INTERSTATE 5 MANAGED LANES PROJECT

(RED HILL AVENUE TO ORANGE COUNTY/LOS ANGELES COUNTY LINE)

12-Ora-5 – PM 28.9/44.4, 26.9, 27.9, 28.4
07-LA-5 – PM 0.1, 0.3, 0.6, 1.7
12-Ora-55 – PM 7.4, 8.0, 8.7, 8.9, 9.2, 9.7 9.9, 10.2
12-Ora-57 – PM 11.0, 11.3, 11.9, 12.5, 12.7, 12.9, 13.5
12-Ora-91 – PM 0.4, 0.7, 1.1, 1.3, 1.4, 1.6, 1.8, 2.0, 2.2, 2.6, 2.8, 3.4

EA 12-0Q950

PALEONTOLOGICAL IDENTIFICATION REPORT AND PALEONTOLOGICAL EVALUATION REPORT (PIR/PER)

Prepared for

Caltrans

CALTRANS DISTRICT 12 ORANGE COUNTY

April 2023

Paleontological IDENTIFICATION Report and Paleontological Evaluation Report (PIR/PER) (PIR/PER)

Interstate 5 Managed Lanes Project

(Red Hill Avenue to Orange County/Los Angeles County Line)

Counties of Orange and Los Angeles, California
Cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs

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EA 12-0Q950

April 2023

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Acronyms and Abbreviations

Abbreviation	Definition
BMP	Best Management Practice
BRT	Bus Rapid Transit
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CMS	changeable message signs
CSMP	Construction Site Monitoring Program
EL	Express Lane
ETC	Electronic Toll Collection
FHWA	Federal Highway Administration
GP	general-purpose
HOV	high-occupancy vehicle
I	Interstate
LOS	level of service
LRTP	Long Range Transportation Plan
Ma	million years ago
ML	managed lane
NALMA	North American Land Mammal Age
NEPA	National Environmental Policy Act
NHMLAC	Natural History Museum of Los Angeles County
NPDES	National Pollutant Discharge Elimination System
OC/LA	Orange/Los Angeles
OCTA	Orange County Transportation Authority
PER	Paleontological Evaluation Report
PIR	Paleontological Identification Report
PM	Post Mile
PMP	Paleontological Mitigation Plan
PMR	Paleontological Mitigation Report
PRC	Public Resources Code
Project	Interstate 5 Managed Lanes Project (Red Hill Avenue to Orange County/Los Angeles County Line)
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy

Abbreviation	Definition
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SDNHM	San Diego Natural History Museum
SER	Standard Environmental Reference
SR	State Route
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
T&R	Traffic and Revenue
TMP	Transportation Management Plan
TSM/TDM	Transportation System Management/Transportation Demand Management
USC	United States Code
USGS	United States Geological Survey

1. INTRODUCTION

The California Department of Transportation (Caltrans) District 12, in cooperation with Caltrans District 7, and the Federal Highway Administration (FHWA), proposes the Interstate 5 (I-5) Managed Lanes Project (Red Hill Avenue to Orange County/Los Angeles County Line) (Project). The improvements would modify the existing high-occupancy vehicle (HOV) lanes within the proposed Project limits to address operational deficiencies. Four preliminary alternatives, including the No Build Alternative and three Build Alternatives, are under consideration. The project improvements include implementing managed lanes (MLs) improvements in each direction on I-5 between Red Hill Avenue and the OC/LA County line. The project traverses the cities of Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, and La Mirada. Caltrans is the Lead Agency under the National Environmental Policy Act of 1969 (NEPA) and the California Environmental Quality Act (CEQA).

1.1 Purpose

The purpose of this Project is to improve the overall movement of people and goods along this section of I-5 by:

- Improving the ML network's operations;
- Improving mobility and trip reliability;
- Maximizing person throughput by facilitating the efficient movement of bus and rideshare users; and
- Applying technology to help manage traffic demand.

1.2 Need

The need for the Project is the following deficiencies being experienced by motorists along the existing I-5 high-occupancy vehicle (HOV) lanes between Red Hill Avenue and the OC/LA County line:

- HOV lane degradation (does not meet the federal performance standards);
- Demand that exceeds existing capacity; and
- Operational deficiencies.

1.3 Project Location

The Project extends along I-5 from Red Hill Avenue (Post Mile [PM] 28.9) to the Orange County/Los Angeles (OC/LA) County line (12-ORA-5 PM 44.4) and traverses the cities of Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs. Figure 1 illustrates the location and regional vicinity of the Project, as depicted on the United States Geological Survey (USGS) *Anaheim, California; Los Alamitos, California; Orange, California; Tustin, California;* and *Whittier, California* 7.5-minute topographic quadrangle maps in Township 3 South, Range 11 West, Sections 26, 27, 35, and 36; Township 4 South, Range 11 West, Sections 1–3; Township 4 South, Range 10 West, Sections 4–9, 16, 22–27, and 36; Township 5 South, Range 10 West, Section 1; and Township 5 South, Range 9 West, in unsectioned land of the

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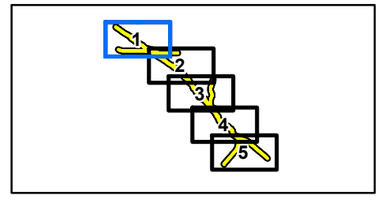
Project Location



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SOURCE: USGS 7.5' Quad - *Whittier* (1981), *Los Alamitos* (1981), *Anaheim* (1981), *Orange* (1981), *Tustin* (1981), CA

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FIGURE 1
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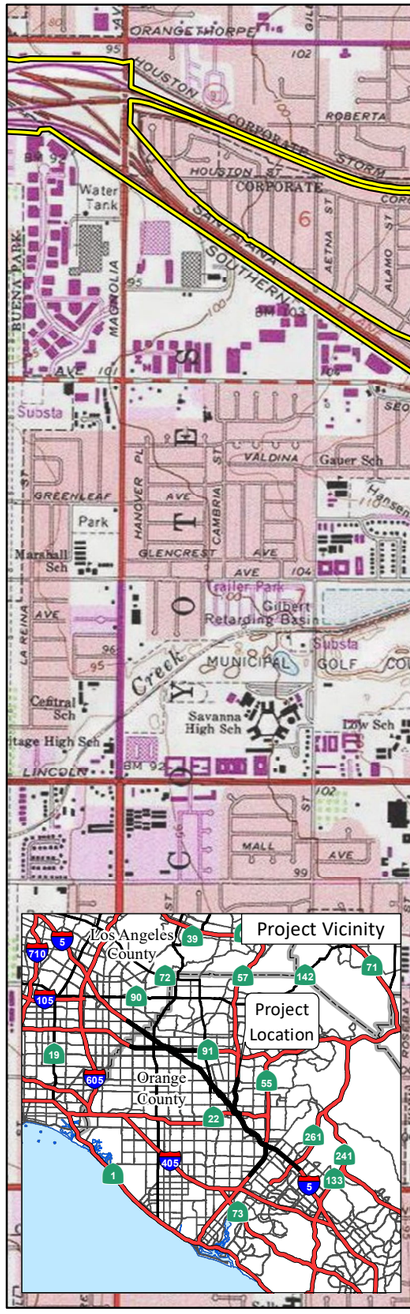

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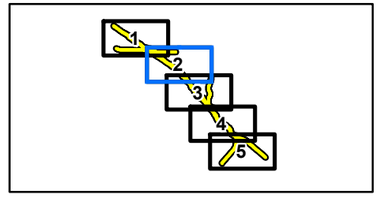

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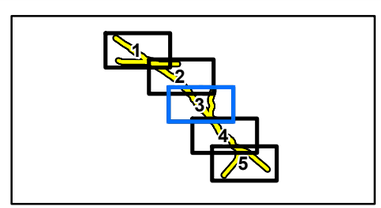

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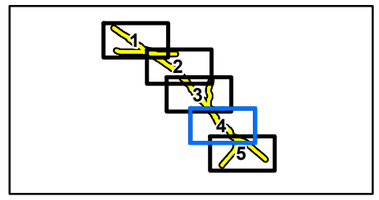

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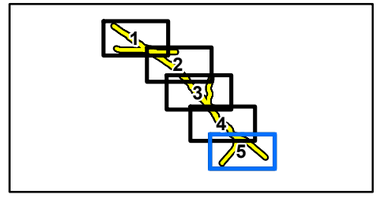

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EA No. 0Q950

Rancho Santiago de Santa Ana Land Grant, San Bernardino Baseline and Meridian (USGS, 1981a, 1981b, 1981c, 1981d, 1981e).

1.4 Alternative 1—No Build Alternative

Alternative 1, the No Build Alternative, does not include improvements to the existing lane configurations for I-5. Under the No Build Alternative, no additional roadway improvements would occur. This alternative includes other projects on the financially constrained project list in the adopted Southern California Association of Governments (SCAG) 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) within the proposed Project limits on I-5 and the Preferred Plan in the Orange County Transportation Authority (OCTA) 2018 Long-Range Transportation Plan (LRTP) within the proposed Project limits.

1.5 Alternative 2—Build Alternative: Modify Existing HOV 2+ Lanes to HOV 3+ Lanes

Alternative 2 would maintain the existing lane configurations for I-5 with a modification of the minimum HOV-lane occupancy requirement from two-plus (2+) to three-plus (3+) passengers within the current HOV system in each direction, between Red Hill Avenue and the OC/LA County line. As a result of this increase in the occupancy requirement and improved trip reliability, through the Transportation System Management/Transportation Design Management (TSM/TDM) elements, it would promote and encourage public and private transit such as Bus Rapid Transit (BRT) and ridesharing. Under this alternative, no additional roadway improvements would occur. Additionally, two proposed park-and-ride facilities are being evaluated as part of Alternative 2 and would be constructed within the existing freeway right-of-way. Sign replacement and pavement delineation would also be implemented to meet the latest California Manual on Uniform Traffic Control Devices (CA MUTCD) standards.

1.5.1 Ramps

Physical modifications of the ramp geometry will not be required where the current HOV system is converted from 2+ to 3+ passengers; however, replacement of signage at direct-access ramps will be required accordingly for Alternative 2.

1.5.2 Impact to Structures

Alternative 2 would not impact existing structures or create new structures (e.g., bridges) as part of its proposed design.

1.5.3 Drainage and Water Quality

Drainage management measures would be included in Alternative 2 to address the impacts to drainage patterns associated with new construction of the park-and-ride facilities. Proposed major drainage design features would include: maintaining existing drainage flow patterns and incorporating existing drainage systems to the maximum extent practicable; providing drainage facilities that would accommodate future improvements; and providing drainage facilities to prevent and/or reduce substantial erosion or siltation on or off site.

Some of the existing systems may be abandoned or removed to accommodate construction of Alternative 2. Best Management Practices (BMPs) would be included to address stormwater requirements and treatment of the added impervious area created by Alternative 2.

1.5.4 Tolled Components

Alternative 2 would not include the implementation of any new tolling components as part of the proposed design.

1.5.5 Transportation Management Plan

Alternative 2 may be implemented in phases and/or segments and procured under one or more contracts, including the option of using design/build. Construction-related delays are anticipated during construction of Alternative 2.

In accordance with Caltrans Deputy Directive (60-R2), a Transportation Management Plan (TMP) has been prepared for Alternative 2 which includes strategies that, when implemented, would minimize Project-related construction and circulation impacts.

It is anticipated that lane closures would be required, and it may be necessary to temporarily close on/off-ramps and connectors during construction of Alternative 2.

Some of the key elements recommended in the TMP include the following: Public Information/ Public Awareness Campaign; Motorist Information Strategies; Incident Management; Construction Strategies; Demand Management; and Alternate Route Strategies.

Detailed detour plans, staging plans, and traffic handling plans would also be developed during the final design phase.

1.5.6 Construction Staging

With Alternative 2, there would be no stage construction impacts associated with construction activities within the freeway mainline, as construction activities are limited to signage replacement and pavement delineators along the freeway mainline. Construction staging is anticipated for the development of the park-and-ride facilities to minimize impacts to existing traffic.

Stage construction concept plans are currently being developed. Should Alternative 2 be selected as the Preferred Alternative, detailed stage construction and detour plans would be developed during final design. Detailed stage construction plans and traffic handling plans would also be developed in the final design stage.

1.5.7 Right-of-Way Data

Additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements) is not anticipated for the construction of Alternative 2.

1.5.8 Utility and Other Owner Involvement

Alternative 2 is not expected to have any impacts to surrounding utilities, as there are no proposed utility relocations associated with its proposed design.

1.5.9 Nonstandard Design Features (Design Standards Risk Assessment)

Alternative 2 would not impact existing nonstandard design features or create new nonstandard design features as part of the proposed design.

1.5.10 Sound Walls

Alternative 2 would not impact any existing sound walls as part of the proposed design.

1.5.11 Transportation System Management/Transportation Demand Management

Alternative 2 would not implement any new TSM/TDM measures or features beyond the ramp metering, changeable message signs (CMS), cameras, and traffic speed detection systems that already exist within the proposed Project limits.

1.5.12 Highway Planting

Existing planting and irrigation systems removed during construction of the Alternative 2 park-and-ride facilities would be replaced wherever space is available. Generally, existing vegetation in and around the park-and-ride areas would be replanted to the maximum extent practicable.

Should Alternative 2 be selected as the Preferred Alternative, planting design would be provided during the final design phase; would consider safety, maintainability, and aesthetic compatibility with adjacent urban communities; and would not deviate significantly from the existing planting theme.

1.5.13 Erosion Control

Alternative 2 would be required to comply with the terms and conditions in accordance with Attachment D of the *NPDES Statewide Construction Stormwater General Permit* (State Water Resources Control Board, 2022), which includes a written site-specific Construction Site Monitoring Program (CSMP). The CSMP would include implementation of specific stormwater effluent monitoring requirements to ensure that the implemented BMPs are effective in preventing discharges from exceeding any of the water quality standards.

Erosion control measures would be implemented during construction as well as after completion of Alternative 2 construction in accordance with the requirements of the Santa Ana (Region 8) and Los Angeles (Region 4) Regional Water Quality Control Boards (RWQCBs) and the current statewide National Pollutant Discharge Elimination System (NPDES) Construction General Permit. During construction, potential construction site BMPs, such as temporary fiber rolls, temporary mulch, drainage inlet protection, concrete washout facilities, street sweeping, and hydroseeding, would be used to minimize erosion. All finished slopes would receive replacement planting or vegetative erosion control application.

Should Alternative 2 be selected as the Preferred Alternative, specific erosion control measures and construction site BMP design would be developed during final design. Preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) would be required during construction.

1.6 Alternative 3—Build Alternative: Convert Existing HOV Lanes to Express Lanes

Alternative 3 would convert the existing HOV lane to an Express Lane (EL) in each direction between Red Hill Avenue and State Route (SR) 55; convert two existing HOV lanes to ELs in each direction between SR-55 and SR-57; and convert the existing HOV lane to an EL in each direction from SR-57 to the OC/LA County line. The typical cross-section consists of a 12-foot-wide EL, a 2- to 4-foot buffer, 12-foot-wide general-purpose (GP) lanes, 12-foot-wide auxiliary lanes, a 4- to 26-foot-wide inside shoulder, and a 10-foot-wide outside shoulder and would be provided to accommodate the EL. One 12-foot weave lane is proposed at locations of ingress or egress. Additionally, two proposed park-and-ride facilities are being evaluated as part of Alternative 3 and would be constructed within the existing freeway right-of-way. Sign replacement and pavement delineation would also be implemented to meet the latest CA MUTCD standards.

1.6.1 Ramps

Alternative 3 would impact several existing ramps. The affected ramps and the proposed improvements are summarized in Tables 1-1 and 1-2, below. In general, several existing ramps would be shifted to accommodate outside widening by Alternative 3. Alternative 3 is not anticipated to impact system interchanges within the proposed Project limits. Within the proposed Project limits, ramp metering is incorporated into the existing local interchange on-ramps, except at the South Anaheim Boulevard northbound on-ramp. Where ramp improvements affect ramp metering, any ramp metering equipment would be reestablished. Existing ramp meters and equipment would be reused where possible.

Table 1-1: Anticipated Impacts to On-Ramps within the Proposed Project Limits—Alternative 3

Location		Post Mile (Approx.)	Ramp Improvements
1	NB SR-55 to NB I-5 Direct Connector	30.472	X
2	Grand Ave. SB Direct-Access On-Ramp	31.794	X
3	N. Main St. SB On-Ramp	32.953	X
4	SB SR-57 to SB I-5 Direct Connector	34.222	X
5	Gene Autry Wy. SB Direct-Access On-Ramp	35.949	X
6	Gene Autry Wy. NB Direct-Access On-Ramp	35.949	X
7	EB SR-91 to SB I-5 Direct Connector	41.928	X
8	WB SR-91 to NB I-5 Direct Connector	42.42	X
9	Auto Center Dr. NB On-Ramp	42.928	X
10	Artesia Blvd. SB On-Ramp	44.271	X
Total Number of On-Ramp Improvements:			**10**

Notes: * Existing ramp metering to be relocated and/or upgraded to latest equipment requirements.
**Ramps metered separately before joining.

EB = eastbound
I = Interstate
NB = northbound
SB = southbound
SR = State Route
WB = westbound

Table 1-2: Anticipated Impacts to Off-Ramps within the Proposed Project Limits—Alternative 3

Location		Post Mile (Approx.)	Ramp Improvements
1	Grand Ave. NB Direct-Access Off-Ramp	31.532	X
2	Penn Wy. SB Off-Ramp	32.521	X
3	NB I-5 to NB SR-57 Direct Connector	33.433	X
4	Gene Autry Wy. NB Direct-Access Off-Ramp	35.466	X
5	Gene Autry Wy. SB Direct-Access Off-Ramp	36.309	X
6	Anaheim Blvd. NB Direct-Access Off-Ramp	36.072	X
7	Disneyland Dr. SB Direct-Access Off-Ramp	38.439	X
8	NB I-5 to WB SR-91 Direct Connector	41.909	X
9	SB I-5 to EB SR-91 Direct Connector	42.545	X
10	Beach Blvd. SB Off-Ramp	43.680	X
11	Artesia Blvd. NB Off-Ramp	43.996	X
Total Number of Off-Ramp Improvements:			**11**

EB = eastbound
I = Interstate
NB = northbound
SB = southbound
SR = State Route
WB = westbound

For the majority of locations, physical modifications of the ramp geometry will not be required where the HOV direct connector is converted to an ELs Connector; however, replacement of signage and addition of tolling equipment will be required accordingly. The incorporation of weave lanes required physical modifications of the ramp gore geometry where the HOV Direct Connector is converted to an ELs Connector at the northbound Gene Autry Way off-ramp, northbound Disney Way off-ramp, southbound Gene Autry Way off-ramp, and southbound Disneyland Drive off-ramp.

1.6.2 Impact to Structures

Alternative 3 would not create new structures (e.g., bridges) but would impact one existing retaining wall to accommodate widening the mainline to avoid right-of-way acquisition. The affected retaining wall structure and the proposed improvements are summarized in Table 1-3.

Table 1-3: Anticipated Retaining Wall Impacts within the Proposed Project Limits—Alternative 3

Location	Post Mile	Retaining Wall Improvements		Maximum Length of Extension (Feet)
		Rebuild (R) / New(N)	Type	
SB I-5, North of E. 17th St.	32.521	R*	Special	793

* Retaining Wall/Sound Wall.
I = Interstate
SB = Southbound

1.6.3 Drainage and Water Quality

Drainage management measures would be included in Alternative 3 to address the impacts to drainage patterns associated with new construction. Proposed major drainage design features would include: maintaining existing drainage flow patterns and incorporating existing drainage systems to the maximum extent practicable; providing drainage facilities that would accommodate future improvements; and providing drainage facilities to prevent and/or reduce substantial erosion or siltation on or off site.

Some of the existing systems may be abandoned or removed to accommodate the construction of Alternative 3. For widened sections of the pavement for Alternative 3, the existing edge drains would be replaced and reconnected to the drainage system; final connection and location details would be developed in the final design phase. BMPs would be included to address stormwater requirements and treatment of the added impervious area created by Alternative 3.

1.6.4 Tolled Components

1.6.4.1 Toll Operations Policies

The ELs would require single-occupant vehicles to pay a toll. The objective is to open the tolled ELs with some level of HOV occupancy free to encourage rideshare and transit usage. Operational adjustments to the tolled ELs may be implemented based on demand, rates of speed, traffic volumes, and to meet financial covenants, maintenance, and operational obligations. This would be determined based on the Traffic and Revenue (T&R) analysis, input from public, and Caltrans business rules. Caltrans has the authority to set the occupancy policy on the I-5 ELs.

Key Caltrans business rules may include, but are not limited to:

- Toll-free travel for vehicles that meet minimum vehicle occupancy requirements, motorcycles, and buses.
- Qualifying carpools would continue to be able to access the lanes without a charge; trucks, other than two-axle light-duty trucks, would not be allowed.
- Toll/transit credits would be available to frequent ELs transit riders.
- Emergency vehicles may use the ELs toll-free when responding to incidents.
- Qualifying Clean Air Vehicles would be given a toll discount.
- Equity Assistance Plan.

1.6.4.2 Toll Operations and Maintenance

At this time, a process is in place to develop a formal maintenance plan as part of the Caltrans and FHWA systems engineering process. It is anticipated that Caltrans would maintain the physical infrastructure, such as pavement, striping, and median barriers, as well as perform general maintenance, such as trash and graffiti removal, paid for from toll revenues. It is anticipated that Caltrans would also manage the tolling infrastructure while the customer service centers and other back-office support facilities would be contracted to others. However, final agreements and decisions on such responsibilities will be decided in the future phases of the Project.

1.6.4.3 Toll Revenue/Pricing Structure

Time-of-day pricing and dynamic pricing methods are being analyzed for their application as part of the Project. Toll rates would be set in response to vehicle demand and would be adjusted as necessary to regulate volume in the ELs to maintain traffic flow at a predetermined level of service (LOS).

The pricing structure and details would be evaluated further during final design. No tolling amount or pricing decisions have been made at this time.

1.6.4.4 Toll Collection

The I-5 ELs facility is expected to use an all-electronic toll collection system and would not accept cash or credit card payment on the facility. This would eliminate the need for customers to stop and pay tolls at traditional tollbooths. The electronic toll collection system would require customers to have pre-paid accounts with a tolling agency and mount a nonstop automated vehicle identification transponder or toll tag on the windshield of a registered vehicle. Tolls would be collected electronically by reading the transponder at highway speeds.

1.6.4.5 Toll Enforcement

Toll enforcement is an essential element of any successful EL system, ensuring that traffic laws are enforced, customers are charged the appropriate toll based on vehicle occupancy, and toll evasion is minimized. Toll enforcement would be accomplished through California Highway Patrol (CHP) patrols, electronic systems, and facility design. The CHP is anticipated to be contracted to conduct routine and supplemental enforcement services on the I-5 Express Lanes facility, including toll infractions, HOV eligibility occupancy infractions, buffer crossing infractions, speeding, and other moving violations. The Electronic Toll Collection (ETC) system is intended to identify both vehicles that do not have a transponder as well as the declared transponder switch setting. Caltrans would incorporate an infrared occupancy detection system into the EL enforcement. The CHP currently provides enforcement on all of the toll roads in southern California under several different institutional arrangements.

1.6.5 Transportation Management Plan

The same TMP described under Alternative 2 would be utilized as part of Alternative 3. This infrastructure is detailed in Section 1.2.5, above.

1.6.6 Construction Staging

It is anticipated that Alternative 3 would be designed and constructed in separate phases to facilitate Project delivery based on available funding. Each phase would include construction staging to minimize impacts to existing traffic. The same number of existing mainline lanes would be kept open to traffic during construction whenever feasible.

Stage construction concept plans are currently being developed. However, Alternative 3 would require ramp closures of less than 10 days to accommodate reconstruction of pavement at or near on- and off-ramps. Closures of successive on- or off-ramps would be avoided. Should Alternative 3 be selected as the Preferred Alternative, detailed stage construction and detour

plans would be developed during final design. Detailed stage construction plans and traffic handling plans would also be developed in the final design stage.

1.6.7 Right-of-Way Data

Additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements) is not anticipated for the construction of Alternative 3.

1.6.8 Utility and Other Owner Involvement

Underground and above-ground utility conflicts are anticipated within the proposed Project limits. The anticipated utility impacts within the proposed Project limits are summarized in Table 1-4.

Table 1-4: Anticipated Impacts to Utilities within the Proposed Project Limits—Alternative 3

No.	Location	Utility Owner and/or Contact Name	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description	H*
1	N. Main St. SB On-Ramp	AT&T	D	Telecom	Roadway Conflict	N/A
2	North of N. State College Blvd.	PacBell	D	Telecom	Overhead Sign Conflict	N/A
3	North of N. State College Blvd.	SCE	W	Electric	Overhead Sign Conflict	N/A

H* Denotes high-priority utilities based on Chapter 600 of the Caltrans Encroachment Permits Manual.
AT&T = American Telephone and Telegraph Company
Caltrans = California Department of Transportation
N/A = Not Applicable
PacBell = Pacific Bell Telephone Company
SB = southbound
SCE = Southern California Edison

Should Alternative 3 be selected as the Preferred Alternative, a "positive location" verification would be performed during the final design phase, which would include surveying and boring the area in order to verify the depth and specific locations of underground utilities in the proposed Project vicinity that may be in close proximity to or conflict with proposed improvements as determined from as-built plans and utility company records. Relocation or addition of towers are not anticipated for the existing overhead electrical lines.

1.6.9 Nonstandard Design Features (Design Standards Risk Assessment)

A listing of major existing nonstandard design features for Alternative 3 is included in Table 1-5, below.

Table 1-5: Design Standards Risk Assessment—Alternative 3

No.	Design Standard	Probability of Design Exception Approval (None, Low, Medium, High)
1	201.1 (Stopping Sight Distance Standards)	Medium/High
2	301.1 (Lane Width)*	Medium
3	302.1 (Shoulder Width)*	Medium/High
4	305.1 (Median Width Freeways and Expressways-Urban)**	High
5	305.1(3)(a) (Median Width)*	High
6	309.1(3)(a) (Horizontal Clearances for Highways)*	Medium /High
7	504.7 (Minimum Weave Length)[1]	High

* Boldface
** Underline

1.6.10 Sound Walls

Alternative 3 would impact one existing sound wall. The affected sound wall and the proposed improvements are summarized in Table 1-6.

Table 1-6: Anticipated Sound Wall Impacts within the Proposed Project Limits—Alternative 3

Location	Post Mile	Sound Wall Improvements			Maximum Length of Extension (Feet)
		Rebuild (R) / New (N)	Extension	Removal	
SB I-5, North of E. 17th St.	32.521	R*			793

* Retaining Wall/Sound Wall.
I = Interstate
SB = Southbound

1.6.11 Transportation System Management/Transportation Demand Management

TSM/TDM aims to improve traffic flow, promote travel safety, and increase transit usage and rideshare participation. The TSM/TDM measures included as part of Alternative 3 would add TSM/TDM techniques to existing features within the proposed Project limits.

The following TSM features would be incorporated into Alternative 3's proposed design:

- Ramp metering
- Intelligent Transportation Systems
- CHP observation and enforcement areas

The following TDM measures have been incorporated into Alternative 3:

- The ELs use would be incentivized for carpool, transit users, electric and clean-emissions vehicles (e.g., discounted fare, partial or full subsidized fare).
- Potential excess toll revenue would be allocated to fund projects and programs to reduce vehicle miles traveled (VMT), such as:
    - Outreach and education regarding ridesharing, transit travel, and multimodal opportunities;

  - Outreach and education regarding alternative work schedule programs and telecommuting; and
  - Construction of two park-and-ride facilities.
- Generating sustainable funding to support ongoing operations and promoting transit equity programs.
- Alternative 3 would facilitate travel for commercial buses and tourist buses to and from tourist destinations within the proposed Project vicinity.

1.6.12 Highway Planting

The same erosion control features described under Alternative 2 would be included as part of Alternative 3. These are detailed in Section 1.2.12, above. Generally, existing vegetation in and around the interchange areas would be replanted; however, due to limited space between the freeway improvements and right-of-way, planting replacement would not always be possible along the mainline.

1.6.13 Erosion Control

The same erosion control features described under Alternative 2 would be included as part of Alternative 3. These are detailed in Section 1.2.13, above.

1.7 Alternative 4—Build Alternative: Convert Existing HOV Lanes to Express Lanes and Construct Additional Express Lanes

Alternative 4 would convert the existing HOV lane to an EL in each direction between Red Hill Avenue and SR-55; convert two existing HOV lanes to ELs in each direction between SR-55 and SR-57; convert the existing HOV lane to an EL in each direction from SR-57 to the OC/LA County line; and construct an additional EL in each direction between SR-57 and SR-91. The typical cross-section consists of 12-foot-wide ELs, a 2- to 4-foot buffer, 12-foot-wide GP lanes, 12-foot-wide auxiliary lanes, a 4- to 14-foot wide inside shoulder, and a 10-foot-wide outside shoulder and would be provided to accommodate the ELs. One 12-foot weave lane is proposed at locations of ingress or egress. Additionally, two proposed park-and-ride facilities are being evaluated as part of Alternative 4 and would be constructed within the existing freeway right-of-way. Sign replacement and pavement delineation would also be implemented to meet the latest CA MUTCD standards.

1.7.1 Ramps

Alternative 4 would impact some existing ramps within the proposed Project limits. The affected ramps and the proposed improvements are summarized in Tables 1-7 and 1-8, below. In general, some existing ramps would be shifted to accommodate outside widening by Alternative 4. Alternative 4 is not anticipated to impact system interchanges within the proposed Project limits. Within the proposed Project limits, ramp metering is incorporated into the existing local interchange on-ramps, except at the South Anaheim Boulevard northbound on-ramp. Where ramp improvements affect ramp metering, any ramp metering equipment would be re-established. Existing ramp meters and equipment would be reused where possible.

Table 1-7: Anticipated Impacts to On-Ramps within the Proposed Project Limits—Alternative 4

Location		Post Mile (Approx.)	Ramp Improvements
1	NB SR-55 to NB I-5 Direct Connector	30.472	X
2	Grand Ave. SB Direct-Access On-Ramp	31.794	X
3	N. Main St. SB On-Ramp	32.953	X
4	SB SR-57 to SB I-5 Direct Connector	34.222	X
5	Gene Autry Wy. SB Direct-Access On-Ramp	35.949	X
6	Gene Autry Wy. NB Direct-Access On-Ramp	35.949	X
7	W. Lincoln Ave. NB On-Ramp	38.913	X
8	EB SR-91 to SB I-5 Direct Connector	41.928	X
9	WB SR-91 to NB I-5 Direct Connector	42.42	X
10	Auto Center Dr. NB On-Ramp	42.928	X
11	Artesia Blvd. SB On-Ramp	44.271	X
	Total Number of Off-Ramp Improvements		**11**

Notes: * Existing ramp metering to be relocated and/or upgraded to latest equipment requirements.
**Ramps metered separately before joining.

EB = Eastbound
I = Interstate
NB = Northbound
SB = Southbound
SR = State Route
WB = Westbound

Table 1-8: Anticipated Impacts to Off-Ramps within the Proposed Project Limits—Alternative 4

Location		Post Mile (Approx.)	Ramp Improvements
1	Grand Ave. NB Direct-Access Off-Ramp	31.532	X
2	Penn Wy. SB Off-Ramp	32.521	X
3	NB I-5 to NB SR-57 Direct Connector	33.433	X
4	Gene Autry Wy. NB Direct-Access Off-Ramp	35.466	X
5	Gene Autry Wy. SB Direct-Access Off-Ramp	36.309	X
6	Anaheim Blvd. NB Direct-Access Off-Ramp	36.072	X
7	Disneyland Dr. SB Direct-Access Off-Ramp	38.439	X
8	Lincoln Ave. SB Off-Ramp	39.471	X
9	N. Euclid St. NB Off-Ramp	39.263	X
10	NB I-5 to WB SR-91 Direct Connector	41.909	X
11	SB I-5 to EB SR-91 Direct Connector	42.545	X
12	Beach Blvd. SB Off-Ramp	43.680	X
13	Artesia Blvd. NB Off-Ramp	43.996	X
	Total Number of Off-Ramp Improvements:		**13**

EB = Eastbound
I = Interstate
NB = Northbound
SB = Southbound
SR = State Route

For the majority of locations, physical modifications of the ramp geometry would not be required where the HOV Direct Connector is converted to an ELs Connector; however, replacement of signage and the addition of tolling equipment would be required accordingly. The incorporation of weave lanes would require physical modifications at the ramp gore where the HOV Direct Connector is converted to an ELs Connector at the following locations:

- Southbound SR-57 connector
- Northbound SR-57 connector
- Southbound Gene Autry Way on-ramp
- Northbound Gene Autry Way off-ramp
- Northbound Disney Way off-ramp
- Southbound Gene Autry Way off-ramp
- Northbound Gene Autry Way on-ramp
- Southbound Disneyland Drive off-ramp

1.7.2 Impact to Structures

Alternative 4 would not create new structures (e.g., bridges) but would impact existing retaining walls and create a new retaining wall. Retaining walls would be provided, where required, to minimize and avoid right-of-way acquisition. The affected retaining wall structures and the proposed improvements are summarized in Table 1-9.

Table 1-9: Anticipated Retaining Wall Impacts within the Proposed Project Limits—Alternative 4

Location	Post Mile	Retaining Wall Improvements		Maximum Length of Extension (Feet)
		Rebuild (R) / New(N)	Type	
SB I-5, South of E. 17th St.	32.521	R*	Special	793
Along NB I-5 to NB SR-57 Direct Connector	34.117	R	Special	479
Along SB SR-57 to SB I-5 Direct Connector	34.124	R	Special	446

* Retaining Wall/Sound Wall.
I = Interstate
NB = Northbound
SB = Southbound
SR = State Route

1.7.3 Drainage and Water Quality

The same drainage and water quality features described under Alternative 3 would be constructed as part of Alternative 4. These features are detailed in Section 1.6.3, above.

1.7.4 Tolled Components

The same tolling infrastructure described under Alternative 3 would be constructed as part of Alternative 4. This infrastructure is detailed in Section 1.6.4, above.

1.7.5 Transportation Management Plan

The same TMP described under Alternative 2 would be utilized as part of Alternative 4. This plan is detailed in Section 1.5.5, above.

1.7.6 Construction Staging

Stage construction concept plans are currently being developed. However, Alternative 4 would require several 55-hour weekend closures of the SR-57 HOV Connectors to accommodate construction of retaining walls, the median barrier, and concrete pavement. Should Alternative 4 be selected as the Preferred Alternative, detailed stage construction and detour plans would be developed during final design. Detailed stage construction plans and traffic handling plans would also be developed in the final design stage.

1.7.7 Right-of-Way Data

Additional right-of-way (e.g., full acquisition, partial acquisition, aerial easements, temporary construction easements) is not anticipated for the construction of Alternative 4.

1.7.8 Utility and Other Owner Involvement

Underground and above-ground utility conflicts are anticipated within the proposed Project limits. The anticipated utility impacts within the proposed Project limits are summarized in Table 1-10.

Table 1-10: Anticipated Impacts to Utilities within the Proposed Project Limits—Alternative 4

No.	Location	Utility Owner and/or Contact Name	Wet (W) / Dry (D)	Utility Type(s)	Utility Conflict Description	H*
1	N. Main St. SB On-Ramp	AT&T	D	Telecom	Roadway Conflict	N/A
2	North of N. State College Blvd.	Pacbell	D	Telecom	Overhead Sign Conflict	N/A
3	North of N State College Blvd.	SCE	W	Electric	Overhead Sign Conflict	N/A
4	N. Euclid St. NB Off-Ramp	City of Anaheim	W	Water	Roadway Conflict	N/A
5	N. Euclid St. SB	City of Anaheim	W	Water	Roadway Conflict	N/A
6	N. Euclid St. SB	Sprint	D	Telecom	Roadway Conflict	N/A
7	North of N. Euclid St. SB	Sprint	D	Telecom	Roadway Conflict	N/A

Notes: H* denotes high-priority utilities based on Chapter 600 of the Caltrans Encroachment Permits Manual.
AT&T = American Telephone and Telegraph Company
Caltrans = California Department of Transportation
N/A = Not Applicable
NB = Northbound
PacBell = Pacific Bell Telephone Company
SB = Southbound
SCE = Southern California Edison

Positive location would be performed for underground utilities in the proposed Project vicinity that may be in close proximity to or conflict with proposed improvements as determined from as-built plans and utility company records.

Relocation or addition of towers are not anticipated for the existing overhead electrical lines.

1.7.9 Nonstandard Design Features (Design Standards Risk Assessment)

A listing of major existing nonstandard design features for Alternative 4 is included in Table 1-11, below.

Table 1-11: Design Standards Risk Assessment—Alternative 4

No.	Design Standard	Probability of Design Exception Approval (None, Low, Medium, High)
1	201.1 (Stopping Sight Distance Standards)*	Medium/High
2	201.7 (Decision Sight Distance)**	High
3	301.1 (Lane Width)*	Medium
4	302.1 (Shoulder Width)*	Medium/High
5	305.1 (Median Width Freeways and Expressways-Urban)**	High
6	305.1(3)(a) (Median Width)*	High
7	309.1(3)(a) (Horizontal Clearances for Highways)*	Medium/High
8	504.2(2) (Design of Freeways Entrances and Exits)**	Medium
9	504.7 (Minimum Weave Length)*	High

* Boldface
**Underline

1.7.10 Sound Walls

The same impacts to sound walls described under Alternative 3 would occur as part of Alternative 4. These are detailed in Section 1.6.10, above.

1.7.11 Transportation System Management/Transportation Demand Management

The same TSM/TDM measures described under Alternative 3 would also be included as part of Alternative 4. These are detailed in Section 1.6.11, above.

1.7.12 Highway Planting

The same highway planting impacts described under Alternative 3 would occur as part of Alternative 4. These are detailed in Section 1.6.12, above.

1.7.13 Erosion Control

The same erosion control impacts described under Alternative 2 would occur as part of Alternative 4. These are detailed in Section 1.5.13, above.

1.8 Excavation Parameters

Because Alternative 1 has no improvements, it does not involve excavation or ground disturbance of any kind. Alternative 2 would involve ground disturbance for the park and ride facilities, including new pavement, minor grading, drainage features, and stormwater BMPs, whereas Alternatives 3 and 4 involve ground disturbance for these features, as well as sound walls, retaining walls, overhead signs, lighting, and utilities. Based on the current design plans, as well as personal communication with WSP, [1,2] Table 1-12, below, details the maximum depths of excavation of the various Project components, as well as which components are included in each alternative.

Table 1-12: Anticipated Maximum Excavation Depths for Components of the Interstate 5 Managed Lanes Project (Red Hill Avenue to Orange County/Los Angeles County Line)

Project Component	Depth (feet)[1]	Alternative			
		1	2	3	4
New and Replaced Roadway Pavement	2–5		X	X	X
Retaining Wall Construction	8-10			X	X
Minor Roadway Grading	1–3		X	X	X
Stormwater BMPs	3–4		X	X	X
New and Reconstructed Surface Drainage Systems	2–5		X	X	X
New and Reconstructed Overhead Sign Foundations	5–25			X	X
Lighting	8			X	X
Sound Wall Reconstruction	8–10			X	X
Utilities	8[2]			X	X

1 Personal communication, Brad Slawson, WSP, November 1, 2022
2 Personal communication, Jeff Fromhertz, WSP, April 7, 2023
BMP = Best Management Practice

[1] Personal communication, Brad Slawson, WSP, November 1, 2022.

[2] Personal communication, Jeff Fromhertz, WSP, April 7, 2023.

2. REGULATORY ENVIRONMENT

This Project is subject to federal, State, and local regulations regarding paleontological resources. The following discussion of applicable regulations has been excerpted from the Caltrans' *Standard Environmental Reference (SER), Volume 1, Chapter 8 – Paleontology* (Caltrans, 2014) and supplemented through additional research on the language of the individual regulations.

2.1 Federal Regulations

A project must comply with one or more federal regulations concerning paleontological resources if: (1) the project involves land under the jurisdiction of a federal agency, (2) a federal agency has oversight on the project, and/or (3) a permit, license, authorization, or funding from a federal agency is required to complete the project. Because this Project is federally funded, the following federal regulations apply to this Project.

2.1.1 National Environmental Policy Act of 1969 (42 United States Code 4321–4375)

NEPA established a national policy for the protection, promotion, enhancement, and understanding of the environment and created the Council on Environmental Quality. As part of this act, Section 101(b)(4) (42 United States Code [USC] 4331) seeks to "…preserve important historic, cultural, and natural aspects of our natural heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice." NEPA requires that the environmental effects of a proposed federal project or action be evaluated, and regulations for implementing this evaluation are found in 40 Code of Federal Regulations (CFR) 1500–1508. Because the Project is federally funded, compliance with NEPA regulations is required. The applicability of NEPA to paleontological resources depends on whether Section 101(b)(4) is interpreted to include fossils. However, compliance with CEQA regulations and Caltrans guidelines regarding paleontological resources will meet the requirements of NEPA regardless of whether paleontological resources are deemed to be covered under this act.

2.1.2 Archaeological and Paleontological Salvage (23 United States Code 305)

As part of the Federal-Aid Highway Act of 1956 (23 USC et seq.), this federal law authorizes the appropriation and use of federal funds for paleontological salvage as necessary by the highway department of any state, in compliance with 16 USC 431–433. According to 23 CFR 1.9(a), the use of federal-aid funds must be in conformity with federal and State laws. Under this statute, mitigation of impacts to paleontological resources during development of this project may be an eligible federal project cost, provided the necessary documentation is submitted to the FHWA.

2.2 State Regulations

Under State law, paleontological resources are protected by both CEQA and Public Resources Code (PRC) Section 5097.5, both of which are discussed in more detail below.

2.2.1 California Environmental Quality Act (California Public Resources Code 21000 et seq.)

The purpose of CEQA is to provide a statewide policy of environmental protection. As part of this protection, State and local agencies are required to analyze, disclose, and, when feasible, mitigate the environmental impacts of, or find alternatives to, proposed projects.

The *State CEQA Guidelines* (California Code of Regulations 15000 et seq.) provide regulations for the implementation of CEQA and include more specific direction on the process of documenting, analyzing, disclosing, and mitigating the environmental impacts of a project. To assist in this process, Appendix G of the *State CEQA Guidelines* provides a sample checklist form that may be used to identify and explain the degree of impact a project will have on a variety of environmental aspects, including paleontological resources (Section VII(f)).

As stated in Section 15002(b)(1-3) of the *State CEQA Guidelines*, CEQA applies to governmental action, including activities that are undertaken by, financed by, or require approval from a governmental agency. Because this Project is undertaken by governmental agencies, CEQA regulations apply.

2.2.2 California Public Resources Code, Section 5097.5

This law protects historic, archaeological, and paleontological resources on public lands in California and establishes criminal and civil penalties for violations.

Specifically, PRC Section 5097.5 states:

"(a) No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

(b) As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

Because this Project involves public lands as defined in Section 5097.5(b), Caltrans is required to comply with this regulation.

2.3 Local Regulations

2.3.1 City of Buena Park

The Conservation and Sustainability Element of the City of Buena Park's General Plan (City of Buena Park, 2010), includes the following objectives and policies to protect archaeological and paleontological resources:

Goal CS-3: Protection of important archaeological and paleontological resources.

Policy CS-3.1: Preserve and protect significant archaeological and paleontological resources.

2.3.2 City of Santa Ana

The Historic Preservation Element of the City of Santa Ana's General Plan (City of Santa Ana, 2022), seeks to "provide guidance in developing and implementing activities that ensure that identification, designation, and protection of architectural, historical, cultural, and archaeological resources are part of the City's planning, development, and permitting processes." In order to achieve this, the City outlined the following goal and policy that relate to paleontological resources:

> **Goal HP-1:** Historic Areas and Resources. Preserve and enhance Santa Ana's historic areas and resources to maintain a unique sense of place.
>
> > **Policy HP-1.4:** Support land use plans and development proposals that actively protect historic and cultural resources. Preserve tribal, archeological, and paleontological resources for their cultural importance to communities as well as their research and educational potential.

2.3.3 City of Tustin

The Conservation and Open Space Element of the City of Tustin's General Plan (City of Tustin, 2012) states that Tustin's location and geology make it an important paleontological resource area. To protect paleontological resources while still permitting development, the City of Tustin developed the following goals, policies, and implementation measures:

> **Goal 12:** Maintain and enhance the City's unique culturally and historically significant building sites or features.
>
> > **Policy 12.2:** Retain and protect significant areas of archaeological, paleontological, or historical value for education and scientific purposes.
>
> **Goal 13:** Preserve Tustin's archaeological and [paleontological] resources.
>
> > **Policy 13.1:** Require a site inspection by certified archaeologists or paleontologists for new development in designated sensitive areas.
> >
> > **Policy 13.2:** Require mitigation measures where development will affect archaeological or paleontological resources.

Implementation Measure 30—Preserve Archaeological and Paleontological Resources: Preserve archaeological and paleontological resources within the City by: a) requiring developers to perform archaeological and paleontological surveys prior to grading in areas known or suspected to contain such resources; and b) enforcing provisions of the California Environmental Quality Act regarding preservation or salvage of significant historic, archaeological, and paleontological sites discovered during construction activities.

3. SIGNIFICANCE

3.1 Definition of Significance

If a paleontological resource, such as a rock unit or formation with the potential to contain fossils, cannot be avoided during construction, the significance of the resource must be assessed before mitigation measures are proposed. The scientific significance or importance of a paleontological resource is based on various attributes of that resource, and in the interest of thoroughness, definitions of significance from Caltrans, the Society of Vertebrate Paleontology (SVP), and one additional source are included below.

3.1.1 California Department of Transportation

According to Caltrans (2014), there are two generally recognized types of paleontological significance:

- **National:** A National Natural Landmark-eligible paleontological resource is an area of national significance (as defined under 36 CFR 62) that contains an outstanding example of fossil evidence of the development of life on earth. This is the only codified definition of paleontological significance.
- **Scientific:** Definitions of a scientifically significant paleontological resource can vary by jurisdictional agency and paleontological practitioner.

Generally, scientifically significant paleontological resources are identified sites or geological deposits containing individual fossils or assemblages of fossils that are unique or unusual, are diagnostically or stratigraphically important, and add to the existing body of knowledge in specific areas stratigraphically, taxonomically, or regionally. Particularly important are fossils found in situ (undisturbed) in primary context (e.g., fossils that have not been subjected to disturbance subsequent to their burial and fossilization). As such, they aid in stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, paleoclimatology, the relationships between aquatic and terrestrial species, and evolution in general. Discovery of in situ fossil-bearing deposits is rare for many species, especially vertebrates. Terrestrial vertebrate fossils are often assigned greater significance than other fossils because they are rarer than other types of fossils. This is primarily due to the fact that the best conditions for fossil preservation include little or no disturbance after death and quick burial in oxygen-depleted, fine-grained sediments. While these conditions often exist in marine settings, they are relatively rare in terrestrial settings. This has ramifications with regard to the amount of scientific study needed to characterize an individual species adequately and, therefore, affects how relative sensitivities are assigned to formations and rock units.

3.1.2 Society of Vertebrate Paleontology

The SVP provides the following definitions of significance (SVP, 2010):

- **Significant Paleontological Resources** are fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources

are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 4,200 radiocarbon years; Cohen et al., 2022).

3.1.3 Other

Eisentraut and Cooper (2002) developed a useful set of criteria for judging whether fossils are scientifically significant. Using their method, fossils can be judged scientifically significant if they meet any of the criteria within the following categories:

- **Taxonomy:** Assemblages that contain rare or unknown taxa, such as defining new (previously unknown to science) species or representing a species that is the first or has very limited occurrence within the area or formation.
- **Evolution:** Fossils that represent important stages or links in evolutionary relationships or that fill gaps or enhance underrepresented intervals in the stratigraphic record.
- **Biostratigraphy:** Fossils that are important for determining or confining relative geologic (stratigraphic) ages or for use in defining regional to interregional stratigraphic associations. These fossils are often known as biostratigraphic markers and represent plants or animals that existed for only a short and restricted period in the geologic past.
- **Paleoecology:** Fossils that are important for reconstructing ancient organism community structure and interpreting ancient sedimentary environments. Depending on which fossils are found, much can be learned about the ancient environment, from water depth, temperature, and salinity to what the substrate was like (muddy, sandy, or rocky) and even whether the area was in a high-energy location (e.g., a beach) or a low-energy location (e.g., a bay). Even terrestrial animals can contain information about the ancient environment. For example, an abundance of grazing animals such as horse, bison, and mammoth suggest more of a grassland environment, while an abundance of browsing animals such as deer, mastodon, and camel suggest more of a brushy environment. Preserved parts of plants can also lend insight into what was growing in the area at a particular time. In addition, by studying the ratios of different species to each other's population densities, relationships between predator and prey can be determined.

There is a complex but vital interrelationship among evolution, biostratigraphy, and paleoecology: biostratigraphy (the record of fossil succession and progression) is the expression of evolution (change in populations of organisms through time), which in turn is driven by natural selection pressures exerted by changing environments (paleoecology).

- **Taphonomy:** Fossils that are exceptionally well or unusually/uniquely preserved or that are relatively rare in the fossil record. This could include preservation of soft tissues such as hair, skin, or feathers from animals or the leaves/stems of plants that are not commonly fossilized.

3.2 Summary of Significance

All vertebrate fossils that can be related to a stratigraphic context are considered scientifically significant, nonrenewable paleontological resources. Invertebrate and plant fossils, as well as other environmental indicators associated with vertebrate fossils, are considered scientifically significant. Certain invertebrate and plant fossils that are regionally rare or uncommon, or that help to define stratigraphy, age, or taxonomic relationships, are considered scientifically significant.

4. SENSITIVITY

4.1 Definition of Sensitivity

Sensitivity is often stated as "potential" because decisions about how to manage paleontological resources must be based on "potential." The actual situation cannot be known until grading and excavation for a project is underway. Caltrans and the SVP each have a ranking system to describe paleontological sensitivity, as described in the following sections.

4.1.1 California Department of Transportation

In accordance with the Caltrans SER guidelines for paleontology (Caltrans, 2014), the sensitivity of rock units and formations that may contain paleontological resources is assessed on the basis of high, low, or no potential for paleontological resources as follows:

- **High Potential:** Rock units that, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include, but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with very limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive. High sensitivity includes the potential for containing (1) abundant vertebrate fossils; (2) a few significant fossils (large or small vertebrate, invertebrate, or plant fossils) that may provide new and significant taxonomic, phylogenetic, ecologic, and/or stratigraphic data; (3) areas that may contain datable organic remains older than Recent, including *Neotoma* middens; and/or (4) areas that may contain unique new vertebrate deposits, traces, and/or trackways. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation during grading and excavation.
- **Low Potential:** This category includes sedimentary rock units that (1) are potentially fossiliferous but have not yielded significant fossils in the past; (2) have not yet yielded fossils but possess a potential to contain fossil remains; or (3) contain common and/or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood. Sedimentary rocks expected to contain vertebrate fossils are not placed in this category because vertebrates are generally rare and found in more localized strata. Rock units designated as low potential generally do not require monitoring and mitigation during grading and excavation. However, as excavation for construction gets underway, it is possible that new and unanticipated paleontological resources might be encountered. If this occurs, a Construction Change Order must be prepared to have a qualified Principal Paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation are required during grading and excavation from that time on.
- **No Potential:** Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential to contain significant paleontological resources. For projects encountering only these types of rock units,

paleontological resources can generally be eliminated as a concern when the Preliminary Environmental Analysis Report is prepared and no further action taken.

4.1.2 Society of Vertebrate Paleontology

According to the SVP (2010), paleontological potential is the potential for the presence of significant nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have potential to contain significant nonrenewable paleontological resources, and review of available literature may further refine the potential of each rock unit, formation, or facies. The SVP has four categories of potential or sensitivity: high, low, none, and undetermined. If a geographic area or geological unit is classified as having undetermined potential for paleontological resources, studies must be undertaken to determine whether that rock unit has a sensitivity of either high, low, or none. These categories are described in more detail below.

- **High Potential:** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rock units classified as having high potential for producing paleontological resources include, but are not limited to: sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), some low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, and fine-grained marine sandstones). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils; and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than the late Holocene, including deposits associated with animal nests or middens, and rock units that may contain new vertebrate deposits, traces, or trackways, are also classified as having high potential.
- **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have a low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus, fossils will only be preserved in rare circumstances; the presence of fossils is the exception, not the rule (e.g., basalt flows or Recent colluvium). Rock units with low potential typically will not require measures to protect fossils.
- **No Potential:** Some rock units have no potential to contain significant paleontological resources (e.g., high-grade metamorphic rocks [such as gneisses and schists] and plutonic igneous rocks [such as granites and diorites]). Rock units with no potential require no protection measures relative to paleontological resources.

5. METHODS

5.1 Literature Review

LSA examined geologic maps of the area and reviewed relevant geological and paleontological literature to determine which geologic units are present in the Project area and whether fossils have been recovered from those or similar geologic units elsewhere in the region. As geologic formations and units may extend over large geographic areas and contain similar lithologies and fossils, the literature review includes areas well beyond the Project area. The results of this literature review include an overview of the geology of the Project area and a discussion of the paleontological sensitivity (or potential) of the geologic units within the Project area.

5.2 Fossil Locality Searches

In July 2022, fossil locality searches were conducted through the Natural History Museum of Los Angeles County (NHMLAC) and the San Diego Natural History Museum (SDNHM). The locality searches included a 1-mile buffer around the Project area. The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources in and adjacent to the Project area. The locality search results from NHMLAC and SDNHM are summarized in Section 6.2, below, and copies of the results letters are provided in Appendices A and B, respectively.

5.3 Field Survey

The purpose of a field survey is to note the sediments and to identify any unrecorded paleontological resources exposed on the surface of a Project area. In this way, impacts to existing, unrecorded paleontological material may be mitigated prior to the beginning of ground-disturbing activities and portions of the Project area that are more likely to contain paleontological resources may be identified.

On October 24, 25, and 26, 2022, LSA Paleontologist Paul Alms, M.Sc., conducted a field survey of the Project area. Because the Project is located within Caltrans right-of-way along I-5, only portions of the Project area could be safely accessed. These portions of the Project area that could be safely accessed were examined opportunistically wherever there was visible ground. Portions that were built up, paved, or landscaped, or that could not be accessed safely, were not surveyed. The results of the field survey are summarized in Section 6.3.

5.4 Personnel

5.4.1 Sarah Rieboldt, Ph.D.

Dr. Sarah Rieboldt, Associate and Principal Paleontologist at LSA, oversaw preparation of this Paleontological Identification Report/Paleontological Evaluation Report (PIR/PER). Dr. Rieboldt received her Ph.D. in Paleontology from the University of California, Berkeley, and has extensive experience surveying for and collecting paleontological resources; salvaging large fossil specimens; collecting bulk sediment samples; identifying, preparing, and curating fossil material; and writing paleontological assessment reports and final mitigation monitoring reports at the conclusion of construction projects. She has conducted paleontological and geological fieldwork

in California, Nevada, Utah, Wyoming, Colorado, Texas, and Alabama and has 8 years of experience working with natural history collections in several museums (the Field Museum of Natural History, the University of California Museum of Paleontology, and the University of Colorado Museum of Natural History). She has worked as a geologist and paleontological consultant on many different projects, including carbon sequestration and astrobiology research programs funded by the United States Department of Energy and the National Aeronautics and Space Administration, respectively, as well as on projects for the State of California Department of Parks and Recreation, Caltrans, and various private developers in California, Nevada, and Utah. Her résumé is included in Appendix C.

5.4.2 Jacob Biewer, M.Sc.

Mr. Biewer is a Paleontologist at LSA whose field and laboratory experience includes fieldwork and research projects throughout California. He received his Master of Science in Geology from California State University, Fullerton, in 2019, where he focused his research on vertebrate paleontology and paleoecology. His research at California State University, Fullerton, and LSA has provided him with a strong knowledge of the geology and paleontology of both Northern and Southern California. In addition to paleontological monitoring and surveying, he is responsible for the collection, identification, preparation, and curation of fossils from various projects within Northern California. Mr. Biewer assisted with the preparation of this PIR/PER. His résumé is included in Appendix C.

6. RESULTS

6.1 Literature Review

The Project area is in the Peninsular Ranges Geomorphic Province, a 900-mile-long northwest-southeast trending structural block with similarly trending faults that extends from the Transverse Ranges in the north to the tip of Baja California in the south and includes the Los Angeles Basin (California Geological Survey, 2002; Norris and Webb, 1976). The total width of this province is 225 miles, extending from the Colorado Desert in the east, across the continental shelf, to the southern Channel Islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) in the west (Sharp, 1976). This province is characterized by a series of mountain ranges and valleys that trend in a northwest-southeast direction roughly parallel to the San Andreas Fault Zone (Norris and Webb, 1976; Sharp, 1976). It contains extensive pre-Cenozoic (more than 66 million years ago [Ma]) igneous and metamorphic rocks covered by Cenozoic (less than 66 Ma) sedimentary deposits (Norris and Webb, 1976).

Geologic mapping by Morton and Miller (2006) and Saucedo et al. (2016) shows the Project area contains Very Young Wash Deposits; Young Alluvium, Unit 2; Young Alluvial Fan Deposits; and Young Axial Channel Deposits (Figure 2). Artificial Fill is likely also present at the surface of the Project area from the prior construction of I-5 and other roads. These geologic units and their paleontological sensitivities are described in more detail below. Dates for the geologic time intervals referenced in this report are derived from the *International Chronostratigraphic Chart* published by the International Commission on Stratigraphy (Cohen et al., 2022).

6.1.1 Artificial Fill

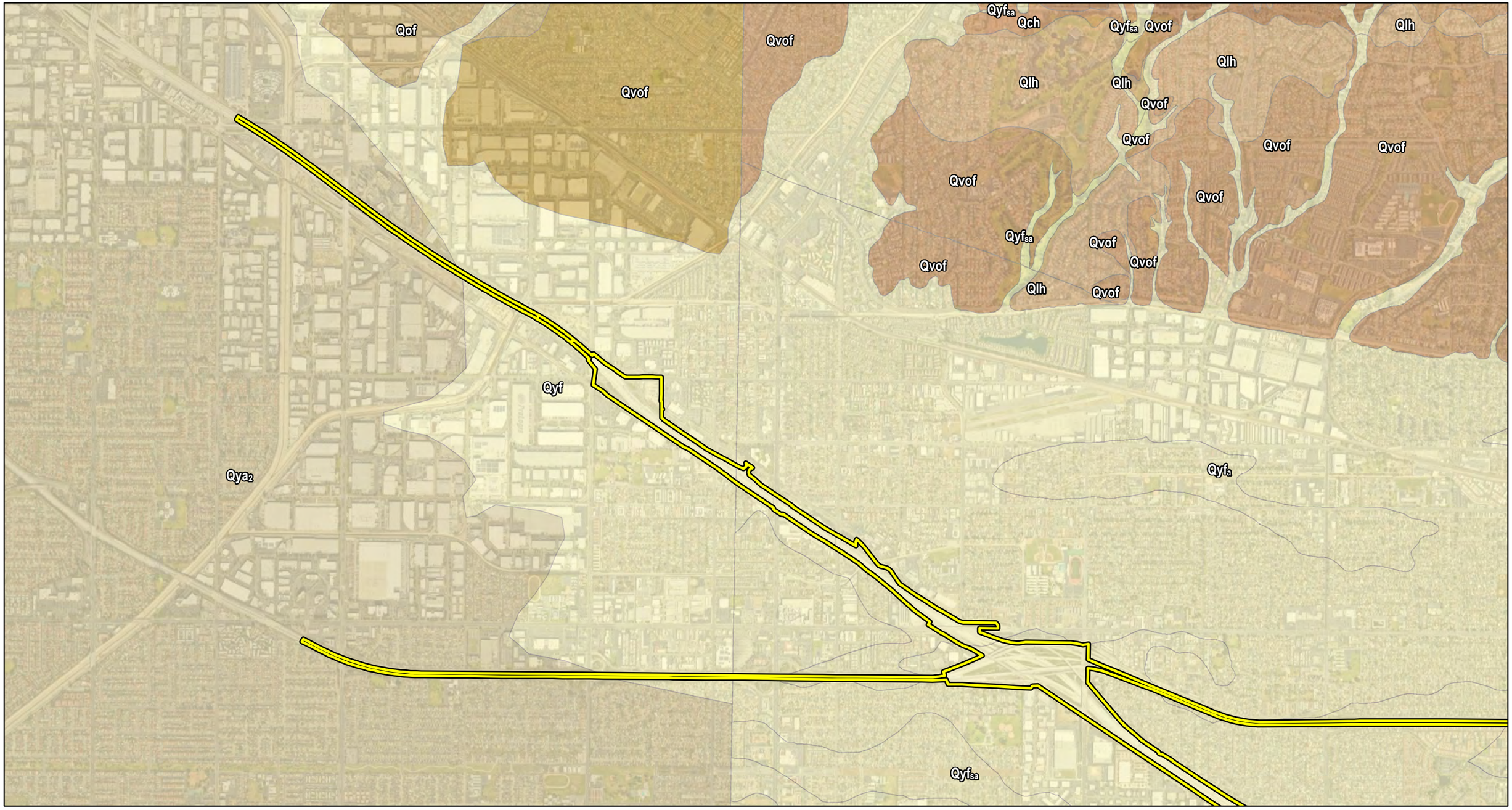
Artificial Fill consists of sediments that have been removed from one location and transported to another location by human activity rather than by natural means. The transportation distance can vary from a few feet to many miles, and composition is dependent on the source and purpose. Artificial Fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material.

While Artificial Fill may contain fossils, these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study. As such, Artificial Fill has no paleontological sensitivity.

6.1.2 Very Young Wash Deposits

The Very Young Wash Deposits are found within active washes, ephemeral river channels, and in channels on active surfaces of alluvial fans (Morton and Miller, 2006). They accumulated during the late Holocene (less than 4,200 years ago) and consist of unconsolidated sand and gravel (Morton and Miller, 2006). These deposits are mapped within the Project area where the Project crosses the Santa Ana River.

Although these Very Young Wash Deposits can contain remains of plants and animals, not enough time has passed for the remains to have become fossilized. Therefore, the Very Young Wash Deposits are considered to have no paleontological sensitivity.



LEGEND

Project Location

Geology

(Qw) Very Young Wash Deposits

(Qya$_2$) Young Alluvium, Unit 2

(Qyf) Young Alluvial Fan Deposits

(Qya) Young Axial Channel Deposits

(Qof) Old Alluvial Fan Deposits

(Qof) Old Alluvial Fan Deposits

(Qof$_3$) Old Alluvial Fan Deposits, Unit 3

(Qvof) Very Old Alluvial Fan Deposits, Undivided

(Qvof) Very Old Alluvial Fan Deposits

(Qlh) La Habra Formation

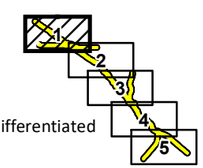
(Qch) Coyote Hills Formation

(Qsp) San Pedro Formation

(Tplv) Puente Formation, La Vida Member

(Tvs) Vaqueros and Sespe Formations, Undifferentiated

a – arenaceous s – silt ca – clayey sand sa – silty sand
c – clay ac – arenaceous clay cg – clayey gravel
g – gravel ag – arenaceous gravel ga – gravelly sand



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SOURCE: Google Imagery (2021); Morton and Miller (2006); Saucedo et al. (2016)

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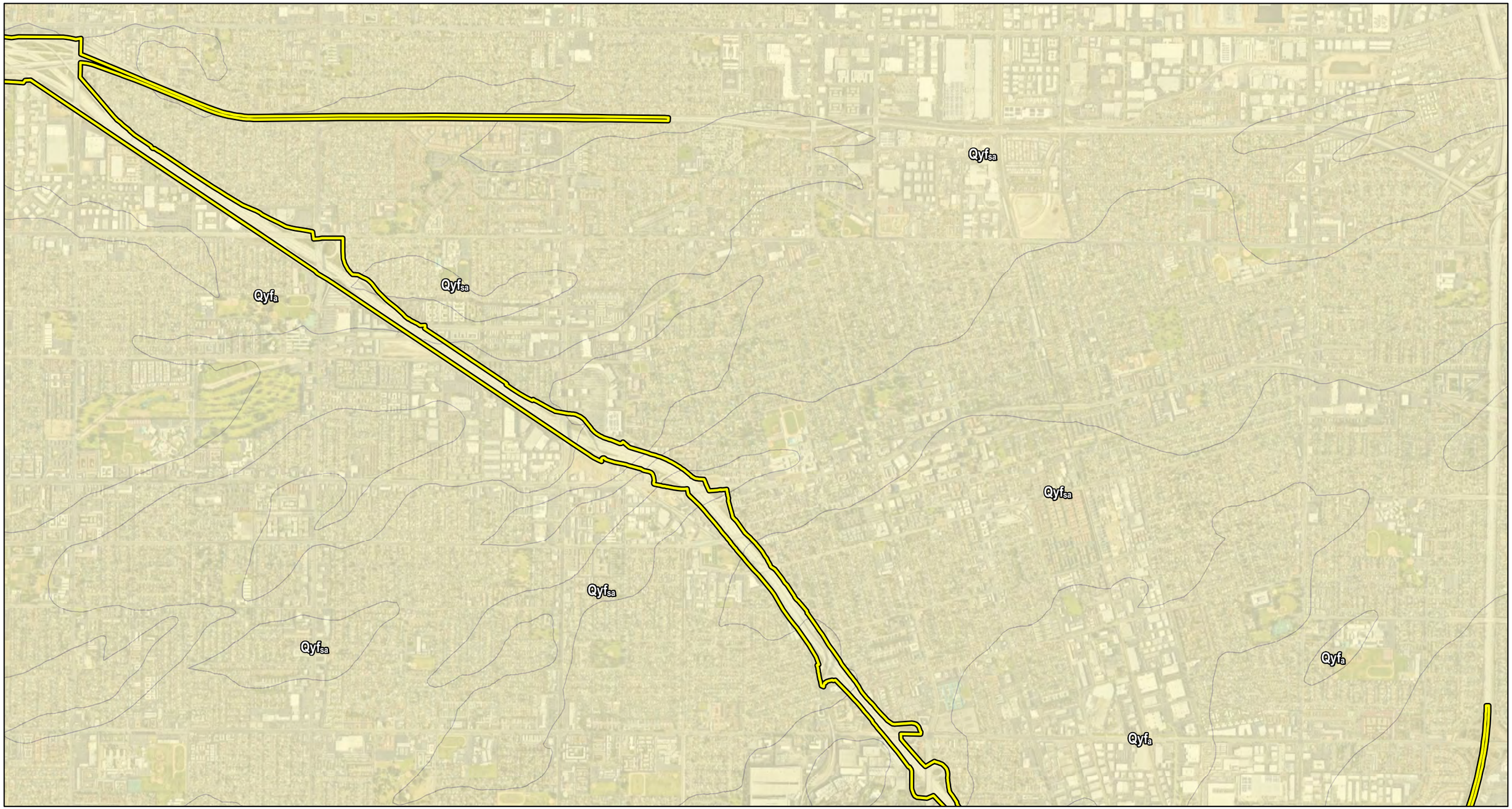
FIGURE 2
Sheet 1 of 5
I-5 Managed Lanes Project
(Red Hill Avenue to Orange County/Los Angeles County Line)
Geology Map
12-Ora-5 – PM 28.9/44.4, 26.9, 27.9, 28.4
07-LA-5 – PM 0.1, 0.3, 0.6, 1.7
12-Ora-55 – PM 7.4, 8.0, 8.7, 8.9, 9.2, 9.7 9.9, 10.2
12-Ora-57 – PM 11.0, 11.3, 11.9, 12.5, 12.7, 12.9, 13.5
12-Ora-91 – PM 0.7, 1.3, 1.8, 2.2, 2.8, 3.4, 0.4, 1.1, 1.4, 1.6, 2.0, 2.6
EA No. 0Q950



LEGEND

Project Location

Geology

(Qw) Very Young Wash Deposits

(Qya$_2$) Young Alluvium, Unit 2

(Qyf) Young Alluvial Fan Deposits

(Qya) Young Axial Channel Deposits

(Qof) Old Alluvial Fan Deposits

(Qof) Old Alluvial Fan Deposits

(Qof$_3$) Old Alluvial Fan Deposits, Unit 3

(Qvof) Very Old Alluvial Fan Deposits, Undivided

(Qvof) Very Old Alluvial Fan Deposits

(Qlh) La Habra Formation

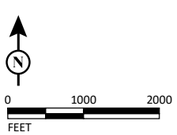
(Qch) Coyote Hills Formation

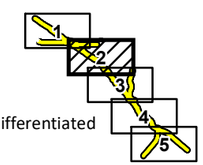
(Qsp) San Pedro Formation

(Tplv) Puente Formation, La Vida Member

(Tvs) Vaqueros and Sespe Formations, Undifferentiated

a – arenaceous s – silt ca – clayey sand sa – silty sand
c – clay ac – arenaceous clay cg – clayey gravel
g – gravel ag – arenaceous gravel ga – gravelly sand





SOURCE: Google Imagery (2021); Morton and Miller (2006); Saucedo et al. (2016)

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FIGURE 2
Sheet 2 of 5
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07-LA-5 – PM 0.1, 0.3, 0.6, 1.7
12-Ora-55 – PM 7.4, 8.0, 8.7, 8.9, 9.2, 9.7 9.9, 10.2
12-Ora-57 – PM 11.0, 11.3, 11.9, 12.5, 12.7, 12.9, 13.5
12-Ora-91 – PM 0.7, 1.3, 1.8, 2.2, 2.8, 3.4, 0.4, 1.1, 1.4, 1.6, 2.0, 2.6
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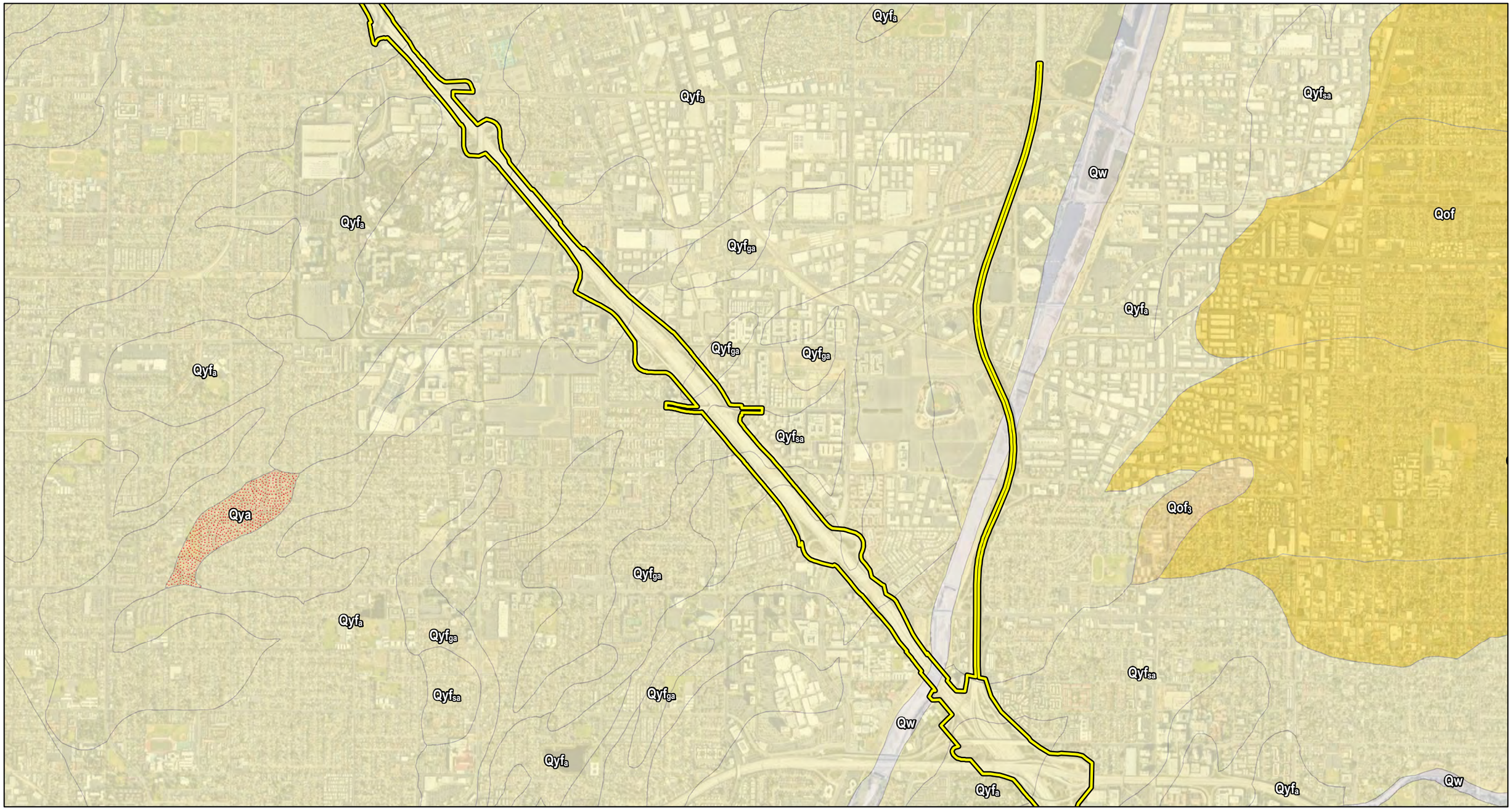

LEGEND

Project Location

Geology

(Qw) Very Young Wash Deposits

(Qya$_2$) Young Alluvium, Unit 2

(Qyf) Young Alluvial Fan Deposits

(Qya) Young Axial Channel Deposits

(Qof) Old Alluvial Fan Deposits

(Qof) Old Alluvial Fan Deposits

(Qof$_3$) Old Alluvial Fan Deposits, Unit 3

(Qvof) Very Old Alluvial Fan Deposits, Undivided

(Qvof) Very Old Alluvial Fan Deposits

(Qlh) La Habra Formation

(Qch) Coyote Hills Formation

(Qsp) San Pedro Formation

(Tplv) Puente Formation, La Vida Member

(Tvs) Vaqueros and Sespe Formations, Undifferentiated

a – arenaceous s – silt ca – clayey sand sa – silty sand
c – clay ac – arenaceous clay cg – clayey gravel
g – gravel ag – arenaceous gravel ga – gravelly sand

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SOURCE: Google Imagery (2021); Morton and Miller (2006); Saucedo et al. (2016)

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FIGURE 2
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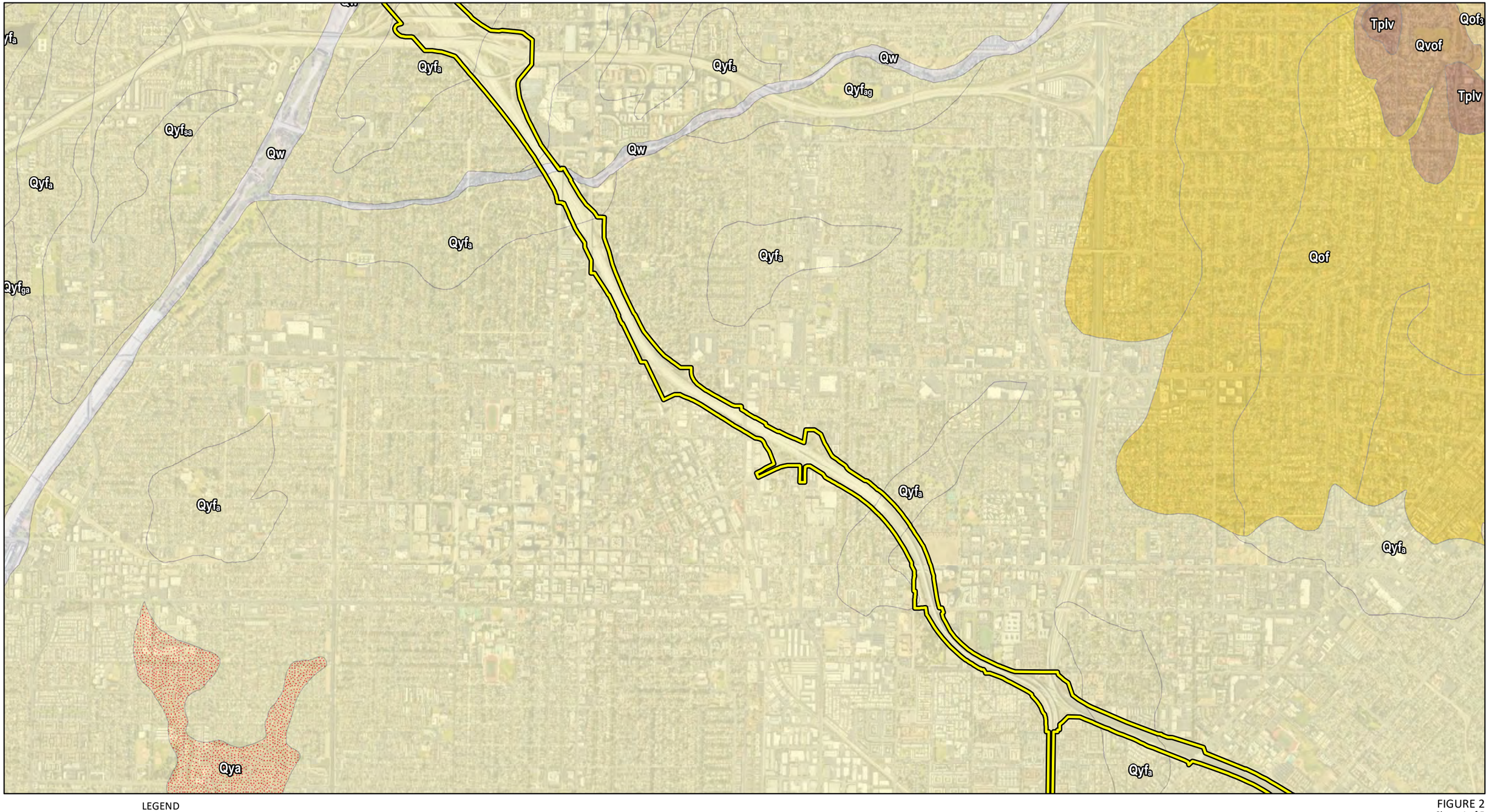
12-Ora-57 – PM 11.0, 11.3, 11.9, 12.5, 12.7, 12.9, 13.5
12-Ora-91 – PM 0.7, 1.3, 1.8, 2.2, 2.8, 3.4, 0.4, 1.1, 1.4, 1.6, 2.0, 2.6
EA No. 0Q950



LEGEND

Project Location

Geology

(Qw) Very Young Wash Deposits

(Qya$_2$) Young Alluvium, Unit 2

(Qyf) Young Alluvial Fan Deposits

(Qya) Young Axial Channel Deposits

(Qof) Old Alluvial Fan Deposits

(Qof) Old Alluvial Fan Deposits

(Qof$_3$) Old Alluvial Fan Deposits, Unit 3

(Qvof) Very Old Alluvial Fan Deposits, Undivided

(Qvof) Very Old Alluvial Fan Deposits

(Qlh) La Habra Formation

(Qch) Coyote Hills Formation

(Qsp) San Pedro Formation

(Tplv) Puente Formation, La Vida Member

(Tvs) Vaqueros and Sespe Formations, Undifferentiated

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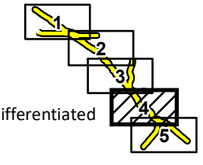

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SOURCE: Google Imagery (2021); Morton and Miller (2006); Saucedo et al. (2016)

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12-Ora-91 – PM 0.7, 1.3, 1.8, 2.2, 2.8, 3.4, 0.4, 1.1, 1.4, 1.6, 2.0, 2.6
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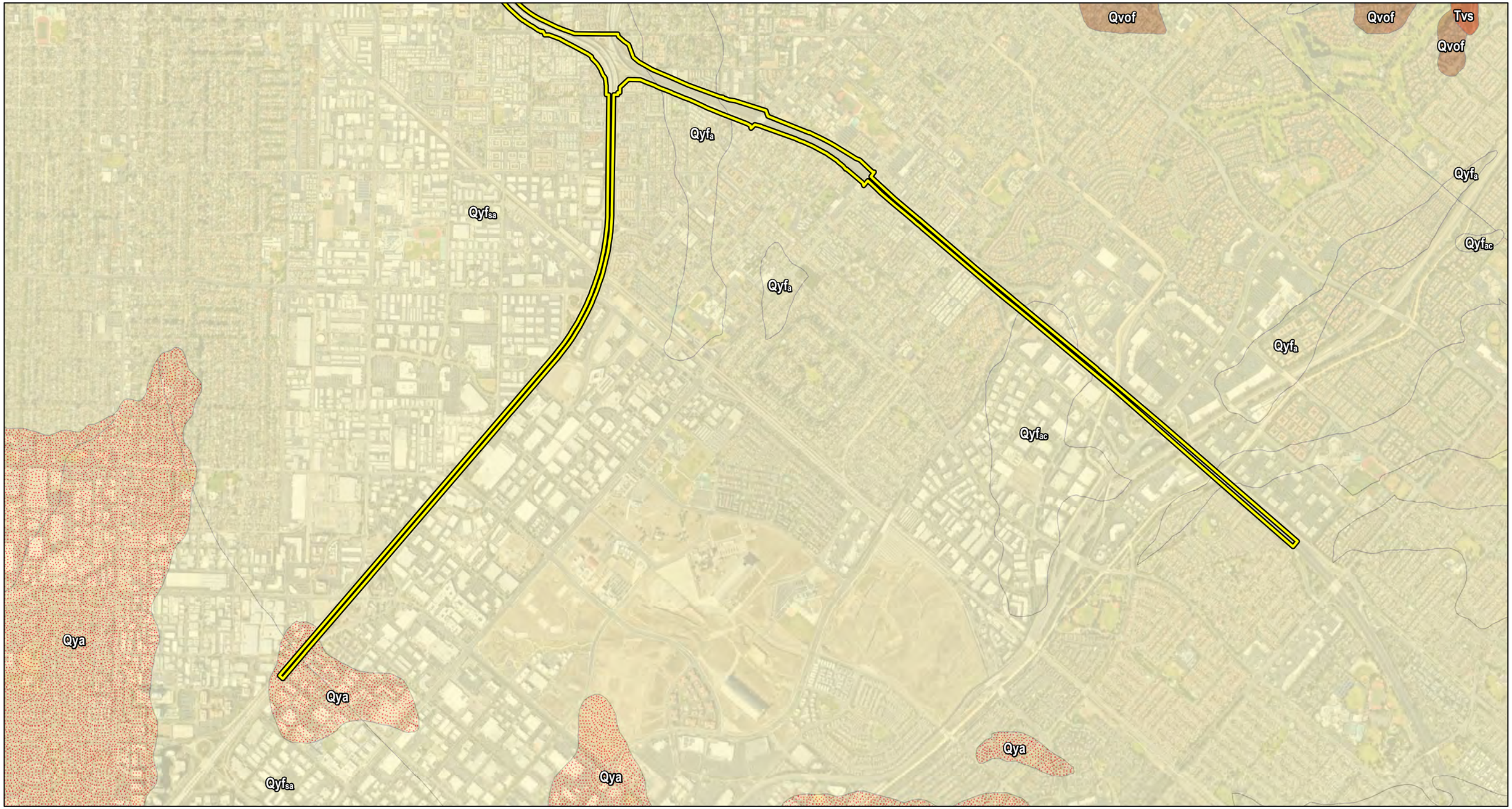

LEGEND

Project Location

Geology

(Qw) Very Young Wash Deposits

(Qya$_2$) Young Alluvium, Unit 2

(Qyf) Young Alluvial Fan Deposits

(Qya) Young Axial Channel Deposits

(Qof) Old Alluvial Fan Deposits

(Qof) Old Alluvial Fan Deposits

(Qof$_3$) Old Alluvial Fan Deposits, Unit 3

(Qvof) Very Old Alluvial Fan Deposits, Undivided

(Qvof) Very Old Alluvial Fan Deposits

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(Tplv) Puente Formation, La Vida Member

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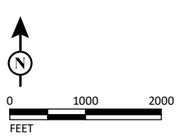

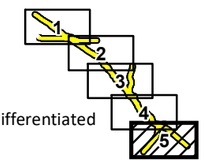

SOURCE: Google Imagery (2021); Morton and Miller (2006); Saucedo et al. (2016)

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FIGURE 2
Sheet 5 of 5
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12-Ora-91 – PM 0.7, 1.3, 1.8, 2.2, 2.8, 3.4, 0.4, 1.1, 1.4, 1.6, 2.0, 2.6
EA No. 0Q950

6.1.3 Young Alluvium, Unit 2

The Young Alluvium, Unit 2, is Holocene to late Pleistocene in age (less than 129,000 years ago) and consists of poorly consolidated, poorly sorted, permeable deposits of soft clay, silt, and loose to moderately dense sand and silty sand (Saucedo et al., 2016). These sediments were eroded from higher elevations, carried by flooding streams and debris flows, and deposited across the floodplain.

Although Holocene (less than 11,700 years ago) deposits can contain remains of plants and animals, only those from the middle to early Holocene (4,200 to 11,700 years ago) are considered scientifically important (SVP, 2010), and fossils from this time interval are not very common. However, the older, Pleistocene sediments in this unit have produced scientifically important fossils elsewhere in the region (Jefferson, 1991a, 1991b; Lander, 2003; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). These older, Pleistocene deposits span the end of the Rancholabrean North American Land Mammal Age (NALMA), which dates from 11,000 to 240,000 years ago (Sanders et al., 2009) and was named for the Rancho La Brea fossil site in central Los Angeles. The presence of *Bison* defines the beginning of the Rancholabrean NALMA (Bell et al., 2004), but fossils from this time also include other large and small mammals, reptiles, fish, invertebrates, and plants (Jefferson, 1991a, 1991b; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). There is a potential to find these types of fossils in the older sediments of this geologic unit, which may be encountered below a depth of approximately 10 feet. Therefore, these deposits are assigned a low paleontological sensitivity above a depth of 10 feet and a high sensitivity below that mark.

6.1.4 Young Alluvial Fan Deposits

The Young Alluvial Fan Deposits are Holocene to late Pleistocene in age (less than 129,000 years ago) and consist of unconsolidated silt, sand, and gravel (Morton and Miller, 2006). Cobble- and boulder-size clasts are also present and become more abundant closer to the hills and mountains (Morton and Miller, 2006). These sediments were eroded from higher elevations, carried by flooding streams and debris flows, and deposited in a fan or lobe shape at the base of the hills. They show slight to moderate dissection by erosional gullies (Morton and Miller, 2006). This unit is synonymous with the Young Alluvial Fan Deposits, Undivided, mapped by Saucedo et al. (2016). The two are combined here under the name Young Alluvial Fan Deposits.

Like the Young Alluvium, Unit 2, the Holocene sediments of the Young Alluvial Fan Deposits are unlikely to contain scientifically important fossils. However, the older, Pleistocene deposits in this geologic unit have produced scientifically important Rancholabrean fossils near the Project area and elsewhere in the region (Jefferson, 1991a, 1991b; Lander, 2003; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). There is a potential to find similar fossils in the older sediments of this geologic unit, which may be encountered below a depth of approximately 10 feet. Therefore, these deposits are assigned a low paleontological sensitivity above a depth of 10 feet and a high sensitivity below that mark.

6.1.5 Young Axial Channel Deposits

The Young Axial Channel Deposits are Holocene to late Pleistocene in age (less than 129,000 years ago) and consist of slightly to moderately consolidated silt, sand, and gravel (Morton and Miller,

2006). They formed as streams and washes carried sediment down from higher elevations in the foothills of the Santa Ana Mountains (Morton and Miller, 2006).

Like the Young Alluvium, Unit 2, and Young Alluvial Fan Deposits, the Holocene sediments of the Young Axial Channel Deposits are unlikely to contain scientifically important fossils. However, the older, Pleistocene deposits in this geologic unit have produced scientifically important Rancholabrean fossils near the Project area and elsewhere in the region (Jefferson, 1991a, 1991b; Lander, 2003; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). There is a potential to find similar fossils in the older sediments of this geologic unit, which may be encountered below a depth of approximately 10 feet. Therefore, these deposits are assigned a low paleontological sensitivity above a depth of 10 feet and a high sensitivity below that mark.

6.2 Fossil Locality Searches

According to the fossil locality searches conducted by the NHMLAC and the SDNHM, there are no known fossil localities within the boundaries of the Project. However, both museums have records of several fossil localities near the Project from geologic units within or similar to those found within the Project area, either at the surface or at depth.

The NHMLAC reports five fossil localities near the Project from geologic units within or similar to those found within the Project area. Three of these localities are from unknown Pleistocene formations. The closest of these, LACM VP 1652, is located on Rio Vista Avenue south of Lincoln Avenue in Anaheim and produced remains of sheep (*Ovis*). LACM VP 3, located in Richfield south of Yorba Linda, produced remains of elephant (Proboscidae), and LACM VP 3524, located north of Malvern Avenue 0.5 mile west of Gilbert Street in Fullerton, produced remains of hooved mammal (Ungulata). The locality search from the NHMLAC also noted a large number of vertebrate remains from the La Habra Formation, a geologic unit equivalent in age and depositional environment to the Young Alluvium, Unit 2; Young Alluvial Fan Deposits; and Young Axial Channel Deposits. From the La Habra Formation, the museum has localities LACM VP 4185-4201, located at Coyote Creek adjacent to Ralph B. Clark Regional Park, and LACM VP 3347, located at 11204 Bluefield Avenue in Whittier. These localities yielded remains of bison (*Bison*), camel (*Camelops*), horse (*Equus*), mammoth (*Mammuthus*), mastodon (*Mammut*), elephant clade (Proboscidea), dire wolf (*Canis dirus*), coyote (*Canis latrans*), deer (*Odocoileus*), dwarf pronghorn (*Capromeryx*), unidentified artiodactyl, and sea duck (*Chendytes*).

The SDNHM reports five localities near the Project, all located at the Anaheim Gardenwalk from within Pleistocene sediments. These localities yielded remains of estuarine oysters, freshwater invertebrates (e.g., freshwater snails and mussels), and terrestrial vertebrates (e.g., pocket mice, gophers).

Copies of the NHMLAC and SDNHM fossil locality search results letters are included in Appendices A and B, respectively.

6.3 Field Survey

The field survey was divided into three sections and conducted over three days. The first section consisted of the interchanges of all exits on I-5 between Valley View Boulevard and Brookhurst Street and the SR-91 median between Valley View Boulevard and Harbor Boulevard. The second

section of the survey consisted of interchanges of all exits on I-5 between Euclid Street and The City Drive. The third section of the survey consisted of interchanges of all exits on I-5 between the I-5/SR-57/SR-22 interchange and Newport Avenue. Also included were portions of the median on SR-55 from I-5 to Dyer Road, and I-5 from Newport Avenue to Culver Drive.

A large majority of the Project area is completely paved, obscuring any view of sediments. These areas largely consist of intersections, roads, and medians. There are also a number of landscaped areas and gores along the roads and intersections planted with grass or ice plant. While coverage by these forms of vegetation during the survey was extremely high, often to the point of total coverage, some areas provided small views of the underlying sediments.

The intersection of Artesia Boulevard and I-5 consisted of a gore covered in ice plant and a vacant lot used for storage parking. Visibility in the gore was extremely poor (less than 1 percent) due to ice plant coverage and infrastructure. The fenced vacant lot east of the gore consisted of cement pavement, asphalt pavement, and Artificial Fill covered in aggregate. The shoulder of SR-91 from Dale Street east along Peppertree Drive was fenced and consisted of Artificial Fill and landscaping. The intersection of I-5 and Euclid Street was landscaped and had less than 1 percent visibility due to ice plant. The intersection of I-5 and Lincoln Avenue was landscaped, likewise with less than 1 percent visibility due to ice plant. The intersection of Ball Road and I-5 was paved and landscaped, with less than 1 percent visibility due to ice plant. The intersection of Harbor Boulevard and I-5 was paved and landscaped, with less than 1 percent visibility due to ice plant. Manchester Avenue from Katella Avenue to The City Drive consisted of paved and landscaped areas and a vacant lot with Artificial Fill between Manchester Avenue and the southbound I-5 ramp to The City Drive. Gene Autry Way from Haster Street to Union Street was paved, with small, landscaped areas and ramps consisting of Artificial Fill. The gores at the intersection of Santa Ana Boulevard, Grand Avenue, and I-5 were landscaped, with some visible Artificial Fill.

All areas with exposed ground surface throughout the Project area contained Artificial Fill with no native sediments visible in any locations. No paleontological resources were observed during the field survey.

7. RECOMMENDATIONS

Based on the results of this study and consideration of the development methods of the Project, no special paleontological situations that would require Project redesign to avoid critical fossil localities or deposits are anticipated for this Project. The Project area contains geologic units that have high paleontological sensitivity (e.g., the Young Alluvium, Unit 2 below a depth of 10 feet; Young Alluvial Fan Deposits below a depth of 10 feet; and Young Axial Channel Deposits below a depth of 10 feet). With no ground disturbance involved, development of Alternative 1 would not have the potential to impact paleontological resources. Ground disturbance associated with Alternative 2 is limited in aerial extent and depth, reaching a maximum depth of 5 feet, and would not reach deposits with high paleontological sensitivity. Therefore, no mitigation is recommended for either Alternative 1 or Alternative 2. However, with excavation activities anticipated to extend up to 25 feet below the surface for Alternative 3 and Alternative 4, development of these alternatives has the potential to impact scientifically important, nonrenewable paleontological resources. Therefore, preparation of a Paleontological Mitigation Plan (PMP), paleontological monitoring, treatment and curation of scientifically significant resources, and preparation of a Paleontological Mitigation Report (PMR) are recommended if Alternative 3 or Alternative 4 is selected. The PMP should follow the guidelines contained in the Caltrans SER, Volume 1, Chapter 8 – Paleontology, as well as those from the SVP. Following these guidelines, the PMP shall include sections describing Project activities, the geologic units within the Project area and their paleontological sensitivities, the work plan for mitigating Project impacts to paleontological resources, estimates of monitoring schedules and costs, decision thresholds for monitoring levels and fossil collections, a recommended repository for recovered fossils, any necessary permits, and the appropriate documentation at the end of the monitoring program.

Once the PMP has been prepared, the paleontological resource protocols and procedures within it shall be incorporated into the Project plans, specifications, and estimates. Implementation of these protocols and procedures will reduce Project impacts to scientifically important paleontological resources.

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Appendices available upon request.