3.11 Geology/Soils/Seismic/Topography

3.11.1 Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act.

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing seismic hazards for Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE) from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the State of California in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The main purpose of this Act is to prevent the construction of buildings used for human occupancy on surface traces of active faults. The Act only addresses the hazard of surface fault rupture and not other potential earthquake-related hazards. The Seismic Hazards Mapping Act, passed in 1990, addresses nonsurface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

The State Geologist is required to establish regulatory zones, referred to as Earthquake Fault Zones (referred to as Special Studies Zones prior to January 1, 1994), around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities and counties and State agencies for their use in planning and controlling new or renewed construction.

3.11.2 Affected Environment

This section discusses the existing geologic and soils environment along SR-91 and I-15 and provides analysis of the potential impacts of the project related to geology and soils. This section also addresses the potential for structural damage to project facilities due to the local geology underlying the project site, as well as slope stability, ground settlement, soil conditions, grading, and regional seismic conditions. This section summarizes information in the *Updated Preliminary Geotechnical Design Report State Route 91 Corridor Improvement Project, SR-91 from SR-241 to Pierce*

Street, I-15 from Hidden Valley Parkway to Cajalco Road, Orange and Riverside County, California (July 2010) (i.e., *Geotechnical Design Report*).

3.11.2.1 National Natural Landmarks and Other Geographic and Topographic Features

Nearly 20,000 ac of open space on the Irvine Ranch have been designated an NNL by both the State of California and the United States Department of Interior. The Irvine Ranch NNL contains large areas of important natural habitats and unusual geological formations. A small part of the NNL abuts SR-91 east of the SR-91/SR-241 interchange. The NNL program aims to encourage and support voluntary preservation of sites that illustrate the geological and ecological history of the United States, and to strengthen the public's appreciation of the country's natural heritage. An NNL designation is an agreement between the property owner and the federal government. An NNL designation does not change ownership of the property nor create any encumbrances on the property. Designation of an NNL presently constitutes only an agreement with the owner to preserve, insofar as possible, the significant natural values of the site or area. Administration and preservation of an NNL is solely the property owner's responsibility. Either party may terminate the agreement after the other party is notified.

The *Geotechnical Design Report* did not identify any geologic or topographic features potentially requiring protection adjacent to the project segments of SR-91 and I-15.

3.11.2.2 Local Geology/Topography

There are 11 geomorphic provinces in California, as defined by the California Geological Survey (CGS). Geomorphic provinces are geologic regions with distinct landforms and geology. The geologic study area for the project is in the northern Peninsular Ranges geomorphic province of southern California. The Peninsular Ranges are a series of northwest-southeast-trending mountain ranges separated by similarly trending valleys. Physiographically, the northern part of the Peninsular Ranges province is divided into three major fault-bounded blocks: the Santa Ana Mountains, Perris Block, and the San Jacinto Mountains.

The bedrock units in the study area are generally exposed on slopes adjacent to the project segments of SR-91 and I-15. The project segments are defined as the entire lengths of SR-91 and I-15 that would be improved under the Build Alternatives.

Table 3.11.1 describes the bedrock formations and the surface geological units present along the project segments of SR-91 and I-15. As shown on Figure 3.11-1, geologic units along SR-91 and I-15 consist of a variety of bedrock and alluvial soil units. From west to east along SR-91 in Santa Ana Canyon, these bedrock units consist of mostly sedimentary sandstone, cobbly sandstone and siltstone, and volcanic intrusive bedrock. Cretaceous-age intrusive granitic bedrock underlies most of SR-91 from I-15 to Pierce Street, with localized areas of older alluvial fan and fluvial deposits. I-15 north of SR-91 is underlain by mostly intrusive granitic bedrock. I-15 south of SR-91 is underlain by recent and older alluvial fan deposits and sections of tertiary sandstone and siltstone and Cretaceous-age volcanic rock.

3.11.2.3 Faulting and Seismicity

The entire southern California region is seismically active due to the influence of several earthquake fault systems resulting from interaction between the Pacific and North American crustal plates. An active fault is defined by the State of California as a "…sufficiently active and well defined fault that has exhibited surface displacement within the last 11,000 years." A potentially active fault is defined by the State as a "…fault with a history of movement between 11,000 and 1.6 mya [million years ago]." The active and potentially active faults in the study area are capable of producing seismic shaking that could be damaging to bridges and other structures. Figure 3.11-2 illustrates the locations of the major fault zones in the study area.

Local faults that have the potential to influence the project area are faults of the San Andreas fault system, which includes several major faults considered active by the State. The San Andreas fault is approximately 23 mi northeast of the study area as shown on Figure 3.11-2. The San Andreas fault system is a right-lateral strike-slip network of faults including the San Andreas, Elsinore, Whittier, Chino, and Central Avenue faults.

The San Andreas fault zone is a 745 mi long network of predominantly strike-slip faults. The average annual geologic slip rate on the San Andreas fault is estimated to be 0.70 to 1.38 inches per year (in/yr) during the past several thousand years. The maximum probable magnitude of an earthquake on the San Andreas fault is estimated to be 8.0 maximum moment magnitude (M_{max}). Recurrence of earthquakes on the San Andreas fault is highly variable and ranges from approximately 20 years at Parkfield, California, to an estimated 300 years. The average interval for major ruptures in the vicinity of the study area is thought to be about 140 years.

Table 3.11.1 Bedrock Formations and Surface Geologic Units Along the Project Segments of SR-91 and I-15

Formation / (Symbol) / Origin[1]	Age	Approximate Station References[2]	Brief Description
Bedrock Formations			
Vaqueros/Sespe Formation (Tvs) Marine and non-marine sedimentary rocks	Early Miocene, Oligocene and Late Eocene (17 to 40 mya)	SR-91 OC 450+00 to 480+00 SR-91 RC 35+00 to 40+00	Sandstone and sandy siltstone; conglomeratic sandstone and clayey, silty sandstone
Santiago Formation (Tsa) Marine and non-marine sedimentary rocks	Middle Eocene (45 to 50 mya)	SR-91 OC 480+00 to 505+00 SR-91 RC 24+00 to 35+00	Sandstone and conglomerate
Silverado Formation (Tsi) Marine and non-marine sedimentary rocks	Paleocene (55 to 65 mya)	SR-91 OC 505+00 to 520+00 SR-91 RC 20+00 to 24+00	Sandstone, siltstone and conglomerate
Holz Shale Member (Ladd Formation) (Klhs) Marine sedimentary rocks	Late Cretaceous (65 to 100 mya)	In Mindeman Landslide Complex SR-91 RC 13+00 to 18+00	Sandstone, siltstone and shale
Baker Canyon Conglomerate Member (Ladd Formation) (Klbc) Marine sedimentary rocks, locally non-marine	Late Cretaceous (65 to 100 mya)	SR-91 OC 520+00 to 560+00	Conglomerate and conglomeratic sandstone
Santiago Peak Volcanics (Ksv, Kvsp, Kvspi) Volcanic intrusives and flows	Cretaceous (100 to 141 mya)	In Mindeman Landslide Complex SR-91 OC 560+00 to SR-91 RC 13+00	Basalt, andesite, dacite and rhyolite
Plutonic Rocks Cajalco Pluton (Kcg) Intrusive granitic rocks	Cretaceous (100 to 141 mya)	SR-91 RC 400+00 to 460+00 500+00 to 540+00	Monzogranite
Plutonic Rocks Cajalco Pluton (Kcg, Kmp) Intrusive Granitic Rocks	Cretaceous (100 to 141 mya)	I-15 RC 2250+00 to 2210+00	Granite with micro pegmatite to monzogranite
Santiago Peak Volcanics (Kvspi) Volcanic intrusives and flows	Cretaceous (100 to 141 mya)	I-15 RC 2090+00 to 2060+00	Basalt, andesite, dacite and rhyolite
Topanga Formation (Tt) Marine sedimentary rocks	Middle Miocene (45 to 50 mya)	I-15 RC 1990+00 to 1960+00	Sandstone, siltstone and shale
Surface Geologic Units			
Old Alluvial Deposits (Qof, Qov, Qof3, Qvoa, Qvof, Qvof1) Mostly well-dissected and terrace deposits elevated above floodplains	Pleistocene (0.1 to 1.8 mya)	SR-91 RC 40+00 to 75+00 110+00 to 175+00 180+00 to 260+00 460+00 to 500+00 540+00 to 620+00 I-15 RC 2280+00 to 2230+00 2040+00 to 1950+00	Well-indurated alluvial fan deposits, predominantly sand and gravel

Table 3.11.1 Bedrock Formations and Surface Geologic Units Along the Project Segments of SR-91 and I-15

Formation / (Symbol) / Origin[1]	Age	Approximate Station References[2]	Brief Description
Alluvial Deposits (Qya, Qyf, Qyf1) Fluvial deposits along canyon floors and floodplains	Holocene and Late Pleistocene (0.0 to 0.1 mya)	SR-91 RC 0+00 to 6+00 75+00 to 110+00 175+00 to 180+00 260+00 to 400+00 I-15 RC 2210+00 to 2040+00 1950+00 to 1920+00	Unconsolidated sand, silt, and clay
Landslide Deposits, Older (Qlso) Usually large landslides that display subdued evidence of recent movement	Pleistocene (0.1 to 1.0 mya)	SR-91 OC 549+00 to 577+00 SR-91 RC 0+00 to 19+00	Highly fragmented to coherent landslide deposits comprised of all bedrock types: Mindeman Landslide
Landslide Deposits (Qls) Landslides that display headscarps, fissures and hummocky topography suggesting recent movement	Holocene and Late Pleistocene (0.0 to 0.1 mya)	Intermittent SR-91 OC 542+00 to 577+00 SR-91 RC 0+00 to 34+00	Highly fragmented landslide deposits and debris flows comprised of all bedrock types
Artificial Fill (Af) Fill placed by mechanical means at roadway alignments and structures	Latest Holocene (0 to 150 years)	Present at structures within study area and elevated roadways	Varies

Source: *Updated Preliminary Geotechnical Design Report* (July 2010).
[1] The locations of these formations are shown on Figure 3.11-1.
[2] Station numbering is used on design plans; refer to Figure 3.11-1 for the locations of these formations.
I-15 = Interstate 15
mya = million years ago
OC = Orange County
RC = Riverside County
SR-91 = State Route 91

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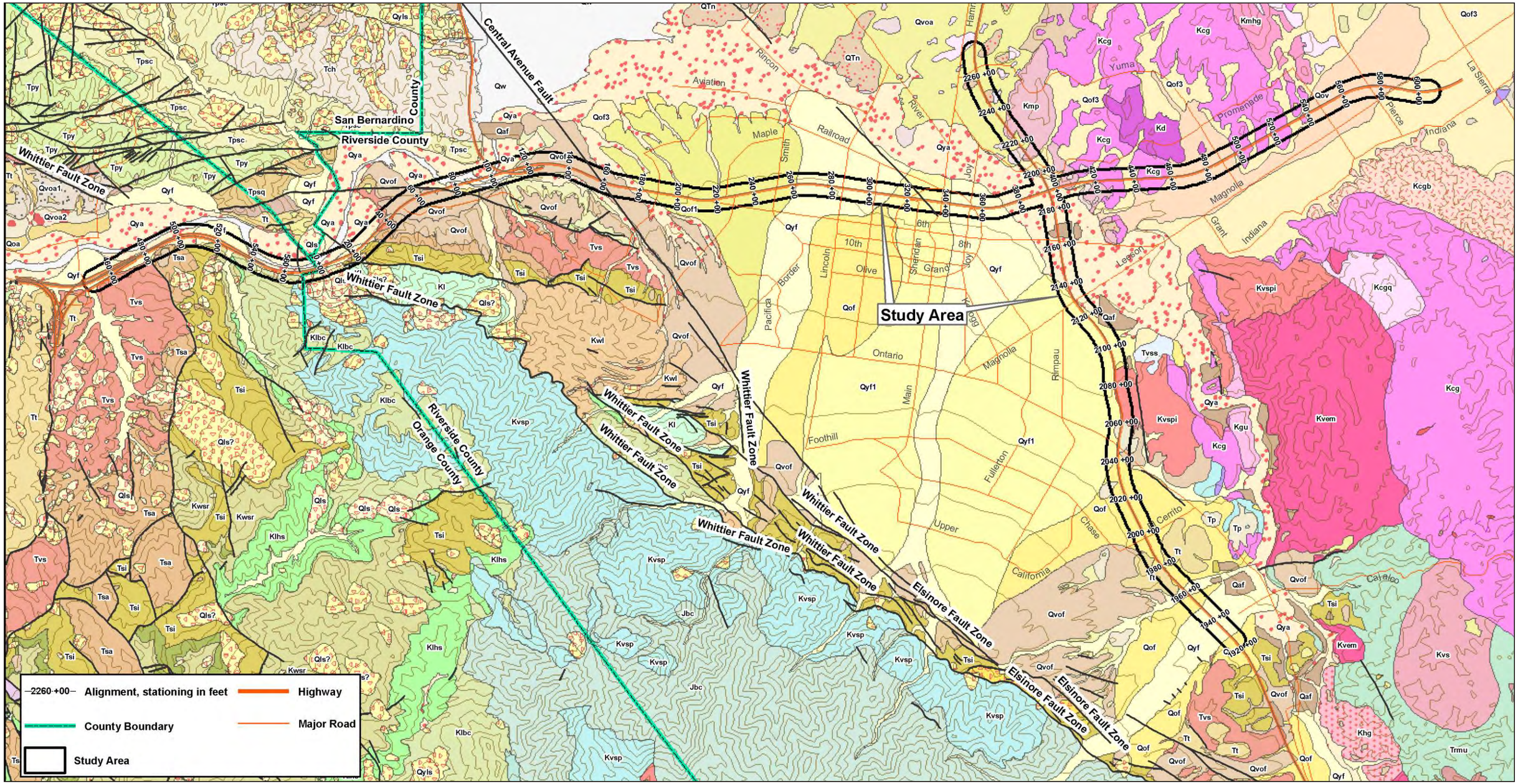

FIGURE 3.11-1

0 3000 6000
FEET

SOURCE: *Updated Preliminary Geotechnical Design Report* (2010)

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SR-91 Corridor Improvement Project
Regional Geologic Map
Ora-91-R14.43/R.18.19
Riv-91-R.0.00//R13.04
Riv-15-35.64/45.14
EA# 0F540

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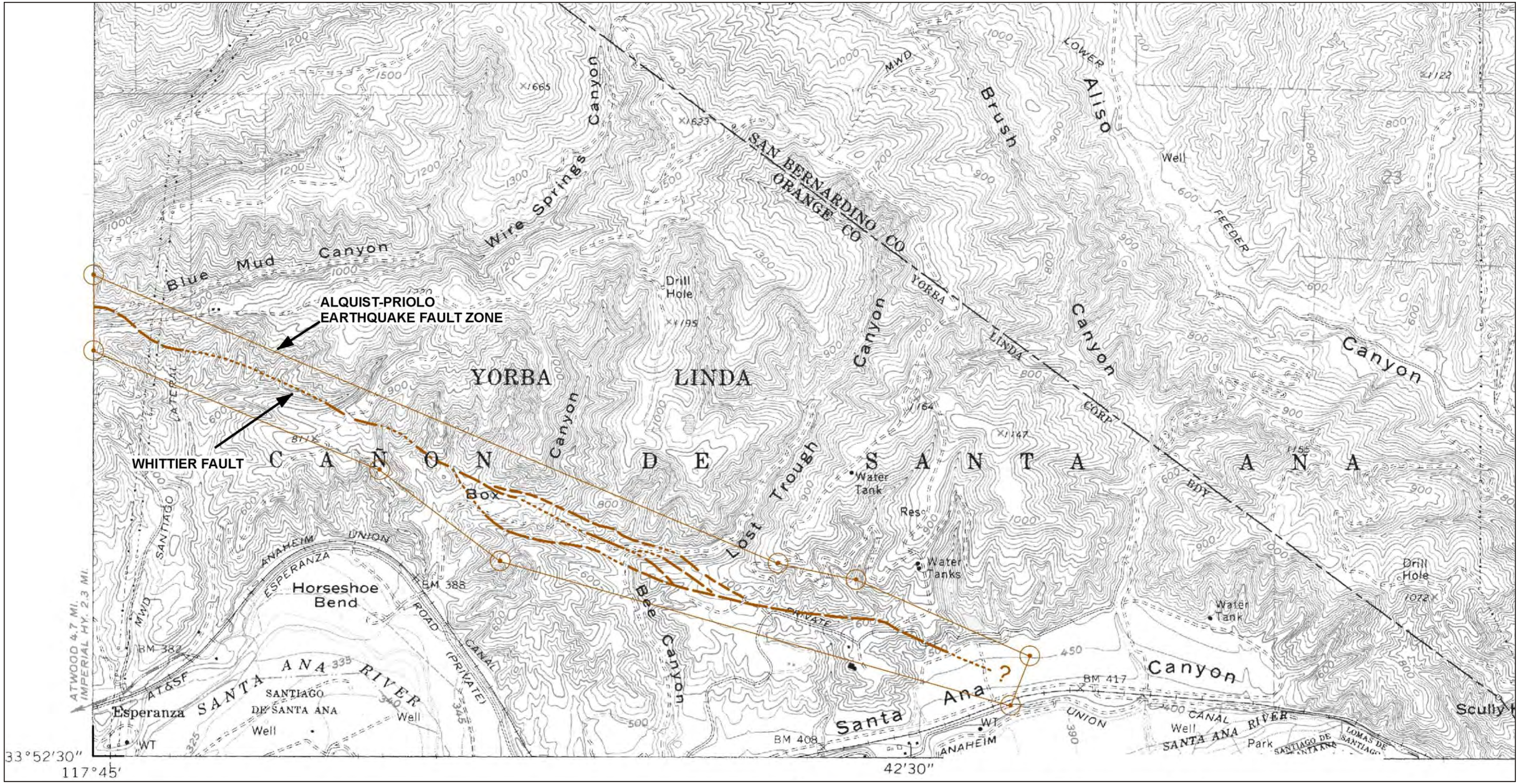

FIGURE 3.11-2
Sheet 1 of 4

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SOURCE: *Updated Preliminary Geotechnical Design Report* (2010), REFERENCE: Prado Dam Quadrangle, A.P. Fault Zone Map (2003)

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SR-91 Corridor Improvement Project
Earthquake Fault Zone Map
Ora-91-R14.43/R.18.19
Riv-91-R.0.00//R13.04
Riv-15-35.64/45.14
EA# 0F540

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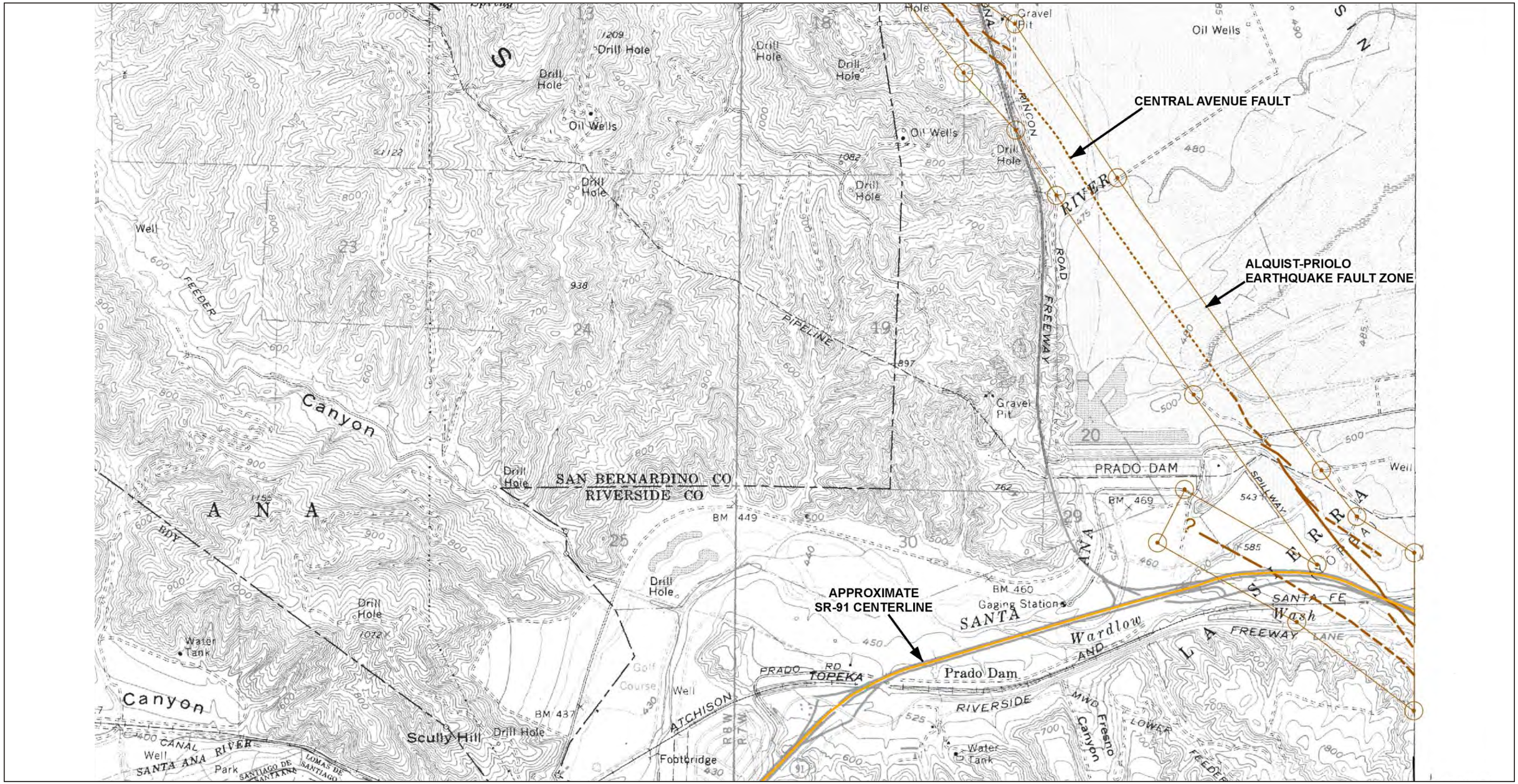

FIGURE 3.11-2
Sheet 2 of 4

SR-91 Corridor Improvement Project
Earthquake Fault Zone Map
Ora-91-R14.43/R.18.19
Riv-91-R.0.00//R13.04
Riv-15-35.64/45.14
EA# 0F540

SOURCE: *Updated Preliminary Geotechnical Design Report* (2010), REFERENCE: Prado Dam Quadrangle, A.P. Fault Zone Map (2003)

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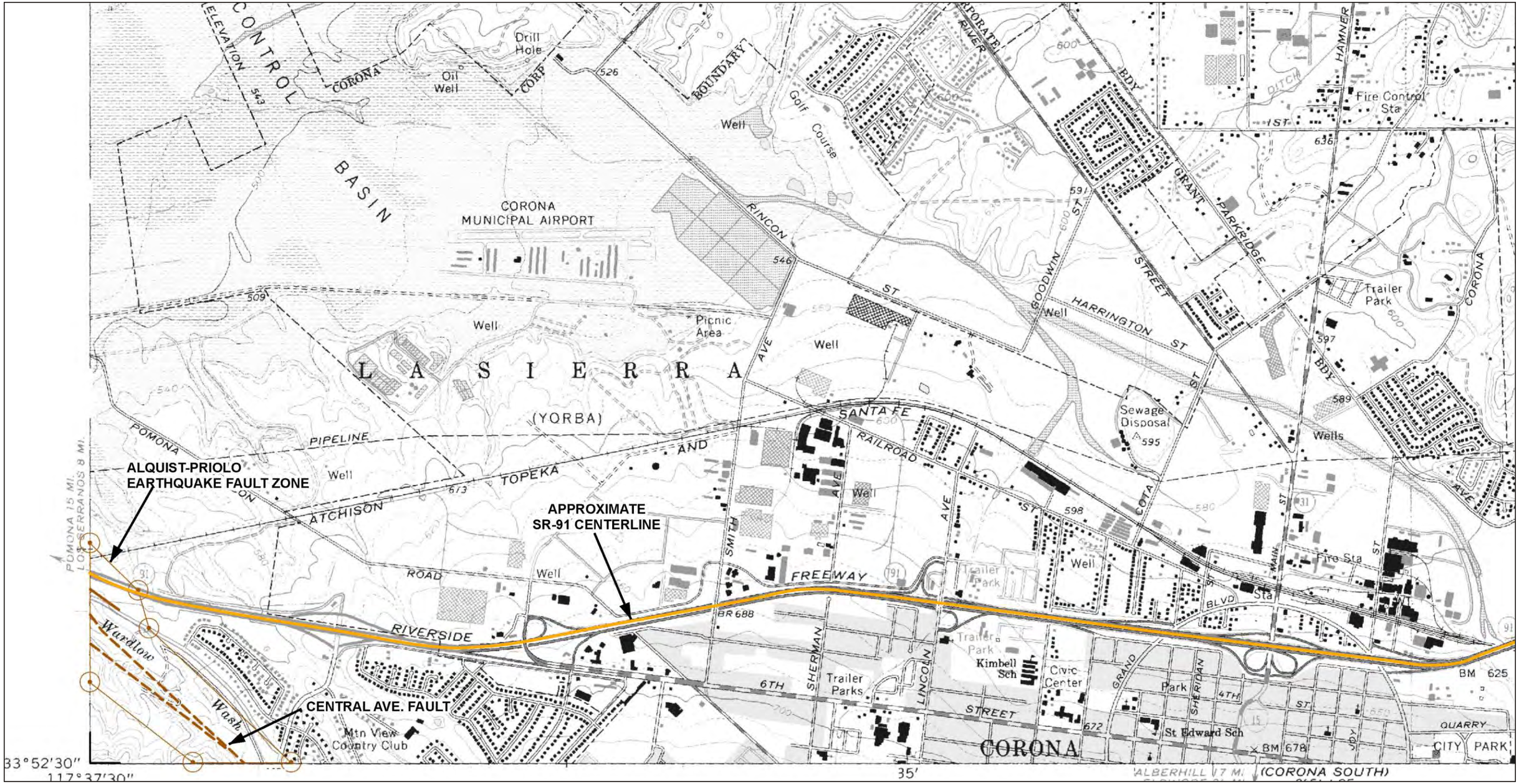

FIGURE 3.11-2
Sheet 3 of 4

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SOURCE: *Updated Preliminary Geotechnical Design Report* (2010), REFERENCE: Prado Dam Quadrangle, A.P. Fault Zone Map (2003)

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SR-91 Corridor Improvement Project
Earthquake Fault Zone Map
Ora-91-R14.43/R.18.19
Riv-91-R.0.00//R13.04
Riv-15-35.64/45.14
EA# 0F540

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FIGURE 3.11-2
Sheet 4 of 4

SR-91 Corridor Improvement Project
Earthquake Fault Zone Map
Ora-91-R14.43/R.18.19
Riv-91-R.0.00//R13.04
Riv-15-35.64/45.14
EA# 0F540

SOURCE: *Updated Preliminary Geotechnical Design Report* (2010), REFERENCE: Prado Dam Quadrangle, A.P. Fault Zone Map (2003)

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The last major rupture of the San Andreas fault in the vicinity of the study area was a magnitude 7.8 event on January 9, 1857.

The Elsinore fault forms the eastern boundary of the Santa Ana Mountains. At the northern end of the Santa Ana Mountains, the Elsinore fault splits into two segments: the Chino-Central Avenue fault, which forms the eastern boundary of the Chino Hills; and the Whittier fault, which passes through Santa Ana Canyon and continues as the northern boundary of the Santa Ana Mountains. The Elsinore fault is approximately 115 mi long, and the geologic slip rate is estimated to be about 0.16 in/yr. The maximum probable magnitude of an earthquake on the Elsinore fault is estimated to be 7.6 M_{max}. The recurrence interval for earthquakes on the Elsinore fault is estimated to be roughly 250 years. There has only been one major earthquake on the Elsinore fault during historical times—a magnitude 6 near Temescal Valley in 1910 that produced no known surface rupture.

The Whittier fault is part of the Elsinore fault zone and forms part of the northern boundary of the Santa Ana Mountains. The Whittier fault is a right-lateral, strike-slip fault that is approximately 25 mi long. The average slip rate is estimated to be between 0.04 and 0.20 in/yr. The maximum probable magnitude of an earthquake on the Whittier fault is 7.6 M_{max}. The recurrence interval for earthquakes on the Whittier fault is unknown.

The Whittier fault is thought to be related to the fault that caused the Whittier Narrows earthquake, which occurred on October 1, 1987, and caused eight deaths and $358 million in property damage. The Whittier fault crosses SR-91 near the Orange County/Riverside County line. That area is not included in a Special Studies Zone (Alquist-Priolo earthquake fault zone) because the fault trace is covered by alluvium and landslide debris and, therefore, is not considered to be well defined. The Whittier segment or the Glen Ivy segment of the Elsinore fault may generate an earthquake having an estimated maximum magnitude of 7.6 M_{max} on the project site.

The Chino-Central Avenue fault is part of the Elsinore fault zone and forms the eastern boundary of the Chino Hills. The Chino-Central Avenue fault is a reverse fault. The Chino-Central Avenue fault is approximately 17 mi long, and the average long-term geologic slip rate is estimated to be between less than 0.04 to 0.08 in/yr. The maximum probable magnitude of an earthquake generated by the Chino-Central Avenue fault is 7.6 M_{max}. The recurrence interval of earthquakes on the Chino-Central Avenue fault is unknown. The Chino-Central Avenue fault crosses SR-91 in

Corona at the Prado Overhead bridge. This fault is within a mapped earthquake fault zone boundary.

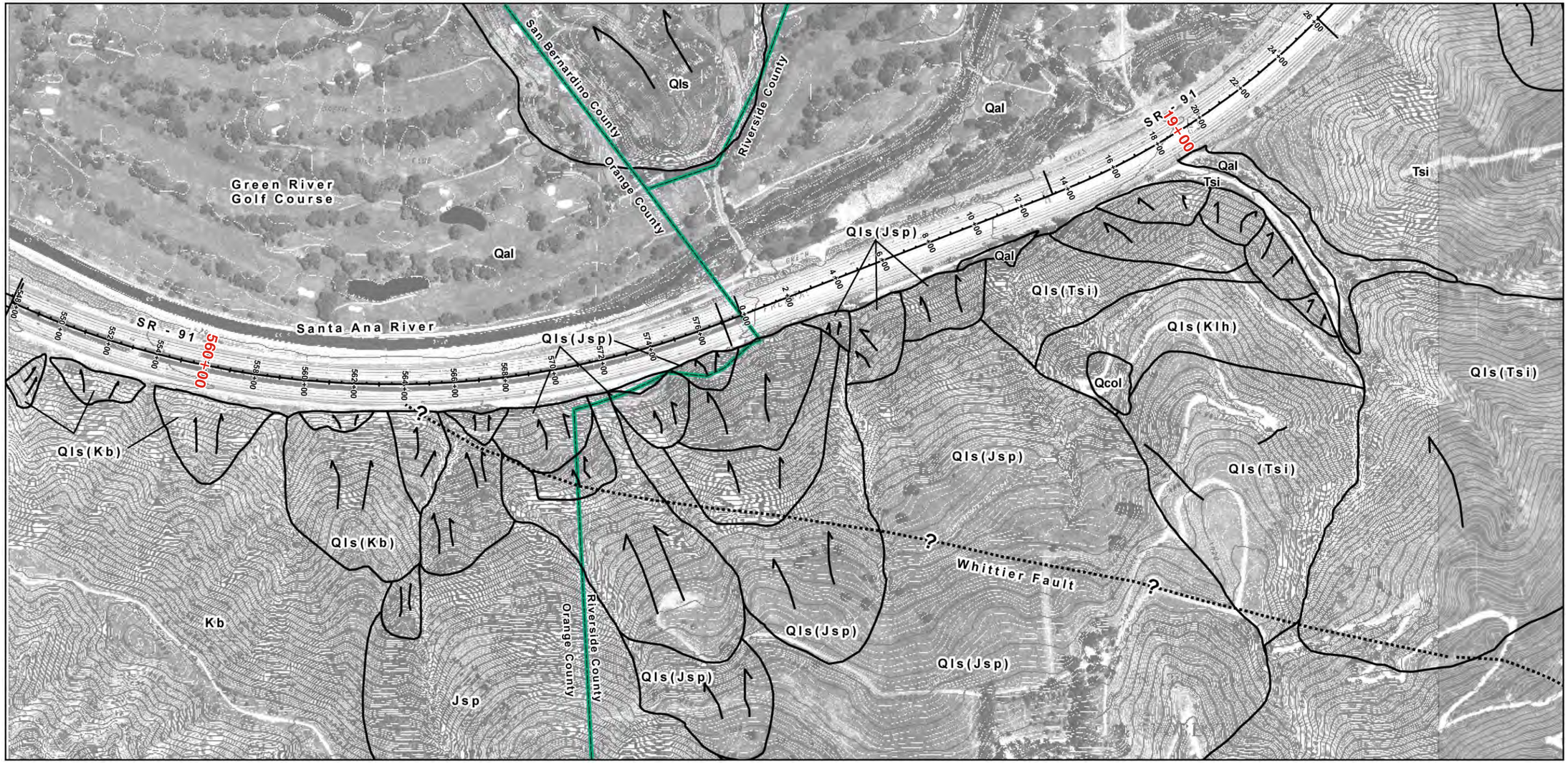
3.11.2.4 Landslides

Landslides are rock, earth, or debris flows on slopes due to gravity. Landslides constitute a major geologic hazard because they are widespread and can cause substantial damage to life and property. The expansion of urban and recreation uses into hillside areas leads to more people being potentially threatened by landslides each year. Although landslides commonly occur in connection with other major natural disasters such as earthquakes, volcanoes, wildfires, and floods, they can occur on any terrain given the right conditions of soil, moisture, and angle or slope. Steep bare slopes, clay-rich rock, deposits of stream or river sediment, and heavy rains can also contribute to landslides.

Landslide deposits are present along the steep slopes adjacent to the south side of SR-91 from approximately Coal Canyon Road to approximately 0.25 mi west of Green River Road. A major large landslide complex, commonly referred to as the Mindeman Landslide or the Green River Landslide, is present on the south side of SR-91 between approximately Station 560+00 in Orange County to approximately Station 19+00 in Riverside County as shown on Figure 3.11-3. The body of the landslide debris extends upslope from SR-91 at El. 442 ft to the top of the landslide mass at El. 1,100 ft. The top part of the landslide continues up slope from the main body of the landslide to a maximum El. 1,900 ft.

3.11.2.5 Liquefaction, Lateral Spreading, and Seismic Compaction

Soil liquefaction occurs when saturated, loose soils lose their strength due to excess water in the soils. The space between the soil particles is completely filled with water, which exerts pressure on the soil particles thereby influencing how tightly the soil particles are pressed together. Prior to an earthquake, the water pressure is relatively low. However, the shaking caused by an earthquake can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. When liquefaction occurs, the strength of the soil decreases and the ability of the soil to support building and bridge foundations is reduced. The potential impacts of liquefaction may include settlement of the ground surface, additional forces pushing down on foundation piles as a result of soil settlement above the liquefied layers, and reduction of the shear strength of the liquefied soil, resulting in reduced load-carrying capacity. Liquefied soils can also exert pressure on retaining walls, which can cause them to tilt or slide.



Qal	Quaternary alluvium	Qls(Kb)	Landslide in Ladd Formation, Baker Conglomerate
Qcol	Quaternary colluvium	Qls(Jsp)	Landslide in Santiago Peak Volcanics
Qls	Quaternary landslide	Tsi	Tertiary Silverado Formation
Qls(Tsi)	Landslide in Tertiary Silverado Formation	Kb	Cretaceous Ladd Formation, Baker Conglomerate
Qls(Klh)	Cretaceous Ladd Formation, Holz Shale Member	Jsp	Jurassic Santiago Peak Volcanics

+2200+00+ Alignment, stationing in feet

Contact

Fault, approximately located

Fault, concealed, queried where location questionable

Landslide arrows showing direction of movement

County boundary

FIGURE 3.11-3

N

0 250 500
FEET

Mindeman Landslide: On the south side of SR-91 between approximately Station **560+00** in Orange County and Station **19+00** in Riverside County.

SOURCE: *Updated Preliminary Geotechnical Design Report* (2010)

State Route 91 Corridor Improvement Project

Mindeman Landslide

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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The primary factors affecting the possibility of liquefaction in a soil deposit are the intensity and duration of the earthquake shaking, the soil type, the relative density of that soil, the pressures of material above that soil, and the depth to groundwater. Soils most susceptible to liquefaction are clean, loose, uniformly graded, fine-grained sands, nonplastic silts that are saturated, and silty sands.

The potential for liquefaction along the project segments of SR-91 and I-15 is anticipated in areas of shallow groundwater and loose granular soils. According to an Environmental Hazards Map prepared by the County of Riverside (2008), areas in Riverside County designated as having high liquefaction susceptibility include the SR-91/I-15 interchange, I-15 north of that interchange in the vicinity of Corona Avenue and Hidden Valley Parkway, and SR-91 east of that interchange in the vicinity of McKinley, Buchanan, and Pierce Streets. According to a Seismic Hazard Zones map prepared by the CGS for the Black Star Canyon Quadrangle, the segment of SR-91 in Orange County between SR-241 and the Orange/Riverside County line is also in a liquefaction hazard zone.

The potential for lateral spreading is not anticipated due to relatively flat topography in areas of shallow groundwater, except along SR-91 in the vicinity of the Orange/Riverside County line where the freeway parallels the Santa Ana River.

Seismic compaction is a phenomenon in which loose, unsaturated sands tend to settle or densify during strong seismic shaking. Sediments that are sufficiently loose can experience seismic compaction, which can cause ground surface settlement and damage to surface and near-surface structures. The potential for seismic compaction is anticipated in areas of shallow groundwater and loose granular soils along the project segments of SR-91 and I-15.

3.11.2.6 Water

Surface and groundwater are discussed briefly in this section as they relate to potential geological/geotechnical conditions such as scour and liquefaction. Detailed discussions of surface water and groundwater are provided in Section 3.9, Hydrology and Floodplains, and Section 3.10, Water Quality and Storm Water Runoff.

Surface Water

The majority of the project alignments of SR-91 and I-15 is not adjacent to an unlined drainage or river channel. However, the Santa Ana River closely parallels the north side of SR-91 near the Orange/Riverside County line, and some retaining walls may be required in this area. Erosion or degradation may occur when moving water lifts

and rolls or carries sand and rocks (streambed material) in the streamflow direction. This condition, called scour, may be a potential project constraint for retaining walls close to the Santa Ana River.

Groundwater

The depth to groundwater along the project segments of SR-91 and I-15 varies from approximately 10 ft to greater than 110 ft bgs. During construction of the existing bridges along the project segments of SR-91 and I-15, groundwater was encountered as shallow as approximately 11 ft bgs at the SR-91 Promenade Avenue Overcrossing to as deep as approximately 110 ft bgs at the I-15/Ontario Avenue Overcrossing.

Groundwater depths in the area of the I-15/Ontario Avenue Overcrossing and the I-15/El Cerrito Road Overcrossing are 50 and 30 ft bgs, respectively. In general, areas with historic depths to groundwater less than 50 ft bgs are along SR-91 in Santa Ana Canyon to approximately Station 160+00 in the City of Corona, near the I-15/SR-91 interchange, and in the vicinity of Pierce Street.

Groundwater levels are subject to seasonal fluctuations and may vary over time. Locally perched groundwater or surface water may also occur during or following periods of intense rainfall.

3.11.2.7 Corrosive Soils

Caltrans Corrosion Guidelines Section 5.5 states that the Department considers a site to be corrosive if one or more of the following conditions exist for soil and/or water samples taken from the site:

- Chloride concentration is greater than or equal to 500 parts per million (ppm)
- Sulfate concentration is greater than or equal to 2,000 ppm
- Percentage of hydrogen (pH) is 5.5 or less

Based on laboratory test results from the *Preliminary Geotechnical Information Report for the Eastbound SR-91 Lane Addition from SR-241 to SR-71* (April 2007), the soils tested along the eastbound side of SR-91 in the vicinity of the Orange/ Riverside County line may generally be considered noncorrosive with respect to the Department guidelines. The corrosion potential of the soils along the remainder of the project segments of SR-91 and I-15 is currently unknown.

3.11.3 Environmental Consequences

3.11.3.1 Summary of Impacts

The Initial Phases and Ultimate Projects under Alternatives 1 and 2 would permanently result in or be affected by the following geotechnical conditions:

- Ground motion, liquefaction, fault rupture, and other effects related to seismic activity
- Implementation of retaining walls for slope stability
- Erosion of slopes
- Permanent 2.25 ac subsurface easement in the NNL adjacent to SR-91 for engineered tiebacks for a wall along SR-91 (the tiebacks are not needed for the Initial Phases of Alternatives 1 and 2)
- Permanent subsurface easement (1.65 ac for the Alternative 1 Ultimate Project and 1.88 ac for the Alternative 2 Ultimate Project) in CHSP on the south side of SR-91 for engineered tiebacks for a wall along SR-91 (the tiebacks are not needed for the Initial Phases of Alternatives 1 and 2)
- Potential for erosion if unpaved areas are not properly landscaped and maintained

The construction of the Initial Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations would temporarily result in or be affected by the following geotechnical conditions:

- Increased potential for soil erosion in areas of disturbed soil
- Ground motion, liquefaction, fault rupture, and other effects related to seismic activity
- Potential need for blasting in areas with non-rippable (i.e., difficult to excavate) granitic bedrock

The phasing plans for the Build Alternatives, described earlier in Chapter 2, Project Alternatives, would result in the improvements in those alternatives being constructed in phases, starting with the Initial Phases in 2015 and ending with the completion of all the project components by 2035. The phasing of the improvements under Alternatives 1 and 2 would result in similar impacts to those alternatives related to geology, soils, seismic issues, and topography compared to the impacts of implementing Alternatives 1 and 2 without the phasing plans.

Summary of Impacts of Alternative 2f

Alternative 2f has been identified as the Preferred Alternative. Alternative 2f (Initial Phase and Ultimate Project) would result in the same permanent and temporary impacts associated with geotechnical conditions described above for Alternatives 1 and 2.

The construction of Alternative 2f (Initial Phase and Ultimate Project) could be temporarily affected by the increased potential for soil erosion in areas of disturbed soil, ground motion, liquefaction, fault rupture, and other effects related to seismic activity and would potentially have the need for blasting in areas with non-rippable (i.e., difficult to excavate) granitic bedrock, similar to the conditions described above for Alternatives 1 and 2.

As with the other Build Alternatives, implementation of safe construction practices and compliance with the Department and California Division of Occupational Safety and Health Administration (Cal-OSHA) requirements would minimize impacts to worker safety during construction of the Alternative 2f Initial Phase and Ultimate Project.

The primary geologic and geotechnical constraints potentially affecting the design of, and facilities in, Alternative 2f (Initial Phase and Ultimate Project) are the same as those listed above for Alternatives 1 and 2.

3.11.3.2 Permanent Impacts

Alternatives 1 and 2

The Initial Phases and Ultimate Projects under Alternatives 1 and 2 would alter existing landforms due to grading and cut-and-fill slopes. Those impacts would not be substantial because grading would be limited and retaining walls would be used in many locations to minimize cut and fill. The road, structures, slopes, and other features of the Build Alternatives could be impacted by ground motion and liquefaction and possibly ground surface rupture during seismic events. The primary geologic and geotechnical constraints potentially affecting the design of, and facilities in, the Initial Phases and Ultimate Projects under Alternatives 1 and 2 are:

- Moderate to high ground accelerations due to the presence of nearby active faults, including the Elsinore (Whittier segment), Chino-Central Avenue, Elsinore (Glen Ivy segment), Puente Hills Blind Thrust, San Andreas, and San Jacinto faults.
- Fault rupture associated with the Whittier and Chino-Central Avenue faults.

- Liquefaction and seismic compaction in areas of shallow groundwater and loose granular soils.
- Slope stability in areas of ancient landslides, steep natural terrain, and cut slopes.
- Erosion and surface instability in hillside areas and areas adjacent to the Santa Ana River floodplain.
- Non-rippable granitic bedrock along SR-91 from I-15 to approximately Pierce Street.
- Possibly corrosive soils along westbound SR-91 in the vicinity of the Orange/Riverside County line and along I-15.
- Permanent subsurface easement in the NNL for underground tiebacks for the tieback wall along SR-91 (the tiebacks are not needed for the Initial Phases of Alternatives 1 and 2).
- Permanent subsurface easement (1.65 ac for the Alternative 1 Ultimate Project and 1.88 ac for the Alternative 2 Ultimate Project) in CHSP on the south side of SR-91 for engineered tiebacks for a wall along SR-91 (the tiebacks are not needed for the Initial Phases of Alternatives 1 and 2).

Faulting/Seismicity

Moderate to severe seismic shaking is likely to occur in the study area during the life of the improvements under the Initial Phases and Ultimate Projects in Alternatives 1 and 2. The project site is in seismically active southern California and within the influence area of several fault systems that are considered active. In general, the project facilities can be designed to accommodate the expected ground accelerations through compliance with applicable building and seismic codes. As a result, the potential for structural damage can be substantially reduced or avoided through seismic engineering design.

Landslides and Cut-and-Fill Slopes

No permanent, large cut slopes would be required for the improvements under the Initial Phases and Ultimate Projects in Alternatives 1 and 2. Areas where the widening would encroach into existing slopes would be accommodated by the new retaining walls.

Under the Initial Phases and Ultimate Projects in Alternatives 1 and 2, if construction of the retaining walls were to occur on the south side of SR-91 in the vicinity of the Orange/Riverside County line and the existing Mindeman Landslide, local slope failure could occur as a result of cutting into the toe of existing landslides. The widening of SR-91 in this location would place fills and/or new retaining walls and

the new lanes on the north side of the existing freeway only. No excavation into the existing landslide areas would occur as part of the Initial Phases and Ultimate Projects in Alternatives 1 and 2.

Retaining walls are anticipated to be required at the abutments below several overcrossings to ensure slope stability for the Initial Phases and Ultimate Projects in Alternatives 1 and 2. In addition, new embankments and fill slopes will be required in various areas along the project segments of SR-91 and I-15. The embankments and fills may have slopes constructed at 2:1 horizontal to vertical (H:V) slope gradients. Embankment slopes may be designed at a gradient steeper than 2:1 H:V using soils reinforcement or engineered buttresses.

The soil and rock material excavated (cut) during construction of the Initial Phases and Ultimate Projects in Alternatives 1 and 2 would be used as fill elsewhere in the project construction. The amounts of excavated material anticipated to be used as fill in the project construction for the Alternative 1 and 2 Ultimate Projects are summarized in Table 3.11.2. In addition to these amounts, soil material would be imported to the project site in areas needing additional fill material. The amounts of imported fill material anticipated to be used during the construction of the Alternative 1 and 2 Ultimate Projects are also summarized in Table 3.11.2.

Table 3.11.2 Summary of Cut and Fill Amounts

Alternative	Cut Material[1] (cubic yards)	Additional Imported Material (cubic yards)	Total Amount of Fill (cubic yards)
Alternative 1	708,420–761,723	275,467–343,004	1,033,042–1,055,572
Alternative 2	725,719–793,107	644,110–738,946	1,383,898–1,495,443

Source: Riverside County Transportation Commission (2011).

[1] The cut material would be used as fill material elsewhere on the project site during construction of Alternatives 1 and 2.

Erosion

Impacts related to erosion occurring after the completion of construction that may affect the traveling public or the project facilities can be substantially reduced through design and grading techniques. The Initial Phases and Ultimate Projects in Alternatives 1 and 2 would result in potential for erosion and a need for sensitive design and grading techniques to reduce erosion. Refer to Section 3.10, Water Quality and Storm Water Runoff, for additional discussion regarding construction-related water quality issues and mitigation, including BMPs.

Liquefaction and Seismic Compaction

The potential impacts of liquefaction to the project facilities may include settlement of the ground surface, additional downdrag forces on foundation piles as a result of soil settlement above the liquefied layers, and reduction of shear strength of the liquefied soil resulting in reduced load-carrying capacity. Liquefaction below areas of sloping ground may also lead to lateral slope instability (lateral spreading).

The potential for liquefaction along the project segments of SR-91 and I-15 is anticipated in areas of shallow groundwater and loose granular soils under the Initial Phases and Ultimate Projects in Alternatives 1 and 2. According to an Environmental Hazards Map prepared by the County of Riverside (2008), areas of the alignment within Riverside County designated as having high liquefaction susceptibility include the SR-91/I-15 interchange; I-15 north of the interchange in the vicinity of Corona Avenue and Hidden Valley Parkway; SR-91 east of the interchanges in the vicinity of McKinley, Buchanan, and Pierce Streets; and the length of SR-91 in Orange County between SR-241 and the Orange/Riverside County line. Soils in some parts of the study area may also be subject to seismic compaction.

According to a Seismic Hazard Zones map (CGS, previously referred to as the California Division of Mines and Geology [CDMG], 2001) for the *Black Star Canyon* quadrangle, the length of SR-91 in Orange County between SR-241 and the Orange County/Riverside County line is in a liquefaction hazard zone. The potential for lateral spreading is not anticipated to be an issue due to the relatively flat topography in areas of shallow groundwater, except along SR-91 in the vicinity of the Orange County/Riverside County line where the freeway parallels the Santa Ana River. Seismic compaction is a phenomenon in which loose, unsaturated sands tend to settle or densify during strong earthquake shaking. Sediments that are sufficiently loose are subject to such densification, which can cause ground surface settlement and damage to surface and near-surface structures.

Corrosive Soils

Although the corrosive potential of soils along the eastbound side of SR-91 in the vicinity of the Orange/Riverside County line is known and those soils were found to be noncorrosive, the corrosion potential of soils along the remainder of the project segments of SR-91 and I-15 is unknown. Therefore, corrosive soils cannot be ruled out as a potential project constraint. Additional laboratory testing would be required during final design to determine the corrosion potential of soils along those segments of the project alignment not previously tested. Depending on where, if any, corrosive

soils are found, this issue may occur under the Initial Phases and Ultimate Projects in Alternatives 1 and 2.

National Natural Landmarks and Other Geographic and Topographic Features

Under the Ultimate Projects for Alternatives 1 and 2, approximately 2.25 ac of the NNL adjacent to SR-91 would be impacted by a permanent subsurface easement for underground tiebacks for the tieback wall along SR-91. No surface disturbance to the NNL would occur. No impacts to this NNL would occur under the Initial Phases of Alternatives 1 and 2.

Because the *Geotechnical Design Report* did not identify any geologic or topographic features potentially requiring protection adjacent to the project segments of SR-91 and I-15, the Build Alternatives would not result in impacts to those types of resources.

No Build Alternative

Under the No Build Alternative, existing earthquake, seismic, and landslide issues would continue to potentially affect the existing facilities along the project segments of SR-91 and I-15. However, the grading and use of cut-and-fill slopes required for the project would not occur under the No Build Alternative, and the No Build Alternative would not result in any impacts to the NNL.

3.11.3.3 Temporary Impacts

Alternatives 1 and 2

Construction activities may temporarily disturb soil outside the project footprint but within the freeway rights-of-way, primarily in the trample zone around work areas, heavy equipment traffic areas, and material laydown areas. Construction activities in TCEs outside the freeway rights-of-way will also temporarily disturb soils in those areas.

During construction of the Initial Phases and Ultimate Projects in Alternatives 1 and 2, excavated soil would be exposed, and there would be an increased potential for soil erosion compared to existing conditions. Additionally, during a storm event, soil erosion could occur at an accelerated rate. The project will be required to adhere to the requirements of the General Construction Permit and implement erosion and sediment control BMPs specifically identified in a project SWPPP to keep sediment from moving off site into receiving waters. Refer to Section 3.10, Water Quality and

Storm Water Runoff, for additional information regarding construction-related water quality issues and mitigation.

Worker safety hazards resulting from erosion during construction activities would be minimized with the implementation of requirements outlined in the General Construction Permit and erosion and sediment control BMPs identified in the SWPPP.

Construction activities for the Build Alternatives could be impacted by ground motion from seismic activities, possible ground rupture, and liquefaction if an earthquake were to occur during construction. Implementation of safe construction practices and compliance with the Department and Cal-OSHA requirements would minimize the impacts to worker safety during construction activities.

In general, the sedimentary bedrock, younger and older alluvial soils, and artificial fills near the surface along the project segments of SR-91 and I-15 can be excavated using conventional earth-moving equipment. However, non-rippable granitic bedrock may be present in areas where shoulder widening would result in new cut slopes, the construction of retaining walls, and/or the modification of existing cut slopes. Excavation characteristics of bedrock are dependent on the depth of cut, type of excavation equipment used, and rock quality. Alternatives 1 and 2 may require blasting in areas underlain by granitic bedrock, particularly in areas along SR-91 east of the I-15 interchange. Project components for both Build Alternatives in this area require minor widening within existing shoulder areas and the requirement for blasting to accommodate widening is unlikely. However, if during final design it is determined that blasting is required, Measure GEO-3 requires the preparation of a blasting plan that will identify specific requirements such as hours that activities may occur, notification of activities to nearby property owners, and measures to minimize noise, vibration, and dust.

No Build Alternative

Under the No Build Alternative, the temporary impacts discussed above for the Build Alternatives would not occur because there would be no construction of project improvements under this alternative.

3.11.4 Avoidance, Minimization, and/or Mitigation Measures

The following measures would be required for the Initial Phases and Ultimate Projects under the SR-91 CIP Build Alternatives.

GEO-1 A *Preliminary Geotechnical Design Report* (July 2010) was prepared during the development of the preliminary engineering for the project. During final design, RCTC's Project Engineer or a Project Geotechnical Engineer or Project Geologist under contract to RCTC will prepare a *Final Geotechnical Design Report* as required by Topic 113 of the Department's Highway Design Manual (May 2012). This report will document soil-related constraints and hazards such as slope instability, settlement, liquefaction, or related secondary seismic impacts that may be present along the project segments of SR-91 and I-15. The performance standard for this report will be the Department's Geotechnical Manual (2012 or most recent version) standards as they apply to the project features and structures. RCTC will submit the *Final Geotechnical Design Report* to the Department for review and approval during final design.

The report will include but not be limited to:

- Evaluation of expansive soils and recommendations regarding construction procedures and/or design criteria to minimize the effect of these soils on the construction of the project and to minimize effects related to expansive soils on project facilities in the long term.
- Identification of potential liquefiable areas within the project limits and recommendations for mitigation.
- Evaluation of the corrosion potential of soils along those segments of the project alignment not previously tested (i.e., areas along I-15 and the westbound side of SR-91).
- Demonstration that no retaining walls or excavations will occur in the existing landslide areas, or that landslide stabilization measures independent of the retaining wall design are included in the final project design.
- Demonstration that the design of all retaining walls is geotechnically suitable for project area soils, and verification that project design has considered and addressed the possibility of scour associated with the Santa Ana River.
- Demonstration that side slopes can be designed and graded so that surface erosion of the engineered fill is not increased compared to existing, natural conditions.

RCTC's Project Engineer will incorporate the measures recommended in the design level geotechnical report in the final design and project specifications.

RCTC's Resident Engineer will require the design/build contractor to implement the measures recommended in the *Final Geotechnical Design Report* as included in the project specifications.

GEO-2 RCTC's Resident Engineer will maintain a quality assurance/quality control plan during construction. The plan will include observing, monitoring, and testing by the Project Geotechnical Engineer and/or the Project Geologist under contract to RCTC prior to and during construction to confirm that the geotechnical/geologic recommendations from the *Final Geotechnical Design Report* and standard design and construction practices are fulfilled by the design/ build contractor, or if different site conditions are encountered, appropriate changes are made to accommodate such issues. The geotechnical engineer will submit weekly reports to RCTC and the Department during all project-related grading, excavation, and construction activities.

GEO-3 During final design, if blasting is required, RCTC's Project Engineer will require the design/build contractor to prepare a blasting plan to minimize potential hazards related to blasting activities. The blasting plan will address all applicable standards in accordance with the United States Department of the Interior, Office of Surface Mining. The issues to be addressed in the blasting plan will include, but are not limited to, the following: hours of blasting activity, notification to adjacent property owners, noise and vibration, and dust control.

RCTC's Resident Engineer will require the design/build contractor to implement the blasting plan prior to and during any blasting during construction.

Refer also to Section 3.10, Water Quality and Storm Water Runoff, for additional mitigation measures related to soil erosion, including BMPs.

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3.12 Paleontology

3.12.1 Regulatory Setting

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1960 [23 USC 305], and the Omnibus Public Land Management Act of 2009 [16 USC 470aaa]). Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA).

3.12.2 Affected Environment

This section provides a discussion of the existing paleontological setting for the project and an analysis of potential impacts of the project on paleontological resources. This section summarizes information provided in the *Paleontological Resources Identification and Evaluation for SR-91 Corridor Improvement Project Cities of Anaheim, Yorba Linda, Corona, Norco, and Riverside Counties of Orange and Riverside, California* (2010). The study area for this analysis was larger than the Area of Direct Impacts (ADI) by approximately 325 ft on all sides. A paleontological locality search was conducted through the records of the San Bernardino County Museum (SBCM), the Natural History Museum of Los Angeles County (LACM), the Riverside Municipal Museum (RMM), and the University of California, Berkeley Museum of Paleontology (UCMP). There is one known paleontological resource within the project ADI: 07GM7-14, which is located within the Puente Formation.

The project segments of SR-91 and I-15 are located in the northwestern Peninsular Range Province of southern California. This Province is bounded on the north by the Transverse Ranges, on the east by the Colorado Desert, and on the west by the Pacific Ocean (Jahns 1954), and extends south to include the entire Baja California Peninsula. Igneous, metamorphic, and sedimentary rocks are exposed throughout the Province.

This section briefly describes the paleontological sensitivity of rock formations in the study area. Refer to the technical report described above for more detailed descriptions of these rock formations.

Generally, scientifically significant paleontological resources are identified sites or geological deposits containing individual fossils or groups of fossils that are unique or

unusual, diagnostically or stratigraphically important, and add to the existing body of knowledge in specific areas stratigraphically, taxonomically, or regionally. All vertebrate fossils that can be related to a stratigraphic context are paleontologically significant and are considered significant nonrenewable paleontological resources. Invertebrate and plant fossils as well as other environmental indicators associated with vertebrate fossils are also considered paleontologically significant. Certain invertebrate and plant fossils that are regionally rare or uncommon, or help to define stratigraphy, age, or taxonomic relationships are likewise considered paleontologically significant. The technical study includes the results of a paleontological locality search through the SBCM, LACM, RMM, and UCMP, and contains an exhaustive discussion of paleontological significance, paleontological sensitivity, the geology, and structure of the project area, and the stratigraphy and paleontology of rocks that may be impacted by the project.

A pedestrian survey of geological exposures in the study area was conducted to locate surface fossils and confirm the geologic mapping.

A formation or rock unit has paleontological sensitivity or the potential for significant paleontological resources if it has previously produced or has lithologies that could contribute to the preservation of vertebrate fossils and associated or regionally uncommon invertebrate and plant fossils. All sedimentary rocks and certain extrusive volcanic rocks and mildly metamorphosed rocks are considered to have potential for paleontological resources.

The project segments of SR-91 and I-15 pass through the Santa Ana Mountains and a structural feature known as the Perris Block. The Santa Ana Mountains contain exposures of Jurassic to Cretaceous (145 to 65 mya) metamorphic and igneous rocks covered by limited exposures of younger sediments dating from the Cretaceous to the present.

There are 21 formally named sedimentary formations or unnamed sedimentary units in the project study area as well as several exposures of igneous and metamorphic rock. There is one known fossil locality in the study area that contained fossil fish, leaves, and coprolites. This locality is within the Puente Formation. The paleontological sensitivity for the sedimentary or other rock types, either high or low, was determined based on their age and whether fossils have or have not been collected from those units in the past. The ADI, the study area, and the paleontological sensitivities in the project study area are shown in Figure 3.12-1.

ESPERANZA RD
N WEIR CANYON RD
LA PALMA AV
GYPSUM CANYON RD
E SANTA ANA CANYON RD
91
241
Horseshoe Bend
SANTA ANA RIVER
SANTIAGO DE SANTA ANA
CANYON DE SANTA ANA
Featherly Regional Park
FREEWAY
Diversion Dam
Well
Water Tank
Gravel Pit
Coal Pipeline
SANTIAGO

LEGEND

Study Area

Area of Direct Impacts

Paleontological Sensitivities

High Potential

Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

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MAP INDEX

1 2 3 4 5 6 7

FIGURE 3.12-1
Sheet 1 of 7

SR-91 Corridor Improvement Project
Paleontological Sensitivities

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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LEGEND

Study Area

Area of Direct Impacts

Paleontological Sensitivities

High Potential

Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

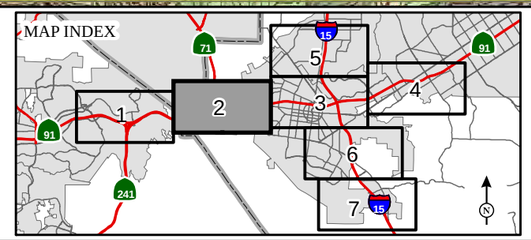

FIGURE 3.12-1
Sheet 2 of 7

SR-91 Corridor Improvement Project
Paleontological Sensitivities

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08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
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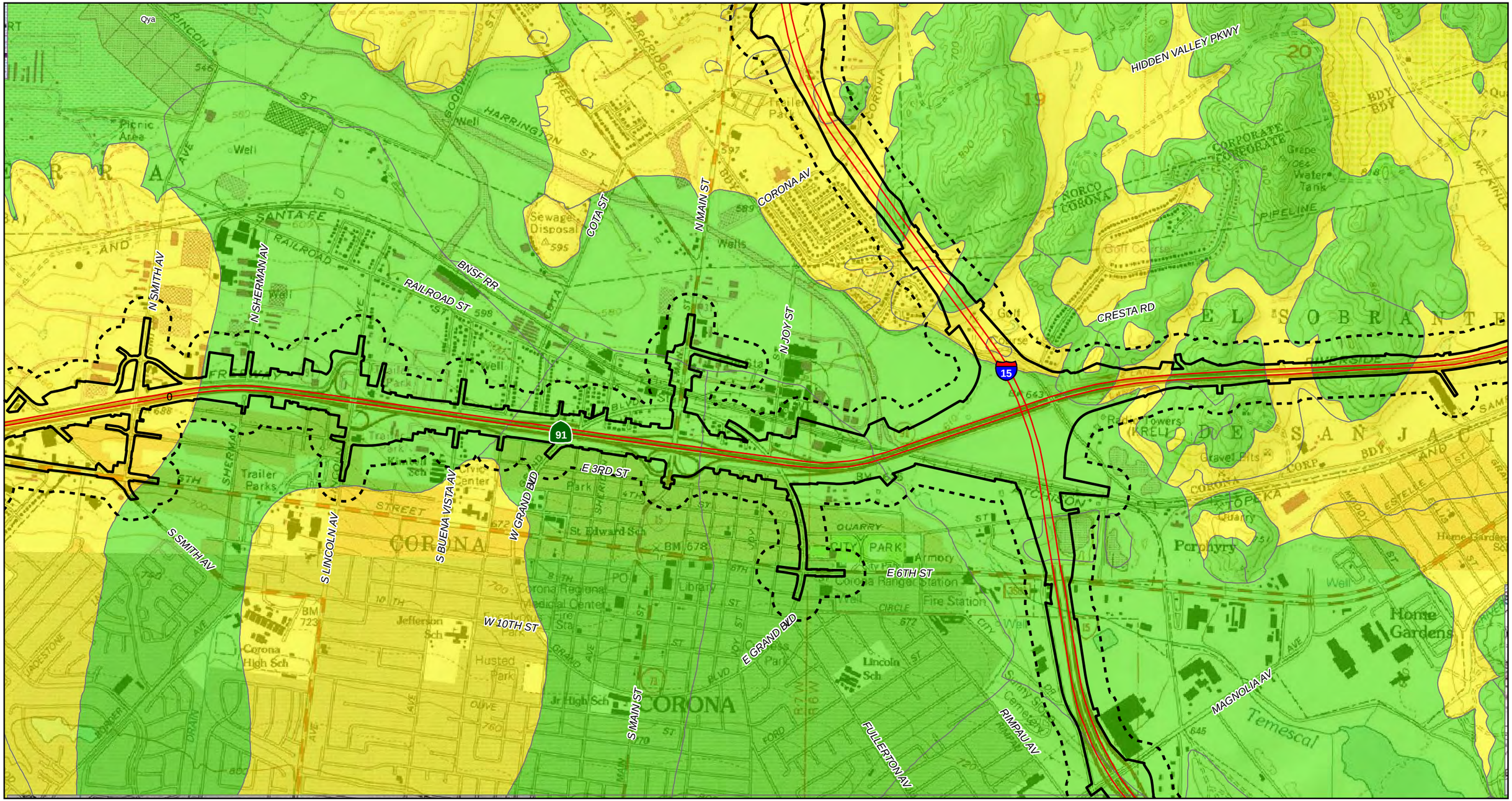

LEGEND

- Study Area
- Area of Direct Impacts

Paleontological Sensitivities

- High Potential
- Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

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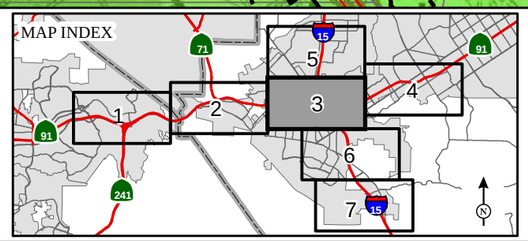

FIGURE 3.12-1
Sheet 3 of 7

SR-91 Corridor Improvement Project
Paleontological Sensitivities

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08-Riv-15-35.64/45.14
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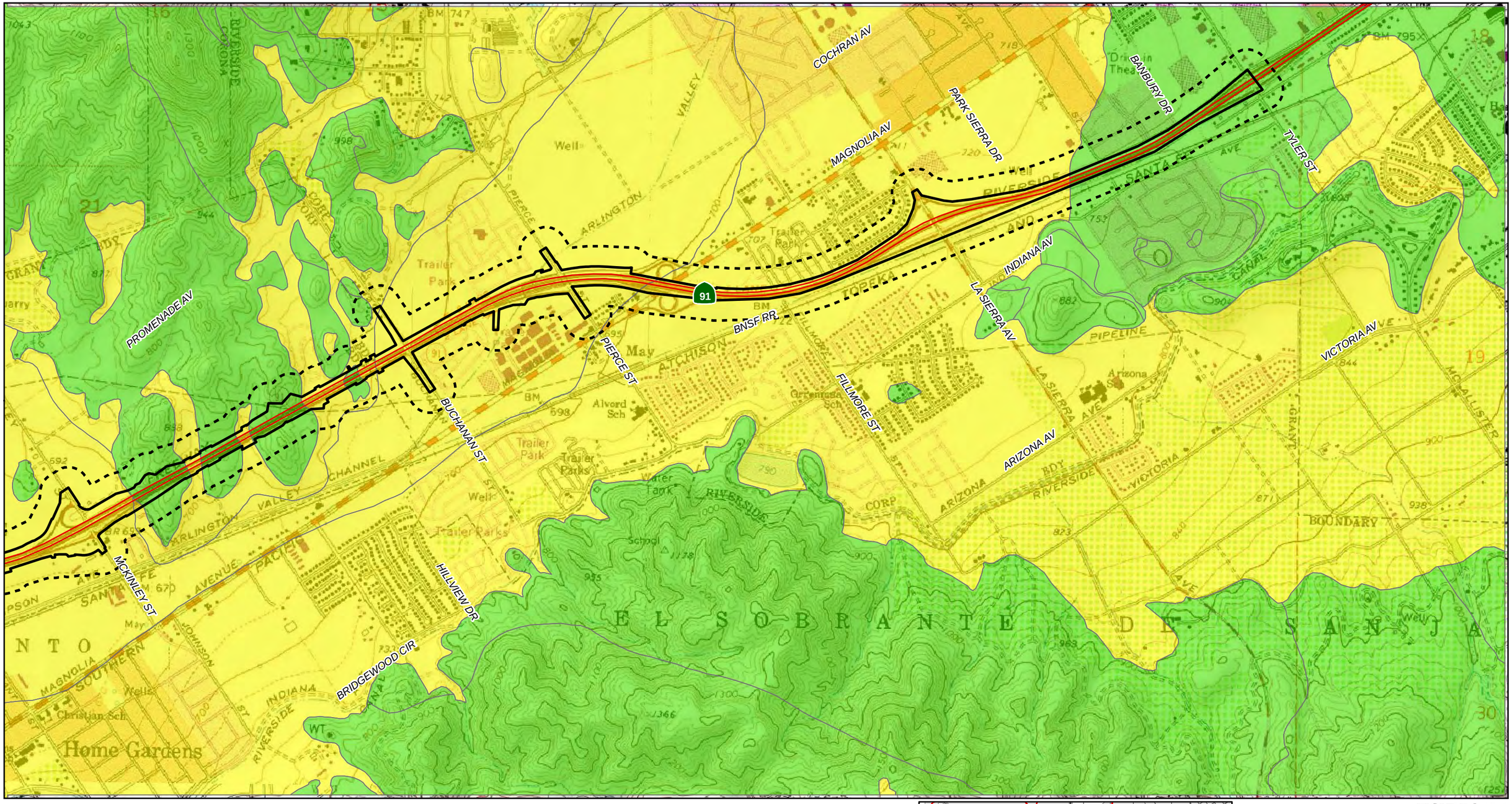

LEGEND

- Study Area
- Area of Direct Impacts

Paleontological Sensitivities

- High Potential
- Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

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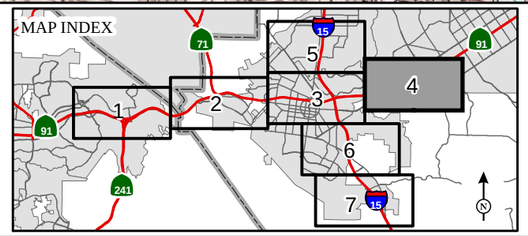

FIGURE 3.12-1
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SR-91 Corridor Improvement Project
Paleontological Sensitivities

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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LEGEND

Study Area

Area of Direct Impacts

Paleontological Sensitivities

High Potential

Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

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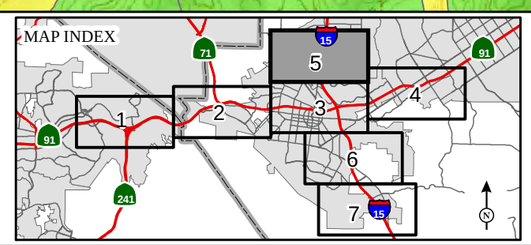

FIGURE 3.12-1
Sheet 5 of 7

SR-91 Corridor Improvement Project
Paleontological Sensitivities

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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LEGEND

- Study Area
- Area of Direct Impacts

Paleontological Sensitivities

- High Potential
- Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

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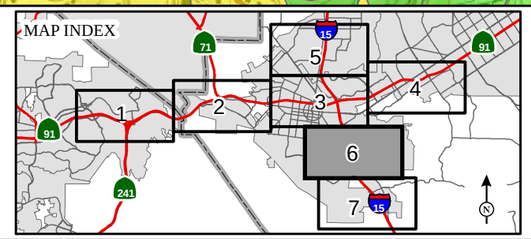

FIGURE 3.12-1
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SR-91 Corridor Improvement Project
Paleontological Sensitivities

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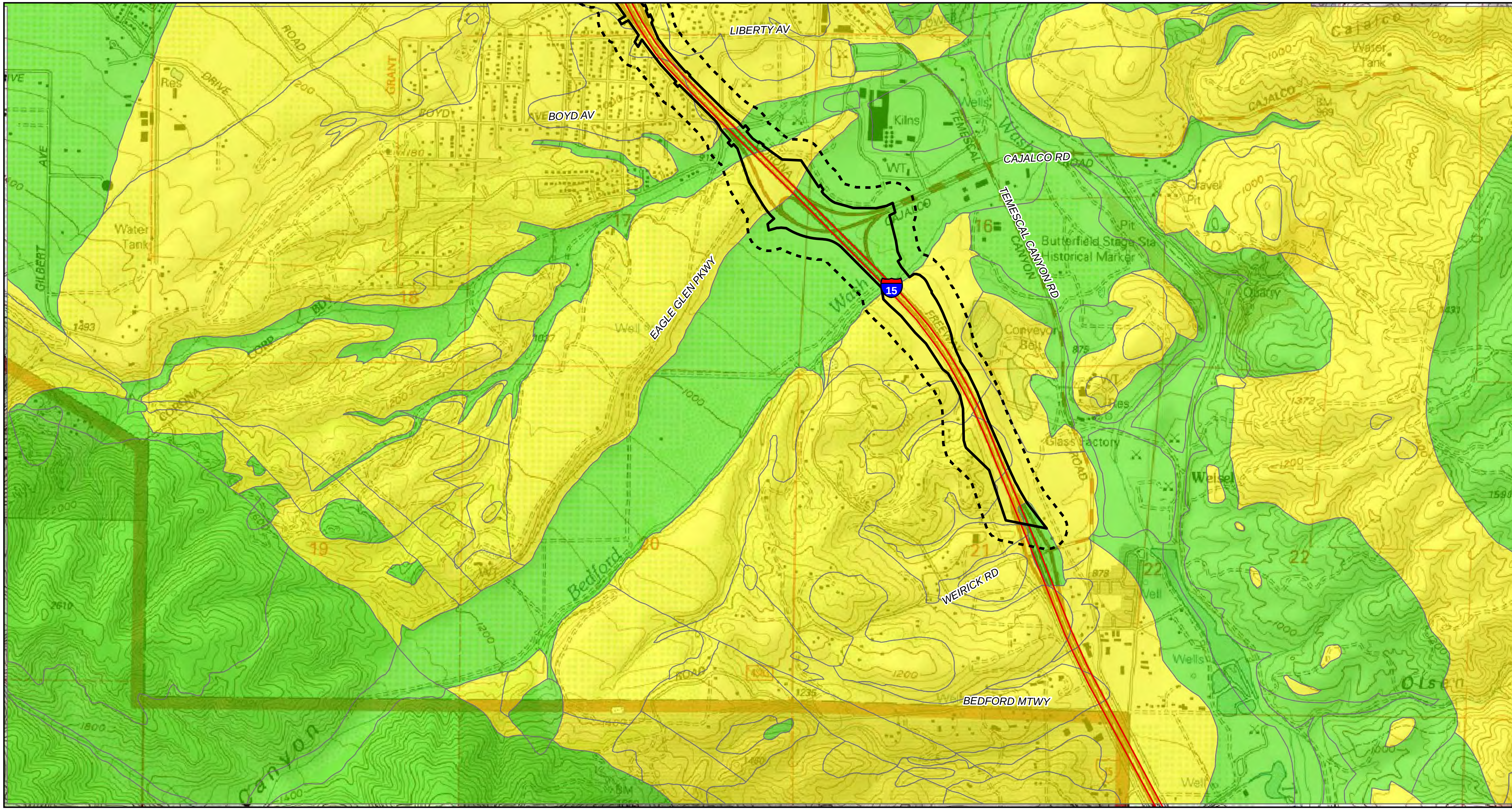

LEGEND

Study Area

Area of Direct Impacts

Paleontological Sensitivities

High Potential

Low Potential

0 750 1,500 Feet

SOURCE: USGS 7.5' Quads: Prado Dam (1981), Corona North (1981), Riverside West (1980), Black Star Canyon (1988), Corona South (1980), Lake Mathews (1988); Thomas Bros. (2008); USGS Geologic Map of the Santa Ana 30' x 60' Quadrangle (2004, Morton).

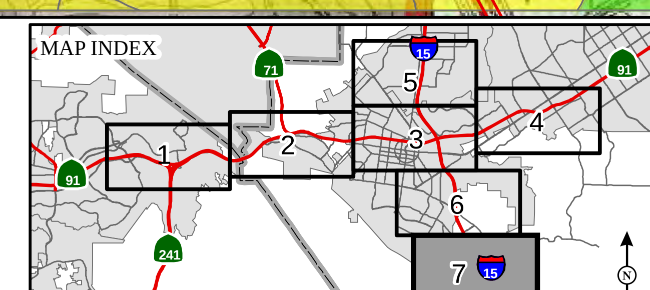

FIGURE 3.12-1

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SR-91 Corridor Improvement Project

Paleontological Sensitivities

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08-Riv-15-35.64/45.14
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The ADI, which includes the existing State and other public rights-of-way and the areas adjacent to those rights-of-way, encompasses a total of approximately 1,652 ac. The area within the ADI is identified as high or low paleontological sensitivity depending on the sediments in each area. Approximately 787 ac or 48 percent of the area in the ADI is identified as high sensitivity for paleontological resources, and 865 ac or 50 percent is identified as low sensitivity.

Six of the sedimentary units are from the Holocene to late Pleistocene Epochs of the Quaternary Period and, because of their young age (less than 10,000 years), are unlikely to contain paleontological resources. These sediments are artificial fill, very young alluvial stream deposits, very young alluvial fan deposits, young alluvium, young alluvial fan deposits, and young landslides. These sediments are considered to have a low paleontological sensitivity. However, they often form a cap several feet deep over older sediments that can contain fossils, so the low sensitivity rating of an area with these sedimentary units could change to high if excavation extends deep enough to encounter the older sediments under those younger sediments.

Four alluvial sediment types from the Pleistocene Epoch of the Quaternary Period (1.8 mya to 10,000 years ago) have the potential to contain paleontological resources. Fossils from similar sediments include animals such as sloth, camel, bison, horse, and deer. As a result, these sedimentary units are considered to have high paleontological sensitivity.

Nine of the sedimentary formations from the Tertiary Period (65 mya to 1.8 mya) have the potential to contain paleontological resources: sediments of the Norco area, the Fernando Formation, Chino Hills Mio-Pliocene sandstone, sandstone of the Norco area, the Puente Formation, the Topanga Formation, the Sespe and Vaqueros Formations (interfingered and undifferentiated), the Santiago Formation, and the Silverado Formation. Fossils found in these formations include mammals, birds, reptiles, fish, invertebrates, and plants. These sedimentary formations are considered to have high paleontological sensitivity.

Two of the sedimentary formations from the Late Cretaceous Period (80 to 65 mya) have the potential to contain paleontological resources. They are the Williams and Ladd Formations. Fossils found in these formations include dinosaurs, sea turtles, ammonites, bivalves, gastropods, and brachiopods. These sedimentary formations are considered to have high paleontological sensitivity.

Areas where igneous and metamorphic rock are exposed at the ground surface have low paleontological sensitivity. The area of exposure is assigned this rating only because there may be a slight chance for paleontological remains if there is a thin mantle of fossiliferous sediments on top of the igneous and metamorphic exposure that was too limited in its extent to be shown when the geology in that specific area was mapped. If fossiliferous sediments containing fossils are found on top of these igneous or metamorphic exposures, the paleontological sensitivity of the area would change to high.

3.12.3 Environmental Consequences

3.12.3.1 Summary of Impacts

The construction of the Initial Phases and Ultimate Projects for Alternatives 1 and 2 and their design variations could result in permanent impacts on paleontological resources in the following sediments: all types of Pleistocene alluvium, sedimentary rocks of the Norco area, the Fernando Formation, sandstone of the Norco area, Chino Hills Pliocene sediments, the Puente Formation, the Topanga Formation, the Sespe and Vaqueros Formations, the Santiago Formation, the Silverado Formation, the Williams Formation, and the Ladd Formation. As shown on Figure 3.12-1, the ADI for Alternatives 1 and 2 is the same. While there would be minor differences in areas actually disturbed during construction, the impacts of the Initial Phases and Ultimate Projects for Alternatives 1 and 2 and their design variations on these sediments would be very similar because the construction of these alternatives would use similar techniques and would disturb approximately the same areas along the alignments. As a result, there is not a substantive difference in permanent impacts on paleontological resources under the Initial Phases and Ultimate Projects for Alternatives 1 and 2 and their design variations.

The construction impacts of Alternatives 1 and 2 and their design variations would be permanent. As a result, the Build Alternatives would not result in temporary impacts on paleontological resources.

Summary of Impacts of Alternative 2f

Alternative 2f has been identified as the Preferred Alternative. The construction of Alternative 2f (Initial Phase and Ultimate Project) could result in permanent impacts on paleontological resources in the sediments listed above. The impacts on these sediments under Alternative 2f (Initial Phase and Ultimate Project) would be very similar to the impacts of Alternative 2 and its design variations because the

construction of Alternative 2f would use similar techniques and would disturb approximately the same areas along the alignments.

Because construction impacts of Alternative 2f (Initial Phase and Ultimate Project) would be permanent, Alternative 2f (Initial Phase and Ultimate Project) would not result in temporary impacts on paleontological resources.

3.12.3.2 Permanent Impacts

Alternatives 1 and 2

The Build Alternatives would alter existing landforms and potentially expose fossil resources during grading activities such as excavation along the alignment, excavation to various depths to reach competent soil, excavation for wall footings, excavation for relocated or new utilities, and activities such as pile driving and cast-in-drilled-hole (CIDH) piles. Construction activities may also disturb sediment outside the project footprint but within the project right-of-way, primarily in the heavy equipment traffic and material laydown areas.

The construction activities associated with the Build Alternatives could encounter paleontological resources during excavation activities. As shown on Figures 2-14 and 2-15, construction will occur only once along individual segments of SR-91 and I-15 for the Initial Phase and Ultimate Project for Alternative 1. As a result, the construction of the Initial Phase and Ultimate Project for Alternative 1 will impact individual areas only once, but in all cases will impact areas of high sensitivity for paleontological resources. As shown on Figures 2-16 and 2-17, construction of the Initial Phase of Alternative 2 will require construction along the majority of the SR-91 and I-15 alignments, and the Ultimate Project will require additional construction in the majority of those areas as well as some areas not affected by the Initial Phase of Alternative 2. As a result, the construction of Alternative 2 will impact many areas along the alignments during both the Initial Phase and Ultimate Project, and in all cases will impact areas of high sensitivity for paleontological resources.

Specifically, construction and excavation under the Initial Phases and Ultimate Projects for Alternatives 1 and 2 and their design variations could impact paleontological resources in the following sediments: all types of Pleistocene alluvium, sedimentary rocks of the Norco area, the Fernando Formation, sandstone of the Norco area, Chino Hills Pliocene sediments, the Puente Formation, the Topanga Formation, the Sespe and Vaqueros Formations, the Santiago Formation, the

Silverado Formation, the Williams Formation, and the Ladd Formation. As discussed earlier and as shown on Figure 3.12-1, approximately 48 percent of the ADI is in areas identified as high sensitivity for paleontological resources and 52 percent as low sensitivity.

The majority of the alignments of the Initial Phases and Ultimate Projects for Alternatives 1 and 2 would stay at the same grade as the existing SR-91 alignment. New excavation would consist of widening existing road cuts to allow construction of additional lanes, overexcavation to reach competent soil, utility trenches, wall footings, and pile driving and/or CIDH piles that may be used for bridge supports. There are several locations where the Build Alternatives would be elevated above current grade to allow for the addition of new structures such as ramps, connectors, collector-distributor roads, etc. Preliminary data regarding depth of excavation within the alternatives suggest that excavation may reach depths of up to 3 ft during preparation of the roadway, up to 10 ft during relocation or installation of utilities or storm drain or sewer lines, potentially up to 10 ft for wall footings (studies still pending), and up to 120 ft during drilling for bridge supports (driven piles or CIDH piles) for installation in certain areas such as the SR-91/I-15 interchange. Borrow areas for obtaining additional fill material for this project have not yet been identified and are not considered in this analysis. The design/build contractor would be required to obtain material from a borrow site that has been environmentally cleared and permitted.

No Build Alternative

Because the No Build Alternative does not involve construction or excavation, there is no potential for encountering paleontological resources under this alternative. Therefore, the No Build Alternative would not result in permanent impacts on paleontological resources.

3.12.3.3 Temporary Impacts

Alternatives 1 and 2

There are no temporary impacts to paleontological resources under Alternatives 1 and 2 because impacts to these resources during construction are considered permanent as discussed above in Section 3.12.3.2, Permanent Impacts.

No Build Alternative

The No Build Alternative does not involve construction. Therefore, there is no potential for encountering paleontological resources under the No Build Alternative.

3.12.4 Avoidance, Minimization, and/or Mitigation Measures

The analysis did not identify any special paleontological situations that would require the redesign of Alternatives 1 and 2 to avoid critical paleontological localities or strata. Mitigation to address impacts on paleontological resources that may be encountered during construction is required for Alternatives 1 and 2 and their design variations. Measure PAL-1 addresses potential impacts to nonrenewable paleontological resources. The following measure would be required for the Initial Phases and Ultimate Projects under the SR-91 CIP Build Alternatives.

PAL-1 Following preparation of suitable construction drawings and elevations and during final design, RCTC's Project Engineer will require the Designated Principal Paleontologist under contract to RCTC to prepare a *Paleontological Mitigation Plan* (PMP). The PMP will provide guidance for developing and implementing paleontological mitigation efforts, including field work, laboratory methods, and curation. This PMP will be consistent with guidelines provided in the Caltrans *Standard Environmental Reference* (SER), Environmental Handbook, Volume I, Chapter 8, Paleontology, the Counties of Riverside and Orange, and the Society of Vertebrate Paleontology (SVP), and will be specifically tailored to the resources and sedimentary formations in the disturbance limits.

The part of the PMP that covers excavation will include but not be limited to:

- Prior to any ground disturbance, RCTC's Designated Prinicipal Paleontologist or his/her representative will attend a meeting with the design/build contractor to explain the likelihood for encountering paleontological resources during construction, what resources may be discovered, and the methods that will be employed if anything is discovered.
- RCTC's Principal Paleontologist will conduct a preconstruction field survey in areas identified as having high paleontological sensitivity after vegetation and any pavement are removed, followed by salvage of any observed surface paleontological resources prior to the beginning of additional ground-disturbing activities. The survey will be conducted by the Prinicpal

Paleontologist or his/her representative who is qualified to identify vertebrate, invertebrate, and plant fossils.

- During ground disturbance, grading, and excavation, RCTC's Project Engineer will require the design/build contractor to retain a Principal Paleontologist. The Prinicpal Paleontologist will provide a Paleontological Monitor who is qualified to recognize and professionally collect vertebrate, invertebrate, and plant fossils. The qualified Paleontological Monitor will initially be present on site on a full-time basis whenever these types of construction activities occur in sediments that have a high paleontological sensitivity rating and also on a spot-check basis in sediments that have a low sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating. Any reduction or modification in scheduling of monitoring will be determined by the Principal Paleontologist and RCTC's Resident Engineer. The qualified Paleontological Monitor will inspect fresh cuts and/or spoils piles to recover paleontological resources. That monitor will be empowered to temporarily divert construction equipment away from the immediate area of the discovery. The monitor will be equipped to rapidly stabilize and remove fossils to avoid prolonged delays to construction schedules. If large mammal fossils or large concentrations of fossils are encountered, RCTC's Resident Engineer will require the design/build contractor to make heavy equipment available to assist in the removal and collection of large materials.
- Localized concentrations of small (or micro-) vertebrates may be found in all native sediments. As described in the PMP, the qualified Paleontological Monitor will spot-screen native sediments through one-eighth- to one-twentieth-inch mesh screens to determine whether microfossils are present. If microfossils are encountered, a standard sediment sample (up to 3 cubic yards or 6,000 pounds) will be collected and processed through one-twentieth-inch mesh screens to recover additional fossils. As described in the PMP, the processing of large bulk samples will be conducted at a designated location within the project limits that will be accessible throughout the duration of construction and also

away from any cut or fill areas or active construction areas. Processing will be completed concurrently with construction and with the intent to have all processing completed before, or just after, project completion.

- RCTC's Project Engineer will require the Principal Paleontologist or his/her representative to prepare any recovered specimens to the point of identification and permanent preservation. This includes sorting any washed mass samples to recover small invertebrate and vertebrate fossils, the removal of surplus sediment from around larger specimens to reduce the volume of storage for the repository and storage cost, and the addition of approved chemical hardeners/ stabilizers to fragile specimens. This preparation will be conducted at a designated laboratory with access to fossil preparation tools, magnifying equipment, storage boxes and vials, and chemical hardeners. The processing of fossils through the lab will be conducted concurrently with construction, especially if numerous fossils are being collected.
- Specimens will be identified to the lowest taxonomic level possible and curated into an institutional repository with retrievable storage. Repository institutions usually charge a one-time fee based on volume, so removing surplus sediment is important. The repository institution may be a local museum or university that has a curator who can retrieve the specimens on request. RCTC's Project Manager and the Department will require that a draft curation agreement be in place between the Principal Paleontologist and an approved curation facility prior to the initiation of paleontological monitoring and mitigation activities for the project.

RCTC's Resident Engineer will require the design/build contractor to comply with the provisions of the PMP during all ground disturbance, grading, and excavation activities. This will include appropriate coordination with RCTC's Designated Principal Paleontologist and the provision of qualified paleontological monitors consistent with the provisions of the PMP.

After the completion of all ground disturbance and grading, RCTC's Project Manager will require the design/build contractor to have the design/build contractor's Designated Principal Paleontologist prepare a

Final Paleontological Mitigation Report (PMR) that summarizes the project area investigated, the field and laboratory methods used, the stratigraphic units inspected, the types of fossils recovered, and the scientific significance of the curated collection. RCTC's Project Manager will retain a copy of the report for the RCTC project files and will provide a copy of the report to the Department.

3.13 Hazardous Waste/Materials

3.13.1 Regulatory Setting

Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health, and land use.

The primary federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The purpose of CERCLA, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- CWA
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, EO 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976 and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper disposal of hazardous material is vital if it is disturbed during project construction.

3.13.2 Affected Environment

The information in this section is based on the *Final Initial Site Assessment* (ISA; July 2010), the *Final Asbestos, Lead-Based Paint, and Hazardous Materials Survey Report* (November 2011), the *Detailed Site Investigation Report* (DSI; December 2011), the *Final Aerially Deposited Lead Survey Report* (December 2008), the *Final Aerially Deposited Lead Survey Report Addendum* (July 2009 [revised April 2010]), and the *Final Community Impact Assessment* (CIA; December 2010).

3.13.2.1 Initial Site Assessment

The ISA was prepared to determine whether construction of the project could be affected by any recorded or visible hazardous waste problems within the project disturbance limits. The ISA included searches of government records by using the Environmental Database Report (EDR) Radius Report (August 5, 2008) to obtain a listing of properties or known incidents from federal, State, local, and EDR proprietary environmental databases in accordance with the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments (E-1527-05) requirements; a review of historical aerial photographs and Sanborn-Perris maps; interviews with local agency officials from the Santa Ana RWQCB and the Riverside County Department of Environmental Health (RCDEH); and a site visit of the sites identified by the results of the EDR database search in order to locate potential contaminant sources on the identified sites, to note general site conditions, and to identify unlisted sites in the project vicinity that may use, store, or transport hazardous materials or wastes.

The ISA included review of files maintained by the SWRCB GeoTracker online database, the California Department of Toxic Substances Control (DTSC) EnviroStor online database, and the EDR Radius Report. Regulatory agency coordination included records reviews of files obtained from the Orange County Health Care Agency (OCHCA), OCFA, Anaheim Fire Department (AFD), Anaheim Public Utilities Department (APUD), Riverside County Community Health Agency (RCCHA), RCDEH, RCFD, Corona Fire Department (CFD), City of Norco Building Department, City of Norco Fire Department (NFD), and the RWQCB were also reviewed as part of the regulatory coordination process. These records were reviewed in October, November, and December 2008; January 2009; and January 2010.

Telephone interviews were also conducted with representatives of the Santa Ana RWQCB and the RCDEH between April 2009 and May 2009. Interviews were

conducted to obtain additional information for sites with documented releases and that may pose a potential concern during the construction of the project.

Sites of Environmental Concern

Sites that may pose a potential environmental concern to the project include known hazardous waste release sites reported within the project disturbance limits and properties that currently store, generate and/or handle hazardous substances that may be acquired as part of the project. Table 3.13.1 lists these sites of potential environmental concern based on the database search, review of historical aerial photographs and Sanborn-Perris maps, interviews conducted with the RWQCB and RCDEH, the site visit, and sites record review conducted for the ISA. All the sites listed in Table 3.13.1 are in or partially in the project disturbance limits.

Sites where hazardous wastes and materials are sold, generated, or otherwise managed at a smaller scale, including but not limited to the storage of small amounts of cleaning products or paint, may also be completely or partially acquired. The primary impact of such a right-of-way acquisition would be the relocation of the building or business and not the relocation of major hazardous materials or wastes. These types of sites are unlikely to pose a hazardous waste/materials concern to the project because they do not typically result in site contamination or other substantive concerns related to hazardous materials and wastes, and therefore are not discussed further in this section.

Figure 3.13-1 shows the locations of these sites of concern in relation to the project disturbance limits of Alternative 1 and its four design variations (a through d). Figure 3.13-2 shows the locations of these sites of concern in relation to the project disturbance limits of Alternative 2 and its eight design variations (a through h). Figures 3.13-1 and 3.13-2 are provided following the last page of text in this section.

The sites of potential concern listed in Table 3.13.1 were identified as along either SR-91 from Weir Canyon Road to Smith Avenue or SR-91 from Smith Avenue to Tyler Street. No sites of potential concern were identified along I-15 from Fifth Street to Weirick Road because hazardous wastes/materials were not identified to be stored within an area that would be required for TCEs on that project segment. In addition, according to the SWRCB GeoTracker (last accessed January 2010), there are no sites with open release cases existing within the project disturbance limits on I-15.

Table 3.13.1 Hazardous Waste/Materials Sites of Potential Concern

Figure 3.13-1 Map ID[1]	Figure 3.13-2 Map ID[1]	Site Name and Address	Assessor's Parcel Numbers	Regulatory Databases	Site Information
N/A	1	Hayden Industrial Products 1531 Pomona Road Corona, CA	118-040-007	FINDS, RCRA-SQG, SLIC, WDS, HAZNET	No open release cases were reported as of January 2010. Based on site records reviewed from the RCDEH and the CFD, ASTs may be present on site.
1	2	Aero Tanks Enterprises 1780 Pomona Rincon Road Corona, CA	102-280-032	Not listed on any regulatory database	No open release cases were reported as of January 2010. Based on site records reviewed from the CFD, argon and carbon dioxide tanks are currently located on site.
2	3	Shell Goodman Sixth Street 1825 West Sixth Street Corona, CA	102-270-011	FID, SWEEPS UST, FINDS, RCRA-SQG, HAZNET, HIST UST, LUST, UST	No open release cases were reported as of January 2010. There are currently three USTs, four pump islands, and an AST containing propane located on site.
3	4	Carl's Jr. 1865 West Sixth Street Corona, CA	102-270-003	Not listed on any regulatory database	No open release cases were reported as of January 2010. Based on site records reviewed from the CFD, an AST containing carbon dioxide is currently located on site.
4	5	Chevron No. 91582 2270 West Frontage Road Corona, CA	102-091-020	FID, SWEEPS UST, FINDS, RCRA-SQG, HAZNET	No open release cases were reported as of January 2010. There are currently USTs and six pump islands located on site.
5	6	Corona Chevrolet 2550 Wardlow Road Corona, CA	102-420-047	FINDS, HAZNET	No open release cases were reported as of January 2010. There is currently one AST on site.
6	7	Green River Golf Club 5215 Green River Road Corona, CA	085-071-30, 101-130-013, 101-210-001, 353-063-06, 353-063-29	HAZNET, CORTESE, FID, LUST	No open release cases were reported as of January 2010. According to available site records, pesticides, herbicides, and fungicides may have been stored on site.
7	8	Stock-Rite Building Supply, Inc. (now an unnamed industrial property) 523 South Maple Street Corona, CA	102-040-013	HIST UST	No open release cases were reported as of January 2010. There is currently one AST on site.
8	9	U.S. Rentals, Inc. (now United Rentals) 525 Maple Street Corona, CA	102-040-015	HAZNET, CORTESE, LUST, HIST UST	No open release cases were reported as of January 2010. One AST containing propane and approximately 17 cylinder tanks (likely storing liquid petroleum gas) are currently located on site.

Table 3.13.1 Hazardous Waste/Materials Sites of Potential Concern

Figure 3.13-1 Map ID[1]	Figure 3.13-2 Map ID[1]	Site Name and Address	Assessor's Parcel Numbers	Regulatory Databases	Site Information
9	10	Mobil No. 18-FLM 616 Paseo Grande Street Corona, CA	102-250-050, 102-250-051	HAZNET, FID, CORTESE, SWEEPS UST, LUST, UST, HIST UST, RCRA-LQG	Based on file information from the SWRCB GeoTracker website, the Santa Ana RWQCB, and the EDR Radius Report, this site is currently undergoing soil and groundwater remediation. Soil contaminated with gasoline was discovered during the replacement of three gasoline USTs and one waste oil UST in 1986. Hydrocarbon concentrations were detected in groundwater during monitoring activities. TPH-g, benzene, and MTBE were identified as the contaminants of concern in groundwater. There are five existing USTs and four existing fuel pump islands on site.
10	11	Song's ARCO 800 Serfas Club Drive Corona, CA	102-050-002	FID, CORTESE, LUST, PROP65, HIST UST	No open release cases were reported as of January 2010. There are currently four USTs and nine pump islands located on site.
11	12	State of California property, formerly 102 South Main Street Corona, CA	N/A	SLIC	Based on information reviewed from the EDR Radius Report and the SWRCB GeoTracker, this site currently has an open case for a petroleum leak that was reported on January 2, 1965. The media affected is unknown. According to the SWRCB GeoTracker, this site is located within the SR-91 right-of-way. Based on the findings of the Phase I ESA and Phase II testing conducted as part of the DSI, no RECs exist on site.
12	13	Orange Heights (now Newport Farms) 105 Pearl Avenue Corona, CA	117-270-013	CORTESE, LUST	No open release cases were reported as of January 2010. However, multiple ASTs (potentially storing propane) and drums (potentially storing waste petroleum, lubricating oil, and/or gear oil) are currently stored on site. There may also be fuel tanks on site.
13	14	Texaco Service Station (now Shell Gas Station) 230 Lincoln Avenue Corona, CA	118-171-049	FID, CORTESE, SWEEPS UST, LUST, HIST UST, UST	No open release cases were reported as of January 2010. There are currently four USTs, four pumps located on two pump islands, and two propane ASTs located on site.
14	15	Honda Cars of Corona (now Vacation Station RV) 231 South Lincoln Avenue Corona, CA	118-270-024	FINDS, RCRA-SQG, LUST, HAZNET, HIST UST, FID, SWEEPS UST, CORTESE	Based on information reviewed from the SWRCB GeoTracker, RCDEH, and the EDR Radius Report, this site is currently undergoing soil and groundwater remediation. Soil contaminated with gasoline was discovered during the removal of a gasoline UST and a waste oil UST in 1997. Hydrocarbon concentrations were detected in groundwater during monitoring activities. TPH-g, benzene, and MTBE 0were identified as the contaminants of concern within the groundwater.
15	16	Union Oil Service Station No. 621(now Unocal 76) 304 South Main Street Corona, CA	117-103-021	HIST UST, UST	No open cases were reported as of January 2010. There are currently USTs and six pump islands located on site.

Table 3.13.1 Hazardous Waste/Materials Sites of Potential Concern

Figure 3.13-1 Map ID[1]	Figure 3.13-2 Map ID[1]	Site Name and Address	Assessor's Parcel Numbers	Regulatory Databases	Site Information
16	17	Corona Industrial Electric, Inc. (now T&T Enterprises [Building A] and Food Tech [Building B]) 901 East Third Street Corona, CA	117-270-024	FID, SWEEPS UST, HIST UST	No open release cases were reported as of January 2010. Drums (potentially storing waste oil, used absorbent, and/or petroleum hydrocarbons) are currently stored on site, and there is a potential for two historical USTs to be present on site.
17	18	Southern California Edison Substation (south of SR-91 and west of South Sherman Avenue in the City of Corona)	118-101-015	Not listed on any regulatory database	No open release sites were reported at this site. However, a number of hazardous waste/materials may be stored on site or may be used during daily facility operations. Potential hazardous wastes/materials located on site include PCBs in transformers, PCBs in soils surrounding transformers, and asbestos-containing materials in electrical insulators. Additional unknown hazardous wastes/materials for daily facility operations may also be used and stored on site.

Source: *Final Initial Site Assessment* (July 2010) and *Detailed Site Investigation Report* (December 2011).

[1] These sites are shown on Figures 3.13-1 (Sheets 1–7) and 3.13-2 (Sheets 1–7).

AST = aboveground storage tank
CFD = Corona Fire Department
CORTESE = Cortese Hazardous Waste and Substances Sites List
ESA = Environmental Site Assessment
FID = Facility Inventory Database
FINDS = Facility Index System/Facility Index Identification Initiative Program Summary Report
HAZNET = Facility and Manifest Data
HIST UST = Historical Underground Storage Tank
ISA = Initial Site Assessment
LUST = leaking underground storage tank
MTBE = methyl tertiary-butyl ether
PCBs = polychlorinated biphenyls
PROP65 = Proposition 65 Records
RCDEH = Riverside County Department of Environmental Health
RCRA-LQG = Resource Conservation and Recovery Act – Large-Quantity Generator
RCRA-SQG = Resource Conservation and Recovery Act – Small-Quantity Generator
RECs = Recognized Environmental Conditions
RWQCB = Regional Water Quality Control Board
SLIC = Spills, Leaks, Investigations, and Cleanup Cost Recovery Listing
SR-91 = State Route 91
SWEEPS UST = Statewide Environmental Evaluation and Planning System
SWRCB = State Water Resources Control Board
TPH-g = total petroleum hydrocarbons-gasoline
UST = underground storage tank
WDS = Water Discharge System

Although there are five open-case sites outside the project disturbance limits along I-15, based on information from the SWRCB GeoTracker website, the soil and/or groundwater contamination at these sites has been limited to areas within and around the boundaries of those parcels. In addition, all five sites are over 500 ft west of the median of I-15. Due to the distance of each site from the project disturbance limits along I-15 and the limited extent of soil and/or groundwater contamination, it is not anticipated that these sites would pose a potential environmental concern to the Build Alternatives.

The 18 sites identified in Table 3.13.1 may generate, handle and/or store hazardous wastes/materials on site. However, only two sites, the Mobil No. 18-FLM (at 616 Paseo Grande Street in the City of Corona) and Honda Cars of Corona (at 231 South Lincoln Avenue in the City of Corona), have been identified as open cases for site contamination resulting from a release to soil and/or groundwater. These sites are located within the project disturbance limits due to the partial acquisition of and TCE at the Mobil No. 18-FLM site and the full acquisition of the Honda Cars of Corona site under both Build Alternatives. According to the SWRCB GeoTracker, the Mobil No. 18-FLM and the Honda Cars of Corona release sites are undergoing various stages of remediation for hydrocarbon contamination.

In addition, according to site records for the Green River Golf Club (located at 5215 Green River Road in the City of Corona), pesticides, herbicides, and fungicides may have been stored on that site. Therefore, there is a potential that pesticides, herbicides, and fungicides were applied on the part of the Green River Golf Club adjacent to the project segment of SR-91.

Agricultural Uses

According to the ISA, there are three parcels (APNs 085-071-23, 353-063-31, and 142-180-002) within the project disturbance limits that appear to have been previously used for historical agricultural purposes. These sites are shown on Figures 3.13-1 and 3.13-2. These parcels appear to have remained undisturbed and, as a result, have the potential to contain pesticides and herbicides that may have been used for pest and weed control. In addition, according to the CIA there are three parcels (APNs 101-250-069, 277-210-003, and 277-210-008) with areas of designated Farmland of Local Importance within the project disturbance limits. These designated farmland areas may also have the potential to contain pesticides and herbicides in soils that have not been disturbed and are also identified on Figures 3.13-1 and 3.13-2.

Aerially Deposited Lead

Due to the historical use of lead in gasoline, lead may exist in soils near heavily traveled roads. This specific type of lead is referred to as aerially deposited lead (ADL). The presence of ADL in soils may pose a potential concern to the environment and on-site workers during construction activities and may result in disposal considerations if removed off site. The *Final Aerially Deposited Lead Survey Report* was conducted to characterize lead in soils within the existing and additional public right-of-way required for the project along SR-91 from Gypsum Canyon Road to Magnolia Avenue, and along I-15 from 1,000 ft north of Hidden Valley Parkway to Bedford Canyon Wash. In addition, planned improvements, including trenching and installation of a fiber optic cable along eastbound SR-91 from east of the Weir Canyon Road undercrossing to east of the Gypsum Canyon Road undercrossing, were also surveyed for soil contaminated by ADL as part of the *Final Aerially Deposited Lead Survey Report Addendum*.

According to the *Final Aerially Deposited Lead Survey Report* and the *Final Aerially Deposited Lead Survey Report Addendum*, test results indicated that soluble lead was detected in 94 out of 148 samples analyzed. Concentrations of soluble lead in soils ranged from 0.1 mg/L to 2.1 mg/L. The criteria against which the lead analytical results for the Final ADL Survey were evaluated are as follows: If the 95 percent upper confidence limit (UCL) mean for soluble lead is less than 0.5 mg/L, the soil is considered non-hazardous for reuse on site. Although the maximum soluble lead concentration of 21 mg/L was detected in soils, a statistical analysis of soluble lead indicated that the 95 percent UCL for soluble lead analysis is less than 0.5 mg/L.

Therefore, according to DTSC Variance No. V09HQSCD006, soils located within the project limits to a depth of 3 ft bgs between Gypsum Canyon Road and Magnolia Avenue and 5 ft bgs along eastbound SR-91 starting east of the Weir Canyon Road undercrossing and extending east of the Gypsum Canyon Road undercrossing may be released to the contractor as nonhazardous soils and reused on site without restrictions under the DTSC Variance No. V09HQSCD006 (effective July 1, 2009 through July 1, 2014) for ADL impacted soil. However, if off-site disposal is required for soils along SR-91 within the project disturbance limits, the soils will be treated as a California hazardous waste. Soil sampling locations along the I-15 median indicate soils from along I-15 are considered nonhazardous.

3.13.2.2 Detailed Site Investigation

A DSI was conducted to evaluate the potential areas of concern identified in the ISA. The DSI included Phase I ESAs of the two sites of environmental concern, the Mobil No. 18-FLM site at 616 Paseo Grande, and the Former Honda Cars of Corona site at 231 South Lincoln Avenue. Both sites are in the City of Corona. The findings of the DSI for these two sites are described below.

Mobile No. 18 – FLM

The Mobile No. 18 – FLM site was a previously occupied by an automobile service station since the 1950s. According to the Phase I ESA for this site, a fuel release that impacted soil and groundwater was reported in 1986. Investigations and remedial activities performed under the oversight of the Santa Ana Regional Water Quality Control Board (RWQCB) are ongoing. At the time the Phase I ESA was conducted, hydraulic lifts and underground storage tanks (USTs) were still located on site and would pose a potential concern if disturbed or removed.

Former Honda Cars of Corona

The Former Honda Cars of Corona site is a 3.5 ac site that was used for agricultural purposes from 1931 to 1968, and later developed for commercial use in approximately 1977. The vacant buildings present on the site are associated with past use of the site for automotive sales and service.

During site reconnaissance as part of the Phase I ESA, hazardous materials containers were observed on the property. Waste oil was observed in an approximately 300-gallon aboveground storage tank (AST) immediately adjacent to an underground four-stage clarifier. Waste antifreeze in an approximately 100-gallon AST, 55-gallon drums of chemicals and waste products, eight hydraulic lifts, and one abandoned hydraulic lift were also noted. Records for the site indicate that a tank was removed in 1997, and a gasoline release was discovered when that tank was removed. Investigation and remedial activities under the oversight of the RCDEH is ongoing. Fuel-related constituents, including benzene, toluene, ethylbenzene, and xylenes (BTEX), MTBE, and trichloroethylene, have been detected in groundwater at the site. A soil vapor extraction (SVE) system was operated from 2006 through 2008 to treat contaminants on site. In April 2008, RCDEH authorized the removal of that equipment.

Phase II testing, including soil and soil vapor investigations, was conducted at the Honda of Corona site on April 12, 2011. Investigation activities were conducted in

areas considered to have the greatest potential for subsurface impacts based on past operations as well as those areas that had not been previously investigated. Based on the results of the investigation, total petroleum hydrocarbons (TPH) were not detected in any of the soil samples analyzed, indicating there was no release of petroleum hydrocarbons associated with the hydraulic lifts or clarifier. Soil sampling results also indicated that perchloroethylene (PCE) was the only volatile organic compound (VOC) detected in the soil samples analyzed. PCE was detected at concentrations between 0.7 and 4 micrograms per kilogram (µg/kg). These concentrations of PCE in soils are below the EPA IX Regional Screening Level (RSL) for residential and commercial land uses (550 µg/kg and 2,600 µg/kg, respectively).

The soil vapor survey results reported four VOCs (toluene, ethylbenzene, xylenes, and PCE) in samples from 5 ft bgs. The highest concentrations of ethylbenzene and xylenes, although not substantial, were detected near the former UST/remediation area. Toluene was detected at 250 µg/L, which is above the residential California Human Health Screening Level (CHHSL) of 135 µg/L but below the commercial CHHSL of 378 µg/L. These results indicate that residual gasoline contamination in soil represents a potential to encounter contaminated soils and/or vapor intrusion should new structures be constructed over the former UST area.

Within the former service bay buildings, PCE was detected at concentrations between 1.3 and 1.4 µg/L, which are slightly above the commercial CHHSL of 0.603 µg/L. These vapor results were consistent with the soil results, indicating that relatively low-level PCE releases have occurred on site in the areas of the service bays and the clarifier.

As of December 2011, the Honda Cars of Corona site received a No Further Action (NFA) letter from the RCDEH. Although an NFA letter was issued, the site closure document notes that low levels of contaminants remain in place; therefore, additional investigation may be warranted.

3.13.2.3 Potential Environmental Concerns

The ISA and DSI revealed no evidence of potential environmental concerns involving spills, accidental releases, or illegal dumping of hazardous waste or materials within the disturbance limits of the project with the exception of the following environmental concerns discussed below. The potential costs associated with the remedial activities required to address the environmental concerns identified below are provided in Section 3.13.4 of this section.

- **Contaminated Soils and Groundwater:** Two sites listed in Table 3.13.1 (Mobil No. 18-FLM and Honda Cars of Corona, shown on Figures 3.13-1 and 3.13-2) are listed in databases indicating a release of hazardous materials into the environment. As a result of these releases, on-site soils and/or area groundwater have been impacted.
- **Hazardous Waste Generators and Handlers:** There are multiple industrial and automotive uses in and adjacent to the disturbance limits of the Build Alternatives. Several of these locations were classified in the records search as a hazardous waste generator and/or handler (refer to Table 3.13.1). While many of these sites are not in violation of hazardous waste regulations, hazardous wastes and materials are routinely present at these sites. For example, as identified in Table 3.13-1, records obtained for the Green River Golf Club facility indicate that herbicides, pesticides, and fungicides are used and stored on site. Therefore, there is a potential that such materials have been used in the area that would be partially acquired or used as a TCE. In addition, the SCE substation (APN 118-101-015), located south of SR-91 and west of South Sherman Avenue, may include polychlorinated biphenyls (PCBs) in transformers, PCBs in soils surrounding transformers, and ACMs in electric insulators. A portion of APN 118-101-015 would be utilized for TCE purposes in all design variations of Alternative 1 and in Alternative 2 with design variations a, b, e, and f. APN 118-101-015 would be fully acquired under Alternative 2 with design variations c, d, g, or h, which would require the relocation of the existing substation. Therefore, there is a potential that such materials may be encountered during the substation relocation.
- **Asbestos in Rails, Bearing Pads, Support Piers, Expansion Joint Materials in Bridges, Asphalt, Concrete, Road-Building Materials, and Other Building Materials Used in Residential and Nonresidential Structures:** The use of asbestos in many building products was banned by the EPA by the late 1970s; however, many ACM categories not previously banned may still be in use today. ACMs represent a concern when they are subject to damage that results in the release of fibers. Asbestos may be found in building materials such as rails, bearing pads, support piers, expansion joint material in bridges, asphalt, and concrete within the project disturbance limits. The types of building materials will be surveyed, sampled, and assessed in accordance with 40 CFR 763 (Asbestos Hazard Emergency Response Act [AHERA]).
- **Lead-Based Paint on Building/Road Structures and Lead in Yellow Paint and Tape Used for Pavement Marking:** Building structures built prior to 1978 are presumed to contain lead-based paint (LBP). In addition, road structures such

as bridges may contain LBP. Yellow paint used for traffic striping prior to 1997 exceeds the hazardous waste criteria under Title 22 California Code of Regulations (CCR) and would require disposal in a Class I disposal facility authorized to accept this type of waste.

- **Polychlorinated Biphenyls in Pole-Mounted or Pad-Mounted Transformers and/or Light Ballasts, Mercury in Light Ballasts and Thermostats:** PCBs are known hazardous materials found in coolants or lubricating oils used in some electrical transformers, light ballasts, electrical panels, and other similar equipment prior to 1976. Pole- and pad-mounted electrical transformers, which were observed in the project disturbance limits, may contain PCBs. In addition, structures built prior to 1976 are presumed to have PCBs in light ballasts and electrical equipment. Mercury is also a known hazardous material found in electrical panels, lighting systems ballasts and fixtures, and thermostats.
- **Railroads:** Although no cases of accidental spills associated with the BNSF railroad tracks in the project disturbance limits were revealed in the records search, soils along the railroad tracks within the project disturbance limits should be assumed to be impacted by polynuclear aromatic hydrocarbons (PNAs). Sources of PNAs include diesel fuel spills from trains, kerosene used to heat rails during rail replacement activities, and wood preservatives used for switch ties. Soils surrounding railroad tracks and ballasts may also be contaminated with ACMs; chlorinated hydrocarbons (e.g., PCE and trichloroethylene) from cargo spills; creosote and pentachlorophenol, which are used as a wood preservative for switch ties; and pesticides and herbicides, which are used around the railroad tracks and ballasts for pest and weed control.
- **Agricultural Soils:** Historic farmlands (APNs 085-071-23, 353-063-31, and 142-180-002) and land designated as Farmland of Local Importance (APNs 101-250-069, 277-210-003, and 277-210-008) located within the project disturbance limits are shown on Figures 3.13-1 and 3.13-2. Due to the historical and existing agricultural land uses in the project disturbance limits, herbicides and pesticides may have been used for pest and weed control.
- **Creosote and Pentachlorophenol in Utility Poles and Railroad Ties:** According to the ISA, wooden utility poles and railroad ties may be removed or disturbed within the right-of-way during project construction. According to the Topical & Chemical Fact Sheets provided by the EPA, creosote is often applied to wood products, primarily utility poles and railroad ties, as a preservative. Pentachlorophenol is also commonly used as a wood treatment or preservative. Therefore, there is a potential for creosote and pentachlorophenol to be present on

existing wooden utility poles and railroad ties. Creosote and pentachlorophenol may also be present in soils located adjacent to railroad ties.

- **All Other Wood-Treated Waste Materials:** Other wood-treated waste materials may be encountered during construction. Therefore, these materials may also contain creosote, pentachlorophenol, arsenic, copper, and chromium; treatment compounds such as copper azole, alkaline copper quaternary, chromated copper arsenate; and other associated compounds.

The presence of ACMs and LBPs in structures and of PCBs in both structures and pole- and pad-mounted transformers was not assessed as part of the ISA. In addition, the presence of potentially contaminated soils in areas adjacent to the BNSF Railway right-of-way and the presence of herbicides and pesticides in former or active agricultural lands were also not assessed as part of the ISA.

3.13.3 Environmental Consequences

3.13.3.1 Summary of Impacts

Routine operation and maintenance of the facilities Alternatives 1 and 2 would not introduce new sources of hazardous materials and wastes. Continued exposure to existing hazardous wastes through vehicle transport would continue. However, the transport of hazardous waste and/or materials is heavily regulated; therefore, no new permanent adverse impacts related to hazardous wastes/materials (direct or indirect) beyond existing conditions would occur during operation of Alternatives 1 and 2, and their design variations, and there are no differences in permanent impacts between Alternatives 1 and 2.

Properties zoned for industrial and automotive uses within the project disturbance limits may routinely store hazardous wastes and materials onsite. Therefore, prior to acquisition of these properties, any potentially hazardous waste material present will be relocated and/or removed off-site.

Impacted soils and/or groundwater were identified at two sites with open release cases that are located within the disturbance limits. Phase I ESAs were conducted to characterize the extent of the contamination for open remediation sites or sites of potential concern that would be disturbed or acquired as part of the project and that were accessible to the project team to conduct these activities. Contact with hazardous materials during construction would be further minimized through the sampling (Phase II Site Investigation) of suspected hazardous materials prior to construction.

According to the DSI, soil and/or groundwater contamination have been reported at the Mobil No. 18-FLM and Honda Cars of Corona sites. Construction of Alternatives 1 and 2 would require partial acquisition of, and a TCE at, the Mobil No. 18-FLM site and full acquisition of the Honda Cars of Corona site. Both these sites would be acquired during the Initial Phases of Alternatives 1 and 2. As a result of the acquisitions at these properties or the use of these properties as TCEs, there is a potential for contaminated soils and/or groundwater to be encountered during construction of the Build Alternatives.

Other areas of environmental concern include potentially contaminated soils related to the BNSF railroad tracks, agricultural land uses, ADL in areas not previously sampled, and ACMs, LBPs, and PCBs in building structures that would be disturbed or demolished as part of the project.

ACM and LBP surveys for road structures were also conducted as part of the *Final Asbestos, Lead-Based Paint, and Hazardous Materials Survey Report*. Of the 21 bridges sampled for ACMs and LBPs, 6 bridges contained ACMs and 3 bridges contained LBPs. The 6 bridges containing ACMs and 3 bridges containing LBPs will be disturbed during both the Initial Phases and Ultimate Projects for Alternatives 1 and 2. In addition, light fixtures under bridges may contain mercury, and lead may be present in metal washers, metal spacers, and soft metal railing brace pads. The types of materials in these 21 bridge structures would require testing at the time of disturbance, which would occur during both the Initial Phases and Ultimate Projects for Alternatives 1 and 2.

With the implementation of measures HW-1 through HW-14, no new temporary adverse impacts related to hazardous wastes/materials (direct or indirect) would occur under Alternatives 1 and 2, and their design variations.

The difference in permanent impacts between Alternatives 1 and 2 and their design variations is the relocation of the SCE substation. The relocation of the SCE substation would only occur under Alternative 2, under specific design variations. However, these impacts would be mitigated with incorporation of measure HW-15.

Summary of Impacts for Alternative 2f

Alternative 2f has been identified as the Preferred Alternative. Similar to Alternatives 1 and 2 described above, the Initial Phase and Ultimate Project under Alternative 2f would include routine operation and maintenance of the facilities and would not introduce new sources of hazardous materials and wastes. Continued exposure to

existing hazardous wastes through vehicle transport would continue. However, the transport of hazardous waste and/or materials is heavily regulated; therefore, no new permanent adverse impacts related to hazardous wastes/materials (direct or indirect) beyond existing conditions would occur during operation of the Initial Phase and Ultimate Project under Alternative 2f.

Similar to Alternatives 1 and 2, Alternative 2f would require that prior to acquisition of properties zoned for industrial and automotive uses, any hazardous waste material present on site will be relocated and/or removed off site. The properties identified in Table 3.13.2 will be acquired during the Initial Phases of Alternatives 1 and 2. Therefore, impacts related to the acquisition of these properties would be limited to the Initial Phase of Alternative 2f.

Because impacted soils and/or groundwater were identified at two sites with open release cases that will be acquired during the Initial Phase of Alternative 2f, Alternative 2f would also require sampling (Phase II Site Investigation) of suspected hazardous materials prior to the Initial Phase of construction to minimize contact with hazardous materials.

During final design of Alternative 2f and prior to any ground disturbance in its Initial Phase, the Honda Cars of Corona site will require final confirmation that sampling has been completed at the site, and that contaminant investigation for the site has received regulatory site closure. Additionally, prior to the completion of final design of the Initial Phase, all monitoring wells and vapor extraction wells on that site must be properly abandoned in accordance with regulatory requirements.

During final design of Alternative 2f and prior to any ground disturbance during its Initial Phase, further investigation at the Mobil No.18-FLM Site will be conducted for contaminants in soils, and a work plan will be prepared.

The Initial Phase under Alternative 2f would require the sampling of potentially contaminated soils related to the BNSF railroad tracks; agricultural uses; ADL in areas not previously sampled; and ACMs, LBPs, and PCBs in building structures that would be disturbed or demolished as part of the project.

As discussed above for Alternatives 1 and 2, both the Initial Phase and Ultimate Project under Alternative 2f would require the remediation of ACMs in five bridges, any light fixtures under bridges that may contain mercury, and any lead that may be present in metal washers, metal spacers, and soft metal railing brace pads.

Table 3.13.2 Potential Impacts to Alternatives 1 and 2 and Their Design Variations[1]

Figure 3.13-1 Map ID	Figure 3.13-2 Map ID	Site of Potential Concern[2]	Impacts Under Alternative 1 and the Initial Phase of Alternative 1	Impacts Under Alternative 2 and the Initial Phase of Alternative 2
N/A	1	Hayden Industrial Products 1531 Pomona Road Corona, CA	This site would not be acquired under Alternative 1. As a result, it would not pose an environmental concern.	Under Alternative 2 with design variations 2a through 2d, 2g, and 2h, ASTs potentially stored on site would require removal as a result of the full acquisition of this property.
1	2	Aero Tanks Enterprises 1780 Pomona Rincon Road Corona, CA	Under Alternative 1 with design variations 1a through 1d, argon and carbon dioxide tanks would require removal as a result of the full acquisition of this property.	Under Alternative 2 with design variations 2a through 2h, argon and carbon dioxide tanks would require removal as a result of the full acquisition of this property.
2	3	Shell Goodman Sixth Street 1825 West Sixth Street Corona, CA	Under Alternative 1 with design variations 1a and 1b, two pump islands would require relocation as a result of the TCE and partial acquisition of this property. Under Alternative 1 with design variations 1c and 1d, two pump islands and potentially an AST would be relocated as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2d, two pump islands would require relocation due to the TCE and partial acquisition of this property. Under Alternative 2 with design variations 2e through 2h, two pump islands and potentially an AST would require relocation due to the TCE and partial acquisition of this property.
3	4	Carl's Jr. 1865 West Sixth Street Corona, CA	Under Alternative 1 with design variations 1a and 1b, an AST would require removal as a result of the full acquisition of this property.	Under Alternative 2 with design variations 2a through 2d, an AST would require removal as a result of the full acquisition of this property.
4	5	Chevron No. 91582 2270 West Frontage Road Corona, CA	Under Alternative 1 with design variations 1a through 1d, USTs and six pump islands would require removal as a result of the full acquisition of this property.	Under Alternative 2 with design variations 2a through 2h, USTs and six pump islands would require removal as a result of the full acquisition of this property.
5	6	Corona Chevrolet 2550 Wardlow Road Corona, CA	Under Alternative 1 with design variations 1a through 1d, one AST would require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2h, one AST would require relocation as a result of the TCE and partial acquisition of this property
6	7	Green River Golf Club 5215 Green River Road Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under the Initial Phase of Alternative 2. Under Alternative 1 with design variations 1a through 1d, soils located in the area of the property that would be partially acquired or used for TCE purposes may contain pesticides, herbicides and fungicides. Therefore, there is a potential for contaminated soils to be encountered during construction activities.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, soils located in the area of the property that would be partially acquired or used for TCE purposes may contain pesticides, herbicides, and fungicides. Based on the findings of the DSI, pesticides were not detected above CHHSLs for residential and commercial uses. Therefore, no impacts from pesticides, herbicides or fungicides are anticipated.
7	8	Stock-Rite Building Supply, Inc. (now an unnamed industrial property) 523 South Maple Street Corona, CA	Under Alternative 1 with design variations 1a and 1b, an existing AST would require removal as a result of the full acquisition of this property. Under Alternative 1 with design variations 1c and 1d, an existing AST would require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2d, an existing AST would require removal as a result of the full acquisition of this property. Under Alternative 2 with design variations 2e through 2h, an existing AST would require relocation as a result of the TCE and partial acquisition of this property.

Table 3.13.2 Potential Impacts to Alternatives 1 and 2 and Their Design Variations[1]

Figure 3.13-1 Map ID	Figure 3.13-2 Map ID	Site of Potential Concern[2]	Impacts Under Alternative 1 and the Initial Phase of Alternative 1	Impacts Under Alternative 2 and the Initial Phase of Alternative 2
8	9	U.S. Rentals, Inc. (now United Rentals) 525 Maple Street Corona, CA	Under Alternative 1 with design variations 1a and 1b, an existing AST and 17 cylinder tanks would require removal as a result of the full acquisition of this property.	Under Alternative 2 with design variations 2a through 2f, the existing AST and 17 cylinder tanks would require removal as a result of the full acquisition of this property.
9	10	Mobil No. 18-FLM 616 Paseo Grande Street Corona, CA	Under Alternative 1 with design variations 1a through 1d, soil and groundwater located in the area of the property that would require partial acquisition or use as a TCE may contain petroleum hydrocarbons. Therefore, there is a potential for contaminated soil and groundwater to be encountered during construction activities. In addition, a UST containing waste oil would require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2f, soil and groundwater located in the area of the property that would require partial acquisition or use as a TCE may contain petroleum hydrocarbons. Therefore, there is a potential for contaminated soil and groundwater to be encountered during construction activities. In addition, a UST containing waste oil would require relocation as a result of the TCE and partial acquisition of this property.
10	11	Song's ARCO 800 Serfas Club Drive Corona, CA	Under Alternative 1 with design variations 1a through 1d, four USTs and one pump island would require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2f, four USTs and one pump island would require relocation as a result of the TCE and partial acquisition of this property.
11	12	State of California property, formerly 102 South Main Street Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Based on the findings of the DSI, this site was misidentified in the ISA, and no RECs exist on site. Therefore, this site will not pose a potential concern to the project during construction activities.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, soil and/or groundwater contamination may be encountered during construction activities. Based on the findings of the DSI, this site was misidentified in the ISA, and no RECs exist on site. Therefore, this site will not pose a potential concern to the project during construction activities.
12	13	Orange Heights (now Newport Farms) 105 Pearl Avenue Corona, CA	The impacts under Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Under Alternative 1 with design variations 1a through 1d, multiple ASTs and drums stored on site would require relocation. Fuel tanks potentially located on site may also require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, multiple ASTs and drums stored on site would require relocation. Fuel tanks potentially located on site may also require relocation as a result of the TCE and partial acquisition of this property.
13	14	Texaco Service Station (now Shell Gas Station) 230 Lincoln Avenue Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Under Alternative 1 with design variations 1a through 1c, one AST may require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, one AST may require relocation as a result of the TCE and partial acquisition of this property.

Table 3.13.2 Potential Impacts to Alternatives 1 and 2 and Their Design Variations[1]

Figure 3.13-1 Map ID	Figure 3.13-2 Map ID	Site of Potential Concern[2]	Impacts Under Alternative 1 and the Initial Phase of Alternative 1	Impacts Under Alternative 2 and the Initial Phase of Alternative 2
14	15	Honda Cars of Corona (now Vacation Station RV) 231 South Lincoln Avenue Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Under Alternative 1 with design variations 1a through 1d, this property would be fully acquired. Known soil and groundwater contamination has been reported at this site; therefore, there is a potential for contaminated soil and groundwater to be encountered during construction activities.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, this property would be fully acquired. Known soil and groundwater contamination has been reported at this site. Therefore, there is a potential for contaminated soil and groundwater to be encountered during construction activities.
15	16	Union Oil Service Station No. 621 (now Unocal 76) 304 South Main Street Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Under Alternative 1 with design variations 1a through 1d, two pump islands and USTs may potentially require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 and the Initial Phase of Alternative 2 with design variations 2a through 2h, two pump islands and USTs may potentially require relocation as a result of the TCE and partial acquisition of this property.
16	17	Corona Industrial Electric, Inc. (now T&T Enterprises [Building A] and Food Tech [Building B]) 901 East Third Street Corona, CA	The impacts under the Initial Phase of Alternative 1 are the same as the impacts discussed under the Initial Phase of Alternative 2. Refer to the impacts discussion under Alternative 2. Under Alternative 1 with design variations 1a through 1d, drums and two historical USTs may require relocation as a result of the TCE and partial acquisition of this property.	Under Alternative 2 with design variations 2a through 2h, drums and two historical USTs may require relocation as a result of the TCE and partial acquisition of this property.
17	18	Southern California Edison Substation (south of SR-91 and west of South Sherman Avenue in the City of Corona)	TCEs would be required under Alternative 1 and all its design variations. However, areas that would be disturbed would not be located within areas adjacent to transformers. Therefore, no adverse impacts would occur under Alternative 1 or its design variations.	TCEs would be required under Alternative 2 and under design variations 2a, 2b, 2e, and 2f. However, areas that would be disturbed would not be located within areas adjacent to transformers. Therefore, no adverse impacts would occur under Alternative 2 under these design variations. Alternative 2 with design variations 2c, 2d, 2g, or 2h would require relocation of the SCE substation. The SCE substation (APN 118-101-015) may include, but not be limited to, potential environmental concerns such as PCBs in transformers, PCBs in soils surrounding transformers, and asbestos-containing materials in electric insulators. There is a potential that such materials may be encountered during the process of the substation relocation. However, any impacts as a result of the relocation would be avoided,

Table 3.13.2 Potential Impacts to Alternatives 1 and 2 and Their Design Variations[1]

Figure 3.13-1 Map ID	Figure 3.13-2 Map ID	Site of Potential Concern[2]	Impacts Under Alternative 1 and the Initial Phase of Alternative 1	Impacts Under Alternative 2 and the Initial Phase of Alternative 2
				minimized, or mitigated under environmental documentation within the purview of SCE only. The Department would coordinate with SCE to request preparation of this environmental documentation if Alternative 2 with design variations 2c, 2d, 2g, or 2h is identified for implementation.

Source: *Final Initial Site Assessment* (July 2010) and the *Detailed Site Investigation Report* (December 2011).

[1] There are four design variations for Alternative 1 and eight design variations exist for Alternative 2. If a design variation is not identified within this impact table under the respective Build Alternative, it is assumed that these hazardous waste release sites and/or hazardous waste generators would not impact the Build Alternatives during construction.

[2] These sites are shown on Figures 3.13-1 (Sheets 1–7) and 3.13-2 (Sheets 1–7).

APN = Assessor's Parcel Number
AST = aboveground storage tank
CHHSL = California Human Health Screening Level
Department = California Department of Transportation
DSI = Detailed Site Investigation
ESA = Environmental Site Assessment
ISA = Initial Site Assessment
PCBs = polychlorinated biphenyls
RECs = Recognized Environmental Conditions
SCE = Southern California Edison
SR-91 = State Route 91
TCE = temporary construction easement
UST = underground storage tank

The three bridges containing LBPs will be disturbed during the Alternative 2f Initial Phase and Ultimate Project.

Of the six bridges containing ACMs, the following four bridges would be disturbed during the both the Initial Phase and Ultimate Project for Alternative 2f:

- Prado Overhead (Bridge No. 56-0637) Railing Brace Pads (Spacers)
- East SR-91/North SR-71 Connector Separation (Bridge No. 56-0635) Railing Brace Pads (Spacers)
- West Grand Boulevard Undercrossing (Bridge No. 56-0445 L/R) Railing Brace Pads (Spacers)
- East SR-91/North SR-71 Separation (Bridge No. 56-0587) Railing Brace Pads (Spacers)

In addition, the following bridge would be disturbed only during the Initial Phase of Alternative 2f:

- Serfas Club Drive Undercrossing (Bridge No. 56-0368 L/R) Railing Brace Pads (Spacers)

The following bridge would be disturbed only during the Ultimate Project for Alternative 2f:

- El Cerrito Road Undercrossing (Bridge No. 56-0635) Railing Brace Pads (Spacers)

With the implementation of Measures HW-1 through HW-14, no new temporary adverse impacts related to hazardous wastes/materials (direct or indirect) would occur under the Initial Phase and Ultimate Project under Alternative 2f.

The Initial Phase and Ultimate Project under Alternative 2f would not require the relocation of the SCE substation.

3.13.3.2 Permanent Impacts

Alternatives 1 and 2

Operation and maintenance of the new facilities under the Build Alternatives would not introduce new sources of hazardous materials and wastes, but instead would continue existing exposure to the transport of hazardous materials and wastes associated with vehicles currently using the project segments of SR-91 and I-15. Routine maintenance activities would continue after the completion of the Initial

Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations, and would be required to follow applicable regulations with respect to handling and disposal of potentially hazardous materials.

No new permanent impacts related to hazardous wastes/materials (direct or indirect) beyond existing conditions would occur during operation of the Initial Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations. Therefore, implementation of the Initial Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations would not result in permanent adverse impacts related to hazardous materials and wastes.

No Build Alternative

The No Build Alternative would not change the existing physical environment; therefore, no permanent impacts would occur as a result of the No Build Alternative. As with the Build Alternatives, routine maintenance activities would continue and would be required to follow applicable regulations with respect to handling and disposal of potentially hazardous materials.

3.13.3.3 Temporary Impacts

Alternatives 1 and 2

Based on the findings of the ISA, hazardous wastes/materials may be encountered during excavation and construction activities for the Initial Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations.

As shown in Table 3.13.2, the sites with potential hazardous wastes/materials that may be encountered during construction are all in the City of Corona. As a result, these properties would be impacted during the construction of the Initial Phases of Alternatives 1 and 2 because the majority of the improvements in the City of Corona would occur in the Initial Phases of the Build Alternatives. Any property impacted in the Initial Phases of Alternatives 1 and 2 would be fully mitigated in the Initial Phases based on the measures provided later in this section. Other measures, such as those associated with structures containing asbestos, would be implemented in both the Initial Phases and Ultimate Projects of Alternatives 1 and 2 at the time structures containing hazardous materials are affected.

Multiple industrial and automotive uses located in the disturbance limits of the project would be acquired. Hazardous wastes and materials are routinely present at these sites and would require relocation and/or removal and proper disposal at an off-site facility. Table 3.13.2 provides a summary of the potential impacts that may occur as a

result of construction of Alternatives 1 and 2 and their design variations. As shown in Table 3.13.2, Alternative 1 has one less site that would pose a potential concern during construction than Alternative 2.

As discussed previously, soil and/or groundwater contamination have been reported at the Mobil No. 18-FLM and Honda Cars of Corona sites in the ISA and DSI. Construction of Alternatives 1 and 2 would require partial acquisition of, and a TCE at, the Mobil No. 18-FLM site and full acquisition of the Honda Cars of Corona site. As a result of the acquisitions at these properties or the use of these properties as TCEs, there is a potential for contaminated soils and/or groundwater to be encountered during construction of the Build Alternatives.

Contact with hazardous materials during construction would be minimized through the sampling of suspected hazardous materials prior to construction.

Soils exceeding State criteria for hazardous waste are required to be disposed of at the appropriate State-certified disposal facility. The avoidance, minimization, and mitigation measures described later in Section 3.13.4 would prevent adverse impacts during construction of the proposed project.

Sites commonly affiliated with the release, storage, and/or handling of hazardous wastes/materials include former and active gasoline service stations, former and active industrial uses, and rail facilities. Previously unknown contaminants could be encountered at properties identified to be acquired as part of the Build Alternatives due to poor housekeeping, improperly stored chemicals, or past spills. If not handled properly, these contaminants could affect construction workers and the surrounding environment. Contaminated soils and/or groundwater resulting from hazardous wastes/materials spills associated with any property acquired for the Build Alternatives would be characterized and properly remediated.

As discussed earlier, the Honda Cars of Corona and Mobil No. 18-FLM sites named above were determined to be acquired or used for TCEs for the project. Therefore, Phase I ESAs were conducted for these two sites, and Phase II testing was conducted as part of the DSI for the Honda Cars of Corona site.

As shown in Table 3.13.2, Alternative 2 with design variations c, d, g, or h would require relocation of the SCE substation (APN 118-101-015). The SCE substation may include, but not be limited to, potential environmental concerns such as PCBs in transformers, PCBs in soils surrounding transformers, and ACMs in electric

insulators. There is a potential that such materials may be encountered during the process of the substation relocation. However, any needed environmental documentation for that relocation are within the purview of SCE only and would not be within the purview of either the RCTC or Department to assess or implement. As a result, the Department acknowledges that Alternative 2 with design variations c, d, g, or h would require relocation of the SCE substation and further acknowledges the potential for hazardous wastes/materials to be encountered during that relocation; however, any further analysis of, and identification of mitigation for, adverse effects would be addressed by SCE in its independent environmental documentation for the relocation. Refer to Measure HW-17 in Section 3.13.4, Avoidance, Minimization, and/or Mitigation Measures. Alternative 2f, the Preferred Alternative, would not require relocation of the SCE substation.

Soils along the BNSF railroad tracks within the project disturbance limits are assumed to be impacted by petroleum hydrocarbons, heavy metals, kerosene, chlorinated hydrocarbons, asbestos, herbicides, and pesticides. During grading or excavation within the railroad right-of-way, hazardous concentrations of the contaminants listed above could be released into the environment and affect construction workers.

Due to the historical and current agricultural land uses in the project disturbance limits, potential herbicides and pesticides may have been used for pest and weed control. Hazardous concentrations of herbicides and pesticides may be encountered during grading or excavation of soils that have remained undisturbed. Historical and current agricultural land use parcels located within the disturbance limits that may pose a potential environmental concern are identified in Table 3.13.3.

Table 3.13.3 Agricultural Land Use Parcels with Potential Soil Contamination

APN	Initial Phase of Alternative 1	Alternative 1	Initial Phase of Alternative 2	Alternative 2
Parcels Potentially Used for Historical Agricultural Purposes				
085-071-23	X	X	X	X
353-063-31	X	X	X	X
142-180-002	--	X	--	X
Parcels with Designated Areas of Farmland of Local Importance				
101-250-069	X	X	X	X
277-210-003	--	--	--	X
277-210-008	--	--	--	X

Source: Based on information provided in the *Final Community Impact Assessment* (December 2010) and *Final Initial Site Assessment* (July 2010).
APN = Assessor Parcel Number
-- = No impact

Based on the results of the DSI, low concentrations of dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichoroethylene (DDE), dichlorodiphenyldichloroethane (DDD), chlordanes, and dieldrin were identified in near-surface soils on 11 properties identified in the ISA that were potentially contaminated with pesticides, herbicides, and metals. The detected concentrations were all below the current CHHSLs for both residential and commercial/industrial land uses; therefore, no further investigations are warranted at this time.

Building structures that would be demolished or renovated as part of Alternatives 1 and 2 may contain ACMs, PCBs, LBPs, and/or mercury. Road structures that would be demolished or renovated as part of the project may also contain ACMs and LBP. The disturbance of road or building structures may cause a release of these hazardous materials into the environment if they are not properly handled and removed for disposal. Demolition of any structure containing ACMs requires notification of the SCAQMD as indicated in Section 7-1.01F, Air Pollution Control, and Section 7-1.04, Permits and Licenses, of the Standard Specifications.

As discussed previously, ACM and LBP surveys for impacted road structures were also conducted as part of the *Final Asbestos, Lead-Based Paint, and Hazardous Materials Survey Report*. Twenty-one bridges were sampled for ACMs and LBPs. Of the 21 bridges sampled, 6 bridges contained ACMs and 3 bridges contained LBPs. The 6 bridges that contained ACMs are:

- **Prado Overhead (Bridge No. 56-0637) Railing Brace Pads (Spacers):** Northern and southern bridge railings measuring approximately 40 sf on each bridge (80 sf total)
- **East SR-91/North SR-71 Connector Separation (Bridge No. 56-0635) Railing Brace Pads (Spacers):** Northern railing only, measuring approximately 40 sf
- **West Grand Boulevard Undercrossing (Bridge No. 56-0445 L/R) Railing Brace Pads (Spacers):** Northern railing only, measuring approximately 40 sf
- **El Cerrito Road Undercrossing (Bridge No. 56-0635) Railing Brace Pads (Spacers):** Eastern and western bridge railings measuring approximately 40 sf on each bridge (80 sf total)
- **East SR-91/North SR-71 Separation (Bridge No. 56-0587) Railing Brace Pads (Spacers):** Northern railing only, measuring approximately 40 sf

- **Serfas Club Drive Undercrossing (Bridge No. 56-0368 L/R) Railing Brace Pads (Spacers):** Northern and southern railings measuring approximately 40 sf on each side (80 sf total)

The brace pads observed at the bridges appeared to be in good and/or fair condition at the time of the survey, were not friable, and therefore do not pose a potential for asbestos fiber release unless disturbed. The three bridges that contained LBPs are:

- **Main Street Undercrossing (Bridge No. 56-0448 L/R):** Gray anti-graffiti paint over blue graffiti paint at the northwestern-most column of the bridge
- **McKinley Street Undercrossing (Bridge No. 56-0368):** Light gray anti-graffiti paint at the northern side of the eastern wall
- **Buchanan Street Overcrossing (Bridge No. 56-0368):** Light gray anti-graffiti paint at the northern end of the bridge, at the western keyway and western side of the bridge

Any transformers that would be removed or relocated during construction of the project should be considered a PCB hazard unless tested and confirmed otherwise. Leaking transformers may have contaminated adjacent soils and could affect construction workers and the surrounding environment during construction.

Any wooden utility poles, railroad ties, or other wood treated waste material that would be removed or relocated during project construction should be tested for the presence of wood treatments. Soils adjacent to railroad ties should also be tested for the presence of wood treatments/preservatives. All contaminated soil and wood-treated materials will be considered hazardous waste and be removed and properly disposed of at an off-site at a Class I landfill facility.

Yellow traffic striping and pavement-marking materials (paint, thermoplastic, permanent tape, and temporary tape) that would be removed as part of the project may contain elevated concentrations of metals such as lead. Removal of these materials during project construction could affect construction workers and the surrounding environment.

As stated previously, based on the ADL studies conducted for the project, soils within the project limits to a depth of 3 ft bgs between Gypsum Canyon Road and Magnolia Avenue and 5 ft bgs along eastbound SR-91 starting east of the Weir Canyon Road undercrossing and extending east of the Gypsum Canyon Road undercrossing may be released to the contractor as nonhazardous soils and reused on site without

restrictions. However, if the project design is modified and excavations may occur deeper than 3 ft bgs between Gypsum Canyon Road and Magnolia Avenue and deeper than 5 ft bgs along eastbound SR-91 starting east of the Weir Canyon Road undercrossing and extending east of the Gypsum Canyon Road undercrossing then additional ADL sampling and laboratory analytical testing may be required to characterize those specific additional areas of disturbance. Should off-site disposal be required for soils within the project disturbance limits along SR-91, the soils should be treated as a California hazardous waste. All soil imported on site must be tested and be in conformance with Department Standard Specifications.

No Build Alternative

The No Build Alternative would not result in any construction and therefore would not result in temporary impacts related to hazardous materials and wastes.

3.13.4 Avoidance, Minimization, and/Mitigation Measures

The avoidance and minimization measures below would be required for the Initial Phases and Ultimate Projects under Alternatives 1 and 2 and their design variations, and would substantially reduce adverse impacts related to hazardous materials and hazardous wastes during construction. The approximate cost to conduct the testing, analysis, inspection, and potential contaminant disposal listed below would be $500,000 ($350,000 for the Initial Phase and $150,000 for the Ultimate Project) and would take an estimated 6 months to complete the Initial Phases of Alternatives 1 and 2, and an additional estimated 3 months to complete the testing, analysis, inspections, and potential contaminant disposal for the measures applicable to the Ultimate Projects. In the event the study area identified in this EIR/EIS is revised, additional environmental evaluations and testing may be required. Individual properties will not be acquired for the project before complete testing is done and case closure is achieved to ensure that each property acquired is free of hazardous wastes.

Measure HW-1 applies to the Initial Phases of the SR-91 CIP Build Alternatives.

HW-1 A Phase I ESA was conducted for the Mobil No. 18-FLM site (616 Paseo Grande Street, Corona, California), and a Phase I ESA and Phase II Site Investigation were conducted for the Honda Cars of Corona site (231 South Lincoln Avenue, Corona, California) as part of the DSI, in accordance with ASTM Standard E 1527-05.

The DSI identified Recognized Environmental Conditions (RECs) associated with on-site releases. Based on the results of the DSI, the following measures will be implemented for these two sites of potential environmental concern:

- **Honda Cars of Corona Site:** During final design and prior to any ground disturbance, RCTC's Resident Engineer will require the design/build contractor to consult with regulators, confirm that the final confirmation sampling has been completed at the site, and that contaminant investigation for the site has received regulatory site closure. In addition, prior to the completion of final design, the RCTC Resident Engineer will require the design build/build contractor to properly abandon all monitoring wells and vapor extraction wells on the site in accordance with regulatory requirements.
- **Mobil No. 18-FLM Site:** During final design and prior to any ground disturbance, RCTC's Resident Engineer will require the design/build contractor to conduct further investigation on contaminants in soils on site after a work plan is prepared and additional information is available.

Measures HW-2 through HW-8 will be required for the Initial Phases and Ultimate Projects under the SR-91 Build Alternatives.

HW-2 During final design and prior to any ground disturbance activities, RCTC's Resident Engineer will require the design/build contractor to conduct site investigations for any new release sites that are within the project right-of-way. RCTC's Resident Engineer will require the design/build contractor to conduct these site investigations in compliance with applicable federal, State, and local regulations and in accordance with ASTM Standard E 1527-05. If contaminants are determined to be present during the site investigations, RCTC's Resident Engineer may require the design/build contractor to prepare and implement recommendations in one or more of the following specialized reports: Remedial Actions Options Report, Sensitive Receptor Survey, Human Health/Ecological Risk Assessment, and/or Quarterly Monitoring Report.

HW-3 During final design and prior to any ground disturbance activities, RCTC's Resident Engineer will require the design/build contractor to conduct an ADL study for soil if excavation will exceed 3 ft bgs in unpaved locations adjacent to the State right-of-way between Gypsum Canyon Road and Magnolia Avenue, or 5 ft bgs in unpaved locations in areas where there would be fiber-optic signage along eastbound SR-91 from east of the Weir Canyon Road undercrossing to east of the Gypsum Canyon Road undercrossing.

During construction, if soils within the project disturbance limits along SR-91 are removed off site, RCTC's Resident Engineer will require the design/build contractor to treat the soils as State hazardous waste and to properly dispose of those soils at an appropriate State-certified landfill facility. In addition, during construction, RCTC's Resident Engineer will require the design/build contractor to test all soils imported onto the site as fill. RCTC's Resident Engineer will require the design/build contractor to use only clean soils as imported fill on site.

HW-4 Predemolition asbestos and LBP surveys were conducted for 21 road structures that will be renovated or demolished during project construction.

Based on the results of the ACM surveys of the 21 freeway structures, the SR-91/SR-71 Separation (Bridge No. 56-0587), East SR-91/North SR-71 Connector Separation (Bridge No. 56-0635), Prado Overhead (Bridge No. 56-0637), West Grand Boulevard Undercrossing (Bridge No. 56-0445 L/R), El Cerrito Road Undercrossing (Bridge No. 56-0558 L/R), and Serfas Club Drive Undercrossing (Bridge No. 56-0368 L/R) contain ACMs. Therefore, prior to any disturbance associated with renovation or demolition of these bridges, RCTC's Resident Engineer will require the design/build contractor to have a licensed asbestos contractor properly remove and dispose of asbestos-containing railing brace pads from these structures.

Based on the results of the LBP surveys of the 21 freeway structures, the Main Street Undercrossing (Bridge No. 56-0448 L/R), McKinley Street Undercrossing (Bridge No. 56-0365), and Buchanan Street

Overcrossing (Bridge No. 56-0368) contain LBPs. Therefore, prior to any disturbance associated with renovation or demolition of these bridges, RCTC's Resident Engineer will inform the design/build contractor of the presence of LBPs in those structures. RCTC's Resident Engineer will require the design/build contractor to protect construction workers from exposure to lead dust when disturbing LBP during bridge renovation or demolition activities.

In addition, a hazardous materials survey identified two areas with potential hazardous materials. Based on the results of the visual hazardous materials survey of the bridges, light fixture components and possible lead metal railing braces may pose an additional concern. These components include:

- Light fixtures (some flush-mounted) on the undersides of many of the bridges. At a few of the bridges that cross over the freeway, there are light posts. The light bulbs in these fixtures may contain mercury.
- The Temescal Wash Bridge overhead has some metal braces and wire tension cable at joint locations on the underside of the bridge. While no suspected ACMs were observed or sampled at these locations, the presence of metal washers and spacers, which may contain lead, was noted.
- Soft metal railing brace pads that may be composed of lead metal were observed at the following bridges: Pierce Street Undercrossing (Bridge No. 56-0369 L/R) and Buchanan Street Overcrossing (Bridge No. 56-0368).

Therefore, during final design and prior to any disturbance of these facilities and materials, RCTC's Resident Engineer will inform the design/build contractor of the presence and location of the hazardous materials in the freeway structures described above.

Prior to any disturbance of freeway structures, RCTC's Resident Engineer will require the design/build contractor to have asbestos-containing railing brace pads removed and disposed of by a licensed asbestos abatement contractor. If abated, RCTC's Resident Engineer will require the design/build contractor to remove non-friable ACMs

in accordance with Category II asbestos abatement procedures as defined by the federal Occupational Safety and Health Administration (Fed-OSHA) 29 CFR 1926.1101. However, if mechanical means are utilized for abatement of ACMs, RCTC's Resident Engineer will require the design/build contractor to convert these non-friable materials into a friable state during removal activities and manage these materials under Class I asbestos abatement procedures.

Prior to any disturbance of freeway structures, RCTC's Resident Engineer will require the design/build contractor to properly test any areas that have not been previously tested, and properly remove and dispose of any materials from these structures that exceed California Health and Safety Code criteria for hazardous waste at an appropriate State-certified landfill facility.

During final design and prior to any ground disturbance, demolition, or renovation activities, RCTC's Project Engineer will require the design/build contractor to conduct predemolition asbestos, LBP, PCB, and/or mercury surveys of any buildings that will be renovated or demolished. During construction, RCTC's Resident Engineer will require the design/build contractor to properly remove and dispose of any materials from these structures that exceed California Health and Safety Code criteria for hazardous waste at an appropriate State-certified landfill facility.

HW-5 During final design and prior to any ground disturbance activities, RCTC's Resident Engineer will require the design/build contractor to conduct inspections for potential PCBs in utility pole-mounted transformers that will be relocated or removed as part of the project.

RCTC's Resident Engineer will require the design/build contractor to consider leaking transformers a PCB hazard unless tested and confirmed otherwise, and to handle them accordingly.

HW-6 During construction, RCTC's Resident Engineer will require the design/build contractor to test, remove, and dispose of any yellow traffic striping and pavement marking materials in accordance with the Department's Construction Manual, Chapter 7, Section 106.

HW-7 During final design and prior to any dewatering activities, RCTC's Resident Engineer will require the design/build contractor to conduct additional coordination with the Riverside County Department of Environmental Health when groundwater dewatering will occur in the vicinity of contaminated soils or contaminated groundwater sites.

HW-8 During final design and prior to any ground disturbance activities, RCTC's Project Engineer will require the design/build contractor to sample soil adjacent to the BNSF railroad tracks that will be disturbed during construction for the presence of petroleum hydrocarbons, metals, solvents, and other potential contaminants (e.g., PNAs, kerosene, ACMs, chlorinated hydrocarbons, pesticides, and herbicides). That testing will determine whether the soils require special handling and disposal during construction.

During construction, RCTC's Resident Engineer will require the design/build contractor to properly dispose of all soils exceeding the criteria for State or federal hazardous waste at an appropriate State-certified landfill facility.

Measures HW-9 through HW-14 will be required for the Initial Phases and Ultimate Projects under the SR-91 Build Alternatives.

HW-9 Prior to the start of construction, RCTC's Project Engineer will require the design/build contractor to prepare a site-specific Health and Safety Plan (HASP) by a certified industrial hygienist. The HASP will be based on evaluation of proposed construction activities, the potential hazards identified in the Phase I ESA and Phase II testing, and any future assessments prepared for the project. The HASP will outline specific procedures for encountering expected and unexpected contaminants. It will include safe work practices, contaminant monitoring, the need for personal protective equipment, emergency response procedures, and safety training requirements to protect construction workers and third parties working on site. The HASP will be in compliance with the requirements of 29 CFR 1910 and 1926 and all other applicable federal, State, and local regulations and requirements.

During construction, RCTC's Resident Engineer will require the design/build contractor to implement the requirements in the HASP.

HW-10 Prior to the start of construction, RCTC's Project Engineer will require the design/build contractor to prepare a soils and groundwater Contaminant Management Plan (CMP). The CMP will include procedures for contaminant monitoring and identification as well as temporary storage, handling, treatment, and disposal of hazardous waste and materials in accordance with applicable federal, State, and local regulations and requirements.

Prior to and during construction, RCTC's Resident Engineer will require the design/build contractor to implement the soils and groundwater CMP.

HW-11 Prior to the start of construction, RCTC's Project Engineer will require the design/build contractor to prepare a Construction Contingency Plan (CCP) in accordance with the Department's Unknown Hazards Procedures for Construction. The CCP will include provisions for emergency response in the event that unidentified USTs, hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes are discovered during construction activities. The CCP will address UST decommissioning, field screening, contaminant materials testing methods, mitigation and contaminant management requirements, and health and safety requirements for construction workers.

RCTC's Resident Engineer will require the design/build contractor to implement the CCP during all construction activities.

During construction, RCTC's Resident Engineer will require the design/build contractor to cease work immediately if an unexpected release of hazardous substances is found in reportable quantities. If an unexpected release of hazardous substances is found in reportable quantities, RCTC's Resident Engineer will require the design/build contractor to notify the National Response Center by calling 1-800-424-8802. RCTC's Resident Engineer will require the design/build contractor to perform cleanup of unexpected releases under the appropriate federal, State, or local agency oversight.

HW-12 RCTC's Resident Engineer will require the design/build contractor to notify Underground Service Alert (USA) at least 2 days prior to excavation by calling 811 to require that all utility owners within the project disturbance limits identify the locations of underground transmission lines and facilities.

HW-13 RCTC's Resident Engineer will require the design/build contractor to submit the fees to SCAQMD at least 10 days prior to proceeding with any demolition or renovation of a structure (refer to SCAQMD Rule 1403). RCTC's Resident Engineer will require the design/build contractor to adhere to the requirements of SCAQMD Rule 1403 during renovation and demolition activities.

HW-14 During final design and prior to any ground disturbance, RCTC's Resident Engineer will require the design/build contractor to test all wooden utility poles, railroad ties, and other treated wood waste material that will be removed and disposed of as part of the project for wood treatments/preservatives. RCTC's Resident Engineer will also require the design/build contractor to test soils surrounding railroad ties for wood treatments/preservatives.

Prior to and during construction, RCTC's Resident Engineer will require the design/build contractor to properly dispose of all treated wood waste, as required by the Alternative Management Standards for Wood Treated Waste in Section 67386.6(a)(2)(B) 3 of the CCR. In addition, RCTC's Resident Engineer will require the design/build contractor to require that any personnel who come in contact with treated wood waste or contaminated soils to follow all applicable requirements under Section 67386.6(a)(2)(B) 3 of the CCR and be trained in the proper identification, disposal, and safe handling of treated wood waste and contaminated soils.

Alternative 2f, the Preferred Alternative, will not require the relocation of the SCE substation; therefore, Measure HW-15, below, does not apply to Alternative 2f. Measure HW-15 would apply to the Initial Phase of Alternative 2 with design variations c, d, g, or h only. As a result, this measure is included in this section but is not included in Appendix E, Environmental Commitments Record, which focuses on Alternative 2f.

HW-15 If Alternative 2 with design variations c, d, g, or h is selected as the Preferred Alternative, RCTC's Project Manager will coordinate with SCE to request SCE's preparation of environmental documentation for relocation of the SCE substation (APN 118-101-015) prior to completion of right-of-way acquisition for the project.

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

FIGURE 3.13-1
(Page 1 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-15-35.64/45.14
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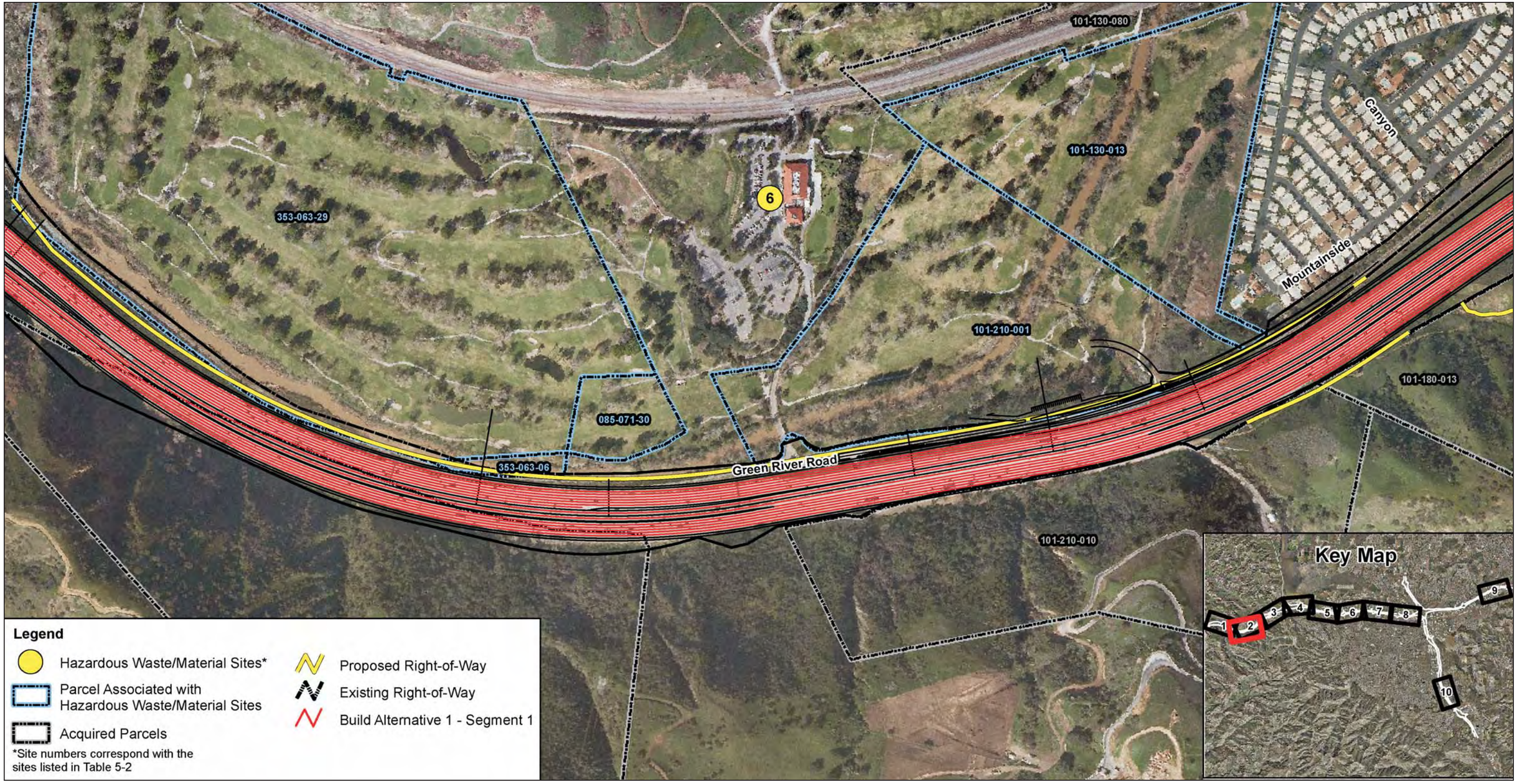

FIGURE 3.13-1
(Page 2 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

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FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

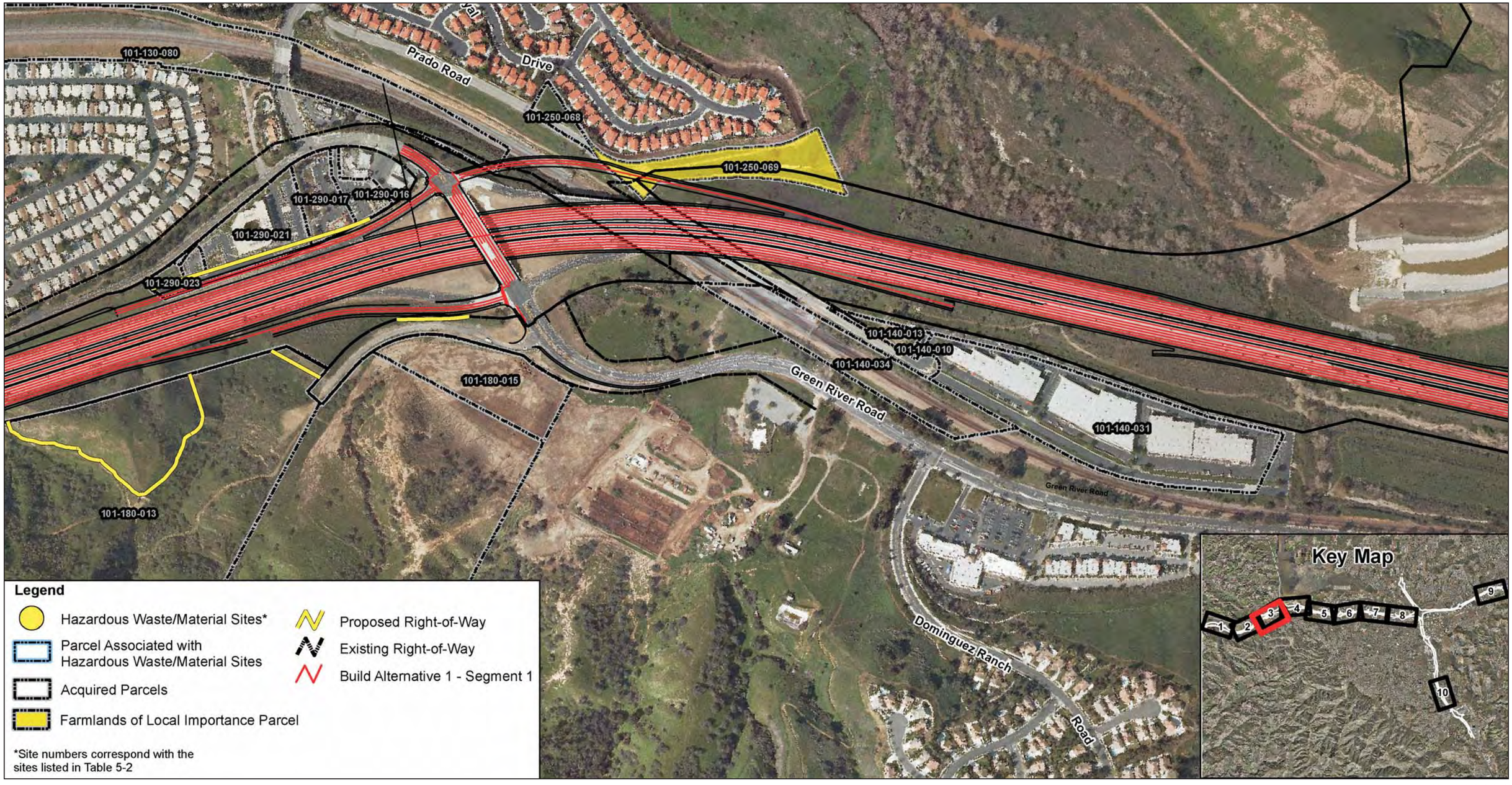

FIGURE 3.13-1
(Page 3 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 3 of 10] (3/28/2011)

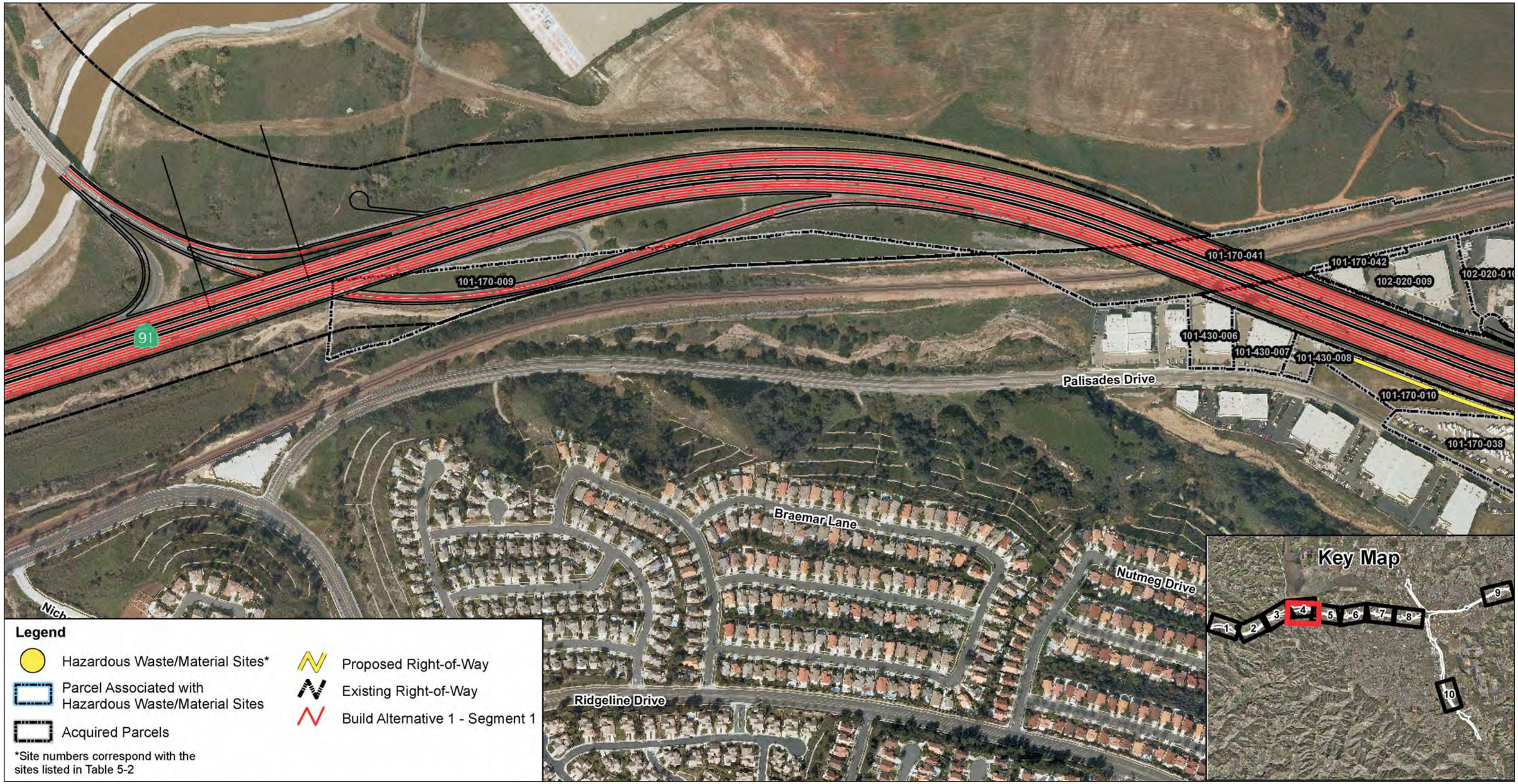

FIGURE 3.13-1
(Page 4 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-15-35.64/45.14
EA 0F540

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

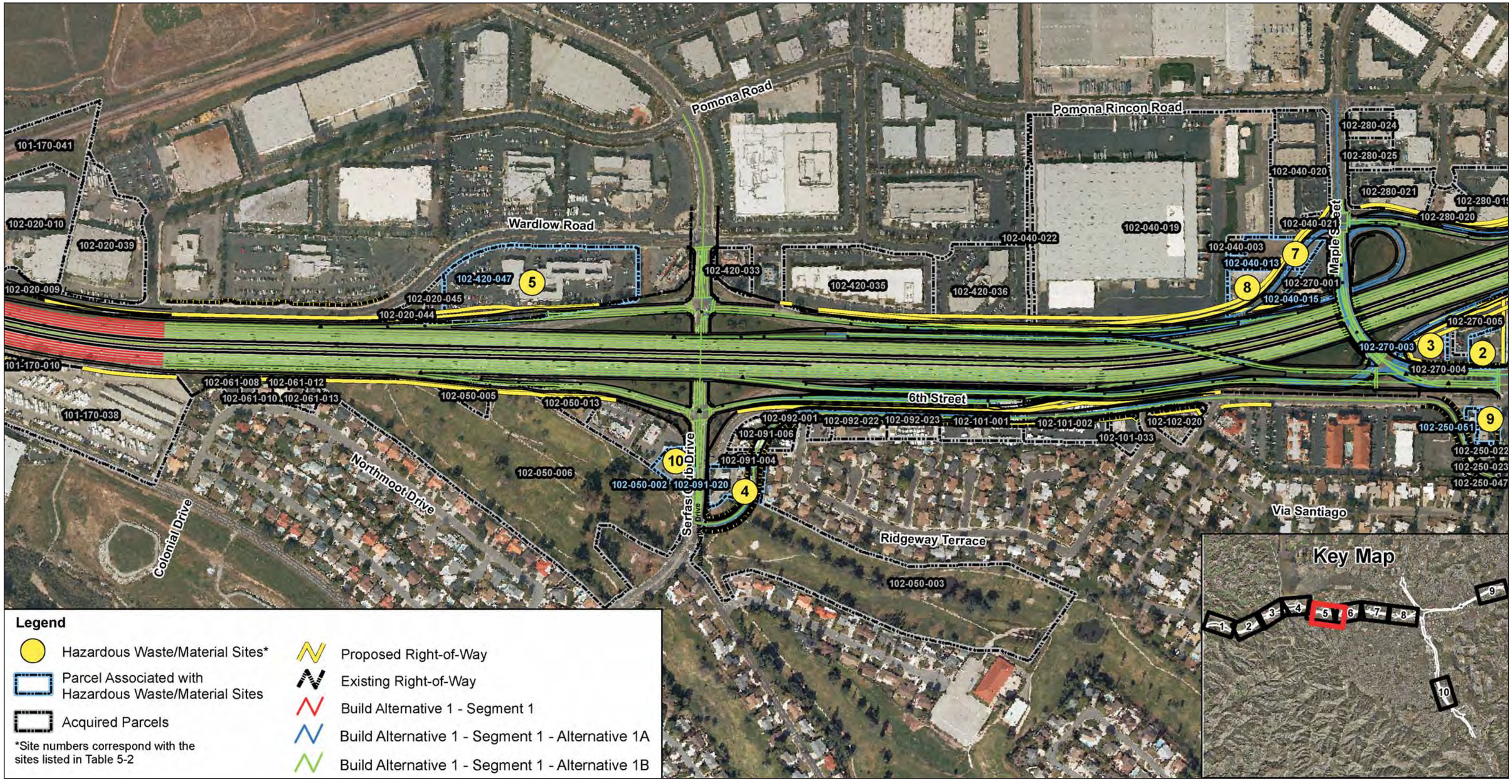

FIGURE 3.13-1
(Page 5 of 10)

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 5 of 10] (3/28/2011)

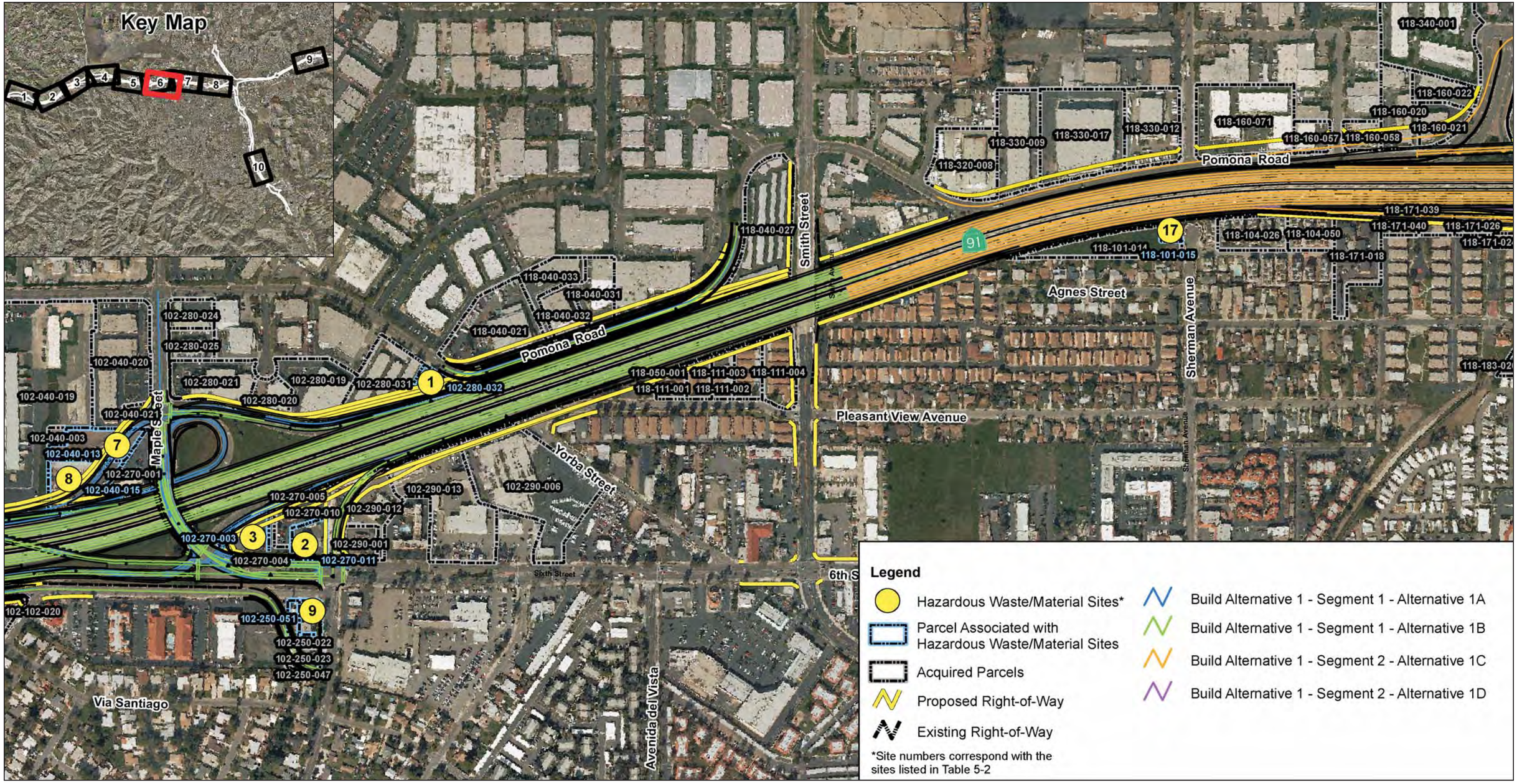

FIGURE 3.13-1
(Page 6 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

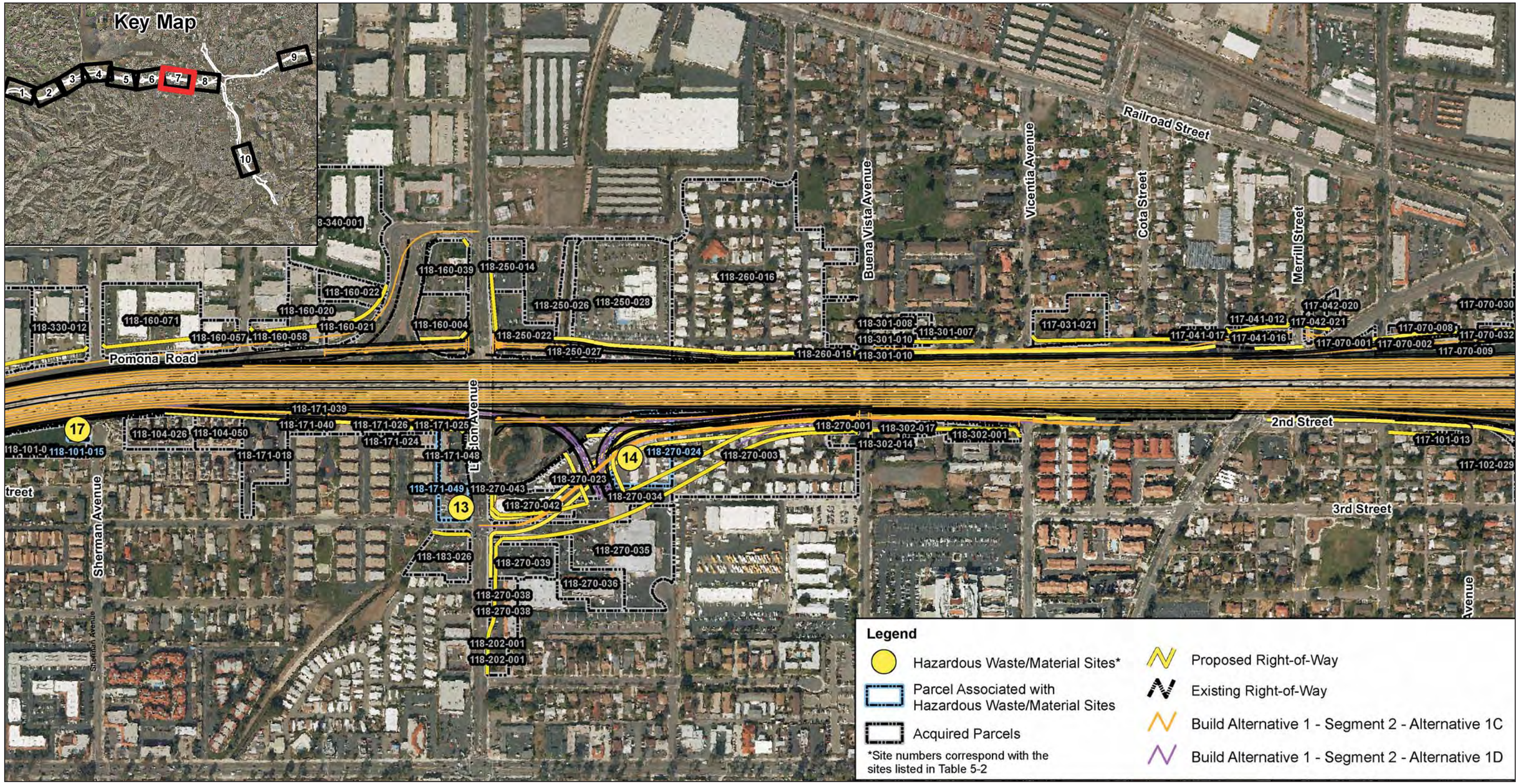

FIGURE 3.13-1
(Page 7 of 10)

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SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 7 of 10] (3/28/2011)

FIGURE 3.13-1
(Page 8 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 8 of 10] (3/28/2011)

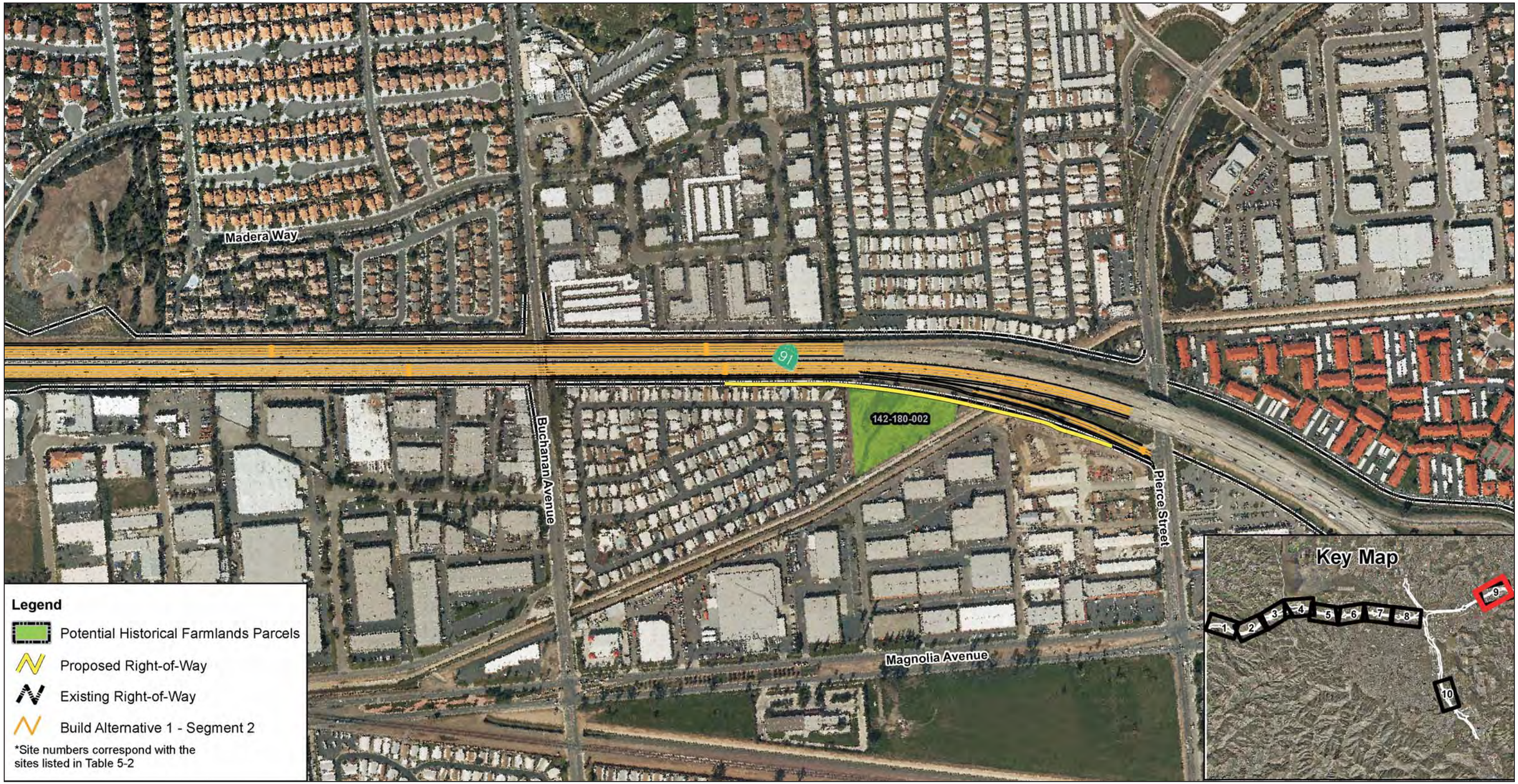

FIGURE 3.13-1
(Page 9 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

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08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

FIGURE 3.13-1
(Page 10 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 1

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 10 of 10] (3/28/2011)

FIGURE 3.13-2
(Page 1 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
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SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

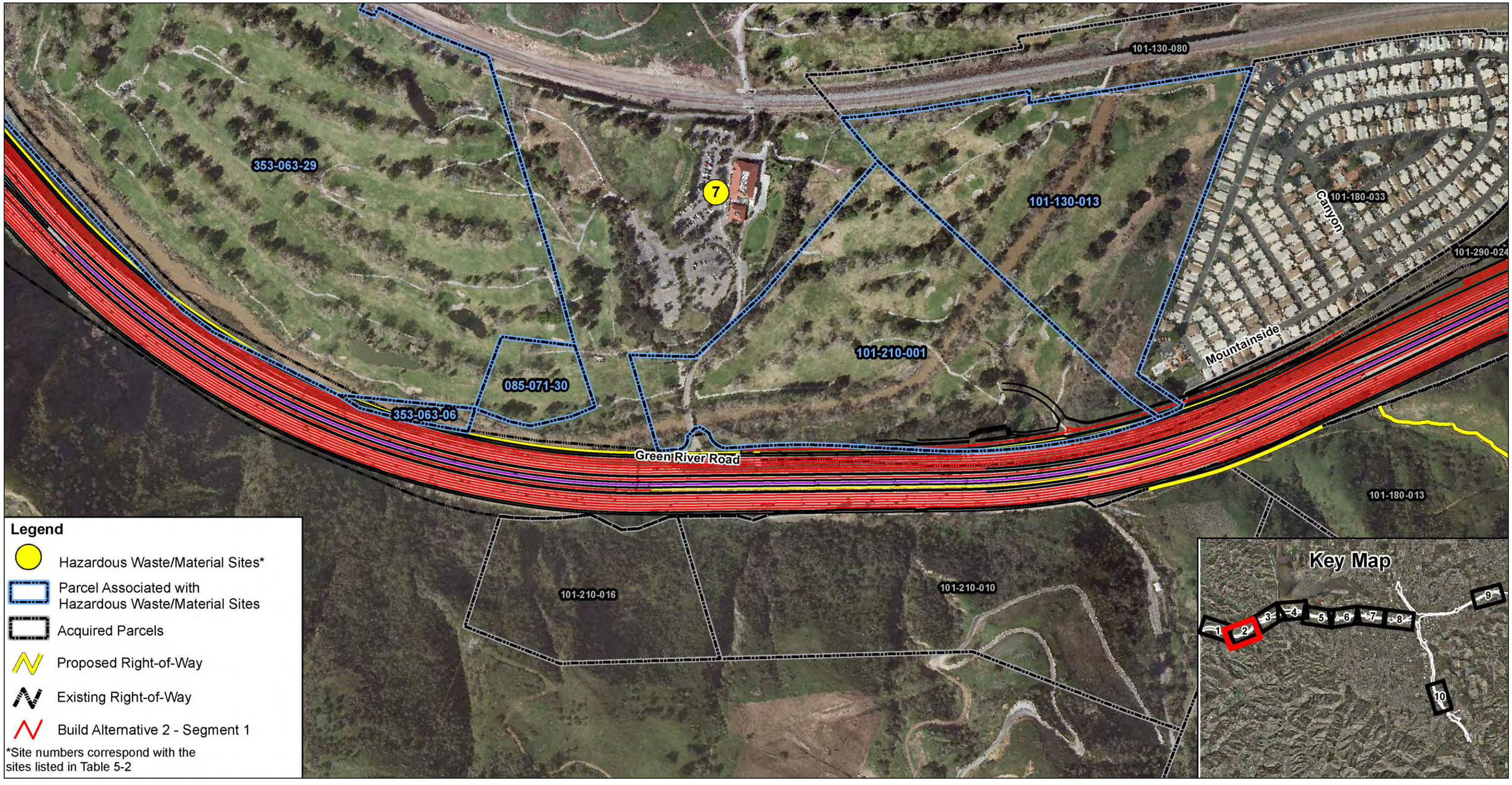

FIGURE 3.13-2
(Page 2 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

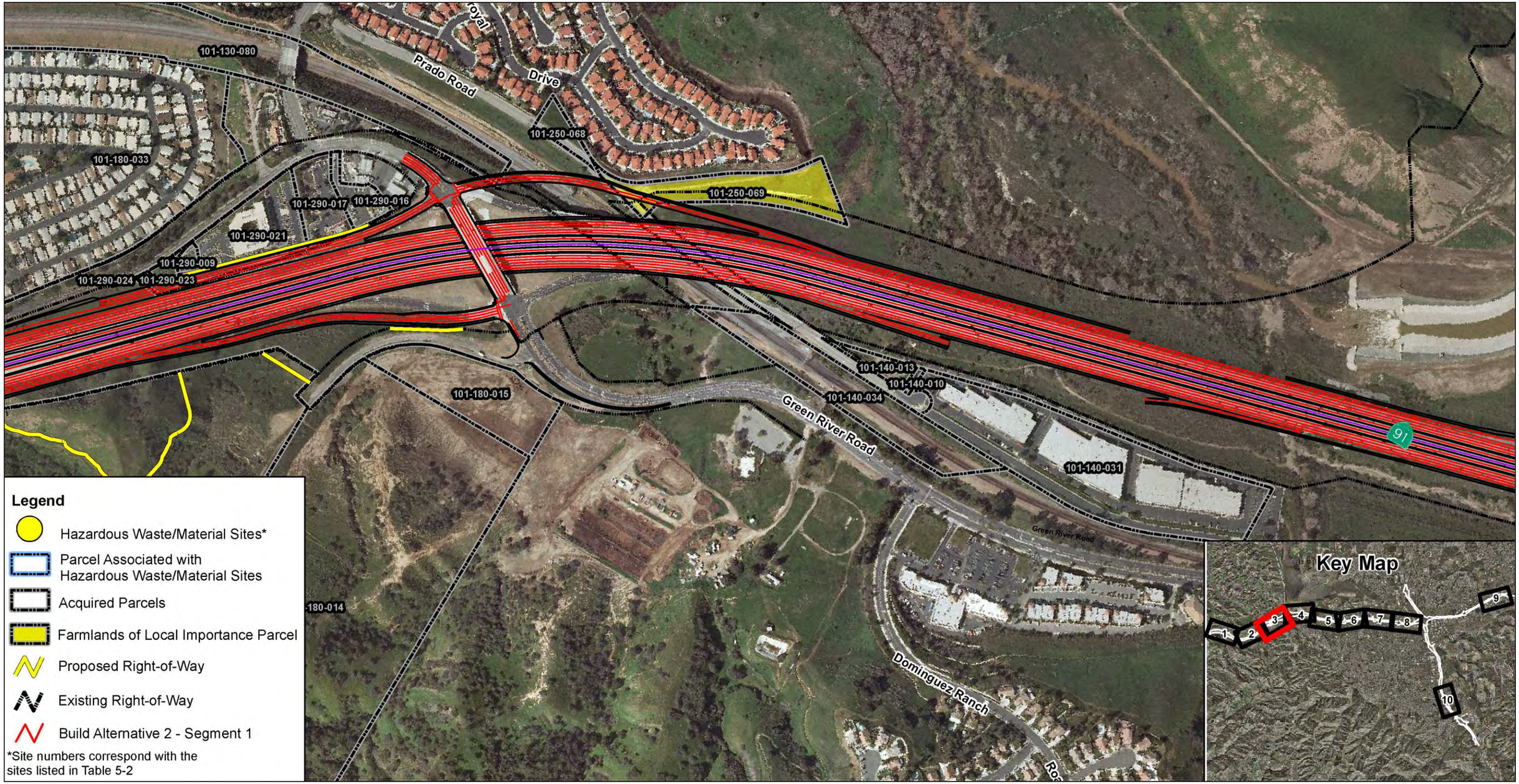

FIGURE 3.13-2
(Page 3 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

FIGURE 3.13-2
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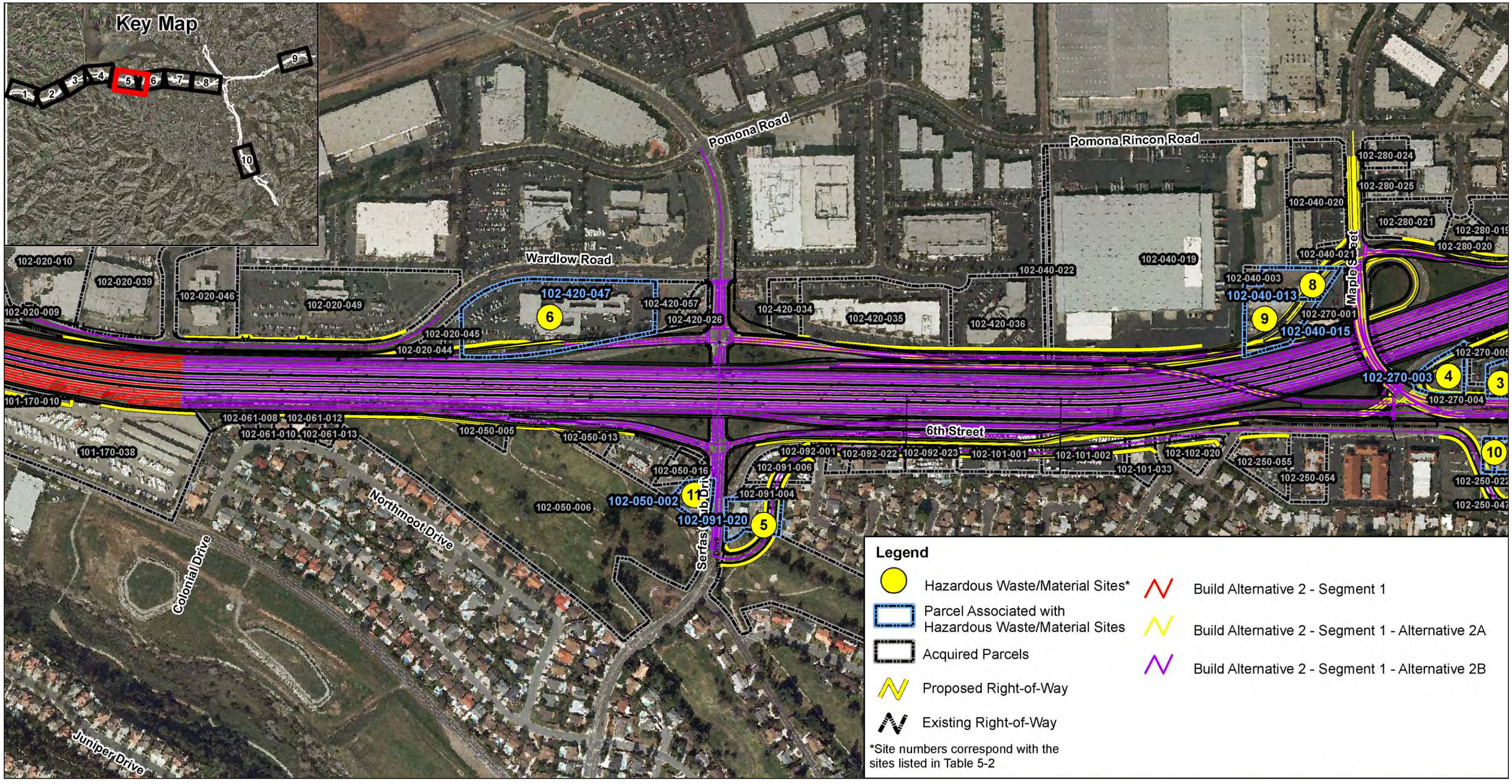
State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540



SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

FIGURE 3.13-2
(Page 5 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 5 of 10] (3/28/2011)

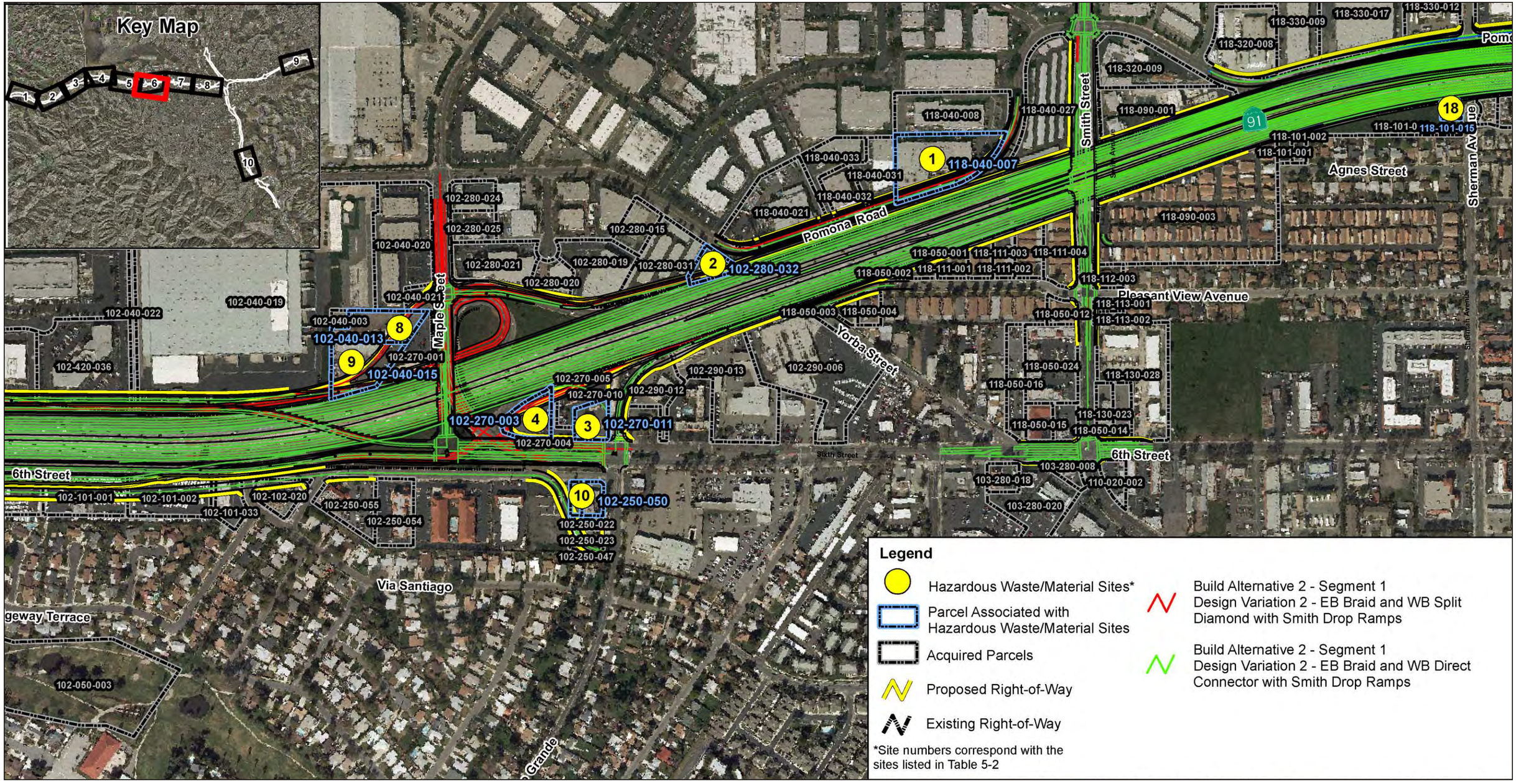


FIGURE 3.13-2
(Page 6 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 6 of 10] (3/28/2011)

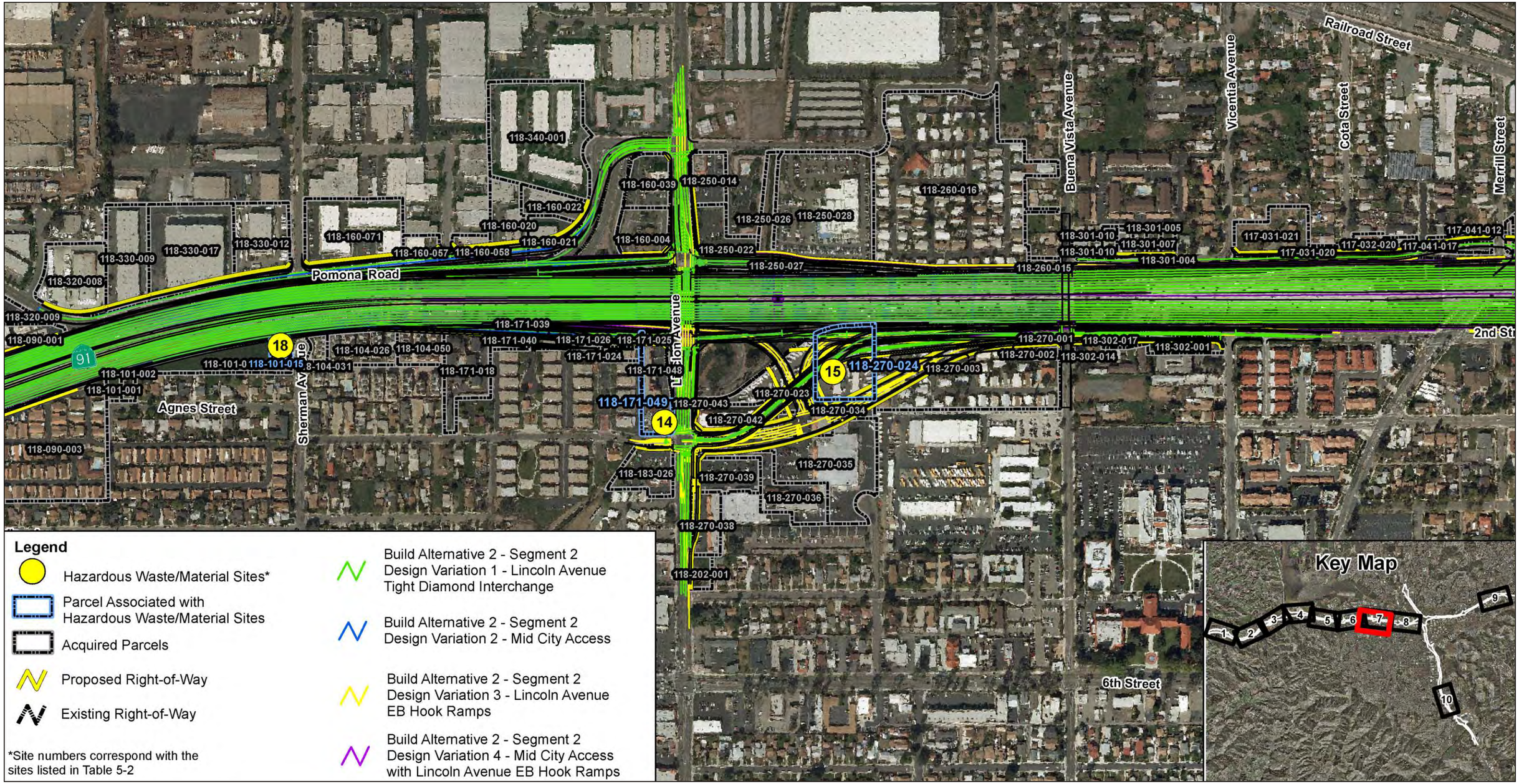


FIGURE 3.13-2
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State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

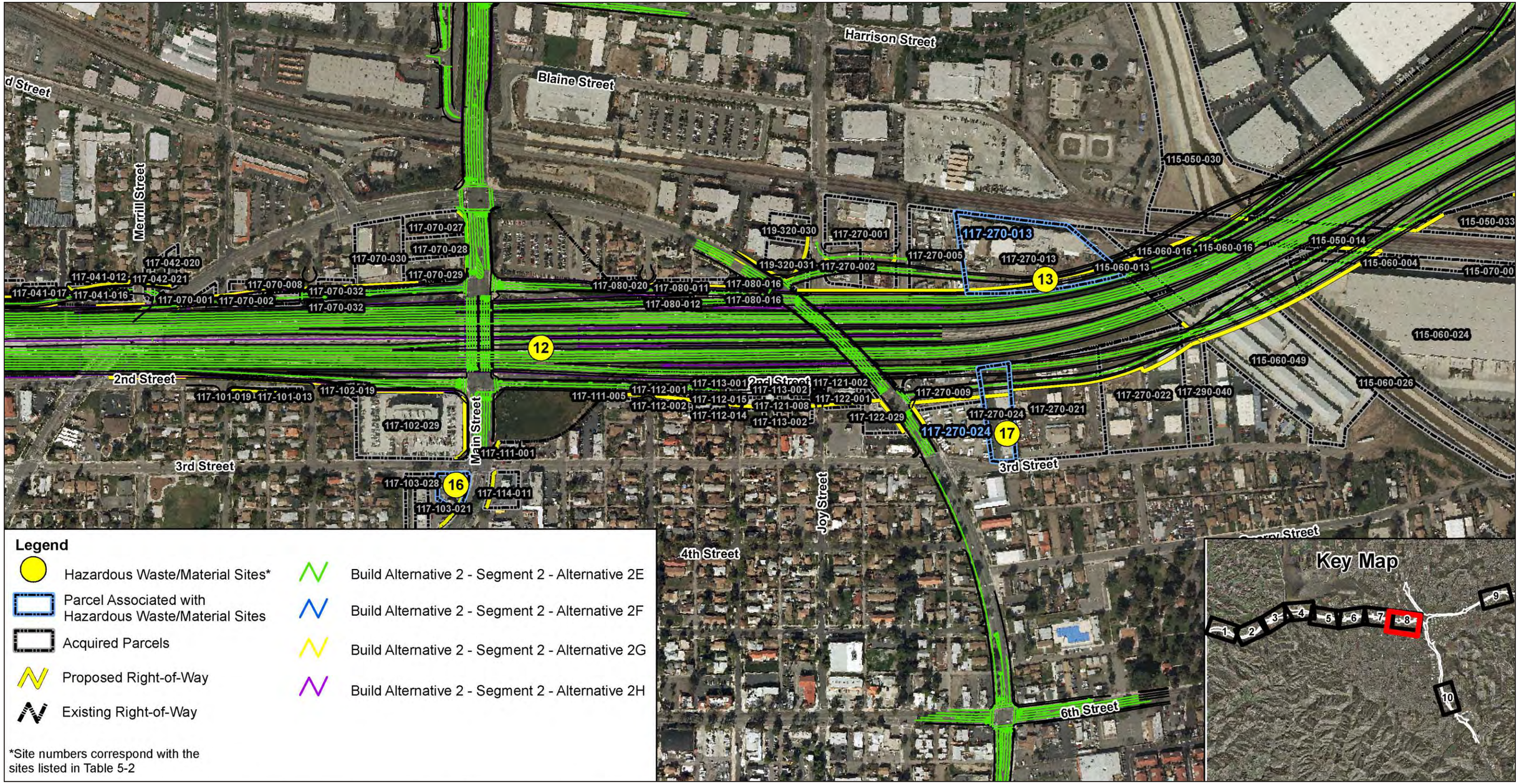

FIGURE 3.13-2
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State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

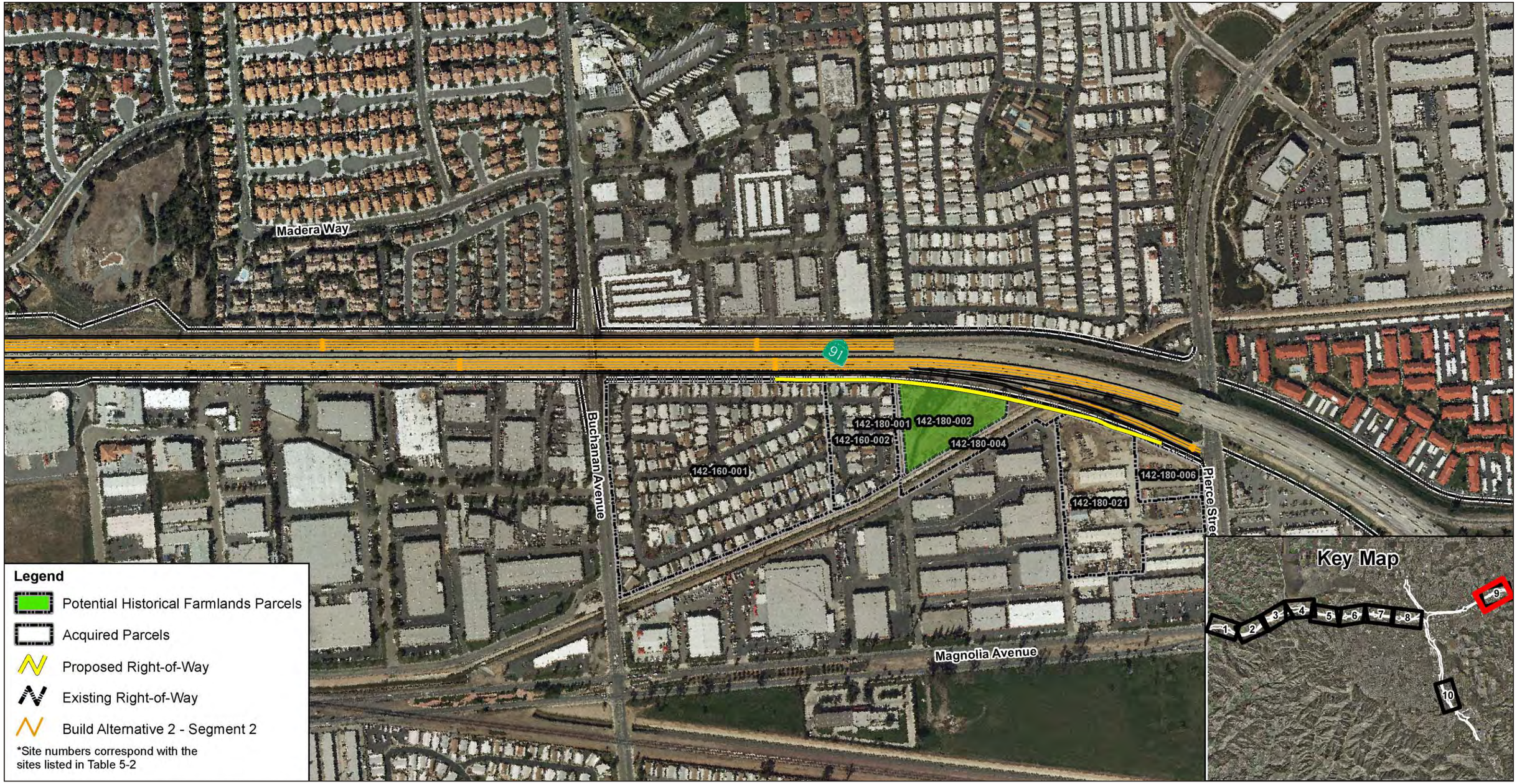

FIGURE 3.13-2
(Page 9 of 10)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

N

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 9 of 10] (3/28/2011)

FIGURE 3.13-2
(Page 10 of 10)

0 207.5 415
FEET

SOURCE: Final Initial Site Assessment (July 2010), PB Americas, Inc. (2010)

State Route 91 Corridor Improvement Project

Hazardous Waste/Materials Sites
of Potential Concern for Alternative 2

12-Ora-91-R14.43/R18.91
08-Riv-91-R0.00/R13.04
08-Riv-15-35.64/45.14
EA 0F540

I:\PAZ0701\G\Haz Waste\Fig 3.1-2_Haz-Waste.cdr [Page 10 of 10] (3/28/2011)