Technical Appendix 18

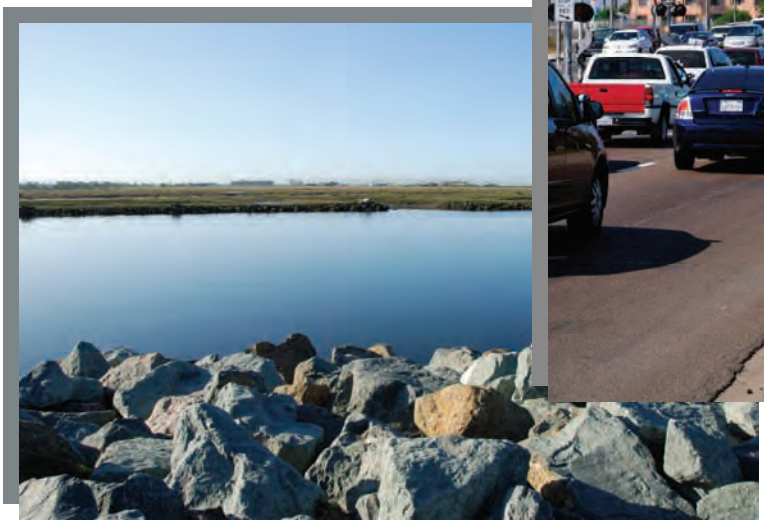
Interstate 5 South Multimodal Corridor Study

Appendix Contents

Interstate 5 South Multimodal Corridor Study

The Interstate 5 (I-5) South Multimodal Corridor Study analyzed a variety of conceptual alternatives for multimodal improvements along I-5 between State Route 54 (SR 54) and Main Street within the City of Chula Vista. The study area for the I-5 South Multimodal Corridor Study focuses on I-5 and the adjacent transportation facilities located between Main Street and SR 54, including transit, highway, freight rail, bicycle, and pedestrian modes. The Study also included a conceptual strategy for implementation of future multimodal transportation improvements. The I-5 South Multimodal Corridor Study is included as Technical Appendix 18.

Interstate 5 (I-5) South Multimodal Corridor Study



PREPARED FOR:

SANDAG
San Diego's Regional Planning Agency

CITY OF CHULA VISTA

PREPARED BY:

AECOM

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Agencies and Organizations of the I-5 South Multimodal Corridor Study

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California Department of Transportation District 11
City of Chula Vista
City of Coronado
City of Imperial Beach
City of National City
City of San Diego
Metropolitan Transit System (MTS)
Port of San Diego
San Diego Association of Governments
San Diego and Imperial Valley Railroad

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Executive Summary

The Interstate 5 (I-5) South Multimodal Corridor Study, prepared by the San Diego Association of Governments (SANDAG) and the City of Chula Vista, in collaboration with Caltrans District 11, analyzes a variety of conceptual alternatives for multimodal improvements along I-5 between State Route (SR) 54 and Main Street within the City of Chula Vista. This segment of I-5 lies within what is referred to as the I-5 South Corridor, which consists of various transportation facilities adjacent to, and including, I-5 between I-15 and the San Ysidro Port of Entry. The focus study area for the I-5 South Multimodal Corridor Study is I-5 and the adjacent transportation facilities located between Main Street and SR 54, including transit, freight rail, bicycle, and pedestrian modes. The Study also includes a conceptual strategy for implementation of future multimodal transportation improvements within the I-5 South Corridor.

Several agencies were invited to participate in the development of the I-5 South Multimodal Corridor Study in the form of an Ad Hoc Working Group. The Group was formed to coordinate the various aspects of this project, and meetings were held monthly since work began on the Study in February 2009 and has continued through April 2010. Member agencies include:

- California Department of Transportation District 11 (Caltrans)
- City of Chula Vista
- City of Coronado
- City of Imperial Beach
- City of National City
- City of San Diego
- Metropolitan Transit System (MTS)
- Port of San Diego
- SANDAG
- San Diego and Imperial Valley Short Line Operator (SDIV)

This project culminated in approval of a conceptual alternative for consideration in SANDAG's 2050 Regional Transportation Plan (RTP) by the SANDAG Board of Directors on May 28, 2010.

In concurrence with this project, Caltrans is developing a Project Study Report-Project Development Support (PSR-PDS) for the I-5 South Corridor between I-15 and the San Ysidro Port of Entry.

This Summary Report is a compilation of the work products and deliverables completed for the I-5 South Multimodal Corridor Study. It contains summary descriptions of each of the work products and deliverables included in this report. Also included is a summary of the project meetings along with key meeting presentations, as well as cost estimates of each of the conceptual project alternatives. This report also contains descriptions of various environmental analysis components that were completed over the course of the project.

Meetings and Presentations

In order to facilitate participation in the development of the I-5 South Multimodal Corridor Study amongst SANDAG and the City of Chula Vista, as well as the multiple agencies involved, an Ad Hoc Working Group, a Rail Working Group, and a Traffic Working Group were formed. To coordinate the various aspects of this project, meetings of these technical groups were held monthly since the beginning of the project. Member agencies that have participated in the meetings include:

- California Department of Transportation District 11 (Caltrans)
- City of Chula Vista
- City of Coronado
- City of Imperial Beach
- City of National City
- City of San Diego
- Metropolitan Transit System (MTS)
- Port of San Diego
- SANDAG
- San Diego and Imperial Valley Short Line Operator (SDIV)

Various other meetings were held to discuss the project including the SANDAG Transportation Committee meeting on May 7, 2010 and the SANDAG Board of Directors meeting on May 28, 2010.

Appendix A includes presentations and handouts from key project meetings.

Issue Statement

The project Issue Statement, dated June 5, 2009, discusses ten major issues for the I-5 South Multimodal Corridor between SR 54 and Main Street within the City of Chula Vista.

1. **Limited travel choices**: There are currently no High Occupancy Vehicle (HOV) or Managed Lanes along I-5 in this section of the corridor, and regional transit trips must be accomplished through the use of localized and corridor service including the Blue Line Trolley, MTS Bus Routes, and Chula Vista Transit Bus Routes. Many of the existing routes operate at or near capacity and below the desired headway specified in the SANDAG 2030 Regional Transportation Plan: *Pathways for the Future*.
2. **Increasing demand for trolley service and associated conflicts with vehicle traffic**: Ridership along the Blue Line Trolley, currently the highest of any light rail transit (LRT) line in the region, is projected to increase, and the at-grade rail crossings at E Street, H Street, and Palomar Street continue to cause traffic congestion.
3. **Pedestrian/bicycle mobility**: The Chula Vista Urban Core currently consists of an environment that is generally unfriendly to non-motorized travel, and there is a lack of connectivity of bicycle and pedestrians facilities.

4. **At-grade rail crossings**: As the frequency of the trolley increases with demand, the level of service at the E Street, H Street, and Palomar Street at-grade rail crossings decreases due to the increased crossing arm down time. The at-grade rail crossings also create potential safety risks to rail workers during maintenance activities, and to the general public.
5. **Capacity constraints for goods movement**: The region's freight rail system, which operates on the double track system used by light rail, currently exhibits congestion and delays, as well as capacity constraints due to operating time restrictions. Due to Federal Railroad Administration regulations, freight is allowed a two and a half hour window Monday through Saturday nights while the light rail transit is not in service. This limits the number of freight trains that can operate to carry goods to the rest of the San Diego region and beyond.
6. **Population growth and increased travel demand**: Growth in the region in which the project area lies is expected to be higher than the San Diego regional average. By the year 2030, population growth is anticipated to be at 39 percent and employment growth is expected to reach 28 percent. Traffic forecasts for the I-5 corridor south of SR 54 indicate that travel demand will increase up to 46 percent by the year 2030. Without improvements, segments of the corridor are expected reach level of service (LOS) F.
7. **Insufficient interchange spacing**: Existing interchange spacing along the I-5 corridor between Main Street and SR 54 is currently less than those recommended in the Caltrans Highway Design Manual.
8. **Environmental factors**: Several environmental factors, including biological resources, cultural resources, visual aesthetics, noise, and water quality, could potentially affect, or be affected by, transportation improvements in the corridor. Biological resources represent the primary potential physical constraint for the proposed improvements.
9. **Limited funding**: There are different types of funding, of which some can be used for multiple modes of transportation, and others are restricted from being used for operations and maintenance costs.
10. **Competing interests for right-of-way**: There are several stakeholders within the project area as well as multiple uses.

The Issue Statement is included in Appendix B to this report.

Purpose and Need Statement

According to the Purpose and Need Statement, dated June 5, 2009, the primary purpose of the I-5 South Multimodal Corridor Study is to identify various forms of transportation existing along, and adjacent to, the I-5 corridor between SR 54 and Main Street, and to investigate ways of maximizing their effectiveness through multimodal planning and proposed transit and highway capacity improvements to meet the anticipated demand through year 2035.

The Purpose and Need Statement discusses the existing corridor characteristics as well as other modes of transportation, such as buses, bicycles, and pedestrians, existing within the I-5 South Corridor. The following objectives of the I-5 South Multimodal Corridor Study are listed in the document:

- Promote efficient movement of people and goods within the corridor
- Accommodate improvements to I-5 included in the 2030 RTP, including HOV lanes and bus rapid transit (BRT)
- Accommodate existing and planned 2030 RTP freight and LRT operations
- Promote and integrate bus, pedestrian, and bicycle facilities and intermodal connections within the corridor
- Minimize conflicts between the various transportation modes and land uses within the corridor
- Minimize adverse environmental effects associated with planned transportation improvements
- Promote economic growth and minimize adverse socioeconomic effects on the community
- Maintain or improve future traffic levels of service in 2030
- Maintain or improve travel times within the corridor
- Provide consistency with the 2030 RTP where feasible and in compliance with federal and state regulations
- Maintain the facility as an effective link in the national Strategic Highway Network

In addition, there are four factors discussed in the Purpose and Need Statement that are anticipated to generate the need for transportation improvements within the corridor. The factors discussed are listed below.

1. **Anticipated Growth**: Projected growth in population and employment in the region would result in additional travel demands. Without transportation improvements, failing levels of service are anticipated to occur by horizon year 2030 along segments of the I-5 South Corridor.
2. **Increased Need for Transit and Carpool Incentives**: In order to reduce fossil fuel consumption and greenhouse gas emissions, as mandated by the State in 2006, increasing emphasis is being given to HOV lanes and transit.
3. **Increasing Demand for Trolley Service**: The Blue Line Trolley currently experiences the highest ridership of any LRT line in the San Diego region, and projections indicate that ridership will continue to rise.
4. **Goods Movement**: The I-5 South Corridor is a key north-south goods movement corridor in the San Diego region, and there is a need to preserve freight train capacity along this corridor in order to provide an alternative to moving freight by truck on the freeway system, which is currently congested.

Initial Conceptual Alternatives

Seven conceptual alternatives, in addition to the No Build alternative, were initially developed for the I-5 South Multimodal Corridor Study:

1. **Alternative 1** (Modified 2030 RTP)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV)
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E Street, H Street, and Palomar Street

- Trade Corridors Improvement Fund (TCIF) mainline track improvements
- Increased local bus frequency
- BRT Route 640 (two in-line BRT stations)
- Increased transit parking facilities
- Arterial improvements

2. **Alternative 2** (Modified 2030 RTP with Shifted I-5 Centerline and Interchange Spacing Improvements)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV, shift I-5 centerline west)
    - Braided ramp system
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E Street, H Street, and Palomar Street
    - TCIF mainline track improvements
    - Increased local bus frequency
    - BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities
    - Arterial improvements
3. **Alternative 3** (Shifted I-5 Centerline with Braided Ramps, with Managed Lanes)
    - Eight freeway main lanes plus four Managed Lanes (8F + 4ML, shift I-5 centerline west)
    - Braided ramp system
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E Street, H Street, and Palomar Street
    - TCIF mainline track improvements
    - Increased local bus frequency
    - BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities
    - Arterial improvements
4. **Alternative 4** (Modified 2030 RTP with LRT Third Mainline Track)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV, shift I-5 centerline west)
    - Access improvements (ramp metering and auxiliary lanes)
    - TCIF mainline track improvements
    - Third LRT mainline track (Express Trolley)
    - Freight shared third mainline track
    - Increased local bus frequency
    - BRT Route 627 and Route 635
    - Increased transit parking facilities
    - Arterial improvements
5. **Alternative 5** (LRT West)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV)
    - Access improvements (ramp metering and auxiliary lanes)
    - TCIF mainline track improvements

- LRT mainline track west of I-5
- Freight only east of I-5
- Relocated transit stations
- Increased local bus frequency
- BRT Route 640 (two in-line BRT stations)
- Arterial improvements

6. **Alternative 6** (Freight Third Mainline Track)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV)
    - Braided ramp system
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E Street, H Street, and Palomar Street
    - TCIF mainline track improvements
    - Third mainline freight track
    - Increased local bus frequency
    - BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities
    - Arterial improvements
7. **Alternative 7** (High Speed Rail/Commuter Rail)
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV)
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E Street, H Street, and Palomar Street
    - TCIF mainline track improvements
    - High speed rail/commuter rail west of I-5 (H Street commuter rail station)
    - Increased local bus frequency
    - BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities
    - Arterial improvements

One component of Alternatives 2, 3, and 6 is the braided ramp system. The braided ramp system would occur between the I-5/SR 54 interchange and approximately Naples Street on each side of I-5. The purpose of the braided ramp system is to address the problems with non-standard interchange spacing and short weaving distances along the corridor between E Street, H Street, J Street, and L Street. Currently, there are 16 on- and off-ramps for I-5 at these four local roadways, four ramps per roadway. The braided ramp system reduces the total number of ramps from 16 to eight by combining the E Street and H Street northbound ramps, the E Street and H Street southbound ramps, the J Street and L Street northbound ramps, and the J Street and L Street southbound ramps into four systems consisting of two ramps each.

With the braided ramp system, all northbound I-5 traffic accessing J Street or L Street would exit the freeway and use the combined ramp system for the two roadways. Northbound traffic would utilize lanes adjacent and parallel to the freeway main lanes (separated from the main lanes by a barrier) to

exit at either J Street or L Street. Access to northbound I-5 from L Street or J Street would remain similar to existing conditions, but traffic would utilize the combined ramp system and merge with the freeway main lanes south of G Street. In order to exit on E Street or H Street, northbound I-5 traffic would transition off the freeway near I Street to travel on lanes separated by a barrier from the main lanes, cross over the lanes for vehicles using the J Street and L Street on-ramps, and exit onto surface streets. Access to northbound I-5 from E Street or H Street would remain, but traffic would use lanes separated by a barrier parallel to the main lanes and then merge with the freeway main lanes south of the I-5/SR-54 interchange. A direct connection to eastbound SR 54 would be provided.

In the southbound direction of the braided ramp system, all vehicles exiting at E Street or H Street would use the combined ramp system. Traffic would transition off the freeway north of E Street, travel on lanes adjacent and parallel to the freeway main lanes (separated from the main lanes by a barrier), and have the option to access the E Street or H Street off-ramps. Access to southbound I-5 from E Street or H Street would remain, but traffic would utilize lanes separated by a barrier parallel to the main lanes and then merge with the freeway main lanes south of J Street. All southbound I-5 traffic accessing J Street or L Street would use the combined ramp system by exiting the freeway near I Street, traveling on lanes separated by a barrier from the main lanes, and crossing over the lanes for vehicles using the E Street and H Street on-ramps to access the surface streets. Access to southbound I-5 from J Street or L Street would remain similar to existing, but traffic would use lanes separated by a barrier parallel to the main lanes and then merge with the freeway main lanes south of Palomar Street. The crossovers mentioned for the northbound and southbound directions are referred to as braided ramps, which occur between H Street and J Street.

Of the seven conceptual build alternatives, Alternative 1 most closely reflects the region's current Regional Transportation Plan (2030 RTP): *Pathways for the Future* (adopted in November 2007). Alternative 1 reflects elements in the 2030 RTP Reasonably Expected revenue scenario with the exception of a third mainline track that is included in the Goods Movement section of the RTP but is not a component of Alternative 1. (See Alternative 4 for consideration of a third mainline track.)

Alternative 2 is similar to Alternative 1, except rather than access improvements consisting of ramp metering and auxiliary lanes, interchange improvements are considered to improve I-5 main lane capacity by increasing the effective length of interchange spacing through a braided ramp or collector-distributor system. The interchange spacing improvement system is contemplated between L Street and E Street on I-5. The centerline of I-5 is shifted westerly to accommodate the wider freeway footprint without encroaching into railroad right-of-way to the east.

Alternative 3 would provide the most travel lanes on I-5 among all the alternatives, with eight multi-purpose lanes and a Managed Lane system consisting of two northbound and two southbound lanes. The lanes would be managed by requiring a toll for single occupancy vehicles (SOV) while allowing HOV users to access the lanes toll-free. Free flow conditions on the HOV lanes would be maintained through a congestion pricing strategy for SOVs.

Alternative 4 is similar to Alternative 1, and includes the addition of a third mainline track for Express Trolley to be shared with freight rail. Alternative 4 reflects elements in the RTP's Reasonably Expected revenue scenario and the Goods Movement section, and adds transit components from the 2030 RTP Revenue Unconstrained scenario and the City of Chula Vista General Plan.

Alternative 5 is similar to Alternative 1, but has the distinct difference of relocating the mainline track for light rail transit to the west of I-5 while maintaining freight rail on the east side. Alternative 5 also does not reflect third mainline track as included in the Goods Movement section of the 2030 RTP.

Alternative 6, similar to Alternative 2, proposes interchange improvements to improve I-5 main lane capacity by implementing a braided ramp or collector-distributor system. Alternative 6 also proposes a third mainline track like Alternative 4, but the additional track would be used solely for freight.

Alternative 7 is identical to Alternative 1 with the exception of the High Speed Rail (HSR) component. Alternative 7 consists of an HSR/commuter rail along the west side of I-5, as well as a commuter rail station near H Street. Currently, the California High-Speed Rail Authority (CHSRA) is in the preliminary planning stages of developing a grade-separated HSR system that will initially run between San Francisco and Los Angeles/Anaheim, and expand to include San Diego and Sacramento. The entire corridor would consist of approximately 800 miles of track and up to 24 stations. The section traveling between Los Angeles and San Diego is 167 miles long and is currently being studied in a preliminary alternatives analysis report.

Additionally, the CHSRA and SANDAG are studying a possible HSR connection between downtown San Diego and the Otay Mesa/international border area. Per discussion with CHSRA staff, it is understood that the connection to Otay Mesa would extend south on one of the following: I-5, I-805, or SR 125. If the I-5 route were utilized, the HSR alignment would likely be located west of I-5 where there is less intense existing development, per CHSRA discussions. The existing Coronado Branch Line railroad tracks west of I-5 were suggested by the CHSRA as a logical alignment for the HSR within Chula Vista.

In addition to the improvements listed above, each of the seven build alternatives consists of non-motorized improvements for bicycles and pedestrians. For pedestrians, improvements include well-designed sidewalks and crosswalks to and from the transit centers at E Street, H Street, and Palomar Street. These improvements are assumed in the Chula Vista Bayfront Master Plan as well as the Chula Vista Urban Core Specific Plan. For bicycle facilities, improvements include the additional local street bikeways per the Chula Vista Bikeway Master Plan and the Bayshore Bikeway Plan that is part of the San Diego Regional Bike Plan.

Initial Screening of Seven Conceptual Alternatives

Qualitative and quantitative criteria were developed by the Ad Hoc Working Group to evaluate and screen the seven conceptual alternatives. The evaluation framework analyzed each alternative based on the following:

- Serves peak period trips (quantitative)

- Provides congestion relief (quantitative)
- Provides travel time savings (quantitative)
- Provides alternatives to single occupancy vehicles (quantitative)
- Serves goods movement (qualitative)
- Compatible with regional Smart Growth planning (qualitative)
- Minimizes environmental impacts (qualitative)
- Minimizes capital and operating/maintenance costs (quantitative)

A scoring system was developed for evaluation of the qualitative criteria. The scoring system was developed in consultation with the Ad Hoc Working Group. The different alternatives were scored for each of the qualitative criteria following input from the Ad Hoc Working Group.

For each conceptual alternative, the Regional Transportation Model was utilized with specific network and transit components, and the output was analyzed quantitatively. For the qualitative analysis, the evaluation criteria listed above were applied to each of the seven conceptual alternatives, as well as to the No Build alternative, and the results were compared relative to each alternative. The goal of this process was to identify alternative(s) that best met the purpose and need of the I-5 South Multimodal Corridor Study. The evaluation can be found in Appendix C of this report.

As approved by the SANDAG Transportation Committee on September 18, 2009, the three alternatives chosen for further study were: Alternative 1 (Modified 2030 RTP), Alternative 2 (Modified 2030 RTP with Shifted I-5 Centerline and Interchange Spacing Improvements), and Alternative 4 (Modified 2030 RTP with LRT Third Mainline Track). Alternative 1 was shown to have the lowest capital and maintenance costs, lowest potential environmental impacts, lowest potential community impacts, highest compatibility with adjacent land uses, and good transit improvements. Alternative 2 was chosen because it is characterized by improved freeway operations, the second lowest maintenance cost, the third lowest capital cost, low potential environmental and community impacts, and good transit improvements. Alternative 4 was chosen because it is the best performing transit alternative, and it was shown to have high potential for increased goods movement and high compatibility with Smart Growth planning. It should be noted that even though Alternative 7 was not chosen for further study, the HSR component would not be precluded with the future implementation of any of the three chosen alternatives.

The three alternatives, in addition to the No Build alternative, were then evaluated in further detail in a secondary screening. In order to conduct the secondary screening, background data was used from the *I-5 South Multimodal Corridor Study Initial Environmental Assessment*, dated July 2010, and the *Traffic Technical Report: I-5 South Multimodal Corridor Study*, dated September 3, 2010. Evaluation of the alternatives was based on several quantitative and qualitative criteria.

The quantitative criteria are as follows:

- Freeway Segment Capacity Analysis
- Ramp Capacity Analysis

- Weaving Analysis
- Intersection Capacity Analysis
- Interchange Spacing
- Cost Effectiveness Index
- Multimodal Effectiveness

The last criterion, Multimodal Effectiveness, used the data from the SANDAG Regional Transportation Model output. The model provides various types of transportation data output including number of trips, average travel time, average trip speed, person miles, regional congestion of roadways (roadway miles at LOS E or F), regional roadway reliability (roadway miles at LOS D or better), and mode share. The data is analyzed by mode including SOVs, HOVs, BRT, transit (LRT and local bus), bicycles, and pedestrians. The multimodal effectiveness was determined by comparing the data from the model for each build alternative to the data for the No Build alternative. Points were assigned and totaled for each alternative based on the performance compared to the No Build alternative. The points were then scaled to fit on a 100-point scale to be used for comparison purposes with other screening criteria.

In addition to the quantitative criteria listed above, qualitative criteria were used to further evaluate the three build alternatives. The qualitative criteria are listed below:

- Natural Resource Impact
- Potential for Increased Goods Movement
- Promotes Smart Growth
- Community Impact

Alternative 2 was shown to rank the highest relative to the other alternatives in the secondary screening.

Table 1: Secondary Screening Evaluation Points

	Evaluation Points		
	Quantitative Criteria	Qualitative Criteria	Total
No Build	86	238	324
Alternative 1	397	279	676
Alternative 2	517	279	**796**
Alternative 4	401	333	734

Bold text represents the highest point total and recommended alternative.

The complete evaluation matrix is included as Appendix D of this report.

Cost estimates were prepared for the conceptual alternatives, and are included in their entirety in Appendix E of this report.

Traffic Capacity Analysis

The *Traffic Technical Report: I-5 South Multimodal Corridor Study*, dated September 3, 2010, conducted traffic analysis on the three build alternatives selected for further study, Alternatives 1, 2 and 4, for

existing (2009) conditions, opening year (2020) conditions, and horizon year (2035) conditions. The year 2020 was used for the opening year based, in part, on the expected timeframe in which the improvements could be built, as well as the expected timeframe, as shown in the SANDAG 2030 RTP, in which related transit improvements could be implemented in the corridor. A horizon year of 2035 was chosen in order to be consistent with other current and ongoing corridor studies in the San Diego region that assume year 2035 to be the horizon year in the analysis of transportation improvements.

The traffic study area consists of the I-5 corridor between Main Street and SR 54 including the existing rail corridors to the east and west of I-5. Average daily traffic forecasts for the analysis were obtained from model runs of the SANDAG Regional Transportation Model. For Caltrans facilities, LOS D was considered to be the target LOS in determining roadway improvements, but LOS E was considered where there are right-of-way and cost constraints. For the City of Chula Vista facilities, the target level of service was LOS D, which was determined based on the Circulation Element of the City's General Plan and applicable City standards.

Analysis of the existing (2009) conditions showed that most freeway segments, freeway ramps, ramp terminal intersections, and local intersections were shown to operate at adequate levels of service. However, a few local street intersections were shown to operate at LOS E and F.

In the analysis of the opening year (2020) conditions without any of the proposed improvements, it was determined that I-5 is expected to be at capacity in the peak direction during peak hours. It was also shown that 13 intersections are expected to operate at LOS E (4) or F (9) by the year 2020 without any of the proposed improvements. For Alternative 1, analysis of opening year conditions showed that 11 intersections are expected to operate at LOS E (3) or F (8). For Alternative 2, 9 intersections are expected to operate at LOS E (1) or F (8), and for Alternative 4, 10 intersections are expected to operate at LOS E (3) or F (7). For 2035 conditions, additional intersections are expected to be operating at LOS E or F. The table below summarizes this information.

Table 2: Number of Intersections Operating at Levels of Service E or F in Opening and Horizon Years

	Year	No Build	Alternative 1	Alternative 2	Alternative 4
Number of Intersections at LOS E or F	2020	13	11	9	10
	2035	28	28	29	26

Analysis of horizon year (2035) conditions showed that the I-5 main lanes and weaving sections would operate at LOS E or F without any transportation improvements. Analysis of Alternative 1 showed that the freeway main lanes would experience LOS E and F conditions because the proposed improvements would be insufficient to improve traffic levels of service to LOS D. Alternative 2 was shown to improve volume to capacity ratios along I-5 between E Street and L Street, but LOS E and F conditions occur throughout the I-5 main lanes even with the proposed improvements. Analysis for Alternative 4 showed similar results to those for Alternative 1.

It is recommended that, in order to serve all of the demand forecasted for year 2035, the cross-section for I-5 would vary from 12 mixed flow lanes (six in each direction) and four HOV lanes (two in each direction) at the north end of the project area to eight mixed flow lanes (four in each direction) and four HOV lanes (two in each direction) at the south end of the study area. However, due to constraints of existing improvements within and beyond the project area, a 12 to 16-lane cross-section for I-5 is considered to be infeasible and, therefore, was not studied. Additionally, because the project area includes only a small section of the longer I-5 South corridor from I-15 to the international border, widening the short segment of I-5 from SR 54 to Main Street to a 12 to 16-lane cross-section is not recommended. Instead, transit alternatives were studied along with the highway improvement alternatives in order to increase capacity without widening I-5 to 12 or 16 lanes.

The report concludes that all of the project alternatives provide mobility benefits in terms of reducing traffic congestion along I-5, providing safety and travel time benefits at existing at-grade trolley crossings, and providing improved travel times for transit trips. However, Alternative 2 provides the most benefits in terms of traffic operations. The *Traffic Technical Report: I-5 South Multimodal Corridor Study* is included as Attachment 1 to this report.

Cultural Resources Constraints Analysis

The *I-5 South Multimodal Corridor Study – Cultural Resources Constraints Analysis*, dated February 8, 2010, indicates the presence of nine archaeological and historic resources in the project area. These resources include two isolated flaked stone tools, a sparse scatter of artifacts and shell in a disturbed context, several flakes in a very disturbed area, the Paradise Marsh Dump, three railways, and remnants of a World War I-era kelp processing plant.

The report concludes that while most of the resources identified are not significant, impacts to a few of the resources would constitute significant effects under the California Environmental Quality Act (CEQA) and federal regulations. There is also the potential for subsurface cultural resources in alluvial areas and for cultural material in some undocumented fill soils in the project area. The report states that there does not appear to be any unmitigable impacts associated with cultural resources. The *I-5 South Multimodal Corridor Study – Cultural Resources Constraints Analysis* is included as Appendix F of this report.

Hazardous Waste Initial Site Assessment

The purpose of the *Hazardous Waste Initial Site Assessment: I-5 South Multimodal Corridor Study*, dated March 19, 2010, was to document properties of potential environmental concern that may represent constraints to the proposed project through the need for further investigation and/or which may impact the project cost, scope, and schedule. The methodology used to document properties involved four components: background research on the physical setting of the project area, review of government agency records and databases of hazardous waste sites, field reconnaissance, and historical research.

However, due to the large scale of the project area, the initial site assessment (ISA) did not include assessing or conducting detailed historical research on individual properties.

The ISA discusses the existing topography, geology, surface waters, and hydrogeology of the project area. The topography generally slopes to the west, and ground elevations within the project area range from approximately sea level, along the western border where the rivers outlet to the bay, to approximately 50 feet above mean sea level along the marine terraces near Palomar Street and Anita Street in the southern portion of the project area. In addition, the project area is generally underlain by artificial fill, marine deposits, young alluvial flood-plain deposits, and very old paralic deposits. The two major surface waters within the project area are the Sweetwater River and the Otay River located in the northern and southernmost portions of the project area, respectively. Additionally, groundwater beneath the project area is presumed to flow west-southwest toward the San Diego Bay, and is approximately 10 to 30 feet below ground surface.

For the history of the project area, the ISA discusses pertinent observations regarding the railroad, above ground storage tanks, South Bay Power Plant/Duke Energy, BF Goodrich Industrial Facility, monitoring wells, surficial disturbance/grading, storage areas, and industrial/mining operations. In addition, the report elaborates on some commonly encountered environmental conditions found in the project area. These include: aerially deposited lead in the soil along I-5, non-polychlorinated biphenyl (PCB)-containing transformers, railroad components, chemically treated wood, asbestos-containing materials associated with structures or infrastructure, lead-based paint on structures or infrastructure, and miscellaneous hazardous materials.

Based on the research conducted for the ISA, properties within the project area have been documented with regulatory agencies as being associated with unauthorized releases of hazardous materials and/or wastes, and/or are associated with historical or current land uses/conditions that may indicate a higher likelihood of being associated with impacted soil and/or groundwater.

The ISA concludes that various mitigation measures including, but not limited to, site-specific environmental assessment studies, evaluations of the presence of aerially deposited lead within the I-5 and SR 54 right-of-way, and implementation of a site/community health and safety plan and worker training, are recommended. The *Hazardous Waste Initial Site Assessment: I-5 South Multimodal Corridor Study* is included as Attachment 2 to this report.

Geotechnical Investigation

The purpose of the *Preliminary Geotechnical Investigation: I-5 South Multimodal Corridor Study*, dated March 19, 2010, was to document areas of potential geotechnical concern that may represent a constraint to the proposed project through the need for further investigation and/or which may impact the project cost, scope, and schedule. The evaluation was based on geologic reconnaissance, review of published geologic maps and data reports, aerial photographs, in-house data, and assessment of the potential geologic hazards in the project area.

The report discusses the regional and site geology, surface waters, groundwater, faulting and seismicity, tsunamis, landslides, flood hazards, scour, expansive soils, corrosive soils, and agricultural soils. The project study area is located in the western portion of the Peninsular Ranges geomorphic province, which extends approximately from the Los Angeles Basin to the tip of Baja California and is characterized by northwest trending mountain ranges. The Peninsular Ranges are traversed by several major active faults, including the San Andreas, Rose Canyon, and San Clemente. The surface and near-surface soils in the project area include artificial fills, young alluvial flood-plain deposits, and old paralic deposits. The Sweetwater and Otay Rivers are located in the northern and southernmost portions of the project area, respectively, and the Telegraph Canyon lies in the central portion of the project area. The groundwater within the project area lies approximately between 10 and 30 feet below ground surface, but depth to groundwater could potentially be less in the western portion in the river valleys and marshland.

Despite the fact that there are several active faults in the region, no known faults cross the project area. The closest known active faults are southerly extensions of the Rose Canyon Fault Zone in San Diego Bay less than one mile west of the project area. The report discusses hazards associated with seismic activity including strong ground motion, ground surface rupture, liquefaction of soils, dynamic settlement, lateral spreading of the ground surface, and tsunamis.

The geotechnical investigation concludes by describing the following potential geotechnical and geologic constraints.

- Soft ground or loose soils, expansive soils, and corrosive soils may be present within the project site.
- The project area has the potential for ground shaking, soil liquefaction, dynamic settlement, lateral spread of embankments, and tsunami inundation.
- Shallow groundwater may be expected throughout the project area, and flooding may occur due to the project's ground elevations and proximity to Telegraph Canyon and the Sweetwater and Otay Rivers.
- Scour of channels during storm events, as well as landslides could potentially occur.

The *Preliminary Geotechnical Investigation: I-5 South Multimodal Corridor Study* is included as Apependix G of this report.

Biological Resources Constraints Analysis

The *Preliminary Biological Resource Constraint Analysis: I-5 South Multimodal Corridor Study*, dated December 2010, describes existing biological conditions, and potential project constraints, impacts, and mitigation measures associated with the proposed transportation improvements. There are eleven existing vegetation communities within the project area including southern coastal salt marsh (25.16 acres), disturbed freshwater marsh (0.10 acre), mule fat scrub (0.13 acre), disturbed wetland (0.80 acre), open water (8.31 acres), drainage channel (1.20 acres), disturbed Diegan coastal sage scrub (7.8 acres), non-native grassland (14.1 acres), disturbed habitat (33.8 acres), non-native vegetation (3.0 acres), and

developed land (680.0 acres). Each community is comprised of various types of vegetation. In addition, although focused plant and animal surveys were not conducted for this project, the sensitive plant and animal species with the potential to occur are listed in the report. These include Palmer's frankenia, salt-marsh bird's beak, western snowy plover, Belding's savannah sparrow, California least tern, and coastal California gnatcatcher.

The project study area is primarily developed with small areas of native wetland habitat and open water, with the wetland habitat occurring along the Sweetwater River and within the Sweetwater Marsh National Wildlife Refuge (NWR). The Sweetwater Marsh NWR is a regional wildlife corridor used by hundreds of thousands of migrating birds twice each year. The Sweetwater River is also considered a regional corridor because of its connectivity with the marsh.

This report also discusses the various federal, state, and local regulatory constraints to which this project would be subject. The federal regulations include the Endangered Species Act (ESA), administered by the U.S. Fish and Wildlife Service, the Clean Water Act, enforced by the Army Corps of Engineers, and the Migratory Bird Treaty Act (MBTA). The state regulations include the requirement of the California Department of Fish and Game for a Streambed Alteration Agreement, as well as the Native Plant Protection Act and the California ESA. The City of Chula Vista local regulations include the Multiple Species Conservation Program, Habitat Loss and Incidental Take Ordinance, and the Wetland Protection Program.

Potential biological resource constraints are also discussed in the technical report, which is included as an attachment to this report. The resources that could pose constraints to the project if impacted include eight sensitive vegetation communities, sensitive plant and animal species, nesting birds covered under the MBTA, wildlife corridors, indirect constraints from drainage/toxics, lighting, noise, invasive species, and/or fugitive dust.

The analysis concludes that implementation of the proposed improvements, primarily those on the west side of I-5 between SR 54 and F Street, could have a significant impact on biological resources. Additionally, grading activities on the west side of I-5 to construct freeway improvements between SR 54 and F Street, along with short-term construction noise and long-term lighting, could have a direct impact on the sensitive vegetation and species associated with the Sweetwater Marsh NWR.

Significant direct and indirect impacts would be expected to be mitigated through implementation of a range of mitigation measures. The *Preliminary Biological Resource Constraint Analysis: I-5 South Multimodal Corridor Study* is included as Attachment 3 to this report.

Initial Environmental Assessment

The purpose of the *I-5 South Multimodal Corridor Study Initial Environmental Assessment*, dated December 2010, was to identify the potential environmental impacts and mitigation measures associated with the proposed transportation improvements in the I-5 South Corridor. The initial environmental assessment (IEA) discusses the I-5 South Multimodal Corridor Study and details the

proposed alternatives, Alternatives 1, 2, and 4. The IEA indicates that construction of any of the three build alternatives would likely result in environmental impacts associated with air quality, biological resources, community access, cultural resources, geologic/seismic hazards, hazardous waste/materials, hydrology, land use, noise, paleontology, visual resources, and water quality.

The environmental analysis for the project area is presented and discussed by topic including land use, community impacts, hazardous waste/materials, air quality, noise, and several others. The IEA discusses the existing land use conditions by individual segments of the project study area, as well as potential impacts to existing and planned land uses that could be a result of the build alternatives. Population and employment growth within Chula Vista is projected to be 25 percent and 44 percent, respectively, by 2030 and the proposed build alternatives would likely have growth-inducing impacts.

Community impacts and impacts to visual/aesthetics are also discussed in the report. The proposed improvements would result in impacts to a community if they present either a physical or psychological barriers to activity or recreational areas of the community. Alternative 1 is shown to have the least community impacts of any of the three build alternatives. Visual impacts could potentially occur from the noise barriers, lighting, and new structures accompanying the proposed improvements. However, the impacts resulting from the noise walls and lighting could be mitigated through aesthetic treatment.

A cultural resources records search was conducted for this project that identified nine archaeological and historic resources within the study area. The three proposed build alternatives have the potential to impact known cultural resources and potentially disturb subsurface deposits, but such measures as monitoring soil during grading and testing any encountered resources would be used to mitigate the cultural impacts.

A preliminary drainage assessment was conducted for this project. All alternatives would increase the amount of impervious area within the study area, which would affect the overall drainage. As impervious surfaces increase, water that would have flowed into soil and been naturally filtered would flow over the surface to downstream drainage systems and receiving waters. Increasing flow rate and volume of storm water runoff would also occur, along with runoff from new impervious surfaces becoming a carrier for pollutants. Additionally, the portion of the I-5 South Corridor between north of H Street and north of J Street lies within an area designated as Other Flood Hazard Area, which means that portion of I-5 and the adjacent rail lines could potentially be inundated in a rain event. Also, the portion of the corridor that intersects with SR 54 is designated as a Special Flood Hazard Area inundated by a 100-Year Flood, which means I-5 and SR 54 as well as the rail lines could potentially be inundated following a rain event. Mitigation measures are discussed for reducing runoff and/or flooding during and after construction.

In the preliminary water quality assessment that was performed for the project area, it was determined that there are properties that have been documented with regulatory agencies as being associated with unauthorized releases of hazardous materials and/or wastes, and/or are associated with historical or current land uses and conditions, which may indicate a higher likelihood of being associated with impacted soil and/or groundwater. The IEA states that water quality could be adversely affected during

or after construction by potential surface runoff including sedimentation, fertilizers, and car petroleum products. Pollutants would potentially pass directly into the Sweetwater Marsh as well as the San Diego Bay due to their proximity to the project area. Best Management Practices (BMPs) that are intended to control construction-related and post-construction runoff, erosion potential, and contaminant generation are discussed within the IEA.

The IEA summarizes the Geologic Constraints Report (March 19, 2010), discussed previously in the Geotechnical Investigation section. The potential geotechnical constraints applicable to all of the proposed build alternatives include seismic and non-seismic hazards. Alternative 1 is stated in the report as being the least constrained in terms of geology, soils, seismicity, and topography because it has the fewest structures of the three build alternatives. Alternative 2, with the highest number of new structures, is stated as potentially being the most constrained.

The proposed alternatives could also have impacts on paleontological resources. Certain features of the proposed improvements, including braided ramp structures, grade separation structures, and parking garages, have the potential to impact paleontological resources. Mitigation would include paleontological monitoring during the construction phase of this project.

The IEA also summarizes the hazardous waste/materials constraints analyzed in the Initial Site Assessment (March 19, 2010), which is discussed in a previous section of this report. In general, the greater the soil disturbance, the greater the potential risk for encountering contaminated soil or groundwater. Consequently, because the proposed improvements include ground-disturbing activities such as freeway widening and improvement, braided ramps, grade separations, parking lots/structures, and rail and local street improvements, each of the alternatives has the potential for encountering hazardous materials/wastes. Alternative 2 is stated in the IEA as having the most ground-disturbing activities and therefore the highest potential of the three build alternatives for risks and impacts related to the release of hazardous materials and/or waste.

Traffic impacts are discussed in the IEA, which summarizes the Traffic Technical Report (September 3, 2010) detailed in the Traffic Capacity Analysis section of this report. The amount of traffic in the project area is expected to increase by horizon year 2035, and levels of service are expected to be at LOS E and F under the No Build condition. With the implementation of the proposed improvements, the number of occurrences of LOS E or F would be reduced relative to the No Build alternative. However, some freeway segments, weaving sections, and intersections would continue to operate at LOS E or F regardless of which alternative is chosen for construction.

Impacts to air quality and noise are also discussed in the IEA. Within the project area, primarily on the east side of I-5, are sensitive receptors including residential, educational, and recreational land uses. They have the potential to be affected by the proposed improvements through exposure to emissions and related concentrations of pollutants generated during construction and operational phases of the project. To mitigate these potential impacts, measures including minimizing land disturbance and dust, stabilizing the surface of inactive stockpiles, minimizing unnecessary vehicular and machinery activities, and street sweeping of paved roads would be used. The project study area also includes land uses that

are considered sensitive to noise, including residential neighborhoods, schools, churches, hotels/motels, and biological preserves. The three build alternatives could potentially have noise impacts during construction and operations of the freeway and rail due to the increased freeway noise and frequency of rail operations. There would be no mitigation measures required for noise during freeway construction, but noise attenuation in the form of walls and/or building retrofitting would be included as mitigation for the noise of freeway operations. Similarly, there would be no mitigation required for construction of rail improvements associated with the build alternatives. However, mitigation measures such as noise barriers would be necessary for rail operations post-construction.

Lastly, the IEA analyzes the impacts to energy and climate change, as well as to the biological environment, potentially resulting from the proposed build alternatives. Energy usage and associated greenhouse gases (GHG) emissions would be associated with short-term construction activities and long-term operation and maintenance of the I-5 infrastructure, as well the energy utilized for regular transportation along the corridor. However, because no substantial increase in energy or GHG emissions would occur in comparison with the No Build alternative, no mitigation would be required. The biological environment section summarizes the Biological Resources Constraint Analysis (May 2010), which is discussed in a previous section of this report. Direct impacts to sensitive vegetation and species associated with the Sweetwater Marsh National Wildlife Refuge, as well as to the Sweetwater Channel could result from grading activities and freeway widening of I-5. Indirect impacts could also result from drainage/toxics, lighting, noise, invasive species, and/or fugitive dust. Significant direct and indirect impacts would be expected to be mitigated through implementation of a range of mitigation measures including wetland habitat restoration and/or restoration and attenuating construction noise and direct lighting away from sensitive habitat for sensitive species.

All impacts for the environmental analysis are summarized at the end of the IEA. The *I-5 South Multimodal Corridor Study Initial Environmental Assessment* is included as Attachment 4 to this report.

Project Initiation Document (PID) – Shared Light Rail Transit (LRT)/Freight Rail Improvements

The *I-5 South Multimodal Corridor Study Shared Light Rail Transit/Freight Rail Improvements Project Initiation Document* (PID), dated October 29, 2010, recommends a preferred rail alignment for the installation and operation of a third mainline track for shared LRT/freight rail along I-5 between SR 54 and Main Street. The PID evaluates alignment alternatives for adding a third mainline track for Express Trolley operations, as well as maintaining or increasing currently planned and future freight operations.

Three rail alignment alternatives are considered:

1. Alignment 4a: Express Trolley track between existing tracks, localized at stations with three grade-separated crossings
2. Alignment 4b: Express Trolley track as center throughout the project limits with three grade-separated crossings

3. Alignment 4c: Freight and Express Trolley located east of two western tracks with three grade-separated crossings

The PID also discusses two variations for the proposed grade-separated structures at E, H, and Palomar Streets for Alignments 4a, 4b, and 4c. Variation 1 allows for LRT operation on the structure, but maintains freight at grade. Variation 2 proposes that LRT and freight both operate on the structures at E, H, and Palomar Streets.

To determine a recommended rail alignment alternative, Alignments 4a, 4b, and 4c were evaluated on each of the following criteria: right-of-way acquisition, cost, platform accessibility, environmental/community constraints, operations for Express Trolley, and freight benefits. The alignment recommended for further study is Alignment 4c, Variation 2.

In a separate evaluation, the recommended alignment from the PID was coupled with other multimodal improvements including Arterial Rapid Transit (ART) and freeway improvements. The resulting concept alternative (Alternative 4) was then compared to other concept alternatives that did not include Express Trolley operations or ART (Alternatives 1 and 2). Because Alternative 2 ranked highest in the overall evaluation, a third mainline track and Express Trolley operations are not recommended for further study.

The PID also discusses three possible grade separation alternatives at Palomar Street.

1. Palomar Street Over Rail: Palomar Street would rise above grade on the east and west sides of the rail to cross over the rail corridor (Road Overcrossing).
2. Rail Under Palomar Street: The rail would drop below grade on the north and south sides of Palomar Street to cross under Palomar Street (Rail Undercrossing).
3. Rail Over Palomar Street: The rail would rise above grade on the north and south sides of Palomar Street to cross over Palomar Street (Rail Overcrossing).

The other grade separation locations at E Street and H Street were analyzed in a separate SANDAG report entitled Final Concept Engineering Report for E Street and H Street Grade Separations (July 2004), but the Palomar Street grade separation was not included.

The *I-5 South Multimodal Corridor Study Shared Light Rail Transit/Freight Rail Improvements Project Initiation Document* is included as Appendix H of this report.

Constructability Review

A constructability review was conducted for the I-5 South Multimodal Corridor Study in order to examine potential construction phasing scenarios as well as to evaluate the feasibility of constructing the recommended alternative, Alternative 2. The objectives of the review were to:

- Evaluate the constructability of the concept
- Identify constraints affecting design decisions and implementation

- Determine the approximate number of primary construction stages
- Develop phasing concepts for multiple construction contracts over extended duration

The constructability review developed two potential construction phasing scenarios. The first assumed that all freeway and interchange improvements would occur within one construction contract over three stages. The first stage would construct new overcrossings and widened undercrossing structures, southbound HOV and main lanes, and the southbound collector-distributor and braided ramp system. The second stage would shift southbound traffic to the newly constructed southbound main lanes, and construct the new northbound HOV and main lanes. The third stage would shift northbound traffic to the newly constructed northbound main lanes, and construct the northbound collector-distributor and braided ramp system. Within each of the three stages, there would potentially be multiple sub-stages.

The second phasing scenario for Alternative 2 considered six phases that could be used to construct the improvements over six construction contracts. The first phase would construct new E, F, and H Streets overcrossings, and the southbound ramp system between E and H Streets. The second phase would widen the J Street undercrossing and construct the new L Street overcrossing, along with the southbound ramp system between J and L Streets. The third and fourth phases would construct the northbound ramp system between J and L Streets and the northbound ramp system between E and H Streets, respectively. The fifth phase would construct the shift of the I-5 main lanes to the west, as well as construct the braided ramp system between H and J Streets. The final phase would construct the HOV lanes.

The constructability review evaluated the ability to maintain traffic on I-5 while constructing the main lane shift, and verified that segregating the overall freeway project into smaller projects is possible. The review showed that local street improvements would be needed to compensate for impacts to Bay Boulevard, and that the proposed improvements should consider the Bayfront circulation planning and Bayfront development planning. In addition, extensive acquisition of right-of-way would be required to accommodate the proposed improvements. The constructability review assumed that there would be no encroachment into railroad right-of-way or maintenance-of-way.

Additionally, the constructability review determined that during construction of the proposed improvements, detours or staging would be needed in order to avoid ramp and road closures, and to maintain access between the east and west sides of I-5 while the structures work is completed. However, ramp and road closures may be necessary to complete the proposed improvements. Freeway closures and/or detours would be necessary for demolition of existing structures as well as erection and removal of falsework for proposed structure overcrossings. Construction of the overcrossings would likely be staged to first build either the north-side half or south-side half of the overcrossing, while traffic would be detoured to the opposite existing side. After one-half of the overcrossing is constructed, both directions of traffic would be shifted to the new structure while the remainder of the overcrossing would be constructed.

Design standards for the freeway, the ramps, and the in-line transit stations would influence the project footprint. Based on the investigation into the constructability of this project, access to the LRT stations could be maintained during construction of the proposed highway improvements.

Exhibits showing the potential construction phases are shown as Appendix I of this report.

Structures Constraint Analysis

The I-5 South Multimodal Corridor Study identifies the various forms of transportation existing within the I-5 corridor between SR 54 and Main Street in the City of Chula Vista, and identifies alternatives for transportation improvements to maximize capacity and efficiency as well as to improve multimodal movement through the corridor. Initially, seven conceptual alternatives, Alternatives 1 through 7, were developed in addition to the No Build alternative to address the needs of the corridor through the City of Chula Vista. After screening the alternatives on the basis of several evaluation criteria, three alternatives were recommended for further study:

- **Alternative 1** (Modified 2030 RTP) – This alternative consists of the following components:
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV)
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E, H, and Palomar Streets
    - TCIF mainline track improvements (freight rail)
    - Increased local bus frequency and BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities and arterial improvements
- **Alternative 2** (Modified 2030 RTP with Shifted I-5 Centerline and Interchange Spacing Improvements) – This alternative consists of the following components:
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV, shift I-5 centerline west)
    - Braided ramp system
    - Access improvements (ramp metering and auxiliary lanes)
    - Rail grade separations at E, H, and Palomar Streets
    - TCIF mainline track improvements (Freight rail)
    - Increased local bus frequency and BRT Route 640 (two in-line BRT stations)
    - Increased transit parking facilities and arterial improvements
- **Alternative 4** (Modified 2030 RTP with LRT Third Mainline Track) – This alternative consists of the following components:
    - Eight freeway main lanes plus two HOV lanes (8F + 2HOV, shift I-5 centerline west)
    - Access improvements (ramp metering and auxiliary lanes)
    - TCIF mainline track improvements (freight rail)
    - Third LRT mainline track (Express Trolley)
    - Freight shared third mainline track
    - Increased local bus frequency and BRT Routes 627 and 635
    - Increased transit parking facilities and arterial improvements

Alternative 2 was approved by the SANDAG Board of Directors at the May 28, 2010 meeting for consideration in the network development for the 2050 RTP, which is currently under development. As a result, this Structures Constraint Analysis discusses the proposed structures for Alternative 2, which are listed below.

- E Street overcrossing
- F Street freeway and rail overcrossings
- H Street overcrossing
- J Street undercrossing
- L Street overcrossing
- Palomar Street overcrossing
- Main Street
- I-5 northbound and southbound braided ramps
- Retaining walls between H Street and J Street

Alternative 2 proposes that I-5 would be widened to include two HOV lanes, and the centerline would be shifted to the west to accommodate a braided ramp system (or other interchange improvements) with associated collector-distributor roads. The centerline shift is necessary due to the railroad right-of-way constraints along the easterly side of the freeway corridor from a point south of SR 54 to a point near L Street. Due to the additional lanes, the existing overcrossings and undercrossing would need to be modified to accommodate the wider freeway cross-section. The proposed freeway cross-section would require longer span lengths for the existing overcrossings and a wider span for the undercrossing. For each of the overcrossings, it is recommended that the existing structures be replaced, with the exception of the Main Street overcrossing where bridge replacement may not be required. For the J Street undercrossing, it is recommended that the existing structure be widened to accommodate the improved freeway cross-section instead of replacement.

Due to the proposed 8F + 2HOV cross-section for I-5, a center median would be available for placement of overcrossing columns. Therefore, each overcrossing would likely be a two-span bridge with a single bent at approximately mid-structure. A unit cost of $400 per square foot has been estimated for structure improvement costs, which includes demolition and removal of existing structures and multiple stages needed to construct new structures. Analysis of each structure is found in the following sections.

E Street Overcrossing (57-0250)

The proposed E Street overcrossing is expected to be approximately 350 feet long, and would replace the existing structure over I-5. The overcrossing would accommodate six lanes of traffic including left-turn lanes at a width of 12 feet per lane, and would have 8-foot shoulders on each side of the structure. There would also be 6-foot sidewalks as well as barriers on each side of the overcrossing. The width of the structure would be approximately 102 feet, and the construction cost at $400 per square foot is estimated at $14.3 million.

F Street Overcrossing (57-0711)

The proposed F Street overcrossing is expected to be approximately 350 feet long and would accommodate four lanes of traffic at 12 feet of width per lane. The overcrossing would have 8-foot shoulders and 6-foot sidewalks with barriers on each side of the structure. The width of the structure would be approximately 78 feet, and the construction cost at $400 per square foot is estimated at $10.9 million.

The existing F Street rail overcrossing structure is not expected to be replaced with the I-5 South freeway improvements. Per discussion with SANDAG rail planning staff at the February 1, 2010 I-5 South Multimodal Corridor Study Ad Hoc Working Group meeting, the existing railroad 'crossing diamond' near F Street and the South Rail tracks is assumed to be removed as part of the planned Blue Line improvements. Therefore the rail overcrossing structure becomes unnecessary and structure replacement costs have not been included in the Alternative 2 project cost estimate.

H Street Overcrossing (57-0256)

The proposed H Street overcrossing is anticipated to be approximately 600 feet long (or longer if an in-line transit station is included), and would replace the existing structure over I-5. The overcrossing would be comprised of eight 12-foot lanes of traffic including left-turn lanes with 8-foot shoulders on each side of the structure. There would also be 6-foot sidewalks with barriers on each side of the overcrossing. The width of the proposed structure would be approximately 126 feet, and the construction cost at $400 per square foot is estimated at $30.2 million (not including in-line transit station improvements).

J Street Undercrossing (57-0710)

The existing J Street undercrossing, measuring approximately 150 feet in length, in which J Street crosses under I-5 would not be replaced in Alternative 2, but would instead be widened by approximately 150 feet. At a cost of $400 per square foot, the construction cost for the widening of this single-span structure is estimated at $9 million.

L Street Overcrossing (57-0709)

The proposed L Street overcrossing would replace the existing structure over I-5, and would be approximately 350 feet long. The structure would accommodate six lanes including left-turn lanes, each at 12 feet in width, as well as 8-foot shoulders. There would also be 6-foot sidewalks with barriers on each side of the overcrossing. The width of the proposed structure would be approximately 102 feet, and the construction cost at $400 per square foot is estimated at $14.3 million.

Palomar Street Overcrossing (57-0354)

The proposed Palomar Street overcrossing would be approximately 350 feet long (or longer if an in-line transit station is included), and would replace the existing Palomar Street structure over I-5. The overcrossing would accommodate six, 12-foot lanes including left-turn lanes with 8-foot shoulders. There would also be 6-foot sidewalks with barriers on each side of the overcrossing. The width of

the proposed structure would be approximately 102 feet, and the construction cost at a unit cost of $400 per square foot is estimated at $14.3 million (not including in-line transit station improvements).

Main Street Overcrossing (57-0112)

The existing Main Street overcrossing over I-5 accommodates two travel lanes and a sidewalk on the south side of the bridge. The Main Street overcrossing may not require replacement, rather a tie-back retaining wall at each existing bridge abutments would accommodate the I-5 widening improvements. Each wall would be approximately 100 feet long by an average of 15 feet high, and would cost an estimated $1.2 million for two walls at a unit cost of $400 per square foot.

Braided Ramp Structures

One of the main features of Alternative 2 is the braided ramp system for I-5, which consists of two structures: one in the northbound direction and one in the southbound direction on the freeway. The structure located on the east side of the I-5 main lanes between H Street and J Street is the I-5 northbound off-ramp to H Street, which crosses over the J Street/L Street northbound on-ramp. The second structure, which is the I-5 southbound off-ramp to J Street /L Street, is located on the west side of the I-5 freeway main lanes between H Street and J Street. This structure crosses over the E Street/H Street southbound on-ramp. The northbound and southbound structures would consist of two 12-foot travel lanes, a 4-foot left shoulder and an 8-foot right shoulder, with barriers on each side. The length and width of each braided ramp structure would be approximately 300 feet and 40 feet, respectively. At a unit cost of $400 per square foot, each structure is estimated at $4.8 million.

Retaining Walls

Alternative 2 proposes the construction of approximately six mechanically stabilized earth (MSE) retaining walls between E Street and J Street that would coincide with the braided ramp structures and freeway widening. There would be two retaining walls adjacent to each of the two braided ramp structures and two or more additional walls may be required near H Street and J Street. The retaining walls would vary in length from approximately 350 feet to 800 feet. The walls are estimated to be approximately 20,000 square feet. At a unit cost of $200 per square foot, the estimated cost of the retaining walls would be $4 million.

Implementation Strategy

A project implementation strategy was developed consisting of a conceptual schedule reflecting potential projects for implementation within the I-5 South Multimodal Corridor Study area. The majority of the projects are found within the following approved documents: City of Chula Vista General Plan (2009); City of Chula Vista Urban Core Specific Plan (2007); City of Chula Vista Western (Area) Transportation Development Impact Fee for Streets (2008); Port of San Diego Final Environmental Impact Report for the Chula Vista Bayfront Master Plan (2010); SANDAG Regional TCIF Proposal, South

Line Rail (2008); SANDAG 2030 Regional Transportation Plan (2007). It should be noted that the 2030 RTP is currently undergoing an update, and the 2050 RTP is scheduled for adoption in 2011.

In order to develop the implementation strategy, traffic data along with input from the City of Chula Vista and SANDAG, and certain assumptions were used to determine approximate start and end dates for the construction phase of each project shown on the schedule. Project start dates are based on the need for the project and do not reflect committed funding. The schedule consists of the following types of projects:

- Intersection improvements
- Interchange improvements
- I-5 access improvements
- H Street widening
- HOV lanes
- BRT Route 640
- Rail grade separations
- Transit parking structures
- Blue Line Trolley
- Bayshore Bikeway
- Goods movement facilities

There are 29 intersection improvement projects shown on the schedule, all of which consist of improving the existing intersections to include the recommended horizon year lane geometries as shown in the Traffic Technical Report, which is summarized in another section of this summary report. Such improvements include adding additional through and turn lanes to the existing intersections.

There are nine interchange improvement projects on the implementation schedule that consist of various types of improvements, including ramp widening and the construction of braided ramps. A system of braided ramps would be constructed between H Street and J Street, and the remaining interchanges would be improved with ramp widening and/or reconfiguration to accommodate the shifted I-5 centerline.

There are six I-5 access improvement projects shown on the implementation schedule, all of which consist of adding ramp meters and auxiliary lanes to the on- and off-ramps along I-5 within the project area. Auxiliary lanes and ramp meters, considered to be near-term interim solutions, address congestion on the freeway main lanes which are shown to have failing levels of service in the Traffic Technical Report for the existing condition. Therefore, the schedule for each set of ramps shows them beginning construction in 2012 and being built by 2014, assuming one year for project development beginning in 2011 due to currently congested main lane conditions.

The H Street widening project, shown as being built by 2018, consists of widening the existing four-lane H Street to six lanes between I-5 and Broadway. H Street is classified as a six-lane roadway in the City of Chula Vista General Plan.

The HOV project consists of the construction of two lanes between the northbound and southbound I-5 main lanes along the centerline of I-5. The implementation schedule shows this project being built by 2030 with the HOV project as a predecessor to BRT Route 640, which is discussed in the following paragraph.

BRT Route 640, which will utilize the HOV lanes, is shown on the implementation schedule as being built by 2030, per the SANDAG 2030 RTP. Implementation of BRT Route 640, which extends between San Ysidro and Downtown San Diego along I-5, must be preceded by the HOV project.

There are three rail grade separation projects shown on the schedule at E Street, H Street, and Palomar Street. The highest priority of the three grade separation projects is Palomar Street, which shows an end of construction date of 2020 on the implementation schedule. The Palomar Street grade separation is followed by the H Street grade separation with an end of construction date of 2030, and then by E Street with a 2040 end of construction date.

The Transit Parking Structures project shown on the schedule consists of construction of parking structures at the existing E Street, H Street, and Palomar Street transit stations. The project is shown on the implementation schedule with an end of construction date of late 2030, and would precede the HOV and BRT Route 640 projects.

The Increase in Blue Line Trolley service project consists of increasing trolley service by decreasing headways and passenger loading and unloading time. The end of construction date shown on the schedule reflects the assumption that this project would be preceded by the mainline track improvements and infrastructure upgrades, discussed below, which have an estimated completion date of 2015 per recent updates to the SANDAG Transportation Committee.

The Bayshore Bikeway is shown on the schedule with a construction start date of early 2011, which is the planned date according to the Bayshore Bikeway Project (Segments 4, 5, 7, and 8A) Addendum to the Final Mitigated Negative Declaration/Initial Study (SANDAG, April 2010). The project is a planned 24-mile Class I, II, and III bicycle facility around San Diego Bay.

The Goods Movement Facilities project consists of track and infrastructure improvements to the San Diego & Arizona Eastern (SD&AE) Railway Company mainline, and is shown with an end of construction date of 2015. This date is reflected in SANDAG's Early Action Program, which was last updated with the SANDAG Transportation Committee on June 18, 2010.

The Implementation Strategy is included as Appendix J of this report.

Recommended Alternative

The SANDAG Board of Directors, at the May 28, 2010 meeting, approved Alternative 2 to be the preferred alternative for consideration in the network development of the 2050 RTP.

Caltrans Study of I-5 South Corridor

Caltrans is currently developing a Project Study Report-Project Development Support (PSR-PDS) for the I-5 South Corridor between I-15 and the San Ysidro Port of Entry. A PSR-PDS is defined in Appendix L of *Caltrans Project Development Procedures Manual* as a project initiation document that serves as a decision-making tool. The PSR-PDS must identify key issues of the transportation deficiency, any major elements that should require further investigation, and the required level of effort and resources needed to complete the studies and implement the proposed project.

The I-5 South PSR-PDS is scheduled for completion in August of 2011.

Chula Vista Bayfront Master Plan

The Chula Vista Bayfront Master Plan is a multi-year planning effort between the City of Chula Vista, the Port of San Diego, and Pacifica Hospitality Group (Pacifica), a partner in the waterfront development. According to the Port of San Diego's website, the plan consists of the redevelopment of 556 acres along the community's waterfront that includes a resort and conference center, three smaller hotels, residential condominiums, office and commercial uses, scenic gathering spaces along the harbor, parks, public promenades, and bicycle trails. On May 18, 2010, the Port's Board of Commissioners certified the project's Environmental Impact Report (EIR), and adopted an amendment to the Port's Master Plan for the Chula Vista planning efforts. Also on that date, the City of Chula Vista certified the project's EIR, and adopted amendments to its General Plan and Local Coastal Program. These actions marked the completion of all local approvals.

Following the local approvals of the EIR and adoption of the Master Plan, consideration at the State level is required by the State Lands Commission and the California Coastal Commission. Review by the State Lands Commission occurred on December 10, 2010. The Commission approved a Land Exchange Agreement between the State Lands Commission, the San Diego Unified Port District and North C.V. Waterfront L.P. (Pacifica), to facilitate the development of the Chula Vista Bayfront Master Plan. The result of the proposed Agreement is to terminate any and all Public Trust and sovereign property rights in certain parcels, acquire a parcel, and issue a 49-year lease of certain lands acquired by the State to the Port. Additional review by the California Coastal Commission is expected in late 2011.[1]

Because the Chula Vista Bayfront Master Plan has not been fully approved as of the completion date of the I-5 South Multimodal Corridor Study, its proposed land uses were not included in the SANDAG Regional Transportation Model. The Regional Transportation Model relied upon approved land uses at the time of preparation of the I-5 South Multimodal Corridor Study. Further studies will be necessary as the master plan gains approval and the I-5 South Multimodal Corridor Study moves forward to subsequent phases.

[1] http://www.portofsandiego.org/chula-vista-bayfront-master-plan/2062-port-of-san-diego-and-city-of-chula-vista-move-forward-on-bayfront-development-.html

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Appendix I – Constructability Review Exhibits (November 30, 2010)

Appendix J – Conceptual Implementation Strategy (December 23, 2010)