NOISE STUDY REPORT

for

STATE ROUTE 11 AND THE OTAY MESA EAST PORT OF ENTRY

SAN DIEGO COUNTY, CALIFORNIA
DISTRICT 11–SD – ROUTE 11 – PM 0.0/2.8
EA056310
DISTRICT 11–SD – ROUTE 905 – PM R8.4/10.1

TIER II ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

November 2010

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NOISE STUDY REPORT

Otay Mesa, San Diego, California
[11-SD-11(PM 0.0-2.8)]
[11-SD-905 (PM R8.4-10.1)]
[EA 056310]

November 2010

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Summary

The purpose of this Noise Study Report (NSR) is to evaluate noise impacts and abatement under the requirements of Title 23, Part 772 of the Code of Federal Regulations, and to provide noise impact information pursuant to National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The State Route (SR-) 11 and Otay Mesa East Port of Entry (POE) project (proposed project) is proposed jointly by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA). The proposed project site is located in the community of East Otay Mesa within the City of San Diego (City) and County of San Diego (County), California. Proposed SR-11 would begin at the future SR-905/SR-125/SR-11 Interchange, continuing to the proposed POE at the United States (U.S.) - Mexico border, and would include connectors to SR-905 and associated modifications to SR-905.

The proposed project is needed to address the projected increase in trade, travel, development, and population. Current transportation infrastructure was not designed to accommodate the large traffic volumes stimulated by the North American Free Trade Agreement and other economic growth, which has resulted in substantial POE cross-border travel delays. These travel delays are discouraging cross-border traffic, costing a large amount of revenue and jobs. The traffic delays are expected to increase in the future unless improvements in border crossing and transportation infrastructure are provided. Through a series of studies, it was determined that an additional POE was needed in the East Otay Mesa area to adequately improve cross-border traffic flow. SR-11 is needed to accommodate the traffic relocated by the proposed POE.

This report analyzes four project alternatives: the Two Interchange Alternative (interchanges at Enrico Fermi Drive and Siempre Viva Road), the One Interchange Alternative (interchange at Alta Road), the No Interchange Alternative, and the No Build Alternative. The build alternatives address SR-11 from the SR-905/SR-125/SR-11 junction (near Harvest Road) to the proposed Otay Mesa East POE, a new 106-acre POE located at the SR-11 terminus/U.S. - Mexico international border, and an associated 23-acre Commercial Vehicle Enforcement Facility (CVEF) to be operated by the California Highway Patrol (CHP). For all of the build alternatives, SR-11 would be constructed as a four-lane toll highway, with connectors to SR-905. To link SR-11 to previously approved (under construction) SR-905, connectors would be provided and certain modifications to the approved SR-905 design would be required. The project would include over/under passes for local roadways where interchanges are not provided. All of the potential build alternatives would include a number of Transportation Systems Management/Transportation Demand Management (TSM/TDM) measures.

Proposed project improvements west of Sanyo Avenue, which would include modifications to the SR-905/SR-125/SR-11 Interchange and SR-905 to just west of Britannia Boulevard, would take place entirely within state right-of-way (R/W).

In addition to the three proposed build alternatives, several possible variations are proposed. These are: the No Toll Variation (in which SR-11 would be operated as a freeway instead of a toll highway); the 46-foot Median Variation (in which the median in the Sanyo Avenue area would be 46 feet wide instead of the 22-foot median proposed under the build alternatives); the SR-125 Connector Variation (in which an extra connector would be constructed at the SR-905/SR-125/SR-11 Interchange to connect southbound SR-125 to eastbound SR-11); the SR-905/SR-125/SR-11 Full Interchange Variation (which would also add two connectors between SR-11 and SR-905, in addition to the SR-125 connector just mentioned); and the Siempre Viva Road Full Interchange Variation (which would apply only to the Two Interchange Alternative, and would involve construction of a full interchange at Siempre Viva Road, instead of the half interchange proposed at this location under the Two Interchange Alternative).

All alternatives analyzed in this report include the SR-905/SR-125/SR-11 Full Interchange Variation, to assess the worst case scenario for any of the build alternatives. Similarly, the noise analysis assumes LOS C traffic conditions, which would constitute a worst case scenario for both the build alternatives with the toll and the no toll variations of the project. Since the analysis would be identical whether or not the project included a toll, the No Toll Variation analysis is the same as the toll baseline alternatives, and is not analyzed separately in this report.

The surrounding land uses include primarily industrial, commercial and undeveloped, and one educational institution (a Southwestern College satellite campus). The nearest residence is located approximately 1,200 feet to the north of the project, beyond a reasonably expected project noise impact distance. The project R/W is primarily vacant, but does currently contain a portion of several developed properties just east of Sanyo Avenue that would be altered under the SR-905 project. In addition, the project would traverse a portion of an auto auction yard west of Alta Road, a portion of a graded industrial property currently being used for truck parking to the east of Enrico Fermi Drive, and a portion of a developed property just west of Michael Faraday. The site and immediate vicinity are located on a mesa, and, as such, are relatively flat, with a slight downward slope to the south. According to Federal Regulation 23 CFR 772, the adjacent land uses fall within Activity Categories B, C, D and E. Activity Category D does not have a corresponding Noise Abatement Criteria (NAC), but Activity Category B has a NAC of 67 A-weighted decibels (dBA) 1-hour A-weighted equivalent sound level (L_{EQ}[h]) at the exterior of buildings; Activity Category C has a NAC of 72 dBA $L_{EQ(h)}$; and Activity Category E has a NAC of 52 dBA $L_{EQ(h)}$ at the interior of buildings.

Ambient noise in the area is primarily generated by vehicular traffic, airport traffic (Brown Field), and commercial/industrial uses. Ambient noise levels in the project vicinity range from 46 to 65 dBA L_{EQ}. The East Otay Mesa area is undergoing a substantial amount of development and is expected to experience an increase in noise levels in the future.

With the implementation of any of the proposed build alternatives, future noise is expected to increase as a result of SR-11 and associated facilities. To determine traffic noise impacts, nineteen surrounding receiver locations were identified in three areas of the project, and the noise levels at these receivers were modeled. The three areas include Area 1 (SR-905 modifications), Area 2 (western portion of SR-11), and Area 3 (eastern portion of SR-11). The traffic noise modeling completed for each alternative with the baseline 22-foot median, the 46-foot median variation, and the Siempre Viva Road Full Interchange Variation did not identify any traffic noise impacts in areas of frequent human use that would benefit from noise reduction in Area 2 or Area 3. Therefore, no abatement measures were considered in these areas. In Area 1, modeling results for all of the build alternatives and design variations indicated that predicted traffic noise levels with maximum traffic for LOS C traffic conditions would exceed the NAC at the Southwestern College receiver locations (R-10 and R-11). A noise control barrier of 10 feet in height approximately 591 feet in length along the edge of the roadway (within transportation R/W) would achieve the required minimum 5 dBA of noise reduction. The total reasonable allowance for this barrier is $105,000.

Under the No Build Alternative, it is anticipated that future traffic noise levels associated with LOS C traffic conditions at analyzed receivers would be similar to noise levels predicted for the proposed project in Areas 1 and 2, where approved SR-905 is planned or under construction, and lower than noise levels predicted for the proposed project in Area 3, but higher than existing noise levels.

During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Construction noise is regulated by Caltrans Standard Specifications Section 7-1.01(I), “Sound Control Requirements” (Caltrans 2006b).

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List of Abbreviated Terms

AMSL	above mean sea level
Caltrans	California Department of Transportation
CBP	Customs and Border Protection
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CNEL	Community Noise Equivalent Level
CVEF	Commercial Vehicle Enforcement Facility
dB	decibels
dBA	A-weighted decibels
DoD	U.S. Department of Defense
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
FDA	U.S. Food and Drug Administration
FHWA	Federal Highway Administration
GSA	General Services Administration
HOV	High Occupancy Vehicle
Hz	Hertz
I-	Interstate
kHz	kilohertz
L_{dn}	Day-Night Level
L_{EQ}	Equivalent Sound Level
L_{EQ} (h)	Equivalent Sound Level over one hour
L_{max}	Maximum Sound Level
LOS	level of service
LT	long-term
L_{xx}	Percentile-Exceeded Sound Level
mPa	micro-Pascals
mph	miles per hour
NAC	noise abatement criteria
NADR	Noise Abatement Decision Report
NAFTA	North American Free Trade Agreement
NEPA	National Environmental Policy Act
NSR	noise study report
PDS	Program Development Study
PEIR/PEIS	Program Environmental Impact Report/Environmental Impact Study
POE	Port of Entry
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects

List of Abbreviated Terms (cont.)

R/W	right-of-way
SANDAG	San Diego Association of Governments
SPL	sound pressure level
SR-	State Route
ST	short-term
TDM	Transportation Demand Management
TeNS	Caltrans' Technical Noise Supplement
TNM 2.5	FHWA Traffic Noise Model Version 2.5
TSM	Transportation Systems Management
UFC	United Facilities Criteria
U.S.	United States
vph	vehicles-per-hour

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CHAPTER 1. INTRODUCTION

1.1. Purpose of the Noise Study Report

The purpose of this Noise Study Report (NSR) is to evaluate noise impacts and abatement under the requirements of Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise," which provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. According to 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with Federal Highway Administration (FHWA) noise standards.

The Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) (Caltrans 2006a) provides Caltrans policy for implementing 23 CFR 772 in California. The Protocol outlines the requirements for preparing NSRs. Noise impacts associated with this project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) are evaluated in the project Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

The State Route (SR-) 11 and Otay Mesa East Port of Entry (POE) project (proposed project) is proposed jointly by the California Department of Transportation (Caltrans) and FHWA. The project site is located in the community of East Otay Mesa within the City of San Diego (City) and County of San Diego (County), California (Figure 1-1, *Regional Location Map*). Proposed SR-11 would begin at the existing SR-905/SR-125 Interchange, extending east and then south approximately 2.1 miles to a proposed POE at the United States (U.S.) - Mexico border (Figure 1-2, *Vicinity Map*).

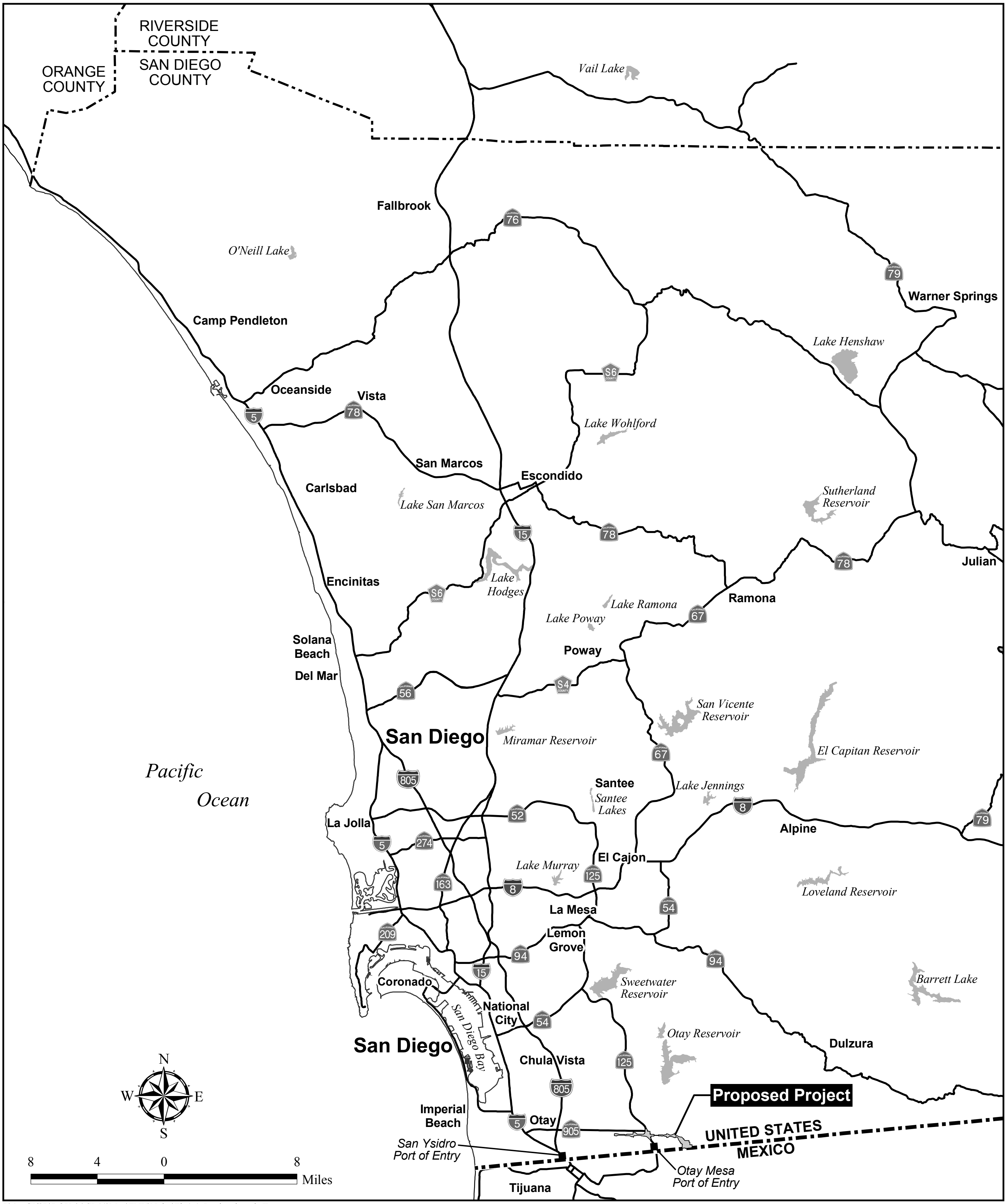
1.2. Project Purpose and Need

The proposed SR-11 and Otay Mesa East POE project is needed to address the projected increase in trade, travel, development, and population at the California/Mexico border. The need for a third POE in the San Diego/Tijuana area is well established, and is based on recent and projected increases in trade and personal travel beyond the capacities of the existing POEs. Trade between the U.S. and Mexico has increased substantially since the signing of the North American Free Trade Agreement (NAFTA) in 1994, and totaled over $332 billion by 2006 (U.S. Department of Transportation 2007). Pedestrian and passenger vehicle border crossings between the U.S. and Mexico have also risen dramatically in the past decade, reaching over 60 million people in 2006 in the San Diego County/Baja California border area alone (San Diego Association of Governments [SANDAG]/Caltrans 2006a). The number of inspections increased substantially over the past decade, and is projected to continue to climb beyond the capacity of the existing POEs in the region.

Current transportation infrastructure was not designed to accommodate the large traffic volumes stimulated by NAFTA (and subsequent related trade agreements with Mexico) as well as other economic growth. This, combined with increases in U.S. security requirements, has resulted in substantial POE cross-border travel delays of approximately one hour on average and maximum delays of approximately four hours (SANDAG/Caltrans 2006a). According to a January 2006 SANDAG/Caltrans study entitled *Economic Impacts of Wait Times at the San Diego – Baja California Border* (2006b), these substantial delays discourage cross-border personal trips and cross-border trading, and cost the U.S. and Mexican economies US$6 billion in gross output and 51,325 jobs in 2005. These numbers are expected to more than double over the next 10 years, unless substantial improvements in border crossing and transportation infrastructure and management take place.

Alternatives to the project include other POE locations and improving the existing POEs; however, these alternatives were determined to be less effective in improving cross-border traffic flow compared to the proposed project. In 2000, the *Feasibility of Opening an International Border Crossing at Jacumba-Jacume* study was prepared by SANDAG and Caltrans District 11. It found that providing a POE at Jacumba would improve border access for trucks that use Interstate (I-) 8, however, it would likely not improve the cross-border congestion generated by trucks using I-5, I-805 and I-15. Numerous improvements to the existing San Ysidro, Otay Mesa and Tecate POEs have also been studied and many have been implemented or are in progress. While further expansion of the Otay Mesa POE is possible, it would not address constraints on the Mexican side of the border. Also, a 2004 Caltrans study (Caltrans 2004) concluded that, in addition to renovation of the existing Otay Mesa POE, an additional POE is still needed to satisfy current and anticipated regional demand. It was also noted that even with improvements to the San Ysidro POE, northbound delays are expected to continue to exceed 60 minutes. The Tecate POE has recently been expanded on the U.S. side, but operational and access constraints have limited the effective capacity of this POE. Thus, the proposed Otay Mesa East POE is needed, as alternative improvements would not provide adequate cross-border travel facilities to fully accommodate future conditions.

The need for proposed SR-11 is linked to the need for the new Otay Mesa East POE. Without SR-11, the Otay Mesa East POE would relocate a substantial number of trips on the local roadway system and would lead to the local roadways operating over capacity and with substantial delays. Proposed SR-11 is required in conjunction with the Otay Mesa East POE project to provide adequate cross-border travel facilities to fully accommodate future conditions. Similarly, the proposed POE necessitates access to an existing or new Commercial Vehicle Enforcement Facility (CVEF) for the California Highway Patrol (CHP) to conduct safety/weight inspections on trucks entering the U.S.



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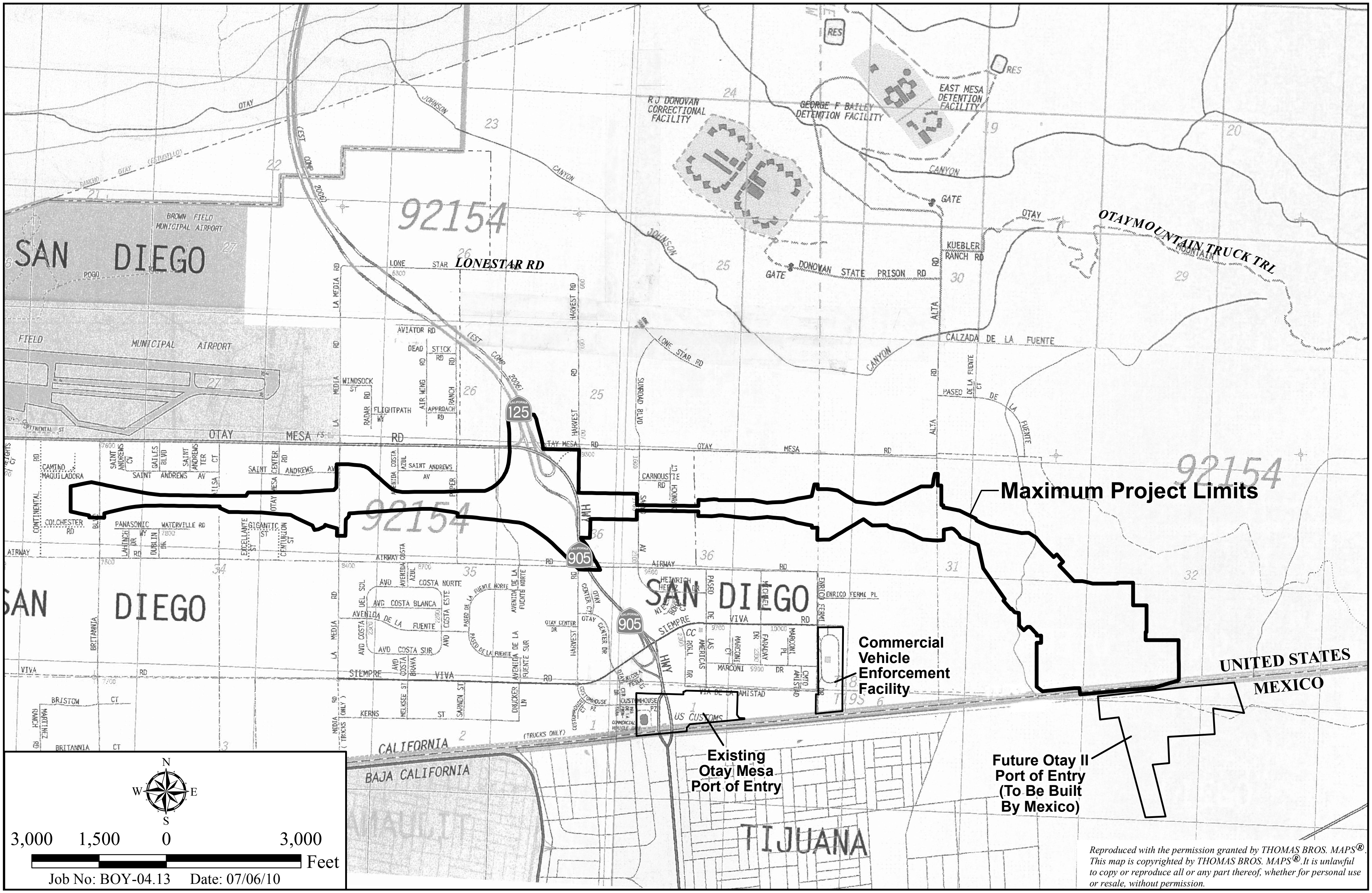
Regional Location Map

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 1-1



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Vicinity Map

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 1-2

CHAPTER 2. PROJECT DESCRIPTION

Three build alternatives (referred to as the Two Interchange, One Interchange, and No Interchange alternatives), with several design/operational variations are analyzed in this report.

SR-11 would be constructed and operated as a toll facility under all of the build alternatives, with SANDAG as the approved tolling agency under authorizing federal legislation.

2.1. Two Interchange Alternative

State Route 11

Under the Two Interchange Alternative, SR-11 would be constructed as a four-lane toll highway with two lanes in each direction, plus auxiliary lanes and connectors (refer to Figures 2-1a and 2-1b, *Major Project Features West of the SR-905/SR-125/SR-11 Interchange [All Alternatives],* Figure 2-2, *SR-905/SR-125/SR-11 Interchange and Variations [All Alternatives],* and Figures 2-3a through 2-3d, *Two Interchange Alternative - Major Project Features Sheets A through D*). The proposed design would include standard-width main lanes (12 feet wide) and shoulders (10 feet wide) in each direction, along with standard sight distances. Auxiliary lanes and connectors would also be included near the interchanges. The proposed median widths for all alternatives would vary within the proposed right-of-way (R/W) from west to east as follows: the median would narrow from 26 feet wide west of Sanyo Avenue to a width of 22 feet for a distance of approximately 1,600 feet (approximately between SR-11 stations 38+00 and 54+00) to minimize impacts to nearby buildings, before widening out over a distance of approximately 1,200 feet (approximately between SR-11 stations 54+00 and 66+00) to a 62-foot width for the remaining eastern portion of SR-11 (refer to Figure 2-3a). The SR-11 corridor would be located midway between Otay Mesa and Airway roads for most of its length, and would cross four local surface streets: Sanyo Avenue, Enrico Fermi Drive, Alta Road, and Siempre Viva Road. It would extend east from the vicinity of Harvest Road (at the future SR-905/SR-125/SR-11 Interchange) for approximately 1.5 miles, before curving to the southeast near Alta Road and continuing for approximately 0.6 mile to connect with the POE/CVEF site. This alternative would include an undercrossing structure at Sanyo Avenue; an overcrossing structure at Alta Road; and interchanges with local roadways at Siempre Viva Road (half interchange) and Enrico Fermi Drive. To link SR-11 to previously approved (under construction) SR-905, connectors would be provided and modifications to the approved SR-905 design would be required (refer to Figures 2-1a and 2-1b). These features are described below.[1]

[1] The Caltrans Highway Design Manual defines an undercrossing as a structure designed to allow a local roadway to pass under a highway, while an overcrossing is defined as a structure designed to allow a local roadway to pass over a highway. An interchange is defined as a system of interconnecting roadways in conjunction with one or more grade separations providing for the interchange of traffic between two or more roadways on different levels.

SR-905 Modifications to Accommodate SR-11 Connections

SR-905 was originally approved (and is now under construction between SR-125 and Britannia Boulevard) as a six-lane highway (three lanes in each direction), with a median wide enough to accommodate four additional lanes, two of which could function as high occupancy vehicle (HOV) lanes should future demand justify their construction. The design of the eastern portion of approved SR-905 includes one- and two-lane ramps from SR-905, just east of the SR-905/SR-125 Interchange, to and from Enrico Fermi Drive, along alignments similar to those that are now proposed as connectors between SR-11 and SR-905. With implementation of SR-11, certain modifications to the approved SR-905 design would be required, and are included as part of the proposed project (refer to Figures 2-1a and 2-1b, and Figure 2-2). These modifications are described below for the Two Interchange Alternative, but would be the same under the One and No Interchange Alternatives.

- The previously approved ramps between SR-905 and Enrico Fermi Drive would be replaced by the western portion of SR-11 (east of Harvest Road), as well as two-lane connectors in each direction (west of Harvest Road) for the entire distance between SR-905 and SR-11, along alignments similar to the previously approved on- and off-ramps within the approved R/W for the SR-905 project;
- On the eastbound side of SR-905, an additional auxiliary lane would be extended between La Media Road and the SR-11 connector (approximately between SR-905 stations 600+50 and 618+00), requiring the widening of this area by up to 12 feet;
- To accommodate weaving movements on westbound SR-905, the SR-11 merge with the SR-905 travel lanes would taper to match SR-905 in the vicinity of the Britannia Boulevard Interchange. This merge occurred at the La Media Road Interchange in the previously-approved design for SR-905.
- On the westbound side of SR-905, the proposed project would construct a ramp from SR-11 to tie into the planned SR-905 and SR-125 off-ramps to La Media Road.

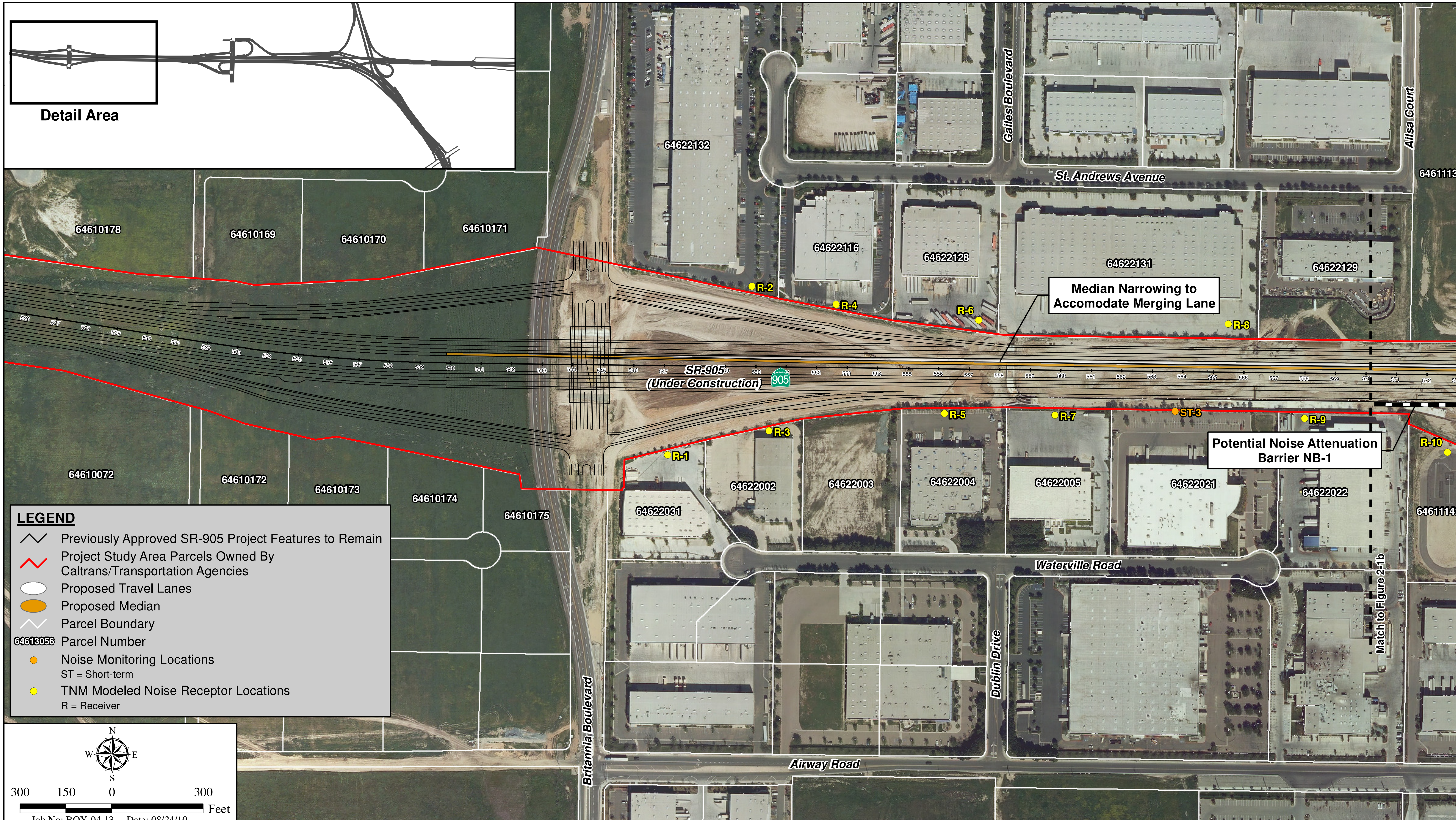
The SR-905 modifications to accommodate SR-11 connections would extend approximately 2.1 miles west of the terminus of SR-11 itself, at approximately Harvest Road, and would be entirely within existing state R/W.

Enrico Fermi Drive and Siempre Viva Road Interchanges

Under this alternative, two interchanges would be constructed along SR-11, at Enrico Fermi Drive and Siempre Viva Road (refer to Figures 2-3a through 2-3d).

The proposed interchange at Enrico Fermi Drive would be a full diamond interchange. This interchange would be located approximately one mile east of the previously described SR-905/SR-125/SR-11 Interchange, and approximately one mile west of the proposed interchange at Siempre Viva Road.

The proposed Siempre Viva Road Interchange under this alternative would be a half interchange with separate lanes for commercial and passenger-only traffic into and out of the new POE/CVEF. This half interchange would also provide an on-ramp from Siempre Viva Road to westbound SR-11; and an off-ramp to Siempre Viva Road from eastbound SR-11. The interchange would not provide access from Siempre Viva Road



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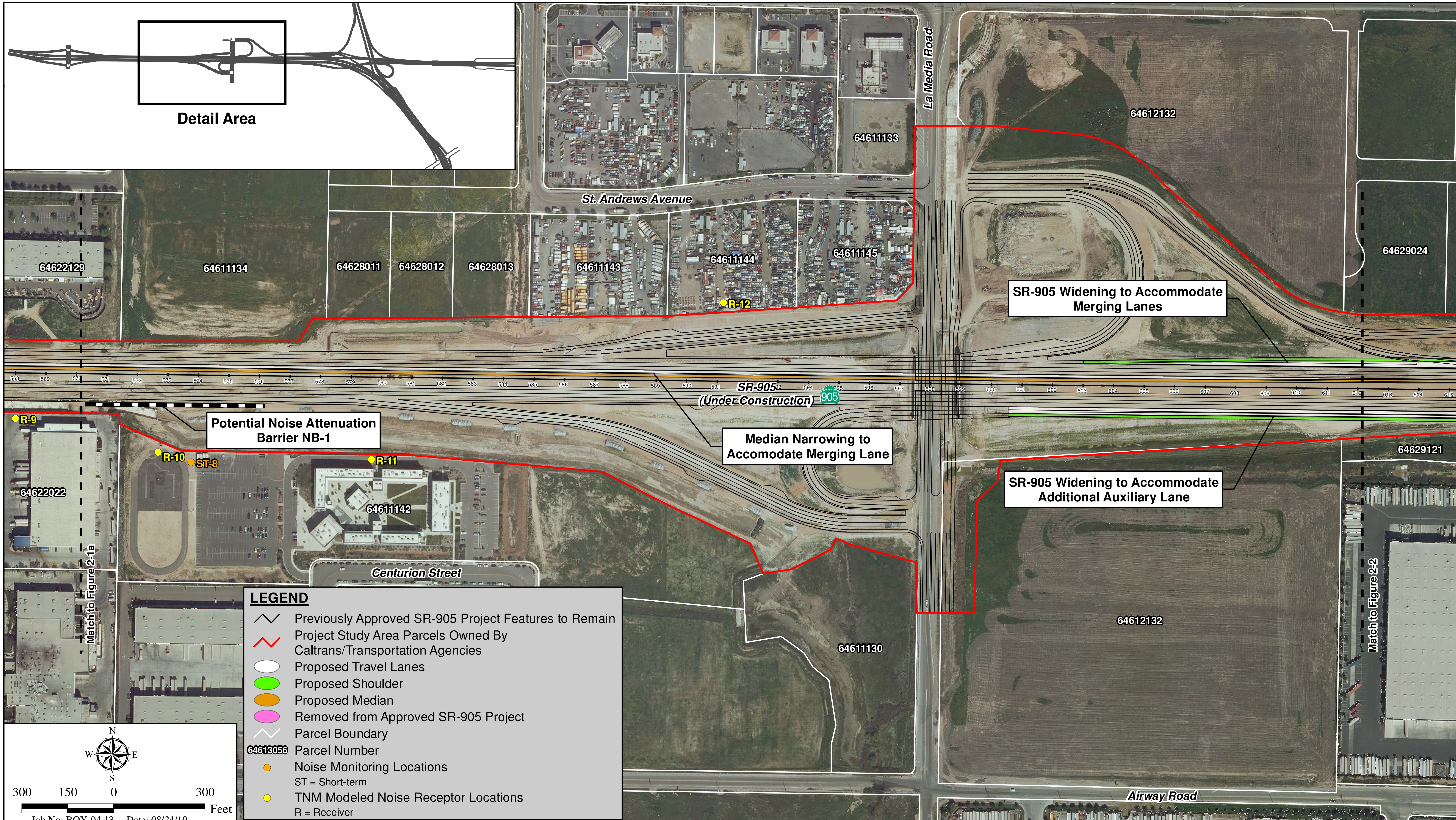
Major Project Features West of SR-905/SR-125/SR-11 Interchange (All Alternatives)

Figure 2-1a



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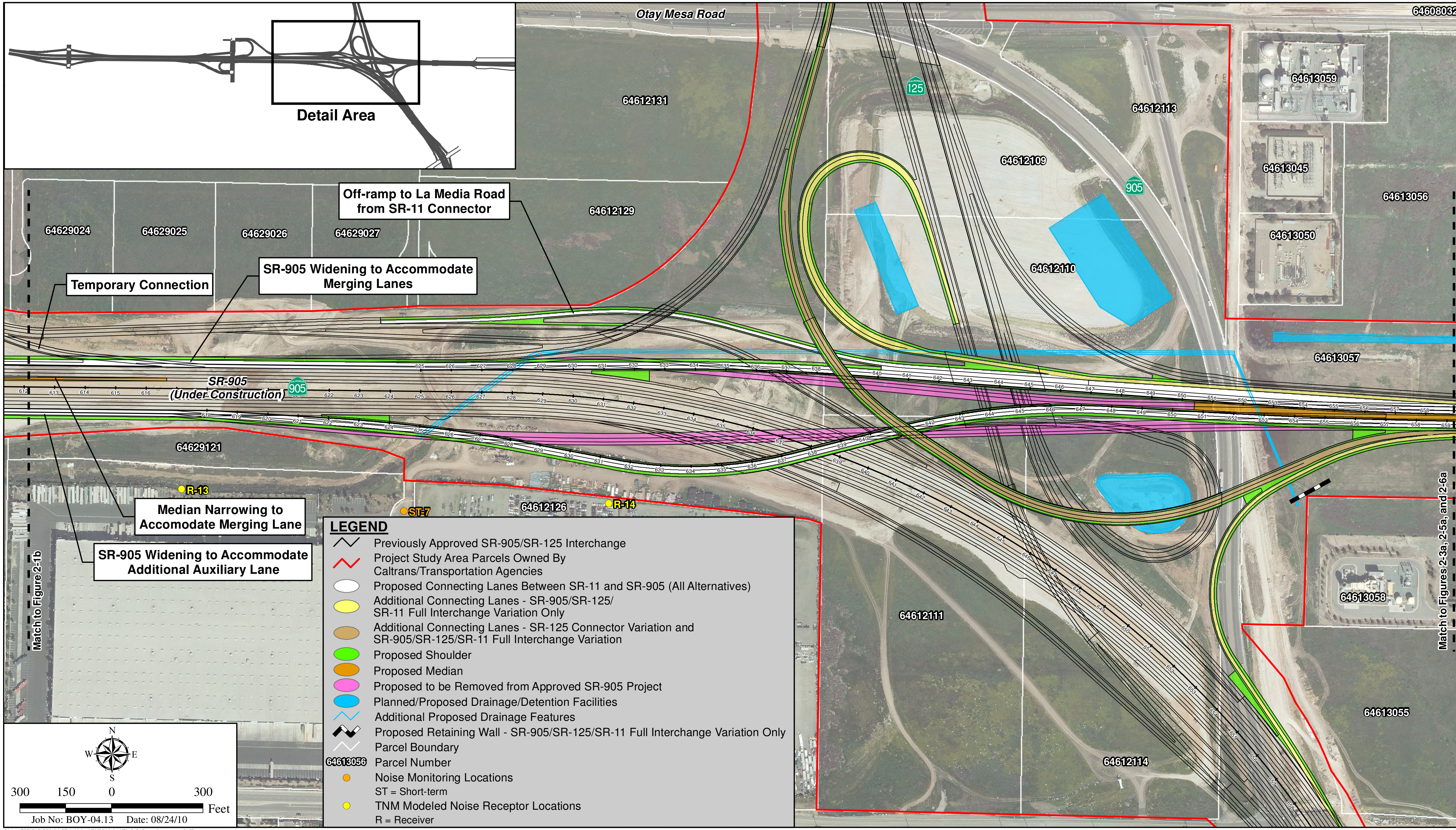
Major Project Features West of SR-905/SR-125/SR-11 Interchange (All Alternatives)



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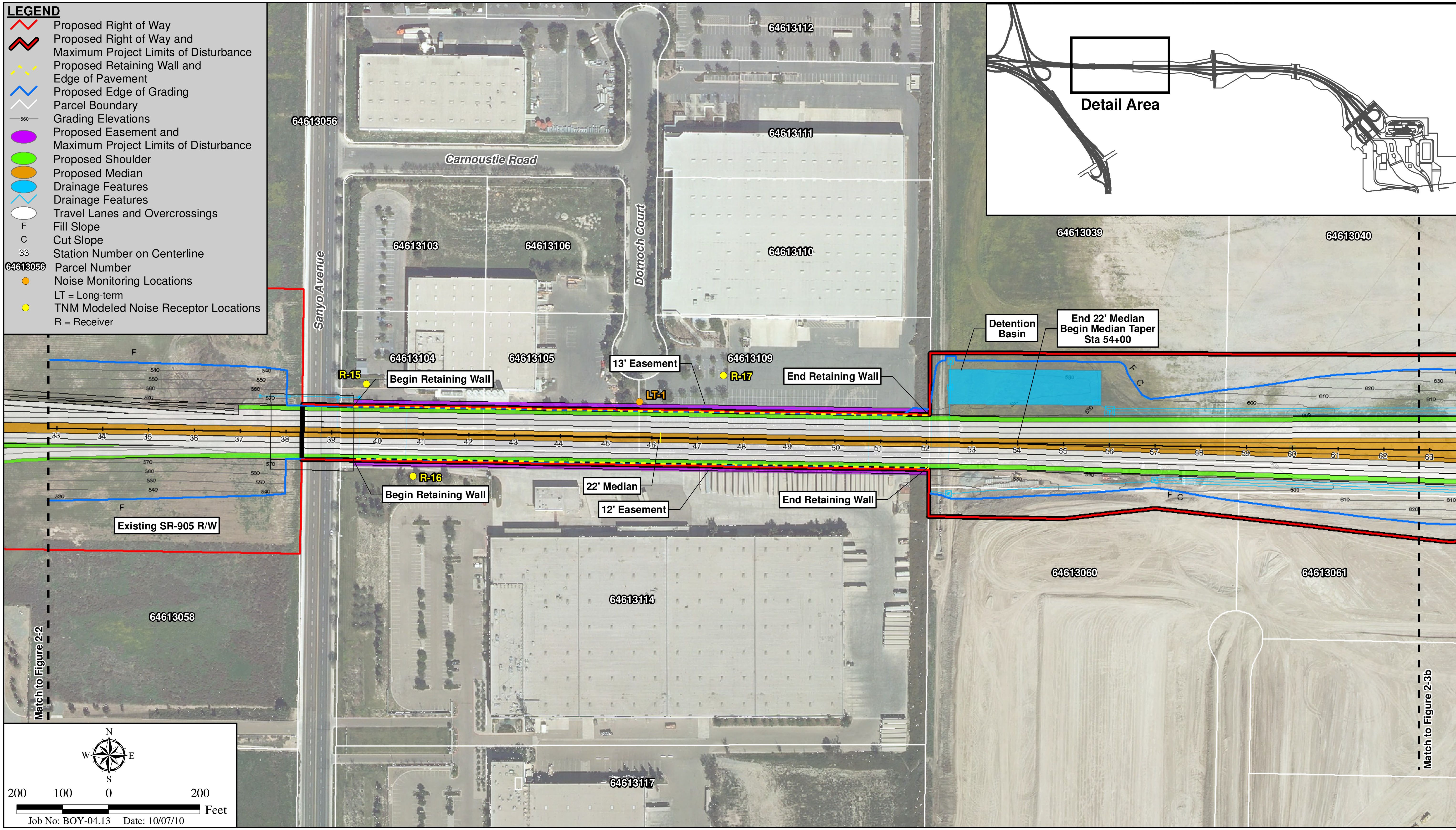
SR-905/SR-125/SR-11 Interchange and Variations

Figure 2-2



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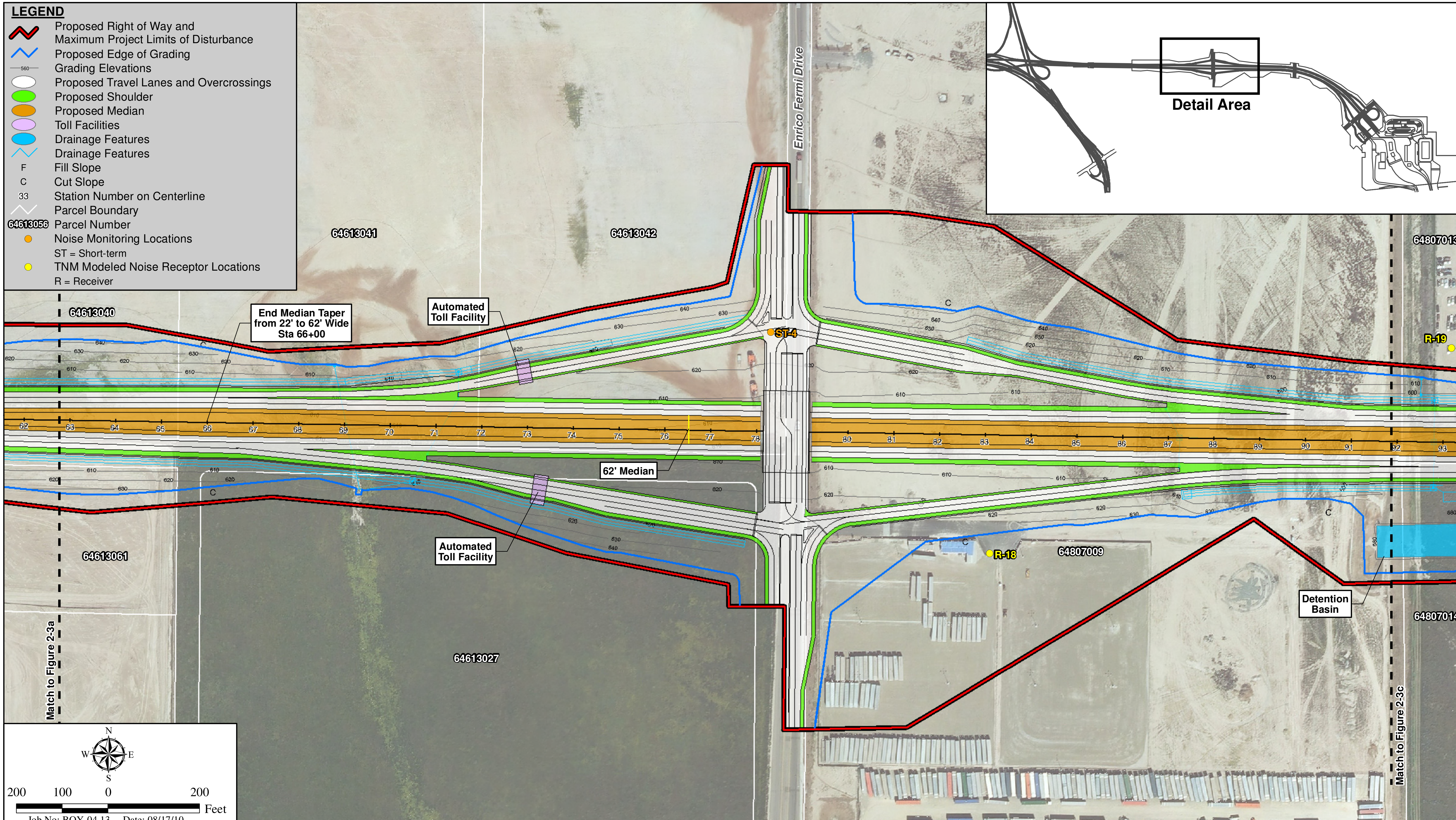
Two Interchange Alternative - Major Project Features Sheet A

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-3a



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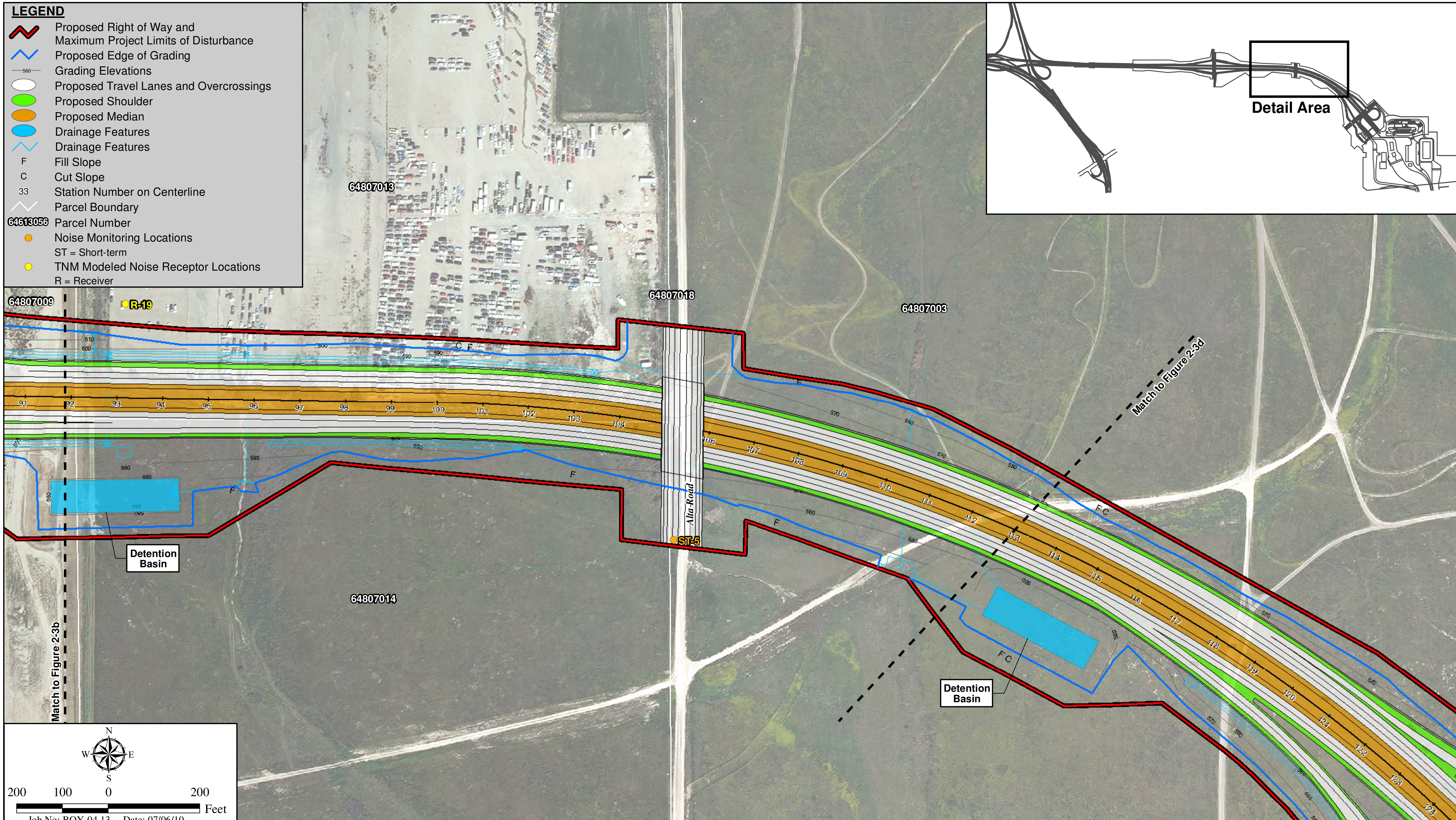
Two Interchange Alternative - Major Project Features Sheet B

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-3b



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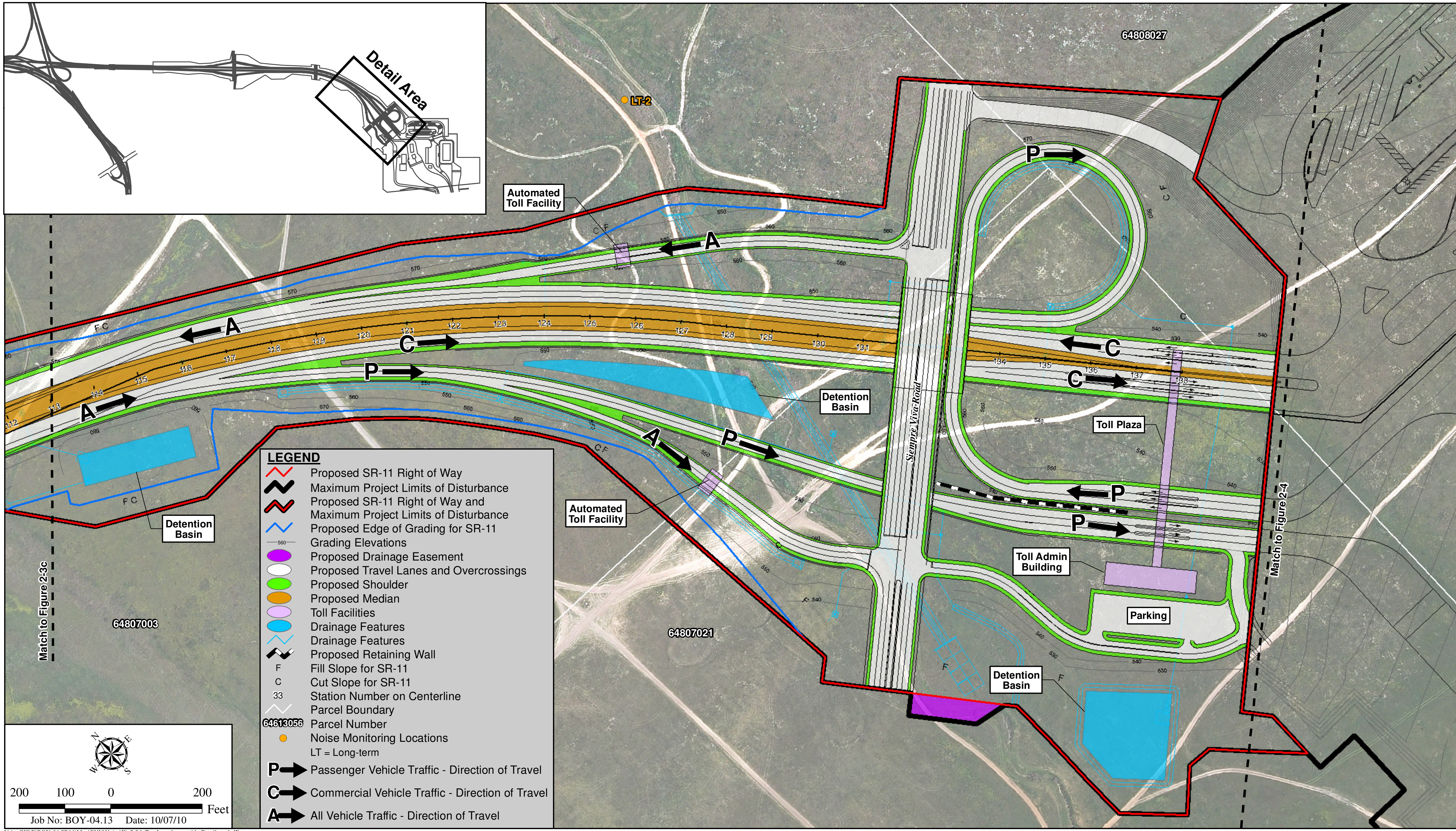
Two Interchange Alternative - Major Project Features Sheet C

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-3c



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Two Interchange Alternative - Major Project Features Sheet D

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-3d

to the POE via eastbound SR-11, nor would it provide public access to Siempre Viva Road for travelers exiting the POE via westbound SR-11. (A controlled-access road just east of the interchange would permit entry for POE/CVEF employees only.) A retaining wall approximately 415 feet long and up to 20 feet high would run between the eastbound and westbound passenger lanes from the Siempre Viva Road overcrossing bridge toward the toll plaza.

Sanyo Avenue Undercrossing and Alta Road Overcrossing

At the Sanyo Avenue undercrossing, SR-11 would be elevated approximately 26 feet above Sanyo Avenue, permitting the local road to pass under the new highway, but allowing no interchange of traffic between them. East of Sanyo Avenue, SR-11 would pass between existing industrial buildings and would be supported by retaining walls for a distance of approximately 1,250 feet as it slopes gradually downward to meet the surrounding grade. The walls and headwall structure at Sanyo Avenue would be a maximum of 26 and 22 feet high on the south and north sides of SR-11, respectively, with the highest portions of the walls located nearest to Sanyo Avenue. Three-foot high barriers would be provided at the edge of pavement and in the center median along this elevated stretch of SR-11. This design is intended to avoid the use of extensive fill slopes to support the elevated roadway, which would have required additional acquisition of existing developed industrial property along both sides of SR-11 in this area. Proposed SR-11 in this area is similar to the local access connection between SR-905 and Enrico Fermi Drive that was approved as part of the SR-905 project.

Alta Road would be elevated on a structure to pass over SR-11, with no interchange of traffic between the highway and the local road.

Otay Mesa East POE

The proposed Otay Mesa East POE would accommodate northbound and southbound commercial and passenger traffic, as well as buses, pedestrians and bicycles. The POE site would be accessed from the north by SR-11. From the south, entry would be through the proposed Otay II POE on the Mexican side of the border (refer to Figure 2-4, *Conceptual Otay Mesa East POE and CVEF Layout)*.

The current 106-acre POE shape and conceptual layout have been adjusted from those shown in the Program Environmental Impact Report/Phase I Environmental Impact Statement (PEIR/PEIS) approved for the project in 2008, to reflect subsequent design changes for proposed SR-11 and the Otay II POE in Mexico. The conceptual POE design is subject to revision pending the results of the Program Development Study (PDS) underway pursuant to GSA and CBP protocol.

Following implementation of the proposed project, it is anticipated that the existing Otay Mesa POE would remain open to all commercial, passenger, bus, bicycle and pedestrian traffic, while the existing POE at San Ysidro would continue to accommodate only passenger, bus, bicycle and pedestrian traffic. The GSA feasibility study conducted as part of the Otay Mesa East POE Phase I analysis (GSA 2008) concluded that this would be the most efficient operational arrangement to accommodate projected traffic in the San Diego-Tijuana region.

Transit Center Site

The overall POE footprint includes space to accommodate a potential future transit center adjacent to the POE, within the overall POE site. This potential transit facility is not part of the proposed project and would be designed and constructed by others. The intent of reserving space for a potential future transit center is to ensure that opportunities to implement transit service to the POE, such as Bus Rapid Transit, would not be precluded by future development in the project site vicinity. It is currently anticipated that a future transit center would encompass an approximately two-acre rectangular site in the vicinity of the western POE boundary.

Commercial Vehicle Enforcement Facility (CVEF)

The proposed site for the CVEF would include approximately 23 acres and would be located east of SR-11 along the northern POE boundary (refer to Figure 2-4). After receiving clearance to enter the U.S. at the POE, northbound commercial vehicles would be routed into the CVEF for a safety/weight inspection by the CHP prior to being released onto the regional roadway system

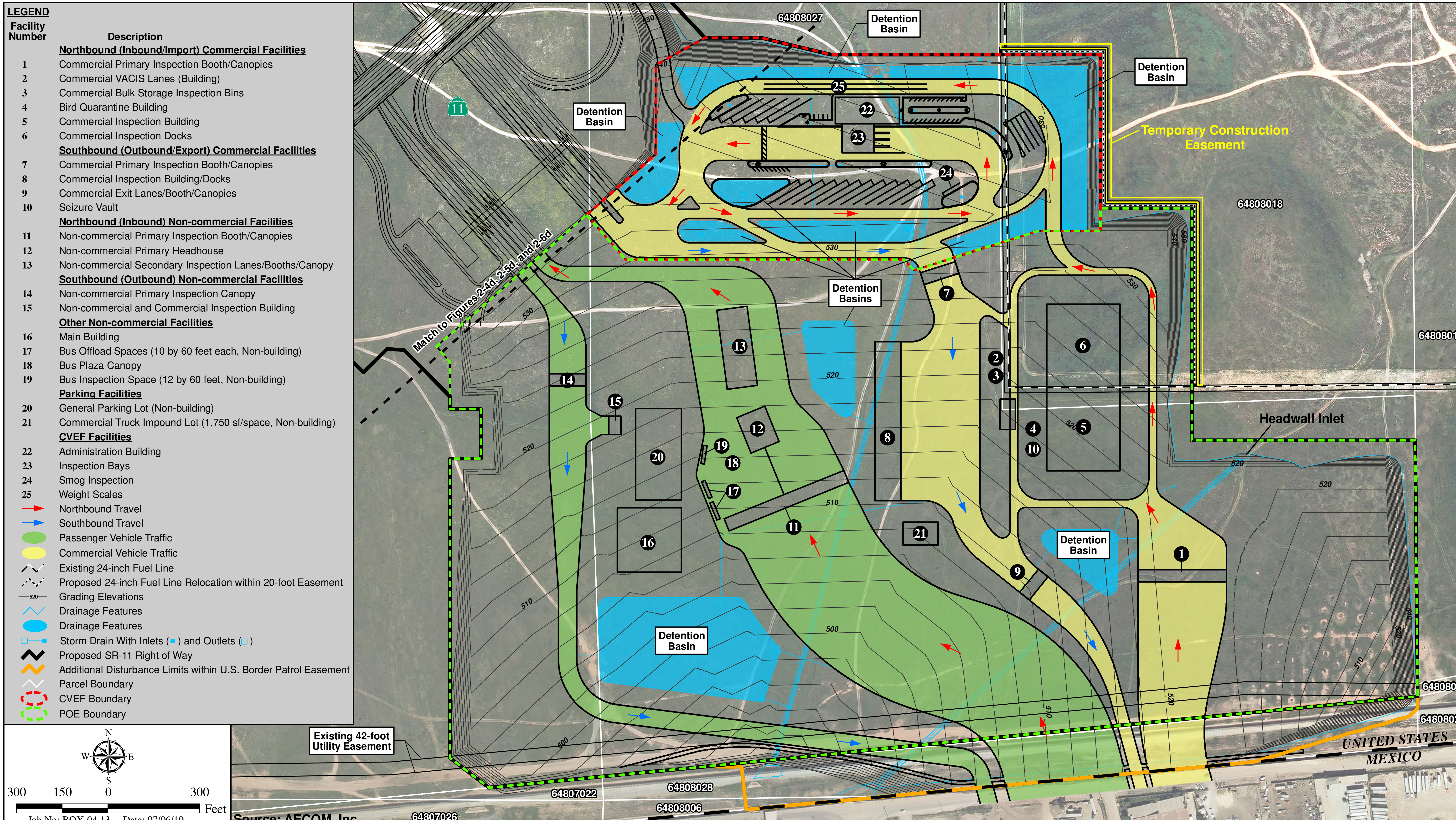
2.2 One Interchange Alternative

The designs of the SR-905/SR-125/SR-11 Interchange, the SR-11/SR-905 connectors, the Otay Mesa East POE (including the potential future transit center site), and the CVEF would be the same under this alternative as described above for the Two Interchange Alternative. The unique features of the One Interchange Alternative would involve SR-11.

Under the One Interchange Alternative, SR-11 would be constructed with a single interchange at Alta Road, approximately 1.4 miles east of the SR-905/SR-125/SR-11 Interchange (refer to Figures 2-1a and 2-1b*,* Figure 2-2 and Figures 2-5a through 2-5d, *One Interchange Alternative - Major Project Features Sheets A through D*). This would be a full interchange. SR-11 would have an undercrossing at Sanyo Avenue and overcrossings at Enrico Fermi Drive and Siempre Viva Road.

SR-11 at Siempre Viva Road would be constructed as an overcrossing under this alternative. Several design elements at the SR-11/Siempre Viva Road overcrossing, however, would be similar to the Siempre Viva Road Interchange under the Two Interchange Alternative (refer to Figures 2-5d and 2-3d). Commercial-only and passenger-only ramps would still be provided in this location to connect SR-11 to the POE. No permanent direct access would be provided between SR-11 and Siempre Viva Road. Until such time as local roadways in the area (including the County portion of Siempre Viva Road) are built, an interim ramp would allow vehicles dropping off or picking up pedestrians at the POE to access SR-11 via Siempre Viva Road.

The One Interchange Alternative would have a slightly smaller footprint between Sanyo Avenue and Enrico Fermi Drive than the Two Interchange Alternative, due to the elimination of the Enrico Fermi Drive Interchange and its associated auxiliary lanes (refer to Figures 2-5a and 2-3a*)*. Consequently, SR-11 would be approximately 12 feet farther away from the existing buildings in this area than under the Two Interchange Alternative.



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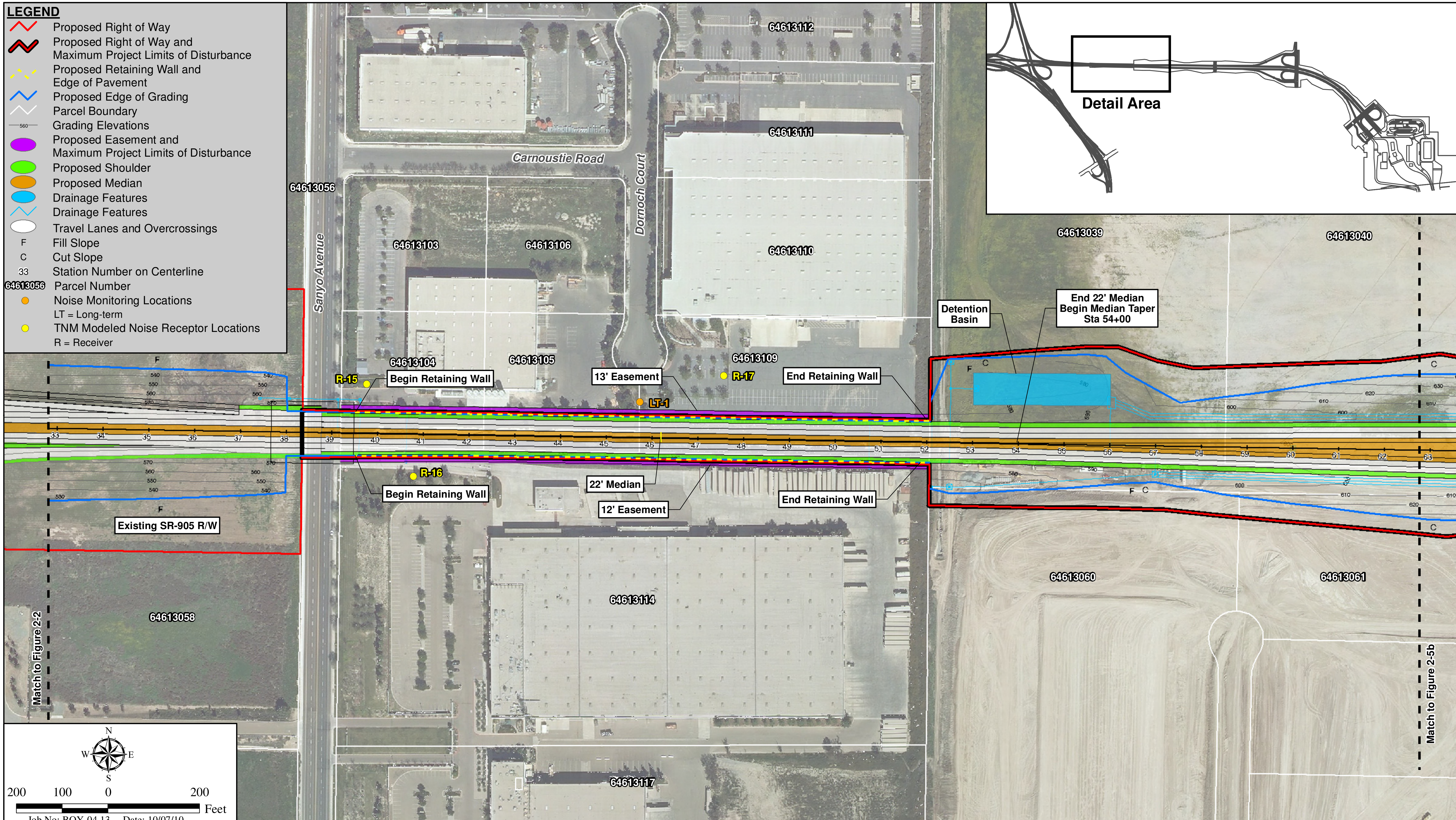
Conceptual Otay Mesa East POE and CVEF Layout

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-4



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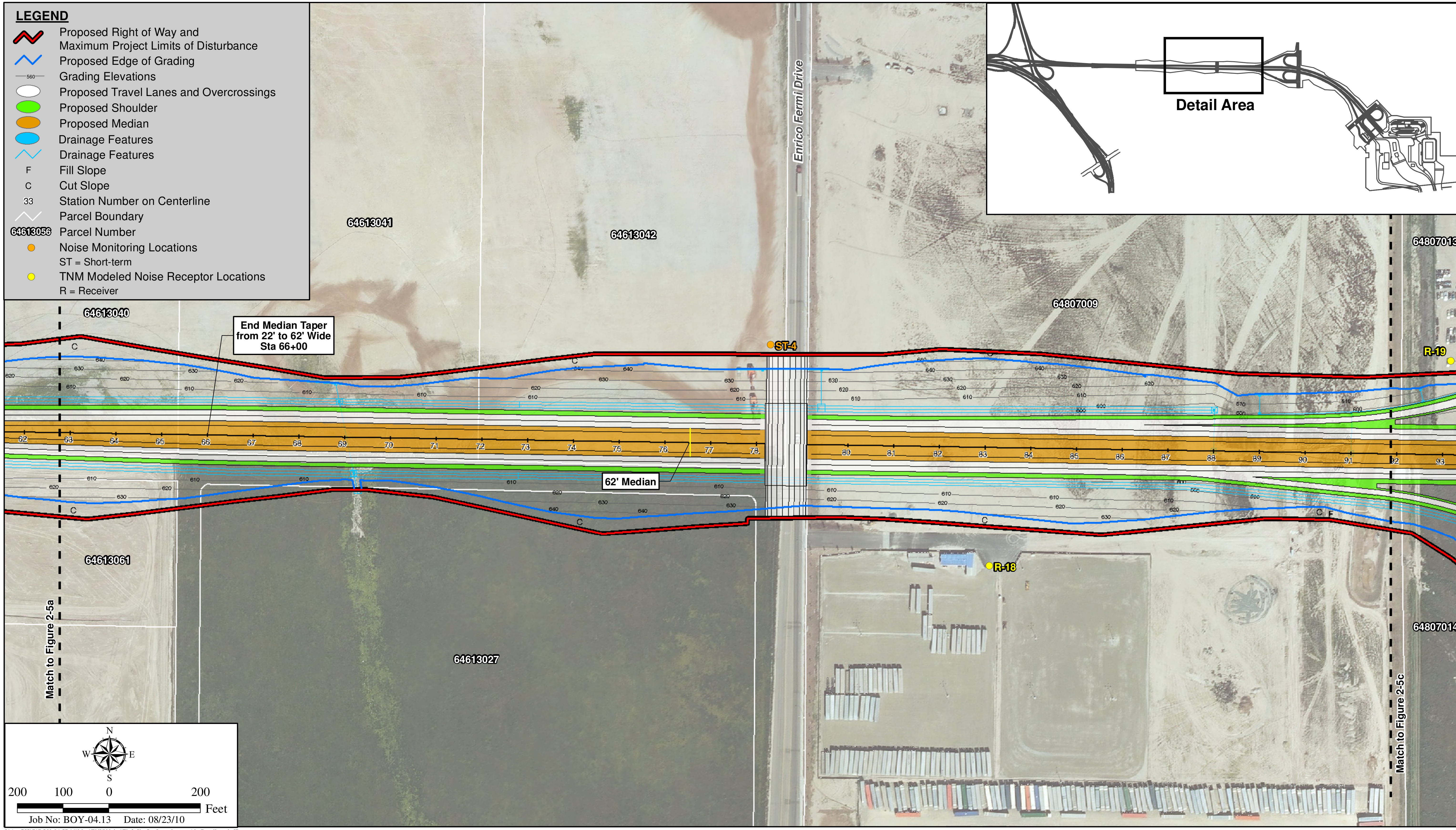
One Interchange Alternative - Major Project Features Sheet A

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

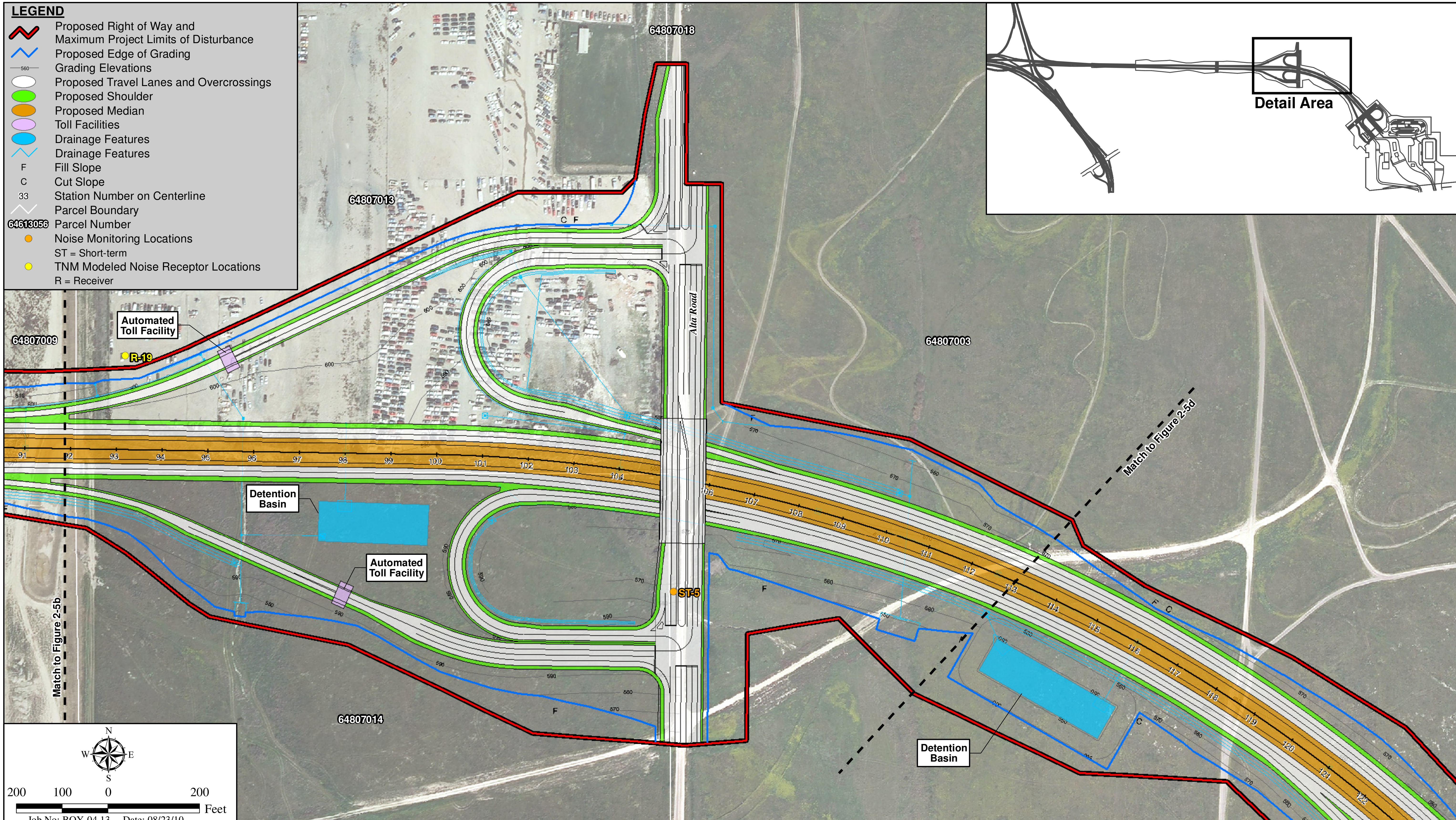
Figure 2-5a



One Interchange Alternative - Major Project Features Sheet B

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-5b



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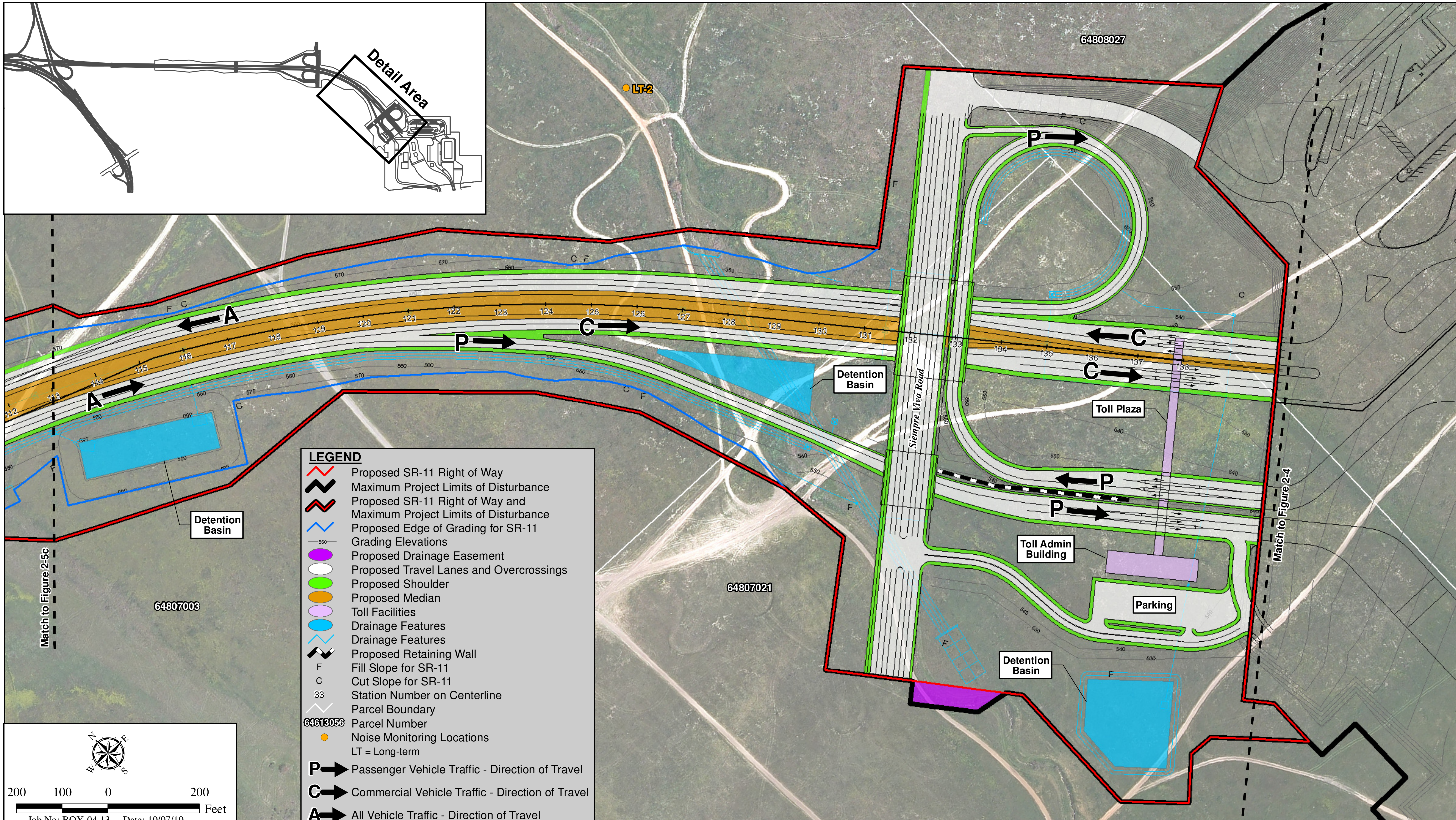
One Interchange Alternative - Major Project Features Sheet C

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-5c



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One Interchange Alternative - Detail Sheet D

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-5d

2.3 No Interchange Alternative

The designs of the SR-905/SR-125/SR-11 Interchange, the SR-11/SR-905 connectors, the Otay Mesa East POE (including the potential future transit center site), and the CVEF would be the same under this alternative as described above for the previous two build alternatives. The unique features of the No Interchange Alternative would involve SR-11.

Under the No Interchange Alternative, no interchanges would be constructed along proposed SR-11; all traffic accessing SR-11 from either SR-905 or SR-125 would have to proceed to the POE. An undercrossing structure would be provided at Sanyo Avenue, and overcrossings would be built at Enrico Fermi Drive and Alta Road (Figures 2-1a and 1b, Figure 2-2, and Figures 2-6a through 2-6d, *No Interchange Alternative – Major Project Features Sheets A through D*). In addition, SR-11 at Siempre Viva Road would be constructed as an overcrossing, with the same design as described above for the One Interchange Alternative (refer to Figures 2-6d and 2-3d). The No Interchange Alternative would have a slightly smaller footprint between Sanyo Avenue and Enrico Fermi Drive than would the Two Interchange Alternative, due to the elimination of the Enrico Fermi Drive Interchange and its associated auxiliary lanes (refer to Figures 2-6a and 2-3a). Consequently, SR-11 would be approximately 12 feet farther away from the existing buildings in this area than under the Two Interchange Alternative.

2.4 Variations on the Build Alternatives

A number of design or operational variations are being evaluated for one or more of the described build alternatives, as outlined below.

<u>No Toll Variation</u>

The No Toll Variation could apply to any of the three build alternatives, and would involve the SR-11 corridor operating as a freeway instead of a toll highway. The principal design difference under this variation would be the lack of toll-related structures such as toll administration and FasTrak facilities.

<u>46-foot Median Variation</u>

Under this variation, the SR-11 median approximately between stations 38+00 and 54+00 would widen from 26 feet west of Sanyo Avenue to 46 feet east of Sanyo Avenue, as depicted in Figure 2-7, *Two Interchange Alternative Variation with 46-foot Median* and Figure 2-8, *One and No Interchange Alternative Variation with 46-foot Median*. This is a variation on the median width described for the baseline build alternatives, which would narrow from 26 feet to a 22-foot width through this area, instead. The 46-foot Median Variation could apply to any of the three build alternatives.

<u>SR-905/SR-125/SR-11 Interchange Design Variations</u>

Two variations are being considered for the SR-905/SR-125/SR-11 Interchange, referred to as the SR-125 Connector Variation and the SR-905/SR-125/SR-11 Full Interchange Variation. These variations could apply to any of the three build alternatives.

SR-125 Connector Variation

Under the SR-125 Connector Variation, the southbound SR-125 to eastbound SR-11 connector would be added to the interchange. A local connector ramp from Enrico Fermi Drive to northbound SR-125 was approved under the SR-905 project; all of the proposed project build alternatives assume a similar direct connector from westbound SR-11 to northbound SR-125. The addition of the complementary southbound SR-125 to eastbound SR-11 connector under this variation would complete the direct link between the two highways.

SR-905/SR-125/SR-11 Full Interchange Variation

Under the SR-905/SR-125/SR-11 Full Interchange Variation, in addition to the SR-125 connector to be included under the SR-125 Connector Variation described above, the following connectors would also be added to the interchange to complete the connections between SR-11 and SR-905 interchange, providing movement in all directions:

- Westbound SR-11 to eastbound SR-905, and
- Westbound SR-905 to eastbound SR-11.

The addition of these connectors would complete the planned SR-125/SR-905/SR-11 Interchange, to provide full connectivity among the three highways.

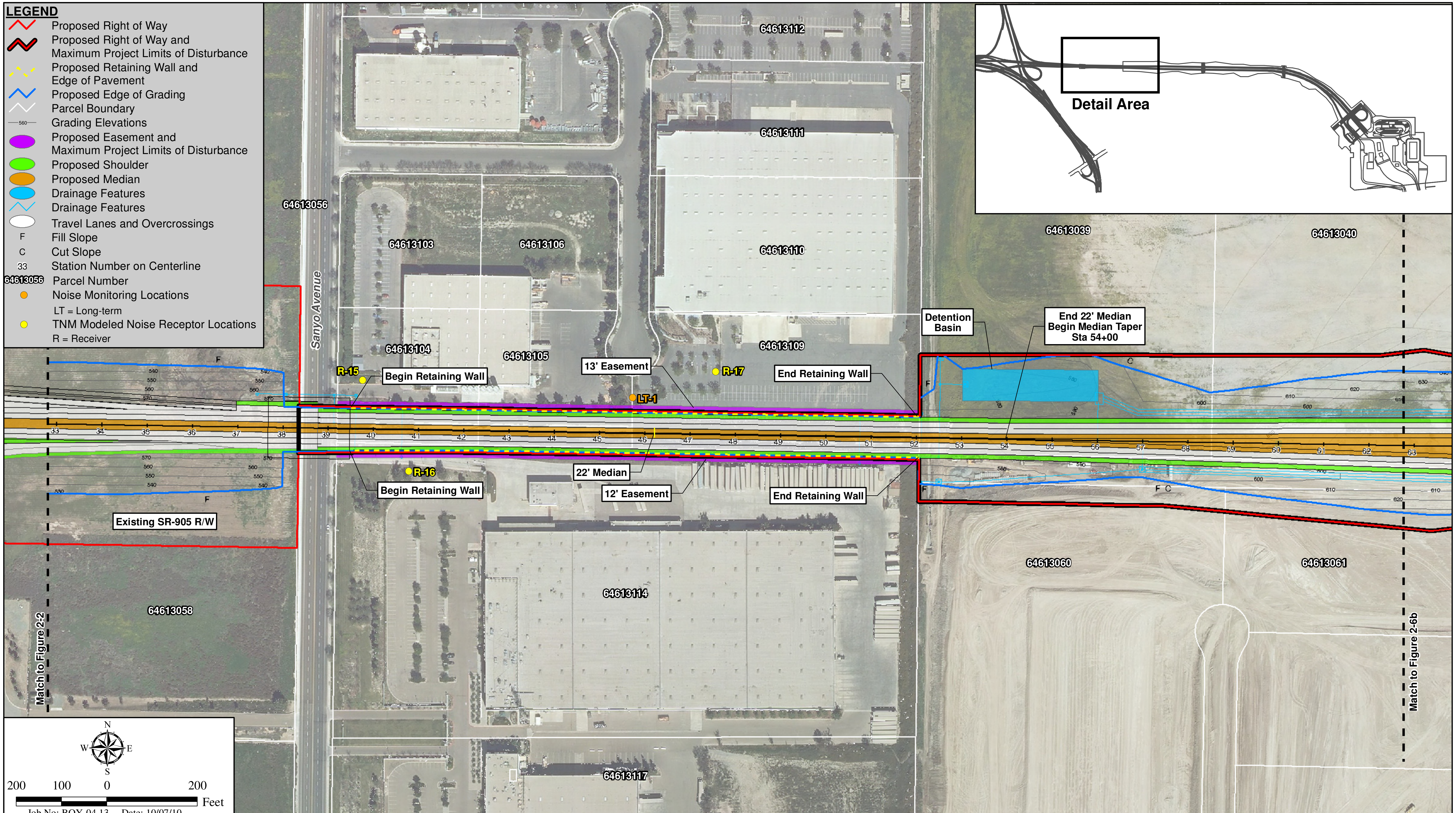
Siempre Viva Road Full Interchange Variation

This variation would only apply to the Two Interchange Alternative, and would involve constructing a full interchange at SR-11/Siempre Viva Road. This full interchange would include a number of elements that would be the same as (or similar to) those described in Section 2.2.1 for the Two Interchange Alternative half interchange at this location, as well as additional facilities to accommodate the full range of vehicle movements. As shown on Figure 2-9, *Siempre Viva Road Full Interchange Variation*, in addition to the features of the half interchange, this variation would include the following elements:

- Two separate loop-style ramps (one for commercial-only traffic and one for passenger-only traffic) would be constructed to provide access from Siempre Viva Road to the southbound lanes in the POE;
- A loop-style ramp would be constructed for northbound passenger-only traffic from the POE to access Siempre Viva Road; and
- Commercial-only traffic would be provided with direct access to Siempre Viva Road from the CVEF.

2.5 No Build Alternative

Under the No Build Alternative, none of the project components described above for the build alternatives would be constructed, including the 2.1-mile SR-11 highway (and associated interchanges, under/overcrossings, connectors, SR-905 modifications, and toll-related facilities), the Otay Mesa East POE and CVEF (including the potential future transit center site). The SR-905/SR-125 Interchange would be implemented as approved, including the connectors between SR-905 and SR-125, local access ramps between SR-905 and Enrico Fermi Drive (along an alignment similar to that proposed for SR-11), and the associated westbound to northbound SR-125 ramp from Enrico Fermi Drive.



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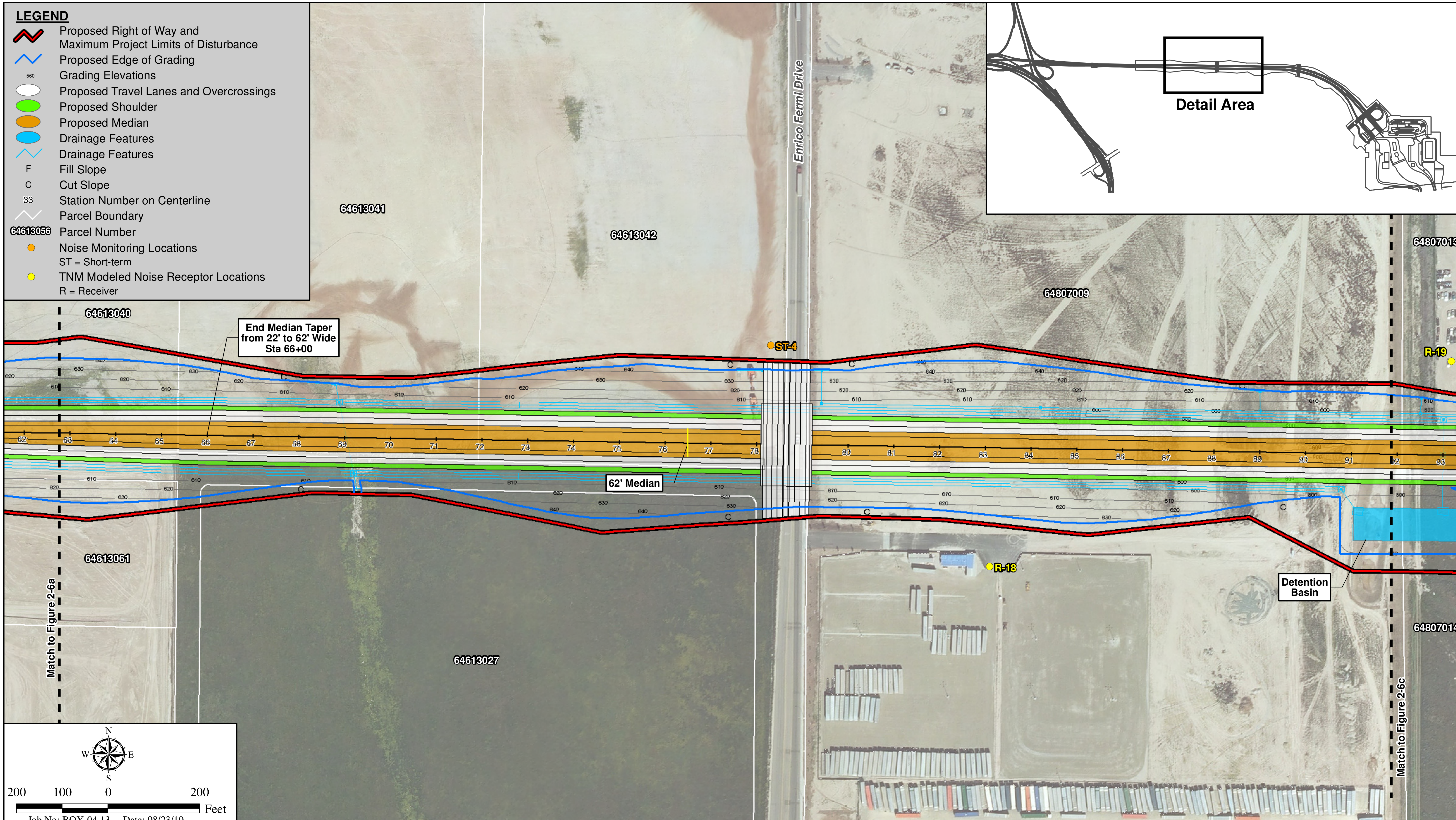
No Interchange Alternative - Major Project Features Sheet A

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-6a



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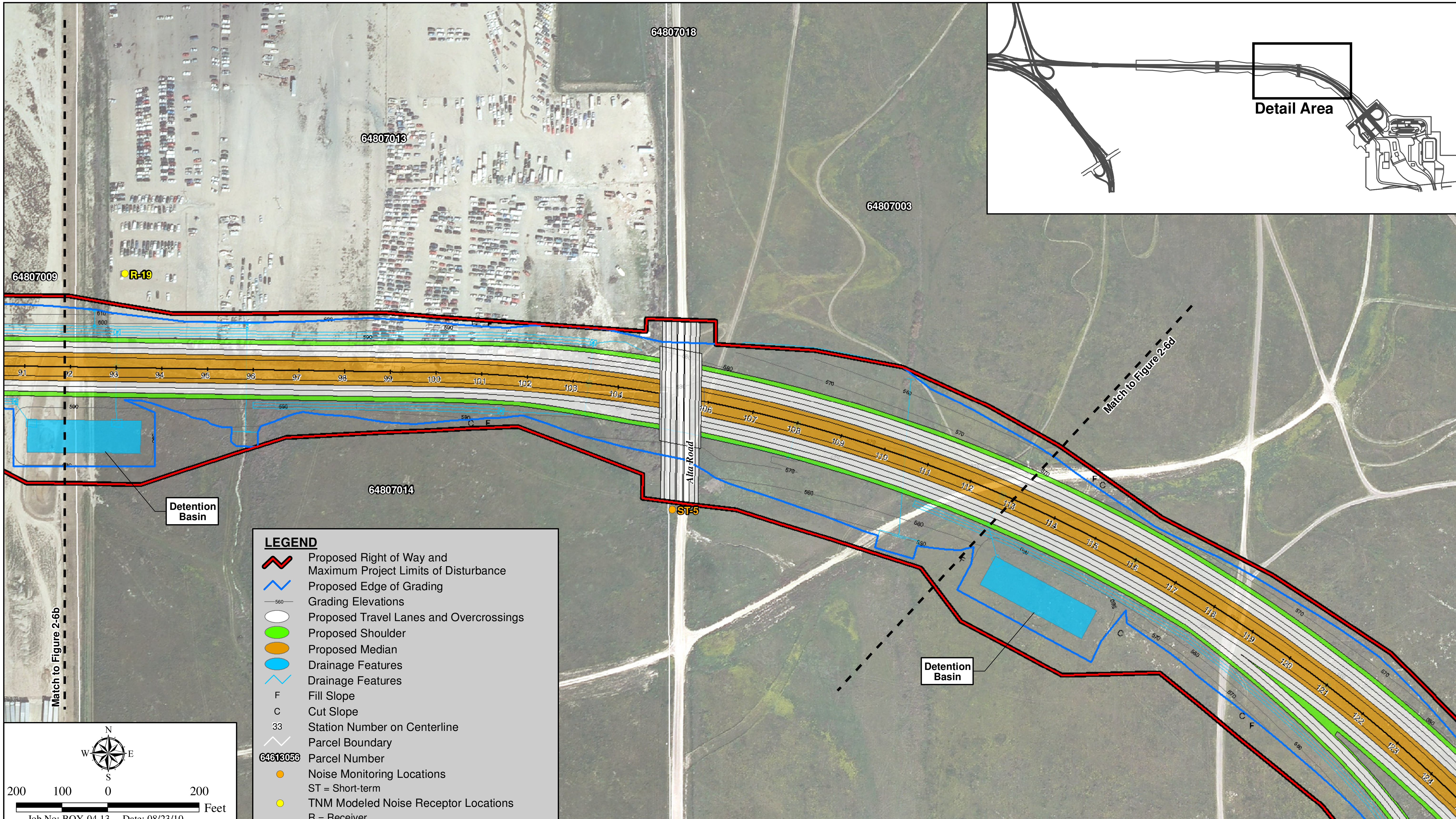
No Interchange Alternative - Major Project Features Sheet B

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-6b



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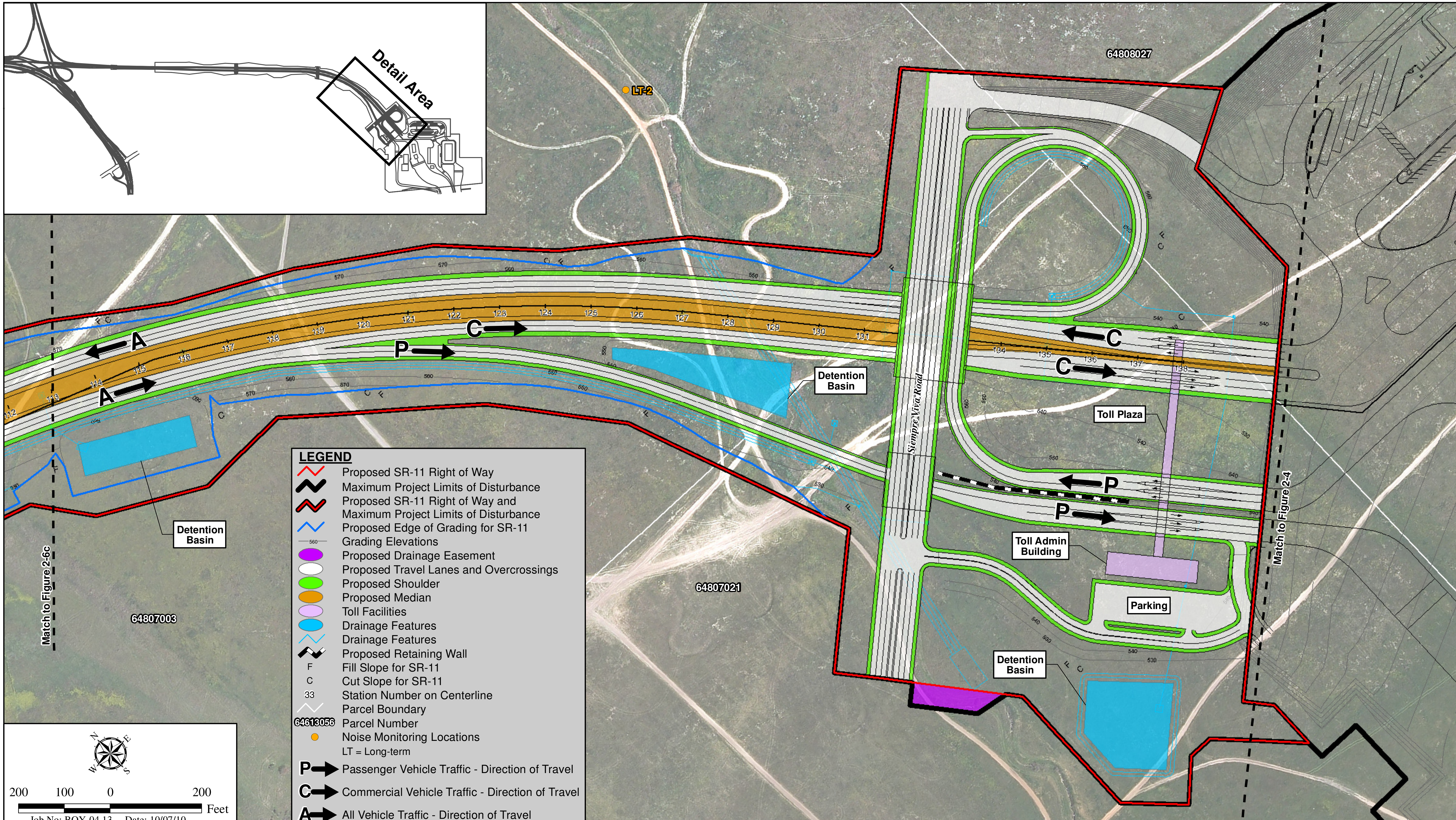
No Interchange Alternative - Major Project Features Sheet C

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-6c



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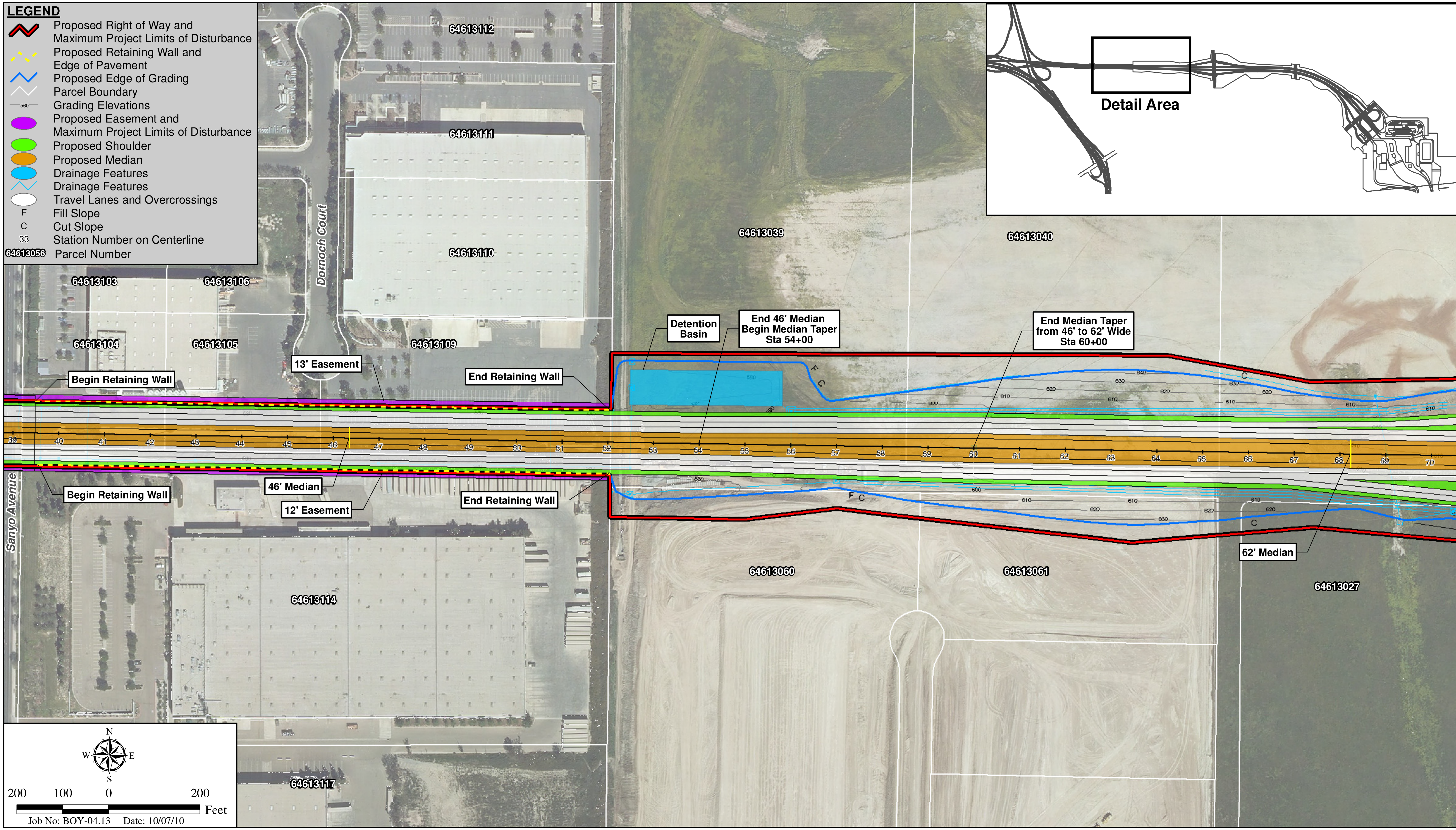
No Interchange Alternative - Major Project Features Sheet D

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-6d



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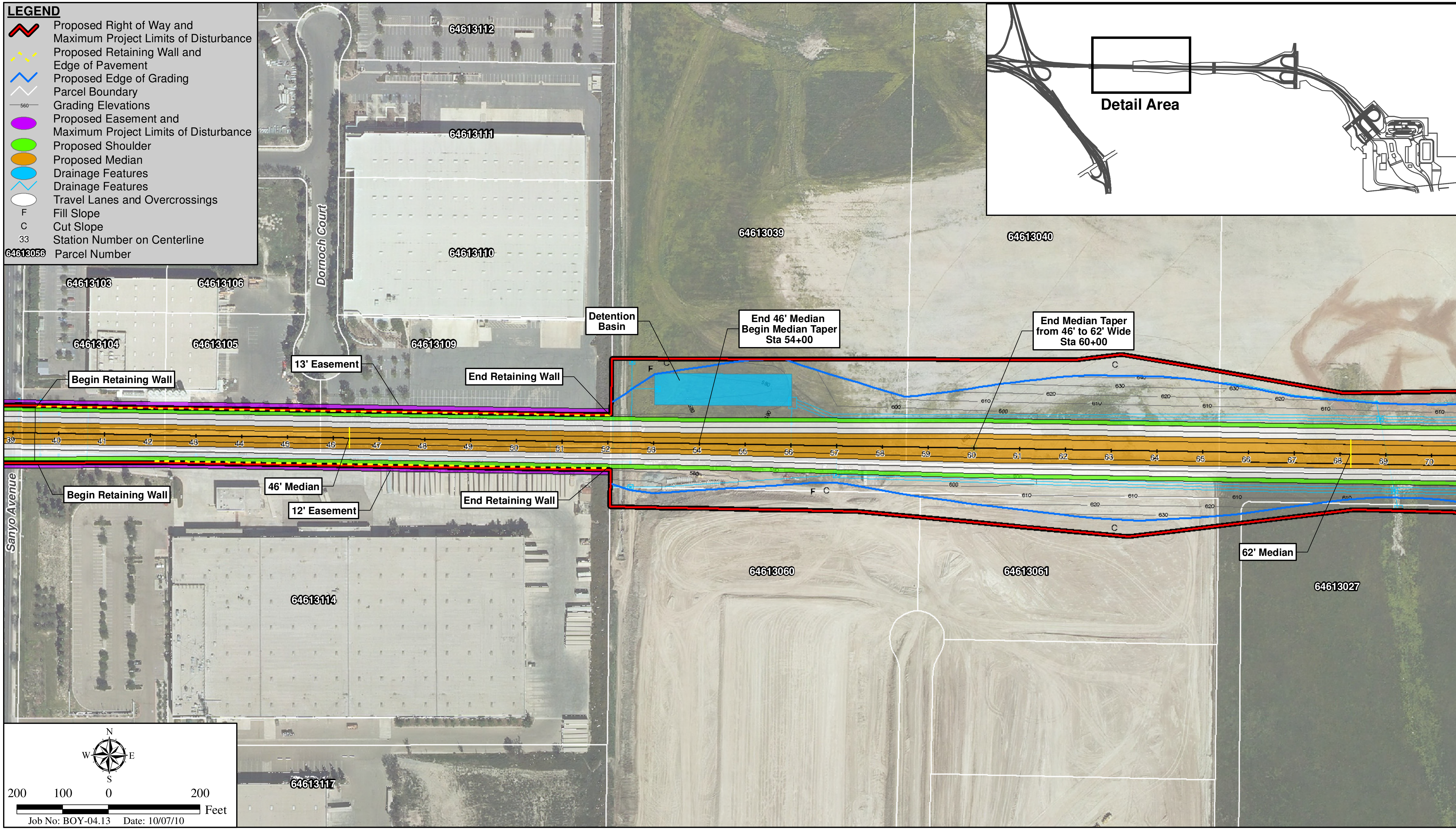
Two Interchange Alternative Variation with 46-Foot Median

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-7



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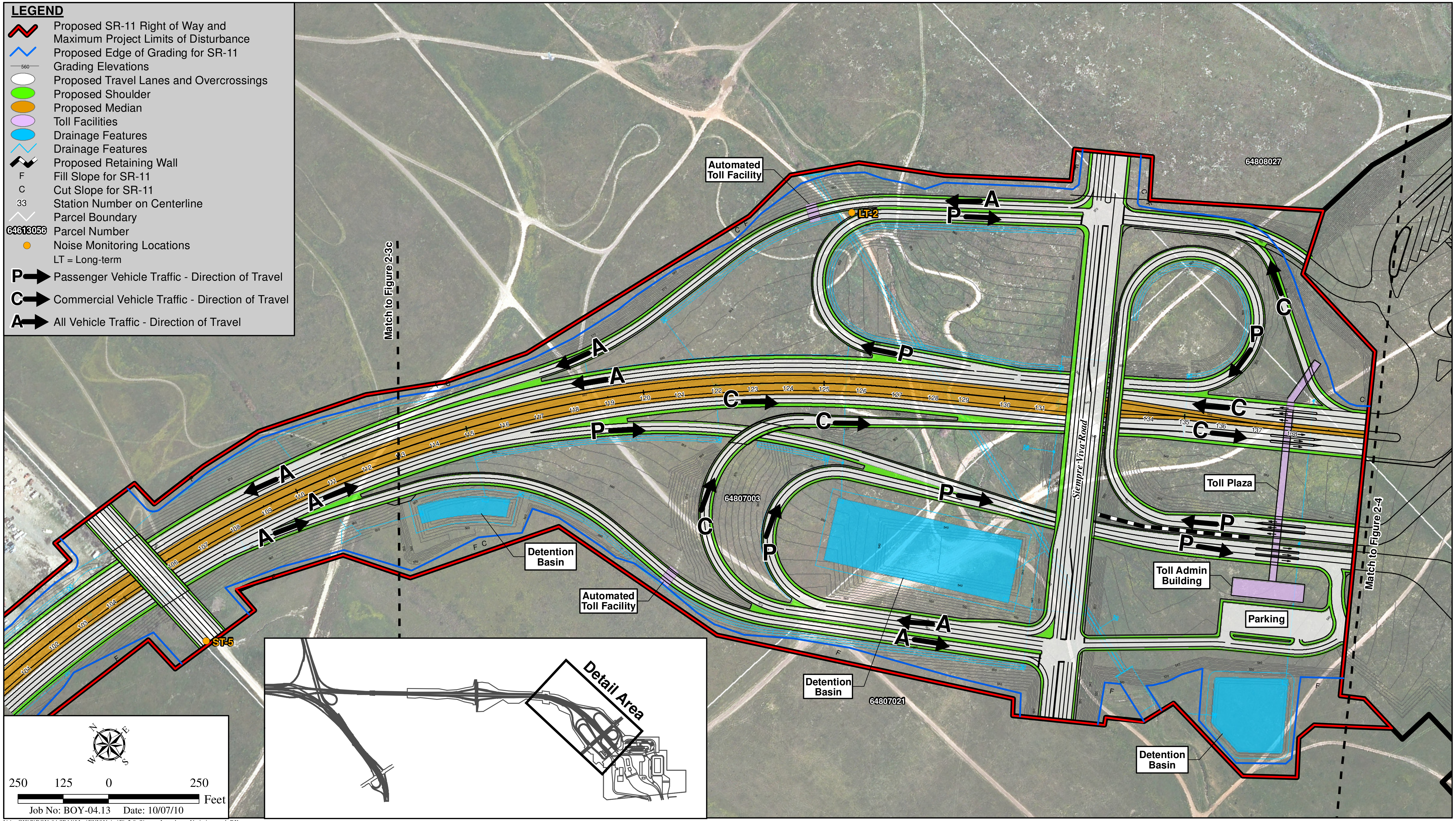
One and No Interchange Alternative Variation with 46-Foot Median

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-8



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Siempre Viva Road Full Interchange Variation

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

Figure 2-9

CHAPTER 3. FUNDAMENTALS OF TRAFFIC NOISE

The following is a brief discussion of fundamental traffic noise concepts. For a detailed discussion, please refer to Caltrans' Technical Noise Supplement (TeNS; Caltrans 1998), a technical supplement to the Protocol that is available on the Caltrans website (www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf).

3.1. Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

3.2. Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

3.3. Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

3.4. Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

3.5. A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Table 3-1 describes typical A-weighted noise levels for various noise sources.

Table 3-1
TYPICAL A-WEIGHTED NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 miles per hour		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, at 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room

Table 3-1 (cont.)
TYPICAL A-WEIGHTED NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans (1998)

3.6. Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the midfrequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound, would generally be perceived as barely detectable.

3.7. Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis.

Equivalent Sound Level (L_{EQ}): L_{EQ} represents an average of the sound energy occurring over a specified period. In effect, L_{EQ} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level (L_{eq}[h]) is the energy average of A-weighted sound levels occurring during a one-hour period, and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.

Percentile-Exceeded Sound Level (L_{xx}): L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time).

Maximum Sound Level (L_{max}): L_{max} is the maximum sound level measured during a specified time period with "slow/1-second" time-averaging.

Day-Night Level (L_{dn}): L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 P.M. and 7 A.M.

Community Noise Equivalent Level (CNEL): Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 P.M. and 7 A.M., and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 P.M. and 10 P.M.

3.8. Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

3.8.1. Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

3.8.2. Ground Absorption

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.

3.8.3. Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

3.8.4. Shielding by Natural or Human-made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. Vegetation between the highway and receiver is rarely effective in reducing noise because it does not create a solid barrier.

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CHAPTER 4. FEDERAL REGULATIONS AND STATE POLICIES

This report focuses on the requirements of 23 CFR 772, as discussed below.

4.1. Federal Regulations

4.1.1. 23 CFR 772

23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type I or Type II projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway at a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment.

Type I projects include those that create a completely new noise source, as well as those that increase the volume or speed of traffic or move the traffic closer to a receiver. Type I projects include the addition of an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening of an existing ramp by a full lane width for its entire length. Projects unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type I projects.

Under 23 CFR 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23 CFR 772 requires that the project sponsor “consider” noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR 772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (a “substantial” noise increase). 23 CFR 772 does not specifically define the terms “substantial increase” or “approach”; these criteria are defined in the Protocol, as described below.

Table 4-1 summarizes NACs corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

Table 4-1
ACTIVITY CATEGORIES AND NOISE ABATEMENT CRITERIA

Activity Category	NAC, Hourly A-Weighted Noise Level (dBA-L_{eq}[h])	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in categories A or B above
D	—	Undeveloped lands
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: United States Code of Federal Regulations Title 23 Part 772, Table 1.

In identifying noise impacts, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category E) is used as the basis for determining a noise impact.

4.2. State Regulations and Policies

4.2.1. Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The NAC specified in the Protocol are the same as those specified in 23 CFR 772. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach a NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The TeNS to the Protocol provides detailed technical guidance for the evaluation of highway traffic noise. This includes field measurement methods, noise modeling methods, and report preparation guidance.

CHAPTER 5. STUDY METHODS AND PROCEDURES

5.1. Methods for Identifying Land Uses and Selecting Noise Measurement and Modeling Receiver Locations

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Land uses in the project area were categorized by land use type and Activity Category as defined in Table 4-1. As stated in the Protocol, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. All developed land uses are evaluated in this analysis.

The geometry of the project relative to nearby existing and planned land uses was also identified. The project area includes developed industrial land uses, partially graded areas, and undeveloped land.

Short-term measurement locations were selected to represent each major geographic area of the project, and to serve as representative modeling locations, as will be described in Table 6.1 in Chapter 6, *Existing Noise Environment*. Two long-term measurement sites were selected to capture the full daytime ambient noise level pattern in the project area. One long-term measurement was sited next to existing receptors in a developed area and the other was sited in an undeveloped portion of the mesa that would be traversed by the proposed project. Measurement locations are depicted in all figures in Chapter 2.

Noise measurements in undeveloped and partially developed industrial/commercial areas are provided only as general background information. Caltrans considers noise abatement only for developed lands that contain areas of frequent outdoor human use that would benefit from a lowered noise level. The locations selected for modeling and analysis represent outdoor locations with regular human use at the Southwestern College campus and in the developed industrial/commercial areas of the project that contain permanent structures or other developed land uses or activities not included in Activity Categories A or B described in Table 4.1.

5.2. Field Measurement Procedures

A field noise study was conducted in accordance with recommended procedures in TeNS Section 5.3. The following is a summary of the procedures used to collect short-term and long term sound level data.

5.2.1. Short-term Measurements

Short-term monitoring was conducted at five locations on Friday, August 7, 2009, with supplemental measurements taken on Thursday, September 24, 2009 and February 18, 2010 at three additional locations. The short-term measurement locations are identified in all figures in Chapter 2. During these short-term measurements, field staff attended each meter. Minute-to-minute L_{EQ} values collected during the measurement period (typically 20 minutes or longer in duration) were logged manually and dominant noise sources observed during each individual one-minute period were also identified and logged. One supplemental monitoring measurement was taken for a 15-minute period on September 24, 2009, and two supplemental monitoring measurements were taken on February 18, 2010.

All short-term measurements used a Larson-Davis Model 820 Precision Type 1 sound level meter (serial number 1502). The calibration of the meter was checked before and after the measurement using a Larson-Davis Model CA200 calibrator (serial number 5173). During the short-term monitoring sessions, approximate temperature, wind speed, and humidity were noted on the Site Survey forms included in Appendix A.

5.2.2. Long-term Measurements

Long-term monitoring (daytime only) was conducted on August 7, 2009 at two locations using Larson-Davis Model 720 Type 2 sound level meters (serial numbers 0432 and 0453). The purpose of these measurements was to identify variations in sound levels throughout the day. The long-term sound level data monitoring were started prior to the short term measurements and stopped in the late afternoon of the same day. Long-term measurement locations are depicted in all figures in Chapter 2.

5.3. Traffic Noise Levels Prediction Methods

Traffic noise levels were predicted using the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). TNM 2.5 is a computer model based on two FHWA reports: FHWA-PD-96-009 and FHWA-PD-96-010 (FHWA 1998a, 1998b). Key inputs to the traffic noise model were the locations of roadways, shielding features (e.g., topography and buildings), noise barriers, ground type, and receivers. Three-dimensional representations of these inputs were developed using CAD drawings, aerial photographs, and topographic contours provided by Caltrans.

Worst-case traffic noise typically occurs when traffic is operating under Level of Service (LOS) C conditions. Under LOS C conditions, traffic is heavy, but remains free-flowing. The following assumptions are used for modeling peak-hour traffic noise levels:

<u>Peak-hour Traffic Assumptions:</u>

- SR-11 Mainline Volumes: 1,650 vehicles per hour (vph)/lane
- Auxiliary Lanes: 1,500 vph/lane
- Connector and Ramp Volumes: 1,000 vph/lane
- SR-11 Mainline Speed: 55 miles per hour (mph)
- Auxiliary Lanes: 55 mph
- Connector Speed: 45 mph
- Ramp Speed: 45 to 55 mph

Due to the anticipated higher volumes of trucks using SR-11 to travel to the border crossing, the future truck traffic percentages in this analysis were assumed to be five percent medium trucks and 10 percent heavy trucks for all lanes, consistent with the project traffic report.

All alternatives analyzed in this report include the full interchange variation, to assess the worst case scenario for any of the build alternatives. Similarly, the noise analysis assumes LOS C traffic conditions, which would constitute a worst case scenario for both the toll baseline alternatives and no toll variations of the project. Since the analysis would be identical whether or not the project included a toll, the No Toll Variation analysis is the same as the Toll baseline alternatives, and is not analyzed separately in this report.

5.4 Methods for Identifying Traffic Noise Impacts and Consideration of Abatement

Traffic noise impacts are considered to occur at receiver locations where predicted, project-related noise levels under LOS C traffic conditions are at least 12 dB greater than existing noise levels, or where predicted project-related, LOS C noise levels approach or exceed the NAC for the applicable activity category. If traffic noise impacts are identified, noise abatement must be considered for reasonableness and feasibility, as required by 23 CFR 772 and the Protocol.

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CHAPTER 6. EXISTING NOISE ENVIRONMENT

6.1. Existing Land Uses

Existing ambient noise in the project area ranges from 46 dBA L_{EQ} to 65 dBA L_{EQ}, and includes operational noise from nearby industrial facilities, traffic noise from the few existing roadways in the area, and limited aircraft noise associated with Brown Field and the Border Patrol. A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Land uses in the study area consist of commercial and industrial uses, an educational institution (Southwestern College), and undeveloped land. No residential land uses are within the project study area. As indicated by Table 4-1, the industrial and commercial land uses are Activity Category C, the college is land use Activity Categories B and E, and the undeveloped uses are land use Activity Category D. The nearest residential land use in the project vicinity consists of three single-family homes located approximately 1,200 feet north of the alignment, beyond a reasonably expected noise impact distance.

SR-11 would be located immediately adjacent to developed industrial properties in isolated locations (refer to Table 6-1). The areas of frequent outdoor use may be comprised of building entrances, lunch break areas and continuously attended guard stations. The outdoor areas at industrial/commercial land uses are analyzed in this report as Activity Category C, Developed Lands.

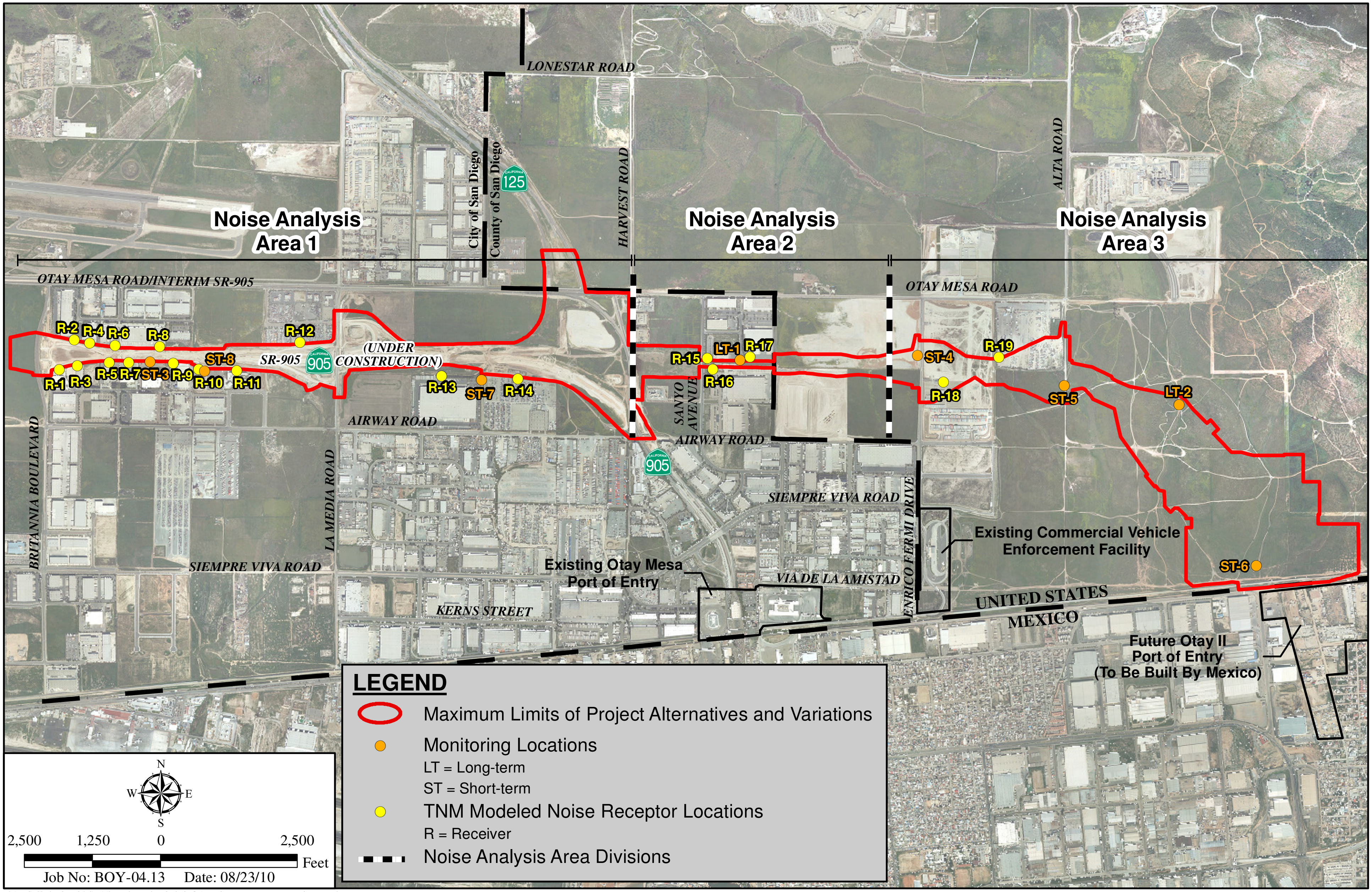
Land uses in the project area have been grouped into the following three analysis areas, identified in Figure 6-1, *Noise Analysis Areas and Receiver and Monitoring Locations*. Each of these analysis areas is considered to be acoustically equivalent.

- **Area 1 (SR-905 Modifications)**: Area 1 is located along the SR-905 corridor between Britannia Boulevard and Harvest Road. Receivers include a satellite campus of Southwestern College. Land uses include Activity Categories B, C and E.
- **Area 2 (Western Portion of SR-11)**: Area 2 is located is located along the SR-11 corridor between Harvest Road and Michael Faraday Drive. Receivers include industrial buildings in the Sanyo Avenue area. Land uses include Activity Categories C and D.
- **Area 3 (Eastern Portion of SR-11)**: Area 3 comprises the proposed SR-11 corridor east of Michael Faraday Drive as well as the proposed POE and CVEF facilities. Receivers include a truck storage lot, and a vehicle auction yard. Land uses include Activity Categories C and D.

Table 6-1
EXISTING NOISE LEVELS AT RECEIVERS IN THE PROJECT AREA

Receiver Number	Address/Station Number[1]	Assessors Parcel Number	Type of Development	Year Built	Number of Units Represented	Activity Category And NAC ()	Existing Worst Hour Noise Levels Leq(h), dBA	Noise Level Measured or Modeled
Area 1								
R-1	7550 Panasonic Way/547+14	646-220-3100	I	N/A	1	C (72)	57[2]	Measured
R-2	1654 St. Andrews Avenue/549+84	646-221-3200	I	N/A	1	C (72)	57[2]	Measured
R-3	7558 Panasonic Way/550+45	646-220-0200	I	N/A	1	C (72)	57[2]	Measured
R-4	7651 St. Andrews Avenue/552+61	646-221-1600	I	N/A	1	C (72)	57[2]	Measured
R-5	7664 Panasonic Way/556+20	646-220-0400	I	N/A	1	C (72)	57[2]	Measured
R-6	7685 St. Andrews Avenue/557+28	646-221-2800	I	N/A	1	C (72)	57[2]	Measured
R-7	7664 Panasonic Way/559+82	646-220-0400	I	N/A	1	C (72)	57[2]	Measured
R-8	7701 St. Andrews Avenue/565+47	646-221-3100	I	N/A	1	C (72)	57[2]	Measured
R-9	7810 Waterville Road/568+01	646-220-2100	I	N/A	1	C (72)	57[2]	Measured
R-10	Southwestern College, Higher Education Center, 8100 Gigantic Street/572+70	646-111-4200	I	2007	3	B (67)[6]	57[2]	Measured
R-11	Southwestern College, Higher Education Center, 8100 Gigantic Street/579+69	646-111-4200	I	2007	1	B (67)[7] and E(52)[8]	57[2]	Measured
R-12	8375 St. Andrews Avenue/591+17	646-111-4500	I	N/A	1	C (72)	57[2]	Measured
R-13	7810 Waterville Road/617+20	646-220-2100	I	N/A	1	C (72)	55[3]	Measured
R-14	9020 Airway Road/631+20	646-121-2600	I	N/A	1	C (72)	55[3]	Measured
Area 2								
R-15	1840 Dornoch Court/39+74[9, 10, 11, 12]	646-131-0400	I	N/A	1	C (72)	62[4]	Measured
R-16	2001 Sanyo Avenue/40+80[9, 11, 12]	646-131-1400	I	N/A	1	C (72)	62[4]	Measured
R-17	1855 Dornoch Court/47+55[9, 11, 12]	646-131-0900	I	N/A	1	C (72)	62[4]	Measured
Area 3								
R-18	8389 St. Andrews Avenue/83+13[12]	648-070-0900	I	N/A	1	C (72)	51[5]	Measured
R-19	7247 Otay Mesa Road/93+16[12]	648-070-1300	I	N/A	1	C (72)	51[5]	Measured

[1] SR-905 station numbers, unless otherwise indicated.
[2] As measured at short-term monitoring locations ST-3 and ST-8.
[3] As measured at short-term monitoring location ST-7.
[4] As measured at long-term monitoring location LT-1.
[5] As measured at long-term monitoring location LT-2.
[6] At Southwestern College outdoor track
[7] Outside Southwestern College building
[8] Inside Southwestern College building
[9] Building Entrance Areas
[10] Outdoor Break Area
[11] Guard Station
[12] SR-11 station numbers
I = Industrial



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Noise Analysis Areas and Receiver and Monitoring Locations

STATE ROUTE 11 AND OTAY MESA EAST PORT OF ENTRY - TIER II NOISE STUDY REPORT

HELIX

Figure 6-1

Land uses surrounding the proposed project are dominated by undeveloped land and industrial uses, along with several vehicle storage lots and the existing CVEF. Existing and proposed development in the land use study area consists primarily of industrial and transborder support uses, many of which were established due to proximity with the existing Otay Mesa POE and planned Otay Mesa East POE. SR-11 and the Otay Mesa East POE would be consistent with the County General Plan, EOMSP, the City General Plan and the OMCP.

Much of the planned development in the area is industrial use associated with the maquiladora industry, and would benefit from the proposed project. Property owners/developers have been tracking the proposed project and have been planning/designing their development projects to accommodate SR-11 and the proposed POE, in the location that was selected in the Phase I ROD for the proposed project.

6.2. Noise Measurement Results

Ambient noise is defined as the total noise in the area from all sources near and far. Background noise is defined as the total of all noise sources excluding the noise from the source of interest. Since this project is all new construction and construction of SR-905 has not yet been completed, all noise in the project area would be considered ambient noise, and no separate background noise level is identified.

The ambient noise environment in the project area is characterized below, based on short-term and long-term noise monitoring conducted for this study (refer to Appendix A for site survey forms). Wind speeds ranged from one to three mph during the measurements, temperatures ranged from 75 to 85 degrees Fahrenheit, with relative humidity typically 60 percent to 80 percent for all measurements. No traffic monitoring data were collected or needed for this study.

6.2.1. Short-term Monitoring

The figures in Chapter 2 illustrate six short-term measurement locations, labeled ST-3 to ST-8. Table 6-2 summarizes the results of the short-term noise monitoring conducted in the project area. As shown, the short-term measurements ranged from 65 to 46 dBA L_{EQ} in the project area.

6.2.2. Long-term Monitoring

As shown in the figures in Chapter 2, long-term monitoring was completed at location LT-1, located at the southern terminus of Dornoch Court, north of SR-11 Station 45+72, and location LT-2, near SR-11 Station 125+64. The loudest hour at location LT-1 was 3:00 P.M. at 62.2 (62) dBA L_{EQ} (Table 6-3; Figure 6-2, *Long-Term Monitoring at Location LT-1*). Location LT-2's loudest hour was at 3:00 P.M. at 51.2 (51) dBA L_{EQ} (Table 6-4; Figure 6-3, *Long-Term Monitoring at Location LT-2*).

6.3. Comparison of Measured Noise to TNM Model

SR-905 is an approved six-lane facility currently under construction; however, no portion of SR-905 has been completed in this area. To link SR-11 to SR-905, connectors and other traffic operations improvements are proposed as a part of the SR-11 project, which overlap the SR-905 design. The proposed project would modify the approved roadway width and provide additional lanes; these modifications would increase the maximum capacity of the build-out configuration by outside widening, resulting in a slight increase in traffic noise levels at nearby receivers. The associated increase in noise levels at nearby receivers would not result in an audible change, if compared to the noise levels generated by traffic associated with built-out SR-905. Therefore, no comparison of TNM modeled noise levels to measured levels is possible.

Table 6-2
SHORT-TERM NOISE MEASUREMENT RESULTS

Monitor Location Number[a]	Area	Location[b]/Station Number[c]	Land Use[d]	Meter Location	Measurement Dates	Start Time	Measurement (dBA L_{EQ})[e]	Adjusted Peak-Hour L_{EQ}, dBA[f]	Adjusted to Long-Term Site
ST-3	1	Adjacent to 7810 Waterville Road/563+77[h]	I/D	In the R/W adjacent to the north fence of the parcel	2/18/10	3:31 P.M.	57	57	--[g]
ST-4	3	Enrico Fermi Drive, 0.21 mile south of Otay Mesa Road Road, San Diego County/78+28	I/U	Edge of road/Open Area	8/07/09	12:23 A.M.	65	65	--[g]
ST-5	3	Alta Road, 0.28 mile south of Otay Mesa Road, San Diego County/105+63	I/U	Open Area	8/07/09	11:10 A.M.	51	51	--[g]
ST-6	3	0.18 miles east of the Via de la Amistad/Enrico Fermi Drive intersection, San Diego County /1,937 feet from 138+00	I/U	Open Area	8/07/09	10:38 A.M.	46	46	--[g]
ST-7	1	0.33 south of the Otay Mesa Road/Piper Ranch Road intersection, City of San Diego San Diego /624+50[h]	I/D	Open Area	10/24/09	4:05 P.M.	55	55	--[g]
ST-8	1	Southwestern College, Higher Education Center, 8100 Gigantic Street/573+79[h]	E	10 feet south of R/W fence, at north end of parcel, between the parking lot and track	2/18/10	2:47 P.M.	57	57	--[g]

[a] Monitor locations 1 and 2 are long-term monitoring locations. Thus, they are not included in this short-term monitoring data table. Refer to Tables 6-3 and 6-4 for the long-term monitoring data.
[b] Street addresses not available because of underdeveloped nature of area.
[c] SR-11 station numbers, except where noted.
[d] I = Industrial/commercial land use designation; U = Undeveloped; D = Developed; E=Educational Facility.
[e] All short-term measured noise levels are a 20-minute L_{EQ}.
[f] Measurements conducted during off-peak hours were adjusted to the peak-hour L_{EQ} based on a comparison with long-term noise levels, which were measured at a nearby measurement site, listed in the last column.
[g] Measured noise source was not roadway traffic; thus, no adjustment necessary.
[h] SR-905 station numbers.

Figure 6-2
LONG-TERM MONITORING AT LOCATION LT-1

Site LT-1 Hourly Noise Levels, $L_{eq}(h)$
Geographic Coordinate (Latitude, Longitude): 32.562006, -116.912405
Sources: Aircraft, Border Patrol vehicles, truck movements at adjacent warehouse, and HVAC equipment

Start of Hour	8/07/09
9:00 AM	56.9
10:00 AM	55.1
11:00 AM	54.7
12:00 PM	55.4
1:00 PM	57.5
2:00 PM	59.3
3:00 PM	62.2

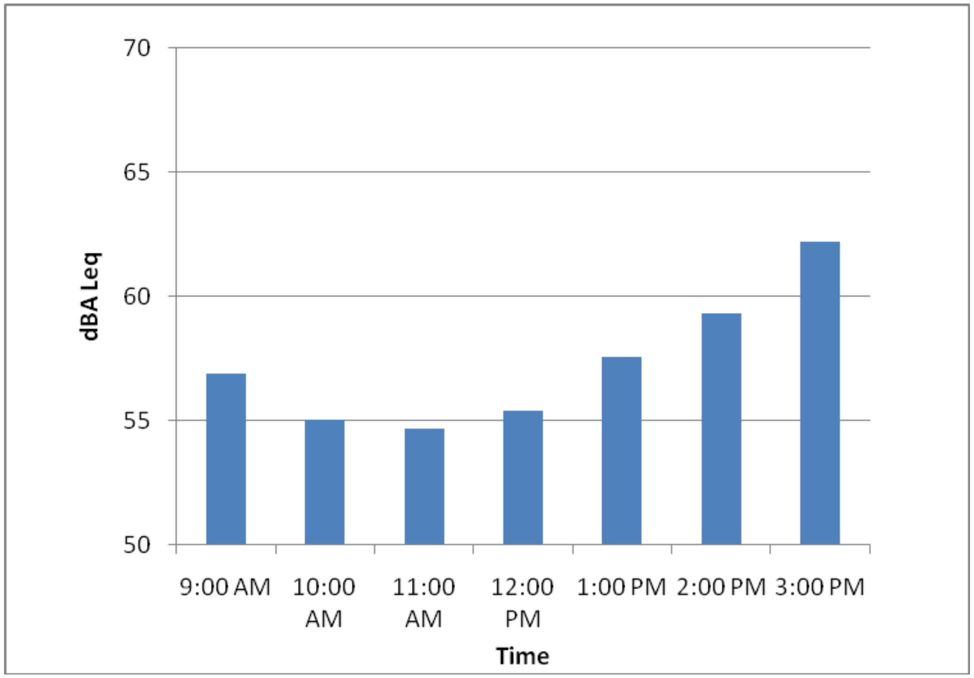
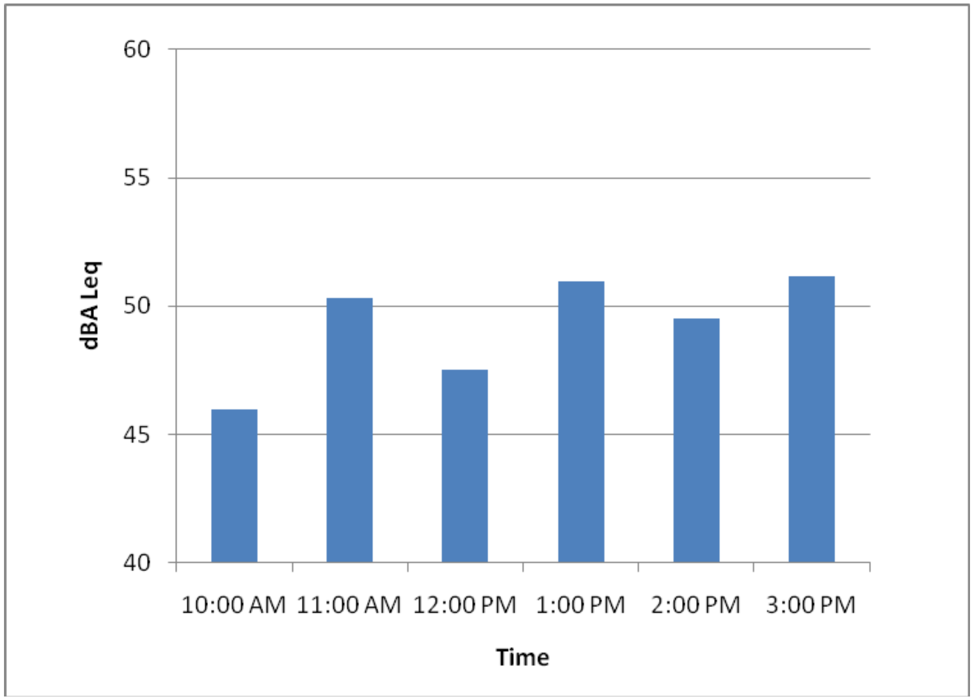


Figure 6-3
LONG-TERM MONITORING AT LOCATION LT-2

Site LT-2 Hourly Noise Levels, L_{eq}(h)
Geographic Coordinate (Latitude, Longitude): 32.564212, -116.938503
Sources: Aircraft & Border Patrol Vehicles

Table CC Site LT-2 Data	
Start of Hour	8/07/09
10:00 AM	46.0
11:00 AM	50.3
12:00 PM	47.5
1:00 PM	51.0
2:00 PM	49.5
3:00 PM	51.2



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CHAPTER 7. FUTURE NOISE ENVIRONMENT, IMPACTS, AND CONSIDERED ABATEMENT

The worst case traffic noise occurs when traffic is operating under LOS C conditions. Under LOS C conditions, traffic is heavy, but remains free flowing. Traffic data associated with LOS C conditions are presented in Appendix B. The results of the traffic noise modeling for LOS C traffic conditions (worst case) under the project build alternatives at the analyzed receiver locations are provided in Table 7-1 below. The analyzed receiver locations are shown in the figures in Chapter 2.

Predicted traffic noise levels under LOS C conditions with the project are compared to ambient noise levels in Table 7-1, and qualitatively, to design-year no-build conditions. The comparison to existing conditions is included in the analysis to identify traffic noise impacts under 23 CFR 772. A qualitative comparison to no-build conditions, disclosing the direct effect of the project in the build-out condition, is provided after the comparison to existing conditions.

7.1 Predicted Noise Environment and Impacts

7.1.1 Area 1: SR-905 Modifications

Build Alternatives

SR-905 is an approved six-lane facility currently under construction; however, no portion of SR-905 has been completed in this area. To link SR-11 to SR-905, connectors and other traffic operations improvements are proposed as a part of the SR-11 project, which overlap the SR-905 design. The proposed project would modify the approved roadway width and provide additional lanes; these modifications would increase the maximum capacity of the build-out configuration by outside widening, resulting in a slight increase in traffic noise levels at nearby receivers. The associated increase in noise levels at nearby receivers would not result in an audible change, if compared to the noise levels generated by traffic associated with built-out SR-905.

Noise modeling for Area 1 includes the build-out configuration of the SR-905/SR-125/SR-11 Interchange, along with the proposed improvements associated with the SR-11 project.

Table 7-1 presents the predicted future noise levels associated with the full build-out configuration in Area 1. Because the SR-905 modifications would be a common feature of all three build alternatives, these noise impacts would apply to any of the build alternatives. The 46-foot Median Variation and the Siempre Viva Road Full Interchange Variation would not apply to Area 1.

Table 7-1
PREDICTED FUTURE NOISE LEVELS AND BARRIER ANALYSIS: Area 1

Receiver Number	Land Use	Existing Noise Levels[1] $L_{eq(h)}$, dBA	Peak Hour Noise Levels, $L_{eq(h)}$, dBA															Barrier Number Location (Type)
			Project Build, No Barrier	Activity Category and NAC ( ) dBA	Impact Type[2]	Noise Prediction With Barrier and Barrier Insertion Loss (IL)												
						6-Ft		8-Ft		10 Ft		12 Ft		14 Ft		16 Ft		
						$L_{eq(h)}$	IL	$L_{eq(h)}$	IL	$L_{eq(h)}$	IL	$L_{eq(h)}$	IL	$L_{eq(h)}$	IL	$L_{eq(h)}$	IL	
R-1	I	57[3]	68	C (72)	None	--	--	--	--	--	--	--	--	--	--	--	--	--
R-2	I	57[3]	70	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-3	I	57[3]	73	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-4	I	57[3]	75	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-5	I	57[3]	79	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-6	I	57[3]	77	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-7	I	57[3]	79	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-8	I	57[3]	77	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-9	I	57[3]	79	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-10[Cr]	E	57[3]	74	B (67)	A/E[5]	71	3	70	4	69	5	68	6	68	6	68	6	NB-1 (R/W)
R-11 (outside)	E	57[3]	75	B (67)	S[4,6]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-11 (inside)	E	N/A	50[7]	E (52)	None	--												
R-12	I	57[3]	69	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-13	I	55[8]	72	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--
R-14	I	55[8]	71	C (72)	S[4]	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] In Area 1, the approved design of SR-905 (currently under construction), would produce a majority of the existing build-out noise Cumulative noise levels associated with SR-11 improvements would not result in an audible change, as described in the qualitative discussion and reflected in Worksheet A.
[2] S = Substantial Increase (12 dBA or more); A/E = Approaches or Exceeds NAC; or None = Does not exceed NAC or result in substantial increase)
[3] Short-term noise level measurement for local area (ST-3 and ST-8).
[4] Although noise levels would approach or exceed NAC, and increase would be substantial, the receiver does not have an outdoor use area that would benefit from reduced noise levels.
[5] Although this receiver would experience a substantial increase when compared to existing noise levels, there would not be a substantial noise increase if compared to the build-out configuration of SR-905, as shown in Worksheet A. In either case, noise levels would approach or exceed NAC.
[6] In a location that does not function as an area of frequent outdoor use; measurement used for interior analysis only.
[7] Calculated based on modeled R-11 exterior noise level and exterior to interior analysis presented on next page.
[8] Short-term noise level measurement for local area (ST-7).
I = Industrial; E = Educational; IL = Insertion Loss; Cr = Critical receiver; R = Recommended height to meet feasibility requirements of Caltrans' Noise Abatement Protocol; T = Minimum height to block the line of sight from the receiver to truck exhaust stacks.

Table 7-1 indicates that implementation of the baseline build alternatives in Area 1 would result in predicted traffic noise levels that would result in substantial increases over existing noise levels at receivers R-2 through R-9 and R-11 (outside) through R-14. At R-10, there would be a substantial increase when compared to existing noise levels, but there would not be a substantial noise increase if compared to the build-out configuration of SR-905, as shown in Worksheet A. In either case, noise levels would approach or exceed the NAC for the Category B land use at this location.

Within Area 1, Activity Categories B and E are represented by receivers R-10 and R-11, respectively. The outdoor track represented by R-10 and the interior of the Southwestern College building would benefit from a reduced noise level, so a noise barrier analysis was performed.

The Activity Category C land uses in Area 1 do not have areas of frequent human use that would benefit from a reduced noise level; therefore, no noise barrier analysis was performed for those land uses.

Noise Barrier Analysis: Receiver R-10 (Outdoor track at Southwestern College)

Based on TNM modeling, as shown in Table 7-1, a noise barrier of 10 feet in height, approximately 591 feet in length along the shoulder, would meet the minimum 5 dBA feasibility requirement, per Caltrans guidelines.

Exterior to Interior Analysis: Receiver R-11 (Southwestern College building)

Based on TNM modeling, as shown in Table 7-1, the exterior noise level for the Southwestern College building is predicted to be 75 dBA L_{eq}. The NAC for the interior of the classrooms (Activity Category E) is 52 dBA L_{eq}. Table 7-2 provides the criteria developed by the FHWA for calculating interior noise levels from measured or modeled exterior noise levels.

Table 7-2
FHWA BUILDING NOISE REDUCTION FACTORS

Building Type	Window Condition	Noise Reduction Due to Exterior of Structure
All	Open	10 dB
Light Frame	Ordinary Sash (closed)	20 dB
Light Frame	Storm Windows	25 dB
Masonry Single	Single Glazed	25 dB
Masonry Double	Double Glazed	35 dB

NOTE: The windows shall be considered open unless there is firm knowledge that the windows are in fact kept closed almost every day of the year.

The building at the Southwestern College building is constructed with permanently closed, double-glazed windows. The building construction is heavier than Light Frame construction, but does not provide as much noise control as Masonry construction. This type of construction typically provides a minimum of 25 dBA transmission reduction, which is assumed for this analysis.

With an assumed transmission reduction of 25 dBA applied to the predicted exterior noise level of 75 dBA L_{eq}, the expected interior noise level would be 50 dBA L_{eq}. The predicted interior noise level would not approach or exceed the Activity Category E NAC of 52 dBA L_{eq}; therefore, noise abatement is not considered.

No Build Alternative: Area 1

SR-905 is an approved six-lane facility currently under construction; however, no portion of SR-905 has been completed in this area. To link SR-11 to SR-905, connectors and other traffic operations improvements are proposed as a part of the SR-11 project, which overlap the SR-905 design. The proposed project would modify the approved roadway width and provide additional merging lanes; these modifications would increase the maximum capacity of the build-out configuration by outside widening, resulting in a slight increase in traffic noise levels at nearby receivers. The associated increase in noise levels at nearby receivers would not result in an audible change, if compared to the noise levels generated by traffic associated with built-out SR-905.

Considering this, future traffic noise levels at identified receivers in Area 1 under the No Build Alternative would be similar to or lower than those predicted for the proposed improvements for SR-11 that overlap SR-905 in Area 1. If lower, the difference in noise levels would be less than one dBA and would not be expected to be audible at the receivers.

7.1.2 Area 2: The Western Portion of SR-11

Table 7-3 presents the modeled, project-related noise levels associated with the project build alternatives at the three receiver locations in Area 2 (R-15, R-16 and R-17). Area 2 includes a portion of the SR-905/SR-125/SR-11 Interchange, as well as the Sanyo Avenue industrial area where two median designs are under consideration, i.e. the baseline project alternatives involving a 22-foot median in this area and a 46-foot median variation.

As previously noted for Area 1, to analyze the worst case scenario for each alternative, the noise modeling for Area 2 included the noise associated with the full SR-905/SR-125/SR-11 Interchange, including all potential future interchange connectors.

The Siempre Viva Road Full Interchange Variation would not apply to Area 2.

In the Sanyo Avenue area, it is noted that the One and No Interchange Alternatives would not have the auxiliary lane associated with the Two Interchange Alternative, so the outer edge of SR-11 would be approximately 12 feet farther from the buildings under these alternatives than under the Two Interchange Alternative. As a result, the One and No Interchange Alternatives are analyzed together for Area 2, while data for the Two Interchange Alternative are presented separately.

Build Alternatives and Variations: Area 2

<u>Build Alternatives</u>

Tables 7-3 presents the modeled noise levels associated with implementation of the baseline build alternatives in Area 2.

Table 7-3
PREDICTED FUTURE NOISE LEVELS:
AREA 2, BASELINE BUILD ALTERNATIVES (22-FOOT MEDIAN)

Receiver Number	Land Use	Existing Noise Levels[1] $L_{eq(h)}$, dBA	Activity Category and NAC ( ) dBA	Two Interchange Alternative		One and No Interchange Alternative	
				Project Build No Barrier[2, 3]	Impact Type[4]	Project Build No Barrier[2, 3]	Impact Type[4]
R-15	I	62	C (72)	68	None	67	None
R-16	I	62	C (72)	67	None	65	None
R-17	I	62	C (72)	67	None	65	None

[1] Long-term noise level measurement - Maximum hour noise measurement for area type (LT-1: Industrial/Commercial)
[2] The approved design of SR-905 (currently under construction) would produce a majority of the existing build-out noise. Cumulative noise levels associated with SR-11 improvements would not result in an audible change, as described in the qualitative discussion.
[3] With project build alternatives, without noise barriers
[4] None = Would not exceed NAC or result in substantial increase; I = Industrial.
Note: Because no impacts were identified in Area 2, no barriers are analyzed.

Table 7-3 indicates that implementation of the baseline build alternatives in Area 2 would result in predicted traffic noise levels that would not approach or exceed the NAC of 72 dBA L_{EQ}(h) nor result in substantial increases over existing noise levels. In addition, because the approved design of SR-905 (currently under construction) is similar to the proposed project in Area 2, implementation of the baseline build alternatives would result in predicted traffic noise levels that would be similar to anticipated future No Build noise levels in this area.

<u>46-foot Median Variation</u>

Under the 46-foot Median Variation of any of the build alternatives, the outer edge of SR-11 would be closer to adjacent industrial buildings in the Sanyo Avenue area than it would be under the baseline build alternatives that would incorporate a 22-foot median. Modeled noise levels at the receiver locations under the three build alternatives with the 46-foot Median Variation are presented in Table 7-4.

Table 7-4 indicates that implementation of the 46-foot Median Variation of any of the build alternatives would result in predicted traffic noise levels that would not approach or exceed the NAC of 72 dBA L_{EQ}(h) in Area 2. As noted for the baseline build alternatives, because the approved design of SR-905 (currently under construction) is similar to the proposed project in Area 2, implementation of the 46-foot Median Variation would result in predicted traffic noise levels that would be similar to anticipated future No Build noise levels in this area.

Table 7-4 PREDICTED FUTURE NOISE LEVELS: AREA 2, 46-FOOT MEDIAN VARIATION							
Receiver Number	Land Use	Existing Noise Levels[1] $L_{eq(h)}$, dBA	Activity Category and NAC ( ) dBA	Two Interchange Alternative		One and No Interchange Alternative	
				Project Build No Barrier [2, 3]	Impact Type[4]	Project Build No Barrier [2, 3]	Impact Type[4]
R-15	I	62	C (72)	67	None	65	None
R-16	I	62	C (72)	67	None	64	None
R-17	I	62	C (72)	67	None	64	None

[1] Long-term noise level measurement - Maximum hour noise measurement for area type (LT-1: Industrial/Commercial)
[2] The approved design of SR-905 (currently under construction), would produce a majority of the existing build-out noise. Cumulative noise levels associated with SR-11 improvements would not result in an audible change, as described in the qualitative discussion and reflected in Worksheet A.
[3] With project build alternatives, without noise barriers
[4] None = Would not exceed NAC or result in substantial increase; I = Industrial.
Note: Because no impacts were identified in Area 2, no barriers are analyzed.

Interchange Variations

To analyze the worst case scenario for each alternative, the noise modeling included the noise associated with the full SR-905/SR-125/SR-11 Interchange (i.e. all potential future interchange connectors). Scenarios involving fewer connectors (e.g. the SR-125 Connector Variation or the baseline project alternatives that would exclude the southbound SR-125 to eastbound SR-11 connector, the westbound SR-11 to eastbound SR-905, and the westbound SR-905 to eastbound SR-11) would likely result in marginally less noise than is shown in Tables 7-3 and 7-4, and would not exceed the NAC at receivers in Area 2.

Conclusions for Build Alternatives and Variations: Area 2

Area 2 consists of Activity Category C and D land uses. Areas of frequent human use that would benefit from a reduced noise level at the Activity Category C land uses include building entrances, outdoor break areas, and guard stations in the Sanyo Avenue area. Modeling results for all build alternatives and design variations indicate that predicted traffic noise levels would not approach or exceed the NAC of 72 dBA L_{EQ}(h), for Activity Category C land uses in Area 2. Therefore, no traffic noise impacts are predicted to occur within Area 2, and noise barrier analysis is required.

The unusually low noise levels identified immediately adjacent to proposed SR-11 in the Sanyo Avenue area are attributed to the roadway design. SR-11 would be elevated as it passes between the buildings at this location. The elevation difference and the concrete barrier would minimize noise levels between the buildings. Thus, noise levels immediately adjacent to SR-11 in the Sanyo Avenue area would not approach or exceed the NAC, and no noise barrier analysis is required.

No Build Alternative: Area 2

SR-905 is an approved six-lane facility currently under construction; however, no portion of SR-905 has been completed in this area. To link SR-11 to SR-905, connectors and other traffic operations improvements are proposed as a part of the SR-11 project, which overlap the SR-905 design.

Under the No Build Alternative, instead of the proposed SR-11 travel lanes and connectors, the SR-905 project would proceed with the construction of an on-/off- ramp to Enrico Fermi Drive through the Sanyo Avenue area. The design of this SR-905 exit ramp would likely be similar to the No Interchange Alternative in Area 2, although traffic volumes would likely be lower on the SR-905 local access ramps than on SR-11. Considering this, future noise levels at identified receivers west of Enrico Fermi Drive under the No Build Alternative would be similar to or lower than noise associated with the proposed project build alternatives.

7.1.3 Area 3: The Eastern Portion of SR-11

Build Alternatives: Area 3

The design of the three build alternatives would differ from each other at receivers in Area 3, so each is analyzed independently. The only project variation that would be applicable to Area 3 is the Siempre Viva Road Full Interchange Variation of the Two Interchange Alternative, which is discussed separately. Because no receivers currently are located adjacent to the proposed POE and CVEF just north of the border with Mexico, only the noise expected to be generated by traffic on SR-11 is analyzed in this chapter. Table 7-7 summarizes the traffic noise modeling results for design-year conditions for the project alternatives in Area 3.

Table 7-5
PREDICTED FUTURE NOISE LEVELS: AREA 3

Receiver Number	Land Use	Existing Noise Levels[1, 2] $L_{eq(h)}$, dBA	Activity Category and NAC ( ) dBA	Two Interchange Alternative		One Interchange Alternative		No Interchange Alternative	
				Noise Level with Project[3]	Impact Type[4]	Noise Level with Project[3]	Impact Type[4]	Noise Level with Project[3]	Impact Type[4]
R-18	I	51	C (72)	69	S[5]	64	S[5]	64	S[5]
R-19	I	51	C (72)	72	S[5]	67	S[5]	72	S[5]

[1] Long-term noise level measurement - Maximum hour noise measurement for area type (LT-2:Undeveloped)
[2] In Area 3, future No Build noise levels would be higher than existing noise levels, due to planned cumulative area development.
[3] With project build alternatives, without noise barriers
[4] S = Substantial Increase
[5] Although the noise level increase would be substantial, receiver would not benefit from reduced noise levels because it does not have outside areas of frequent human use.
I = Industrial.
Note: Because no impacts were identified in Area 3, no barriers are analyzed.

Modeling results for Area 3 in Table 7-5 indicate that the project would result in a substantial noise level increase for the Activity Category C land uses (commercial/industrial temporary uses) represented by receiver numbers R-18 and R-19 (refer to Figure 6-1). There are no areas of frequent human use that would benefit from a reduced noise level in Area 3; therefore, no noise barrier analysis is required.

Siempre Viva Road Full Interchange Variation

If constructed, the Siempre Viva Road Full Interchange Variation would occupy an additional approximately 20.2 acres, compared to the half interchange at Siempre Viva Road contemplated as part of the baseline Two Interchange Alternative. The northwestern edge of the full interchange would be approximately 1,500 feet from the nearest receiver (R-19; refer to Figure 6-1). This would be approximately 300 feet closer to the receiver than under the baseline half interchange scenario. It is predicted that noise levels with the project would be similar to the modeled noise levels associated with the Two Interchange Alternative with the half interchange at this location. While the noise level increase over existing conditions would be substantial at both R-18 and R-19, there are no areas of frequent human use that would benefit from a reduced noise level at these receivers. Therefore, no noise barrier analysis is required.

No Build Alternative: Area 3

Currently, Area 3 is largely undeveloped or subject to temporary uses such as truck parking. It is anticipated that if the No Build Alternative were selected for the proposed project, planned development in Area 3 would proceed, including the construction of County Circulation Element roads. Therefore, it is anticipated that future traffic noise levels under the No Build Alternative would be lower than those predicted for the proposed project in this area, but higher than existing noise levels.

7.2 Preliminary Noise Abatement Analysis

In accordance with 23 CFR 772, noise abatement is considered where noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. Potential noise abatement measures identified in the Protocol include the following:

- Avoiding the impact by using design alternatives, such as altering the horizontal and vertical alignment of the project;
- Constructing noise barriers;
- Acquiring property to serve as a buffer zone;
- Using traffic management measures to regulate types of vehicles and speeds; and
- Acoustically insulating public-use or nonprofit institutional structures.

All of these abatement options have been considered; because of the configuration and location of the project, however, abatement in the form of noise barriers is the only abatement that is considered to be feasible.

Each noise barrier evaluated has been evaluated for feasibility based on achievable noise reduction. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated. Worksheet A, provided in Appendix C, summarizes the reasonable cost allowance calculations at the critical design receiver based on the allowance calculation procedure identified in the Protocol. Refer to the Protocol for the definition of the critical design receiver. Table B-1 in Appendix C summarizes results at receiver location for the single noise barrier (Barrier NB-1) that has been evaluated in detail for this project.

For any noise barrier to be considered reasonable from a cost perspective, the estimated construction cost of the noise barrier should be equal to or less than the total reasonable cost allowance calculated for the barrier. The cost calculations of the noise barrier should include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, and retaining walls. Construction cost estimates are not provided in this NSR, but are presented in the Noise Abatement Decision Report (NADR). The NADR is the responsibility of the design unit and is prepared from information provided in this NSR and other relevant environmental studies. The NADR is prepared by the project engineer after completion of the NSR and prior to publication of the draft environmental document. The NADR includes noise abatement construction cost estimates based on site-specific conditions and corresponding cost index associated with same year the reasonable allowance determination. Construction cost estimates are compared to reasonableness allowances in the NADR to identify which wall configurations are cost reasonable.

The design of noise barriers presented in this report is preliminary and has been conducted at a level appropriate for environmental review and not for final design. Preliminary information on the physical location, length, and height of noise barriers is provided in this report. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the project design.

The following is a discussion of noise abatement considered for Area 1, the only evaluation zone where traffic noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level.

7.2.1 Preliminary Analysis of Proposed Noise Control Barrier for Area 1

The traffic noise modeling results in Table 7-1 indicate that noise levels at the outdoor track at the Southwestern College are predicted to be 74 dBA Leq(h). Although the increase in noise over ambient conditions will be 17 dBA, there will be only a fraction of 1 dBA increase, resulting in the same noise level from the proposed project compared to the future existing configuration of the approved SR-905 project, currently under construction. Because the predicted noise level exceeds 67 dBA Leq(h), traffic noise impacts are predicted at this area, and noise abatement must be considered. The outdoor track represented by R-10 is represented by recreational area equivalent based on a frontage distance of 270 feet, equivalent to 3 benefited residences.

Detailed modeling analysis was conducted for a barrier located at the edge of the shoulder. The barrier evaluated is identified as Barrier NB-1. The barrier analysis for NB-1 shows that a barrier 10 feet in height with a length of 591 feet would meet the feasibility requirement of an insertion loss of at least 5 dBA. Barrier heights in the range of 6 to 16 feet were evaluated in two-foot increments. Worksheet A, the reasonable allowance calculation for this barrier, is provided in Appendix C. Table 7-6 summarizes the calculated noise reductions and reasonable allowances for each barrier height.

Table 7-6
SUMMARY OF REASONABLENESS DETERMINATION DATA—BARRIER NB-1[a]

Barrier I.D.: NB-1 in Area 1
Predicted Sound Level without Barrier
Critical Design Receiver: R-10
LOS C Noise Level without Barrier: 75 dBA L_{eq}(h)
LOS C Noise Level Minus Existing Noise Level: 18 dBA L_{eq}(h

Feature	6-foot Barrier	8-foot Barrier	10-foot Barrier	12-foot Barrier	14-foot Barrier	16-foot Barrier
Barrier Noise Reduction, dB	3	4	5	6	6	6
Number of Benefited Residence-Equivalents	3	3	3	3	3	3
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No	No
Reasonable Allowance Per Benefited Residence-Equivalent	$35,000	$35,000	$35,000	$37,000	$37,000	$37,000
Total Reasonable Allowance	$105,000	$105,000	$105,000	$111,000	$111,000	$111,000

Note: NA-Not applicable. Barrier does not provide 5 dB of noise reduction; therefore, this scenario is not analyzed.
[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.
[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 7-7
SUMMARY OF ANALYZED BARRIERS

Barrier Number	Receptor Number	Type/ Number of Benefitted Residences	Barrier Location/ Highway Side	Barrier Height/ Total Length (feet)	Reasonable Cost per Residence	Reasonable Allowance Cost per Barrier
NB-1	R-10	Educational-Recreational/ 3 Frontage units at track	Shoulder/south edge of road	10 feet/591 feet	$35,000	$105,000

Table 7-8
BARRIER LOCATIONS AND ELEVATIONS

Barrier Number	Receptor Number	Type[1]/Number of Benefitted Residences	Barrier Location	SR-905 Station Number	Barrier Height (feet)	Top of Barrier Elevation (feet)2
NB-1	R-10	Educational-Recreational/ 3 Frontage units at track	Shoulder/south edge of road Approximate length: 591 feet	570+28	10	505.41
				570+61	10	505.21
				570+93	10	505.11
				571+26	10	505.01
				571+59	10	504.91
				571+92	10	504.82
				572+25	10	504.75
				572+57	10	504.95
				572+90	10	505.34
				573+23	10	505.7
				573+56	10	505.06
				573+88	10	506.42
				574+22	10	506.82
				574+54	10	507.18
				574+87	10	507.54
				575+20	10	508.03
				575+53	10	508.59
				575+85	10	508.69
				576+18	10	508.69

[1] Land use
[2] The top of barrier elevation takes precedence over the recommended barrier height. Therefore, the barrier shall be constructed according to the top-of-barrier elevations as listed in this table.

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CHAPTER 8. CONSTRUCTION NOISE

During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Construction noise is regulated by Caltrans Standard Specifications Section 7-1.01(I), "Sound Control Requirements" (Caltrans 2006b), which states that noise levels generated during construction shall comply with applicable local, state, and federal regulations, and that all equipment shall be fitted with adequate mufflers according to the manufacturers' specifications.

Table 8-1 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance.

Table 8-1
CONSTRUCTION EQUIPMENT NOISE

Equipment	Maximum Noise Level (dBA at 50 feet)
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82
Impact Pile Driver	101

Source: Federal Highway Administration Roadway Noise Construction Model Version 1.0, 2006

Caltrans Standard Specifications Section 7-1.01(I) (Caltrans 2006b) requires the contractor to comply with the applicable local noise standards.

All equipment should have sound-control devices that are no less effective than those provided on the original equipment. No equipment should have an unmuffled exhaust.

As directed by Caltrans, the contractor should implement appropriate additional noise minimizing measures, such as changing the location of stationary construction equipment, turning off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, and installing acoustic barriers around stationary construction noise sources.

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CHAPTER 9. REFERENCES

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Appendix A Supplemental Data

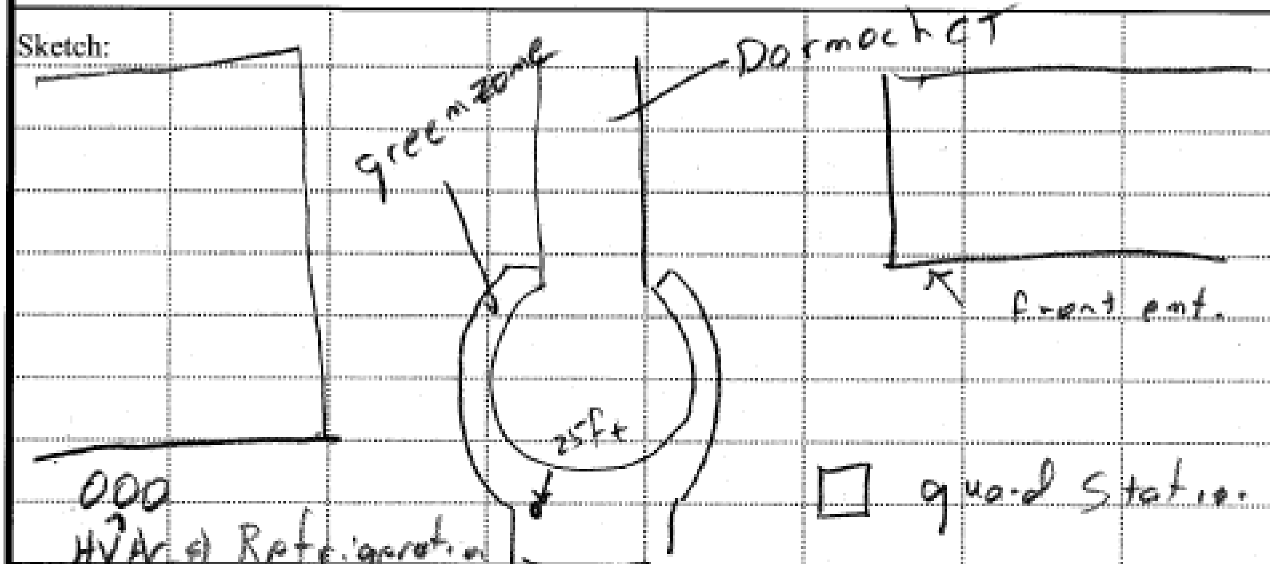
Site Survey

Job # BOY-04.13				Project Name: SR-11			
Date:	8/7/2009	Site #:	LT-1		Engineer:	Charles Terry	
Address:	Geographic Coordinate (Latitude, Longitude) 32.562006, -116.912405						
Meter:	LD-720	Serial #:	0432	Calibrator:	CA-200	Serial #:	5173

Notes: Trucks use Doornoch Court for temporary parking.

Manufacturing HVAC systems audible from adjacent site.

Sketch:



Temperature:	84 F°	Wind Speed:	<3 mph	Humidity:	54 %
Start of Measurement:	8:47 A.M.	End of Measurement:	4:32 P.M.	62.2 (P/H) dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

Picture: LT-1

Site Survey

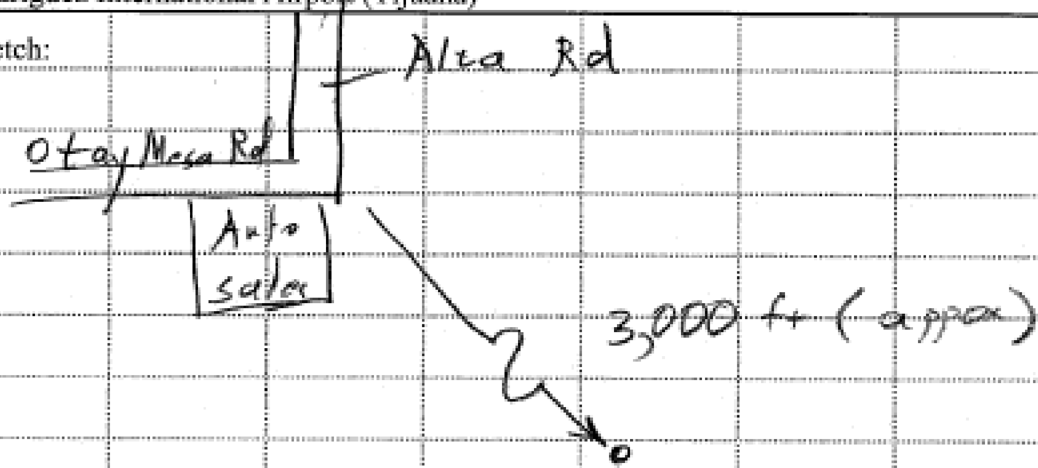
Job # BOY-04.13	Project Name: SR-11	
Date: 8/7/2009	Site #: LT-2	Engineer: Charles Terry

Address: Geographic Coordinate (Latitude, Longitude) 32.564212, -116.938503

Meter: LD-720	Serial #: 0453	Calibrator: CA-200	Serial #: 5173

Notes: Undeveloped area without roads. The only noise sources are occasional border patrol vehicles including helicopters and distant aircraft from Brown Filed and Rodriguez International Airport (Tijuana)

Sketch:



Temperature: 84 F°	Wind Speed: <3 mph	Humidity: 54 %
Start of Measurement: 10 A.M.	End of Measurement: 3 P.M.	51.2 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

Picture: LT-2

Site Survey

Job # BOY-04.13	Project Name: SR-11

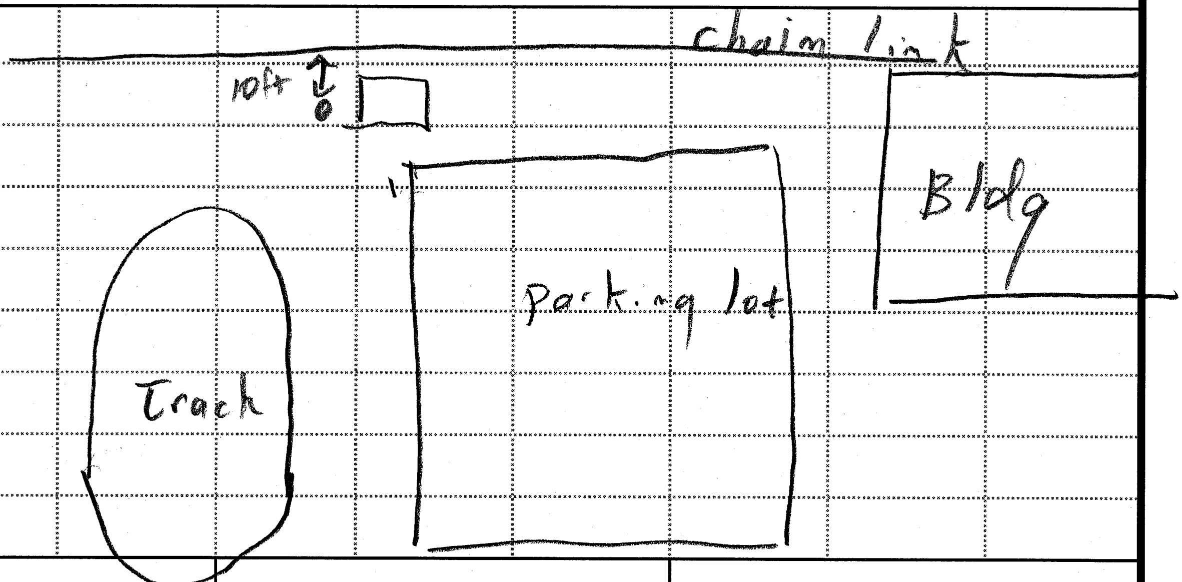
Date: 2/18/2010	Site #: ST-3	Engineer: Charles Terry

Address: Geographic Coordinate (Latitude, Longitude) 32.563498, -116.970263

Meter: LS-820	Serial #: 1502	Calibrator: CA-200	Serial #: 5173

Notes: Southwestern College. Noise sources: air handler systems at nearby building; helicopter overpass.

Sketch:



Temperature: 67 F°	Wind Speed: 8-9 mph	Humidity: 78 %

Start of Measurement: 3:31 P.M.	End of Measurement: 4:04 P.M.	56.8 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Roadways in Area		
No Calibration Analysis Will Be Provided		

Picture: ST-3

Site Survey

Job # BOY-04.13 | Project Name: SR-11

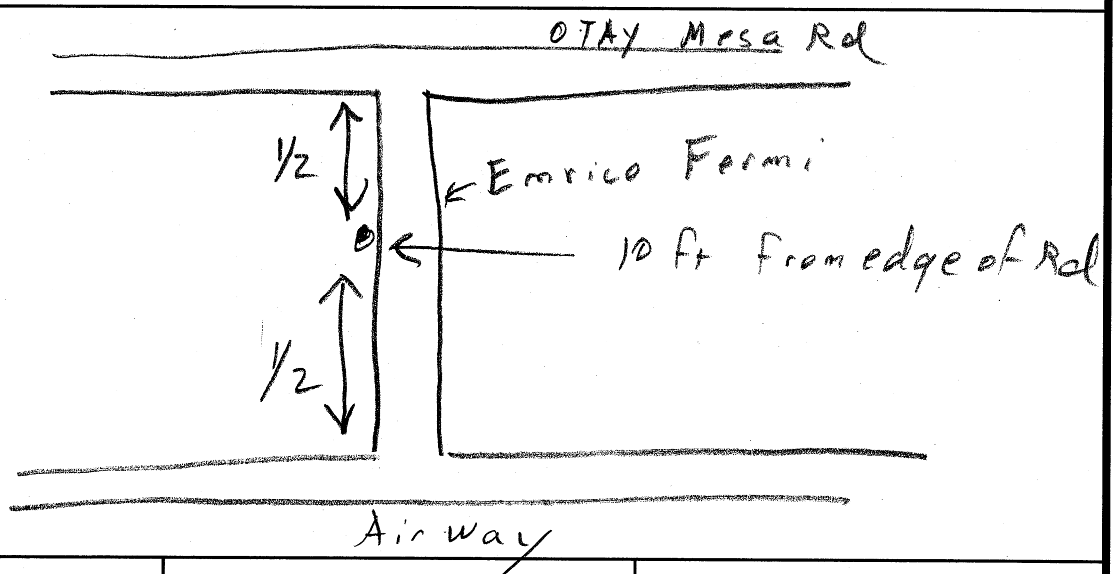
Date: 8/7/2009 | Site #: ST-4 | Engineer: Charles Terry

Address: Geographic Coordinate (Latitude, Longitude) 32.564214, -116.938528

Meter: LS-820 | Serial #: 1502 | Calibrator: CA-200 | Serial #: 5173

Notes: No vehicle count. Truck passing by on Roadway

Sketch:



Temperature: 84 F° | Wind Speed: <3 mph | Humidity: 54 %

Start of Measurement: 12:23 P.M. | End of Measurement: 12:47 P.M. | 65.3 dBA L_{EQ}

Cars	MT		HT	
Cars (tally per 5 cars)				
Noise Measurement for Information Only				
No Roadways in Area				
No Calibration Analysis Will Be Provided				

Picture: ST-4

Site Survey

Job # BOY-04.13	Project Name: SR-11

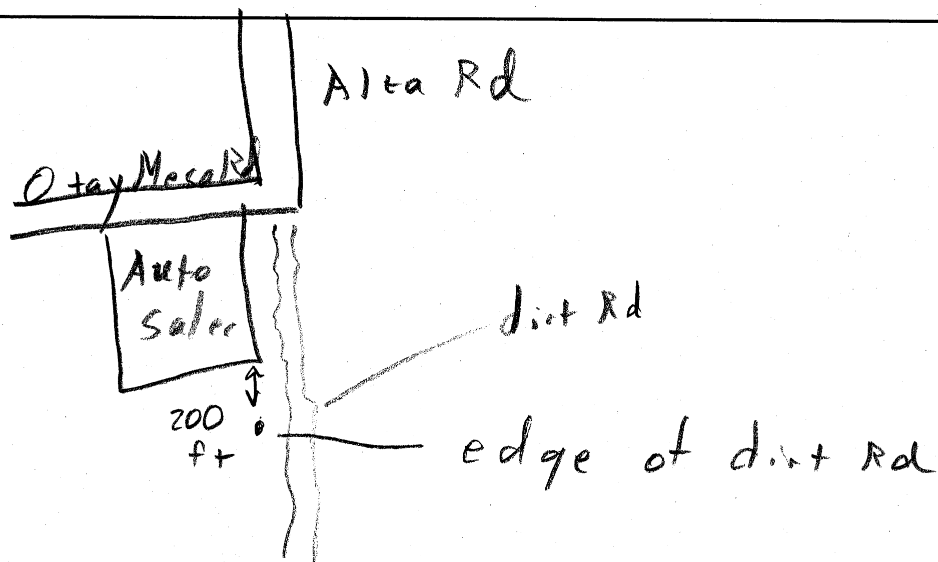
Date: 8/7/2009	Site #: ST-5	Engineer: Charles Terry

Address: Geographic Coordinate (Latitude, Longitude) 32.562883, -116.918914

Meter: LS-820	Serial #: 1502	Calibrator: CA-200	Serial #: 5173

Notes: One car headed south and returned.

Sketch:



Temperature: 84 F°	Wind Speed: <3 mph	Humidity: 55 %

Start of Measurement: 11:10 A.M.	End of Measurement: 11:34 A.M.	51.3 dBA L_{EQ}

Cars	MT		HT	
Cars (tally per 5 cars)				
2 cars at 10 - 15 miles per hour on dirt road				
Noise Measurement for Information Only				
No Calibration Analysis Will Be Provided				

Picture: ST-5

Site Survey

Job # BOY-04.13	Project Name: SR-11

Date: 8/7/2009	Site #: ST-6	Engineer: Charles Terry

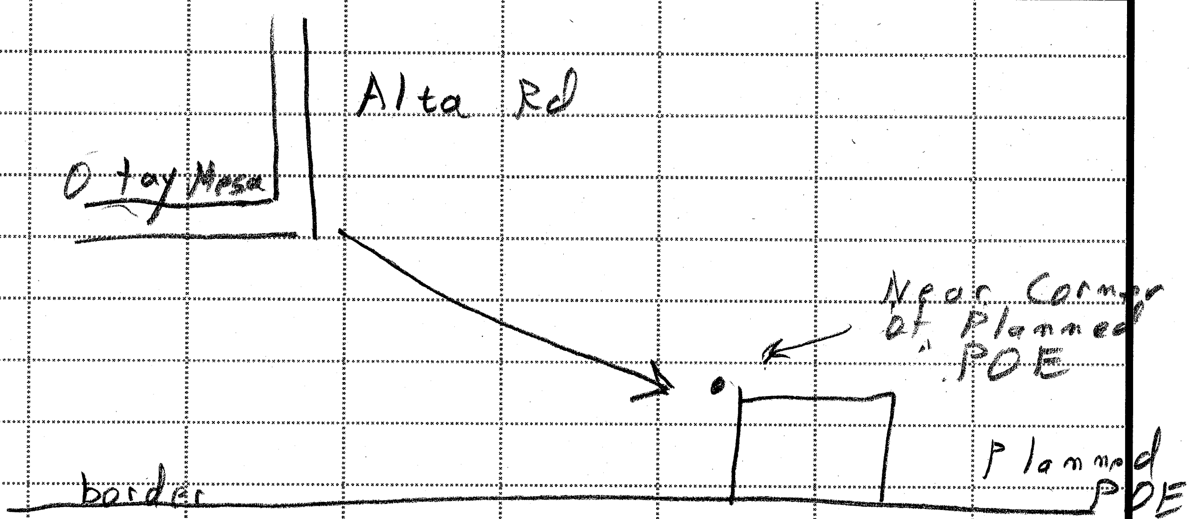
Address: Geographic Coordinate (Latitude, Longitude) 32.553872, -116.907553

Meter: LS-820	Serial #: 1502	Calibrator: CA-200	Serial #: 5173

Notes: Eastern undeveloped project area near the planned new border crossing.

Measurement stopped and restarted after Border Patrol vehicle questioning.

Sketch:



Temperature: 84 F°	Wind Speed: <3 mph mph	Humidity: 56 %
Start of Measurement: 10:30 A.M.	End of Measurement: 11:02 A.M.	45.9 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Roadways in Area		
No Calibration Analysis Will Be Provided		

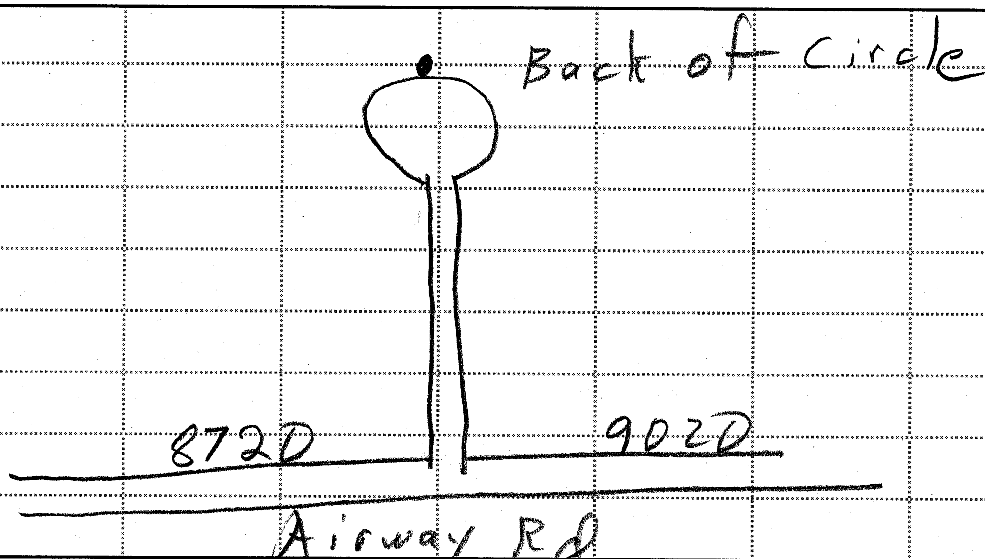
Picture: ST-6

Site Survey

Job # BOY-04.13		Project Name: SR-11	
Date: 10/24/2009	Site #: ST-7		Engineer: Charles Terry
Address: Geographic Coordinate (Latitude, Longitude) 32.563036, -116.953819			
Meter: LS-820	Serial #: 0453	Calibrator: CA-200	Serial #: 5173

Notes: Some construction noise.

Sketch:



Temperature: 84 F°	Wind Speed: 6 mph	Humidity: 79 %
Start of Measurement: 4:05 P.M.	End of Measurement: 4:20 P.M.	55.2 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

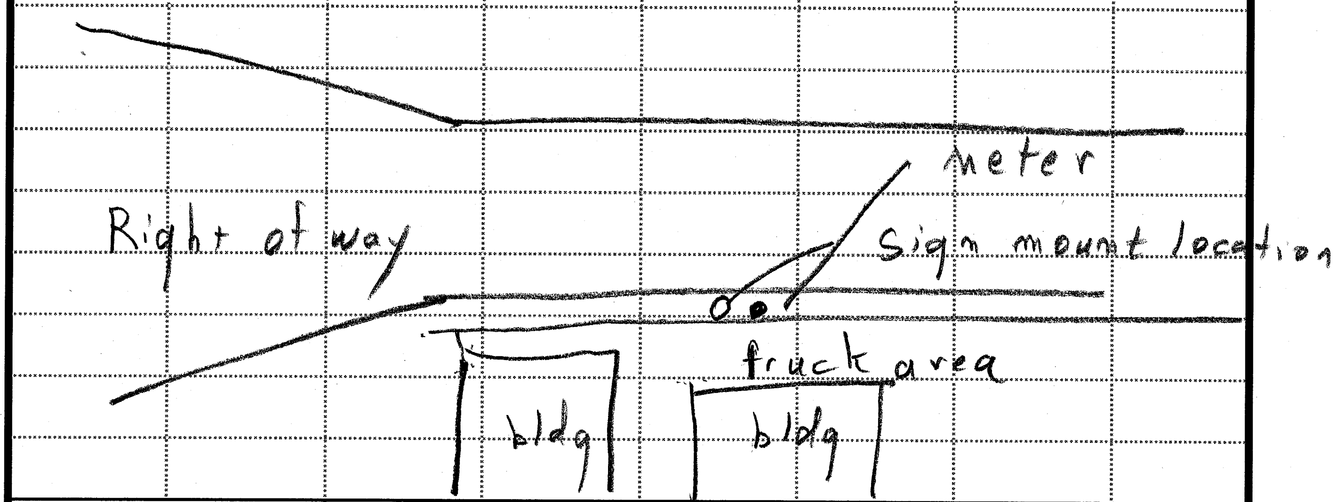
Picture: ST-7

Site Survey

Job # BOY-04.13		Project Name: SR-11	
Date: 2/18/2010	Site #: ST-8	Engineer: Charles Terry	
Address: Geographic Coordinate (Latitude, Longitude) 32.563884, -116.974968			
Meter: LS-820	Serial #: 1502	Calibrator: CA-200	Serial #: 5173

Notes: Industrial area. Noise sources: chop saw in industrial building; air handler systems at distant building; helicopter overpass; idling and slow-moving trucks nearby; coupling and decoupling tractor trailors nearby.

Sketch:



Temperature: 68 F	Wind Speed: 8-9 mph	Humidity: 79 %
Start of Measurement: 2:47 P.M.	End of Measurement: 3:13 P.M.	56.9 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
Noise Measurement for Information Only		
No Roadways in Area		
No Calibration Analysis Will Be Provided		

Picture: ST-8

Appendix B Traffic Data

Table B-2.
TRAFFIC DATA FOR MAXIMUM LOS C CONDITIONS

	Segment	Number of Lanes	Total Peak Hour Volume per Lane	Auto Per Lane		Medium Trucks		Heavy Trucks		Speed
				%	Volume	%	Volume	%	Volume	
SR-905										
Eastbound Lanes	Area 1	3	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Outer Two Lanes	Area 1	2	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Inner Lane (Autos Only)	Area 1	1	1,650	100.00%	1,650	0.00%	0	0.00%	0	55
Westbound Lanes	Area 1	3	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Outer Two Lanes	Area 1	2	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Inner Lane (Autos Only)	Area 1	1	1,650	100.00%	1,650	0.00%	0	0.00%	0	55
Eastbound Auxiliary Lanes	Area 1	1	1,000	85.00%	850	5.00%	50	10.00%	100	55
Westbound Auxiliary Lanes	Area 1	1	1,000	85.00%	850	5.00%	50	10.00%	100	55
All Connector Ramps	Area 1	Varies*	1,000	85.00%	850	5.00%	50	10.00%	100	45
SR-11										
Eastbound Lanes	Area 2 & 3	2	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Westbound Lanes	Area 2 & 3	2	1,650	85.00%	1,403	5.00%	83	10.00%	165	55
Eastbound Auxiliary Lanes	Area 2 & 3	1	1,000	85.00%	850	5.00%	50	10.00%	100	55
Westbound Auxiliary Lanes	Area 1	1	1,000	85.00%	850	5.00%	50	10.00%	100	55
All Connector Ramps	Area 2 & 3	Varies*	1,000	85.00%	850	5.00%	50	10.00%	100	45

* Number of connector ramps varies by area and intersection

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Appendix C Noise Barrier Reasonableness Analysis Worksheets

Worksheet A
Reasonable Allowance Calculation for Noise Abatement based on Critical Design Receiver

Base Allowance				
Base Year	2008			$31,000
1) Absolute Noise Levels			Check One	
69 dBA or less:	Add:	$2,000		$0
70-74 dBA:	Add:	$4,000	√	$4,000
75-78 dBA:	Add:	$6,000		$0
More than 78 dBA:	Add:	$8,000		$0
2) Build vs. Existing Noise Levels[1]			Check One	
Less than 3 dBA:	Add:	$0	√	$0
3-7 dBA:	Add:	$2,000		$0
8-11 dBA:	Add:	$4,000		$0
12 dBA or more:	Add:	$6,000		$0
3) Achievable Noise Reduction			Check One	
Less than 6 dBA:	Add:	$0	√	$0
6-8 dBA:	Add:	$2,000		$0
9-11 dBA:	Add:	$4,000		$0
12 dBA or more:	Add:	$6,000		$0
4) New Construction Or Pre 1978 residences? (Choose Yes or No)				
YES on either one:	Add:	$10,000		$0
NO on both:	Add:	$0	√	$0
Reasonable Allowance Per Residence				$35,000
Unmodified Barrier Allowance				$105,000
Adjusted reasonable allowance for Benefitted Residence				$35,000
Adjusted Unmodified Barrier Allowance				$105,000

County:	San Diego
Route:	SR-905
Post Mile:	570+28/576+18
Project Exp Auth:	EA 085780
Program Code:	

Barrier Name or ID	NB-1
Barrier Height (Feet)	10
Critical Design Receiver	R-10
Number of benefitted Residences (equivalent)	3
New Hwy Construction	No
Pre 1978 residences	No
Existing Noise Levels[2]	74 dBA
Future Noise Levels	74 dBA
Changes in Noise Level	0 dBA
Noise Level with Abatement	69 dBA
Barrier Insertion Loss	5 dBA

Continue to Worksheet B

Adjusted reasonable allowance for Residence and Barrier must be rounded up to the nearest $1,000

[1] Build vs. Build-out SR-905 (under construction)
[2] Build-out SR-905 Noise Levels

Worksheet B
Noise Barrier Reasonable Allowance Calculation

County: San Diego Route: SR-905 Post Mile: 570+28/576+18 Program Code:
Construction Cost without abatement: $139,134,000.00[1]

From Worksheet A				Adjusted Barrier Allowance vs Construction Cost	Percentage of Total Barrier Allowance	Modified Barrier Allowance	Modified Allowance Benefitted Residence
Barrier ID	Adjusted Allowance for Critical Design Receiver	Number of Benefitted Residences	Adjusted Unmodified Barrier Allowance		(col 4: A/ΣA)	(A/ΣA x .5 x Const Cost)	(col 7/col 3)
R-10	$35,000	3	$105,000	The total unmodified barrier allowance (column 4) is less than 50% of the construction cost without abatement, therefore no allowance modification is required.			
	Totals	3	$105,000				
1	2	3	4	5	6	7	8

[1] Lowest cost scenario, i.e. No Interchange Alternative, SR-11 Only ($358,020,000 if POE and CVEF included)