

LOCATION HYDRAULIC STUDY

State Route 241/91 Express Lanes Connector Project
On Route SR-241 and SR-91 between SR-241 Windy Ridge Toll Plaza and
SR-91/Coal Canyon Road

EA OK9700
Project No. 1200020097

Prepared for:

**California Department
of Transportation**



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REGISTERED CIVIL ENGINEER CERTIFICATION

This Location Hydraulic Study Report has been prepared under the direction of the following registered civil engineers. The registered civil engineers attest to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.



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REGISTERED CIVIL ENGINEER C65140



DATE



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Executive Summary

The Foothill/Eastern Transportation Corridor Agency (TCA), in cooperation with the California Department of Transportation (Caltrans), proposes to construct direct connectors between State Route 241 (SR-241) and the State Route 91 (SR-91) Express Lanes. SR-241 is a tolled facility, starting at the Oso Parkway interchange, in south Orange County, to its terminus at SR-91. The SR-91 Express Lanes is a two-lane tolled facility located within the median of SR-91, from State Route 55 (SR-55), to the Orange/Riverside County line (east of the SR-241 interchange). Currently, there is no direct connection between the SR-241 toll lanes and the SR-91 Express Lanes.

The Initial Phase of the SR-91 Corridor Improvement Project (CIP) was approved in October 2012 and is planned for completion by 2017. The subsequent phases will be constructed as funding becomes available. Once the Initial Phase of the SR-91 CIP is constructed, median Express Lanes will exist on SR-91 between SR-55 and SR-15 and will replace the existing HOV lanes between the Orange/Riverside County line and I-15. Therefore, the SR-241/SR-91 Express Lanes Connector project would provide a direct connection between SR-241 and express lanes on SR-91 between SR-241 and I-15.

The project is adjacent to the Santa Ana River. A small portion of the project falls within a FEMA mapped Zone X (shaded) floodplain. Zone X (shaded) at this location is an area of 0.2% annual chance (500-yr) flood. The applicable FEMA map numbers for the project are 06059C0180J and 06059C0185J, both dated December 3, 2009.

The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector.

The results contained herein indicate that the Floodplain Encroachment can be classified as "MINIMAL."

Section 1 – Introduction

1.1 Purpose of the Report

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. Federal financial assistance and/or issuance of a federal permit(s) required for a proposed state/local project constitute federal support and/or allowing actions. The Federal Highway Administration requirements for compliance are outlined in 23 CFR 650 Subpart A.

In order to comply with 23 CFR 650 Subpart A and determine if an encroachment itself is “minimal,” or “significant,” the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action (to life and property)
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development (inconsistencies with existing watershed and floodplain management programs)
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values impacted by the project.

1.2 Definitions

1.2.1 Base Flood

The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

-Executive Order 11988 Section 6 (b)

The one percent or greater chance of occurrence flood is commonly referenced as the “100-year” flood.

1.2.2 Floodplain

The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

-Executive Order 11988 Section 6 (c)

1.2.3 Special Flood Hazard Areas – High Risk

Special Flood Hazard Areas represent the area subject to inundation by 1-percent-annual chance flood. The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA) on National Flood Insurance Program (NFIP) maps. The SFHA is the area where the National Flood Insurance Program's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. The SFHA includes Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30,

AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, and V. (<http://www.fema.gov/floodplain-management/special-flood-hazard-area>)

1.2.4 Zone X (Shaded)

Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No base flood elevations (BFE) or base flood depths are shown within these zones.

1.3 Project Need and Purpose

1.3.1 Need

The need for the proposed project arises from the lack of connectivity between the SR-241 and the SR-91 Express Lanes, which results in a variety of deficiencies that negatively affect traffic flow and worsen an already congested SR-91 during peak hours. These deficiencies are described below:

- Northbound vehicles on SR-241 cannot access the eastbound SR-91 Express Lanes. Access from northbound SR-241 to eastbound SR-91 is provided by means of a two-lane connector that merges with the SR-91 general purpose lanes.
- Westbound SR-91 Express Lane motorists cannot access southbound SR-241. Access from westbound SR-91 to southbound SR-241 is provided by means of a two-lane connector that diverges from the general purpose lanes.

1.3.2 Purpose

The purpose of the proposed project is to implement the buildout of the ETC, as approved in 1994, and attain compatibility with the proposed SR-91 CIP, while minimizing environmental and financial impacts.

As stated in the 1994 Final EIR/EIS, the overall objective of the ETC project was to accommodate traffic growth associated with planned and approved development in Orange County. Specifically, the ETC project was proposed to meet the following objectives:

- To provide relief for existing freeways;
- To help achieve the Regional Mobility Plan goals of reducing emissions from transportation sources;
- To improve traffic flow on the regional transportation system;
- To reduce current and projected congestion and air pollution along portions of SR-91, the Costa Mesa Freeway (SR-55), and Interstate 5 (I-5) by providing an alternative travel route in northeast Orange County;
- To service existing and planned development consistent with the General Plans of the County and the cities in areas that will benefit from the project;
- To employ advanced transportation technology for the maximum operational and design efficiency and automatic vehicle monitoring for toll collections; and
- To implement the County of Orange Master Plan of Arterial Highways.

1.4 Project Description

The Foothill/Eastern Transportation Corridor Agency (TCA), in cooperation with the California Department of Transportation (Caltrans), proposes to construct direct connectors between State Route 241 (SR-241) and the State Route 91 (SR-91) Express Lanes. SR-241 is a tolled facility, starting at the Oso Parkway interchange, in south Orange County, to its terminus at SR-91. The SR-91 Express Lanes is a two-lane tolled facility located within the median of SR-91, from State Route 55 (SR-55), to the Orange/Riverside County line (east of the SR-241 interchange). Currently, there is no direct connection between the SR-241 toll lanes and the SR-91 Express Lanes.

SR-241/SR-91 direct connectors were previously evaluated in the Eastern Transportation Corridor (ETC) 1994 Final Environmental Impact Report/EIR/EIS. The Systems Management Concept (SMC), for the ETC project, proposed that each Build Alternative would be staged, incorporating general purpose traffic and eventually high-occupancy vehicle (HOV) lanes, to meet the forecasted demand. Under the SMC, ETC construction would be completed in one stage with three or more phases. The direct connectors were identified for Phase 2 of the ETC project.

The eastern limits of the project evaluated in the Final EIR/EIS were not clearly defined and ended approximately 4,200 feet west of Coal Canyon on SR-91. Therefore, a Supplemental EIR/EIS is being prepared to focus on the eastern portion of the project and to address changes to environmental conditions and regulatory requirements.

The Initial Phase of the SR-91 Corridor Improvement Project (CIP) was approved in October 2012 and is planned for completion by 2017. The subsequent phases will be constructed as funding becomes available. The Initial Phase of the SR-91 CIP includes the following SR-91 mainline improvements: (1) extend the existing SR-91 Express Lanes in Orange County east from the Orange/Riverside County line to I-15; (2) convert the existing high-occupancy vehicle (HOV) lanes to tolled express lanes and add an additional tolled express lane between the Orange/Riverside County line and SR-71; (3) add an additional general purpose lane between SR-71 and I-15; (4) add direct tolled express lane connectors on southbound and northbound I-15 near the Ontario Avenue interchange through the SR-91/I-15 interchange to connect to the eastbound and westbound SR-91 Express Lanes; and (5) add auxiliary lanes at various locations.

Once the Initial Phase of the SR-91 CIP is constructed, median Express Lanes will exist on SR-91 between SR-55 and SR-15 and will replace the existing HOV lanes between the Orange/Riverside County line and I-15. Therefore, the SR-241/SR-91 Express Lanes Connector project would provide a direct connection between SR-241 and express lanes on SR-91 between SR-241 and I-15.

The project location and vicinity are shown in Figure 1. The project area is within existing California Department of Transportation right-of-way and includes SR-241, from approximately 1,920 ft south of the Windy Ridge Wildlife Crossing to the SR-91/SR-241 interchange, and SR-91, from the SR-91/SR-241 interchange to the Coal Canyon Bridge. Construction access and staging areas would also occur within existing Caltrans right-of-way.

Figure 1: Regional Vicinity



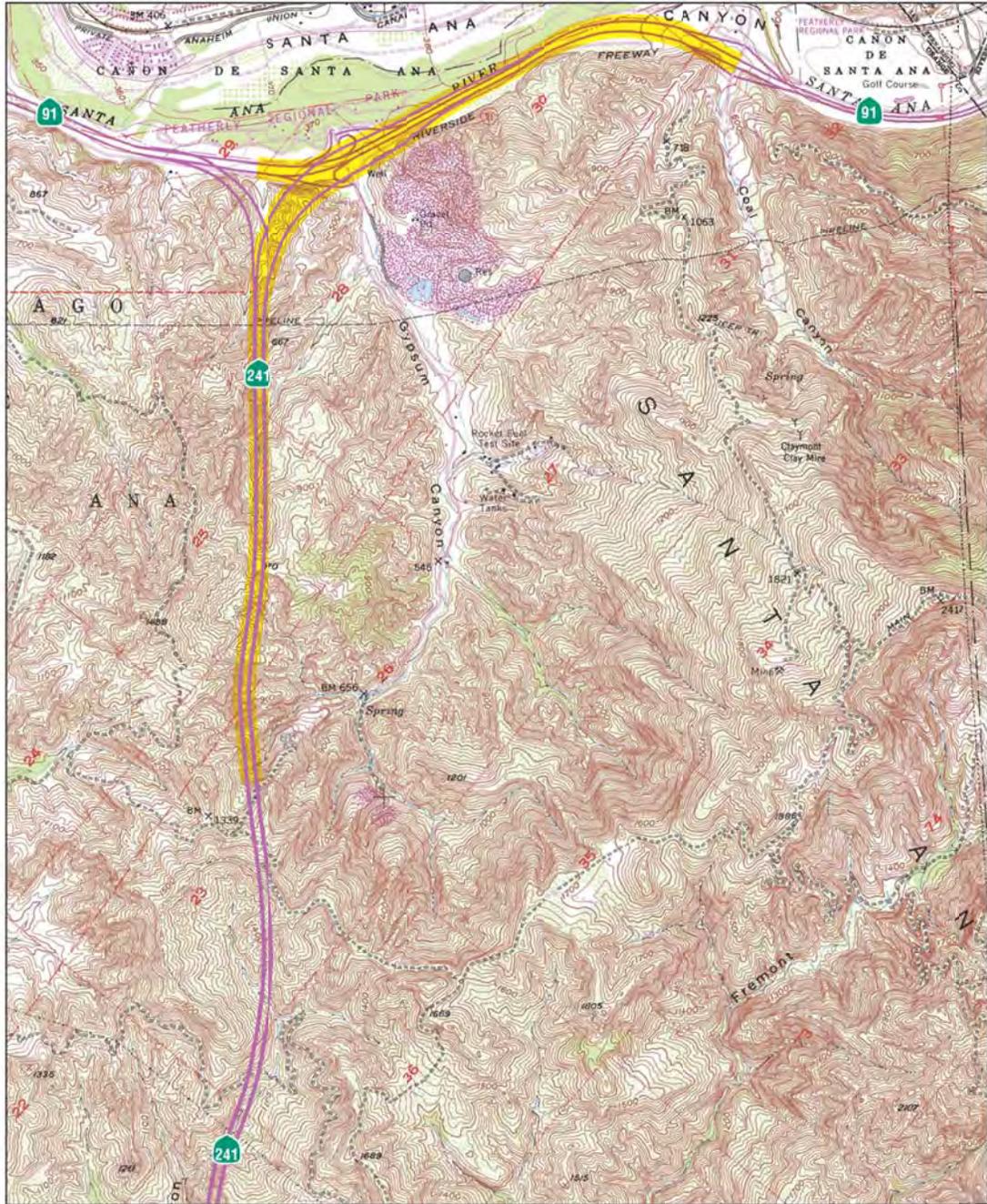
 Subject Site

 not to scale
1/22/13, JY 130005-10714 MMS

SR-241 / SR-91 EXPRESS LANES DIRECT CONNECTOR PROJECT
Regional Vicinity

Figure 1

Figure 2: Site Vicinity



Source: USGS Black Star Canyon, CA Quadrangle, 1988.

 Subject Site

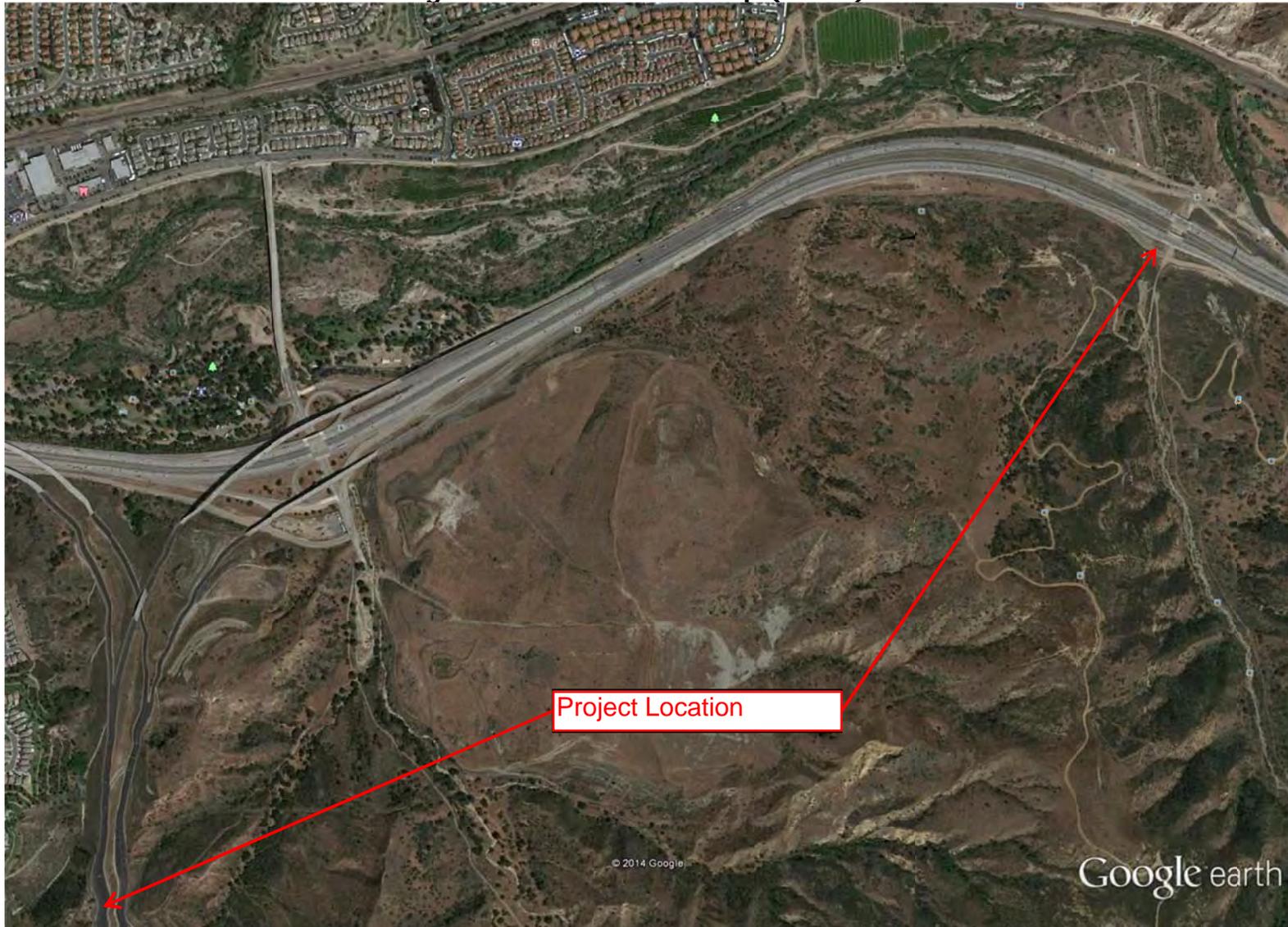


SR-241 / SR-91 EXPRESS LANES DIRECT CONNECTOR PROJECT

Site Vicinity

Figure 2

Figure 3: Site Location Map (Aerial)



1.5 Project Alternatives

This section describes the proposed action and the project alternatives that were developed to meet the identified need through accomplishing the project purposes outlined above, while avoiding or minimizing environmental impacts. Two alternatives are being analyzed in this document: Alternative 1 (Two-lane Express Lane Connector) and the No Build Alternative.

1.5.1 Alternative 1 (Two-lane Express Lane Connector)

Alternative 1 would construct a median-to-median connector between SR-241 and SR-91. The connector would bring lanes from the median of northbound SR-241 to the existing eastbound SR-91 Express Lanes. The reverse movement would also be accommodated, from the westbound SR-91 Express Lanes to the median of southbound SR-241. The connector would be tolled. Alternative 1 is shown in Figure 2.

Starting at the southern end of the project, the Windy Ridge Wildlife Crossing would be widened on the southbound median side, and an additional lane and shoulder would be constructed for approximately 5,300 feet (ft). At this point, two lanes, one in both the northbound and the southbound direction, would be added by widening within the existing median area. The two new lanes for the connector would be constructed on bridge structures and fill within the area between the existing SR-241 general purpose connectors and would merge with the SR-91 mainline.

To accommodate the addition of the median-to-median connector, the existing eastbound SR-91 Express Lanes would be shifted to the south and an eastbound auxiliary express lane would be constructed along SR-91. The Gypsum Canyon on- and off-ramps and the northbound-SR-241-to-eastbound-SR-91 general purpose connector would be realigned to accommodate the SR-91 modifications. The number of existing eastbound SR-91 general purpose lanes would be maintained within the project limits.

The westbound SR-91 lanes would be restriped to accommodate the addition of the express lane that would provide for the southbound SR-241 median-to-median connector. The restriping would begin west of Coal Canyon, and would end east of the Gypsum Canyon Road Undercrossing.

The eastbound and westbound SR-91 Express Lanes would have a buffer to separate the express lanes from the general purpose lanes. The westbound SR-91 Express Lanes would have a 2 foot wide buffer, and the eastbound SR-91 Express Lanes would have 4 foot wide buffers on both sides: a buffer to the right to separate the general purpose lanes, and a buffer to the left to separate the express connector lane. In order to match the existing eastbound lanes, at the eastern terminus of the project limits, the buffers would gradually transition to a width of 0 ft.

Alternative 1 would tie into the western limits of the initial SR-91 CIP, which will extend the SR-91 Express Lanes easterly to I-15. The Alternative 1 Express Lane Connector would merge into the existing SR-91 Express Lanes, prior to the connection to the SR-91 CIP. Alternative 1 is compatible with the approved SR-91 CIP for both the initial and ultimate configurations, including the number and widths of the express lanes, express auxiliary lanes, and general purpose lanes.

Retaining walls would be required on eastbound SR-91 in order to contain the grading within the existing right-of-way.

1.5.2 No Build Alternative

Under this alternative, no direct toll connector would be constructed between SR-241 and SR-91. This alternative would not close the toll connector gap between SR-241 and the SR-91 Express Lanes.

1.6 Permits and Approvals Needed

Table 1: Required Permits, Reviews, and Approvals

Agency	Permit/Approval	Status
SARWQCB	Section 401 Water Quality Certification	Department is to obtain certification
SWRCB	Section 402 NPDES (Construction Activity)/Department NPDES Permit CAS000003 and CAS000002 (General Permit)	Department is to obtain permit

Source: LSA Associates, Inc.
Department = California Department of Transportation
NPDES = National Pollutant Discharge Elimination System
PS&E = Plans, Specifications, and Estimates
SARWQCB = Santa Ana Regional Water Quality Control Board
SWRCB = State Water Resources Control Board

Section 2 – Affected Environment

2.1 Introduction

The project is adjacent to the Santa Ana River. The Santa Ana River has mapped High Risk Special Flood Hazard Areas (Zone AE Floodplain and Regulatory Floodway) that are adjacent to the northern shoulder of the Westbound lanes of SR-91. The project improvements are not within the Zone AE Floodplain and Regulatory Floodway.

A small portion of the project falls within a FEMA mapped Zone X (shaded) boundary. The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector. See Exhibits 1 and Exhibit 2 for the FIRM for the project location. The proposed alignment is shown on Exhibit 3.

2.2 General Setting

2.2.1 Land Use

According to the Circulation Element of the City of Anaheim General Plan (Anaheim General Plan) (Figure C-1, Planned Roadway Network), the subject site is designated Freeway/Tollroad. Gypsum Canyon Road in the subject site is designated Hillside Primary Arterial.

2.2.2 Topography

Based on the USGS Black Star Canyon, California, Quadrangle, dated 1967 (photorevised 1988), the subject site consists of vacant land and SR-91. On-site topography ranges from approximately 375 feet above mean sea level (msl) in the northwestern portion of the site to 1,500 feet above msl in the southern portion of the subject site. Sloping topography and blue line streams are visible throughout the central and southern portions of the subject site. Surrounding uses consist of vacant land and open space. One petroleum pipeline is visible traversing the central portion of the subject site in an east/west direction. A gravel pit and rocket fuel testing site are noted to the south of the northeastern portion of the subject site. Within this area, a reservoir and water well are also visible off-site.

2.2.3 Regional Hydrology

Detailed hydrology for the Santa Ana River was not performed as a part of this study. Due to the proximity of Prado Dam (about 13 miles upstream of the bridge), the flow in the river is controlled by the dam outlet works. The United States Army Corps of Engineers has specified a 100-year discharge for this reach at 38,000 cubic feet per second. No known overtopping events or events greater than the 100-year event are on record.

The project is in the 801.11 Primary Hydrologic Unit.

2.2.4 Local Hydrology

2.2.4.1 Precipitation and Climate

The local climate is similar to a Mediterranean climate having warm dry summers and mild wet winters. Annual rainfall is approximately 15 inches, with most of the precipitation occurring in November to May.

2.2.4.2 Surface Streams

There are several surface streams within the project limits. The USGS topographical maps show blueline streams for Gypsum Canyon, Gypsum Canyon Tributaries, Coal Canyon and Weir Canyon. These streams are ephemeral and are not mapped as floodplains on the FIRMs.

The principal surface stream within the project is the Santa Ana River. The Santa Ana River is a persistent stream, with the daily flow rate being controlled by the Army Corps of Engineers Prado Dam.

The Santa Ana RWQCB Basin Plan designates the portion of the Santa Ana River From 17th Street to Prado Dam as "Reach 2."

Some local storm drains and roadside channels are within the project limits for drainage purposes.

2.2.4.3 Municipal Water Supply

The Santa Ana River does not function as a direct Municipal Water Supply. Instead, the Orange County Water District uses it for groundwater recharge.

2.2.5 Ground Water Hydrology

Based on Section 4.3, Geology and Soils, of the Mountain Park Specific Plan Environmental Impact Report (EIR), groundwater investigations were conducted in 2003 for the adjoining Mountain Park Specific Plan (located to the east of the northern portion of the subject site). At that time, groundwater was encountered between 18 and 55 feet below ground surface (bgs). Groundwater flow in the vicinity is anticipated to follow the topography and surface waters, generally in a westerly direction (along the Santa Ana River). Based on the Anaheim General Plan EIR, Figure 5.13-1, Water Distribution System, there are no active or proposed water wells located within the boundaries of the subject site.

No additional geotechnical borings in the vicinity of the floodplain have been completed in support of this project.

2.2.6 Geology/Soils/Soil Erosion Potential

According to the *Geologic Summary and General Earthwork Recommendations, State Route 241/91 Direct Connector Project, Orange County, California* (CH2M Hill, June 27, 2011)

"This project is located within the Peninsular Ranges geomorphic province of California, characterized by a series of northwest-trending mountains, valleys, and faults, all of which generally parallel the San Andreas Fault system. The Santa Ana Mountains and the Whittier Fault are prime examples of this northwest-trending regional structure. The Santa Ana Mountains are present as a result of uplift related to movement of the San Andreas and its associated faults, such as the Whittier Fault. The Whittier Fault of the Elsinore Fault Zone is the closest active fault to the site, mapped on the north side of Santa Ana Canyon,

north of the Project Area. The Whittier Fault is a right-lateral strike-slip fault with an estimated maximum magnitude (Mmax) of 6.9. The Project Area extends from the foothills of the northwestern flank of the Santa Ana Mountains into Santa Ana Canyon. The Santa Ana River is a major drainage route for southern California; the river originates in the San Bernardino Mountains and extends southwest, into the Pacific Ocean in the vicinity of Newport Beach.

Locally, the Project Area is underlain by artificial fill placed in association with SR-241 and SR-91, sediments eroded from upland areas and transported and deposited by the Santa Ana River, competent landslide debris, and bedrock of various sedimentary formations.”

Most of this segment of SR-91 soil consists of corralitos loamy sand, riverwash and yorba cobbly sandy loam. Around the location of the SR-241 the soil consists of mainly cienebarock outcrop complex, corralitos loamy sand, rock outcrop-cieneba complex, soper loam, soper gravelly loam and yoba cobbly sandy loam.

A large landslide, the Mindeman Landslide, runs along the south side of SR-91 near a portion of the Green River Golf Course. The slide area extends from approximately the county line to 1,800 feet into Riverside County. The landslide debris is derived from the local bedrock units including the Santiago Peak Volcanics, Baker Canyon Conglomerate, and Holz Shale Member. A detailed geotechnical study is being performed on the Mindeman Landslide under a separate project.

2.3 Watershed Characteristics and Beneficial Uses

Highway Design Manual lists the Natural and Beneficial Floodplain Values including, but not limited to fish, wildlife, plant, open space, natural beauty, scientific study, outdoor recreation, agriculture, and forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

The Basin Plan Table 3-1 lists the Beneficial Uses for Reach 2 of the Santa Ana River as AGR, GWR, REC1, REC2, WARM, WILD, and RARE.

Agricultural Supply (AGR) waters are used for farming, horticulture or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.

Groundwater Recharge (GWR) waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality or halting saltwater intrusion into freshwater aquifers.

Water Contact Recreation (REC 1) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs.

Non-contact Water Recreation (REC 2) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting sightseeing and aesthetic enjoyment

Warm Freshwater Habitat (WARM) waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish and wildlife, including invertebrates.

Wildlife Habitat (WILD) waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife.

Rare, Threatened or Endangered Species (RARE) waters support the habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened or endangered.

2.4 Support of Incompatible Floodplain Development

Because the proposed action within Zone X is limited to reuse of an existing roadway, restriping, and relocating an existing median within an area of existing pavement, there is no consideration given to development compatibility.

Exhibit 1: FEMA FIRM – 06059C0180J dated December 3, 2009

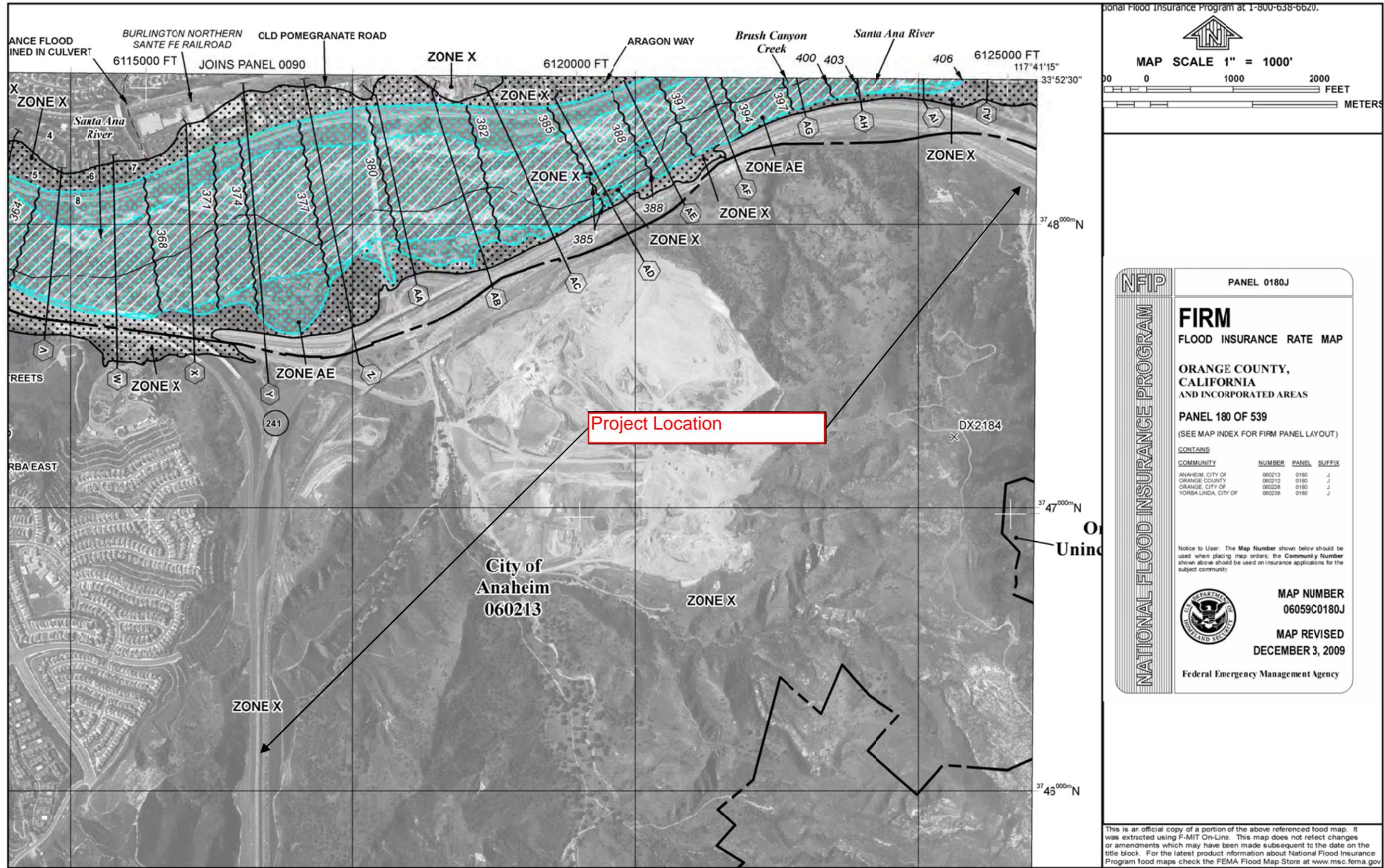


Exhibit 2: FEMA FIRM – 06059C0185J dated December 3, 2009

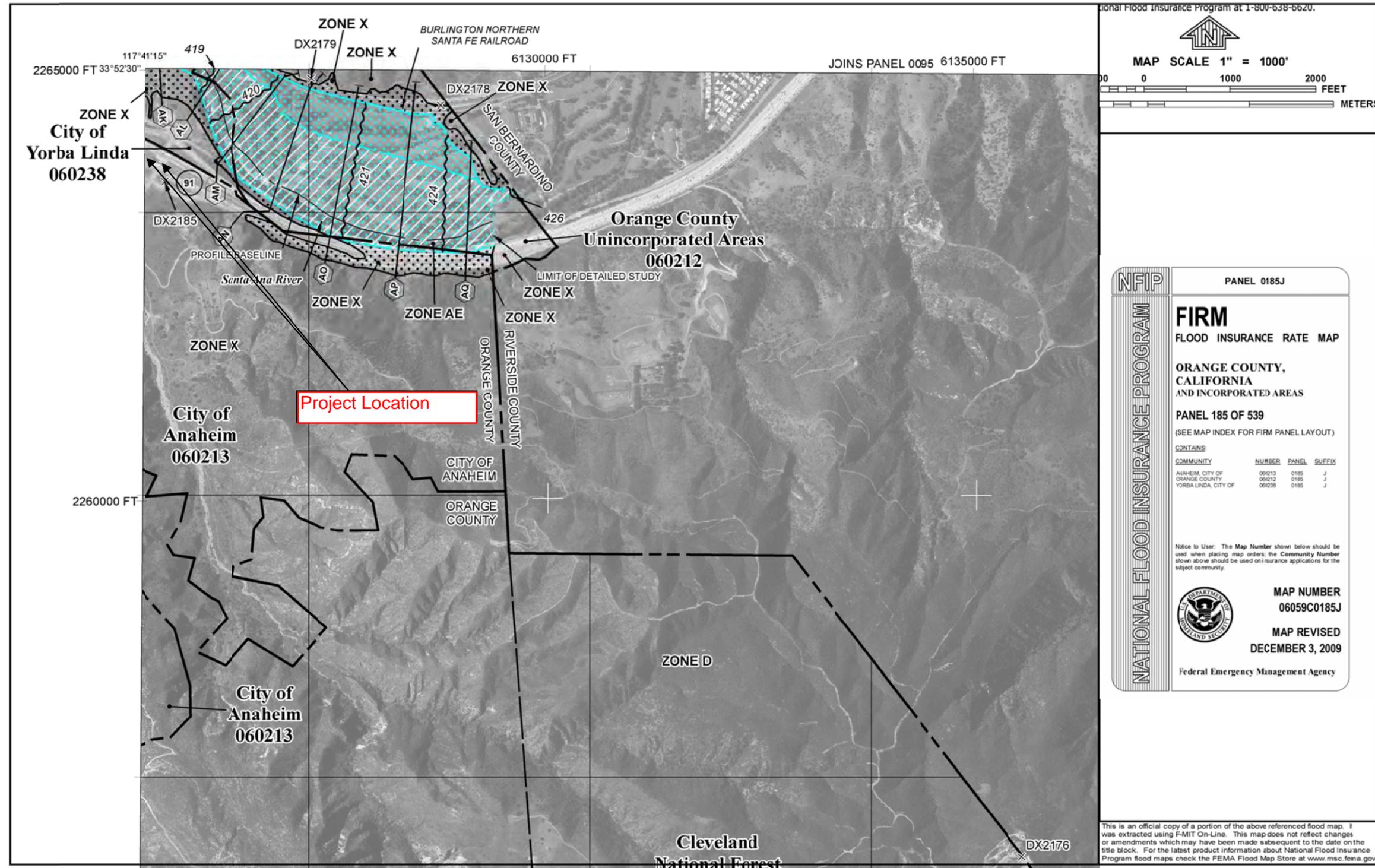


Exhibit 3: Preliminary Construction Drawing

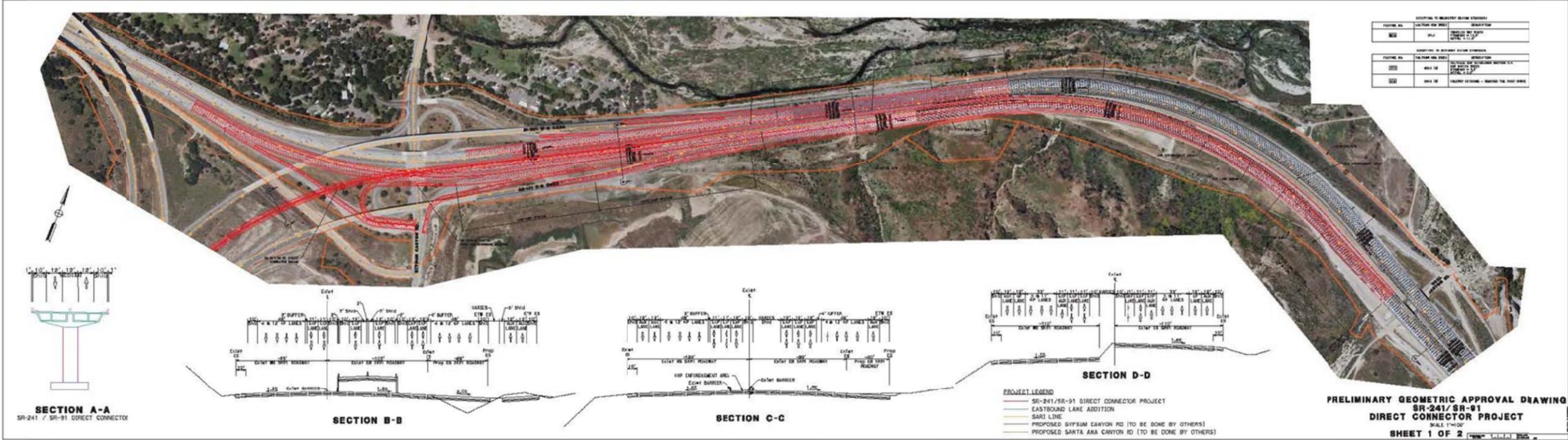
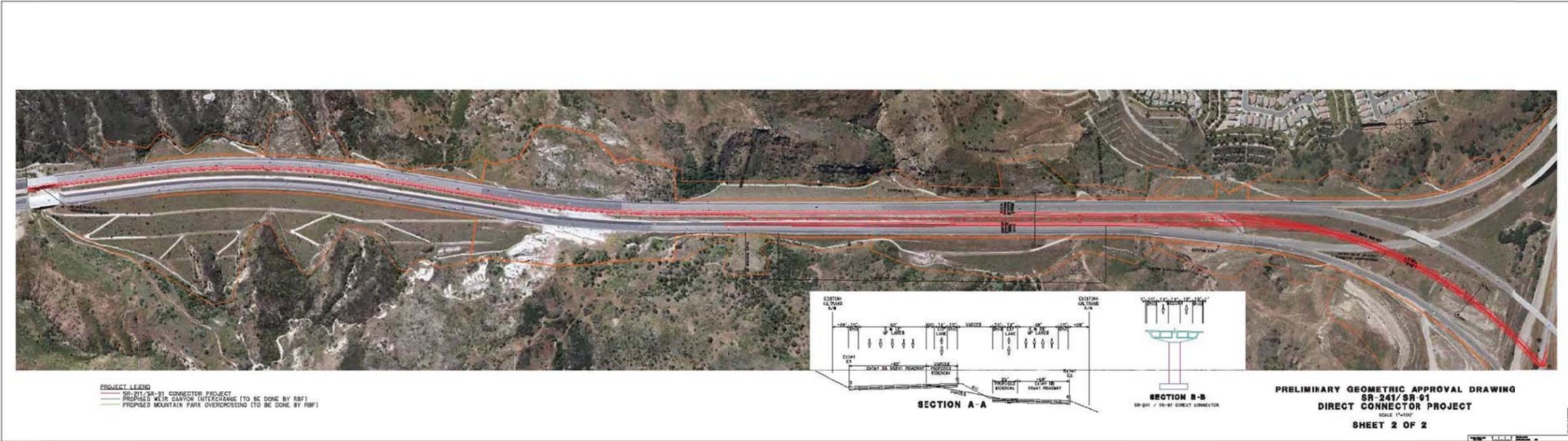


Exhibit 4: Preliminary Construction Drawing



Section 3 – Hydraulic Analysis

3.1 Introduction

Although adjacent to the Santa Ana River, the project is not within a FEMA mapped 100-year floodplain. Small portions of the project are within a FEMA Zone X (shaded). Areas within Zone X (shaded) on the Flood Insurance Rate Maps are Areas of moderate or minimal hazard. Zone X is not a Special Flood Hazard Area of High Risk.

The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector. No hydraulic study was performed as part of this project.

3.2 Hydraulic Analysis

The Zone X shown on the FIRMs is adjacent to a mapped Zone AE Floodway and near to Zone AE Floodplains. The National Flood Insurance Program Zone X classification includes three different cases:

1. Moderate risk areas within the 0.2-percent-annual-chance floodplain,
2. Areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile,
3. Areas protected from the 1-percent-annual-chance flood by a levee.

Zone X does not distinguish between these cases. To determine the effective Zone X case, deductive reasoning was applied.

- A Case 3 Zone X is not present. Route 91 is not separated from the Santa Ana River Floodplain by a Levee.
- A Case 2 Zone X is not likely. The adjacent river and floodplain are modeled by deterministic methods and water surfaces are known. The probability that the Zone X shown on SR-91 is based on an "average depth less than 1-ft" is low. Furthermore, the drainage area is much greater than one square mile (the Prado Dam watershed is 2,255 square miles).
- A Case 1 Zone X is probable. Because both Case 2 and Case 3 Zone X are discounted, the only remaining case for this Zone X is an "Area of 0.2-percent annual chance flood".

By this analysis, Zone X does not represent the 1% annual chance flood, and therefore is not within the floodplain limits subject to inundation during the Base Flood. Furthermore, because the proposed action within Zone X is limited to reuse of an existing roadway, restriping, and relocating an existing median within an area of existing pavement, there are no foreseeable impacts to the Santa Ana River hydraulics. Therefore, no hydraulic study was performed for the project.

3.3 Results of Hydraulic Analysis

No hydraulic study was performed for the project. The Zone X does not meet the definitions provided in Executive Order 11988 Section 6.

Section 4 – Risks and Impacts

4.1 Potential Risk from Longitudinal Encroachment

The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order 11988 because Zone X is not High Risk Special Flood Hazard Area. Therefore the Potential Risk of Longitudinal Encroachment is NOT APPLICABLE as a result of these improvements.

4.2 Potential Risk to Life and Property

The Highway Design Manual, Chapter 804, evaluates the potential for risk to life and property by a potential Q100 backwater (Base Flood) for Residences, other buildings, and crops.

The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector. The Potential Risk to Life and Property remains unchanged as a result of these improvements.

The Highway Design Manual, Chapter 804, evaluates the potential for traffic disruptions by a potential Q100 backwater (Base Flood) for:

1. Emergency Supply or Evacuation routes
2. Emergency Vehicle Access
3. Whether a Practicable Detour is available
4. School Bus or Mail Routes

The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector.

Therefore, the potential for traffic disruptions due to the influences of the Build Alternative on the hydraulics is deemed NOMINAL. The duration of traffic interruptions for the base flood event is estimated to be ZERO hours.

4.3 Potential Risk to Natural and Beneficial Floodplain Values

The project improvements that occur within Zone X are limited to reuse of an existing roadway, restriping, and relocating an existing median within an area of existing pavement. The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order 11988 because Zone X is not High Risk Special Flood Hazard Area. There are no changes that alter the current natural environment, and therefore no Potential Risk to Natural and Beneficial Floodplain Values.

4.4 Potential Risk for Support of Incompatible Floodplain Development

The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order

11988 because Zone X is not High Risk Special Flood Hazard Area. Because the proposed action is within Zone X and not within a High Risk Special Flood Hazard Area there is no consideration given to development compatibility.

4.5 Measures to Minimize Floodplain Impacts

The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order 11988 because Zone X is not High Risk Special Flood Hazard Area. Because the proposed action is within Zone X and would not result in impacts to the 100-year floodplain, measures to Minimize Floodplain Impacts are not required.

4.6 Measures to Restore/Preserve Natural and Beneficial Floodplain Values Impacted by the Project

The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order 11988 because Zone X is not High Risk Special Flood Hazard Area. Because the proposed action is within Zone X and would not result in impacts to the 100-year floodplain, measures to Restore/Preserve Natural and Beneficial Floodplain Values are not required.

4.7 Assessment of Level of Risk

Since the changes to the channel hydraulics resulting from the Build Alternatives do not pose any appreciable risk to the Traffic Disruption, Loss of Life and Property, or Natural and Beneficial Floodplain Values Risk Factors; and no Temporary Avoidance and Minimization Measures are required, the combined Assessed Risk Level is LOW RISK.

Section 5 – Conclusion

The project does not encroach into the nearby Zone AE Floodplain and Regulatory Floodway. The portions of the project within Zone X are not regulated by 44 CFR 650 or Executive Order 11988 because Zone X is not High Risk Special Flood Hazard Area. The proposed action within Zone X does not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector.

Because the project is not within a High Risk Special Flood Hazard Area there are:

- No Potential Risks for Longitudinal Encroachment
- No Potential Risks to Natural and Beneficial Floodplain Values
- No Potential Risk for Support of Incompatible Floodplain Development
- No Measures to Minimize Floodplain Impacts - The need for measures to minimize floodplain impacts associated with the project is not warranted as the proposed action is not within the base floodplain.
- No Measures to Restore/Preserve Natural and Beneficial Floodplain Values Impacted by the Project - The need for measures to minimize floodplain impacts associated with the project is not warranted as the proposed action is not within the base floodplain.

Engineering assessment of the project condition improvements reveal that the project does not introduce additional risk for traffic disruptions or loss of life and property.

Because the proposed action is outside of the High Risk Special Flood Hazard Area, the Standard Environmental Reference Chapter 17 criteria is met, and a classification of NOT APPLICABLE is recommended.

The Location Hydraulics Study Forms and Floodplain Evaluation Report Summary Forms are prepared and included with this report as Appendix A.

Summary of Preparer's Experience

This Location Hydraulic Study Report has been prepared under the direction of the following registered civil engineer.

Bradley M. Losey is a Registered Civil Engineer in the State of California, license number C65140. Mr. Losey holds a Bachelors' of Science in Civil Engineering from the University of California, Irvine, and has fifteen years of flood control experience related to Roadways, Bridges, Hydrology, and Channel Hydraulics.

This Location Hydraulic Study Report has also been prepared with input and consultation of the following Environmental Specialist.

Nicole West is an Associate with LSA Associates, Inc. Ms. West holds a Master of Science degree in Civil and Environmental Engineering from the University of California, Berkeley. Ms. West has over fourteen years of experience in water quality, floodplains, fisheries, and aquatic weed control. Ms. West has been actively involved in water quality and floodplain analysis for transportation projects throughout California (specializing in projects with Caltrans involvement) for eight years.

Technical Appendix

- **Location Hydraulic Study Forms**
- **Floodplain Evaluation Report Summary Forms**

**TECHNICAL INFORMATION FOR LOCATION HYDRAULIC STUDY
STATE ROUTE 241/91 EXPRESS LANES DIRECT CONNECTOR CONSTRUCTION**

Dist. 12 Co. Orange Rte. 241 and 91
P.M. 241-PM 16.0-17.9 91-PM 36.7/38.7
EA OK9700 Bridge No. N/A

Floodplain Description:

The project is adjacent to the Santa Ana River. A small portion of the project falls within a FEMA mapped Zone X (shaded) floodplain. The applicable FEMA map numbers for the project are 06059C0180J and 06059C0185J, both dated December 3, 2009.

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

The Foothill/Eastern Transportation Corridor Agency (TCA), in cooperation with the California Department of Transportation (Caltrans), proposes to construct direct connectors between State Route 241 (SR-241) and the State Route 91 (SR-91) Express Lanes. Currently, there is no direct connection between the SR-241 toll lanes and the SR-91 Express Lanes. The connectors will be partly on flyover bridge and partly on retaining wall. At the east terminus the connectors will join existing pavement within Route 91, and at the south terminus the connectors will join existing pavement with Route 241.

A small portion of the project falls within a FEMA Zone X (shaded) boundary. The portions of the project within Zone X do not include any major roadway alteration, or any cut or fill. The work in these areas is limited to re-striping of existing pavement and a shift of the median barrier to accommodate the alignment of the express lanes connector.

2. ADT: Current N/A Projected 20,500 (2040)

3. Hydraulic Data: Base Flood $Q_{100} =$ N/A WSE₁₀₀ = N/A ft

The flood of record, if greater than Q_{100} : $Q =$ N/A cfs WSE = N/A ft

Overtopping flood $Q =$ N/A cfs WSE = N/A ft

Are NFIP maps available? YES X NO _____

Are NFIP studies available? YES X NO _____

4. Is the highway location alternative within a regulatory floodway?

YES _____ NO X

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.

Potential Q₁₀₀ backwater damages:

- A. Residences? NO X YES _____
B. Other Bldgs? NO X YES _____
C. Crops? NO X YES _____
D. Natural and beneficial Floodplain values? NO X YES _____

6. **Type of Traffic:**

- A. Emergency supply or evacuation route? NO _____ YES X _____
B. Emergency vehicle access? NO _____ YES X _____
C. Practicable detour available? NO _____ YES X _____
D. School bus or mail route? NO _____ YES X _____

7. Estimated duration of traffic interruption for 100-year event hours: 0

8. Estimated value of Q₁₀₀ flood damages (if any) – moderate risk level.

A. Roadway \$ 0
B. Property \$ 0
Total \$ 0

9. **Assessment of Level of Risk** Low X
Moderate _____
High _____



For High Risk projects, during design phase, additional Design Study Risk Analysis may be necessary to determine design alternative.

Preparer's Signature – Licensed Civil Engineer
(Item numbers 3,4,5,7,9)

 Date 8/14/14

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible Floodplain development? NO X YES _____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

Signature – Project Engineer
(Item numbers 1, 2, 6, 8)

 Date 8/15/14

**SUMMARY FLOODPLAIN ENCROACHMENT REPORT
STATE ROUTE 241/91 EXPRESS LANES DIRECT CONNECTOR CONSTRUCTION**

Dist. 12 Co. Orange Rte. 241 and 91
P.M. 241-PM 16.0-17.9 91-PM 36.7/38.7
EA 0K9700 Bridge No. N/A

Limits: Route 241 approximately 1.3 miles south of Gypsum Canyon Road in the City of Anaheim to Route 91 vicinity of Coal Canyon Road in unincorporated Orange County.

Floodplain Description:

The project is adjacent to the Santa Ana River. A small portion of the project falls within a FEMA mapped Zone X (shaded) floodplain. The applicable FEMA map numbers for the project are 06059C0180J and 06059C0185J, both dated December 3, 2009.

- | | No | Yes |
|---|----------|----------|
| 1. Is the proposed action a longitudinal encroachment of the base floodplain? | <u>X</u> | ___ |
| 2. Are the risks associated with the implementation of the proposed action significant? | <u>X</u> | ___ |
| 3. Will the proposed action support probable incompatible floodplain development? | ___ | <u>X</u> |
| 4. Are there any significant impacts on natural and beneficial floodplain values? | <u>X</u> | ___ |
| 5. Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain. | <u>X</u> | ___ |
| 6. Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q). | <u>X</u> | ___ |
| 7. Are Location Hydraulic Studies that document the above answers on file? If not explain. | ___ | <u>X</u> |

PREPARED BY:

[Signature]
Preparer's Signature - Licensed Civil Engineer

8/14/14
Date

[Signature]
Signature - Environmental Consultant

8/14/14
Date

[Signature]
Signature - Project Engineer

8/14/14
Date

