ERRATA

This technical background report was drafted prior to the final definition of the current Build Alternative, with Design Options 1 and 2, presented in the draft environmental impact report/environmental assessment (DEIR/EA). Accordingly, several additional build alternatives and design options, other than those presented in the DEIR/EA, are still discussed in this report. They no longer apply and should be disregarded.

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TECHNICAL MEMORANDUM

To: Lee Lisecki
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From: Jonathan Louie

Date: March 11, 2011

Subject: **California Incline Bridge Replacement Project - Traffic Assessment**
[KOA Job Number JA6233]

INTRODUCTION

The City of Santa Monica (City), in cooperation with the California Department of Transportation (Caltrans), is planning to reconstruct the California Incline sidehill viaduct to meet current seismic standards. The California Incline extends from Ocean Avenue to Palisades Beach Road (State Route 1 [SR-1]), a distance of approximately 1,400 feet. Located within the City of Santa Monica, the California Incline is in proximity to the Pacific coastline (within 950 feet). The incline extends from the intersection of Ocean and California Avenues at the top of the Palisades bluffs to SR-1 at the base of the bluffs, bisecting Palisades Park, which extends the length of the bluffs.

The California Incline has an estimated sufficiency rating of 35.8 and is classified as structurally deficient. It qualifies for replacement under the federal Highway Bridge Replacement and Rehabilitation Program (HBRRP).[1]

A Draft EIR/EA for the proposed project was circulated for public review from May 23, 2007 through July 9, 2007. A public meeting was held on June 20, 2007 to discuss the project and receive comments from the community. Subsequent to the circulation of the Draft EIR/EA, refinements to the design resulting in the identification of two design options for further review have occurred as a result of the Caltrans type selection process. In addition, restriping to accommodate a bicycle lane, slope stability measures, and a temporary construction road are now proposed as part of the project. Therefore, the lead agencies have prepared a revised Draft EIR/EA for recirculation to address the project as currently proposed including these recent changes. The revised EIR/EA has been prepared in accordance with State CEQA Guidelines Sections 15088.5 and 15163.

This memorandum serves as the traffic analysis for the proposed California Incline Bridge Replacement Project (hereafter referred to as the "Project"). It provides a traffic impact assessment during the proposed construction period which was developed in consultation with staff from the City of Santa Monica with input from the State of California Department of Transportation (Caltrans) and the City of Los Angeles Department of Transportation (LADOT). This study focuses on traffic conditions during the construction phase when the California Incline

[1] According to FHWA guidelines, if the sufficiency rating for a bridge is less than 50, the bridge is eligible for replacement using HBRRP funding.

would be closed to traffic. Emphasis is placed on traffic impacts along detour routes and possible options to maintain peak period traffic demand during construction.

In addition, this study provides an operations level assessment at the two intersections located at each end of the California Incline, and also evaluates queuing on the Incline to determine if the proposed striping design which assumes one travel lane instead of two existing travel lanes on the California Incline in the southbound direction approaching Ocean Avenue would have sufficient queuing capacity to accommodate vehicular demand.

PROJECT DESCRIPTION

Below is a description of the proposed build alternatives that were developed to meet the identified need through accomplishing the defined purpose, while avoiding or minimizing environmental impacts. The build alternatives are Alternative "1: Cast in Place Concrete Slab Bridge," Alternative 2: Precast Slab Bridge Spanning Longitudinally". In addition, the "No-Build Alternative" is also described below.

The project is located in western Los Angeles County on the California Incline from Ocean Avenue to SR-1. The project covers a distance of approximately 1,400 feet. The incline follows a north–south alignment, traversing a steep coastal bluff with a three-lane (one northbound lane, two southbound lanes) roadway that terminates at each end with a signalized intersection. A 4.5-foot-wide sidewalk with a cast concrete balustrade runs along the western edge of the incline, starting at Palisades Park at the top and continuing to the bottom. The purpose of the project is to replace the existing structure, correct structural deficiencies of the roadway and upgrade the facility to meet current seismic standards. In addition, the proposed project would improve pedestrian and bicycle access and safety.

PROJECT ALTERNATIVES

Eight design options were considered by the City and Caltrans in 2009 and early 2010 as part of the type selection process. Two of the design options were selected to be carried forward for further analysis as build alternatives. These two build alternatives (Alternatives 1 and 2) are bridge replacement alternatives and analyzed in detail in this document. Some of the criteria used for alternatives evaluation include environmental, geotechnical, structural, cost, and community concern impacts of each alternative. These alternatives are summarized below.

Common Design Features of the Build Alternatives

Both build Alternative 1 and Alternative 2 would entail demolition of the existing incline structure and construction of a new incline structure at the same location. The replacement structure would retain the same alignment and profile as that of the existing roadway. To correct the geometric deficiencies, the roadway would be widened by approximately 6 feet to allow more shoulder width, as well as to accommodate widened sidewalks and a bike path. However, due to the fixed width of the pedestrian overcrossing, roadway width would remain the same north of the pedestrian overcrossing structure. Falsework and guy wires may be needed on the lower slope to stabilize the column forms. Although falsework columns may be needed on the lower slope at the south end of the incline, custom brackets on the pile extensions could eliminate extensive falsework columns.

The preliminary slope stability analysis indicates that a portion of the upper bluff slope will need to be strengthened with soil nails. The technique to install the nails involves drilling a small diameter hole (6" to 8") in the hillside usually anywhere from 25' to 50' deep. Once installed, the soil nails do not require replacement.

The new incline would be a reinforced concrete slab structure with spans of approximately 44 feet. The overall width of the new incline would be approximately 52 feet, an increase of 6 feet. Also, it was determined that to access the columns under the bridge structure during construction, a temporary access road may be required along the lower bluffs. The road would be approximately 600 feet in length and 12 feet in width.

The current striping on the incline consists of one vehicular lane in the northbound direction fanning out to one left-turn lane and one right-turn lane at the intersection with SR-1. Currently there are two vehicular lanes in the southbound direction, which fan out to one left-turn lane, one through lane, and one right-turn lane at the intersection with Ocean Avenue. Under the proposed restriping plan, the northbound vehicular lane striping would remain the same. However, in the southbound direction one lane instead of two would be provided, and that one vehicular traffic lane in the southbound direction would fan out to one left-turn lane, one through lane, and one right-turn lane. The southbound left-turn and right-turn lanes at Ocean Avenue would be approximately 20 feet and 75 feet, respectively. The space created with the restriping would be used for widening and improving the pedestrian sidewalk, as well as for striping designated bicycle lanes between the pedestrian sidewalk and the vehicular lanes. It should be noted that bicyclists who wish to continue on PCH in the northbound direction would use the 4-foot shoulder on the incline, which is similar to what takes place today. The intersection of PCH/California Incline would remain the same as it is today. In addition, the intersection at Ocean Avenue/California Incline would remain much the same as it is today, but with improved signage for bicyclists and pedestrians indicating that the bicycle lanes and pedestrian sidewalks are available on the west side of the new California Incline. Figure 1 shows the conceptual striping plan and Figure 2 shows the proposed crossed-section of the California Incline.

Under both build alternatives the construction period would be approximately 12 to 18 months and the incline would be closed during this time. In response to the comments and suggestions received during the public review of the Draft EIR/EA, the City will consider various incentives for expedited construction and to minimize construction-period traffic disruptions to the public.

Construction of both build alternatives would involve the following:

- Demolish the existing structure;
- Constructing a temporary access road on the lower bluffs; approximately 600 feet in length and 12 feet wide;
- Excavating soil for temporary falsework footings and drilling holes for cast-in-drilled-hole (CIDH) piles;
- Installing reinforcing cages and pouring concrete for CIDH piles;
- Erecting temporary falsework columns and beams;
- Placing reinforcing steel and pouring concrete for new bridge deck;
- Constructing a retaining wall at the north-end curb, gutter, sidewalk, and barrier;
- Reconstructing and restriping the roadway and reconstructing the curb and gutter;
- Removing falsework and temporary footings; and
- Removing the temporary access road, and regrading and revegetating the disturbed slope.

Unique Features of Build Alternatives

Build Alternative 1: Cast-in-Place Concrete Slab Bridge

A standard reinforced concrete cast-in-place slab bridge supported on cast-in-drilled-hole (CIDH) piles is under consideration. This type of bridge would be designed to carry legal loads, be visually similar to the existing structure, and would require minimal maintenance. Since the structure would be supported on the CIDH piles, it would remain stable and accommodate slope erosion throughout its design life. This type of structure can be readily constructed on straight and curved alignments. The new structure could be cast directly on the ground in most locations, though additional excavation may be needed to install and remove falsework beams. There would also be some excavation needed for bent cap beams.

Build Alternative 2: Precast Slab Bridge Spanning Longitudinally

A precast slab bridge spanning longitudinally is proposed as Alternative 2. A precast slab bridge would be supported on CIDH piles, and similar to Alternative 1, the new structure would be independently stable from slope erosion. However, under Alternative 2, the CIDH piles would be aligned in transverse bents that are spaced at the span length of the precast slabs. The span lengths can be adjusted to cross over deep erosion gullies in the slope, but are limited by a maximum span length of approximately 55 feet. The precast slabs would be designed to act compositely with a cast-in-place topping slab. The use of a topping slab would ensure structural continuity between the precast slabs, would increase the strength of the superstructure, and would vary in thickness to provide the desired roadway profile.

No Build (No Action) Alternative

The No-Build (or No-Action) Alternative would result in no structural or physical changes to the incline or the surrounding environment. Under this alternative the incline could continue to deteriorate if not properly maintained or repaired and could be susceptible to damage or collapse in the event of a major earthquake, posing a hazard to motorists and pedestrians on the incline and residents in the vicinity. In addition, the multi-modal transportation improvements on the California Incline, i.e., a proposed bicycle lane and sidewalk improvements, would not occur under the No-Build Alternative.

EXISTING CONDITIONS/SETTING

The California Incline Bridge is located between State Route 1 (SR-1) and Ocean Avenue approximately one mile northwest of the Santa Monica Freeway (I-10). The California Incline provides a direct connection to California Avenue and major employment/retail and residential areas within the City of Santa Monica. Figure 3 shows the Project location.

Based on discussions with City of Santa Monica staff, three routes have been identified for analysis of traffic impacts during the construction phase period. The three routes are:

- Channel Road/Entrada Drive via Pacific Coast Highway (PCH)
- Ocean Avenue via Moomat Ahiko Way
- Lincoln Boulevard/4th Street via I-10 Freeway

In addition, this study also provides an operations level assessment at the two intersections located at each end of the California Incline. The two intersections are listed below. Queuing was also evaluated to determine if the proposed striping on the California Incline would provide sufficient capacity to accommodate vehicular demand.

- California Incline/California Avenue and Ocean Avenue
- California Incline and Palisades Beach Road (SR-1)

The study area is defined as the area bounded by Channel Road to the north, I-10 Freeway to the south, Lincoln Boulevard to the east and the Pacific Ocean to the west. Figure 4 depicts the study area and the three routes studied.

The City of Santa Monica requires traffic analysis to be conducted based on guidelines per California Environmental Quality Act (CEQA). The latest available traffic counts were used for the weekday AM and PM peak hour traffic analysis. For the summer weekend midday peak hour, the latest 2005 traffic counts were used for the traffic analysis. Where 2005 summer weekend counts were not available, the latest available counts were used. Table 1 summarizes the year traffic count data was collected.

Additional traffic counts were conducted at the intersections of PCH and Channel Road/Chautauqua Boulevard and PCH/Entrada Drive, as these two intersections are under Caltrans' jurisdiction and are not regularly counted by the City of Santa Monica. The weekday AM and PM counts were conducted on August 30, 2006. No weekend counts were collected.

Figures 5, 6 and 7 illustrate existing AM, PM and summer weekend midday peak hour traffic conditions based on raw count data within the study area. The peak hour traffic volumes are shown at the key locations along the major routes previously identified.

Based on the Highway Capacity Manual (HCM) 2000 methodology, existing level of service at signalized intersections are presented. Table 2 summarizes the AM, PM and summer weekend midday peak hour level of service results, respectively.

CONSTRUCTION IMPACTS

This section describes the potential traffic impacts during the construction and closure of the California Incline on the study area roadways.

Construction Scenarios

Construction of the proposed project is expected to last approximately 12 to 18 months. The proposed project would require closure of the incline to vehicular and pedestrian traffic during the construction period.

Broad construction steps involved would include the following:

- Drill holes in bluff slope above the California Incline roadway for soil nails. Install soil nails in holes then fill holes with grout.

- Construct temporary access road from SR-1 to base of Incline slope.

- Demolish and remove existing pavement and bridge structure using concrete breakers, backhoes, loaders, small cranes, concrete saws, and dump trucks. Remove utility lines from underneath roadway.

- Excavate, only where necessary, to create space for the new deck slab, piles, and retaining walls using backhoes, loaders, and dump trucks. Excavation for temporary falsework footings may be needed

- Drill holes for piles, install rebar, and fill holes with concrete using truck-mounted drill rig, small cranes, transit mixers, and concrete pump. Note that drilling/auguring, which is considered less disruptive in terms of noise and vibration generation, would be used as opposed to pile driving.

- Place temporary wood supports and forms (falsework) for the bridge structure's beams, deck, and walls.

- Construct new utility lines under roadway.

- Install rebar and pour concrete for deck, railings, and retaining walls using small cranes, transit mixers, and concrete pump.

- Remove temporary falsework.

- Place new pavement, curb, gutter, and sidewalk. Install new striping and signage.

- Modify or reconstruct traffic signals, if necessary and as required.

- Remove temporary access road and re-grade slope to existing conditions. Revegetate disturbed area.

- Final cleanup.

Project construction hours are likely to follow the City of Santa Monica's construction guidelines which limit the hours of construction to 8 a.m. to 6 p.m. Monday through Friday and 9 a.m. to 5 p.m. on Saturday. Per City guidelines, no construction shall occur on a Sunday or on any of the following legal holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, or Christmas Day. However, it should be noted that potential extended working hours may occur in order to expedite the project which would also reduce the number of construction hours during peak traffic times.

Construction staging would largely be accommodated on the California Incline. Lane closures on SR-1 may be required and would be carried in accordance with Caltrans guidelines, which allow for lanes to only be closed during non-peak hours, while maintaining 1 to 2 through traffic lanes open in the northbound direction from Broadway to Temescal Canyon Road, and at least 1 through traffic lane open during off-peak hours in the summertime in both the northbound and southbound direction from the Olympic Boulevard/4th Street Left Turn Eastbound ramp to the County Line. No lane closures are allowed during peak hours.

It is estimated that construction activities would generate the following vehicular trips:

- Average of 6.4 trucks per day or approximately 12 to 14 truck trips.

- During peak construction periods, a maximum of 100 daily trucks or 200 daily truck trips may be generated.

- During non-peak construction periods, a minimum of zero trucks may be generated.

Concurrent Construction Projects

The City has a number of construction projects in the vicinity of the study area. The projects listed below identify their respective development schedule relative to the California Incline Project:

- Palisades Bluff Improvement Project – anticipated to be completed prior to the California Incline Project.
- Proposition O – Santa Monica Bay Low Flow Diversion – anticipated to be completed prior to the California Incline Project.
- 1440 PCH Signal Project – study currently being considered.
- Pier bridge ramp widening.
- Los Angeles County/Pacific Coast Highway relief sewer Project.

Pedestrian/Bicycle Access With Bridge Closure

The existing pedestrian/bicycle access on the California Incline would also be closed during the construction period. Alternative pedestrian/bicycle access would be provided at the following locations which are the closest access points located to the north and south of the Incline:

- Pedestrian/bicycle access via the trail off of the intersection of Ocean Avenue and Montana Avenue which is about 2,000 feet north of the intersection of Ocean Avenue and California Incline.
- Pedestrian/bicycle access via the trail off of the intersection of Ocean Avenue and Arizona Avenue which is about 1,400 feet south of the intersection of Ocean Avenue and California Incline.

Traffic Diversion During Construction (Without Mitigation)

The temporary closure would result in the redistribution of traffic that is currently using the California Incline Bridge. As stated previously, three routes have been identified which may be impacted by the proposed temporary bridge closure. The three routes are:

- Channel Road/Entrada Drive via PCH
- Ocean Avenue via Moomat Ahiko Way
- Lincoln Boulevard/4th Street via 1-10 Freeway

The three routes have been identified based on the assumption that the majority of the traffic using the California Incline is bound for areas within the study-area (see Figure 4). It should be noted that some of the trips on the California Incline use PCH to get to the west side of the San Fernando Valley rather than using the I-405. These trips are considered nominal compared to trips bound for the study area. For the purpose of identifying origins

and destinations and for quantifying the shift in traffic due to the Project, three general sub-area zones have been developed.

Zone A defines the area generally located northeast of the California Incline north of Washington Avenue. This zone is primarily residential with some commercial/office uses. Zone B defines the area generally located east of the California Incline (between Washington Avenue and Wilshire Boulevard). This zone is a mixture of residential use and commercial/office uses. Zone C defines the area generally located southeast of the California Incline between Wilshire Boulevard and I-10 Freeway. This area is primarily commercial and office uses with some residential use. Figure 8 depicts the boundaries of the three zones.

Utilizing the existing weekday AM, PM and weekend peak hour turning movement traffic counts at the California Incline/PCH and California Incline/Ocean Avenue, inbound and outbound distribution patterns were developed. Figures 9 and 10 illustrate the AM peak hour outbound and inbound distribution patterns, respectively. Figures 11 and 12 illustrate the PM peak hour outbound and inbound distribution pattern, respectively. Figures 13 and 14 illustrate the weekend peak hour outbound and inbound distribution pattern, respectively.

AM Peak Hour Traffic Estimates With Bridge Closure

During the AM peak hour, approximately 650 outbound vehicles (vehicles leaving the study area) are currently utilizing the California Incline Bridge. As shown in Figure 9, approximately 35% are estimated to originate from Zone A, 20% from Zone B and 45% from Zone C. In addition, approximately 60% are destined for areas north of the study area via PCH and the remaining 40% are bound for areas south or east via PCH and I-10 Freeway. It is assumed that all of the 40% southbound traffic is destined to the eastbound Santa Monica Freeway (I-10) as those who are southbound would have likely remained on Ocean Avenue and other north-south oriented streets (i.e. 4th Street and Lincoln Boulevard).

Approximately 740 inbound vehicles (vehicles entering the study area) are currently utilizing the California Incline Bridge during the AM peak hour. Note that the northbound right-turn movement is prohibited at the intersection of PCH and the California Incline. Therefore, all of the 740 vehicles are from areas north of the study traveling southbound via PCH. Figure 10 illustrates the distribution pattern. Of the 740 vehicles, approximately 5% are bound for Zone A, 15% are bound for Zone B and 80% are bound for Zone C.

Based on the estimated trip distribution pattern identified, AM peak hour inbound and outbound traffic shifts to the detour routes are estimated. The estimated shift in traffic is based on the location of the zones in relation to the detour routes and the propensity for the use of specific routes taking into account drive-time, driving-distance and accessibility. Table 3 summarizes the estimated traffic shift to the various detour routes. Figures 15 and 16 illustrate the estimated inbound and outbound traffic shifts, respectively.

PM Peak Hour Traffic Estimates With Bridge Closure

During the PM peak hour, approximately 1,140 outbound vehicles (vehicles leaving the study area) are currently utilizing the California Incline Bridge. As shown in Figure 11, approximately 10% are estimated to originate from Zone A, 25% from Zone B and 65% from Zone C. In addition, approximately 90% are bound for areas north of the study area via PCH and the remaining 10% are bound for areas south or east via PCH and I-10 Freeway. It is assumed that all of the 10% southbound traffic is bound for the eastbound Santa Monica Freeway (I-10) as those who are southbound would have likely remained on Ocean Avenue and other north-south oriented streets (i.e. 4th Street and Lincoln Boulevard).

Approximately 640 inbound vehicles (vehicles entering the study area) are currently utilizing the California Incline Bridge during the PM peak hour (note that northbound right-turn movement is prohibited at the intersection of PCH and the California Incline). Therefore, all of the 640 vehicles are from areas north of the study traveling southbound via PCH. Figure 12 illustrates the distribution pattern. Of the 640 vehicles, approximately 15% are bound for Zone A, 20% are bound for Zone B and 65% are bound for Zone C.

Based on the estimated trip distribution pattern identified, PM peak hour inbound and outbound traffic shifts to the detour routes are estimated. The estimated shift in traffic is based on the location of the zones in relation to the detour routes and the propensity for the use of specific routes taking into account drive-time, driving-distance and accessibility. Table 4 summarizes the estimated traffic shift to the various detour routes. Figures 17 and 18 illustrate the estimated inbound and outbound traffic shifts, respectively.

Summer Weekend Midday Peak Hour Traffic Estimates With Bridge Closure

During the weekend midday peak hour, approximately 1,020 outbound vehicles (vehicles leaving the study area) are currently utilizing the California Incline Bridge. As shown in Figure 13, approximately 20% are estimated to originate from Zone A, 20% from Zone B and 60% from Zone C. In addition, approximately 80% are bound for areas north of the study area via PCH and the remaining 20% are bound for areas south or east via PCH and I-10 Freeway. It is assumed that all of the 20% southbound traffic is bound for the eastbound Santa Monica Freeway (I-10) as those who are southbound would have likely remained on Ocean Avenue and other north-south oriented streets (i.e. 4th Street and Lincoln Boulevard).

Approximately 800 inbound vehicles (vehicles entering the study area) are currently utilizing the California Incline Bridge during the PM peak hour (note that northbound right-turn movement is prohibited at the intersection of PCH and the California Incline). Therefore, all of the 800 vehicles are from areas north of the study traveling southbound via PCH. Figure 14 illustrates the distribution pattern. Of the 800 vehicles, approximately 20% are bound for Zone A, 20% are bound for Zone B and 60% are bound for Zone C.

Based on the estimated trip distribution pattern identified, PM peak hour inbound and outbound traffic shifts to the detour routes are estimated. The estimated shift in traffic is based on the location of the zones in relation to the detour routes and the propensity for the use of specific routes taking into account drive-time, driving-distance and accessibility. Table 5 summarizes the estimated traffic shift to the various detour routes. Figures 19 and 20 illustrate the estimated inbound and outbound traffic shifts, respectively.

Potential Construction Impacts (Without Mitigation)

This section describes the potential construction related traffic impacts on the three studied routes. Future traffic volumes are based on City of Santa Monica's most current traffic forecast model (Traffix) projections at the time this study was prepared. The projected " No Construction" traffic volumes at the key detour route intersections for the weekday AM, weekday PM and Summer Weekend midday peak hour periods are shown in Figures 21, 22 and 23, respectively. The projected "During Construction" traffic volumes for these study peak hour periods are shown in Figures 24, 25 and 26.

Channel Road/Entrada Drive - Based on the estimated traffic redistribution previously presented, Channel Road/Entrada Drive is expected to have an increase/shift in traffic volumes during the temporary closure of the California Incline Bridge. An additional 250 AM peak hour, 360 PM peak hour and 460 weekend midday peak

hour vehicles are estimated to divert to Channel Road/Entrada Drive. The estimated diverted traffic is also expected to primarily use 7th Street via San Vicente Boulevard to Ocean Avenue as traffic dissipates to and from Zones A and B. Channel Road and Entrada Drive are under City of Los Angeles Department of Transportation's jurisdiction. PCH is a State facility under the jurisdiction of Caltrans. The estimated added volumes are shown on Figures 15 through 20.

The key intersection most likely to be impacted by the temporary closure along the subject detour is PCH and Channel Road/Chautauqua Drive. Before the construction in the year 2012, this intersection is projected to operate at LOS F during the AM and PM peak hours. Substantial traffic delays and queuing would occur during peak periods of traffic. With the addition of diverted traffic resulting from the proposed Bridge Project, the intersection would likely continue to operate at LOS F during the AM and PM peak hours.

Ocean Avenue via Moomat Ahiko Way - Based on the estimated traffic redistribution previously presented, Ocean Avenue is expected to have an increase/shift in traffic pattern during the temporary closure of the California Incline Bridge. Currently, inbound traffic (traffic entering the study area) utilizing the California Incline generally travels in the southbound direction along Ocean Avenue to Zone C. Outbound traffic travels in the northbound direction from Zone C. With the proposed temporary closure of the California Incline, about 560 AM peak hour, 810 PM peak hour and 730 weekend midday peak hour vehicles are estimated to divert to the Ocean Avenue ramps located south of I-10 Freeway/Colorado Avenue. The estimated added volumes are shown on Figures 15 through 20.

The impact essentially shifts existing inbound southbound traffic along Ocean Avenue to northbound traffic along Ocean Avenue. The inbound traffic pattern shift would also likely decrease southbound left-turn demand from Ocean Avenue to the various cross-streets including: Wilshire Boulevard, Arizona Avenue, Santa Monica Boulevard, Broadway and Colorado Avenue. Conversely, traffic demand in the northbound right-turn movements would likely increase.

The Project would also result in an outbound traffic (traffic leaving the study area) pattern shift. As indicated previously, outbound traffic from Zone C currently travels northbound to the California Incline and would shift to the Ocean Avenue Ramps south of Colorado Avenue. This would likely result in decrease in westbound right-turn traffic demand along the various east-west roadways intersecting Ocean Avenue and conversely increase westbound left-turn traffic demand.

The key intersection most likely to be impacted by the temporary closure along the subject detour is the Ocean Avenue ramps to and from Moomat Ahiko Way. Before the construction in the year 2012, this intersection is projected to operate at LOS D, LOS F and LOS E during the AM, PM and weekend midday peak hours of traffic, respectively. With the addition of diverted traffic resulting from the proposed Bridge Project, the intersection would likely also operate at LOS F and LOS E during the PM and weekend midday peak hours, respectively.

Intersection	Projected 2012 Traffic Conditions - Without Construction					
	Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Ocean Ave & PCH	42.6	D	92.9	F	61.1	E

Lincoln Boulevard/4th Street via I-10 Freeway - Based on the estimated traffic redistribution previously presented, Lincoln Boulevard and 4th Street are expected to have an increase/shift in traffic during the temporary closure of the California Incline Bridge. Estimated inbound traffic (traffic entering the study area) utilizing the three routes are as follows:

- Lincoln Boulevard - 450 vehicles during the AM peak hour, 550 vehicles during the PM peak hour and 530 vehicles during the weekend midday peak hour

- 4th Street - 130 vehicles during the AM peak hour, 60 vehicles during the PM peak hour and 100 vehicles during the weekend midday peak hour

As indicated previously, a significant amount of outbound traffic (traffic leaving the study area) currently utilizing the California Incline Bridge is assumed to be destined for areas east of the study area via I-10 Freeway. With the proposed Project, outbound traffic (primarily from Zones B and C) would likely shift to the I-10 Eastbound On-ramps at Lincoln Boulevard and 4th Street. Current inbound traffic (traffic entering the study area) utilizing the California Incline Bridge would also likely shift to the I-10 Eastbound Off-ramp at Lincoln Boulevard. The estimated added volumes are shown on Figures 15 through 20.

The estimated outbound traffic expected to utilize Lincoln Boulevard would essentially add new traffic along the corridor. Based on the traffic estimate, it is expected that both northbound and southbound traffic demand would increase along Lincoln Boulevard. It is also expected that an increase in northbound left-turn demand from Lincoln Boulevard onto cross-streets and eastbound right-turn demand from cross Streets to Lincoln Boulevard would occur. This reflects traffic originating and destined for Zone C.

Key intersections most likely to be impacted by the temporary closure along the subject detour routes include:

- Lincoln Boulevard and Olympic Boulevard/I-10 Eastbound Ramps
- Lincoln Boulevard and Olympic Boulevard/I-10 Westbound Ramps
- 4th Street and Olympic Boulevard/I-10 Eastbound On-ramp

Based on the analysis results, level of service at the three key intersections are:

Projected 2012 Traffic Conditions - Without Construction

Intersection	Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Lincoln Blvd & Olympic Blvd/ I-10 EB Ramps	41.7	D	26.8	C	98.9	F
Lincoln Blvd & Olympic Blvd/ I-10 WB Ramps	158.2	F	102.6	F	240.7	F
4th St & Olympic Blvd/I-10 EB On-Ramp	74.0	E	34.4	C	55.0	D

With the added/shifted traffic as a result of the temporary closure at the California Incline Bridge, the three key intersections are expected to operate at:

Projected 2012 Traffic Conditions - During Construction

Intersection	Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Lincoln Blvd & Olympic Blvd/ I-10 EB Ramps	83.8	F	28.7	C	111.6	F
Lincoln Blvd & Olympic Blvd/ I-10 WB Ramps	167.2	F	134.2	F	266.6	F
4th St & Olympic Blvd/I-10 EB On-Ramp	87.0	F	37.3	D	62.5	E

The intersection of Lincoln Boulevard at Olympic Boulevard/I-10 Eastbound Ramps is projected to operate at LOS D, LOS C and LOS F during the AM, PM and summer weekend midday peak hours, respectively. With the temporary closure of the California Incline Bridge, this intersection is expected to operate at LOS F during the AM and summer weekend midday peak hours.

The intersection of Lincoln Boulevard at Olympic Boulevard/I-10 Westbound Ramps is projected to operate at LOS F during the AM, PM and summer weekend midday peak hours. With the temporary closure of the California Incline Bridge, traffic operations would continue to operate at LOS F during the AM, PM and summer weekend midday peak hours.

The intersection of 4th Street at Olympic Boulevard/I-10 Eastbound On-Ramp is projected to operate at LOS E, LOS C and LOS D during the AM, PM and summer weekend midday peak hours, respectively. With the temporary closure of the California Incline Bridge, traffic operations are expected to worsen to LOS F, LOS D and LOS E during the AM, PM and summer weekend midday peak hours, respectively.

PROPOSED MITIGATION MEASURES

Per the City of Santa Monica's traffic study guidelines:

"*Traffic impacts associated with construction activities are considered potentially significant if the project construction would materially interfere with the existing traffic flow, cause unsafe conditions or introduce substantial truck traffic through a residential area".*

The officially designated detour will be Ocean Avenue via Moomat Ahiko Way during the 12 to 18-month construction period. It is the City's desire to route all traffic currently utilizing the California Incline to this designated detour route.

From a traffic circulation and accessibility standpoint, the Ocean Avenue/Moomat Ahiko Way detour is the most logical detour as it is located less than one mile southeast of the Ocean Avenue/California Incline intersection (roughly 5 blocks). As the impact analysis indicated previously, the majority of detoured traffic is bound for those areas located south of California Avenue. These areas are geographically closer to the detour intersection of Ocean Avenue and Moomat Ahiko Way.

Based on the estimated traffic redistribution previously presented, Ocean Avenue is expected to have an increase/shift in traffic pattern during the temporary closure of the California Incline Bridge. Currently, inbound traffic (traffic entering the study area) utilizing the California Incline generally travels in the southbound direction along Ocean Avenue to Zone C. Outbound traffic travels in the northbound direction from Zone C. With the proposed temporary closure of the California Incline, an estimated 560 AM peak hour, 810 PM peak hour and 730 summer weekend midday peak hour vehicles are estimated to divert to Ocean Avenue ramps located south of I-10 Freeway/Colorado Avenue. Estimated added volumes are shown on Figures 15 through 20.

The impact essentially shifts existing inbound southbound traffic along Ocean Avenue to northbound traffic. The inbound traffic pattern shift would also likely decrease southbound left-turn demand from Ocean Avenue to the various cross-streets including: Wilshire Boulevard, Arizona Avenue, Santa Monica Boulevard, Broadway and Colorado Avenue. Conversely, traffic demand in the northbound right-turn movements would likely increase.

The Project would also result in an outbound (traffic leaving the study area) traffic pattern shift. As indicated previously, outbound traffic from Zone C currently travels northbound to the California Incline and would shift to the Ocean Avenue Ramps south of Colorado Avenue. This would likely result in decrease in westbound right-turn traffic demand along the various east-west roadways intersecting Ocean Avenue and conversely increase westbound left-turn traffic demand.

While the Ocean Avenue/Moomat Ahiko Way detour is the most logical and feasible detour, the ability for the detour/intersection to accommodate the expected added traffic shift would be key in minimizing traffic shifts to other routes. In anticipation of the traffic shift to the Ocean Avenue/Moomat Ahiko Way detour, the City has identified a number of physical improvements to enhance the traffic carrying capacity along the detour route and at the intersection of Ocean Avenue/Moomat Ahiko Way. Figure 27 illustrates the official detour route and associated improvements as follows:

1. Restripe Moomat Ahiko Way to provide dual left-turn lanes and single right-turn lane at Ocean Avenue. The existing raised median on Moomat Ahiko Way would also need to be reconstructed. This improvement will require approval by the City of Santa Monica Transportation Management Department.
2. Synchronize traffic signals along Ocean Avenue to minimize north-south traffic delays. Traffic conditions will be monitored regularly and the traffic signal timings would be adjusted as needed. As an example, signal timings could be adjusted at locations where severe queuing that results in long delays or restricts one or more movements at an intersection is observed. This benefits in the reduction of travel time and

traffic delay. The City of Santa Monica would monitor traffic conditions and adjust the signal timing as necessary on a daily basis for the first 30 days after closure of the California Incline and on a weekly basis thereafter. In order to better monitor traffic conditions, the City will also install additional CCTV cameras at key traffic signal controlled intersections along Ocean Avenue. Currently, there are existing CCTV cameras located along Ocean Avenue at California Avenue, Wilshire Boulevard, Santa Monica Boulevard, Colorado Avenue and Pico Boulevard. The City will install three new CCTV cameras along Ocean Avenue at Arizona Avenue, Broadway and Moomat Ahiko Way.

3. Enforce stricter pedestrian controls at Ocean Avenue/Colorado Avenue/Pier Bridge intersection. These may include pedestrian barricades, fencing or channelization devices. The types of pedestrian control improvements would depend on traffic conditions during the construction period and specific measures will be determined and approved by the City of Santa Monica.
4. Install dynamic signage along PCH and Ocean Avenue advising and directing motorists to the Ocean Avenue/Moomat Ahiko Way detour as well as the I-10 via 4th Street and Lincoln Boulevard. Portable Changeable Message Signs (PCMS) equipped with cellular data modems shall be utilized to allow for the City to make modifications to messages from a centralized location.
5. If needed, assign traffic officers to direct vehicular traffic and pedestrians. For example, traffic officers could be assigned to intersections where vehicle queues in the left turn lane severely disrupts the through movements and overall traffic operations. An officer could alleviate blockages and improve operations by manually directing traffic flow when needed. Traffic conditions will be monitored regularly and traffic officers will be assigned as determined by the City traffic engineer.

The key intersection most likely to be impacted by the temporary closure along the subject detour is Ocean Avenue ramps to and from Moomat Ahiko Way. Before the construction in the year 2012, this intersection is projected to operate at LOS D, LOS F and LOS E during the AM, PM and weekend midday peak hours of traffic, respectively. With the addition of diverted traffic resulting from the proposed Bridge Project and the proposed mitigation measures, the intersection would operate at LOS D, LOS E and LOS F during the AM, PM and weekend midday peak hours, respectively. The table below shows the level of service with the proposed mitigation measures:

Intersection	Projected 2012 Traffic Conditions - Without Construction						Projected 2012 Traffic Conditions - During Construction (With Mitigation)					
	Weekday				Summer Weekend		Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak		AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Ocean Ave & PCH	42.6	D	92.9	F	61.1	E	39.0	D	78.6	E	110.2	F

Based on the results of the intersection level of service analysis, the subject intersection would operate at a good level of service (i.e. LOS C) with the proposed mitigation measures during the AM peak hour. During the PM peak hour, the intersection would improve from LOS F for the projected before construction condition to LOS E with the proposed mitigation measures. During the weekend midday peak hour, the intersection is anticipated to operate at LOS F with the proposed mitigation measures at this location.

An additional analysis was also conducted to determine the effect the mitigation measures would have on traffic operations at this intersection. The operations analysis evaluated vehicular queuing on the Moomat Ahiko Way approach at Ocean Avenue. It should be noted that the mitigation measures would increase capacity for the left-

turn movement and decrease capacity for the right-turn movement on the Moomat Ahiko Way approach at Ocean Avenue. Based on the analysis results, Moomat Ahiko Way with implementation of the mitigation measures is anticipated to have enough capacity to accommodate the expected traffic shifts due to the proposed Project for the weekday AM and PM peak hour periods. However, the right-turn demand on Moomat Ahiko Way at Ocean Avenue is projected to exceed capacity during the weekend midday peak hour. It should be noted that synchronization of the traffic signal system would improve traffic progression compared to the level of service projected at this intersection.

While the City recognizes that there are other alternative routes which motorists could use during the California Incline closure, such as Channel Road/Entrada Drive and Lincoln Boulevard via the I-10 Freeway, these are considered less desirable detour routes to the motorists as they require motorists to travel a much longer distance. The Channel Road/Entrada Drive route is estimated to be approximately 2.3 miles of additional driving and the Lincoln Boulevard via I-10 Freeway route is estimated to be approximately 2.9 miles of additional driving as opposed to the Ocean Avenue/Moomat Ahiko Way detour which is only 0.7 miles of additional driving. The City of Santa Monica is actively working with the City of Los Angeles and Caltrans to explore available measures to discourage the use of alternate routes during the California Incline closure.

With the recommended improvements identified, the added traffic during the closure and reconstruction of the California Incline Bridge would likely be temporarily significant and unavoidable.

The following describes other proposed mitigation measures at the remaining two studied routes:

Channel Road/Entrada Drive - The estimated diverted traffic from the Bridge Project would also add traffic to the primarily residential neighborhood served by Channel Road, Entrada Drive, 7th Street and Ocean Avenue. Based on discussions with LADOT staff, traffic calming measures such as speed humps would not be feasible along Channel Road since travel speeds are too high and thus would be too dangerous to implement. Based on discussion with Caltrans staff, possible adjustments to the traffic signal phasing at the intersection of PCH and Channel Road/Chautauqua Boulevard was also explored to discourage diverted traffic from using the subject route. This would require regular monitoring of the intersection traffic demand after the closure of the California Incline.

It is recommended at this time that in lieu to traffic calming measures and signal timing adjustments, clearly marked detour signage be placed along southbound PCH to discourage motorist from using this route and direct them to use the officially designated detour routes of Ocean Avenue ramps via Moomat Ahiko Way and I-10 Freeway via 4th Street and Lincoln Boulevard. Even with these efforts, this location may have temporary unavoidable traffic impacts during the 12 to 18-month construction period.

Lincoln Boulevard/4th Street via I-10 Freeway - With the temporary closure of the California Incline Bridge, the intersection of Lincoln Boulevard at Olympic Boulevard/I-10 Eastbound Ramps is projected to operate at LOS F during the AM and summer weekend midday peak hours. The intersection of Lincoln Boulevard at Olympic Boulevard/I-10 Westbound Ramps is projected to operate at LOS F during the AM, PM and summer weekend midday peak hours. The intersection of 4th Street at Olympic Boulevard/I-10 Eastbound On-Ramp is projected to operate at LOS F, LOS D and LOS E during the AM, PM and summer weekend midday peak hours, respectively. These locations may have temporary unavoidable traffic impacts during the 12 to 18-month construction period.

It is recommended that the City and/or Caltrans conduct regular monitoring of traffic operations/demand and make necessary adjustments to traffic signal timing along Ocean Avenue. It is expected that signal timing

modifications would be required to accommodate the increase/shift in the traffic at the three key intersections and along the major detour routes (i.e. Lincoln Boulevard and 4th Street).

Traffic Management Plan

Prior to construction and throughout the design process, the City of Santa Monica will coordinate with LADOT and Caltrans to develop a detailed traffic management plan (TMP) to minimize neighborhood traffic and encourage the use of the designated detour route via Moomat Ahiko Way. By developing the detailed TMP throughout the design phase, the City will be able to include the most up-to-date information regarding traffic counts and other projects to be completed within the City and surrounding areas during the construction period. Traffic monitoring will be ongoing throughout construction, and signal timing will be adjusted as necessary to facilitate traffic flow between downtown and PCH. As noted above, the City of Santa Monica would monitor traffic conditions (using CCTV cameras installed prior to beginning of construction) and adjust the signal timing as necessary. For example, the signal timings could be adjusted at locations where severe queuing that results in long delays or restricts one or more movements at an intersection is observed. The appropriate adjustments would be performed on a daily basis for the first 30 days after closure of the California Incline and on a weekly basis thereafter. In order to better monitor traffic conditions, additional CCTV cameras would be installed at all traffic signal controlled intersections along Ocean Avenue and other alternate north-south routes (e.g. Lincoln Boulevard and 4th Street) where CCTV cameras are not currently installed. In addition, dynamic signage shall be installed along PCH and Ocean Avenue advising and directing motorists to the Ocean Avenue/Moomat Ahiko Way detour as well as the I-10 via 4th Street and Lincoln Boulevard. Portable Changeable Message Signs (PCMS) equipped with cellular data modems shall be utilized to allow for the City to make modifications to messages from a centralized location. Traffic officers will be used as necessary to ensure safe traffic circulation. The City of Santa Monica is open to the idea of forming a working group consisting of the various stakeholders. The City will continue to consult with Caltrans, LADOT, and PCH Partners (pchpartners.net) in developing traffic management and signage plans.

Construction project managers would be the point of contact for the project. A public relations firm would be contracted to help relay information about the construction to residents and community members. In addition, a hotline service would be provided to obtain comments/complaints during construction. As is standard practice with all City projects requiring detours, the closure of the incline, as well as the location of the designated detour route, will be communicated in advance through flyers, updates on the City's web site, and the online resource pchpartners.org. Traffic mitigation will be revised and updated throughout the project, as necessary, to ensure the safest environment for motorists, bicyclists, and pedestrians. The City would meet with local citizen and homeowners association groups regularly to address any concerns and provide updates on project construction. A hotline and web site will be available for all interested parties, and both will be updated regularly.

Nighttime and weekend work will be considered as a means to accelerate the construction period, depending on community input and consideration of impacts to nearby residents. During final design, consideration will also be given to selection of materials, such as precast concrete bridge units, that will help to reduce overall construction time. Placement of concrete can be done at night, with an added cost premium as noted above. Local concrete suppliers would keep their facilities open to supply the materials. It is very unlikely that an onsite batch plant would be employed, since the size of the bridge would make it uneconomical. Any time-reduction or traffic-mediation methods that can be integrated into design will be used. The City has identified critical path elements that need to be completed in a timely manner to meet the 12 to 18-month construction schedule. Upon completion of 90 percent of the design, a constructability review will be prepared, and risks will be identified and minimized to the fullest extent practicable.

The City intends to assess the contractor for liquidated damages for any delay in completion of the project. This amount will be set forth in the contract and deducted from the contracted price to cover additional costs incurred by the City because of the contractor's failure to complete the project within the contracted number of working days. The number of working days will not be specified until construction drawings have been prepared and a constructability review has been completed.

Other Potential Improvements

During the public review period, several potential mitigation measures were proposed such as:

- Allow southbound PCH traffic to access Ocean Avenue via Appian Way/Seaside Terrace
- One-way couplet on 4th Street and 5th Street
- Reconfigure I-10 Freeway Ramps along 4th Street, 5th Street and Lincoln Boulevard

After careful review and consideration, City staff has decided that these improvements are not feasible due to the following reasons:

Divert traffic to Appian Way/Seaside Terrace – While this improvement may reduce traffic demand at Moomat Ahiko Way and Ocean Avenue, it will add traffic to the residential areas fronted by Appian Way and Seaside Terrace and potentially cause significant adverse impacts.

One-way couplet (4th Street and 5th Street) – The proposal includes converting 4th Street and 5th Street to one-way streets and theoretically improve traffic circulation between the project study area and the I-10 Freeway. To implement this improvement, the City would have to restripe for one-way traffic, remove/replace on-street meters, signage, re-install and re-program traffic signals and remove/restripe cross-street turn lanes. This improvement will adversely disrupt traffic and business operations at a high implementation cost.

Reconfigure I-10 Freeway Ramps – These improvements will require detailed planning and design, and impact traffic during construction. The cost for these improvements would be very high and not justifiable.

FUTURE CONDITIONS/IMPACTS WITH COMPLETION OF PROJECT

As discussed previously, the proposed bridge replacement Project would decrease roadway capacity on the California Incline. Currently, the California Incline provides two vehicular travel lanes in the southbound direction toward Ocean Avenue, and has one left-turn lane, one through lane and one exclusive right-turn lane at Ocean Avenue. Upon completion of the Project, the reconstructed California Incline would provide one vehicular travel lane in the southbound direction toward Ocean Avenue. In addition, one left-turn lane, one through lane and one exclusive right-turn lane would continue to be provided at Ocean Avenue, but the left and right-turn lane capacities would be reduced to about 20 feet and 75 feet, respectively. The Project would also include pedestrian and bicycle access enhancements.

An operations level of service analysis was conducted at the intersections of California Incline/Ocean Avenue/California Avenue and California Incline/Palisades Beach Road for the existing condition and future with and without Project implementation conditions. Queuing was also evaluated on the California Incline and at the two intersections for turn movements to and from the California Incline.

Existing and future traffic volumes used for the operations level analysis were obtained from the most current City of Santa Monica's Traffix Model at the time this study was prepared. The City's Traffix Model takes into account traffic growth from related projects identified by the City of Santa Monica Planning Division. As requested by City staff, KOA reviewed the current list of related projects that was obtained from the City's Planning Division. Based on a comparison of the related projects from the City's Traffix Model and from the current related projects list, it was determined that the current list of related projects contained two additional projects that were not included in the City's Traffix Model but are anticipated to add traffic to the study intersections. The trips generated by the related projects were estimated based on trip rates from the Institute of Transportation Engineers (ITE) Trip Generation 8th Edition book. The trips generated by the two related projects were distributed and assigned to the study intersections, and were added to the future traffic volumes. The table below summarizes the description and trip generation estimates for the two additional related projects.

#	Location	Project Description - Land Use	Intensity	Units	Weekday							Weekend		
					Daily	AM Peak Hour			PM Peak Hour			Midday Peak Hour		
					Total	Total	In	Out	Total	In	Out	Total	In	Out
1	217 Bicknell Avenue	Condominiums	7	du	41	3	1	2	4	3	1	3	2	1
2	1515-25 Ocean Avenue	Hotel + Retail [1]	-	-	565	37	14	23	48	26	22	55	23	32
Total					**606**	**40**	**15**	**25**	**52**	**29**	**23**	**58**	**25**	**33**

[1] Trip generation obtained from Traffic study for the 1515 - 1525 Ocean Avenue Motel Project, Santa Monica, California, Fehr and Peers (Kaku Associates), September 2007.

The operations level of service and queuing analyses were conducted using the City of Santa Monica's Synchro Model. It should be noted that the intersection of California Incline and Palisades Beach Road was not included in the Synchro Model. The Synchro network was modified to reflect the addition of this intersection. The existing signal timings at the intersections were obtained from the City of Santa Monica and Caltrans, and were entered into the Synchro database. The signal timings for future conditions were based on existing signal timings but with minor adjustments where appropriate to account for traffic growth.

The delay and associated level of service for the key turning movements entering and exiting the California Incline and for the intersections overall are summarized below. As shown in the tables below, the Ocean Avenue/California Avenue/Incline intersection is currently operating at LOS B, D and C for the weekday AM, weekday PM and weekend midday peak periods, respectively. The Palisades Beach Road/California Incline intersection is currently operating at LOS E, E and D for the weekday AM, weekday PM and weekend midday peak periods, respectively. For future conditions, the Ocean Avenue/California Avenue/Incline intersection is projected to operate at LOS C, F and E for the weekday AM, weekday PM and weekend midday peak periods, respectively. The Palisades Beach Road/California Incline intersection is projected to operate at LOS F for all three study periods. It is important to note that the delay and level of service values for future conditions reflect operating conditions with and without the California Incline Reconstruction Project. The Synchro worksheets are attached.

Based on the analysis results and on review of the traffic simulation using SimTraffic, the capacity on the California Incline with Project implementation would be sufficient to accommodate vehicular queuing in both the northbound and southbound directions. The traffic signals would need to be coordinated and optimized in order to enhance traffic progression on the Incline.

It is important to note that the left-turn volumes from Palisades Beach Road onto the California Incline currently exceed capacity during all three study peak periods. For future conditions, the left-turn volumes for this movement would continue to exceed capacity with or without Project implementation.

Study Intersection	Existing Conditions (Based on Raw Counts)					
	Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Ocean Ave & California Ave/Incline						
Left turn from Ocean Av to California Incline	26.4	C	123.5	F	47.2	D
Left turn/through from California Av to Ocean Av/California Incline	39.1	D	40.5	D	37.9	D
Right turn from Ocean Av to California Incline	6.5	A	8.7	A	8.0	A
Left turn from California Incline to Ocean Av	31.4	C	47.9	D	46.9	D
Through from California Incline to California Av	38.0	D	27.5	C	29.4	C
Right turn from California Incline to Ocean Av	6.1	A	6.8	A	6.4	A
Overall Intersection	**19.4**	**B**	**47.5**	**D**	**27.3**	**C**
Palisades Beach Rd (PCH) & California Incline						
Left turn from PCH to California Incline	187.9	F	106.3	F	109.6	F
Left turn/through from California Incline to PCH	248.0	F	145.6	F	94.0	F
Right turn from California Incline to PCH	54.0	D	218.0	F	29.8	C
Overall Intersection	**55.1**	**E**	**77.3**	**E**	**46.7**	**D**

Note: Results are based on the operational analysis carried out using Synchro program.

Study Intersection	Future Conditions After Construction					
	Weekday				Summer Weekend	
	AM Peak		PM Peak		Midday Peak	
	Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
Ocean Ave & California Ave/Incline						
Left turn from Ocean Av to California Incline	30.0	C	321.3	F	204.9	F
Left turn/through from California Av to Ocean Av/California Incline	41.0	D	41.1	D	33.1	C
Right turn from Ocean Av to California Incline	7.4	A	9.3	A	10.5	B
Left turn from California Incline to Ocean Av	29.8	C	46.9	D	60.9	E
Through from California Incline to California Av	32.4	C	26.8	C	28.4	C
Right turn from California Incline to Ocean Av	17.9	B	8.6	A	12.4	B
Overall Intersection	**21.1**	**C**	**99.2**	**F**	**58.6**	**E**
Palisades Beach Rd (PCH) & California Incline						
Left turn from PCH to California Incline	408.4	F	169.3	F	334.8	F
Left turn/through from California Incline to PCH	246.2	F	144.3	F	99.6	F
Right turn from California Incline to PCH	62.3	E	365.6	F	53.1	D
Overall Intersection	**86.0**	**F**	**116.7**	**F**	**106.0**	**F**

Results reflect both with and without California Incline Bridge Replacement Project.

Note: Results are based on the operational analysis carried out using Synchro program.

In addition, the left-turn movement from Ocean Avenue onto the California Incline currently has high traffic volumes (222, 570 and 469 vehicles during the AM, PM and weekend midday peak periods, respectively). The analysis shows that during the PM and weekend midday peak periods, the left-turn vehicles queue and extend throughout the length of the block on Ocean Avenue from the California Incline to Wilshire Boulevard. For future conditions, the left-turn volumes are projected to be 312, 827 and 651 vehicles during the AM, PM and weekend midday peak periods, respectively. The left-turn vehicles would continue to queue and extend throughout the length of this block to Wilshire Boulevard with or without Project implementation during the PM and weekend midday peak periods.

Table 6 summarizes the analysis results of the key detour route intersections.

Table 1 - Summary of Traffic Count Data

Study Intersections		Weekday		Summer Weekend
		AM Peak	PM Peak	Midday Peak
1	PCH & Channel & Chautauqua Blvd	2006	2006	-
2	PCH & Entrada Dr	2006	2006	-
3	Ocean Ave & PCH	2007	2007	2005
4	Lincoln Blvd & I 10 EB On Ramp	2007	2007	2005
5	Lincoln Blvd & I 10 WB Off Ramp	2007	2007	2005
6	Palisades Beach Rd & California Ave	2007	2007	2005
7	Ocean Ave & California Ave	2007	2007	2005
8	Lincoln Blvd & Montana Ave	2007	2007	-
9	Lincoln Blvd & Wilshire Blvd	2007	2007	2005
10	Lincoln Blvd & Arizona Ave	2007	2007	2005
11	Lincoln Blvd & Santa Monica Blvd	2007	2007	2005
12	Lincoln Blvd & Broadway	2007	2007	2005
13	Lincoln Blvd & Colorado Ave	2007	2007	2005
14	Seventh St & San Vicente Blvd	2007	2007	-
15	Seventh St & Montana Ave	2007	2007	-
16	Seventh St & Wilshire Blvd	2007	2007	-
17	Seventh St & Arizona Ave	2007	2007	-
18	Seventh St & Santa Monica Blvd	2007	2007	2003
19	Seventh St & Broadway	2007	2007	2003
20	Seventh St & Colorado Ave	2007	2007	2003
21	Fourth St & California Ave	2007	2007	-
22	Ocean Ave & Wilshire Blvd	2007	2007	2005
23	Ocean Ave & Arizona Ave	2007	2007	2005
24	Ocean Ave & Santa Monica Blvd	2007	2007	2005
25	Ocean Ave & Colorado Ave	2007	2007	2005

Note: The latest available count data was utilized for the study.

Table 2 - Existing Level of Service Summary
(Based on Raw Traffic Counts)

Study Intersections		Weekday				Summer Weekend	
		AM Peak		PM Peak		Midday Peak	
		Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
1	PCH & Channel & Chautauqua Blvd	61.5	E	169.0	F	N/A	N/A
2	PCH & Entrada Dr	7.7	A	6.6	A	N/A	N/A
3	Ocean Ave & PCH	23.6	C	35.4	D	64.3	E
4	Lincoln Blvd & I 10 EB On Ramp	20.4	C	22.7	C	26.7	C
5	Lincoln Blvd & I 10 WB Off Ramp	25.4	C	27.2	C	127.5	F
6	Palisades Beach Rd & California Ave	30.1	C	85.7	F	33.4	C
7	Ocean Ave & California Ave	18.2	B	25.4	C	21.2	C
8	Lincoln Blvd & Montana Ave	13.4	B	12.4	B	N/A	N/A
9	Lincoln Blvd & Wilshire Blvd	43.4	D	37.8	D	16.3	B
10	Lincoln Blvd & Arizona Ave	10.7	B	11.3	B	10.5	B
11	Lincoln Blvd & Santa Monica Blvd	15.4	B	17.9	B	27.5	C
12	Lincoln Blvd & Broadway	20.4	C	37.9	D	31.3	C
13	Lincoln Blvd & Colorado Ave	24.9	C	30.9	C	23.6	C
14	Seventh St & San Vicente Blvd	26.6	C	24.0	C	N/A	N/A
15	Seventh St & Montana Ave	14.4	B	15.3	B	N/A	N/A
16	Seventh St & Wilshire Blvd	17.9	B	15.7	B	N/A	N/A
17	Seventh St & Arizona Ave	12.6	B	15.2	B	N/A	N/A
18	Seventh St & Santa Monica Blvd	14.1	B	13.8	B	12.0	B
19	Seventh St & Broadway	13.6	B	14.9	B	13.4	B
20	Seventh St & Colorado Ave	10.2	B	11.0	B	8.9	A
21	Fourth St & California Ave	14.4	B	14.5	B	N/A	N/A
22	Ocean Ave & Wilshire Blvd	17.7	B	17.7	B	16.8	B
23	Ocean Ave & Arizona Ave	7.7	A	8.3	A	6.0	A
24	Ocean Ave & Santa Monica Blvd	9.8	A	12.7	B	28.6	C
25	Ocean Ave & Colorado Ave	11.8	B	20.4	C	17.0	B

Notes:

- Results are based on the HCM methodology using the City of Santa Monica's Traffix Model.
- N/A - Not Available
- LOS A=Excellent, LOS B=Very Good, LOS C=Good, LOS D=Fair, LOS E=Poor, LOS F=Congestion

Table 3
AM Peak Hour Estimated Inbound/Outbound Traffic Shift

Weekday AM Peak Hour Outbound
650 trips per hour

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	21.0%	0.0%	0.0%	0.0%	7.0%	7.0%	**35.0%**
Zone B	6.0%	0.0%	6.0%	0.0%	4.0%	4.0%	**20.0%**
Zone C	0.0%	0.0%	13.5%	13.5%	9.0%	9.0%	**45.0%**
Total	**27.0%**	**0.0%**	**19.5%**	**13.5%**	**20.0%**	**20.0%**	**100.0%**

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	137	-	-	-	46	46	**228**
Zone B	39	-	39	-	26	26	**130**
Zone C	-	-	88	88	59	59	**293**
Total	**176**	**-**	**127**	**88**	**130**	**130**	**650**

Weekday AM Peak Hour Inbound
740 trips per hour

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**5.0%**
Zone B	5.0%	0.0%	8.0%	2.0%	0.0%	0.0%	**15.0%**
Zone C	0.0%	0.0%	50.0%	30.0%	0.0%	0.0%	**80.0%**
Total	**10.0%**	**0.0%**	**58.0%**	**32.0%**	**0.0%**	**0.0%**	**100.0%**

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	37	-	-	-	-	-	**37**
Zone B	37	-	59	15	-	-	**111**
Zone C	-	-	370	222	-	-	**592**
Total	**74**	**-**	**429**	**237**	**-**	**-**	**740**

Table 4
PM Peak Hour Estimated Inbound/Outbound Traffic Shift

Weekday PM Peak Hour Outbound
1140 trips per hour

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	9.0%	0.0%	0.0%	0.0%	0.5%	0.5%	**10.0%**
Zone B	11.3%	0.0%	11.3%	0.0%	1.3%	1.3%	**25.0%**
Zone C	0.0%	0.0%	29.3%	29.3%	3.3%	3.3%	**65.0%**
Total	**20.3%**	**0.0%**	**40.5%**	**29.3%**	**5.0%**	**5.0%**	**100.0%**

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	103	-	-	-	6	6	**114**
Zone B	128	-	128	-	14	14	**285**
Zone C	-	-	333	333	37	37	**741**
Total	**231**	**-**	**462**	**333**	**57**	**57**	**1,140**

Weekday PM Peak Hour Inbound
640 trips per hour

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**15.0%**
Zone B	5.0%	0.0%	10.0%	5.0%	0.0%	0.0%	**20.0%**
Zone C	0.0%	0.0%	45.0%	20.0%	0.0%	0.0%	**65.0%**
Total	**20.0%**	**0.0%**	**55.0%**	**25.0%**	**0.0%**	**0.0%**	**100.0%**

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	96	-	-	-	-	-	**96**
Zone B	32	-	64	32	-	-	**128**
Zone C	-	-	288	128	-	-	**416**
Total	**128**	**-**	**352**	**160**	**-**	**-**	**640**

Table 5
Weekend Midday Peak Hour Estimated Inbound/Outbound Traffic Shift

Weekend Midday Peak Hour Outbound
1020 trips per hour

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	16.0%	0.0%	0.0%	0.0%	2.0%	2.0%	**20.0%**
Zone B	8.0%	0.0%	8.0%	0.0%	2.0%	2.0%	**20.0%**
Zone C	0.0%	0.0%	24.0%	24.0%	6.0%	6.0%	**60.0%**
Total	**24.0%**	**0.0%**	**32.0%**	**24.0%**	**10.0%**	**10.0%**	**100.0%**

From/To	Via Channel Road/Entrada Dr NB PCH	Via Channel Road/Entrada Dr SB PCH	NB PCH Via Ocean Av	I-10 WB Via Lincoln Bl	I-10 EB Via 4th Street	I-10 EB Via Lincoln Bl	Total
Zone A	163	-	-	-	20	20	**204**
Zone B	82	-	82	-	20	20	**204**
Zone C	-	-	245	245	61	61	**612**
Total	**245**	**-**	**326**	**245**	**102**	**102**	**1,020**

Weekend Midday Peak Hour Inbound
800 trips per hour

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**20.0%**
Zone B	7.0%	0.0%	10.0%	3.0%	0.0%	0.0%	**20.0%**
Zone C	0.0%	0.0%	40.0%	20.0%	0.0%	0.0%	**60.0%**
Total	**27.0%**	**0.0%**	**50.0%**	**23.0%**	**0.0%**	**0.0%**	**100.0%**

To/From	Via Channel Road/Entrada Dr SB PCH	Via Channel Road/Entrada Dr NB PCH	SB PCH Via Ocean Av	I-10 EB Via Lincoln Bl	I-10 WB Via Lincoln Bl	I-10 WB Via 4th/5th St	Total
Zone A	160	-	-	-	-	-	**160**
Zone B	56	-	80	24	-	-	**160**
Zone C	-	-	320	160	-	-	**480**
Total	**216**	**-**	**400**	**184**	**-**	**-**	**800**

Table 6 - Analysis Results of the Key Detour Route Intersections

Existing Level of Service Summary

Study Intersections		Weekday				Summer Weekend	
		AM Peak		PM Peak		Midday Peak	
		Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
1	PCH & Channel & Chautauqua Blvd	61.5	E	169.0	F	N/A	N/A
2	PCH & Entrada Dr	7.7	A	6.6	A	N/A	N/A
3	Ocean Ave & PCH	23.6	C	35.4	D	64.3	E
4	Lincoln Blvd & I 10 EB On Ramp	20.4	C	22.7	C	26.7	C
5	Lincoln Blvd & I 10 WB Off Ramp	25.4	C	27.2	C	127.5	F
6	Palisades Beach Rd & California Ave *	55.1	E	77.3	E	46.7	D
7	Ocean Ave & California Ave *	19.4	B	47.5	D	27.3	C

Projected Traffic Conditions (2012)

Study Intersections		Weekday				Summer Weekend	
		AM Peak		PM Peak		Midday Peak	
		Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
1	PCH & Channel & Chautauqua Blvd	[1]					
2	PCH & Entrada Dr	[1]					
3	Ocean Ave & PCH	42.6	D	92.9	F	61.1	E
4	Lincoln Blvd & I 10 EB On Ramp	41.7	D	26.8	C	98.9	F
5	Lincoln Blvd & I 10 WB Off Ramp	158.2	F	102.6	F	240.7	F
6	Palisades Beach Rd & California Ave *	86.0	F	116.7	F	106.0	F
7	Ocean Ave & California Ave *	21.1	C	99.2	F	58.6	E

Projected Traffic Conditions During Construction (With Mitigation Where Available)

Study Intersections		Weekday				Summer Weekend	
		AM Peak		PM Peak		Midday Peak	
		Del/ Veh	LOS	Del/ Veh	LOS	Del/ Veh	LOS
1	PCH & Channel & Chautauqua Blvd	[1]					
2	PCH & Entrada Dr	[1]					
3	Ocean Ave & PCH	39.0	D	78.6	E	110.2	F
4	Lincoln Blvd & I 10 EB On Ramp	83.8	F	134.2	F	266.6	F
5	Lincoln Blvd & I 10 WB Off Ramp	167.2	F	37.3	D	62.5	E
6	Palisades Beach Rd & California Ave *	[2]					
7	Ocean Ave & California Ave *	[2]					

Notes:

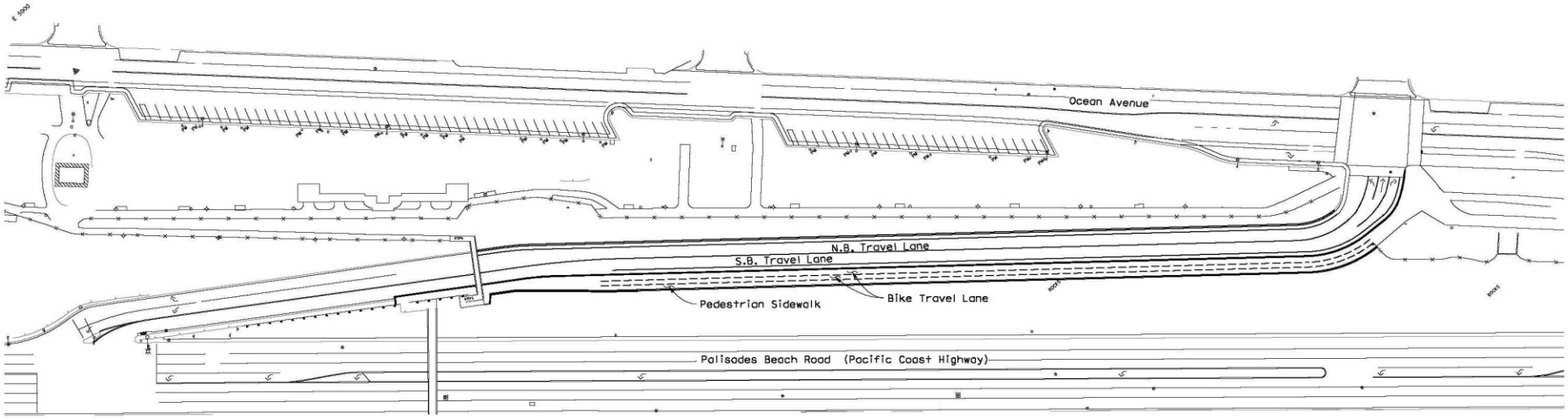
- N/A - Not Available
- LOS A=Excellent, LOS B=Very Good, LOS C=Good, LOS D=Fair, LOS E=Poor, LOS F=Congestion

* Results are based on the operational analysis carried out using Synchro program.

[1] This intersection is located in the City of Los Angeles. Traffic volume projections are not available from the City of Santa Monica's Traffic Model.

[2] This intersection was not analyzed as the California Incline will be closed during the construction period.

Figure 1



PLAN
1"=100'-0"

City of Santa Monica
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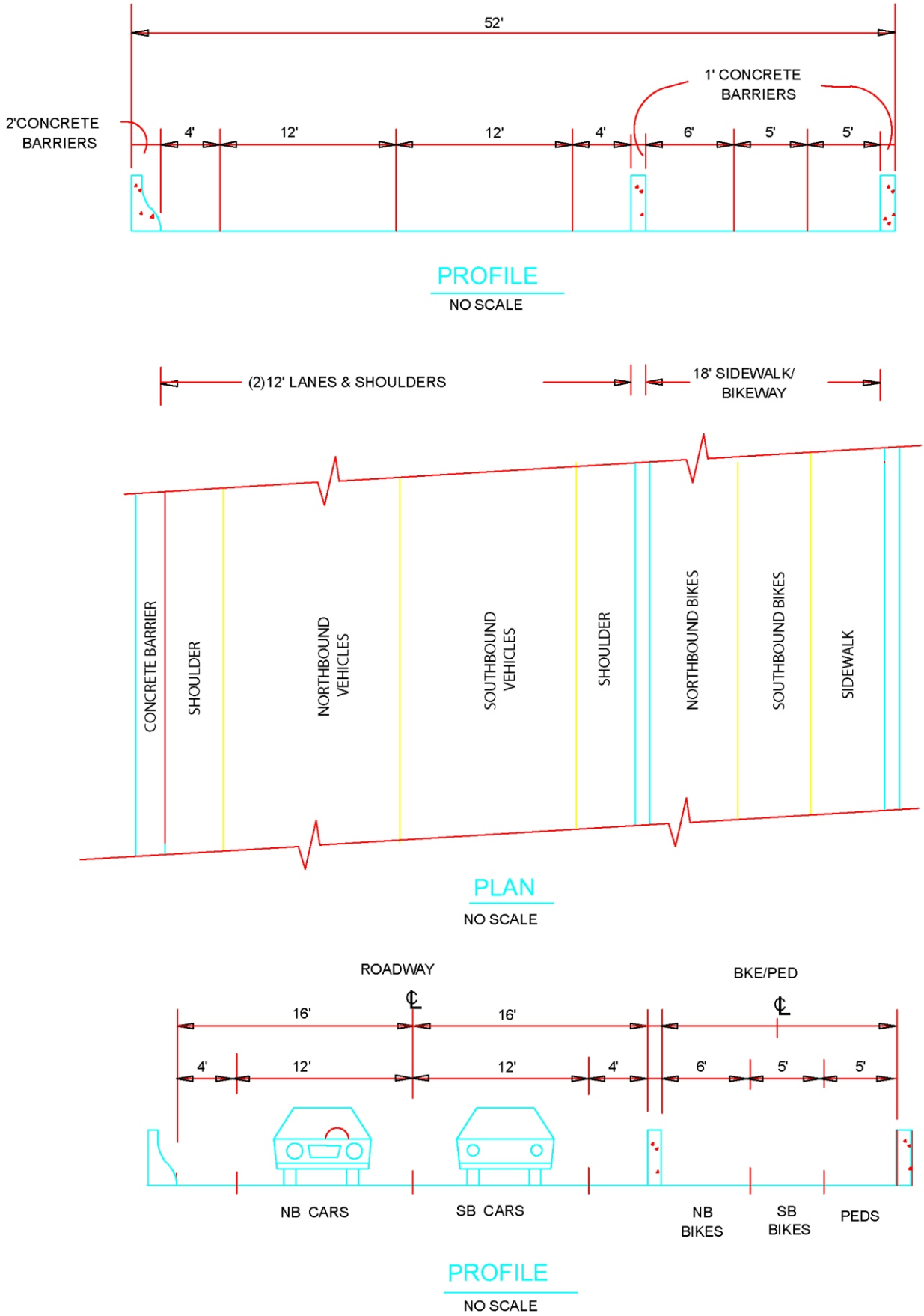
DESIGN PLANS
CALIFORNIA INCLINE

STRIPING PLAN

Filename: \projects\750\761.10_California_Incline\DGN\project plan striping.dgn Date: 6/22/2010 Time: 2:32:50 PM



Source: City of Santa Monica (2011), ICF International (2011)

KOA CORPORATION PLANNING & ENGINEERING	California Incline Bridge Replacement Project	Figure 2
	Proposed Cross Section of California Incline	

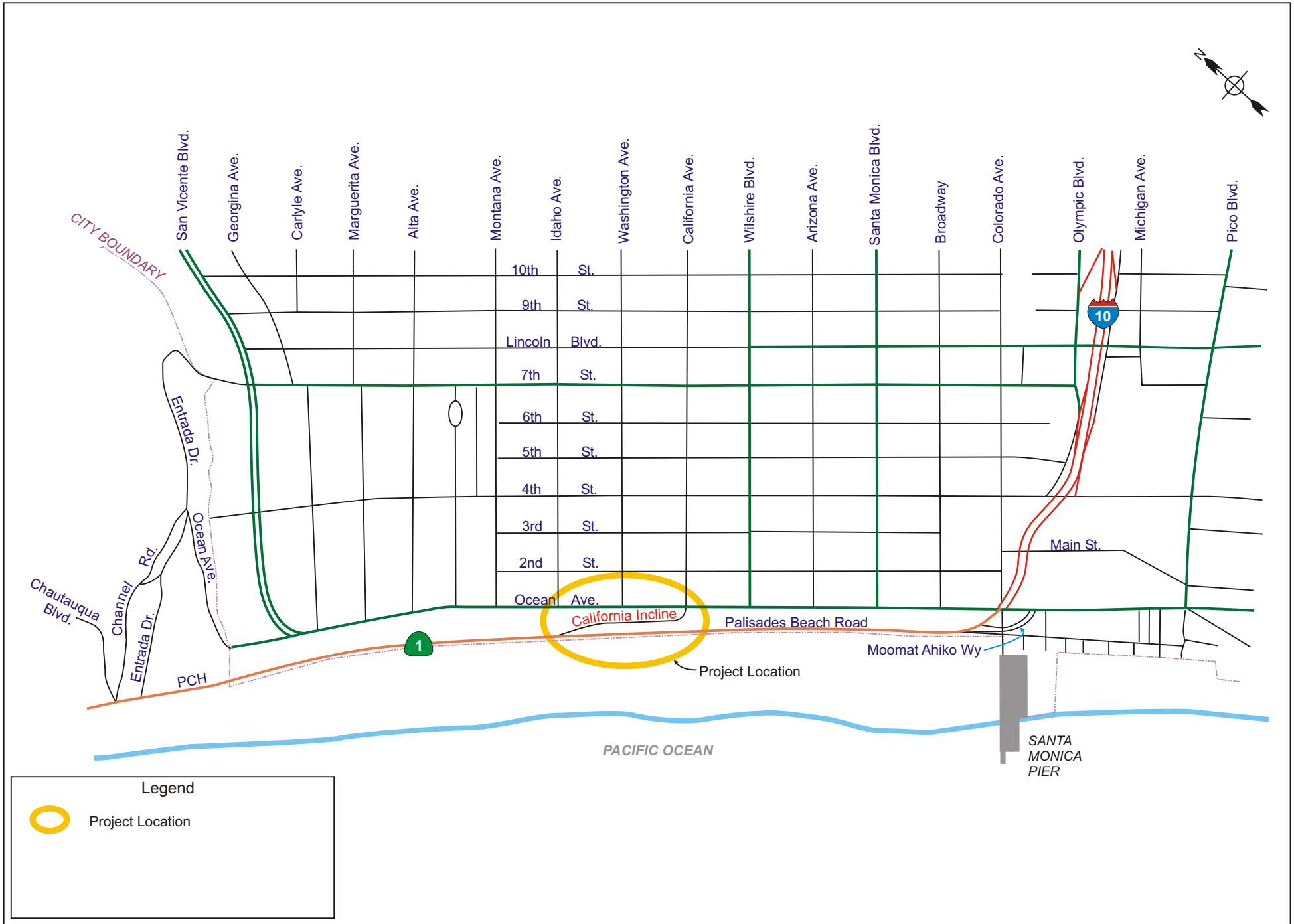


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Figure 3

Project Location

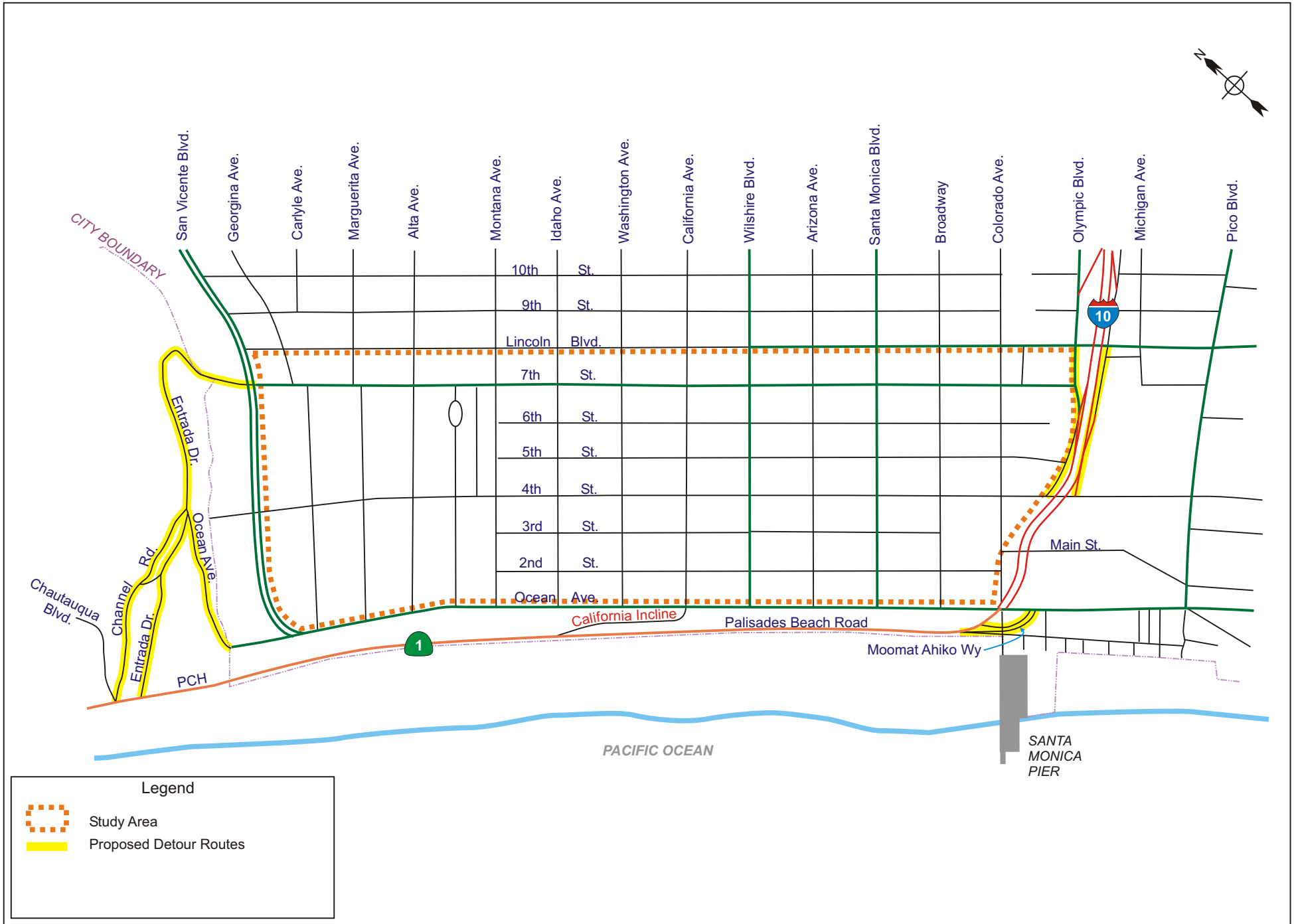

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Figure 4

Study Area / Proposed Detour Routes

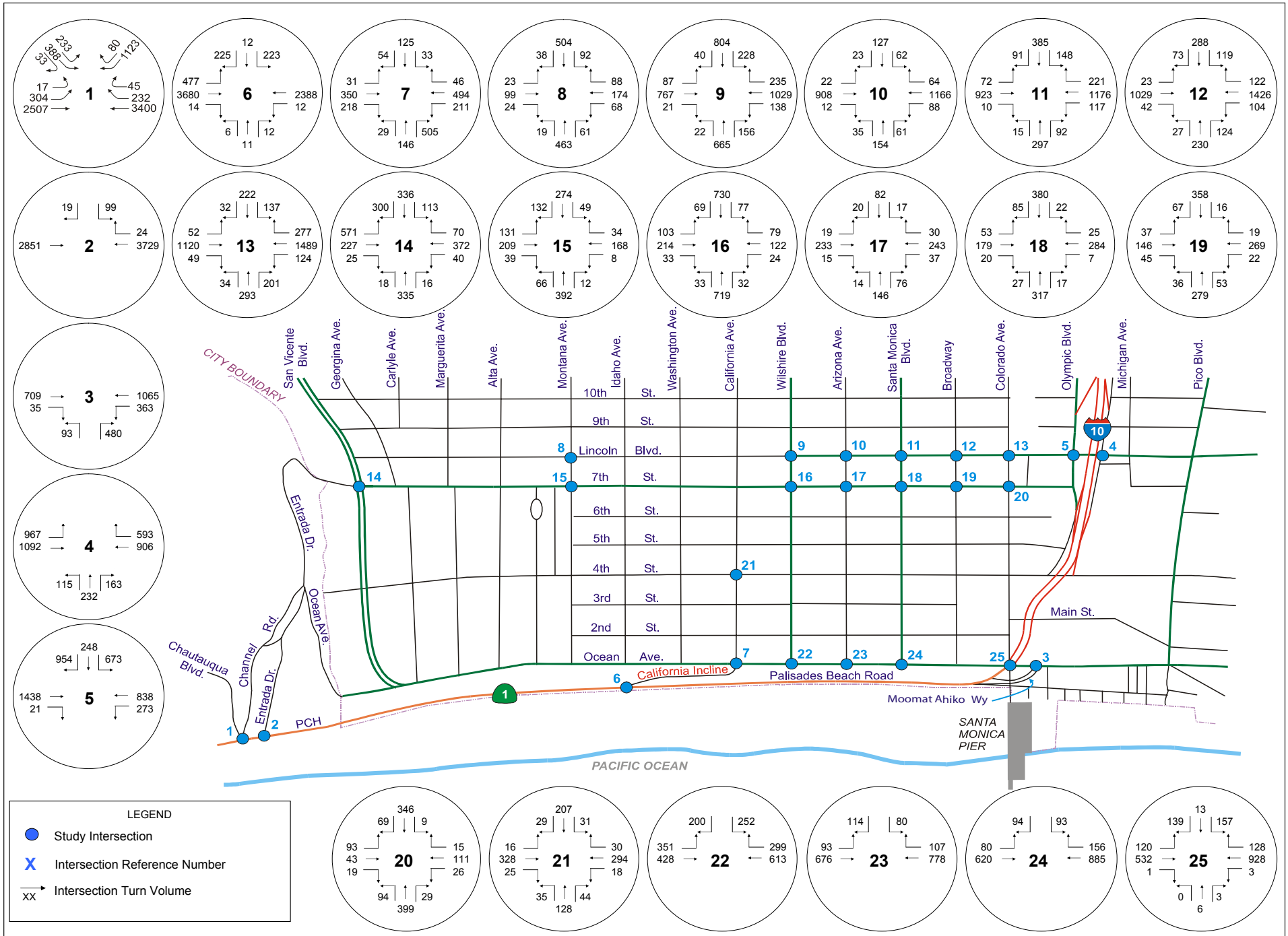

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Figure 5

Existing Weekday AM Peak Hour Turn Volumes

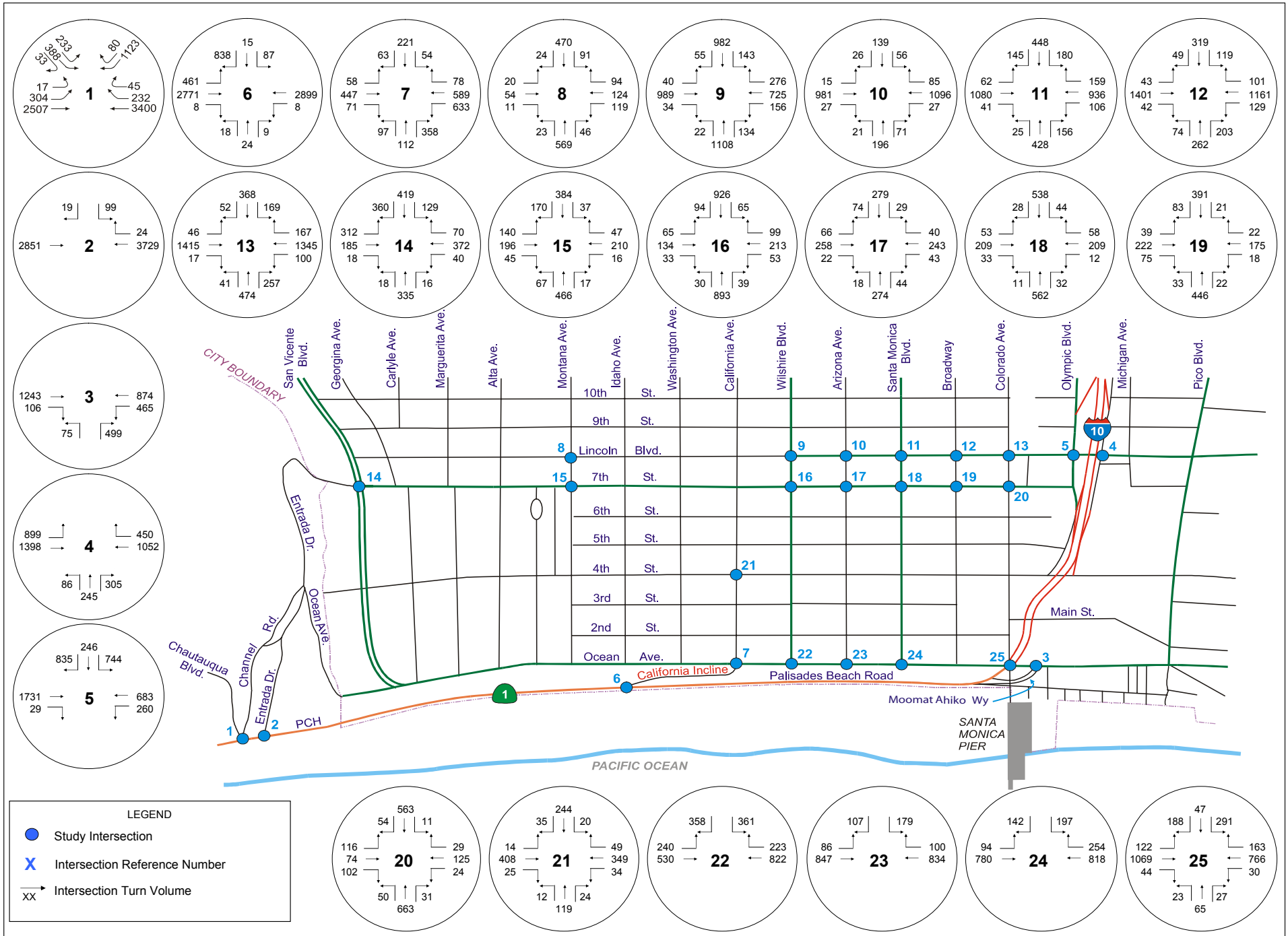

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Figure 6

Existing Weekday PM Peak Hour Turn Volumes

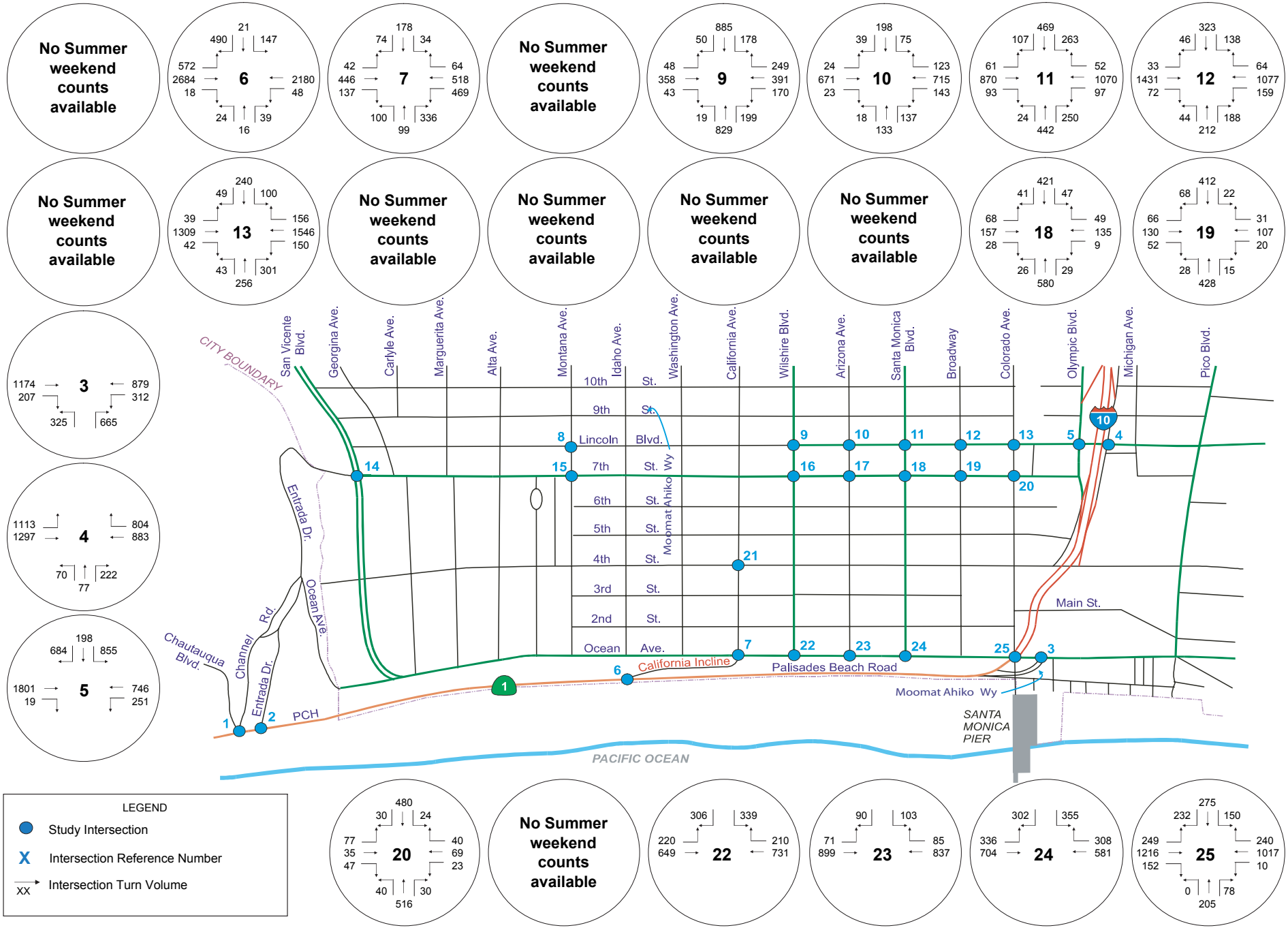

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Figure 7

Existing Summer Weekend Midday Peak Hour Turn Volumes

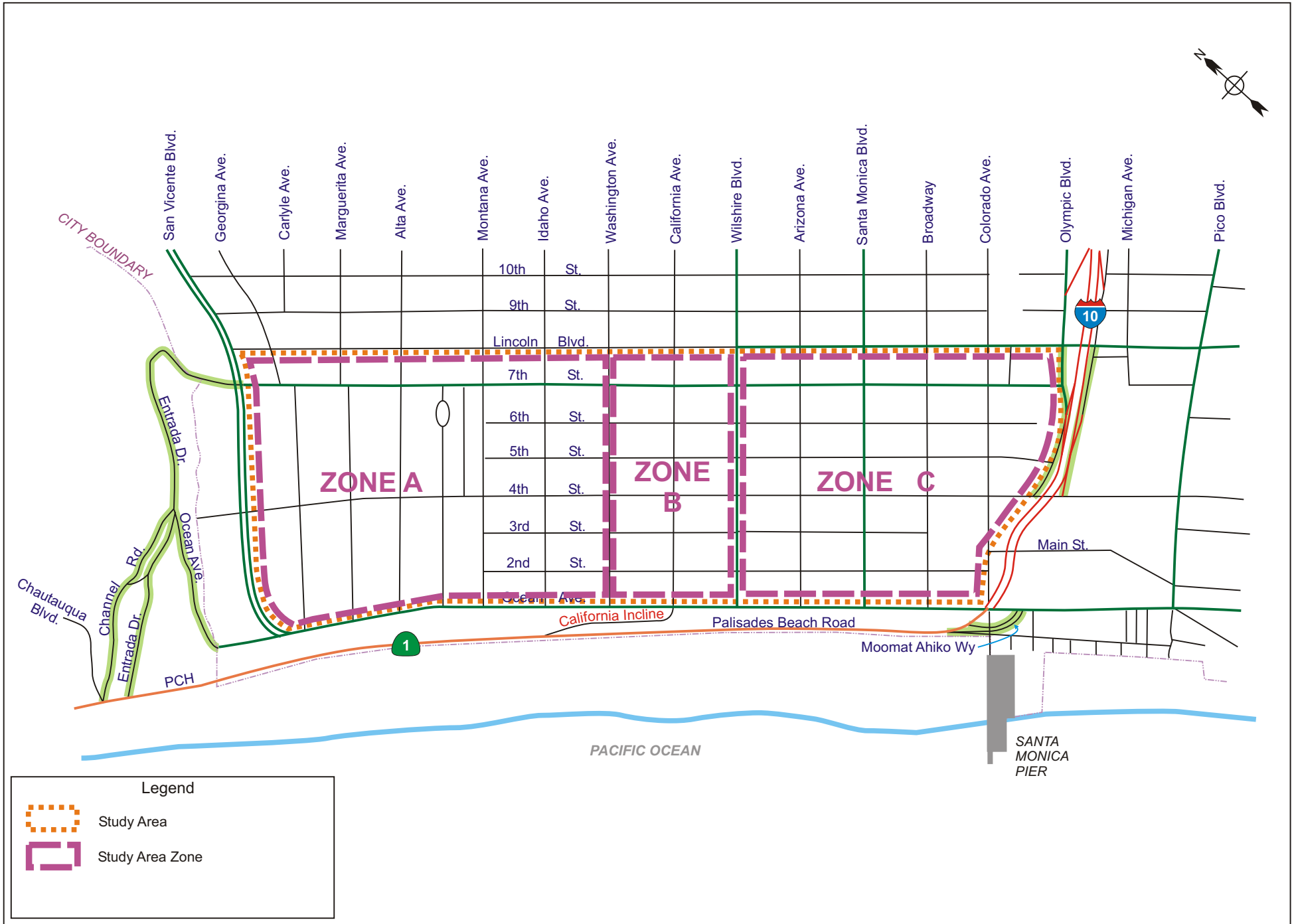

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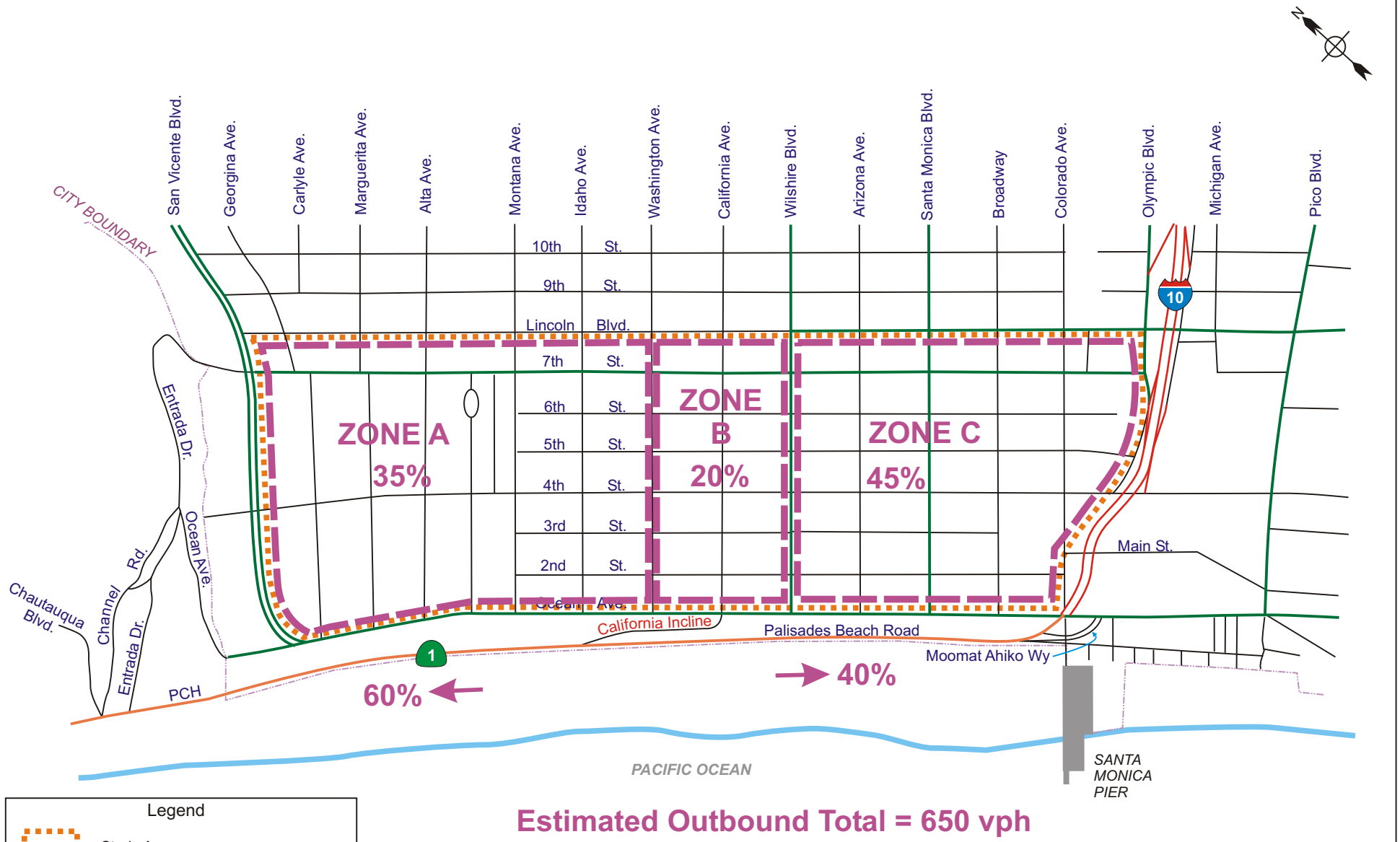
Figure 8

Study Area Zones



Legend

- Study Area
- Study Area Zone
- XX% Distribution Percentage

Estimated Outbound Total = 650 vph

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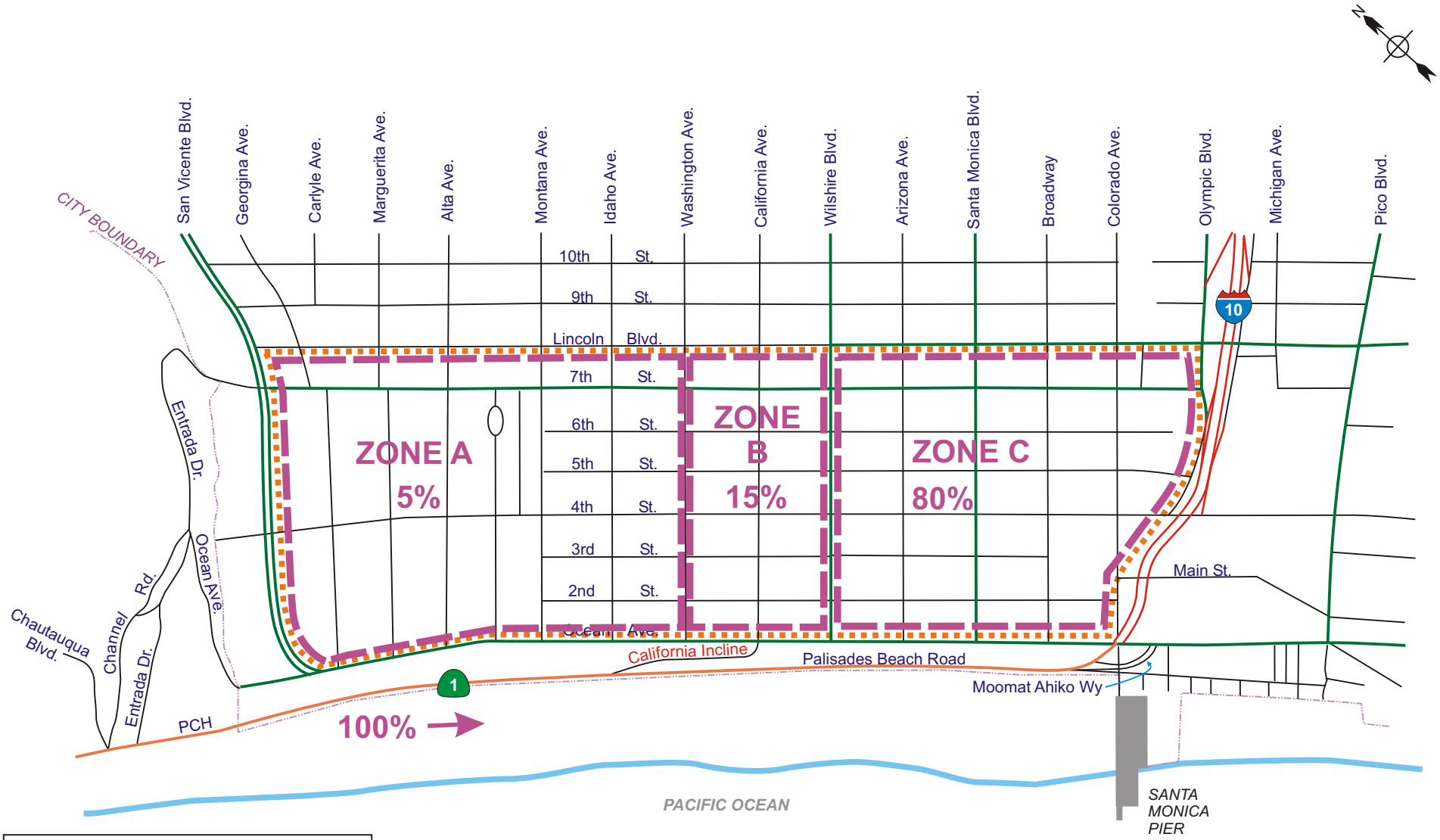
Figure 9

Weekday AM Peak Hour Outbound Distribution Pattern



Legend

Study Area

Study Area Zone

XX% Distribution Percentage

Estimated Inbound Total = 740 vph

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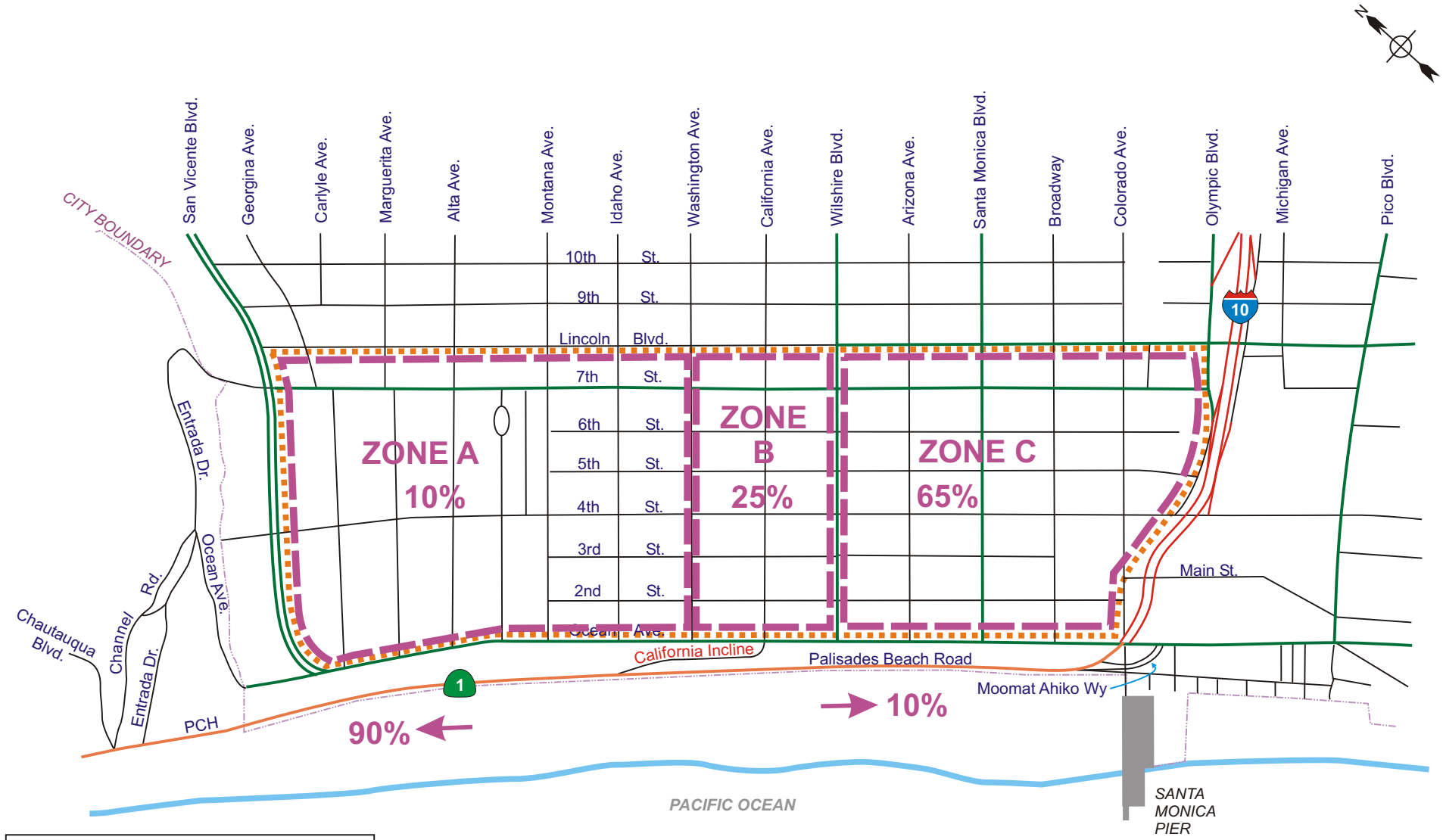
Figure 10

Weekday AM Peak Hour Inbound Distribution Pattern



Legend

- Study Area
- Study Area Zone
- XX% Distribution Percentage

Estimated Outbound Total = 1,140 vph

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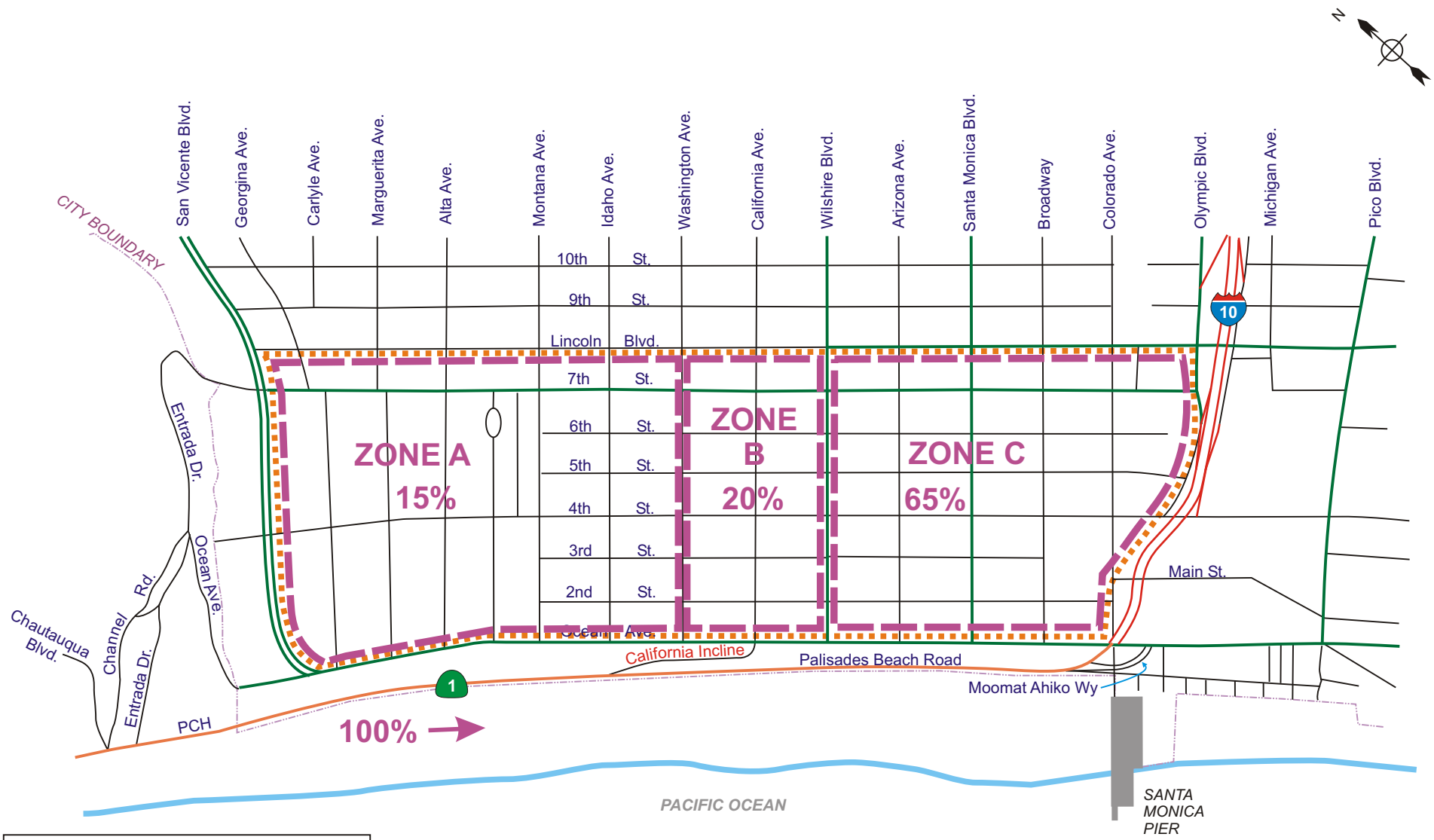
Figure 11

Weekday PM Peak Hour Outbound Distribution Pattern



Legend

- Study Area
- Study Area Zone
- XX% Distribution Percentage

Estimated Inbound Total = 640 vph

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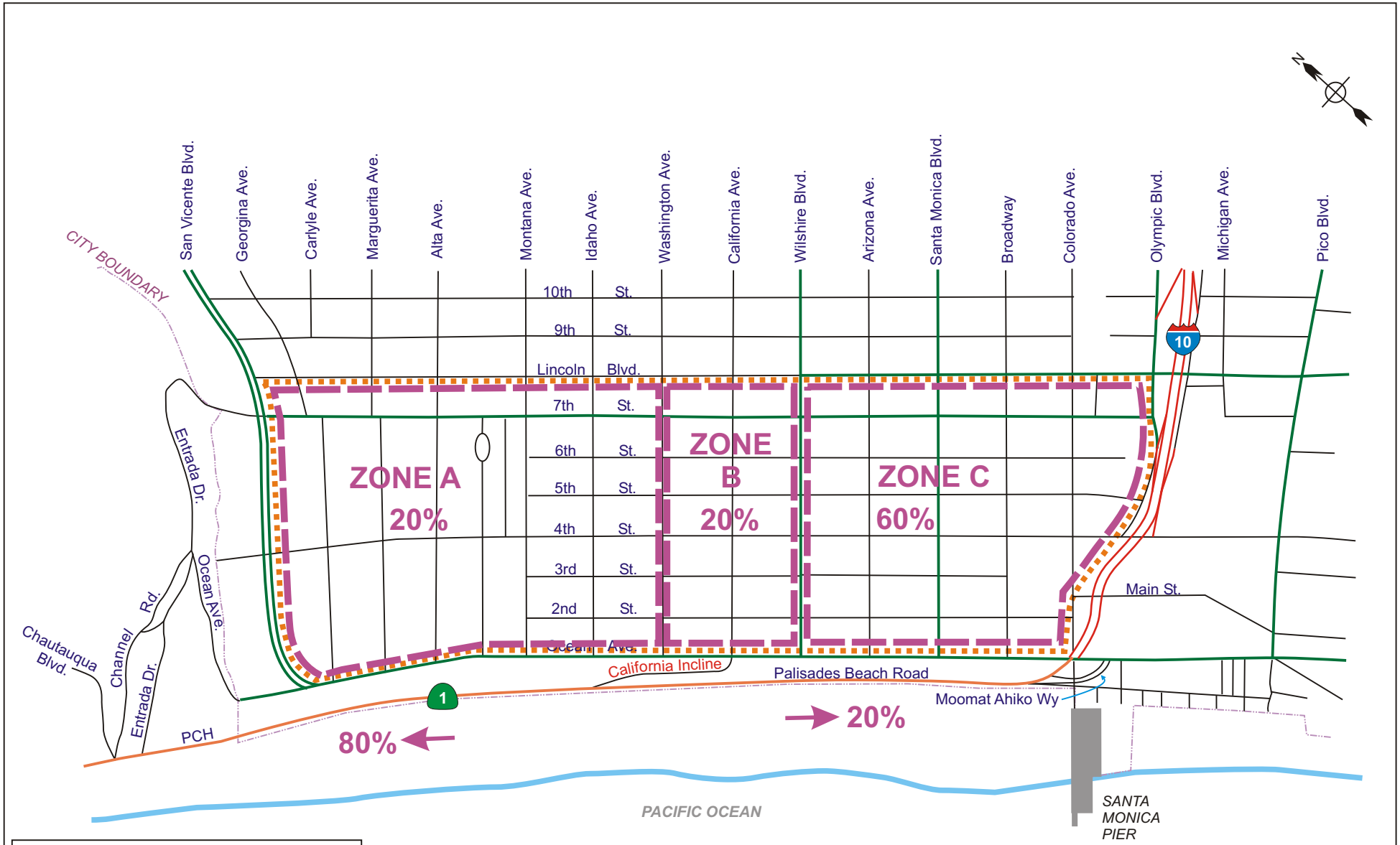
Figure 12

Weekday PM Peak Hour Inbound Distribution Pattern



Legend

- Study Area
- Study Area Zone
- XX% Distribution Percentage

Estimated Outbound Total = 1,020 vph

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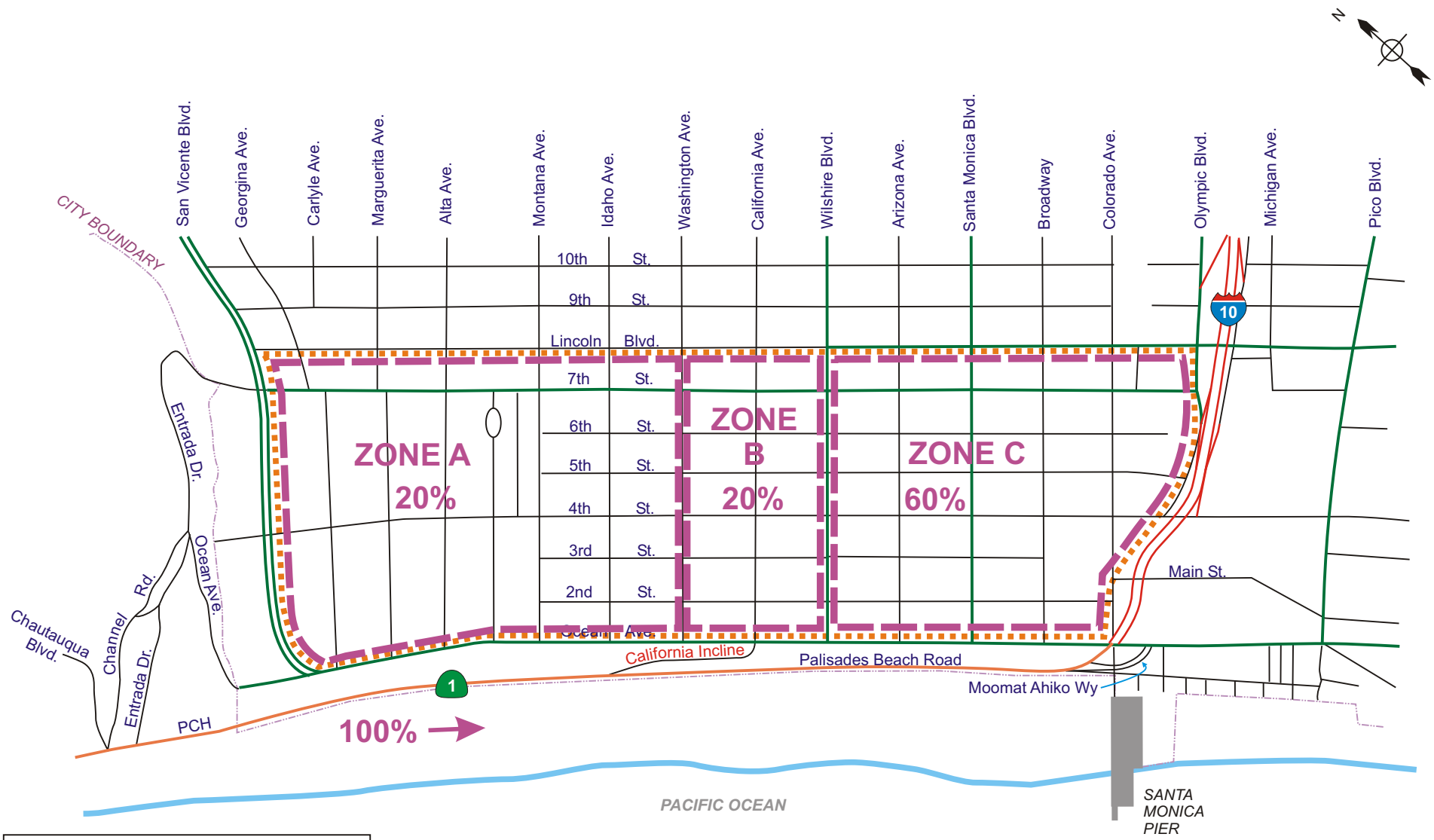
Figure 13

Summer Weekend MD Peak Hour Outbound Distribution Pattern



Legend

- Study Area
- Study Area Zone
- XX% Distribution Percentage

Estimated Inbound Total = 800 vph

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Figure 14

Summer Weekend MD Peak Hour Inbound Distribution Pattern

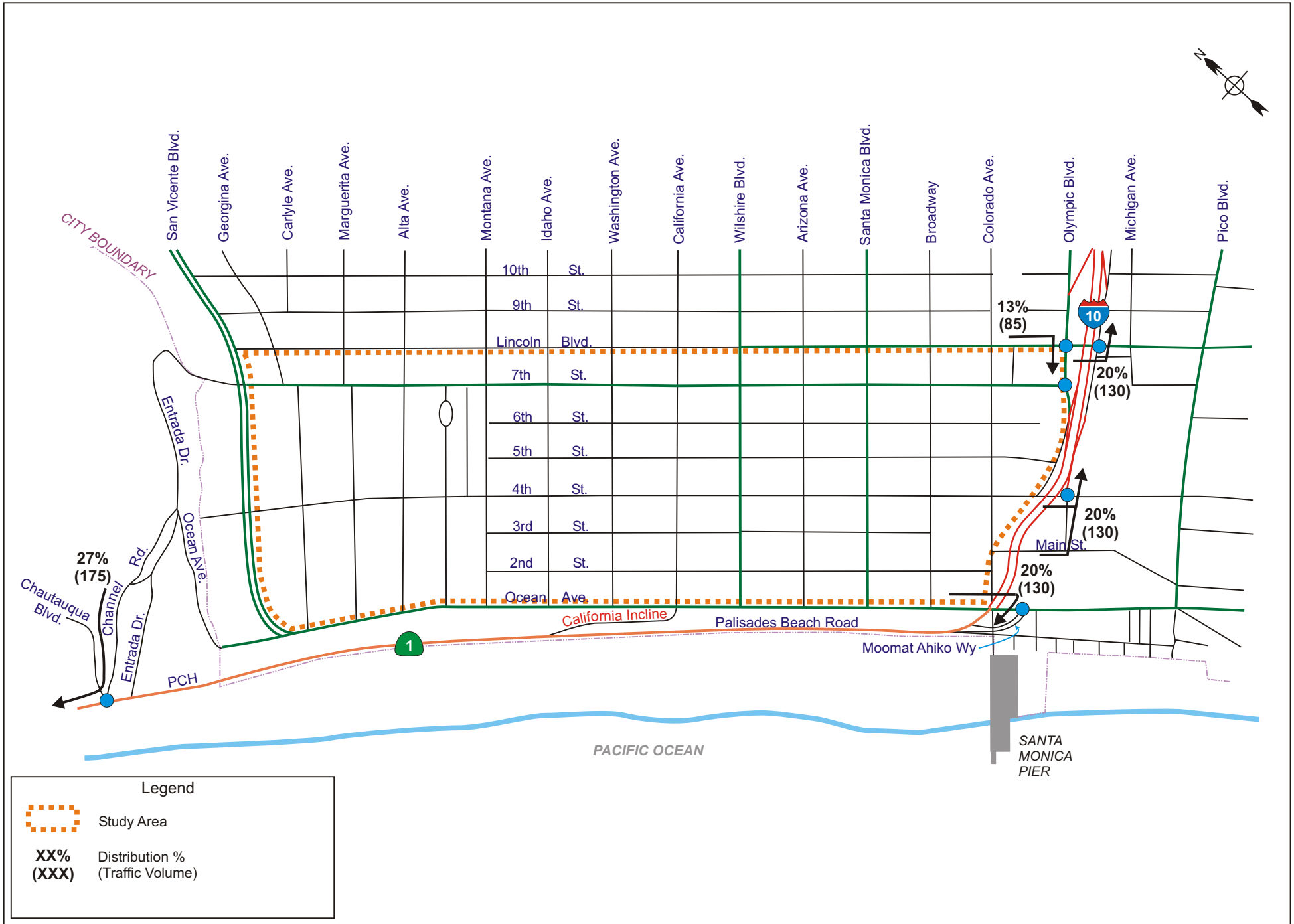

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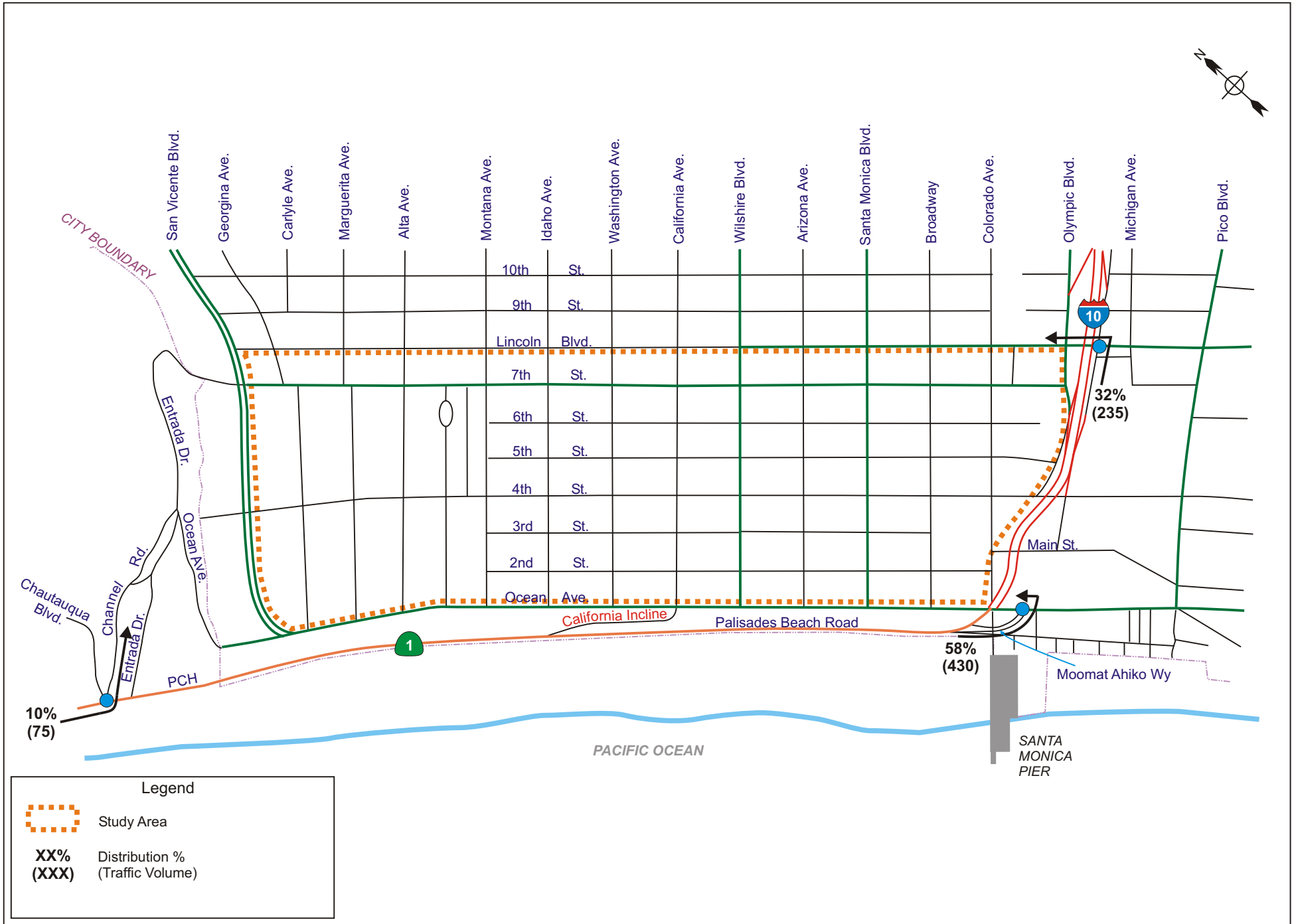
Figure 15

Weekday AM Peak Hour Outbound Traffic



Legend

Study Area

XX% **(XXX)** Distribution % (Traffic Volume)

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Figure 16

Weekday AM Peak Hour Inbound Traffic

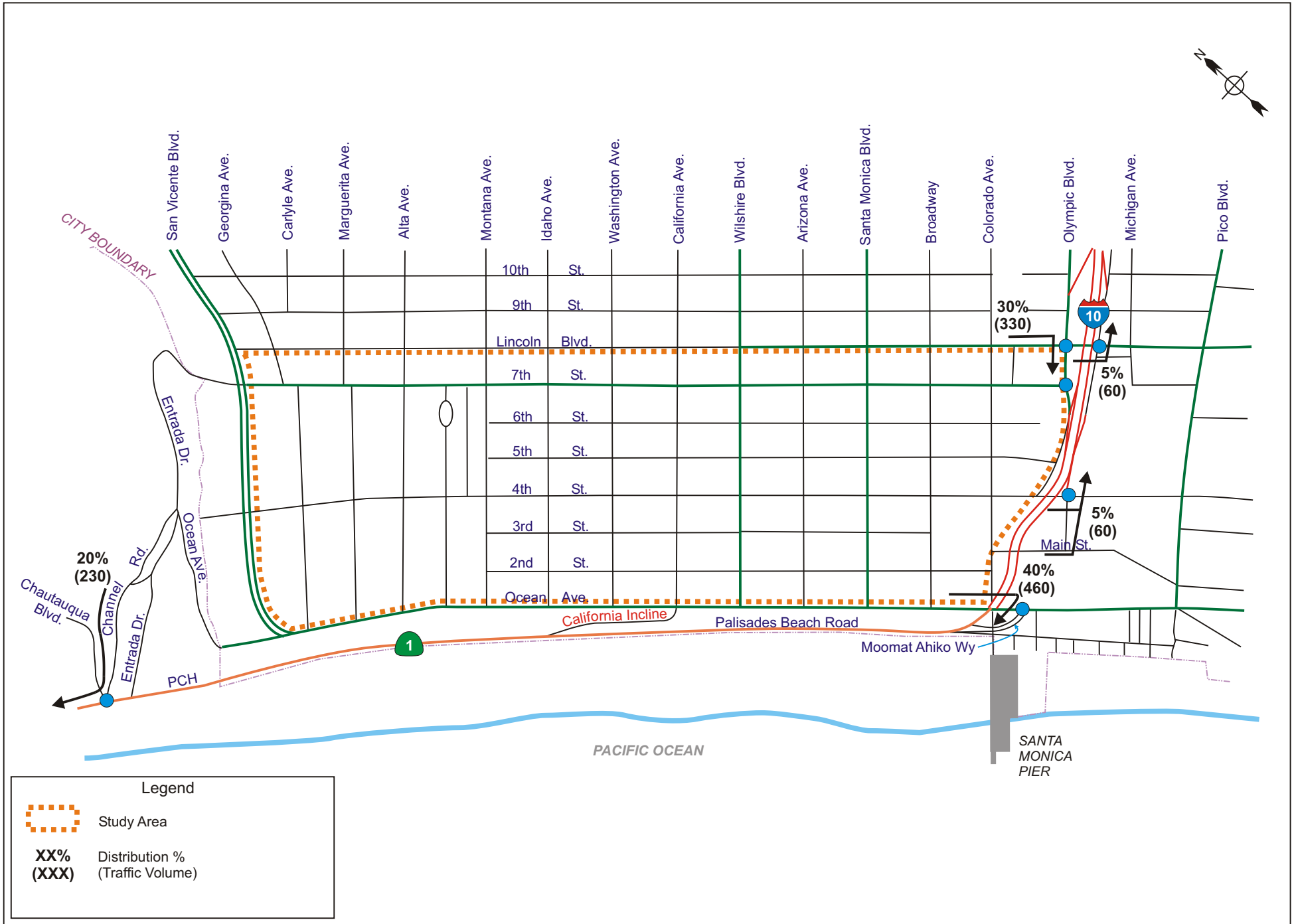

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Figure 17

Weekday PM Peak Hour Outbound Traffic

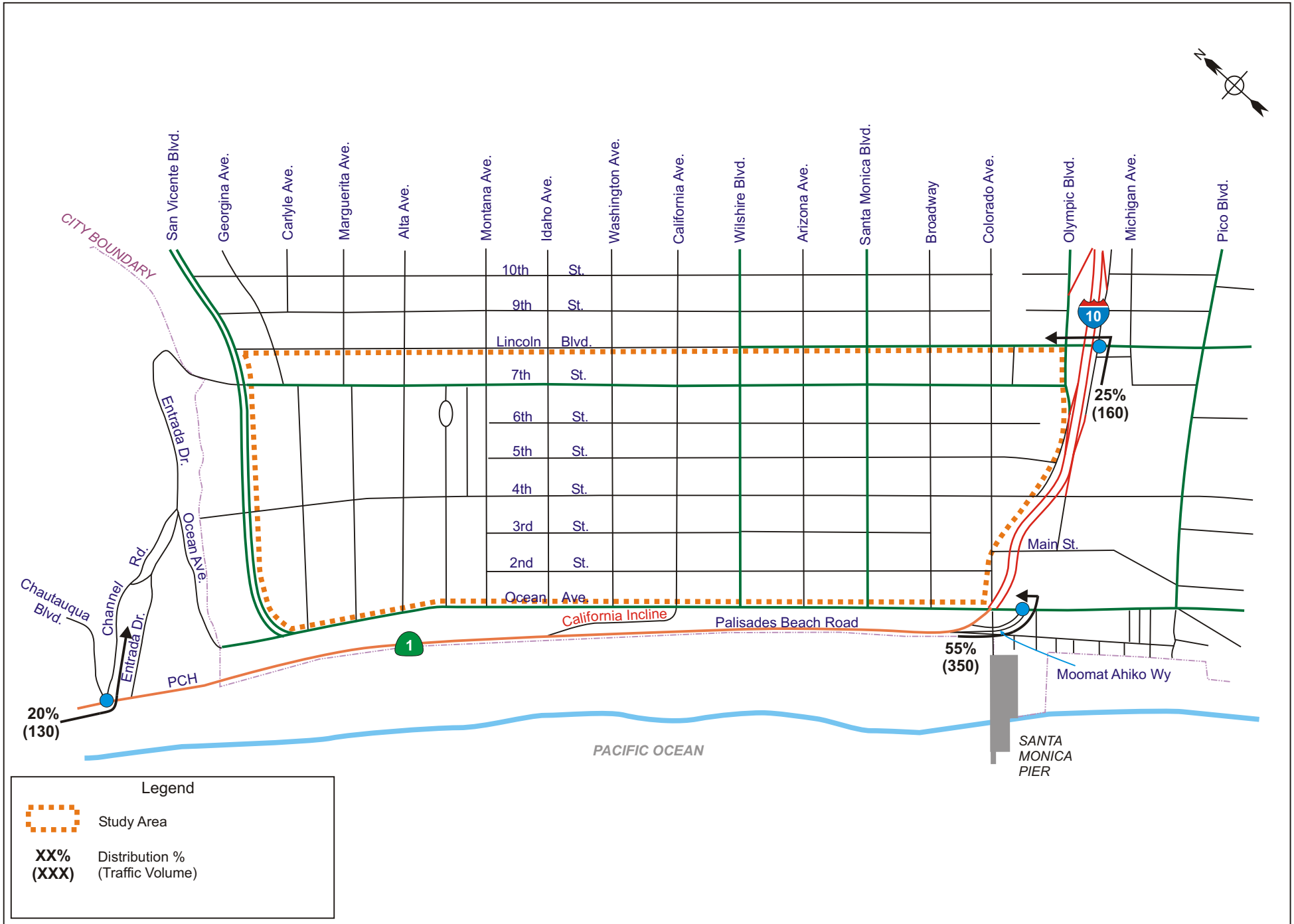

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Figure 18

Weekday PM Peak Hour Inbound Traffic

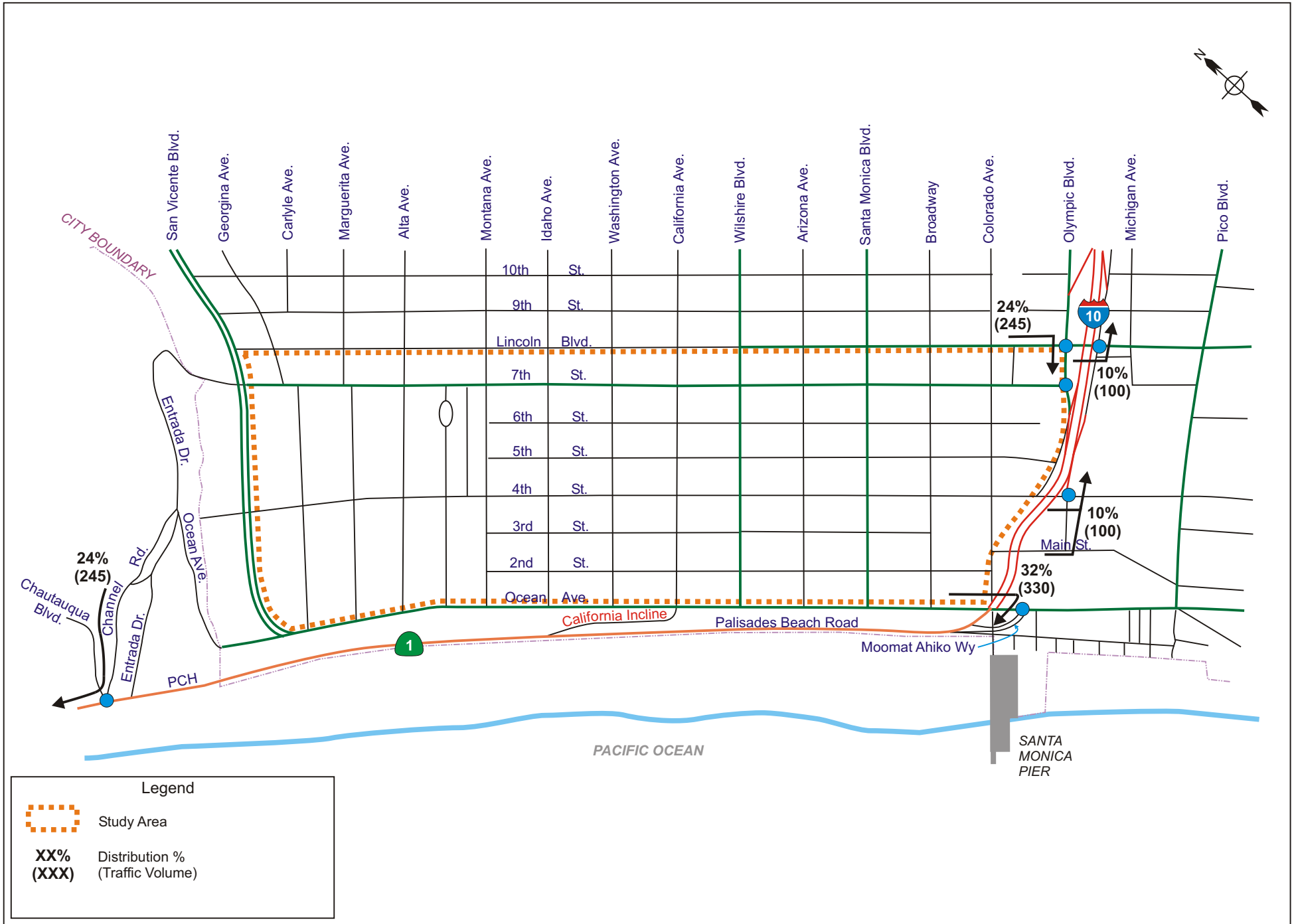

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Figure 19

Summer Weekend MD Peak Hour Outbound Traffic

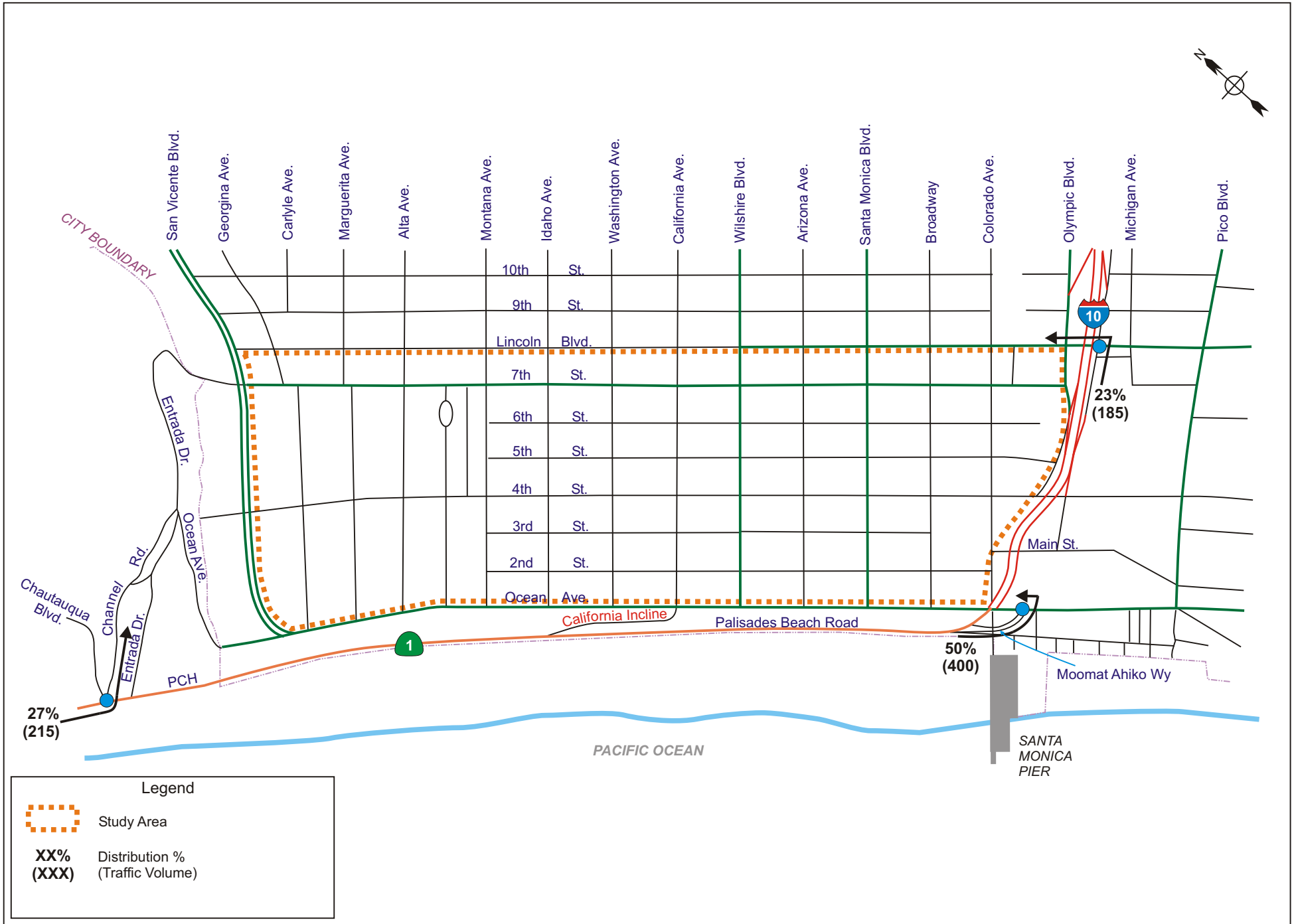

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Figure 20

Summer Weekend MD Peak Hour Inbound Traffic

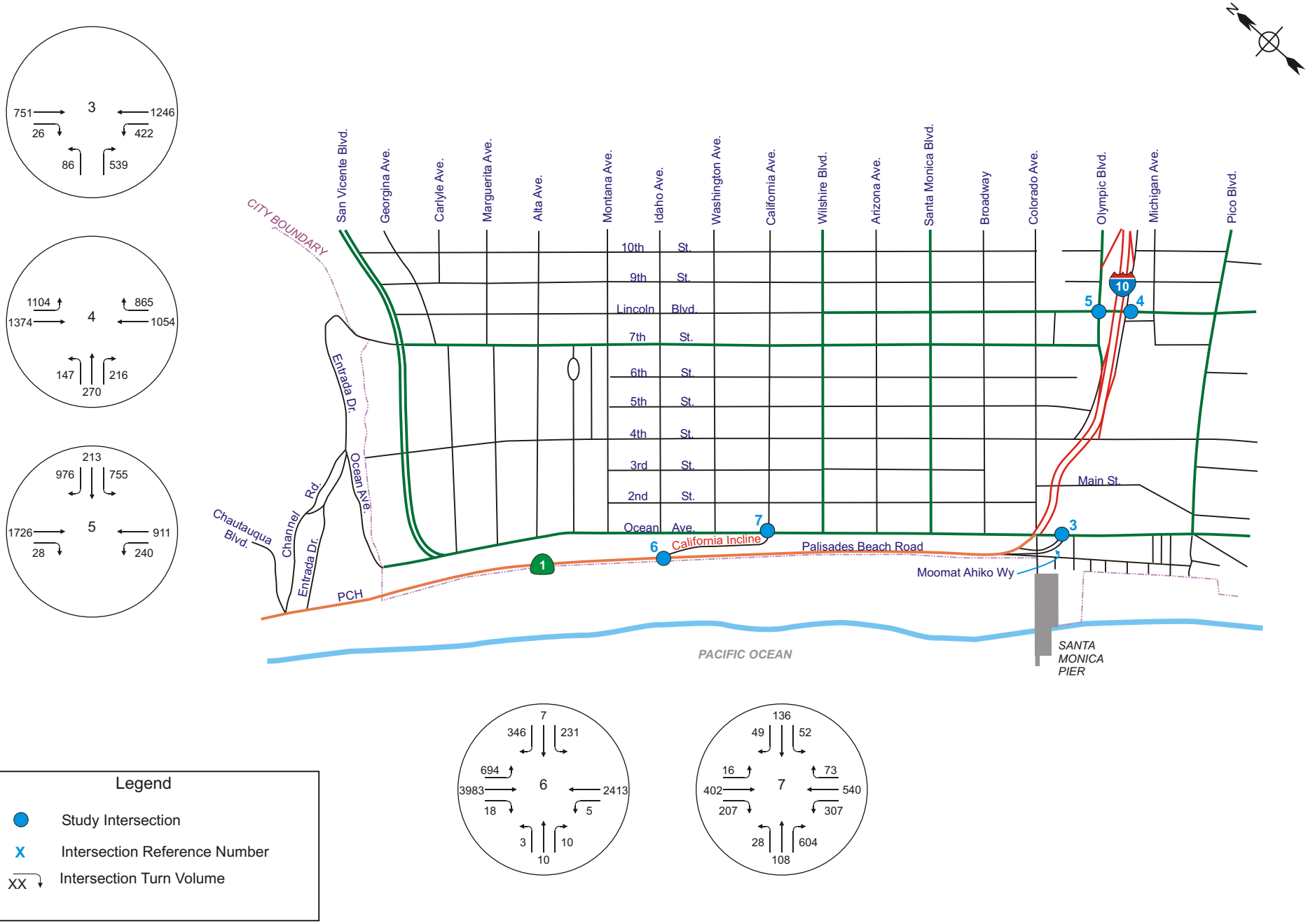

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Figure 21

Projected (2012) Weekday AM Peak Hour Turn Volumes

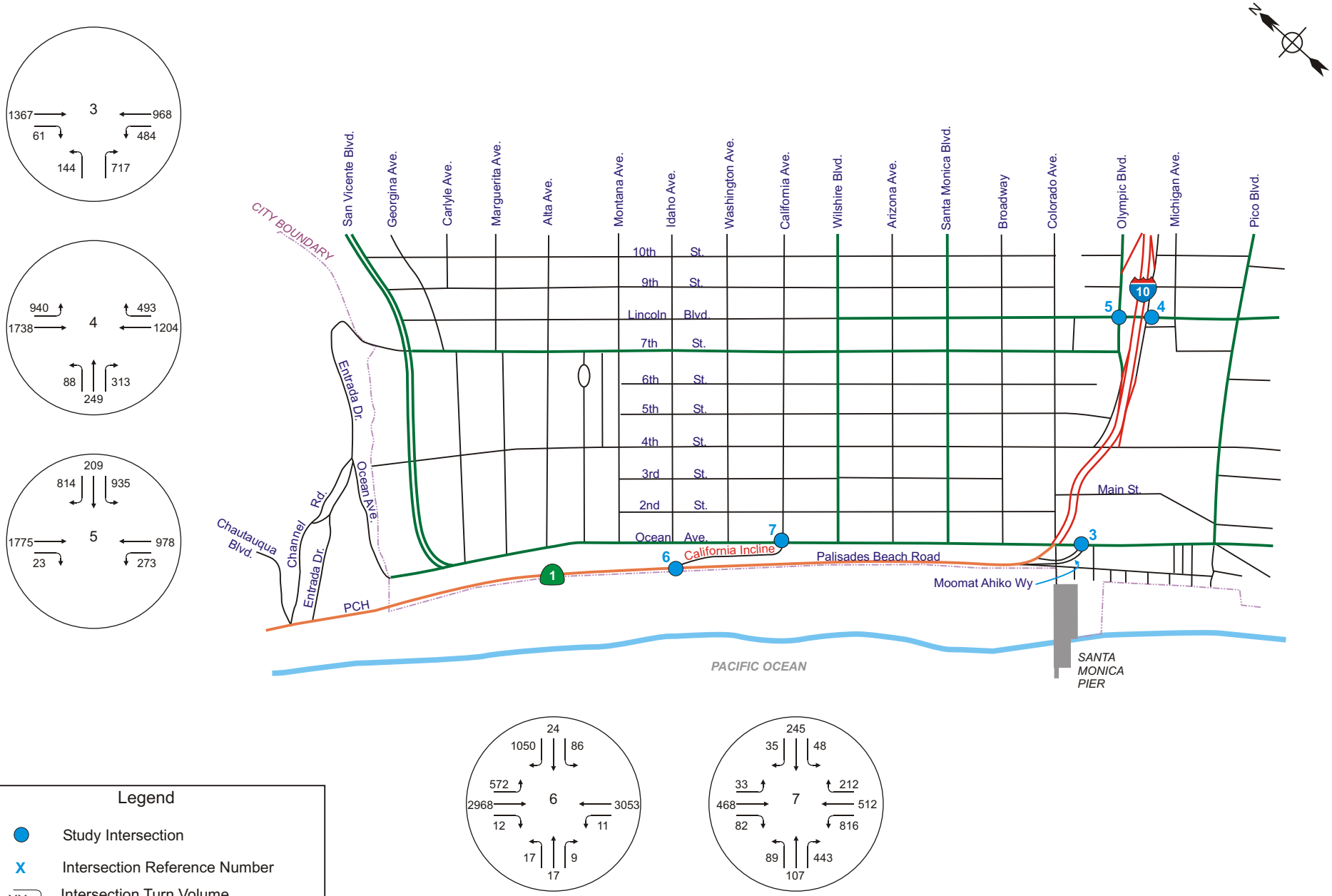

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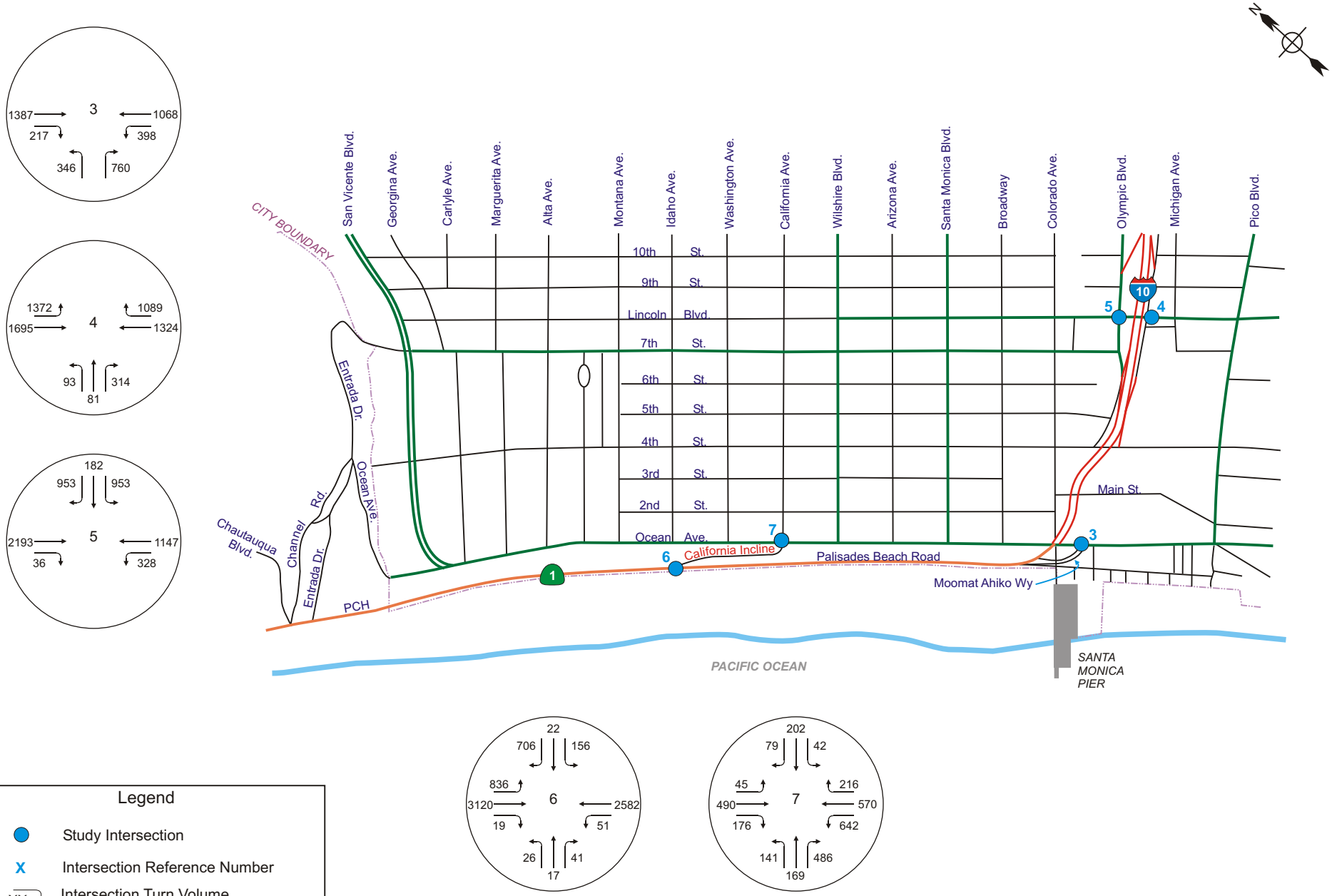
Figure 22

Projected (2012) Weekday PM Peak Hour Turn Volumes



Legend

- Study Intersection
- X Intersection Reference Number
- XX Intersection Turn Volume

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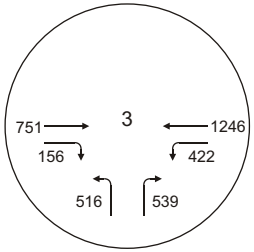
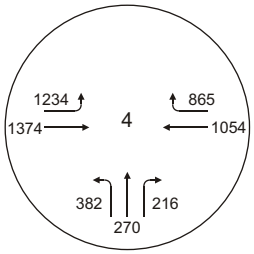
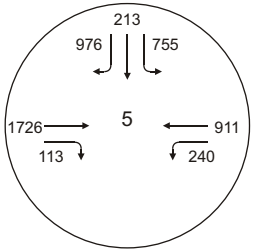
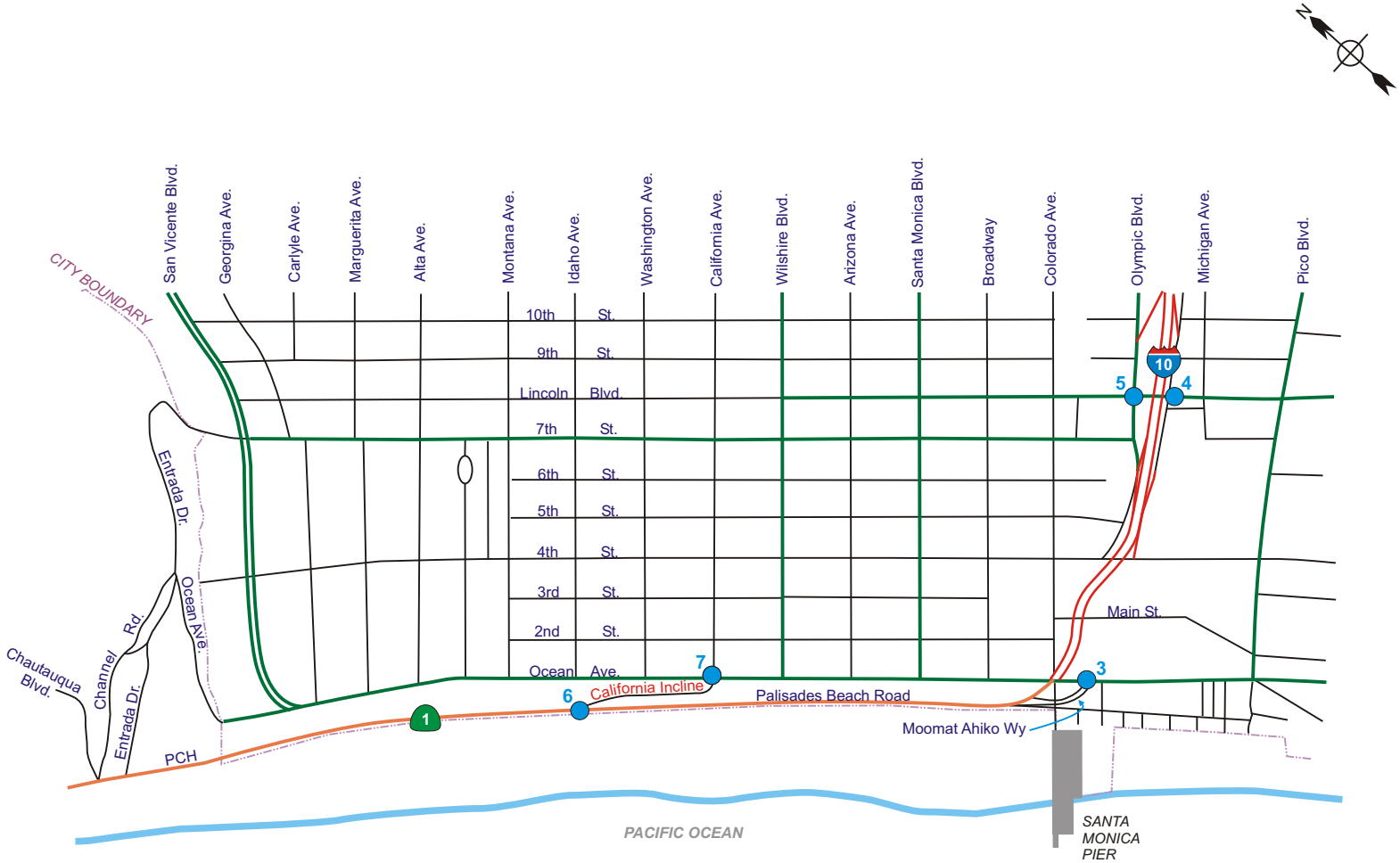
Figure 23

Projected (2012) Summer Weekend Midday Peak Hour Turn Volumes









Intersection: 6

California Incline Closed During Construction. Intersection Not Analyzed.

Intersection: 7

California Incline Closed During Construction. Intersection Not Analyzed.

Legend

- Study Intersection
- X Intersection Reference Number
- XX Intersection Turn Volume

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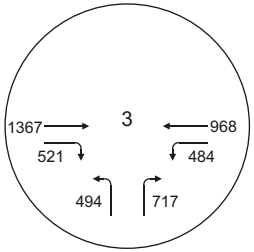
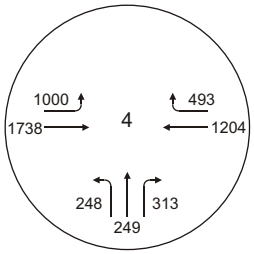
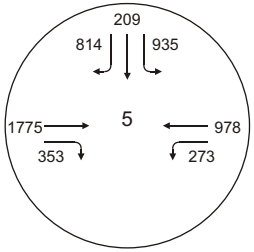
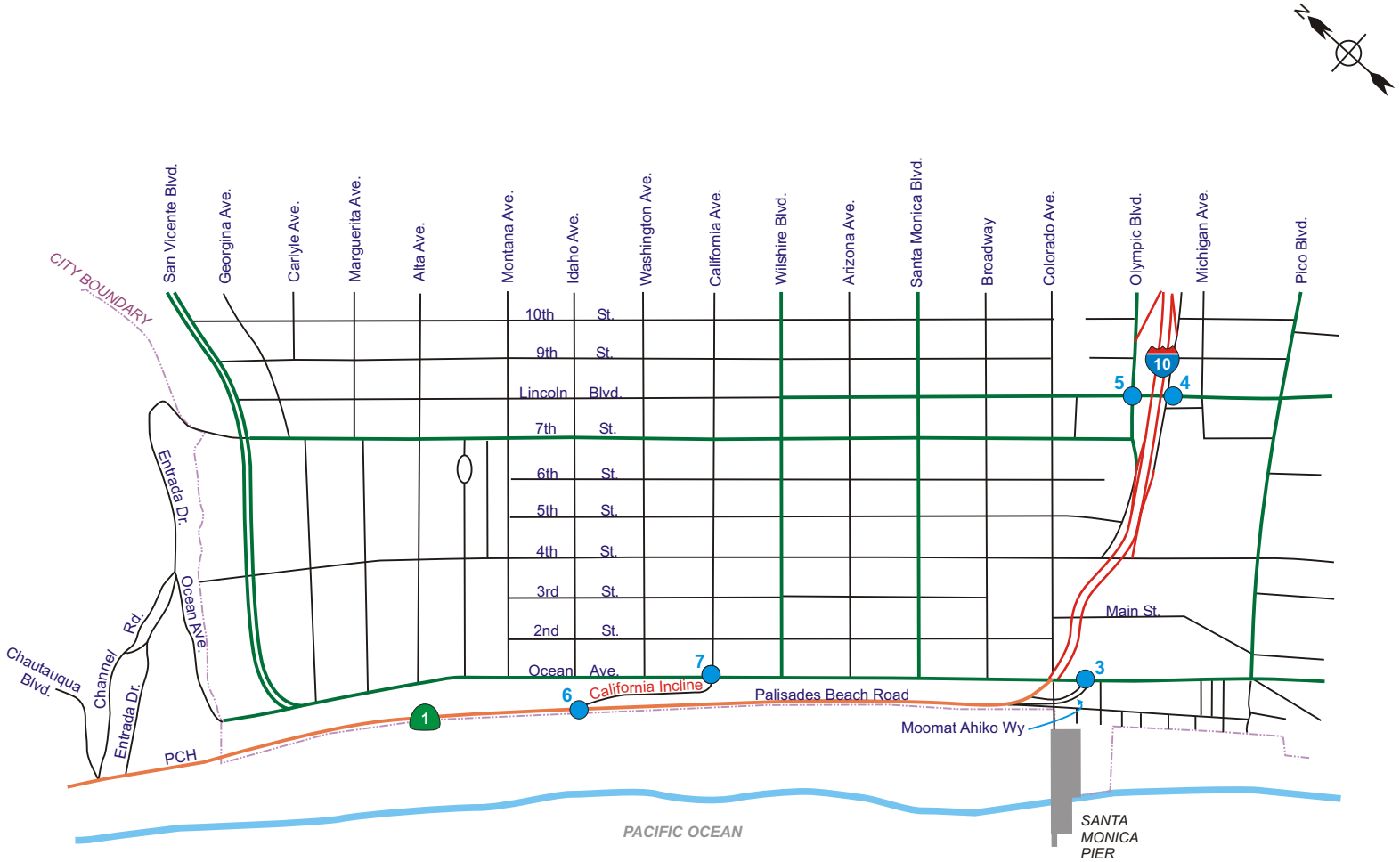
Figure 24

Projected "During Construction" Weekday AM Peak Hour Turn Volumes









Intersection: 6

California Incline Closed During Construction. Intersection Not Analyzed.

Intersection: 7

California Incline Closed During Construction. Intersection Not Analyzed.

Legend

- Study Intersection
- X Intersection Reference Number
- XX Intersection Turn Volume

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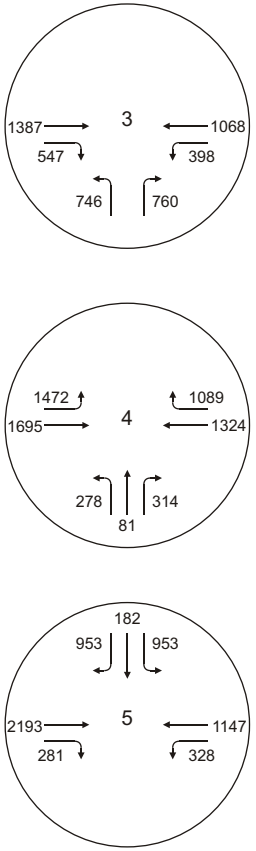
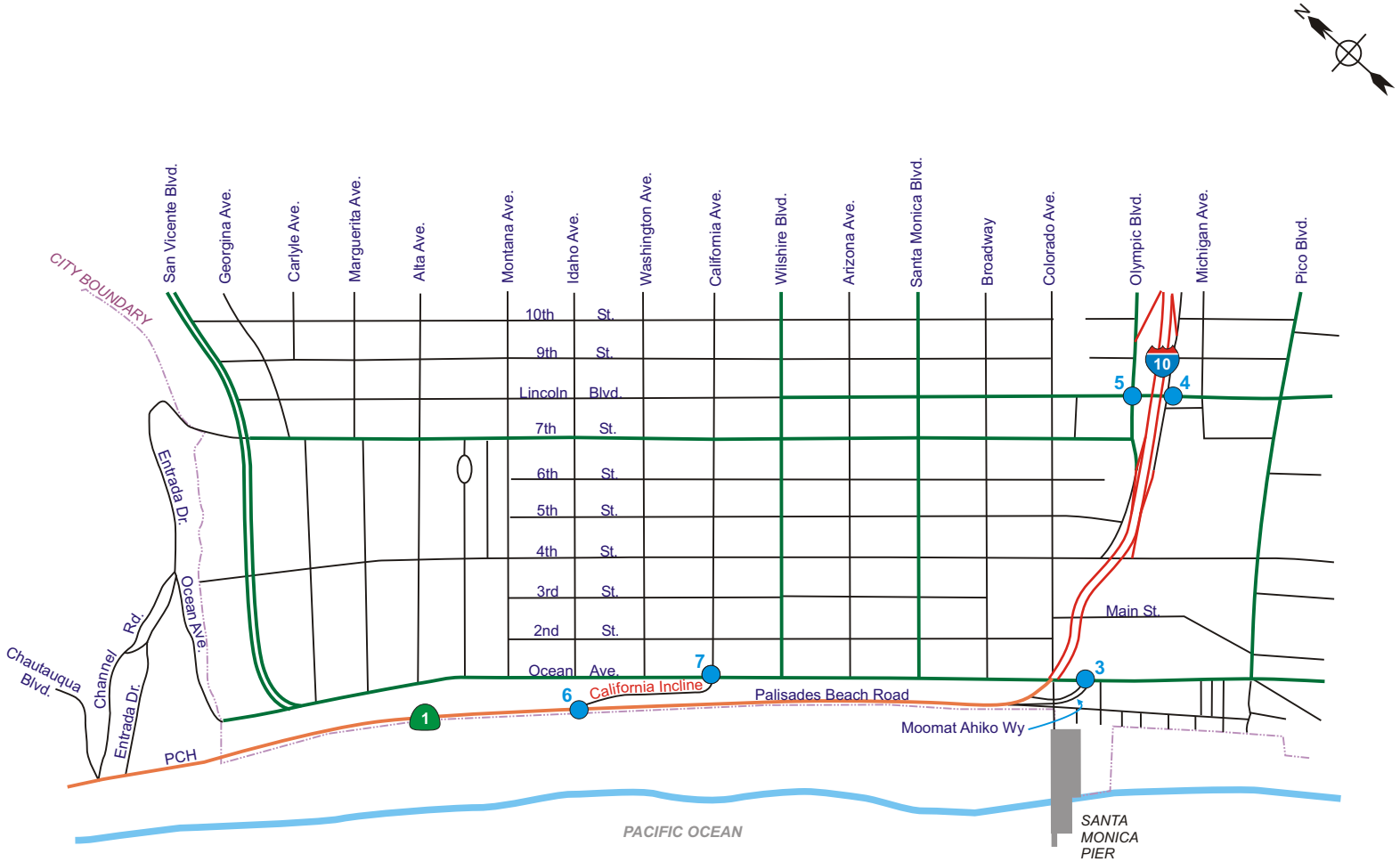
Figure 25

Projected "During Construction" Weekday PM Peak Hour Turn Volumes





Intersection: 6

California Incline Closed During Construction. Intersection Not Analyzed.

Intersection: 7

California Incline Closed During Construction. Intersection Not Analyzed.

Legend

- Study Intersection
- X Intersection Reference Number
- XX Intersection Turn Volume

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Figure 26

Projected "During Construction" Summer Weekend Midday Peak Hour Turn Volumes

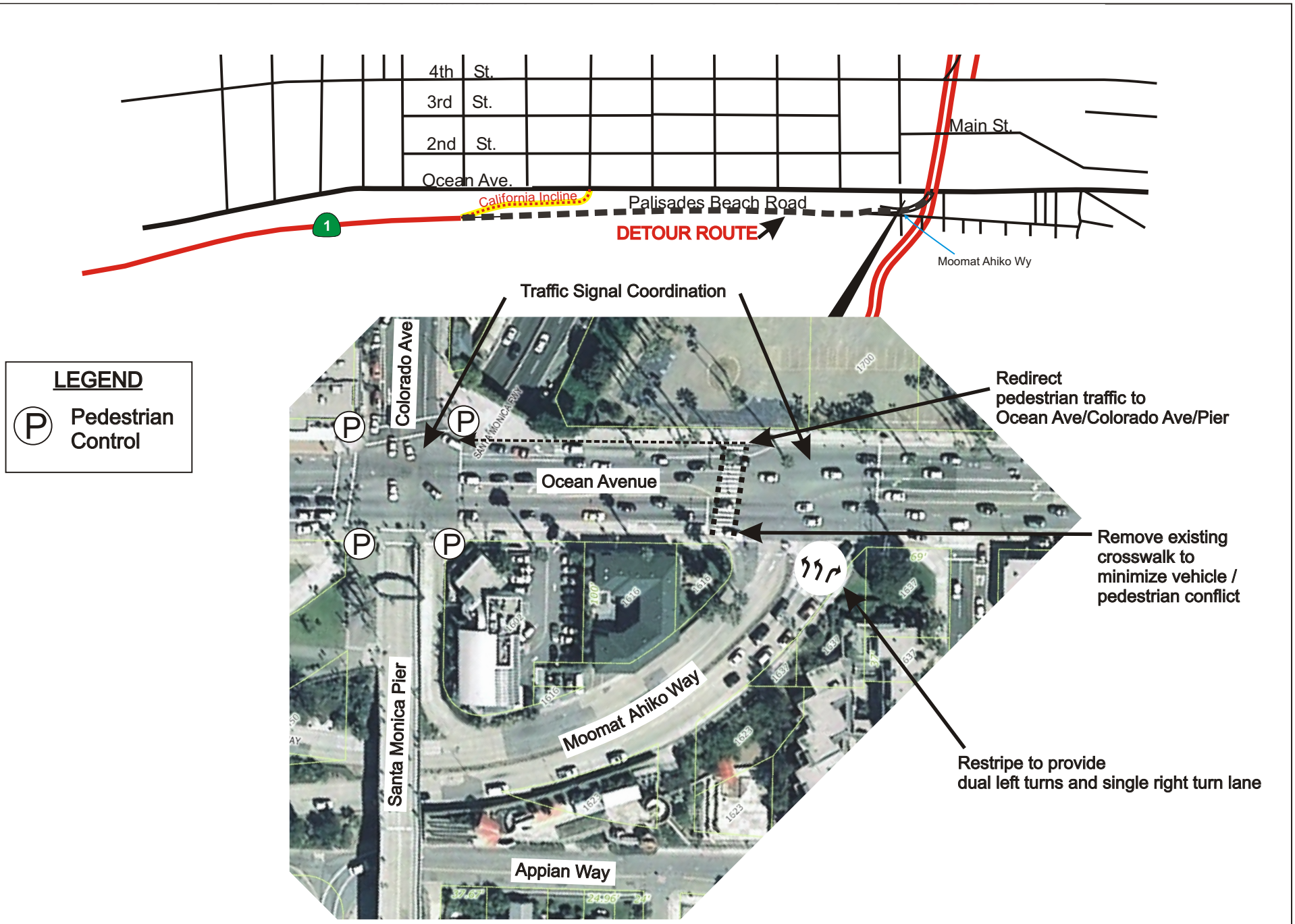

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Figure 27

Detour Improvements

KOA CORPORATION
PLANNING & ENGINEERING

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ATTACHMENT

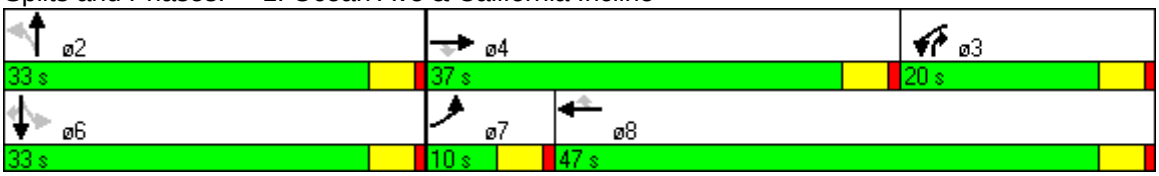
SYNCHRO WORKSHEETS FOR INTERSECTIONS OF CALIFORNIA INCLINE/OCEAN AVENUE AND CALIFORNIA INCLINE/PALISADES BEACH ROAD

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1715	1472
Flt Permitted	0.950			0.950			0.575				0.924	
Satd. Flow (perm)	1441	1676	1353	1581	1676	1353	860	1565	1377	0	1591	1353
Satd. Flow (RTOR)			202			48			524			57
Volume (vph)	31	350	218	211	494	46	29	146	505	33	125	54
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	33	368	229	215	520	48	31	154	532	0	167	57
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	37.0	37.0	20.0	47.0	47.0	33.0	33.0	20.0	33.0	33.0	33.0
Act Effct Green (s)	7.7	27.2	27.2	39.1	61.1	61.1	17.2	17.2	38.1		17.2	17.2
Actuated g/C Ratio	0.09	0.30	0.30	0.43	0.68	0.68	0.19	0.19	0.42		0.19	0.19
v/c Ratio	0.26	0.73	0.42	0.30	0.46	0.05	0.19	0.52	0.60		0.55	0.19
Control Delay	42.8	35.8	6.5	26.4	12.8	3.9	31.4	38.0	6.1		39.1	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	42.8	35.8	6.5	26.4	12.8	3.9	31.4	38.0	6.1		39.1	9.5
LOS	D	D	A	C	B	A	C	D	A		D	A
Approach Delay		25.5			16.0			14.0			31.5	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	18	188	11	105	224	5	14	76	3		83	0
Queue Length 95th (ft)	45	237	52	199	370	m23	38	132	102		141	30
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	137	654	651	715	1137	933	291	530	886		539	496
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.24	0.56	0.35	0.30	0.46	0.05	0.11	0.29	0.60		0.31	0.11

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 19.4 Intersection LOS: B
Intersection Capacity Utilization 80.1% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



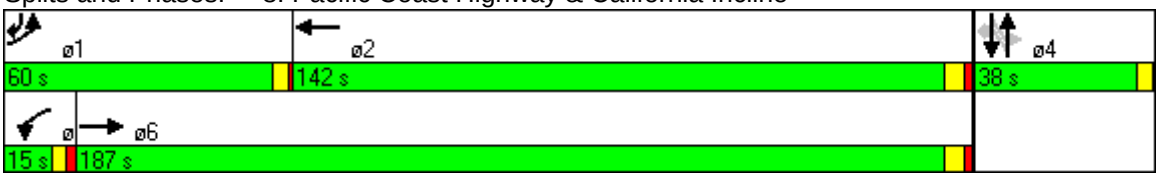
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1739	0	0	1779	1583
Flt Permitted	0.950			0.950				0.625			0.709	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1098	0	0	1321	1583
Satd. Flow (RTOR)		1						13				2
Volume (vph)	477	3680	14	12	2388	0	6	11	12	223	12	225
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	502	3889	0	13	2514	0	0	31	0	0	248	237
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	187.0	0.0	15.0	142.0	0.0	38.0	38.0	0.0	38.0	38.0	60.0
Act Effct Green (s)	56.0	190.2		8.3	138.0			34.0			34.0	94.0
Actuated g/C Ratio	0.23	0.79		0.03	0.58			0.14			0.14	0.39
v/c Ratio	1.22	0.97		0.21	0.86			0.19			1.33	0.38
Control Delay	187.9	30.8		120.2	46.8			61.3			248.0	54.0
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	187.9	30.8		120.2	46.8			61.3			248.0	54.0
LOS	F	C		F	D			E			F	D
Approach Delay		48.8			47.2			61.3			153.2	
Approach LOS		D			D			E			F	
Queue Length 50th (ft)	~969	2023		21	1214			25			~506	269
Queue Length 95th (ft)	#1228	2052		51	1249			67			#719	360
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	413	4026		81	2924			167			187	621
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.22	0.97		0.16	0.86			0.19			1.33	0.38

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 66 (28%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.33
Intersection Signal Delay: 55.1 Intersection LOS: E
Intersection Capacity Utilization 106.1% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



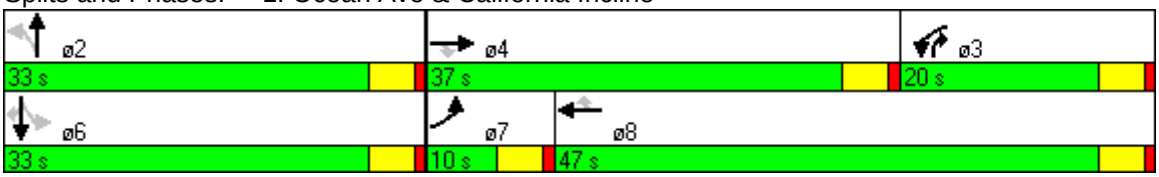
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1715	1472
Flt Permitted	0.950			0.950			0.412				0.924	
Satd. Flow (perm)	1447	1676	1353	1590	1676	1353	624	1565	1377	0	1591	1353
Satd. Flow (RTOR)			52			82			377			66
Volume (vph)	58	447	71	633	589	78	97	112	358	54	221	63
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	61	471	75	646	620	82	102	118	377	0	290	66
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	37.0	37.0	20.0	47.0	47.0	33.0	33.0	20.0	33.0	33.0	33.0
Act Effct Green (s)	8.2	30.3	30.3	30.5	53.2	53.2	22.8	22.8	29.5		22.8	22.8
Actuated g/C Ratio	0.09	0.34	0.34	0.34	0.59	0.59	0.25	0.25	0.33		0.25	0.25
v/c Ratio	0.45	0.84	0.15	1.16	0.63	0.10	0.65	0.30	0.54		0.72	0.17
Control Delay	49.4	41.0	8.7	123.5	19.6	4.5	47.9	27.5	6.8		40.5	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	49.4	41.0	8.7	123.5	19.6	4.5	47.9	27.5	6.8		40.5	7.0
LOS	D	D	A	F	B	A	D	C	A		D	A
Approach Delay		37.8			68.5			17.9			34.3	
Approach LOS		D			E			B			C	
Queue Length 50th (ft)	33	241	9	~463	291	11	52	54	0		151	0
Queue Length 95th (ft)	#79	345	36	#806	459	m31	98	89	82		212	27
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	141	649	556	557	991	834	211	530	704		539	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.43	0.73	0.13	1.16	0.63	0.10	0.48	0.22	0.54		0.54	0.13

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 47.5 Intersection LOS: D
Intersection Capacity Utilization 102.3% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



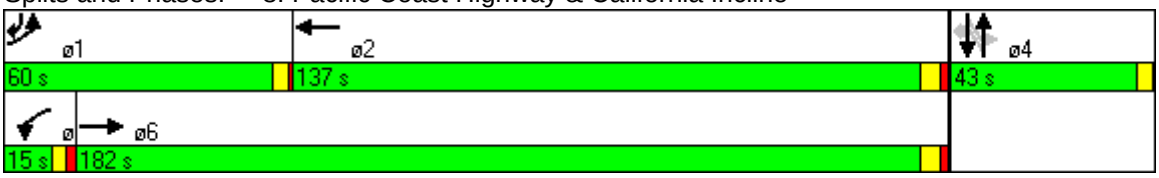
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5085	0	1770	5085	0	0	1787	0	0	1786	1583
Flt Permitted	0.950			0.950				0.880			0.683	
Satd. Flow (perm)	1770	5085	0	1770	5085	0	0	1602	0	0	1272	1583
Satd. Flow (RTOR)								4				
Volume (vph)	461	2771	8	8	2899	0	18	24	9	87	15	838
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	485	2925	0	8	3052	0	0	53	0	0	108	882
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	182.0	0.0	15.0	137.0	0.0	43.0	43.0	0.0	43.0	43.0	60.0
Act Effct Green (s)	70.2	202.1		7.7	133.0			24.8			24.8	99.0
Actuated g/C Ratio	0.29	0.84		0.03	0.55			0.10			0.10	0.41
v/c Ratio	0.94	0.68		0.14	1.08			0.31			0.82	1.35
Control Delay	106.3	9.5		117.9	94.1			94.6			145.6	218.0
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	106.3	9.5		117.9	94.1			94.6			145.6	218.0
LOS	F	A		F	F			F			F	F
Approach Delay		23.3			94.2			94.6			210.1	
Approach LOS		C			F			F			F	
Queue Length 50th (ft)	759	467		13	~1973			74			172	~1821
Queue Length 95th (ft)	#1118	888		36	#1987			124			248	#2090
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	517	4283		81	2818			264			207	653
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	0.94	0.68		0.10	1.08			0.20			0.52	1.35

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 185 (77%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.35
Intersection Signal Delay: 77.3 Intersection LOS: E
Intersection Capacity Utilization 122.9% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1718	1472
Flt Permitted	0.950			0.950			0.499				0.947	
Satd. Flow (perm)	1443	1676	1353	1589	1676	1353	751	1565	1377	0	1632	1353
Satd. Flow (RTOR)			100			67			354			78
Volume (vph)	42	446	137	469	518	64	100	99	336	34	178	74
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	44	469	144	479	545	67	105	104	354	0	223	78
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	37.0	37.0	20.0	47.0	47.0	33.0	33.0	20.0	33.0	33.0	33.0
Act Effct Green (s)	7.8	31.2	31.2	32.3	58.1	58.1	20.0	20.0	31.3		20.0	20.0
Actuated g/C Ratio	0.09	0.35	0.35	0.36	0.65	0.65	0.22	0.22	0.35		0.22	0.22
v/c Ratio	0.34	0.81	0.27	0.81	0.50	0.07	0.63	0.30	0.50		0.61	0.22
Control Delay	45.5	37.5	8.0	47.2	15.3	4.8	46.9	29.4	6.4		37.9	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	45.5	37.5	8.0	47.2	15.3	4.8	46.9	29.4	6.4		37.9	7.3
LOS	D	D	A	D	B	A	D	C	A		D	A
Approach Delay		31.6			28.7			18.2			30.0	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)	24	236	17	283	230	8	54	50	0		115	0
Queue Length 95th (ft)	57	331	53	#579	397	m34	98	83	79		165	30
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	138	662	595	589	1082	897	255	530	709		553	510
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.32	0.71	0.24	0.81	0.50	0.07	0.41	0.20	0.50		0.40	0.15

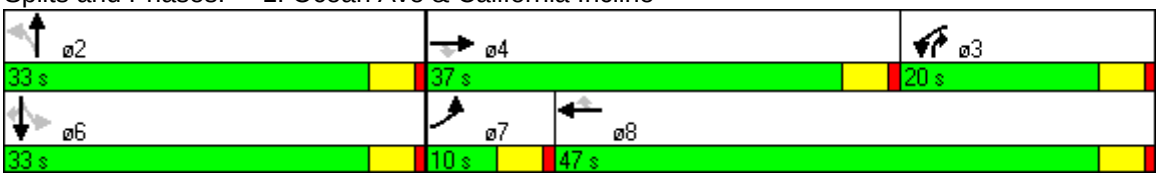
Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 27.3 Intersection LOS: C
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



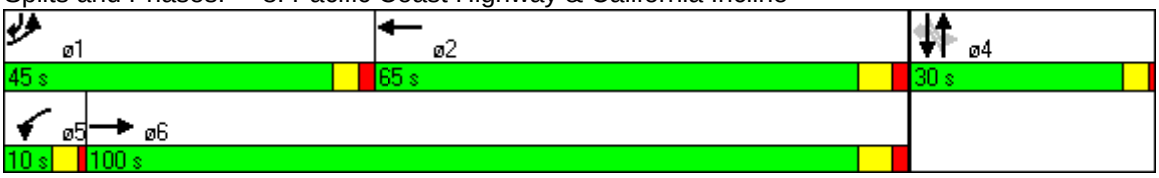
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1712	0	0	1785	1583
Flt Permitted	0.950			0.950				0.836			0.652	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1453	0	0	1215	1583
Satd. Flow (RTOR)		2						31				1
Volume (vph)	572	2684	18	48	2180	0	24	16	39	147	21	490
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	602	2844	0	51	2295	0	0	83	0	0	177	516
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	45.0	100.0	0.0	10.0	65.0	0.0	30.0	30.0	0.0	30.0	30.0	45.0
Act Effct Green (s)	43.7	100.3		6.4	61.0			23.3			23.3	71.0
Actuated g/C Ratio	0.31	0.72		0.05	0.44			0.17			0.17	0.51
v/c Ratio	1.09	0.78		0.63	1.04			0.31			0.88	0.64
Control Delay	109.6	15.9		97.8	67.8			34.9			94.0	29.8
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	109.6	15.9		97.8	67.8			34.9			94.0	29.8
LOS	F	B		F	E			C			F	C
Approach Delay		32.2			68.4			34.9			46.2	
Approach LOS		C			E			C			D	
Queue Length 50th (ft)	~648	624		47	~821			41			155	334
Queue Length 95th (ft)	#882	685		#117	#912			92			#276	463
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	553	3641		81	2216			295			226	803
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.09	0.78		0.63	1.04			0.28			0.78	0.64

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 24 (17%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 46.7 Intersection LOS: D
Intersection Capacity Utilization 99.7% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1708	1472
Flt Permitted	0.950			0.950			0.528				0.898	
Satd. Flow (perm)	1445	1676	1353	1586	1676	1353	793	1565	1377	0	1542	1353
Satd. Flow (RTOR)			167			78			469			53
Volume (vph)	16	407	210	312	548	74	28	110	611	53	138	50
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	17	428	221	318	577	78	29	116	643	0	201	53
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	37.0	37.0	20.0	47.0	47.0	33.0	33.0	20.0	33.0	33.0	33.0
Act Effct Green (s)	6.8	30.3	30.3	34.6	62.3	62.3	18.5	18.5	33.6		18.5	18.5
Actuated g/C Ratio	0.08	0.34	0.34	0.38	0.69	0.69	0.21	0.21	0.37		0.21	0.21
v/c Ratio	0.15	0.76	0.39	0.50	0.50	0.08	0.18	0.36	0.80		0.63	0.17
Control Delay	41.4	34.7	7.4	30.0	8.6	0.5	29.8	32.4	17.9		41.0	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	41.4	34.7	7.4	30.0	8.6	0.5	29.8	32.4	17.9		41.0	8.9
LOS	D	C	A	C	A	A	C	C	B		D	A
Approach Delay		25.8			14.9			20.5			34.3	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	9	213	21	161	26	0	13	56	82		103	0
Queue Length 95th (ft)	29	269	60	m#349	382	m1	35	97	#358		162	27
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	127	664	637	632	1160	961	269	530	808		523	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.13	0.64	0.35	0.50	0.50	0.08	0.11	0.22	0.80		0.38	0.11

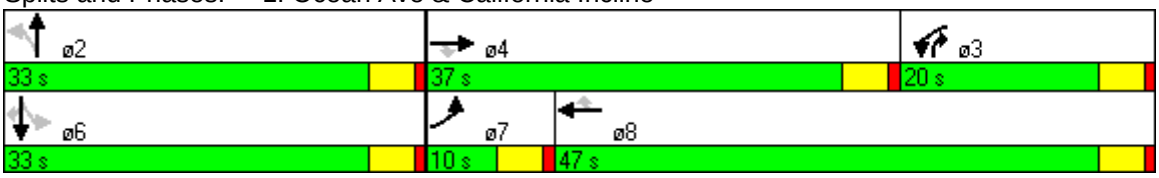
Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 21.1 Intersection LOS: C
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



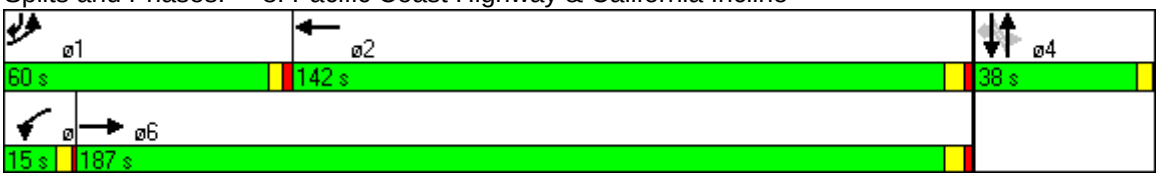
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1742	0	0	1777	1583
Flt Permitted	0.950			0.950				0.721			0.728	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1264	0	0	1356	1583
Satd. Flow (RTOR)		1						11				2
Volume (vph)	702	4046	18	5	2458	0	3	10	10	234	8	350
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	739	4278	0	5	2587	0	0	25	0	0	254	368
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	187.0	0.0	15.0	142.0	0.0	38.0	38.0	0.0	38.0	38.0	60.0
Act Effct Green (s)	56.0	195.7		6.4	138.0			34.0			34.0	94.0
Actuated g/C Ratio	0.23	0.82		0.03	0.58			0.14			0.14	0.39
v/c Ratio	1.79	1.03		0.10	0.88			0.13			1.32	0.59
Control Delay	408.4	45.3		118.4	48.9			60.1			246.2	62.3
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	408.4	45.3		118.4	48.9			60.1			246.2	62.3
LOS	F	D		F	D			E			F	E
Approach Delay		98.8			49.0			60.1			137.4	
Approach LOS		F			D			E			F	
Queue Length 50th (ft)	~1746	~2621		8	1286			20			~518	463
Queue Length 95th (ft)	#2015	#2704		27	1320			57			#734	592
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	413	4143		81	2924			189			192	621
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.79	1.03		0.06	0.88			0.13			1.32	0.59

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 66 (28%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.79
Intersection Signal Delay: 86.0 Intersection LOS: F
Intersection Capacity Utilization 116.4% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



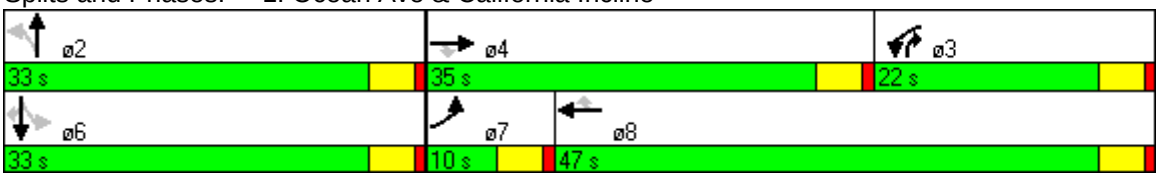
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1718	1472
Flt Permitted	0.950			0.950			0.384				0.939	
Satd. Flow (perm)	1443	1676	1353	1592	1676	1353	583	1565	1377	0	1619	1353
Satd. Flow (RTOR)			55			224			455			38
Volume (vph)	33	474	83	827	519	213	90	108	449	48	248	36
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	35	499	87	844	546	224	95	114	473	0	312	38
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	35.0	35.0	22.0	47.0	47.0	33.0	33.0	22.0	33.0	33.0	33.0
Act Effct Green (s)	7.2	32.1	32.1	28.1	55.4	55.4	23.4	23.4	27.1		23.4	23.4
Actuated g/C Ratio	0.08	0.36	0.36	0.31	0.62	0.62	0.26	0.26	0.30		0.26	0.26
v/c Ratio	0.30	0.84	0.17	1.65	0.53	0.24	0.63	0.28	0.65		0.74	0.10
Control Delay	45.4	40.1	9.3	321.3	9.9	1.4	46.9	26.8	8.6		41.1	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	45.4	40.1	9.3	321.3	9.9	1.4	46.9	26.8	8.6		41.1	7.8
LOS	D	D	A	F	A	A	D	C	A		D	A
Approach Delay		36.1			171.6			17.0			37.5	
Approach LOS		D			F			B			D	
Queue Length 50th (ft)	19	236	11	~765	92	0	48	52	8		162	0
Queue Length 95th (ft)	49	#425	43	#999	181	m0	94	87	109		229	21
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	128	634	546	512	1031	919	198	530	732		549	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.27	0.79	0.16	1.65	0.53	0.24	0.48	0.22	0.65		0.57	0.08

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.65
Intersection Signal Delay: 99.2 Intersection LOS: F
Intersection Capacity Utilization 115.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



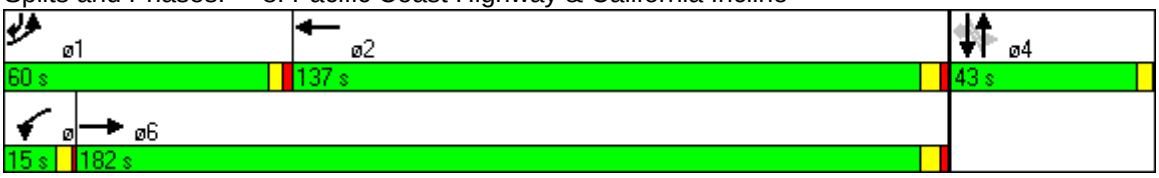
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1776	0	0	1792	1583
Flt Permitted	0.950			0.950				0.868			0.722	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1573	0	0	1345	1583
Satd. Flow (RTOR)		1						4				
Volume (vph)	579	3020	12	11	3104	0	17	17	9	87	25	1062
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	609	3192	0	12	3267	0	0	45	0	0	118	1118
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	182.0	0.0	15.0	137.0	0.0	43.0	43.0	0.0	43.0	43.0	60.0
Act Effct Green (s)	69.6	199.5		7.2	133.0			25.4			25.4	99.0
Actuated g/C Ratio	0.29	0.83		0.03	0.55			0.11			0.11	0.41
v/c Ratio	1.19	0.76		0.23	1.16			0.26			0.83	1.71
Control Delay	169.3	12.3		123.3	123.0			91.2			144.3	365.6
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	169.3	12.3		123.3	123.0			91.2			144.3	365.6
LOS	F	B		F	F			F			F	F
Approach Delay		37.5			123.0			91.2			344.4	
Approach LOS		D			F			F			F	
Queue Length 50th (ft)	~1155	833		19	~2231			61			187	~2595
Queue Length 95th (ft)	#1534	1098		49	#2232			109			265	#2857
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	513	4223		81	2818			259			219	653
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.19	0.76		0.15	1.16			0.17			0.54	1.71

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 185 (77%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.71
Intersection Signal Delay: 116.7 Intersection LOS: F
Intersection Capacity Utilization 140.7% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



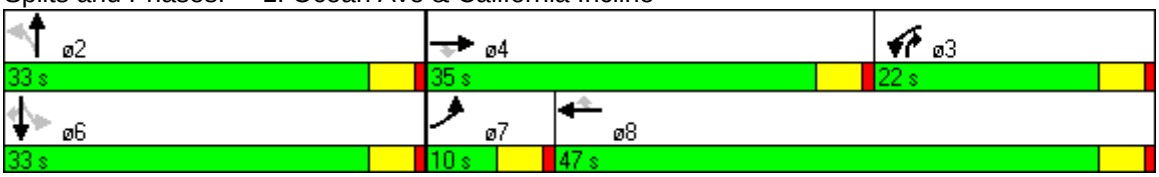
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1717	1472
Flt Permitted	0.950			0.950			0.449				0.927	
Satd. Flow (perm)	1447	1676	1353	1593	1676	1353	678	1565	1377	0	1599	1353
Satd. Flow (RTOR)			112			228			457			84
Volume (vph)	45	497	178	651	578	217	143	171	492	43	205	80
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	47	523	187	664	608	228	151	180	518	0	261	84
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	35.0	35.0	22.0	47.0	47.0	33.0	33.0	22.0	33.0	33.0	33.0
Act Effct Green (s)	7.1	32.2	32.2	26.6	54.2	54.2	24.7	24.7	25.6		24.7	24.7
Actuated g/C Ratio	0.08	0.36	0.36	0.30	0.60	0.60	0.27	0.27	0.28		0.27	0.27
v/c Ratio	0.40	0.87	0.34	1.37	0.60	0.25	0.81	0.42	0.72		0.59	0.19
Control Delay	49.6	44.1	10.5	204.9	14.1	1.9	60.9	28.4	12.4		33.1	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	49.6	44.1	10.5	204.9	14.1	1.9	60.9	28.4	12.4		33.1	6.1
LOS	D	D	B	F	B	A	E	C	B		C	A
Approach Delay		36.1			96.7			24.4			26.5	
Approach LOS		D			F			C			C	
Queue Length 50th (ft)	26	252	26	~590	308	22	77	81	29		124	0
Queue Length 95th (ft)	61	#457	78	#807	454	m28	#163	131	#197		189	30
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	25		230			
Base Capacity (vph)	127	623	573	486	1009	905	230	530	719		542	514
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.37	0.84	0.33	1.37	0.60	0.25	0.66	0.34	0.72		0.48	0.16

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.37
Intersection Signal Delay: 58.6 Intersection LOS: E
Intersection Capacity Utilization 106.3% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



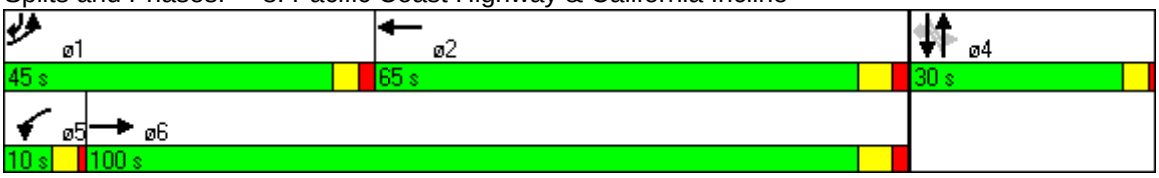
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1712	0	0	1785	1583
Flt Permitted	0.950			0.950				0.780			0.641	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1356	0	0	1194	1583
Satd. Flow (RTOR)		1						31				
Volume (vph)	845	3164	19	52	2618	0	26	17	42	159	23	716
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	889	3351	0	55	2756	0	0	89	0	0	191	754
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	45.0	100.0	0.0	10.0	65.0	0.0	30.0	30.0	0.0	30.0	30.0	45.0
Act Effct Green (s)	42.5	99.4		6.2	61.0			24.5			24.5	71.0
Actuated g/C Ratio	0.30	0.71		0.04	0.44			0.18			0.18	0.51
v/c Ratio	1.66	0.93		0.71	1.24			0.34			0.91	0.94
Control Delay	334.8	24.4		107.4	148.7			36.2			99.6	53.1
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	334.8	24.4		107.4	148.7			36.2			99.6	53.1
LOS	F	C		F	F			D			F	D
Approach Delay		89.5			147.8			36.2			62.5	
Approach LOS		F			F			D			E	
Queue Length 50th (ft)	~1190	952		50	~1140			46			171	630
Queue Length 95th (ft)	#1445	1040		#127	#1223			100			#310	#914
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	537	3607		78	2216			277			222	803
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.66	0.93		0.71	1.24			0.32			0.86	0.94

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 24 (17%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.66
Intersection Signal Delay: 106.0 Intersection LOS: F
Intersection Capacity Utilization 124.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1708	1472
Flt Permitted	0.950			0.950			0.528				0.898	
Satd. Flow (perm)	1445	1676	1353	1586	1676	1353	793	1565	1377	0	1542	1353
Satd. Flow (RTOR)			167			78			469			53
Volume (vph)	16	407	210	312	548	74	28	110	611	53	138	50
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	17	428	221	318	577	78	29	116	643	0	201	53
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	37.0	37.0	20.0	47.0	47.0	33.0	33.0	20.0	33.0	33.0	33.0
Act Effct Green (s)	6.8	29.7	29.7	35.3	62.3	62.3	18.5	18.5	34.3		18.5	18.5
Actuated g/C Ratio	0.08	0.33	0.33	0.39	0.69	0.69	0.21	0.21	0.38		0.21	0.21
v/c Ratio	0.15	0.77	0.40	0.49	0.50	0.08	0.18	0.36	0.79		0.63	0.17
Control Delay	41.4	36.3	7.6	29.2	8.6	0.5	29.8	32.4	17.4		41.0	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	41.4	36.3	7.6	29.2	8.6	0.5	29.8	32.4	17.4		41.0	8.9
LOS	D	D	A	C	A	A	C	C	B		D	A
Approach Delay		26.9			14.7			20.1			34.3	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	9	219	21	159	26	0	13	56	79		103	0
Queue Length 95th (ft)	29	269	60	m#349	382	m1	35	97	#358		162	27
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	20		75			
Base Capacity (vph)	127	663	637	644	1160	961	269	530	815		523	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.13	0.65	0.35	0.49	0.50	0.08	0.11	0.22	0.79		0.38	0.11

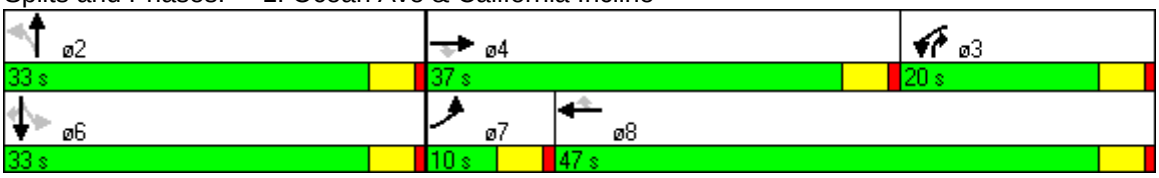
Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



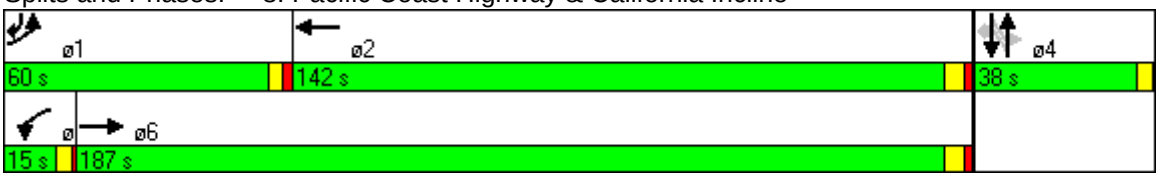
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1742	0	0	1777	1583
Flt Permitted	0.950			0.950				0.721			0.728	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1264	0	0	1356	1583
Satd. Flow (RTOR)		1						11				2
Volume (vph)	702	4046	18	5	2458	0	3	10	10	234	8	350
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	739	4278	0	5	2587	0	0	25	0	0	254	368
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	187.0	0.0	15.0	142.0	0.0	38.0	38.0	0.0	38.0	38.0	60.0
Act Effct Green (s)	56.0	195.7		6.4	138.0			34.0			34.0	94.0
Actuated g/C Ratio	0.23	0.82		0.03	0.58			0.14			0.14	0.39
v/c Ratio	1.79	1.03		0.10	0.88			0.13			1.32	0.59
Control Delay	408.4	45.3		118.4	48.9			60.1			246.2	62.3
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	408.4	45.3		118.4	48.9			60.1			246.2	62.3
LOS	F	D		F	D			E			F	E
Approach Delay		98.8			49.0			60.1			137.4	
Approach LOS		F			D			E			F	
Queue Length 50th (ft)	~1746	~2621		8	1286			20			~518	463
Queue Length 95th (ft)	#2015	#2704		27	1320			57			#734	592
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	413	4143		81	2924			189			192	621
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.79	1.03		0.06	0.88			0.13			1.32	0.59

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 66 (28%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.79
Intersection Signal Delay: 86.0 Intersection LOS: F
Intersection Capacity Utilization 116.4% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



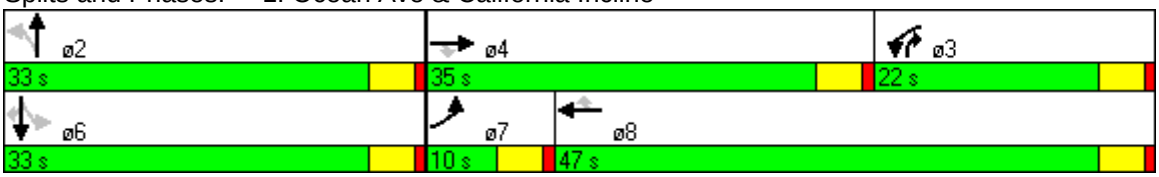
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1718	1472
Flt Permitted	0.950			0.950			0.384				0.939	
Satd. Flow (perm)	1443	1676	1353	1592	1676	1353	583	1565	1377	0	1619	1353
Satd. Flow (RTOR)			55			224			455			38
Volume (vph)	33	474	83	827	519	213	90	108	449	48	248	36
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	35	499	87	844	546	224	95	114	473	0	312	38
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	35.0	35.0	22.0	47.0	47.0	33.0	33.0	22.0	33.0	33.0	33.0
Act Effct Green (s)	7.2	32.1	32.1	28.1	55.4	55.4	23.4	23.4	27.1		23.4	23.4
Actuated g/C Ratio	0.08	0.36	0.36	0.31	0.62	0.62	0.26	0.26	0.30		0.26	0.26
v/c Ratio	0.30	0.84	0.17	1.65	0.53	0.24	0.63	0.28	0.65		0.74	0.10
Control Delay	45.4	40.1	9.3	321.3	9.9	1.4	46.9	26.8	8.6		41.1	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	45.4	40.1	9.3	321.3	9.9	1.4	46.9	26.8	8.6		41.1	7.8
LOS	D	D	A	F	A	A	D	C	A		D	A
Approach Delay		36.1			171.6			17.0			37.5	
Approach LOS		D			F			B			D	
Queue Length 50th (ft)	19	236	11	~765	92	0	48	52	8		162	0
Queue Length 95th (ft)	49	#425	43	#999	181	m0	94	87	109		229	21
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	20		75			
Base Capacity (vph)	128	634	546	512	1031	919	198	530	732		549	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.27	0.79	0.16	1.65	0.53	0.24	0.48	0.22	0.65		0.57	0.08

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.65
Intersection Signal Delay: 99.2 Intersection LOS: F
Intersection Capacity Utilization 115.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Ocean Ave & California Incline



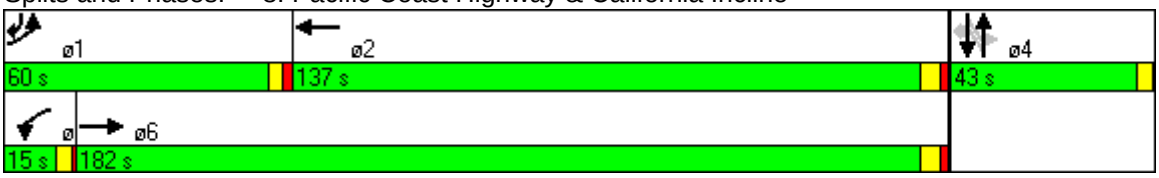
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1776	0	0	1792	1583
Flt Permitted	0.950			0.950				0.868			0.722	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1573	0	0	1345	1583
Satd. Flow (RTOR)		1						4				
Volume (vph)	579	3020	12	11	3104	0	17	17	9	87	25	1062
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	609	3192	0	12	3267	0	0	45	0	0	118	1118
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	60.0	182.0	0.0	15.0	137.0	0.0	43.0	43.0	0.0	43.0	43.0	60.0
Act Effct Green (s)	69.6	199.5		7.2	133.0			25.4			25.4	99.0
Actuated g/C Ratio	0.29	0.83		0.03	0.55			0.11			0.11	0.41
v/c Ratio	1.19	0.76		0.23	1.16			0.26			0.83	1.71
Control Delay	169.3	12.3		123.3	123.0			91.2			144.3	365.6
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	169.3	12.3		123.3	123.0			91.2			144.3	365.6
LOS	F	B		F	F			F			F	F
Approach Delay		37.5			123.0			91.2			344.4	
Approach LOS		D			F			F			F	
Queue Length 50th (ft)	~1155	833		19	~2231			61			187	~2595
Queue Length 95th (ft)	#1534	1098		49	#2232			109			265	#2857
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	513	4223		81	2818			259			219	653
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.19	0.76		0.15	1.16			0.17			0.54	1.71

Intersection Summary

Cycle Length: 240
Actuated Cycle Length: 240
Offset: 185 (77%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.71
Intersection Signal Delay: 116.7 Intersection LOS: F
Intersection Capacity Utilization 140.7% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline



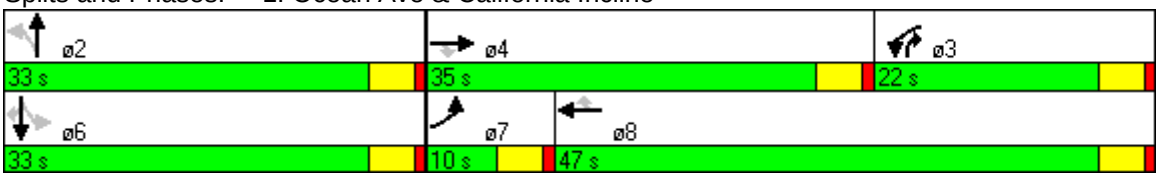
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	2.5	2.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Satd. Flow (prot)	1486	1676	1472	1643	1676	1472	1486	1565	1377	0	1717	1472
Flt Permitted	0.950			0.950			0.449				0.927	
Satd. Flow (perm)	1447	1676	1353	1593	1676	1353	678	1565	1377	0	1599	1353
Satd. Flow (RTOR)			112			228			457			84
Volume (vph)	45	497	178	651	578	217	143	171	492	43	205	80
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	47	523	187	664	608	228	151	180	518	0	261	84
Turn Type	Prot		Perm	Prot		Perm	Perm		Over	Perm		Perm
Protected Phases	7	4		3	8			2	3		6	
Permitted Phases			4			8	2			6		6
Total Split (s)	10.0	35.0	35.0	22.0	47.0	47.0	33.0	33.0	22.0	33.0	33.0	33.0
Act Effct Green (s)	7.1	32.2	32.2	26.6	54.2	54.2	24.7	24.7	25.6		24.7	24.7
Actuated g/C Ratio	0.08	0.36	0.36	0.30	0.60	0.60	0.27	0.27	0.28		0.27	0.27
v/c Ratio	0.40	0.87	0.34	1.37	0.60	0.25	0.81	0.42	0.72		0.59	0.19
Control Delay	49.6	44.1	10.5	204.9	14.1	1.9	60.9	28.4	12.4		33.1	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	49.6	44.1	10.5	204.9	14.1	1.9	60.9	28.4	12.4		33.1	6.1
LOS	D	D	B	F	B	A	E	C	B		C	A
Approach Delay		36.1			96.7			24.4			26.5	
Approach LOS		D			F			C			C	
Queue Length 50th (ft)	26	252	26	~590	308	22	77	81	29		124	0
Queue Length 95th (ft)	61	#457	78	#807	454	m28	#163	131	#197		189	30
Internal Link Dist (ft)		501			658			463			333	
Turn Bay Length (ft)	100		100			200	20		75			
Base Capacity (vph)	127	623	573	486	1009	905	230	530	719		542	514
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		0	0
Reduced v/c Ratio	0.37	0.84	0.33	1.37	0.60	0.25	0.66	0.34	0.72		0.48	0.16

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 30 (33%), Referenced to phase 3:WBL and 8:WBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.37
Intersection Signal Delay: 58.6 Intersection LOS: E
Intersection Capacity Utilization 106.3% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

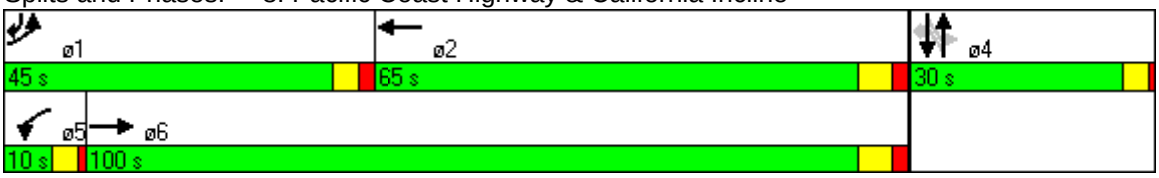
Splits and Phases: 1: Ocean Ave & California Incline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	5080	0	1770	5085	0	0	1712	0	0	1785	1583
Flt Permitted	0.950			0.950				0.780			0.641	
Satd. Flow (perm)	1770	5080	0	1770	5085	0	0	1356	0	0	1194	1583
Satd. Flow (RTOR)		1						31				
Volume (vph)	845	3164	19	52	2618	0	26	17	42	159	23	716
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	889	3351	0	55	2756	0	0	89	0	0	191	754
Turn Type	Prot			Prot			Perm			Perm		pm+ov
Protected Phases	1	6		5	2			4			4	1
Permitted Phases							4			4		4
Total Split (s)	45.0	100.0	0.0	10.0	65.0	0.0	30.0	30.0	0.0	30.0	30.0	45.0
Act Effct Green (s)	42.5	99.4		6.2	61.0			24.5			24.5	71.0
Actuated g/C Ratio	0.30	0.71		0.04	0.44			0.18			0.18	0.51
v/c Ratio	1.66	0.93		0.71	1.24			0.34			0.91	0.94
Control Delay	334.8	24.4		107.4	148.7			36.2			99.6	53.1
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	334.8	24.4		107.4	148.7			36.2			99.6	53.1
LOS	F	C		F	F			D			F	D
Approach Delay		89.5			147.8			36.2			62.5	
Approach LOS		F			F			D			E	
Queue Length 50th (ft)	~1190	952		50	~1140			46			171	630
Queue Length 95th (ft)	#1445	1040		#127	#1223			100			#310	#914
Internal Link Dist (ft)		652			872			2			467	
Turn Bay Length (ft)	345			130								
Base Capacity (vph)	537	3607		78	2216			277			222	803
Starvation Cap Reductn	0	0		0	0			0			0	0
Spillback Cap Reductn	0	0		0	0			0			0	0
Storage Cap Reductn	0	0		0	0			0			0	0
Reduced v/c Ratio	1.66	0.93		0.71	1.24			0.32			0.86	0.94

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 24 (17%), Referenced to phase 2:WBT and 6:EBT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.66
Intersection Signal Delay: 106.0 Intersection LOS: F
Intersection Capacity Utilization 124.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

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

Splits and Phases: 8: Pacific Coast Highway & California Incline