

1. TRAFFIC OVERVIEW

1.1 Project Objectives

The I-5/SR 56 Interchange Project (Project) is designed to address both the existing and anticipated future traffic operational deficiencies associated with the absence of direct freeway-to-freeway connectors in the southbound I-5 to eastbound SR 56 (S-E) and westbound SR 56 to northbound I-5 (W-N) directions. The current I-5/SR 56 interchange network requires that drivers exit the freeway at Carmel Valley Road to travel from southbound I-5 to eastbound SR 56 (S-E) and from westbound SR 56 to northbound I-5 (W-N). The ramp intersections along El Camino Real and Carmel Valley Road that serve these freeway-to-freeway movements experience congestion during peak periods in the morning and again in the evening. Furthermore, during periods of increased travel demand drivers use alternative routes including El Camino Real, Carmel Creek Road, and Carmel Country Road, to travel between I-5 and SR 56 and avoid traffic congestion related to the “missing moves” at the I-5/SR 56 interchange. The neighboring communities experience increased demand and congestion due to these “cut through” traffic volumes.

The primary purpose of the proposed project is to maintain or improve the existing and future traffic operations along the Interstate 5 (I-5) and State Route 56 (SR 56) corridors between Del Mar Heights Road, Carmel Valley Road, and Carmel Country Road, and along local streets within the Carmel Valley Community.

1.2 Project Study Area

The *I-5/SR 56 Interchange Project Traffic Volumes and Operations Report* (traffic study), which was prepared by Linscott, Law and Greenspan (LLG), analyzed 41 intersections, 38 street segments, freeway mainline, weaving, merge/diverge and queuing (lines of cars) locations. Facilities have been categorized as either an “Urban Street Facility” or a “Freeway Facility.” Urban street facilities include signalized and unsignalized intersections and local street segments. Freeway facilities include the freeway mainline, ramps, merge and diverge locations at ramp exit and entrance points, and weaving sections. See **Figure 1** for an overview of the project locations that were analyzed in the traffic study.

LEGEND:

● **TRAFFIC STUDY INTERSECTION**

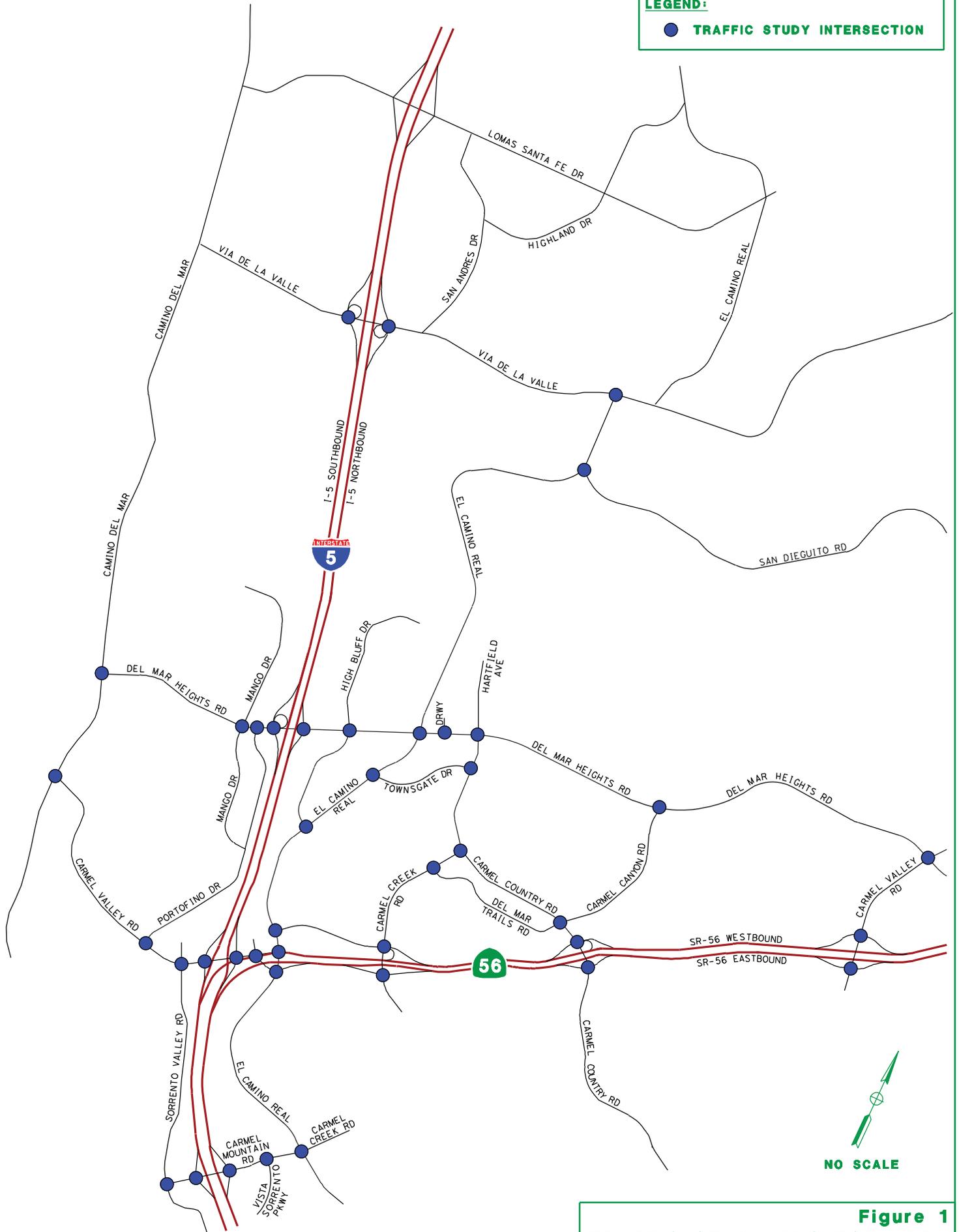


Figure 1
TRAFFIC STUDY PROJECT AREA

1.3 Community Concerns

In order to better meet the needs of the communities that would be affected by the proposed Project a Steering Committee was formed. Representatives from the Carmel Valley, Del Mar Mesa, Torrey Hills, and Torrey Pines Community Planning Groups meet with representatives from the City of San Diego, The California Department of Transportation (Caltrans), SANDAG and the project development team to discuss progress on the I-5/SR 56 Interchange Project and obtain feedback from the community. The meetings have been held on a quarterly basis since February of 2002. The following traffic related issues and concerns were identified as being particularly important to the Steering Committee and are discussed in detail in the proceeding traffic study summary:

- The severity of congestion in the future if no improvements are made at the I-5/SR56 interchange.
- Impacts to I-5 in each of the proposed alternatives.
- Traffic impacts related to removing the existing eastbound SR 56 slip off-ramp to Carmel Creek Road and restricting access to southbound I-5 from the westbound SR 56 loop on-ramp at Carmel Creek Road.
- “Cut through” traffic using local streets within Carmel Valley to avoid congestion related to the “missing moves” (absence of direct connectors for the S-E and W-N interchange movements).
- System constraints on SR 56, east of Carmel Valley, and the effect on the value of the proposed direct connectors.
- Recent economic changes and the effect on the need for improvements at the I-5/SR56 interchange.
- Completion of Pacific Highlands Ranch (PHR) and the effect on the need for improvements at the I-5/SR56 interchange.

1.4 Traffic Modeling

1.4.1 Assumptions for the Future Traffic Volume Forecasts

The traffic volume forecasts were developed using SANDAG’s Series 10 Traffic Model. The Project Development Team collectively selected the year 2015 as the interim (opening day) scenario and the year 2030 as the long-term (design horizon) scenario for forecasting. Model Runs were developed to simulate traffic conditions for both the year 2015 and the year 2030 No Build, Auxiliary Lane, Direct Connector, Hybrid and Hybrid with Flyover alternative scenarios, as well as the existing scenario.

The year 2030 forecasts assume that a number of regional improvements would occur over the next two decades. These improvements include, but are not limited to, the following:

- Widening of I-5 from La Jolla Village Drive in San Diego to Harbor Drive in Oceanside/Camp Pendleton to an average configuration of ten general-purpose lanes and four high occupancy vehicle (HOV)/managed lanes

- Widening of SR 56 from I-5 to I-15 to an average configuration of six general-purpose lanes and two HOV lanes
- In general, widening of I-805 from Palomar Street to I-5 to an average configuration of eight general-purpose lanes and two-four HOV/managed lanes
- Double tracking of the Los Angeles-San Diego- San Luis Obispo (LOSSAN) Rail Corridor
- Arterial Bus Rapid Transit (BRT) to El Camino Real

Please see Table 4-1 of the *I-5/SR 56 Interchange Project Traffic Volumes and Operations Report* completed on December 4, 2009 (**Attachment X**) for additional information on modeling assumptions.

1.4.2 Short Term vs. Long Term Trends for the Region

According to SANDAG's 2030 San Diego Regional Transportation Plan (RTP), the San Diego region faces a large increase in travel demand over the next two decades. In 1990 daily travel demand was nine million trips. The region's current population (2007-2008) generates an estimated 16.7 million daily trips by some sort of motorized travel today. By the year 2030, this number is projected to increase to 22 million daily trips.

In recent years, there has been a decline in travel demand in the San Diego Region from numbers seen in 2007 and 2008. This is commonly attributed to a variety of effects including rising gas prices and the recent economic recession. Historically, these types of travel trends have resulted in a short term flattening of the region's traffic volume vs. time curve, but have not resulted in any long term downhill trends. Therefore, observed temporary reductions in travel demand would not appreciably affect the projected long term traffic volume forecasts for the region.

1.5 Network Conditions

1.5.1 Regional vs. Local Traffic Movements

Vehicular travel within the proposed project area consists of regional traffic (i.e. traffic originating from or bound for locations outside of the project area) and local traffic (i.e. traffic originating from and bound for locations within the project area). An urban highway network is generally comprised of principal arterials, minor arterials, collectors, and local street systems. An effective design should ensure that regional traffic is served by and confined to the principal arterial system (which are the freeways for most urban highway networks) and the local traffic is served by and confined to the remaining parts of the network as much as is practicable.

As this applies to the I-5/SR 56 Interchange Project, one objective for the project is to ensure that regional traffic movements are made on I-5 and SR 56 while local traffic movements are made on El Camino Real, Carmel Valley Road, Carmel Creek Road, and Del Mar Heights Road. By drawing regional traffic volumes from the local streets

to the freeway facilities, the improvements proposed in the Direct Connector, Hybrid, and Hybrid with Flyover Alternatives work toward achieving this goal with varying levels of success.

1.5.2 Major Traffic Operations Features

Through the iterative process of alternative design – traffic analysis – and refinement of alternative design, four distinct design features have emerged as part of the project alternatives under consideration, each vital to the traffic operational characteristics of the proposed alternatives. These design features are: the proposed construction of freeway-to-freeway direct connector ramps, the proposed removal of the existing eastbound SR 56 slip off-ramp to Carmel Creek Road, the proposed construction of a collector-distributor system along westbound SR 56 between Carmel Creek Road and El Camino Real, and the proposed extension of the barrier-separated I-5 local bypasses to the Del Mar Heights Road interchange.

1.5.2.1 Future Freeway-to-Freeway Direct Connector Ramps

By the year 2030, the lack of freeway-to-freeway connectors for the S-E and W-N movements at the I-5/SR 56 interchange would result in very congested traffic conditions at the interchange and considerable increase in the traffic demand on the “cut through” local street routes within the Carmel Valley community.

Construction of proposed freeway-to-freeway direct connectors in either the S-E or W-N direction (or both) would enable unimpeded traffic flow at full freeway speeds between I-5 and SR 56 to and from the north. The presence of the new direct connectors would reduce freeway congestion and improve travel times between I-5 at Del Mar Heights Road and SR 56 at Carmel Valley Road. Furthermore, these reduced travel times would ensure that the freeway route is more attractive than alternate local street routes and would provide reduced demand and congestion in the neighboring communities due to “cut through” traffic volumes.

See **Figure 2** for illustration of the existing and future interchange movements with the proposed direct connectors.

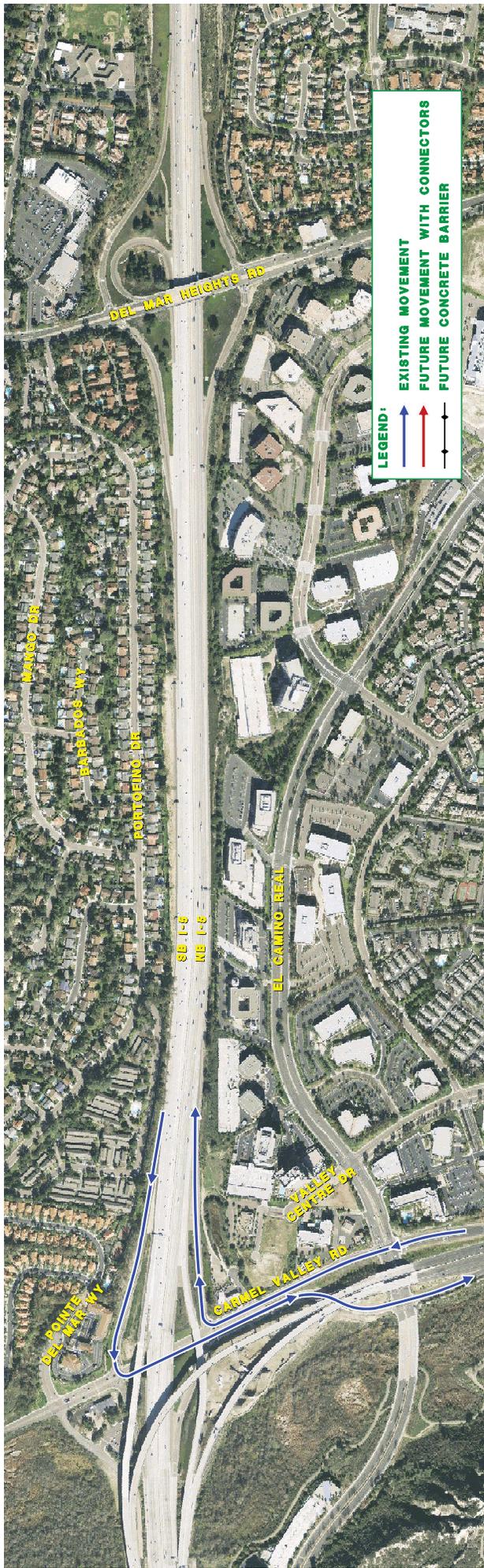


Figure 2
EXISTING MOVEMENTS AND FUTURE MOVEMENTS WITH CONNECTORS

1.5.2.2 Future Removal of Existing Eastbound SR 56 Slip Off-Ramp

The Direct Connector, Auxiliary Lane, Hybrid, and Hybrid with Flyover Alternatives were analyzed with and without the proposed removal of the existing eastbound SR 56 slip off-ramp (slip ramp) to Carmel Creek Road. The slip ramp, which was originally intended to serve as a temporary network feature, allows traffic to exit the freeway at Carmel Creek Road from the N-E direct connector.

A number of concerns were identified with maintaining the slip ramp. Due to the limited decision sight distance in advance of the slip ramp exit combined with high operating speeds, there are concerns with the operations of the slip ramp in the future. In addition, traffic operational analysis indicated failing future operations for the weave segment between vehicles entering eastbound SR 56 from El Camino Real and vehicles exiting eastbound SR 56 to Carmel Creek Road. This failing weave is due to a combination of inadequate existing interchange spacing and an anticipated increase in the number of future slip ramp users. All proposed build alternatives recommend removal of the slip ramp.

Removal of the slip ramp would divert an estimated 75% of potential future users of the facility to the northbound I-5 to Carmel Valley Road off-ramp. The remaining 25% would be diverted to other alternate routes, such as Carmel Country Road and Del Mar Heights Road. The Direct Connector, Auxiliary Lane, and Hybrid Alternatives propose three right turn lanes at the northbound I-5 to Carmel Valley Road off-ramp termini to mitigate for the addition of traffic at this intersection. It is likely that the ramp would be constructed to accommodate three right turn lanes, but striped for only two right turn lanes until traffic volumes warranted the third right turn.

See **Figure 3** for illustration of the existing movement for the slip ramp and future movement without the slip ramp.

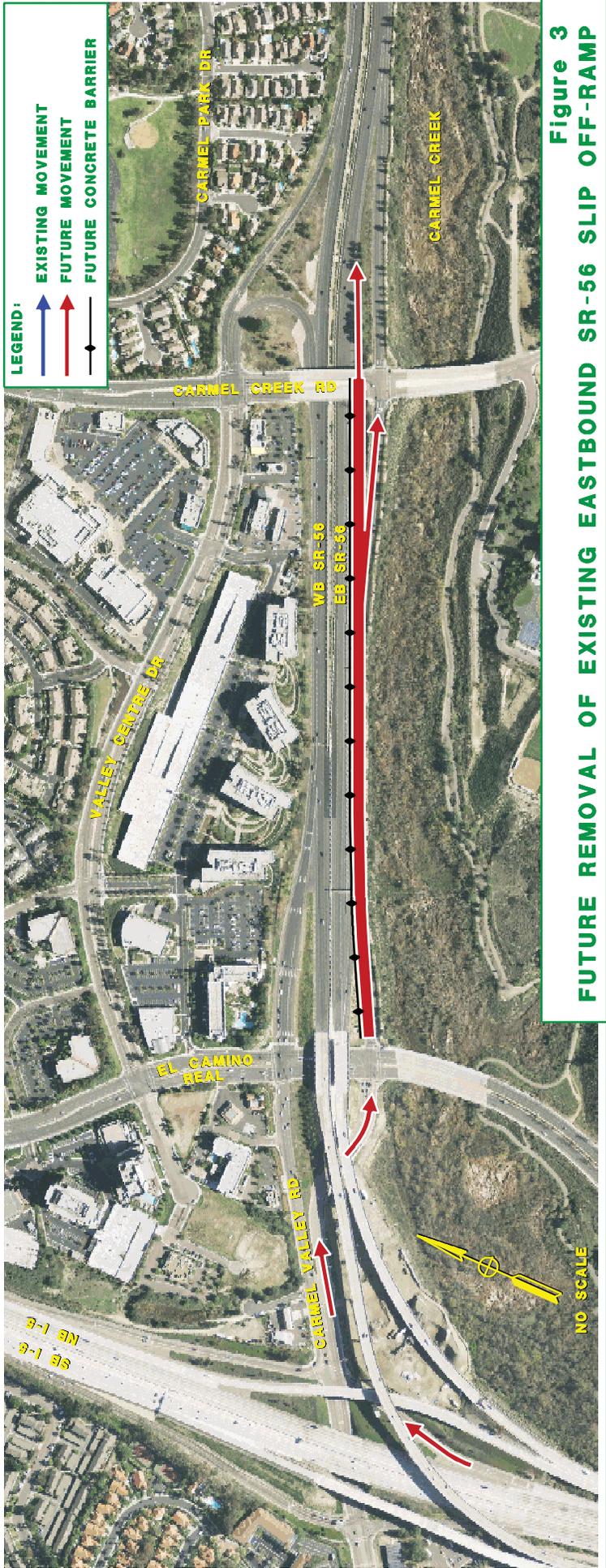
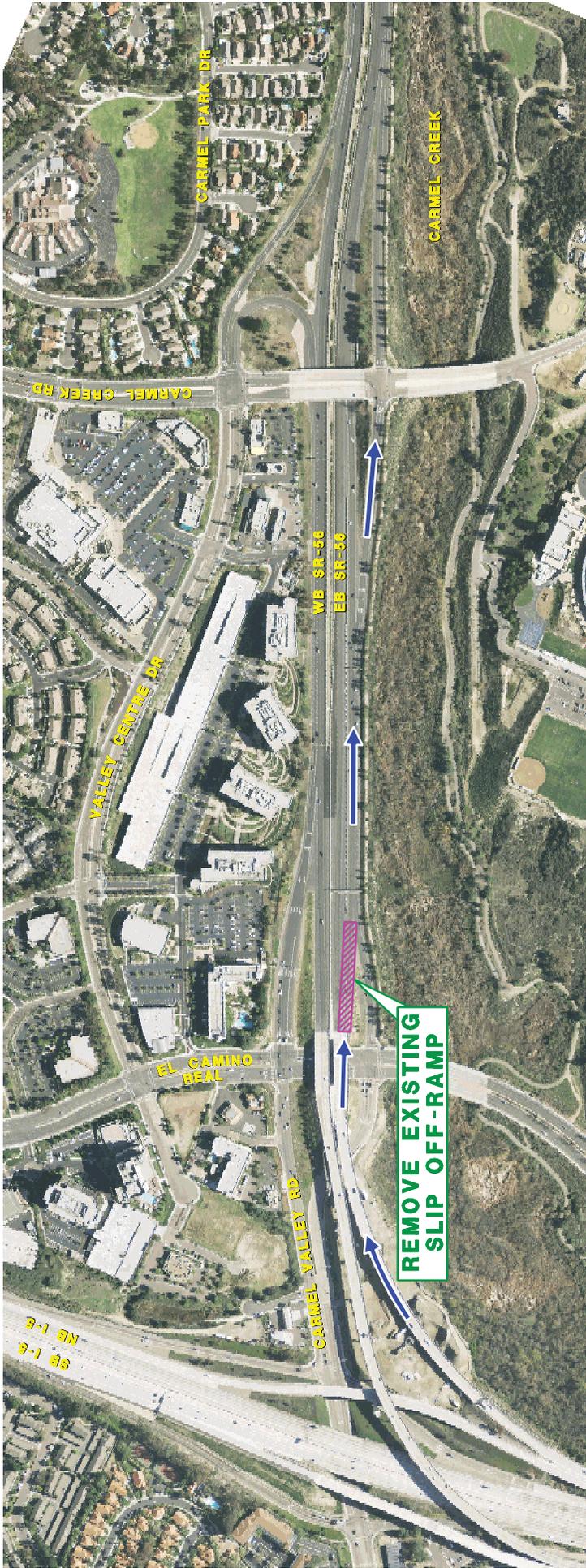


Figure 3
FUTURE REMOVAL OF EXISTING EASTBOUND SR-56 SLIP OFF-RAMP

1.5.2.3 Future Westbound SR 56 Collector-Distributor System

The Direct Connector, Hybrid, and Hybrid with Flyover Alternatives were analyzed with a proposed collector-distributor (c-d) system along westbound SR 56 between Carmel Creek Road and El Camino Real.

As with the removal of the slip-ramp, the c-d system was proposed to improve traffic and safety operations along this segment. Traffic operational analysis indicated failing future operations for the weave segment between vehicles entering westbound SR 56 from Carmel Creek Road and vehicles exiting westbound SR 56 to El Camino Real. This failing weave is due to a combination of inadequate existing interchange spacing, proposed future freeway widening, and an anticipated increase in freeway traffic volumes at this location.

The proposed c-d system would prevent vehicles from accessing the W-S direct connector when entering westbound SR 56 from the Carmel Creek Road loop on-ramp. This would be accomplished by barrier separating the westbound SR 56 mainline between Carmel Creek Road and El Camino Real and would thereby eliminate the need for multiple lane changes through this area. Drivers headed for southbound I-5 from Carmel Creek Road must exit westbound SR 56 at the El Camino Real off-ramp, travel west on Carmel Valley Road, and enter southbound I-5 from the Carmel Valley Road on-ramp. Drivers may also choose to enter westbound SR 56 east of Carmel Creek Road to access the W-S direct connector.

See **Figure 4** for illustration of the existing movement for westbound SR 56 and the future movement with the proposed c-d system.

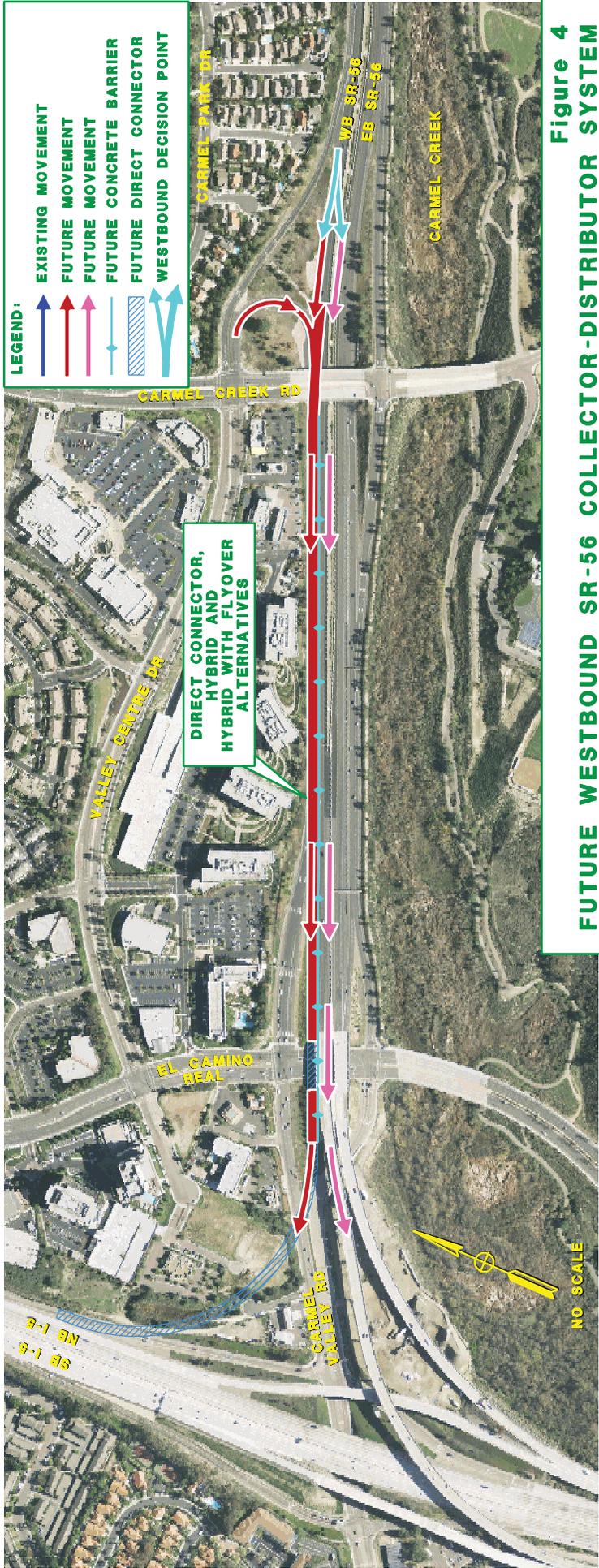
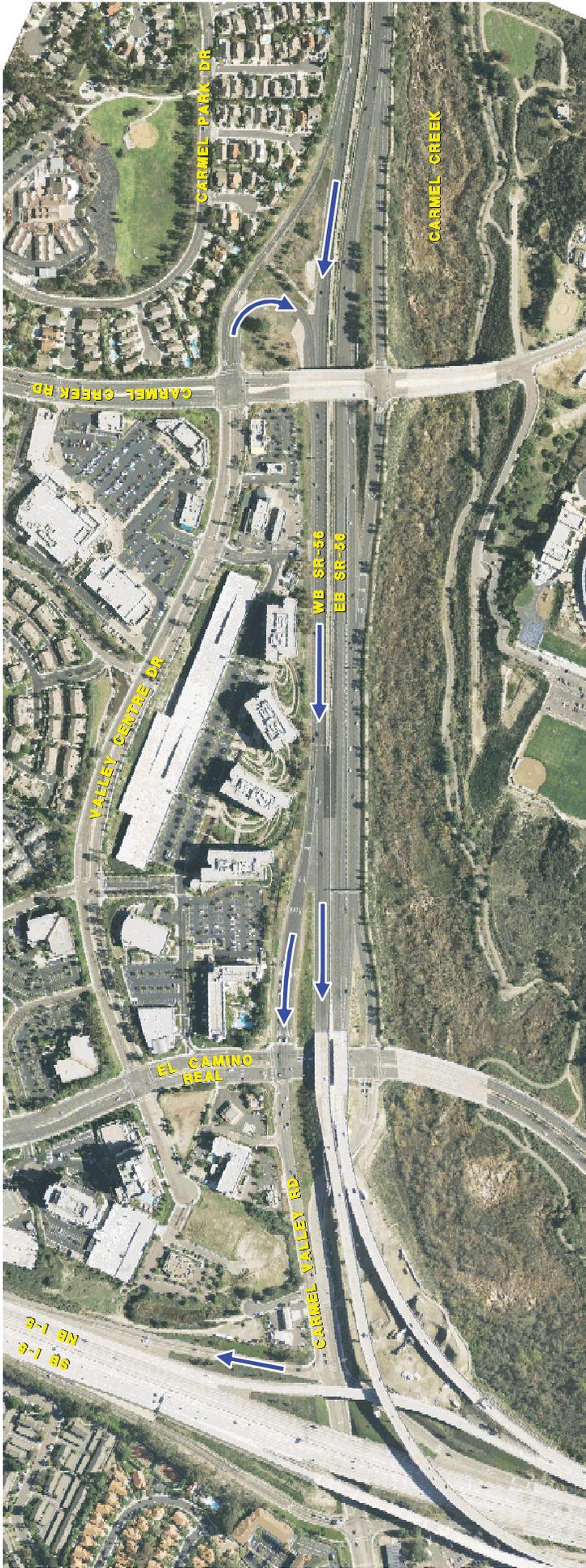


Figure 4
FUTURE WESTBOUND SR-56 COLLECTOR-DISTRIBUTOR SYSTEM

1.5.2.4 Future Extension of I-5 Local Bypasses

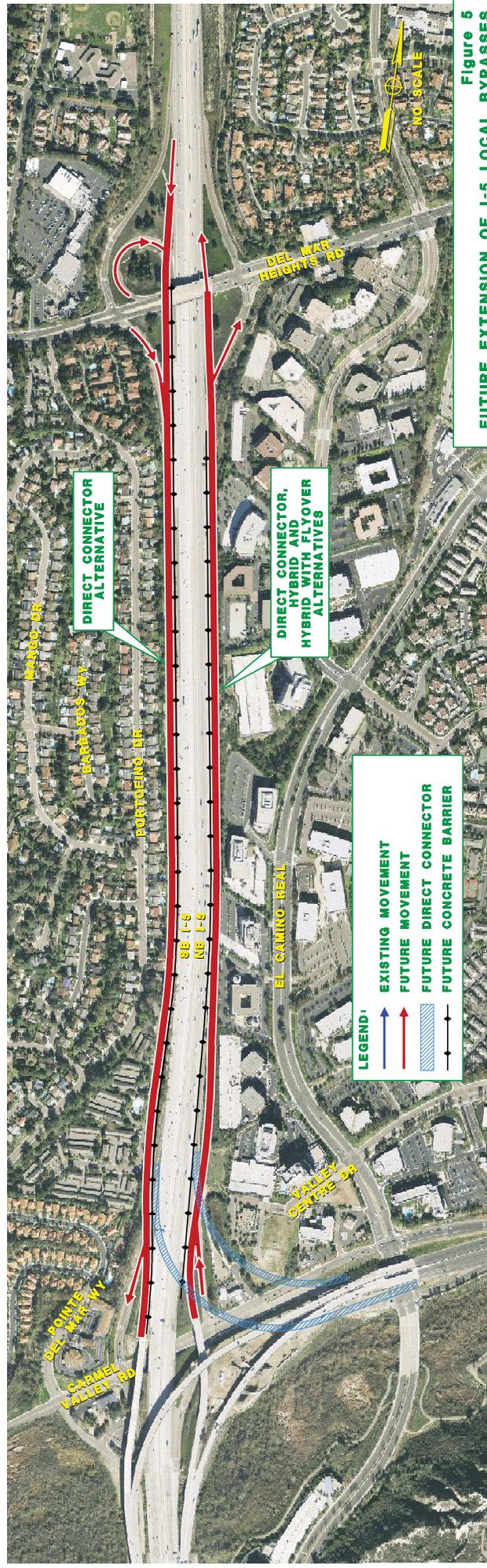
The fourth design feature that redistributes traffic within the project area is the proposed extension of the barrier-separated I-5 local bypass facilities (local bypasses) to Del Mar Heights Road. The local bypasses are designed to mitigate congestion on the I-5 freeway mainline by separating the high speed through traffic from the slower moving traffic merging and diverging at the local street interchanges.

The Direct Connector Alternative was analyzed with the extension of the local bypasses along northbound and southbound I-5 to accommodate the proposed S-E and W-N direct connector alignments. The Hybrid and Hybrid with Flyover Alternatives were analyzed with the extension of the local bypass along northbound I-5 only, to accommodate the proposed W-N direct connector alignment. In the Direct Connector Alternative, the southbound local bypass would contain all of the local interchange traffic entering and exiting at Del Mar Heights Road and Carmel Valley Road, respectively. In the Direct Connector, Hybrid, and Hybrid with Flyover Alternatives the northbound local bypass would contain all of the local interchange traffic entering and exiting at Carmel Valley Road and Del Mar Heights Road, respectively. For these alternatives, drivers traveling northbound who want to exit at Del Mar Heights Road would need to take the northbound local bypass to do so. For the Direct Connector Alternative, drivers exiting at Carmel Valley Road from southbound I-5 would need to take the southbound bypass to do so.

The S-E direct connector would exit from the I-5 freeway mainline approximately ½ mile north of Carmel Valley Road. Drivers entering southbound I-5 from Del Mar Heights Road would not be able to use the S-E direct connector; as is done today, they must exit at Carmel Valley Road and use the El Camino Real to eastbound SR 56 on-ramp to access eastbound SR 56. The W-N direct connector would merge with the northbound local bypass before entering the I-5 freeway mainline at the Del Mar Heights overcrossing.

Extending the local bypasses addresses the traffic operational and weaving concerns associated with having two local street interchanges (I-5/Carmel Valley Road and I-5/Del Mar Heights Road) and a freeway-to-freeway interchange located in the same area. Without the proposed extension of the local bypasses, the addition of the S-E and W-N direct connectors would result in problematic merging, difficult weave maneuvers, and increased congestion due to the inadequate interchange spacing. Extending the local bypasses north to Del Mar Heights Road will also provide additional freeway capacity within the project limits.

See **Figure 5** for illustration of the existing movements for the southbound and northbound local bypasses and the future movements with the proposed extension of the bypasses



LEGEND:

- ↑ EXISTING MOVEMENT
- ↑ FUTURE MOVEMENT
- ▨ FUTURE DIRECT CONNECTOR
- FUTURE CONCRETE BARRIER

DIRECT CONNECTOR ALTERNATIVE

DIRECT CONNECTOR, HYBRID WITH FLYOVER ALTERNATIVES

Figure 5
FUTURE EXTENSION OF I-5 LOCAL BYPASSES

2. FORECASTED TRAFFIC VOLUMES

2.1 Existing and Future Traffic Volumes at a Glance

Figure 6 shows existing and year 2030 future forecast traffic volumes at a number of key Project locations. Sections 3.3 and 3.4 discuss some notable differences between the proposed Project alternatives and reasons for those differences.

DRAFT

LEGEND:

- ADT EXISTING
- NO BUILD (YEAR 2030)
- AUXILIARY LANE (YEAR 2030)
- DIRECT CONNECTORS (YEAR 2030)
- HYBRID (YEAR 2030)
- HYBRID W/ FLYOVER (YEAR 2030)



Figure 6
I-5/SR-56 AVERAGE DAILY TRAFFIC

2.2 Traffic Volumes – Urban Street Facilities

2.2.1 No Build Alternative

Forecasts for the No Build Alternative indicate that local street traffic volumes would more than double by the year 2030 along Del Mar Heights Road east of I-5. This means the addition of 17,000 to 25,000 average daily trips (ADT) by the year 2030 on Del Mar Heights Road. Local street traffic volumes would approximately double along Carmel Valley Road between Del Mar Heights Road and SR-56 and along Carmel Country Road between Del Mar Heights Road and Carmel Creek Road. The largest increases in local street traffic volumes are within the Carmel Valley and Pacific Highland Ranch communities.

2.2.2 Direct Connector Alternative

With the proposed Direct Connector Alternative improvements, year 2030 local street traffic volumes are forecasted to decrease relative to the No Build Alternative throughout the Carmel Valley and Pacific Highlands Ranch communities. Notable decreases in traffic volumes are anticipated along Del Mar Heights Road east of I-5, Carmel Valley Road near the I-5/SR 56 interchange, and Carmel Country Road north of SR 56. Construction of the proposed direct connectors would ensure that the freeway route is more attractive than alternate local street routes when traveling between I-5 at Del Mar Heights Road and SR 56 at Carmel Valley Road. The “cut through” traffic volumes are reduced by drawing travelers from the local streets to the freeway facilities, thereby reducing congestion and improving traffic operational quality in the neighboring communities.

2.2.3 Auxiliary Lane Alternative

The forecasted local street traffic volumes for the Auxiliary Lane Alternative are similar to the No Build Alternative for the year 2030. Slight increases in local street traffic volumes as compared to the No Build Alternative are anticipated along Carmel Country Road between Carmel Creek Road and SR 56 and along Carmel Valley Road near the I-5/SR 56 interchange. Slight decreases in traffic volumes relative to the No Build Alternative are anticipated along Carmel Creek Road between Carmel Country Road and SR 56. These changes would be attributed to the proposed removal of the slip ramp, which would reduce the number of vehicles traveling on Carmel Creek Road and re-route traffic to Carmel Valley Road and Carmel Country Road.

2.2.4 Hybrid Alternative

Forecasted year 2030 local street traffic volumes for the Hybrid Alternative are similar to the Direct Connector Alternative in the W-N direction and similar to the Auxiliary Lane Alternative in the S-E direction. Traffic volumes would increase relative to the Direct Connector Alternative along Del Mar Heights Road east of I-5, Carmel Valley Road near the I-5/SR 56 interchange, and Carmel Country Road north of SR 56.

2.2.5 Hybrid with Flyover Alternative

Forecasted year 2030 local street traffic volumes for the Hybrid with Flyover Alternative are similar to the Hybrid Alternative along the local street segments. Traffic volumes along eastbound Carmel Valley Road would increase relative to the Hybrid Alternative due to the improvements in this area and the addition of the proposed flyover ramp connecting eastbound Carmel Valley Road with eastbound SR 56.

2.3 Traffic Volumes – Freeway Facilities

2.3.1 No Build Alternative

Forecasts for the No Build Alternative indicate that freeway and ramp traffic volumes would approximately double by the year 2030 along the northbound local bypass and the slip ramp to Carmel Creek Road. Traffic volumes are anticipated to approximately double at 7 of the 19 local street interchange ramps within the project limits. The largest change in ramp traffic volumes with the No Build Alternative would occur at the El Camino Real to eastbound SR 56 on-ramp, where volumes would increase from 16,000 ADT under current conditions to more than 32,000 ADT by the year 2030.

2.3.2 Direct Connector Alternative

With the proposed Direct Connector Alternative improvements, year 2030 traffic volumes along the I-5 and SR 56 freeway mainlines are forecasted to increase relative to the No Build Alternative. This increase is attributed to the construction of the proposed direct connectors, which would entice many travelers to use the I-5/SR 56 interchange instead of alternate local street routes or other interchanges serving west-east corridors within the region. Traffic volumes are anticipated to increase along the extended local bypasses since they would contain all of the local street traffic entering and exiting the freeway between the Carmel Valley Road and Del Mar Heights Road interchanges. The construction of the proposed c-d system would increase traffic volumes on the Carmel Valley Road to southbound I-5 on-ramp and decrease traffic volumes on the W-S direct connector. Furthermore, the proposed removal of the existing slip ramp would increase traffic volumes on the northbound I-5 to Carmel Valley Road off-ramp and the eastbound SR 56 to Carmel Country Road off-ramp.

2.3.3 Auxiliary Lane Alternative

With the exception of the northbound I-5 to Carmel Valley Road off-ramp, year 2030 freeway and ramp traffic volumes are anticipated to remain relatively unchanged in the Auxiliary Lane Alternative as compared to the No Build Alternative. As with all of the proposed build alternatives, traffic would be re-routed to the northbound I-5 Carmel Valley Road off-ramp due to the proposed removal of the existing slip ramp in the Auxiliary Lane Alternative.

2.3.4 Hybrid Alternative

Forecasted year 2030 freeway and ramp traffic volumes for the Hybrid Alternative are similar to the Direct Connector Alternative in the W-N direction and similar to the Auxiliary Lane Alternative in the S-E direction. As with the Direct Connector Alternative, the c-d system proposed in the Hybrid Alternative would increase traffic volumes along the Carmel Valley Road to southbound I-5 on-ramp and decrease traffic volumes along the W-S direct connector.

2.3.5 Hybrid with Flyover Alternative

With the exception of the El Camino Real to eastbound SR 56 on-ramp, forecasted year 2030 freeway and ramp traffic volumes for the Hybrid with Flyover Alternative are similar to the Hybrid Alternative. Volumes for the El Camino Real to eastbound SR 56 on-ramp would decrease as compared to the Hybrid Alternative due to construction of the proposed flyover ramp. The flyover ramp would provide direct access to the eastbound SR 56 fast lane from eastbound Carmel Valley Road, allowing drivers to bypass both the intersection and on-ramp at El Camino Real.

2.4 Pacific Highlands Ranch Development Project

LLG studied the overall affect of the Pacific Highlands Ranch (PHR) development on the year 2030 traffic demand for the existing and proposed direct connectors at the I-5/SR 56 interchange. A memo entitled “I-5/SR-56 Interchange Project – Pacific Highlands Ranch Memo” was prepared in June 10, 2009, which explained the effect of the PHR development on the forecasted traffic volumes. A total of 4,907 single and multi-family dwelling units were assumed for the year 2030 traffic models. According to LLG, the Pacific Highlands Ranch development is anticipated to generate 74,220 ADT at full build-out. This value includes trips generated by the dwelling units, a fire or police station, three elementary schools, two high schools, library, agriculture use, commercial use, and industrial park use.

Of the 74,220 ADT generated by the PHR development a total of 4,230 ADT are expected to use the proposed S-E and W-N direct connectors. A combined ADT of 42,220 is anticipated for the proposed direct connectors by the year 2030; therefore the PHR development would generate approximately ten percent of the total traffic volume using the proposed S-E and W-N direct connectors. 16,740 ADT of the 74,220 ADT generated by the development are expected to use the existing N-E and W-S direct connectors. A combined ADT of 69,980 is anticipated for the existing direct connectors by the year 2030; therefore the PHR development would generate approximately 24% of the total traffic volume using the existing N-E and W-S direct connectors.

PHR project traffic is forecasted to make up approximately 10% of the total traffic volume using the proposed S-E and W-N direct connectors. Construction of the proposed S-E and W-N direct connectors is warranted based on total regional traffic volumes; the PHR project would have little impact on total traffic volumes utilizing the S-E and W-N direct connectors.

3. FUTURE TRAFFIC OPERATIONS

3.1 Standard Procedures

LLG completed the traffic study according to the methods described in the Highway Capacity Manual (HCM) and the Caltrans Highway Design Manual (HDM). Traffic operations were analyzed for the existing, 2015 interim, and 2030 design horizon. Street segments, intersections, and freeway mainline segments were analyzed using a volume/capacity (V/C) method consistent with the City of San Diego and Caltrans standards of practice, respectively. Urban street segment daily traffic volumes were compared to the City of San Diego's *Roadway Classification, Level of Service, and ADT Thresholds* table.

3.2 Level of Service Defined

Traffic operations were analyzed using the HCM Level of Service (LOS) method. LOS is a standard by which the operating conditions of a given roadway segment or intersection is measured. The LOS method takes into account roadway geometrics (i.e. the physical layout of the freeways, ramps, intersections, etc.), signal phasing (i.e. the green time given to each of the intersection movements) traffic speed, travel delay, and freedom of vehicles to maneuver to determine the operational quality of the roadway facility. LOS designations range from A to F, where LOS A represents free flowing traffic conditions at average travel speeds with minimal delay; LOS C represents stable traffic flow with speed and maneuverability limited by other vehicles and a significant number of vehicles stopping at intersections; and LOS F represents unstable traffic flow with brief periods of movement at extremely low travel speeds followed by forced stops. In other words, LOS A represents the best operating conditions and is characterized by little or no restrictions on maneuverability, while LOS F represents the worst operating conditions and is characterized by very congested traffic flow with traffic jams and considerable delays.

For freeways and expressways, Caltrans District 11 accepts the use of additional categories per the San Diego Traffic Engineer's Council/Institute of Transportation Engineers (SANTEC/ITE) Guidelines to describe instances of severe congestion and delay. These categories are LOS F0, LOS F1, LOS F2 and LOS F3. LOS F0 describes forced flow with heavy congestion, long queues, and stop and go movement. LOS F1 describes very heavy congestion with very long queues. LOS F2 describes extremely heavy congestion with longer queues and longer stop periods. LOS F3 describes total breakdown of traffic flow with brief periods of movement followed by long stop periods. LOS F3 can be thought of as traffic gridlock.

The City of San Diego encourages traffic operations of LOS D or better for all urban street facilities. Caltrans encourages traffic operations of LOS C-E for freeway facilities. **Figures 7 and 8** (Source: 2000 Highway Capacity Manual) provide levels of service criteria for both freeways and signalized intersections.

Level of Service	Flow Conditions	Operating Speed (mph)	Technical Descriptions
A		70	Highest quality of service. Traffic flows freely with little or no restrictions on speed or maneuverability. No delays
B		70	Traffic is stable and flows freely. The ability to maneuver in traffic is only slightly restricted. No delays
C		67	Few restrictions on speed. Freedom to maneuver is restricted. Drivers must be more careful making lane changes. Minimal delays
D		62	Speeds decline slightly and density increases. Freedom to maneuver is noticeably limited. Minimal delays
E		53	Vehicles are closely spaced, with little room to maneuver. Driver comfort is poor. Significant delays
F		<53	Very congested traffic with traffic jams, especially in areas where vehicles have to merge. Considerable delays

Figure 7 – Freeway Levels of Service

(Source: 2000 Highway Capacity Manual)

Level of Service	Delay per Vehicle (seconds)
A	≤10
B	11-20
C	21-35
D	36-55
E	56-80
F	>80

Factors Affecting LOS of Signalized Intersections

Traffic Signal Conditions:

- Signal Coordination
- Cycle Length
- Protected left turn
- Timing
- Pre-timed or traffic activated signal
- Etc.

Geometric Conditions:

- Left- and right-turn lanes
- Number of lanes
- Etc.

Traffic Conditions:

- Percent of truck traffic
- Number of pedestrians
- Etc.

Figure 8 – Signalized Intersection Levels of Service

3.3 Traffic Operations – Urban Street Facilities

3.3.1 Street Segments

According to the traffic study, by the year 2030 the No Build, Auxiliary Lane, Hybrid, and Hybrid with Flyover Alternatives would have failing street segments (LOS E or below) on Del Mar Heights Road between Camino Del Mar and High Bluff Road and on Carmel Valley Road between I-5 and El Camino Real. Average peak hour travel speeds would range from 9 to 15 miles per hour (mph) through these areas.

The Direct Connector Alternative would provide operational improvement along Del Mar Heights Road between the I-5 northbound ramps and Carmel Valley Road, which would operate at LOS D or better for all segments. Although the Direct Connector Alternative would provide some improvement along Carmel Valley Road between I-5 and El Camino Real, this segment would continue to operate at LOS E despite the construction of both the S-E and W-N direct connectors. This is due to the traffic volumes that would be re-routed to Carmel Valley Road as a result of the removal of the slip ramp and construction of the proposed c-d system.

Table 1 below provides a summary of the street segment operations at key locations for the Project.

Table 1 – Street Segment Operations

Street Name	Street Segment	Year 2030 LOS				
		<i>No Build</i>	<i>Direct Connector</i>	<i>Auxiliary Lane</i>	<i>Hybrid</i>	<i>Hybrid with Flyover</i>
Carmel Valley Rd	Sorrento Valley Rd to I-5	B	B	B	B	B
	I-5 to El Camino Real	F	E	F	F	F
El Camino Real	Valley Center Dr to Carmel Valley Rd	D	D	D	D	D
	Carmel Valley Rd to Carmel Mountain Rd	B	B	B	B	B
Carmel Country Rd	Del Mar Trails Rd to SR 56 WB ramps	D	C	D	D	D
Del Mar Heights Rd	Mango Dr to Portofino Dr	E	E	E	E	E
	I-5 NB ramps to High Bluff Rd	F	D	F	E	E

Level of Service (LOS)		
	A - D	
		
		F

3.3.2 Intersections

A total of 41 intersections were chosen for analysis in the traffic study, the majority of which lie in the Carmel Valley and Del Mar Heights communities. Of the 41 intersections analyzed, five were determined to have failing traffic operations in either the AM or PM peak hour under current traffic conditions. With the No Build Alternative this number would increase to 20 out of 41 by the year 2030. During peak hours, drivers should expect to wait through multiple signal phases at these locations. Whether traveling just a few blocks to the local grocery store or 20 miles to the work place, each of these intersections has the potential to add more than 80 seconds to a trip.

The number of failing intersections in the year 2030 would drop from 20 to 12 with the proposed Direct Connector Alternative improvements. Operational improvement would occur at several key intersections for the project, including the southbound I-5 ramps at Del Mar Heights Road, El Camino Real at Del Mar Heights Road, the southbound I-5 ramps at Carmel Valley Road, and El Camino Real at the westbound SR 56 off-ramp.

Despite the improvements proposed in the Auxiliary Lane Alternative, the number of failing intersections in the year 2030 would increase from 20 to 21 with this alternative. While proposed ramp and local street widening would improve traffic operations for the key intersections of El Camino Real at the westbound SR 56 off-ramp and Carmel Valley Road at the southbound I-5 ramps, operations at some intersections along Carmel Country Road would degrade due to the removal of the slip ramp to Carmel Creek Road.

Despite the improvements proposed in the Hybrid and Hybrid with Flyover Alternatives, the number of failing intersections in the year 2030 would remain at 20 as with the No Build Alternative. Traffic operations would improve at a few key intersections including El Camino Real at the westbound SR 56 off-ramp and Carmel Valley Road at the southbound I-5 ramp. Additionally, the Hybrid with Flyover Alternative would provide improved operations at the intersection of El Camino Real and the eastbound SR 56 on-ramp, although the intersection would continue to fail during PM peak hours. As with the Auxiliary Lane Alternative, operations with the Hybrid and Hybrid with Flyover Alternatives would degrade at some intersections along Carmel Country Road due to the removal of the slip ramp.

Table 2 provides a summary of the intersection operations at key Project locations.

Table 2 – Intersection Operations

Intersection	Direction of Travel	Peak Hour	Year 2030 LOS				
			No Build	Direct Connector	Auxiliary Lane	Hybrid	Hybrid with Flyover
Carmel Valley Rd / I-5 ramps	NB	AM	E	D	E	E	E
		PM	E	E	F	F	F
	SB	AM	F	C	E	F	F
		PM	F	C	F	F	F
El Camino Real / Carmel Valley Road	EB	AM	E	D	E	E	D
		PM	F	E	F	F	F
	WB	AM	E	D	D	D	D
		PM	D	C	C	C	C
Carmel Country Rd / SR 56 ramps	EB	AM	C	D	D	D	D
		PM	D	D	E	E	E
	WB	AM	C	E	D	E	E
		PM	C	C	C	C	C
Del Mar Heights Rd / I-5 ramps	NB	AM	F	E	F	F	F
		PM	E	E	E	E	E
	SB	AM	E	C	E	E	E
		PM	E	C	E	E	E

3.4 Traffic Operations – Freeway Facilities

3.4.1 Freeway Mainline

According to the traffic study, both the northbound and southbound I-5 freeway mainline would operate at LOS E or better between Via Del La Valle and Carmel Valley Road for all of the alternatives under consideration through the 2030 design year. Even during peak hours, drivers should expect average travel speeds above 20 mph on I-5.

Westbound SR 56 is anticipated to have failing traffic operations (AM peak hour) between El Camino Real and Carmel Country Road in the No Build Alternative by the year 2030. During peak hours, drivers would experience severely reduced travel speeds through this area with extensive traffic jams. Under these conditions, performing simple maneuvers such as lane changes would become very difficult.

With the improvements proposed in the Direct Connector, Auxiliary Lane, Hybrid and Hybrid with Flyover Alternative, westbound SR 56 would no longer have failing operations between El Camino Real and Carmel Country Road.

Year 2030 traffic operations along the eastbound SR 56 freeway mainline between Carmel Creek Road and Carmel Country Road would degrade to LOS F(0) (PM Peak) in the Auxiliary Lane and Hybrid Alternative. This is due to the lack of proposed freeway improvements for eastbound SR 56 in combination with the removal of the slip ramp.

Table 3 provides a summary of the freeway mainline operations at key Project locations. See **Figure 9** for an overview of the key freeway locations analyzed in the traffic study.

Table 3 – Freeway Mainline Operations

Freeway Segment	Direction of Travel	Peak Hour	Year 2030 LOS				
			No Build	Direct Connector	Auxiliary Lane	Hybrid	Hybrid with Flyover
I-5: Del Mar Heights Rd to Carmel Valley Rd	NB	AM	C	C	C	C	C
		PM	D	E	D	E	E
	SB	AM	E	E	D	D	D
		PM	C	D	C	C	C
SR 56: El Camino Real to Carmel Creek Rd	EB	AM	A	A	A	A	A
		PM	C	B	C	C	C
	WB	AM	F(1)	C	E	C	C
		PM	C	A	B	A	A
SR 56: Carmel Creek Rd to Carmel Country Rd	EB	AM	B	B	B	B	A
		PM	E	D	F(0)	F(0)	C
	WB	AM	F(0)	E	D	E	E
		PM	A	B	A	B	B

3.4.2 I-5 Local Bypasses

According to the traffic study, both the northbound and southbound local bypasses would operate at LOS E or better for all of the alternatives under consideration through the 2030 design year. Even during peak hours, drivers should expect average travel speeds above 20 mph on the local bypasses.

3.4.3 Freeway Weaves

The traffic study identified two weaving segments that would operate at a LOS F (AM peak hour, PM peak hour or both) in the No Build Alternative by the year 2030. The first segment is located along eastbound SR 56 and occurs between vehicles exiting at Carmel Creek Road via the slip ramp and those entering from the eastbound SR 56 El Camino Real on-ramp. The second segment is along westbound SR 56 and occurs between vehicles entering from the westbound SR 56 Carmel Creek Road loop on-ramp and those exiting at El Camino Real. During peak hours, the lack of spacing between vehicles in the traffic stream and severely reduced travel speeds would make maneuvering noticeably difficult at these locations.

The Auxiliary Lane Alternative would eliminate the weave segment in the eastbound direction by removing the slip ramp; however, the westbound direction would still operate at a LOS F, as in the No Build Alternative. The proposed removal of the slip ramp and implementation of the c-d system would eliminate these problematic weaving segments in the Direct Connector, Hybrid, and Hybrid with Flyover Alternatives.

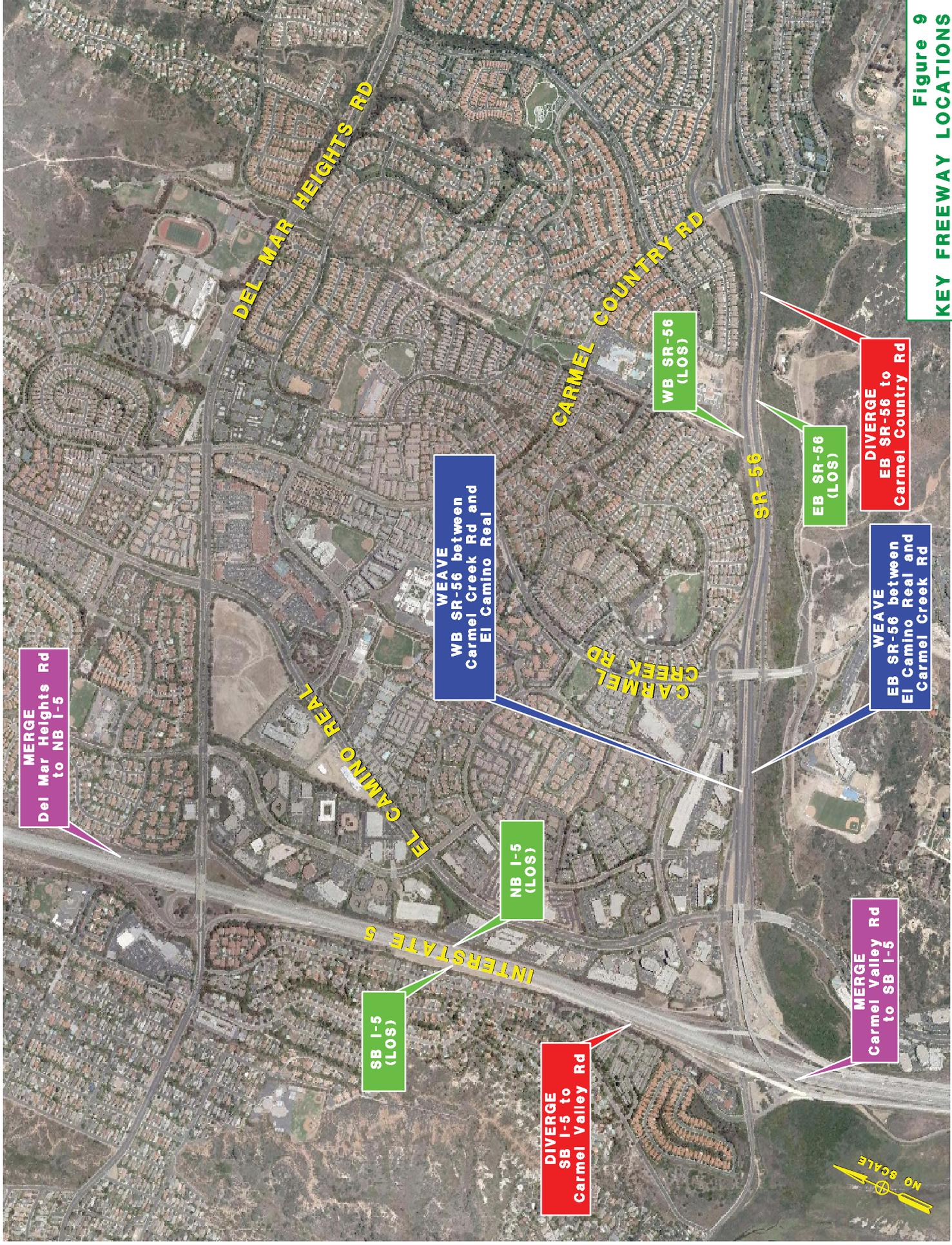


Figure 9
KEY FREEWAY LOCATIONS

3.4.4 Freeway Ramp Merges and Diverges

The traffic study identified two merge segments that would have failing operations (either AM or PM peak hour) in the No Build Alternative by the year 2030. These merge segments are located at the entrance points for the Carmel Valley Road southbound I-5 on-ramp and the Del Mar Heights Road northbound I-5 on-ramp.

The merge at the Carmel Valley Road southbound I-5 on-ramp would continue to fail in all of the build alternatives despite the proposed improvements. The merge at the Del Mar Heights Road northbound I-5 on-ramp would improve from LOS F to LOS D in the Direct Connector, Hybrid and Hybrid with Flyover Alternatives.

The following ramp diverge locations were identified in the traffic study to have failing traffic operations (AM peak hour) in the No Build Alternative by the year 2030: the southbound local bypass exit from the I-5 mainline, the southbound I-5 to Carmel Valley Road off-ramp, and the westbound SR 56 to Carmel Creek Road off-ramp.

Traffic operations for the diverge at the southbound local bypass exit would improve from LOS F to LOS B with the Direct Connector Alternative, but would continue to fail with the Auxiliary Lane, Hybrid and Hybrid with Flyover Alternatives. The diverges at the southbound I-5 to Carmel Valley Road off-ramp and the westbound SR 56 to Carmel Creek Road off-ramp would improve from LOS F to LOS C or better with the Direct Connector, Auxiliary Lane, Hybrid and Hybrid with Flyover Alternatives.

3.4.5 Freeway Ramp Capacity

All on-ramps within the project area are anticipated to operate under capacity for all of the alternatives under consideration through the 2030 design year. All off-ramps are anticipated to operate under capacity with the Direct Connector Alternative. The eastbound SR 56 to Carmel Country Road off-ramp would operate approximately 5-10% over capacity with the Auxiliary Lane and Hybrid Alternatives by the year 2030. This is due to the proposed removal of the slip ramp, which would re-route traffic to this off-ramp, in combination with a lack of proposed improvements at the off-ramp with the Auxiliary Lane and Hybrid Alternatives.

3.5 Travel Time Study

3.5.1 Regional Travel Time Performance Goals and Statistics

The 2030 San Diego RTP uses travel time for regional performance measures of both mobility and accessibility. According to the 2030 RTP, the current (2006) average work trip travel time for the San Diego region is 27 minutes and the average work trip length is 11.9 miles. In addition, 61 percent of work/school trips are 30 minutes or less and 66 percent of non-work related trips are 15 minutes or less. Despite the anticipated one-million new people and more than half a million new jobs in the

region by the year 2030, the goal of the RTP is to ensure that there is very little change in future travel times as compared to current conditions. By implementing the 2030 RTP, it is expected that the average work trip travel time would increase from 27 to 30 minutes by the year 2030. In addition, 63 percent of work/school trips would remain within 30 minutes, and 56 percent non-work trips would remain within 15 minutes over the next 20 years.

Since commutes between the home and the workplace are almost exclusively round-trips, it is helpful to think of travel time as a daily total. If the current average one-way work trip takes 27 minutes, then the average daily round-trip commute to work is 54 minutes. This means that the average San Diego worker spends a total of 54 minutes a day commuting a total of 23.8 round trip miles to and from the workplace.

3.5.2 Travel Time Study Methodology

The Travel Time study looked at five distinct routes (One freeway route and four “cut through” local street routes) in the I-5/SR 56 project study area. Travel time was calculated between westbound SR 56 at Carmel Valley Road and northbound I-5 at Del Mar Heights for both the south to east and west to north movements. The freeway route for the No Build and Auxiliary Lane Alternatives modeled vehicles traveling through the Carmel Valley Road interchange at I-5. The freeway route for the Direct Connector Alternative modeled vehicles traveling along the freeway-to-freeway connectors. The proposed W-N direct connector was modeled in the Hybrid and Hybrid with Flyover Alternatives. In the southbound to eastbound direction, the Carmel Valley Road interchange was modeled for the Hybrid and Hybrid with Flyover Alternatives. The local street routes are various combinations of Carmel Valley Road, Carmel Country Road, Carmel Creek Road, El Camino Real, and Del Mar Heights Road (See **Figures 10 and 11** – Travel Time Study Routes). The average length for all of the routes that were studied is approximately 4.5 miles.

The existing travel time data for the various routes was collected with pilot car runs on June 4 and 5, 2008 during the AM, mid-day, and PM peak periods. Schools were in session and the average travel time of two runs was determined for every route.



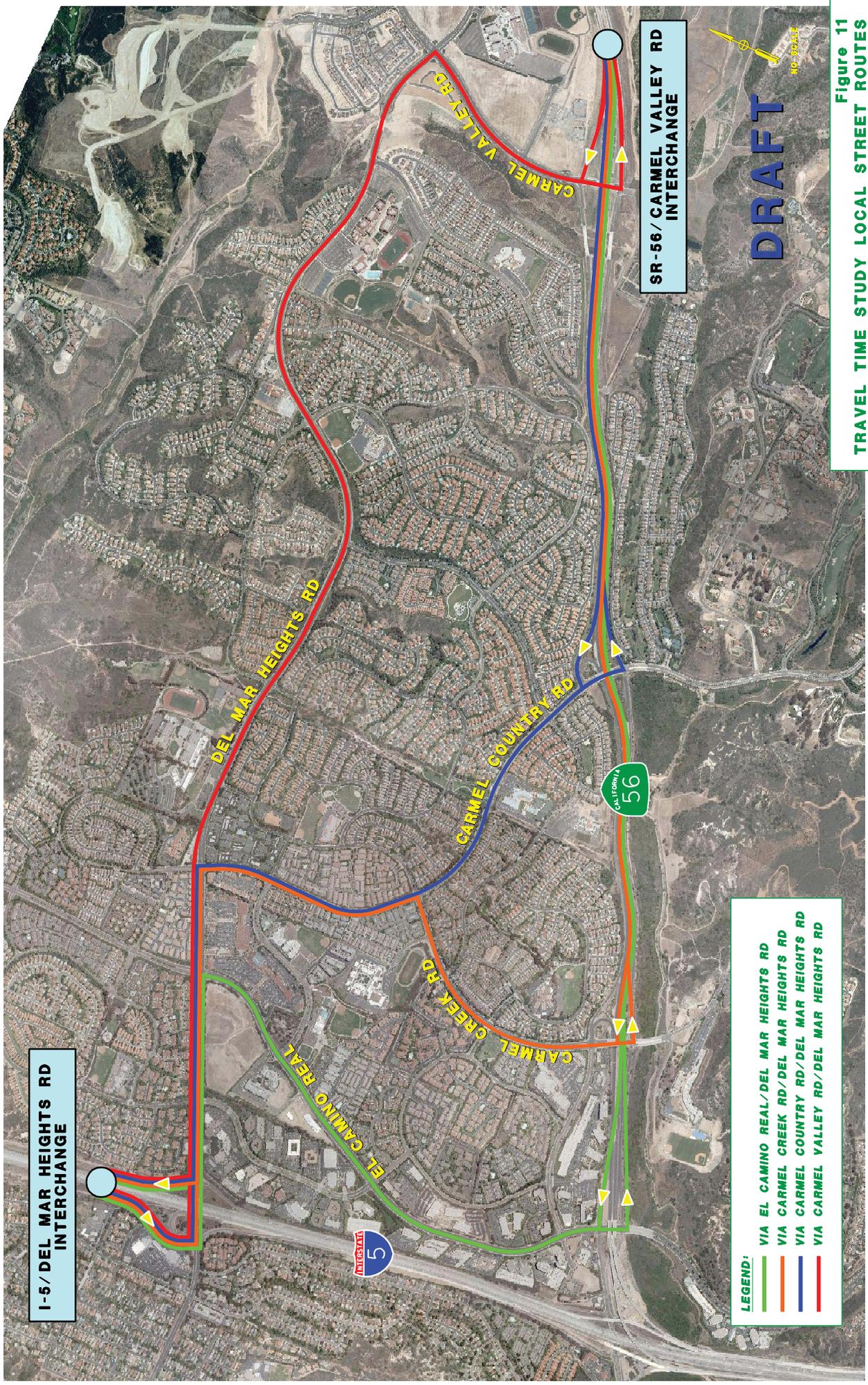
I-5/DEL MAR HEIGHTS RD INTERCHANGE

SR-56/CARMEL VALLEY RD INTERCHANGE

- LEGEND:**
- AUX LANE AND NO BUILD ALTERNATIVE
 - HYBRID ALTERNATIVE
 - HYBRID WITH FLYOVER ALTERNATIVE
 - DIRECT CONNECTOR ALTERNATIVE

DRAFT

TRAVEL TIME STUDY FREEWAY ROUTES **Figure 10**



I-5/DEL MAR HEIGHTS RD INTERCHANGE

SR-56/ CARMEL VALLEY RD INTERCHANGE

- LEGEND:**
- VIA EL CAMINO REAL/DEL MAR HEIGHTS RD
 - VIA CARMEL CREEK RD/DEL MAR HEIGHTS RD
 - VIA CARMEL COUNTRY RD/DEL MAR HEIGHTS RD
 - VIA CARMEL VALLEY RD/DEL MAR HEIGHTS RD

DRAFT

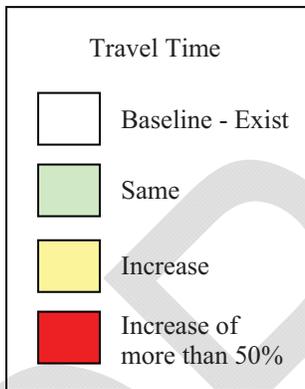
TRAVEL TIME STUDY LOCAL STREET ROUTES **Figure 11**

3.5.3 Travel Time Study Results

Table 4 provides a summary of the round-trip travel times (in minutes of travel) under existing conditions and in the year 2030 under the No Build, Direct Connector, Auxiliary Lane, Hybrid and Hybrid with Flyover alternative scenarios. The table presents the results for both the “cut through” local street routes and the freeway routes. For the purpose of determining the round-trip travel times, it was assumed that drivers who travel in the westbound to northbound direction in the morning would return in the southbound to eastbound direction in the evening, and vice-versa.

Table 4 – Round-Trip Travel Times

Routes	Direction of Travel in Morning and Evening	Current Travel Times (min)	Year 2030 Travel Times (min)				
			No Build	Direct Connector	Auxiliary Lane	Hybrid	Hybrid with Flyover
Local Street Routes	W-N in AM and S-E in PM	18-30	46-57	30-36	46-57	37-45	37-45
	S-E in AM and W-N in PM	20-24	36-38	27-32	33-40	29-35	29-35
Freeway Route	W-N in AM and S-E in PM	24	51	19	39	37	33
	S-E in AM and W-N in PM	17	33	19	27	26	25



3.6 Queuing Analysis

According to the traffic study, there are several locations on and along Carmel Valley Road that would have peak period queues (lines of cars) that exceed available storage lengths in the No Build Alternative by the year 2030. The anticipated queues at the southbound I-5 to Carmel Valley Road off-ramp (north of the Carmel Valley Road and southbound I-5 ramps intersection) and along eastbound Carmel Valley Road (west of the El Camino Real and westbound SR 56 ramps intersection) are of particular importance as these locations are vital components of the project’s purpose and need. In the No Build Alternative, queues would extend back to the southbound I-5 freeway lanes at the southbound off-ramp during the peak periods by the year 2030. In addition, queues along eastbound Carmel Valley Road would extend from El Camino Real past the Carmel Valley Road and southbound I-5 ramps intersection by the year 2030. This extensive queuing along eastbound Carmel Valley Road would likely exacerbate the queuing problems at the southbound I-5 to Carmel Valley Road off-ramp.

The Auxiliary Lane, Hybrid, and Hybrid with Flyover Alternatives would have peak period queues similar to the No Build Alternative. Despite the improvements proposed as part of these alternatives, it is anticipated that peak period queues would extend back to the southbound I-5 freeway lanes at the southbound I-5 to Carmel Valley Road off-ramp. Extensive queuing is also anticipated along eastbound Carmel Valley Road by the year 2030. In addition, the Auxiliary Lane, Hybrid, and Hybrid with Flyover Alternatives would have peak period queues that extend back to the northbound I-5 freeway lanes at the northbound I-5 to Carmel Valley Road off-ramp. This is due to the proposed removal of the slip ramp, which re-routes vehicles bound for Carmel Creek Road to the northbound off-ramp. To mitigate for this issue, triple right turn lanes are proposed at the northbound I-5 to Carmel Valley Road off-ramp termini in the Direct Connector, Auxiliary Lane and Hybrid Alternatives; however, spill back onto the northbound I-5 freeway lanes is anticipated for the Auxiliary Lane and Hybrid Alternatives despite the triple right turns.

The Direct Connector, Hybrid, and Hybrid with Flyover Alternatives would have an increase in queue lengths as compared to the No Build Alternative for the westbound left turn movement at the intersection of Carmel Valley Road and the southbound I-5 ramps. This would be due to construction of the proposed c-d system, which would re-route vehicles to Carmel Valley Road that currently use the Carmel Creek Road to westbound SR 56 loop on-ramp to access southbound I-5.

With the Direct Connector Alternative, construction of the proposed S-E and W-N direct connectors would enable a large reduction in queue lengths over the No Build Alternative at the southbound I-5 to Carmel Valley Road off-ramp and along eastbound Carmel Valley Road. In addition, the Direct Connector Alternative is the only proposed build alternative that would accommodate the year 2030 traffic volumes at the northbound I-5 to Carmel Valley Road. Peak period queues would be contained by the northbound and southbound I-5 to Carmel Valley Road off-ramps and would not extend back to the I-5 freeway mainline lanes. Peak period queues would also be contained along eastbound Carmel Valley Road and would not extend back to the Carmel Valley Road and northbound I-5 ramps intersection. .

Table 6 provides a summary of the anticipated year 2030 queues at key Project locations.

Table 6 – Anticipated Queue Lengths

Intersection	Direction of Travel	Peak Hour	Year 2030 Queue Lengths in Feet (Available Storage/Required Storage)				
			No Build	Direct Connector	Auxiliary Lane	Hybrid	Hybrid with Flyover
Del Mar Heights Rd / I-5 NB ramps	WB R	AM	200 / 810	200 / 620	200 / 810	200 / 570	200 / 620
		PM	200 / 640	200 / 520	200 / 640	200 / 500	200 / 520
	EB T	AM	1310 / 1520	1345 / 1230	1310 / 1520	1310 / 1520	1310 / 1520
		PM	1310 / 1150	1345 / 830	1310 / 1150	1310 / 1150	1310 / 1150
	EB L	AM	930 / 680	940 / 620	930 / 680	930 / 680	930 / 680
		PM	930 / 730	940 / 720	930 / 730	930 / 730	930 / 730
Carmel Valley Rd / I-5 NB ramps	WB R	AM	460 / 50	460 / 80	460 / 40	460 / 50	460 / 50
		PM	460 / 30	460 / 120	460 / 60	460 / 50	460 / 50
	EB T	AM	980 / 1890	980 / 1710	980 / 2420	980 / 2420	1410 / 1870
		PM	980 / 2430	980 / 2280	980 / 2880	980 / 2880	1410 / 2120
	EB L	AM	260 / 200	260 / 230	260 / 200	260 / 200	260 / 200
		PM	260 / 180	260 / 180	260 / 180	260 / 180	260 / 180
Carmel Valley Rd / I-5 SB ramps	WB T	AM	980 / 370	980 / 230	980 / 370	980 / 370	980 / 370
		PM	980 / 280	980 / 190	980 / 280	980 / 280	980 / 280
	WB L	AM	590 / 870	590 / 930	590 / 810	590 / 900	590 / 900
		PM	590 / 920	590 / 1380	590 / 920	590 / 1660	590 / 1660
El Camino Real / SR 56 ramps	WB T	AM	1970 / 1530	1340 / 1260	1970 / 1470	1340 / 1260	1340 / 1260
		PM	1970 / 930	1340 / 590	1970 / 770	1340 / 590	1340 / 590
	EB T	AM	2360 / 550	3310 / 630	3310 / 1150	3310 / 1150	2360 / 1030
		PM	2360 / 2370	3310 / 1650	3310 / 3320	3310 / 3320	2360 / 2920
Carmel Country Rd / SR 56 WB ramps	SB L	AM	340 / 750	340 / 940	340 / 920	340 / 940	340 / 940
		PM	340 / 450	340 / 520	340 / 450	340 / 520	340 / 520
Carmel Country Rd / SR 56 EB ramps	SB L	AM	720 / 550	720 / 420	720 / 640	720 / 690	720 / 690
		PM	720 / 360	720 / 250	720 / 650	720 / 650	720 / 650
SB I-5 ramp / Carmel Valley Rd*	SB L	AM	1570 / 1630	1170 / 490	1570 / 1350	1570 / 1350	1570 / 1350
		PM	1570 / 1910	1170 / 390	1570 / 1600	1570 / 1600	1570 / 1600
NB I-5 ramp / Carmel Valley Rd*	NB L	AM	830 / 410	775 / 350	725 / 470	775 / 470	1030 / 420
		PM	830 / 780	775 / 660	725 / 1030	775 / 1030	1030 / 840
	NB R	AM	1100 / 840	1455 / 1040	1400 / 2240	1455 / 2240	1060 / 2990
		PM	1100 / 770	1455 / 1340	1400 / 2990	1455 / 2990	1060 / 3280
WB SR 56 ramp / Carmel Country Rd*	WB	AM	2130 / 240	2130 / 210	2130 / 540	2130 / 210	2130 / 210
		PM	2130 / 310	2130 / 150	2130 / 360	2130 / 150	2130 / 150
EB SR 56 ramp / Carmel Country Rd*	EB	AM	2230 / 420	2230 / 680	2230 / 680	2230 / 680	2230 / 680
		PM	2230 / 1120	2230 / 1790	2230 / 2030	2230 / 1790	2230 / 1790

Queue Length	
	Queue less than available storage
	Queue exceeds available storage by < 20%
	Queue exceeds available storage by > 20%

* Note: Queues that exceed the available storage lengths at these locations would result in back up onto the freeway mainline lanes.