAN	-0.2%	5,920,000	5,930,000
9	EVERLAND, GYEONGGI-DO, SOUTH KOREA	-7.3%	5,850,000	6,310,000
10	OCEAN PARK, HONG KONG SAR	0.0%	5,800,000	5,800,000
11	CHIMELONG PARADISE, GUANGZHOU, CHINA	11.9%	4,680,000	4,181,000
12	UNIVERSAL STUDIOS SINGAPORE, SINGAPORE	4.3%	4,400,000	4,220,000
13	CHANGZHOU CHINA DINOSAURS PARK, CHANGZHOU, CHINA	27.9%	4,106,000	3,210,000*
14	OCT WINDOW OF THE WORLD, SHENZHEN, CHINA	0.3%	3,990,000	3,980,000
15	OCT HAPPY VALLEY, BEIJING, CHINA	0.8%	3,980,000	3,950,000
16	OCT HAPPY VALLEY, SHENZHEN, CHINA	0.3%	3,910,000	3,900,000
17	ZHENGZHOU FANTAWILD ADVENTURE, CHANGZHOU, CHINA	-0.5%	3,800,000	3,819,000
18	NINGBO FANTAWILD ORIENTAL HERITAGE, NINGBO, CHINA	-2.3%	3,740,000	3,827,000
19	OCT EAST, SHENZHEN, CHINA	-7.1%	3,680,000	3,960,000
20	OCT HAPPY VALLEY, CHENGDU, CHINA	4.4%	3,100,000	2,970,000
	TOP 20 TOTAL ATTENDANCE 2018		139,104,000	134,794,000
	TOP 20 ATTENDANCE GROWTH 2017–18	3.6%	139,104,000	134,224,000*

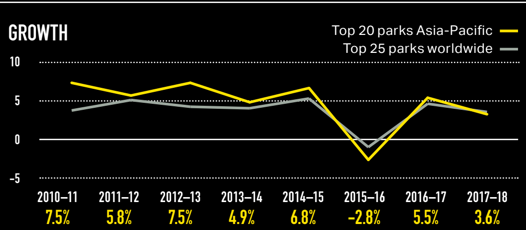
* Adjustment versus the figure we published in last year's report

KEY

< 0%
0%–4.9%
5%–9.9%
10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH

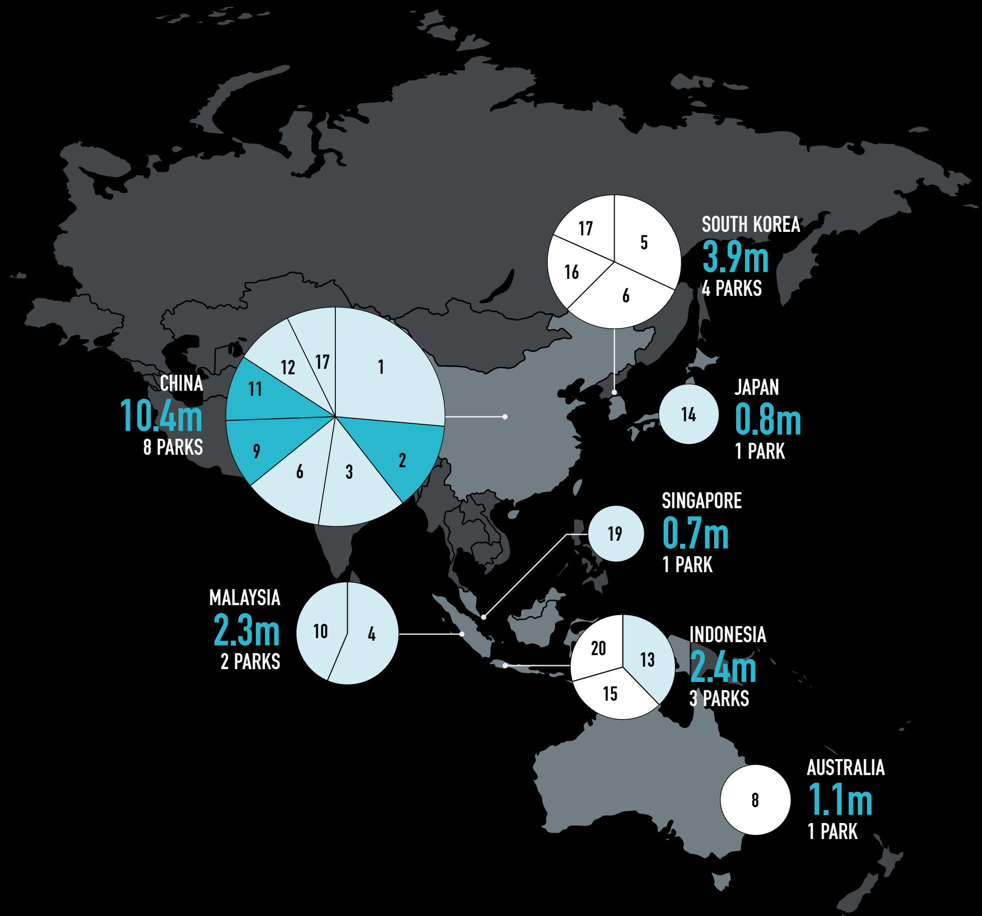


3.6%
Top 20 amusement/theme parks attendance growth Asia-Pacific 2017–18

139.1m
Top 20 amusement/theme parks Asia-Pacific attendance 2018

134.2m
Top 20 amusement/theme parks Asia-Pacific attendance 2017

TOP 20 WATER PARKS ASIA-PACIFIC



RANK	PARK LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	CHIMELONG WATER PARK, GUANGZHOU, CHINA	1.9%	2,740,000	2,690,000
2	WUHU FANTAWILD WATER PARK, WUHU, CHINA	13.3%	1,360,000	1,200,000*
3	KAIFENG YINJI WATER PARK, KAIFENG, CHINA	3.8%	1,350,000	1,300,000
4	SUNWAY LAGOON, KUALA LUMPUR, MALAYSIA	0.0%	1,300,000	1,300,000
5	OCEAN WORLD, GANGWON-DO, SOUTH KOREA	-5.0%	1,264,000	1,330,000
6	CARIBBEAN BAY, GYEONGGI-DO, SOUTH KOREA	-13.0%	1,200,000	1,380,000
	SHENYANG ROYAL OCEAN PARK — WATER WORLD, FUSHUN, CHINA	0.0%	1,200,000	1,200,000
8	WET 'N' WILD GOLD COAST, GOLD COAST, AUSTRALIA	-5.1%	1,120,000	1,180,000
9	PLAYA MAYA WATER PARK, WUHAN, CHINA	54.3%	1,080,000	700,000
10	SUNWAY LOST WORLD OF TAMBUN, PERAK, MALAYSIA	0.0%	1,000,000	1,000,000
11	PLAYA MAYA WATER PARK, SHANGHAI, CHINA	11.2%	990,000	890,000
12	ZHENGZHOU FANTAWILD WATER PARK, ZHENGZHOU, CHINA	1.3%	910,000	898,000
13	ATLANTIS WATER ADVENTURE, JAKARTA, INDONESIA	2.5%	907,000	885,000
14	SUMMERLAND, TOKYO, JAPAN	1.0%	820,000	812,000
15	THE JUNGLE WATER ADVENTURE, BOGOR, WEST JAVA, INDONESIA	-14.0%	783,000	910,000
16	LOTTE WATER PARK, GIMHAE, SOUTH KOREA	-6.8%	744,000	798,000
17	WOONGJIN PLAYDOCI WATERDOCI, GYEONGGI-DO, SOUTH KOREA	-18.3%	720,000	881,000
	PLAYA MAYA WATER PARK, TIANJIN, CHINA	NEW	720,000	-
19	ADVENTURE COVE WATER PARK, SINGAPORE	2.9%	700,000	680,000
20	OCEAN PARK WATER ADVENTURE, JAKARTA, INDONESIA	-3.3%	698,000	722,000
	TOP 20 TOTAL ATTENDANCE 2018		21,606,000	20,756,000
	TOP 20 ATTENDANCE GROWTH 2017–18	0.7%	21,606,000	21,460,000*

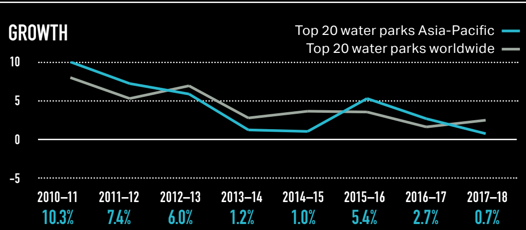
* Adjustment versus the figure we published in last year's report

KEY

< 0%
0%–4.9%
5%–9.9%
10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH



0.7%
Top 20 water parks Asia-Pacific attendance growth 2017–18

21.6m
Top 20 water parks Asia-Pacific attendance 2018

21.5m
Top 20 water parks Asia-Pacific attendance 2017

EMEA

4.4%

Top 20 amusement/theme parks EMEA attendance growth 2017–18

65.4m

Top 20 amusement/theme parks EMEA attendance 2018

62.6m

Top 20 amusement/theme parks EMEA attendance 2017

JODIE LOCK

Associate – Economics, Asia-Pacific and EMEA

11.5%

Gardaland, Castelnuovo Del Garda, Italy, attendance growth 2017–18

Peppa Pig Land, Gardaland, Castelnuovo del Garda, Italy

Theme parks

POWER OF THE DESTINATION

Destination development rules when it comes to staying at the top and moving up the ranks of the Top 20 theme parks in Europe.

While our study encompasses the EMEA region, the parks on our Top 20 list are all mature parks in Europe. For the most part these parks have remained consistent and stable over the past eight years, with moderate ups and downs in attendance depending on reinvestment and other factors. No Middle East parks have yet made it into the Top 20.

Europe — packaging appeals
Disney is the top worldwide operator and the top European operator, and the Disney parks in Paris showed moderate attendance growth and stability in 2018, following a 25th anniversary bump in 2017.

Meanwhile, other top European parks are making their way up the charts, showing off the positive effects of building up their destinations. Europa-Park (Germany), Efteling (Netherlands), Tivoli (Denmark), Gardaland (Italy) and Alton Towers (UK) are among those that did well.

Parque Warner in Madrid displays the biggest attendance increase for a European theme park on our 2018 charts (approaching 19%). This growth is attributed to expansion of the Aquopolis water park, a strong marketing campaign, and a range of packages and "Bono Parques" passes from operator Parques Reunidos that extend a park visit into a multifaceted resort experience.

A park ticket can be bundled with transportation, hotels and other proximate leisure properties operated by Parques Reunidos, including Warner Beach, Parque de Atracciones de Madrid and Zoo Aquarium Madrid.

Merlin Entertainments Group has also benefited from bundling its parks and attractions, and from aggressively reinvesting in its parks. This strategy, along with good weather, proved advantageous in 2018 for Merlin's UK parks, such as Alton Towers, Chessington World of Adventures, and LEGOLAND Windsor. The popular, new Wicker Man ride and seasonal Scarefest at Alton Towers propelled attention and helped the park recover from the attendance decline of a few years back, which also affected other Merlin-operated theme parks across the UK.

"EUROPEAN PARKS ARE MAKING THEIR WAY UP THE CHARTS, SHOWING OFF THE POSITIVE EFFECTS OF BUILDING UP THEIR DESTINATIONS.

In the Netherlands, Efteling continues to do well, with attendance growth of more than 4% in 2018 following a dramatic increase of nearly 9% in 2017, showing how a park can continue to drive attendance in times of stability. Efteling has benefited from season pass sales, overnight stays and the draw of unique new attractions such as Symbolica, a dark ride that opened in 2017 and was honored with a TEA Thea Award.

Outside of Paris, Parc Astérix attendance grew by 8.7% in 2018, reaping the benefits of a 100 million Euro investment plan that rolled out in 2017 and continues through to 2020. This has enabled the park to thrive despite factors negatively impacting other parks in continental Europe. The improvements include a new, 150-room hotel that doubled the park's accommodation capacity in 2018. The park recently marked a key operations milestone — 50 million visits since opening in 1989 — and is gearing up for 30th anniversary celebrations.

2.3m

Legoland Billund, Billund, Denmark, attendance 2018

Legoland Billund, Denmark
© Merlin Entertainments Group

Gardaland (Italy) added Peppa Pig Land, based on the popular cartoon pig from the namesake children's television show. The new land was largely responsible for increasing attendance at the park to 2.9 million. The Peppa Pig IP has proved hugely popular in global markets, achieving near-cult status in some and beloved by adults as well as children.

Futuroscope (France) and Gröna Lund and Liseberg (Sweden), struggled to maintain attendance in 2018, attributed, ironically enough, to the kind of very good weather that makes people head for the great outdoors. The World Cup was also cited as a factor motivating people to seek the great indoors during what is traditionally the parks' peak season. Futuroscope will likely show a healthy increase in the near future when its new kids' land opens, with some 21 attractions.

> **EXPANSION INTO NEW REGIONS WHILE CONTINUING TO BUILD ONE'S CORE OFFERING IS ANOTHER STRATEGY.**

PortAventura (Spain) as a destination recorded an impressive 5 million visits for 2018, taking in all three of its separate gates. This comprised 3.65 million visits to the main gate theme park; 350,000 visits to the park's second gate, water park Caribe Aquatic; and 1 million visits to the new third gate, Ferrari Land, which completed its first full year.

Keys to growth and success

As shown above, when it comes to attendance growth at theme parks in Europe, a broad trend is the increase in overnight stays and the expansion into destinations. Another, familiar trend is acquisition — building up one's portfolio by acquiring and overhauling smaller, underperforming parks. It's all about expanding the guest's options and promoting a longer stay: adding a second (or third) gate, hotel, FEC, adventure park, seasonal event or other variety.

Whether mature theme park markets in Europe need another big theme park is open to question. Compared to Asia and the Middle East, leisure sector investment in Europe is smaller-scale. British parks have done well and attracted many visitors from abroad, with lower relative prices being an advantage.

We're seeing our big European operators such as Parques Reunidos and Merlin diversifying into different concepts, such as adventure parks and FECs.

FECs will be interesting to watch in the future as a strategy to revitalize shopping centers and retail stores. Retail centers tend to be well located in large urban markets served by transit. Some leisure operators and entertainment companies, including Parques Reunidos and Nickelodeon, have already begun to explore the sector and collaborate on projects.

Expansion into new regions while continuing to build one's core offering is another strategy. Puy du Fou is a good example, rolling out new attractions in its original park in France while bringing its brand to Spain and exploring options in China as well. The Puy du Fou signature spectacular, grand, theatrical live show ought to adapt well in those markets, if sensitively applied.

2.3m

Puy du Fou, Epesses, France, attendance 2018

Mystère de La Pérouse, Puy du Fou, Epesses, France
© Puy du Fou

Ferrari Land, PortAventura, Salou, Spain
© PortaAventura

Middle East

In Dubai, entertainment and retail operators are gearing up for 2020 in anticipation of the world expo with numerous leisure attractions launching in the run up to expo year. This is a unique market that depends very heavily on tourism for its patronage. And as the UAE builds up its locations as destinations and works on its family-friendly image, year after year attendance is increasing. We see strengthening results from the newer properties such as IMG Worlds of Adventure and the multi-gate Dubai Parks and Resorts as well as the more established Ferrari World Abu Dhabi, and various water parks.

The UAE is best known as a shopping destination for Gulf residents and Europeans who fly in and out, often in the course of a business trip. Yet this region is working to heighten appeal among the global tourist market, with some positive results seen such as the consistent growth in water parks. It will be interesting to see what happens with the Dubai 2020 expo. An expo triggers infrastructure development and a real estate ripple and can go a long way toward building a city or a region's tourism profile, but expos can also prompt domestic tourists and locals to avoid the city during expo year.

> "SAUDI ARABIA LOOKS SET FOR AN ENTERTAINMENT REVOLUTION AND TO MAKE A BIG ENTRANCE INTO THE THEME PARK MARKET.

At present, the number of visitor attractions in Dubai is large, relative to the size of its market. It is comparable to emerging markets in Asia, such as China, in that it has grown its leisure sector at a very rapid pace, but without the equivalent of China's vast, resident population. This is a more high-risk process than the slower, organic growth that typified mature Western markets such as Orlando.

Another market to watch in the future will be Saudi Arabia. With a vast population, strengthening demographic fundamentals, enabling policy changes, and a significantly under-developed leisure market, it will be interesting to see what transpires from ambitious Government-supported plans to boost tourism and develop theme park mega-projects across the country. Saudi Arabia looks set for an entertainment revolution and to make a big entrance into the theme park market.

Water parks

As mentioned above, good attendance growth was seen at some water parks in the Middle East in 2018. In Dubai, these include Aquaventure, which is on our Top 20 Water Parks Worldwide list (3.5% increase in 2018) and Wild Wadi (3.3% increase in 2018), which is tied for eighth place on our Top 10 EMEA Water parks list, with Aqualand Moravia in the Czech Republic.

Staying competitive in this space means anticipating competition — such as new water parks from IMG Worlds and LEGOLAND — and keeping up accordingly with reinvestment, special events and unique offerings. Aquaventure, for instance, opened a new family area, and hosted after-dark events with entertainment appealing to an adult audience.

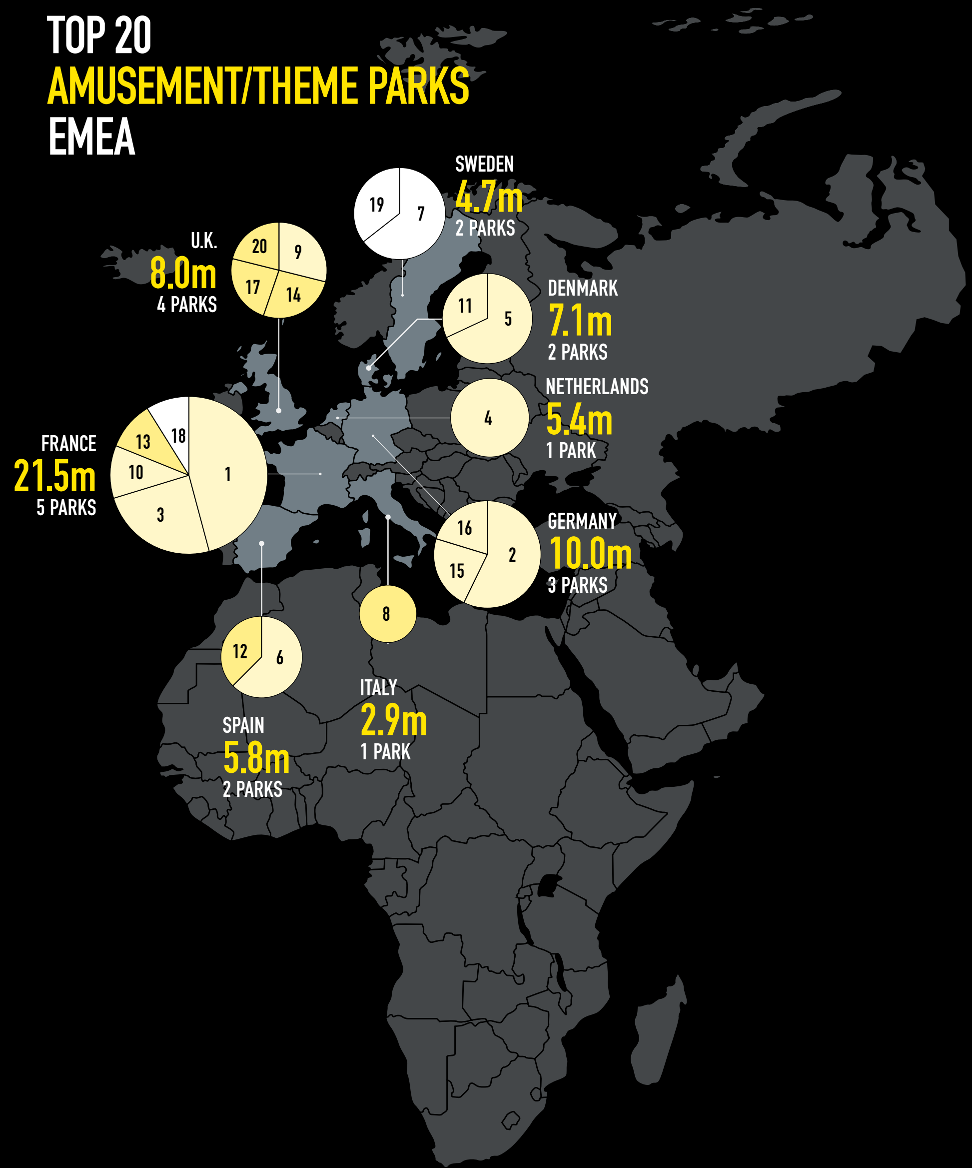
Hot weather is always a motivating factor for water park guests in continental Europe, and this was the case in 2018.

Therme Erding in Germany and Tiki Pool in the Netherlands both enjoyed double-digit increases; Therme Erding moved into first place on the Top 10 list with 13.6% growth and Tiki Pool, with 14.3% growth, moved up from #7 to #6 on the list. Germany's Nettebad differentiated itself and broadened its market by cross selling sports and leisure facilities, including an on-site sauna.

As we've seen, a key trend across the market is achieving repeat visitation via such drivers as seasonal events, evening events and season passes, in addition to packages and building destination appeal. Weather can swing either way, either boosting attendance or depressing it. Many operators now compete on the destination level in Europe, and in the Middle East, the destination development model has been in place from the first, with a new property often launched with a hotel and two gates. The hotel is a factor that enhances tracking and a better understanding of guests' needs, and the longer stay supports higher per capita spending.

Parque Warner, Madrid, Spain
© Parque Warner

TOP 20
AMUSEMENT/THEME PARKS
EMEA



RANK	PARK, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	**DISNEYLAND PARK AT DISNEYLAND PARIS**, MARNE-LA-VALLEE, FRANCE	1.9%	9,843,000	9,660,000
2	**EUROPA PARK**, RUST, GERMANY	0.4%	5,720,000	5,700,000
3	**WALT DISNEY STUDIOS PARK AT DISNEYLAND PARIS**, MARNE-LA-VALLEE, FRANCE	1.9%	5,298,000	5,200,000
4	**DE EFTELING**, KAATSHEUVEL, NETHERLANDS	4.2%	5,400,000	5,180,000
5	**TIVOLI GARDENS**, COPENHAGEN, DENMARK	4.5%	4,850,000	4,640,000
6	**PORT AVENTURA**, SALOU, SPAIN	0.0%	3,650,000	3,650,000
7	**LISEBERG**, GOTHENBURG, SWEDEN	-0.2%	3,055,000	3,061,000
8	**GARDALAND**, CASTELNUOVO DEL GARDA, ITALY	11.5%	2,900,000	2,600,000
9	**LEGOLAND WINDSOR**, WINDSOR, U.K.	2.9%	2,315,000	2,250,000*
10	**PUY DU FOU**, LES EPESSES, FRANCE	2.0%	2,305,000	2,260,000
11	**LEGOLAND BILLUND**, BILLUND, DENMARK	2.3%	2,250,000	2,200,000*
12	**PARQUE WARNER**, MADRID, SPAIN	18.8%	2,185,000	1,840,000
13	**PARC ASTERIX**, PLAILLY, FRANCE	8.7%	2,174,000	2,000,000
14	**ALTON TOWERS**, STAFFORDSHIRE, U.K.	10.5%	2,100,000	1,900,000*
15	**LEGOLAND DEUTSCHLAND**, GERMANY	4.7%	2,250,000	2,150,000*
16	**PHANTASIALAND**, BRUHL, GERMANY	0.3%	2,000,000	1,995,000
17	**THORPE PARK**, CHERTSEY, U.K.	7.4%	1,880,000	1,750,000*
18	**FUTUROSCOPE**, JAUNAY-CLAN, FRANCE	-7.5%	1,850,000	2,000,000
19	**GRÖNA LUND**, STOCKHOLM, SWEDEN	-0.8%	1,676,000	1,690,000
20	**CHESSINGTON WORLD OF ADVENTURES**, CHESSINGTON, U.K.	9.9%	1,670,000	1,520,000
	TOP 20 TOTAL ATTENDANCE 2018		65,371,000	63,246,000
	TOP 20 ATTENDANCE GROWTH 2017–18	4.4%	65,371,000	62,596,000

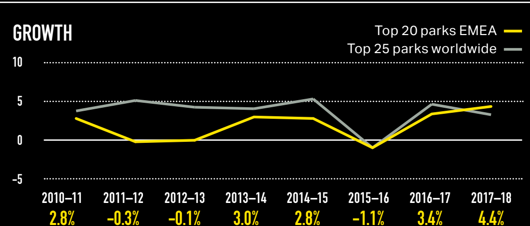
* Adjustment versus the figure we published in last year's report

KEY

< 0% · 0%–4.9% · 5%–9.9% · 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH

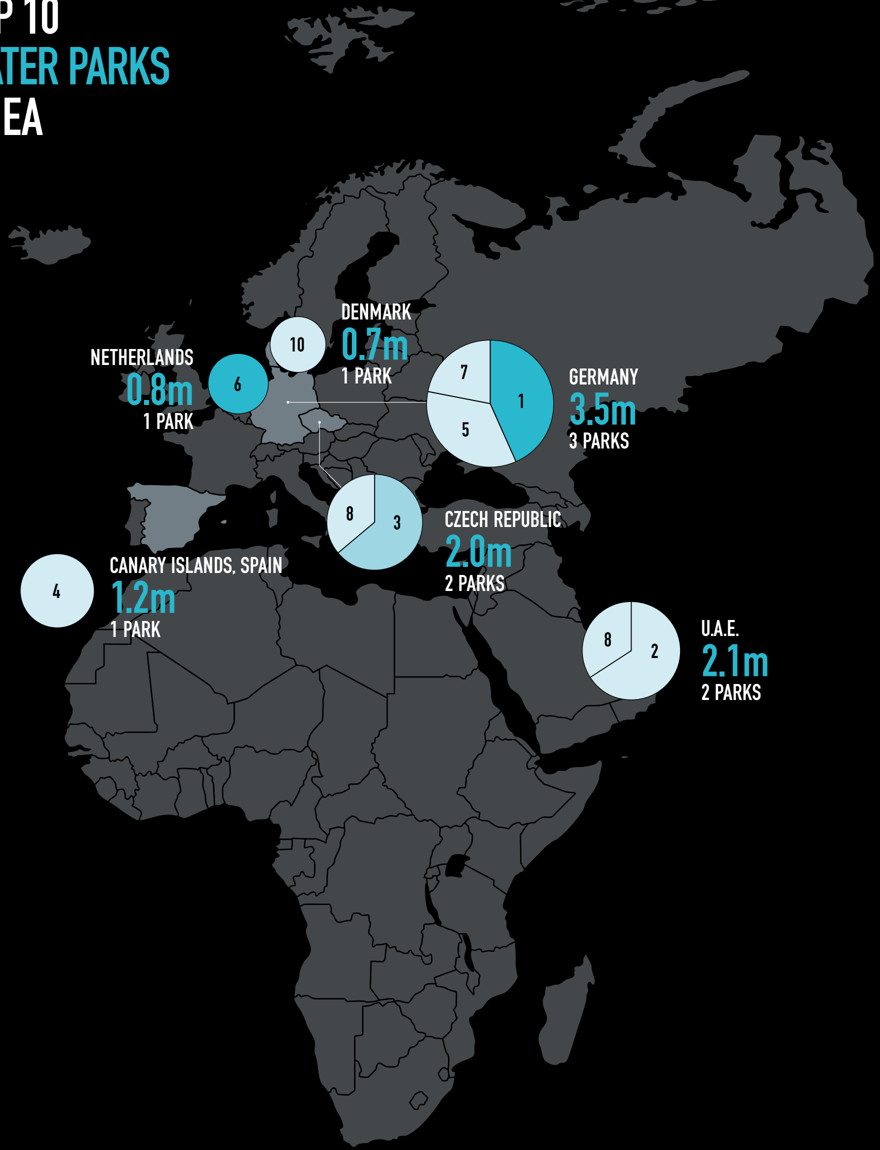


4.4%
Top 20 amusement/theme parks EMEA attendance growth 2017–18

65.4m
Top 20 amusement/theme parks EMEA attendance 2018

62.6m
Top 20 amusement/theme parks EMEA attendance 2017

TOP 10 WATER PARKS EMEA



RANK	PARK LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017
1	**THERME ERDING**, ERDING, GERMANY	13.6%	1,500,000	1,320,000
2	**AQUAVENTURE WATER PARK**, DUBAI, U.A.E.	3.5%	1,397,000	1,350,000
3	**AQUAPALACE**, PRAGUE, CZECH REPUBLIC	6.0%	1,288,000	1,215,000
4	**SIAM PARK**, SANTA CRUZ DE TENERIFE, SPAIN	0.1%	1,210,000	1,209,000
5	**TROPICAL ISLANDS**, KRAUSNICK, GERMANY	2.7%	1,200,000	1,168,000
6	**TIKI POOL, DUINRELL**, THE NETHERLANDS	14.3%	800,000	700,000
7	**NETTEBAD**, OSNABRÜCK, GERMANY	1.9%	758,000	744,000
8	**AQUALAND MORAVIA**, CZECH REPUBLIC	1.1%	720,000	712,400*
	WILD WADI, DUBAI, U.A.E	3.3%	720,000	697,000
10	**LALANDIA**, BILLUND, DENMARK	0.3%	682,000	680,000
TOP 10 TOTAL ATTENDANCE 2018			10,275,000	9,795,400
TOP 10 ATTENDANCE GROWTH 2017–18		6.7%	10,275,000	9,633,000

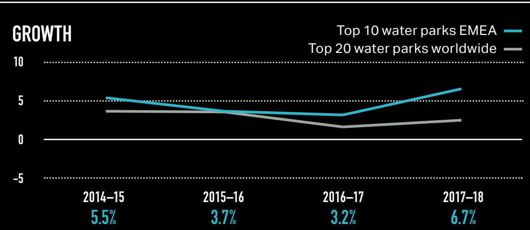
* Adjustment versus the figure we published in last year's report

KEY

< 0%
0%–4.9%
5%–9.9%
10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked park indicated by number. Shading indicates attendance growth at the ranked park versus all other ranked parks.

GROWTH



6.7%
Top 10 water parks EMEA attendance growth 2017–18

10.3m
Top 10 water parks EMEA attendance 2018

9.6m
Top 10 water parks EMEA attendance 2017

MUSEUMS

0.1%
Top 20 museums attendance growth worldwide 2017–18

108.1m
Top 20 museums worldwide attendance 2018

108.0m
Top 20 museums worldwide attendance 2017

LINDA CHEU
Vice President – Economics, Americas

—

With contributions from **Sarah Linford**, Senior Associate – Economics, Americas, **Beth Chang**, Executive Director – Economics, Asia Pacific and **Jodie Lock**, Associate – Economics, Asia-Pacific and EMEA.

10.2m
Louvre, Paris, France, attendance 2018

WORLDWIDE

Around the world, the museum experience is being redefined.

—

Attendance at the top 20 worldwide museums was relatively stable overall, growing slightly from 108 million in 2017 to 108.1 million in 2018. European museums continue to represent the largest percentage on our Museum Index Top 20 worldwide list, with 9 out of 20 museums and 48% of attendance. Of the others on the list, six museums are in North America and five in Asia.

The Louvre in Paris, France was once again the leader in attendance, with 10.2 million visitors in 2018, a significant increase over last year's 8.1 million. Museums in China also exhibited strong growth, with attendance of those on the Top 20 list growing between 5% and 15%. There was a great deal of volatility among the largest museums in North America, with some experiencing double-digit declines and others seeing significant increases in attendance.

Internationally renowned architect I.M. Pei, who died May 16 at age 102, was best known for designing the 1989 glass Louvre pyramid addition shown here.

Louvre, Paris, France

Generally, museum attendance continues to be driven by temporary exhibitions, facility improvements or expansions, external market factors, and improvements to competitive museums in the same market. But there are other drivers, too, as museums across geographic sectors are innovating in areas including visitor experiences, exhibitions, and operations.

EUROPE — FINDING NEW AUDIENCES

Temporary exhibitions and geopolitical changes continue to serve as key attendance drivers for museums in Europe, the global market leader. But there are also some new factors including social media and special events.

New drivers include the successful engagement and expanded use of multiple marketing channels, particularly social media platforms. In addition, major museums are modernizing their systems. For example, new online ticketing systems were launched in 2018 at The Louvre in Paris and the Van Gogh Museum in Amsterdam.

The path to continued success and growth for Europe's museums also includes special events and new collaborations with well-recognized celebrities, designers, and relevant IP. Museums are also actively extending their brands and their reach, as well as ancillary revenues, through new locations and traveling exhibitions.

"THE PATH TO CONTINUED SUCCESS AND GROWTH FOR EUROPE'S MUSEUMS ALSO INCLUDES SPECIAL EVENTS AND NEW COLLABORATIONS WITH WELL-RECOGNIZED CELEBRITIES, DESIGNERS, AND RELEVANT IP.

The Natural History Museum in London's collaboration with Dippy the Dinosaur (children's character) to deliver touring exhibits is another example of leveraging IP. Known as "Dippy On Tour: A Natural History Adventure," this package of special temporary events and themed exhibitions will be touring multiple locations for a limited time only. The objective is to reach 1.5 million visitors over a three-year period, which preliminary indicators suggest is achievable.

The museum at Auschwitz Birkenau in Poland grew attendance sufficiently to earn a place among the Top 20 museums in Europe for the first time, not an easy feat in this mature market. The museum preserved a Nazi concentration camp to document Holocaust atrocities perpetrated during World War II. Its inaugural appearance in the TEA/AECOM Museum Index is attributed to broad awareness created through social media platforms.

Breaking attendance records

The Musée du Louvre in Paris, already the world's top-attended museum, had a record-breaking year with 10.2 million visits in 2018, smashing its previous record in 2012 of 9.7 million visits. This represents a recovery from the museum's 30% downturn in 2017, a drop largely attributed to a plunge in tourism volumes to Paris during a time of unrest.

Numerous factors contributed to the Louvre's 2018 attendance surge. A social media flurry surrounding Beyoncé and Jay Z's music video being filmed at the museum sparked interest among new markets. This was in line with the museum's goal to reach audiences with limited prior access or exposure to museum culture. During 2018, the Louvre also hosted the most popular temporary exhibition in its history featuring the work of Eugène Delacroix and drawing 540,000 visits.

In a collaboration between the City of Abu Dhabi and the government of France, the Louvre Abu Dhabi, designed by Pritzker Prize honored "starchitect" Jean Nouvel, launched in 2017 and received 1 million visits in its first year. Funds drawn from this agreement supported a €60m investment at the Louvre Paris. This helped boost capacity, online ticketing, and services targeted to the international tourists who comprise 75% of the museum's visitors.

The Natural History Museum, London also enjoyed a record year (17.8% growth to 5.2 million). Attendance was driven by the opening of its re-imagined main gallery Hintze Hall, featuring "Hope," a 25-meter blue whale skeleton suspended from the ceiling. Other attendance boosters came from collaboration on events and products with leading IP, such as Dippy the Dinosaur (see above); Roald Dahl Story Company and LEGO Group, and the addition of a new, 357-seat traditional performance theater. Its peak attendance day in 2018 topped off the year with 28,000 on December 30.

Also in London, the Victoria & Albert Museum broke its prior attendance record with the number of visits up by 178,000 in 2018. Traffic was driven by three, hugely popular temporary exhibitions: "Frida Kahlo: Making Her Self Up," "Winnie the Pooh: Exploring a Classic" and "Balenciaga: Shaping Fashion."

Natural History Museum, London, U.K.

NORTH AMERICA — TRENDS IN THE NUMBERS

Overall attendance at the top 20 museums in North America was relatively stable in 2018, with a decrease from 59.1 million in 2017 to 57.3 million 2018. In this mature market, changes in attendance are due primarily to the presence or absence of blockbuster exhibits, facility changes, in addition to some external factors.

Most of the volatility in the numbers was seen in Washington, D.C. based institutions. While attendance at most Smithsonian museums was down or flat, there was record attendance of 2.3 million (a major increase of about 1 million) at the Donald W. Reynolds Center for American Art and Portraiture (aka National Portrait Gallery) driven by the exhibition of the new portraits of President Barack Obama and First Lady Michelle Obama, painted by Kehinde Wiley and Amy Sherald.

76.9%

National Portrait Gallery, Washington, DC, U.S., attendance growth 2017–18

National Portrait Gallery
© National Portrait Gallery, Paul Morigi

The National Museum of African American History and Culture (NMAAHC, a past TEA Thea Award recipient) held steady with an impressive 2.4 million visits.

A decrease in attendance of nearly 16% at the National Gallery of Art in D.C. is likely a stabilization impact after a surge in attendance the previous year due to the recently re-opened East Building, in addition to related special events and celebrations. The month-long government shutdown in the U.S. (December 22, 2018 to January 25, 2019) has also been identified by the Smithsonian as a factor related to declines in attendance.

In New York City, "Heavenly Bodies: Fashion and the Catholic Imagination," which closed in October 2018, was the most-visited exhibition in the Metropolitan Museum of Art's 148-year history. Organized by the museum's Costume Institute, it attracted nearly 1.7 million visits over the course of five months and brought total visits for 2018 to 7.4 million, up from 7 million in 2017.

In Chicago, the attendance decline at the Field Museum is likely attributable to the museum having been under repair for much of 2018. In Los Angeles, the California Science Center rang in its 20th anniversary in 2018 with attendance growth of nearly 20%, from 2.1 million in 2017 to 2.5 million in 2018 and a hefty turnout for "King Tut: Treasures of the Golden Pharaoh." The nine-gallery exhibit presages the centennial of the discovery of the famous tomb and includes multimedia features such as 3D scans of artifacts.

Meow Wolf House of Eternal Return in Santa Fe, NM, U.S.

The Rise of Instagram, Pop-Up and Immersive Experiences

The fantastical environments created by the artist collective Meow Wolf in Santa Fe (with new installations coming soon to Denver and Las Vegas). Candytopia, a self-described "outrageously interactive candy wonderland" in Atlanta and Dallas (so far). Wisdom in Los Angeles, with near-religious meditation ceremonies. The Museum of Pizza in New York, where you can see a Totino's sponsored Pizza Heaven diorama featuring dead pizza rolls in the clouds. The Rosé Mansion (NYC), a "labyrinth of science, history and wine culture." Human's Best Friend (NYC), "a pop-up experience for dogs and the humans who love them" where you can bring your dog to be immersed and have over 20 photo opportunities.

These and other cultural experiences are competing with traditional museums for leisure time and dollars. They are artistic, theatrical, musical, often food-oriented and quirky. They tend to "pop-up" in multiple locations, offer immersive environments rich in "Instagrammable" photo ops, attract significant corporate sponsorship, and operate on a for-profit basis. The admission price can be high, with minimal discounting. The visitors are primarily millennials and families, plus a high proportion of social media influencers.

Although repeat visitation tends to be minimal, they attract large numbers of people in very short time frames — in some cases hundreds of thousands of people — with sold-out tickets and long lines. They tend to be oriented toward the use of smartphones and devices. While some are organized by serious artists and are exploring the potential of digital media and technology in art, others are more whimsical and focus on food experiences. They're an international phenomenon — one of today's most famous examples is MORI Building teamLab in Tokyo, an immersive digital art experience that was honored in 2019 with a TEA Thea Award, and will soon have a new installation in Brooklyn. There are other examples around the world.

These new kinds of educational and entertaining experiences have become a formidable new category – easy to recognize, but hard to fully define, partly because their business models are evolving. A leading example is the Museum of Ice Cream, which began as a pop-up but has now established a permanent location in San Francisco and sells its own brand of ice cream at Target.

Another trend to watch is the customization and personalization of experiences, through technology, digital media and data collection. The new National Comedy Center in Jamestown, New York, is an example of this. The experience begins with a touchscreen survey where visitors indicate their favorite comedy television shows, movies, and comedians. This information is used to customize the visitor experience and even crowd-source preferences for shared audience experiences. Another example is "David Bowie Is," an exhibit that uses technology to deliver content individually to the visitor. Museum Hack, a third-party operation that provides unorthodox tours and team building activities in museums across the country, is another example of customizing experiences within museums. These experiences cater to modern visitors and help out-of-home leisure differentiate itself and remain competitive.

ASIA PACIFIC

Chinese museums in 2018 generally performed well with respect to attendance. The National Museum of China in Beijing held onto its first-place position on our list of the Top 20 Museums, Asia Pacific — with 8.6 million visits in 2018, representing a remarkable increase of 550,000 visits over 2017.

Three new Chinese museums entered the Top 20 this year, and double-digit attendance increases were recorded at multiple existing museums across the country, suggesting that governmental initiatives to invest in and boost cultural appreciation are paying off. The Hunan Provincial Museum celebrated its first year of operations after re-opening in a new building and immediately entered our 2018 Top 20, in sixth place.

17%

Suzhou Museum, Suzhou, China, attendance growth 2017–18

Suzhou Museum, Suzhou, China

3.6m

Hunan Provincial Museum, Hunan, China, attendance 2018

Hunan Provincial Museum, Hunan, China
© Hunan Provincial Museum

Similar to the Beyoncé effect at The Louvre in Paris, Chinese museums are also looking to celebrity influencers to help drive up attendance. The popular "National Treasure" TV show blends heritage with celebrity sketches and was renewed for a second year in 2018. Participating museums included The Palace Museum, Shanghai Museum, Hunan Provincial Museum and Nanjing Museum, among others.

A trend to watch is foreign museums coming to China. Sea World Culture and Arts Center, opened in Dec. 2017, is a multi-use culture and arts center in Shenzhen. The project is a joint venture between the state-owned China Merchants Group and London's Victoria & Albert Museum. Later in 2019, Center Pompidou is opening a branch in Shanghai.

The "mediafication" of exhibits is another key direction. Instagrammable media moments are being incorporated at museums to crowd-please those active on social media platforms. Art is being blended into interactive exhibits, allowing visitors to step into, touch, and move through the artwork — and, of course, capture all of this on camera. Immersive exhibits are popular and often incorporate digital media environments, rain rooms, smoke rooms, and mirror rooms.

In Australia, The National Gallery of Victoria had a great year, recording an 11.5% increase for 2018. This was driven by the huge success of the co-curated, temporary exhibition "MoMA at NGV: 130 Years of Modern and Contemporary Art" — the largest Melbourne Masterpieces exhibition the Gallery has ever presented.

11.5%

Tokyo National Museum, Tokyo, Japan, attendance growth 2017–18

Tokyo National Museum, Tokyo, Japan

Moreover, a strong emphasis on summer and evening programming paid dividends, as did a series of initiatives to boost and diversify audience engagement, such as the "NGV Kids Summer Festival," workshops, and "Friday Nights" social events.

Overall, 11 of the 20 museums featured in our Asia Pacific Top 20 are free-admission. In total, these free museums recorded an overall increase in attendance, while attendance to paid museums slipped by 3.2%. However, we find that this disparity is more due to the location of those museums (as opposed to the existence of an admission fee) and to the relative popularity of 2018 temporary exhibitions as compared to those that ran in 2017.

Taiwanese museums continued to be negative impacted by a slump in tourism, particularly from China. Most severely affected was the National Palace Museum in Taipei, which experienced a decrease of 13%.

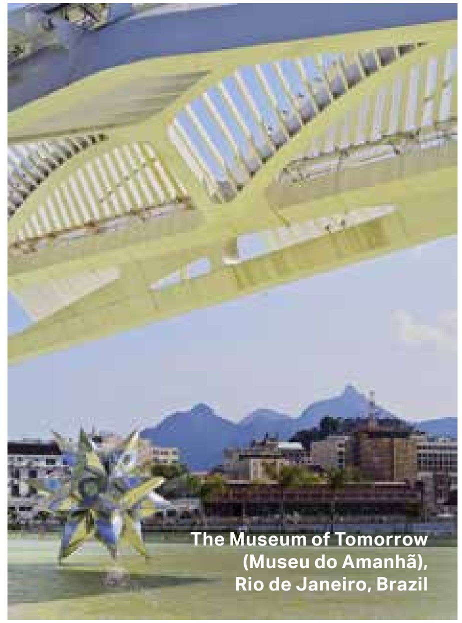
> "
>
> **A STRONG EMPHASIS ON SUMMER AND EVENING PROGRAMMING PAID DIVIDENDS.**

LATIN AMERICA

There are some instructive and inspiring examples in Latin America's museum industry, although as of yet no museums from this region appear on our published charts. One is The Museum of Tomorrow (Museu do Amanhã), which opened in Rio de Janeiro in December 2015. The museum, which is approximately 161,000 square feet of exhibit area and nearly five acres of outdoor space, is a new feature on the harbor and was designed by Santiago de Calatrava. The museum has attracted over three million visitors since its opening in December 2015. Rio was home to the 2014 World Cup and the 2016 Summer Olympics, which increased visitation to Rio and its attractions in those years.

Modern in concept, mission and presentation, Museum of Tomorrow is described as an experimental science museum "where the content is presented through a narrative that combines the accuracy of science with the expressiveness of art, using technology as a support in interactive environments and audiovisual and gaming facilities created from scientific studies conducted by experts and data released all over the world."

The discussion of sustainability is a theme in other new Latin American museums as well. Biomuseo is a 44,000 square foot museum that opened in 2014 with six acres of gardens focused on the natural history of Panama. The museum consists of eight galleries which tell the origin of the Panamanian isthmus and its impact on the planet's biodiversity. The indoor galleries were designed by Canadian designer Bruce Mau, founder of the Institute Without Boundaries, and the outdoor exhibits were designed by Edwina von Gal.



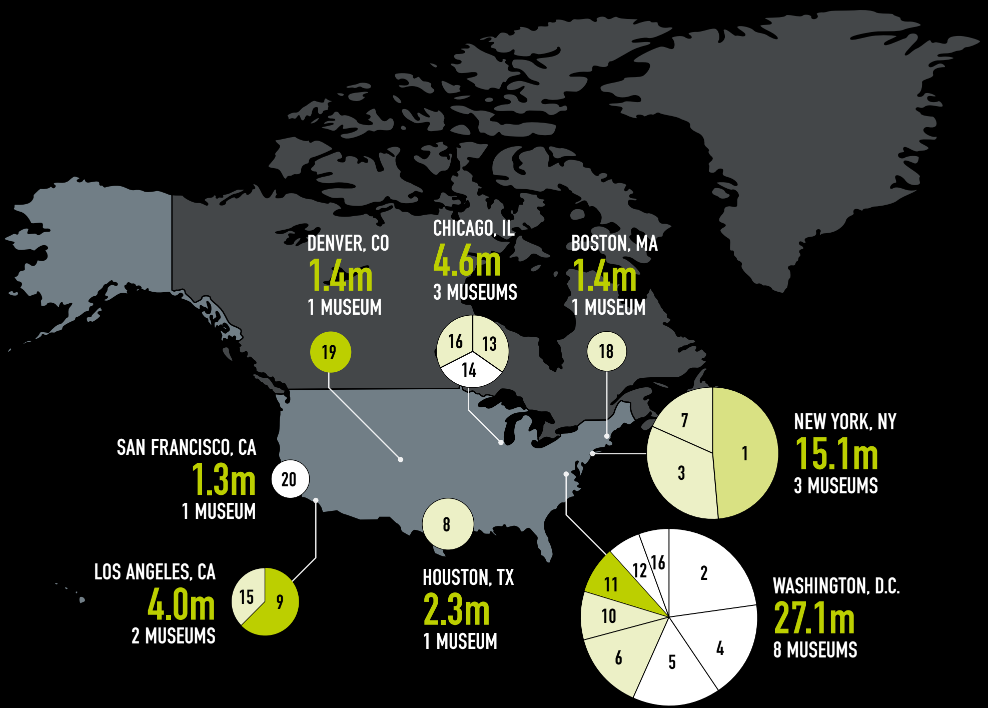
The Museum of Tomorrow (Museu do Amanhã), Rio de Janeiro, Brazil

The Biomuseo is a Smithsonian Affiliate, which along with the University of Panama helped develop its scientific content. The Museum highlights scientific research resulting from its partnership between Panama and the Smithsonian Tropical Research Institute.

While most museums in Latin America are government owned and run, a handful of cultural attractions have emerged that are managed by public-private partnerships between government agencies, corporations, and nonprofit organizations or foundations.

We must also speak of the great tragedy of the Brazil National Museum, a 200-year-old natural history museum that was an icon of Rio. The building and most of its 2,000 artifacts were lost in a fire in September 2018.

TOP 20 MUSEUMS NORTH AMERICA



RANK	MUSEUM, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017	FREE/PAID
1	THE METROPOLITAN MUSEUM OF ART, NEW YORK, NY, U.S.	5.1%	7,360,000	7,000,000	P
2	NATIONAL AIR AND SPACE MUSEUM, WASHINGTON, DC, U.S.	-11.4%	6,200,000	7,000,000	F
3	AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK, NY, U.S.	0.0%	5,000,000	5,000,000	P
4	NATIONAL MUSEUM OF NATURAL HISTORY, WASHINGTON, DC, U.S.	-20.0%	4,800,000	6,000,000	F
5	NATIONAL GALLERY OF ART, WASHINGTON, DC, U.S.	-15.8%	4,404,000	5,232,000	F
6	NATIONAL MUSEUM OF AMERICAN HISTORY, WASHINGTON, DC, U.S.	0.0%	3,800,000	3,800,000	F
7	THE MUSEUM OF MODERN ART, NEW YORK, NY, U.S.	0.9%	2,774,000	2,750,000	P
8	CALIFORNIA SCIENCE CENTER, LOS ANGELES, CA, U.S.	19.7%	2,520,000	2,106,000	P
9	NATIONAL MUSEUM OF AFRICAN AMERICAN HISTORY AND CULTURE, WASHINGTON, DC, U.S.	0.0%	2,400,000	2,400,000	F
10	HOUSTON MUSEUM OF NATURAL SCIENCE, HOUSTON, TX, U.S.	0.8%	2,313,000	2,295,000	F
11	DONALD W. REYNOLDS CENTER FOR AMERICAN ART AND PORTRAITURE, WASHINGTON, DC, U.S.	76.9%	2,300,000	1,300,000	F
12	U.S. HOLOCAUST MEMORIAL MUSEUM, WASHINGTON, DC, U.S.	-2.9%	1,650,000	1,700,000	P
13	THE ART INSTITUTE OF CHICAGO, CHICAGO, IL, U.S.	0.7%	1,622,000	1,610,000	P
14	FIELD MUSEUM OF NATURAL HISTORY, CHICAGO, IL, U.S.	-15.3%	1,525,000	1,800,000	P
15	THE J. PAUL GETTY CENTER, LOS ANGELES, CA, U.S.	3.9%	1,509,000	1,452,000	F
16	UDVAR-HAZY CENTER, WASHINGTON, DC, U.S.	-6.3%	1,500,000	1,600,000	F
	MUSEUM OF SCIENCE AND INDUSTRY, CHICAGO, IL, U.S.	0.7%	1,500,000	1,490,000	P
18	MUSEUM OF SCIENCE, BOSTON, MA, U.S.	4.1%	1,458,000	1,400,000	P
19	DENVER MUSEUM OF NATURE & SCIENCE, DENVER, CO, U.S.	11.2%	1,415,000	1,273,000*	P
20	CALIFORNIA ACADEMY OF SCIENCES, SAN FRANCISCO, CA, U.S.	-4.9%	1,295,000	1,362,000	P
	TOP 20 TOTAL ATTENDANCE 2018		57,345,000	58,570,000	
	TOP 20 TOTAL ATTENDANCE GROWTH 2017–18	-3.0%	57,345,000	59,097,000	

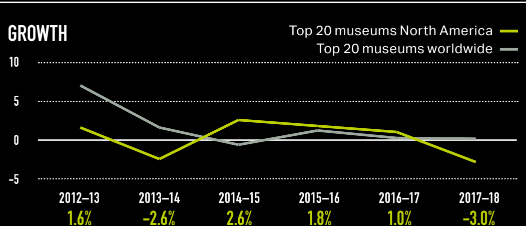
* Adjustment versus the figure we published in last year's report

KEY

< 0% | 0%–4.9% | 5%–9.9% | 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked museum indicated by number. Shading indicates attendance growth at the ranked museum versus all other ranked museums.

GROWTH

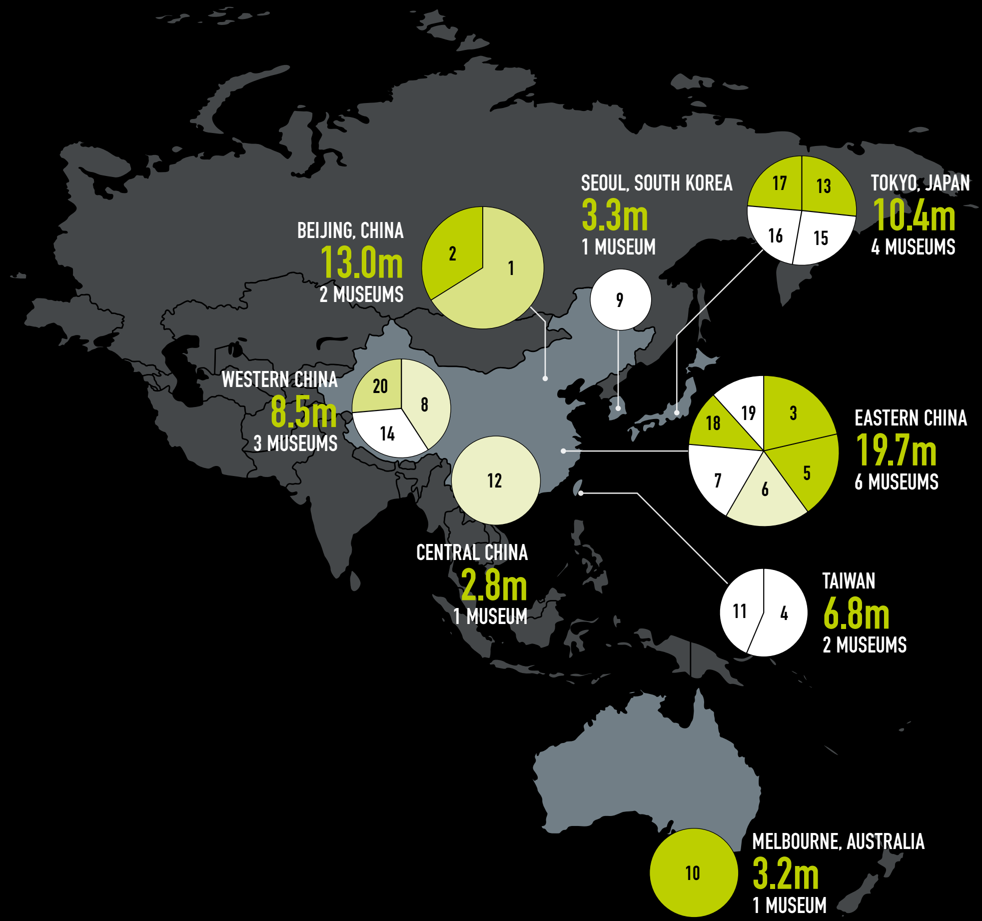


-3.0%
Top 20 museums North America attendance growth 2017–18

57.3m
Top 20 museums North America attendance 2018

59.1m
Top 20 museums North America attendance 2017

TOP 20 MUSEUMS ASIA-PACIFIC



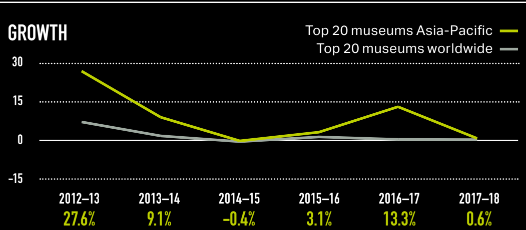
RANK	MUSEUM, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017	FREE/PAID
1	**NATIONAL MUSEUM OF CHINA**, BEIJING, CHINA	6.8%	8,610,000	8,063,000	F
2	**CHINA SCIENCE TECHNOLOGY MUSEUM**, BEIJING, CHINA	10.5%	4,400,000	3,983,000	P
3	**ZHEJIANG MUSEUM**, HANGZHOU, CHINA	14.4%	4,200,000	3,670,000	F
4	**NATIONAL PALACE MUSEUM (TAIWAN)**, TAIPEI, TAIWAN	-13.0%	3,860,000	4,436,000	P
5	**NANJING MUSEUM**, NANJING, CHINA	11.2%	3,670,000	3,300,000	F
6	**HUNAN PROVINCIAL MUSEUM**, HUNAN, CHINA	NEW	3,600,000	-	F
7	**SHANGHAI SCIENCE & TECHNOLOGY MUSEUM**, SHANGHAI, CHINA	-11.1%	3,540,000	3,980,000	P
8	**GANSU PROVINCIAL MUSEUM**, LANZHOU, CHINA	4.5%	3,500,000	3,350,000	F
9	**NATIONAL MUSEUM OF KOREA**, SEOUL, SOUTH KOREA	-5.1%	3,300,000	3,477,000	F
10	**NATIONAL GALLERY OF VICTORIA**, MELBOURNE, AUSTRALIA	11.5%	3,200,000	2,869,000	F
11	**NATIONAL MUSEUM OF NATURAL SCIENCE**, TAICHUNG, TAIWAN	-5.0%	2,960,000	3,115,000	P
12	**SHANXI HISTORY MUSEUM**, XIAN, CHINA	3.7%	2,800,000	2,700,000	F
13	**TOKYO METROPOLITAN ART MUSEUM**, TOKYO, JAPAN	2.4%	2,790,000	2,724,000	P
14	**CHENGDU MUSEUM**, CHENGDU, CHINA	-7.3%	2,780,000	3,000,000	F
15	**NATIONAL ART CENTER**, TOKYO, JAPAN	-8.9%	2,720,000	2,987,000	P
16	**NATIONAL MUSEUM OF NATURAL SCIENCE**, TOKYO, JAPAN	-5.4%	2,460,000	2,600,000	P
17	**TOKYO NATIONAL MUSEUM**, TOKYO, JAPAN	11.5%	2,430,000	2,180,000	P
18	**SUZHOU MUSEUM**, SUZHOU, CHINA	17.0%	2,340,000	2,000,000	F
19	**CHINA ART MUSEUM**, PUDONG XINQU (SHANGHAI), CHINA	-9.8%	2,300,000	2,550,000	P
20	**CHINA THREE GORGES MUSEUM**, CHONGQING, CHINA	6.1%	2,240,000	2,112,000	F
	TOP 20 TOTAL ATTENDANCE 2018		67,700,000	63,096,000	
	TOP 20 TOTAL ATTENDANCE GROWTH 2017–18	0.6%	67,700,000	67,322,000	

KEY

< 0% | 0%–4.9% | 5%–9.9% | 10%+

Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked museum indicated by number. Shading indicates attendance growth at the ranked museum versus all other ranked museums.

GROWTH

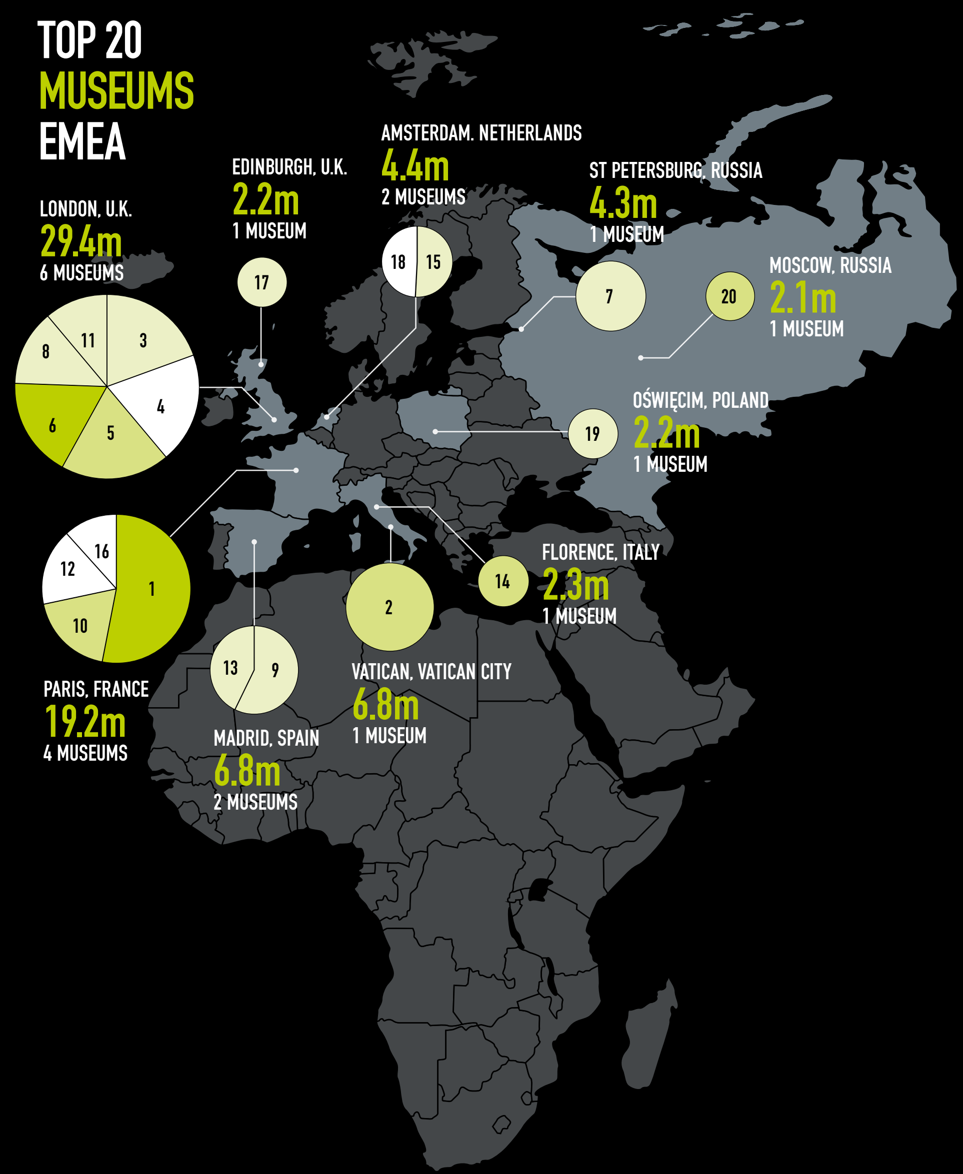


0.6%
Top 20 museums Asia-Pacific attendance growth 2017–18

67.7m
Top 20 museums Asia-Pacific attendance 2018

67.3m
Top 20 museums Asia-Pacific attendance 2017

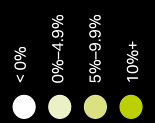
TOP 20 MUSEUMS EMEA



RANK	MUSEUM, LOCATION	% CHANGE	ATTENDANCE 2018	ATTENDANCE 2017	FREE/PAID
1	**LOUVRE**, PARIS, FRANCE	25.9%	10,200,000	8,100,000	P
2	**VATICAN MUSEUMS**, VATICAN, VATICAN CITY	5.1%	6,756,000	6,427,000	P
3	**BRITISH MUSEUM**, LONDON, U.K.	3.8%	5,869,000	5,656,000	F
4	**TATE MODERN**, LONDON, U.K.	-1.3%	5,829,000	5,907,000	F
5	**NATIONAL GALLERY**, LONDON, U.K.	9.7%	5,736,000	5,229,000	F
6	**NATURAL HISTORY MUSEUM**, LONDON, U.K.	17.8%	5,226,000	4,435,000	F
7	**STATE HERMITAGE**, ST PETERSBURG, RUSSIA	1.8%	4,294,000	4,220,000	P
8	**VICTORIA & ALBERT MUSEUM**, LONDON, U.K.	4.7%	3,968,000	3,790,000	P
9	**REINA SOFÍA**, MADRID, SPAIN	0.0%	3,898,000	3,897,000	F
10	**CENTRE POMPIDOU**, PARIS, FRANCE	5.4%	3,552,000	3,371,000	P
11	**SCIENCE MUSEUM (SOUTH KENSINGTON)**, LONDON, U.K.	3.4%	3,286,000	3,178,000	P
12	**MUSÉE D'ORSAY**, PARIS, FRANCE	-2.3%	3,175,000	3,251,000	F
13	**MUSEO NACIONAL DEL PRADO**, MADRID, SPAIN	2.4%	2,893,000	2,824,000	P
14	**GALLERIA DEGLI UFFIZI**, FLORENCE, ITALY	7.9%	2,330,000	2,160,000	P
15	**RIJKSMUSEUM**, AMSTERDAM, THE NETHERLANDS	1.8%	2,300,000	2,260,000	P
16	**CITE DES SCIENCES ET DE L'INDUSTRIE**, PARIS, FRANCE	-0.2%	2,231,000	2,235,000*	P
17	**NATIONAL MUSEUM OF SCOTLAND**, EDINBURGH, U.K.	2.9%	2,228,000	2,166,000	F
18	**VAN GOGH MUSEUM**, AMSTERDAM, THE NETHERLANDS	-9.6%	2,206,000	2,439,000	P
19	**AUSCHWITZ-BIRKENAU MUSEUM**, OŚWIĘCIM, POLAND	2.5%	2,152,000	2,100,000	P
20	**STATE TRETYAKOV GALLERY**, MOSCOW, RUSSIA	6.2%	2,149,000	2,024,000	P
	TOP 20 TOTAL ATTENDANCE 2018		80,278,000	75,669,000	
	TOP 20 TOTAL ATTENDANCE GROWTH 2017–18	6.1%	80,278,000	75,634,000	

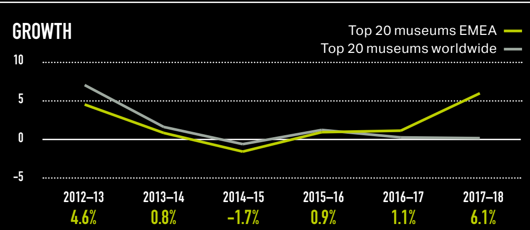
* Adjustment versus the figure we published in last year's report

KEY



Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked museum indicated by number. Shading indicates attendance growth at the ranked museum versus all other ranked museums.

GROWTH



6.1%
Top 20 museums EMEA attendance growth 2017–18

80.3m
Top 20 museums EMEA attendance 2018

75.6m
Top 20 museums EMEA attendance 2017

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SPECIAL FEATURE

OBSERVATION EXPERIENCES

BRIAN SANDS

Vice President / Director – Economics, Americas

—

KATHLEEN LACLAIR

Associate Principal – Economics, Americas

—

6.4m

Tokyo Skytree, Tokyo, Japan, attendance 2018

Observation Experiences

ON TOP OF THE WORLD

Observation experiences are a type of specialty attraction proliferating across the globe. This growth is driven primarily by a combination of increasing urbanization, technology improvements allowing for higher building heights as well as faster and more reliable mechanical systems, and the realization by developers and operators that they can provide significant revenue. In the best cases, they have iconic architecture and become "must-do" visitor experiences, helping to create a symbol for a city or region.

The diversity of design in the top 20 observation experiences worldwide is notable. It includes observation decks in purpose-built towers and in multi-use buildings (which may include retail, office, and residential uses), wheels that hark back to the original Ferris wheel (designed and constructed by George Washington Gale Ferris Jr. as a landmark for the 1893 World's Columbian Exposition in Chicago), as well as a religious monument and a cable car.

Tokyo Skytree, Tokyo, Japan

Ever since people have had the chance to get above their immediate surroundings, such as on a high building or a mountaintop, they have enjoyed the view, thinking about the meaning of what they saw, and daydreaming about visiting all they see. The Eiffel Tower, opened in Paris as the centerpiece of the 1889 Universal Exposition, was perhaps the first notable gated observation experience in the world. It remains a very popular icon, with recent attendance ranging between 6 million and 7 million annually.

With 6.4 million annual visits, the Tokyo Tree is the most-attended observation experience globally, which by comparison would place it near the middle of the most-attended theme parks globally. The Empire State Building and the London Eye, both at around 4 million visitors annually, are also very popular and iconic observation experiences. Notably, the combined annual attendance at the top 20 observation experiences worldwide of nearly 53 million surpasses by a wide margin the total for the top 20 water parks worldwide, though it is approximately one-half of the total for the top 20 museums worldwide.

With the right combination of factors — such as location, adjacent or nearby attractions and other uses, quality and uniqueness of the visitor experience, pricing, market size and characteristics, and competitive position — these specialty attractions can also generate significant revenue. For example, the Empire State Building reported $131 million in revenue from its observatory in 2018.

That said, as these attractions proliferate across urban markets globally, and particularly as multiple observation experiences compete in the same market, there is growing concern about the likely performance of the new experiences as well as existing ones.

Recently, the Economics practice at AECOM has worked on a number of proposed new observation experiences in major markets with multiple existing well-established observation attractions, such as the soon-to-open Edge at Hudson Yards in New York City, which will be competing head-to-head with the Empire State Building, Top of the Rock, and One World Observatory (a TEA Thea Award recipient in 2016) as well as several others under construction or in-planning.

1.5m

Sky Garden, London, attendance 2018

Sky Garden, London

OPENING 2020

Edge at Hudson Yards, New York, U.S.

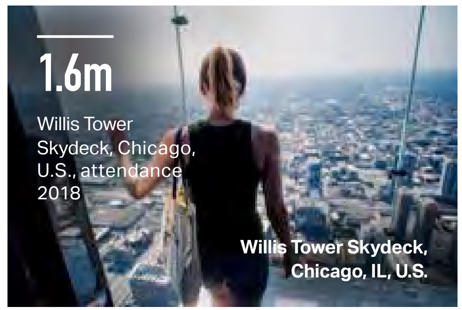
Our analyses reveal that when attendance at these attractions within a market is combined (also known as aggregated attendance), they are able to capture one-fifth to one-quarter of the combined resident and tourist markets. Given the large size of these markets, and the relatively small physical size of the attractions and the generally short length of stay for visitors, this is a remarkable achievement.

As the competition increases in these markets, it will be interesting to see what kinds of innovations occur in the visitor experience that helps to keep them fresh and fun for new and returning visitors.

1.2m

Sugarloaf Cable Car, Rio de Janiero, Brazil, attendance 2018

Sugarloaf Cable Car, Rio de Janiero, Brazil



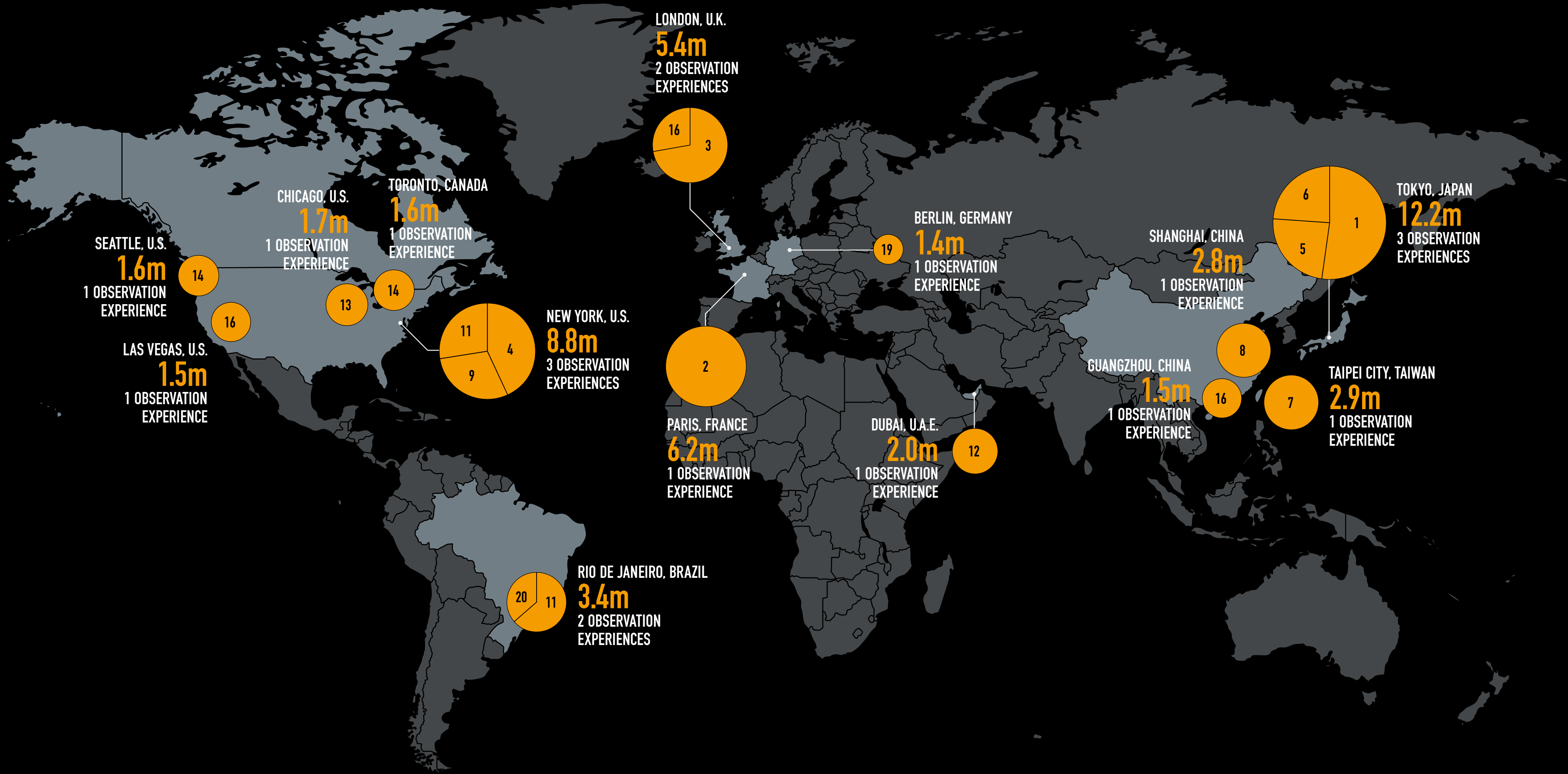
1.6m

Willis Tower Skydeck, Chicago, U.S., attendance 2018

Willis Tower Skydeck, Chicago, IL, U.S.

SPECIAL FEATURE

TOP 20
OBSERVATION EXPERIENCES
WORLDWIDE



Circles represent size of attendance at ranked parks at the geography indicated. Slices within circles represent proportion of attendance at the geography from the ranked museum indicated by number.

53.0m

Top 20 observation experiences worldwide 2018

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TOP 20 OBSERVATION EXPERIENCES WORLDWIDE

RANK	ATTRACTION, LOCATION	OBSERVATION EXPERIENCE TYPE	ESTIMATED ATTENDANCE 2018
1	TOKYO SKYTREE, TOKYO, JAPAN	TOWER	6,400,000
2	EIFFEL TOWER, PARIS, FRANCE	TOWER	6,207,000
3	COCA-COLA LONDON EYE, LONDON, U.K.	WHEEL	3,900,000
4	EMPIRE STATE BUILDING, NEW YORK, NY, U.S.	MULTI-USE	3,805,000
5	TOKYO TOWER, TOKYO, JAPAN	TOWER	2,920,000
6	TOKYO CITY VIEW, TOKYO, JAPAN	MULTI-USE	2,900,000
7	TAIPEI 101, TAIPERI CITY, TAIWAN	MULTI-USE	2,880,000
8	ORIENTAL PEARL, SHANGHAI, CHINA	TOWER	2,800,000
9	TOP OF THE ROCK, NEW YORK, NY, U.S.	MULTI-USE	2,600,000
10	ONE WORLD OBSERVATORY, NEW YORK, NY, U.S.	MULTI-USE	2,400,000

RANK	ATTRACTION, LOCATION	OBSERVATION EXPERIENCE TYPE	ESTIMATED ATTENDANCE 2018
11	CHRIST THE REDEEMER, RIO DE JANIERO, BRAZIL	MONUMENT	2,200,000
12	AT THE TOP – BURJ KHALIFA, DUBAI, U.A.E.	MULTI-USE	2,000,000
13	WILLIS TOWER SKYDECK, CHICAGO, IL, U.S.	MULTI-USE	1,652,000
14	CN TOWER, TORONTO, ONTARIO, CANADA	TOWER	1,600,000
	SPACE NEEDLE, SEATTLE, WA, U.S.	TOWER	1,600,000
16	CANTON TOWER, GUANGZHOU, CHINA	MULTI-USE	1,500,000
	HIGH ROLLER, LAS VEGAS, NV, U.S.	WHEEL	1,500,000
	SKY GARDEN, LONDON, U.K.	MULTI-USE	1,500,000
19	BERLINER FERNSEHTURM, BERLIN, GERMANY	TOWER	1,350,000
20	SUGARLOAF CABLE CAR, RIO DE JANIERO, BRAZIL	RIDE	1,249,000
	TOP 20 ATTENDANCE 2018		52,963,000

53.0m

Top 20 observation experiences worldwide 2018

ABOUT THE STUDY

Methodology and evolution of the TEA/ AECOM Theme Index and Museum Index

This is the thirteenth annual Theme Index and Museum Index collaboration between the Themed Entertainment Association (TEA) and AECOM, although the study itself has been in existence for much longer. The report has evolved over the years, starting as just a report on major U.S. theme parks, with additional regions (EMEA, Asia, Latin America) and attraction types (water parks, museums) added over time. The report represents a significant body of international research and annual tracking.

Inclusion in the annual Theme Index and Museum Index is now seen as a benchmark of success among operators, parks, and museums. Every year AECOM and TEA hear from parks and museums desiring to share their attendance increases and earn a place on the list. Those who believe their properties should be included in the report are encouraged to contact the AECOM office in their region, after studying the criteria for consideration given below. The more feedback and information we receive, the more accurate this report will become.

AECOM obtains the figures used to create the TEA/AECOM Theme Index and Museum Index through a variety of sources, including statistics furnished directly by the operators, historical numbers, financial reports, the investment banking community, local tourism organizations, and professional estimates where necessary.

The global market is studied as a whole, and each of its main regions is also studied separately: the Americas, EMEA, and Asia-Pacific.

For a theme park or water park to be included in the report, at a minimum the property must be gated (entry ticket required) and the park generally must be focused on the visitor experience. To be included in the top theme park groups list, an operator must have theme parks in its portfolio in which it has controlling ownership or that are branded by the operator (i.e., licensed).

Due to differences in reporting across operators and regions, there is some variation in the time periods for which figures are reported. Unless otherwise noted, figures for North America and Europe are calendar year figures, while most figures for Asia-Pacific are fiscal year figures. In Asia-Pacific, for those parks/museums with a fiscal year ending from June 30th to December 31st, we use the current fiscal year number in our tables, while for those parks/museums with a fiscal year ending early in the year, for example on March 31st, we use the following fiscal year number in our tables. By way of example, Ocean Park Hong Kong fiscal year ends June 30, 2018, so we use fiscal year 2018 in our 2018 table, while Tokyo Disneyland's fiscal year ends on March 31, so we use fiscal year 2019 in our 2018 table.

FREQUENTLY ASKED QUESTIONS

Why should parks share their numbers?
When operators share their information, it is good for the industry. It ties directly into re-investing wisely in ways that bring in more attendance and more repeat visitation, driving revenue and profits. Tracking differences and fluctuations in attendance helps the industry recognize what drives changes in attendance. Knowing what works, what doesn't work — and where and why — allows operators to make wise investment decisions and to know what results can be expected. That's the heart of market and feasibility analysis.

Do some operators exaggerate in order to look more successful? What can you do about that?
Our role is to share what the industry operators say officially or, if that information is not provided, to share our best professional estimate. It's possible that some are over-reporting their numbers. We can't control that. However, all of the major operators are publicly owned and therefore obliged to report financial performance information at the corporate level, even if they don't break it down to the park level.

Over-reporting may get an operator temporarily higher on the list than its competitors, but it will cause problems, some in the near term and others down the road. In the near term, if attendance is up but revenues or profitability are not, it raises questions. In the longer term, eventually, they'll hit a point where the numbers are too far off to be believable. Misrepresenting also complicates the picture if the company eventually goes public, or is acquired or wants to sell off an individual property. Operators know this.

Misreporting also raises false expectations. If you're trying to make an investment decision and forecast future performance, you need accurate information. If a property is not investing in regular improvements, yet reports that numbers are stable or growing, the numbers are suspect. Moreover, it's not the kind of secret that can be kept for long. People move from one operator to another and they take that knowledge with them. Consultants are called upon to help interested parties evaluate ongoing operations as well as potential new investments and activities.

In other words, over-reporting will eventually come to a point of correction. Our advice is to trust the process.

How do you estimate figures for individual parks and museums that don't report them?
Fortunately, with more than 60-years experience working in the attractions industry, AECOM's Economics practice has a strong understanding of what drives performance at the park level and a robust process to estimate attendance where necessary. The following outlines our general process:

- We start by reviewing publicly available information about the performance of the multi-park/attraction operators and also the individual parks/museums. We also review information that we have collected as part of the previous year's report and throughout the year.

- Where park/museum-level information is missing, we then ask the multi-park operators and the individual parks/ museums to provide us with their attendance figures, and many of them do so directly.

- Where we do not receive specific park/ museum-level figures from the operator, we use a detailed methodology that considers the following: historic attendance trends at the park/museum; generally available information on the park/museum and/or operator; park/museum changes, such as new rides, areas, shows, exhibits, ticket prices, intellectual property connections, etc.; general economy of the nation and the specific metropolitan area; tourism trends nationally and in the metropolitan area; for parks, weather trends in the area, particularly during peak periods; the performance of nearby parks/museums and other attractions; media coverage about the operator/park/museum; and select factors as relevant.

– Park/museum operators are also given the opportunity to review and comment on AECOM's estimate before the Theme Index and Museum Index are finalized and published. Of those that don't provide official figures at the park/museum level, we generally receive some form of feedback regarding the individual parks/museums. Leadership at TEA (the Themed Entertainment Association, which publishes and helps edit the report) plays an important role here, encouraging responses.

– As the leading provider of business planning studies worldwide for attractions, our group also works frequently with all of the major operators, parks, and museums, providing us with the opportunity to periodically compare our estimates with actual exact figures. We use this to refine our methodology where necessary.

– As part of our active work in these markets and our awareness of what drives performance and the macroeconomics of different countries, we visit the parks and museums, watching for new development and trends. We help to bring professional processes to the industry so that a higher level of quality can be transmitted from more developed markets into emerging markets. We frequently work for operators who are looking to enter the attractions business, or to grow or improve their existing operations. We also team with attraction master planners and designers to help correctly position and right-size parks and museums to match their market potential and optimize their financial performance. In addition, we regularly speak at industry events, such as those organized by TEA, IAAPA, WWA, AAM, AZA, ULI, and many others, about industry trends, and also contribute to articles to industry publications and in more general media publications.

What causes wide swings in performance at parks and museums?
As can be seen from the process outlined above, there are many factors affecting the performance of a park or museum, including past performance, new offerings, the economy, tourism, weather, media coverage, management, and more. Typically, large changes in attendance, up or down, are driven by major changes in one or more of these factors, with the relationship between the two frequently clear when examined in detail.

How is a water park defined for the purposes of the Theme Index?
A water park must have a minimum of three water slides / flumes, a wave pool, retail and food areas, and at least two of the following other elements: tube rides; free-form pool; lazy river; and kids water play area. In Asia and America, the water parks are defined as outdoor facilities. If a water park also has a separate spa facility, only the entertainment-related attendance is factored into our study.

Why aren't other attraction types included, such as zoos and aquariums, observation experiences, and sports and performance venues?
The report has evolved over the years, starting as just a report on major U.S. theme parks, with additional regions (EMEA, Asia, Latin America) and attraction types (water parks, museums) added over time. That said, we are indeed considering additional attraction types and will include these as interest is shown and resources allow.

Why do you focus on the top-attended parks and museums?
The top-attended parks and museums are a clear indicator of the overall state of the industry and associated trends. In addition, trends and activities at the top-attended parks and museums signal both what is currently occurring in the industry more broadly, as well as what is likely to occur in the future, particularly in such areas as investment, technology, IP, marketing, facility spending, visitor spending and behavior. This is also why the top-attended parks and museums tend to be the most-watched by the media as well as the industry. The report currently lists more than 200 parks and museums, the result of a significant research, tracking and evaluation effort on the part of our team.

Can we assume that the same dynamic of the top parks is playing out in the smaller parks and museums?
Generally, the answer is yes, with attractions of all types and scales facing many of the same ongoing challenges, which include meeting visitor expectations, hiring and retaining good management and staff, efficient operations, understanding and applying new technology, addressing the need for continuous reinvestment, and the like. That said, smaller and more regional venues have their own unique place in the market. They have distinct challenges when it comes to marketing, investment and guest retention, making the most of smaller budgets, and differentiating themselves from other leisure options competing for visitors' time and money. How they respond to those challenges often sets an example of creativity, innovation, leadership and/or economic stimulus that influences the rest of the sector — many such examples have appeared in the annual slate of TEA Thea Awards recipients over the years.

How do you account for the performance of operators of numerous smaller attractions that don't make the lists, but that are still large operators?
The two operators that most readily come to mind here are Merlin Entertainments Group and Parques Reunidos, both of which do make the Top 10 Theme Park Groups Worldwide list. In the case of Merlin Entertainments Group, they are the second most attended operator globally with attendance of 67.0 million in 2018, around one-third of which occurred at larger parks, with most of these located in the EMEA region (e.g., LEGLOLAND Windsor, LEGOLAND Billund, Alton Towers, etc.). However, about two-thirds of Merlin's attendance occurs in mid- and small-size attractions, particularly at "midway" attractions, most of which are situated in highly trafficked locations in well-known locations, particularly top tourist destinations, with highly recognized individual brands (e.g., Madame Tussauds, SeaLife, the Dungeons, etc.). Similarly, with 20.9 million visitors in 2018, Parques Reunidos was the tenth most attended operator globally, with a strategy of focusing largely on a wide variety of attraction types, including amusement parks, zoos, aquariums, and IECs, primarily located in the EMEA region, but with a growing portfolio in North America (via its subsidiary Palace Entertainment). Clearly both Merlin Entertainments and Parques Reunidos have developed effective strategies to attract large numbers of visitors overall to their respective attraction portfolios, but a combination of factors such as their location, focus, and scale, inhibits most of their properties from reaching levels for inclusion in the Theme Index.

TEA and AECOM express thanks to the numerous park and museum operators who graciously and generously furnished attendance information, enabling this report to be as complete and accurate as possible.

About AECOM
AECOM is built to deliver a better world. We design, build, finance and operate critical infrastructure assets for governments, businesses and organizations. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A *Fortune 500* firm, AECOM had revenue of approximately $20.2 billion during fiscal year 2018. See how we deliver what others can only imagine at aecom.com and @AECOM.

See how we deliver what others can only imagine at aecom.com and @AECOM.

About the Themed Entertainment Association (TEA)
Through its activities in the global themed entertainment community, TEA leads the conversation about how great guest experiences are conceived and realized, and helps focus attention on themed entertainment as a vital niche of popular culture, and its essential role in global economic development. As a nonprofit membership association representing the creators of compelling places and experiences worldwide, TEA encompasses some 1,700 member companies and produces a full calendar of conferences and events including the prestigious, annual TEA Thea Awards. TEA was founded in 1991 and is headquartered in the Los Angeles area.

Visit www.teaconnect.org. On Twitter: @TEA_Connect.

This version of the Theme and Museum Index and previous versions back to 2006 can be downloaded at the following links:

aecom.com/theme-index
teaconnect.org/resources/theme-index

v1.1

SeaWorld Entertainment

2020 Financial Goal

August 6, 2018

Cautionary Statements

This presentation contains “forward-looking statements” within the meaning of U.S. federal securities laws. All statements contained in this presentation other than statements of historical facts are forward-looking statements. You can identify forward-looking statements by the use of words such as “might,” “will,” “may,” “should,” “estimates,” “expects,” “continues,” “contemplates,” “anticipates,” “projects,” “plans,” “potential,” “predicts,” “intends,” “believes,” “forecasts,” “future,” “targeted”, “goal” and other similar expressions.

Although the Company believes that these statements are based upon reasonable assumptions, it cannot guarantee any future results and readers are cautioned not to place undue reliance on these forward-looking statements, which reflect management’s opinions only as of the date of this presentation. There can be no assurance that (i) the Company has correctly measured or identified all of the factors affecting its business or the extent of these factors' likely impact, (ii) the available information with respect to these factors on which the Company’s analysis is based is complete or accurate, (iii) such analysis is correct or (iv) the Company’s strategy, which is based in part on this analysis, will be successful. Forward-looking statements speak only as of the date the statements are made. The Company assumes no obligation to update forward-looking statements to reflect actual results, subsequent events or circumstances or other changes affecting forward-looking information except to the extent required by applicable securities laws. There can be no assurance that management’s expectations, beliefs, estimates and projections will be achieved and actual results may differ materially from what is expressed in or indicated by the forward-looking statements.

These forward-looking statements are subject to a number of risks, uncertainties and other important factors, many of which are beyond management’s control, that could cause actual results to differ materially from the forward-looking statements contained in this presentation, including among others: a decline in discretionary consumer spending or consumer confidence; various factors beyond management’s control adversely affecting attendance and guest spending at the Company’s theme parks, including the potential spread of contagious diseases; any risks affecting the markets in which the Company operates, such as natural disasters, severe weather and travel-related disruptions or incidents; increased labor costs and employee health and welfare benefits; complex federal and state regulations governing the treatment of animals, which can change, and claims and lawsuits by activist groups; incidents or adverse publicity concerning the Company’s theme parks; any adverse judgments or settlements resulting from legal proceedings as well as risks relating to audits, inspections and investigations by, or requests for information from, various federal and state regulatory agencies; cyber security risks and the failure to maintain the integrity of internal or guest data; inability to protect the Company’s intellectual property or the infringement on intellectual property rights of others; risks associated with the Company’s cost optimization program, capital allocation plans, share repurchases and financing transactions; and other risks, uncertainties and factors set forth in the section entitled “Risk Factors” in the Company’s most recently available Annual Report on Form 10-K, as such risks, uncertainties and factors may be updated in the Company’s periodic filings with the Securities and Exchange Commission (“SEC”). Readers are advised to review the Company’s filings with the SEC (which are available from the SEC’s EDGAR database at www.sec.gov and via the Company’s website at www.seaworldinvestors.com).

This presentation includes Adjusted EBITDA, a financial metric which is not calculated in accordance with the generally accepted accounting principles in the United States (“GAAP”).

This metric has important limitations and should not be considered in isolation or as a substitute for measures of the Company’s financial performance or liquidity prepared in accordance with GAAP. In addition, this metric, as presented by the Company, may not be comparable to similarly titled measures of other companies due to varying methods of calculation.

As used in the presentation, Adjusted EBITDA is defined as set forth in the Company’s existing credit agreement governing the Company’s senior secured credit facilities. For a reconciliation of historical Adjusted EBITDA to net income (loss), please refer to the Appendix to this presentation. However, the Company has not reconciled the forward-looking Adjusted EBITDA long-term goal included in this presentation to the most directly comparable GAAP financial measure because this cannot be done without unreasonable effort due to the seasonal nature of the Company’s business and the high variability, complexity and low visibility with respect to amounts for disposition of assets, income taxes and other expenses and adjusting items which are excluded from the calculation of Adjusted EBITDA. For the same reasons, the Company is unable to assess the probable significance of the unavailable information, which could have a potentially significant impact on its future GAAP financial results.

Illustrative Roadmap to $475 to $500 Million of Adjusted EBITDA by end of 2020[1]

SEAWORLD ENTERTAINMENT

	2017A	3-yr. change	Impact on Adj. EBITDA	Drivers / commentary
Attendance	**20.8mm**	**~+1.3 – 1.6mm** *Annual % inc.: ~+2.0% – 2.5%*	**~$62 - 75mm[2]**	• Annual attendance growth of ~1.0% plus ~20% to 25% recapture of attendance loss over last 5 years driven by: – Improved marketing / communications strategy – Revamped capital strategy – Re-focused season pass strategy
Total revenue per capita	**$60.74**	**~$3.24 – $3.72** *Annual % inc.: ~+1.75% – 2.0%*	**~$61 - 70mm[3]**	• Annual pricing growth of ~1.75% to 2.0% • Improved revenue management • Improved execution on in-park opportunities
Cost savings	**$962mm[4]**	**~$50mm** *Total % change: (~5.2%)*	**~$50mm**	• Heightened focus on cost efficiencies • Narrow and close gap to competitors
Total	**$301mm**	**~$175mm - $200mm**	**Total '20E Adj. EBITDA: ~$475mm - $500mm**	• Expected impact from above three drivers
Target annual capex[5]		**~$150mm[6]**		• Renewed, disciplined focus on efficiency of spend and ROI • New rides / attractions / shows / events in every park, every year

[1] Forward Looking Statements – see "Cautionary Statements" on slide 2; Adjusted EBITDA is defined in the Company's credit agreement;
[2] Assumes 80% Adjusted EBITDA flow-through;
[3] Assumes 90% Adjusted EBITDA flow-through;
[4] Calculated as 2017 actual Total Revenues less Adjusted EBITDA;
[5] Target annual capital expenditures of ~$150mm after 2018; ~$175mm of capital expenditures in 2018;
[6] Excludes potential ROI projects such as New Parks, Hotels, etc.

Illustrative Roadmap to $475 to $500 Million of Adjusted EBITDA by end of 2020[1] (cont'd)

SeaWorld Entertainment

Attendance (000s)

(000's)		
Peak annual attendance[2]	24,391	
Less: 2017A Annual attendance	20,798	
Total attendees lost	**(3,593)**	
A **Base attendance growth of 1% per annum**		
2017A Annual attendance	20,798	
Assumed annual growth rate	*1%*	
2020E Illustrative annual attendance from base growth	**21,428**	
Change in attendance	*630*	
B **2020 attendance regained**		
Attendance growth (2017A - 2020E)	1,300	1,600
Less: Base attendance growth	(630)	(630)
Required growth beyond base to achieve goal	**670**	**970**
Regained customers as % of attendees lost	**19%**	**27%**

Commentary

- Attendees lost over recent period (past 5 years)
- Assumes 50% of historical industry base growth rate throughout 3-year period [3]
- Assumed industry base growth
- Represents modest percentage of initial attendee base lost since 2012A

- **Attendance growth assumptions based on:**
  - **1% base growth**
  - **Recapturing ~20% to ~25% of lost attendance**
- **Q2 YTD already up ~700k**

[1] *Forward Looking Statements – see "Cautionary Statements" on slide 2; Adjusted EBITDA is defined in the Company's credit agreement;*
[2] *Peak annual attendance since 2012A;*
[3] *10-year growth rate of 20 largest theme parks in North America ~2% from 2007-2017. Source: AECOM and TEA Theme and Museum Index : The Global Attractions Attendance Report.*

Appendix

Reconciliation of Non-GAAP Financial Measures

$ in millions

	Fiscal Year 2017
Net loss	**($202)**
Benefit from income taxes	(85)
Loss on early extinguishment of debt and write-off of discounts and debt issuance costs	8
Interest expense	78
Depreciation & amortization	163
Goodwill impairment charges	269
Equity-based compensation expense	23
Loss on impairment or disposal of assets	12
Business optimization, development and strategic initiative costs	15
Certain investment costs and franchise taxes	8
Other adjusting items	1
Estimated cost savings	10
Adjusted EBITDA[1]	**$301**

Note: Column may not foot due to rounding.
[1] Adjusted EBITDA is defined in the Company's credit agreement

APPENDIX B

INTERSECTION AND SEGMENT MANUAL COUNT SHEETS, CALTRANS DATA

Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#01	File Name:	ITM-19-093-01
Intersection:	Sea World Drive & I-5 Northbound Ramps	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World

AM	I-5 Northbound On Ramp			Sea World Drive			I-5 Northbound Off Ramp			Sea World Drive			
	Southbound			**Westbound**			**Northbound**			**Eastbound**			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	0	0	0	66	71	38	3	76	195	52	0	501
7:15	0	0	0	0	82	85	40	0	74	214	81	0	576
7:30	0	0	0	0	92	84	51	2	57	233	90	0	609
7:45	0	0	0	0	67	71	54	4	96	219	112	0	623
8:00	0	0	0	0	95	66	60	1	81	199	112	0	614
8:15	0	0	0	0	91	60	49	1	87	198	103	0	589
8:30	0	0	0	0	97	68	70	3	77	204	129	0	648
8:45	0	0	0	0	106	58	66	5	102	192	105	0	634
Total	0	0	0	0	696	563	428	19	650	1654	784	0	4794
Approach%	-	-	-	-	55.3	44.7	39.0	1.7	59.3	67.8	32.2	-	
Total%	-	-	-	-	14.5	11.7	8.9	0.4	13.6	34.5	16.4	-	

AM Intersection Peak Hour: **08:00 to 09:00**

	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right	Total
Volume	-	-	-	-	389	252	245	10	347	793	449	-	2,485
Approach%	-	-	-	-	60.7	39.3	40.7	1.7	57.6	63.8	36.2	-	
Total%	-	-	-	-	15.7	10.1	9.9	0.4	14.0	31.9	18.1	-	
PHF			#DIV/0!			0.97			0.87			0.93	0.96

PM	I-5 Northbound On Ramp			Sea World Drive			I-5 Northbound Off Ramp			Sea World Drive			
	Southbound			**Westbound**			**Northbound**			**Eastbound**			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	0	0	0	83	82	74	0	125	169	117	0	650
16:15	0	0	0	0	84	85	64	0	119	210	95	0	657
16:30	0	0	0	0	90	70	68	2	123	201	123	0	677
16:45	0	0	0	0	98	77	71	1	121	189	130	0	687
17:00	0	0	0	0	121	86	52	1	124	182	110	0	676
17:15	0	0	0	0	120	82	69	0	139	181	100	0	691
17:30	0	0	0	0	103	85	84	0	106	195	81	0	654
17:45	0	0	0	0	95	69	57	0	112	159	100	0	592
Total	0	0	0	0	794	636	539	4	969	1486	856	0	5284
Approach%	-	-	-	-	55.5	44.5	35.6	0.3	64.1	63.5	36.5	-	
Total%	-	-	-	-	15.0	12.0	10.2	0.1	18.3	28.1	16.2	-	

PM Intersection Peak Hour: **16:30 to 17:30**

	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right	Total
Volume	-	-	-	-	429	315	260	4	507	753	463	-	2,731
Approach%	-	-	-	-	57.7	42.3	33.7	0.5	65.8	61.9	38.1	-	
Total%	-	-	-	-	15.7	11.5	9.5	0.1	18.6	27.6	17.0	-	
PHF			#DIV/0!			0.90			0.93			0.94	0.99

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#01	File Name: ITM-19-093-01
Intersection:	Sea World Drive & I-5 Northbound Ramps	Project: LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019	Sea World

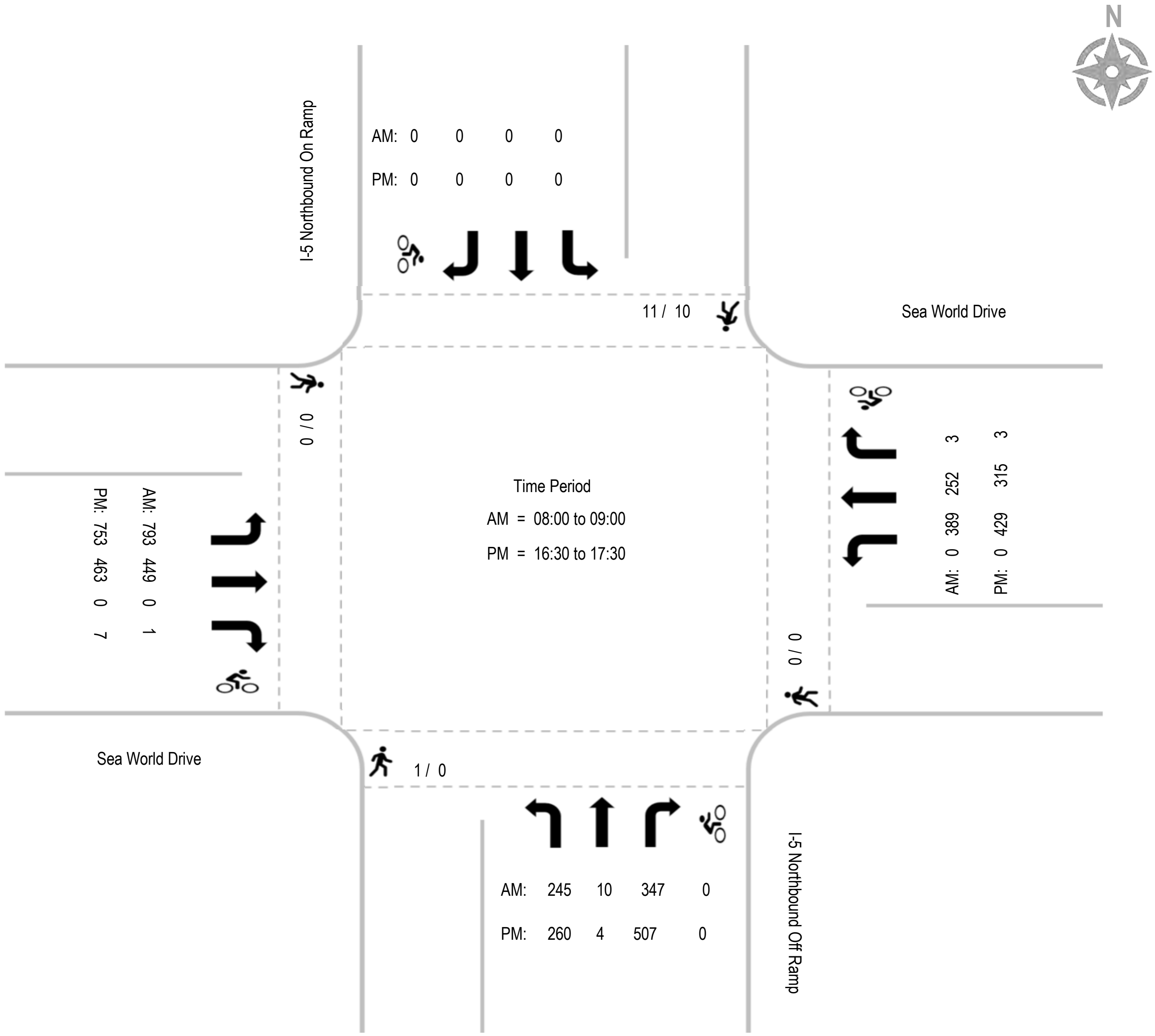
AM	I-5 Northbound On Ramp				Sea World Drive				I-5 Northbound Off Ramp				Sea World Drive				Totals	
	Southbound				**Westbound**				**Northbound**				**Eastbound**					
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2	1
7:30	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1
7:45	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
8:00	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8:15	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1
8:30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8:45	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Ped Total	11				0				1				0				12	
Bike Total		0	0	0		0	3	0		0	0	0		0	1	0		4

PM	I-5 Northbound On Ramp				Sea World Drive				I-5 Northbound Off Ramp				Sea World Drive				Totals	
	Southbound				**Westbound**				**Northbound**				**Eastbound**					
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
16:15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1
16:30	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1
17:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
17:30	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
17:45	3	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	3	3
Ped Total	10				0				0				0				10	
Bike Total		0	0	0		0	3	0		0	0	0		0	7	0		10

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers

Location:	#01	File Name:	ITM-19-093-01
Intersection:	Sea World Drive & I-5 Northbound Ramps	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#02	File Name:	ITM-19-093-02
Intersection:	Sea World Drive & I-5 Southbound Ramps	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World

AM	I-5 Southbound Off Ramp			Sea World Drive			I-5 Southbound On Ramp			Sea World Drive			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	29	0	128	60	56	0	0	0	0	0	235	18	526
7:15	39	0	169	61	64	0	0	0	0	0	276	13	622
7:30	39	0	165	76	77	0	0	0	0	0	303	14	674
7:45	48	0	183	63	50	0	0	0	0	0	266	14	624
8:00	51	0	150	58	76	0	0	0	0	0	224	10	569
8:15	51	0	175	48	88	0	0	0	0	0	215	6	583
8:30	75	0	149	66	99	0	0	0	0	0	264	13	666
8:45	50	0	141	66	72	0	0	0	0	0	208	19	556
Total	382	0	1260	498	582	0	0	0	0	0	1991	107	4820
Approach%	23.3	-	76.7	46.1	53.9	-	-	-	-	-	94.9	5.1	
Total%	7.9	-	26.1	10.3	12.1	-	-	-	-	-	41.3	2.2	

AM Intersection Peak Hour: **07:15 to 08:15**

Volume	177	-	667	258	267	-	-	-	-	-	1,069	51	2,489
Approach%	21.0	-	79.0	49.1	50.9	-	-	-	-	-	95.4	4.6	
Total%	7.1	-	26.8	10.4	10.7	-	-	-	-	-	42.9	2.0	
PHF			0.91			0.86			#DIV/0!			0.88	0.92

PM	I-5 Southbound Off Ramp			Sea World Drive			I-5 Southbound On Ramp			Sea World Drive			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	49	0	245	38	104	0	0	0	0	0	256	51	743
16:15	46	0	212	32	120	0	0	0	0	0	286	41	737
16:30	38	0	225	42	131	0	0	0	0	0	241	35	712
16:45	48	0	240	46	125	0	0	0	0	0	279	50	788
17:00	40	0	223	69	92	0	0	0	0	0	244	47	715
17:15	30	0	260	45	136	0	0	0	0	0	235	51	757
17:30	31	0	242	38	142	0	0	0	0	0	241	52	746
17:45	46	0	277	55	103	0	0	0	0	0	212	59	752
Total	328	0	1924	365	953	0	0	0	0	0	1994	386	5950
Approach%	14.6	-	85.4	27.7	72.3	-	-	-	-	-	83.8	16.2	
Total%	5.5	-	32.3	6.1	16.0	-	-	-	-	-	33.5	6.5	

PM Intersection Peak Hour: **16:45 to 17:45**

Volume	149	-	965	198	495	-	-	-	-	-	999	200	3,006
Approach%	13.4	-	86.6	28.6	71.4	-	-	-	-	-	83.3	16.7	
Total%	5.0	-	32.1	6.6	16.5	-	-	-	-	-	33.2	6.7	
PHF			0.96			0.96			#DIV/0!			0.91	0.95

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers

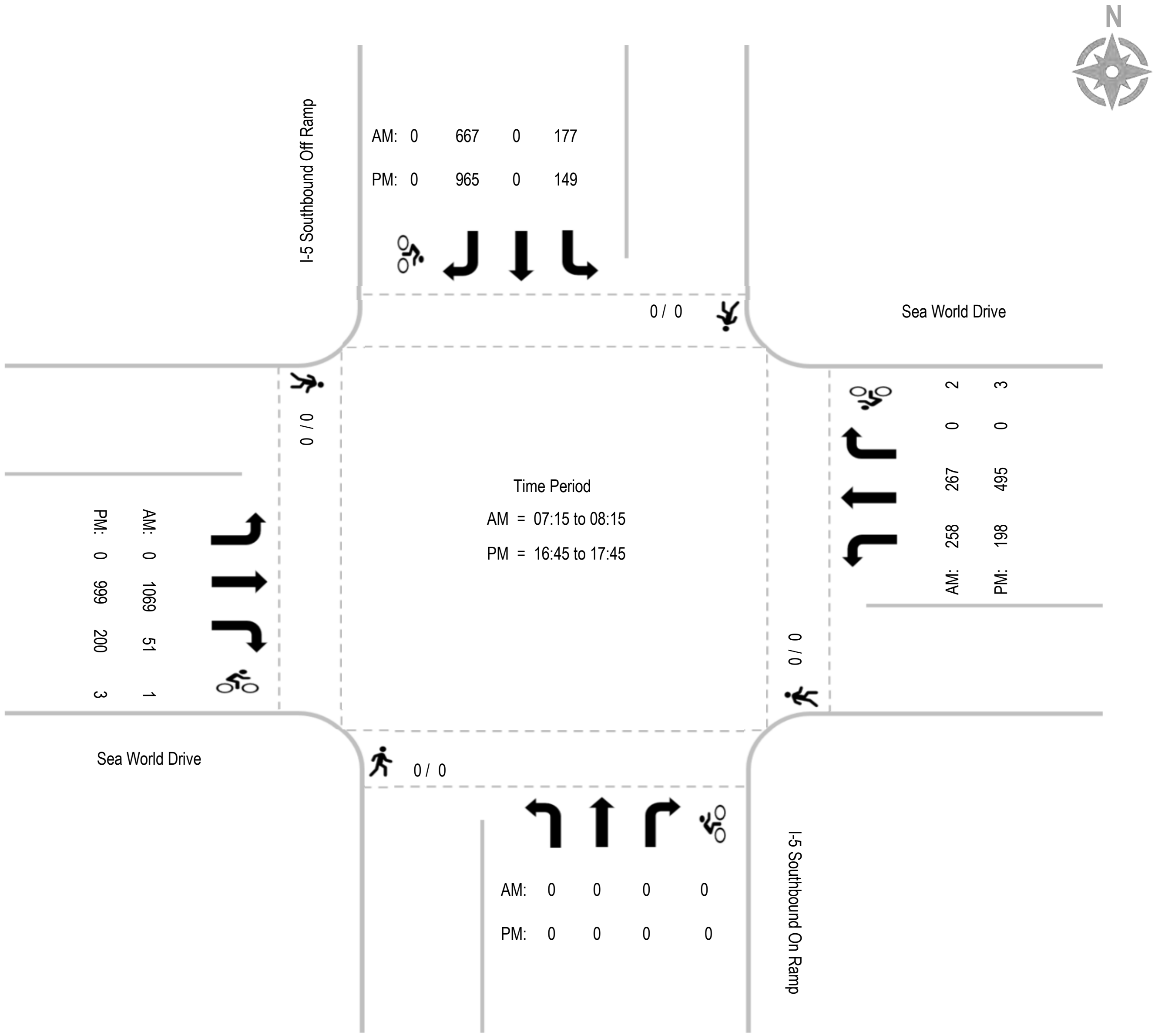
Location:	#02	File Name:	ITM-19-093-02
Intersection:	Sea World Drive & I-5 Southbound Ramps	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World

AM	I-5 Southbound Off Ramp Southbound				Sea World Drive Westbound				I-5 Southbound On Ramp Northbound				Sea World Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	2	0		0	0	0		0	1	0		3

PM	I-5 Southbound Off Ramp Southbound				Sea World Drive Westbound				I-5 Southbound On Ramp Northbound				Sea World Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		1	2	0		0	0	0		0	3	0		6

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers	Location:	#02	File Name:	ITM-19-093-02
	Intersection:	Sea World Drive & I-5 Southbound Ramps	Project:	LLG Ref. 3-96-0691
	Date of Count:	Wednesday, August 14, 2019		Sea World



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#03	File Name: ITM-19-093-03
Intersection:	Sea World Drive & Pacific Highway & East Mission Bay Drive	Project: LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019	Sea World

AM	Sea World Drive Southbound			Pacific Highway Westbound			Sea World Drive Northbound			East Mission Bay Drive Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	19	131	27	5	18	7	20	234	13	21	7	12	514
7:15	24	174	34	4	30	21	30	217	15	14	6	16	585
7:30	29	158	43	6	34	16	39	271	12	13	1	17	639
7:45	40	171	44	16	40	20	63	253	14	14	9	18	702
8:00	33	185	43	6	20	13	52	237	20	17	11	21	658
8:15	32	187	33	17	23	19	40	252	14	15	4	22	658
8:30	19	162	59	6	17	16	69	277	7	21	9	22	684
8:45	32	185	47	13	13	13	63	252	8	11	8	22	667
Total	228	1353	330	73	195	125	376	1993	103	126	55	150	5107
Approach%	11.9	70.8	17.3	18.6	49.6	31.8	15.2	80.6	4.2	38.1	16.6	45.3	
Total%	4.5	26.5	6.5	1.4	3.8	2.4	7.4	39.0	2.0	2.5	1.1	2.9	

AM Intersection Peak Hour: **07:45 to 08:45**

Volume	124	705	179	45	100	68	224	1,019	55	67	33	83	2,702
Approach%	12.3	69.9	17.8	21.1	46.9	31.9	17.3	78.5	4.2	36.6	18.0	45.4	
Total%	4.6	26.1	6.6	1.7	3.7	2.5	8.3	37.7	2.0	2.5	1.2	3.1	
PHF			0.97			0.70			0.92			0.88	0.96

PM	Sea World Drive Southbound			Pacific Highway Westbound			Sea World Drive Northbound			East Mission Bay Drive Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	28	295	29	31	12	22	34	265	20	39	24	47	846
16:15	34	255	45	22	21	26	39	246	17	33	32	68	838
16:30	29	292	48	44	18	45	30	313	32	42	31	57	981
16:45	31	283	62	36	23	39	38	309	35	52	22	54	984
17:00	39	259	44	51	12	47	66	238	33	36	39	59	923
17:15	41	357	39	30	14	35	45	270	24	39	44	74	1012
17:30	32	309	48	37	12	29	33	261	37	51	36	55	940
17:45	48	265	54	22	8	35	66	232	44	24	37	70	905
Total	282	2315	369	273	120	278	351	2134	242	316	265	484	7429
Approach%	9.5	78.1	12.4	40.7	17.9	41.4	12.9	78.3	8.9	29.7	24.9	45.4	
Total%	3.8	31.2	5.0	3.7	1.6	3.7	4.7	28.7	3.3	4.3	3.6	6.5	

PM Intersection Peak Hour: **16:30 to 17:30**

Volume	140	1,191	193	161	67	166	179	1,130	124	169	136	244	3,900
Approach%	9.2	78.1	12.7	40.9	17.0	42.1	12.5	78.9	8.7	30.8	24.8	44.4	
Total%	3.6	30.5	4.9	4.1	1.7	4.3	4.6	29.0	3.2	4.3	3.5	6.3	
PHF			0.87			0.90			0.94			0.87	0.96

Intersection Turning Movement - Bicycle & Pedestrian Count

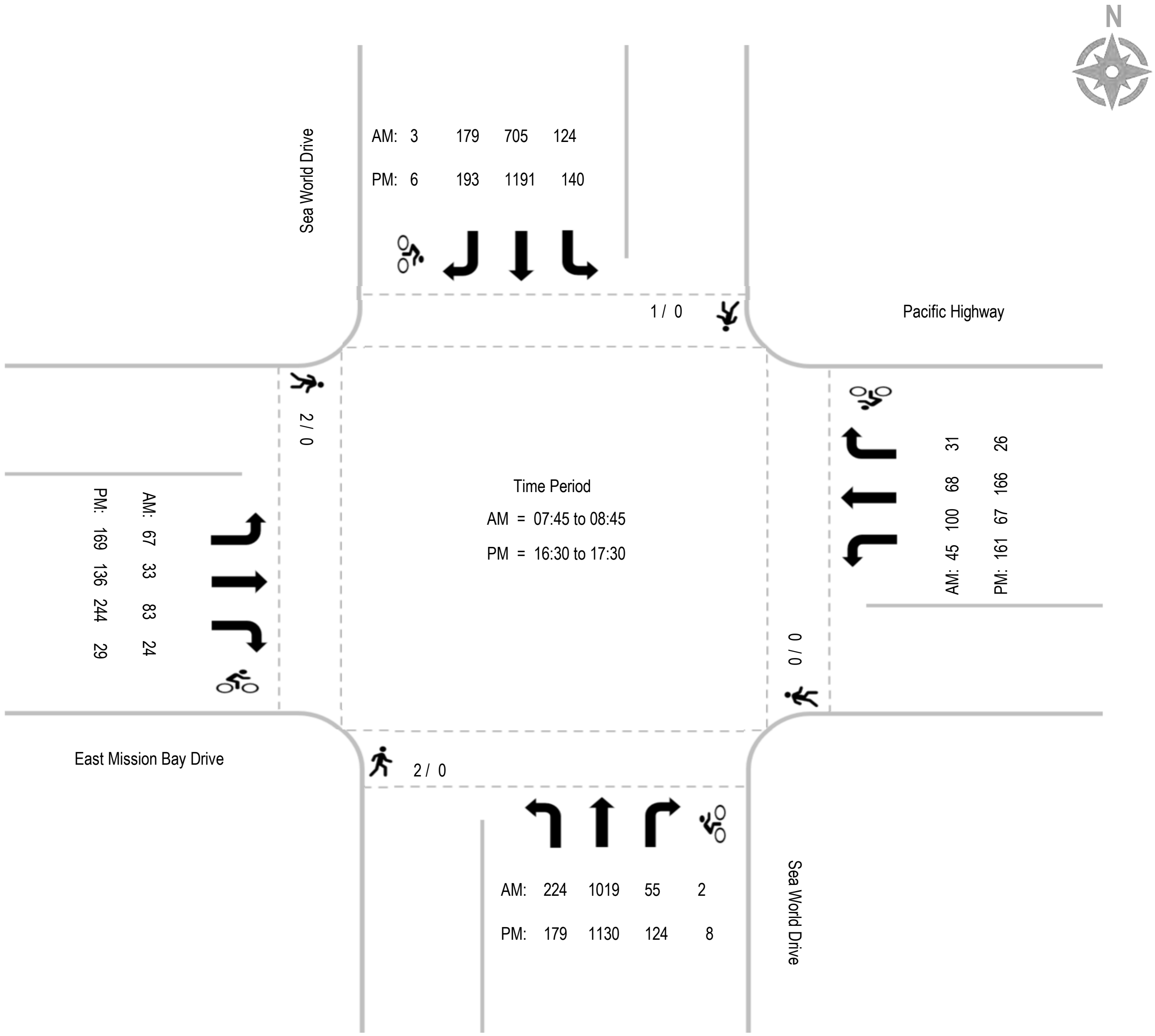
LINSCOTT LAW & GREENSPAN engineers	Location:	#03	File Name:	ITM-19-093-03
	Intersection:	Sea World Drive & Pacific Highway & East Mission Bay Drive	Project:	LLG Ref. 3-96-0691
	Date of Count:	Wednesday, August 14, 2019		Sea World

AM	Sea World Drive Southbound				Pacific Highway Westbound				Sea World Drive Northbound				East Mission Bay Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	4
7:15	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	3	0	7
7:30	0	0	0	0	0	0	3	0	1	0	0	0	1	0	1	0	2	4
7:45	0	0	0	0	0	0	3	0	1	0	0	0	1	0	0	1	2	4
8:00	0	0	0	0	0	0	6	0	0	0	0	0	0	0	4	2	0	12
8:15	0	0	1	0	0	0	8	0	0	0	0	0	0	0	2	1	0	12
8:30	0	0	0	0	0	0	4	0	0	0	0	0	0	0	2	5	0	11
8:45	0	0	0	2	0	1	3	0	0	0	0	0	0	0	0	0	0	6
Ped Total	1				0				2				2				5	
Bike Total		0	1	2		1	30	0		1	1	0		0	10	14		60

PM	Sea World Drive Southbound				Pacific Highway Westbound				Sea World Drive Northbound				East Mission Bay Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	0	5
16:15	0	0	0	0	0	1	1	0	0	1	0	0	0	0	2	1	0	6
16:30	0	1	0	0	0	0	3	0	0	1	2	1	0	0	2	0	0	10
16:45	0	0	1	0	0	0	3	0	0	0	1	0	0	0	2	1	0	8
17:00	0	0	0	0	0	1	2	1	0	0	0	0	0	0	5	0	0	9
17:15	0	0	1	0	0	1	5	0	0	0	1	0	0	1	1	2	0	12
17:30	0	0	0	1	0	0	4	0	0	0	0	0	0	0	2	1	0	8
17:45	0	0	1	1	0	0	1	2	0	0	0	0	0	0	4	2	0	11
Ped Total	0				0				0				0				0	
Bike Total		1	3	2		4	19	3		2	4	2		2	19	8		69

Intersection Turning Movement - Peak Hour Summary

Location:	#03	File Name:	ITM-19-093-03
Intersection:	Sea World Drive & Pacific Highway & East Mission Bay Drive	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#04	File Name: ITM-19-093-04
Intersection:	Sea World Drive & Friars Road	Project: LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019	Sea World

AM	Sea World Drive Southbound			Friars Road Westbound			Sea World Drive Northbound			- Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	24	110	0	25	0	24	0	216	23	0	0	0	422
7:15	37	128	0	50	0	29	0	220	31	0	0	0	495
7:30	29	127	0	45	0	36	0	283	36	0	0	0	556
7:45	28	161	0	57	0	48	0	252	50	0	0	0	596
8:00	29	166	0	47	0	37	0	282	47	0	0	0	608
8:15	41	181	0	63	0	43	0	249	52	0	0	0	629
8:30	29	150	0	59	0	50	0	284	71	0	0	0	643
8:45	29	166	0	57	0	33	0	217	52	0	0	0	554
Total	246	1189	0	403	0	300	0	2003	362	0	0	0	4503
Approach%	17.1	82.9	-	57.3	-	42.7	-	84.7	15.3	-	-	-	
Total%	5.5	26.4	-	8.9	-	6.7	-	44.5	8.0	-	-	-	

AM Intersection Peak Hour: **07:45 to 08:45**

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	127	658	-	226	-	178	-	1,067	220	-	-	-	2,476
Approach%	16.2	83.8	-	55.9	-	44.1	-	82.9	17.1	-	-	-	
Total%	5.1	26.6	-	9.1	-	7.2	-	43.1	8.9	-	-	-	
PHF			0.88			0.93			0.91			#DIV/0!	0.96

PM	Sea World Drive Southbound			Friars Road Westbound			Sea World Drive Northbound			- Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	79	241	0	50	0	23	0	264	197	0	0	0	854
16:15	67	263	0	67	0	44	0	292	231	0	0	0	964
16:30	77	260	0	100	0	47	0	264	171	0	0	0	919
16:45	61	279	0	59	0	21	0	300	174	0	0	0	894
17:00	87	266	0	70	0	28	0	276	190	0	0	0	917
17:15	94	319	0	70	0	32	0	280	186	0	0	0	981
17:30	75	281	0	99	0	49	0	268	174	0	0	0	946
17:45	61	282	0	64	0	22	0	295	175	0	0	0	899
Total	601	2191	0	579	0	266	0	2239	1498	0	0	0	7374
Approach%	21.5	78.5	-	68.5	-	31.5	-	59.9	40.1	-	-	-	
Total%	8.2	29.7	-	7.9	-	3.6	-	30.4	20.3	-	-	-	

PM Intersection Peak Hour: **17:00 to 18:00**

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	317	1,148	-	303	-	131	-	1,119	725	-	-	-	3,743
Approach%	21.6	78.4	-	69.8	-	30.2	-	60.7	39.3	-	-	-	
Total%	8.5	30.7	-	8.1	-	3.5	-	29.9	19.4	-	-	-	
PHF			0.89			0.73			0.98			#DIV/0!	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

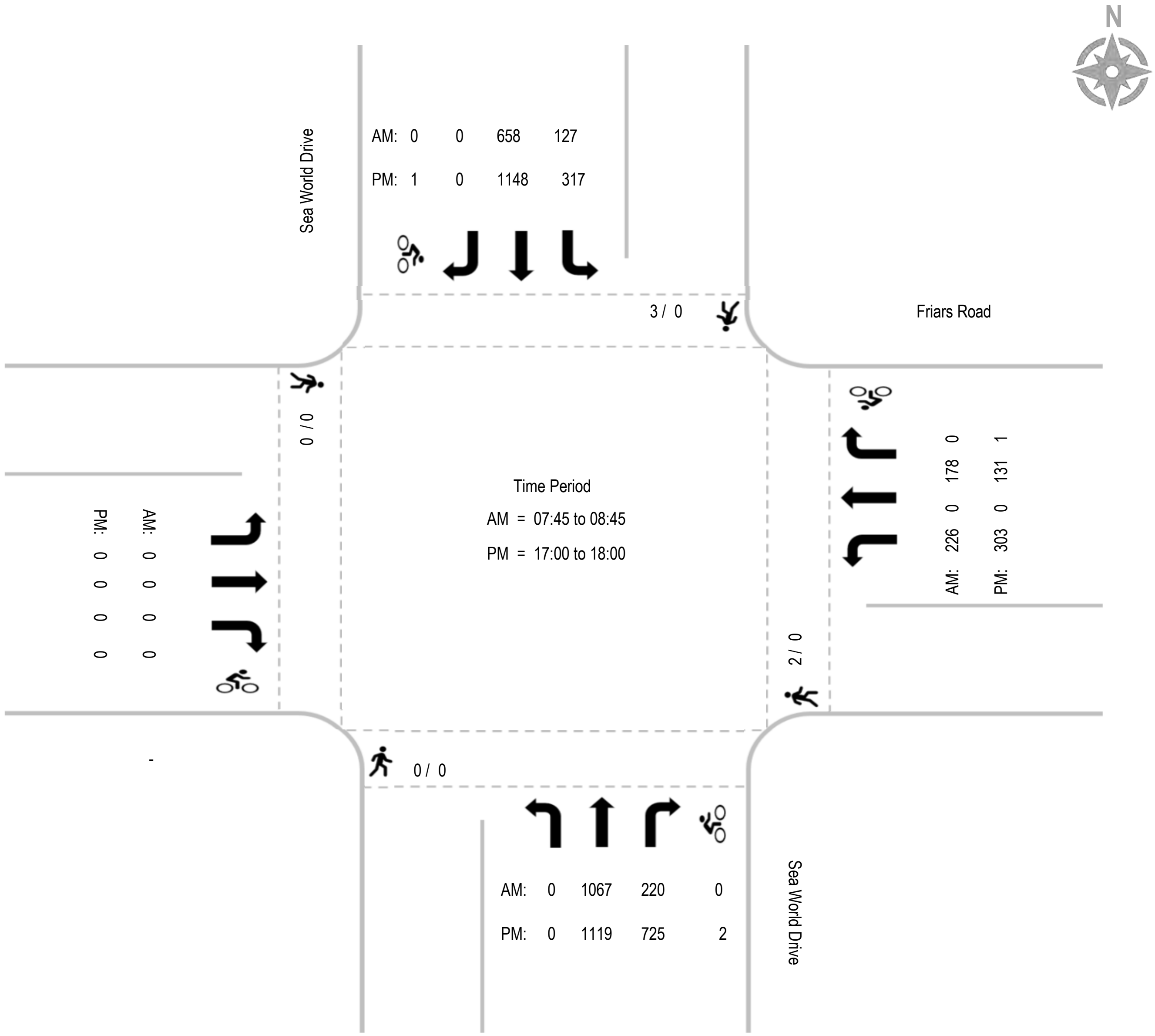
LINSCOTT LAW & GREENSPAN engineers				
	Location:	#04	File Name:	ITM-19-093-04
	Intersection:	Sea World Drive & Friars Road	Project:	LLG Ref. 3-96-0691
	Date of Count:	Wednesday, August 14, 2019		Sea World

AM	Sea World Drive Southbound				Friars Road Westbound				Sea World Drive Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0
8:15	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	3				2				0				0				5	
Bike Total		0	0	0		0	0	0		0	0	0		0	0	0		0

PM	Sea World Drive Southbound				Friars Road Westbound				Sea World Drive Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
Ped Total	0				0				0				0				0	
Bike Total		1	0	0		0	0	1		0	1	1		0	0	0		4

Intersection Turning Movement - Peak Hour Summary

Location:	#04	File Name:	ITM-19-093-04
Intersection:	Sea World Drive & Friars Road	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers			
Location:	#01	File Name:	ITM-19-092-01
Intersection:	Sea World Drive & Sea World Way (Exit)	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Sea World Way (Exit) Southbound			Sea World Drive Westbound			Sea World Way (Exit) Northbound			Sea World Drive Eastbound			
	Left	Thru	Right	U-Turn	Thru	Right	Left	Thru	Right	U-Turn	Thru	Right	Total
7:00	0	0	0	0	146	0	0	0	0	3	235	0	384
7:15	1	0	0	0	159	0	0	0	0	2	266	0	428
7:30	2	0	1	0	163	0	0	0	0	2	316	0	484
7:45	1	0	0	0	212	0	0	0	0	4	314	0	531
8:00	1	0	0	0	204	0	0	0	0	4	317	0	526
8:15	1	0	0	0	239	0	0	0	0	1	314	0	555
8:30	0	0	0	0	209	0	0	0	0	7	322	0	538
8:45	1	0	0	0	205	0	0	0	0	6	276	0	488
Total	7	0	1	0	1537	0	0	0	0	29	2360	0	3934
Approach%	87.5	-	12.5	-	100.0	-	-	-	-	1.2	98.8	-	
Total%	0.2	-	0.0	-	39.1	-	-	-	-	0.7	60.0	-	

AM Intersection Peak Hour: **07:45 to 08:45**

	Left	Thru	Right	U-Turn	Thru	Right	Left	Thru	Right	U-Turn	Thru	Right	Total
Volume	3	-	-	-	864	-	-	-	-	16	1,267	-	2,150
Approach%	100.0	-	-	-	100.0	-	-	-	-	1.2	98.8	-	
Total%	0.1	-	-	-	40.2	-	-	-	-	0.7	58.9	-	
PHF			0.75			0.90			#DIV/0!			0.97	0.97

PM	Sea World Way (Exit) Southbound			Sea World Drive Westbound			Sea World Way (Exit) Northbound			Sea World Drive Eastbound			
	Left	Thru	Right	U-Turn	Thru	Right	Left	Thru	Right	U-Turn	Thru	Right	Total
16:00	40	0	19	0	296	0	0	0	0	13	402	0	770
16:15	54	0	18	0	334	0	0	0	0	11	458	0	875
16:30	58	0	15	0	319	0	0	0	0	6	462	0	860
16:45	62	0	21	0	334	0	0	0	0	9	461	0	887
17:00	41	0	25	0	348	0	0	0	0	12	407	0	833
17:15	39	0	20	0	405	0	0	0	0	7	410	0	881
17:30	70	0	30	0	364	0	0	0	0	9	363	0	836
17:45	94	0	22	0	344	0	0	0	0	6	367	0	833
Total	458	0	170	0	2744	0	0	0	0	73	3330	0	6775
Approach%	72.9	-	27.1	-	100.0	-	-	-	-	2.1	97.9	-	
Total%	6.8	-	2.5	-	40.5	-	-	-	-	1.1	49.2	-	

PM Intersection Peak Hour: **16:30 to 17:30**

	Left	Thru	Right	U-Turn	Thru	Right	Left	Thru	Right	U-Turn	Thru	Right	Total
Volume	200	-	81	-	1,406	-	-	-	-	34	1,740	-	3,461
Approach%	71.2	-	28.8	-	100.0	-	-	-	-	1.9	98.1	-	
Total%	5.8	-	2.3	-	40.6	-	-	-	-	1.0	50.3	-	
PHF			0.85			0.87			#DIV/0!			0.94	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers

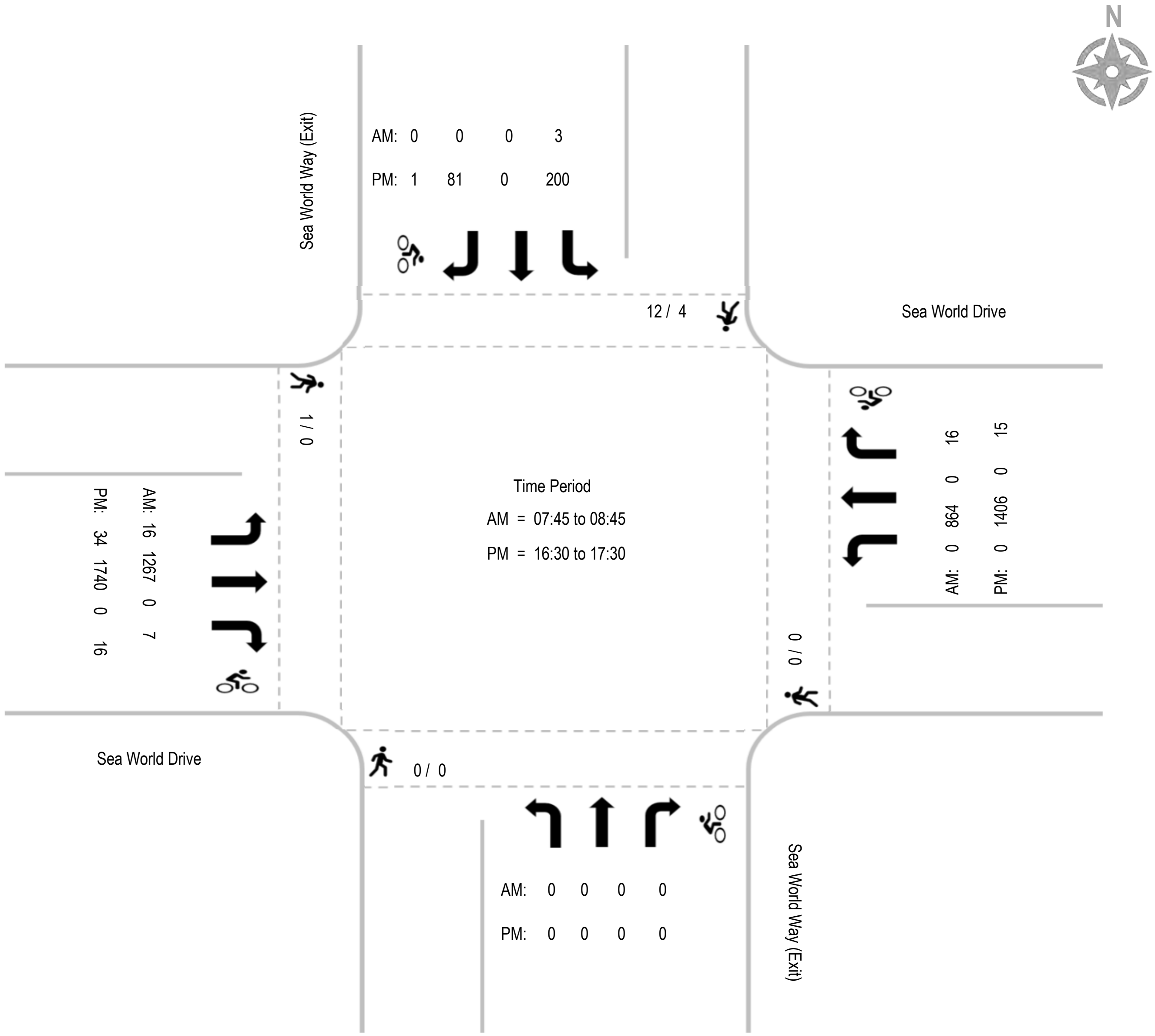
Location:	#01	File Name:	ITM-19-092-01
Intersection:	Sea World Drive & Sea World Way (Exit)	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Sea World Way (Exit) **Southbound**				Sea World Drive **Westbound**				Sea World Way (Exit) **Northbound**				Sea World Drive **Eastbound**				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
7:15	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	2
7:30	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	5
7:45	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
8:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
8:15	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	5
8:30	10	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	10	3
8:45	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	4
Ped Total	12				0				0				1				13	
Bike Total		0	0	0		0	16	0		0	0	0		0	7	0		23

PM	Sea World Way (Exit) **Southbound**				Sea World Drive **Westbound**				Sea World Way (Exit) **Northbound**				Sea World Drive **Eastbound**				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	4
16:15	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	4
16:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
16:45	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
17:00	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2	2
17:15	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	5
17:30	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	5
17:45	1	1	0	0	0	0	3	0	0	0	0	0	0	0	4	0	1	8
Ped Total	4				0				0				0				4	
Bike Total		1	0	0		0	15	0		0	0	0		0	16	0		32

Intersection Turning Movement - Peak Hour Summary

Location:	#01	File Name:	ITM-19-092-01
Intersection:	Sea World Drive & Sea World Way (Exit)	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#05	File Name: ITM-19-093-05
Intersection:	Ingraham Street & Perez Cove Way/ Dana Landing Road	Project: LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019	Sea World

AM	Ingraham Street Southbound			Perez Cove Way Westbound			Ingraham Street Northbound			Dana Landing Road Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	1	230	2	1	1	1	19	200	17	9	0	2	483
7:15	2	259	0	2	0	1	24	233	26	2	0	2	551
7:30	2	357	2	3	0	2	32	339	30	0	0	1	768
7:45	1	307	9	3	1	3	38	380	22	10	0	8	782
8:00	4	321	3	5	0	1	18	345	38	4	0	4	743
8:15	6	292	4	35	0	15	28	32	55	1	1	5	474
8:30	0	315	3	20	3	6	34	373	36	4	0	3	797
8:45	1	337	0	9	1	2	27	364	37	6	0	2	786
Total	17	2418	23	78	6	31	220	2266	261	36	1	27	5384
Approach%	0.7	98.4	0.9	67.8	5.2	27.0	8.0	82.5	9.5	56.3	1.6	42.2	
Total%	0.3	44.9	0.4	1.4	0.1	0.6	4.1	42.1	4.8	0.7	0.0	0.5	

AM Intersection Peak Hour: **07:15 to 08:15**

Volume	9	1,244	14	13	1	7	112	1,297	116	16	-	15	2,844
Approach%	0.7	98.2	1.1	61.9	4.8	33.3	7.3	85.0	7.6	51.6	-	48.4	
Total%	0.3	43.7	0.5	0.5	0.0	0.2	3.9	45.6	4.1	0.6	-	0.5	
PHF			0.88			0.75			0.87			0.43	0.91

PM	Ingraham Street Southbound			Perez Cove Way Westbound			Ingraham Street Northbound			Dana Landing Road Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	5	334	6	66	1	12	27	345	27	4	0	16	843
16:15	2	381	9	50	1	6	16	410	21	7	1	9	913
16:30	4	309	4	60	1	9	28	373	33	6	6	22	855
16:45	0	377	10	63	0	3	23	402	23	10	0	8	919
17:00	3	317	7	56	0	6	23	453	23	7	2	8	905
17:15	3	404	1	65	1	3	13	464	21	7	1	9	992
17:30	5	332	4	45	1	4	22	427	21	3	1	6	871
17:45	1	299	6	48	1	4	18	418	20	12	0	13	840
Total	23	2753	47	453	6	47	170	3292	189	56	11	91	7138
Approach%	0.8	97.5	1.7	89.5	1.2	9.3	4.7	90.2	5.2	35.4	7.0	57.6	
Total%	0.3	38.6	0.7	6.3	0.1	0.7	2.4	46.1	2.6	0.8	0.2	1.3	

PM Intersection Peak Hour: **16:45 to 17:45**

Volume	11	1,430	22	229	2	16	81	1,746	88	27	4	31	3,687
Approach%	0.8	97.7	1.5	92.7	0.8	6.5	4.2	91.2	4.6	43.5	6.5	50.0	
Total%	0.3	38.8	0.6	6.2	0.1	0.4	2.2	47.4	2.4	0.7	0.1	0.8	
PHF			0.90			0.89			0.96			0.86	0.92

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers			
Location:	#05	File Name:	ITM-19-093-05
Intersection:	Ingraham Street & Perez Cove Way/ Dana Landing Road	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World

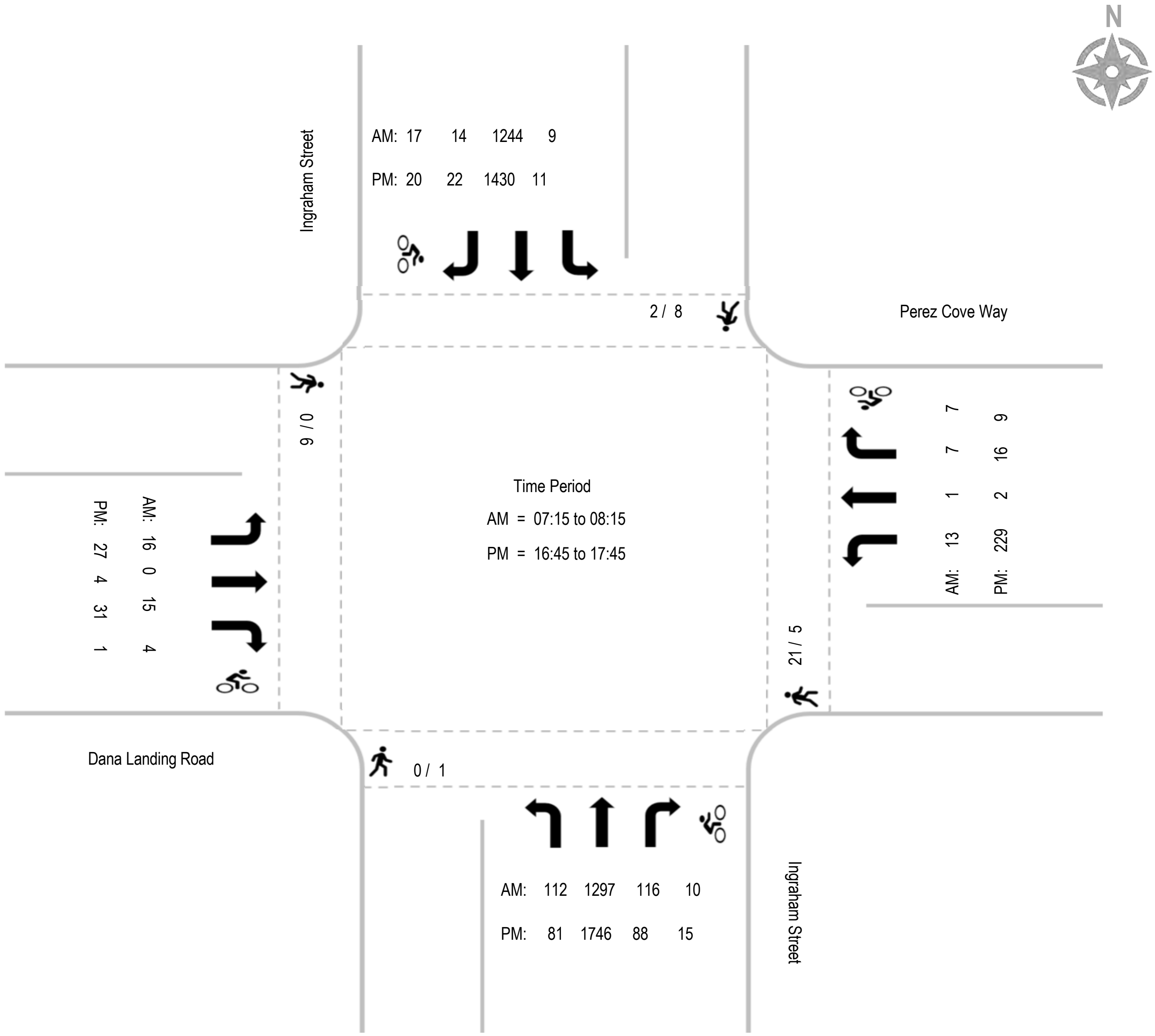
AM	Ingraham Street **Southbound**				Perez Cove Way **Westbound**				Ingraham Street **Northbound**				Dana Landing Road **Eastbound**				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	1	7	0	1	0	0	0	0	0	0	0	0	0	7	2
7:15	0	0	1	3	0	0	0	0	0	0	0	0	0	2	1	0	0	7
7:30	0	0	3	0	1	0	0	0	0	0	2	0	0	0	0	0	1	5
7:45	0	0	1	0	0	0	1	2	0	1	0	0	0	0	0	0	0	5
8:00	0	0	0	4	0	0	1	1	0	0	2	0	0	1	0	0	0	9
8:15	0	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6
8:30	2	0	1	1	13	0	0	0	0	0	0	0	0	0	0	0	15	2
8:45	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Ped Total	2				21				0				0				23	
Bike Total		0	8	9		0	4	3		1	9	0		3	1	0		38

PM	Ingraham Street **Southbound**				Perez Cove Way **Westbound**				Ingraham Street **Northbound**				Dana Landing Road **Eastbound**				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	2	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	3	2
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	1	0	0	0	0	0	0	0	0	0	3	0	2	0	1	0	3	4
16:45	0	0	3	3	1	0	2	2	0	0	0	0	0	0	0	0	1	10
17:00	0	2	5	0	1	0	1	0	0	2	5	0	0	0	0	0	1	15
17:15	0	0	0	0	1	0	1	1	0	0	2	0	0	0	0	0	1	4
17:30	3	0	1	2	0	0	1	0	0	0	1	0	2	0	0	0	5	5
17:45	2	0	3	0	2	0	1	0	1	0	1	0	1	0	0	0	6	5
Ped Total	8				5				1				6				20	
Bike Total		2	12	6		0	6	3		3	12	0		0	1	0		45

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers

Location:	#05	File Name:	ITM-19-093-05
Intersection:	Ingraham Street & Perez Cove Way/ Dana Landing Road	Project:	LLG Ref. 3-96-0691
Date of Count:	Wednesday, August 14, 2019		Sea World



Report Generated by Bearcat Enterprises LLC, DBA "Count Data" | 619-987-5136 | info@yourcountdata.com

Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#03	File Name: ITM-19-092-03
Intersection:	Ingraham Street & Vacation Road	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

AM	Ingraham Street Southbound			Vacation Road Westbound			Ingraham Street Northbound			Vacation Road Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	3	231	5	5	0	7	14	189	1	3	0	5	463
7:15	1	262	2	1	1	7	12	228	4	3	0	4	525
7:30	1	326	4	3	0	2	14	290	3	1	0	1	645
7:45	1	318	3	3	0	5	25	350	3	3	0	4	715
8:00	1	310	4	1	0	2	18	318	4	1	0	6	665
8:15	2	283	9	2	0	3	30	316	4	6	0	11	666
8:30	1	307	4	2	2	0	19	317	6	3	1	12	674
8:45	1	320	9	3	0	2	34	338	3	4	1	23	738
Total	11	2357	40	20	3	28	166	2346	28	24	2	66	5091
Approach%	0.5	97.9	1.7	39.2	5.9	54.9	6.5	92.4	1.1	26.1	2.2	71.7	
Total%	0.2	46.3	0.8	0.4	0.1	0.5	3.3	46.1	0.5	0.5	0.0	1.3	

AM Intersection Peak Hour: **08:00 to 09:00**

Volume	5	1,220	26	8	2	7	101	1,289	17	14	2	52	2,743
Approach%	0.4	97.5	2.1	47.1	11.8	41.2	7.2	91.6	1.2	20.6	2.9	76.5	
Total%	0.2	44.5	0.9	0.3	0.1	0.3	3.7	47.0	0.6	0.5	0.1	1.9	
PHF			0.95			0.85			0.94			0.61	0.93

PM	Ingraham Street Southbound			Vacation Road Westbound			Ingraham Street Northbound			Vacation Road Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	3	323	10	5	0	3	20	328	8	5	0	29	734
16:15	1	324	10	8	2	5	23	377	8	9	1	21	789
16:30	3	285	4	3	2	5	15	343	9	6	3	22	700
16:45	1	341	10	9	0	6	19	417	9	7	1	26	846
17:00	3	316	4	4	1	8	29	412	13	6	7	30	833
17:15	5	339	5	8	0	6	20	410	18	9	0	16	836
17:30	2	325	11	4	0	3	25	403	13	6	1	13	806
17:45	10	290	7	5	3	1	16	416	15	6	1	22	792
Total	28	2543	61	46	8	37	167	3106	93	54	14	179	6336
Approach%	1.1	96.6	2.3	50.5	8.8	40.7	5.0	92.3	2.8	21.9	5.7	72.5	
Total%	0.4	40.1	1.0	0.7	0.1	0.6	2.6	49.0	1.5	0.9	0.2	2.8	

PM Intersection Peak Hour: **16:45 to 17:45**

Volume	11	1,321	30	25	1	23	93	1,642	53	28	9	85	3,321
Approach%	0.8	97.0	2.2	51.0	2.0	46.9	5.2	91.8	3.0	23.0	7.4	69.7	
Total%	0.3	39.8	0.9	0.8	0.0	0.7	2.8	49.4	1.6	0.8	0.3	2.6	
PHF			0.97			0.82			0.98			0.71	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#03	File Name: ITM-19-092-03
Intersection:	Ingraham Street & Vacation Road	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

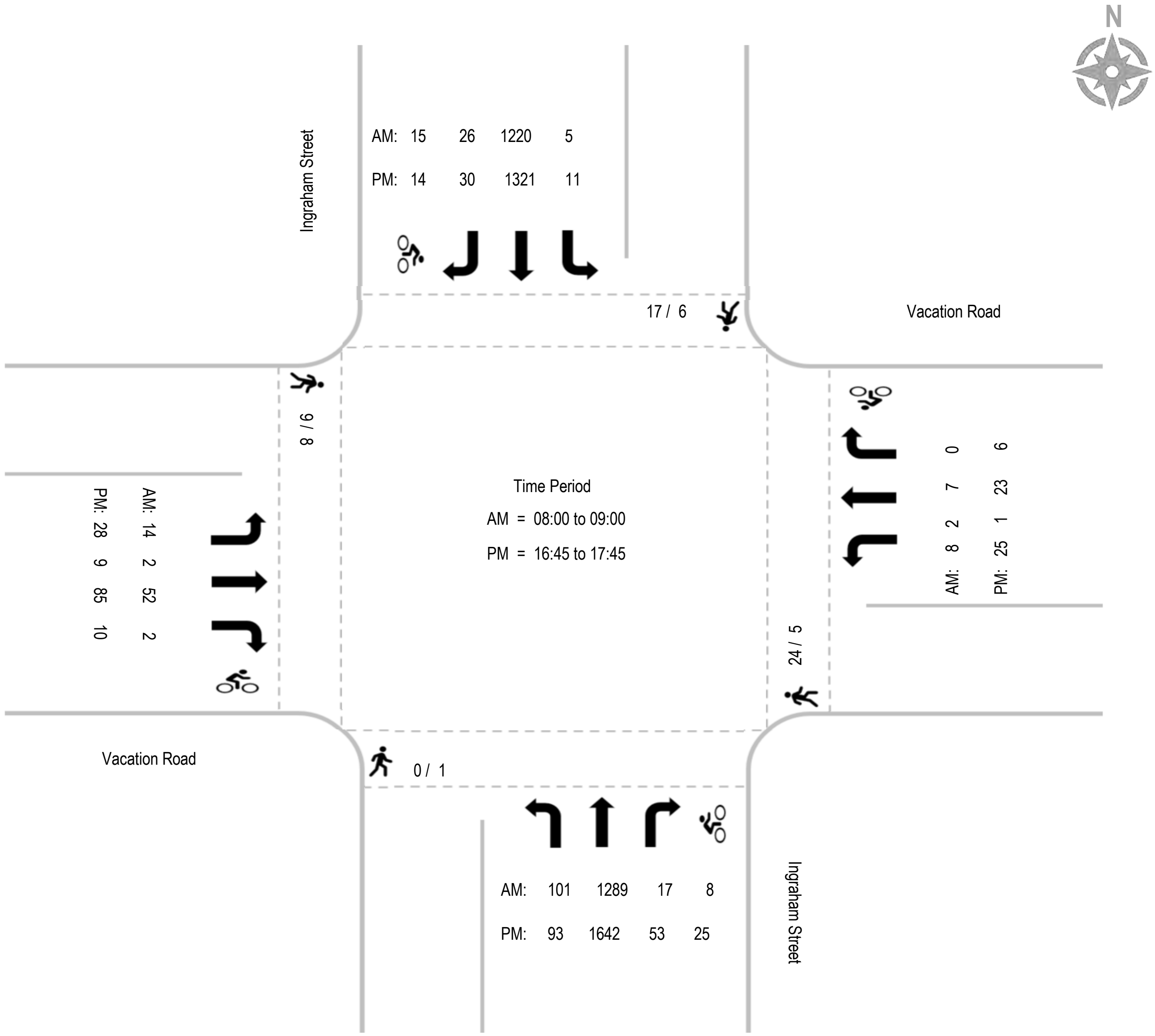
AM	Ingraham Street Southbound				Vacation Road Westbound				Ingraham Street Northbound				Vacation Road Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	4	0	0	0	10	0	0	0	0	0	0	0	3	0	0	0	17	0
7:15	2	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	3	2
7:30	0	0	1	0	1	0	0	0	0	0	3	0	0	0	0	0	1	4
7:45	5	0	3	0	0	0	0	0	0	0	0	0	4	0	0	0	9	3
8:00	2	0	3	0	1	0	0	0	0	0	2	0	0	0	0	0	3	5
8:15	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
8:30	1	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	2	4
8:45	3	0	0	0	12	0	0	0	0	0	2	0	0	0	2	0	15	4
Ped Total	17				24				0				9				50	
Bike Total		0	15	0		0	0	0		0	8	0		0	2	0		25

PM	Ingraham Street Southbound				Vacation Road Westbound				Ingraham Street Northbound				Vacation Road Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	2	3
16:15	2	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	2	3
16:30	2	0	1	0	1	0	0	0	0	0	3	0	1	0	0	0	4	4
16:45	0	0	2	0	0	0	0	0	0	0	4	0	2	0	0	0	2	6
17:00	0	0	2	0	0	0	3	0	0	0	3	0	1	0	0	1	1	9
17:15	0	0	1	1	1	0	0	0	0	0	5	0	1	0	2	0	2	9
17:30	0	0	1	0	1	0	0	0	1	0	4	0	2	0	1	1	4	7
17:45	0	0	4	0	2	0	0	1	0	0	6	0	1	0	2	1	3	14
Ped Total	6				5				1				8				20	
Bike Total		0	13	1		0	3	3		0	25	0		1	5	4		55

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers

Location:	#03	File Name:	ITM-19-092-03
Intersection:	Ingraham Street & Vacation Road	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#02	File Name:	ITM-19-092-02
Intersection:	Ingraham Street & Crown Point Drive	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Ingraham Street Southbound			Crown Point Drive Westbound			Ingraham Street Northbound			Crown Point Drive Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	132	0	46	0	1	39	118	41	0	0	67	444
7:15	0	148	0	40	1	0	37	158	51	0	0	77	512
7:30	0	179	0	66	1	2	41	194	66	0	0	104	653
7:45	2	144	0	64	2	1	53	232	76	0	1	109	684
8:00	0	157	0	71	1	1	52	216	59	0	1	96	654
8:15	0	150	0	52	2	0	51	219	53	0	1	95	623
8:30	1	162	0	55	2	0	53	211	57	1	2	87	631
8:45	0	159	0	64	0	1	59	208	80	1	1	86	659
Total	3	1231	0	458	9	6	385	1556	483	2	6	721	4860
Approach%	0.2	99.8	-	96.8	1.9	1.3	15.9	64.2	19.9	0.3	0.8	98.9	
Total%	0.1	25.3	-	9.4	0.2	0.1	7.9	32.0	9.9	0.0	0.1	14.8	

AM Intersection Peak Hour: 07:30 to 08:30

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	2	630	-	253	6	4	197	861	254	-	3	404	2,614
Approach%	0.3	99.7	-	96.2	2.3	1.5	15.0	65.6	19.4	-	0.7	99.3	
Total%	0.1	24.1	-	9.7	0.2	0.2	7.5	32.9	9.7	-	0.1	15.5	
PHF			0.88			0.90			0.91			0.93	0.96

PM	Ingraham Street Southbound			Crown Point Drive Westbound			Ingraham Street Northbound			Crown Point Drive Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	234	0	51	2	0	72	197	89	0	2	61	708
16:15	0	237	1	49	2	1	70	217	100	2	0	72	751
16:30	0	182	1	56	0	5	77	196	81	0	2	69	669
16:45	0	243	0	48	5	3	92	228	96	0	3	69	787
17:00	0	184	1	58	5	0	71	206	126	0	3	83	737
17:15	0	206	0	62	4	3	89	235	132	2	0	83	816
17:30	0	207	0	70	1	2	85	247	91	1	1	81	786
17:45	0	170	0	57	1	1	90	218	128	0	1	63	729
Total	0	1663	3	451	20	15	646	1744	843	5	12	581	5983
Approach%	-	99.8	0.2	92.8	4.1	3.1	20.0	53.9	26.1	0.8	2.0	97.2	
Total%	-	27.8	0.1	7.5	0.3	0.3	10.8	29.1	14.1	0.1	0.2	9.7	

PM Intersection Peak Hour: 16:45 to 17:45

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	-	840	1	238	15	8	337	916	445	3	7	316	3,126
Approach%	-	99.9	0.1	91.2	5.7	3.1	19.8	53.9	26.2	0.9	2.1	96.9	
Total%	-	26.9	0.0	7.6	0.5	0.3	10.8	29.3	14.2	0.1	0.2	10.1	
PHF			0.87			0.89			0.93			0.95	0.96

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers

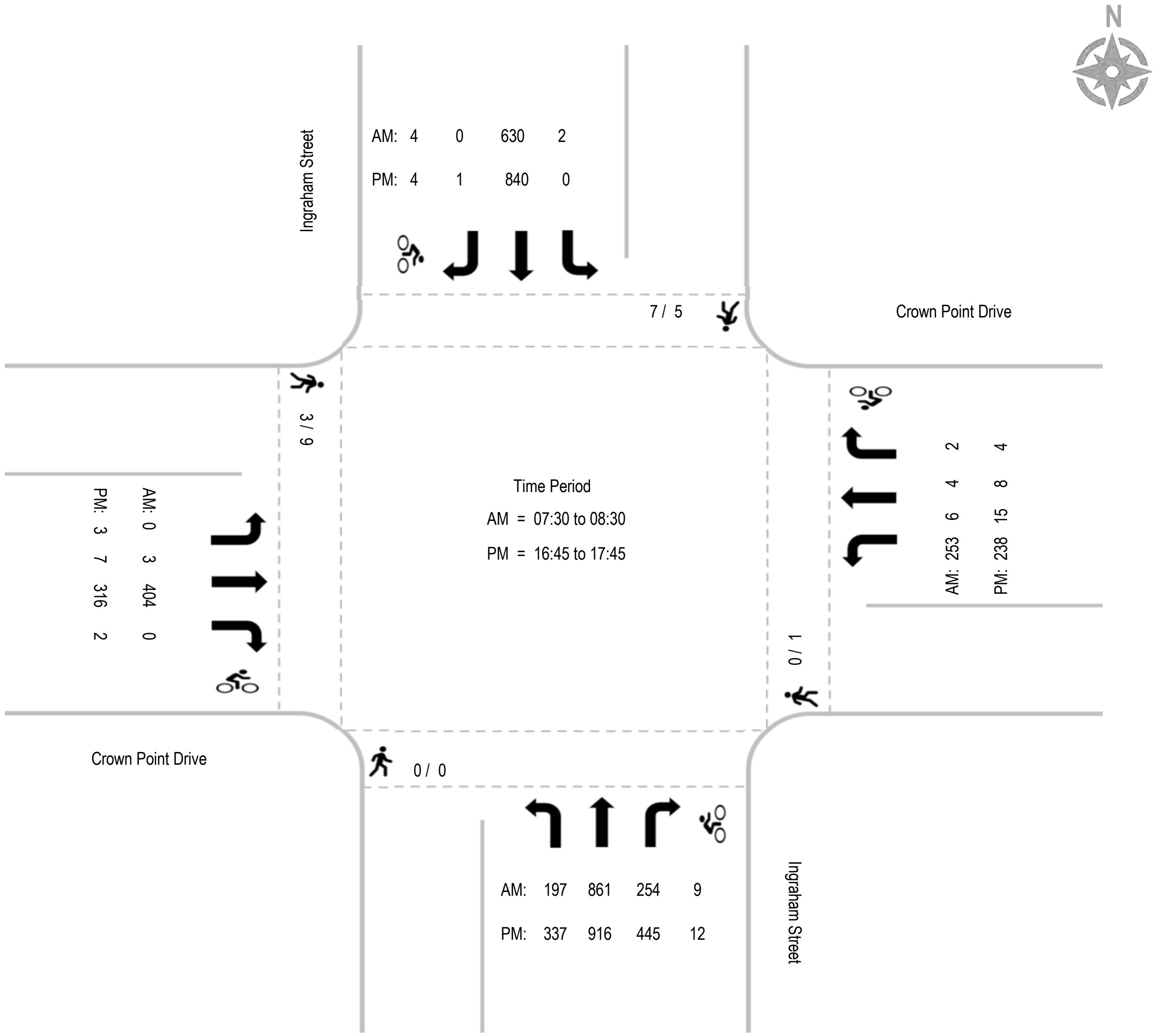
Location:	#02	File Name:	ITM-19-092-02
Intersection:	Ingraham Street & Crown Point Drive	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Ingraham Street Southbound				Crown Point Drive Westbound				Ingraham Street Northbound				Crown Point Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
7:30	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8:15	0	0	3	0	0	1	1	0	0	0	2	2	0	0	0	0	0	9
8:30	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	1	2
8:45	2	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	3	4
Ped Total	7				0				0				3				10	
Bike Total		0	4	0		1	1	0		0	3	6		0	0	0		15

PM	Ingraham Street Southbound				Crown Point Drive Westbound				Ingraham Street Northbound				Crown Point Drive Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
16:15	1	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1	4
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	1	0	0	0	0	0	0	0	4	0	5	0	0	0	5	5
17:15	0	0	1	0	1	0	1	0	0	0	1	3	0	0	0	0	1	6
17:30	4	0	0	0	0	1	0	0	0	1	0	0	3	0	0	0	7	2
17:45	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	2
Ped Total	5				1				0				9				15	
Bike Total		0	4	0		1	2	1		1	7	4		0	2	0		22

Intersection Turning Movement - Peak Hour Summary

Location:	#02	File Name:	ITM-19-092-02
Intersection:	Ingraham Street & Crown Point Drive	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#04	File Name: ITM-19-092-04
Intersection:	Mission Bay Drive & I-8 Westbound Off Ramp	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

AM	Mission Bay Drive			I-8 WB Off Ramp			Mission Bay Drive			-			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	264	0	94	0	245	0	84	0	0	0	0	687
7:15	0	291	0	66	0	223	0	132	0	0	0	0	712
7:30	0	373	0	66	0	341	0	123	0	0	0	0	903
7:45	0	343	0	136	0	416	0	109	0	0	0	0	1004
8:00	0	414	0	109	0	362	0	130	0	0	0	0	1015
8:15	0	364	0	97	0	436	0	120	0	0	0	0	1017
8:30	0	411	0	98	0	407	0	114	0	0	0	0	1030
8:45	0	352	0	156	0	449	0	112	0	0	0	0	1069
Total	0	2812	0	822	0	2879	0	924	0	0	0	0	7437
Approach%	-	100.0	-	22.2	-	77.8	-	100.0	-	-	-	-	
Total%	-	37.8	-	11.1	-	38.7	-	12.4	-	-	-	-	

AM Intersection Peak Hour: **08:00 to 09:00**

Volume	-	1,541	-	460	-	1,654	-	476	-	-	-	-	4,131
Approach%	-	100.0	-	21.8	-	78.2	-	100.0	-	-	-	-	
Total%	-	37.3	-	11.1	-	40.0	-	11.5	-	-	-	-	
PHF			0.93			0.87			0.92			#DIV/0!	0.97

PM	Mission Bay Drive			I-8 WB Off Ramp			Mission Bay Drive			-			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	461	0	165	0	371	0	187	0	0	0	0	1184
16:15	0	470	0	170	0	376	0	204	0	0	0	0	1220
16:30	0	477	0	155	0	460	0	193	0	0	0	0	1285
16:45	0	467	0	186	0	424	0	199	0	0	0	0	1276
17:00	0	471	0	183	0	396	0	183	0	0	0	0	1233
17:15	0	490	0	145	0	406	0	207	0	0	0	0	1248
17:30	0	478	0	163	0	427	0	193	0	0	0	0	1261
17:45	0	454	0	201	0	433	0	170	0	0	0	0	1258
Total	0	3768	0	1368	0	3293	0	1536	0	0	0	0	9965
Approach%	-	100.0	-	29.3	-	70.7	-	100.0	-	-	-	-	
Total%	-	37.8	-	13.7	-	33.0	-	15.4	-	-	-	-	

PM Intersection Peak Hour: **16:30 to 17:30**

Volume	-	1,905	-	669	-	1,686	-	782	-	-	-	-	5,042
Approach%	-	100.0	-	28.4	-	71.6	-	100.0	-	-	-	-	
Total%	-	37.8	-	13.3	-	33.4	-	15.5	-	-	-	-	
PHF			0.97			0.96			0.94			#DIV/0!	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

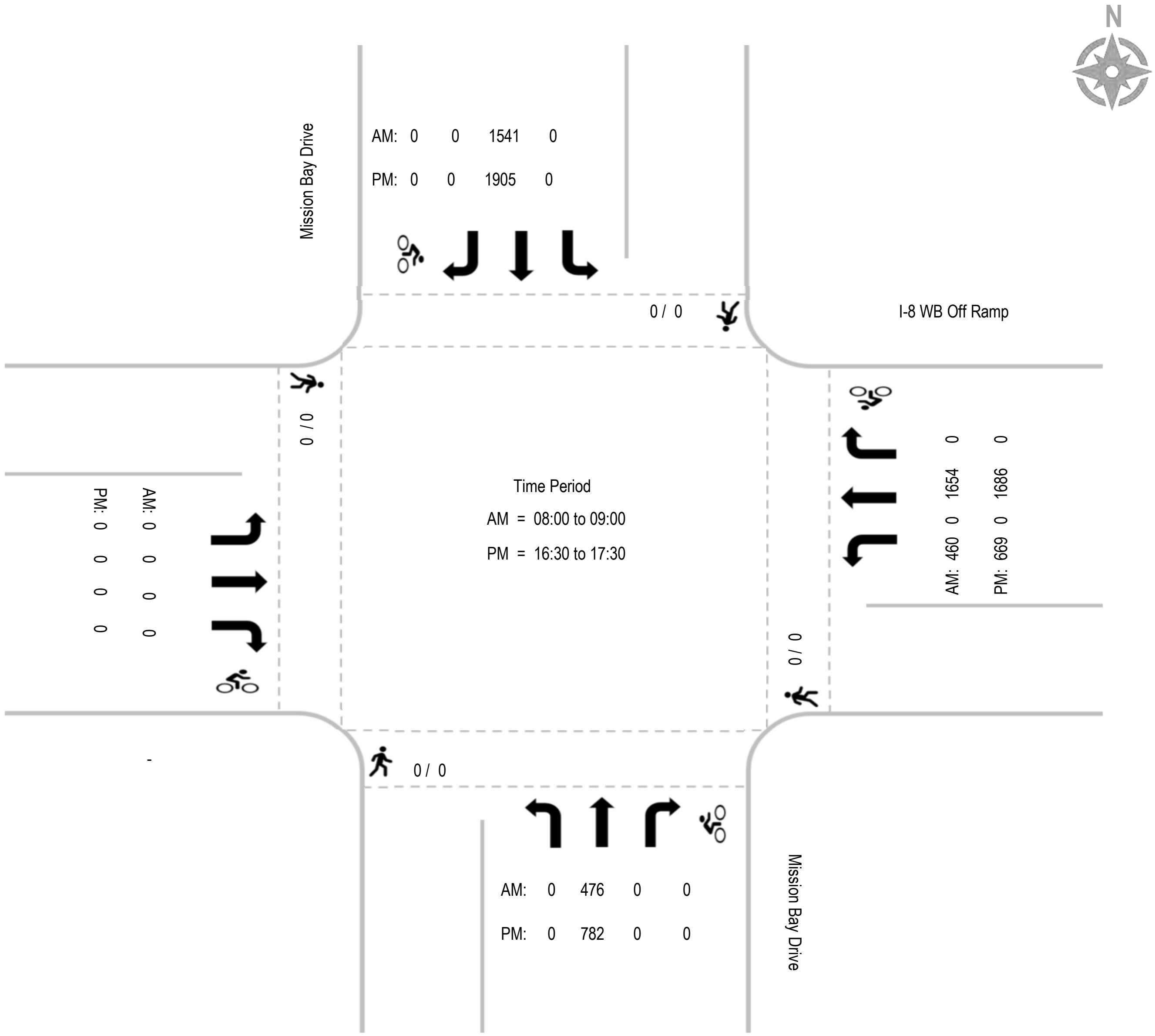
Location:	#04	File Name:	ITM-19-092-04
Intersection:	Mission Bay Drive & I-8 Westbound Off Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Mission Bay Drive Southbound				I-8 WB Off Ramp Westbound				Mission Bay Drive Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	0	0		0	0	0		0	0	0		0

PM	Mission Bay Drive Southbound				I-8 WB Off Ramp Westbound				Mission Bay Drive Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	0	0		0	0	0		0	0	0		0

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers	Location:	#04	File Name:	ITM-19-092-04
	Intersection:	Mission Bay Drive & I-8 Westbound Off Ramp	Project:	LLG Ref. 3-19-3077
	Date of Count:	Wednesday, August 14, 2019		SeaWorld



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Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#09	File Name:	ITM-19-092-09
Intersection:	Sports Arena Boulevard & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Sports Arena Blvd Southbound			I-8 Eastbound On Ramp Westbound			Sports Arena Blvd Northbound			Olli Street Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	129	18	0	0	0	0	88	131	0	0	8	374
7:15	0	128	5	0	0	0	6	124	131	1	0	3	398
7:30	0	111	5	0	0	0	6	126	170	0	0	11	429
7:45	0	172	16	0	0	0	8	113	148	1	0	5	463
8:00	0	189	27	0	0	0	6	131	214	0	0	2	569
8:15	0	170	9	0	0	0	2	118	139	0	0	3	441
8:30	0	175	10	0	0	0	3	123	147	1	0	8	467
8:45	0	217	17	0	0	0	4	109	166	0	0	3	516
Total	0	1291	107	0	0	0	35	932	1246	3	0	43	3657
Approach%	-	92.3	7.7	-	-	-	1.6	42.1	56.3	6.5	-	93.5	
Total%	-	35.3	2.9	-	-	-	1.0	25.5	34.1	0.1	-	1.2	

AM Intersection Peak Hour: **08:00 to 09:00**

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	-	751	63	-	-	-	15	481	666	1	-	16	1,993
Approach%	-	92.3	7.7	-	-	-	1.3	41.4	57.3	5.9	-	94.1	
Total%	-	37.7	3.2	-	-	-	0.8	24.1	33.4	0.1	-	0.8	
PHF			0.87			#DIV/0!			0.83			0.47	0.88

PM	Sports Arena Blvd Southbound			I-8 Eastbound On Ramp Westbound			Sports Arena Blvd Northbound			Olli Street Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	319	26	0	0	0	13	183	122	1	0	6	670
16:15	0	305	27	0	0	0	4	195	93	0	0	10	634
16:30	0	302	32	0	0	0	5	190	111	0	0	9	649
16:45	0	342	46	0	0	0	15	196	70	0	0	8	677
17:00	0	323	37	0	0	0	14	185	92	0	0	7	658
17:15	0	281	46	0	0	0	8	199	98	1	0	6	639
17:30	0	325	35	0	0	0	9	188	87	2	0	5	651
17:45	0	331	54	0	0	0	13	164	93	1	0	9	665
Total	0	2528	303	0	0	0	81	1500	766	5	0	60	5243
Approach%	-	89.3	10.7	-	-	-	3.5	63.9	32.6	7.7	-	92.3	
Total%	-	48.2	5.8	-	-	-	1.5	28.6	14.6	0.1	-	1.1	

PM Intersection Peak Hour: **16:00 to 17:00**

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	-	1,268	131	-	-	-	37	764	396	1	-	33	2,630
Approach%	-	90.6	9.4	-	-	-	3.1	63.8	33.1	2.9	-	97.1	
Total%	-	48.2	5.0	-	-	-	1.4	29.0	15.1	0.0	-	1.3	
PHF			0.90			#DIV/0!			0.94			0.85	0.97

Intersection Turning Movement - Bicycle & Pedestrian Count

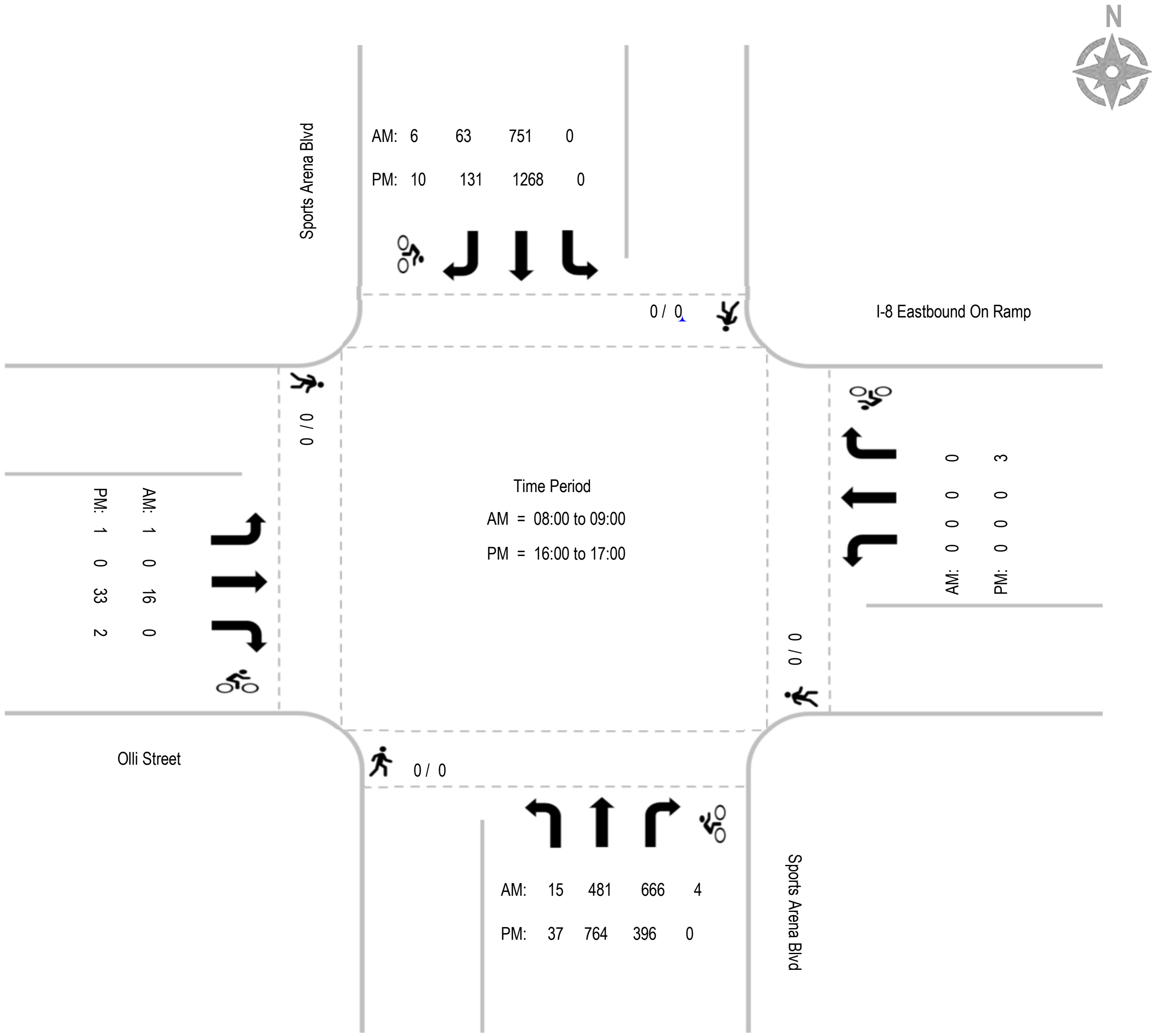
LINSCOTT LAW & GREENSPAN engineers		
Location:	#09	File Name: ITM-19-092-09
Intersection:	Sports Arena Boulevard & I-8 Eastbound On Ramp	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

AM	Sports Arena Blvd Southbound				I-8 Eastbound On Ramp Westbound				Sports Arena Blvd Northbound				Olli Street Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
7:30	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
8:30	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ped Total	0				0				0				0				0	
Bike Total		1	5	0		0	0	0		0	4	0		0	0	0		10

PM	Sports Arena Blvd Southbound				I-8 Eastbound On Ramp Westbound				Sports Arena Blvd Northbound				Olli Street Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	3	0	0	0	1	0	0	0	0	0	0	0	1	0	0	5
17:00	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
17:15	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
17:30	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	3
17:45	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Ped Total	0				0				0				0				0	
Bike Total		0	10	0		0	1	2		0	0	0		0	2	0		15

Intersection Turning Movement - Peak Hour Summary

Location:	#09	File Name:	ITM-19-092-09
Intersection:	Sports Arena Boulevard & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



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*Volumes at the I-8 EB on ramp from NB Sports Arena. Loop ramp volumes from SB Sports Arena manually calculated.

Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#05	File Name: ITM-19-092-05
Intersection:	Mission Bay Drive & I-8 Eastbound On Ramp	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

AM	Mission Bay Drive Southbound			- Westbound			Mission Bay Drive Northbound			I-8 Eastbound On Ramp Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	139	198	0	0	0	0	0	0	0	0	0	337
7:15	0	141	222	0	0	0	0	0	0	0	0	0	363
7:30	0	124	327	0	0	0	0	0	0	0	0	0	451
7:45	0	205	266	0	0	0	0	0	0	0	0	0	471
8:00	0	187	314	0	0	0	0	0	0	0	0	0	501
8:15	0	183	275	0	0	0	0	0	0	0	0	0	458
8:30	0	180	319	0	0	0	0	0	0	0	0	0	499
8:45	0	248	239	0	0	0	0	0	0	0	0	0	487
Total	0	1407	2160	0	0	0	0	0	0	0	0	0	3567
Approach%	-	39.4	60.6	-	-	-	-	-	-	-	-	-	
Total%	-	39.4	60.6	-	-	-	-	-	-	-	-	-	

AM Intersection Peak Hour: **08:00 to 09:00**

Volume	-	798	1,147	-	-	-	-	-	-	-	-	-	1,945
Approach%	-	41.0	59.0	-	-	-	-	-	-	-	-	-	
Total%	-	41.0	59.0	-	-	-	-	-	-	-	-	-	
PHF			0.97			#DIV/0!			#DIV/0!			#DIV/0!	0.97

PM	Mission Bay Drive Southbound			- Westbound			Mission Bay Drive Northbound			I-8 Eastbound On Ramp Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	338	290	0	0	0	0	0	0	0	0	0	628
16:15	0	336	294	0	0	0	0	0	0	0	0	0	630
16:30	0	348	271	0	0	0	0	0	0	0	0	0	619
16:45	0	390	254	0	0	0	0	0	0	0	0	0	644
17:00	0	365	286	0	0	0	0	0	0	0	0	0	651
17:15	0	335	309	0	0	0	0	0	0	0	0	0	644
17:30	0	366	266	0	0	0	0	0	0	0	0	0	632
17:45	0	390	361	0	0	0	0	0	0	0	0	0	751
Total	0	2868	2331	0	0	0	0	0	0	0	0	0	5199
Approach%	-	55.2	44.8	-	-	-	-	-	-	-	-	-	
Total%	-	55.2	44.8	-	-	-	-	-	-	-	-	-	

PM Intersection Peak Hour: **17:00 to 18:00**

Volume	-	1,456	1,222	-	-	-	-	-	-	-	-	-	2,678
Approach%	-	54.4	45.6	-	-	-	-	-	-	-	-	-	
Total%	-	54.4	45.6	-	-	-	-	-	-	-	-	-	
PHF			0.89			#DIV/0!			#DIV/0!			#DIV/0!	0.99

Intersection Turning Movement - Bicycle & Pedestrian Count

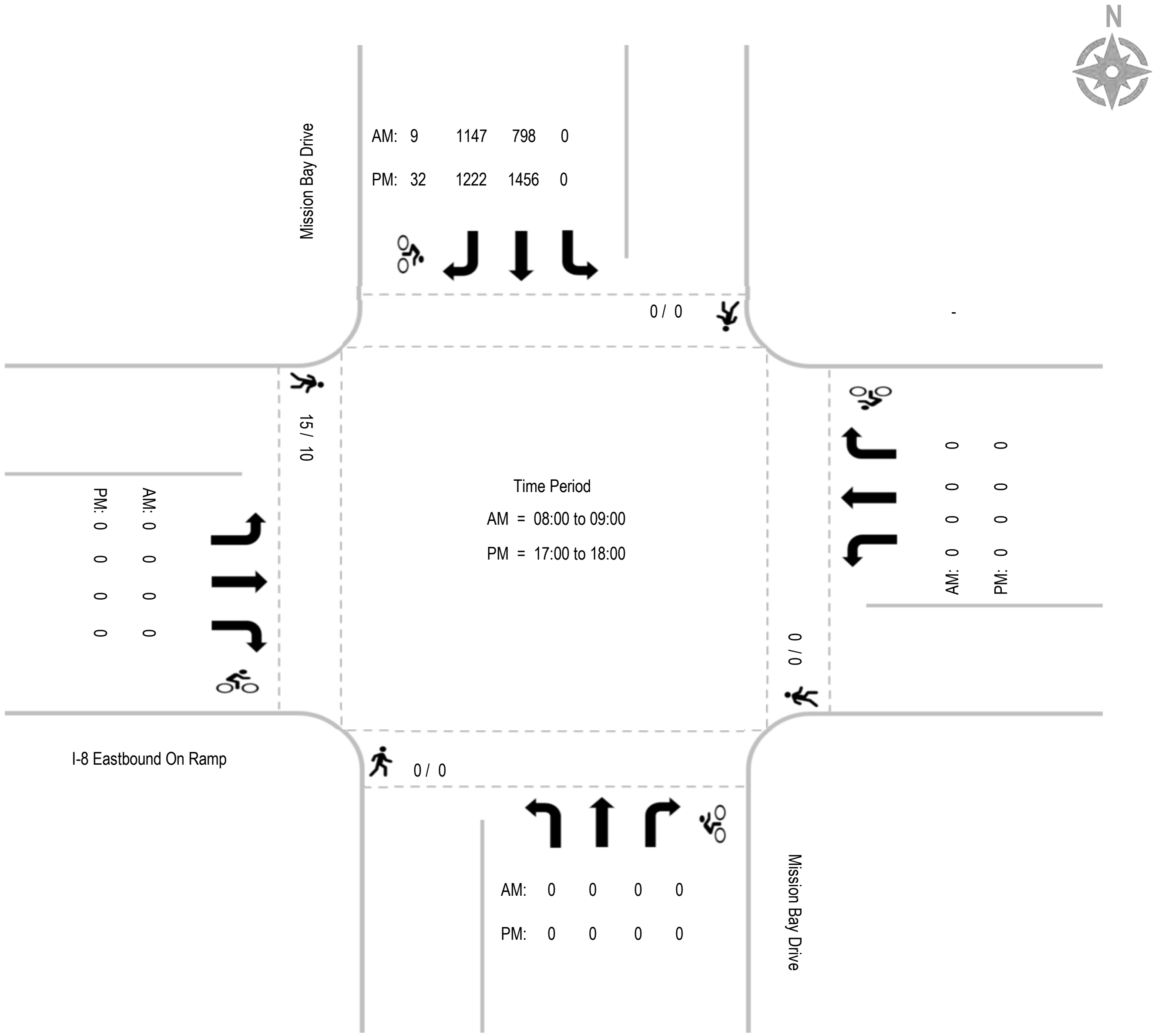
LINSCOTT LAW & GREENSPAN engineers	Location:	#05	File Name:	ITM-19-092-05
	Intersection:	Mission Bay Drive & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
	Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Mission Bay Drive Southbound				- Westbound				Mission Bay Drive Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30	0	0	2	0	0	0	0	0	0	0	0	0	4	0	0	0	4	2
7:45	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1
8:00	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
8:15	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
Ped Total	0				0				0				15				15	
Bike Total		0	9	0		0	0	0		0	0	0		0	0	0		9

PM	Mission Bay Drive Southbound				- Westbound				Mission Bay Drive Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	3	0	0	0	0	0	0	0	0	0	2	0	0	0	2	3
16:15	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16:30	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16:45	0	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	1	5
17:00	0	0	7	0	0	0	0	0	0	0	0	0	3	0	0	0	3	7
17:15	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
17:30	0	0	5	0	0	0	0	0	0	0	0	0	3	0	0	0	3	5
17:45	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Ped Total	0				0				0				10				10	
Bike Total		0	32	0		0	0	0		0	0	0		0	0	0		32

Intersection Turning Movement - Peak Hour Summary

Location:	#05	File Name:	ITM-19-092-05
Intersection:	Mission Bay Drive & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



*Volumes at the I-8 EB on ramp from NB Sports Arena. Loop ramp volumes from SB Sports Arena manually calculated.

Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#06	File Name:	ITM-19-092-06
Intersection:	Sunset Cliffs Boulevard & I-8 Westbound Off Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Sunset Cliffs Blvd Southbound			I-8 WB Off Ramp Westbound			Sunset Cliffs Blvd Northbound			- Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	178	0	398	0	0	0	245	0	0	0	0	821
7:15	0	163	0	366	0	0	0	254	0	0	0	0	783
7:30	0	153	0	386	0	0	0	292	0	0	0	0	831
7:45	0	176	0	409	0	0	0	319	0	0	0	0	904
8:00	0	222	0	398	0	0	0	306	0	0	0	0	926
8:15	0	171	0	339	0	0	0	269	0	0	0	0	779
8:30	0	139	0	253	0	0	0	219	0	0	0	0	611
8:45	0	216	0	410	0	0	0	293	0	0	0	0	919
Total	0	1418	0	2959	0	0	0	2197	0	0	0	0	6574
Approach%	-	100.0	-	100.0	-	-	-	100.0	-	-	-	-	
Total%	-	21.6	-	45.0	-	-	-	33.4	-	-	-	-	

AM Intersection Peak Hour: **07:15 to 08:15**

Volume	-	714	-	1,559	-	-	-	1,171	-	-	-	-	3,444
Approach%	-	100.0	-	100.0	-	-	-	100.0	-	-	-	-	
Total%	-	20.7	-	45.3	-	-	-	34.0	-	-	-	-	
PHF			0.80			0.95			0.92			#DIV/0!	0.97

PM	Sunset Cliffs Blvd Southbound			I-8 WB Off Ramp Westbound			Sunset Cliffs Blvd Northbound			- Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	341	0	577	0	0	0	342	0	0	0	0	1260
16:15	0	269	0	464	0	0	0	313	0	0	0	0	1046
16:30	0	286	0	459	0	0	0	324	0	0	0	0	1069
16:45	0	240	0	508	0	0	0	311	0	0	0	0	1059
17:00	0	297	0	497	0	0	0	351	0	0	0	0	1145
17:15	0	249	0	520	0	0	0	312	0	0	0	0	1081
17:30	0	293	0	536	0	0	0	343	0	0	0	0	1172
17:45	0	226	0	405	0	0	0	250	0	0	0	0	881
Total	0	2201	0	3966	0	0	0	2546	0	0	0	0	8713
Approach%	-	100.0	-	100.0	-	-	-	100.0	-	-	-	-	
Total%	-	25.3	-	45.5	-	-	-	29.2	-	-	-	-	

PM Intersection Peak Hour: **16:45 to 17:45**

Volume	-	1,079	-	2,061	-	-	-	1,317	-	-	-	-	4,457
Approach%	-	100.0	-	100.0	-	-	-	100.0	-	-	-	-	
Total%	-	24.2	-	46.2	-	-	-	29.5	-	-	-	-	
PHF			0.91			0.96			0.94			#DIV/0!	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

Location:	#06	File Name:	ITM-19-092-06
Intersection:	Sunset Cliffs Boulevard & I-8 Westbound Off Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

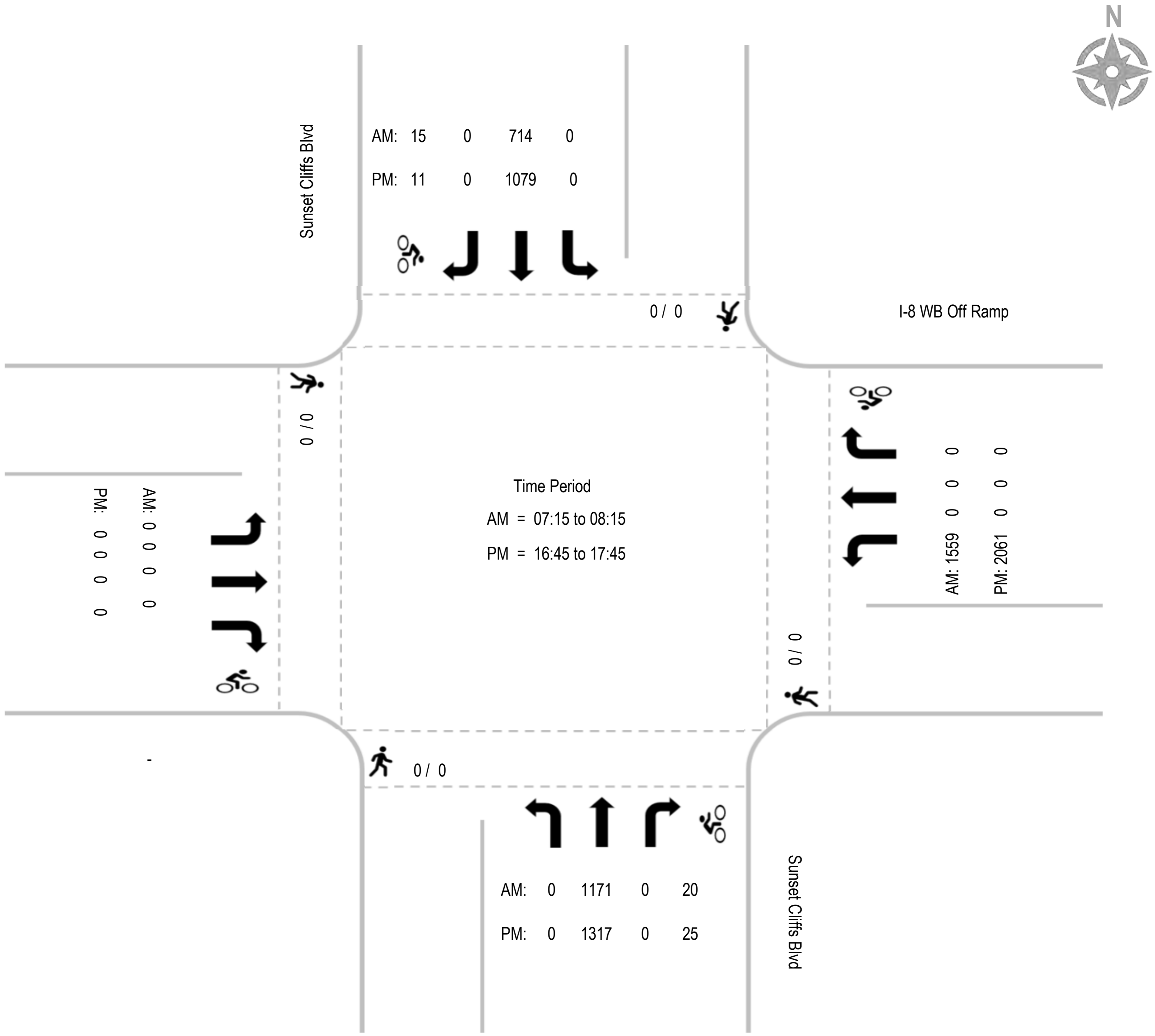
AM	Sunset Cliffs Blvd Southbound				I-8 WB Off Ramp Westbound				Sunset Cliffs Blvd Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
7:15	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
7:30	0	0	3	0	0	0	0	0	0	0	5	0	0	0	0	0	0	8
7:45	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
8:00	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
8:15	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
8:30	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
8:45	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4
Ped Total	0				0				0				0				0	
Bike Total		0	15	0		0	0	0		0	20	0		0	0	0		35

PM	Sunset Cliffs Blvd Southbound				I-8 WB Off Ramp Westbound				Sunset Cliffs Blvd Northbound				- Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
16:15	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	4
16:30	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4
16:45	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
17:00	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
17:15	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	4
17:30	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
17:45	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
Ped Total	0				0				0				0				0	
Bike Total		0	11	0		0	0	0		0	25	0		0	0	0		36

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers

Location:	#06	File Name:	ITM-19-092-06
Intersection:	Sunset Cliffs Boulevard & I-8 Westbound Off Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



Report Generated by Bearcat Enterprises LLC, DBA "Count Data" | 619-987-5136 | info@yourcountdata.com

Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#07	File Name:	ITM-19-092-07
Intersection:	Nimitz Boulevard & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	-			-			Nimitz Boulevard			I-8 Eastbound On Ramp			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	0	0	0	0	0	0	0	124	227	0	139	0	490
7:15	0	0	0	0	0	0	0	146	288	0	172	0	606
7:30	0	0	0	0	0	0	0	191	357	0	177	0	725
7:45	0	0	0	0	0	0	0	184	345	0	194	0	723
8:00	0	0	0	0	0	0	0	186	347	0	180	0	713
8:15	0	0	0	0	0	0	0	182	316	0	181	0	679
8:30	0	0	0	0	0	0	0	205	338	0	182	0	725
8:45	0	0	0	0	0	0	0	176	319	0	174	0	669
Total	0	0	0	0	0	0	0	1394	2537	0	1399	0	5330
Approach%	-	-	-	-	-	-	-	35.5	64.5	-	100.0	-	
Total%	-	-	-	-	-	-	-	26.2	47.6	-	26.2	-	

AM Intersection Peak Hour: **07:30 to 08:30**

Volume	-	-	-	-	-	-	-	743	1,365	-	732	-	2,840
Approach%	-	-	-	-	-	-	-	35.2	64.8	-	100.0	-	
Total%	-	-	-	-	-	-	-	26.2	48.1	-	25.8	-	
PHF			#DIV/0!			#DIV/0!			0.96			0.94	0.98

PM	-			-			Nimitz Boulevard			I-8 Eastbound On Ramp			
	Southbound			Westbound			Northbound			Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	0	0	0	0	0	0	0	194	196	0	146	0	536
16:15	0	0	0	0	0	0	0	205	179	0	138	0	522
16:30	0	0	0	0	0	0	0	181	168	0	135	0	484
16:45	0	0	0	0	0	0	0	221	162	0	126	0	509
17:00	0	0	0	0	0	0	0	204	172	0	134	0	510
17:15	0	0	0	0	0	0	0	229	214	0	138	0	581
17:30	0	0	0	0	0	0	0	198	188	0	156	0	542
17:45	0	0	0	0	0	0	0	173	165	0	118	0	456
Total	0	0	0	0	0	0	0	1605	1444	0	1091	0	4140
Approach%	-	-	-	-	-	-	-	52.6	47.4	-	100.0	-	
Total%	-	-	-	-	-	-	-	38.8	34.9	-	26.4	-	

PM Intersection Peak Hour: **16:45 to 17:45**

Volume	-	-	-	-	-	-	-	852	736	-	554	-	2,142
Approach%	-	-	-	-	-	-	-	53.7	46.3	-	100.0	-	
Total%	-	-	-	-	-	-	-	39.8	34.4	-	25.9	-	
PHF			#DIV/0!			#DIV/0!			0.90			0.89	0.92

Intersection Turning Movement - Bicycle & Pedestrian Count

LINSCOTT LAW & GREENSPAN engineers

Location:	#07	File Name:	ITM-19-092-07
Intersection:	Nimitz Boulevard & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld

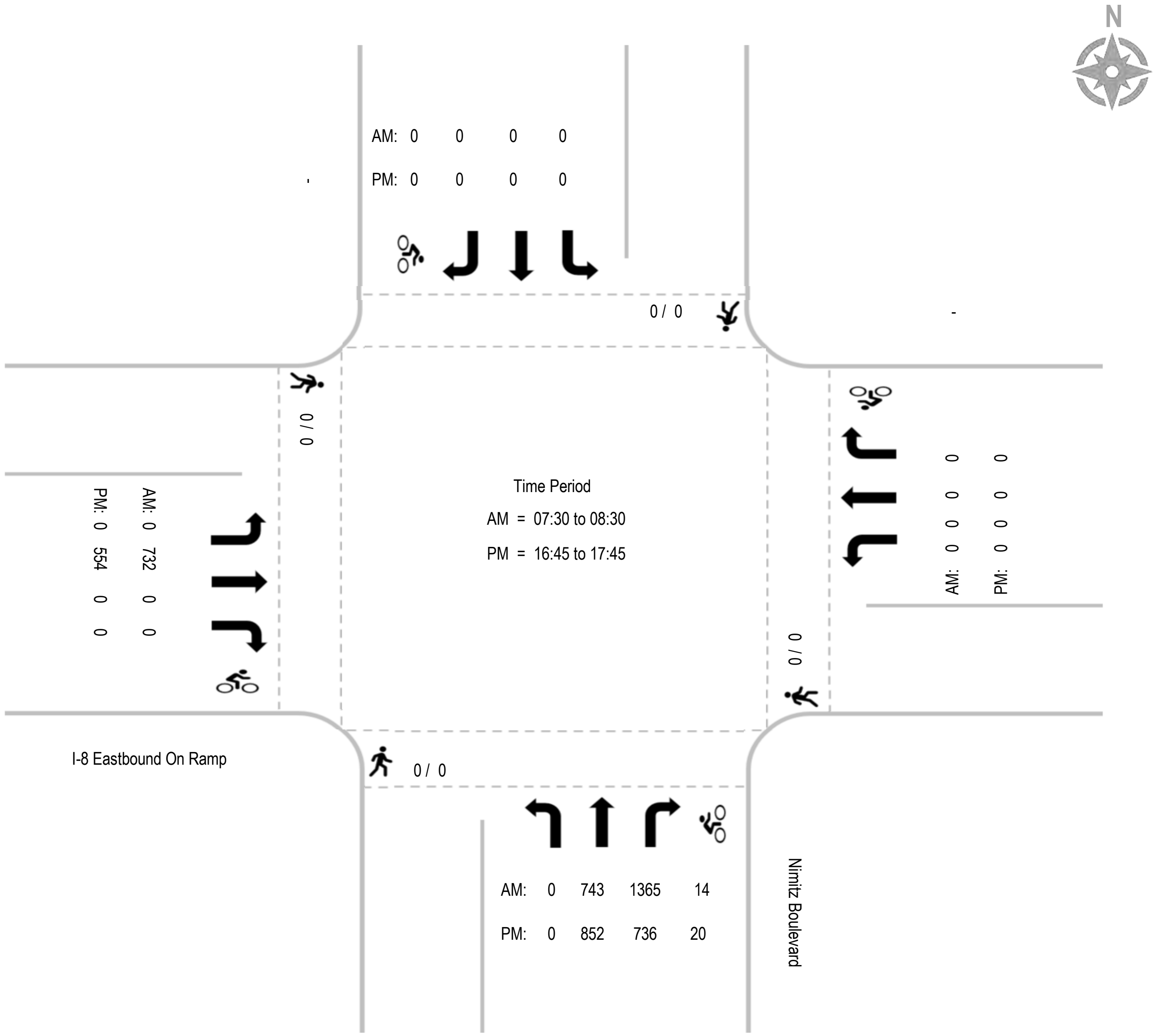
AM	- Southbound				- Westbound				Nimitz Boulevard Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
7:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
7:30	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4
7:45	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
8:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
8:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	0	0		0	14	0		0	0	0		14

PM	- Southbound				- Westbound				Nimitz Boulevard Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
16:15	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
16:30	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
16:45	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
17:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
17:15	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
17:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
17:45	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	0	0		0	20	0		0	0	0		20

Intersection Turning Movement - Peak Hour Summary

LINSCOTT LAW & GREENSPAN engineers

Location:	#07	File Name:	ITM-19-092-07
Intersection:	Nimitz Boulevard & I-8 Eastbound On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



Intersection Turning Movement - Peak Hour Vehicle Count

LINSCOTT LAW & GREENSPAN engineers		
Location:	#08	File Name: ITM-19-092-08
Intersection:	Nimitz Boulevard & Sunset Cliffs Blvd & I-8 EB On Ramp	Project: LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019	SeaWorld

AM	Sunset Cliffs Blvd Southbound			Sunset Cliffs Blvd Westbound			Nimitz Boulevard Northbound			I-8 Eastbound On Ramp Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
7:00	2	393	146	0	0	0	0	0	0	92	136	2	771
7:15	4	395	161	0	0	0	0	0	0	130	171	5	866
7:30	1	372	215	0	0	0	0	0	0	129	178	3	898
7:45	3	382	202	0	0	0	0	0	0	135	191	2	915
8:00	7	345	225	0	0	0	0	0	0	127	178	8	890
8:15	0	351	244	0	0	0	0	0	0	143	186	4	928
8:30	5	346	228	0	0	0	0	0	0	140	179	4	902
8:45	7	326	261	0	0	0	0	0	0	114	173	4	885
Total	29	2910	1682	0	0	0	0	0	0	1010	1392	32	7055
Approach%	0.6	63.0	36.4	-	-	-	-	-	-	41.5	57.2	1.3	
Total%	0.4	41.2	23.8	-	-	-	-	-	-	14.3	19.7	0.5	

AM Intersection Peak Hour: 07:45 to 08:45

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	15	1,424	899	-	-	-	-	-	-	545	734	18	3,635
Approach%	0.6	60.9	38.5	-	-	-	-	-	-	42.0	56.6	1.4	
Total%	0.4	39.2	24.7	-	-	-	-	-	-	15.0	20.2	0.5	
PHF			0.98			#DIV/0!			#DIV/0!			0.97	0.97

PM	Sunset Cliffs Blvd Southbound			Sunset Cliffs Blvd Westbound			Nimitz Boulevard Northbound			I-8 Eastbound On Ramp Eastbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
16:00	6	323	442	0	0	0	0	0	0	130	157	37	1095
16:15	7	379	413	0	0	0	0	0	0	144	140	16	1099
16:30	3	339	431	0	0	0	0	0	0	158	131	11	1073
16:45	4	321	470	0	0	0	0	0	0	122	122	15	1054
17:00	0	341	474	0	0	0	0	0	0	119	137	7	1078
17:15	0	406	327	0	0	0	0	0	0	113	137	10	993
17:30	0	344	438	0	0	0	0	0	0	107	159	5	1053
17:45	0	350	449	0	0	0	0	0	0	85	120	11	1015
Total	20	2803	3444	0	0	0	0	0	0	978	1103	112	8460
Approach%	0.3	44.7	55.0	-	-	-	-	-	-	44.6	50.3	5.1	
Total%	0.2	33.1	40.7	-	-	-	-	-	-	11.6	13.0	1.3	

PM Intersection Peak Hour: 16:00 to 17:00

	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total
Volume	20	1,362	1,756	-	-	-	-	-	-	554	550	79	4,321
Approach%	0.6	43.4	56.0	-	-	-	-	-	-	46.8	46.5	6.7	
Total%	0.5	31.5	40.6	-	-	-	-	-	-	12.8	12.7	1.8	
PHF			0.98			#DIV/0!			#DIV/0!			0.91	0.98

Intersection Turning Movement - Bicycle & Pedestrian Count

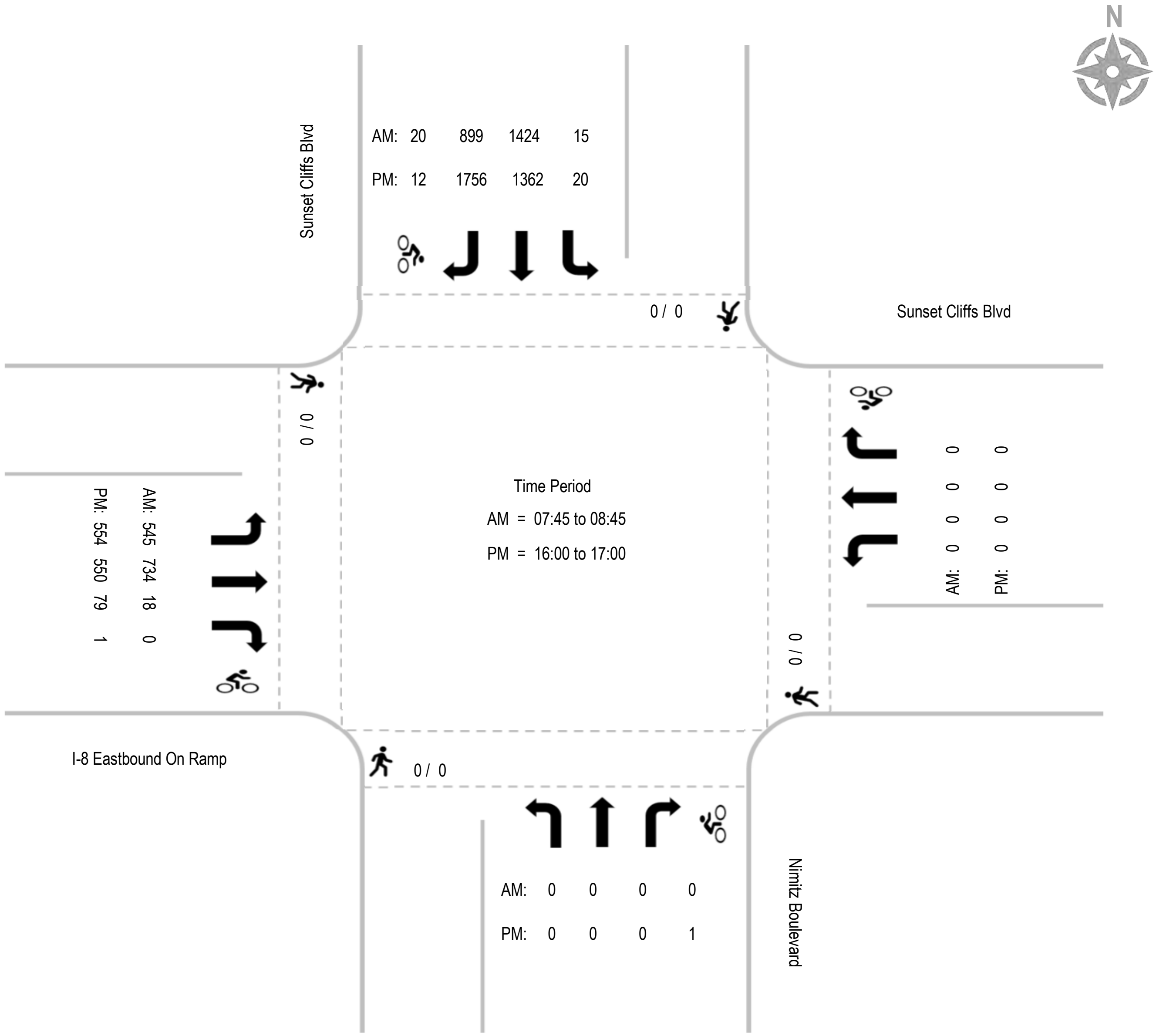
LINSCOTT LAW & GREENSPAN engineers	Location:	#08	File Name:	ITM-19-092-08
	Intersection:	Nimitz Boulevard & Sunset Cliffs Blvd & I-8 EB On Ramp	Project:	LLG Ref. 3-19-3077
	Date of Count:	Wednesday, August 14, 2019		SeaWorld

AM	Sunset Cliffs Blvd Southbound				Sunset Cliffs Blvd Westbound				Nimitz Boulevard Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
7:30	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
7:45	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
8:00	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:15	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Total	0				0				0				0				0	
Bike Total		0	0	20		0	0	0		0	0	0		0	0	0		20

PM	Sunset Cliffs Blvd Southbound				Sunset Cliffs Blvd Westbound				Nimitz Boulevard Northbound				I-8 Eastbound On Ramp Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	2	2	0	0	0	0	0	0	1	0	0	0	0	1	0	6
17:15	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
17:30	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
17:45	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Ped Total	0				0				0				0				0	
Bike Total		0	2	10		0	0	0		0	1	0		0	0	1		14

Intersection Turning Movement - Peak Hour Summary

Location:	#08	File Name:	ITM-19-092-08
Intersection:	Nimitz Boulevard & Sunset Cliffs Blvd & I-8 EB On Ramp	Project:	LLG Ref. 3-19-3077
Date of Count:	Wednesday, August 14, 2019		SeaWorld



PEAK HOUR VOLUME DATA

Peak hour volume data consists of hourly volume relationships and data location. The hourly volumes are expressed as a percentage of the Annual Average Daily Traffic (AADT). The percentages are shown for both the AM and the PM peak periods.

The principle data described here are the K factor, the D factor and their product (KD). The K factor is the percentage of AADT during the peak hour for both directions of travel. The D factor is the percentage of the peak hour travel in the peak direction. KD multiplied with the AADT gives the one way peak period directional flow rate or the design hourly volume (DHV). The design hourly volume is used for either Operational Analysis or Design Analysis. Refer to the 2016 Highway Capacity Manual, 6th Edition A Guide for Multimodal Mobility Analysis for more details.

Following is a glossary of terms used in this listing of peak hour volume data:

Dir	Indicates direction of travel for peak volume.
AADT	Annual Average Daily Traffic in vehicles per day (vpd).
AM Peak	Represents the morning peak period for traffic analysis.
CS	Control Station Number, Caltrans identification number for monitoring site.
CO	County abbreviation used by Caltrans.
D	D factor. The percentage of traffic in the peak direction during the peak hour. Values in this book are derived by dividing the measured PHV by the sum of both directions of travel during the peak hour.
DAY	Day of week for the peak volume.
DDHV	The directional design hour volume, in vehicles per hour (vph) DDHV=AADTxKxD. See Equation (3-1) on Page 3-13 of the 2016 Highway Capacity Manual.
DI	Caltrans has twelve transportation districts statewide. This abbreviation identifies the district in which the count station is located.
HR	The ending time for the peak hour volume listed. The volume observed from 1 to 2 would be recorded as 2.

K	The percentage of the AADT in both directions during the peak hour. Values in this table are derived by dividing the measured 2-way PHV by the AADT.
KD	The product of K and D. The percentage of AADT in the peak direction during the peak hour. Values in this table are derived by dividing the measured 1-way PHV by the AADT.
LEG	For traffic counting purposes, a highway intersection or interchange is assigned two legs according to increasing postmiles (route direction) and with a postmile reference at the center of the intersection or interchange. The volume of traffic on each leg is denoted by an A, B or O. A = ahead leg, B = back leg, and O – traffic volume being same for both back and ahead legs.
MNTH	The month that the peak volume occurred.
PHV	Peak Hour Volume in the peak direction. A one way volume in vehicles per hour (vph) as used here. The PHV is analogous to the DDHV as used for design purposes.
PM	The Post Mile is the mileage measured from the county line, or from the beginning of a route. Each postmile along a route in a county is a unique location on the state highway system.
PM Peak	Represents the afternoon peak period for traffic analysis.
PRE	The postmile may have a prefix like R, T, L, M, etc. When a length of highway is changed due to construction or realigment, new postmile values are assigned. To distinguish the new values from the old, an alpha code is prefixed to the new postmile.
RTE	The state highway route number.
YR	The year when the count was made. Traffic counting is on a 3-year cycle.

CALIFORNIA DEPARTMENT OF TRANSPORT

REPORT : OTM32420

REPORT TITLE : PRINT TRAFFIC BOOK

PARAMETERS

YEAR : 2017

									AM PEAK								PM PEAK					
DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
10	004	SJ	T	14.05	54	A	16	W	832	7.53	75.29	5.67	6	MON	APR	E	1340	12.21	74.82	9.14	17	FRI	OCT
10	004	SJ		15.91	113	B	15	W	907	7.09	69.4	4.92	6	TUE	OCT	E	1398	10.43	72.7	7.59	16	FRI	JUL
10	004	SJ	R	16.06	59	A	16	E	3306	8.01	52.59	4.21	7	WED	SEP	E	3182	7.75	52.3	4.05	14	FRI	APR
10	004	SJ		24.87	313	A	16	E	425	9.88	75.49	7.46	11	SAT	FEB	W	481	11.69	72.22	8.44	13	MON	FEB
10	004	SJ		24.87	336	B	16	W	375	10.56	60.98	6.44	11	SUN	JUL	W	438	10.75	69.97	7.52	16	SUN	AUG
11	005	SD	R	.878	501	A	17	S	1680	5.84	64.87	3.79	12	SAT	MAY	S	2686	8.42	71.9	6.05	15	FRI	JUN
11	005	SD	R	11.13	952	A	17	N	8583	6.01	69.66	4.19	6	TUE	AUG	S	9186	7.58	59.14	4.48	14	WED	MAY
11	005	SD	R	12.65	903	A	17	N	8615	6.46	79.92	5.16	6	THU	MAY	S	7950	7.82	60.9	4.76	14	THU	JUN
11	005	SD	R	20.06	800	B	17	S	8018	7.24	53.21	3.85	8	THU	OCT	S	8017	7.46	51.6	3.85	15	SAT	JUL
11	005	SD	R	20.06	931	A	17	S	7442	7	54.84	3.84	8	THU	FEB	S	8602	7.58	58.56	4.44	15	WED	DEC
11	005	SD	R	22.26	801	B	17	N	8741	7.15	54.69	3.91	7	WED	JUN	S	9288	7.81	53.19	4.15	15	FRI	DEC
11	005	SD	R	25.95	802	B	17	N	9558	7.67	58.88	4.51	7	THU	JUL	S	11195	8.43	62.74	5.29	15	WED	MAY
11	005	SD	R	30.68	502	A	17	S	8328	7.45	51.59	3.85	8	THU	MAY	N	8985	7.29	56.89	4.15	15	TUE	FEB
11	005	SD	R	30.68	803	B	17	S	5908	7.55	56.23	4.25	8	MON	JUN	N	6059	8	54.44	4.35	15	THU	OCT
11	005	SD	R	36.27	898	A	17	S	9158	6.99	54.86	3.83	8	TUE	APR	N	8565	6.81	52.68	3.59	14	WED	NOV
11	005	SD	R	49.28	904	B	17	N	12034	7.75	73.48	5.69	5	WED	AUG	N	9922	7.05	66.59	4.69	19	FRI	SEP
11	005	SD	R	51.20	905	A	17	N	7603	6.98	51.76	3.61	10	SAT	JUN	N	7411	6.52	53.96	3.52	17	THU	JUN
11	005	SD	R	52.83	907	O	17	S	7454	6.97	53	3.69	10	SUN	AUG	S	6936	6.19	55.53	3.43	18	SUN	MAY
11	005	SD	R	53.93	906	B	17	N	6602	6.82	55.78	3.8	10	MON	SEP	S	6379	6.63	55.43	3.68	16	FRI	MAY
11	005	SD	R	54.39	954	A	17	N	6030	7.65	54.53	4.17	11	SUN	AUG	N	5496	7.37	51.59	3.8	13	SUN	JUN
12	005	ORA		.483	401	O	16	S	5886	7.63	54.8	4.18	12	SAT	FEB	N	5619	6.68	59.8	3.99	21	SUN	OCT
12	005	ORA	R	25.00	900	O	17	S	10653	6.99	53.85	3.77	8	WED	JAN	S	10887	6.85	56.17	3.85	17	TUE	OCT
12	005	ORA		30.26	904	B	16	N	11223	6.93	57.74	4	7	WED	OCT	S	9871	5.7	61.78	3.52	17	THU	APR
12	005	ORA		30.26	905	A	16	N	12681	6.72	55.61	3.74	7	TUE	MAY	S	11391	6.07	55.32	3.36	16	MON	MAY
12	005	ORA		33.09	906	A	16	N	12558	5.81	58	3.37	7	THU	OCT	N	12093	6.05	53.64	3.25	16	MON	JAN
07	005	LA		.7	475	A	15	S	5444	5.92	53.78	3.18	6	WED	NOV	S	5304	5.61	55.31	3.1	17	MON	OCT
07	005	LA		15.33	27	O	16	N	7932	5.57	57.01	3.18	4	WED	MAR	S	7937	5.84	54.46	3.18	15	SUN	MAR
07	005	LA		17.8	28	O	15	N	7789	6.12	53.1	3.25	7	TUE	OCT	N	7807	5.98	54.46	3.26	14	FRI	OCT
07	005	LA		33.98	754	O	16	S	7826	6.25	63.82	3.99	6	WED	MAR	N	7161	6.52	55.99	3.65	16	MON	FEB
07	005	LA		41	34	B	17	S	6920	5.67	69.34	3.93	5	WED	FEB	N	7654	6.4	67.93	4.34	16	THU	APR
07	005	LA	R	56.60	906	B	17	S	5581	8.14	55.48	4.51	8	SAT	SEP	S	5900	7.66	62.29	4.77	16	MON	FEB
06	005	KER		13.52	631	A	17	S	4620	9.56	54.83	5.24	10	SAT	MAY	S	5172	11.24	52.21	5.87	15	MON	SEP
06	005	KER		19.61	172	B	15	N	2030	10.13	59.15	5.99	10	SAT	SEP	S	2764	13.97	58.44	8.16	13	MON	SEP

DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	AM PEAK 1 WAY PHV	AM PEAK % K	AM PEAK % D	AM PEAK % KD	HR	DAY	MNTH	Dir	PM PEAK 1 WAY PHV	PM PEAK % K	PM PEAK % D	PM PEAK % KD	HR	DAY	MNTH
06	005	KER		19.61	640	A	17	S	2318	12.03	51.72	6.22	10	WED	NOV	S	2483	11.58	57.56	6.66	15	SAT	JUL
06	005	KER		38.79	681	A	15	N	2154	10.63	56.3	5.99	11	MON	SEP	N	2947	15.17	53.98	8.19	15	MON	SEP
06	005	KER		47.55	201	A	17	N	2647	10.62	59.5	6.32	7	THU	NOV	N	2799	12.3	54.31	6.68	13	FRI	DEC
06	005	KER		47.55	431	B	15	N	2155	11.12	56.5	6.28	11	MON	SEP	N	2957	15.87	54.33	8.62	16	MON	SEP
06	005	KER		56.64	682	A	15	N	2221	10.23	56.06	5.73	11	MON	SEP	N	3024	14.6	53.47	7.81	16	MON	SEP
06	005	KIN		12.36	571	B	17	N	1354	7.19	58.95	4.24	12	FRI	JUN	N	2125	10.18	65.37	6.65	17	SUN	JUN
06	005	KIN		16.57	203	A	17	S	2146	9.09	60.79	5.52	9	FRI	JUN	N	2602	12.71	52.72	6.7	13	MON	SEP
06	005	FRE		29.96	533	A	17	S	2523	10.41	59.21	6.16	8	FRI	DEC	S	2767	13.1	51.6	6.76	16	WED	NOV
06	005	FRE		48.99	851	A	17	S	2633	11.56	54.73	6.33	11	FRI	DEC	N	2809	12.48	54.09	6.75	18	SUN	NOV
06	005	FRE		65.78	675	A	16	S	2563	8.87	70.37	6.24	7	SAT	JUL	S	2749	12.96	51.66	6.7	14	MON	SEP
10	005	MER		17.58	284	A	17	S	2032	8.23	69.88	5.75	7	SUN	NOV	N	2134	11.55	52.3	6.04	18	WED	NOV
10	005	STA		15.86	196	A	16	S	2365	9.08	54.78	4.97	11	WED	DEC	S	2471	9.82	52.91	5.2	13	WED	DEC
10	005	SJ		6.467	82	A	15	S	1237	8.73	57.67	5.03	11	FRI	DEC	S	1277	9.24	56.23	5.19	13	SUN	JUL
10	005	SJ	R	14.83	237	A	15	S	4249	6.48	54.59	3.54	12	SUN	DEC	N	5012	7.42	56.25	4.17	14	FRI	JUN
03	005	SAC		2.131	5	B	17	S	2546	7.7	57.64	4.44	12	SUN	JUN	S	2709	8.33	56.64	4.72	14	SUN	SEP
03	005	SAC		12.04	10	A	17	N	4380	6.62	67.72	4.48	6	WED	NOV	S	4894	8.56	58.51	5.01	16	THU	OCT
03	005	SAC		17.19	12	B	17	N	5723	7.53	66.21	4.99	7	TUE	MAY	S	5758	8.51	58.97	5.02	17	TUE	APR
03	005	SAC		22.57	20	B	17	N	8730	7.77	69.54	5.4	7	MON	MAR	S	8063	8.18	61.05	4.99	16	WED	JAN
03	005	SAC		23.18	25	A	17	N	8504	7.77	57.56	4.47	7	THU	MAY	N	7608	7.86	50.9	4	15	TUE	NOV
03	005	SAC		23.80	30	A	17	S	7652	7.62	51.87	3.95	7	WED	JUN	N	8091	7.76	53.85	4.18	16	MON	OCT
03	005	SAC		26.72	39	B	17	S	7324	7.44	57.96	4.31	7	WED	JUN	N	7791	7.54	60.83	4.59	16	THU	MAR
03	005	SAC		29.02	45	A	17	S	4966	6.86	56.95	3.91	7	FRI	AUG	N	5568	7.76	56.45	4.38	16	FRI	MAY
03	005	SAC		29.91	50	A	17	N	3145	6.97	52.59	3.66	12	SUN	SEP	S	3351	7.01	55.66	3.9	15	THU	MAR
03	005	SAC		34.65	60	O	15	N	2277	6.98	58.79	4.1	7	MON	MAY	S	2972	8.9	60.15	5.35	16	FRI	JUL
03	005	YOL		0	60	O	15	N	2277	6.98	58.79	4.1	7	MON	MAY	S	2972	8.9	60.15	5.35	16	FRI	JUL
03	005	YOL		5.53	65	B	15	N	2318	7.25	57.19	4.14	7	WED	JUL	S	2994	9.25	57.89	5.35	17	FRI	JUN
03	005	YOL	R	6.5	70	A	17	S	1242	7.81	55.65	4.35	12	THU	DEC	S	1407	9.12	54.01	4.92	15	WED	DEC
03	005	YOL	R	7.086	75	A	17	N	1558	7.12	55.5	3.95	10	THU	JUN	N	1791	8.7	52.25	4.55	16	FRI	JUL
03	005	YOL	R	22.61	79	B	17	N	1171	8.73	53.54	4.67	11	MON	DEC	S	1276	8.45	60.22	5.09	16	SAT	NOV
03	005	YOL	R	22.61	80	A	17	N	1946	8.48	63.31	5.37	9	FRI	AUG	N	2173	9.57	62.6	5.99	17	FRI	JUN
03	005	COL	R	17.98	85	B	17	N	1852	10.12	59.97	6.07	11	FRI	JUN	N	2061	10.95	61.65	6.75	13	FRI	AUG
03	005	GLE	R	9.872	345	B	17	S	1363	10.18	52.14	5.31	11	SAT	AUG	S	1748	11.23	60.61	6.81	16	SUN	AUG
03	005	GLE	R	10.88	202	B	17	N	1684	10.11	57.2	5.78	11	FRI	JUN	N	1945	10.49	63.69	6.68	17	FRI	AUG

DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	AM PEAK 1 WAY PHV	AM PEAK % K	AM PEAK % D	AM PEAK % KD	HR	DAY	MNTH	Dir	PM PEAK 1 WAY PHV	PM PEAK % K	PM PEAK % D	PM PEAK % KD	HR	DAY	MNTH
03	005	GLE	R	24.82	92	B	17	S	1391	9.26	53.87	4.99	11	SUN	AUG	S	1717	10.65	57.87	6.16	15	SUN	AUG
03	005	GLE	R	27.81	95	A	17	N	1507	9.35	58.78	5.49	10	FRI	JUN	S	1679	10.5	58.3	6.12	13	SUN	JUL
02	005	TEH	R	9.972	271	O	17	S	1792	10.47	54.6	5.72	12	WED	NOV	S	2002	10.37	61.58	6.38	14	MON	MAY
02	005	TEH	R	26.53	321	B	17	S	1967	7.73	66.81	5.17	8	TUE	AUG	N	2259	9.08	65.33	5.93	16	SAT	AUG
02	005	SHA	R	3.83	272	B	16	N	2335	7.43	62.47	4.64	8	WED	MAR	S	2325	8.5	54.37	4.62	17	FRI	MAR
02	005	SHA	R	7.8	239	B	17	N	2704	7.67	64.54	4.95	7	WED	MAR	S	2766	9.18	55.1	5.06	15	FRI	AUG
02	005	SHA	R	13.95	298	O	17	N	2941	7.73	63.1	4.88	7	THU	MAR	N	2981	9.16	54	4.94	14	FRI	JUN
02	005	SHA	R	14.46	304	A	17	N	3082	8.45	53.52	4.52	12	THU	JUL	S	3290	9.03	53.48	4.83	15	THU	AUG
02	005	SHA	R	15.45	196	A	17	N	2737	8.29	55.72	4.62	10	FRI	AUG	N	2927	9.22	53.62	4.94	15	FRI	JUN
02	005	SHA	R	19.40	312	B	17	N	2239	8.77	54.82	4.81	12	SAT	JUL	S	2537	10.17	53.59	5.45	14	SUN	NOV
02	005	SHA	R	24.08	309	A	17	N	1586	10.99	63.57	6.98	12	THU	AUG	N	1620	11.85	60.2	7.13	15	SAT	JUL
02	005	SHA	R	26.04	273	B	17	N	2031	13.27	66.85	8.87	11	SUN	AUG	N	2029	10.82	81.95	8.86	14	WED	JAN
02	005	SHA		57.41	179	B	17	N	1371	13.15	53.39	7.02	10	SUN	NOV	N	1687	13.21	65.39	8.64	13	FRI	AUG
02	005	SIS	R	11.17	310	O	17	S	1441	4.81	71.51	3.44	8	TUE	AUG	N	1783	6.72	63.38	4.26	13	FRI	AUG
02	005	SIS	R	23.00	294	O	17	N	1040	10.44	60.57	6.32	9	SAT	JUL	N	1247	12.05	62.95	7.58	15	FRI	AUG
02	005	SIS	R	52.78	232	O	17	N	1028	11.07	58.54	6.48	12	SUN	JUL	N	1232	11.8	65.85	7.77	14	SUN	APR
02	005	SIS	R	62.92	410	A	17	S	1026	10.91	58.23	6.35	11	SAT	NOV	S	1256	11.79	65.97	7.78	16	TUE	AUG
02	005	SIS	R	68.33	231	B	17	N	1038	12.27	52.74	6.47	12	MON	DEC	N	1257	11.6	67.54	7.84	16	THU	AUG
09	006	INY		0	944	A	17	S	240	8.97	69.57	6.24	7	WED	OCT	N	223	9	64.45	5.8	17	WED	MAR
09	006	INY	R	3.952	945	A	17	S	163	8.7	79.13	6.88	6	WED	APR	S	130	8.15	67.36	5.49	15	SAT	NOV
09	006	MNO		32.29	997	B	17	S	68	10.42	60.18	6.27	12	WED	SEP	S	75	12.27	56.39	6.92	14	FRI	AUG
11	007	IMP		1.188	607	B	17	N	453	8.43	64.26	5.41	12	MON	DEC	S	818	14.89	65.65	9.78	16	SAT	FEB
11	007	IMP		1.188	401	A	17	N	283	6.76	62.75	4.24	12	MON	MAR	S	479	10.46	68.63	7.18	15	FRI	FEB
11	007	IMP		6.718	402	B	17	N	293	6.98	62.47	4.36	12	MON	NOV	S	433	9.81	65.71	6.44	15	FRI	MAR
11	008	SD	L	1.213	951	B	17	E	2243	7.99	58.31	4.66	7	TUE	NOV	W	2021	6.68	62.8	4.2	17	MON	APR
11	008	SD	L	1.213	958	A	17	W	4298	7.46	55.93	4.17	11	SAT	OCT	W	4139	6.59	60.97	4.02	16	FRI	NOV
11	008	SD		.946	804	A	17	W	8282	7.05	58.53	4.13	7	TUE	FEB	E	8046	7.16	56.01	4.01	15	MON	APR
11	008	SD		5.638	953	B	17	W	10825	6.4	68.22	4.36	7	THU	AUG	E	10499	7.66	55.28	4.23	14	FRI	OCT
11	008	SD		8.336	807	B	17	W	10646	6.1	76.62	4.67	6	WED	APR	E	10913	8	59.82	4.79	15	THU	OCT
11	008	SD		11.76	810	B	17	W	7642	5.57	72.94	4.06	6	WED	JUN	E	8624	8.17	56.08	4.58	15	FRI	SEP
11	008	SD		12.65	834	A	17	W	9591	5.54	72.37	4.01	6	MON	NOV	E	11577	8.43	57.39	4.84	16	WED	JUN
11	008	SD		14.59	806	B	17	W	7281	6.91	59.51	4.11	7	THU	AUG	E	7411	7.98	52.46	4.18	15	THU	JUN
11	008	SD	R	18.73	824	B	17	W	7730	11.83	67.15	7.94	7	FRI	JUL	E	8228	14.63	57.81	8.46	17	WED	JUL

									AM PEAK								PM PEAK						
DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH	Dir	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
11	008	SD	R	20.04	888	B	17	W	3726	6.42	68.43	4.4	7	TUE	MAY	E	3772	7.55	58.91	4.45	16	TUE	DEC
11	008	SD	R	51.98	621	B	17	W	1191	13.18	53.46	7.04	12	MON	DEC	E	1378	14.61	55.79	8.15	14	MON	SEP
11	008	SD	R	65.90	981	A	17	W	1106	10.72	64.23	6.88	12	SAT	MAY	W	1172	13.66	53.39	7.29	14	FRI	MAY
11	008	IMP	R	10.29	993	B	17	W	1094	12.26	58.69	7.2	10	SAT	JUL	W	1266	12.4	67.16	8.33	17	SUN	NOV
11	008	IMP	R	10.29	994	A	17	W	1030	12.97	58.13	7.54	12	SAT	NOV	W	1176	12.14	70.89	8.61	18	SUN	NOV
11	008	IMP	R	23.48	624	A	17	W	1021	12.53	56.41	7.07	12	SAT	JUL	W	1152	11.38	70.03	7.97	18	SUN	NOV
04	009	SCL		0	50	A	16	N	288	13.85	64.29	8.91	12	SAT	JUN	S	337	13.27	78.56	10.42	17	SUN	JUN
04	009	SCL		7.09	170	A	16	N	533	11.65	67.21	7.83	11	SAT	DEC	N	685	15.41	65.3	10.06	14	SUN	SEP
04	009	SCL		11.45	171	B	16	N	1633	7.88	64.32	5.06	8	WED	DEC	S	1748	8.34	64.98	5.42	17	TUE	DEC
07	010	LA		18.41	456	B	15	W	1558	13.19	96.35	12.7	7	MON	DEC	E	1308	12.93	82.47	10.67	17	WED	JUL
07	010	LA		19.71	783	O	17	W	1598	12.09	96.21	11.63	7	WED	MAY	E	1312	12.02	79.42	9.55	17	THU	SEP
07	010	LA		24.31	785	A	15	W	3325	11.87	92.52	10.98	7	WED	OCT	E	2694	10.73	82.94	8.9	16	WED	SEP
07	010	LA		19.67	752	O	17	E	8064	6.33	58.28	3.69	12	FRI	MAY	E	9022	6.62	62.43	4.13	16	FRI	MAR
07	010	LA		24.32	721	A	15	E	7000	6.25	51.32	3.21	11	SAT	FEB	E	6963	6.09	52.39	3.19	17	THU	MAY
07	010	LA		30.3	429	A	17	W	8875	6.51	61.47	4	8	TUE	JAN	W	8569	7.07	54.65	3.86	14	SAT	MAY
07	010	LA		34.28	48	O	15	W	6826	5.37	72.81	3.91	5	FRI	OCT	E	6533	5.73	65.27	3.74	14	SUN	MAY
07	010	LA		47.11	54	B	16	E	9730	6.31	55.47	3.5	11	SAT	APR	E	9876	6.26	56.78	3.55	13	THU	APR
08	010	SBD		9.176	102	B	17	W	8821	6.7	51.34	3.44	7	THU	AUG	E	8580	6.39	52.34	3.34	14	SAT	FEB
08	010	SBD		31.41	150	B	17	W	7791	6.71	67.54	4.53	7	TUE	AUG	E	7116	6.82	60.72	4.14	16	THU	JUL
08	010	RIV	R	3.048	862	A	17	W	4345	6.16	66.14	4.08	6	MON	APR	W	4337	7.12	57.1	4.07	13	MON	SEP
08	010	RIV		8.205	865	B	17	E	6066	7.54	61.56	4.64	11	SAT	MAR	W	5738	8.32	52.77	4.39	13	SUN	JUN
08	010	RIV	R	19.4	808	A	17	W	5738	9.06	58.47	5.3	11	SUN	JUN	E	5183	8.52	56.22	4.79	14	FRI	APR
08	010	RIV	R	149.2	908	A	17	W	1742	9.73	63.76	6.2	10	SUN	MAR	W	1757	10.7	58.49	6.26	13	SUN	JAN
08	010	RIV	R	156.5	909	O	17	E	2686	9.4	91.33	8.58	4	MON	DEC	E	1874	10.1	59.3	5.99	15	FRI	DEC
04	012	NAP		2.3	906	B	17	W	2411	7.8	73.96	5.77	6	WED	AUG	E	1947	7.42	62.83	4.66	15	THU	APR
04	012	SOL		19.17	315	B	17	W	759	7.85	73.55	5.78	7	THU	JUL	E	850	8.53	75.83	6.47	16	THU	OCT
10	012	CAL		13.87	155	A	15	E	489	11.91	68.49	8.16	8	MON	JAN	W	431	11.62	61.84	7.19	15	TUE	JAN
04	013	ALA		4.262	27	A	15	N	2998	10.02	55.03	5.52	8	TUE	SEP	N	2653	8.78	55.61	4.88	17	TUE	SEP
04	013	ALA		13.91	240	B	15	S	1871	8.51	64.43	5.48	8	THU	SEP	S	1668	9.49	51.55	4.89	15	SAT	JUN
07	014	LA	R	26	779	A	16	S	8746	6.43	75.27	4.84	6	FRI	MAR	N	8241	6.81	67	4.56	16	TUE	MAR
07	014	LA	R	54.2	712	B	17	S	5067	4.94	91.23	4.51	4	TUE	JAN	N	5061	6.74	66.88	4.51	18	FRI	MAR
07	014	LA	R	73	63	O	15	N	1634	6.79	67.11	4.56	6	THU	OCT	S	1934	9.6	56.19	5.39	17	THU	DEC
09	014	KER	R	0	927	A	17	N	1506	6.22	68.83	4.28	5	FRI	AUG	S	1967	9.49	58.93	5.59	16	MON	SEP

Dist	Route	County		Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
11	005	SD		2.312	SAN DIEGO, DAIRY MART ROAD	5100	62000	57000	6300	77000	76000
11	005	SD		3.1	SAN DIEGO, JCT. RTE. 905	6300	77000	76000	8900	115000	114000
11	005	SD		4.042	SAN DIEGO, CORONADO AVENUE	9400	122000	121000	10300	136000	135000
11	005	SD		4.632	JCT. RTE. 75 WEST	10300	136000	135000	12700	166000	160000
11	005	SD		5.404	SAN DIEGO, MAIN STREET	12700	166000	160000	13800	164000	162000
11	005	SD		6.056	CHULA VISTA, PALOMAR STREET	13800	164000	162000	13500	160000	158000
11	005	SD		6.807	CHULA VISTA, L STREET	13500	160000	158000	14600	172000	171000
11	005	SD		7.3	CHULA VISTA, J STREET	14600	172000	171000	14600	176000	175000
11	005	SD		7.812	CHULA VISTA, H STREET	14600	176000	175000	13800	185000	170000
11	005	SD		8.562	E STREET	13800	185000	170000	11300	138000	132000
11	005	SD		9.396	JCT. RTE. 54	11300	138000	132000	16100	197000	190000
11	005	SD	R	10.042	NATIONAL CITY, 24TH STREET	16100	197000	190000	16000	195000	189000
11	005	SD	R	10.749	NATIONAL CITY, 9TH STREET	16000	195000	189000	15100	188000	180000
11	005	SD	R	11.129	8TH STREET	15100	188000	180000	15400	212000	196000
11	005	SD	R	11.66	SAN DIEGO, DIVISION/MAIN STREETS	15400	212000	196000	16500	204000	203000
11	005	SD	R	12.647	JCT. RTE. 15 NORTH	16500	204000	203000	13300	177000	167000
11	005	SD	R	13.386	SAN DIEGO, 28TH STREET	13300	177000	167000	13300	177000	171000
11	005	SD	R	14.077	SAN DIEGO, JCT. RTE. 75 SOUTH	13300	177000	171000	13500	180000	173000
11	005	SD	R	14.74	J STREET	13500	180000	173000	13800	189000	178000
11	005	SD	R	15.036	SAN DIEGO, JCT. RTE. 94	13800	189000	178000	17700	245000	229000
11	005	SD	R	15.405	SAN DIEGO, PERSHING DRIVE	17700	245000	229000	17700	245000	229000
11	005	SD	R	16.069	SAN DIEGO, JCT. RTE. 163	17700	245000	229000	17100	237000	219000
11	005	SD	R	16.311	SAN DIEGO, SIXTH AVENUE	17100	237000	219000	17100	237000	219000
11	005	SD	R	16.589	SAN DIEGO, FIRST AVENUE	17100	237000	219000	13200	186000	174000
11	005	SD	R	16.912	SAN DIEGO, HAWTHORN STREET	13200	186000	174000	16300	226000	207000
11	005	SD	R	17.25	SAN DIEGO, INDIA/SASSAFRAS STREETS	16300	226000	207000	15800	218000	201000
11	005	SD	R	17.53	PACIFIC HIGHWAY VIADUCT	15800	218000	201000	13900	166000	158000
11	005	SD	R	17.77	SAN DIEGO, SASSAFRAS STREET	13900	166000	158000	12400	164000	154000
11	005	SD	R	18.283	SAN DIEGO, WASHINGTON STREET	12400	164000	154000	16300	218000	203000
11	005	SD	R	19.033	SAN DIEGO, OLD TOWN AVENUE	16300	218000	203000	16200	238000	205000
11	005	SD	R	20.056	JCT. RTE. 8/CAMINO DEL RIO	16200	238000	205000	16300	237000	207000
11	005	SD	R	20.818	SAN DIEGO, MISSION BAY DRIVE/SEA WORLD DRIVE	16300	237000	207000	17500	237000	222000
11	005	SD	R	22.262	CLAIREMONT DRIVE	17500	237000	222000	17000	210000	205000
11	005	SD	R	22.872	SAN DIEGO, DE ANZA ROAD	17000	210000	205000	13700	168000	163000
11	005	SD	R	23.476	SAN DIEGO, BALBOA AVENUE	13700	168000	163000	12600	153000	147000
11	005	SD	R	23.93	SAN DIEGO, MISSION BAY DRIVE	12600	153000	147000	15900	208000	201000
11	005	SD	R	25.947	JCT. RTE. 52 EAST	15900	208000	201000	13800	192000	187000

Dist	Route	County		Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
09	006	MNO		25.715	BENTON STATION, JCT. RTE. 120 WEST	110	2000	1890	100	1100	890
09	006	MNO		32.29	NEVADA STATE LINE	140	1450	1060			
11	007	IMP	S	0	BEGIN SPUR RTE 7 AT U.S. CUSTOMS STATION				1250	15700	14800
11	007	IMP	S	.239	MENVIELLE ROAD	1250	15700	14800	830	10400	9800
11	007	IMP	S	.449	JCT. RTE. 7	610	8000	7500	610	8000	7500
11	007	IMP	S	.536	END SPUR RTE 7; BEGIN RTE 7, U.S./MEXICO INT'L BDRY	370	4650	4250			
11	007	IMP		0	END SPUR RTE 7; BEGIN RTE 7, U.S./MEXICO INT'L BDRY				200	2550	2300
11	007	IMP		.04	POE TRUCKS COMM VEHICLE INSPECTION	200	2550	2300	200	2550	2300
11	007	IMP		.264	CALEXICO VEHICLE INSPECTION	200	2550	2300	480	6100	5800
11	007	IMP		.672	MAGGIO ROAD	650	8600	7900	760	8500	7800
11	007	IMP		1.188	CALEXICO, JCT RTE 98	760	8500	7800	660	7100	6600
11	007	IMP		6.718	JCT. RTE. 8	650	7300	6700	250	3650	3600
11	007	IMP		6.823	END OF RTE 7	250	3650	3600			
11	008	SD	T	.407	SAN DIEGO, SUNSET CLIFFS BOULEVARD				880	13000	12400
11	008	SD	T	.466	EB RIGHT TURN FR NIMITZ BLVD	950	14000	13400	5100	49000	47500
11	008	SD	L	1.213	MIDWAY DRIVE	5100	49000	47500	8100	116000	102000
11	008	SD	L	2.379	JCT. RTE. 5	8100	116000	102000	11100	146000	134000
11	008	SD	R	.364	SAN DIEGO, MORENA BOULEVARD	11100	146000	134000	15000	211000	196000
11	008	SD		.946	HOTEL CIRCLE/TAYLOR STREET	15000	211000	196000	15200	213000	199000
11	008	SD		2.23	SAN DIEGO, HOTEL CIRCLE	15200	213000	199000	17500	232000	215000
11	008	SD		2.41	SAN DIEGO, JCT. RTE. 163	17500	232000	215000	17900	238000	221000
11	008	SD		3.04	SAN DIEGO, MISSION CENTER ROAD	17900	238000	221000	19300	254000	237000
11	008	SD		3.902	SAN DIEGO, TEXAS STREET	19300	254000	237000	17100	226000	210000
11	008	SD		4.378	SAN DIEGO, JCT. RTE. 805	17100	226000	210000	18800	251000	246000
11	008	SD		5.638	JCT. RTE. 15	18800	251000	246000	17400	228000	224000
11	008	SD		6.271	SAN DIEGO, FAIRMOUNT AVENUE	17400	228000	224000	19500	252000	247000
11	008	SD		7.06	SAN DIEGO, WARING ROAD	19500	252000	247000	17700	234000	224000
11	008	SD		8.336	COLLEGE AVENUE	17700	234000	224000	16100	208000	203000
11	008	SD		9.591	LA MESA, LAKE MURRAY BOULEVARD	16100	208000	203000	16300	212000	208000
11	008	SD		10.57	FLETCHER PARKWAY	15800	205000	201000	14900	192000	190000
11	008	SD		10.967	SPRING STREET	14400	185000	183000	16200	207000	203000
11	008	SD		11.101	LA MESA, EL CAJON BOULEVARD	16200	207000	203000	15200	190000	186000
11	008	SD		11.764	JACKSON DRIVE	15200	190000	186000	14900	187000	183000
11	008	SD		12.24	LA MESA, JCT. RTE. 125 SOUTH	14900	187000	183000	18800	235000	226000
11	008	SD		12.654	LA MESA, SEVERIN/ FUERTE DRIVES	18800	235000	226000	18700	238000	231000
11	008	SD		13.658	EL CAJON, EL CAJON BOULEVARD	18700	238000	231000	14200	180000	175000
11	008	SD		14.594	WEST MAIN STREET	14200	180000	175000	13300	171000	167000

Ramp Meter Observations

Sea World Drive / I-5 Southbound Ramp

Date: Wednesday, November 13, 2019

Time Period: AM Peak Hour (7:00am – 8:00am)

Time	Number of Cars	Wait Time
7:00am	4	26 seconds
7:10am	2	12 seconds
7:20am	6	45 seconds
7:30am	6	43 seconds
7:40am	4	30 seconds
7:50am	3	23 seconds
8:00am	4	30 seconds

Max Queue: 270 feet

Max Delay: 45 seconds

Date: Wednesday, November 13, 2019

Time Period: PM Peak Hour (5:00pm – 6:00pm)

Time	Number of Cars	Wait Time
5:00pm	3	33 seconds
5:10pm	2	21 seconds
5:20pm	8	83 seconds
5:30pm	7	76 seconds
5:40pm	4	40 seconds
5:50pm	3	32 seconds
6:00pm	3	30 seconds

Max Queue: 345 feet

Max Delay: 83 seconds

Ramp Meter Observations

Sports Arena Boulevard (Southbound) / I-8 Eastbound Ramp

Date: Wednesday, November 13, 2019

Time Period: PM Peak Hour (5:00pm – 6:00pm)

Time	Number of Cars	Wait Time
5:00pm	0	0 seconds (meter off)
5:10pm	0	0 seconds
5:30pm	0	0 seconds
5:40pm	0	0 seconds (meter off)

Max Queue: 0 feet

Max Delay: 0 seconds

Location (I.D.)	Route	Dir	Period	Cars per green	Sec./ Cycle	(per lane) Veh./hr	Total # lanes	HOV
Sea World Dr (16201)	5	SB	0530 - 0930	1	6.3 - 11.3	570 - 318	2	Lt
			1500 - 1900		6.3 - 11.3	570 - 318		
Sea World Dr (16210)	5	NB	0530 - 0630	2	7.2 - 12.9	996 - 559	2	No
			0630 - 0930		7.5	965		
			1500 - 1830		7.4	972		
			1830 - 1900		7.2 - 10.9	996 - 660		
La Costa Ave (214)	5	NB	1500 - 1600	2	7.2	996	2	Lt
			1600 - 1800		13.6	528		
			1800 - 1900		7.2	996		
La Costa Ave (249)	5	SB	0530 - 0600	2	12.8	564	3	Lt
			0600 - 1100		17.1	420		
			1400 - 1500		12.8	564		
			1500 - 1800		15.4	468		
			1800 - 1900		12.8	564		
W Mission Bay Dr	8	EB	1500 - 1900	2	7.2 - 10.3	996 - 696	2	No

The meters normally operate in a traffic responsive mode.
There are 15 separate rates or steps between the slowest and the fastest discharge rate that depend on the mainlane volumes.

APPENDIX C

CITY OF SAN DIEGO ROADWAY CLASSIFICATION TABLE

TABLE 2
Roadway Classifications, Levels of Service (LOS) and Average Daily Traffic (ADT)

STREET CLASSIFICATION	LANES	CROSS SECTIONS	LEVEL OF SERVICE A	B	C	D	E
Freeway	8 lanes		60,000	84,000	120,000	140,000	150,000
Freeway	6 lanes		45,000	63,000	90,000	110,000	120,000
Freeway	4 lanes		30,000	42,000	60,000	70,000	80,000
Expressway	6 lanes	102/122	30,000	42,000	60,000	70,000	80,000
Primary Arterial	6 lanes	102/122	25,000	35,000	50,000	55,000	60,000
Major Arterial	6 lanes	102/122	20,000	28,000	40,000	45,000	50,000
Major Arterial	4 lanes	78/98	15,000	21,000	30,000	35,000	40,000
Collector	4 lanes	72/92	10,000	14,000	20,000	25,000	30,000
Collector (no center lane) continuous left-turn lane)	4 lanes 2 lanes	64/84 50/70	5,000	7,000	10,000	13,000	15,000
Collector (no fronting property)	2 lanes	40/60	4,000	5,500	7,500	9,000	10,000
Collector (commercial-industrial fronting)	2 lanes	50/70	2,500	3,500	5,000	6,500	8,000
Collector (multifamily)	2 lanes	40/60	2,500	3,500	5,000	6,500	8,000
Sub-Collector (single-family)	2 lanes	36/56	—	—	2,200	—	—

LEGEND:

XXX/XXX = Curb to curb width (feet)/right-of-way width (feet): based on the City of San Diego Street Design. Manual

XX/XXX= Approximate recommended ADT based on the City of San Diego Street Design Manual.

NOTES:

1. The volumes and the average daily level of service listed above are only intended as a general planning guideline.

2. Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

APPENDIX D

EXISTING SEAWORLD TRIP GENERATION INFORMATION

2019 TRIP GENERATION DATA
SeaWorld ADT

Reference	Direction		Aug-19
1	IN	SeaWorld Drive s/o Main Lot - Cars	2,092
2	IN	Perez s/o Ingraham	3,519
		Total Inbound	**5,611**
3	OUT	Sea World Way	3,747
4	OUT	Perez s/o Ingraham	2,847
		Total Outbound	**6,594**
		Total In & Out	**12,205**

SeaWorld AM highest hour between 7AM–9AM

			Aug-19
1	IN	SeaWorld Drive s/o Main Lot	16
2	IN	Perez s/o Ingraham	179
		Total Inbound	**195**
3	OUT	Sea World Way	9
4	OUT	Perez s/o Ingraham	104
		Total Outbound	**113**

SeaWorld PM highest hour between 4PM–6PM

			Aug-19
1	IN	SeaWorld Drive s/o Main Lot	102
2	IN	Perez s/o Ingraham	214
		Total Inbound	**316**
3	OUT	Sea World Way	445
4	OUT	Perez s/o Ingraham	312
		Total Outbound	**757**

Source: 2019 Tube Counts.

N:\3077\Trip Generation\MMRP 2019 Volumes\Trip Gen
10/2/2019 2:26 PM

HIGHEST OF 3 DAYS   EMPLOYEE TRIP GEN

	ADT ↓	ADT ↑	AM (7-8, 8-9) ↓	AM (4-5, 5-6) ↑	PM ↓	PM ↑
2/4						
1	4016	3525	139, 214	23, 113	238, 155	306, 333
2	4127	3470	140, 198	22, 115	241, 207	339, 295
3	4109	3441	134, 218	32, 104	235, 206	311, 290
AVG:	4111	3479	210	112	238	326
5	↓	↑	↓	↑	↓	↑
1	3436	2803	80, 162	32, 120	200, 142	222, 236
2	3586	2853	77, 144	28, 123	212, 178	241, 225
3	3631	2803	77, 156	41, 106	206, 186	232, 216
AVG	3551	2820	154	116	206	236
Δ						
1	(580)	722	(59), (52)	(9), (2)	(38), (13)	84, 97
2	(541)	617	(63), (54)	(6), (0)	(29), (29)	98, 70
3	(558)	638	(57), (62)	(9) (2)	(29), (20)	79, 74

5

HIGHEST AVG

	↓	↑	↓	↑	↓	↑
	(560)	+ 659	(56)	*(4)	(32)	+ 90

INGRAHAM

6,11/11,2

L 7,24/30,17
— 2,4/3,3
⌐ 9,69/239,214

PCW

0,1/7,4

95,166/104,85

→ 101,178/122,91

← 18,97/272,234

* PM vols are quite different in PM from ADTs hourly counts

CH 10/3/19

1

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance** INBOUND

Date: **Tuesday, August 6, 2019** Total Daily Volume: **2195** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2	0	0	0	0	10	7	6	8	181	572	352	231	179	118	117	94	101	86	59	35	16	19	2
2	0	0	0	0	3	3	0	3	10	111	97	78	51	29	26	23	21	24	20	8	5	7	0
0	0	0	0	0	2	2	2	0	19	146	91	57	50	33	22	22	31	19	13	12	3	5	0
0	0	0	0	0	2	2	1	3	48	153	89	49	49	26	28	27	23	26	15	7	2	4	2
0	0	0	0	0	3	0	3	2	104	162	75	47	29	30	41	22	26	17	11	8	6	3	0

AVERAGE

WK 1-2
2195
2396
2340
1870
1823
1925
2092

WK 2-3
1870
1823
1925
1333
1347
1511
1634

WK 1-2

AM	PM
6,8	94,101
6,19	108,101
11,18	104,101
4,17	78,62
7,18	69,83
11,13	68,76
16	102

WK 2-3

AM	PM
4,17	78,62
7,18	69,83
11,13	68,76
10,14	49,49
6,17	61,54
12,8	54,65
15	73

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Wednesday, August 7, 2019** Total Daily Volume: **2396** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	0	3	0	1	8	13	6	19	132	602	431	264	193	133	101	108	101	84	80	47	24	36	9
1	0	0	0	0	1	3	0	6	9	105	148	68	62	39	30	42	32	17	31	10	7	12	3
0	0	0	0	0	1	5	0	8	16	164	110	68	52	30	25	16	25	28	13	18	8	14	2
0	0	2	0	1	3	4	4	2	32	156	108	62	53	33	24	23	25	22	19	14	6	6	0
0	0	1	0	0	3	1	2	3	75	177	65	66	26	31	22	27	19	17	17	5	3	4	4

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Thursday, August 8, 2019** Total Daily Volume: **2340** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
3	1	0	2	0	12	9	11	18	159	581	394	266	181	124	102	104	101	108	56	50	21	30	7
0	0	0	0	0	2	1	2	2	10	127	124	74	57	41	33	34	27	24	11	17	9	13	2
3	0	0	1	0	1	5	2	5	22	133	111	67	51	29	27	27	19	30	13	11	6	8	2
0	0	0	0	0	5	3	4	1	46	170	90	70	37	26	18	23	31	29	13	12	3	3	1
0	1	0	1	0	4	0	3	10	81	151	69	55	36	28	24	20	24	25	19	10	3	6	2

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Tuesday, August 13, 2019** Total Daily Volume: **1870** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2	0	0	0	3	5	11	4	17	119	512	348	243	147	102	71	78	62	87	43	11	3	2	0
0	0	0	0	0	1	2	2	1	6	101	124	60	31	29	21	18	18	15	16	3	2	0	0
1	0	0	0	0	0	5	0	8	14	141	83	63	39	21	19	19	9	25	16	3	0	1	0
1	0	0	0	0	2	2	2	4	38	146	70	68	38	26	14	20	15	27	4	3	1	0	0
0	0	0	0	3	2	2	0	4	61	124	71	52	39	26	17	21	20	20	7	2	0	1	0

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Wednesday, August 14, 2019** Total Daily Volume: **1823** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	0	0	1	2	9	9	7	18	133	451	355	193	160	129	77	69	83	51	49	17	4	4	2
0	0	0	0	0	4	3	1	4	4	83	110	55	39	40	22	10	20	14	12	8	2	0	0
0	0	0	0	0	0	1	0	5	16	121	92	57	44	33	15	29	32	15	15	4	2	0	0
0	0	0	0	0	2	3	3	4	49	133	79	50	41	27	17	17	21	8	18	3	0	0	1
0	0	0	1	2	3	2	3	5	64	114	74	31	36	29	23	13	10	14	4	2	0	4	1

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Thursday, August 15, 2019** Total Daily Volume: **1925** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	0	1	0	4	10	12	11	13	115	489	384	249	163	118	81	68	76	69	43	9	4	1	4
1	0	1	0	1	1	8	1	5	12	100	127	60	46	33	28	19	21	16	15	5	2	0	0
0	0	0	0	3	2	3	3	3	8	125	95	69	50	28	14	19	22	23	10	3	2	0	2
0	0	0	0	0	3	1	6	3	38	138	75	70	33	32	27	17	13	16	11	1	0	1	0
0	0	0	0	0	4	0	1	2	57	126	87	50	34	25	12	13	20	14	7	0	0	0	2

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Tuesday, August 20, 2019** Total Daily Volume: **1333** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	0	0	0	2	9	19	10	14	98	352	273	162	110	56	53	49	49	53	14	2	4	2	2
0	0	0	0	0	1	9	1	2	4	77	84	54	37	18	18	10	11	14	3	1	1	0	2
0	0	0	0	1	4	5	1	1	12	99	72	54	23	15	16	12	13	17	5	0	0	1	0
0	0	0	0	0	1	3	4	6	23	96	63	36	23	13	12	8	15	13	4	1	2	0	0
0	0	0	0	1	3	2	4	5	59	80	54	18	27	10	7	19	10	9	2	0	1	1	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Wednesday, August 21, 2019** Total Daily Volume: **1347** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	1	0	1	2	12	10	6	17	103	402	254	125	112	70	51	61	54	45	12	5	2	1	1
0	1	0	0	1	3	4	1	5	5	85	72	35	36	24	13	13	16	16	3	1	0	0	0
0	0	0	0	0	1	2	0	4	12	102	67	31	31	18	14	18	14	13	4	1	1	0	0
0	0	0	0	1	2	3	3	3	25	111	57	33	29	12	11	14	12	3	3	1	0	0	1
0	0	0	1	0	6	1	2	5	61	104	58	26	16	16	13	16	12	13	2	2	1	1	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Main Entrance**

Date: **Thursday, August 22, 2019** Total Daily Volume: **1511** Description: **Westbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	1	0	0	2	19	12	12	8	96	406	297	211	121	88	53	54	65	40	11	5	5	1	4
0	0	0	0	0	2	3	3	1	10	85	91	57	34	27	10	9	18	14	4	0	2	0	1
0	0	0	0	0	4	4	2	3	18	97	80	49	33	20	14	14	13	15	3	1	0	0	2
0	1	0	0	0	6	5	7	1	19	108	74	62	30	25	19	20	18	6	2	4	2	1	0
0	0	0	0	2	7	0	0	3	49	116	52	43	24	16	10	11	16	5	2	0	1	0	1

3

Don't use week 3

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

OUTBOUND

Date: **Tuesday, August 6, 2019** Total Daily Volume: **4069** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
4	1	0	1	0	2	0	12	4	6	28	23	125	196	261	365	341	403	491	413	458	319	603	13
0	0	0	1	0	0	0	0	3	0	5	6	28	33	49	64	83	79	109	108	92	104	255	5
0	0	0	0	0	0	0	3	1	0	4	0	24	56	48	89	86	103	127	110	103	62	217	2
0	0	0	0	0	2	0	6	0	1	8	8	33	54	61	113	93	96	147	93	125	96	99	4
4	1	0	0	0	0	0	3	0	5	11	9	40	53	103	99	79	125	108	102	138	57	32	2

WK 1-2
ADT
4069
4351
4407
3179
3100
3377
3747

WK 2-3
ADT
3179
3100
3377
3008
2822
3187
3112

WK 1-2

AM	PM
12, 4	341, 403
9, 9	375, 455
3, 6	438, 441
3, 14	400, 426
7, 10	385, 428
5, 3	395, 482
9	445

WK 2-3

AM	PM
3, 14	400, 426
7, 6	385, 428
5, 3	395, 482
6, 9	434, 633
6, 5	370, 582
10, 2	457, 642
~~9~~	~~538~~

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Wednesday, August 7, 2019** Total Daily Volume: **4351** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	1	0	0	0	0	5	9	8	13	21	29	88	178	342	356	375	455	496	461	440	363	695	16
0	0	0	0	0	0	1	1	3	3	8	6	22	30	73	106	87	100	133	110	107	115	250	14
0	0	0	0	0	0	2	3	4	0	6	11	18	41	69	99	104	88	111	152	106	88	282	2
0	1	0	0	0	0	0	2	0	3	3	7	26	44	95	83	97	129	131	94	122	75	120	0
0	0	0	0	0	0	2	3	1	7	4	5	22	63	105	68	87	138	121	105	105	85	43	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Thursday, August 8, 2019** Total Daily Volume: **4407** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	6	1	0	2	1	1	3	6	20	20	62	97	179	274	317	438	441	487	507	495	320	693	36
0	0	1	0	0	0	0	0	2	12	2	24	18	45	52	77	96	92	106	135	123	100	275	19
0	0	0	0	1	0	0	0	4	0	6	16	22	31	52	70	110	89	127	139	102	62	244	6
1	0	0	0	1	0	0	2	0	2	4	12	28	56	71	97	122	117	131	134	136	75	120	9
0	6	0	0	0	1	1	1	0	6	8	10	29	47	99	73	110	143	123	99	134	83	54	2

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Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Tuesday, August 13, 2019** Total Daily Volume: **3179** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	2	0	0	0	4	2	3	14	9	25	23	57	144	218	338	400	426	490	942	81	1	0	0
0	0	0	0	0	3	0	0	4	3	4	9	5	32	52	91	79	105	129	262	50	0	0	0
0	2	0	0	0	1	1	1	3	2	3	3	14	29	70	86	95	115	105	335	15	1	0	0
0	0	0	0	0	0	0	2	2	3	5	3	20	48	46	81	115	82	148	245	7	0	0	0
0	0	0	0	0	0	1	0	5	1	13	8	18	35	50	80	111	124	108	100	9	0	0	0

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Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Wednesday, August 14, 2019** Total Daily Volume: **3100** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	2	0	1	1	2	3	7	6	10	7	18	91	121	201	325	385	428	467	932	91	1	0	1
0	0	0	0	0	2	1	0	2	0	3	8	16	31	37	83	95	97	108	213	51	0	0	0
0	0	0	0	0	0	1	1	2	0	2	2	24	19	62	91	86	72	107	337	22	1	0	0
0	0	0	0	0	0	0	6	1	7	2	0	21	38	44	82	102	115	112	251	16	0	0	1
0	2	0	1	1	0	1	0	1	3	0	8	30	33	58	69	102	144	140	131	2	0	0	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Thursday, August 15, 2019** Total Daily Volume: **3377** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	2	4	0	4	1	0	5	3	17	37	23	90	125	194	377	395	482	564	964	82	5	2	0
1	0	3	0	1	0	0	0	0	1	9	6	18	23	39	105	96	118	141	214	56	1	1	0
0	0	0	0	1	1	0	2	2	2	6	4	16	37	49	104	101	110	151	356	17	1	0	0
0	2	0	0	2	0	0	2	0	4	6	5	28	36	47	78	111	134	141	255	9	0	1	0
0	0	1	0	0	0	0	1	1	10	16	8	28	29	59	90	87	120	131	139	0	3	0	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Tuesday, August 20, 2019** Total Daily Volume: **3008** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	0	4	0	6	2	6	6	9	6	32	31	70	185	188	394	434	633	908	83	7	3	1	0
0	0	1	0	0	0	0	3	3	0	7	5	13	47	60	101	92	143	230	51	5	0	0	0
0	0	0	0	0	0	1	2	0	0	4	13	15	39	37	112	96	125	318	24	0	3	0	0
0	0	1	0	2	0	5	0	0	4	15	5	25	46	46	88	128	192	247	6	2	0	1	0
0	0	2	0	4	2	0	1	6	2	6	8	17	53	45	93	118	173	113	2	0	0	0	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Wednesday, August 21, 2019** Total Daily Volume: **2822** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	2	2	1	2	3	2	6	5	14	24	50	80	162	192	377	370	582	856	86	5	1	0	0
0	0	0	0	2	0	0	0	1	8	2	13	12	41	46	94	81	98	253	43	5	0	0	0
0	0	0	0	0	1	0	5	3	2	1	10	19	33	40	86	87	138	315	27	0	1	0	0
0	0	2	1	0	1	0	1	0	2	8	15	21	41	68	92	104	165	194	11	0	0	0	0
0	2	0	0	0	1	2	0	1	2	13	12	28	47	38	105	98	181	94	5	0	0	0	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Sea World Way, North of Sea World Drive**

Date: **Thursday, August 22, 2019** Total Daily Volume: **3187** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	6	0	0	0	1	9	10	2	19	33	54	92	215	240	391	457	642	898	107	8	2	1	0
0	0	0	0	0	0	4	2	1	4	5	13	18	44	62	97	113	167	249	75	1	0	0	0
0	5	0	0	0	0	1	2	0	0	5	11	22	51	68	92	85	115	267	19	0	0	0	0
0	0	0	0	0	0	4	3	0	3	10	11	30	68	62	91	119	165	229	9	6	1	1	0
0	1	0	0	0	1	0	3	1	12	13	19	22	52	48	111	140	195	153	4	1	1	0	0

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4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Tuesday, August 6, 2019** Total Daily Volume: **7541** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
45	2	7	7	28	111	116	162	332	449	853	629	418	383	505	620	544	488	420	382	262	230	393	155
23	1	2	0	1	13	12	39	68	74	218	175	111	80	107	190	129	123	107	110	79	62	114	53
15	0	2	1	6	17	47	46	139	96	214	188	127	83	106	132	147	116	100	100	58	57	130	39
5	1	2	3	6	28	24	41	69	101	215	145	100	115	155	163	158	130	125	86	64	56	87	33
2	0	1	3	15	53	33	36	56	178	206	121	80	105	137	135	110	119	88	86	61	55	62	30

OUTBOUND

4

Date: **Tuesday, August 6, 2019** Total Daily Volume: **3525** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
36	0	3	0	7	17	20	23	118	112	188	167	130	143	248	365	306	333	253	252	182	170	319	133
21	0	2	0	0	5	0	7	14	20	53	39	29	28	63	119	71	80	65	69	55	49	93	44
10	0	0	0	3	0	10	6	51	26	45	66	38	26	50	72	78	79	62	64	42	41	105	36
4	0	1	0	1	4	6	3	36	23	42	36	41	46	80	93	87	89	75	68	43	44	72	28
1	0	0	0	3	8	4	7	17	43	48	26	22	43	55	81	70	85	51	51	42	36	49	25

INBOUND

2

Date: **Tuesday, August 6, 2019** Total Daily Volume: **4016** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
9	2	4	7	21	94	96	139	214	337	665	462	288	240	257	255	238	155	167	130	80	60	74	22
2	1	0	0	1	8	12	32	54	54	165	136	82	52	44	71	58	43	42	41	24	13	21	9
5	0	2	1	3	17	37	40	88	70	169	122	89	57	56	60	69	37	38	36	16	16	25	3
1	1	1	3	5	24	18	38	33	78	173	109	59	69	75	70	71	41	50	18	21	12	15	5
1	0	1	3	12	45	29	29	39	135	158	95	58	62	82	54	40	34	37	35	19	19	13	5

2
WK 1-2

ADT	AM	PM
4016	139, 214	238, 155
4127	140, 198	241, 227
4139	134, 218	235, 206
2048	65, 152	134, 123
2825	59, 139	126, 103
3108	69, 150	141, 121

AVG ADT = 3519
AVG AM = 179
AVG PM = 214

AVG ADT = 2847
AVG AM = 104
AVG PM = 312

4 WK 1-2

ADT	AM	PM
3525	23, 118	306, 333
3470	23, 115	339, 295
3441	34, 102	311, 290
2191	20, 95	161, 205
2154	20, 100	179, 168
2303	29, 96	161, 200

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Wednesday, August 7, 2019** Total Daily Volume: **7597** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
44	7	5	10	21	98	121	162	313	437	853	630	467	394	532	548	580	502	444	347	256	214	447	165
21	4	4	2	2	10	30	30	67	71	220	182	133	107	110	155	150	149	110	93	61	38	138	67
13	1	0	1	5	18	35	48	121	78	255	171	115	90	114	110	149	116	119	83	63	49	156	48
9	0	1	3	5	24	25	35	63	115	215	146	118	101	156	153	156	122	135	89	60	59	93	28
1	2	0	4	9	46	31	49	62	173	163	131	101	96	152	130	125	115	80	82	72	68	60	22

Date: **Wednesday, August 7, 2019** Total Daily Volume: **3470** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
39	3	3	2	2	8	19	22	115	95	204	183	124	158	244	299	339	295	274	219	182	142	373	126
18	3	3	1	0	0	1	3	11	19	62	46	29	41	47	96	94	86	70	65	44	26	120	52
12	0	0	0	1	0	10	4	51	12	42	58	34	26	63	54	87	74	73	49	44	33	125	37
9	0	0	0	0	2	7	6	33	31	53	45	30	51	71	87	94	72	90	53	41	41	82	24
0	0	0	1	1	6	1	9	20	33	47	34	31	40	63	62	64	63	41	52	53	42	46	13

Date: **Wednesday, August 7, 2019** Total Daily Volume: **4127** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
5	4	2	8	19	90	102	140	198	342	649	447	343	236	288	249	241	207	170	128	74	72	74	39
3	1	1	1	2	10	29	27	56	52	158	136	104	66	63	59	56	63	40	28	17	12	18	15
1	1	0	1	4	18	25	44	70	66	213	113	81	64	51	56	62	42	46	34	19	16	31	11
0	0	1	3	5	22	18	29	30	84	162	101	88	50	85	66	62	50	45	36	19	18	11	4
1	2	0	3	8	40	30	40	42	140	116	97	70	56	89	68	61	52	39	30	19	26	14	9

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Thursday, August 8, 2019** Total Daily Volume: **7630** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
51	9	14	15	24	105	107	166	322	430	853	634	446	409	490	593	546	496	462	351	261	226	431	189
25	3	1	4	4	6	26	29	59	68	199	177	120	92	93	180	154	137	116	93	79	66	135	72
13	3	7	2	4	28	26	47	126	93	217	165	107	101	106	133	113	121	131	86	53	45	118	53
11	1	1	3	5	27	26	38	83	104	247	168	109	105	148	164	162	116	128	104	70	50	111	42
2	2	5	6	11	44	29	52	54	165	190	124	110	111	143	116	117	122	87	68	59	65	67	22

Date: **Thursday, August 8, 2019** Total Daily Volume: **3441** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
41	5	10	6	2	14	17	32	104	107	186	176	131	148	190	313	311	290	283	224	180	169	350	152
21	2	0	2	2	1	3	5	7	22	39	39	34	31	36	112	82	79	66	57	50	53	111	61
12	2	5	2	0	3	5	7	50	22	37	52	29	34	43	62	66	70	87	52	40	32	97	41
7	0	1	0	0	5	6	5	32	24	65	48	31	38	67	84	95	76	71	67	52	38	90	33
1	1	4	2	0	5	3	15	15	39	45	37	37	45	44	55	68	65	59	48	38	46	52	17

Date: **Thursday, August 8, 2019** Total Daily Volume: **4189** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
10	4	4	9	22	91	90	134	218	323	667	458	315	261	300	280	235	206	179	127	81	57	81	37
4	1	1	2	2	5	23	24	52	46	160	138	86	61	57	68	72	58	50	36	29	13	24	11
1	1	2	0	4	25	21	40	76	71	180	113	78	67	63	71	47	51	44	34	13	13	21	12
4	1	0	3	5	22	20	33	51	80	182	120	78	67	81	80	67	40	57	37	18	12	21	9
1	1	1	4	11	39	26	37	39	126	145	87	73	66	99	61	49	57	28	20	21	19	15	5

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Tuesday, August 13, 2019** Total Daily Volume: **5039** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
8	14	5	17	29	55	79	91	247	302	692	488	361	317	368	418	295	328	318	444	106	31	17	9
1	0	1	2	7	10	9	13	51	56	154	154	102	76	97	139	65	98	80	129	37	12	10	2
1	2	0	1	6	22	20	25	97	46	204	122	94	84	80	125	78	69	71	143	29	7	4	4
5	9	3	6	6	11	26	20	52	82	169	107	82	66	89	81	82	94	91	113	22	6	1	1
1	3	1	8	10	12	24	33	47	118	165	105	83	91	102	73	70	67	76	59	18	6	2	2

Date: **Tuesday, August 13, 2019** Total Daily Volume: **2191** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
4	4	3	7	7	4	20	26	95	92	161	123	107	141	143	256	161	205	206	323	71	18	10	4
0	0	0	1	1	2	0	5	11	20	38	39	28	30	48	90	38	65	49	81	28	8	7	1
1	2	0	1	3	0	6	10	45	18	39	30	27	38	34	83	39	43	46	112	17	5	3	3
3	1	2	3	2	1	7	3	24	28	39	27	21	26	30	45	46	59	58	93	13	3	0	0
0	1	1	2	1	1	7	8	15	26	45	27	31	47	31	38	38	38	53	37	13	2	0	0

Date: **Tuesday, August 13, 2019** Total Daily Volume: **2848** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
4	10	2	10	22	51	59	65	152	210	531	365	254	176	225	162	134	123	112	121	35	13	7	5
1	0	1	1	6	8	9	8	40	36	116	115	74	46	49	49	27	33	31	48	9	4	3	1
0	0	0	0	3	22	14	15	52	28	165	92	67	46	46	42	39	26	25	31	12	2	1	1
2	8	1	3	4	10	19	17	28	54	130	80	61	40	59	36	36	35	33	20	9	3	1	1
1	2	0	6	9	11	17	25	32	92	120	78	52	44	71	35	32	29	23	22	5	4	2	2

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Wednesday, August 14, 2019** Total Daily Volume: **4979** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
9	3	2	9	28	56	64	79	239	320	670	499	377	317	393	389	304	271	282	461	124	53	18	12
2	0	2	1	4	10	17	13	37	51	151	137	121	70	80	131	73	77	64	126	48	24	9	4
3	0	0	2	7	17	14	11	104	58	162	131	84	84	100	96	79	77	75	147	40	14	5	4
4	1	0	0	6	15	19	28	53	83	203	101	82	74	97	82	88	57	63	112	19	10	1	2
0	2	0	6	11	14	14	27	45	128	154	130	90	89	116	80	64	60	80	76	17	5	3	2

Date: **Wednesday, August 14, 2019** Total Daily Volume: **2154** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
7	2	0	3	6	4	11	20	100	88	147	126	118	128	175	229	178	168	170	339	85	32	12	6
1	0	0	1	0	0	3	3	6	17	30	34	45	21	35	85	42	46	37	86	36	16	8	2
3	0	0	1	1	1	2	1	48	14	37	38	19	37	50	57	47	51	49	118	23	7	2	3
3	0	0	0	1	1	5	6	26	23	46	21	20	30	43	48	50	34	40	82	15	6	1	1
0	2	0	1	4	2	1	10	20	34	34	33	34	40	47	39	39	37	44	53	11	3	1	0

Date: **Wednesday, August 14, 2019** Total Daily Volume: **2825** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2	1	2	6	22	52	53	59	139	232	523	373	259	189	218	160	126	103	112	122	39	21	6	6
1	0	2	0	4	10	14	10	31	34	121	103	76	49	45	46	31	31	27	40	12	8	1	2
0	0	0	1	6	16	12	10	56	44	125	93	65	47	50	39	32	26	26	29	17	7	3	1
1	1	0	0	5	14	14	22	27	60	157	80	62	44	54	34	38	23	23	30	4	4	0	1
0	0	0	5	7	12	13	17	25	94	120	97	56	49	69	41	25	23	36	23	6	2	2	2

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Thursday, August 15, 2019** Total Daily Volume: **5411** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
10	4	3	11	38	58	75	98	246	351	814	593	375	356	370	404	302	321	356	419	129	39	21	18
0	2	1	0	2	7	20	22	45	59	175	196	115	79	91	146	77	88	81	115	57	13	9	3
9	1	1	3	12	26	14	28	97	54	219	154	76	92	78	92	74	80	76	160	31	8	3	7
0	0	0	2	12	9	23	22	68	95	238	123	111	92	90	98	84	77	102	94	31	14	5	1
1	1	1	6	12	16	18	26	36	143	182	120	73	93	111	68	67	76	97	50	10	4	4	7

Date: **Thursday, August 15, 2019** Total Daily Volume: **2303** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
8	0	1	3	14	9	23	29	96	109	192	152	121	141	161	230	161	200	215	308	85	18	14	13
0	0	1	0	0	1	6	6	4	19	44	48	37	29	48	111	33	55	51	82	39	6	7	1
7	0	0	2	3	1	5	10	39	14	49	41	18	33	39	43	43	41	42	116	20	3	1	6
0	0	0	1	6	2	7	4	39	34	52	28	36	41	38	46	52	57	66	75	20	8	4	1
1	0	0	0	5	5	5	9	14	42	47	35	30	38	36	30	33	47	56	35	6	1	2	5

Date: **Thursday, August 15, 2019** Total Daily Volume: **3108** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2	4	2	8	24	49	52	69	150	242	622	441	254	215	209	174	141	121	141	111	44	21	7	5
0	2	0	0	2	6	14	16	41	40	131	148	78	50	43	35	44	33	30	33	18	7	2	2
2	1	1	1	9	25	9	18	58	40	170	113	58	59	39	49	31	39	34	44	11	5	2	1
0	0	0	1	6	7	16	18	29	61	186	95	75	51	52	52	32	20	36	19	11	6	1	0
0	1	1	6	7	11	13	17	22	101	135	85	43	55	75	38	34	29	41	15	4	3	2	2

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Tuesday, August 20, 2019** Total Daily Volume: **4381** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
4	4	6	19	19	74	89	134	146	311	764	482	324	294	261	245	273	311	405	129	27	28	22	10
0	0	0	4	5	8	31	26	35	45	137	145	96	71	78	41	71	60	104	43	13	10	5	2
2	0	4	3	4	23	23	26	45	54	251	137	78	61	47	66	70	55	109	35	5	6	5	1
2	0	0	6	2	14	21	32	34	79	210	114	87	82	77	69	73	88	113	35	4	7	4	1
0	4	2	6	8	29	14	50	32	133	166	86	63	80	59	69	59	108	79	16	5	5	8	6

Date: **Tuesday, August 20, 2019** Total Daily Volume: **1944** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
4	4	4	12	5	17	26	50	52	115	218	143	118	117	126	126	175	210	284	87	17	15	14	5
0	0	0	3	2	1	9	10	11	19	29	34	36	22	36	21	44	38	70	33	8	6	4	2
2	0	3	3	2	3	7	9	16	24	76	43	26	28	22	31	38	42	81	22	3	1	4	0
2	0	0	3	0	5	6	13	18	28	66	37	33	29	44	39	51	54	79	22	2	5	3	1
0	4	1	3	1	8	4	18	7	44	47	29	23	38	24	35	42	76	54	10	4	3	3	2

Date: **Tuesday, August 20, 2019** Total Daily Volume: **2437** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0	0	2	7	14	57	63	84	94	196	546	339	206	177	135	119	98	101	121	42	10	13	8	5
0	0	0	1	3	7	22	16	24	26	108	111	60	49	42	20	27	22	34	10	5	4	1	0
0	0	1	0	2	20	16	17	29	30	175	94	52	33	25	35	32	13	28	13	2	5	1	1
0	0	0	3	2	9	15	19	16	51	144	77	54	53	33	30	22	34	34	13	2	2	1	0
0	0	1	3	7	21	10	32	25	89	119	57	40	42	35	34	17	32	25	6	1	2	5	4

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Wednesday, August 21, 2019** Total Daily Volume: **4221** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
12	5	12	20	15	66	67	94	143	344	698	468	324	284	257	271	242	320	360	119	39	27	19	15
1	2	1	1	5	8	16	20	18	64	144	127	89	72	66	58	63	75	67	40	19	7	3	9
1	3	4	5	2	25	8	25	31	67	217	122	86	65	61	58	61	78	116	37	7	4	7	1
6	0	6	5	2	6	24	26	41	94	204	119	76	69	81	79	57	87	121	30	11	4	6	1
4	0	1	9	6	27	19	23	53	119	133	100	73	78	49	76	61	80	56	12	2	12	3	4

Date: **Wednesday, August 21, 2019** Total Daily Volume: **1917** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
9	3	10	11	2	16	16	32	52	124	227	148	109	114	132	156	145	221	257	77	23	16	11	6
0	2	1	1	1	2	5	7	4	29	50	39	27	23	36	38	32	52	51	27	15	5	2	3
1	1	3	3	0	5	2	9	10	27	71	37	29	23	32	31	46	55	81	21	5	2	4	0
5	0	5	4	1	1	4	9	18	35	65	41	27	31	41	47	37	59	87	21	1	2	3	1
3	0	1	3	0	8	5	7	20	33	41	31	26	37	23	40	30	55	38	8	2	7	2	2

Date: **Wednesday, August 21, 2019** Total Daily Volume: **2304** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
3	2	2	9	13	50	51	62	91	220	471	320	215	170	125	115	97	99	103	42	16	11	8	9
1	0	0	0	4	6	11	13	14	35	94	88	62	49	30	20	31	23	16	13	4	2	1	6
0	2	1	2	2	20	6	16	21	40	146	85	57	42	29	27	15	23	35	16	2	2	3	1
1	0	1	1	1	5	20	17	23	59	139	78	49	38	40	32	20	28	34	9	10	2	3	0
1	0	0	6	6	19	14	16	33	86	92	69	47	41	26	36	31	25	18	4	0	5	1	2

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Average Daily Traffic

Location: **Perez Cove Way, South of Ingraham Street**

Date: **Thursday, August 22, 2019** Total Daily Volume: **4890** Description: **Total Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
8	6	9	17	26	70	64	85	146	337	855	586	377	366	302	304	302	387	436	100	43	37	17	10
0	1	1	3	5	12	31	20	33	45	184	170	112	75	78	67	87	76	116	39	19	7	4	4
4	0	5	6	4	25	7	18	41	65	229	160	96	111	66	79	71	75	137	36	6	4	5	1
2	1	2	1	6	10	15	22	35	96	255	141	85	90	79	71	66	112	131	14	11	13	2	4
2	4	1	7	11	23	11	25	37	131	187	115	84	90	79	87	78	124	52	11	7	13	6	1

Date: **Thursday, August 22, 2019** Total Daily Volume: **2255** Description: **Northbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
7	4	8	10	8	11	19	26	53	127	286	198	132	144	161	165	183	258	317	66	28	25	13	6
0	1	1	1	1	1	9	5	11	13	62	55	44	30	41	35	54	46	77	23	13	4	4	3
4	0	5	5	1	5	2	6	14	29	70	49	33	42	37	46	43	51	104	27	4	3	3	1
2	1	2	1	2	0	4	8	11	34	91	54	25	38	40	36	40	77	100	9	6	9	2	2
1	2	0	3	4	5	4	7	17	51	63	40	30	34	43	48	46	84	36	7	5	9	4	0

Date: **Thursday, August 22, 2019** Total Daily Volume: **2635** Description: **Southbound Volume**

0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1	2	1	7	18	59	45	59	93	210	569	388	245	222	141	139	119	129	119	34	15	12	4	4
0	0	0	2	4	11	22	15	22	32	122	115	68	45	37	32	33	30	39	16	6	3	0	1
0	0	0	1	3	20	5	12	27	36	159	111	63	69	29	33	28	24	33	9	2	1	2	0
0	0	0	0	4	10	11	14	24	62	164	87	60	52	39	35	26	35	31	5	5	4	0	2
1	2	1	4	7	18	7	18	20	80	124	75	54	56	36	39	32	40	16	4	2	4	2	1

APPENDIX E

PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS
EXISTING

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	793	449	0	0	389	252	245	10	347	0	0	0
Future Volume (veh/h)	793	449	0	0	389	252	245	10	347	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.95	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	853	483	0	0	401	260	282	11	399			
Peak Hour Factor	0.93	0.93	0.93	0.97	0.97	0.97	0.87	0.87	0.87			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1140	2299	0	0	497	318	363	14	335			
Arrive On Green	0.56	1.00	0.00	0.00	0.25	0.25	0.21	0.21	0.21			
Sat Flow, veh/h	3428	3618	0	0	2114	1291	1704	66	1572			
Grp Volume(v), veh/h	853	483	0	0	349	312	293	0	399			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1549	1770	0	1572			
Q Serve(g_s), s	14.2	0.0	0.0	0.0	14.0	14.3	11.7	0.0	16.0			
Cycle Q Clear(g_c), s	14.2	0.0	0.0	0.0	14.0	14.3	11.7	0.0	16.0			
Prop In Lane	1.00		0.00	0.00		0.83	0.96		1.00			
Lane Grp Cap(c), veh/h	1140	2299	0	0	434	381	378	0	335			
V/C Ratio(X)	0.75	0.21	0.00	0.00	0.80	0.82	0.78	0.00	1.19			
Avail Cap(c_a), veh/h	1140	2299	0	0	541	475	378	0	335			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.68	0.68	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	14.3	0.0	0.0	0.0	26.6	26.7	27.8	0.0	29.5			
Incr Delay (d2), s/veh	1.9	0.1	0.0	0.0	14.6	17.5	8.9	0.0	111.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.0	0.0	0.0	0.0	7.3	6.8	5.7	0.0	22.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.2	0.1	0.0	0.0	41.2	44.2	36.7	0.0	140.6			
LnGrp LOS	B	A	A	A	D	D	D	A	F			
Approach Vol, veh/h		1336			661			692				
Approach Delay, s/veh		10.4			42.6			96.6				
Approach LOS		B			D			F				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		54.4		20.6	30.4	24.0						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		48.9		16.0	21.8	* 23						
Max Q Clear Time (g_c+I1), s		2.0		18.0	16.2	16.3						
Green Ext Time (p_c), s		2.2		0.0	1.8	1.6						
Intersection Summary												
HCM 6th Ctrl Delay			40.5									
HCM 6th LOS			D									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1069	51	258	267	0	0	0	0	177	0	667
Future Volume (veh/h)	0	1069	51	258	267	0	0	0	0	177	0	667
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1215	58	300	310	0				195	0	0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86				0.91	0.91	0.91
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1394	609	951	2607	0				234	0	
Arrive On Green	0.00	0.40	0.40	0.55	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3618	1540	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1215	58	300	310	0				195	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1540	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	23.8	1.8	3.5	0.0	0.0				8.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	23.8	1.8	3.5	0.0	0.0				8.1	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1394	609	951	2607	0				234	0	
V/C Ratio(X)	0.00	0.87	0.10	0.32	0.12	0.00				0.83	0.00	
Avail Cap(c_a), veh/h	0	1608	702	951	2607	0				372	0	
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.52	0.52	0.80	0.80	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	20.9	14.2	12.8	0.0	0.0				31.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	4.3	0.2	0.2	0.1	0.0				4.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.4	0.6	1.2	0.0	0.0				3.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	25.2	14.4	13.0	0.1	0.0				36.2	0.0	0.0
LnGrp LOS	A	C	B	B	A	A				D	A	
Approach Vol, veh/h		1273			610						195	A
Approach Delay, s/veh		24.7			6.4						36.2	
Approach LOS		C			A						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.8	34.6		14.5		60.5						
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0						
Max Green Setting (Gmax), s	11.2	* 34		15.8		49.6						
Max Q Clear Time (g_c+I1), s	5.5	25.8		10.1		2.0						
Green Ext Time (p_c), s	0.5	3.8		0.0		1.3						
Intersection Summary												
HCM 6th Ctrl Delay			20.4									
HCM 6th LOS			C									

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	33	83	45	100	68	224	1019	55	124	705	179
Future Volume (veh/h)	67	33	83	45	100	68	224	1019	55	124	705	179
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	76	38	94	64	143	97	243	1108	60	128	727	185
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	161	232	185	80	229	180	350	1437	78	164	1460	715
Arrive On Green	0.05	0.12	0.12	0.05	0.12	0.12	0.10	0.42	0.42	0.09	0.41	0.41
Sat Flow, veh/h	3428	1856	1483	1767	1856	1459	3428	3397	184	1767	3526	1549
Grp Volume(v), veh/h	76	38	94	64	143	97	243	575	593	128	727	185
Grp Sat Flow(s),veh/h/ln	1714	1856	1483	1767	1856	1459	1714	1763	1818	1767	1763	1549
Q Serve(g_s), s	1.4	1.1	3.7	2.2	4.6	3.9	4.3	17.5	17.5	4.4	9.5	4.6
Cycle Q Clear(g_c), s	1.4	1.1	3.7	2.2	4.6	3.9	4.3	17.5	17.5	4.4	9.5	4.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	161	232	185	80	229	180	350	746	769	164	1460	715
V/C Ratio(X)	0.47	0.16	0.51	0.80	0.62	0.54	0.69	0.77	0.77	0.78	0.50	0.26
Avail Cap(c_a), veh/h	263	920	735	113	885	696	609	840	867	452	1963	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.0	24.4	25.6	29.5	26.0	25.7	27.1	15.4	15.4	27.7	13.5	10.3
Incr Delay (d2), s/veh	0.8	0.3	2.1	15.1	1.0	0.9	0.9	4.6	4.5	3.0	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.5	1.3	1.2	1.9	1.3	1.6	6.6	6.8	1.8	3.2	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.8	24.8	27.7	44.6	27.1	26.7	28.1	20.1	19.9	30.7	13.9	10.6
LnGrp LOS	C	C	C	D	C	C	C	C	B	C	B	B
Approach Vol, veh/h		208			304			1411			1040	
Approach Delay, s/veh		27.9			30.6			21.4			15.4	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	31.7	7.2	13.3	10.8	31.2	7.3	13.2
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	6.4	19.5	4.2	5.7	6.3	11.5	3.4	6.6
Green Ext Time (p_c), s	0.1	6.9	0.0	0.5	0.2	8.4	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1067	220	127	658	226	178
Future Volume (veh/h)	1067	220	127	658	226	178
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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1111	229	137	708	293	148
Peak Hour Factor	0.96	0.96	0.93	0.93	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1578	908	215	2038	463	206
Arrive On Green	0.50	0.50	0.07	0.64	0.15	0.15
Sat Flow, veh/h	3256	1412	3086	3256	3181	1415
Grp Volume(v), veh/h	1111	229	137	708	293	148
Grp Sat Flow(s),veh/h/ln	1586	1412	1543	1586	1590	1415
Q Serve(g_s), s	15.8	4.0	2.5	6.0	5.1	5.8
Cycle Q Clear(g_c), s	15.8	4.0	2.5	6.0	5.1	5.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1578	908	215	2038	463	206
V/C Ratio(X)	0.70	0.25	0.64	0.35	0.63	0.72
Avail Cap(c_a), veh/h	2149	1163	348	2790	1469	654
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.4	4.4	26.5	4.8	23.5	23.8
Incr Delay (d2), s/veh	0.9	0.2	1.2	0.2	0.5	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.2	0.9	1.2	1.6	1.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.3	4.7	27.6	5.1	24.0	25.6
LnGrp LOS	B	A	C	A	C	C
Approach Vol, veh/h	1340			845	441	
Approach Delay, s/veh	11.0			8.7	24.6	
Approach LOS	B			A	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	8.5	35.3				43.7		14.7
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	6.6	39.6				* 51		27.0
Max Q Clear Time (g_c+I1), s	4.5	17.8				8.0		7.8
Green Ext Time (p_c), s	0.0	11.2				11.3		0.7

Intersection Summary			
HCM 6th Ctrl Delay			12.5
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	16	0	1267	0	864	0	71	21
Future Volume (veh/h)	16	0	1267	0	864	0	71	21
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		0	1856		1856	0	1870	1870
Adj Flow Rate, veh/h		0	1306		960	0	95	28
Peak Hour Factor		0.97	0.97		0.90	0.90	0.75	0.75
Percent Heavy Veh, %		0	3		3	0	2	2
Cap, veh/h		0	2089		3002	0	605	488
Arrive On Green		0.00	0.59		0.59	0.00	0.18	0.18
Sat Flow, veh/h		0	3711		5400	0	3456	2790
Grp Volume(v), veh/h		0	1306		960	0	95	28
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1728	1395
Q Serve(g_s), s		0.0	10.7		4.3	0.0	1.0	0.4
Cycle Q Clear(g_c), s		0.0	10.7		4.3	0.0	1.0	0.4
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2089		3002	0	605	488
V/C Ratio(X)		0.00	0.63		0.32	0.00	0.16	0.06
Avail Cap(c_a), veh/h		0	2805		4087	0	2780	2245
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	5.9		4.6	0.0	15.7	15.4
Incr Delay (d2), s/veh		0.0	0.5		0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	1.2		0.6	0.0	0.4	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	6.4		4.7	0.0	15.7	15.4
LnGrp LOS		A	A		A	A	B	B
Approach Vol, veh/h			1306		960		123	
Approach Delay, s/veh			6.4		4.7		15.6	
Approach LOS			A		A		B	

Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		32.9		11.8		32.9		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		35.6		36.0		* 36		
Max Q Clear Time (g_c+I1), s		12.7		3.0		6.3		
Green Ext Time (p_c), s		13.8		0.2		11.4		

Intersection Summary		
HCM 6th Ctrl Delay		6.2
HCM 6th LOS		A

Notes

User approved ignoring U-Turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	0	15	13	1	7	112	1297	116	9	1244	14
Future Volume (veh/h)	16	0	15	13	1	7	112	1297	116	9	1244	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.91	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	37	0	35	18	0	9	129	1491	133	10	1414	16
Peak Hour Factor	0.43	0.43	0.43	0.75	0.75	0.75	0.87	0.87	0.87	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	61	0	52	94	0	52	150	2808	1266	31	2541	1101
Arrive On Green	0.03	0.00	0.03	0.03	0.00	0.03	0.08	0.80	0.80	0.02	1.00	1.00
Sat Flow, veh/h	1767	0	1513	3534	0	1430	1767	3526	1537	3428	3526	1527
Grp Volume(v), veh/h	37	0	35	18	0	9	129	1491	133	10	1414	16
Grp Sat Flow(s),veh/h/ln	1767	0	1513	1767	0	1430	1767	1763	1537	1714	1763	1527
Q Serve(g_s), s	3.3	0.0	3.6	0.8	0.0	1.0	11.4	23.6	2.7	0.5	0.0	0.0
Cycle Q Clear(g_c), s	3.3	0.0	3.6	0.8	0.0	1.0	11.4	23.6	2.7	0.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	61	0	52	94	0	52	150	2808	1266	31	2541	1101
V/C Ratio(X)	0.61	0.00	0.67	0.19	0.00	0.17	0.86	0.53	0.11	0.32	0.56	0.01
Avail Cap(c_a), veh/h	179	0	153	783	0	331	174	2808	1266	87	2541	1101
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	75.2	0.0	75.4	75.3	0.0	74.0	71.4	5.7	2.7	77.1	0.0	0.0
Incr Delay (d2), s/veh	3.6	0.0	5.4	0.4	0.0	0.6	27.3	0.7	0.2	1.9	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.5	0.4	0.0	0.4	6.2	7.2	0.8	0.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.8	0.0	80.8	75.6	0.0	74.5	98.7	6.4	2.9	79.0	0.8	0.0
LnGrp LOS	E	A	F	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		72			27			1753			1440	
Approach Delay, s/veh		79.8			75.3			12.9			1.3	
Approach LOS		E			E			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	132.7		10.4	17.8	120.8		9.1				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 83		16.0	15.6	70.3		35.0				
Max Q Clear Time (g_c+I1), s	2.5	25.6		5.6	13.4	2.0		3.0				
Green Ext Time (p_c), s	0.0	22.3		0.1	0.0	18.1		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	9.8
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	2	52	8	2	7	101	1289	17	5	1220	26
Future Volume (veh/h)	14	2	52	8	2	7	101	1289	17	5	1220	26
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.98	1.00		0.96	1.00		0.96	1.00		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	23	3	85	9	2	8	107	1371	18	5	1284	27
Peak Hour Factor	0.61	0.61	0.61	0.85	0.85	0.85	0.94	0.94	0.94	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	3	3	3
Cap, veh/h	53	17	140	100	29	69	681	2753	1180	9	1373	584
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.39	0.78	0.78	0.01	0.78	0.78
Sat Flow, veh/h	216	147	1187	563	243	586	1767	3526	1511	1767	3526	1501
Grp Volume(v), veh/h	111	0	0	19	0	0	107	1371	18	5	1284	27
Grp Sat Flow(s),veh/h/ln	1550	0	0	1392	0	0	1767	1763	1511	1767	1763	1501
Q Serve(g_s), s	4.7	0.0	0.0	0.0	0.0	0.0	6.3	22.0	0.4	0.4	46.9	0.7
Cycle Q Clear(g_c), s	10.6	0.0	0.0	1.6	0.0	0.0	6.3	22.0	0.4	0.4	46.9	0.7
Prop In Lane	0.21		0.77	0.47		0.42	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	210	0	0	198	0	0	681	2753	1180	9	1373	584
V/C Ratio(X)	0.53	0.00	0.00	0.10	0.00	0.00	0.16	0.50	0.02	0.57	0.94	0.05
Avail Cap(c_a), veh/h	340	0	0	320	0	0	681	2753	1180	51	1981	844
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.79	0.79	0.79	0.78	0.78	0.78
Uniform Delay (d), s/veh	66.1	0.0	0.0	62.2	0.0	0.0	31.8	6.2	3.8	78.0	15.9	10.8
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.0	15.5	10.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	0.0	0.7	0.0	0.0	2.7	7.0	0.1	0.2	8.3	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.8	0.0	0.0	62.3	0.0	0.0	31.8	6.7	3.9	93.6	26.7	10.9
LnGrp LOS	E	A	A	E	A	A	C	A	A	F	C	B
Approach Vol, veh/h		111			19			1496			1316	
Approach Delay, s/veh		66.8			62.3			8.5			26.6	
Approach LOS		E			E			A			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.2	129.3		23.5	66.8	67.7		23.5				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	4.6	106.1		32.1	21.6	* 89		32.1				
Max Q Clear Time (g_c+I1), s	2.4	24.0		12.6	8.3	48.9		3.6				
Green Ext Time (p_c), s	0.0	17.4		0.4	0.1	12.6		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			19.1
HCM 6th LOS			B

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	3	404	253	6	4	197	861	254	0	630	0
Future Volume (veh/h)	0	3	404	253	6	4	197	861	254	0	630	0
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		0.97	1.00		0.97	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	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	0	3	434	281	7	4	216	946	279	0	716	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	0	3	3
Cap, veh/h	0	599	874	395	353	202	409	1003	828	0	871	0
Arrive On Green	0.00	0.32	0.32	0.32	0.32	0.32	0.31	0.72	0.72	0.00	0.25	0.00
Sat Flow, veh/h	0	1870	1585	952	1102	630	1767	1856	1531	0	3711	0
Grp Volume(v), veh/h	0	3	434	281	0	11	216	946	279	0	716	0
Grp Sat Flow(s),veh/h/ln	0	1870	1585	952	0	1732	1767	1856	1531	0	1763	0
Q Serve(g_s), s	0.0	0.1	0.0	22.5	0.0	0.3	8.0	35.2	5.3	0.0	15.2	0.0
Cycle Q Clear(g_c), s	0.0	0.1	0.0	22.6	0.0	0.3	8.0	35.2	5.3	0.0	15.2	0.0
Prop In Lane	0.00		1.00	1.00		0.36	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	599	874	395	0	554	409	1003	828	0	871	0
V/C Ratio(X)	0.00	0.01	0.50	0.71	0.00	0.02	0.53	0.94	0.34	0.00	0.82	0.00
Avail Cap(c_a), veh/h	0	736	991	465	0	682	409	1003	828	0	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	1.00	0.87	0.87	0.87	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	18.3	10.9	26.0	0.0	18.4	23.8	10.0	5.8	0.0	28.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	3.0	0.0	0.0	0.8	15.9	1.0	0.0	8.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	4.2	5.1	0.0	0.1	3.0	9.9	1.5	0.0	7.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	18.3	11.1	29.0	0.0	18.4	24.6	26.0	6.8	0.0	36.7	0.0
LnGrp LOS	A	B	B	C	A	B	C	C	A	A	D	A
Approach Vol, veh/h		437			292			1441			716	
Approach Delay, s/veh		11.1			28.6			22.1			36.7	
Approach LOS		B			C			C			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		48.8		30.2	24.4	24.4		30.2				
Change Period (Y+Rc), s		6.1		4.9	6.1	* 4.9		4.9				
Max Green Setting (Gmax), s		36.9		31.1	11.1	* 23		31.1				
Max Q Clear Time (g_c+I1), s		37.2		2.1	10.0	17.2		24.6				
Green Ext Time (p_c), s		0.0		0.8	0.0	2.4		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			24.7									
HCM 6th LOS			C									
Notes												

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	460	1654	476	0	0	1541
Future Volume (vph)	460	1654	476	0	0	1541
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			3505
Peak-hour factor, PHF	0.87	0.87	0.92	0.92	0.93	0.93
Adj. Flow (vph)	529	1901	517	0	0	1657
RTOR Reduction (vph)	0	55	0	0	0	0
Lane Group Flow (vph)	529	1846	517	0	0	1657
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	16.1	58.2	19.1			61.2
Effective Green, g (s)	16.1	58.2	19.1			61.2
Actuated g/C Ratio	0.17	0.63	0.21			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	593	1740	725			2324
v/s Ratio Prot	0.16	c0.67	0.15			c0.47
v/s Ratio Perm						
v/c Ratio	0.89	1.06	0.71			0.71
Uniform Delay, d1	37.3	17.0	34.1			9.9
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	15.3	39.8	2.8			0.9
Delay (s)	52.6	56.9	36.8			10.8
Level of Service	D	E	D			B
Approach Delay (s)	55.9		36.8			10.8
Approach LOS	E		D			B

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	22.5
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1559	7	1171	0	0	714
Future Volume (vph)	1559	7	1171	0	0	714
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.80	0.80
Adj. Flow (vph)	1641	7	1273	0	0	892
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	1641	5	1273	0	0	893
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	48.5	48.5	36.5			36.5
Effective Green, g (s)	48.5	48.5	36.5			36.5
Actuated g/C Ratio	0.48	0.48	0.36			0.36
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1649	760	1279			1279
v/s Ratio Prot	c0.48		c0.36			0.25
v/s Ratio Perm		0.00				
v/c Ratio	1.00	0.01	1.00			0.70
Uniform Delay, d1	25.6	13.3	31.7			27.1
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	20.9	0.0	24.1			3.2
Delay (s)	46.5	13.3	55.7			30.2
Level of Service	D	B	E			C
Approach Delay (s)	46.4		55.7			30.2
Approach LOS	D		E			C

Intersection Summary			
HCM 2000 Control Delay	45.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	732	0	0	0	0	0	743	1365	0	0	0
Future Volume (vph)	0	732	0	0	0	0	0	743	1365	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1544			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1544			
Peak-hour factor, PHF	0.94	0.94	0.94	0.98	0.98	0.98	0.96	0.96	0.96	0.98	0.98	0.98
Adj. Flow (vph)	0	779	0	0	0	0	0	774	1422	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	779	0	0	0	0	0	774	1422	0	0	0
Confl. Bikes (#/hr)									14			
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		42.0						44.5	100.0			
Effective Green, g (s)		42.0						44.5	100.0			
Actuated g/C Ratio		0.42						0.44	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		774						1559	1544			
v/s Ratio Prot		0.42						0.22				
v/s Ratio Perm									c0.92			
v/c Ratio		1.01						0.50	0.92			
Uniform Delay, d1		29.0						19.8	0.0			
Progression Factor		0.32						1.00	1.00			
Incremental Delay, d2		22.6						1.1	10.5			
Delay (s)		31.8						20.9	10.5			
Level of Service		C						C	B			
Approach Delay (s)		31.8			0.0			14.2			0.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1279	18	0	0	0	0	0	0	15	1424	0
Future Volume (vph)	0	1279	18	0	0	0	0	0	0	15	1424	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	1.00								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1568								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1568								3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	0	1319	19	0	0	0	0	0	0	15	1453	0
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	1319	8	0	0	0	0	0	0	0	1450	0
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		42.0	42.0								44.5	
Effective Green, g (s)		42.0	42.0								44.5	
Actuated g/C Ratio		0.42	0.42								0.44	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1472	658								1558	
v/s Ratio Prot		c0.38										
v/s Ratio Perm			0.01								0.41	
v/c Ratio		0.90	0.01								0.93	
Uniform Delay, d1		27.0	16.9								26.3	
Progression Factor		1.00	1.00								0.91	
Incremental Delay, d2		8.9	0.0								5.6	
Delay (s)		35.8	16.9								29.5	
Level of Service		D	B								C	
Approach Delay (s)		35.6			0.0			0.0			29.5	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	753	463	0	0	429	315	260	4	507	0	0	0
Future Volume (veh/h)	753	463	0	0	429	315	260	4	507	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	801	493	0	0	477	350	280	4	545			
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.93	0.93	0.93			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1007	2168	0	0	516	377	495	7	447			
Arrive On Green	0.49	1.00	0.00	0.00	0.27	0.27	0.28	0.28	0.28			
Sat Flow, veh/h	3428	3618	0	0	1997	1392	1743	25	1572			
Grp Volume(v), veh/h	801	493	0	0	442	385	284	0	545			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1533	1768	0	1572			
Q Serve(g_s), s	19.5	0.0	0.0	0.0	24.4	24.5	13.7	0.0	28.4			
Cycle Q Clear(g_c), s	19.5	0.0	0.0	0.0	24.4	24.5	13.7	0.0	28.4			
Prop In Lane	1.00		0.00	0.00		0.91	0.99		1.00			
Lane Grp Cap(c), veh/h	1007	2168	0	0	478	416	502	0	447			
V/C Ratio(X)	0.80	0.23	0.00	0.00	0.92	0.93	0.57	0.00	1.22			
Avail Cap(c_a), veh/h	1007	2168	0	0	494	429	502	0	447			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.84	0.84	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	23.0	0.0	0.0	0.0	35.4	35.5	30.5	0.0	35.8			
Incr Delay (d2), s/veh	3.8	0.2	0.0	0.0	26.0	29.2	0.9	0.0	117.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.4	0.1	0.0	0.0	13.5	12.2	5.9	0.0	35.9			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.8	0.2	0.0	0.0	61.4	64.7	31.5	0.0	153.7			
LnGrp LOS	C	A	A	A	E	E	C	A	F			
Approach Vol, veh/h		1294			827			829				
Approach Delay, s/veh		16.6			62.9			111.8				
Approach LOS		B			E			F				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		67.0		33.0	34.9	32.1						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5						
Max Green Setting (Gmax), s		61.5		28.4	29.3	* 28						
Max Q Clear Time (g_c+I1), s		2.0		30.4	21.5	26.5						
Green Ext Time (p_c), s		2.2		0.0	2.1	0.6						

Intersection Summary				
HCM 6th Ctrl Delay			56.4	
HCM 6th LOS			E	

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	999	200	198	495	0	0	0	0	149	0	955
Future Volume (veh/h)	0	999	200	198	495	0	0	0	0	149	0	955
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1098	220	206	516	0				155	0	0
Peak Hour Factor	0.91	0.91	0.91	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1282	559	1321	2817	0				186	0	
Arrive On Green	0.00	0.36	0.36	0.51	1.00	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	3618	1536	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1098	220	206	516	0				155	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1536	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	28.8	10.6	3.2	0.0	0.0				8.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	28.8	10.6	3.2	0.0	0.0				8.6	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1282	559	1321	2817	0				186	0	
V/C Ratio(X)	0.00	0.86	0.39	0.16	0.18	0.00				0.83	0.00	
Avail Cap(c_a), veh/h	0	1833	799	1321	2817	0				361	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.42	0.42	0.76	0.76	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	29.4	23.6	15.8	0.0	0.0				43.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.3	0.9	0.0	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	12.0	3.8	1.2	0.0	0.0				3.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	32.8	24.5	15.8	0.1	0.0				47.6	0.0	0.0
LnGrp LOS	A	C	C	B	A	A				D	A	
Approach Vol, veh/h		1318			722						155	A
Approach Delay, s/veh		31.4			4.6						47.6	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	43.5	41.4		15.1		84.9						
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0						
Max Green Setting (Gmax), s	13.8	* 52		20.4		70.0						
Max Q Clear Time (g_c+I1), s	5.2	30.8		10.6		2.0						
Green Ext Time (p_c), s	0.4	5.6		0.0		2.4						

Intersection Summary			
HCM 6th Ctrl Delay			23.7
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	136	244	161	67	166	179	1130	124	140	1191	193
Future Volume (veh/h)	169	136	244	161	67	166	179	1130	124	140	1191	193
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	194	156	280	179	74	184	190	1202	132	161	1369	222
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	255	391	317	186	447	366	249	1276	140	190	1531	790
Arrive On Green	0.07	0.21	0.21	0.11	0.24	0.24	0.07	0.40	0.40	0.11	0.43	0.43
Sat Flow, veh/h	3428	1856	1505	1767	1856	1516	3428	3194	350	1767	3526	1549
Grp Volume(v), veh/h	194	156	280	179	74	184	190	662	672	161	1369	222
Grp Sat Flow(s),veh/h/ln	1714	1856	1505	1767	1856	1516	1714	1763	1781	1767	1763	1549
Q Serve(g_s), s	6.1	8.0	19.9	11.1	3.5	11.6	6.0	39.9	40.2	9.9	39.7	9.1
Cycle Q Clear(g_c), s	6.1	8.0	19.9	11.1	3.5	11.6	6.0	39.9	40.2	9.9	39.7	9.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	255	391	317	186	447	366	249	704	711	190	1531	790
V/C Ratio(X)	0.76	0.40	0.88	0.96	0.17	0.50	0.76	0.94	0.95	0.85	0.89	0.28
Avail Cap(c_a), veh/h	354	521	423	186	518	423	279	704	711	259	1574	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.1	37.6	42.3	49.2	33.1	36.2	50.3	31.9	32.0	48.4	28.9	15.6
Incr Delay (d2), s/veh	3.7	0.7	15.6	55.1	0.1	0.4	8.8	20.8	21.6	13.3	7.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	3.7	8.5	7.6	1.5	4.2	2.8	20.0	20.5	5.0	17.2	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.8	38.2	57.9	104.4	33.2	36.6	59.1	52.7	53.6	61.7	36.0	15.8
LnGrp LOS	D	D	E	F	C	D	E	D	D	E	D	B
Approach Vol, veh/h		630			437			1524			1752	
Approach Delay, s/veh		51.8			63.8			53.9			35.8	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.3	49.4	16.0	28.7	12.4	53.3	12.6	32.1				
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5				
Max Green Setting (Gmax), s	16.2	42.0	11.6	* 31	9.0	* 49	11.4	30.8				
Max Q Clear Time (g_c+I1), s	11.9	42.2	13.1	21.9	8.0	41.7	8.1	13.6				
Green Ext Time (p_c), s	0.1	0.0	0.0	1.3	0.0	6.3	0.1	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			47.3									
HCM 6th LOS			D									

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1119	725	317	1148	303	131
Future Volume (veh/h)	1119	725	317	1148	303	131
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1142	740	434	1573	309	134
Peak Hour Factor	0.98	0.98	0.73	0.73	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1550	862	457	2214	416	185
Arrive On Green	0.49	0.49	0.15	0.70	0.13	0.13
Sat Flow, veh/h	3256	1385	3086	3256	3181	1415
Grp Volume(v), veh/h	1142	740	434	1573	309	134
Grp Sat Flow(s),veh/h/ln	1586	1385	1543	1586	1590	1415
Q Serve(g_s), s	20.8	31.6	10.1	21.5	6.8	6.6
Cycle Q Clear(g_c), s	20.8	31.6	10.1	21.5	6.8	6.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1550	862	457	2214	416	185
V/C Ratio(X)	0.74	0.86	0.95	0.71	0.74	0.72
Avail Cap(c_a), veh/h	1559	865	457	2258	1189	529
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	14.8	11.2	30.5	6.5	30.2	30.2
Incr Delay (d2), s/veh	2.0	8.9	29.4	1.4	1.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	12.1	5.3	4.7	2.4	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.8	20.2	59.9	7.9	31.2	32.2
LnGrp LOS	B	C	E	A	C	C
Approach Vol, veh/h	1882			2007	443	
Approach Delay, s/veh	18.1			19.2	31.5	
Approach LOS	B			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.1	41.5				56.6		15.6
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	10.7	35.5				* 51		27.0
Max Q Clear Time (g_c+I1), s	12.1	33.6				23.5		8.8
Green Ext Time (p_c), s	0.0	1.7				22.1		0.7

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	34	0	1740	0	1406	0	395	115
Future Volume (veh/h)	34	0	1740	0	1406	0	395	115
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		0	1856		1856	0	1856	1856
Adj Flow Rate, veh/h		0	1851		1616	0	465	135
Peak Hour Factor		0.94	0.94		0.87	0.87	0.85	0.85
Percent Heavy Veh, %		0	3		3	0	3	3
Cap, veh/h		0	2410		3463	0	595	481
Arrive On Green		0.00	0.68		0.68	0.00	0.17	0.17
Sat Flow, veh/h		0	3711		5400	0	3428	2768
Grp Volume(v), veh/h		0	1851		1616	0	465	135
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1714	1384
Q Serve(g_s), s		0.0	25.5		10.8	0.0	9.4	3.1
Cycle Q Clear(g_c), s		0.0	25.5		10.8	0.0	9.4	3.1
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2410		3463	0	595	481
V/C Ratio(X)		0.00	0.77		0.47	0.00	0.78	0.28
Avail Cap(c_a), veh/h		0	2691		3762	0	1694	1368
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	7.7		5.4	0.0	28.8	26.1
Incr Delay (d2), s/veh		0.0	1.5		0.2	0.0	0.9	0.1
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	5.2		2.3	0.0	3.8	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	9.2		5.5	0.0	29.6	26.3
LnGrp LOS		A	A		A	A	C	C
Approach Vol, veh/h			1851		1616		600	
Approach Delay, s/veh			9.2		5.5		28.9	
Approach LOS			A		A		C	
Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		56.2		16.6		56.2		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		55.6		36.0		* 54		
Max Q Clear Time (g_c+I1), s		27.5		11.4		12.8		
Green Ext Time (p_c), s		22.3		1.2		25.2		
Intersection Summary								
HCM 6th Ctrl Delay			10.6					
HCM 6th LOS			B					

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	4	31	229	2	16	81	1746	88	11	1430	22
Future Volume (veh/h)	27	4	31	229	2	16	81	1746	88	11	1430	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.95	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	31	5	36	258	0	18	84	1819	92	12	1589	24
Peak Hour Factor	0.86	0.86	0.86	0.89	0.89	0.89	0.96	0.96	0.96	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	67	7	52	388	0	180	100	2473	1255	36	2310	993
Arrive On Green	0.04	0.04	0.04	0.11	0.00	0.11	0.06	0.70	0.70	0.02	1.00	1.00
Sat Flow, veh/h	1767	191	1375	3534	0	1492	1767	3526	1543	3428	3526	1516
Grp Volume(v), veh/h	31	0	41	258	0	18	84	1819	92	12	1589	24
Grp Sat Flow(s),veh/h/ln	1767	0	1566	1767	0	1492	1767	1763	1543	1714	1763	1516
Q Serve(g_s), s	2.6	0.0	3.9	10.5	0.0	1.6	7.1	47.7	1.8	0.5	0.0	0.0
Cycle Q Clear(g_c), s	2.6	0.0	3.9	10.5	0.0	1.6	7.1	47.7	1.8	0.5	0.0	0.0
Prop In Lane	1.00		0.88	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	67	0	59	388	0	180	100	2473	1255	36	2310	993
V/C Ratio(X)	0.46	0.00	0.69	0.67	0.00	0.10	0.84	0.74	0.07	0.33	0.69	0.02
Avail Cap(c_a), veh/h	188	0	167	825	0	365	100	2473	1255	91	2310	993
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80
Uniform Delay (d), s/veh	70.7	0.0	71.3	64.1	0.0	58.8	70.1	13.8	2.8	72.9	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.0	5.3	0.7	0.0	0.1	41.8	2.0	0.1	1.6	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.7	4.8	0.0	0.6	4.3	17.4	0.9	0.2	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.5	0.0	76.6	64.9	0.0	58.9	111.8	15.8	3.0	74.5	1.4	0.0
LnGrp LOS	E	A	E	E	A	E	F	B	A	E	A	A
Approach Vol, veh/h		72			276			1995			1625	
Approach Delay, s/veh		74.8			64.5			19.3			1.9	
Approach LOS		E			E			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	112.1		10.6	12.9	105.2		21.3				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 75		16.0	8.5	69.4		35.0				
Max Q Clear Time (g_c+I1), s	2.5	49.7		5.9	9.1	2.0		12.5				
Green Ext Time (p_c), s	0.0	18.3		0.1	0.0	22.7		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			16.3									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	9	85	25	1	23	93	1642	53	11	1321	30
Future Volume (veh/h)	28	9	85	25	1	23	93	1642	53	11	1321	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.97	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	39	13	120	30	1	28	95	1676	54	11	1362	31
Peak Hour Factor	0.71	0.71	0.71	0.82	0.82	0.82	0.98	0.98	0.98	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	67	26	146	102	14	72	540	2662	1145	17	1577	675
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.31	0.76	0.76	0.01	0.45	0.45
Sat Flow, veh/h	278	196	1094	491	101	535	1767	3526	1517	1767	3526	1509
Grp Volume(v), veh/h	172	0	0	59	0	0	95	1676	54	11	1362	31
Grp Sat Flow(s),veh/h/ln	1568	0	0	1127	0	0	1767	1763	1517	1767	1763	1509
Q Serve(g_s), s	8.9	0.0	0.0	0.0	0.0	0.0	5.9	33.3	1.4	0.9	52.2	1.7
Cycle Q Clear(g_c), s	15.8	0.0	0.0	6.9	0.0	0.0	5.9	33.3	1.4	0.9	52.2	1.7
Prop In Lane	0.23		0.70	0.51		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	0	0	187	0	0	540	2662	1145	17	1577	675
V/C Ratio(X)	0.72	0.00	0.00	0.32	0.00	0.00	0.18	0.63	0.05	0.63	0.86	0.05
Avail Cap(c_a), veh/h	350	0	0	288	0	0	540	2662	1145	66	2040	873
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	0.00	1.00	0.00	0.00	0.57	0.57	0.57	0.74	0.74	0.74
Uniform Delay (d), s/veh	62.9	0.0	0.0	58.9	0.0	0.0	38.2	8.6	4.7	74.0	37.3	23.4
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.4	0.0	0.0	0.0	0.7	0.0	10.1	4.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	0.0	0.0	2.1	0.0	0.0	2.5	10.9	0.4	0.5	22.7	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.4	0.0	0.0	59.2	0.0	0.0	38.3	9.2	4.7	84.1	42.3	23.5
LnGrp LOS	E	A	A	E	A	A	D	A	A	F	D	C
Approach Vol, veh/h		172			59			1825			1404	
Approach Delay, s/veh		64.4			59.2			10.6			42.2	
Approach LOS		E			E			B			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	119.2		25.0	51.7	73.3		25.0				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	5.6	98.1		31.1	16.6	* 87		31.1				
Max Q Clear Time (g_c+I1), s	2.9	35.3		17.8	7.9	54.2		8.9				
Green Ext Time (p_c), s	0.0	25.0		0.5	0.1	12.9		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		26.9
HCM 6th LOS		C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	7	316	238	15	8	337	916	445	0	840	1
Future Volume (veh/h)	3	7	316	238	15	8	337	916	445	0	840	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	3	7	333	267	17	9	362	985	478	0	966	1
Peak Hour Factor	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	0	3	3
Cap, veh/h	146	327	746	313	294	155	384	1236	1019	0	1515	2
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.29	0.89	0.89	0.00	0.42	0.42
Sat Flow, veh/h	442	1253	1551	1032	1126	596	1767	1856	1529	0	3707	4
Grp Volume(v), veh/h	10	0	333	267	0	26	362	985	478	0	471	496
Grp Sat Flow(s),veh/h/ln	1695	0	1551	1032	0	1723	1767	1856	1529	0	1763	1855
Q Serve(g_s), s	0.0	0.0	21.4	38.5	0.0	1.7	30.0	30.9	9.2	0.0	31.8	31.8
Cycle Q Clear(g_c), s	0.6	0.0	21.4	39.1	0.0	1.7	30.0	30.9	9.2	0.0	31.8	31.8
Prop In Lane	0.30		1.00	1.00		0.35	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	473	0	746	313	0	449	384	1236	1019	0	739	778
V/C Ratio(X)	0.02	0.00	0.45	0.85	0.00	0.06	0.94	0.80	0.47	0.00	0.64	0.64
Avail Cap(c_a), veh/h	473	0	746	313	0	449	517	1236	1019	0	739	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.75	0.75	0.75	0.00	1.00	1.00
Uniform Delay (d), s/veh	41.2	0.0	26.0	55.9	0.0	41.6	52.4	4.6	3.4	0.0	34.5	34.5
Incr Delay (d2), s/veh	0.0	0.0	0.2	19.0	0.0	0.0	17.0	4.1	1.2	0.0	4.2	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	8.0	11.8	0.0	0.7	14.2	5.7	2.2	0.0	14.6	15.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.2	0.0	26.2	74.9	0.0	41.6	69.4	8.7	4.6	0.0	38.7	38.5
LnGrp LOS	D	A	C	E	A	D	E	A	A	A	D	D
Approach Vol, veh/h		343			293			1825			967	
Approach Delay, s/veh		26.6			71.9			19.7			38.6	
Approach LOS		C			E			B			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		106.0		44.0	37.0	69.0		44.0				
Change Period (Y+Rc), s		6.1		4.9	4.4	* 6.1		4.9				
Max Green Setting (Gmax), s		99.9		39.1	43.9	* 53		39.1				
Max Q Clear Time (g_c+I1), s		32.9		23.4	32.0	33.8		41.1				
Green Ext Time (p_c), s		19.3		0.6	0.6	6.7		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		30.2
HCM 6th LOS		C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	669	1666	782	0	0	1905
Future Volume (vph)	669	1666	782	0	0	1905
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			3505
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.97	0.97
Adj. Flow (vph)	697	1735	832	0	0	1964
RTOR Reduction (vph)	0	7	0	0	0	0
Lane Group Flow (vph)	697	1728	832	0	0	1964
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	25.5	75.0	29.6			79.1
Effective Green, g (s)	25.5	75.0	29.6			79.1
Actuated g/C Ratio	0.21	0.63	0.25			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	724	1730	867			2318
v/s Ratio Prot	0.21	c0.63	c0.24			0.56
v/s Ratio Perm						
v/c Ratio	0.96	1.00	0.96			0.85
Uniform Delay, d1	46.6	22.2	44.4			15.6
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	24.3	21.1	20.9			2.9
Delay (s)	70.9	43.4	65.3			18.5
Level of Service	E	D	E			B
Approach Delay (s)	51.3		65.3			18.5
Approach LOS	D		E			B

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	119.6	Sum of lost time (s)	22.5
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2061	2	1317	0	0	1079
Future Volume (vph)	2061	2	1317	0	0	1079
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.91	0.91
Adj. Flow (vph)	2147	2	1401	0	0	1186
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	2147	2	1401	0	0	1186
Confl. Bikes (#/hr)						11
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	64.5	64.5	40.5			40.5
Effective Green, g (s)	64.5	64.5	40.5			40.5
Actuated g/C Ratio	0.54	0.54	0.34			0.34
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1827	842	1182			1182
v/s Ratio Prot	c0.63		c0.40			0.34
v/s Ratio Perm		0.00				
v/c Ratio	1.18	0.00	1.19			1.00
Uniform Delay, d1	27.8	12.8	39.8			39.8
Progression Factor	1.00	1.00	0.65			1.00
Incremental Delay, d2	85.0	0.0	91.7			27.0
Delay (s)	112.7	12.8	117.6			66.7
Level of Service	F	B	F			E
Approach Delay (s)	112.6		117.6			66.7
Approach LOS	F		F			E

Intersection Summary			
HCM 2000 Control Delay	102.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	554	0	0	0	0	0	852	736	0	0	0
Future Volume (vph)	0	554	0	0	0	0	0	852	736	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1542			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1542			
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	622	0	0	0	0	0	947	818	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	622	0	0	0	0	0	947	818	0	0	0
Confl. Bikes (#/hr)									20			
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		49.1						57.4	120.0			
Effective Green, g (s)		49.1						57.4	120.0			
Actuated g/C Ratio		0.41						0.48	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		754						1676	1542			
v/s Ratio Prot		c0.34						0.27				
v/s Ratio Perm									c0.53			
v/c Ratio		0.82						0.57	0.53			
Uniform Delay, d1		31.6						22.4	0.0			
Progression Factor		0.21						1.00	1.00			
Incremental Delay, d2		5.0						1.4	1.3			
Delay (s)		11.5						23.8	1.3			
Level of Service		B						C	A			
Approach Delay (s)		11.5			0.0			13.4			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1104	79	0	0	0	0	0	0	20	1362	0
Future Volume (vph)	0	1104	79	0	0	0	0	0	0	20	1362	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	0.99								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1548								3502	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1548								3502	
Peak-hour factor, PHF	0.91	0.91	0.91	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1213	87	0	0	0	0	0	0	20	1390	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1213	63	0	0	0	0	0	0	0	1396	0
Confl. Bikes (#/hr)			1						1			12
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		49.1	49.1								57.4	
Effective Green, g (s)		49.1	49.1								57.4	
Actuated g/C Ratio		0.41	0.41								0.48	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1434	633								1675	
v/s Ratio Prot		c0.35										
v/s Ratio Perm			0.04								0.40	
v/c Ratio		0.85	0.10								0.83	
Uniform Delay, d1		32.0	21.8								27.2	
Progression Factor		1.00	1.00								0.93	
Incremental Delay, d2		6.0	0.3								0.5	
Delay (s)		38.0	22.1								25.8	
Level of Service		D	C								C	
Approach Delay (s)		37.0			0.0			0.0			25.8	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX F

PEAK HOUR QUEUING ANALYSIS WORKSHEETS
EXISTING

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	244	376	121	206	214	241	148
Average Queue (ft)	172	185	80	46	105	112	131	76
95th Queue (ft)	251	256	250	97	173	183	209	130
Link Distance (ft)			433	433	1194	1194	379	379
Upstream Blk Time (%)			0					
Queuing Penalty (veh)			0					
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	1	4						
Queuing Penalty (veh)	2	10						

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	378	214	45	147	150	96	90	231	175
Average Queue (ft)	138	61	12	52	78	22	31	105	20
95th Queue (ft)	306	156	36	111	127	62	75	182	112
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	0			2	0
Queuing Penalty (veh)				0	0			12	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	T	R	L	T	R	L	L	T	TR	L
Maximum Queue (ft)	59	51	35	32	65	93	69	170	335	518	495	113
Average Queue (ft)	15	9	5	5	21	33	14	82	93	278	235	45
95th Queue (ft)	41	33	22	21	52	76	45	141	287	462	422	93
Link Distance (ft)			449			329				1280	1280	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	260	260		250	155		200	310	310			240
Storage Blk Time (%)									0	8		
Queuing Penalty (veh)									0	17		

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	213	224	82
Average Queue (ft)	109	120	36
95th Queue (ft)	183	191	66
Link Distance (ft)	903	903	903
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	628	563	240	78	91	183	191	143	132	66
Average Queue (ft)	346	294	104	30	46	63	86	70	54	8
95th Queue (ft)	548	483	265	66	77	137	153	118	105	35
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		11	0							
Queuing Penalty (veh)		24	0							

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	103	284	258	257	174	86	62	25	32	23
Average Queue (ft)	18	177	121	108	59	26	26	2	10	1
95th Queue (ft)	64	301	249	198	136	66	51	13	32	10
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)		17		5						
Queuing Penalty (veh)		3		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	52	53	48	36	41	204	314	326	205	40	405	389
Average Queue (ft)	16	17	10	5	6	100	102	105	23	8	116	127
95th Queue (ft)	43	45	34	23	28	183	258	260	109	30	296	305
Link Distance (ft)		103	63	63			2238	2238			2582	2582
Upstream Blk Time (%)			0	0	0							
Queuing Penalty (veh)			0	0	0							
Storage Bay Dist (ft)	50				55	180			180	180		
Storage Blk Time (%)	3	1		0	0	2	3	3	0		3	4
Queuing Penalty (veh)	0	0		0	0	15	3	4	0		0	1

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB
Directions Served	R
Maximum Queue (ft)	176
Average Queue (ft)	12
95th Queue (ft)	82
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	91	59	259	446	414	107	85	352	357	178
Average Queue (ft)	33	9	94	191	147	6	5	170	181	15
95th Queue (ft)	71	35	208	389	338	52	42	316	324	83
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	5	2			8	9	0
Queuing Penalty (veh)			1	5	0			0	2	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	10	159	124	244	222	565	168	230	200
Average Queue (ft)	1	60	106	59	104	216	34	166	100
95th Queue (ft)	6	122	139	199	182	451	100	243	193
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								3	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		2	16						
Queuing Penalty (veh)		0	2						

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	397	786	790	524	198	180	519	535
Average Queue (ft)	224	633	663	352	161	121	185	238
95th Queue (ft)	382	977	941	486	198	189	403	446
Link Distance (ft)		746	746				2778	2778
Upstream Blk Time (%)		9	10					
Queuing Penalty (veh)		0	0					
Storage Bay Dist (ft)	500			500				
Storage Blk Time (%)		0	1	0				
Queuing Penalty (veh)		0	7	0				

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	SB
Directions Served	R	L	TR
Maximum Queue (ft)	31	27	10
Average Queue (ft)	11	6	0
95th Queue (ft)	33	23	5
Link Distance (ft)	154		312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		60	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	789	795	103	149	152	277	244
Average Queue (ft)	754	749	5	125	125	173	144
95th Queue (ft)	815	830	48	135	137	245	214
Link Distance (ft)	737	737					
Upstream Blk Time (%)	64	61					
Queuing Penalty (veh)	0	0					
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		57	0				
Queuing Penalty (veh)		4	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	NB	NB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	157	410	689	140
Average Queue (ft)	97	207	290	53
95th Queue (ft)	155	333	640	165
Link Distance (ft)	120	657	657	
Upstream Blk Time (%)	7		3	
Queuing Penalty (veh)	90		0	
Storage Bay Dist (ft)				115
Storage Blk Time (%)			2	0
Queuing Penalty (veh)			24	0

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	663	656	180	421	430
Average Queue (ft)	628	625	10	234	249
95th Queue (ft)	649	641	79	344	354
Link Distance (ft)	605	605		633	633
Upstream Blk Time (%)	94	79			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		6	0		
Queuing Penalty (veh)		1	0		

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	245	429	170	264	290	293	311
Average Queue (ft)	192	206	118	38	137	145	149	145
95th Queue (ft)	271	276	344	113	230	246	249	257
Link Distance (ft)			433	433			379	379
Upstream Blk Time (%)			0	0				0
Queuing Penalty (veh)			3	0				0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	2	9						
Queuing Penalty (veh)	5	21						

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	372	201	81	138	155	133	119	369	175
Average Queue (ft)	104	55	27	55	83	15	14	138	49
95th Queue (ft)	276	152	61	113	133	71	65	303	176
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								1	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	0	0		4	0
Queuing Penalty (veh)				0	1	0		41	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	B47	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	T	L	L	T	TR
Maximum Queue (ft)	107	122	163	177	177	254	179	27	184	335	698	650
Average Queue (ft)	37	47	51	59	114	54	51	3	91	172	422	410
95th Queue (ft)	83	96	121	133	189	200	140	35	167	412	681	649
Link Distance (ft)			449			329		336			1280	1280
Upstream Blk Time (%)						2						
Queuing Penalty (veh)						0						
Storage Bay Dist (ft)	260	260		250	155		200		310	310		
Storage Blk Time (%)				0	9	0	0			0	28	
Queuing Penalty (veh)				0	20	1	0			0	50	

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	265	662	777	365
Average Queue (ft)	170	412	425	78
95th Queue (ft)	335	666	697	313
Link Distance (ft)		903	903	903
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	0	35		
Queuing Penalty (veh)	0	48		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	804	814	240	152	149	274	305	182	166	82
Average Queue (ft)	756	782	240	88	84	151	178	91	55	13
95th Queue (ft)	844	814	241	140	132	252	273	151	121	55
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		46	4			0				
Queuing Penalty (veh)		330	25			0				

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	134	290	293	307	276	218	180	127	71	47
Average Queue (ft)	44	257	256	208	138	88	102	36	33	11
95th Queue (ft)	126	274	285	316	240	162	159	94	61	36
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	53		25						
Queuing Penalty (veh)	0	18		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	B55	B55	NB	NB	NB	NB	SB
Directions Served	L	TR	L	LT	R	T	T	L	T	T	R	L
Maximum Queue (ft)	74	107	154	179	63	28	62	198	475	493	205	68
Average Queue (ft)	29	35	80	111	15	2	5	88	235	241	45	14
95th Queue (ft)	66	84	135	173	53	18	32	177	414	427	175	46
Link Distance (ft)		103	63	63		714	714		2238	2238		
Upstream Blk Time (%)		1	21	37	0							
Queuing Penalty (veh)		0	26	46	0							
Storage Bay Dist (ft)	50				55			180			180	180
Storage Blk Time (%)	12	8		50	1			0	11	12	0	
Queuing Penalty (veh)	4	2		8	1			3	9	11	0	

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	102	512	524	151
Average Queue (ft)	5	257	269	16
95th Queue (ft)	54	436	448	90
Link Distance (ft)		2582	2582	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	180			180
Storage Blk Time (%)		18	20	0
Queuing Penalty (veh)		2	4	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	141	109	259	626	592	260	69	473	493	147
Average Queue (ft)	57	34	106	304	246	35	10	197	207	20
95th Queue (ft)	118	79	248	548	495	160	41	389	397	100
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)	0									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	14	7	0		10	11	0
Queuing Penalty (veh)			0	13	4	0		1	3	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	19	186	124	386	594	642	166	247	243
Average Queue (ft)	3	69	116	171	280	244	53	213	176
95th Queue (ft)	13	151	138	364	483	519	120	275	289
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								22	12
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		4	39	0		0			
Queuing Penalty (veh)		0	9	1		0			

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	R	T	T	T	T
Maximum Queue (ft)	524	786	788	524	200	202	926	941
Average Queue (ft)	394	675	685	374	176	174	461	508
95th Queue (ft)	559	915	922	511	186	193	849	871
Link Distance (ft)		746	746				2778	2778
Upstream Blk Time (%)		7	12					
Queuing Penalty (veh)		0	0					
Storage Bay Dist (ft)	500			500				
Storage Blk Time (%)	1	9	2	0				
Queuing Penalty (veh)	4	31	21	2				

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	NB	NB	SB
Directions Served	R	L	T	TR	TR
Maximum Queue (ft)	51	57	32	27	14
Average Queue (ft)	20	19	1	1	0
95th Queue (ft)	44	47	25	21	6
Link Distance (ft)	154		533	533	312
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		60			
Storage Blk Time (%)		1			
Queuing Penalty (veh)		5			

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	766	768	62	246	243	1024	1014
Average Queue (ft)	735	737	2	229	228	791	756
95th Queue (ft)	753	757	28	238	236	1228	1206
Link Distance (ft)	715	715		217	217		
Upstream Blk Time (%)	65	63		60	60		
Queuing Penalty (veh)	0	0		397	397		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		53					
Queuing Penalty (veh)		1					

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	NB	NB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	167	388	464	140
Average Queue (ft)	79	269	252	101
95th Queue (ft)	147	372	401	202
Link Distance (ft)	121	657	657	
Upstream Blk Time (%)	7			
Queuing Penalty (veh)	78			
Storage Bay Dist (ft)				115
Storage Blk Time (%)			11	0
Queuing Penalty (veh)			80	2

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	656	652	220	552	558
Average Queue (ft)	626	625	48	290	304
95th Queue (ft)	644	641	165	436	443
Link Distance (ft)	605	605		634	634
Upstream Blk Time (%)	90	72		0	0
Queuing Penalty (veh)	0	0		2	2
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		7	0		
Queuing Penalty (veh)		6	0		

APPENDIX G

HCS FREEWAY ANALYSIS WORKSHEETS
EXISTING

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7860	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1441
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.3
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7348	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1347
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	6512	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1194
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.3
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8350	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1531
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8916	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1962
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.92
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	36.9
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8335	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1834
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.86
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	56.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	32.6
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7386	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1625
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	60.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.0
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9471	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2084
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.97
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	49.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	42.2
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3419	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	920
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.8
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	2675	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	720
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.34
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	11.6
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4339	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	934
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.48
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.7
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Existing
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4179	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	900
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.46
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.2
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

APPENDIX H

SANDAG SERIES 12 FIESTA ISLAND AMENDMENT FORECAST TRAFFIC DATA (YEAR 2025)

INTERSECTION	DIRECTION	LEG	EXISTING TRAFFIC VOLUMES (Year 2019)						EXISTING ADT		YEAR 2025	GROWTH FACTOR	2025 APROACH TRAFFIC VOLUMES						2025 DEPARTURE TRAFFIC VOLUMES					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	CALCULATED	SELECTED	SELECTED		Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
1. Sea World Dr / I-5 NB Ramps	Sb	North	0	0	0	0	0	0	13300	13300	13950	1.05	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	252	315	389	429	0	0	19700	19700	21140	1.07	270	338	417	460	0	0	264	330	402	444	0	0
	Nb	South	347	507	10	4	245	260	8600	8600	9100	1.06	367	536	11	4	259	275	372	544	10	4	253	269
	Eb	West	0	0	449	463	793	753	23600	23600	24410	1.03	0	0	464	479	820	779	0	0	482	497	832	790
2. Sea World Dr / I-5 SB Ramps	Sb	North	667	955	0	0	177	149	12200	12200	12470	1.02	682	976	0	0	181	152	669	958	0	0	183	154
	Wb	East	0	0	267	495	258	198	22600	22600	23380	1.03	0	0	276	512	267	205	0	0	268	496	290	222
	Nb	South	0	0	0	0	0	0	4400	4400	4940	1.12	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	51	200	1069	999	0	0	29400	29400	29480	1.00	51	201	1,072	1,002	0	0	57	225	1106	1033	0	0
3. Sea World Dr (N/S) / Pacific Hwy (E/W)	Sb	North	179	193	705	1191	124	140	32200	32200	32290	1.00	180	194	707	1,194	124	140	187	201	748	1264	142	160
	Wb	East	68	166	100	67	45	161	7600	7600	8680	1.14	78	190	114	77	51	184	68	166	104	70	48	171
	Nb	South	55	124	1019	1130	224	179	32300	32300	34270	1.06	58	132	1,081	1,199	238	190	63	142	1022	1133	234	187
	Eb	West	83	244	33	136	67	169	10500	10500	10960	1.04	87	255	34	142	70	176	88	259	38	155	67	169
4. Sea World Dr (E/W) / Friars Rd	Sb	North	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	658	1148	127	317	29700	29700	31510	1.06	0	0	698	1,218	135	336	0	0	718	1252	135	338
	Nb	South	178	131	0	0	226	303	13900	13900	14800	1.06	190	139	0	0	241	323	189	139	0	0	247	331
	Eb	West	220	725	1067	1119	0	0	34200	34200	37310	1.09	240	791	1,164	1,221	0	0	234	772	1132	1187	0	0
5. Sea World Dr / Sea World Wy	Sb	North	21	115	0	0	71	395	4100	4100	4430	1.08	23	124	0	0	77	427	22	122	0	0	77	431
	Wb	East	0	0	864	1406	0	0	35900	35900	39160	1.09	0	0	942	1,534	0	0	0	0	915	1488	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	0	0	1267	1740	16	34	34100	34100	36100	1.06	0	0	1,341	1,842	17	36	0	0	1382	1898	17	37
6. Perez Cove Wy / SeaWorld Entrance	Sb	North	0	0	0	0	69	71	2000	2000	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	17	157	0	0	0	0	3700	3700	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	70	213	0	0	0	0	1800	1800	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
7. Ingraham St / Perez Cove Wy/ Dana Landing Rd	Sb	North	14	22	1244	1430	9	11	36500	36500	37890	1.04	15	23	1,291	1,484	9	11	14	23	1284	1476	11	14
	Wb	East	7	16	1	2	13	229	3100	3100	3810	1.23	9	20	1	2	16	281	7	17	1	2	13	236
	Nb	South	116	88	1297	1746	112	81	40000	40000	41290	1.03	120	91	1,339	1,802	116	84	143	108	1346	1812	116	84
	Eb	West	15	31	0	4	16	27	2000	2000	2070	1.04	16	32	0	4	17	28	15	32	0	5	17	28
8. Ingraham St / Vacation Rd	Sb	North	26	30	1220	1321	5	11	35100	35100	36100	1.03	27	31	1,255	1,359	5	11	27	32	1266	1371	5	11
	Wb	East	7	23	2	1	8	25	1000	1000	1040	1.04	7	24	2	1	8	26	7	24	2	1	8	26
	Nb	South	17	53	1289	1642	101	93	36900	36900	38300	1.04	18	55	1,338	1,704	105	97	18	55	1326	1689	106	98
	Eb	West	52	85	2	9	14	28	2800	2800	2940	1.05	55	89	2	9	15	29	54	88	2	9	14	29
9. Ingraham St / Crown Point Dr	Sb	North	0	1	630	840	0	0	20400	20400	20890	1.02	0	1	645	860	0	0	0	1	647	862	0	0
	Wb	East	4	8	6	15	253	238	7700	7700	7900	1.03	4	8	6	15	260	244	4	8	6	15	260	244
	Nb	South	254	445	861	916	197	337	35600	35600	36540	1.03	261	457	884	940	202	346	261	457	882	938	200	343
	Eb	West	404	316	3	7	0	3	8100	8100	8240	1.02	411	321	3	7	0	3	415	324	3	7	0	3

INTERSECTION	DIRECTION	LEG	EXISTING TRAFFIC VOLUMES (Year 2019)						EXISTING ADT		YEAR 2025	GROWTH FACTOR	2025 APROACH TRAFFIC VOLUMES						2025 DEPARTURE TRAFFIC VOLUMES					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	CALCULATED	SELECTED	SELECTED		Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
10. Mission Bay Dr / Sports Arena / I-8 WB Off Ramp	Sb	North	0	0	1541	1905	0	0	50200	50200	52670	1.05	0	0	1,617	1,999	0	0	0	0	1628	2013	0	0
	Wb	East	1654	1666	0	0	460	669	27800	27800	29010	1.04	1,726	1,739	0	0	480	698	1735	1748	0	0	486	707
	Nb	South	0	0	476	782	0	0	36500	36500	38570	1.06	0	0	503	826	0	0	0	0	499	820	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
11. Mission Bay Dr / Sports Arena / I-8 EB On Ramp	Sb	North	1187	1175	814	1399	0	0	36500	36500	39330	1.08	1,279	1,266	877	1,507	0	0	1298	1285	887	1525	0	0
	Wb	East	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	476	782	0	0	21700	21700	23650	1.09	0	0	519	852	0	0	0	0	513	843	0	0
	Eb	West	0	0	0	0	0	0	14800	14800	16180	1.09	0	0	0	0	0	0	0	0	0	0	0	0
12. Sunset Cliffs Blvd / I-8 WB Off Ramps	Sb	North	0	0	714	1079	0	0	26800	26800	28290	1.06	0	0	754	1,139	0	0	0	0	747	1129	0	0
	Wb	East	7	2	0	0	1559	2061	22700	22700	23900	1.05	7	2	0	0	1,641	2,170	7	2	0	0	1631	2157
	Nb	South	0	0	1171	1317	0	0	49400	49400	51690	1.05	0	0	1,225	1,378	0	0	0	0	1236	1390	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0	0	0	0	0	0	0	0	0
13. Sunset Cliffs Blvd / I-8 EB On Ramps	Sb	North	0	0	0	0	0	0	10000	10000	10420	1.04	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	0	0	0	0	21200	21200	21960	1.04	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	1365	736	743	852	0	0	23100	23100	24070	1.04	1,422	767	774	888	0	0	1414	762	774	888	0	0
	Eb	West	0	0	732	554	0	0	8000	8000	8140	1.02	0	0	745	564	0	0	0	0	758	574	0	0
14. Sunset Cliffs Blvd / Nimitz Blvd	Sb	North	0	0	1424	1362	15	20	17600	17600	18330	1.04	0	0	1,483	1,418	16	21	0	0	1483	1419	16	21
	Wb	East	0	0	0	0	0	0	15100	15100	15730	1.04	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	0	0	0	0	18000	18000	18750	1.04	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	18	79	1279	1104	0	0	15500	15500	16150	1.04	19	82	1,333	1,150	0	0	19	82	1332	1150	0	0

INTERSECTION	DIRECTION	LEG	2025 WEIGHTED AVERAGE TRAFFIC VOLUMES						2025 ROUNDED TRAFFIC VOLUMES						EXISTING						FINAL 2025					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
1. Sea World Dr / I-5 NB Ramps	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	267	333	411	453	0	0	270	330	410	450	0	0	252	315	389	429	0	0	270	330	410	450	0	0
	Nb	South	369	539	11	4	258	273	370	540	10	0	260	270	347	507	10	4	245	260	370	540	10	5	260	270
	Eb	West	0	0	474	489	828	786	0	0	470	490	830	790	0	0	449	463	793	753	0	0	470	490	830	790
2. Sea World Dr / I-5 SB Ramps	Sb	North	678	971	0	0	182	153	680	970	0	0	180	150	667	955	0	0	177	149	680	970	0	0	180	150
	Wb	East	0	0	273	505	286	219	0	0	270	510	290	220	0	0	267	495	258	198	0	0	270	510	290	220
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	56	221	1091	1020	0	0	60	220	1090	1020	0	0	51	200	1069	999	0	0	60	220	1090	1020	0	0
3. Sea World Dr (N/S) / Pacific Hwy (E/W)	Sb	North	185	200	727	1229	138	156	190	200	730	1230	140	160	179	193	705	1191	124	140	190	200	730	1230	140	160
	Wb	East	76	185	110	74	51	181	80	190	110	70	50	180	68	166	100	67	45	161	80	190	110	70	50	180
	Nb	South	62	140	1051	1166	235	188	60	140	1050	1170	230	190	55	124	1019	1130	224	179	60	140	1050	1170	230	190
	Eb	West	87	256	36	150	69	175	90	260	40	150	70	170	83	244	33	136	67	169	90	260	40	150	70	170
4. Sea World Dr (E/W) / Friars Rd	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	707	1234	135	337	0	0	710	1230	140	340	0	0	658	1148	127	317	0	0	710	1230	140	340
	Nb	South	189	139	0	0	242	325	190	140	0	0	240	320	178	131	0	0	226	303	190	140	0	0	240	320
	Eb	West	236	777	1147	1203	0	0	240	780	1150	1200	0	0	220	725	1067	1119	0	0	240	780	1150	1200	0	0
5. Sea World Dr / Sea World Wy	Sb	North	23	124	0	0	77	427	20	120	0	0	80	430	21	115	0	0	71	395	21	115	0	0	71	395
	Wb	East	0	0	928	1510	0	0	0	0	930	1510	0	0	0	0	864	1406	0	0	0	0	930	1510	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	0	0	1361	1869	17	37	0	0	1360	1870	20	40	0	0	1267	1740	16	34	0	0	1360	1870	16	34
6. Perez Cove Wy / SeaWorld Entrance	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	71	0	0	0	0	69	71
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	17	157	0	0	0	0	17	157	0	0	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	70	213	0	0	0	0	70	213	0	0	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Ingraham St / Perez Cove Wy/ Dana Landing Rd	Sb	North	14	23	1288	1480	11	13	10	20	1290	1480	10	10	14	22	1244	1430	9	11	15	25	1290	1480	9	11
	Wb	East	8	19	1	2	16	278	10	20	0	0	20	280	7	16	1	2	13	229	7	16	1	2	13	229
	Nb	South	141	107	1343	1808	116	84	140	110	1340	1810	120	80	116	88	1297	1746	112	81	116	88	1340	1810	120	85
	Eb	West	16	32	0	4	17	28	20	30	0	0	20	30	15	31	0	4	16	27	20	35	0	4	20	30
8. Ingraham St / Vacation Rd	Sb	North	27	31	1260	1365	5	11	30	30	1260	1360	10	10	26	30	1220	1321	5	11	30	30	1260	1360	10	15
	Wb	East	7	24	2	1	8	26	10	20	0	0	10	30	7	23	2	1	8	25	10	25	5	5	10	30
	Nb	South	18	55	1332	1696	106	98	20	60	1330	1700	110	100	17	53	1289	1642	101	93	20	60	1330	1700	110	100
	Eb	West	55	89	2	9	15	29	50	90	0	10	10	30	52	85	2	9	14	28	55	90	5	10	15	30
9. Ingraham St / Crown Point Dr	Sb	North	0	1	646	861	0	0	0	0	650	860	0	0	0	1	630	840	0	0	0	5	650	860	0	0
	Wb	East	4	8	6	15	260	244	0	10	10	20	260	240	4	8	6	15	253	238	5	10	10	20	260	240
	Nb	South	261	457	882	939	201	343	260	460	880	940	200	340	254	445	861	916	197	337	260	460	880	940	200	340
	Eb	West	412	322	3	7	0	3	410	320	0	10	0	0	404	316	3	7	0	3	410	320	5	10	0	5

INTERSECTION	DIRECTION	LEG	2025 WEIGHTED AVERAGE TRAFFIC VOLUMES						2025 ROUNDED TRAFFIC VOLUMES						EXISTING						FINAL 2025					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
10. Mission Bay Dr / Sports Arena / I-8 WB Off Ramp	Sb	North	0	0	1624	2007	0	0	0	0	1620	2010	0	0	0	0	1541	1905	0	0	0	0	1620	2010	0	0
	Wb	East	1729	1742	0	0	483	702	1730	1740	0	0	480	700	1654	1666	0	0	460	669	1730	1740	0	0	480	700
	Nb	South	0	0	501	824	0	0	0	0	500	820	0	0	0	0	476	782	0	0	0	0	500	820	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Mission Bay Dr / Sports Arena / I-8 EB On Ramp	Sb	North	1292	1279	883	1518	0	0	1290	1280	880	1520	0	0	1187	1175	814	1399	0	0	1250	1240	850	1470	0	0
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	517	849	0	0	0	0	520	850	0	0	0	0	476	782	0	0	0	0	500	820	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. Sunset Cliffs Blvd / I-8 WB Off Ramps	Sb	North	0	0	751	1135	0	0	0	0	750	1140	0	0	0	0	714	1079	0	0	0	0	750	1140	0	0
	Wb	East	7	2	0	0	1638	2166	10	0	0	0	1640	2170	7	2	0	0	1559	2061	10	5	0	0	1640	2170
	Nb	South	0	0	1232	1386	0	0	0	0	1230	1390	0	0	0	0	1171	1317	0	0	0	0	1230	1390	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. Sunset Cliffs Blvd / I-8 EB On Ramps	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	1418	765	774	888	0	0	1420	760	770	890	0	0	1365	736	743	852	0	0	1420	760	770	890	0	0
	Eb	West	0	0	748	566	0	0	0	0	750	570	0	0	0	0	732	554	0	0	0	0	750	570	0	0
14. Sunset Cliffs Blvd / Nimitz Blvd	Sb	North	0	0	1483	1419	16	21	0	0	1480	1420	20	20	0	0	1424	1362	15	20	0	0	1480	1420	20	20
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	19	82	1332	1150	0	0	20	80	1330	1150	0	0	18	79	1279	1104	0	0	20	80	1330	1150	0	0

GIS ID#	Roadway	Existing 2019	Year 2025	Year 2040	Year 2050	Fiesta Island 2050 Option A		Final 2025	2025-2019	Check	Final 2040	2040-2025	Check
	SeaWorld Drive												
1	I-5 Ramps to Pacific Highway	39,140	41,500	48,200	53,300	36,542		41,070	1,930		46,610	5,110	
2	Pacific Highway to Friars Road	34,630	37,200	44,400	50,000	43,191		36,750	2,120		42,700	5,500	
3	Friars Road to SeaWorld Way	38,830	41,700	49,800	56,100	55,446		41,190	2,360		47,870	6,170	
4	SeaWorld Way to W. Mission Bay Drive	38,670	40,700	46,100	50,200			40,620	1,950		45,800	5,100	
	Friars Road												
5	Pacific Highway to SeaWorld Drive	13,360	14,800	19,300	23,000	25,857		14,740	1,380		19,070	4,270	
	W. Mission Bay Drive												
6	Dana Landing Road to Ingraham Street	38,380	39,700	43,400	46,000			39,680	1,300		43,340	3,640	
7	Ingraham Street to SeaWorld Drive	71,570	75,100	84,600	91,600			74,980	3,410		84,160	9,060	
8	SeaWorld Drive to I-8 Ramps (bridge)	56,900	59,200	65,200	69,500			59,030	2,130		64,550	5,350	
9	I-8 Ramps to Sports Arena Boulevard	35,990	37,900	43,100	46,900			37,880	1,890		43,010	5,110	
	Perez Cove Way												
10	Ingraham Street to SeaWorld Main Entrance	7,600	7,600	7,600	7,600			7,600	0		7,600	0	
11	SeaWorld Main Entrance to SeaWorld Drive	2,320	2,320	2,300	2,300			2,320	0		2,320	0	
	Ingraham Street												
12	Crown Point Drive to Vacation Road (bridge)	36,470	37,400	39,900	41,600			37,370	900		39,810	2,410	
13	Vacation Road to Perez Cove Way (bridge)	39,330	40,700	44,500	47,100			40,670	1,340		44,390	3,690	
14	Perez Cove Way to W. Mission Bay Drive	50,170	51,700	55,800	58,700			51,570	1,400		55,300	3,600	
	Sunset Cliffs Boulevard												
15	W. Mission Bay Drive to I-8 Ramps (bridge)	37,560	38,900	42,600	45,300			38,880	1,320		42,510	3,610	
16	I-8 Ramps to Nimitz Blvd (W. Point Loma Blvd)	39,610	40,800	43,800	45,900			40,780	1,170		43,710	2,910	

GIS ID#	Roadway	Model 12				Compound Annual Growth					Model 13				Compound Annual Growth			
		2008	2020	2035	2050	2020-2008	2035-2020	2050-2035	2050-2020	2050-2008 (Total)	2012	2020	2035	2050	2020-2012	2035-2020	2050-2035	Total
	SeaWorld Drive																	
1	I-5 Ramps to Pacific Highway	41,700	44,400	49,300	45,000	0.5%	0.7%	-0.6%	0.0%	1.00%	26,200	27,100	28,100	23,700	0.4%	0.2%	-1.1%	-0.3%
2	Pacific Highway to Friars Road	40,700	45,400	52,200	58,900	0.9%	0.9%	0.8%	0.9%	1.19%	26,600	28,000	29,000	31,300	0.6%	0.2%	0.5%	0.4%
3	Friars Road to SeaWorld Way	42,300	48,400	56,700	69,600	1.1%	1.1%	1.4%	1.2%	1.19%	37,000	39,600	41,900	44,700	0.9%	0.4%	0.4%	0.5%
4	SeaWorld Way to W. Mission Bay Drive	45,800	50,700	58,400	65,200	0.9%	0.9%	0.7%	0.8%	0.84%	33,100	34,500	37,300	36,900	0.5%	0.5%	-0.1%	0.3%
	Friars Road																	
5	Pacific Highway to SeaWorld Drive	10,800	17,100	22,600	22,500	3.9%	1.9%	0.0%	0.9%	1.76%	17,100	17,800	19,500	18,700	0.5%	0.6%	-0.3%	0.2%
	W. Mission Bay Drive																	
6	Dana Landing Road to Ingraham Street	40,700	43,800	50,400	52,000	0.6%	0.9%	0.2%	0.6%	0.59%	26,400	26,400	29,000	32,000	0.0%	0.6%	0.7%	0.5%
7	Ingraham Street to SeaWorld Drive	61,900	65,400	74,300	95,300	0.5%	0.9%	1.7%	1.3%	0.80%	61,600	60,200	65,400	65,700	-0.3%	0.6%	0.0%	0.2%
8	SeaWorld Drive to I-8 Ramps (bridge)	63,100	66,700	73,900	82,800	0.5%	0.7%	0.8%	0.7%	0.65%	41,200	39,700	44,200	43,300	-0.5%	0.7%	-0.1%	0.1%
9	I-8 Ramps to Sports Arena Boulevard	32,300	32,300	41,000	46,300	0.0%	1.6%	0.8%	1.2%	0.86%	24,800	24,500	28,400	28,900	-0.2%	1.0%	0.1%	0.4%
	Perez Cove Way																	
10	Ingraham Street to SeaWorld Main Entrance	-	-	-	-						12,100	11,400	11,300	10,200	-0.7%	-0.1%	-0.7%	-0.4%
11	SeaWorld Main Entrance to SeaWorld Drive	-	-	-	-						17,100	16,000	16,200	15,700	-0.8%	0.1%	-0.2%	-0.2%
	Ingraham Street																	
12	Crown Point Drive to Vacation Road (bridge)	34,600	36,600	40,900	41,400	0.5%	0.7%	0.1%	0.4%	0.43%	35,200	34,100	38,100	36,700	-0.4%	0.7%	-0.2%	0.1%
13	Vacation Road to Perez Cove Way (bridge)	40,700	43,800	50,400	52,000	0.6%	0.9%	0.2%	0.6%	0.59%	37,600	36,200	40,700	39,200	-0.5%	0.8%	-0.3%	0.1%
14	Perez Cove Way to W. Mission Bay Drive	40,700	43,400	48,600	50,300	0.5%	0.8%	0.2%	0.5%	0.51%	41,300	40,000	43,400	41,200	-0.4%	0.5%	-0.3%	0.0%
	Sunset Cliffs Boulevard																	
15	W. Mission Bay Drive to I-8 Ramps (bridge)	42,800	43,300	49,000	55,100	0.1%	0.8%	0.8%	0.8%	0.60%	50,400	49,400	51,600	52,600	-0.3%	0.3%	0.1%	0.1%
16	I-8 Ramps to Nimitz Blvd (W. Point Loma Blvd)	43,500	43,600	48,400	53,100	0.0%	0.7%	0.6%	0.7%	0.48%	39,000	38,800	40,100	41,700	-0.1%	0.2%	0.3%	0.2%

	AVERAGE					0.8%	1.0%	0.5%	0.8%	0.8%					-0.1%	0.5%	-0.1%	0.1%

APPENDIX I

PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITHOUT PROJECT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	830	470	0	0	410	270	260	10	370	0	0	0
Future Volume (veh/h)	830	470	0	0	410	270	260	10	370	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.95	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	892	505	0	0	423	278	299	11	425			
Peak Hour Factor	0.93	0.93	0.93	0.97	0.97	0.97	0.87	0.87	0.87			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1101	2299	0	0	517	336	364	13	335			
Arrive On Green	0.54	1.00	0.00	0.00	0.26	0.26	0.21	0.21	0.21			
Sat Flow, veh/h	3428	3618	0	0	2100	1304	1707	63	1572			
Grp Volume(v), veh/h	892	505	0	0	371	330	310	0	425			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1548	1770	0	1572			
Q Serve(g_s), s	16.0	0.0	0.0	0.0	14.8	15.1	12.5	0.0	16.0			
Cycle Q Clear(g_c), s	16.0	0.0	0.0	0.0	14.8	15.1	12.5	0.0	16.0			
Prop In Lane	1.00		0.00	0.00		0.84	0.96		1.00			
Lane Grp Cap(c), veh/h	1101	2299	0	0	454	399	378	0	335			
V/C Ratio(X)	0.81	0.22	0.00	0.00	0.82	0.83	0.82	0.00	1.27			
Avail Cap(c_a), veh/h	1101	2299	0	0	562	493	378	0	335			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.65	0.65	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.5	0.0	0.0	0.0	26.2	26.3	28.1	0.0	29.5			
Incr Delay (d2), s/veh	3.1	0.1	0.0	0.0	15.0	17.7	12.7	0.0	141.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.6	0.0	0.0	0.0	7.7	7.1	6.4	0.0	25.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.6	0.1	0.0	0.0	41.2	44.0	40.8	0.0	171.2			
LnGrp LOS	B	A	A	A	D	D	D	A	F			
Approach Vol, veh/h		1397			701			735				
Approach Delay, s/veh		11.9			42.5			116.2				
Approach LOS		B			D			F				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		54.4		20.6	29.6	24.8						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		48.9		16.0	20.8	* 24						
Max Q Clear Time (g_c+I1), s		2.0		18.0	18.0	17.1						
Green Ext Time (p_c), s		2.3		0.0	1.1	1.8						
Intersection Summary												
HCM 6th Ctrl Delay			46.5									
HCM 6th LOS			D									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1090	60	290	270	0	0	0	0	180	0	680
Future Volume (veh/h)	0	1090	60	290	270	0	0	0	0	180	0	680
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1239	68	337	314	0				198	0	0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86				0.91	0.91	0.91
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1412	616	928	2601	0				237	0	
Arrive On Green	0.00	0.40	0.40	0.45	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3618	1540	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1239	68	337	314	0				198	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1540	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	24.4	2.1	4.8	0.0	0.0				8.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	24.4	2.1	4.8	0.0	0.0				8.2	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1412	616	928	2601	0				237	0	
V/C Ratio(X)	0.00	0.88	0.11	0.36	0.12	0.00				0.83	0.00	
Avail Cap(c_a), veh/h	0	1598	698	928	2601	0				363	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.46	0.46	0.73	0.73	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	20.8	14.1	16.3	0.0	0.0				31.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.9	0.2	0.2	0.1	0.0				5.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.5	0.7	1.7	0.0	0.0				3.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	24.7	14.3	16.5	0.1	0.0				37.5	0.0	0.0
LnGrp LOS	A	C	B	B	A	A				D	A	
Approach Vol, veh/h		1307			651						198	A
Approach Delay, s/veh		24.2			8.6						37.5	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	25.3	35.0	14.7	60.3
Change Period (Y+Rc), s	5.0	* 5	4.6	5.0
Max Green Setting (Gmax), s	11.8	* 34	15.4	50.0
Max Q Clear Time (g_c+I1), s	6.8	26.4	10.2	2.0
Green Ext Time (p_c), s	0.5	3.7	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	40	90	50	110	80	230	1050	60	140	720	190
Future Volume (veh/h)	70	40	90	50	110	80	230	1050	60	140	720	190
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	80	45	102	71	157	114	250	1141	65	144	742	196
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	161	233	187	90	241	190	353	1420	81	183	1481	724
Arrive On Green	0.05	0.13	0.13	0.05	0.13	0.13	0.10	0.42	0.42	0.10	0.42	0.42
Sat Flow, veh/h	3428	1856	1484	1767	1856	1464	3428	3386	193	1767	3526	1549
Grp Volume(v), veh/h	80	45	102	71	157	114	250	594	612	144	742	196
Grp Sat Flow(s),veh/h/ln	1714	1856	1484	1767	1856	1464	1714	1763	1816	1767	1763	1549
Q Serve(g_s), s	1.5	1.4	4.2	2.6	5.3	4.8	4.6	19.2	19.3	5.2	10.1	5.0
Cycle Q Clear(g_c), s	1.5	1.4	4.2	2.6	5.3	4.8	4.6	19.2	19.3	5.2	10.1	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	161	233	187	90	241	190	353	739	761	183	1481	724
V/C Ratio(X)	0.50	0.19	0.55	0.79	0.65	0.60	0.71	0.80	0.80	0.79	0.50	0.27
Avail Cap(c_a), veh/h	252	881	705	108	847	668	583	805	829	433	1880	900
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	25.6	26.8	30.6	27.0	26.8	28.3	16.6	16.6	28.5	13.9	10.6
Incr Delay (d2), s/veh	0.9	0.4	2.5	22.2	1.1	1.1	1.0	6.2	6.0	2.8	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.6	1.5	1.6	2.2	1.6	1.8	7.7	7.9	2.2	3.5	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.2	26.0	29.3	52.8	28.1	27.9	29.3	22.7	22.6	31.4	14.3	10.9
LnGrp LOS	C	C	C	D	C	C	C	C	C	C	B	B
Approach Vol, veh/h		227			342			1456			1082	
Approach Delay, s/veh		29.3			33.2			23.8			16.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	32.7	7.7	13.7	11.1	32.7	7.5	14.0
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	7.2	21.3	4.6	6.2	6.6	12.1	3.5	7.3
Green Ext Time (p_c), s	0.1	6.1	0.0	0.5	0.2	8.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1150	240	140	700	240	190
Future Volume (veh/h)	1150	240	140	700	240	190
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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1198	250	151	753	312	158
Peak Hour Factor	0.96	0.96	0.93	0.93	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1612	930	229	2070	478	213
Arrive On Green	0.51	0.51	0.07	0.65	0.15	0.15
Sat Flow, veh/h	3256	1412	3086	3256	3181	1415
Grp Volume(v), veh/h	1198	250	151	753	312	158
Grp Sat Flow(s),veh/h/ln	1586	1412	1543	1586	1590	1415
Q Serve(g_s), s	18.7	4.6	3.0	6.8	5.8	6.7
Cycle Q Clear(g_c), s	18.7	4.6	3.0	6.8	5.8	6.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1612	930	229	2070	478	213
V/C Ratio(X)	0.74	0.27	0.66	0.36	0.65	0.74
Avail Cap(c_a), veh/h	2001	1103	324	2597	1368	608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	4.5	28.3	5.0	25.1	25.5
Incr Delay (d2), s/veh	1.4	0.2	1.2	0.3	0.6	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	1.4	1.1	1.4	1.9	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.6	4.7	29.5	5.2	25.7	27.5
LnGrp LOS	B	A	C	A	C	C
Approach Vol, veh/h	1448			904	470	
Approach Delay, s/veh	12.1			9.3	26.3	
Approach LOS	B			A	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	9.1	38.1				47.2		15.6
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	6.6	39.6				* 51		27.0
Max Q Clear Time (g_c+I1), s	5.0	20.7				8.8		8.7
Green Ext Time (p_c), s	0.0	11.2				12.1		0.7

Intersection Summary	
HCM 6th Ctrl Delay	13.6
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	16	0	1360	0	920	0	71	21
Future Volume (veh/h)	16	0	1360	0	920	0	71	21
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		0	1856		1856	0	1870	1870
Adj Flow Rate, veh/h		0	1402		1022	0	95	28
Peak Hour Factor		0.97	0.97		0.90	0.90	0.75	0.75
Percent Heavy Veh, %		0	3		3	0	2	2
Cap, veh/h		0	2138		3071	0	590	476
Arrive On Green		0.00	0.61		0.61	0.00	0.17	0.17
Sat Flow, veh/h		0	3711		5400	0	3456	2790
Grp Volume(v), veh/h		0	1402		1022	0	95	28
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1728	1395
Q Serve(g_s), s		0.0	12.1		4.6	0.0	1.1	0.4
Cycle Q Clear(g_c), s		0.0	12.1		4.6	0.0	1.1	0.4
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2138		3071	0	590	476
V/C Ratio(X)		0.00	0.66		0.33	0.00	0.16	0.06
Avail Cap(c_a), veh/h		0	2690		3919	0	2666	2153
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	6.0		4.5	0.0	16.5	16.2
Incr Delay (d2), s/veh		0.0	0.6		0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	1.5		0.7	0.0	0.4	0.3
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	6.6		4.6	0.0	16.5	16.2
LnGrp LOS		A	A		A	A	B	B
Approach Vol, veh/h			1402		1022		123	
Approach Delay, s/veh			6.6		4.6		16.5	
Approach LOS			A		A		B	
Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		34.7		12.0		34.7		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		35.6		36.0		* 36		
Max Q Clear Time (g_c+I1), s		14.1		3.1		6.6		
Green Ext Time (p_c), s		14.2		0.2		12.2		
Intersection Summary								
HCM 6th Ctrl Delay			6.3					
HCM 6th LOS			A					

Notes

User approved ignoring U-Turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	20	13	1	7	120	1340	116	9	1290	20
Future Volume (veh/h)	20	0	20	13	1	7	120	1340	116	9	1290	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.91	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	47	0	47	18	0	9	138	1540	133	10	1466	23
Peak Hour Factor	0.43	0.43	0.43	0.75	0.75	0.75	0.87	0.87	0.87	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	76	0	66	94	0	52	159	2777	1252	31	2493	1080
Arrive On Green	0.04	0.00	0.04	0.03	0.00	0.03	0.09	0.79	0.79	0.02	1.00	1.00
Sat Flow, veh/h	1767	0	1521	3534	0	1430	1767	3526	1537	3428	3526	1527
Grp Volume(v), veh/h	47	0	47	18	0	9	138	1540	133	10	1466	23
Grp Sat Flow(s),veh/h/ln	1767	0	1521	1767	0	1430	1767	1763	1537	1714	1763	1527
Q Serve(g_s), s	4.1	0.0	4.8	0.8	0.0	1.0	12.2	26.0	2.8	0.5	0.0	0.0
Cycle Q Clear(g_c), s	4.1	0.0	4.8	0.8	0.0	1.0	12.2	26.0	2.8	0.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	76	0	66	94	0	52	159	2777	1252	31	2493	1080
V/C Ratio(X)	0.62	0.00	0.72	0.19	0.00	0.17	0.87	0.55	0.11	0.32	0.59	0.02
Avail Cap(c_a), veh/h	179	0	154	783	0	331	174	2777	1252	87	2493	1080
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	74.3	0.0	74.6	75.3	0.0	74.0	71.0	6.3	3.0	77.1	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.0	5.3	0.4	0.0	0.6	30.8	0.8	0.2	1.8	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.0	0.4	0.0	0.4	6.8	8.2	0.9	0.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.3	0.0	79.9	75.6	0.0	74.5	101.8	7.1	3.2	78.9	0.8	0.0
LnGrp LOS	E	A	E	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		94			27			1811			1499	
Approach Delay, s/veh		78.6			75.3			14.0			1.4	
Approach LOS		E			E			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	131.4		11.7	18.6	118.6		9.1				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 83		16.0	15.6	70.3		35.0				
Max Q Clear Time (g_c+I1), s	2.5	28.0		6.8	14.2	2.0		3.0				
Green Ext Time (p_c), s	0.0	23.3		0.1	0.0	19.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			10.7
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	60	10	10	10	110	1330	20	10	1260	30
Future Volume (veh/h)	20	10	60	10	10	10	110	1330	20	10	1260	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.98	1.00		0.96	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	33	16	98	12	12	12	117	1415	21	11	1326	32
Peak Hour Factor	0.61	0.61	0.61	0.85	0.85	0.85	0.94	0.94	0.94	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	3	3	3
Cap, veh/h	63	35	139	81	80	65	634	2681	1149	17	1410	601
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.36	0.76	0.76	0.02	0.80	0.80
Sat Flow, veh/h	260	260	1041	379	595	487	1767	3526	1511	1767	3526	1502
Grp Volume(v), veh/h	147	0	0	36	0	0	117	1415	21	11	1326	32
Grp Sat Flow(s),veh/h/ln	1561	0	0	1461	0	0	1767	1763	1511	1767	1763	1502
Q Serve(g_s), s	9.0	0.0	0.0	0.0	0.0	0.0	7.2	25.4	0.5	1.0	48.0	0.7
Cycle Q Clear(g_c), s	14.1	0.0	0.0	2.9	0.0	0.0	7.2	25.4	0.5	1.0	48.0	0.7
Prop In Lane	0.22		0.67	0.33		0.33	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	0	0	226	0	0	634	2681	1149	17	1410	601
V/C Ratio(X)	0.62	0.00	0.00	0.16	0.00	0.00	0.18	0.53	0.02	0.64	0.94	0.05
Avail Cap(c_a), veh/h	343	0	0	331	0	0	634	2681	1149	51	1981	844
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.76	0.76	0.76	0.77	0.77	0.77
Uniform Delay (d), s/veh	65.3	0.0	0.0	60.5	0.0	0.0	34.8	7.6	4.6	77.2	14.3	9.6
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	10.9	11.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	0.0	0.0	1.3	0.0	0.0	3.1	8.4	0.2	0.5	7.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.3	0.0	0.0	60.7	0.0	0.0	34.8	8.1	4.6	88.1	25.3	9.7
LnGrp LOS	E	A	A	E	A	A	C	A	A	F	C	A
Approach Vol, veh/h		147			36			1553			1369	
Approach Delay, s/veh		66.3			60.7			10.1			25.4	
Approach LOS		E			E			B			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	126.0		26.0	62.6	69.4		26.0				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	4.6	106.1		32.1	21.6	* 89		32.1				
Max Q Clear Time (g_c+I1), s	3.0	27.4		16.1	9.2	50.0		4.9				
Green Ext Time (p_c), s	0.0	18.5		0.5	0.1	13.2		0.1				
Intersection Summary												
HCM 6th Ctrl Delay			20.1									
HCM 6th LOS			C									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	10	410	260	10	10	200	880	260	0	650	0
Future Volume (veh/h)	0	10	410	260	10	10	200	880	260	0	650	0
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		0.97	1.00		0.97	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	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	0	11	441	289	11	11	220	967	286	0	739	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	0	3	3
Cap, veh/h	0	625	866	401	282	282	375	977	806	0	889	0
Arrive On Green	0.00	0.33	0.33	0.33	0.33	0.33	0.28	0.70	0.70	0.00	0.25	0.00
Sat Flow, veh/h	0	1870	1585	939	843	843	1767	1856	1531	0	3711	0
Grp Volume(v), veh/h	0	11	441	289	0	22	220	967	286	0	739	0
Grp Sat Flow(s),veh/h/ln	0	1870	1585	939	0	1685	1767	1856	1531	0	1763	0
Q Serve(g_s), s	0.0	0.3	0.0	23.5	0.0	0.7	8.5	40.2	5.9	0.0	15.7	0.0
Cycle Q Clear(g_c), s	0.0	0.3	0.0	23.8	0.0	0.7	8.5	40.2	5.9	0.0	15.7	0.0
Prop In Lane	0.00		1.00	1.00		0.50	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	625	866	401	0	563	375	977	806	0	889	0
V/C Ratio(X)	0.00	0.02	0.51	0.72	0.00	0.04	0.59	0.99	0.35	0.00	0.83	0.00
Avail Cap(c_a), veh/h	0	736	961	457	0	663	375	977	806	0	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	1.00	0.85	0.85	0.85	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	17.6	11.2	25.6	0.0	17.7	25.4	11.6	6.5	0.0	28.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	3.6	0.0	0.0	1.7	24.2	1.0	0.0	8.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	4.3	5.3	0.0	0.3	3.3	12.8	1.6	0.0	7.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.6	11.4	29.2	0.0	17.8	27.0	35.8	7.5	0.0	36.9	0.0
LnGrp LOS	A	B	B	C	A	B	C	D	A	A	D	A
Approach Vol, veh/h		452			311			1473			739	
Approach Delay, s/veh		11.6			28.4			29.0			36.9	
Approach LOS		B			C			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.7		31.3	22.9	24.8		31.3				
Change Period (Y+Rc), s		6.1		4.9	6.1	* 4.9		4.9				
Max Green Setting (Gmax), s		36.9		31.1	11.1	* 23		31.1				
Max Q Clear Time (g_c+I1), s		42.2		2.3	10.5	17.7		25.8				
Green Ext Time (p_c), s		0.0		0.9	0.0	2.2		0.5				

Intersection Summary		
HCM 6th Ctrl Delay		28.3
HCM 6th LOS		C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	480	1730	500	0	0	1620
Future Volume (vph)	480	1730	500	0	0	1620
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.87	0.87	0.92	0.92	0.93	0.93
Adj. Flow (vph)	552	1989	543	0	0	1742
RTOR Reduction (vph)	0	48	0	0	0	0
Lane Group Flow (vph)	552	1941	543	0	0	1742
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	16.1	58.2	19.3			61.4
Effective Green, g (s)	16.1	58.2	19.3			61.4
Actuated g/C Ratio	0.17	0.63	0.21			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	591	1736	731			4212
v/s Ratio Prot	0.16	c0.70	c0.15			0.27
v/s Ratio Perm						
v/c Ratio	0.93	1.12	0.74			0.41
Uniform Delay, d1	37.7	17.1	34.3			7.2
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	21.7	61.6	3.6			0.0
Delay (s)	59.4	78.7	37.9			7.2
Level of Service	E	E	D			A
Approach Delay (s)	74.5		37.9			7.2
Approach LOS	E		D			A

Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	22.5
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1640	10	1230	0	0	750
Future Volume (vph)	1640	10	1230	0	0	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.80	0.80
Adj. Flow (vph)	1726	11	1337	0	0	938
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	1726	9	1337	0	0	938
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	48.5	48.5	36.5			36.5
Effective Green, g (s)	48.5	48.5	36.5			36.5
Actuated g/C Ratio	0.48	0.48	0.36			0.36
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1649	760	1279			1279
v/s Ratio Prot	c0.51		c0.38			0.27
v/s Ratio Perm		0.01				
v/c Ratio	1.05	0.01	1.05			0.73
Uniform Delay, d1	25.8	13.3	31.8			27.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	35.5	0.0	37.9			3.8
Delay (s)	61.2	13.3	69.6			31.3
Level of Service	E	B	E			C
Approach Delay (s)	60.9		69.6			31.3
Approach LOS	E		E			C

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑						↑↑	↱			
Traffic Volume (vph)	0	750	0	0	0	0	0	770	1420	0	0	0
Future Volume (vph)	0	750	0	0	0	0	0	770	1420	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1544			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1544			
Peak-hour factor, PHF	0.94	0.94	0.94	0.98	0.98	0.98	0.96	0.96	0.96	0.98	0.98	0.98
Adj. Flow (vph)	0	798	0	0	0	0	0	802	1479	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	798	0	0	0	0	0	802	1479	0	0	0
Confl. Bikes (#/hr)									14			
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		42.0						44.5	100.0			
Effective Green, g (s)		42.0						44.5	100.0			
Actuated g/C Ratio		0.42						0.44	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		774						1559	1544			
v/s Ratio Prot		0.43						0.23				
v/s Ratio Perm									c0.96			
v/c Ratio		1.03						0.51	0.96			
Uniform Delay, d1		29.0						20.0	0.0			
Progression Factor		0.32						1.00	1.00			
Incremental Delay, d2		27.8						1.2	14.9			
Delay (s)		37.1						21.2	14.9			
Level of Service		D						C	B			
Approach Delay (s)		37.1			0.0			17.1			0.0	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1330	20	0	0	0	0	0	0	20	1480	0
Future Volume (vph)	0	1330	20	0	0	0	0	0	0	20	1480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	1.00								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1568								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1568								3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	0	1371	21	0	0	0	0	0	0	20	1510	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	1371	9	0	0	0	0	0	0	0	1512	0
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		42.0	42.0								44.5	
Effective Green, g (s)		42.0	42.0								44.5	
Actuated g/C Ratio		0.42	0.42								0.44	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1472	658								1558	
v/s Ratio Prot		c0.39										
v/s Ratio Perm			0.01								0.43	
v/c Ratio		0.93	0.01								0.97	
Uniform Delay, d1		27.6	16.9								27.1	
Progression Factor		1.00	1.00								0.91	
Incremental Delay, d2		12.0	0.0								8.2	
Delay (s)		39.6	17.0								32.7	
Level of Service		D	B								C	
Approach Delay (s)		39.2			0.0			0.0			32.7	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	780	480	0	0	450	330	270	10	540	0	0	0
Future Volume (veh/h)	780	480	0	0	450	330	270	10	540	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	830	511	0	0	500	367	290	11	581			
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.93	0.93	0.93			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	943	2133	0	0	523	383	501	19	462			
Arrive On Green	0.46	1.00	0.00	0.00	0.28	0.28	0.29	0.29	0.29			
Sat Flow, veh/h	3428	3618	0	0	1995	1394	1706	65	1572			
Grp Volume(v), veh/h	830	511	0	0	463	404	301	0	581			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1533	1770	0	1572			
Q Serve(g_s), s	22.0	0.0	0.0	0.0	25.8	25.9	14.5	0.0	29.4			
Cycle Q Clear(g_c), s	22.0	0.0	0.0	0.0	25.8	25.9	14.5	0.0	29.4			
Prop In Lane	1.00		0.00	0.00		0.91	0.96		1.00			
Lane Grp Cap(c), veh/h	943	2133	0	0	485	422	520	0	462			
V/C Ratio(X)	0.88	0.24	0.00	0.00	0.96	0.96	0.58	0.00	1.26			
Avail Cap(c_a), veh/h	987	2133	0	0	485	422	520	0	462			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.83	0.83	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.5	0.0	0.0	0.0	35.7	35.7	30.0	0.0	35.3			
Incr Delay (d2), s/veh	7.7	0.2	0.0	0.0	31.2	34.4	1.1	0.0	132.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	7.8	0.1	0.0	0.0	14.9	13.4	6.2	0.0	38.9			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	0.2	0.0	0.0	66.9	70.1	31.1	0.0	167.5			
LnGrp LOS	C	A	A	A	E	E	C	A	F			
Approach Vol, veh/h		1341			867			882				
Approach Delay, s/veh		20.6			68.4			120.9				
Approach LOS		C			E			F				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		66.0		34.0	33.0	33.0						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		60.5		29.4	28.8	* 28						
Max Q Clear Time (g_c+I1), s		2.0		31.4	24.0	27.9						
Green Ext Time (p_c), s		2.3		0.0	1.6	0.0						

Intersection Summary		
HCM 6th Ctrl Delay		62.7
HCM 6th LOS		E

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1000	210	220	510	0	0	0	0	150	0	960
Future Volume (veh/h)	0	1000	210	220	510	0	0	0	0	150	0	960
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1099	231	229	531	0				156	0	0
Peak Hour Factor	0.91	0.91	0.91	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1282	558	1319	2815	0				187	0	
Arrive On Green	0.00	0.36	0.36	0.51	1.00	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	3618	1536	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1099	231	229	531	0				156	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1536	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	28.8	11.3	3.6	0.0	0.0				8.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	28.8	11.3	3.6	0.0	0.0				8.7	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1282	558	1319	2815	0				187	0	
V/C Ratio(X)	0.00	0.86	0.41	0.17	0.19	0.00				0.84	0.00	
Avail Cap(c_a), veh/h	0	1798	783	1319	2815	0				361	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.35	0.35	0.67	0.67	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	29.4	23.8	15.9	0.0	0.0				43.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.8	0.8	0.0	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	12.0	4.0	1.4	0.0	0.0				4.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	32.3	24.6	15.9	0.1	0.0				47.6	0.0	0.0
LnGrp LOS	A	C	C	B	A	A				D	A	
Approach Vol, veh/h		1330			760						156	A
Approach Delay, s/veh		30.9			4.9						47.6	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	43.5	41.4	15.2	84.8
Change Period (Y+Rc), s	5.0	* 5	4.6	5.0
Max Green Setting (Gmax), s	14.8	* 51	20.4	70.0
Max Q Clear Time (g_c+I1), s	5.6	30.8	10.7	2.0
Green Ext Time (p_c), s	0.5	5.5	0.0	2.4

Intersection Summary	
HCM 6th Ctrl Delay	23.3
HCM 6th LOS	C

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	150	260	180	70	190	190	1150	140	160	1220	200
Future Volume (veh/h)	170	150	260	180	70	190	190	1150	140	160	1220	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	195	172	299	200	78	211	202	1223	149	184	1402	230
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	254	411	334	180	462	378	259	1212	147	212	1511	781
Arrive On Green	0.07	0.22	0.22	0.10	0.25	0.25	0.08	0.38	0.38	0.12	0.43	0.43
Sat Flow, veh/h	3428	1856	1508	1767	1856	1517	3428	3154	383	1767	3526	1549
Grp Volume(v), veh/h	195	172	299	200	78	211	202	681	691	184	1402	230
Grp Sat Flow(s),veh/h/ln	1714	1856	1508	1767	1856	1517	1714	1763	1774	1767	1763	1549
Q Serve(g_s), s	6.3	9.0	21.9	11.6	3.7	13.8	6.6	43.7	43.7	11.6	42.9	9.9
Cycle Q Clear(g_c), s	6.3	9.0	21.9	11.6	3.7	13.8	6.6	43.7	43.7	11.6	42.9	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	254	411	334	180	462	378	259	677	681	212	1511	781
V/C Ratio(X)	0.77	0.42	0.90	1.11	0.17	0.56	0.78	1.01	1.01	0.87	0.93	0.29
Avail Cap(c_a), veh/h	344	506	411	180	503	411	271	677	681	252	1529	789
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.6	38.0	43.0	51.0	33.4	37.2	51.6	35.0	35.0	49.1	30.8	16.5
Incr Delay (d2), s/veh	4.5	0.7	18.9	99.2	0.1	0.6	11.7	36.1	37.9	20.7	10.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.2	9.6	9.9	1.6	5.0	3.2	24.5	25.0	6.2	19.3	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.2	38.7	61.9	150.2	33.5	37.8	63.3	71.1	72.9	69.9	41.1	16.8
LnGrp LOS	E	D	E	F	C	D	E	F	F	E	D	B
Approach Vol, veh/h		666			489			1574			1816	
Approach Delay, s/veh		54.2			83.1			70.9			40.9	
Approach LOS		D			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	49.0	16.0	30.6	13.0	54.0	12.8	33.8				
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5				
Max Green Setting (Gmax), s	16.2	42.0	11.6	* 31	9.0	* 49	11.4	30.8				
Max Q Clear Time (g_c+I1), s	13.6	45.7	13.6	23.9	8.6	44.9	8.3	15.8				
Green Ext Time (p_c), s	0.1	0.0	0.0	1.3	0.0	3.9	0.1	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			57.8									
HCM 6th LOS			E									

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1170	780	340	1220	320	140
Future Volume (veh/h)	1170	780	340	1220	320	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1194	796	466	1671	327	143
Peak Hour Factor	0.98	0.98	0.73	0.73	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1544	867	453	2201	434	193
Arrive On Green	0.49	0.49	0.15	0.69	0.14	0.14
Sat Flow, veh/h	3256	1385	3086	3256	3181	1415
Grp Volume(v), veh/h	1194	796	466	1671	327	143
Grp Sat Flow(s),veh/h/ln	1586	1385	1543	1586	1590	1415
Q Serve(g_s), s	22.6	35.5	10.7	24.9	7.2	7.1
Cycle Q Clear(g_c), s	22.6	35.5	10.7	24.9	7.2	7.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1544	867	453	2201	434	193
V/C Ratio(X)	0.77	0.92	1.03	0.76	0.75	0.74
Avail Cap(c_a), veh/h	1544	867	453	2236	1177	524
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	15.4	11.9	31.1	7.2	30.3	30.3
Incr Delay (d2), s/veh	2.7	14.8	50.1	1.9	1.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	15.5	6.8	5.6	2.5	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.1	26.6	81.2	9.1	31.3	32.4
LnGrp LOS	B	C	F	A	C	C
Approach Vol, veh/h	1990			2137	470	
Approach Delay, s/veh	21.5			24.9	31.6	
Approach LOS	C			C	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.1	41.7				56.8		16.1
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	10.7	35.5				* 51		27.0
Max Q Clear Time (g_c+I1), s	12.7	37.5				26.9		9.2
Green Ext Time (p_c), s	0.0	0.0				20.7		0.7

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

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	34	0	1870	0	1500	0	395	115
Future Volume (veh/h)	34	0	1870	0	1500	0	395	115
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		0	1856		1856	0	1856	1856
Adj Flow Rate, veh/h		0	1989		1724	0	465	135
Peak Hour Factor		0.94	0.94		0.87	0.87	0.85	0.85
Percent Heavy Veh, %		0	3		3	0	3	3
Cap, veh/h		0	2435		3498	0	590	476
Arrive On Green		0.00	0.69		0.69	0.00	0.17	0.17
Sat Flow, veh/h		0	3711		5400	0	3428	2768
Grp Volume(v), veh/h		0	1989		1724	0	465	135
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1714	1384
Q Serve(g_s), s		0.0	30.4		12.1	0.0	9.8	3.2
Cycle Q Clear(g_c), s		0.0	30.4		12.1	0.0	9.8	3.2
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2435		3498	0	590	476
V/C Ratio(X)		0.00	0.82		0.49	0.00	0.79	0.28
Avail Cap(c_a), veh/h		0	2587		3617	0	1629	1315
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	8.3		5.5	0.0	30.0	27.3
Incr Delay (d2), s/veh		0.0	2.3		0.2	0.0	0.9	0.1
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	6.5		2.6	0.0	4.0	2.6
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	10.6		5.7	0.0	30.9	27.4
LnGrp LOS		A	B		A	A	C	C
Approach Vol, veh/h			1989		1724		600	
Approach Delay, s/veh			10.6		5.7		30.1	
Approach LOS			B		A		C	

Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		58.7		17.0		58.7		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		55.6		36.0		* 54		
Max Q Clear Time (g_c+I1), s		32.4		11.8		14.1		
Green Ext Time (p_c), s		20.0		1.2		26.6		

Intersection Summary			
HCM 6th Ctrl Delay			11.4
HCM 6th LOS			B

Notes

User approved ignoring U-Turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	4	40	229	2	16	90	1810	88	11	1480	30
Future Volume (veh/h)	30	4	40	229	2	16	90	1810	88	11	1480	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.95	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	35	5	47	258	0	18	94	1885	92	12	1644	33
Peak Hour Factor	0.86	0.86	0.86	0.89	0.89	0.89	0.96	0.96	0.96	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	81	7	65	388	0	180	100	2445	1242	36	2282	981
Arrive On Green	0.05	0.05	0.05	0.11	0.00	0.11	0.06	0.69	0.69	0.02	1.00	1.00
Sat Flow, veh/h	1767	150	1412	3534	0	1492	1767	3526	1543	3428	3526	1516
Grp Volume(v), veh/h	35	0	52	258	0	18	94	1885	92	12	1644	33
Grp Sat Flow(s),veh/h/ln	1767	0	1562	1767	0	1492	1767	1763	1543	1714	1763	1516
Q Serve(g_s), s	2.9	0.0	4.9	10.5	0.0	1.6	7.9	52.8	1.9	0.5	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	4.9	10.5	0.0	1.6	7.9	52.8	1.9	0.5	0.0	0.0
Prop In Lane	1.00		0.90	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	81	0	71	388	0	180	100	2445	1242	36	2282	981
V/C Ratio(X)	0.43	0.00	0.73	0.67	0.00	0.10	0.94	0.77	0.07	0.33	0.72	0.03
Avail Cap(c_a), veh/h	188	0	167	825	0	365	100	2445	1242	91	2282	981
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.77	0.77	0.77
Uniform Delay (d), s/veh	69.7	0.0	70.7	64.1	0.0	58.8	70.5	15.1	3.1	72.9	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	5.2	0.7	0.0	0.1	69.4	2.4	0.1	1.5	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	2.1	4.8	0.0	0.6	5.5	19.5	0.9	0.2	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.0	0.0	75.9	64.9	0.0	58.9	139.9	17.6	3.2	74.4	1.5	0.0
LnGrp LOS	E	A	E	E	A	E	F	B	A	E	A	A
Approach Vol, veh/h		87			276			2071			1689	
Approach Delay, s/veh		73.9			64.5			22.5			2.0	
Approach LOS		E			E			C			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	110.9		11.8	12.9	104.0		21.3
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9
Max Green Setting (Gmax), s	4.0	* 75		16.0	8.5	69.4		35.0
Max Q Clear Time (g_c+I1), s	2.5	54.8		6.9	9.9	2.0		12.5
Green Ext Time (p_c), s	0.0	15.8		0.1	0.0	24.4		0.5

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	10	90	30	10	30	100	1700	60	20	1360	30
Future Volume (veh/h)	30	10	90	30	10	30	100	1700	60	20	1360	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.97	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	42	14	127	37	12	37	102	1735	61	21	1402	31
Peak Hour Factor	0.71	0.71	0.71	0.82	0.82	0.82	0.98	0.98	0.98	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	70	27	152	94	36	72	510	2623	1128	27	1617	693
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.29	0.74	0.74	0.02	0.46	0.46
Sat Flow, veh/h	288	194	1094	426	260	518	1767	3526	1516	1767	3526	1510
Grp Volume(v), veh/h	183	0	0	86	0	0	102	1735	61	21	1402	31
Grp Sat Flow(s),veh/h/ln	1577	0	0	1204	0	0	1767	1763	1516	1767	1763	1510
Q Serve(g_s), s	6.9	0.0	0.0	0.0	0.0	0.0	6.5	37.2	1.6	1.8	53.6	1.7
Cycle Q Clear(g_c), s	16.7	0.0	0.0	9.8	0.0	0.0	6.5	37.2	1.6	1.8	53.6	1.7
Prop In Lane	0.23		0.69	0.43		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	0	0	202	0	0	510	2623	1128	27	1617	693
V/C Ratio(X)	0.73	0.00	0.00	0.43	0.00	0.00	0.20	0.66	0.05	0.76	0.87	0.04
Avail Cap(c_a), veh/h	351	0	0	298	0	0	510	2623	1128	66	2040	874
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	0.00	1.00	0.00	0.00	0.53	0.53	0.53	0.72	0.72	0.72
Uniform Delay (d), s/veh	62.6	0.0	0.0	59.3	0.0	0.0	40.3	9.7	5.1	73.6	36.5	22.4
Incr Delay (d2), s/veh	2.4	0.0	0.0	0.5	0.0	0.0	0.0	0.7	0.0	11.1	4.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	0.0	0.0	3.1	0.0	0.0	2.8	12.5	0.5	0.9	23.2	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.9	0.0	0.0	59.8	0.0	0.0	40.3	10.4	5.2	84.7	41.3	22.5
LnGrp LOS	E	A	A	E	A	A	D	B	A	F	D	C
Approach Vol, veh/h		183			86			1898			1454	
Approach Delay, s/veh		64.9			59.8			11.8			41.5	
Approach LOS		E			E			B			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	117.5		25.8	49.2	75.0		25.8				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	5.6	98.1		31.1	16.6	* 87		31.1				
Max Q Clear Time (g_c+I1), s	3.8	39.2		18.7	8.5	55.6		11.8				
Green Ext Time (p_c), s	0.0	26.2		0.6	0.1	13.2		0.3				
Intersection Summary												
HCM 6th Ctrl Delay			27.6									
HCM 6th LOS			C									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	320	240	20	10	340	940	460	0	860	10
Future Volume (veh/h)	10	10	320	240	20	10	340	940	460	0	860	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	11	11	337	270	22	11	366	1011	495	0	989	11
Peak Hour Factor	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	0	3	3
Cap, veh/h	229	217	746	300	300	150	384	1236	1019	0	1497	17
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.43	1.00	1.00	0.00	0.42	0.42
Sat Flow, veh/h	739	834	1551	1025	1151	576	1767	1856	1529	0	3663	40
Grp Volume(v), veh/h	22	0	337	270	0	33	366	1011	495	0	488	512
Grp Sat Flow(s),veh/h/ln	1574	0	1551	1025	0	1727	1767	1856	1529	0	1763	1847
Q Serve(g_s), s	0.0	0.0	21.7	36.9	0.0	2.2	30.0	0.0	0.0	0.0	33.4	33.4
Cycle Q Clear(g_c), s	2.2	0.0	21.7	39.1	0.0	2.2	30.0	0.0	0.0	0.0	33.4	33.4
Prop In Lane	0.50		1.00	1.00		0.33	1.00		1.00	0.00		0.02
Lane Grp Cap(c), veh/h	446	0	746	300	0	450	384	1236	1019	0	739	775
V/C Ratio(X)	0.05	0.00	0.45	0.90	0.00	0.07	0.95	0.82	0.49	0.00	0.66	0.66
Avail Cap(c_a), veh/h	446	0	746	300	0	450	517	1236	1019	0	739	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.70	0.70	0.70	0.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	0.0	26.1	57.7	0.0	41.8	41.7	0.0	0.0	0.0	35.0	35.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	27.2	0.0	0.0	18.1	4.4	1.2	0.0	4.6	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	8.2	12.7	0.0	0.9	12.2	1.5	0.3	0.0	15.3	16.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	0.0	26.3	84.9	0.0	41.8	59.8	4.4	1.2	0.0	39.6	39.4
LnGrp LOS	D	A	C	F	A	D	E	A	A	A	D	D
Approach Vol, veh/h		359			303			1872			1000	
Approach Delay, s/veh		27.2			80.2			14.3			39.5	
Approach LOS		C			F			B			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		106.0		44.0	37.0	69.0		44.0				
Change Period (Y+Rc), s		6.1		4.9	4.4	* 6.1		4.9				
Max Green Setting (Gmax), s		99.9		39.1	43.9	* 53		39.1				
Max Q Clear Time (g_c+I1), s		2.0		23.7	32.0	35.4		41.1				
Green Ext Time (p_c), s		21.7		0.6	0.6	6.7		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			28.4
HCM 6th LOS			C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	700	1740	820	0	0	2000
Future Volume (vph)	700	1740	820	0	0	2000
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.97	0.97
Adj. Flow (vph)	729	1812	872	0	0	2062
RTOR Reduction (vph)	0	6	0	0	0	0
Lane Group Flow (vph)	729	1807	872	0	0	2062
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	25.5	75.0	30.0			79.5
Effective Green, g (s)	25.5	75.0	30.0			79.5
Actuated g/C Ratio	0.21	0.62	0.25			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	722	1725	876			4204
v/s Ratio Prot	0.21	c0.65	c0.25			0.32
v/s Ratio Perm						
v/c Ratio	1.01	1.05	1.00			0.49
Uniform Delay, d1	47.2	22.5	44.9			10.1
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	35.9	35.3	29.1			0.0
Delay (s)	83.2	57.8	74.0			10.2
Level of Service	F	E	E			B
Approach Delay (s)	65.1		74.0			10.2
Approach LOS	E		E			B

Intersection Summary			
HCM 2000 Control Delay	45.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2170	10	1390	0	0	1140
Future Volume (vph)	2170	10	1390	0	0	1140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.91	0.91
Adj. Flow (vph)	2260	10	1479	0	0	1253
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	2260	9	1479	0	0	1253
Confl. Bikes (#/hr)						11
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	64.5	64.5	40.5			40.5
Effective Green, g (s)	64.5	64.5	40.5			40.5
Actuated g/C Ratio	0.54	0.54	0.34			0.34
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1827	842	1182			1182
v/s Ratio Prot	c0.66		c0.42			0.36
v/s Ratio Perm		0.01				
v/c Ratio	1.24	0.01	1.25			1.06
Uniform Delay, d1	27.8	12.9	39.8			39.8
Progression Factor	1.00	1.00	0.66			1.00
Incremental Delay, d2	111.6	0.0	119.8			43.7
Delay (s)	139.3	12.9	145.8			83.4
Level of Service	F	B	F			F
Approach Delay (s)	138.8		145.8			83.4
Approach LOS	F		F			F

Intersection Summary			
HCM 2000 Control Delay	127.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	112.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	570	0	0	0	0	0	890	760	0	0	0
Future Volume (vph)	0	570	0	0	0	0	0	890	760	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1542			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1542			
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	640	0	0	0	0	0	989	844	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	640	0	0	0	0	0	989	844	0	0	0
Confl. Bikes (#/hr)									20			
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		48.5						58.0	120.0			
Effective Green, g (s)		48.5						58.0	120.0			
Actuated g/C Ratio		0.40						0.48	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		745						1694	1542			
v/s Ratio Prot		c0.35						0.28				
v/s Ratio Perm									c0.55			
v/c Ratio		0.86						0.58	0.55			
Uniform Delay, d1		32.6						22.3	0.0			
Progression Factor		0.23						1.00	1.00			
Incremental Delay, d2		5.6						1.5	1.4			
Delay (s)		13.2						23.8	1.4			
Level of Service		B						C	A			
Approach Delay (s)		13.2			0.0			13.5			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1150	80	0	0	0	0	0	0	20	1420	0
Future Volume (vph)	0	1150	80	0	0	0	0	0	0	20	1420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	0.99								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1548								3502	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1548								3502	
Peak-hour factor, PHF	0.91	0.91	0.91	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1264	88	0	0	0	0	0	0	20	1449	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1264	64	0	0	0	0	0	0	0	1455	0
Confl. Bikes (#/hr)			1						1			12
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		48.5	48.5								58.0	
Effective Green, g (s)		48.5	48.5								58.0	
Actuated g/C Ratio		0.40	0.40								0.48	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1416	625								1692	
v/s Ratio Prot		c0.36										
v/s Ratio Perm			0.04								0.42	
v/c Ratio		0.89	0.10								0.86	
Uniform Delay, d1		33.3	22.2								27.4	
Progression Factor		1.00	1.00								0.94	
Incremental Delay, d2		8.9	0.3								0.6	
Delay (s)		42.2	22.5								26.3	
Level of Service		D	C								C	
Approach Delay (s)		41.0			0.0			0.0			26.3	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX J

PEAK HOUR QUEUING ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITHOUT PROJECT

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	244	420	164	200	196	300	246
Average Queue (ft)	176	189	95	53	111	121	149	88
95th Queue (ft)	253	260	284	120	180	189	246	168
Link Distance (ft)			433	433	1194	1194	379	379
Upstream Blk Time (%)			0				0	0
Queuing Penalty (veh)			1				0	0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	1	5						
Queuing Penalty (veh)	2	12						

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	376	214	52	157	162	86	88	350	175
Average Queue (ft)	139	65	12	64	89	24	32	122	34
95th Queue (ft)	314	162	37	134	140	70	76	258	147
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	1			3	0
Queuing Penalty (veh)				0	1			24	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	T	R	L	T	R	L	L	T	TR	L
Maximum Queue (ft)	55	55	42	44	98	96	63	147	335	785	756	138
Average Queue (ft)	14	9	5	6	31	39	15	79	151	397	357	56
95th Queue (ft)	40	34	23	26	75	83	44	134	392	741	695	110
Link Distance (ft)			449			329				1280	1280	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	260	260		250	155		200	310	310			240
Storage Blk Time (%)									0	22		
Queuing Penalty (veh)									0	52		

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	214	467	266
Average Queue (ft)	109	136	47
95th Queue (ft)	184	297	171
Link Distance (ft)	903	903	903
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	744	717	240	79	97	203	214	137	136	30
Average Queue (ft)	503	463	164	36	50	77	100	71	58	6
95th Queue (ft)	848	824	325	70	82	164	184	117	109	23
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		31	0							
Queuing Penalty (veh)		74	1							

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	134	274	255	279	198	68	61	16	31	19
Average Queue (ft)	20	183	134	118	62	25	25	1	12	1
95th Queue (ft)	78	299	271	219	142	62	49	8	34	11
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)		19		6						
Queuing Penalty (veh)		3		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	L	T
Maximum Queue (ft)	53	68	35	45	45	204	335	331	203	41	68	449
Average Queue (ft)	20	16	9	7	9	109	119	125	22	10	3	140
95th Queue (ft)	51	47	32	29	32	196	286	280	105	33	46	339
Link Distance (ft)		89	63	63			2238	2238				2582
Upstream Blk Time (%)		0	0	0	0							
Queuing Penalty (veh)		0	0	0	0							
Storage Bay Dist (ft)	50				55	180			180	180	180	
Storage Blk Time (%)	6	0		0	0	2	3	4	0			4
Queuing Penalty (veh)	1	0		0	0	16	4	5	0			0

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	466	176
Average Queue (ft)	158	8
95th Queue (ft)	363	65
Link Distance (ft)	2582	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		180
Storage Blk Time (%)	6	
Queuing Penalty (veh)	1	

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	91	67	259	467	430	113	126	414	440	205
Average Queue (ft)	38	19	110	231	183	8	13	190	204	25
95th Queue (ft)	76	51	235	421	358	56	61	343	364	116
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	8	3			10	12	0
Queuing Penalty (veh)			0	9	1			1	4	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	12	177	124	243	330	610	244	230	211
Average Queue (ft)	2	63	106	68	107	229	40	169	90
95th Queue (ft)	9	128	141	210	234	506	145	241	180
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								2	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		3	17			0			
Queuing Penalty (veh)		0	3			0			

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	377	789	797	517	192	196	178	214	245	234
Average Queue (ft)	208	641	680	362	169	148	62	80	109	99
95th Queue (ft)	346	994	948	490	196	203	130	172	209	208
Link Distance (ft)		748	748				882	882	882	882
Upstream Blk Time (%)		7	13							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0		1	0						
Queuing Penalty (veh)	0		9	0						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	NB	NB
Directions Served	R	L	TR	R
Maximum Queue (ft)	46	32	6	18
Average Queue (ft)	13	7	0	1
95th Queue (ft)	37	25	4	10
Link Distance (ft)	154		533	533
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		60		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	797	796	104	155	148	306	248
Average Queue (ft)	751	749	8	125	126	184	152
95th Queue (ft)	837	853	59	137	139	258	223
Link Distance (ft)	737	737					
Upstream Blk Time (%)	66	65					
Queuing Penalty (veh)	0	0					
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		57	0				
Queuing Penalty (veh)		6	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	B48	B48	NB	NB	NB
Directions Served	T	T		T	T	R
Maximum Queue (ft)	175	22	7	413	699	140
Average Queue (ft)	100	1	0	213	354	53
95th Queue (ft)	160	13	6	338	719	164
Link Distance (ft)	120	139	139	657	657	
Upstream Blk Time (%)	10				4	
Queuing Penalty (veh)	129				0	
Storage Bay Dist (ft)						115
Storage Blk Time (%)					2	0
Queuing Penalty (veh)					29	0

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	668	662	184	445	460
Average Queue (ft)	629	626	17	253	271
95th Queue (ft)	653	644	97	389	402
Link Distance (ft)	605	605		633	633
Upstream Blk Time (%)	93	78		0	0
Queuing Penalty (veh)	0	0		0	0
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		5	0		
Queuing Penalty (veh)		1	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB	SB
Directions Served	T	T	TR	R
Maximum Queue (ft)	42	58	64	18
Average Queue (ft)	1	2	3	1
95th Queue (ft)	25	29	36	14
Link Distance (ft)	319	319	319	319
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	SB	SB
Directions Served	R	R
Maximum Queue (ft)	20	25
Average Queue (ft)	2	2
95th Queue (ft)	21	23
Link Distance (ft)	216	216
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	5
Average Queue (ft)	4	0
95th Queue (ft)	19	4
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 392

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	244	406	145	271	318	334	320
Average Queue (ft)	194	203	135	50	150	150	160	153
95th Queue (ft)	261	275	366	114	245	264	270	272
Link Distance (ft)			433	433			379	379
Upstream Blk Time (%)			0					0
Queuing Penalty (veh)			3					0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	2	9	0					
Queuing Penalty (veh)	4	22	0					

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	287	154	82	146	154	68	64	440	175
Average Queue (ft)	85	49	26	56	82	10	10	136	43
95th Queue (ft)	224	128	64	118	137	41	44	318	166
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								1	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	1			3	0
Queuing Penalty (veh)				0	1			30	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	B47	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	T	L	L	T	TR
Maximum Queue (ft)	109	119	159	229	179	403	225	184	173	335	832	824
Average Queue (ft)	39	47	59	85	140	161	97	69	94	201	519	507
95th Queue (ft)	83	98	128	177	210	432	235	290	162	440	894	863
Link Distance (ft)			449			329		336			1280	1280
Upstream Blk Time (%)						18		10				
Queuing Penalty (veh)						0		0				
Storage Bay Dist (ft)	260	260		250	155		200		310	310		
Storage Blk Time (%)				0	30	0	0			0	35	
Queuing Penalty (veh)				0	79	0	0			0	66	

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	265	804	924	811
Average Queue (ft)	206	531	534	173
95th Queue (ft)	346	844	860	611
Link Distance (ft)		903	903	903
Upstream Blk Time (%)		0	0	0
Queuing Penalty (veh)		0	2	1
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	0	45		
Queuing Penalty (veh)	1	72		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	791	813	240	154	152	337	320	168	161	87
Average Queue (ft)	747	779	240	91	91	175	194	98	58	15
95th Queue (ft)	853	848	240	139	139	290	293	157	121	53
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		48	3			0				
Queuing Penalty (veh)		372	20			1				

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	134	295	295	304	295	244	171	120	72	37
Average Queue (ft)	41	257	257	207	140	93	101	33	30	9
95th Queue (ft)	119	276	279	316	238	182	155	83	60	32
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	52		25						
Queuing Penalty (veh)	0	18		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	B55	B55	NB	NB	NB	NB	SB
Directions Served	L	TR	L	LT	R	T	T	L	T	T	R	L
Maximum Queue (ft)	70	88	142	166	63	12	57	204	445	451	205	51
Average Queue (ft)	29	30	84	120	14	1	6	84	232	246	34	14
95th Queue (ft)	63	65	138	174	52	8	34	168	417	427	146	41
Link Distance (ft)		89	63	63		714	714		2238	2238		
Upstream Blk Time (%)	0	1	22	44	0							
Queuing Penalty (veh)	0	0	27	55	0							
Storage Bay Dist (ft)	50				55			180			180	180
Storage Blk Time (%)	12	3		54	1			0	11	13	0	
Queuing Penalty (veh)	5	1		9	1			3	10	11	0	

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	102	530	554	204
Average Queue (ft)	3	267	286	34
95th Queue (ft)	46	458	481	148
Link Distance (ft)		2582	2582	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	180			180
Storage Blk Time (%)		18	22	0
Queuing Penalty (veh)		2	7	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	138	111	260	604	570	224	178	494	469	205
Average Queue (ft)	58	42	109	311	266	37	27	205	214	25
95th Queue (ft)	113	86	254	546	505	161	101	381	383	119
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	15	7	0		10	12	0
Queuing Penalty (veh)			1	15	4	0		2	4	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	88	193	124	402	478	587	183	250	247
Average Queue (ft)	8	74	119	186	258	259	65	219	187
95th Queue (ft)	38	161	134	372	436	516	141	264	282
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)				0				23	11
Queuing Penalty (veh)				0				0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		5	44	0					
Queuing Penalty (veh)		1	13	0					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	519	791	788	518	205	198	181	262	281	255
Average Queue (ft)	336	668	688	382	178	176	89	130	165	151
95th Queue (ft)	505	930	920	499	191	190	160	224	269	252
Link Distance (ft)		748	748				855	855	855	855
Upstream Blk Time (%)		7	11							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	7	2	0						
Queuing Penalty (veh)	0	23	15	1						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	SB	SB
Directions Served	R	L	T	TR
Maximum Queue (ft)	52	65	4	35
Average Queue (ft)	22	19	0	2
95th Queue (ft)	44	45	3	14
Link Distance (ft)	154		312	312
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		60		
Storage Blk Time (%)		1		
Queuing Penalty (veh)		2		

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	764	772	83	243	248	1136	1124
Average Queue (ft)	737	738	8	228	228	960	932
95th Queue (ft)	755	758	58	237	239	1289	1281
Link Distance (ft)	715	715		217	217		
Upstream Blk Time (%)	63	63		61	61		
Queuing Penalty (veh)	0	0		400	401		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		52	0				
Queuing Penalty (veh)		5	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	NB	NB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	157	465	549	140
Average Queue (ft)	79	285	265	105
95th Queue (ft)	149	405	435	201
Link Distance (ft)	121	657	657	
Upstream Blk Time (%)	7		0	
Queuing Penalty (veh)	84		0	
Storage Bay Dist (ft)				115
Storage Blk Time (%)			13	0
Queuing Penalty (veh)			101	2

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	655	654	249	483	519
Average Queue (ft)	626	624	50	271	291
95th Queue (ft)	643	640	180	393	414
Link Distance (ft)	605	605		634	634
Upstream Blk Time (%)	91	75		0	0
Queuing Penalty (veh)	0	0		6	6
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		5	0		
Queuing Penalty (veh)		4	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	9	24
Average Queue (ft)	1	1
95th Queue (ft)	10	11
Link Distance (ft)	319	319
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 36: SeaWorld Dr/Telecote Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	NB	NB	SB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	311	296	112	93
Average Queue (ft)	248	242	5	6
95th Queue (ft)	317	308	54	52
Link Distance (ft)	267	267	217	217
Upstream Blk Time (%)	4	3	0	0
Queuing Penalty (veh)	20	12	5	6
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement	B50	WB
Directions Served	T	R
Maximum Queue (ft)	370	60
Average Queue (ft)	12	7
95th Queue (ft)	284	34
Link Distance (ft)	2182	472
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	66	41
Average Queue (ft)	34	6
95th Queue (ft)	56	27
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1961

APPENDIX K

HCS FREEWAY ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITHOUT PROJECT

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8001	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1467
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7480	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1372
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	6628	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1215
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.7
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8499	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1558
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.9
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9056	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1993
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	52.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	38.2
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8467	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1863
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.87
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	33.5
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7503	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1651
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.7
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9621	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2117
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.99
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	48.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	43.8
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3623	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	975
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	2834	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	763
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.3
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4598	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	990
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.6
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4428	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	954
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

APPENDIX L

PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITH PROJECT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	832	471	0	0	411	270	262	10	370	0	0	0
Future Volume (veh/h)	832	471	0	0	411	270	262	10	370	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.95	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	895	506	0	0	424	278	301	11	425			
Peak Hour Factor	0.93	0.93	0.93	0.97	0.97	0.97	0.87	0.87	0.87			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1100	2299	0	0	518	336	364	13	335			
Arrive On Green	0.54	1.00	0.00	0.00	0.26	0.26	0.21	0.21	0.21			
Sat Flow, veh/h	3428	3618	0	0	2102	1302	1708	62	1572			
Grp Volume(v), veh/h	895	506	0	0	371	331	312	0	425			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1548	1770	0	1572			
Q Serve(g_s), s	16.1	0.0	0.0	0.0	14.9	15.1	12.6	0.0	16.0			
Cycle Q Clear(g_c), s	16.1	0.0	0.0	0.0	14.9	15.1	12.6	0.0	16.0			
Prop In Lane	1.00		0.00	0.00		0.84	0.96		1.00			
Lane Grp Cap(c), veh/h	1100	2299	0	0	454	399	378	0	335			
V/C Ratio(X)	0.81	0.22	0.00	0.00	0.82	0.83	0.83	0.00	1.27			
Avail Cap(c_a), veh/h	1100	2299	0	0	562	493	378	0	335			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.65	0.65	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.5	0.0	0.0	0.0	26.2	26.3	28.2	0.0	29.5			
Incr Delay (d2), s/veh	3.2	0.1	0.0	0.0	15.0	17.7	13.2	0.0	141.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.6	0.0	0.0	0.0	7.7	7.2	6.5	0.0	25.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.7	0.1	0.0	0.0	41.2	44.0	41.4	0.0	171.2			
LnGrp LOS	B	A	A	A	D	D	D	A	F			
Approach Vol, veh/h		1401			702			737				
Approach Delay, s/veh		12.0			42.5			116.2				
Approach LOS		B			D			F				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		54.4		20.6	29.6	24.8						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		48.9		16.0	20.8	* 24						
Max Q Clear Time (g_c+I1), s		2.0		18.0	18.1	17.1						
Green Ext Time (p_c), s		2.3		0.0	1.1	1.8						

Intersection Summary		
HCM 6th Ctrl Delay		46.6
HCM 6th LOS		D

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1093	61	290	273	0	0	0	0	180	0	684
Future Volume (veh/h)	0	1093	61	290	273	0	0	0	0	180	0	684
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1242	69	337	317	0				198	0	0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86				0.91	0.91	0.91
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1414	617	926	2601	0				237	0	
Arrive On Green	0.00	0.40	0.40	0.45	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3618	1540	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1242	69	337	317	0				198	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1540	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	24.4	2.1	4.8	0.0	0.0				8.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	24.4	2.1	4.8	0.0	0.0				8.2	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1414	617	926	2601	0				237	0	
V/C Ratio(X)	0.00	0.88	0.11	0.36	0.12	0.00				0.83	0.00	
Avail Cap(c_a), veh/h	0	1598	698	926	2601	0				363	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.46	0.46	0.73	0.73	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	20.8	14.1	16.4	0.0	0.0				31.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.9	0.2	0.2	0.1	0.0				5.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.6	0.7	1.7	0.0	0.0				3.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	24.7	14.3	16.5	0.1	0.0				37.5	0.0	0.0
LnGrp LOS	A	C	B	B	A	A				D	A	
Approach Vol, veh/h		1311			654						198	A
Approach Delay, s/veh		24.2			8.6						37.5	
Approach LOS		C			A						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.2	35.1		14.7		60.3						
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0						
Max Green Setting (Gmax), s	11.8	* 34		15.4		50.0						
Max Q Clear Time (g_c+I1), s	6.8	26.4		10.2		2.0						
Green Ext Time (p_c), s	0.5	3.6		0.0		1.4						

Intersection Summary			
HCM 6th Ctrl Delay			20.7
HCM 6th LOS			C

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	40	90	51	110	80	230	1054	60	140	727	190
Future Volume (veh/h)	70	40	90	51	110	80	230	1054	60	140	727	190
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	80	45	102	73	157	114	250	1146	65	144	749	196
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	161	230	184	93	241	190	353	1422	81	183	1482	725
Arrive On Green	0.05	0.12	0.12	0.05	0.13	0.13	0.10	0.42	0.42	0.10	0.42	0.42
Sat Flow, veh/h	3428	1856	1483	1767	1856	1464	3428	3387	192	1767	3526	1549
Grp Volume(v), veh/h	80	45	102	73	157	114	250	596	615	144	749	196
Grp Sat Flow(s),veh/h/ln	1714	1856	1483	1767	1856	1464	1714	1763	1816	1767	1763	1549
Q Serve(g_s), s	1.5	1.4	4.2	2.7	5.3	4.8	4.6	19.4	19.4	5.2	10.2	5.0
Cycle Q Clear(g_c), s	1.5	1.4	4.2	2.7	5.3	4.8	4.6	19.4	19.4	5.2	10.2	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	161	230	184	93	241	190	353	740	762	183	1482	725
V/C Ratio(X)	0.50	0.20	0.55	0.79	0.65	0.60	0.71	0.81	0.81	0.79	0.51	0.27
Avail Cap(c_a), veh/h	252	880	703	108	846	667	582	804	828	433	1877	898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	25.7	26.9	30.6	27.0	26.8	28.4	16.6	16.6	28.6	13.9	10.6
Incr Delay (d2), s/veh	0.9	0.4	2.6	23.3	1.1	1.1	1.0	6.3	6.1	2.8	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.6	1.5	1.6	2.2	1.6	1.8	7.8	8.0	2.2	3.5	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.3	26.1	29.5	53.9	28.2	28.0	29.3	22.9	22.8	31.4	14.3	10.9
LnGrp LOS	C	C	C	D	C	C	C	C	C	C	B	B
Approach Vol, veh/h		227			344			1461			1089	
Approach Delay, s/veh		29.5			33.6			23.9			16.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	32.7	7.8	13.6	11.1	32.8	7.5	14.0
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	7.2	21.4	4.7	6.2	6.6	12.2	3.5	7.3
Green Ext Time (p_c), s	0.1	6.0	0.0	0.5	0.2	8.6	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1154	241	140	708	241	190
Future Volume (veh/h)	1154	241	140	708	241	190
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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1202	251	151	761	313	158
Peak Hour Factor	0.96	0.96	0.93	0.93	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1614	931	229	2071	478	213
Arrive On Green	0.51	0.51	0.07	0.65	0.15	0.15
Sat Flow, veh/h	3256	1412	3086	3256	3181	1415
Grp Volume(v), veh/h	1202	251	151	761	313	158
Grp Sat Flow(s),veh/h/ln	1586	1412	1543	1586	1590	1415
Q Serve(g_s), s	18.9	4.6	3.0	6.9	5.8	6.7
Cycle Q Clear(g_c), s	18.9	4.6	3.0	6.9	5.8	6.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1614	931	229	2071	478	213
V/C Ratio(X)	0.74	0.27	0.66	0.37	0.66	0.74
Avail Cap(c_a), veh/h	1996	1101	324	2591	1365	607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	4.5	28.4	5.0	25.2	25.6
Incr Delay (d2), s/veh	1.4	0.2	1.2	0.3	0.6	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	1.5	1.1	1.4	1.9	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.7	4.7	29.6	5.2	25.8	27.5
LnGrp LOS	B	A	C	A	C	C
Approach Vol, veh/h	1453			912	471	
Approach Delay, s/veh	12.1			9.3	26.4	
Approach LOS	B			A	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	9.1	38.2				47.3		15.7
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	6.6	39.6				* 51		27.0
Max Q Clear Time (g_c+I1), s	5.0	20.9				8.9		8.7
Green Ext Time (p_c), s	0.0	11.1				12.3		0.7

Intersection Summary			
HCM 6th Ctrl Delay			13.6
HCM 6th LOS			B

Notes
User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	16	0	1360	0	929	0	76	22
Future Volume (veh/h)	16	0	1360	0	929	0	76	22
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		0	1856		1856	0	1870	1870
Adj Flow Rate, veh/h		0	1402		1032	0	101	29
Peak Hour Factor		0.97	0.97		0.90	0.90	0.75	0.75
Percent Heavy Veh, %		0	3		3	0	2	2
Cap, veh/h		0	2131		3061	0	601	485
Arrive On Green		0.00	0.60		0.60	0.00	0.17	0.17
Sat Flow, veh/h		0	3711		5400	0	3456	2790
Grp Volume(v), veh/h		0	1402		1032	0	101	29
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1728	1395
Q Serve(g_s), s		0.0	12.3		4.7	0.0	1.2	0.4
Cycle Q Clear(g_c), s		0.0	12.3		4.7	0.0	1.2	0.4
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2131		3061	0	601	485
V/C Ratio(X)		0.00	0.66		0.34	0.00	0.17	0.06
Avail Cap(c_a), veh/h		0	2675		3898	0	2652	2141
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	6.1		4.6	0.0	16.5	16.2
Incr Delay (d2), s/veh		0.0	0.6		0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	1.5		0.7	0.0	0.4	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	6.7		4.7	0.0	16.5	16.2
LnGrp LOS		A	A		A	A	B	B
Approach Vol, veh/h			1402		1032		130	
Approach Delay, s/veh			6.7		4.7		16.5	
Approach LOS			A		A		B	

Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		34.8		12.2		34.8		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		35.6		36.0		* 36		
Max Q Clear Time (g_c+I1), s		14.3		3.2		6.7		
Green Ext Time (p_c), s		14.1		0.2		12.3		

Intersection Summary			
HCM 6th Ctrl Delay			6.4
HCM 6th LOS			A

Notes
User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	20	14	1	7	120	1340	119	10	1290	20
Future Volume (veh/h)	20	0	20	14	1	7	120	1340	119	10	1290	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.91	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	47	0	47	20	0	9	138	1540	137	11	1466	23
Peak Hour Factor	0.43	0.43	0.43	0.75	0.75	0.75	0.87	0.87	0.87	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	76	0	66	96	0	54	159	2773	1251	33	2491	1079
Arrive On Green	0.04	0.00	0.04	0.03	0.00	0.03	0.09	0.79	0.79	0.02	1.00	1.00
Sat Flow, veh/h	1767	0	1521	3534	0	1433	1767	3526	1537	3428	3526	1527
Grp Volume(v), veh/h	47	0	47	20	0	9	138	1540	137	11	1466	23
Grp Sat Flow(s),veh/h/ln	1767	0	1521	1767	0	1433	1767	1763	1537	1714	1763	1527
Q Serve(g_s), s	4.1	0.0	4.8	0.9	0.0	1.0	12.2	26.2	2.9	0.5	0.0	0.0
Cycle Q Clear(g_c), s	4.1	0.0	4.8	0.9	0.0	1.0	12.2	26.2	2.9	0.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	76	0	66	96	0	54	159	2773	1251	33	2491	1079
V/C Ratio(X)	0.62	0.00	0.72	0.21	0.00	0.17	0.87	0.56	0.11	0.33	0.59	0.02
Avail Cap(c_a), veh/h	179	0	154	783	0	333	174	2773	1251	87	2491	1079
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	74.3	0.0	74.6	75.2	0.0	73.8	71.0	6.4	3.0	77.0	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.0	5.3	0.4	0.0	0.5	30.8	0.8	0.2	1.8	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.0	0.4	0.0	0.4	6.8	8.3	0.9	0.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.3	0.0	79.9	75.6	0.0	74.3	101.8	7.2	3.2	78.7	0.8	0.0
LnGrp LOS	E	A	E	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		94			29			1815			1500	
Approach Delay, s/veh		78.6			75.2			14.1			1.4	
Approach LOS		E			E			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	131.2		11.7	18.6	118.5		9.2				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 83		16.0	15.6	70.3		35.0				
Max Q Clear Time (g_c+I1), s	2.5	28.2		6.8	14.2	2.0		3.0				
Green Ext Time (p_c), s	0.0	23.3		0.1	0.0	19.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			10.8									
HCM 6th LOS			B									
Notes												

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	60	10	10	10	110	1330	20	10	1261	30
Future Volume (veh/h)	20	10	60	10	10	10	110	1330	20	10	1261	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.98	1.00		0.96	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	33	16	98	12	12	12	117	1415	21	11	1327	32
Peak Hour Factor	0.61	0.61	0.61	0.85	0.85	0.85	0.94	0.94	0.94	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	3	3	3
Cap, veh/h	63	35	139	81	80	65	634	2681	1149	17	1411	601
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.36	0.76	0.76	0.02	0.80	0.80
Sat Flow, veh/h	260	260	1041	379	595	487	1767	3526	1511	1767	3526	1502
Grp Volume(v), veh/h	147	0	0	36	0	0	117	1415	21	11	1327	32
Grp Sat Flow(s),veh/h/ln	1561	0	0	1461	0	0	1767	1763	1511	1767	1763	1502
Q Serve(g_s), s	9.0	0.0	0.0	0.0	0.0	0.0	7.2	25.4	0.5	1.0	48.0	0.7
Cycle Q Clear(g_c), s	14.1	0.0	0.0	2.9	0.0	0.0	7.2	25.4	0.5	1.0	48.0	0.7
Prop In Lane	0.22		0.67	0.33		0.33	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	0	0	226	0	0	634	2681	1149	17	1411	601
V/C Ratio(X)	0.62	0.00	0.00	0.16	0.00	0.00	0.18	0.53	0.02	0.64	0.94	0.05
Avail Cap(c_a), veh/h	343	0	0	331	0	0	634	2681	1149	51	1981	844
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.76	0.76	0.76	0.77	0.77	0.77
Uniform Delay (d), s/veh	65.3	0.0	0.0	60.5	0.0	0.0	34.8	7.6	4.6	77.2	14.3	9.5
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	10.9	11.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	0.0	0.0	1.3	0.0	0.0	3.1	8.4	0.2	0.5	7.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.3	0.0	0.0	60.7	0.0	0.0	34.8	8.1	4.6	88.1	25.3	9.7
LnGrp LOS	E	A	A	E	A	A	C	A	A	F	C	A
Approach Vol, veh/h		147			36			1553			1370	
Approach Delay, s/veh		66.3			60.7			10.1			25.4	
Approach LOS		E			E			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	126.0		26.0	62.6	69.4		26.0				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	4.6	106.1		32.1	21.6	* 89		32.1				
Max Q Clear Time (g_c+I1), s	3.0	27.4		16.1	9.2	50.0		4.9				
Green Ext Time (p_c), s	0.0	18.5		0.5	0.1	13.2		0.1				

Intersection Summary			
HCM 6th Ctrl Delay			20.1
HCM 6th LOS			C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	10	410	260	10	10	200	880	260	0	651	0
Future Volume (veh/h)	0	10	410	260	10	10	200	880	260	0	651	0
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		0.97	1.00		0.97	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	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	0	11	441	289	11	11	220	967	286	0	740	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	0	3	3
Cap, veh/h	0	625	866	401	282	282	375	977	806	0	890	0
Arrive On Green	0.00	0.33	0.33	0.33	0.33	0.33	0.28	0.70	0.70	0.00	0.25	0.00
Sat Flow, veh/h	0	1870	1585	939	843	843	1767	1856	1531	0	3711	0
Grp Volume(v), veh/h	0	11	441	289	0	22	220	967	286	0	740	0
Grp Sat Flow(s),veh/h/ln	0	1870	1585	939	0	1685	1767	1856	1531	0	1763	0
Q Serve(g_s), s	0.0	0.3	0.0	23.5	0.0	0.7	8.5	40.2	5.9	0.0	15.7	0.0
Cycle Q Clear(g_c), s	0.0	0.3	0.0	23.8	0.0	0.7	8.5	40.2	5.9	0.0	15.7	0.0
Prop In Lane	0.00		1.00	1.00		0.50	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	625	866	401	0	563	375	977	806	0	890	0
V/C Ratio(X)	0.00	0.02	0.51	0.72	0.00	0.04	0.59	0.99	0.35	0.00	0.83	0.00
Avail Cap(c_a), veh/h	0	736	960	457	0	663	375	977	806	0	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	1.00	0.85	0.85	0.85	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	17.6	11.3	25.6	0.0	17.7	25.4	11.6	6.5	0.0	27.9	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	3.6	0.0	0.0	1.7	24.2	1.0	0.0	9.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	4.3	5.3	0.0	0.3	3.3	12.8	1.6	0.0	7.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.6	11.4	29.2	0.0	17.8	27.1	35.8	7.5	0.0	36.9	0.0
LnGrp LOS	A	B	B	C	A	B	C	D	A	A	D	A
Approach Vol, veh/h		452			311			1473			740	
Approach Delay, s/veh		11.6			28.4			29.0			36.9	
Approach LOS		B			C			C			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.7		31.3	22.9	24.8		31.3				
Change Period (Y+Rc), s		6.1		4.9	6.1	* 4.9		4.9				
Max Green Setting (Gmax), s		36.9		31.1	11.1	* 23		31.1				
Max Q Clear Time (g_c+I1), s		42.2		2.3	10.5	17.7		25.8				
Green Ext Time (p_c), s		0.0		0.9	0.0	2.2		0.5				

Intersection Summary	
HCM 6th Ctrl Delay	28.3
HCM 6th LOS	C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	480	1732	500	0	0	1622
Future Volume (vph)	480	1732	500	0	0	1622
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.87	0.87	0.92	0.92	0.93	0.93
Adj. Flow (vph)	552	1991	543	0	0	1744
RTOR Reduction (vph)	0	48	0	0	0	0
Lane Group Flow (vph)	552	1943	543	0	0	1744
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	16.1	58.2	19.3			61.4
Effective Green, g (s)	16.1	58.2	19.3			61.4
Actuated g/C Ratio	0.17	0.63	0.21			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	591	1736	731			4212
v/s Ratio Prot	0.16	c0.70	c0.15			0.27
v/s Ratio Perm						
v/c Ratio	0.93	1.12	0.74			0.41
Uniform Delay, d1	37.7	17.1	34.3			7.2
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	21.7	62.0	3.6			0.0
Delay (s)	59.4	79.2	37.9			7.2
Level of Service	E	E	D			A
Approach Delay (s)	74.9		37.9			7.2
Approach LOS	E		D			A

Intersection Summary			
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	22.5
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1640	10	1230	0	0	750
Future Volume (vph)	1640	10	1230	0	0	750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.80	0.80
Adj. Flow (vph)	1726	11	1337	0	0	938
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	1726	9	1337	0	0	938
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	48.5	48.5	36.5			36.5
Effective Green, g (s)	48.5	48.5	36.5			36.5
Actuated g/C Ratio	0.48	0.48	0.36			0.36
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1649	760	1279			1279
v/s Ratio Prot	c0.51		c0.38			0.27
v/s Ratio Perm		0.01				
v/c Ratio	1.05	0.01	1.05			0.73
Uniform Delay, d1	25.8	13.3	31.8			27.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	35.5	0.0	37.9			3.8
Delay (s)	61.2	13.3	69.6			31.3
Level of Service	E	B	E			C
Approach Delay (s)	60.9		69.6			31.3
Approach LOS	E		E			C

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	750	0	0	0	0	0	770	1420	0	0	0
Future Volume (vph)	0	750	0	0	0	0	0	770	1420	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1544			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1544			
Peak-hour factor, PHF	0.94	0.94	0.94	0.98	0.98	0.98	0.96	0.96	0.96	0.98	0.98	0.98
Adj. Flow (vph)	0	798	0	0	0	0	0	802	1479	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	798	0	0	0	0	0	802	1479	0	0	0
Confl. Bikes (#/hr)									14			
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		42.0						44.5	100.0			
Effective Green, g (s)		42.0						44.5	100.0			
Actuated g/C Ratio		0.42						0.44	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		774						1559	1544			
v/s Ratio Prot		0.43						0.23				
v/s Ratio Perm									c0.96			
v/c Ratio		1.03						0.51	0.96			
Uniform Delay, d1		29.0						20.0	0.0			
Progression Factor		0.32						1.00	1.00			
Incremental Delay, d2		27.8						1.2	14.9			
Delay (s)		37.1						21.2	14.9			
Level of Service		D						C	B			
Approach Delay (s)		37.1			0.0			17.1			0.0	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1330	20	0	0	0	0	0	0	20	1480	0
Future Volume (vph)	0	1330	20	0	0	0	0	0	0	20	1480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	1.00								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1568								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1568								3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98
Adj. Flow (vph)	0	1371	21	0	0	0	0	0	0	20	1510	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	1371	9	0	0	0	0	0	0	0	1512	0
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		42.0	42.0								44.5	
Effective Green, g (s)		42.0	42.0								44.5	
Actuated g/C Ratio		0.42	0.42								0.44	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1472	658								1558	
v/s Ratio Prot		c0.39										
v/s Ratio Perm			0.01								0.43	
v/c Ratio		0.93	0.01								0.97	
Uniform Delay, d1		27.6	16.9								27.1	
Progression Factor		1.00	1.00								0.91	
Incremental Delay, d2		12.0	0.0								8.2	
Delay (s)		39.6	17.0								32.7	
Level of Service		D	B								C	
Approach Delay (s)		39.2			0.0			0.0			32.7	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	793	486	0	0	452	330	273	10	540	0	0	0
Future Volume (veh/h)	793	486	0	0	452	330	273	10	540	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	844	517	0	0	502	367	294	11	581			
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.93	0.93	0.93			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	943	2133	0	0	524	382	502	19	462			
Arrive On Green	0.46	1.00	0.00	0.00	0.28	0.28	0.29	0.29	0.29			
Sat Flow, veh/h	3428	3618	0	0	1999	1391	1706	64	1572			
Grp Volume(v), veh/h	844	517	0	0	464	405	305	0	581			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1534	1770	0	1572			
Q Serve(g_s), s	22.6	0.0	0.0	0.0	25.9	26.0	14.7	0.0	29.4			
Cycle Q Clear(g_c), s	22.6	0.0	0.0	0.0	25.9	26.0	14.7	0.0	29.4			
Prop In Lane	1.00		0.00	0.00		0.91	0.96		1.00			
Lane Grp Cap(c), veh/h	943	2133	0	0	485	422	520	0	462			
V/C Ratio(X)	0.90	0.24	0.00	0.00	0.96	0.96	0.59	0.00	1.26			
Avail Cap(c_a), veh/h	987	2133	0	0	485	422	520	0	462			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.7	0.0	0.0	0.0	35.7	35.7	30.1	0.0	35.3			
Incr Delay (d2), s/veh	8.7	0.2	0.0	0.0	31.6	34.8	1.2	0.0	132.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	8.2	0.1	0.0	0.0	15.0	13.4	6.3	0.0	38.9			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	0.2	0.0	0.0	67.3	70.5	31.3	0.0	167.5			
LnGrp LOS	C	A	A	A	E	E	C	A	F			
Approach Vol, veh/h		1361			869			886				
Approach Delay, s/veh		21.4			68.8			120.6				
Approach LOS		C			E			F				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		66.0		34.0	33.0	33.0						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		60.5		29.4	28.8	* 28						
Max Q Clear Time (g_c+I1), s		2.0		31.4	24.6	28.0						
Green Ext Time (p_c), s		2.4		0.0	1.4	0.0						

Intersection Summary		
HCM 6th Ctrl Delay		62.8
HCM 6th LOS		E

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1019	217	220	515	0	0	0	0	150	0	966
Future Volume (veh/h)	0	1019	217	220	515	0	0	0	0	150	0	966
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1120	238	229	536	0				156	0	0
Peak Hour Factor	0.91	0.91	0.91	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1303	568	1298	2815	0				187	0	
Arrive On Green	0.00	0.37	0.37	0.50	1.00	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	3618	1536	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1120	238	229	536	0				156	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1536	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	29.3	11.6	3.6	0.0	0.0				8.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	29.3	11.6	3.6	0.0	0.0				8.7	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1303	568	1298	2815	0				187	0	
V/C Ratio(X)	0.00	0.86	0.42	0.18	0.19	0.00				0.84	0.00	
Avail Cap(c_a), veh/h	0	1798	784	1298	2815	0				361	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.32	0.32	0.66	0.66	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	29.1	23.5	16.3	0.0	0.0				43.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.6	0.7	0.0	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	12.1	4.1	1.4	0.0	0.0				4.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	31.7	24.2	16.4	0.1	0.0				47.6	0.0	0.0
LnGrp LOS	A	C	C	B	A	A				D	A	
Approach Vol, veh/h		1358			765						156	A
Approach Delay, s/veh		30.4			5.0						47.6	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	42.9	42.0	15.2	84.8
Change Period (Y+Rc), s	5.0	* 5	4.6	5.0
Max Green Setting (Gmax), s	14.8	* 51	20.4	70.0
Max Q Clear Time (g_c+I1), s	5.6	31.3	10.7	2.0
Green Ext Time (p_c), s	0.5	5.6	0.0	2.5

Intersection Summary	
HCM 6th Ctrl Delay	23.0
HCM 6th LOS	C

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	150	260	181	70	190	190	1175	141	160	1231	200
Future Volume (veh/h)	170	150	260	181	70	190	190	1175	141	160	1231	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	195	172	299	201	78	211	202	1250	150	184	1415	230
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.94	0.94	0.94	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	255	410	333	180	461	377	235	1217	145	212	1539	793
Arrive On Green	0.07	0.22	0.22	0.10	0.25	0.25	0.07	0.39	0.39	0.12	0.44	0.44
Sat Flow, veh/h	3428	1856	1508	1767	1856	1517	3428	3160	377	1767	3526	1549
Grp Volume(v), veh/h	195	172	299	201	78	211	202	695	705	184	1415	230
Grp Sat Flow(s),veh/h/ln	1714	1856	1508	1767	1856	1517	1714	1763	1775	1767	1763	1549
Q Serve(g_s), s	6.4	9.1	22.0	11.6	3.8	13.8	6.6	43.9	43.9	11.7	43.0	9.7
Cycle Q Clear(g_c), s	6.4	9.1	22.0	11.6	3.8	13.8	6.6	43.9	43.9	11.7	43.0	9.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	255	410	333	180	461	377	235	679	683	212	1539	793
V/C Ratio(X)	0.77	0.42	0.90	1.12	0.17	0.56	0.86	1.02	1.03	0.87	0.92	0.29
Avail Cap(c_a), veh/h	361	505	410	180	492	402	235	679	683	248	1563	803
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.8	38.1	43.1	51.2	33.6	37.4	52.5	35.0	35.0	49.2	30.2	16.0
Incr Delay (d2), s/veh	3.4	0.7	19.1	102.0	0.1	0.8	25.2	40.6	42.9	21.5	9.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.2	9.6	10.1	1.7	5.0	3.6	25.4	26.1	6.3	19.1	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	38.8	62.2	153.2	33.6	38.1	77.7	75.7	78.0	70.7	39.5	16.3
LnGrp LOS	E	D	E	F	C	D	E	F	F	E	D	B
Approach Vol, veh/h		666			490			1602			1829	
Approach Delay, s/veh		54.1			84.6			76.9			39.7	
Approach LOS		D			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.1	49.2	16.0	30.7	12.2	55.0	12.9	33.8				
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5				
Max Green Setting (Gmax), s	16.0	42.2	11.6	* 31	7.8	* 51	12.0	30.2				
Max Q Clear Time (g_c+I1), s	13.7	45.9	13.6	24.0	8.6	45.0	8.4	15.8				
Green Ext Time (p_c), s	0.1	0.0	0.0	1.2	0.0	4.7	0.1	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			59.6									
HCM 6th LOS			E									

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1197	784	340	1232	322	140
Future Volume (veh/h)	1197	784	340	1232	322	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1221	800	466	1688	329	143
Peak Hour Factor	0.98	0.98	0.73	0.73	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1543	867	452	2199	436	194
Arrive On Green	0.49	0.49	0.15	0.69	0.14	0.14
Sat Flow, veh/h	3256	1385	3086	3256	3181	1415
Grp Volume(v), veh/h	1221	800	466	1688	329	143
Grp Sat Flow(s),veh/h/ln	1586	1385	1543	1586	1590	1415
Q Serve(g_s), s	23.5	35.5	10.7	25.5	7.3	7.1
Cycle Q Clear(g_c), s	23.5	35.5	10.7	25.5	7.3	7.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1543	867	452	2199	436	194
V/C Ratio(X)	0.79	0.92	1.03	0.77	0.76	0.74
Avail Cap(c_a), veh/h	1543	867	452	2234	1177	523
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	15.7	11.9	31.2	7.3	30.3	30.2
Incr Delay (d2), s/veh	3.0	15.3	50.3	2.0	1.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	15.9	6.9	5.8	2.5	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.7	27.2	81.5	9.4	31.3	32.3
LnGrp LOS	B	C	F	A	C	C
Approach Vol, veh/h	2021			2154	472	
Approach Delay, s/veh	22.1			25.0	31.6	
Approach LOS	C			C	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.1	41.7				56.8		16.2
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	10.7	35.5				* 51		27.0
Max Q Clear Time (g_c+I1), s	12.7	37.5				27.5		9.3
Green Ext Time (p_c), s	0.0	0.0				20.3		0.7

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

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	35	0	1870	0	1513	0	426	123
Future Volume (veh/h)	35	0	1870	0	1513	0	426	123
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		0	1856		1856	0	1856	1856
Adj Flow Rate, veh/h		0	1989		1739	0	501	145
Peak Hour Factor		0.94	0.94		0.87	0.87	0.85	0.85
Percent Heavy Veh, %		0	3		3	0	3	3
Cap, veh/h		0	2406		3457	0	626	506
Arrive On Green		0.00	0.68		0.68	0.00	0.18	0.18
Sat Flow, veh/h		0	3711		5400	0	3428	2768
Grp Volume(v), veh/h		0	1989		1739	0	501	145
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1714	1384
Q Serve(g_s), s		0.0	31.7		12.8	0.0	10.8	3.5
Cycle Q Clear(g_c), s		0.0	31.7		12.8	0.0	10.8	3.5
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2406		3457	0	626	506
V/C Ratio(X)		0.00	0.83		0.50	0.00	0.80	0.29
Avail Cap(c_a), veh/h		0	2541		3552	0	1600	1292
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	8.9		5.9	0.0	30.2	27.2
Incr Delay (d2), s/veh		0.0	2.5		0.2	0.0	0.9	0.1
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	7.2		2.9	0.0	4.4	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	11.4		6.1	0.0	31.1	27.3
LnGrp LOS		A	B		A	A	C	C
Approach Vol, veh/h			1989		1739		646	
Approach Delay, s/veh			11.4		6.1		30.2	
Approach LOS			B		A		C	

Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		59.1		18.1		59.1		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		55.6		36.0		* 54		
Max Q Clear Time (g_c+I1), s		33.7		12.8		14.8		
Green Ext Time (p_c), s		18.9		1.3		26.5		

Intersection Summary		
HCM 6th Ctrl Delay		12.1
HCM 6th LOS		B

Notes

User approved ignoring U-Turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	4	40	236	2	17	90	1810	92	12	1480	30
Future Volume (veh/h)	30	4	40	236	2	17	90	1810	92	12	1480	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.95	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	35	5	47	266	0	19	94	1885	96	13	1644	33
Peak Hour Factor	0.86	0.86	0.86	0.89	0.89	0.89	0.96	0.96	0.96	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	81	7	65	394	0	184	100	2436	1241	38	2275	978
Arrive On Green	0.05	0.05	0.05	0.11	0.00	0.11	0.06	0.69	0.69	0.02	1.00	1.00
Sat Flow, veh/h	1767	150	1412	3534	0	1493	1767	3526	1543	3428	3526	1516
Grp Volume(v), veh/h	35	0	52	266	0	19	94	1885	96	13	1644	33
Grp Sat Flow(s),veh/h/ln	1767	0	1562	1767	0	1493	1767	1763	1543	1714	1763	1516
Q Serve(g_s), s	2.9	0.0	4.9	10.8	0.0	1.7	7.9	53.3	2.0	0.6	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	4.9	10.8	0.0	1.7	7.9	53.3	2.0	0.6	0.0	0.0
Prop In Lane	1.00		0.90	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	81	0	71	394	0	184	100	2436	1241	38	2275	978
V/C Ratio(X)	0.43	0.00	0.73	0.67	0.00	0.10	0.94	0.77	0.08	0.34	0.72	0.03
Avail Cap(c_a), veh/h	188	0	167	825	0	366	100	2436	1241	91	2275	978
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.77	0.77	0.77
Uniform Delay (d), s/veh	69.7	0.0	70.7	64.0	0.0	58.5	70.5	15.4	3.1	72.8	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	5.2	0.8	0.0	0.1	69.4	2.5	0.1	1.5	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	2.1	5.0	0.0	0.7	5.5	19.7	1.0	0.3	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.0	0.0	75.9	64.8	0.0	58.6	139.9	17.9	3.2	74.3	1.6	0.0
LnGrp LOS	E	A	E	E	A	E	F	B	A	E	A	A
Approach Vol, veh/h		87			285			2075			1690	
Approach Delay, s/veh		73.9			64.4			22.7			2.1	
Approach LOS		E			E			C			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.1	110.5		11.8	12.9	103.7		21.6				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 75		16.0	8.5	69.4		35.0				
Max Q Clear Time (g_c+I1), s	2.6	55.3		6.9	9.9	2.0		12.8				
Green Ext Time (p_c), s	0.0	15.6		0.1	0.0	24.4		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			18.2									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	10	90	30	10	30	100	1701	60	20	1361	30
Future Volume (veh/h)	30	10	90	30	10	30	100	1701	60	20	1361	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.97	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	42	14	127	37	12	37	102	1736	61	21	1403	31
Peak Hour Factor	0.71	0.71	0.71	0.82	0.82	0.82	0.98	0.98	0.98	0.97	0.97	0.97
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	70	27	152	94	36	72	510	2623	1128	27	1618	693
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.29	0.74	0.74	0.02	0.46	0.46
Sat Flow, veh/h	288	194	1094	426	260	518	1767	3526	1516	1767	3526	1510
Grp Volume(v), veh/h	183	0	0	86	0	0	102	1736	61	21	1403	31
Grp Sat Flow(s),veh/h/ln	1577	0	0	1204	0	0	1767	1763	1516	1767	1763	1510
Q Serve(g_s), s	6.9	0.0	0.0	0.0	0.0	0.0	6.5	37.3	1.6	1.8	53.6	1.7
Cycle Q Clear(g_c), s	16.7	0.0	0.0	9.8	0.0	0.0	6.5	37.3	1.6	1.8	53.6	1.7
Prop In Lane	0.23		0.69	0.43		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	0	0	202	0	0	510	2623	1128	27	1618	693
V/C Ratio(X)	0.73	0.00	0.00	0.43	0.00	0.00	0.20	0.66	0.05	0.76	0.87	0.04
Avail Cap(c_a), veh/h	351	0	0	298	0	0	510	2623	1128	66	2040	874
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	0.00	1.00	0.00	0.00	0.52	0.52	0.52	0.72	0.72	0.72
Uniform Delay (d), s/veh	62.6	0.0	0.0	59.3	0.0	0.0	40.3	9.7	5.1	73.6	36.5	22.4
Incr Delay (d2), s/veh	2.4	0.0	0.0	0.5	0.0	0.0	0.0	0.7	0.0	11.1	4.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	0.0	0.0	3.1	0.0	0.0	2.8	12.4	0.5	0.9	23.2	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.9	0.0	0.0	59.8	0.0	0.0	40.3	10.4	5.2	84.7	41.3	22.5
LnGrp LOS	E	A	A	E	A	A	D	B	A	F	D	C
Approach Vol, veh/h		183			86			1899			1455	
Approach Delay, s/veh		64.9			59.8			11.8			41.5	
Approach LOS		E			E			B			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	117.5		25.8	49.2	75.1		25.8				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	5.6	98.1		31.1	16.6	* 87		31.1				
Max Q Clear Time (g_c+I1), s	3.8	39.3		18.7	8.5	55.6		11.8				
Green Ext Time (p_c), s	0.0	26.2		0.6	0.1	13.2		0.3				
Intersection Summary												
HCM 6th Ctrl Delay			27.6									
HCM 6th LOS			C									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	320	240	20	10	340	941	460	0	861	10
Future Volume (veh/h)	10	10	320	240	20	10	340	941	460	0	861	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	11	11	337	270	22	11	366	1012	495	0	990	11
Peak Hour Factor	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93	0.87	0.87	0.87
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	0	3	3
Cap, veh/h	229	217	746	300	300	150	384	1236	1019	0	1497	17
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.43	1.00	1.00	0.00	0.42	0.42
Sat Flow, veh/h	739	834	1551	1025	1151	576	1767	1856	1529	0	3663	40
Grp Volume(v), veh/h	22	0	337	270	0	33	366	1012	495	0	489	512
Grp Sat Flow(s),veh/h/ln	1574	0	1551	1025	0	1727	1767	1856	1529	0	1763	1847
Q Serve(g_s), s	0.0	0.0	21.7	36.9	0.0	2.2	30.0	0.0	0.0	0.0	33.4	33.4
Cycle Q Clear(g_c), s	2.2	0.0	21.7	39.1	0.0	2.2	30.0	0.0	0.0	0.0	33.4	33.4
Prop In Lane	0.50		1.00	1.00		0.33	1.00		1.00	0.00		0.02
Lane Grp Cap(c), veh/h	446	0	746	300	0	450	384	1236	1019	0	739	775
V/C Ratio(X)	0.05	0.00	0.45	0.90	0.00	0.07	0.95	0.82	0.49	0.00	0.66	0.66
Avail Cap(c_a), veh/h	446	0	746	300	0	450	517	1236	1019	0	739	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.70	0.70	0.70	0.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	0.0	26.1	57.7	0.0	41.8	41.7	0.0	0.0	0.0	35.0	35.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	27.2	0.0	0.0	18.1	4.4	1.2	0.0	4.6	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	8.2	12.7	0.0	0.9	12.2	1.5	0.3	0.0	15.4	16.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	0.0	26.3	84.9	0.0	41.8	59.8	4.4	1.2	0.0	39.6	39.4
LnGrp LOS	D	A	C	F	A	D	E	A	A	A	D	D
Approach Vol, veh/h		359			303			1873			1001	
Approach Delay, s/veh		27.2			80.2			14.4			39.5	
Approach LOS		C			F			B			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		106.0		44.0	37.0	69.0		44.0				
Change Period (Y+Rc), s		6.1		4.9	4.4	* 6.1		4.9				
Max Green Setting (Gmax), s		99.9		39.1	43.9	* 53		39.1				
Max Q Clear Time (g_c+I1), s		2.0		23.7	32.0	35.4		41.1				
Green Ext Time (p_c), s		21.8		0.6	0.6	6.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			28.4									
HCM 6th LOS			C									

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	700	1743	821	0	0	2013
Future Volume (vph)	700	1743	821	0	0	2013
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.97	0.97
Adj. Flow (vph)	729	1816	873	0	0	2075
RTOR Reduction (vph)	0	6	0	0	0	0
Lane Group Flow (vph)	729	1810	873	0	0	2075
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	25.5	75.0	30.0			79.5
Effective Green, g (s)	25.5	75.0	30.0			79.5
Actuated g/C Ratio	0.21	0.62	0.25			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	722	1725	876			4204
v/s Ratio Prot	0.21	c0.66	c0.25			0.33
v/s Ratio Perm						
v/c Ratio	1.01	1.05	1.00			0.49
Uniform Delay, d1	47.2	22.5	44.9			10.2
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	35.9	35.9	29.3			0.0
Delay (s)	83.2	58.4	74.3			10.2
Level of Service	F	E	E			B
Approach Delay (s)	65.5		74.3			10.2
Approach LOS	E		E			B

Intersection Summary			
HCM 2000 Control Delay	46.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2170	10	1391	0	0	1141
Future Volume (vph)	2170	10	1391	0	0	1141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.91	0.91
Adj. Flow (vph)	2260	10	1480	0	0	1254
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	2260	9	1480	0	0	1254
Confl. Bikes (#/hr)						11
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	64.5	64.5	40.5			40.5
Effective Green, g (s)	64.5	64.5	40.5			40.5
Actuated g/C Ratio	0.54	0.54	0.34			0.34
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1827	842	1182			1182
v/s Ratio Prot	c0.66		c0.42			0.36
v/s Ratio Perm		0.01				
v/c Ratio	1.24	0.01	1.25			1.06
Uniform Delay, d1	27.8	12.9	39.8			39.8
Progression Factor	1.00	1.00	0.66			1.00
Incremental Delay, d2	111.6	0.0	120.2			44.0
Delay (s)	139.3	12.9	146.2			83.7
Level of Service	F	B	F			F
Approach Delay (s)	138.8		146.2			83.7
Approach LOS	F		F			F

Intersection Summary			
HCM 2000 Control Delay	127.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	112.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	570	0	0	0	0	0	891	760	0	0	0
Future Volume (vph)	0	570	0	0	0	0	0	891	760	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1542			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1542			
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	640	0	0	0	0	0	990	844	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	640	0	0	0	0	0	990	844	0	0	0
Confl. Bikes (#/hr)									20			
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		48.5						58.0	120.0			
Effective Green, g (s)		48.5						58.0	120.0			
Actuated g/C Ratio		0.40						0.48	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		745						1694	1542			
v/s Ratio Prot		c0.35						0.28				
v/s Ratio Perm									c0.55			
v/c Ratio		0.86						0.58	0.55			
Uniform Delay, d1		32.6						22.3	0.0			
Progression Factor		0.23						1.00	1.00			
Incremental Delay, d2		5.6						1.5	1.4			
Delay (s)		13.2						23.8	1.4			
Level of Service		B						C	A			
Approach Delay (s)		13.2			0.0			13.5			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1150	80	0	0	0	0	0	0	20	1420	0
Future Volume (vph)	0	1150	80	0	0	0	0	0	0	20	1420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	0.99								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1548								3502	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1548								3502	
Peak-hour factor, PHF	0.91	0.91	0.91	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1264	88	0	0	0	0	0	0	20	1449	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	1264	64	0	0	0	0	0	0	0	1455	0
Confl. Bikes (#/hr)			1						1			12
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		48.5	48.5								58.0	
Effective Green, g (s)		48.5	48.5								58.0	
Actuated g/C Ratio		0.40	0.40								0.48	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1416	625								1692	
v/s Ratio Prot		c0.36										
v/s Ratio Perm			0.04								0.42	
v/c Ratio		0.89	0.10								0.86	
Uniform Delay, d1		33.3	22.2								27.4	
Progression Factor		1.00	1.00								0.94	
Incremental Delay, d2		8.9	0.3								0.6	
Delay (s)		42.2	22.5								26.3	
Level of Service		D	C								C	
Approach Delay (s)		41.0			0.0			0.0			26.3	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX M

PEAK HOUR QUEUING ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITH PROJECT

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	244	414	124	195	218	277	188
Average Queue (ft)	174	185	87	53	116	121	141	82
95th Queue (ft)	250	255	260	110	184	201	232	146
Link Distance (ft)			433	433	1194	1194	379	379
Upstream Blk Time (%)			0				0	
Queuing Penalty (veh)			1				0	
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	1	5						
Queuing Penalty (veh)	2	12						

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	348	174	45	148	148	91	86	277	175
Average Queue (ft)	132	65	12	62	86	24	31	109	29
95th Queue (ft)	295	151	36	125	138	68	73	223	135
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	1			2	0
Queuing Penalty (veh)				0	1			13	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	T	R	L	T	R	L	L	T	TR	L
Maximum Queue (ft)	48	51	49	54	85	104	67	154	335	675	618	146
Average Queue (ft)	14	10	4	7	26	37	14	83	137	338	295	56
95th Queue (ft)	40	32	22	29	61	80	43	137	367	616	554	115
Link Distance (ft)			449			329				1280	1280	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	260	260		250	155		200	310	310			240
Storage Blk Time (%)									0	15		
Queuing Penalty (veh)									0	34		

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	226	236	84
Average Queue (ft)	110	126	38
95th Queue (ft)	194	206	67
Link Distance (ft)	903	903	903
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	722	688	240	84	95	190	195	145	125	50
Average Queue (ft)	442	397	156	33	49	74	96	72	62	9
95th Queue (ft)	691	651	322	69	81	157	171	122	113	32
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		24	0							
Queuing Penalty (veh)		57	1							

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	117	272	258	257	196	102	69	20	28	28
Average Queue (ft)	19	175	123	110	64	26	25	1	10	2
95th Queue (ft)	75	299	252	216	151	71	53	11	32	12
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)		18		6						
Queuing Penalty (veh)		3		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	L	T
Maximum Queue (ft)	56	47	38	42	35	204	321	340	204	43	50	418
Average Queue (ft)	21	13	10	7	6	103	115	127	37	12	2	132
95th Queue (ft)	51	42	33	28	26	187	278	291	147	37	29	324
Link Distance (ft)		89	63	63			2238	2238				2582
Upstream Blk Time (%)	0	0	0	0	0							
Queuing Penalty (veh)	0	0	0	0	0							
Storage Bay Dist (ft)	50				55	180			180	180	180	
Storage Blk Time (%)	5	0		1	0	2	3	5	0			5
Queuing Penalty (veh)	1	0		0	0	11	4	5	0			1

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	462	154
Average Queue (ft)	150	12
95th Queue (ft)	348	78
Link Distance (ft)	2582	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		180
Storage Blk Time (%)	7	
Queuing Penalty (veh)	1	

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	101	67	259	412	387	74	123	375	367	174
Average Queue (ft)	39	21	93	216	173	7	12	192	203	24
95th Queue (ft)	80	54	203	395	352	42	59	341	349	118
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	7	3	0		9	11	0
Queuing Penalty (veh)			0	8	1	0		1	3	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	20	162	124	238	228	695	250	230	212
Average Queue (ft)	3	63	106	59	110	234	40	172	98
95th Queue (ft)	12	129	140	190	196	527	154	248	188
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								3	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		2	17	0		0			
Queuing Penalty (veh)		0	3	0		0			

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	405	788	790	503	196	196	149	196	232	234
Average Queue (ft)	201	650	712	360	172	152	66	87	116	102
95th Queue (ft)	338	978	923	484	193	203	130	177	213	207
Link Distance (ft)		748	748				754	754	754	754
Upstream Blk Time (%)		7	14							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)		0	1	0						
Queuing Penalty (veh)		0	9	0						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	SB
Directions Served	R	L	TR
Maximum Queue (ft)	48	35	3
Average Queue (ft)	15	7	0
95th Queue (ft)	40	27	3
Link Distance (ft)	154		312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		60	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	793	784	104	152	146	290	265
Average Queue (ft)	755	750	10	126	125	184	153
95th Queue (ft)	826	835	67	139	136	263	232
Link Distance (ft)	737	737					
Upstream Blk Time (%)	66	64					
Queuing Penalty (veh)	0	0					
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		56	0				
Queuing Penalty (veh)		6	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	B48	NB	NB	NB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	175	6	480	694	140
Average Queue (ft)	101	0	218	339	59
95th Queue (ft)	162	5	362	726	173
Link Distance (ft)	120	139	657	657	
Upstream Blk Time (%)	8			5	
Queuing Penalty (veh)	106			0	
Storage Bay Dist (ft)					115
Storage Blk Time (%)				2	0
Queuing Penalty (veh)				29	0

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	659	656	180	479	482
Average Queue (ft)	627	625	13	255	271
95th Queue (ft)	645	642	82	404	414
Link Distance (ft)	605	605		633	633
Upstream Blk Time (%)	94	77		0	0
Queuing Penalty (veh)	0	0		1	0
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		6			
Queuing Penalty (veh)		1			

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	43	28
Average Queue (ft)	1	1
95th Queue (ft)	27	13
Link Distance (ft)	319	319
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	SB	SB
Directions Served	R	R
Maximum Queue (ft)	51	96
Average Queue (ft)	4	8
95th Queue (ft)	36	55
Link Distance (ft)	216	216
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	26
Average Queue (ft)	4	1
95th Queue (ft)	21	10
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 317

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	245	409	185	299	312	327	358
Average Queue (ft)	200	211	148	51	164	162	160	147
95th Queue (ft)	265	275	380	127	260	268	269	272
Link Distance (ft)			433	433			379	379
Upstream Blk Time (%)			0				0	1
Queuing Penalty (veh)			1				0	0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	3	10	0					
Queuing Penalty (veh)	7	24	0					

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	278	170	81	150	153	119	81	471	175
Average Queue (ft)	94	52	26	56	85	15	13	178	59
95th Queue (ft)	230	137	63	121	138	65	53	417	192
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								4	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	1			4	5
Queuing Penalty (veh)				0	2			35	8

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	B47	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	T	L	L	T	TR
Maximum Queue (ft)	100	123	161	192	178	296	198	152	148	335	877	878
Average Queue (ft)	37	45	56	76	128	118	84	38	84	191	528	517
95th Queue (ft)	82	99	125	158	202	362	209	205	133	434	898	882
Link Distance (ft)			449			329		336			1280	1280
Upstream Blk Time (%)						10		4				
Queuing Penalty (veh)						0		0				
Storage Bay Dist (ft)	260	260		250	155		200		310	310		
Storage Blk Time (%)					22	1	0			0	38	
Queuing Penalty (veh)					58	3	0			0	72	

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	265	907	922	873
Average Queue (ft)	191	598	605	327
95th Queue (ft)	349	981	1000	1006
Link Distance (ft)		903	903	903
Upstream Blk Time (%)		4	7	3
Queuing Penalty (veh)		18	33	15
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	1	47		
Queuing Penalty (veh)	4	75		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	805	818	240	160	214	297	311	181	146	75
Average Queue (ft)	753	786	240	96	95	166	186	95	58	11
95th Queue (ft)	848	809	241	142	159	280	295	152	117	42
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		49	3			0				
Queuing Penalty (veh)		382	18			0				

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	134	290	286	312	282	223	196	155	67	42
Average Queue (ft)	49	258	257	234	157	99	109	42	32	10
95th Queue (ft)	129	278	274	332	254	180	176	109	57	33
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	53		31						
Queuing Penalty (veh)	0	19		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	B55	B55	NB	NB	NB	NB	SB
Directions Served	L	TR	L	LT	R	T	T	L	T	T	R	L
Maximum Queue (ft)	68	92	142	166	63	9	51	204	478	475	205	53
Average Queue (ft)	29	32	82	117	16	0	5	91	247	260	37	17
95th Queue (ft)	63	73	135	173	56	5	27	168	427	440	157	46
Link Distance (ft)		89	63	63		714	714		2238	2238		
Upstream Blk Time (%)	0	1	23	41	0							
Queuing Penalty (veh)	0	0	28	51	0							
Storage Bay Dist (ft)	50				55			180			180	180
Storage Blk Time (%)	12	3		53	1			1	12	14	0	
Queuing Penalty (veh)	5	1		9	1			7	11	13	0	

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	76	526	526	204
Average Queue (ft)	3	281	296	26
95th Queue (ft)	38	499	507	123
Link Distance (ft)		2582	2582	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	180			180
Storage Blk Time (%)		19	23	0
Queuing Penalty (veh)		2	7	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	140	98	259	647	645	260	158	462	461	202
Average Queue (ft)	56	39	106	332	293	45	25	202	213	25
95th Queue (ft)	112	80	251	601	564	183	90	377	395	120
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	17	9	0		11	13	0
Queuing Penalty (veh)			0	17	5	0		2	4	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	82	210	124	414	454	649	180	243	245
Average Queue (ft)	9	74	116	174	243	237	58	217	188
95th Queue (ft)	40	155	140	384	404	508	125	261	280
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)				0				22	12
Queuing Penalty (veh)				0				0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		5	42	0					
Queuing Penalty (veh)		1	13	0					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	516	788	785	525	195	202	201	238	288	273
Average Queue (ft)	340	637	680	391	177	175	83	121	152	142
95th Queue (ft)	515	926	922	531	188	191	163	217	261	249
Link Distance (ft)		748	748				741	741	741	741
Upstream Blk Time (%)		6	11							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	6	2	0						
Queuing Penalty (veh)	0	22	18	1						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	EB	NB	NB	SB
Directions Served	R	L	R	TR
Maximum Queue (ft)	56	66	9	13
Average Queue (ft)	22	19	0	1
95th Queue (ft)	47	47	7	7
Link Distance (ft)	154		533	312
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		60		
Storage Blk Time (%)		1		
Queuing Penalty (veh)		2		

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	765	768	124	255	248	1139	1146
Average Queue (ft)	736	735	9	229	228	989	970
95th Queue (ft)	755	754	62	241	238	1327	1329
Link Distance (ft)	715	715		217	217		
Upstream Blk Time (%)	62	63		61	61		
Queuing Penalty (veh)	0	0		400	402		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		52	0				
Queuing Penalty (veh)		5	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	B48	NB	NB	NB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	169	6	446	521	140
Average Queue (ft)	84	0	270	254	99
95th Queue (ft)	145	4	381	412	202
Link Distance (ft)	121	139	657	657	
Upstream Blk Time (%)	5			0	
Queuing Penalty (veh)	58			0	
Storage Bay Dist (ft)					115
Storage Blk Time (%)				12	0
Queuing Penalty (veh)				91	2

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	652	650	250	522	516
Average Queue (ft)	626	625	47	285	305
95th Queue (ft)	644	639	166	417	437
Link Distance (ft)	605	605		634	634
Upstream Blk Time (%)	90	75		0	0
Queuing Penalty (veh)	0	0		0	1
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		5	0		
Queuing Penalty (veh)		4	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	9	71	22
Average Queue (ft)	1	4	1
95th Queue (ft)	9	36	17
Link Distance (ft)	319	319	319
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 36: SeaWorld Dr/Telecote Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	NB	NB	SB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	310	310	138	137
Average Queue (ft)	243	245	6	6
95th Queue (ft)	313	315	55	58
Link Distance (ft)	267	267	217	217
Upstream Blk Time (%)	4	3	0	0
Queuing Penalty (veh)	16	12	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement	B50	WB
Directions Served	T	R
Maximum Queue (ft)	367	58
Average Queue (ft)	12	7
95th Queue (ft)	282	35
Link Distance (ft)	2182	472
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	61	31
Average Queue (ft)	33	5
95th Queue (ft)	55	23
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1986

APPENDIX N

HCS FREEWAY ANALYSIS WORKSHEETS
NEAR-TERM (YEAR 2025) WITH PROJECT

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8006	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1468
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.8
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7493	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1374
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	6632	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1216
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.7
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8501	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1559
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.9
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9058	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1993
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	52.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	38.2
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8468	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1863
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.87
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	55.6
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	33.5
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information			
Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data			
Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Volume (V), veh/h	7506	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1652
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	27.7
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9628	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2118
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.99
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	48.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	43.9
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3628	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	976
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	2846	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	766
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.3
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4600	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	991
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.6
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2025 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4429	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	954
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

APPENDIX O

SANDAG SERIES 12 FIESTA ISLAND AMENDMENT FORECAST TRAFFIC DATA (YEAR 2040)

INTERSECTION	DIRECTION	LEG	EXISTING TRAFFIC VOLUMES (Year 2019) Ram	Rpm	Tam	Tpm	Lam	Lpm	EXISTING ADT CALCULATED	SELECTED	YEAR 2040 SELECTED	GROWTH FACTOR
1. Sea World Dr / I-5 NB Ramps	Sb	North	0	0	0	0	0	0	13300	13300	15720	1.18
	Wb	East	252	315	389	429	0	0	19700	19700	25200	1.28
	Nb	South	347	507	10	4	245	260	8600	8600	10480	1.22
	Eb	West	0	0	449	463	793	753	23600	23600	26560	1.13
2. Sea World Dr / I-5 SB Ramps	Sb	North	667	955	0	0	177	149	12200	12200	13170	1.08
	Wb	East	0	0	267	495	258	198	22600	22600	25430	1.13
	Nb	South	0	0	0	0	0	0	4400	4400	6590	1.50
	Eb	West	51	200	1069	999	0	0	29400	29400	29680	1.01
3. Sea World Dr (N/S) / Pacific Hwy (E/W)	Sb	North	179	193	705	1191	124	140	32200	32200	32510	1.01
	Wb	East	68	166	100	67	45	161	7600	7600	12110	1.59
	Nb	South	55	124	1019	1130	224	179	32300	32300	39730	1.23
	Eb	West	83	244	33	136	67	169	10500	10500	12190	1.16
4. Sea World Dr (E/W) / Friars Rd	Sb	North	0	0	0	0	0	0	0	0	0	#DIV/0!
	Wb	East	0	0	658	1148	127	317	29700	29700	36540	1.23
	Nb	South	178	131	0	0	226	303	13900	13900	17320	1.25
	Eb	West	220	725	1067	1119	0	0	34200	34200	46370	1.36
5. Sea World Dr / Sea World Wy	Sb	North	21	115	0	0	71	395	4100	4100	5360	1.31
	Wb	East	0	0	864	1406	0	0	35900	35900	48670	1.36
	Nb	South	0	0	0	0	0	0	0	0	0	#DIV/0!
	Eb	West	0	0	1267	1740	16	34	34100	34100	41620	1.22
6. Perez Cove Wy / SeaWorld Entrance	Sb	North	0	0	0	0	69	71	2000	2000	0	0.00
	Wb	East	17	157	0	0	0	0	3700	3700	0	0.00
	Nb	South	70	213	0	0	0	0	1800	1800	0	0.00
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!
7. Ingraham St / Perez Cove Wy/ Dana Landing Rd	Sb	North	14	22	1244	1430	9	11	36500	36500	41590	1.14
	Wb	East	7	16	1	2	13	229	3100	3100	6360	2.05
	Nb	South	116	88	1297	1746	112	81	40000	40000	44700	1.12
	Eb	West	15	31	0	4	16	27	2000	2000	2270	1.14
8. Ingraham St / Vacation Rd	Sb	North	26	30	1220	1321	5	11	35100	35100	38720	1.10
	Wb	East	7	23	2	1	8	25	1000	1000	1130	1.13
	Nb	South	17	53	1289	1642	101	93	36900	36900	42050	1.14
	Eb	West	52	85	2	9	14	28	2800	2800	3330	1.19
9. Ingraham St / Crown Point Dr	Sb	North	0	1	630	840	0	0	20400	20400	22150	1.09
	Wb	East	4	8	6	15	253	238	7700	7700	8430	1.09
	Nb	South	254	445	861	916	197	337	35600	35600	39020	1.10
	Eb	West	404	316	3	7	0	3	8100	8100	8590	1.06

INTERSECTION	DIRECTION	LEG	EXISTING TRAFFIC VOLUMES (Year 2019)						EXISTING ADT		YEAR 2040	GROWTH FACTOR
			Ram	Rpm	Tam	Tpm	Lam	Lpm	CALCULATED	SELECTED	SELECTED	
10. Mission Bay Dr / Sports Arena / I-8 WB Off Ramp	Sb	North	0	0	1541	1905	0	0	50200	50200	59400	1.18
	Wb	East	1654	1666	0	0	460	669	27800	27800	32290	1.16
	Nb	South	0	0	476	782	0	0	36500	36500	44280	1.21
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!
11. Mission Bay Dr / Sports Arena / I-8 EB On Ramp	Sb	North	1187	1175	814	1399	0	0	36500	36500	47400	1.30
	Wb	East	0	0	0	0	0	0	0	0	0	#DIV/0!
	Nb	South	0	0	476	782	0	0	21700	21700	29330	1.35
	Eb	West	0	0	0	0	0	0	14800	14800	20230	1.37
12. Sunset Cliffs Blvd / I-8 WB Off Ramps	Sb	North	0	0	714	1079	0	0	26800	26800	32400	1.21
	Wb	East	7	2	0	0	1559	2061	22700	22700	27200	1.20
	Nb	South	0	0	1171	1317	0	0	49400	49400	57900	1.17
	Eb	West	0	0	0	0	0	0	0	0	0	#DIV/0!
13. Sunset Cliffs Blvd / I-8 EB On Ramps	Sb	North	0	0	0	0	0	0	10000	10000	11530	1.15
	Wb	East	0	0	0	0	0	0	21200	21200	23980	1.13
	Nb	South	1365	736	743	852	0	0	23100	23100	26680	1.15
	Eb	West	0	0	732	554	0	0	8000	8000	8490	1.06
14. Sunset Cliffs Blvd / Nimitz Blvd	Sb	North	0	0	1424	1362	15	20	17600	17600	20300	1.15
	Wb	East	0	0	0	0	0	0	15100	15100	17420	1.15
	Nb	South	0	0	0	0	0	0	18000	18000	20770	1.15
	Eb	West	18	79	1279	1104	0	0	15500	15500	17880	1.15

INTERSECTION	DIRECTION	LEG	2040 ROUNDED TRAFFIC VOLUMES						EXISTING						FINAL 2040					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
1. Sea World Dr / I-5 NB Ramps	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	310	380	470	520	0	0	252	315	389	429	0	0	310	380	470	520	0	0
	Nb	South	430	630	10	0	290	310	347	507	10	4	245	260	430	630	10	5	290	310
	Eb	West	0	0	540	560	920	870	0	0	449	463	793	753	0	0	540	560	920	870
2. Sea World Dr / I-5 SB Ramps	Sb	North	710	1010	0	0	190	160	667	955	0	0	177	149	710	1010	0	0	190	160
	Wb	East	0	0	290	530	370	280	0	0	267	495	258	198	0	0	290	530	370	280
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	70	290	1150	1070	0	0	51	200	1069	999	0	0	70	290	1150	1070	0	0
3. Sea World Dr (N/S) / Pacific Hwy (E/W)	Sb	North	200	220	790	1330	180	210	179	193	705	1191	124	140	200	220	790	1330	180	210
	Wb	East	100	250	140	90	70	250	68	166	100	67	45	161	100	250	140	90	70	250
	Nb	South	80	190	1140	1270	260	210	55	124	1019	1130	224	179	80	190	1140	1270	260	210
	Eb	West	100	290	50	190	80	190	83	244	33	136	67	169	100	290	50	190	80	190
4. Sea World Dr (E/W) / Friars Rd	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	850	1480	160	390	0	0	658	1148	127	317	0	0	850	1480	160	390
	Nb	South	220	160	0	0	290	390	178	131	0	0	226	303	220	160	0	0	290	390
	Eb	West	280	930	1370	1440	0	0	220	725	1067	1119	0	0	280	930	1370	1440	0	0
5. Sea World Dr / Sea World Wy	Sb	North	30	150	0	0	90	520	21	115	0	0	71	395	21	115	0	0	71	395
	Wb	East	0	0	1110	1810	0	0	0	0	864	1406	0	0	0	0	1110	1810	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	0	0	1630	2240	20	40	0	0	1267	1740	16	34	0	0	1630	2240	16	34
6. Perez Cove Wy / SeaWorld Entrance	Sb	North	0	0	0	0	0	0	0	0	0	0	69	71	0	0	0	0	69	71
	Wb	East	0	0	0	0	0	0	17	157	0	0	0	0	17	157	0	0	0	0
	Nb	South	0	0	0	0	0	0	70	213	0	0	0	0	70	213	0	0	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Ingraham St / Perez Cove Wy/ Dana Landing Rd	Sb	North	20	20	1400	1610	20	20	14	22	1244	1430	9	11	20	25	1400	1610	9	11
	Wb	East	10	30	0	0	30	450	7	16	1	2	13	229	7	16	1	2	13	229
	Nb	South	230	170	1460	1970	130	90	116	88	1297	1746	112	81	116	88	1460	1970	130	90
	Eb	West	20	40	0	10	20	30	15	31	0	4	16	27	20	40	0	4	20	30
8. Ingraham St / Vacation Rd	Sb	North	30	40	1370	1480	10	10	26	30	1220	1321	5	11	30	40	1370	1480	10	15
	Wb	East	10	30	0	0	10	30	7	23	2	1	8	25	10	30	5	5	10	30
	Nb	South	20	60	1440	1840	120	110	17	53	1289	1642	101	93	20	60	1440	1840	120	110
	Eb	West	60	100	0	10	20	30	52	85	2	9	14	28	60	100	5	10	20	30
9. Ingraham St / Crown Point Dr	Sb	North	0	0	690	920	0	0	0	1	630	840	0	0	0	5	690	920	0	0
	Wb	East	0	10	10	20	280	260	4	8	6	15	253	238	5	10	10	20	280	260
	Nb	South	280	490	940	1000	210	360	254	445	861	916	197	337	280	490	940	1000	210	360
	Eb	West	430	340	0	10	0	0	404	316	3	7	0	3	430	340	5	10	0	5

INTERSECTION	DIRECTION	LEG	2040 ROUNDED TRAFFIC VOLUMES						EXISTING						FINAL 2040					
			Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
10. Mission Bay Dr / Sports Arena / I-8 WB Off Ramp	Sb	North	0	0	1850	2290	0	0	0	0	1541	1905	0	0	0	0	1850	2290	0	0
	Wb	East	1930	1950	0	0	540	790	1654	1666	0	0	460	669	1930	1950	0	0	540	790
	Nb	South	0	0	570	940	0	0	0	0	476	782	0	0	0	0	570	940	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Mission Bay Dr / Sports Arena / I-8 EB On Ramp	Sb	North	1600	1580	1080	1860	0	0	1187	1175	814	1399	0	0	1430	1420	970	1660	0	0
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	630	1040	0	0	0	0	476	782	0	0	0	0	570	940	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. Sunset Cliffs Blvd / I-8 WB Off Ramps	Sb	North	0	0	850	1290	0	0	0	0	714	1079	0	0	0	0	850	1290	0	0
	Wb	East	10	0	0	0	1860	2450	7	2	0	0	1559	2061	10	5	0	0	1860	2450
	Nb	South	0	0	1400	1580	0	0	0	0	1171	1317	0	0	0	0	1400	1580	0	0
	Eb	West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. Sunset Cliffs Blvd / I-8 EB On Ramps	Sb	North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	1560	840	860	980	0	0	1365	736	743	852	0	0	1560	840	860	980	0	0
	Eb	West	0	0	790	600	0	0	0	0	732	554	0	0	0	0	790	600	0	0
14. Sunset Cliffs Blvd / Nimitz Blvd	Sb	North	0	0	1640	1570	20	20	0	0	1424	1362	15	20	0	0	1640	1570	20	20
	Wb	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nb	South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eb	West	20	90	1480	1270	0	0	18	79	1279	1104	0	0	20	90	1480	1270	0	0

GIS ID#	Roadway	Existing	Year 2025	Year 2040	Year 2050	Fiesta Island 2050		Final 2025	2025-2019	Check	Final 2040	2040-2025	Check
		2019				Option A							
	SeaWorld Drive												
1	I-5 Ramps to Pacific Highway	39,140	41,500	48,200	53,300	36,542		41,070	1,930		46,610	5,110	
2	Pacific Highway to Friars Road	34,630	37,200	44,400	50,000	43,191		36,750	2,120		42,700	5,500	
3	Friars Road to SeaWorld Way	38,830	41,700	49,800	56,100	55,446		41,190	2,360		47,870	6,170	
4	SeaWorld Way to W. Mission Bay Drive	38,670	40,700	46,100	50,200			40,620	1,950		45,800	5,100	
	Friars Road												
5	Pacific Highway to SeaWorld Drive	13,360	14,800	19,300	23,000	25,857		14,740	1,380		19,070	4,270	
	W. Mission Bay Drive												
6	Dana Landing Road to Ingraham Street	38,380	39,700	43,400	46,000			39,680	1,300		43,340	3,640	
7	Ingraham Street to SeaWorld Drive	71,570	75,100	84,600	91,600			74,980	3,410		84,160	9,060	
8	SeaWorld Drive to I-8 Ramps (bridge)	56,900	59,200	65,200	69,500			59,030	2,130		64,550	5,350	
9	I-8 Ramps to Sports Arena Boulevard	35,990	37,900	43,100	46,900			37,880	1,890		43,010	5,110	
	Perez Cove Way												
10	Ingraham Street to SeaWorld Main Entrance	7,600	7,600	7,600	7,600			7,600	0		7,600	0	
11	SeaWorld Main Entrance to SeaWorld Drive	2,320	2,320	2,300	2,300			2,320	0		2,320	0	
	Ingraham Street												
12	Crown Point Drive to Vacation Road (bridge)	36,470	37,400	39,900	41,600			37,370	900		39,810	2,410	
13	Vacation Road to Perez Cove Way (bridge)	39,330	40,700	44,500	47,100			40,670	1,340		44,390	3,690	
14	Perez Cove Way to W. Mission Bay Drive	50,170	51,700	55,800	58,700			51,570	1,400		55,300	3,600	
	Sunset Cliffs Boulevard												
15	W. Mission Bay Drive to I-8 Ramps (bridge)	37,560	38,900	42,600	45,300			38,880	1,320		42,510	3,610	
16	I-8 Ramps to Nimitz Blvd (W. Point Loma Blvd)	39,610	40,800	43,800	45,900			40,780	1,170		43,710	2,910	

GIS ID#	Roadway	Model 12				Compound Annual Growth					Model 13				Compound Annual Growth			
		2008	2020	2035	2050	2020-2008	2035-2020	2050-2035	2050-2020	2050-2008 (Total)	2012	2020	2035	2050	2020-2012	2035-2020	2050-2035	Total
	SeaWorld Drive																	
1	I-5 Ramps to Pacific Highway	41,700	44,400	49,300	45,000	0.5%	0.7%	-0.6%	0.0%	1.00%	26,200	27,100	28,100	23,700	0.4%	0.2%	-1.1%	-0.3%
2	Pacific Highway to Friars Road	40,700	45,400	52,200	58,900	0.9%	0.9%	0.8%	0.9%	1.19%	26,600	28,000	29,000	31,300	0.6%	0.2%	0.5%	0.4%
3	Friars Road to SeaWorld Way	42,300	48,400	56,700	69,600	1.1%	1.1%	1.4%	1.2%	1.19%	37,000	39,600	41,900	44,700	0.9%	0.4%	0.4%	0.5%
4	SeaWorld Way to W. Mission Bay Drive	45,800	50,700	58,400	65,200	0.9%	0.9%	0.7%	0.8%	0.84%	33,100	34,500	37,300	36,900	0.5%	0.5%	-0.1%	0.3%
	Friars Road																	
5	Pacific Highway to SeaWorld Drive	10,800	17,100	22,600	22,500	3.9%	1.9%	0.0%	0.9%	1.76%	17,100	17,800	19,500	18,700	0.5%	0.6%	-0.3%	0.2%
	W. Mission Bay Drive																	
6	Dana Landing Road to Ingraham Street	40,700	43,800	50,400	52,000	0.6%	0.9%	0.2%	0.6%	0.59%	26,400	26,400	29,000	32,000	0.0%	0.6%	0.7%	0.5%
7	Ingraham Street to SeaWorld Drive	61,900	65,400	74,300	95,300	0.5%	0.9%	1.7%	1.3%	0.80%	61,600	60,200	65,400	65,700	-0.3%	0.6%	0.0%	0.2%
8	SeaWorld Drive to I-8 Ramps (bridge)	63,100	66,700	73,900	82,800	0.5%	0.7%	0.8%	0.7%	0.65%	41,200	39,700	44,200	43,300	-0.5%	0.7%	-0.1%	0.1%
9	I-8 Ramps to Sports Arena Boulevard	32,300	32,300	41,000	46,300	0.0%	1.6%	0.8%	1.2%	0.86%	24,800	24,500	28,400	28,900	-0.2%	1.0%	0.1%	0.4%
	Perez Cove Way																	
10	Ingraham Street to SeaWorld Main Entrance	-	-	-	-						12,100	11,400	11,300	10,200	-0.7%	-0.1%	-0.7%	-0.4%
11	SeaWorld Main Entrance to SeaWorld Drive	-	-	-	-						17,100	16,000	16,200	15,700	-0.8%	0.1%	-0.2%	-0.2%
	Ingraham Street																	
12	Crown Point Drive to Vacation Road (bridge)	34,600	36,600	40,900	41,400	0.5%	0.7%	0.1%	0.4%	0.43%	35,200	34,100	38,100	36,700	-0.4%	0.7%	-0.2%	0.1%
13	Vacation Road to Perez Cove Way (bridge)	40,700	43,800	50,400	52,000	0.6%	0.9%	0.2%	0.6%	0.59%	37,600	36,200	40,700	39,200	-0.5%	0.8%	-0.3%	0.1%
14	Perez Cove Way to W. Mission Bay Drive	40,700	43,400	48,600	50,300	0.5%	0.8%	0.2%	0.5%	0.51%	41,300	40,000	43,400	41,200	-0.4%	0.5%	-0.3%	0.0%
	Sunset Cliffs Boulevard																	
15	W. Mission Bay Drive to I-8 Ramps (bridge)	42,800	43,300	49,000	55,100	0.1%	0.8%	0.8%	0.8%	0.60%	50,400	49,400	51,600	52,600	-0.3%	0.3%	0.1%	0.1%
16	I-8 Ramps to Nimitz Blvd (W. Point Loma Blvd)	43,500	43,600	48,400	53,100	0.0%	0.7%	0.6%	0.7%	0.48%	39,000	38,800	40,100	41,700	-0.1%	0.2%	0.3%	0.2%
	AVERAGE					0.8%	1.0%	0.5%	0.8%	0.8%					-0.1%	0.5%	-0.1%	0.1%

APPENDIX P

PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITHOUT PROJECT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	890	540	0	0	470	310	280	10	430	0	0	0
Future Volume (veh/h)	890	540	0	0	470	310	280	10	430	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	927	562	0	0	490	323	292	10	448			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1161	2344	0	0	542	356	400	14	368			
Arrive On Green	0.57	1.00	0.00	0.00	0.27	0.27	0.23	0.23	0.23			
Sat Flow, veh/h	3428	3618	0	0	2091	1312	1711	59	1572			
Grp Volume(v), veh/h	927	562	0	0	432	381	302	0	448			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1548	1770	0	1572			
Q Serve(g_s), s	21.4	0.0	0.0	0.0	23.6	23.8	15.8	0.0	23.4			
Cycle Q Clear(g_c), s	21.4	0.0	0.0	0.0	23.6	23.8	15.8	0.0	23.4			
Prop In Lane	1.00		0.00	0.00		0.85	0.97		1.00			
Lane Grp Cap(c), veh/h	1161	2344	0	0	478	420	414	0	368			
V/C Ratio(X)	0.80	0.24	0.00	0.00	0.90	0.91	0.73	0.00	1.22			
Avail Cap(c_a), veh/h	1161	2344	0	0	520	457	414	0	368			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.70	0.70	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	19.0	0.0	0.0	0.0	35.2	35.2	35.4	0.0	38.3			
Incr Delay (d2), s/veh	2.8	0.2	0.0	0.0	23.0	25.9	5.6	0.0	120.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.3	0.1	0.0	0.0	12.9	11.7	7.3	0.0	30.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.9	0.2	0.0	0.0	58.1	61.1	41.0	0.0	158.5			
LnGrp LOS	C	A	A	A	E	E	D	A	F			
Approach Vol, veh/h		1489			813			750				
Approach Delay, s/veh		13.7			59.5			111.2				
Approach LOS		B			E			F				
Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		72.0		28.0	39.4	32.6						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		66.5		23.4	32.8	* 30						
Max Q Clear Time (g_c+I1), s		2.0		25.4	23.4	25.8						
Green Ext Time (p_c), s		2.6		0.0	2.7	1.3						
Intersection Summary												
HCM 6th Ctrl Delay			49.8									
HCM 6th LOS			D									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1120	70	370	300	0	0	0	0	190	0	740
Future Volume (veh/h)	0	1120	70	370	300	0	0	0	0	190	0	740
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1217	76	402	326	0				207	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1375	601	1128	2711	0				238	0	
Arrive On Green	0.00	0.39	0.39	0.55	1.00	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3618	1540	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1217	76	402	326	0				207	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1540	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	32.2	3.2	6.6	0.0	0.0				11.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	32.2	3.2	6.6	0.0	0.0				11.5	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1375	601	1128	2711	0				238	0	
V/C Ratio(X)	0.00	0.88	0.13	0.36	0.12	0.00				0.87	0.00	
Avail Cap(c_a), veh/h	0	1646	719	1128	2711	0				366	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.40	0.40	0.71	0.71	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	28.4	19.6	16.6	0.0	0.0				42.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.8	0.2	0.1	0.1	0.0				8.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	13.4	1.1	2.3	0.0	0.0				5.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	32.2	19.7	16.7	0.1	0.0				51.1	0.0	0.0
LnGrp LOS	A	C	B	B	A	A				D	A	
Approach Vol, veh/h		1293			728						207	A
Approach Delay, s/veh		31.4			9.3						51.1	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	37.9	44.0	18.1	81.9
Change Period (Y+Rc), s	5.0	* 5	4.6	5.0
Max Green Setting (Gmax), s	18.8	* 47	20.7	69.7
Max Q Clear Time (g_c+I1), s	13.6	34.2	13.5	2.0
Green Ext Time (p_c), s	1.1	4.9	0.1	1.4

Intersection Summary	
HCM 6th Ctrl Delay	26.0
HCM 6th LOS	C

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	50	100	70	140	100	260	1100	80	180	820	200
Future Volume (veh/h)	80	50	100	70	140	100	260	1100	80	180	820	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	83	52	104	73	146	104	271	1146	83	188	854	208
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	159	215	171	93	226	178	371	1373	99	232	1535	748
Arrive On Green	0.05	0.12	0.12	0.05	0.12	0.12	0.11	0.41	0.41	0.13	0.44	0.44
Sat Flow, veh/h	3428	1856	1478	1767	1856	1458	3428	3328	241	1767	3526	1549
Grp Volume(v), veh/h	83	52	104	73	146	104	271	607	622	188	854	208
Grp Sat Flow(s),veh/h/ln	1714	1856	1478	1767	1856	1458	1714	1763	1806	1767	1763	1549
Q Serve(g_s), s	1.6	1.7	4.6	2.8	5.1	4.6	5.2	21.0	21.0	7.0	12.3	5.5
Cycle Q Clear(g_c), s	1.6	1.7	4.6	2.8	5.1	4.6	5.2	21.0	21.0	7.0	12.3	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	159	215	171	93	226	178	371	727	745	232	1535	748
V/C Ratio(X)	0.52	0.24	0.61	0.79	0.65	0.58	0.73	0.83	0.84	0.81	0.56	0.28
Avail Cap(c_a), veh/h	242	845	673	104	812	638	559	771	790	415	1802	865
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	27.4	28.6	31.9	28.5	28.3	29.4	17.9	17.9	28.8	14.3	10.6
Incr Delay (d2), s/veh	1.0	0.6	3.4	25.6	1.2	1.1	1.1	8.1	8.0	2.6	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	1.6	1.8	2.1	1.5	2.0	8.8	9.0	2.9	4.2	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.7	27.9	32.1	57.4	29.6	29.4	30.5	26.0	26.0	31.4	14.8	10.9
LnGrp LOS	C	C	C	E	C	C	C	C	C	C	B	B
Approach Vol, veh/h		239			323			1500			1250	
Approach Delay, s/veh		31.4			35.8			26.8			16.6	
Approach LOS		C			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	33.4	8.0	13.4	11.8	35.0	7.6	13.8
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	9.0	23.0	4.8	6.6	7.2	14.3	3.6	7.1
Green Ext Time (p_c), s	0.1	5.0	0.0	0.6	0.2	9.4	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1330	280	160	790	290	220
Future Volume (veh/h)	1330	280	160	790	290	220
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1385	292	167	823	351	177
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1658	965	242	2106	509	227
Arrive On Green	0.52	0.52	0.08	0.66	0.16	0.16
Sat Flow, veh/h	3256	1413	3086	3256	3181	1415
Grp Volume(v), veh/h	1385	292	167	823	351	177
Grp Sat Flow(s),veh/h/ln	1586	1413	1543	1586	1590	1415
Q Serve(g_s), s	26.0	5.8	3.7	8.3	7.3	8.4
Cycle Q Clear(g_c), s	26.0	5.8	3.7	8.3	7.3	8.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1658	965	242	2106	509	227
V/C Ratio(X)	0.84	0.30	0.69	0.39	0.69	0.78
Avail Cap(c_a), veh/h	1786	1022	289	2318	1221	543
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	14.2	4.5	31.6	5.4	27.9	28.4
Incr Delay (d2), s/veh	3.6	0.2	3.6	0.3	0.6	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	2.0	1.4	1.9	2.5	2.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.8	4.7	35.2	5.7	28.5	30.6
LnGrp LOS	B	A	D	A	C	C
Approach Vol, veh/h	1677			990	528	
Approach Delay, s/veh	15.5			10.6	29.2	
Approach LOS	B			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	9.9	43.0				52.9		17.5
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	6.6	39.6				* 51		27.0
Max Q Clear Time (g_c+I1), s	5.7	28.0				10.3		10.4
Green Ext Time (p_c), s	0.0	8.8				13.5		0.8

Intersection Summary		
HCM 6th Ctrl Delay		16.3
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	16	0	1610	0	1040	0	71	21
Future Volume (veh/h)	16	0	1610	0	1040	0	71	21
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		0	1856		1856	0	1870	1870
Adj Flow Rate, veh/h		0	1660		1072	0	73	22
Peak Hour Factor		0.97	0.97		0.97	0.97	0.97	0.97
Percent Heavy Veh, %		0	3		3	0	2	2
Cap, veh/h		0	2267		3257	0	509	411
Arrive On Green		0.00	0.64		0.64	0.00	0.15	0.15
Sat Flow, veh/h		0	3711		5400	0	3456	2790
Grp Volume(v), veh/h		0	1660		1072	0	73	22
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1728	1395
Q Serve(g_s), s		0.0	15.7		4.8	0.0	0.9	0.3
Cycle Q Clear(g_c), s		0.0	15.7		4.8	0.0	0.9	0.3
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2267		3257	0	509	411
V/C Ratio(X)		0.00	0.73		0.33	0.00	0.14	0.05
Avail Cap(c_a), veh/h		0	2532		3689	0	2510	2026
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	6.0		4.0	0.0	18.4	18.2
Incr Delay (d2), s/veh		0.0	1.2		0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	1.8		0.6	0.0	0.3	0.3
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	7.2		4.1	0.0	18.5	18.2
LnGrp LOS		A	A		A	A	B	B
Approach Vol, veh/h			1660		1072		95	
Approach Delay, s/veh			7.2		4.1		18.4	
Approach LOS			A		A		B	
Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		38.3		11.3		38.3		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		35.6		36.0		* 36		
Max Q Clear Time (g_c+I1), s		17.7		2.9		6.8		
Green Ext Time (p_c), s		14.1		0.2		12.9		

Intersection Summary			
HCM 6th Ctrl Delay			6.4
HCM 6th LOS			A

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	20	13	1	7	130	1460	116	9	1400	20
Future Volume (veh/h)	20	0	20	13	1	7	130	1460	116	9	1400	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.91	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	0	22	15	0	8	143	1604	127	10	1538	22
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	42	0	35	89	0	50	141	2852	1283	31	2602	1128
Arrive On Green	0.02	0.00	0.02	0.03	0.00	0.03	0.08	0.81	0.81	0.02	1.00	1.00
Sat Flow, veh/h	1767	0	1498	3534	0	1424	1767	3526	1537	3428	3526	1528
Grp Volume(v), veh/h	22	0	22	15	0	8	143	1604	127	10	1538	22
Grp Sat Flow(s),veh/h/ln	1767	0	1498	1767	0	1424	1767	1763	1537	1714	1763	1528
Q Serve(g_s), s	1.9	0.0	2.3	0.7	0.0	0.9	12.6	25.2	2.4	0.5	0.0	0.0
Cycle Q Clear(g_c), s	1.9	0.0	2.3	0.7	0.0	0.9	12.6	25.2	2.4	0.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	42	0	35	89	0	50	141	2852	1283	31	2602	1128
V/C Ratio(X)	0.53	0.00	0.62	0.17	0.00	0.16	1.01	0.56	0.10	0.32	0.59	0.02
Avail Cap(c_a), veh/h	179	0	152	783	0	330	141	2852	1283	87	2602	1128
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.77	0.77	0.77
Uniform Delay (d), s/veh	76.3	0.0	76.5	75.4	0.0	74.1	72.7	5.3	2.4	77.1	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.0	6.6	0.3	0.0	0.6	79.7	0.8	0.2	1.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.0	0.3	0.0	0.3	8.8	7.4	0.7	0.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.1	0.0	83.0	75.7	0.0	74.7	152.4	6.1	2.5	78.8	0.8	0.0
LnGrp LOS	F	A	F	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		44			23			1874			1570	
Approach Delay, s/veh		81.6			75.4			17.0			1.3	
Approach LOS		F			E			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	134.7		8.6	17.0	123.5		8.9				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 83		16.0	12.6	73.3		35.0				
Max Q Clear Time (g_c+I1), s	2.5	27.2		4.3	14.6	2.0		2.9				
Green Ext Time (p_c), s	0.0	25.0		0.0	0.0	21.5		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		11.2
HCM 6th LOS		B

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	60	10	10	10	120	1430	20	10	1360	30
Future Volume (veh/h)	20	10	60	10	10	10	120	1430	20	10	1360	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.98	1.00		0.95	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	11	65	11	11	11	129	1538	22	11	1462	32
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	3	3	3	3	3	3
Cap, veh/h	54	33	116	76	74	60	627	2759	1183	17	1482	641
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.35	0.78	0.78	0.02	0.84	0.85
Sat Flow, veh/h	234	294	1040	412	667	539	1767	3526	1512	1767	3526	1504
Grp Volume(v), veh/h	98	0	0	33	0	0	129	1538	22	11	1462	32
Grp Sat Flow(s),veh/h/ln	1569	0	0	1617	0	0	1767	1763	1512	1767	1763	1504
Q Serve(g_s), s	3.5	0.0	0.0	0.0	0.0	0.0	8.0	26.6	0.5	1.0	61.1	0.5
Cycle Q Clear(g_c), s	9.1	0.0	0.0	2.7	0.0	0.0	8.0	26.6	0.5	1.0	61.1	0.5
Prop In Lane	0.22		0.66	0.33		0.33	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	203	0	0	211	0	0	627	2759	1183	17	1482	641
V/C Ratio(X)	0.48	0.00	0.00	0.16	0.00	0.00	0.21	0.56	0.02	0.64	0.99	0.05
Avail Cap(c_a), veh/h	343	0	0	352	0	0	627	2759	1183	51	1961	846
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.75	0.75	0.75	0.78	0.78	0.78
Uniform Delay (d), s/veh	66.4	0.0	0.0	63.6	0.0	0.0	35.5	6.6	3.8	77.2	12.1	6.7
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	11.0	17.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	1.2	0.0	0.0	3.5	8.4	0.1	0.5	8.6	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.0	0.0	0.0	63.7	0.0	0.0	35.5	7.2	3.8	88.2	29.8	6.8
LnGrp LOS	E	A	A	E	A	A	D	A	A	F	C	A
Approach Vol, veh/h		98			33			1689			1505	
Approach Delay, s/veh		67.0			63.7			9.4			29.7	
Approach LOS		E			E			A			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	129.6		22.5	57.7	77.8		22.5				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	4.6	106.1		32.1	21.6	* 89		32.1				
Max Q Clear Time (g_c+I1), s	3.0	28.6		11.1	10.0	63.1		4.7				
Green Ext Time (p_c), s	0.0	21.8		0.3	0.1	12.8		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		20.8
HCM 6th LOS		C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	10	430	280	10	10	210	930	280	0	680	0
Future Volume (veh/h)	0	10	430	280	10	10	210	930	280	0	680	0
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		0.97	1.00		0.97	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	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	0	10	448	292	10	10	219	969	292	0	708	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	0	3	3
Cap, veh/h	0	633	877	404	285	285	380	970	800	0	865	0
Arrive On Green	0.00	0.34	0.34	0.34	0.34	0.34	0.29	0.69	0.69	0.00	0.25	0.00
Sat Flow, veh/h	0	1870	1585	934	843	843	1767	1856	1531	0	3711	0
Grp Volume(v), veh/h	0	10	448	292	0	20	219	969	292	0	708	0
Grp Sat Flow(s),veh/h/ln	0	1870	1585	934	0	1685	1767	1856	1531	0	1763	0
Q Serve(g_s), s	0.0	0.3	0.0	23.9	0.0	0.6	8.4	41.2	6.2	0.0	15.0	0.0
Cycle Q Clear(g_c), s	0.0	0.3	0.0	24.2	0.0	0.6	8.4	41.2	6.2	0.0	15.0	0.0
Prop In Lane	0.00		1.00	1.00		0.50	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	633	877	404	0	570	380	970	800	0	865	0
V/C Ratio(X)	0.00	0.02	0.51	0.72	0.00	0.04	0.58	1.00	0.36	0.00	0.82	0.00
Avail Cap(c_a), veh/h	0	736	965	455	0	664	380	970	800	0	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	1.00	0.82	0.82	0.82	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	17.4	11.0	25.4	0.0	17.5	25.1	12.0	6.7	0.0	28.2	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	3.9	0.0	0.0	1.4	26.0	1.1	0.0	8.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	4.3	5.4	0.0	0.2	3.2	13.4	1.7	0.0	7.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.4	11.1	29.3	0.0	17.5	26.5	38.1	7.7	0.0	36.7	0.0
LnGrp LOS	A	B	B	C	A	B	C	D	A	A	D	A
Approach Vol, veh/h		458			312			1480			708	
Approach Delay, s/veh		11.3			28.5			30.4			36.7	
Approach LOS		B			C			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.4		31.6	23.1	24.3		31.6				
Change Period (Y+Rc), s		6.1		4.9	6.1	* 4.9		4.9				
Max Green Setting (Gmax), s		36.9		31.1	11.1	* 23		31.1				
Max Q Clear Time (g_c+I1), s		43.2		2.3	10.4	17.0		26.2				
Green Ext Time (p_c), s		0.0		0.9	0.0	2.4		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			28.7
HCM 6th LOS			C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	540	1880	560	0	0	1810
Future Volume (vph)	540	1880	560	0	0	1810
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	557	1938	577	0	0	1866
RTOR Reduction (vph)	0	21	0	0	0	0
Lane Group Flow (vph)	557	1917	577	0	0	1866
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	17.5	77.6	22.7			82.8
Effective Green, g (s)	17.5	77.6	22.7			82.8
Actuated g/C Ratio	0.15	0.67	0.20			0.72
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	516	1857	690			4557
v/s Ratio Prot	0.16	c0.69	c0.16			0.29
v/s Ratio Perm						
v/c Ratio	1.08	1.03	0.84			0.41
Uniform Delay, d1	48.9	18.9	44.5			6.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	62.8	29.7	8.3			0.0
Delay (s)	111.7	48.6	52.8			6.5
Level of Service	F	D	D			A
Approach Delay (s)	62.6		52.8			6.5
Approach LOS	E		D			A

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	115.3	Sum of lost time (s)	22.5
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1860	10	1390	0	0	840
Future Volume (vph)	1860	10	1390	0	0	840
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1918	10	1433	0	0	866
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	1918	8	1433	0	0	866
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	64.5	64.5	50.5			50.5
Effective Green, g (s)	64.5	64.5	50.5			50.5
Actuated g/C Ratio	0.50	0.50	0.39			0.39
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1686	777	1361			1361
v/s Ratio Prot	c0.56		c0.41			0.25
v/s Ratio Perm		0.01				
v/c Ratio	1.14	0.01	1.05			0.64
Uniform Delay, d1	32.8	16.6	39.8			32.3
Progression Factor	1.00	1.00	1.02			1.00
Incremental Delay, d2	69.8	0.0	39.2			2.3
Delay (s)	102.5	16.6	79.6			34.6
Level of Service	F	B	E			C
Approach Delay (s)	102.1		79.6			34.6
Approach LOS	F		E			C

Intersection Summary			
HCM 2000 Control Delay	80.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	790	0	0	0	0	0	860	1560	0	0	0
Future Volume (vph)	0	790	0	0	0	0	0	860	1560	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1544			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1544			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	823	0	0	0	0	0	896	1625	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	823	0	0	0	0	0	896	1625	0	0	0
Confl. Bikes (#/hr)									14			
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		56.0						60.5	130.0			
Effective Green, g (s)		56.0						60.5	130.0			
Actuated g/C Ratio		0.43						0.47	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		794						1631	1544			
v/s Ratio Prot		0.45						0.26				
v/s Ratio Perm									c1.05			
v/c Ratio		1.04						0.55	1.05			
Uniform Delay, d1		37.0						25.0	65.0			
Progression Factor		0.24						1.00	1.00			
Incremental Delay, d2		21.0						1.3	38.1			
Delay (s)		29.9						26.3	103.1			
Level of Service		C						C	F			
Approach Delay (s)		29.9			0.0			75.8			0.0	
Approach LOS		C			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	64.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1480	20	0	0	0	0	0	0	20	1640	0
Future Volume (vph)	0	1480	20	0	0	0	0	0	0	20	1640	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	1.00								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1568								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1568								3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1526	21	0	0	0	0	0	0	21	1691	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	1526	9	0	0	0	0	0	0	0	1699	0
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		56.0	56.0								60.5	
Effective Green, g (s)		56.0	56.0								60.5	
Actuated g/C Ratio		0.43	0.43								0.47	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1509	675								1630	
v/s Ratio Prot		c0.44										
v/s Ratio Perm			0.01								0.48	
v/c Ratio		1.01	0.01								1.04	
Uniform Delay, d1		37.0	21.2								34.8	
Progression Factor		1.00	1.00								0.73	
Incremental Delay, d2		26.0	0.0								26.1	
Delay (s)		63.0	21.2								51.6	
Level of Service		E	C								D	
Approach Delay (s)		62.4			0.0			0.0			51.6	
Approach LOS		E			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	56.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	840	540	0	0	510	380	290	10	630	0	0	0
Future Volume (veh/h)	840	540	0	0	510	380	290	10	630	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	848	545	0	0	515	384	293	10	636			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	949	2139	0	0	519	387	537	18	494			
Arrive On Green	0.46	1.00	0.00	0.00	0.28	0.28	0.31	0.31	0.31			
Sat Flow, veh/h	3428	3618	0	0	1980	1406	1712	58	1572			
Grp Volume(v), veh/h	848	545	0	0	481	418	303	0	636			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1530	1770	0	1572			
Q Serve(g_s), s	22.7	0.0	0.0	0.0	27.2	27.2	14.2	0.0	31.4			
Cycle Q Clear(g_c), s	22.7	0.0	0.0	0.0	27.2	27.2	14.2	0.0	31.4			
Prop In Lane	1.00		0.00	0.00		0.92	0.97		1.00			
Lane Grp Cap(c), veh/h	949	2139	0	0	485	421	556	0	494			
V/C Ratio(X)	0.89	0.25	0.00	0.00	0.99	0.99	0.55	0.00	1.29			
Avail Cap(c_a), veh/h	949	2139	0	0	485	421	556	0	494			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.78	0.78	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	25.6	0.0	0.0	0.0	36.1	36.2	28.4	0.0	34.3			
Incr Delay (d2), s/veh	8.8	0.2	0.0	0.0	39.0	42.2	0.6	0.0	144.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	8.2	0.1	0.0	0.0	16.5	14.7	6.0	0.0	42.9			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.3	0.2	0.0	0.0	75.2	78.4	29.0	0.0	178.6			
LnGrp LOS	C	A	A	A	E	E	C	A	F			
Approach Vol, veh/h		1393			899			939				
Approach Delay, s/veh		21.0			76.7			130.3				
Approach LOS		C			E			F				

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		66.2		36.0	33.2	33.0
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5
Max Green Setting (Gmax), s		58.5		31.4	26.8	* 28
Max Q Clear Time (g_c+I1), s		2.0		33.4	24.7	29.2
Green Ext Time (p_c), s		2.5		0.0	0.8	0.0

Intersection Summary			
HCM 6th Ctrl Delay			68.3
HCM 6th LOS			E

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1090	260	280	540	0	0	0	0	160	0	1030
Future Volume (veh/h)	0	1090	260	280	540	0	0	0	0	160	0	1030
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1147	274	295	568	0				168	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1236	569	1271	2719	0				199	0	
Arrive On Green	0.00	0.35	0.37	0.74	1.00	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	3618	1536	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1147	274	295	568	0				168	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1536	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	31.3	13.7	2.7	0.0	0.0				9.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	31.3	13.7	2.7	0.0	0.0				9.3	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1236	569	1271	2719	0				199	0	
V/C Ratio(X)	0.00	0.93	0.48	0.23	0.21	0.00				0.84	0.00	
Avail Cap(c_a), veh/h	0	1382	633	1271	2719	0				530	0	
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.27	0.27	0.53	0.53	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	31.3	24.1	8.5	0.0	0.0				43.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	4.5	0.8	0.0	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	13.3	4.8	0.9	0.0	0.0				4.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	35.7	24.9	8.5	0.1	0.0				47.2	0.0	0.0
LnGrp LOS	A	D	C	A	A	A				D	A	
Approach Vol, veh/h		1421			863						168	A
Approach Delay, s/veh		33.7			3.0						47.2	
Approach LOS		C			A						D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	42.1	42.0		15.9		84.1
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0
Max Green Setting (Gmax), s	15.0	* 41		30.0		60.4
Max Q Clear Time (g_c+I1), s	4.7	33.3		11.3		2.0
Green Ext Time (p_c), s	0.7	3.7		0.1		2.6

Intersection Summary	
HCM 6th Ctrl Delay	23.8
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	190	290	250	90	250	210	1190	190	210	1340	220
Future Volume (veh/h)	190	190	290	250	90	250	210	1190	190	210	1340	220
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	198	198	272	260	94	260	219	1240	198	219	1396	229
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	249	369	299	256	503	412	251	1173	186	223	1549	795
Arrive On Green	0.07	0.20	0.20	0.14	0.27	0.27	0.07	0.39	0.39	0.13	0.44	0.44
Sat Flow, veh/h	3428	1856	1503	1767	1856	1520	3428	3035	481	1767	3526	1549
Grp Volume(v), veh/h	198	198	272	260	94	260	219	716	722	219	1396	229
Grp Sat Flow(s),veh/h/ln	1714	1856	1503	1767	1856	1520	1714	1763	1753	1767	1763	1549
Q Serve(g_s), s	7.8	13.1	24.2	19.8	5.3	20.5	8.6	52.8	52.8	16.9	50.2	11.6
Cycle Q Clear(g_c), s	7.8	13.1	24.2	19.8	5.3	20.5	8.6	52.8	52.8	16.9	50.2	11.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.27	1.00		1.00
Lane Grp Cap(c), veh/h	249	369	299	256	503	412	251	682	678	223	1549	795
V/C Ratio(X)	0.80	0.54	0.91	1.01	0.19	0.63	0.87	1.05	1.06	0.98	0.90	0.29
Avail Cap(c_a), veh/h	357	421	341	256	503	412	251	682	678	223	1552	796
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.3	49.1	53.5	58.4	38.2	43.7	62.6	41.9	41.9	59.5	35.5	19.1
Incr Delay (d2), s/veh	4.9	1.2	25.5	60.0	0.1	2.3	25.8	48.7	53.1	55.4	7.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	6.2	11.0	12.9	2.4	7.8	4.6	31.4	32.0	10.9	22.4	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.2	50.3	79.0	118.4	38.3	46.1	88.5	90.6	94.9	115.0	43.3	19.4
LnGrp LOS	E	D	E	F	D	D	F	F	F	F	D	B
Approach Vol, veh/h		668			614			1657			1844	
Approach Delay, s/veh		67.0			75.5			92.2			48.9	
Approach LOS		E			E			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.6	58.1	24.2	32.7	14.4	65.3	14.3	42.6				
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5				
Max Green Setting (Gmax), s	17.2	52.8	19.8	* 31	10.0	* 60	14.2	36.2				
Max Q Clear Time (g_c+I1), s	18.9	54.8	21.8	26.2	10.6	52.2	9.8	22.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	6.6	0.1	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			69.8									
HCM 6th LOS			E									

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1310	920	390	1390	380	160
Future Volume (veh/h)	1310	920	390	1390	380	160
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	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	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1337	939	398	1418	388	163
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1510	879	442	2152	495	220
Arrive On Green	0.48	0.48	0.14	0.68	0.16	0.16
Sat Flow, veh/h	3256	1385	3086	3256	3181	1415
Grp Volume(v), veh/h	1337	939	398	1418	388	163
Grp Sat Flow(s),veh/h/ln	1586	1385	1543	1586	1590	1415
Q Serve(g_s), s	28.5	35.5	9.5	19.4	8.8	8.2
Cycle Q Clear(g_c), s	28.5	35.5	9.5	19.4	8.8	8.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1510	879	442	2152	495	220
V/C Ratio(X)	0.89	1.07	0.90	0.66	0.78	0.74
Avail Cap(c_a), veh/h	1510	879	442	2186	1151	512
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	17.7	11.6	31.4	7.0	30.3	30.1
Incr Delay (d2), s/veh	6.9	50.2	20.4	1.1	1.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	26.9	4.6	4.6	3.0	2.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.6	61.9	51.9	8.0	31.3	31.9
LnGrp LOS	C	F	D	A	C	C
Approach Vol, veh/h	2276			1816	551	
Approach Delay, s/veh	40.0			17.6	31.5	
Approach LOS	D			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.1	41.7				56.8		17.8
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	10.7	35.5				* 51		27.0
Max Q Clear Time (g_c+I1), s	11.5	37.5				21.4		10.8
Green Ext Time (p_c), s	0.0	0.0				21.4		0.9

Intersection Summary			
HCM 6th Ctrl Delay			30.2
HCM 6th LOS			C

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	34	0	2210	0	1710	0	395	115
Future Volume (veh/h)	34	0	2210	0	1710	0	395	115
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		0	1856		1856	0	1856	1856
Adj Flow Rate, veh/h		0	2255		1745	0	403	117
Peak Hour Factor		0.98	0.98		0.98	0.98	0.98	0.98
Percent Heavy Veh, %		0	3		3	0	3	3
Cap, veh/h		0	2512		3609	0	522	422
Arrive On Green		0.00	0.71		0.71	0.00	0.15	0.15
Sat Flow, veh/h		0	3711		5400	0	3428	2768
Grp Volume(v), veh/h		0	2255		1745	0	403	117
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1714	1384
Q Serve(g_s), s		0.0	39.2		11.6	0.0	8.7	2.9
Cycle Q Clear(g_c), s		0.0	39.2		11.6	0.0	8.7	2.9
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2512		3609	0	522	422
V/C Ratio(X)		0.00	0.90		0.48	0.00	0.77	0.28
Avail Cap(c_a), veh/h		0	2549		3609	0	1605	1296
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	8.8		4.9	0.0	31.3	28.8
Incr Delay (d2), s/veh		0.0	4.9		0.2	0.0	0.9	0.1
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	8.5		2.4	0.0	3.5	2.3
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	13.7		5.0	0.0	32.2	29.0
LnGrp LOS		A	B		A	A	C	C
Approach Vol, veh/h			2255		1745		520	
Approach Delay, s/veh			13.7		5.0		31.5	
Approach LOS			B		A		C	
Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		61.2		15.7		61.2		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		55.6		36.0		* 54		
Max Q Clear Time (g_c+I1), s		41.2		10.7		13.6		
Green Ext Time (p_c), s		13.5		1.0		27.1		

Intersection Summary		
HCM 6th Ctrl Delay		12.4
HCM 6th LOS		B

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	4	40	229	2	16	90	1970	88	11	1610	30
Future Volume (veh/h)	30	4	40	229	2	16	90	1970	88	11	1610	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.95	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	33	4	43	250	0	17	98	2141	96	12	1750	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	75	6	60	381	0	177	100	2464	1248	36	2301	990
Arrive On Green	0.04	0.04	0.04	0.11	0.00	0.11	0.06	0.70	0.70	0.02	1.00	1.00
Sat Flow, veh/h	1767	133	1425	3534	0	1491	1767	3526	1543	3428	3526	1516
Grp Volume(v), veh/h	33	0	47	250	0	17	98	2141	96	12	1750	33
Grp Sat Flow(s),veh/h/ln	1767	0	1557	1767	0	1491	1767	1763	1543	1714	1763	1516
Q Serve(g_s), s	2.7	0.0	4.5	10.2	0.0	1.5	8.3	69.8	1.9	0.5	0.0	0.0
Cycle Q Clear(g_c), s	2.7	0.0	4.5	10.2	0.0	1.5	8.3	69.8	1.9	0.5	0.0	0.0
Prop In Lane	1.00		0.91	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	75	0	66	381	0	177	100	2464	1248	36	2301	990
V/C Ratio(X)	0.44	0.00	0.71	0.66	0.00	0.10	0.98	0.87	0.08	0.33	0.76	0.03
Avail Cap(c_a), veh/h	188	0	166	825	0	364	100	2464	1248	91	2301	990
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.73	0.73	0.73
Uniform Delay (d), s/veh	70.1	0.0	70.9	64.3	0.0	59.0	70.7	17.3	3.0	72.9	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	5.3	0.7	0.0	0.1	82.5	4.5	0.1	1.5	1.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.9	4.7	0.0	0.6	6.0	26.0	1.0	0.2	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.6	0.0	76.2	65.0	0.0	59.1	153.2	21.8	3.1	74.4	1.8	0.0
LnGrp LOS	E	A	E	E	A	E	F	C	A	E	A	A
Approach Vol, veh/h		80			267			2335			1795	
Approach Delay, s/veh		74.3			64.6			26.6			2.2	
Approach LOS		E			E			C			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	111.7		11.2	12.9	104.8		21.1				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 75		16.0	8.5	69.4		35.0				
Max Q Clear Time (g_c+I1), s	2.5	71.8		6.5	10.3	2.0		12.2				
Green Ext Time (p_c), s	0.0	3.1		0.1	0.0	27.6		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			19.9
HCM 6th LOS			B

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	10	100	30	10	30	110	1830	60	20	1460	40
Future Volume (veh/h)	30	10	100	30	10	30	110	1830	60	20	1460	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.96	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	31	10	102	31	10	31	112	1867	61	20	1490	41
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	54	19	109	79	28	55	479	2633	1132	15	1664	713
Arrive On Green	0.12	0.10	0.12	0.12	0.10	0.12	0.27	0.75	0.75	0.01	0.47	0.47
Sat Flow, veh/h	256	197	1127	461	293	570	1767	3526	1516	1767	3526	1511
Grp Volume(v), veh/h	143	0	0	72	0	0	112	1867	61	20	1490	41
Grp Sat Flow(s),veh/h/ln	1580	0	0	1324	0	0	1767	1763	1516	1767	1763	1511
Q Serve(g_s), s	5.5	0.0	0.0	0.0	0.0	0.0	7.4	42.8	1.6	1.3	58.0	2.2
Cycle Q Clear(g_c), s	12.9	0.0	0.0	7.4	0.0	0.0	7.4	42.8	1.6	1.3	58.0	2.2
Prop In Lane	0.22		0.71	0.43		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	214	0	0	189	0	0	479	2633	1132	15	1664	713
V/C Ratio(X)	0.67	0.00	0.00	0.38	0.00	0.00	0.23	0.71	0.05	1.35	0.90	0.06
Avail Cap(c_a), veh/h	348	0	0	318	0	0	479	2633	1132	54	1944	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	0.00	1.00	0.00	0.00	0.34	0.34	0.34	0.73	0.73	0.73
Uniform Delay (d), s/veh	65.5	0.0	0.0	63.0	0.0	0.0	42.5	10.2	5.0	74.4	36.2	21.5
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.5	0.0	0.0	0.0	0.6	0.0	179.5	6.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	2.5	0.0	0.0	3.2	14.1	0.5	1.3	25.2	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.9	0.0	0.0	63.5	0.0	0.0	42.6	10.8	5.0	253.8	42.2	21.6
LnGrp LOS	E	A	A	E	A	A	D	B	A	F	D	C
Approach Vol, veh/h		143			72			2040			1551	
Approach Delay, s/veh		66.9			63.5			12.4			44.4	
Approach LOS		E			E			B			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.7	120.9		22.4	47.6	80.0		22.4
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9
Max Green Setting (Gmax), s	5.6	98.2		31.0	17.8	* 86		31.0
Max Q Clear Time (g_c+I1), s	3.3	45.8		14.9	9.4	61.0		9.4
Green Ext Time (p_c), s	0.0	28.3		0.5	0.1	12.8		0.2

Intersection Summary	
HCM 6th Ctrl Delay	28.4
HCM 6th LOS	C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	340	260	20	10	360	990	490	0	900	10
Future Volume (veh/h)	10	10	340	260	20	10	360	990	490	0	900	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.97	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	10	10	354	271	21	10	375	1031	510	0	938	10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	0	3	3
Cap, veh/h	249	238	796	328	335	159	397	1190	981	0	1384	15
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.85	0.85	0.00	0.39	0.39
Sat Flow, veh/h	747	834	1551	1010	1173	559	1767	1856	1529	0	3665	38
Grp Volume(v), veh/h	20	0	354	271	0	31	375	1031	510	0	463	485
Grp Sat Flow(s),veh/h/ln	1581	0	1551	1010	0	1732	1767	1856	1529	0	1763	1847
Q Serve(g_s), s	0.0	0.0	21.7	39.8	0.0	2.0	31.1	46.9	13.2	0.0	32.7	32.7
Cycle Q Clear(g_c), s	1.2	0.0	21.7	40.9	0.0	2.0	31.1	46.9	13.2	0.0	32.7	32.7
Prop In Lane	0.50		1.00	1.00		0.32	1.00		1.00	0.00		0.02
Lane Grp Cap(c), veh/h	487	0	796	328	0	494	397	1190	981	0	683	716
V/C Ratio(X)	0.04	0.00	0.44	0.83	0.00	0.06	0.95	0.87	0.52	0.00	0.68	0.68
Avail Cap(c_a), veh/h	487	0	796	328	0	494	517	1190	981	0	683	716
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.64	0.64	0.64	0.00	1.00	1.00
Uniform Delay (d), s/veh	38.7	0.0	23.3	53.5	0.0	39.0	51.7	7.4	4.9	0.0	38.2	38.2
Incr Delay (d2), s/veh	0.0	0.0	0.1	14.8	0.0	0.0	16.1	5.7	1.3	0.0	5.3	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	8.1	11.4	0.0	0.9	14.6	8.1	3.1	0.0	15.2	15.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	0.0	23.5	68.3	0.0	39.0	67.8	13.1	6.2	0.0	43.5	43.3
LnGrp LOS	D	A	C	E	A	D	E	B	A	A	D	D
Approach Vol, veh/h		374			302			1916			948	
Approach Delay, s/veh		24.3			65.3			22.0			43.4	
Approach LOS		C			E			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		102.3		47.7	38.1	64.2		47.7				
Change Period (Y+Rc), s		6.1		4.9	4.4	* 6.1		4.9				
Max Green Setting (Gmax), s		96.2		42.8	43.9	* 49		42.8				
Max Q Clear Time (g_c+I1), s		48.9		23.7	33.1	34.7		42.9				
Green Ext Time (p_c), s		19.5		0.7	0.6	5.7		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			31.7
HCM 6th LOS			C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	790	1880	920	0	0	2190
Future Volume (vph)	790	1880	920	0	0	2190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	806	1918	939	0	0	2235
RTOR Reduction (vph)	0	5	0	0	0	0
Lane Group Flow (vph)	806	1913	939	0	0	2235
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	34.9	96.0	39.0			100.1
Effective Green, g (s)	34.9	96.0	39.0			100.1
Actuated g/C Ratio	0.23	0.64	0.26			0.67
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	791	1766	911			4234
v/s Ratio Prot	0.24	c0.69	c0.27			0.35
v/s Ratio Perm						
v/c Ratio	1.02	1.08	1.03			0.53
Uniform Delay, d1	57.6	27.0	55.5			12.8
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	36.8	47.9	38.0			0.1
Delay (s)	94.4	74.9	93.5			12.9
Level of Service	F	E	F			B
Approach Delay (s)	80.7		93.5			12.9
Approach LOS	F		F			B

Intersection Summary			
HCM 2000 Control Delay	57.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2450	10	1570	0	0	1280
Future Volume (vph)	2450	10	1570	0	0	1280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	2500	10	1602	0	0	1306
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	2500	9	1602	0	0	1306
Confl. Bikes (#/hr)						11
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	82.5	82.5	52.5			52.5
Effective Green, g (s)	82.5	82.5	52.5			52.5
Actuated g/C Ratio	0.55	0.55	0.35			0.35
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1870	862	1226			1226
v/s Ratio Prot	c0.74		c0.46			0.37
v/s Ratio Perm		0.01				
v/c Ratio	1.34	0.01	1.31			1.07
Uniform Delay, d1	33.8	15.3	48.8			48.8
Progression Factor	1.00	1.00	0.64			1.00
Incremental Delay, d2	155.3	0.0	143.6			45.0
Delay (s)	189.1	15.3	175.0			93.8
Level of Service	F	B	F			F
Approach Delay (s)	188.4		175.0			93.8
Approach LOS	F		F			F

Intersection Summary			
HCM 2000 Control Delay	161.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	125.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑						↑↑	↱			
Traffic Volume (vph)	0	600	0	0	0	0	0	980	840	0	0	0
Future Volume (vph)	0	600	0	0	0	0	0	980	840	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1542			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1542			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	652	0	0	0	0	0	1065	913	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	652	0	0	0	0	0	1065	913	0	0	0
Confl. Bikes (#/hr)									20			
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		60.4						76.1	150.0			
Effective Green, g (s)		60.4						76.1	150.0			
Actuated g/C Ratio		0.40						0.51	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		742						1778	1542			
v/s Ratio Prot		c0.35						0.30				
v/s Ratio Perm									c0.59			
v/c Ratio		0.88						0.60	0.59			
Uniform Delay, d1		41.4						26.2	0.0			
Progression Factor		0.19						1.00	1.00			
Incremental Delay, d2		6.1						1.5	1.7			
Delay (s)		14.0						27.7	1.7			
Level of Service		B						C	A			
Approach Delay (s)		14.0			0.0			15.7			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1260	90	0	0	0	0	0	0	20	1570	0
Future Volume (vph)	0	1260	90	0	0	0	0	0	0	20	1570	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	0.99								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1548								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1548								3503	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1286	92	0	0	0	0	0	0	20	1602	0
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	1286	72	0	0	0	0	0	0	0	1611	0
Confl. Bikes (#/hr)			1						1			12
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		60.4	60.4								76.1	
Effective Green, g (s)		60.4	60.4								76.1	
Actuated g/C Ratio		0.40	0.40								0.51	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1411	623								1777	
v/s Ratio Prot		c0.37										
v/s Ratio Perm			0.05								0.46	
v/c Ratio		0.91	0.12								0.91	
Uniform Delay, d1		42.3	28.1								33.7	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		10.4	0.4								0.9	
Delay (s)		52.7	28.4								34.5	
Level of Service		D	C								C	
Approach Delay (s)		51.1			0.0			0.0			34.5	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	42.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX Q

PEAK HOUR QUEUING ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITHOUT PROJECT

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	245	460	166	282	279	341	269
Average Queue (ft)	213	225	232	70	162	149	183	105
95th Queue (ft)	268	277	492	138	249	253	303	199
Link Distance (ft)			433	433	1194	1194	379	379
Upstream Blk Time (%)			2				0	
Queuing Penalty (veh)			11				0	
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	4	18	0					
Queuing Penalty (veh)	11	47	0					

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	329	252	56	162	173	272	88	473	175
Average Queue (ft)	164	86	14	99	120	37	12	181	60
95th Queue (ft)	330	196	40	177	180	177	53	399	196
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)						0		2	
Queuing Penalty (veh)						0		0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				1	4			8	0
Queuing Penalty (veh)				1	6			61	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	T	R	L	T	R	L	L	T	TR	L
Maximum Queue (ft)	64	48	57	58	102	146	90	168	335	585	552	197
Average Queue (ft)	18	12	8	12	41	55	23	85	124	301	267	79
95th Queue (ft)	46	38	33	41	86	111	61	145	337	502	463	153
Link Distance (ft)			449			329				1280	1280	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	260	260		250	155		200	310	310			240
Storage Blk Time (%)						0			0	11		
Queuing Penalty (veh)						0			0	28		

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	301	413	86
Average Queue (ft)	142	162	39
95th Queue (ft)	230	294	69
Link Distance (ft)	903	903	903
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)	1		
Queuing Penalty (veh)	1		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	810	812	240	106	112	220	236	163	167	110
Average Queue (ft)	780	773	232	43	58	94	119	90	76	15
95th Queue (ft)	827	844	297	88	96	185	210	147	139	62
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		60	0							
Queuing Penalty (veh)		169	3							

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	117	276	268	303	226	110	62	9	32	15
Average Queue (ft)	21	217	178	136	80	35	26	1	11	1
95th Queue (ft)	78	315	306	262	179	85	51	9	33	8
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)		26		9						
Queuing Penalty (veh)		4		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	L	T
Maximum Queue (ft)	64	59	31	45	47	204	294	306	175	52	32	372
Average Queue (ft)	20	17	7	8	7	90	92	100	22	11	1	126
95th Queue (ft)	52	48	26	32	30	173	240	247	108	37	25	315
Link Distance (ft)		89	63	63			2238	2238				2582
Upstream Blk Time (%)	0	0		0	0							
Queuing Penalty (veh)	0	0		0	0							
Storage Bay Dist (ft)	50				55	180			180	180	180	
Storage Blk Time (%)	6	0		1	0	1	2	3	0			5
Queuing Penalty (veh)	1	0		0	0	8	3	4	0			0

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	416	146
Average Queue (ft)	152	9
95th Queue (ft)	349	65
Link Distance (ft)	2582	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		180
Storage Blk Time (%)	6	0
Queuing Penalty (veh)	1	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	137	56	256	477	427	160	119	451	459	205
Average Queue (ft)	45	19	95	172	133	9	13	216	231	24
95th Queue (ft)	98	47	200	351	299	66	64	404	419	115
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	4	1	0		11	14	0
Queuing Penalty (veh)			1	4	0	0		1	4	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	45	184	124	296	180	486	214	238	211
Average Queue (ft)	3	67	109	91	85	177	33	178	106
95th Queue (ft)	22	138	142	253	155	403	118	251	196
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								4	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		3	21	0					
Queuing Penalty (veh)		0	4	0					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	525	796	798	525	193	200	121	283	344	266
Average Queue (ft)	466	761	761	344	172	156	35	89	168	123
95th Queue (ft)	682	819	842	547	198	211	86	208	293	234
Link Distance (ft)		748	748				894	894	894	894
Upstream Blk Time (%)		31	39							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	72	5	1						
Queuing Penalty (veh)	1	195	50	7						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	123	285
Average Queue (ft)	8	75
95th Queue (ft)	71	255
Link Distance (ft)	312	312
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	796	797	104	241	260	447	416
Average Queue (ft)	759	760	6	226	230	255	220
95th Queue (ft)	780	782	51	235	248	366	331
Link Distance (ft)	737	737		216	216		
Upstream Blk Time (%)	68	67		24	23		
Queuing Penalty (veh)	0	0		169	159		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		58	0				
Queuing Penalty (veh)		6	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	NB	NB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	167	490	707	140
Average Queue (ft)	92	292	502	98
95th Queue (ft)	153	442	846	203
Link Distance (ft)	120	657	657	
Upstream Blk Time (%)	7		14	
Queuing Penalty (veh)	105		0	
Storage Bay Dist (ft)				115
Storage Blk Time (%)			8	0
Queuing Penalty (veh)			118	2

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	659	655	217	629	635
Average Queue (ft)	627	624	19	380	389
95th Queue (ft)	645	640	110	588	592
Link Distance (ft)	605	605		633	633
Upstream Blk Time (%)	92	76		1	2
Queuing Penalty (veh)	0	0		19	21
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		7	0		
Queuing Penalty (veh)		1	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	144	300	149
Average Queue (ft)	6	53	8
95th Queue (ft)	64	190	75
Link Distance (ft)	319	319	319
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	NB	NB	SB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	305	285	211	224
Average Queue (ft)	237	202	33	35
95th Queue (ft)	324	297	146	153
Link Distance (ft)	267	267	216	216
Upstream Blk Time (%)	5	1	1	1
Queuing Penalty (veh)	23	6	17	18
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement	WB
Directions Served	R
Maximum Queue (ft)	9
Average Queue (ft)	0
95th Queue (ft)	8
Link Distance (ft)	472
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	29	25
Average Queue (ft)	4	1
95th Queue (ft)	20	13
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1296

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	244	402	172	386	396	358	404
Average Queue (ft)	182	193	112	54	193	207	179	225
95th Queue (ft)	259	270	303	119	321	344	314	383
Link Distance (ft)			433	433			379	379
Upstream Blk Time (%)			0				1	3
Queuing Penalty (veh)			3				0	0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	2	6	0					
Queuing Penalty (veh)	4	16	0					

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	261	179	92	156	170	174	121	494	175
Average Queue (ft)	81	45	29	88	106	43	35	340	131
95th Queue (ft)	207	128	70	156	161	123	92	609	253
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								24	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	2	0		5	24
Queuing Penalty (veh)				1	6	0		53	39

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	B47	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	T	L	L	T	TR
Maximum Queue (ft)	130	156	244	242	179	394	225	131	196	335	1062	1044
Average Queue (ft)	46	58	100	107	150	158	112	21	103	212	684	674
95th Queue (ft)	103	121	196	208	207	399	238	134	181	443	1176	1159
Link Distance (ft)			449			329		336			1280	1280
Upstream Blk Time (%)						6		1			0	0
Queuing Penalty (veh)						0		0			2	1
Storage Bay Dist (ft)	260	260		250	155		200		310	310		
Storage Blk Time (%)			0	1	23	1	1			0	47	
Queuing Penalty (veh)			0	2	78	6	2			0	99	

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	265	965	994	1072
Average Queue (ft)	229	881	906	860
95th Queue (ft)	340	1013	1045	1396
Link Distance (ft)		903	903	903
Upstream Blk Time (%)		12	24	14
Queuing Penalty (veh)		64	126	72
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	7	60		
Queuing Penalty (veh)	45	127		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	792	816	240	182	194	318	358	196	162	56
Average Queue (ft)	747	785	240	103	103	185	211	109	72	17
95th Queue (ft)	844	807	241	164	169	302	323	173	137	43
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		50	4			0				
Queuing Penalty (veh)		458	26			1				

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	133	281	293	319	303	264	200	150	85	40
Average Queue (ft)	43	256	257	245	173	117	104	37	35	11
95th Queue (ft)	119	272	276	347	286	215	171	94	68	35
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	51		33						
Queuing Penalty (veh)	0	17		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	B55	B55	NB	NB	NB	NB	SB
Directions Served	L	TR	L	LT	R	T	T	L	T	T	R	L
Maximum Queue (ft)	66	99	142	166	63	42	84	204	511	524	205	58
Average Queue (ft)	31	30	76	114	15	2	8	91	264	276	36	11
95th Queue (ft)	64	70	132	177	52	23	44	186	479	483	154	39
Link Distance (ft)		89	63	63		714	714		2238	2238		
Upstream Blk Time (%)	0	0	18	39	0							
Queuing Penalty (veh)	0	0	23	48	0							
Storage Bay Dist (ft)	50				55			180			180	180
Storage Blk Time (%)	13	2		51	1			0	12	14	0	
Queuing Penalty (veh)	6	1		8	1			0	11	12	0	

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	102	532	551	204
Average Queue (ft)	5	302	323	30
95th Queue (ft)	54	490	508	136
Link Distance (ft)		2582	2582	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	180			180
Storage Blk Time (%)		22	25	0
Queuing Penalty (veh)		2	8	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	166	102	260	602	568	260	182	532	559	205
Average Queue (ft)	69	37	105	308	270	37	27	234	253	20
95th Queue (ft)	135	80	241	545	507	161	100	443	470	104
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	15	8	0	0	13	16	0
Queuing Penalty (veh)			0	17	5	0	0	3	6	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	108	208	124	407	459	615	167	256	251
Average Queue (ft)	11	86	118	199	256	273	59	223	201
95th Queue (ft)	49	181	138	377	411	546	126	263	282
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)				0				28	16
Queuing Penalty (veh)				0				0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)	0	8	43	1					
Queuing Penalty (veh)	0	2	13	2					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	525	784	787	525	199	201	173	293	341	290
Average Queue (ft)	420	673	697	411	176	177	65	129	191	153
95th Queue (ft)	586	904	896	560	188	188	133	247	314	262
Link Distance (ft)		748	748				789	789	789	789
Upstream Blk Time (%)		7	10							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	19	3	0						
Queuing Penalty (veh)	1	75	27	2						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	SB	SB	SB
Directions Served	T	T	TR
Maximum Queue (ft)	58	170	278
Average Queue (ft)	2	14	77
95th Queue (ft)	33	95	247
Link Distance (ft)	312	312	312
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	764	767	101	243	242	1148	1150
Average Queue (ft)	736	736	5	226	226	1104	1098
95th Queue (ft)	753	756	43	236	237	1196	1211
Link Distance (ft)	715	715		217	217		
Upstream Blk Time (%)	58	58		60	61		
Queuing Penalty (veh)	0	0		397	400		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		50	0				
Queuing Penalty (veh)		5	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	B48	B48	NB	NB	NB
Directions Served	T	T		T	T	R
Maximum Queue (ft)	157	9	6	655	698	140
Average Queue (ft)	74	0	0	404	474	131
95th Queue (ft)	141	5	5	598	757	186
Link Distance (ft)	121	139	139	657	657	
Upstream Blk Time (%)	6			0	8	
Queuing Penalty (veh)	74			0	0	
Storage Bay Dist (ft)						115
Storage Blk Time (%)					27	1
Queuing Penalty (veh)					228	4

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	654	656	250	640	644
Average Queue (ft)	625	624	42	349	363
95th Queue (ft)	642	639	144	560	569
Link Distance (ft)	605	605		634	634
Upstream Blk Time (%)	89	74		1	2
Queuing Penalty (veh)	0	0		22	24
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		5	0		
Queuing Penalty (veh)		5	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	17	203	194
Average Queue (ft)	1	21	7
95th Queue (ft)	9	105	72
Link Distance (ft)	319	319	319
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 36: SeaWorld Dr/Telecote Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	NB	NB	SB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	312	303	136	163
Average Queue (ft)	270	266	15	20
95th Queue (ft)	344	334	96	112
Link Distance (ft)	267	267	217	217
Upstream Blk Time (%)	9	7	1	1
Queuing Penalty (veh)	42	34	20	23
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement	B50	B50	WB
Directions Served	T	T	R
Maximum Queue (ft)	339	353	62
Average Queue (ft)	11	12	9
95th Queue (ft)	260	272	40
Link Distance (ft)	2182	2182	472
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	69	35
Average Queue (ft)	34	4
95th Queue (ft)	55	22
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2800

APPENDIX R

HCS FREEWAY ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITHOUT PROJECT

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8423	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1544
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7875	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1444
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.3
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	6978	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1280
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.5
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	20.8
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8948	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1641
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.82
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	56.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.1
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9475	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2085
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.97
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	49.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	42.2
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8858	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1949
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	36.5
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7850	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1727
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	10065	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2215
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.03
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4274	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1150
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.55
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.5
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3344	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	900
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	14.5
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	5424	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1168
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.5
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	5223	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1125
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	17.8
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

APPENDIX S

PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITH PROJECT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	918	543	0	0	475	310	292	10	430	0	0	0
Future Volume (veh/h)	918	543	0	0	475	310	292	10	430	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	956	566	0	0	495	323	304	10	448			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1158	2344	0	0	547	355	401	13	368			
Arrive On Green	0.56	1.00	0.00	0.00	0.27	0.27	0.23	0.23	0.23			
Sat Flow, veh/h	3428	3618	0	0	2100	1305	1713	56	1572			
Grp Volume(v), veh/h	956	566	0	0	434	384	314	0	448			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1550	1770	0	1572			
Q Serve(g_s), s	22.8	0.0	0.0	0.0	23.8	23.9	16.5	0.0	23.4			
Cycle Q Clear(g_c), s	22.8	0.0	0.0	0.0	23.8	23.9	16.5	0.0	23.4			
Prop In Lane	1.00		0.00	0.00		0.84	0.97		1.00			
Lane Grp Cap(c), veh/h	1158	2344	0	0	480	422	414	0	368			
V/C Ratio(X)	0.83	0.24	0.00	0.00	0.90	0.91	0.76	0.00	1.22			
Avail Cap(c_a), veh/h	1158	2344	0	0	520	457	414	0	368			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.69	0.69	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	19.4	0.0	0.0	0.0	35.1	35.2	35.7	0.0	38.3			
Incr Delay (d2), s/veh	3.5	0.2	0.0	0.0	23.1	26.0	7.1	0.0	120.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	6.8	0.1	0.0	0.0	12.9	11.8	7.8	0.0	30.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.9	0.2	0.0	0.0	58.3	61.2	42.8	0.0	158.5			
LnGrp LOS	C	A	A	A	E	E	D	A	F			
Approach Vol, veh/h		1522			818			762				
Approach Delay, s/veh		14.5			59.6			110.8				
Approach LOS		B			E			F				

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s		72.0		28.0	39.3	32.7		
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5		
Max Green Setting (Gmax), s		66.5		23.4	32.8	* 30		
Max Q Clear Time (g_c+I1), s		2.0		25.4	24.8	25.9		
Green Ext Time (p_c), s		2.6		0.0	2.6	1.3		

Intersection Summary	
HCM 6th Ctrl Delay	50.0
HCM 6th LOS	D

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1151	78	370	317	0	0	0	0	190	0	783
Future Volume (veh/h)	0	1151	78	370	317	0	0	0	0	190	0	783
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1251	85	402	345	0				207	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1406	614	1098	2711	0				238	0	
Arrive On Green	0.00	0.40	0.40	0.32	0.77	0.00				0.13	0.00	0.00
Sat Flow, veh/h	0	3618	1540	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1251	85	402	345	0				207	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1540	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	33.1	3.5	9.0	2.5	0.0				11.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	33.1	3.5	9.0	2.5	0.0				11.5	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1406	614	1098	2711	0				238	0	
V/C Ratio(X)	0.00	0.89	0.14	0.37	0.13	0.00				0.87	0.00	
Avail Cap(c_a), veh/h	0	1646	719	1098	2711	0				366	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.34	0.34	0.68	0.68	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	28.0	19.1	26.2	3.0	0.0				42.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.3	0.2	0.1	0.1	0.0				8.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	13.6	1.2	3.6	0.7	0.0				5.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	31.3	19.3	26.3	3.0	0.0				51.1	0.0	0.0
LnGrp LOS	A	C	B	C	A	A				D	A	
Approach Vol, veh/h		1336			747						207	A
Approach Delay, s/veh		30.5			15.6						51.1	
Approach LOS		C			B						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	37.0	44.9		18.1		81.9						
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0						
Max Green Setting (Gmax), s	18.8	* 47		20.7		69.7						
Max Q Clear Time (g_c+I1), s	11.0	35.1		13.5		4.5						
Green Ext Time (p_c), s	0.9	4.8		0.1		1.5						
Intersection Summary												
HCM 6th Ctrl Delay			27.5									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	50	100	72	140	100	260	1139	81	180	880	200
Future Volume (veh/h)	80	50	100	72	140	100	260	1139	81	180	880	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	83	52	104	75	146	104	271	1186	84	188	917	208
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	159	213	169	96	227	179	370	1385	98	231	1546	752
Arrive On Green	0.05	0.11	0.11	0.05	0.12	0.12	0.11	0.42	0.42	0.13	0.44	0.44
Sat Flow, veh/h	3428	1856	1477	1767	1856	1458	3428	3334	236	1767	3526	1549
Grp Volume(v), veh/h	83	52	104	75	146	104	271	626	644	188	917	208
Grp Sat Flow(s),veh/h/ln	1714	1856	1477	1767	1856	1458	1714	1763	1807	1767	1763	1549
Q Serve(g_s), s	1.6	1.8	4.6	2.9	5.2	4.6	5.3	22.2	22.2	7.1	13.6	5.5
Cycle Q Clear(g_c), s	1.6	1.8	4.6	2.9	5.2	4.6	5.3	22.2	22.2	7.1	13.6	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	159	213	169	96	227	179	370	732	751	231	1546	752
V/C Ratio(X)	0.52	0.24	0.61	0.79	0.64	0.58	0.73	0.86	0.86	0.81	0.59	0.28
Avail Cap(c_a), veh/h	239	836	666	103	804	632	553	764	783	411	1784	856
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.1	27.7	29.0	32.1	28.7	28.5	29.7	18.2	18.3	29.1	14.7	10.5
Incr Delay (d2), s/veh	1.0	0.6	3.6	27.0	1.1	1.1	1.1	9.7	9.7	2.6	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	1.7	1.9	2.2	1.5	2.1	9.6	9.9	3.0	4.7	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.1	28.3	32.6	59.2	29.9	29.6	30.8	27.9	27.9	31.7	15.3	10.9
LnGrp LOS	C	C	C	E	C	C	C	C	C	C	B	B
Approach Vol, veh/h		239			325			1541			1313	
Approach Delay, s/veh		31.8			36.6			28.4			16.9	
Approach LOS		C			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	33.9	8.1	13.4	11.8	35.5	7.6	13.9
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	9.1	24.2	4.9	6.6	7.3	15.6	3.6	7.2
Green Ext Time (p_c), s	0.1	4.3	0.0	0.6	0.2	9.6	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1370	282	160	852	294	220
Future Volume (veh/h)	1370	282	160	852	294	220
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1670	1670	1670	1670	1670	1670
Adj Flow Rate, veh/h	1427	294	167	888	353	178
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	1668	970	241	2112	510	227
Arrive On Green	0.53	0.53	0.08	0.67	0.16	0.16
Sat Flow, veh/h	3256	1413	3086	3256	3181	1415
Grp Volume(v), veh/h	1427	294	167	888	353	178
Grp Sat Flow(s),veh/h/ln	1586	1413	1543	1586	1590	1415
Q Serve(g_s), s	27.6	5.9	3.8	9.3	7.5	8.6
Cycle Q Clear(g_c), s	27.6	5.9	3.8	9.3	7.5	8.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1668	970	241	2112	510	227
V/C Ratio(X)	0.86	0.30	0.69	0.42	0.69	0.78
Avail Cap(c_a), veh/h	1762	1012	286	2287	1205	536
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	14.6	4.4	32.0	5.5	28.3	28.7
Incr Delay (d2), s/veh	4.4	0.2	3.9	0.3	0.6	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	2.1	1.4	2.1	2.6	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.0	4.7	35.9	5.8	28.9	31.0
LnGrp LOS	B	A	D	A	C	C
Approach Vol, veh/h	1721			1055	531	
Approach Delay, s/veh	16.5			10.6	29.6	
Approach LOS	B			B	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	43.7				53.7		17.6
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	6.6	39.6				* 51		27.0
Max Q Clear Time (g_c+I1), s	5.8	29.6				11.3		10.6
Green Ext Time (p_c), s	0.0	7.9				14.7		0.8

Intersection Summary	
HCM 6th Ctrl Delay	16.7
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	17	0	1635	0	1106	0	88	26
Future Volume (veh/h)	17	0	1635	0	1106	0	88	26
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		0	1856		1856	0	1870	1870
Adj Flow Rate, veh/h		0	1686		1140	0	91	27
Peak Hour Factor		0.97	0.97		0.97	0.97	0.97	0.97
Percent Heavy Veh, %		0	3		3	0	2	2
Cap, veh/h		0	2244		3224	0	551	445
Arrive On Green		0.00	0.64		0.64	0.00	0.16	0.16
Sat Flow, veh/h		0	3711		5400	0	3456	2790
Grp Volume(v), veh/h		0	1686		1140	0	91	27
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1728	1395
Q Serve(g_s), s		0.0	17.0		5.4	0.0	1.2	0.4
Cycle Q Clear(g_c), s		0.0	17.0		5.4	0.0	1.2	0.4
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2244		3224	0	551	445
V/C Ratio(X)		0.00	0.75		0.35	0.00	0.17	0.06
Avail Cap(c_a), veh/h		0	2464		3590	0	2443	1972
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	6.5		4.3	0.0	18.5	18.2
Incr Delay (d2), s/veh		0.0	1.4		0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	2.3		0.8	0.0	0.4	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	7.9		4.5	0.0	18.5	18.2
LnGrp LOS		A	A		A	A	B	B
Approach Vol, veh/h			1686		1140		118	
Approach Delay, s/veh			7.9		4.5		18.5	
Approach LOS			A		A		B	
Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		38.8		12.1		38.8		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		35.6		36.0		* 36		
Max Q Clear Time (g_c+I1), s		19.0		3.2		7.4		
Green Ext Time (p_c), s		13.4		0.2		13.6		

Intersection Summary		
HCM 6th Ctrl Delay		7.0
HCM 6th LOS		A

Notes

User approved ignoring U-Turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	20	94	1	19	130	1460	227	22	1400	20
Future Volume (veh/h)	20	0	20	94	1	19	130	1460	227	22	1400	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.95	1.00		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	0	22	104	0	21	143	1604	249	24	1538	22
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	42	0	35	178	0	101	141	2736	1272	57	2513	1088
Arrive On Green	0.02	0.00	0.02	0.05	0.00	0.05	0.08	0.78	0.78	0.03	1.00	1.00
Sat Flow, veh/h	1767	0	1498	3534	0	1488	1767	3526	1537	3428	3526	1527
Grp Volume(v), veh/h	22	0	22	104	0	21	143	1604	249	24	1538	22
Grp Sat Flow(s),veh/h/ln	1767	0	1498	1767	0	1488	1767	1763	1537	1714	1763	1527
Q Serve(g_s), s	1.9	0.0	2.3	4.5	0.0	2.1	12.6	29.5	5.3	1.1	0.0	0.0
Cycle Q Clear(g_c), s	1.9	0.0	2.3	4.5	0.0	2.1	12.6	29.5	5.3	1.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	42	0	35	178	0	101	141	2736	1272	57	2513	1088
V/C Ratio(X)	0.53	0.00	0.62	0.58	0.00	0.21	1.01	0.59	0.20	0.42	0.61	0.02
Avail Cap(c_a), veh/h	179	0	152	783	0	355	141	2736	1272	87	2513	1088
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.76	0.76	0.76
Uniform Delay (d), s/veh	76.3	0.0	76.5	73.4	0.0	69.8	72.7	7.3	2.8	75.7	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.0	6.6	1.1	0.0	0.4	79.7	0.9	0.3	1.4	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.0	2.1	0.0	0.8	8.8	9.6	2.0	0.5	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.1	0.0	83.0	74.5	0.0	70.1	152.4	8.2	3.2	77.1	0.9	0.0
LnGrp LOS	F	A	F	E	A	E	F	A	A	E	A	A
Approach Vol, veh/h		44			125			1996			1584	
Approach Delay, s/veh		81.6			73.8			17.9			2.0	
Approach LOS		F			E			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.0	129.5		8.6	17.0	119.5		12.9				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 83		16.0	12.6	73.3		35.0				
Max Q Clear Time (g_c+I1), s	3.1	31.5		4.3	14.6	2.0		6.5				
Green Ext Time (p_c), s	0.0	25.6		0.0	0.0	21.5		0.2				

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

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	60	10	10	10	120	1439	20	10	1373	30
Future Volume (veh/h)	20	10	60	10	10	10	120	1439	20	10	1373	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.98	1.00		0.95	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	11	65	11	11	11	129	1547	22	11	1476	32
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	3	3	3	3	3	3
Cap, veh/h	54	33	116	76	74	60	635	2759	1183	17	1469	634
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.36	0.78	0.78	0.02	0.83	0.84
Sat Flow, veh/h	234	294	1040	412	667	539	1767	3526	1512	1767	3526	1504
Grp Volume(v), veh/h	98	0	0	33	0	0	129	1547	22	11	1476	32
Grp Sat Flow(s),veh/h/ln	1569	0	0	1617	0	0	1767	1763	1512	1767	1763	1504
Q Serve(g_s), s	3.5	0.0	0.0	0.0	0.0	0.0	8.0	26.9	0.5	1.0	65.8	0.6
Cycle Q Clear(g_c), s	9.1	0.0	0.0	2.7	0.0	0.0	8.0	26.9	0.5	1.0	65.8	0.6
Prop In Lane	0.22		0.66	0.33		0.33	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	203	0	0	211	0	0	635	2759	1183	17	1469	634
V/C Ratio(X)	0.48	0.00	0.00	0.16	0.00	0.00	0.20	0.56	0.02	0.64	1.00	0.05
Avail Cap(c_a), veh/h	343	0	0	352	0	0	635	2759	1183	51	1964	845
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.73	0.73	0.73	0.77	0.77	0.77
Uniform Delay (d), s/veh	66.4	0.0	0.0	63.6	0.0	0.0	35.0	6.6	3.8	77.2	13.2	7.2
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	10.9	21.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	1.2	0.0	0.0	3.4	8.5	0.1	0.5	9.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.0	0.0	0.0	63.7	0.0	0.0	35.0	7.3	3.8	88.1	35.0	7.3
LnGrp LOS	E	A	A	E	A	A	D	A	A	F	F	A
Approach Vol, veh/h		98			33			1698			1519	
Approach Delay, s/veh		67.0			63.7			9.3			34.8	
Approach LOS		E			E			A			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	129.6		22.5	56.3	79.2		22.5				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	4.6	106.1		32.1	21.6	* 89		32.1				
Max Q Clear Time (g_c+I1), s	3.0	28.9		11.1	10.0	67.8		4.7				
Green Ext Time (p_c), s	0.0	22.1		0.3	0.1	11.5		0.1				

Intersection Summary	
HCM 6th Ctrl Delay	23.1
HCM 6th LOS	C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	10	430	280	10	10	210	939	280	0	693	0
Future Volume (veh/h)	0	10	430	280	10	10	210	939	280	0	693	0
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		0.97	1.00		0.97	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	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	0	10	448	292	10	10	219	978	292	0	722	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	0	3	3
Cap, veh/h	0	633	872	404	285	285	375	970	800	0	876	0
Arrive On Green	0.00	0.34	0.34	0.34	0.34	0.34	0.28	0.69	0.69	0.00	0.25	0.00
Sat Flow, veh/h	0	1870	1585	934	843	843	1767	1856	1531	0	3711	0
Grp Volume(v), veh/h	0	10	448	292	0	20	219	978	292	0	722	0
Grp Sat Flow(s),veh/h/ln	0	1870	1585	934	0	1685	1767	1856	1531	0	1763	0
Q Serve(g_s), s	0.0	0.3	0.0	23.9	0.0	0.6	8.4	41.3	6.2	0.0	15.3	0.0
Cycle Q Clear(g_c), s	0.0	0.3	0.0	24.2	0.0	0.6	8.4	41.3	6.2	0.0	15.3	0.0
Prop In Lane	0.00		1.00	1.00		0.50	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	0	633	872	404	0	570	375	970	800	0	876	0
V/C Ratio(X)	0.00	0.02	0.51	0.72	0.00	0.04	0.58	1.01	0.36	0.00	0.82	0.00
Avail Cap(c_a), veh/h	0	736	960	455	0	664	375	970	800	0	1009	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	1.00	0.82	0.82	0.82	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	17.4	11.1	25.4	0.0	17.5	25.4	12.0	6.7	0.0	28.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	3.9	0.0	0.0	1.6	28.3	1.1	0.0	8.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	4.4	5.4	0.0	0.2	3.3	14.1	1.7	0.0	7.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.4	11.3	29.3	0.0	17.5	27.0	40.4	7.7	0.0	36.8	0.0
LnGrp LOS	A	B	B	C	A	B	C	F	A	A	D	A
Approach Vol, veh/h		458			312			1489			722	
Approach Delay, s/veh		11.4			28.5			32.0			36.8	
Approach LOS		B			C			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.4		31.6	22.9	24.5		31.6				
Change Period (Y+Rc), s		6.1		4.9	6.1	* 4.9		4.9				
Max Green Setting (Gmax), s		36.9		31.1	11.1	* 23		31.1				
Max Q Clear Time (g_c+I1), s		43.3		2.3	10.4	17.3		26.2				
Green Ext Time (p_c), s		0.0		0.9	0.0	2.3		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			29.6
HCM 6th LOS			C

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	540	1926	572	0	0	1854
Future Volume (vph)	540	1926	572	0	0	1854
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	557	1986	590	0	0	1911
RTOR Reduction (vph)	0	19	0	0	0	0
Lane Group Flow (vph)	557	1967	590	0	0	1911
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	17.5	77.6	23.1			83.2
Effective Green, g (s)	17.5	77.6	23.1			83.2
Actuated g/C Ratio	0.15	0.67	0.20			0.72
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	514	1851	699			4563
v/s Ratio Prot	0.16	c0.71	c0.17			0.30
v/s Ratio Perm						
v/c Ratio	1.08	1.06	0.84			0.42
Uniform Delay, d1	49.1	19.1	44.6			6.5
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	64.2	39.8	8.8			0.0
Delay (s)	113.3	58.8	53.4			6.6
Level of Service	F	E	D			A
Approach Delay (s)	70.8		53.4			6.6
Approach LOS	E		D			A

Intersection Summary			
HCM 2000 Control Delay	44.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	115.7	Sum of lost time (s)	22.5
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1860	10	1396	0	0	846
Future Volume (vph)	1860	10	1396	0	0	846
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1918	10	1439	0	0	872
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	1918	9	1439	0	0	872
Confl. Bikes (#/hr)						15
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	65.5	65.5	49.5			49.5
Effective Green, g (s)	65.5	65.5	49.5			49.5
Actuated g/C Ratio	0.50	0.50	0.38			0.38
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1713	790	1334			1334
v/s Ratio Prot	c0.56		c0.41			0.25
v/s Ratio Perm		0.01				
v/c Ratio	1.12	0.01	1.08			0.65
Uniform Delay, d1	32.2	16.1	40.2			33.2
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	62.3	0.0	48.8			2.5
Delay (s)	94.6	16.1	89.1			35.7
Level of Service	F	B	F			D
Approach Delay (s)	94.2		89.1			35.7
Approach LOS	F		F			D

Intersection Summary			
HCM 2000 Control Delay	80.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	790	0	0	0	0	0	862	1560	0	0	0
Future Volume (vph)	0	790	0	0	0	0	0	862	1560	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1544			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1544			
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	823	0	0	0	0	0	898	1625	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	823	0	0	0	0	0	898	1625	0	0	0
Confl. Bikes (#/hr)									14			
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		56.0						60.5	130.0			
Effective Green, g (s)		56.0						60.5	130.0			
Actuated g/C Ratio		0.43						0.47	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		794						1631	1544			
v/s Ratio Prot		0.45						0.26				
v/s Ratio Perm									c1.05			
v/c Ratio		1.04						0.55	1.05			
Uniform Delay, d1		37.0						25.0	65.0			
Progression Factor		0.24						1.00	1.00			
Incremental Delay, d2		21.0						1.3	38.1			
Delay (s)		30.0						26.3	103.1			
Level of Service		C						C	F			
Approach Delay (s)		30.0			0.0			75.8			0.0	
Approach LOS		C			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	64.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1484	20	0	0	0	0	0	0	20	1642	0
Future Volume (vph)	0	1484	20	0	0	0	0	0	0	20	1642	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	1.00								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1568								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1568								3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1530	21	0	0	0	0	0	0	21	1693	0
RTOR Reduction (vph)	0	0	12	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	1530	9	0	0	0	0	0	0	0	1701	0
Confl. Bikes (#/hr)												20
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		56.0	56.0								60.5	
Effective Green, g (s)		56.0	56.0								60.5	
Actuated g/C Ratio		0.43	0.43								0.47	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1509	675								1630	
v/s Ratio Prot		c0.44										
v/s Ratio Perm			0.01								0.49	
v/c Ratio		1.01	0.01								1.04	
Uniform Delay, d1		37.0	21.2								34.8	
Progression Factor		1.00	1.00								0.71	
Incremental Delay, d2		26.7	0.0								25.2	
Delay (s)		63.7	21.2								50.0	
Level of Service		E	C								D	
Approach Delay (s)		63.1			0.0			0.0			50.0	
Approach LOS		E			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	56.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	917	559	0	0	519	380	309	10	630	0	0	0
Future Volume (veh/h)	917	559	0	0	519	380	309	10	630	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	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			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1856	1856	1856	1856	1856			
Adj Flow Rate, veh/h	926	565	0	0	524	384	312	10	636			
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99			
Percent Heavy Veh, %	3	3	0	0	3	3	3	3	3			
Cap, veh/h	1071	2264	0	0	523	383	521	17	478			
Arrive On Green	0.52	1.00	0.00	0.00	0.28	0.28	0.30	0.30	0.30			
Sat Flow, veh/h	3428	3618	0	0	1995	1393	1715	55	1572			
Grp Volume(v), veh/h	926	565	0	0	485	423	322	0	636			
Grp Sat Flow(s),veh/h/ln	1714	1763	0	0	1763	1533	1770	0	1572			
Q Serve(g_s), s	23.5	0.0	0.0	0.0	27.5	27.5	15.5	0.0	30.4			
Cycle Q Clear(g_c), s	23.5	0.0	0.0	0.0	27.5	27.5	15.5	0.0	30.4			
Prop In Lane	1.00		0.00	0.00		0.91	0.97		1.00			
Lane Grp Cap(c), veh/h	1071	2264	0	0	485	422	538	0	478			
V/C Ratio(X)	0.86	0.25	0.00	0.00	1.00	1.00	0.60	0.00	1.33			
Avail Cap(c_a), veh/h	1071	2264	0	0	485	422	538	0	478			
HCM Platoon Ratio	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.73	0.73	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	22.1	0.0	0.0	0.0	36.3	36.3	29.6	0.0	34.8			
Incr Delay (d2), s/veh	5.7	0.2	0.0	0.0	41.2	44.4	1.3	0.0	162.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	7.7	0.1	0.0	0.0	16.9	15.1	6.7	0.0	44.1			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.8	0.2	0.0	0.0	77.5	80.6	30.9	0.0	197.4			
LnGrp LOS	C	A	A	A	F	F	C	A	F			
Approach Vol, veh/h		1491			908			958				
Approach Delay, s/veh		17.3			79.0			141.4				
Approach LOS		B			E			F				

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		69.7		35.0	36.7	33.0						
Change Period (Y+Rc), s		5.5		4.6	5.5	* 5.5						
Max Green Setting (Gmax), s		59.5		30.4	27.8	* 28						
Max Q Clear Time (g_c+I1), s		2.0		32.4	25.5	29.5						
Green Ext Time (p_c), s		2.6		0.0	1.0	0.0						

Intersection Summary	
HCM 6th Ctrl Delay	69.4
HCM 6th LOS	E

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1186	290	280	568	0	0	0	0	160	0	1094
Future Volume (veh/h)	0	1186	290	280	568	0	0	0	0	160	0	1094
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	1856	1856	0				1856	0	1856
Adj Flow Rate, veh/h	0	1248	305	295	598	0				168	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	3	3	3	3	0				3	0	3
Cap, veh/h	0	1261	580	1247	2719	0				199	0	
Arrive On Green	0.00	0.36	0.38	0.73	1.00	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	3618	1536	3428	3618	0				1767	0	1572
Grp Volume(v), veh/h	0	1248	305	295	598	0				168	0	0
Grp Sat Flow(s),veh/h/ln	0	1763	1536	1714	1763	0				1767	0	1572
Q Serve(g_s), s	0.0	35.2	15.4	2.8	0.0	0.0				9.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	35.2	15.4	2.8	0.0	0.0				9.3	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1261	580	1247	2719	0				199	0	
V/C Ratio(X)	0.00	0.99	0.53	0.24	0.22	0.00				0.84	0.00	
Avail Cap(c_a), veh/h	0	1269	584	1247	2719	0				530	0	
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.09	0.09	0.45	0.45	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	31.9	24.2	9.1	0.0	0.0				43.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	5.6	0.3	0.0	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	15.0	5.4	1.0	0.0	0.0				4.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	37.6	24.5	9.1	0.1	0.0				47.2	0.0	0.0
LnGrp LOS	A	D	C	A	A	A				D	A	
Approach Vol, veh/h		1553			893						168	A
Approach Delay, s/veh		35.0			3.1						47.2	
Approach LOS		C			A						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	41.4	42.8		15.9		84.1						
Change Period (Y+Rc), s	5.0	* 5		4.6		5.0						
Max Green Setting (Gmax), s	18.2	* 38		30.0		60.4						
Max Q Clear Time (g_c+I1), s	4.8	37.2		11.3		2.0						
Green Ext Time (p_c), s	0.8	0.6		0.1		2.8						
Intersection Summary												
HCM 6th Ctrl Delay			24.9									
HCM 6th LOS			C									

Notes

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

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	190	291	252	90	250	212	1316	195	210	1432	220
Future Volume (veh/h)	190	190	291	252	90	250	212	1316	195	210	1432	220
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	198	198	273	262	94	260	221	1371	203	219	1492	229
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	249	370	300	256	504	413	251	1187	174	222	1548	794
Arrive On Green	0.07	0.20	0.20	0.14	0.27	0.27	0.07	0.39	0.39	0.13	0.44	0.44
Sat Flow, veh/h	3428	1856	1503	1767	1856	1520	3428	3072	450	1767	3526	1549
Grp Volume(v), veh/h	198	198	273	262	94	260	221	780	794	219	1492	229
Grp Sat Flow(s),veh/h/ln	1714	1856	1503	1767	1856	1520	1714	1763	1759	1767	1763	1549
Q Serve(g_s), s	7.8	13.1	24.3	19.8	5.3	20.5	8.7	52.8	52.8	16.9	56.2	11.6
Cycle Q Clear(g_c), s	7.8	13.1	24.3	19.8	5.3	20.5	8.7	52.8	52.8	16.9	56.2	11.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	249	370	300	256	504	413	251	681	680	222	1548	794
V/C Ratio(X)	0.80	0.54	0.91	1.02	0.19	0.63	0.88	1.14	1.17	0.98	0.96	0.29
Avail Cap(c_a), veh/h	356	421	341	256	504	413	251	681	680	222	1551	795
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.4	49.0	53.5	58.4	38.2	43.7	62.7	41.9	41.9	59.6	37.3	19.1
Incr Delay (d2), s/veh	4.9	1.2	25.7	62.3	0.1	2.3	27.4	81.9	90.9	55.6	15.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	6.2	11.1	13.1	2.4	7.8	4.7	37.6	39.3	10.9	26.5	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.3	50.2	79.3	120.8	38.2	46.0	90.1	123.8	132.9	115.2	52.5	19.4
LnGrp LOS	E	D	E	F	D	D	F	F	F	F	D	B
Approach Vol, veh/h		669			616			1795			1940	
Approach Delay, s/veh		67.1			76.6			123.7			55.7	
Approach LOS		E			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.6	58.1	24.2	32.7	14.4	65.3	14.3	42.6
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	17.2	52.8	19.8	* 31	10.0	* 60	14.2	36.2
Max Q Clear Time (g_c+I1), s	18.9	54.8	21.8	26.3	10.7	58.2	9.8	22.5
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	1.7	0.1	0.6

Intersection Summary	
HCM 6th Ctrl Delay	84.1
HCM 6th LOS	F

Notes

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	1443	934	390	1485	386	160		
Future Volume (veh/h)	1443	934	390	1485	386	160		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		0.98	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	1670	1670	1670	1670	1670	1670		
Adj Flow Rate, veh/h	1472	953	398	1515	394	163		
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98		
Percent Heavy Veh, %	3	3	3	3	3	3		
Cap, veh/h	1506	880	442	2147	501	223		
Arrive On Green	0.47	0.47	0.14	0.68	0.16	0.16		
Sat Flow, veh/h	3256	1385	3086	3256	3181	1415		
Grp Volume(v), veh/h	1472	953	398	1515	394	163		
Grp Sat Flow(s),veh/h/ln	1586	1385	1543	1586	1590	1415		
Q Serve(g_s), s	34.0	35.5	9.5	22.1	8.9	8.2		
Cycle Q Clear(g_c), s	34.0	35.5	9.5	22.1	8.9	8.2		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1506	880	442	2147	501	223		
V/C Ratio(X)	0.98	1.08	0.90	0.71	0.79	0.73		
Avail Cap(c_a), veh/h	1506	880	442	2181	1149	511		
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	19.2	11.6	31.5	7.5	30.3	30.0		
Incr Delay (d2), s/veh	18.0	55.2	20.8	1.4	1.1	1.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	13.2	28.2	4.6	5.3	3.1	2.6		
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh	37.2	66.8	52.3	8.9	31.3	31.7		
LnGrp LOS	D	F	D	A	C	C		
Approach Vol, veh/h	2425			1913	557			
Approach Delay, s/veh	48.9			17.9	31.5			
Approach LOS	D			B	C			
Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.1	41.7				56.8		18.0
Change Period (Y+Rc), s	4.4	6.2				* 6.2		6.2
Max Green Setting (Gmax), s	10.7	35.5				* 51		27.0
Max Q Clear Time (g_c+I1), s	11.5	37.5				24.1		10.9
Green Ext Time (p_c), s	0.0	0.0				21.1		0.9

Intersection Summary		
HCM 6th Ctrl Delay		34.8
HCM 6th LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Volume (veh/h)	35	0	2243	0	1811	0	509	148
Future Volume (veh/h)	35	0	2243	0	1811	0	509	148
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		0	1856		1856	0	1856	1856
Adj Flow Rate, veh/h		0	2289		1848	0	519	151
Peak Hour Factor		0.98	0.98		0.98	0.98	0.98	0.98
Percent Heavy Veh, %		0	3		3	0	3	3
Cap, veh/h		0	2415		3469	0	640	516
Arrive On Green		0.00	0.68		0.68	0.00	0.19	0.19
Sat Flow, veh/h		0	3711		5400	0	3428	2768
Grp Volume(v), veh/h		0	2289		1848	0	519	151
Grp Sat Flow(s),veh/h/ln		0	1763		1689	0	1714	1384
Q Serve(g_s), s		0.0	47.2		14.6	0.0	11.7	3.8
Cycle Q Clear(g_c), s		0.0	47.2		14.6	0.0	11.7	3.8
Prop In Lane		0.00				0.00	1.00	1.00
Lane Grp Cap(c), veh/h		0	2415		3469	0	640	516
V/C Ratio(X)		0.00	0.95		0.53	0.00	0.81	0.29
Avail Cap(c_a), veh/h		0	2423		3469	0	1526	1232
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		0.00	1.00		1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		0.0	11.5		6.3	0.0	31.5	28.3
Incr Delay (d2), s/veh		0.0	9.1		0.2	0.0	1.0	0.1
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.0	13.1		3.5	0.0	4.8	3.1
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		0.0	20.6		6.6	0.0	32.5	28.4
LnGrp LOS		A	C		A	A	C	C
Approach Vol, veh/h			2289		1848		670	
Approach Delay, s/veh			20.6		6.6		31.6	
Approach LOS			C		A		C	

Timer - Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		61.8		19.1		61.8		
Change Period (Y+Rc), s		6.4		4.0		* 6.4		
Max Green Setting (Gmax), s		55.6		36.0		* 54		
Max Q Clear Time (g_c+I1), s		49.2		13.7		16.6		
Green Ext Time (p_c), s		6.2		1.4		27.3		

Intersection Summary			
HCM 6th Ctrl Delay			16.7
HCM 6th LOS			B

Notes

User approved ignoring U-Turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	4	40	356	2	31	90	1970	250	31	1610	30
Future Volume (veh/h)	30	4	40	356	2	31	90	1970	250	31	1610	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	1.00		0.98	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	33	4	43	388	0	34	98	2141	272	34	1750	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	75	6	60	499	0	245	100	2311	1233	69	2183	938
Arrive On Green	0.04	0.04	0.04	0.14	0.00	0.14	0.06	0.66	0.66	0.04	1.00	1.00
Sat Flow, veh/h	1767	133	1425	3534	0	1506	1767	3526	1542	3428	3526	1515
Grp Volume(v), veh/h	33	0	47	388	0	34	98	2141	272	34	1750	33
Grp Sat Flow(s),veh/h/ln	1767	0	1557	1767	0	1506	1767	1763	1542	1714	1763	1515
Q Serve(g_s), s	2.7	0.0	4.5	15.9	0.0	2.9	8.3	79.9	6.5	1.5	0.0	0.0
Cycle Q Clear(g_c), s	2.7	0.0	4.5	15.9	0.0	2.9	8.3	79.9	6.5	1.5	0.0	0.0
Prop In Lane	1.00		0.91	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	75	0	66	499	0	245	100	2311	1233	69	2183	938
V/C Ratio(X)	0.44	0.00	0.71	0.78	0.00	0.14	0.98	0.93	0.22	0.49	0.80	0.04
Avail Cap(c_a), veh/h	188	0	166	825	0	383	100	2311	1233	91	2183	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.72	0.72	0.72
Uniform Delay (d), s/veh	70.1	0.0	70.9	62.1	0.0	53.9	70.7	22.7	3.8	71.2	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	5.3	1.0	0.0	0.1	82.5	7.9	0.4	1.4	2.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.9	7.2	0.0	1.1	6.0	31.9	3.7	0.6	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.6	0.0	76.2	63.1	0.0	54.0	153.2	30.6	4.2	72.7	2.3	0.1
LnGrp LOS	E	A	E	E	A	D	F	C	A	E	A	A
Approach Vol, veh/h		80			422			2511			1817	
Approach Delay, s/veh		74.3			62.4			32.5			3.6	
Approach LOS		E			E			C			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	105.2		11.2	12.9	99.8		26.1				
Change Period (Y+Rc), s	4.4	* 6.9		4.9	4.4	6.9		4.9				
Max Green Setting (Gmax), s	4.0	* 75		16.0	8.5	69.4		35.0				
Max Q Clear Time (g_c+I1), s	3.5	81.9		6.5	10.3	2.0		17.9				
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	27.6		0.8				
Intersection Summary												
HCM 6th Ctrl Delay			24.9									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	10	100	30	10	30	110	1845	60	20	1480	40
Future Volume (veh/h)	30	10	100	30	10	30	110	1845	60	20	1480	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		0.96	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	31	10	102	31	10	31	112	1883	61	20	1510	41
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	54	19	109	79	28	55	470	2633	1132	15	1682	721
Arrive On Green	0.12	0.10	0.12	0.12	0.10	0.12	0.27	0.75	0.75	0.01	0.48	0.48
Sat Flow, veh/h	256	197	1127	461	293	570	1767	3526	1516	1767	3526	1511
Grp Volume(v), veh/h	143	0	0	72	0	0	112	1883	61	20	1510	41
Grp Sat Flow(s),veh/h/ln	1580	0	0	1324	0	0	1767	1763	1516	1767	1763	1511
Q Serve(g_s), s	5.5	0.0	0.0	0.0	0.0	0.0	7.5	43.6	1.6	1.3	58.8	2.2
Cycle Q Clear(g_c), s	12.9	0.0	0.0	7.4	0.0	0.0	7.5	43.6	1.6	1.3	58.8	2.2
Prop In Lane	0.22		0.71	0.43		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	214	0	0	189	0	0	470	2633	1132	15	1682	721
V/C Ratio(X)	0.67	0.00	0.00	0.38	0.00	0.00	0.24	0.72	0.05	1.35	0.90	0.06
Avail Cap(c_a), veh/h	348	0	0	318	0	0	470	2633	1132	54	1944	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	0.00	1.00	0.00	0.00	0.23	0.23	0.23	0.73	0.73	0.73
Uniform Delay (d), s/veh	65.5	0.0	0.0	63.0	0.0	0.0	43.1	10.3	5.0	74.4	35.9	21.1
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.5	0.0	0.0	0.0	0.4	0.0	179.5	6.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	2.5	0.0	0.0	3.2	14.3	0.4	1.3	25.5	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.9	0.0	0.0	63.5	0.0	0.0	43.2	10.7	5.0	253.8	41.9	21.2
LnGrp LOS	E	A	A	E	A	A	D	B	A	F	D	C
Approach Vol, veh/h		143			72			2056			1571	
Approach Delay, s/veh		66.9			63.5			12.3			44.1	
Approach LOS		E			E			B			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	120.9		22.4	46.8	80.8		22.4				
Change Period (Y+Rc), s	4.4	5.9		4.9	5.9	* 6.2		4.9				
Max Green Setting (Gmax), s	5.6	98.2		31.0	17.8	* 86		31.0				
Max Q Clear Time (g_c+I1), s	3.3	46.6		14.9	9.5	61.8		9.4				
Green Ext Time (p_c), s	0.0	28.4		0.5	0.1	12.8		0.2				
Intersection Summary												
HCM 6th Ctrl Delay			28.3									
HCM 6th LOS			C									

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	340	260	20	10	360	1005	490	0	920	10
Future Volume (veh/h)	10	10	340	260	20	10	360	1005	490	0	920	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.97	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	0	1856	1856
Adj Flow Rate, veh/h	10	10	354	271	21	10	375	1047	510	0	958	10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	0	3	3
Cap, veh/h	249	238	796	328	335	159	397	1190	981	0	1384	14
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.30	0.85	0.85	0.00	0.39	0.39
Sat Flow, veh/h	747	834	1551	1010	1173	559	1767	1856	1529	0	3665	37
Grp Volume(v), veh/h	20	0	354	271	0	31	375	1047	510	0	473	495
Grp Sat Flow(s),veh/h/ln	1581	0	1551	1010	0	1732	1767	1856	1529	0	1763	1847
Q Serve(g_s), s	0.0	0.0	21.7	39.8	0.0	2.0	31.1	49.9	13.2	0.0	33.7	33.7
Cycle Q Clear(g_c), s	1.2	0.0	21.7	40.9	0.0	2.0	31.1	49.9	13.2	0.0	33.7	33.7
Prop In Lane	0.50		1.00	1.00		0.32	1.00		1.00	0.00		0.02
Lane Grp Cap(c), veh/h	487	0	796	328	0	494	397	1190	981	0	683	716
V/C Ratio(X)	0.04	0.00	0.44	0.83	0.00	0.06	0.95	0.88	0.52	0.00	0.69	0.69
Avail Cap(c_a), veh/h	487	0	796	328	0	494	517	1190	981	0	683	716
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.63	0.63	0.63	0.00	1.00	1.00
Uniform Delay (d), s/veh	38.7	0.0	23.3	53.5	0.0	39.0	51.7	7.6	4.9	0.0	38.5	38.5
Incr Delay (d2), s/veh	0.0	0.0	0.1	14.8	0.0	0.0	15.9	6.3	1.2	0.0	5.7	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	8.1	11.4	0.0	0.9	14.5	8.4	3.1	0.0	15.7	16.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	0.0	23.5	68.3	0.0	39.0	67.6	13.9	6.2	0.0	44.1	43.9
LnGrp LOS	D	A	C	E	A	D	E	B	A	A	D	D
Approach Vol, veh/h		374			302			1932			968	
Approach Delay, s/veh		24.3			65.3			22.3			44.0	
Approach LOS		C			E			C			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		102.3		47.7	38.1	64.2		47.7				
Change Period (Y+Rc), s		6.1		4.9	4.4	* 6.1		4.9				
Max Green Setting (Gmax), s		96.2		42.8	43.9	* 49		42.8				
Max Q Clear Time (g_c+I1), s		51.9		23.7	33.1	35.7		42.9				
Green Ext Time (p_c), s		19.6		0.7	0.6	5.6		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			32.0									
HCM 6th LOS			C									
Notes												

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	790	1948	938	0	0	2288
Future Volume (vph)	790	1948	938	0	0	2288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.88	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	2760	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	2760	3505			6346
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	806	1988	957	0	0	2335
RTOR Reduction (vph)	0	4	0	0	0	0
Lane Group Flow (vph)	806	1984	957	0	0	2335
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	34.9	96.0	39.0			100.1
Effective Green, g (s)	34.9	96.0	39.0			100.1
Actuated g/C Ratio	0.23	0.64	0.26			0.67
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	791	1766	911			4234
v/s Ratio Prot	0.24	c0.72	c0.27			0.37
v/s Ratio Perm						
v/c Ratio	1.02	1.12	1.05			0.55
Uniform Delay, d1	57.6	27.0	55.5			13.1
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	36.8	63.6	44.0			0.1
Delay (s)	94.4	90.6	99.5			13.2
Level of Service	F	F	F			B
Approach Delay (s)	91.7		99.5			13.2
Approach LOS	F		F			B

Intersection Summary			
HCM 2000 Control Delay	62.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2450	10	1581	0	0	1291
Future Volume (vph)	2450	10	1581	0	0	1291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	1568	3505			3505
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	1568	3505			3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	2500	10	1613	0	0	1317
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	2500	9	1613	0	0	1317
Confl. Bikes (#/hr)						11
Turn Type	Prot	Perm	NA			NA
Protected Phases	4		2			6
Permitted Phases		4				
Actuated Green, G (s)	80.5	80.5	54.5			54.5
Effective Green, g (s)	80.5	80.5	54.5			54.5
Actuated g/C Ratio	0.54	0.54	0.36			0.36
Clearance Time (s)	7.5	7.5	7.5			7.5
Vehicle Extension (s)	4.0	4.0	6.5			8.0
Lane Grp Cap (vph)	1824	841	1273			1273
v/s Ratio Prot	c0.74		c0.46			0.38
v/s Ratio Perm		0.01				
v/c Ratio	1.37	0.01	1.27			1.03
Uniform Delay, d1	34.8	16.2	47.8			47.8
Progression Factor	1.00	1.00	0.63			1.00
Incremental Delay, d2	170.3	0.0	126.2			34.6
Delay (s)	205.1	16.2	156.5			82.3
Level of Service	F	B	F			F
Approach Delay (s)	204.3		156.5			82.3
Approach LOS	F		F			F

Intersection Summary			
HCM 2000 Control Delay	160.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	126.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	600	0	0	0	0	0	985	840	0	0	0
Future Volume (vph)	0	600	0	0	0	0	0	985	840	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						7.5	4.0			
Lane Util. Factor		1.00						0.95	1.00			
Frpb, ped/bikes		1.00						1.00	0.98			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		1845						3505	1542			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		1845						3505	1542			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	652	0	0	0	0	0	1071	913	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	652	0	0	0	0	0	1071	913	0	0	0
Confl. Bikes (#/hr)									20			
Turn Type		NA						NA	Free			
Protected Phases		4						2				
Permitted Phases									Free			
Actuated Green, G (s)		60.4						76.1	150.0			
Effective Green, g (s)		60.4						76.1	150.0			
Actuated g/C Ratio		0.40						0.51	1.00			
Clearance Time (s)		6.0						7.5				
Vehicle Extension (s)		8.0						3.0				
Lane Grp Cap (vph)		742						1778	1542			
v/s Ratio Prot		c0.35						0.31				
v/s Ratio Perm									c0.59			
v/c Ratio		0.88						0.60	0.59			
Uniform Delay, d1		41.4						26.2	0.0			
Progression Factor		0.19						1.00	1.00			
Incremental Delay, d2		6.0						1.5	1.7			
Delay (s)		13.9						27.7	1.7			
Level of Service		B						C	A			
Approach Delay (s)		13.9			0.0			15.7			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1266	90	0	0	0	0	0	0	20	1575	0
Future Volume (vph)	0	1266	90	0	0	0	0	0	0	20	1575	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0								7.5	
Lane Util. Factor		0.95	1.00								0.95	
Frpb, ped/bikes		1.00	0.99								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3505	1548								3503	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3505	1548								3503	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	1292	92	0	0	0	0	0	0	20	1607	0
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	1292	72	0	0	0	0	0	0	0	1616	0
Confl. Bikes (#/hr)			1						1			12
Turn Type		NA	Perm							Perm	NA	
Protected Phases		4									6	
Permitted Phases			4							6		
Actuated Green, G (s)		60.4	60.4								76.1	
Effective Green, g (s)		60.4	60.4								76.1	
Actuated g/C Ratio		0.40	0.40								0.51	
Clearance Time (s)		6.0	6.0								7.5	
Vehicle Extension (s)		8.0	8.0								8.0	
Lane Grp Cap (vph)		1411	623								1777	
v/s Ratio Prot		c0.37										
v/s Ratio Perm			0.05								0.46	
v/c Ratio		0.92	0.12								0.91	
Uniform Delay, d1		42.4	28.1								33.8	
Progression Factor		1.00	1.00								1.01	
Incremental Delay, d2		10.8	0.4								0.9	
Delay (s)		53.2	28.4								35.0	
Level of Service		D	C								D	
Approach Delay (s)		51.5			0.0			0.0			35.0	
Approach LOS		D			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	42.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX T

PEAK HOUR QUEUING ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITH PROJECT

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	245	450	165	296	307	373	293
Average Queue (ft)	210	224	209	42	172	162	188	129
95th Queue (ft)	269	278	490	113	266	263	314	231
Link Distance (ft)			433	433	1194	1194	379	379
Upstream Blk Time (%)			1				0	0
Queuing Penalty (veh)			9				0	0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	4	14	0					
Queuing Penalty (veh)	10	37	0					

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	418	233	68	161	172	244	75	472	175
Average Queue (ft)	171	89	15	111	124	33	10	196	70
95th Queue (ft)	362	197	45	186	178	150	45	419	209
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								4	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				1	5	0		9	0
Queuing Penalty (veh)				1	8	0		69	0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	T	R	L	T	R	L	L	T	TR	L
Maximum Queue (ft)	70	54	57	53	124	135	77	159	335	625	586	232
Average Queue (ft)	17	14	8	10	41	54	20	86	141	336	300	83
95th Queue (ft)	46	41	35	34	92	106	53	146	363	581	533	165
Link Distance (ft)			449			329				1280	1280	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	260	260		250	155		200	310	310			240
Storage Blk Time (%)					0	0			0	16		0
Queuing Penalty (veh)					0	0			0	42		0

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	313	307	78
Average Queue (ft)	158	171	39
95th Queue (ft)	260	270	69
Link Distance (ft)	903	903	903
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)	1		
Queuing Penalty (veh)	2		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	811	814	240	106	110	232	254	163	177	102
Average Queue (ft)	765	761	230	42	57	94	119	87	76	14
95th Queue (ft)	907	916	302	84	92	191	209	139	140	51
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		60	0							
Queuing Penalty (veh)		169	3							

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	100	276	282	288	205	120	71	30	43	24
Average Queue (ft)	16	210	170	128	78	37	28	2	14	2
95th Queue (ft)	61	316	305	234	170	92	54	15	39	13
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	27		8						
Queuing Penalty (veh)	1	5		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	LT	R	L	T	T	R	L	L	T
Maximum Queue (ft)	52	40	60	68	63	200	310	310	179	65	110	439
Average Queue (ft)	19	15	35	35	15	91	117	126	33	23	4	142
95th Queue (ft)	47	42	58	64	46	167	247	248	124	55	48	336
Link Distance (ft)		89	63	63			2238	2238				2582
Upstream Blk Time (%)			1	1	0							
Queuing Penalty (veh)			0	0	0							
Storage Bay Dist (ft)	50				55	180			180	180	180	
Storage Blk Time (%)	4	0		8	1	1	2	3	0			4
Queuing Penalty (veh)	1	0		2	0	10	3	7	0			1

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	471	151
Average Queue (ft)	163	10
95th Queue (ft)	359	71
Link Distance (ft)	2582	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		180
Storage Blk Time (%)	7	0
Queuing Penalty (veh)	1	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	119	58	259	420	388	41	89	421	440	203
Average Queue (ft)	42	19	89	186	146	5	9	210	224	30
95th Queue (ft)	96	48	198	372	322	25	49	378	387	135
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)	0									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	5	2			11	13	0
Queuing Penalty (veh)			0	6	0			1	4	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	38	180	124	260	202	387	90	238	221
Average Queue (ft)	3	70	109	76	92	142	27	179	109
95th Queue (ft)	21	141	142	225	167	313	65	259	202
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								5	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		3	21	0					
Queuing Penalty (veh)		0	4	0					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	525	798	799	525	199	196	170	270	339	296
Average Queue (ft)	439	758	762	336	172	155	37	102	176	135
95th Queue (ft)	713	821	823	539	191	202	106	234	300	263
Link Distance (ft)		748	748				893	893	893	893
Upstream Blk Time (%)		31	38							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	71	6	1						
Queuing Penalty (veh)	1	191	56	7						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	121	307
Average Queue (ft)	12	111
95th Queue (ft)	90	307
Link Distance (ft)	312	312
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	789	793	83	153	146	440	430
Average Queue (ft)	759	760	5	126	125	259	225
95th Queue (ft)	777	781	44	138	135	396	371
Link Distance (ft)	737	737					
Upstream Blk Time (%)	64	63					
Queuing Penalty (veh)	0	0					
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		54	0				
Queuing Penalty (veh)		5	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	B48	NB	NB	NB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	181	12	545	696	140
Average Queue (ft)	93	0	266	454	86
95th Queue (ft)	163	6	438	824	197
Link Distance (ft)	120	139	657	657	
Upstream Blk Time (%)	10			9	
Queuing Penalty (veh)	146			0	
Storage Bay Dist (ft)					115
Storage Blk Time (%)				4	0
Queuing Penalty (veh)				56	1

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	665	653	216	604	613
Average Queue (ft)	629	625	14	354	368
95th Queue (ft)	650	641	89	528	543
Link Distance (ft)	605	605		633	633
Upstream Blk Time (%)	92	76		1	1
Queuing Penalty (veh)	0	0		9	10
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		7	0		
Queuing Penalty (veh)		1	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	127	314	284
Average Queue (ft)	7	66	14
95th Queue (ft)	62	219	114
Link Distance (ft)	319	319	319
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		1	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	SB	SB
Directions Served	R	R
Maximum Queue (ft)	178	180
Average Queue (ft)	13	15
95th Queue (ft)	92	95
Link Distance (ft)	216	216
Upstream Blk Time (%)	1	1
Queuing Penalty (veh)	9	9
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	10
Average Queue (ft)	4	1
95th Queue (ft)	20	7
Link Distance (ft)	203	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		220
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 902

Intersection: 1: I-5 NB Off Ramp/I-5 NB On Ramp & SeaWorld Dr

Movement	EB	EB	EB	EB	WB	WB	NB	NB
Directions Served	L	L	T	T	T	TR	LT	R
Maximum Queue (ft)	232	245	448	165	339	362	377	387
Average Queue (ft)	194	207	139	45	211	212	189	220
95th Queue (ft)	262	273	381	115	312	336	334	376
Link Distance (ft)			433	433			379	379
Upstream Blk Time (%)			1				1	3
Queuing Penalty (veh)			5				0	0
Storage Bay Dist (ft)	220	220						
Storage Blk Time (%)	3	8						
Queuing Penalty (veh)	7	23						

Intersection: 2: I-5 SB On Ramp/I-5 SB Off Ramp & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	T	T	R	L	L	T	T	L	R
Maximum Queue (ft)	346	160	91	155	172	193	131	505	175
Average Queue (ft)	110	51	31	84	104	42	41	455	168
95th Queue (ft)	272	123	72	146	161	131	106	579	219
Link Distance (ft)	903	903				433	433	450	
Upstream Blk Time (%)								47	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)			400	150	150				150
Storage Blk Time (%)				0	2	0		5	42
Queuing Penalty (veh)				0	5	0		50	68

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	EB	EB	EB	EB	WB	WB	WB	B47	NB	NB	NB	NB
Directions Served	L	L	T	R	L	T	R	T	L	L	T	TR
Maximum Queue (ft)	129	170	281	256	179	406	225	347	196	335	920	928
Average Queue (ft)	54	59	91	103	153	187	126	60	98	227	594	585
95th Queue (ft)	108	124	196	204	211	448	263	249	174	456	984	963
Link Distance (ft)			449			329		336			1280	1280
Upstream Blk Time (%)						14		3				
Queuing Penalty (veh)						0		0				
Storage Bay Dist (ft)	260	260		250	155		200		310	310		
Storage Blk Time (%)			0	0	30	1	1			0	43	
Queuing Penalty (veh)			1	2	102	6	5			0	90	

Intersection: 3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	265	972	1000	1068
Average Queue (ft)	228	920	948	1004
95th Queue (ft)	346	984	1021	1255
Link Distance (ft)		903	903	903
Upstream Blk Time (%)		20	39	23
Queuing Penalty (veh)		109	214	127
Storage Bay Dist (ft)	240			
Storage Blk Time (%)	2	63		
Queuing Penalty (veh)	11	131		

Intersection: 4: Friars Rd & SeaWorld Dr

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	L	T	T	L	LR	R
Maximum Queue (ft)	810	816	240	172	214	301	311	214	169	68
Average Queue (ft)	757	786	240	95	98	187	213	113	71	15
95th Queue (ft)	826	808	240	145	159	283	302	174	140	45
Link Distance (ft)						1280	1280	416	416	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			215	315	315					280
Storage Blk Time (%)		51	3			0				
Queuing Penalty (veh)		481	25			0				

Intersection: 5: SeaWorld Dr/Sunset Cliffs Blvd & SeaWorld Wy

Movement	EB	EB	EB	WB	WB	WB	SB	SB	SB	SB
Directions Served	U	T	T	T	T	T	L	L	R	R
Maximum Queue (ft)	134	287	291	326	311	289	213	172	88	45
Average Queue (ft)	37	256	259	278	213	141	129	60	40	12
95th Queue (ft)	112	273	280	358	317	253	197	137	72	38
Link Distance (ft)							274	274	274	274
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110									
Storage Blk Time (%)	0	53		39						
Queuing Penalty (veh)	0	18		0						

Intersection: 6: Perez Cove Wy & SeaWorld Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	EB	EB	WB	WB	WB	B55	B55	NB	NB	NB	NB	SB
Directions Served	L	TR	L	LT	R	T	T	L	T	T	R	L
Maximum Queue (ft)	72	97	154	168	63	43	77	204	553	603	205	89
Average Queue (ft)	32	32	92	124	22	2	9	94	342	359	97	35
95th Queue (ft)	67	75	142	181	62	19	42	190	541	556	253	73
Link Distance (ft)		89	63	63		714	714		2238	2238		
Upstream Blk Time (%)	0	2	30	47	0							
Queuing Penalty (veh)	0	0	37	59	0							
Storage Bay Dist (ft)	50				55			180			180	180
Storage Blk Time (%)	13	4		61	1			1	19	20	0	
Queuing Penalty (veh)	6	1		19	3			9	17	50	1	

Intersection: 7: Ingraham St & Dana Landing Point/Perez Cove Wy

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	153	639	654	205
Average Queue (ft)	12	354	367	27
95th Queue (ft)	86	598	606	127
Link Distance (ft)		2582	2582	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	180			180
Storage Blk Time (%)		23	28	0
Queuing Penalty (veh)		7	8	0

Intersection: 8: Ingraham St & Vacation Rd

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	156	111	260	570	491	260	166	596	599	205
Average Queue (ft)	72	45	105	321	262	33	22	276	284	41
95th Queue (ft)	139	88	252	540	488	154	90	509	525	159
Link Distance (ft)	220	223		2582	2582			1740	1740	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			235			235	180			180
Storage Blk Time (%)			0	17	7	0		18	20	0
Queuing Penalty (veh)			0	19	4	0		4	8	0

Intersection: 9: Ingraham St & Riviera Dr/Crown Point Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	T	R	T	TR
Maximum Queue (ft)	107	243	125	377	482	599	145	249	247
Average Queue (ft)	13	84	119	197	269	264	56	222	203
95th Queue (ft)	50	179	134	373	435	514	119	256	284
Link Distance (ft)		435		512		1740	1740	213	213
Upstream Blk Time (%)								27	16
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)	100		100		850				
Storage Blk Time (%)		7	45	0					
Queuing Penalty (veh)		1	13	0					

Intersection: 10: Sports Arena Blvd/W Mission Bay Dr & I-8 WB Off Ramp

Movement	WB	WB	WB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	T	T	T	T
Maximum Queue (ft)	524	781	794	525	201	213	249	308	367	337
Average Queue (ft)	375	664	696	418	177	178	97	160	219	190
95th Queue (ft)	552	916	906	554	189	196	195	275	341	309
Link Distance (ft)		748	748				729	729	729	729
Upstream Blk Time (%)		6	10							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	500			500						
Storage Blk Time (%)	0	12	3	0						
Queuing Penalty (veh)	1	49	27	2						

Intersection: 11: Sports Arena Blvd & Ollie St/I-8 EB On Ramp

Movement	SB	SB	SB
Directions Served	T	T	TR
Maximum Queue (ft)	45	212	280
Average Queue (ft)	2	29	101
95th Queue (ft)	29	143	287
Link Distance (ft)	312	312	312
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 12: Nimitz Blvd/Sunset Cliffs Blvd & I-8 WB

Movement	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	L	R	T	T	T	T
Maximum Queue (ft)	767	763	30	251	243	1139	1144
Average Queue (ft)	736	736	1	226	226	1032	1015
95th Queue (ft)	754	755	19	240	237	1289	1306
Link Distance (ft)	715	715		217	217		
Upstream Blk Time (%)	58	58		59	60		
Queuing Penalty (veh)	0	0		389	393		
Storage Bay Dist (ft)			100				
Storage Blk Time (%)		50	0				
Queuing Penalty (veh)		5	0				

Intersection: 13: Nimitz Blvd & Sunset Cliffs Blvd & I-8 EB

Movement	EB	NB	NB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	159	633	692	140
Average Queue (ft)	80	401	479	134
95th Queue (ft)	146	583	743	180
Link Distance (ft)	121	657	657	
Upstream Blk Time (%)	6	0	8	
Queuing Penalty (veh)	82	0	0	
Storage Bay Dist (ft)				115
Storage Blk Time (%)			27	1
Queuing Penalty (veh)			228	4

Intersection: 14: Nimitz Blvd & Sunset Cliffs Blvd

Movement	EB	EB	EB	SB	SB
Directions Served	T	T	R	LT	T
Maximum Queue (ft)	656	650	250	560	587
Average Queue (ft)	626	624	48	318	333
95th Queue (ft)	643	638	168	496	512
Link Distance (ft)	605	605		634	634
Upstream Blk Time (%)	92	74		0	0
Queuing Penalty (veh)	0	0		6	7
Storage Bay Dist (ft)			225		
Storage Blk Time (%)		5	0		
Queuing Penalty (veh)		5	0		

Intersection: 15: SeaWorld Dr & S. Shores Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 32: Sports Arena Blvd

Movement	SB	SB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	25	273	177
Average Queue (ft)	1	34	8
95th Queue (ft)	12	146	76
Link Distance (ft)	319	319	319
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 36: SeaWorld Dr/Telecote Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 44: Nimitz Blvd & Sunset Cliffs Blvd

Movement	NB	NB	SB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	313	304	165	154
Average Queue (ft)	270	260	11	11
95th Queue (ft)	342	336	81	82
Link Distance (ft)	267	267	217	217
Upstream Blk Time (%)	8	6	0	0
Queuing Penalty (veh)	37	29	2	3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 52: SeaWorld Dr & Perez Cove Wy

Movement	WB
Directions Served	R
Maximum Queue (ft)	58
Average Queue (ft)	8
95th Queue (ft)	37
Link Distance (ft)	472
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 56: Perez Cove Wy & Employee Access

Movement	WB	SB	B55	B55
Directions Served	LR	L	T	
Maximum Queue (ft)	80	31	9	9
Average Queue (ft)	33	4	0	0
95th Queue (ft)	56	21	5	6
Link Distance (ft)	203		63	63
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		220		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 3019

APPENDIX U

PEAK HOUR INTERSECTION ARTERIAL ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITH PROJECT

Arterial Level of Service: NB Ingraham St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Perez Cove Wy	II	45	78.3	18.9	97.2	0.98	36.2	A
Vacation Rd	II	45	44.3	20.3	64.6	0.50	28.0	B
Crown Point Dr	II	45	32.9	33.7	66.6	0.34	18.5	D
Total	II		155.5	72.9	228.4	1.82	28.8	B

Arterial Level of Service: SB Ingraham St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Riviera Dr	II	30	8.0	22.5	30.5	0.05	6.1	F
Vacation Rd	II	45	32.9	17.0	49.9	0.34	24.7	C
Dana Landing Point	II	45	44.3	34.3	78.6	0.50	23.0	C
Total	II		85.2	73.8	159.0	0.90	20.3	D

Arterial Level of Service: EB SeaWorld Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
SeaWorld Wy	I	55	55.5	13.5	69.0	0.85	44.3	A
Total	I		55.5	13.5	69.0	0.85	44.3	A

Arterial Level of Service: NB W Mission Bay Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Perez Cove Wy	II	45	78.3	18.9	97.2	0.98	36.2	A
Total	II		78.3	18.9	97.2	0.98	36.2	A

Arterial Level of Service: SB W Mission Bay Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-8 WB Off Ramp	II	45	78.3	6.8	85.1	0.98	41.4	A
Total	II		78.3	6.8	85.1	0.98	41.4	A

Arterial Level of Service: NB Ingraham St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Perez Cove Wy	II	45	78.3	39.7	118.0	0.98	29.8	B
Vacation Rd	II	45	44.3	19.4	63.7	0.50	28.4	B
Crown Point Dr	II	45	32.9	23.0	55.9	0.34	22.1	C
Total	II		155.5	82.1	237.6	1.82	27.6	C

Arterial Level of Service: SB Ingraham St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Riviera Dr	II	30	8.0	37.5	45.5	0.05	4.1	F
Vacation Rd	II	45	32.9	14.1	47.0	0.34	26.3	C
Dana Landing Point	II	45	44.3	33.9	78.2	0.50	23.2	C
Total	II		85.2	85.5	170.7	0.90	18.9	D

Arterial Level of Service: EB SeaWorld Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
SeaWorld Wy	I	55	55.5	33.7	89.2	0.85	34.2	B
Total	I		55.5	33.7	89.2	0.85	34.2	B

Arterial Level of Service: NB W Mission Bay Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Perez Cove Wy	II	45	78.3	39.7	118.0	0.98	29.8	B
Total	II		78.3	39.7	118.0	0.98	29.8	B

Arterial Level of Service: SB W Mission Bay Dr

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
I-8 WB Off Ramp	II	45	78.3	13.7	92.0	0.98	38.3	A
Total	II		78.3	13.7	92.0	0.98	38.3	A

APPENDIX V

HCS FREEWAY ANALYSIS WORKSHEETS
HORIZON YEAR (YEAR 2040) WITH PROJECT

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8530	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1564
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	25.6
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: I-8 to Sea World Drive		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.933
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7982	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1464
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2166
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	23.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7054	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1293
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	21.1
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Sea World Drive to I-8		

Geometric Data

Number of Lanes (N), ln	6	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.4
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.867
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8999	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1650
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2011
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.82
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	56.0
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.5
Total Ramp Density Adjustment	6.6	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	9494	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2089
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.98
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	49.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	42.4
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 NB: Sea World Dr to Clairemont Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	8870	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1952
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	36.6
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	7876	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1733
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	58.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	29.7
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-5 SB: Clairemont Dr to Sea World Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	64.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.920
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	10100	Heavy Vehicle Adjustment Factor (f_{HV})	0.967
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2222
Total Trucks, %	3.40	Capacity (c), pc/h/ln	2326
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2140
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.04
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.6		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	4413	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1188
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	19.1
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 EB: W. Mission Bay Dr to I-5		

Geometric Data

Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	63.8
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.900
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	3469	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	934
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2322
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2090
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.45
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	62.2		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	AM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	5515	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1188
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	62.8
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.9
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

HCS7 Basic Freeway Report

Project Information

Analyst	LLG	Date	9/17/2019
Agency		Analysis Year	Year 2040 + Project
Jurisdiction	Caltrans	Time Period Analyzed	PM Peak
Project Description	I-8 WB: I-5 to W. Mission Bay Dr		

Geometric Data

Number of Lanes (N), ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.975
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.840
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Volume (V), veh/h	5288	Heavy Vehicle Adjustment Factor (f_{HV})	0.988
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	1139
Total Trucks, %	1.20	Capacity (c), pc/h/ln	2334
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	1961
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	18.1
Total Ramp Density Adjustment	5.0	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	63.4		

APPENDIX W

CITY OF SAN DIEGO BICYCLE MASTER PLAN

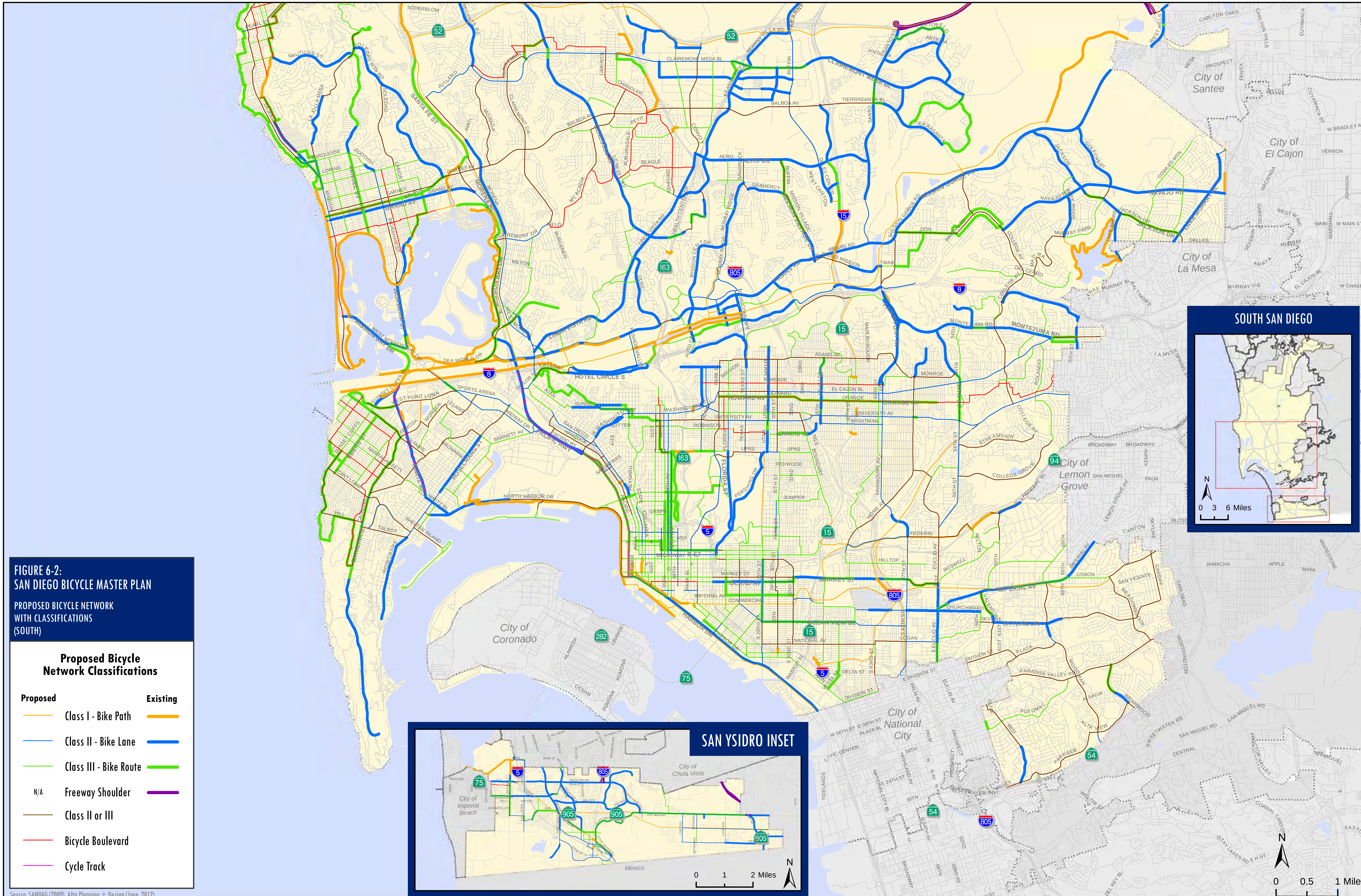


FIGURE 6-2:
SAN DIEGO BICYCLE MASTER PLAN
PROPOSED BICYCLE NETWORK
WITH CLASSIFICATIONS
(SOUTH)
Proposed Bicycle Network Classifications
Proposed
Existing
Class I - Bike Path
Class II - Bike Lane
Class III - Bike Route
N/A
Freeway Shoulder
Class II or III
Bicycle Boulevard
Cycle Track
Source: SANDAG (2009), Alta Planning + Design (June, 2012)
SOUTH SAN DIEGO
0 3 6 Miles
SAN YSIDRO INSET
City of Chula Vista
City of Imperial Beach
Mexico
0 1 2 Miles
City of Santee
City of El Cajon
City of La Mesa
City of Lemon Grove
City of Coronado
City of National City
0 0.5 1 Miles

APPENDIX X

ENTRY/EXIT QUEUE COUNT SHEETS AND CALCULATIONS

Table 19-1

ENTRY - EXIT QUEUE SUMMARY

	NON-HOLIDAY SUMMER WEEKEND SATURDAY 8/10/19	Forecast Year 2025	Forecast Year 2040
ENTRANCE(14 gates at Perez Cove Way)			
- Entering AM Peak Volumes (veh/hr) [1]	1,257	1,334	1,549
- Average Queue (veh/hr/gate) [1]	5	5	6
- Max. Queue Observed (vehicles in one lane) [1]	17	18	21
Coefficient of Utilization	0.99	0.99	0.99
- Calculated Service Rate (veh/hr/gate) [2]	98	104	120
EXIT(Sea World Way)			
- Exiting PM peak Volumes (veh/hr) [1]	701	744	864
- Average Queue (veh/lane/hr) [1]	2	2	2
- Max. Queue Observed (vehicles in one lane) [1]	11	12	14

[1] Source: LLG traffic counts (Saturday Intersection Counts on 8/10/19)
[2] Service rate calculated using queuing graphs (see Appendix D).
- Averages do not include Monday count days.

Linscott, Law & Greenspan, Engineers

4542 Ruffner Street, Suite 100, San Diego, CA 92111

BC 19-095 3-19-3077

Vehicle Queue Count - SeaWorld Entrance- Saturday August 10, 2019

Time - AM	Booth #1	Booth #2	Booth #3	Booth #4	Booth #5	Booth #6	Booth #7	Booth #8	Booth #9	Booth #10	Booth #11	Booth #12	Booth #13	Booth #14	Booth Total
10:00	4	3	3	4	0	0	2	3	4	4	2	3	3	2	37
10:15	2	4	5	4	2	1	3	3	5	5	7	9	12	12	74
10:30	4	5	6	6	0	1	1	3	3	4	4	6	5	6	54
10:45	12	6	14	8	0	6	4	6	6	7	6	6	5	8	94
11:00	5	11	5	5	0	5	5	6	6	6	6	6	8	11	85
11:15	6	7	5	6	0	4	4	7	7	6	7	7	17	7	90
11:30	6	3	4	5	Closed	closed	6	6	3	1	8	6	5	10	63
11:45	2	4	1	3	Closed	closed	3	2	4	5	3	5	4	4	40

Linscott, Law & Greenspan,

4542 Ruffner Street, Suite 100, San Diego, CA 92111

BC 19-095

Vehicle Queue Count - SeaWorld Way Exit - Saturday August 10,

Time	Outside Lane Left Turn	Inside Lane Left Turn	Inside Lane Right Turn	Outside Lane Right Turn	Total Exiting in Queue
17:00	0	1	1	0	2
17:05	0	0	0	0	0
17:10	3	5	2	1	11
17:15	0	0	0	0	0
17:20	0	1	2	3	6
17:25	2	9	0	0	11
17:30	1	7	1	2	11
17:35	1	5	0	0	6
17:40	0	5	2	2	9
17:45	0	0	0	0	0
17:50	3	4	4	4	15
17:55	0	0	0	2	2
18:00	1	7	0	2	10
18:05	1	3	0	1	5
18:10	3	4	3	2	12
18:15	3	3	3	2	11
18:20	6	8	2	1	17
18:25	0	3	0	0	3
18:30	0	2	1	0	3
18:35	2	7	4	2	15
18:40	4	8	2	3	17
18:45	3	8	2	2	15
18:50	2	11	2	1	16
18:55	5	10	2	4	21

Appendix C

Identification of Systemic Hotspots

Identification of Systemic Hotspots

Systemic hotspots are identified using the framework of the systemic collision matrices. The highest priority systemic concerns are identified using a statistically significant percentile value. For the vehicle matrices, the 99.5th percentile was set as the threshold criterion for identifying systemic hotspots. For the pedestrian and bicycle matrices, the 99th percentile was used as the threshold criterion for identifying systemic hotspots. The difference in percentile thresholds are a result of the relative size of the statistical population (i.e. the number of records in the ped/bike matrices is smaller relative to the number of vehicle records). For both criteria, the percentile is rounded down to prevent situations where a systemic hotspot was missed due to a fraction of a crash and to maintain a conservative approach. The methodology to select the threshold is described in Appendix A.

Further scrutiny was taken for each collision matrix and each individual scenario to determine whether countermeasures could be made on a systemic basis based on the geometrics and features of each collision identified in the hotspots. Roadway characteristics (i.e. intersection control, number of lanes) were examined for each collision to ensure that none of the collisions were mis-geocoded or erroneously assigned the incorrect environment attributes. Collisions that did not correctly match the hotspot environment were removed. Additionally, engineering judgment was employed to discern which hotspots could reasonably maintain a systemic approach to implementing city-wide countermeasures. A summary for all hotspots removed after the primary statistical analysis are described below each table.

Table 1A: Pedestrian Injury Collisions - Intersection Footprint
(99% percentile = 15.14 collisions; the criterion is 15)

Number of Collisions	Crash Scenario	Roadway Environment
27	Failure to Yield – Crossing in Crosswalk at Intersection – Making Left Turn	Signalized, Primary Road ADT 7,001-15,000 3-Lane (1-Way) Intersects 3-Lane (1-Way) or 3-Lane (1-Way) Intersects 4-Lane (2-Way)
27	Failure to Yield – Crossing in Crosswalk at Intersection – Making Left Turn	Signalized, Primary Road ADT 7,001-25,000 4-Lane (2-Way) Intersects 2-Lane (2-Way)
17	Failure to Yield – Crossing in Crosswalk at Intersection – Making Right Turn	Signalized, Primary Road ADT 15,001-25,000 2-Lane (2-Way) Intersects 4-Lane (2-Way)

Hotspots #2 and #4 were combined as they were similar in both intersection control and roadway cross-section, the hotspots only varied in terms of the Primary Roadway ADT.

~~Table 1B: Pedestrian Injury Collisions - Intersection Influence Area~~
~~(99% percentile = 9.15 collisions; the criterion is 9)~~

~~Number of Collisions~~	~~Crash Scenario~~	~~Roadway Environment~~
~~13~~	~~Pedestrian Not in Dedicated Areas~~	~~Signalized, 2 Lanes in Each Direction, ADT 15,001-25,000~~

This hotspot was removed as very few collisions occurred under these conditions as compared to the number of intersections this hotspot represents.

~~Table 1C: Pedestrian Injury Collisions - Midblock~~
~~(99% percentile = 8.12 collisions; the criterion is 8)~~

~~Number of Collisions~~	~~Crash Scenario~~	~~Roadway Environment~~
~~11~~	~~Failure to Yield - Crossing Not in Crosswalk~~	~~≤25 MPH, 1 Lane in Each Direction, ADT ≤7,000 (Local)~~
~~8~~	~~Failure to Yield – In road~~	~~≤25 MPH, 1 Lane in Each Direction, ADT ≤7,000 (Local)~~

These hotspots were removed as very few collisions occurred under these conditions as compared to the number of roadway miles this hotspot represents. This roadway environment makes up a majority of City of San Diego streets, making systemic countermeasures very difficult to implement.

Table 2A: Bicycle Injury Collisions - Intersection Footprint
(99% percentile = 14.65 collisions; the criterion is 14)

Number of Collisions	Crash Scenario	Roadway Environment	Tie-Breakers
18	Bicyclist at Fault - Control Violation Through Movement	Signalized, 4-Lane Intersects 2-Lane	N/A
15	Bicyclist at Fault - Control Violation Through Movement	Signalized, 4-Lane Intersects 4-Lane	(15/128)
15	Bicyclist at Fault - Control Violation Through Movement	Side-Street Stop, 2-Lane Intersects 2-Lane	(15/190)
~~14~~	~~Driver at Fault - Unsafe Turning Left~~	~~Side-Street Stop, 2-Lane Intersects 2-Lane~~	~~(14/190)~~
~~14~~	~~Bicyclist at Fault - Unsafe Speed~~	~~Signalized, 4-Lane Intersects 2-Lane~~	~~(14/212), 63~~
~~14~~	~~Bicyclist at Fault - Unsafe Turning Other~~	~~Signalized, 4-Lane Intersects 2-Lane~~	~~(14/212), 52~~

Three of these hotspots were removed. The driver at fault hotspot was removed as very few collisions occurred under these conditions as compared to the number of intersections this hotspot represents. The two bicyclist at fault hotspots were removed as the collisions were largely attributed to careless behavior and did not have any operational characteristics that were common amongst the collision records.

Table 3A: Vehicular Injury Collisions - Intersection Footprint
(99.5% percentile = 89.47 collisions; the criterion is 89)

Number of Collisions	Crash Scenario	Roadway Environment
~~111~~	~~Broadside - Failure to Yield~~	~~Side-Street Stop,~~ ~~Primary Road ADT ≤15,000, Secondary Road ADT ≤7,000,~~ ~~2-Lane (2-Way) Intersects 2-Lane (2-Way)~~
104	Broadside - Control Violation Through Movement	Signalized, Primary Road ADT >15,000, Secondary Road ADT ≤7,000, 4-Lane (2-Way) Intersects 2-Lane (2-Way)
88	Broadside - Control Violation Through Movement	Signalized, Primary Road ADT >15,000, Secondary Road ADT >7,000, 6-Lane (2-Way) Intersects 4-Lane (2-Way)
~~89~~	~~Rear-End - Unsafe Speed~~	~~Signalized,~~ ~~Primary Road ADT >15,000, Secondary Road ADT ≤7,000,~~ ~~4-Lane (2-Way) Intersects 2-Lane (2-Way)~~
86	Broadside - Control Violation Through Movement	Signalized, Secondary Road ADT >7,000, 4-Lane (2-Way) Intersects 4-Lane (2-Way)
~~76~~	~~Rear-End - Unsafe Speed~~	~~Signalized,~~ ~~Primary Road ADT >15,000, Secondary Road ADT >7,000,~~ ~~4-Lane (2-Way) Intersects 4-Lane (2-Way)~~
55	Broadside - Control Violation Through Movement	Signalized, Primary Road ADT ≤15,000, Secondary Road ADT >7,000, 3-Lane (One-Way) Intersects 3-Lane (One-Way)

Three of these hotspots were removed. The side-street stop hotspot was removed as the number of this type of intersection makes systemic countermeasures very difficult to implement. The two rear-end hotspots were removed. However, the rear-end crash intersections will receive the countermeasures identified for the broadside hotspots due to matching environments.

~~Table 3B: Vehicular Injury Collisions - Intersection Influence Area~~
~~(99.5% percentile = 34.01 collisions; the criterion is 34)~~

~~Number of Collisions~~	~~Crash Scenario~~	~~Roadway Environment~~
~~83~~	~~Rear-End - Unsafe Speed~~	~~Signalized, 35-45 MPH, Median~~
~~55~~	~~Rear-End - Unsafe Speed~~	~~Signalized, 25-35 MPH, Median~~
~~38~~	~~Rear-End - Following Too Closely~~	~~Signalized, 35-45 MPH, No Median~~

These hotspots were removed as few collisions occurred under these conditions as compared to the number of intersections these hotspots represent. This intersection environment makes up a majority of City of San Diego signalized intersections, making systemic countermeasures very difficult to implement.

~~Table 3C: Vehicular Injury Collisions - Midblock~~
~~(99.5% percentile = 23.10 collisions; the criterion is 23)~~

~~Number of Collisions~~	~~Crash Scenario~~	~~Roadway Environment~~	~~Tie-Breakers~~
~~28~~	~~Rear-End – Unsafe Speed~~	~~Median, 40 & 45 MPH, ADT >25,000~~	~~(28/112)~~
~~28~~	~~Sideswipe - Unsafe Turning Other~~	~~No Median, ≤25 MPH, ADT ≤7,000 (Local)~~	~~(28/193)~~
~~27~~	~~Rear-End - Unsafe Speed~~	~~Median, ≥50 MPH, ADT >25,000~~	~~N/A~~
~~23~~	~~Rear-End - Unsafe Turning Other~~	~~No Median, ≤25 MPH, ADT ≤7,000 (Local)~~	~~N/A~~

These hotspots were removed as very few collisions occurred under these conditions as compared to the number of roadway miles this hotspot represents. This roadway environment makes up a majority of City of San Diego streets, making systemic countermeasures very difficult to implement.

Pedestrian Matrix - Intersection Footprint #1

<u>Scenarios Description</u>

Hotspot Roadway Environment (columns):

- Intersection Control: Signalized
- One-way 3-lane roadway intersects with a 4-lane roadway; OR
  one-way 3-lane roadway intersects with a one-way 3-lane roadway
- Primary Roadway ADT: 7,001 – 15,000

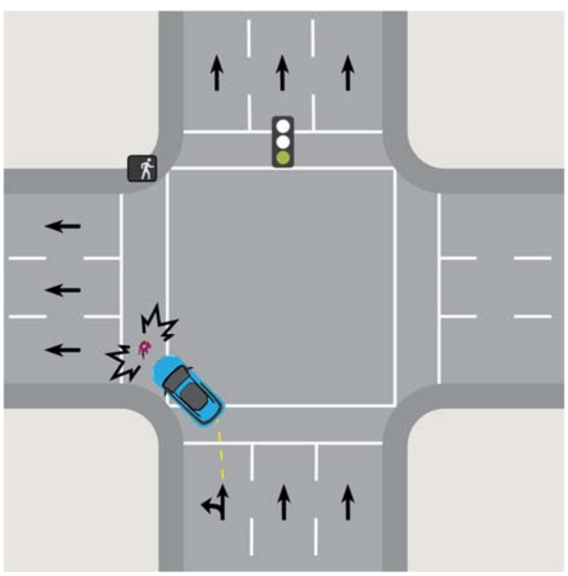
Behaviors Associated with this Hotspot Roadway Environment (rows):

- Violation Code: "Failure to Yield"
- Pedestrian Action: "Crossing in Crosswalk at Intersection"
- Driver Movement: "Making Left Turn"

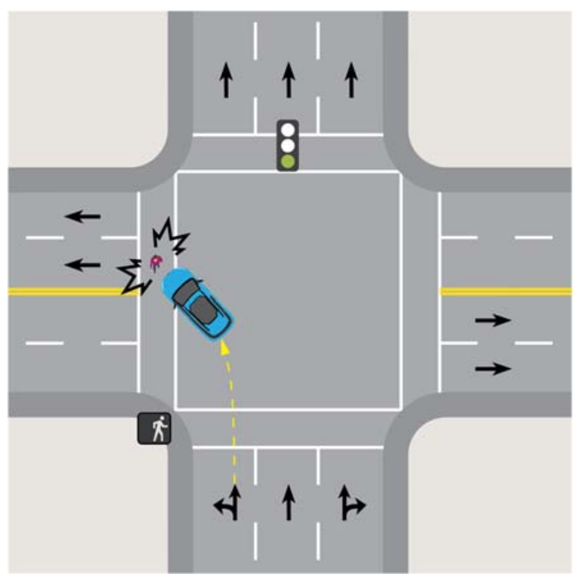
Safety Issue: Conflict between a vehicle on a one-way street making a left turn and a pedestrian crossing in the crosswalk at a signalized intersection.

The majority of locations where a one-way street intersects a one-way street occur in Downtown San Diego where pedestrian volumes are significantly higher than other parts of the City.

Multi-lane one-way streets present a unique challenge for pedestrians wanting to cross the intersection leg that conflicts with left turning vehicles from a one-way street (see Case 1 and 2 below). Left turning vehicles do not have opposing traffic to yield to before executing their turns. Because of this, a driver might mistake their movement as being a protected movement. In cases where a one-way street intersects a one-way street, wide turning radii allow for higher speed turning movements.



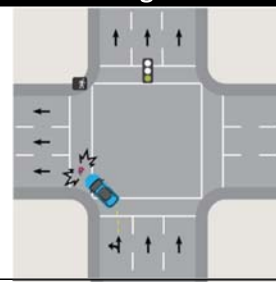
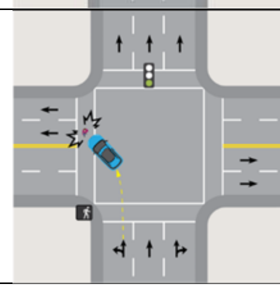
Case 1



Case 2

A total of 27 records were identified under these conditions. The driver was at-fault in all instances. The 27 collisions were experienced at 21 unique locations. One collision was a fatality at the intersection of 4th Avenue and B Street.

Vehicle-Pedestrian Intersection Hotspot #1 Scenarios

	Collision Scenario	Crashes	Diagram
Case 1	Vehicle turning left from a 3-lane (1-way) roadway onto a 3-lane (1-way) roadway	22	
Case 2	Vehicle turning left from a 3-lane (1-way) roadway onto a 4-lane (2-way) roadway	5	

Engineering Countermeasures

Short-Term Systemic Countermeasure Recommendations

The three countermeasures listed below are low cost, highly effective, and can be implemented systemically with relative ease. Individually, each of these countermeasures has been shown to enhance safety for people crossing at signalized intersections, with individual Crash Reduction Factors (CRFs) as high as 60%. Combined together, these countermeasures will likely lead to a significant reduction in collisions identified in this hotspot. They will provide people walking with high-visibility marked areas and exclusive lead time for crossing.

Vehicle-Pedestrian Intersection Hotspot #1 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Phasing (Lead Pedestrian Interval (LPI))	60%
2	High Visibility Pedestrian Crossing (Marked Continental Crosswalks)	40%
3	Pedestrian Countdown Signal Heads	25%

[1] The CRFs shown represent the anticipated percentage drop in collisions after a given countermeasure is implemented. These values are taken from the LRSM and the FHWA CMF Clearinghouse. Note: A recent New York City before and after study of 104 intersections with LPIs showed left turn pedestrian and bicycles injuries declined by 14% and left turn pedestrian and bicycle severe injuries and fatalities declined by 56%.

Lead Pedestrian Interval (LPI) Signal Phasing - CRF: 60% (Case 1 and 2)

A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection crosswalk before vehicles are given a green indication. With this head start, pedestrians can establish their presence in the crosswalk before vehicles have the opportunity to turn left. By the time the left turning vehicle has a green indication allowing for permissive left turns, the pedestrian is in a much more conspicuous position in the crosswalk. Implementation of LPIs will result in a little less green time for vehicles each signal cycle for fixed time traffic signals.

LPIs provide:

- increased visibility of crossing pedestrians
- reduced conflicts between pedestrians and vehicles
- increased likelihood of motorists yielding to pedestrians
- established opportunity for pedestrians who may be slower to start crossing

An LPI gives pedestrians a walk indication while vehicles traveling in the same direction still have a red indication. In these situations, it is important to consider protecting the crossing pedestrians from vehicles turning left on red from a one-way street to a one-way street (Case 1). Drivers wanting to turn left on red look to their right for a gap in the traffic and begin their turn when the gap appears. This could lead to collisions during the LPI when pedestrians have started their crossing. “No Left Turn on Red” signs can eliminate this conflict. However, static “No Left Turn on Red” signs can, at some locations, significantly increase vehicle delay. One strategy to minimize vehicle delay is the inclusion of activated “No Left Turn” blank out signs rather than static “No Left Turn on Red” signs. The activated signs only restrict left-turning vehicles when the blank out sign is activated compared to static turn restriction signs that would restrict left turns for the entire red portion of the signal cycle.

For Case 1, activated “No Left Turn” blank out signs should be considered to compliment the recommended LPI. The blank out sign will restrict left turns on red during the LPI only, allowing for full protection for pedestrians during the LPI. The blank out signs should be programmed to turn on in advance of the LPI and turn off at the end of the LPI.

For Case 2, activated “No Right Turn” blank out signs should be considered to compliment the recommended LPI. This is because the LPI will be for both crossings of the intersection and, for Case 2, right turns on red are generally permitted.

High Visibility Crosswalks – CRF: 40% (Case 1 and 2)

High visibility crosswalks increase awareness of pedestrian crossing locations at intersections by using highly visible marking patterns. High visibility (continental) crosswalks are the current standard for all crosswalks in the City of San Diego. The implementation of high-visibility crosswalks will alert left turning vehicles to the presence of a dedicated pedestrian crossing area that conflicts with their intended movement.

Pedestrian Countdown Signal Heads – CRF: 25% (Case 1 and 2)
Pedestrian countdown signals heads provide crossing pedestrians with a countdown timer display to inform them of the number of seconds left to finish crossing a signalized pedestrian crossing. Countdown signals provide information for pedestrians so they can assess the risk associated with leaving the curb during the flashing "DON'T WALK" interval. Countdown signals begin counting down when the flashing "DON'T WALK" interval appears and stop at the beginning of the steady "DON'T WALK" interval. These signals have also been successful in encouraging more pedestrians to use the pushbutton rather than not using the crosswalk to cross or crossing against a red light.

Longer-Term Countermeasures
The two countermeasures listed below have moderate cost, and are moderately challenging to implement systemically.

Left Turn Lane and Protected Left Turn Phase – CRF: 55% (Case 1 and 2)
Multi-lane one-way streets typically do not have left turn lanes or a protected left turn phase. This is because left turning vehicles do not have opposing traffic to yield to before executing their turns. However, they do have to yield to pedestrians. Installation of a left turn lane with a protected left turn phase will significantly reduce collisions between left-turning vehicles and pedestrians. In these cases, providing a protected only phase for left turning vehicles will directly result in a fully protected phase for the pedestrians that would otherwise be in conflict with the left turning vehicle.

Implementation of this countermeasure should coincide with removal of LPI and activated "No Left Turn" blank out signs for Case 1. The fully protected left turn phase would mean these countermeasures would no longer be required. The LPI and activated "No Right Turn" blank out signs should remain for Case 2.

Flashing Yellow Arrows – CRF: 36.5% (Case 1 and 2)
Flashing yellow arrows can be used to warn vehicles turning left to proceed with caution. For vehicles turning left from a one-way street, the only conflict they encounter when making the turning movement is pedestrians crossing the street. Flashing yellow arrows could be implemented to turn on at the end of the LPI to provide an enhanced warning to vehicles. One advantage of Flashing Yellow Arrows is that their permitted left turn can become a red arrow while a pedestrian is being served. Traditional signal indications must either permit left turns during the pedestrian phase or not at all. This countermeasure can be implemented in conjunction with the LPI and activated "No Left Turn" blank out signs.

Educational Countermeasures

Intersection Control Awareness Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics, including how the three pedestrian intersection hotspots relate as a percentage to all pedestrian injury crashes at signalized intersections, and safe behaviors for vehicles making left turns from one-way streets at signalized intersections and for pedestrians crossing in crosswalks at signalized intersections along one-way streets. Safe behaviors for vehicles making left turns from one-way streets at signalized intersections should focus on watching for and yielding to pedestrians. It is recommended that this material include information related to the proposed LPIs and blank out signs. Information should be distributed immediately following the installation of the initial phase of LPIs and blank out signs for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Pedestrian Safety Zones – CRF: 8.5% - 13.3% (Case 1 and 2)
Target enforcement of left turning vehicles at one-way street signalized intersections. Enforcement would be most effective immediately following the installation of the initial phase of LPIs and blank out signs.

Pedestrian Matrix - Intersection Footprint #2

<u>Scenarios Description</u>

Hotspot Roadway Environment (columns):

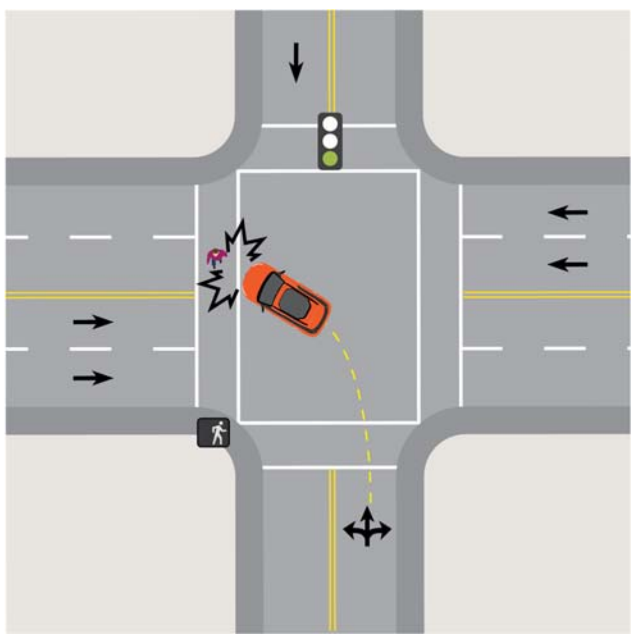
- Intersection Control: Signalized
- Two-way, 4-lane roadway intersects with a two-way, 2-lane roadway
- Primary Roadway ADT: 7,001 – 25,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

- Violation Code: “Failure to Yield”
- Pedestrian Action: “Crossing in Crosswalk at Intersection”
- Driver Movement: “Making Left Turn”

Safety Issue: Conflict between a vehicle making a left turn and a pedestrian crossing in the crosswalk at a signalized intersection.

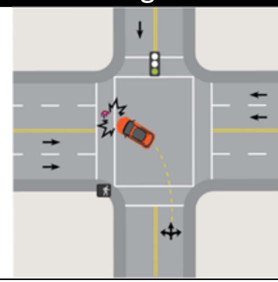
Intersections with permissive left turn signal phasing present a unique challenge for pedestrians wanting to cross the intersection leg that conflicts the left turning vehicles. Permissive left turn signal phasing at locations where a two-way, 4-lane roadway intersects a two-way, 2-lane roadway (see Case 1 below) may result in a scenario where the vehicle intending to turn left is focused on vehicles heading towards them (through the intersection) to determine when it is clear to make the left turn. This focus on oncoming vehicles may distract the driver from seeing pedestrians – who have the right-of-way – that are crossing the leg of the intersection where the vehicle intends to make the left turn.



Case 1

A total of 27 records were identified under these conditions. The driver was at-fault in all instances. The 27 collisions were experienced at 21 unique locations.

Vehicle-Pedestrian Intersection Hotspot #2 Scenario

Collision Scenario	Crashes	Diagram
Vehicle turning left from a 2-lane (2-way) roadway onto a 4-lane (2-way) roadway	27	

<u>Engineering Countermeasures</u>
If locations are prioritized, intersections with primary roadway ADT greater than 15,000 vpd should be prioritized for countermeasures.

<u>Short-Term Systemic Countermeasure Recommendations</u>

The three countermeasures listed below are low cost, highly effective, and can be implemented systemically with relative ease. Individually, each of these countermeasures has been shown to enhance safety for people crossing at signalized intersections, with individual Crash Reduction Factors (CRFs) as high as 60%. Combined together, these countermeasures will likely lead to a significant reduction in collisions identified in this hotspot. They will provide people walking with high-visibility marked areas and exclusive lead time for crossing.

Vehicle-Pedestrian Intersection Hotspot #2 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Phasing (Lead Pedestrian Interval (LPI))	60%
2	High Visibility Pedestrian Crossing (Marked Continental Crosswalks)	40%
3	Pedestrian Countdown Signal Heads	25%

[1] The CRFs shown represent the anticipated percentage drop in collisions after a given countermeasure is implemented. These values are taken from the LRSM and the FHWA CMF Clearinghouse. Note: A recent New York City before and after study of 104 intersections with LPIs showed left turn pedestrian and bicycles injuries declined by 14% and left turn pedestrian and bicycle severe injuries and fatalities declined by 56%.

Lead Pedestrian Interval (LPI) Signal Phasing - **CRF: 60%**

A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection crosswalk before vehicles are given a green indication. With this head start, pedestrians can establish their presence in the crosswalk before vehicles have the opportunity to turn left. By the time the left turning vehicle has a green indication allowing for permissive left turns, the pedestrian is in a much more conspicuous position in the crosswalk. Implementation of LPIs will result in a little less green time for vehicles each signal cycle for fixed time traffic signals.

LPIs provide:

- increased visibility of crossing pedestrians
- reduced conflicts between pedestrians and vehicles
- increased likelihood of motorists yielding to pedestrians
- established opportunity for pedestrians who may be slower to start crossing

An LPI gives pedestrians a walk indication while vehicles traveling in the same direction still have a red indication. In these situations, it is important to consider protecting the crossing pedestrians from vehicles turning right on red. Drivers wanting to turn right on red look to their left for a gap in the traffic and begin their turn when the gap appears. This could lead to collisions during the LPI when pedestrians have started their crossing. "No Right Turn on Red" signs can eliminate this conflict. However, static "No Right Turn on Red" signs can, at some locations, significantly increase vehicle delay. One strategy to minimize vehicle delay is the inclusion of activated "No Right Turn" blank out signs rather than static "No Right Turn on Red" signs. The activated signs only restrict right-turning vehicles when the blank out sign is activated compared to static turn restriction signs that would restrict right turns for the entire red portion of the signal cycle.

For both Case 1 and 2, activated "No Right Turn" blank out signs should be considered to compliment the recommended LPI. This is because the LPI will be for both crossings of the intersection and, for both Case 1 and 2, right turns on red are generally permitted.

High Visibility Crosswalks – **CRF: 40%**

High visibility crosswalks increase awareness of pedestrian crossing locations at intersections by using highly visible marking patterns. High visibility (continental) crosswalks are the current standard for all crosswalks in the City of San Diego. The implementation of high-visibility crosswalks will alert left turning vehicles to the presence of a dedicated pedestrian crossing area that conflicts with their intended movement.

Pedestrian Countdown Signal Heads – **CRF: 25%**

Pedestrian countdown signals heads provide crossing pedestrians with a countdown timer display to inform them of the number of seconds left to finish crossing a signalized pedestrian crossing. Countdown signals provide information for pedestrians so they can assess the risk associated with leaving the curb during the flashing "DON'T WALK" interval. Countdown signals begin counting down when the flashing "DON'T WALK" interval appears and stop at the beginning of the steady "DON'T WALK" interval. These signals have also been successful in encouraging more pedestrians to use the pushbutton rather than not using the crosswalk to cross or crossing against a red light.

Longer-Term Countermeasures

The two countermeasures listed below have moderate cost, and are moderately challenging to implement systemically.

Left Turn Lane and Protected Left Turn Phase – **CRF: 55%**

Of the 21 unique locations where these collisions occurred, only 4 have an existing left turn lane and none of the locations have a protected left turn phase. Installation of a left turn lane with a protected left turn phase will significantly reduce collisions between left-turning vehicles and pedestrians. A dedicated left turn lane helps to clearly signify the vehicles intention (to either turn or not) to oncoming traffic, while eliminating the pressure to turn from vehicles waiting behind them. In these cases, providing a protected only phase for left turning vehicles will directly result in a protected phase for the pedestrians that would otherwise be in conflict with the left turning vehicle. This countermeasure can be implemented in conjunction with the LPI and activated “No Right Turn” blank out signs.

Flashing Yellow Arrows – **CRF: 36.5%**

Flashing yellow arrows can be used to warn vehicles turning left to proceed with caution. For vehicles turning left from a two-way street, the driver focuses on vehicles heading towards them (through the intersection) to determine when it is clear to make the left turn and may not anticipate a pedestrian crossing the street. Flashing yellow arrows could be implemented to turn on at the end of the LPI to provide an enhanced warning to vehicles. One advantage of Flashing Yellow Arrows is that their permitted left turn can become a red arrow while a pedestrian is being served. Traditional signal indications must either permit left turns during the pedestrian phase or not at all. This countermeasure can be implemented in conjunction with the LPI and activated “No Right Turn” blank out signs.

Educational Countermeasures

Intersection Control Awareness Campaign –

Develop and distribute information related to collision statistics, including how the three pedestrian intersection hotspots relate as a percentage to all pedestrian injury crashes at signalized intersections; and safe behaviors for vehicles making permissive left turns at signalized intersections and for pedestrians crossing in crosswalks at signalized intersections with permissive left turn phasing. Safe behaviors for vehicles making permissive left turns at signalized intersections should focus on watching for and yielding to pedestrians. It is recommended that this material include information related to the proposed LPIs and blank out signs. Information should be distributed immediately following the installation of the initial phase of LPIs and blank out signs for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Pedestrian Safety Zones – CRF: 8.5% - 13.3%

Target enforcement of left turning vehicles at signalized intersections where a two-way, 4-lane roadway intersects a two-way, 2-lane roadway. Enforcement would be most effective immediately following the installation of the initial phase of LPIs and blank out signs.

Pedestrian Matrix - Intersection Footprint #3

<u>Scenarios Description</u>

Hotspot Roadway Environment (columns):

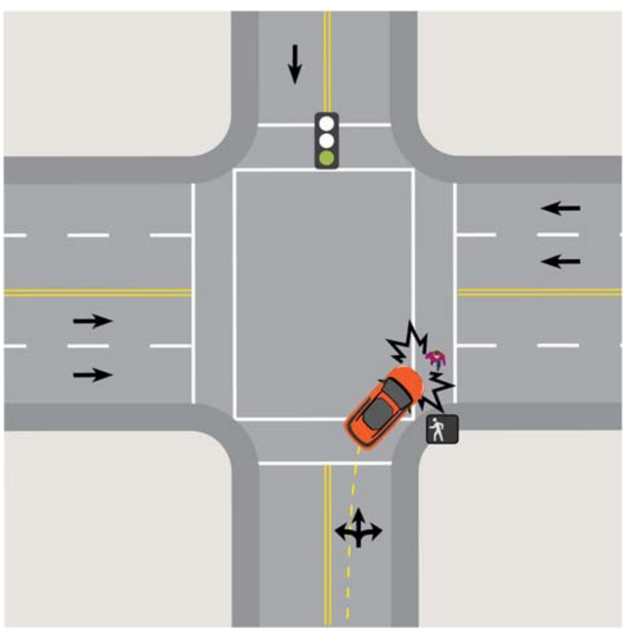
- Intersection Control: Signalized
- Two-way 4-lane roadway intersects with a two-way 2-lane roadway
- Primary Roadway ADT: 15,001 – 25,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

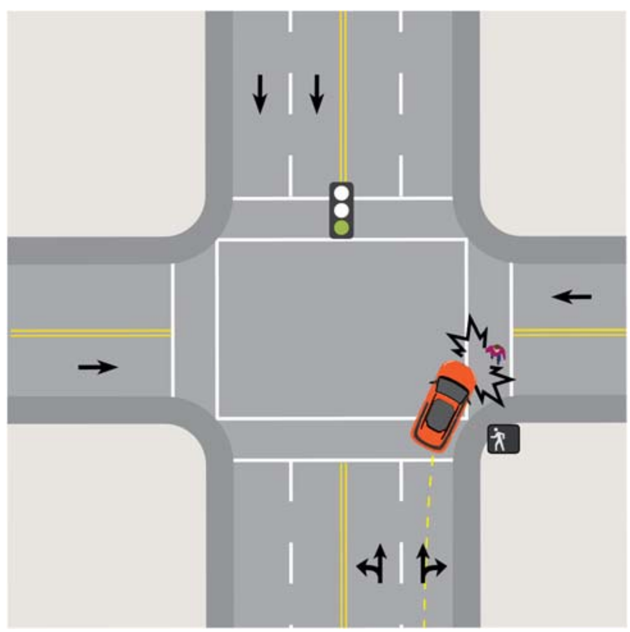
- Violation Code: “Failure to Yield”
- Pedestrian Action: “Crossing in Crosswalk at Intersection”
- Driver Movement: “Making Right Turn”

Safety Issue: Conflict between a vehicle making a right turn and a pedestrian crossing in the crosswalk at a signalized intersection.

Intersections that allow right turns on red present a challenge for pedestrians wanting to cross the intersection leg that conflicts with right turning vehicles. Drivers wanting to turn right on red look to their left for a gap in the traffic and begin their turn when the gap appears. In these situations, the driver may not be aware of a pedestrian to their right. When the gap in traffic comes at the same time the WALK and GREEN indications come on, the driver may continue with their turn at the same time a pedestrian has started to cross in the crosswalk.



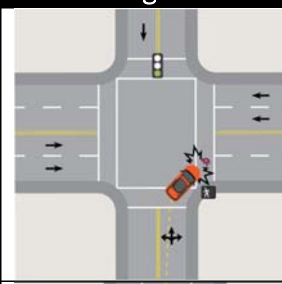
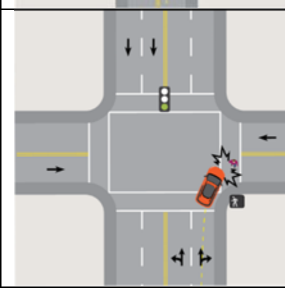
Case 1



Case 2

A total of 17 records were identified under these conditions. The driver was the party at-fault in all instances. The 17 collisions were experienced at 16 unique locations. Two collisions occurred at the intersection of West Bernardo Drive and Poblado Road.

Vehicle-Pedestrian Intersection Hotspot #3 Scenarios

Collision Scenario	Crashes	Diagram
Vehicle turning right from a 2-lane (2-way) roadway onto a 4-lane (2-way) roadway	9	
Vehicle turning right from a 4-lane (2-way) roadway onto a 2-lane (2-way) roadway	8	

Engineering Countermeasures

Short-Term Systemic Countermeasure Recommendations

The three countermeasures listed below are low cost, highly effective, and can be implemented systemically with relative ease. Individually, each of these countermeasures has been shown to enhance safety for people crossing at signalized intersections, with individual Crash Reduction Factors (CRFs) as high as 60%. Combined together, these countermeasures will likely lead to a significant reduction in collisions identified in this hotspot. They will provide people walking with high-visibility marked areas and exclusive lead time for crossing.

Vehicle-Pedestrian Intersection Hotspot #3 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Phasing (Lead Pedestrian Interval (LPI))	60%
2	High Visibility Pedestrian Crossing (Marked Continental Crosswalks)	40%
3	Pedestrian Countdown Signal Heads	25%

[1] The CRFs shown represent the anticipated percentage drop in collisions after a given countermeasure is implemented. These values are taken from the LRSM and the FHWA CMF Clearinghouse. Note: A recent New York City before and after study of 104 intersections with LPIs showed left turn pedestrian and bicycles injuries declined by 10% and left turn pedestrian and bicycle severe injuries and fatalities declined by 74%.

Lead Pedestrian Interval (LPI) Signal Phasing - CRF: 60% (Case 1 and 2)
A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection crosswalk before vehicles are given a green indication. With this head start, pedestrians can establish their presence in the crosswalk before vehicles have the opportunity to turn right. By the time the right turning vehicle has a green indication allowing for permissive right turns, the pedestrian is in a much more conspicuous position in the crosswalk. Implementation of LPIs will result in a little less green time for vehicles each signal cycle for fixed time traffic signals.

LPIs provide:

- increased visibility of crossing pedestrians
- reduced conflicts between pedestrians and vehicles
- increased likelihood of motorists yielding to pedestrians
- established opportunity for pedestrians who may be slower to start crossing

An LPI gives pedestrians a walk indication while vehicles traveling in the same direction still have a red indication. Drivers wanting to turn right on red look to their left for a gap in the traffic and begin their turn when the gap appears. This could lead to collisions during the LPI when pedestrians have started their crossing. “No Right Turn on Red” signs can eliminate this conflict. However, static no right turn on red signs can, at some locations, significantly increase vehicle delay. One strategy to minimize vehicle delay is the inclusion of activated “No Right Turn” blank out signs rather than static “No Right Turn on Red” signs. The activated signs only restrict right-turning vehicles when the blank out sign is activated compared to static turn restriction signs that would restrict right turns for the entire red portion of the signal cycle.

For both Case 1 and 2, activated “No Right Turn” blank out signs should be considered to compliment the recommended LPI. The blank out sign will restrict right turns on red during the LPI only, allowing for full protection for pedestrians during the LPI. The blank out signs should be programmed to turn on in advance of the LPI and turn off at the end of the LPI.

High Visibility Crosswalks – CRF: 40% (Case 1 and 2)
High visibility crosswalks increase awareness of pedestrian crossing locations at intersections by using highly visible marking patterns. High visibility (continental) crosswalks are the current standard for all crosswalks in the City of San Diego. The implementation of high-visibility crosswalks will alert right turning vehicles to the presence of a dedicated pedestrian crossing area that conflicts with their intended movement.

Pedestrian Countdown Signal Heads – CRF: 25% (Case 1 and 2)
Pedestrian countdown signals heads provide crossing pedestrians with a countdown timer display to inform them of the number of seconds left to finish crossing a signalized pedestrian crossing. Countdown signals provide information for pedestrians so they can assess the risk associated with leaving the curb during the flashing “DON’T WALK” interval. Countdown signals begin counting down when the flashing "DON’T WALK" interval appears and stop at the beginning of the steady "DON’T WALK" interval. These signals have also been successful in

encouraging more pedestrians to use the pushbutton rather than not using the crosswalk to cross or crossing against a red light.

Educational Countermeasures

Intersection Control Awareness Campaign – **(Case 1 and 2)**
Develop and distribute information related to collision statistics, including how the three pedestrian intersection hotspots relate as a percentage to all pedestrian injury crashes at signalized intersections; and safe behaviors for vehicles making permissive right turns at signalized intersections and for pedestrians crossing in crosswalks at signalized intersections with permissive right turn phasing. Safe behaviors for vehicles making permissive right turns at signalized intersections should focus on watching for and yielding to pedestrians. It is recommended that this material include information related to the proposed LPIs and blank out signs. Information should be distributed immediately following the installation of the initial phase of LPIs and blank out signs for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Pedestrian Safety Zones – **CRF: 8.5% - 13.3% (Case 1 and 2)**
Target enforcement of right turning vehicles at signalized intersections where a two-way, 4-lane roadway intersects a two-way, 2-lane roadway (Case 1 and 2). Enforcement would be most effective immediately following the installation of the initial phase of LPIs and blank out signs.

Bicycle Matrix - Intersection Footprint #1

Scenario Description

Hotspot Roadway Environment (columns):

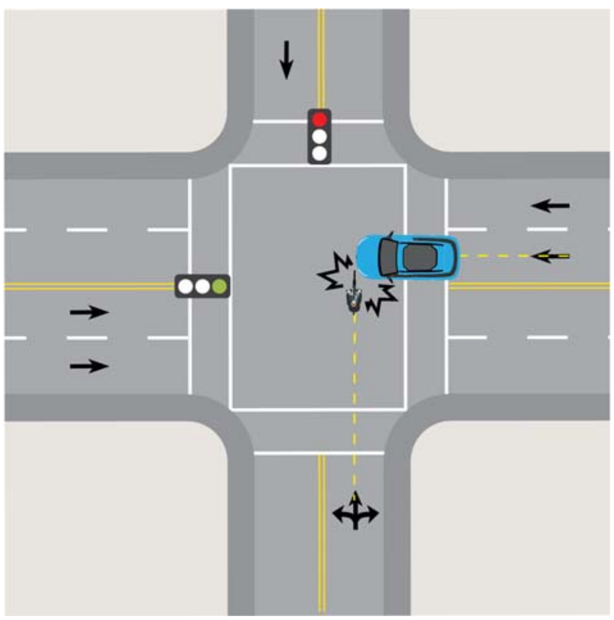
- Intersection Control: Signalized
- 4-lane roadway intersects with a 2-lane roadway; OR
  4-lane roadway intersects with a 4-lane roadway

Behaviors Associated with this Hotspot Roadway Environment (rows):

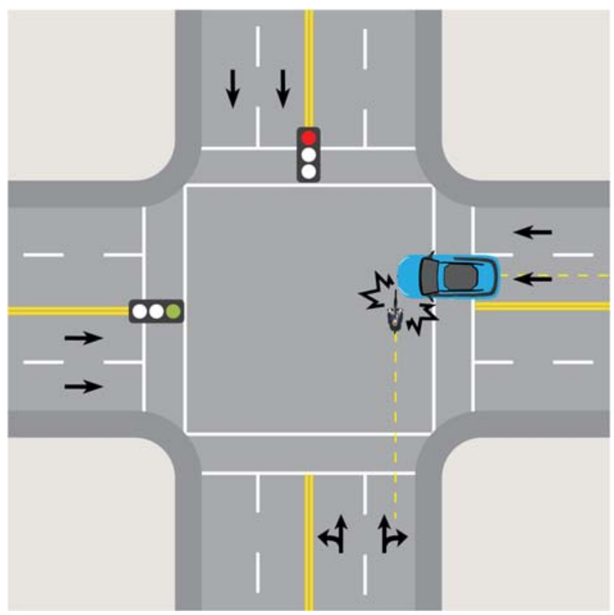
- Bicyclist at-Fault
- Violation Code: “Control Violation Through Movement”

Safety Issue: Bicyclists approaching an intersection and proceeding through against a red light.

Signalized intersections may result in a scenario where a bicyclist approaching a red light continues through the intersection rather than coming to a complete stop and waiting for a GREEN indication. Bicyclists may be inclined to risk passing through crossing traffic in order to avoid stopping and then having to regain momentum when the signal turns green.



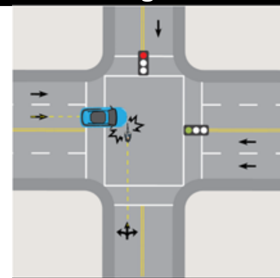
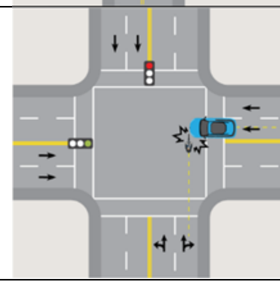
Case 1



Case 2

A total of 33 records were identified under these conditions. The bicyclist was the party at-fault in all instances. The 33 collisions were experienced at 30 unique locations. Four collisions occurred at the intersection of Fairmount Avenue and Home Avenue. Three collisions resulted in a severe injury at the intersections of Fairmount Avenue & Home Avenue, 47^{th} Avenue & Market Street, and Friars Road & Sea World Drive.

Vehicle-Bicycle Intersection Hotspot #1 Scenarios

Collision Scenario	Instances	Diagram
4-lane (2-way) roadway intersects with a 2-lane (2-way) roadway	18	
4-lane (2-way) roadway intersects with a 4-lane (2-way) roadway	15	

Engineering Countermeasures

Short-Term Systemic Countermeasure Recommendations

The countermeasure listed below is low cost, highly effective, and can be implemented systemically with relative ease. This countermeasure has been shown to enhance safety for all users at signalized intersections. It will decrease the amount of time people have to wait for a green signal indication, enhancing compliance and safety.

Loop Detectors – (Case 1 and 2)
Loop detectors for vehicles and bikes help to enhance compliance at signalized intersections. When a signalized intersection does not have loop detectors or the loops require maintenance, the signal is placed into recall mode for vehicles and bikes. In these cases, users on the main street may get used to a traffic signal serving the side street or left turns when there is no traffic present. This situation can lead to non-compliance, which can lead to injury collisions. Robust loop detectors enhance signal operations and decrease driver and cyclist frustration. The implementation of robust loop detectors and a program to quickly and efficiently fix broken systems will reduce delay at signalized intersections, enhancing compliance and safety.

Educational Countermeasures

Public Safety Messaging Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics and safe behaviors ("Don't Ride the Red") for bicyclists at intersections. Focus should be on how bicyclists should behave at signalized intersections and how vehicles should behave when bikes are present. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign and San

Francisco's "Coexist" campaign should be considered as models for a successful awareness campaign.

Enforcement Countermeasures

Bicycle Red Light Running Enforcement – **(Case 1 and 2)**
Bicyclists running red lights are more likely to experience broadside collisions from crossing traffic. Target enforcement of bicyclists running red lights at signalized intersections where a two-way, 4-lane roadway intersects a two-way, 2-lane roadway (Case 1) and where a two-way, 4-lane roadway intersects a two-way, 4-lane roadway (Case 2). Targeted enforcement of higher volume bicycle areas will most effectively reduce this traffic violation.

Bicycle Matrix - Intersection Footprint #2

Scenario Description

Hotspot Roadway Environment (columns):

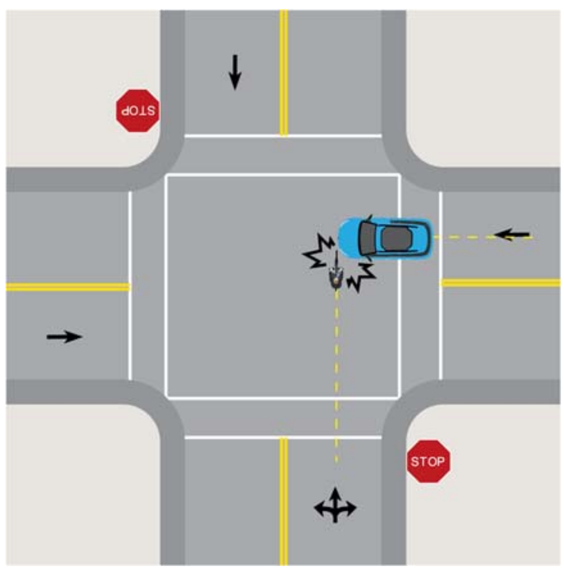
- Intersection Control: Side-Street Stop
- 2-lane roadway intersects with a 2-lane roadway

Behaviors Associated with this Hotspot Roadway Environment (rows):

- Bicyclist at-Fault
- Violation Code: "Control Violation Through Movement"

Safety Issue: Bicyclists approaching a stop sign at a side-street stop-controlled intersection and proceeding through without stopping at the stop sign.

Side-street stop-controlled intersections may result in a scenario where a bicyclist approaching a stop sign continues through the intersection rather than coming to a complete stop at the stop sign. Bicyclists may be inclined to risk passing through crossing traffic in order to avoid stopping and then having to regain momentum.



Case 1

A total of 15 records were identified under these conditions. The bicyclist was the party at-fault in all instances. The 15 collisions were experienced at 14 unique locations. Two collisions occurred at the intersection of Bacon Street and Niagara Avenue. One collision resulted in a severe injury at the intersection of University Avenue & 47th Street.

Educational Countermeasures

Public Safety Messaging Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics and safe behaviors ("Don't Roll the Stop") for bicyclists at intersections. Focus should be on how bicyclists should behave at side-street stop-controlled intersections and how vehicles should behave when bikes are present. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign and San Francisco's "Coexist" campaign should be considered as models for a successful awareness campaign.

Enforcement Countermeasures

Bicycle Stop Sign Running Enforcement – (Case 1 and 2)
Bicyclists running stop signs are more likely to experience broadside collisions from crossing traffic. Target enforcement of bicyclists running stop signs at side-street stop-controlled intersections where a two-way, 2-lane roadway intersects a two-way, 2-lane roadway. Targeted enforcement of higher volume bicycle areas will most effectively reduce this traffic violation.

Vehicle Intersection Footprint #1

<u>Scenario Description</u>

Hotspot Roadway Environment (columns):

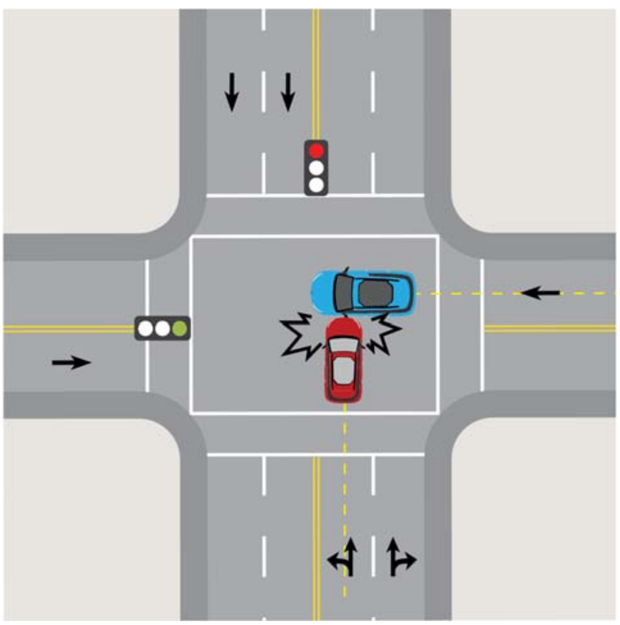
- Intersection Control: Signalized
- 4-lane roadway intersects with a 2-lane roadway
- Primary Roadway ADT: >15,000
- Secondary Roadway ADT: ≤7,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

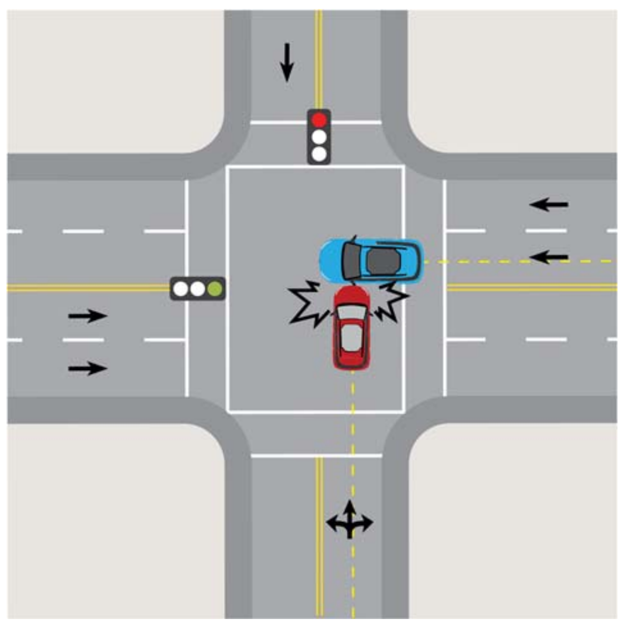
- Violation Code: "Control Violation Through Movement"
- Collision Type: Broadside

Safety Issue: Vehicles violating red-light stop control while making a through movement.

Signalized intersections (See Case 1 & 2 below) have been found to experience a higher prevalence of crashes compared to other types of intersection control. These intersection types may result in a scenario where the vehicle approaching a red signal indication continues through the intersection without stopping. This can result in a broadside injury collision. These collision types typically result in more severe injuries than other collisions types.



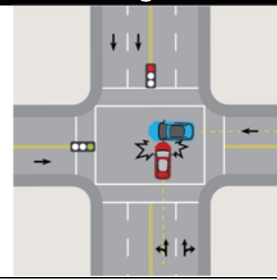
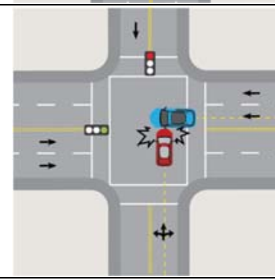
Case 1



Case 2

A total of 104 records were identified under these conditions. The 104 collisions were experienced at 83 unique locations. Two collisions were fatal at the intersections of El Cajon Boulevard & Chamoune Avenue and Navajo Road & Boulder Lake Avenue. A total of 5 additional collisions resulted in a severe injury.

Vehicle-Vehicle Intersection Hotspot #1 Scenarios

	Collision Scenario	Crashes	Diagram
Case 1	Vehicle traveling straight through a red signal indication while traveling on a 4-lane (2-way) roadway at the intersection with a 2-lane (2-way) roadway	90	
Case 2	Vehicle traveling straight through a red signal indication while traveling on a 2-lane (2-way) roadway at the intersection with a 4-lane (2-way) roadway	14	

Engineering Countermeasures

The countermeasure listed below is low cost, effective, and can be implemented systemically with relative ease. This countermeasure has been shown to enhance safety at signalized intersections, especially related to broadside collisions. It will improve the visibility and conspicuity of the traffic signal indications, enhancing compliance and safety.

Vehicle-Vehicle Intersection Hotspot #1 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Hardware Upgrade – Backplates with Retroreflective Borders	15%

[1] The CRF shown represents the anticipated percentage drop in collisions after the countermeasure is implemented. These values are taken from the LRSM. Note: A Kentucky Transportation Cabinet (KYTC) before and after study of 30 intersections with backplates with retroreflective material showed broadside crashes declined by 44-percent.

Signal Hardware Upgrade – Backplates with Retroreflective Borders - **CRF: 15% (Case 1 & 2)**
Backplates with retroreflective borders enhance visibility of traffic signal indications and ultimately lead to fewer crashes. They can be particularly beneficial for aging drivers and color vision impaired drivers. Studies have shown this countermeasure to be particularly effective at reducing broadside collisions. Drivers will sometimes run a red light at a signalized intersection because they are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. This can result in a broadside collision (one of the most dangerous collision types). The enhanced visibility and conspicuity provided by backplates with retroreflective borders can aid drivers' advance perception of the upcoming signalized intersection.

Longer-Term Countermeasure

The countermeasure listed below is high cost, and can be challenging to implement systemically. However, as existing signals reach the end of their useful life, an opportunity arises to consider conversion of the intersection to a roundabout.

Convert intersection to roundabout (from signal) – CRF: 35% - 67% (Case 1 and 2)
Well-designed roundabouts have been proven to lessen the severity of crashes within an intersection footprint. This is because the types of collisions that occur at roundabouts are different from those occurring at conventional intersections; namely, broadside and left turn conflicts are not present in a roundabout (i.e. it is not possible for a broadside collision to occur based on roundabout geometry). The geometry of a well-designed roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps reduce the severity of crashes when they do occur.

Per the City of San Diego Street Design Manual (March 2017 Edition), when deciding what type of control an intersection should have, follow Caltrans Intersection Control Evaluation (Traffic Operations Policy Directive 13-02). When expansion or addition of one type of intersection traffic control is considered, this evaluation ensures a comparison with other types of traffic control and the no-build scenario on the basis of system impacts, safety and mobility benefits for all modes, and life-cycle costs.

Educational Countermeasures

Intersection Control Awareness Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics, including how the four vehicle intersection hotspots relate as a percentage to all vehicle injury crashes at signalized intersections; and safe behaviors for vehicles approaching signalized intersections. Safe behaviors for vehicles approaching signalized intersections should focus on signal indication awareness. It is recommended that this material include information related to the proposed backplates with retroreflective borders. Information should be distributed immediately following the installation of the initial phase of backplates with retroreflective borders for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Vehicle Red Light Running Enforcement – (Case 1 and 2)
Target enforcement of vehicles running red lights at signalized intersections where a two-way, 4-lane roadway intersects a two-way, 2-lane roadway (Case 1 and 2). Enforcement would be most effective immediately following the installation of the initial phase of backplates with retroreflective borders.

Vehicle Intersection Footprint #2

Scenario Description

Hotspot Roadway Environment (columns):

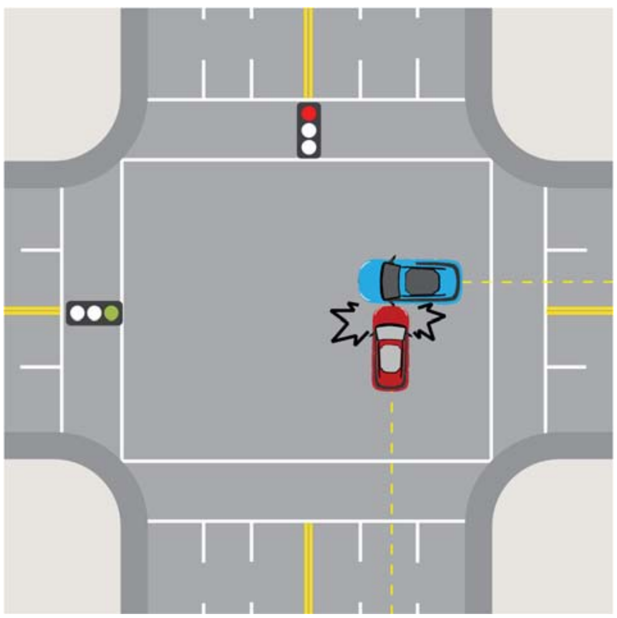
- Intersection Control: Signalized
- 6-lane roadway intersects with a 4-lane roadway
- Primary Roadway ADT: >15,000
- Secondary Roadway ADT: >7,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

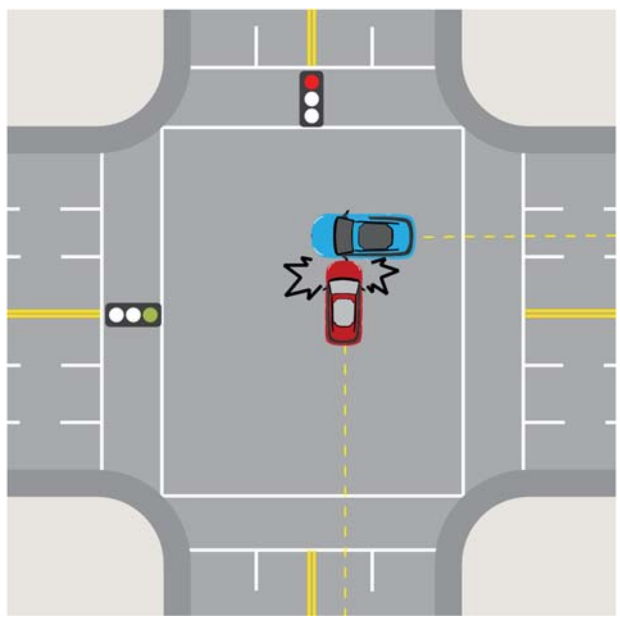
- Collision Type: Broadside
- Violation Code: "Control Violation Through Movement"

Safety Issue: Vehicles violating red-light control while making a through movement.

Signalized intersections (See Case 1 & 2 below) have been found to experience a higher prevalence of crashes compared to other types of intersection control. These intersection types may result in a scenario where the vehicle approaching a red signal indication continues through the intersection without stopping. This can result in a broadside injury collision. These collision types typically result in more severe injuries than other collisions types.



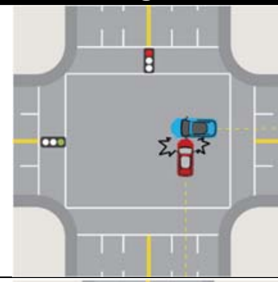
Case 1



Case 2

A total of 88 records were identified under these conditions. The 88 collisions were experienced at 49 unique locations. Mira Mesa Boulevard experienced 14 of the 88 total collisions.

Vehicle-Vehicle Intersection Hotspot #2 Scenarios

	Collision Scenario	Instances	Diagram
Case 1	Vehicle traveling straight through a red signal indication while traveling on a 6-lane (2-way) roadway at the intersection with a 4-lane (2-way) roadway	74	
Case 2	Vehicle traveling straight through a red signal indication while traveling on a 4-lane (2-way) roadway at the intersection with a 6-lane (2-way) roadway	14	

Engineering Countermeasures

The countermeasure listed below is low cost, effective, and can be implemented systemically with relative ease. This countermeasure has been shown to enhance safety at signalized intersections, especially related to broadside collisions. It will improve the visibility and conspicuity of the traffic signal indications, enhancing compliance and safety.

Vehicle-Vehicle Intersection Hotspot #1 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Hardware Upgrade – Backplates with Retroreflective Borders	15%

[1] The CRF shown represents the anticipated percentage drop in collisions after the countermeasure is implemented. These values are taken from the LRSM. Note: A Kentucky Transportation Cabinet (KYTC) before and after study of 30 intersections with backplates with retroreflective material showed broadside crashes declined by 44-percent.

Signal Hardware Upgrade – Backplates with Retroreflective Borders - **CRF: 15% (Case 1 & 2)**
Backplates with retroreflective borders enhance visibility of traffic signal indications and ultimately lead to fewer crashes. They can be particularly beneficial for aging drivers and color vision impaired drivers. Studies have shown this countermeasure to be particularly effective at reducing broadside collisions. Drivers will sometimes run a red light at a signalized intersection because they are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. This can result in a broadside collision (one of the most dangerous collision types). The enhanced visibility and conspicuity provided by backplates with retroreflective borders can aid drivers' advance perception of the upcoming signalized intersection.

Longer-Term Countermeasure

The countermeasure listed below is high cost, and can be challenging to implement systemically. However, as existing signals reach the end of their useful life, an opportunity arises to consider conversion of the intersection to a roundabout.

Convert intersection to roundabout (from signal) – CRF: 35% - 67% (Case 1 and 2)
Well-designed roundabouts have been proven to lessen the severity of crashes within an intersection footprint. This is because the types of collisions that occur at roundabouts are different from those occurring at conventional intersections; namely, broadside and left turn conflicts are not present in a roundabout (i.e. it is not possible for a broadside collision to occur based on roundabout geometry). The geometry of a well-designed roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps reduce the severity of crashes when they do occur.

Per the City of San Diego Street Design Manual (March 2017 Edition), when deciding what type of control an intersection should have, follow Caltrans Intersection Control Evaluation (Traffic Operations Policy Directive 13-02). When expansion or addition of one type of intersection traffic control is considered, this evaluation ensures a comparison with other types of traffic control and the no-build scenario on the basis of system impacts, safety and mobility benefits for all modes, and life-cycle costs.

Educational Countermeasures

Intersection Control Awareness Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics, including how the four vehicle intersection hotspots relate as a percentage to all vehicle injury crashes at signalized intersections; and safe behaviors for vehicles approaching signalized intersections. Safe behaviors for vehicles approaching signalized intersections should focus on signal indication awareness. It is recommended that this material include information related to the proposed backplates with retroreflective borders. Information should be distributed immediately following the installation of the initial phase of backplates with retroreflective borders for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Vehicle Red Light Running Enforcement – (Case 1 and 2)
Target enforcement of vehicles running red lights at signalized intersections where a two-way, 6-lane roadway intersects a two-way, 4-lane roadway (Case 1 and 2). Enforcement would be most effective immediately following the installation of the initial phase of backplates with retroreflective borders.

Vehicle Intersection Footprint #3

Scenario Description

Hotspot Roadway Environment (columns):

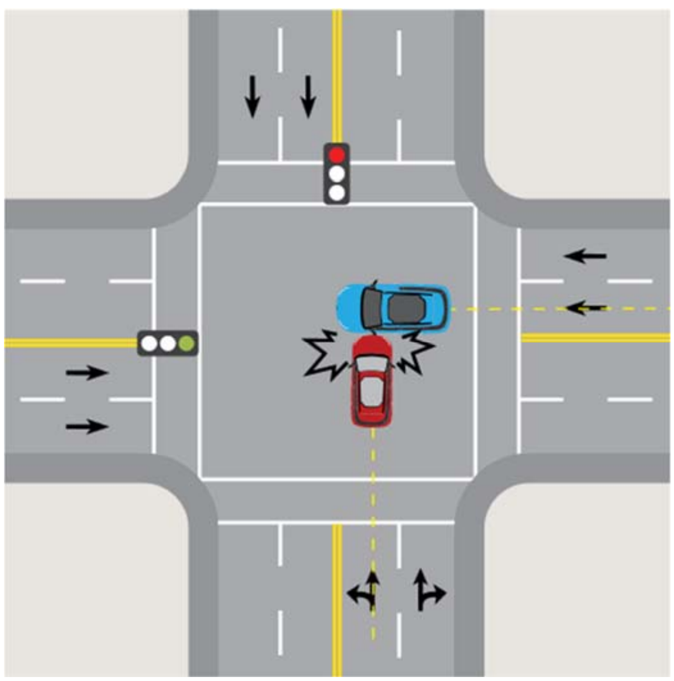
- Intersection Control: Signalized
- 4-lane roadway intersects with a 4-lane roadway
- Secondary Roadway ADT: >7,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

- Collision Type: Broadside
- Violation Code: "Control Violation Through Movement"

Safety Issue: Vehicles violating red-light control while making a through movement.

Signalized intersections (See Case 1 below) have been found to experience a higher prevalence of crashes compared to other types of intersection control. These intersection types may result in a scenario where the vehicle approaching a red signal indication continues through the intersection without stopping. This can result in a broadside injury collision. These collision types typically result in more severe injuries than other collisions types.



Case 1

A total of 86 records were identified under these conditions. The 86 collisions were experienced at 55 unique locations. One collision was fatal at the intersection of Morena Boulevard & Avati Drive. Four collisions resulted in a severe injury at the intersection of Carmel Country Road & Del Mar Trails Road, Grand Avenue & Balboa Avenue, Imperial Avenue & 47th Street, and Morena Boulevard & Sherman Street.

Engineering Countermeasures

The countermeasure listed below is low cost, effective, and can be implemented systemically with relative ease. This countermeasure has been shown to enhance safety at signalized intersections, especially related to broadside collisions. It will improve the visibility and conspicuity of the traffic signal indications, enhancing compliance and safety.

Vehicle-Vehicle Intersection Hotspot #1 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Hardware Upgrade – Backplates with Retroreflective Borders	15%

[1] The CRF shown represents the anticipated percentage drop in collisions after the countermeasure is implemented. These values are taken from the LRSM. Note: A Kentucky Transportation Cabinet (KYTC) before and after study of 30 intersections with backplates with retroreflective material showed broadside crashes declined by 44-percent.

Signal Hardware Upgrade – Backplates with Retroreflective Borders - **CRF: 15%**
Backplates with retroreflective borders enhance visibility of traffic signal indications and ultimately lead to fewer crashes. They can be particularly beneficial for aging drivers and color vision impaired drivers. Studies have shown this countermeasure to be particularly effective at reducing broadside collisions. Drivers will sometimes run a red light at a signalized intersection because they are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. This can result in a broadside collision (one of the most dangerous collision types). The enhanced visibility and conspicuity provided by backplates with retroreflective borders can aid drivers' advance perception of the upcoming signalized intersection.

Longer-Term Countermeasure

The countermeasure listed below is high cost, and can be challenging to implement systemically. However, as existing signals reach the end of their useful life, an opportunity arises to consider conversion of the intersection to a roundabout.

Convert intersection to roundabout (from signal) – **CRF: 35% - 67%**
Well-designed roundabouts have been proven to lessen the severity of crashes within an intersection footprint. This is because the types of collisions that occur at roundabouts are different from those occurring at conventional intersections; namely, broadside and left turn conflicts are not present in a roundabout (i.e. it is not possible for a broadside collision to occur based on roundabout geometry). The geometry of a well-designed roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps reduce the severity of crashes when they do occur.

Per the City of San Diego Street Design Manual (March 2017 Edition), when deciding what type of control an intersection should have, follow Caltrans Intersection Control Evaluation (Traffic Operations Policy Directive 13-02). When expansion or addition of one type of intersection traffic control is considered, this evaluation ensures a comparison with other types of traffic control and the no-build scenario on the basis of system impacts, safety and mobility benefits for all modes, and life-cycle costs.

Educational Countermeasures

Intersection Control Awareness Campaign

Develop and distribute information related to collision statistics, including how the four vehicle intersection hotspots relate as a percentage to all vehicle injury crashes at signalized intersections; and safe behaviors for vehicles approaching signalized intersections. Safe behaviors for vehicles approaching signalized intersections should focus on signal indication awareness. It is recommended that this material include information related to the proposed backplates with retroreflective borders. Information should be distributed immediately following the installation of the initial phase of backplates with retroreflective borders for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Vehicle Red Light Running Enforcement

Target enforcement of vehicles running red lights at signalized intersections where a two-way, 4-lane roadway intersects a two-way, 4-lane roadway. Enforcement would be most effective immediately following the installation of the initial phase of backplates with retroreflective borders.

Vehicle Intersection Footprint #4

Scenario Description

Hotspot Roadway Environment (columns):

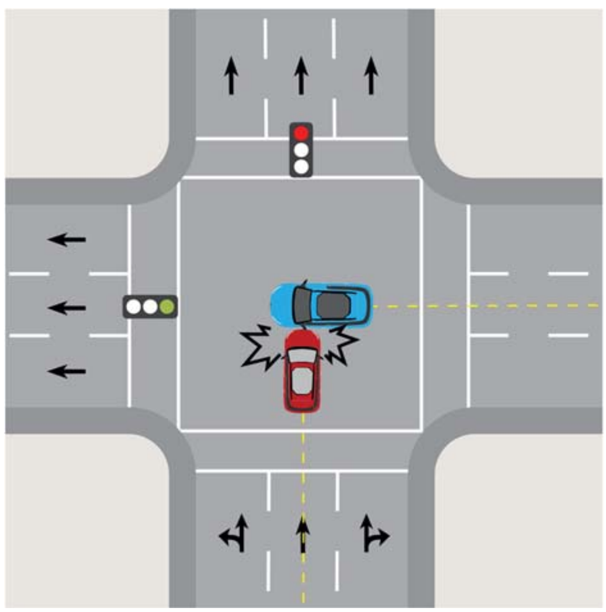
- Intersection Control: Signalized
- One-way 3-lane roadway intersects with a one-way 3-lane roadway
- Primary Roadway ADT: ≤15,000
- Secondary Roadway ADT: >7,000

Behaviors Associated with this Hotspot Roadway Environment (rows):

- Collision Type: Broadside
- Violation Code: "Control Violation Through Movement"

Safety Issue: Vehicles violating red-light control while making a through movement.

Signalized intersections (See Case 1 below) have been found to experience a higher prevalence of crashes compared to other types of intersection control. These intersection types may result in a scenario where the vehicle approaching a red signal indication continues through the intersection without stopping. This can result in a broadside injury collision. These collision types typically result in more severe injuries than other collisions types.



Case 1

A total of 55 records were identified under these conditions. The 55 collisions were experienced at 22 unique locations. One collision resulted in a severe injury at the intersection of Ash Street & 4th Avenue.

<u>Engineering Countermeasures</u>

The countermeasure listed below is low cost, effective, and can be implemented systemically with relative ease. This countermeasure has been shown to enhance safety at signalized intersections, especially related to broadside collisions. It will improve the visibility and conspicuity of the traffic signal indications, enhancing compliance and safety.

Vehicle-Vehicle Intersection Hotspot #1 Short-Term Countermeasures

	Countermeasure	CRF[1]
1	Signal Hardware Upgrade – Backplates with Retroreflective Borders	15%

[1] The CRF shown represents the anticipated percentage drop in collisions after the countermeasure is implemented. These values are taken from the LRSM. Note: A Kentucky Transportation Cabinet (KYTC) before and after study of 30 intersections with backplates with retroreflective material showed broadside crashes declined by 44-percent.

Signal Hardware Upgrade – Backplates with Retroreflective Borders - **CRF: 15% (Case 1 & 2)**
Backplates with retroreflective borders enhance visibility of traffic signal indications and ultimately lead to fewer crashes. They can be particularly beneficial for aging drivers and color vision impaired drivers. Studies have shown this countermeasure to be particularly effective at reducing broadside collisions. Drivers will sometimes run a red light at a signalized intersection because they are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. This can result in a broadside collision (one of the most dangerous collision types). The enhanced visibility and conspicuity provided by backplates with retroreflective borders can aid drivers' advance perception of the upcoming signalized intersection.

Longer-Term Countermeasure

The countermeasure listed below is high cost, and can be challenging to implement systemically. However, as existing signals reach the end of their useful life, an opportunity arises to consider conversion of the intersection to a roundabout.

Convert intersection to roundabout (from signal) – **CRF: 35% - 67% (Case 1 and 2)**
Well-designed roundabouts have been proven to lessen the severity of crashes within an intersection footprint. This is because the types of collisions that occur at roundabouts are different from those occurring at conventional intersections; namely, broadside and left turn conflicts are not present in a roundabout (i.e. it is not possible for a broadside collision to occur based on roundabout geometry). The geometry of a well-designed roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps reduce the severity of crashes when they do occur.

Per the City of San Diego Street Design Manual (March 2017 Edition), when deciding what type of control an intersection should have, follow Caltrans Intersection Control Evaluation (Traffic Operations Policy Directive 13-02). When expansion or addition of one type of intersection traffic control is considered, this evaluation ensures a comparison with other types of traffic control and the no-build scenario on the basis of system impacts, safety and mobility benefits for all modes, and life-cycle costs.

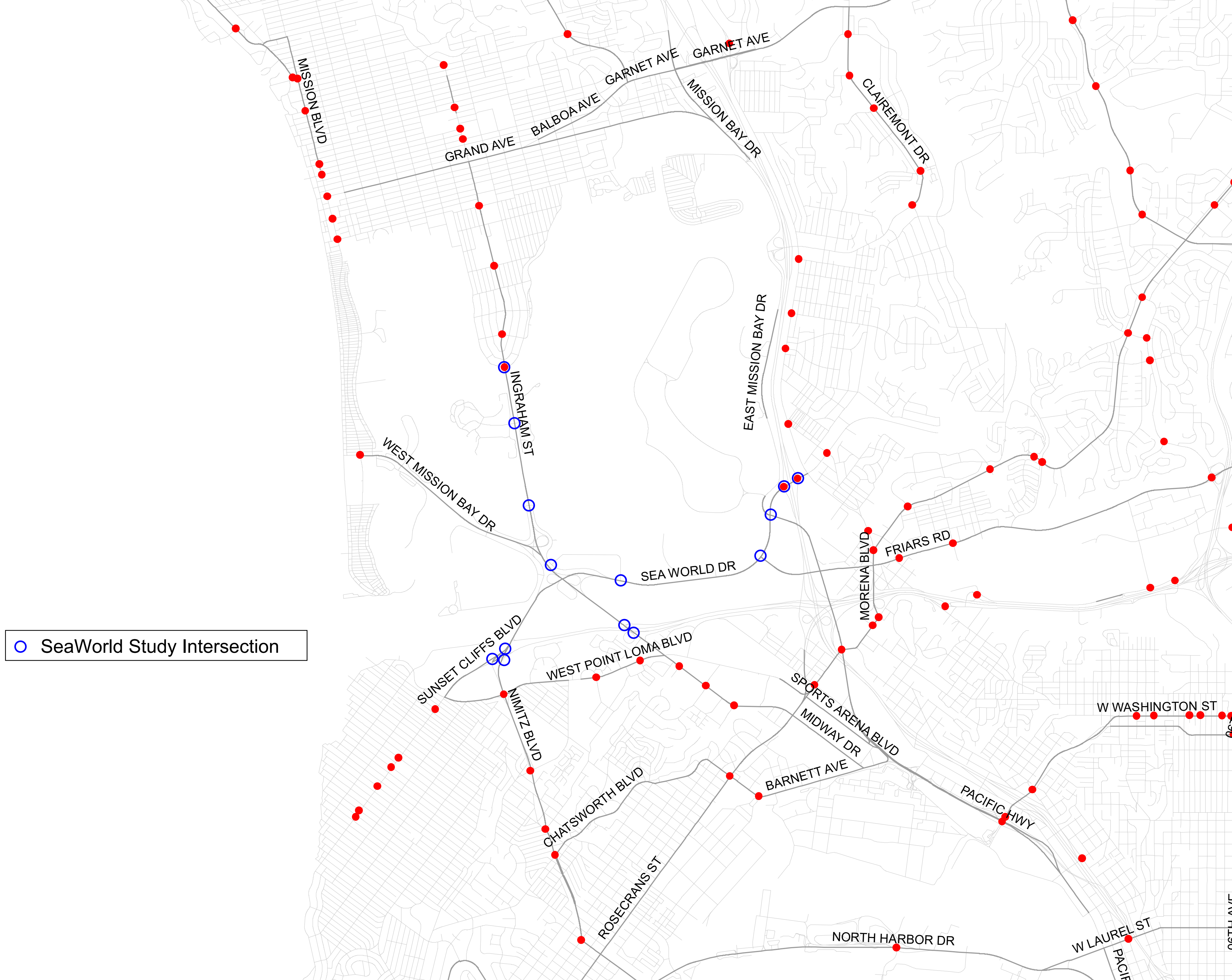
Educational Countermeasures

Intersection Control Awareness Campaign – (Case 1 and 2)
Develop and distribute information related to collision statistics, including how the four vehicle intersection hotspots relate as a percentage to all vehicle injury crashes at signalized intersections; and safe behaviors for vehicles approaching signalized intersections. Safe behaviors for vehicles approaching signalized intersections should focus on signal indication awareness. It is recommended that this material include information related to the proposed backplates with retroreflective borders. Information should be distributed immediately following the installation of the initial phase of backplates with retroreflective borders for maximum effect. A variety of media should be considered in order to reach as much of the population as possible including, but not limited to, social media, radio, and print. The Think Blue San Diego campaign should be considered as a model for a successful awareness campaign.

Enforcement Countermeasures

Vehicle Red Light Running Enforcement – (Case 1 and 2)
Target enforcement of vehicles running red lights at signalized intersections where a one-way, 3-lane roadway intersects a one-way, 3-lane roadway. Enforcement would be most effective immediately following the installation of the initial phase of backplates with retroreflective borders.


N
Scale
1" = 3600'
SeaWorld Study Intersection
ENCINITAS BLVD
SANTA FE DR
DEL DIOS HWY
HIGHLAND VALLEY RD
RANCHO BERNARDO RD
ESPOLA RD
LOMAS SANTA FE DR
VIA DE LA VALLE
CARMEL VALLEY RD
POWAY RD
DEL MAR HEIGHTS RD
TED WILLIAMS PKY
MERCY RD
SCRIPPS POWAY PKY
CARMEL MOUNTAIN RD
MIRAMAR RD
LA JOLLA VILLAGE DR
GILMAN DR
LA JOLLA PKY
MAST BLVD
MISSION GORGE RD
CLAIREMONT MESA BLVD
BALBOA AVE
TIERRASANTA BLVD
GARNET AVE
GRAND AVE
FLETCHER PKY
BROADWAY
W MAIN ST
E WASHINGTON AVE
MURRAY DR
FRIARS RD
SEA WORLD DR
WEST MISSION BAY DR
WEST POINT LOMA BLVD
MONTEZUMA RD
ADAMS AVE
EL CAJON BLVD
UNIVERSITY AVE
W WASHINGTON ST
NORTH HARBOR DR
MARKET ST
IMPERIAL AVE
OCEAN VIEW BLVD
NATIONAL AVE
JAMACHA BLVD
BONITA RD
OTAY LAKES RD
TELEGRAPH CANYON RD
OLYMPIC PKY
PALOMAR ST
ORANGE AVE
MAIN ST
PALM AVE
IMPERIAL BEACH BLVD
CORONADO AVE
OTAY MESA RD



SeaWorld Study Intersection
MISSION BLVD
GRAND AVE
BALBOA AVE
GARNET AVE
GARNET AVE
MISSION BAY DR
CLAIREMONT DR
INGRAHAM ST
EAST MISSION BAY DR
WEST MISSION BAY DR
SEA WORLD DR
FRIARS RD
MORENA BLVD
SUNSET CLIFFS BLVD
WEST POINT LOMA BLVD
NIMITZ BLVD
SPORTS ARENA BLVD
MIDWAY DR
BARNETT AVE
PACIFIC HWY
W WASHINGTON ST
CHATSWORTH BLVD
ROSECRANS ST
NORTH HARBOR DR
W LAUREL ST

APPENDIX Z

POST-MITIGATION INTERSECTION ANALYSIS WORKSHEETS

2040 + Project AM (Mitigated) | SeaWorld Master Plan Update
3: SeaWorld Dr & E Mission Bay Dr/Pacific Hwy | 05/18/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	50	100	72	140	100	260	1139	81	180	880	200
Future Volume (veh/h)	80	50	100	72	140	100	260	1139	81	180	880	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.93	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	83	52	104	75	146	104	271	1186	84	188	917	208
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	159	211	338	96	226	383	370	1386	98	231	1547	753
Arrive On Green	0.05	0.11	0.11	0.05	0.12	0.12	0.11	0.42	0.42	0.13	0.44	0.44
Sat Flow, veh/h	3428	1856	1476	1767	1856	1458	3428	3334	236	1767	3526	1549
Grp Volume(v), veh/h	83	52	104	75	146	104	271	626	644	188	917	208
Grp Sat Flow(s),veh/h/ln	1714	1856	1476	1767	1856	1458	1714	1763	1807	1767	1763	1549
Q Serve(g_s), s	1.6	1.8	4.1	2.9	5.2	3.9	5.3	22.1	22.2	7.1	13.6	5.5
Cycle Q Clear(g_c), s	1.6	1.8	4.1	2.9	5.2	3.9	5.3	22.1	22.2	7.1	13.6	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	159	211	338	96	226	383	370	733	751	231	1547	753
V/C Ratio(X)	0.52	0.25	0.31	0.79	0.65	0.27	0.73	0.85	0.86	0.81	0.59	0.28
Avail Cap(c_a), veh/h	240	837	836	103	805	838	554	765	784	412	1786	858
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	27.7	22.4	32.1	28.8	20.7	29.7	18.2	18.2	29.0	14.6	10.5
Incr Delay (d2), s/veh	1.0	0.6	0.5	27.0	1.2	0.1	1.1	9.6	9.6	2.6	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	1.3	1.9	2.2	1.2	2.1	9.6	9.8	3.0	4.7	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.0	28.3	22.9	59.1	29.9	20.8	30.7	27.8	27.8	31.7	15.2	10.8
LnGrp LOS	C	C	C	E	C	C	C	C	C	C	B	B
Approach Vol, veh/h		239			325			1541			1313	
Approach Delay, s/veh		27.6			33.7			28.3			16.9	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	33.9	8.1	13.3	11.8	35.4	7.6	13.9
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	16.0	29.8	4.0	* 31	11.1	* 35	4.8	29.8
Max Q Clear Time (g_c+I1), s	9.1	24.2	4.9	6.1	7.3	15.6	3.6	7.2
Green Ext Time (p_c), s	0.1	4.4	0.0	0.6	0.2	9.6	0.0	0.6

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

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	540	1926	572	0	0	1854
Future Volume (vph)	540	1926	572	0	0	1854
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	4.0	7.5			7.5
Lane Util. Factor	0.97	0.76	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	3575	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	3575	3505			6346
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	557	1986	590	0	0	1911
RTOR Reduction (vph)	0	32	0	0	0	0
Lane Group Flow (vph)	557	1954	590	0	0	1911
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	Prot	custom	NA			NA
Protected Phases	8	13 8	2			6 9
Permitted Phases		8				
Actuated Green, G (s)	17.7	62.8	20.3			61.9
Effective Green, g (s)	17.7	55.3	20.3			61.9
Actuated g/C Ratio	0.19	0.58	0.21			0.65
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	636	2089	752			4152
v/s Ratio Prot	0.16	c0.55	c0.17			0.30
v/s Ratio Perm						
v/c Ratio	0.88	0.94	0.78			0.46
Uniform Delay, d1	37.4	18.0	35.1			8.1
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	12.5	8.6	5.0			0.0
Delay (s)	49.9	26.6	40.1			8.1
Level of Service	D	C	D			A
Approach Delay (s)	31.7		40.1			8.1
Approach LOS	C		D			A

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	94.6	Sum of lost time (s)	22.5
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	190	291	252	90	250	212	1316	195	210	1432	220
Future Volume (veh/h)	190	190	291	252	90	250	212	1316	195	210	1432	220
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	198	198	273	262	94	260	221	1371	203	219	1492	229
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	249	349	399	260	487	599	254	1204	176	226	1569	804
Arrive On Green	0.07	0.19	0.19	0.15	0.26	0.26	0.07	0.39	0.39	0.13	0.45	0.45
Sat Flow, veh/h	3428	1856	1500	1767	1856	1519	3428	3073	450	1767	3526	1549
Grp Volume(v), veh/h	198	198	273	262	94	260	221	780	794	219	1492	229
Grp Sat Flow(s),veh/h/ln	1714	1856	1500	1767	1856	1519	1714	1763	1760	1767	1763	1549
Q Serve(g_s), s	7.7	13.1	22.1	19.8	5.3	17.0	8.6	52.8	52.8	16.6	54.9	11.3
Cycle Q Clear(g_c), s	7.7	13.1	22.1	19.8	5.3	17.0	8.6	52.8	52.8	16.6	54.9	11.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	249	349	399	260	487	599	254	691	689	226	1569	804
V/C Ratio(X)	0.79	0.57	0.68	1.01	0.19	0.43	0.87	1.13	1.15	0.97	0.95	0.28
Avail Cap(c_a), veh/h	361	427	462	260	498	609	254	691	689	226	1572	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.5	49.7	44.8	57.5	38.6	30.2	61.7	41.0	41.0	58.5	36.0	18.4
Incr Delay (d2), s/veh	4.5	1.4	3.4	58.2	0.1	0.2	25.0	75.7	84.5	51.3	13.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	6.2	8.4	12.8	2.4	6.1	4.6	36.6	38.2	10.5	25.4	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.0	51.1	48.2	115.7	38.7	30.4	86.7	116.7	125.4	109.9	49.0	18.7
LnGrp LOS	E	D	D	F	D	C	F	F	F	F	D	B
Approach Vol, veh/h		669			616			1795			1940	
Approach Delay, s/veh		54.4			68.0			116.9			52.3	
Approach LOS		D			E			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.6	58.1	24.2	30.9	14.4	65.3	14.2	40.9
Change Period (Y+Rc), s	4.4	5.3	4.4	* 5.5	4.4	* 5.3	4.4	5.5
Max Green Setting (Gmax), s	17.2	52.8	19.8	* 31	10.0	* 60	14.2	36.2
Max Q Clear Time (g_c+I1), s	18.6	54.8	21.8	24.1	10.6	56.9	9.7	19.0
Green Ext Time (p_c), s	0.0	0.0	0.0	1.3	0.0	2.9	0.1	0.7

Intersection Summary	
HCM 6th Ctrl Delay	77.6
HCM 6th LOS	E

Notes

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	790	1948	938	0	0	2288
Future Volume (vph)	790	1948	938	0	0	2288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5			7.5
Lane Util. Factor	0.97	0.76	0.95			0.86
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3400	3575	3505			6346
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3400	3575	3505			6346
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	806	1988	957	0	0	2335
RTOR Reduction (vph)	0	5	0	0	0	0
Lane Group Flow (vph)	806	1983	957	0	0	2335
Turn Type	Prot	custom	NA			NA
Protected Phases	8	1 3 8	2			6 9
Permitted Phases						
Actuated Green, G (s)	34.9	94.4	39.0			98.5
Effective Green, g (s)	34.9	94.4	39.0			98.5
Actuated g/C Ratio	0.24	0.64	0.26			0.66
Clearance Time (s)	7.5		7.5			
Vehicle Extension (s)	2.0		2.0			
Lane Grp Cap (vph)	799	2274	921			4212
v/s Ratio Prot	c0.24	c0.55	c0.27			0.37
v/s Ratio Perm						
v/c Ratio	1.01	0.87	1.04			0.55
Uniform Delay, d1	56.8	22.1	54.7			13.3
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	34.0	4.0	40.3			0.1
Delay (s)	90.8	26.0	95.0			13.4
Level of Service	F	C	F			B
Approach Delay (s)	44.7		95.0			13.4
Approach LOS	D		F			B

Intersection Summary			
HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	148.4	Sum of lost time (s)	22.5
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group