PALEONTOLOGICAL IDENTIFICATION AND EVALUATION REPORT

FOR

INTERSTATE 215/BARTON ROAD INTERCHANGE IMPROVEMENT PROJECT

CITIES OF GRAND TERRACE AND COLTON

COUNTY OF SAN BERNARDINO, CALIFORNIA

08-SBd-215-PM 0.58/1.95

EA 0J070

Prepared for: Olufemi Odufalu 11/5/10

Olufemi A. Odufalu, Branch Chief, Environmental Engineering Oversight
California Department of Transportation, District 08
464 West 4th Street, 6th Floor – MS 825
San Bernardino, California 92401-1400

Prepared by:

Robert E. Reynolds, Associate, Senior Paleontological Project Manager
Michael Pasenko, M.A., Paleontologist
LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507

Reviewed by: Gabrielle Duff 11/5/10

Ms. Gabrielle Duff, Principal Investigator, Prehistoric Archaeology
California Department of Transportation, District 8
464 W. 4th Street, 8th Floor MS 825
San Bernardino, California 92401-1400

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August 2010

SUMMARY OF FINDINGS

The California Department of Transportation (Department), in cooperation with the San Bernardino Associated Governments (SANBAG), the Riverside County Transportation Commission (RCTC), and the City of Grand Terrace, proposes to improve the Interstate 215 (I-215)/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. On Barton Road, the project limits extend from approximately 0.3 mile (mi) west of I-215 to 0.4 mi east of I-215. The project limits on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road.

The area of potential disturbance (APD) covers all areas to be disturbed by construction of any of the Build Alternatives, including areas for staging and access, temporary construction easements (TCEs), temporary construction signage, grading, and project construction activities.

The APD contains three types of sediments. Geologic mapping indicates that the APD is located on early Pleistocene alluvium (Qvof), middle Pleistocene alluvium (Qof), and young (Holocene) alluvial sediments (Qf, Qyf), including recently active Holocene wash sediments (Qw). Very old Pleistocene sediments and middle Pleistocene sediments within the APD are present just below the surface. These two types of Pleistocene sediments have the potential to contain significant nonrenewable paleontological resources. National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) recommendations, as well as guidelines from the County of San Bernardino, are consistent with recommendations of the Society of Vertebrate Paleontology (SVP) and require that impacts to nonrenewable paleontological resources must be considered during project design and construction within undisturbed Pleistocene sediments.

The literature review and records searches through museums produced information showing that sediments dating from the Pleistocene Period in the project vicinity have the potential to contain significant nonrenewable paleontological resources. This study reviews definitions of paleontological significance and definitions for rock units that have high potential and high sensitivity for the presence of nonrenewable paleontological resources. The results of the research and field surveys conducted for this project show that fossiliferous Pleistocene sediments deposited during the last 2 million years may be encountered during excavation of undisturbed sediments. Consequently, potential impacts to paleontological resources are anticipated as a result of the proposed Build Alternatives, and it will be necessary to prepare a Paleontological Mitigation Plan (PMP) for the project.

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INTRODUCTION

The California Department of Transportation (Department), in cooperation with the San Bernardino Associated Governments (SANBAG), the Riverside County Transportation Commission (RCTC), and the City of Grand Terrace, proposes to improve the Interstate 215 (I-215)/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. On Barton Road, the project limits extend from approximately 0.3 mile (mi) west of I-215 to 0.4 mi east of I-215. The project limits on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road. Figure 1 shows project location and vicinity maps.

I-215 is a major north-south freeway facility that begins at the southern junction of Interstate 15 (I-15) in the City of Murrieta in Riverside County and terminates at the northern junction with I-15, near Devore in San Bernardino County. It is an alternative route of I-15. The portion of I-215 within the project limits currently provides three through lanes in each direction and a paved median.

The existing I-215/Barton Road interchange is a compact diamond interchange with single-lane entrance and exit ramps. Both of the exit ramp approaches expand to two lanes to accommodate turning traffic. The existing northbound ramp intersection and southbound ramp intersection are spaced approximately 350 feet (ft) apart. The existing overcrossing is a single lane in each direction with back-to-back left-turn pockets for the entrance ramps.

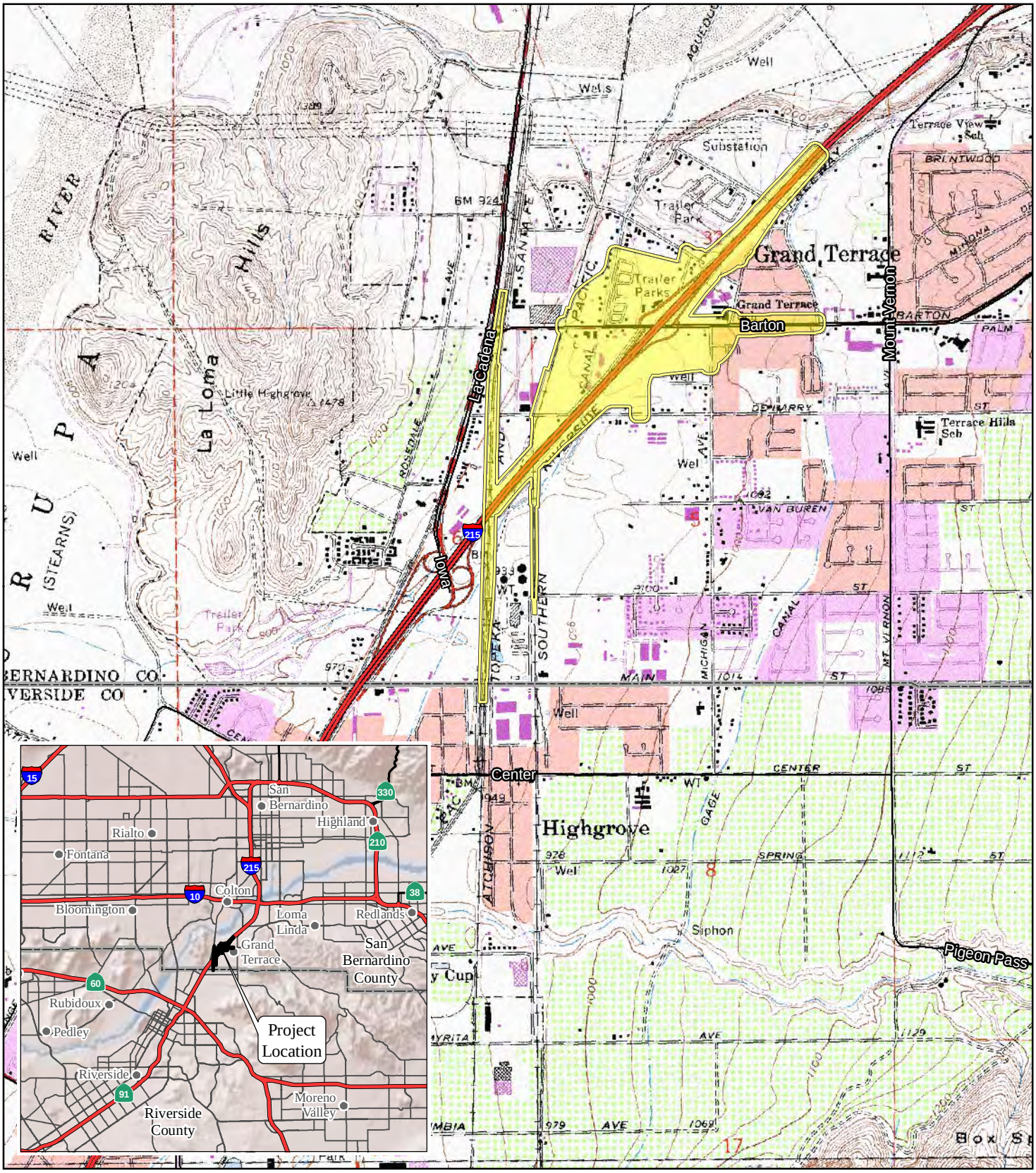
Barton Road is an east-west primary arterial in the County of San Bernardino. It extends from La Cadena Drive in the City of Colton to east of San Mateo Street in the City of Redlands. Within the project limits, Barton Road is a two-lane roadway west of I-215. East of I-215, Barton Road is a four-lane facility with turn lanes at various intersections. Within the project limits, there are several intersections:

- Grand Terrace Road (unsignalized T-intersection)
- Southbound ramps and La Crosse Avenue intersection (signalized)
- Northbound ramps intersection (signalized)
- Michigan Avenue intersection (signalized T-intersection)
- Vivienda Avenue intersection (unsignalized T-intersection)

PURPOSE AND NEED

Purpose

The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/Barton Road interchange and facilities served by the interchange.



LEGEND

Project Area

FIGURE 1

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SOURCE: USGS 7.5 min. quad. (San Bernardino South, 1980)

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I-215/Barton Road Interchange Improvement Project

Project Location Map

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Need

The proposed project is needed to increase capacity, improve operations, and reduce congestion at the I-215/Barton Road interchange. Based on traffic projections and the existing and future land uses in the vicinity, the facility is forecast to degrade to level of service (LOS) F (breakdown condition) by 2040 without improvements. Due to its nonstandard design, the existing interchange restricts large truck movements, as well as pedestrian and bicyclist access to local streets.

Capacity and Transportation Demand. The study area intersections currently operate at LOS B or C during the a.m. and p.m. peak hours. Without improvements, in 2015, the Barton Road/Grand Terrace Road intersection would operate at LOS F during the a.m. peak hour and LOS E during the p.m. peak hour. Because of the projected demand, without improvements, by 2040 all seven study area intersections would operate at LOS F during both the a.m. and p.m. peak hours, with the exception of Barton Road/La Cadena Drive during the a.m. peak hour, which would operate at LOS C.

The demand for interchange access is also represented in traffic volumes. Traffic projections for 2040 show that the average daily traffic (ADT) volumes on I-215 will increase by more than 200 percent. The 2009 Barton Road interchange ramp volumes are forecast to double by 2040. Additional capacity is needed to accommodate projected traffic volumes and improve LOS.

Roadway Deficiencies. The existing I-215 southbound off-ramp at Barton Road is nonstandard per the Highway Design Manual (6^{th} Edition) because it intersects with a local street (La Crosse Avenue) before reaching Barton Road. The southbound off-ramp at Barton Road is a five-legged intersection with a two-way frontage road adjacent to the southbound on-ramp. The existing interchange does not have adequate space for Surface Transportation Assistance Act (STAA) truck-turning movements, a sidewalk on the south side, or bicycle lanes. Therefore, the existing interchange restricts large truck movements and pedestrian and bicyclist access to local streets. Reconstruction of the interchange is needed to improve access to the freeway and local streets.

In the existing condition, the left-turn lane on westbound Barton Road at the I-215 southbound on-ramp does not have sufficient vehicle capacity during the a.m. and p.m. peak hours. This prevents left-turning and through traffic from moving through the interchange. Queue lengths are forecasted to increase substantially by 2040 without interchange improvements. Additional turn-pocket capacity is needed in order to reduce delays at the interchange.

Social Demand and Economic Development. The I-215/Barton Road interchange is the primary regional access for the City of Grand Terrace. It also serves the southwestern portion of the City of Colton and provides direct access to the City of Loma Linda. The western region of the City of Grand Terrace and eastern region of the City of Colton are projected to experience substantial population growth through 2035 according to the Southern California Association of Governments (SCAG) 2008 Adopted Regional Transportation Plan (RTP) Growth Forecasts. The build out of the area in accordance with the City of Grand Terrace General Plan and the Barton Road Specific Plan will result in increased traffic congestion on the freeway and the local street networks leading to the interchange. Reconstruction of the interchange is needed to relieve additional congestion.

PROJECT DESCRIPTION

The Project Description describes the proposed action and the design alternatives that were developed to meet the identified need through accomplishing the defined purposes while avoiding or minimizing environmental impacts. The alternatives are Alternative 1 (No Build), Alternative 3 (Cloverleaf Interchange), Alternative 5 (Single-Point/Bowtie Interchange), and Alternative 6 (Modified Cloverleaf). The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. Within the limits of the proposed project, I-215 currently provides three lanes in each direction. Barton Road is a two-lane roadway west of I-215 and a four-lane facility with turn lanes at various intersections east of I-215. Barton Road provides four ramps that connect to I-215: southbound on- and off-ramps, and northbound on- and off-ramps.

The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/Barton Road interchange. The existing interchange has a nonstandard southbound off-ramp, and the existing interchange restricts large truck movements and pedestrian and bicyclist access. Without the interchange improvement, the operation of this facility will deteriorate over time to reach unacceptable LOS in the future.

The project area for the I-215/Barton Road Interchange Improvement Project overlaps the project area with the I-215 High-Occupancy Vehicle (HOV) Lane Gap Closure Project at the Burlington Northern Santa Fe Railroad (BNSF) two-track underpass (bridge over the freeway) and the Union Pacific Railroad (UPRR) single-track underpass between the Iowa Avenue/La Cadena Drive interchange and the Barton Road interchange. Both projects would require the reconstruction of these two structures. For the I-215/Barton Road Interchange Improvement Project, the reconstruction is needed to accommodate an auxiliary lane that is proposed between the northbound La Cadena entrance ramp and the proposed Barton Road exit ramp. The underpass replacements are required for I-215/Barton Road interchange Alternatives 3, 5, and 6. For the I-215 Bi-County HOV Lane Gap Closure Project, the reconstruction is necessary due to inadequate horizontal clearance between the existing structure supports and the proposed HOV lane addition. The reconstructed bridges would be raised to provide adequate vertical clearance with the freeway.

The I-215/Barton Road Interchange Improvement Project is scheduled to be constructed after construction of the I-215 Bi-County HOV Lane Gap Closure Project. However, because each project has independent utility, the environmental impacts of reconstruction of the two railroad structures as well as construction of temporary railroad bridges to be utilized during reconstruction of the existing structures (railroad shooflies) are analyzed for each project.

PROJECT ALTERNATIVES

Four alternatives are being analyzed in this document: the No Build Alternative (Alternative 1) and three Build Alternatives (Alternatives 3, 5, and 6).

No Build Alternative

Alternative 1 (No Build Alternative). Under this alternative, no interchange reconstruction would occur. This alternative would not improve operations, increase highway capacity, or reduce highway congestion at the I-215/Barton Road interchange.

Proposed Build Alternatives

Alternative 3 (Cloverleaf Interchange). This alternative would reconstruct and improve the existing interchange in a cloverleaf design. Alternative 3 would widen the Barton Road overcrossing from one to three lanes in each direction, allowing for additional turning lanes onto the southbound and northbound loop on-ramps. The existing freeway overcrossing would be replaced with a new structure with four through lanes and two turn lanes. The conceptual design for Alternative 3 is shown in Figure 2 and described in the following sections.

Interchange Components. This alternative includes the components listed below:

- A new southbound off-ramp, southbound loop on-ramp, northbound loop on-ramp, and northbound off-ramp.
- The southbound off-ramp would make a new connection at Barton Road with one right-turn lane, one shared right-/left-turn lane, and one left-turn lane; La Crosse Avenue north of Barton Road would be removed.
- The southbound loop on-ramp would provide three lanes at Barton Road.
- The northbound off-ramp would accommodate three lanes (two right-turn lanes and one left-turn lane) at the Barton Road intersection.
- The northbound loop on-ramp would provide three lanes at Barton Road.
- Modified drainage facilities consistent with other project improvements.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of the Barton Road overcrossing.
- Storm water treatment devices as needed to address storm water runoff in the project limits.
- Replacement landscaping consistent with the 215/91 Corridor Master Plan Conceptual Interchange design.
- Potential sound barriers in the vicinity of new on- and off-ramps.
- Utility relocation or protection in place during construction.
- Design exceptions for interchange spacing, superelevation design on the southbound on-ramp and northbound off-ramp, curb ramps (one ramp at each of the four corners at the intersection of Barton Road and the southbound on- and off-ramps), and minimum traffic width during construction (three 11-foot (ft) inside traffic lanes and one 12 ft outside traffic lane).

LEGEND

- Alternative 3
- Temporary Construction Easement
- Proposed Caltrans Right of Way
- Proposed City Right of Way
- Parcel Boundary
- Proposed Railroad Shoofly Area
- New/Modify Bridge Structure
- Proposed Retaining Wall
- Potential Sound Barrier
- Proposed Best Management Practices (BMPs)

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SOURCE: Bing (2008); TBM (2008); County of San Bernardino (5/09); LAN Engineering (2008, 6/09)

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FIGURE 2

I-215/Barton Road Interchange Improvement Project

Alternative 3

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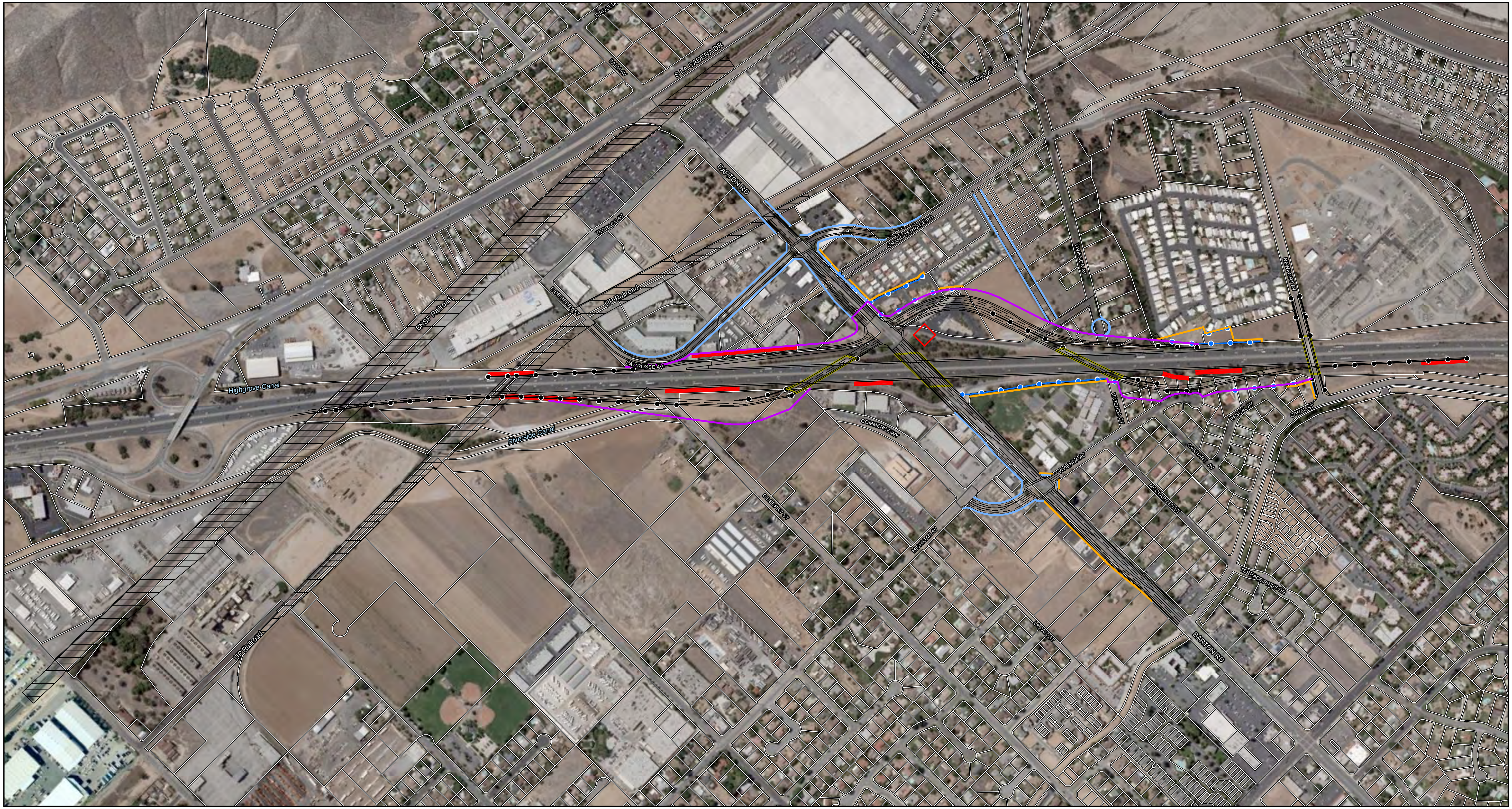
Local Circulation Components. Alternative 3 includes the following local circulation components:

- Reconfigure Commerce Way to intersect with Barton Road at Vivienda Avenue.
- Eliminate the intersection of Michigan Avenue at Barton Road; Michigan Avenue will form a T-intersection with Commerce Way.
- Widen Barton Road to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Convert the segment of Vivienda Avenue west of I-215 into a cul-de-sac.
- Construct a new two-lane road between La Crosse Avenue and Grand Terrace Road adjacent to Vivienda Avenue.
- Realign Grand Terrace Road and the Grand Terrace Road/Barton Road intersection.
- Extend Grand Terrace Road southwest of Barton Road to tie into East Deberry Street.
- Convert Grand Terrace Road at Barton Road into a cul-de-sac.
- Modified drainage facilities consistent with other project improvements.
- Traffic signal modifications.

Alternative 5 (Single-Point/Bowtie Interchange). Alternative 5 would be constructed as a single-point/bowtie interchange. Under Alternative 5, Barton Road would be widened to two lanes in each direction. The existing overcrossing would be replaced with a new structure with four through lanes and three turn lanes. The conceptual design for Alternative 5 is shown in Figure 3 and described in the following sections.

Interchange Components. This alternative includes the following components:

- The new southbound off-ramp would include one right-turn lane, one left-turn lane, and one shared through/right-turn lane at Barton Road; La Crosse Avenue north of Barton Road would be removed.
- The new southbound on-ramp would provide two lanes at Barton Road.
- The new northbound off-ramp would cross over I-215 south of Barton Road and would include three lanes at the Barton Road intersection (two right-turn lanes and one shared through/left-turn lane).
- The new northbound on-ramp would provide two lanes at Barton Road and would cross over I-215 north of Barton Road.
- Drainage for the entire interchange would be improved.



LEGEND

——	Alternative 5	▨	Proposed Railroad Shoofly Area
——	Temporary Construction Easement	——	New/Modify Bridge Structure
——	Proposed Caltrans Right of Way	•—•	Proposed Retaining Wall
——	Proposed City Right of Way	•—•	Potential Sound Barrier
▭	Parcel Boundary	——	Proposed Best Management Practices (BMPs)

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FIGURE 3

I-215/Barton Road Interchange Improvement Project

Alternative 5

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EA# 0J070

SOURCE: Bing (2008); TBM (2008); County of San Bernardino (5/09); LAN Engineering (2008, 6/09)

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- Standard sidewalks and a Class II bicycle lane would be provided on both sides of the Barton Road overcrossing.
- Storm water treatment devices as needed to address storm water runoff in the project limits.
- Replacement landscaping consistent with the 215/91 Corridor Master Plan Conceptual Interchange design.
- Potential sound barriers in the vicinity of new on- and off-ramps.
- Utility relocation or protection in place during construction.
- Design exceptions for interchange spacing, superelevation on the northbound on-ramp and southbound on and off-ramps, and minimum traffic width during construction (three 11 ft inside traffic lanes and one 12 ft outside traffic lane).

Local Circulation Components. Alternative 5 includes the following local circulation components:

- Reconfigure Commerce Way to intersect with Barton Road at Vivienda Avenue.
- Eliminate the intersection of Michigan Avenue at Barton Road; Michigan Avenue will form a T-intersection with Commerce Way.
- Widen Barton Road to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Convert the segment of Vivienda Avenue west of I-215 into a cul-de-sac.
- Construct a new two-lane road between La Crosse Avenue and Grand Terrace Road adjacent to Vivienda Avenue.
- Realign Grand Terrace Road and the Grand Terrace Road/Barton Road intersection.
- Extend Grand Terrace Road southwest of Barton Road to tie into East Deberry Street.
- Convert Grand Terrace Road at Barton Road into a cul-de-sac.
- Modified drainage facilities consistent with other project improvements.
- Traffic signal modifications.

Alternative 6 (Modified Cloverleaf) (Locally Preferred Alternative). Under Alternative 6, Barton Road would be widened to two through lanes in each direction plus one left-turn and one right-turn lane. The existing overcrossing would be replaced with a new structure with four through lanes and three turn lanes. The conceptual design for Alternative 6 is shown in Figure 4 and described in the following sections.

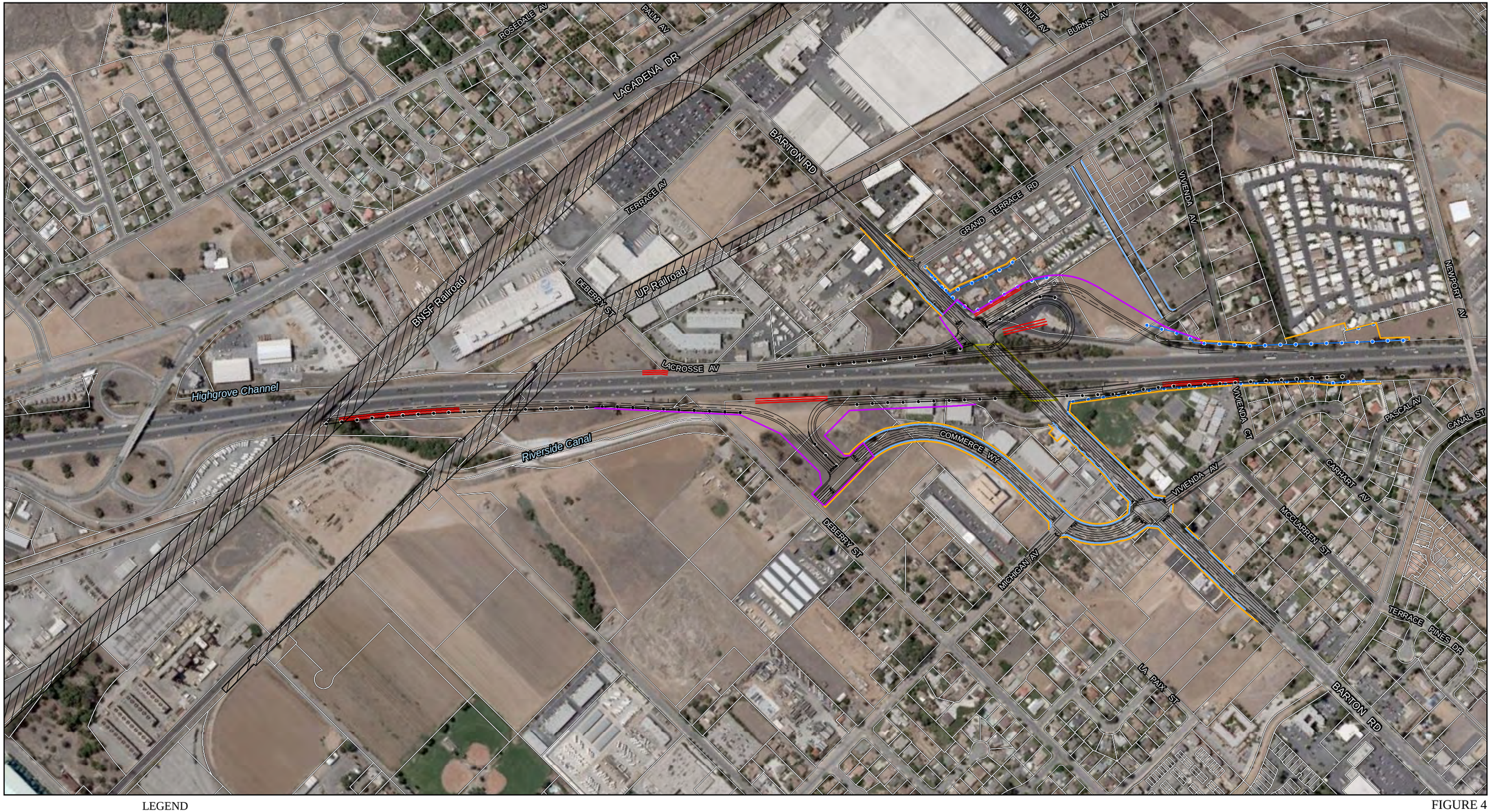
Interchange Components. This alternative includes the components listed below:

- The new southbound loop on-ramp would provide two lanes at Barton Road.

- The new southbound off-ramp would make a new connection at Barton Road with one right-turn lane, one left-turn lane, and one shared through/left-turn lane; La Crosse Avenue north of Barton Road would be removed.
- The new northbound off-ramp would tie in to Commerce Way and provide for dual left-turn lanes and a single right-turn lane.
- A new northbound hook on-ramp would be provided in the southeast quadrant. The access to the ramp would be through proposed extension of the Commerce Way.
- Drainage for the entire interchange would be improved.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of the Barton Road overcrossing.
- Storm water treatment devices as needed to address storm water runoff in the project limits.
- Replacement landscaping consistent with the 215/91 Corridor Master Plan Conceptual Interchange design.
- Potential sound barriers in the vicinity of new on- and off-ramps.
- Utility relocation or protection in place during construction.
- Design exceptions for interchange spacing, superelevation design on the northbound on-ramp, curb ramps (one ramp at each of the four corners at the intersection of Barton Road and the southbound on- and off- ramps), minimum traffic width during construction (three 11 ft inside traffic lanes and one 12 ft outside traffic lane), and access control opposite the southbound on- and off-ramps.

Local Circulation Components. Alternative 6 includes the following local circulation components:

- Reconfigure Commerce Way to intersect with Barton Road at Vivienda Avenue.
- Shift Commerce Way east to accommodate the northbound off- and on-ramps.
- Extend Commerce Way southeast of Barton Road to cross Michigan Avenue to the vicinity of Deberry Street.
- Tie the hook on-ramp and I-215 off-ramp to the new intersection at Commerce Way.
- Eliminate the intersection of Michigan Avenue at Barton Road; Michigan Avenue will form a T-intersection with Commerce Way.
- Widen Barton Road to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Construct a new two-lane road between La Crosse Avenue and Grand Terrace Road adjacent to Vivienda Avenue.
- Modified drainage facilities consistent with other project improvements.
- Traffic signal modifications.



LEGEND

- Alternative 6
- Temporary Construction Easement
- Proposed Caltrans Right of Way
- Proposed City Right of Way
- Parcel Boundary
- Proposed Railroad Shoofly Area
- New/Modify Bridge Structure
- Proposed Retaining Wall
- Potential Sound Barrier
- Proposed Best Management Practices (BMPs)

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SOURCE: Bing (2008); TBM (2008); County of San Bernardino (5/09); LAN Engineering (2008, 6/09)

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FIGURE 4

I-215/Barton Road Interchange Improvement Project

Alternative 6

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Alternatives Considered but Eliminated from Further Discussion

Alternatives 2 and 4 included a new northbound on-ramp that encroached into the playfields and portable buildings at Grand Terrace Elementary School in the northeast quadrant of the interchange. Meetings with the Colton Joint Unified School District Director of Facilities and Planning and a California Department of Education representative determined that the acquisition of school property under these alternatives would require the school to be relocated. This would require that the project cost include the cost of moving the school and environmental clearance of a new site. Further study determined that a suitable site within the school enrollment area was not available. For these reasons, and because Alternatives 3, 5, and 6 are feasible, the Project Development Team (PDT) made a decision to withdraw Alternatives 2 and 4 from further consideration.

PARAMETERS OF EXCAVATION

The ramps for the project will be on an embankment requiring minimal excavation, but the excavation for structure footings would be 10–15 ft deep.

PURPOSE OF INVESTIGATION

The paleontological locality search and field assessment were conducted pursuant to CEQA; Public Resources Code (PRC) 21000 (Division 13); California Code of Regulations (CCR) 15000 (Title 14, Division 3, Chapter 1); and CEQA Appendix G; PRC 5097.5. This assessment documents the potential for paleontological resources older than 9,000 years to occur in the study area and the need for a Paleontological Mitigation Plan (PMP).

This assessment was also prepared in accord with guidelines on a national level, including those from NEPA (Public Law [PL] 91–190, 83 Stat. 852, 42 United States Code [USC] 4321–4327), the Federal Land Policy and Management Act of 1976 (FLPMA, PL 94–579, 43 USC. 1701–1782), and the Paleontological Resource Management 1998 Bureau of Land Management (BLM) Handbook H-8270-1.

SIGNIFICANCE

Generally, scientifically significant paleontological resources are identified sites or geological deposits containing individual fossils or assemblages 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 (SVP 1995). Particularly important are fossils found in situ (undisturbed) in primary context (i.e., 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 because 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 on the amount of scientific study needed to adequately characterize an individual species and therefore affects how relative sensitivities are assigned to formations and rock units.

DEFINITIONS OF SIGNIFICANCE

The SVP (1995) and the Departmnet provide the following definitions of significance for paleontological resources:

- **Significant Nonrenewable Paleontological Resources** are fossils and fossiliferous deposits. In this analysis, they are restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate and botanic fossils except when present within a given vertebrate assemblage. Certain plant and invertebrate fossils or assemblages may be defined as significant by a project paleontologist, local paleontologist, specialist, or special interest groups, or by Lead Agencies or local governments.
- **A Significant Fossiliferous Deposit** is a rock unit or formation that contains significant nonrenewable paleontological resources, defined as comprising one or more identifiable vertebrate fossils, and any associated invertebrate and plant fossils, traces, and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways or nests and middens, which provide datable material and climatic information).

According to the Department, the significance of a paleontological resource may be stated for a particular fossil species, fossil assemblage, or for a rock unit as a whole. 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 Code of Federal Regulations (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.

SUMMARY OF SIGNIFICANCE

This assessment uses the following summary to define significance as it relates to paleontological resources:

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

SENSITIVITY

DEFINITIONS OF SENSITIVITY

The SVP (1995) and the Department provide the following definitions of sensitivity for paleontological resources:

- **Paleontological Sensitivity** is determined only after a field survey of the rock unit, in conjunction with a review of available literature and paleontological locality records. In cases where no subsurface data are available, sensitivity may be determined by subsurface excavation.
- **Paleontological Potential** is the potential for the presence of significant nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have the potential for the presence of significant nonrenewable paleontological resources. A review of available literature may further refine the potential of each rock unit, formation, or facies. The SVP and the Department identify three categories of sensitivity: High, Low, 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 either High or Low sensitivity.

The SVP and the Department are consistent in their usage of the three categories of sensitivity (High, Low, or Undetermined). According to the Department, significance is often stated as "sensitivity" or "potential." In most cases, decisions about how to manage paleontological resources must be based on this potential because the actual situation cannot be known until excavation for a project is underway. Significance may also be stated for a particular rock unit, predicated on the research potential of fossils suspected to occur in that unit. The Department uses the following to describe High, Low, and No Potential for paleontological resources:

- **High Potential:** This category includes 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. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation. The SVP divides High Potential into **Ha** (high sensitivity on the surface) and **Hb** (high sensitivity starting 3 ft below the surface).
- **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 for containing 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. Rock units designated as Low Potential generally do not require mitigation monitoring. Low Potential corresponds to the "Undetermined" potential identified by the SVP, which requires research and field inspection conducted as part of a Paleontological Resources

Identification and Evaluation Report to determine whether additional mitigation measures are necessary.

- **No Potential:** Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources.

Given the range of criteria that may be used, significance assessments should necessarily be based on the recommendations of a professional Principal Paleontologist with expertise in the region under study and the resources found in that region. An evaluation of a particular rock unit's significance rests on the known importance of specific fossils. Often this significance is reflected as a sensitivity ranking relative to other rock units in the same region.

SUMMARY OF SENSITIVITY

This assessment uses the following summary to define paleontological sensitivity and the potential for significant paleontological resources:

> *A formation or rock unit has paleontological sensitivity or the potential for significant paleontological resources if it has previously produced, or has lithologies conducive 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.*

METHODS

The study area for paleontological resources for the project is larger than the area of direct effects and consists of an approximately 1,000 ft radius beyond the area of potential disturbance (APD). The APD is defined as the area that would be disturbed during construction of the Build Alternatives and is also referred to as the project area. The study area includes additional areas to check for exposure of sediments outside the APD. The study area is shown on the United States Geological Survey (USGS) *San Bernardino South, California* 7.5-minute topographic quadrangle (1967, photorevised 1980) in Sections 31 and 32, Township 1 South, Range 4 West, and in Sections 5 and 6, Township 2 South, Range 4 West, San Bernardino Baseline and Meridian (SBBM), included as Figure 5.

Prior to the field survey, research was conducted to locate previously documented fossil localities in the study area and in western San Bernardino and Riverside Counties. That research focused on identifying sediments and formations conducive to the preservation of paleontological resources and included review of available geological and paleontological literature concerning or related to the Pleistocene stratigraphy of the project area and requests for paleontological locality data from museums in the vicinity of the project site.

Appendix A lists a summary of applicable legislation, Appendix B includes the records search results, and Appendix C includes the resource localities.

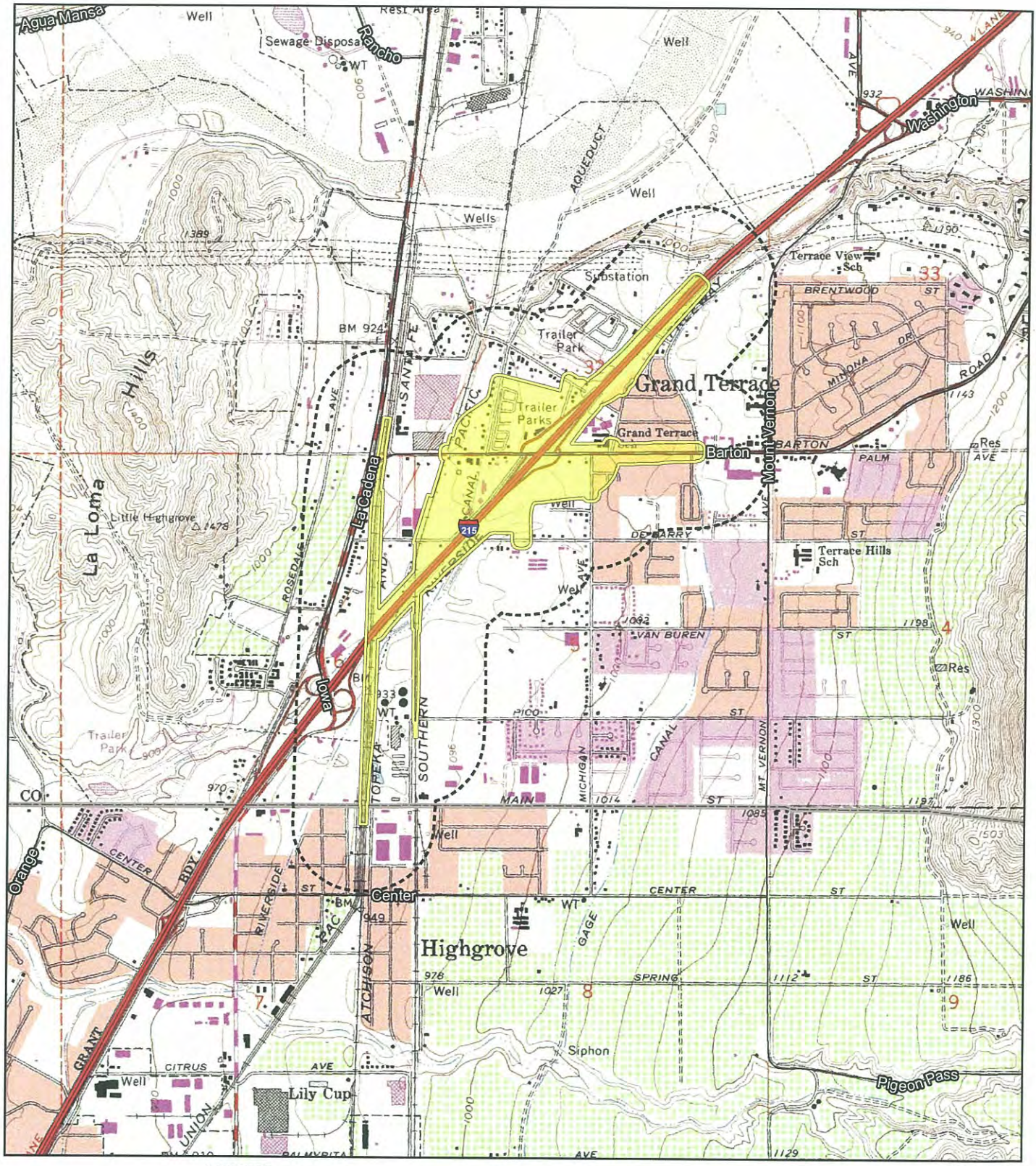
LITERATURE REVIEW AND LOCALITY SEARCH

A paleontological literature review was conducted for the proposed project using unpublished reports, paleontological assessment and monitoring reports, field notes, and published literature. A paleontological resource locality search was conducted through the San Bernardino County Museum (SBCM) and the Natural History Museum of Los Angeles County (LACM). Paleontological resource locality forms housed in those institutions record fossil localities in sediments equivalent in age to those in the study area.

FIELD INSPECTION

Vehicular Survey

A vehicular survey of the study area was conducted by Paleontologists Michael R. Pasenko, M.A., and Robert E. Reynolds on February 10, 2009. That survey verified the results of the literature review and analysis of the geologic mapping along the APD (Morton and Miller 2003). The vehicular survey also verified lithologic descriptions that support the potential for preservation of fossils in older Pleistocene alluvium.



LEGEND

Area of Potential Disturbance

Study Area

FIGURE 5

N

0 1000 2000

FEET

SOURCE: USGS 7.5 min. quad. (San Bernardino South, 1980)

I:\SBA330\Barton_I-215\GIS\Cultural_StudyArea.mxd (7/30/2010)

I-215/Barton Road Interchange Improvement Project

Study Area - Area of Potential Disturbance

08-SBd-215-PM 0.58/1.95

EA# 0J070

Foot Survey

A foot survey was conducted on February 11, 2009, by Mr. Reynolds, who inspected available exposures on vacant parcels within the study area shown on Figure 2. Exposed yellow-brown silty sands on east-west streets verified the presence of older Pleistocene alluvium (Qvof; Morton and Miller, 2003). No mid-Pleistocene Alluvium (Qof; Morton and Miller, 2003) was observed in the APD due to a thick cover of vegetation. Exposures of sediments were present at the west ends of Deberry and Van Buren Streets, and along the deep cuts for the Burlington Northern Santa Fe (BNSF) and the UPRR. Pleistocene sediments that might have been visible in road cuts along I-215 are now covered by decorative rock, manufactured organic mulch, and vegetation.

Mr. Pasenko completed the foot survey of additional areas of the APD on April 20, 2009. He walked along the railroad cuts at Deberry Street close to I-215 and just north of Van Buren Street. An additional railroad cut was surveyed west of I-215 near Barton Road. The exposures were reddish-brown, fine sandy silt with lenses of gravel. The Barton Road and I-215 road cuts were either developed or covered with vegetation. No paleontological resources were found during the foot surveys, although the older Pleistocene sediments are appropriate for the preservation of vertebrate fossils.

PERSONNEL

Robert E. Reynolds, Paleontologist, completed the paleontological resource literature review and report preparation and participated in the conduct of the vehicular and foot surveys. Mr. Reynolds' resume, provided in Appendix D, shows he was the paleontological program manager at LSA's Riverside office; a research associate of the LACM and California State University, Fullerton Desert Studies Consortium; and former Curator of Earth Sciences at the SBCM. He has 26 years of experience with paleontological salvage programs and 40 years of research experience collecting biostratigraphic specimens from sediments in Southern California, Arizona, and Nevada. Mr. Reynolds developed the Paleontological Resource Sensitivity Map for the San Bernardino County Planning Department in 1985.

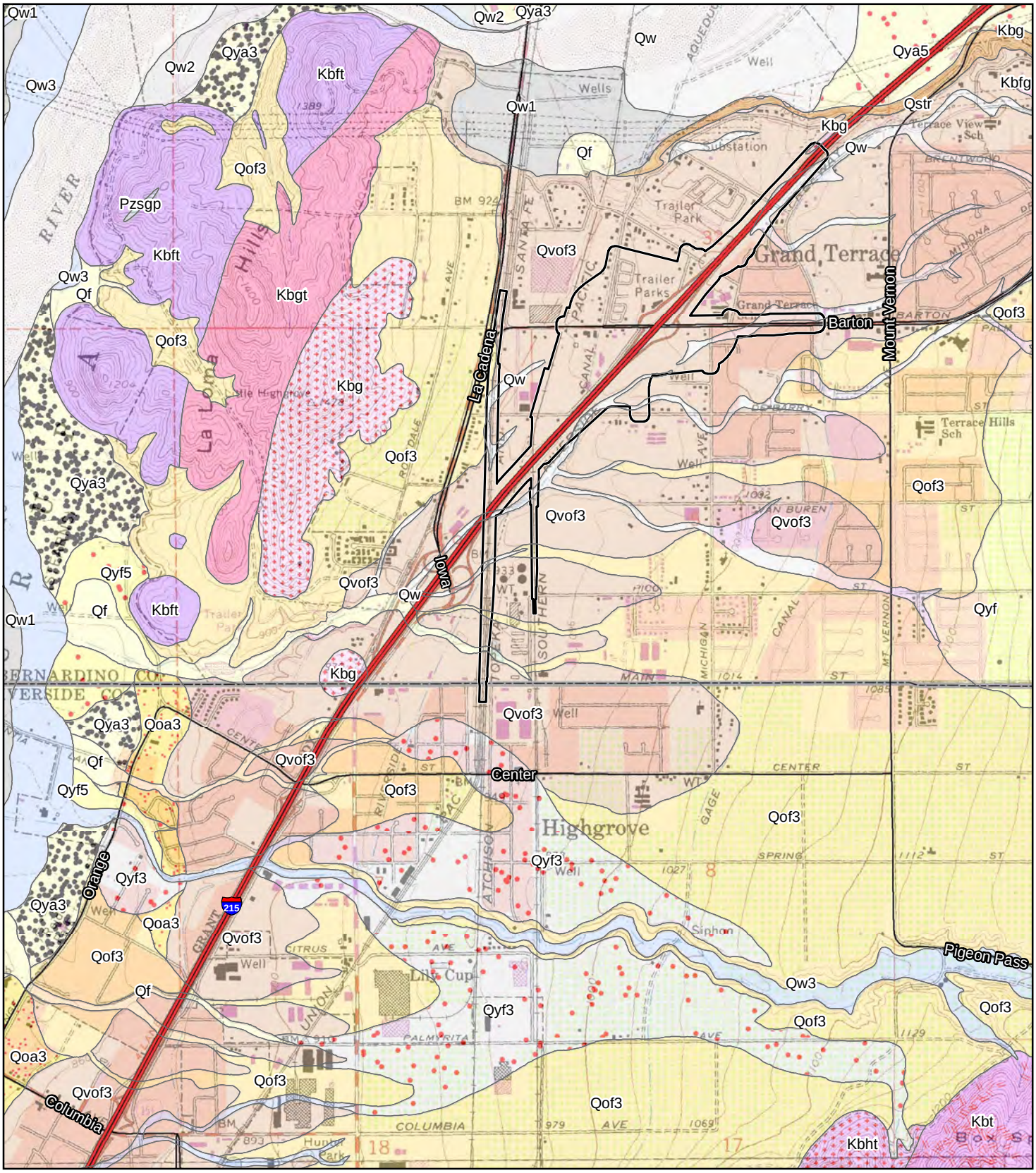
Michael R. Pasenko, M.A., Paleontological Resources Manager, assisted with the report preparation and the vehicular and foot surveys. As shown in Mr. Pasenko's resume in Appendix D, he has over 10 years of experience in Late Cenozoic faunas and paleontological mitigation projects.

BACKGROUND

GEOLOGICAL PROVINCES

The APD is within the northwestern Peninsular Range Province of Southern California. It is near the northern end of the Perris Block of the Peninsular Range Province (Jahns 1954). The Perris Block extends from the southern foot of the San Gabriel and San Bernardino Mountains (Bailey and Jahns 1954) southeast to the vicinity of Bachelor Mountain and Poly Butte. The Perris Block is bounded on the southwest by the Elsinore Fault Zone and on the northeast by the San Jacinto Fault (Morton 1977). The surface of the Perris Block consists of granitic exposures that have been tectonically tilted eastward, leaving granitic outcrops elevated and exposed on the west side of the Perris Block (Jurupa Hills) and allowing Pleistocene sediments to cover the east side, filling the eastern San Bernardino, Moreno, Lakeview, and San Jacinto Valleys. The block tilted eastward prior to late Pleistocene time. The Santa Ana River, which is immediately north and west of the project site, has incised the Perris Block from its northern margin to the Elsinore Fault Zone.

Geologic mapping (Morton and Miller 2003) indicates that the APD is located on early Pleistocene alluvium (Qvof), middle Pleistocene alluvium (Qof) and young (Holocene) alluvial sediments (Qf, Qyf) as shown in Figure 6. To the west, similar basin-filling sediments are truncated at the eastern edge of the Chino Hills by the Chino Fault, part of the Whittier Fault system (Rogers 1965, Morton and Miller 2003). The Red Hill Fault and Cucamonga Fault Zone are to the northwest. The Rialto-Colton, San Jacinto, and San Andreas Faults are to the north and northeast (Bortugno and Spittler 1986, Morton and Miller 2003). The Chino Hills to the west contain fossiliferous Miocene marine and continental sediments. The sedimentary rocks in the Santa Ana Mountains to the southwest consist of fossiliferous early Tertiary marine sandstones and Pleistocene to Holocene alluvial deposits. The San Gabriel Mountains to the north are composed of granitic and metamorphic rocks, as are the San Bernardino Mountains to the northeast. The Jurupa Hills and La Loma Hills to the west and Blue Mountain to the east are also composed of granitic and metamorphic rocks, including Paleozoic limestone that has metamorphosed to marble.



LEGEND

FIGURE 6

Area of Potential Disturbance

Geologic Units

Kbfg
Kbft
Kbg
Kbgt
Kbht
Kbt
Pzsgp
Qf
Qoa3
Qof3
Qstr
Qvof3
Qw
Qw1
Qw2
Qw3
Qya3
Qya5
Qyf
Qyf3
Qyf5

0 1000 2000
FEET

I-215/Barton Road Interchange Improvement Project

Geologic Map

08-SBd-215-PM 0.58/1.95
EA# 0J070

SOURCE: USGS 7.5 min. quad. (San Bernardino South, 1980); USGS (Morton and Miller, 2006)

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STRATIGRAPHIC OCCURRENCE OF PALEONTOLOGICAL RESOURCES

The record of sedimentary deposition in the northern Perris Block started in the late Cenozoic Era. Pleistocene sediments sit on a Mesozoic basement consisting of granitic and metamorphic rocks. Pleistocene depositional events record change in depositional style, which can often be recognized as an erosional event. Erosional surfaces mark a depositional break between several sedimentary formations in the study area. Table A describes the sequence of depositional events in the region.

Table A: Sequence of Late Tertiary and Quaternary Depositional Events

MESOZOIC ERA
• Crystalline granitic and metamorphic rocks.
CENOZOIC ERA
Early Pleistocene Period
• Very Old Pleistocene Deposits (**Qvof3**). Yellow-brown silty sand of early Pleistocene age.
Middle Pleistocene Period
• Older Pleistocene Deposits (**Qof3**). Reddish-brown silts, sands and gravel, commonly with caliche, of middle Pleistocene age.
Late Pleistocene Period
• Late Pleistocene Alluvium (not mapped in the project area).
Holocene Period
• Old Holocene Deposits (**Qyf**). Gray-brown sands and gravels deposited during Holocene time that sit higher than Qyw. • Young Wash Deposits (**Qyw**). Active sand and gravel deposits in wash bottoms below alluvial fan surfaces.

Sources: Albright 1999; Reynolds and Reynolds 1991; Reynolds 2004a and b; Reynolds 2003; Reynolds 2004 b, c, and d; Morton and Miller 2003.

DEPOSITIONAL HISTORY

Deposition of sediments from early Pliocene time on the northern Perris Block started with the San Timoteo Formation (Albright 1999) in the Badlands area of Moreno Valley and Calimesa. The earliest sediments known from the western Perris Block in the project area were deposited in early Pleistocene time. Significant fauna have been recovered from middle to late Pleistocene sediments deposited on the Perris Block (Reynolds and Reynolds 1991, Reynolds 2004a and b) during the Rancholabrean North American Land Mammal Age (NALMA; less than 200,000 years before present [BP]). Some of these sediments may be more recent (Reynolds 2003, 2004b, c and d). Holocene alluvium (the last 9,000 years) is not considered to contain paleontological resources in a meaningful stratigraphic context.

PALEONTOLOGICAL RESOURCES OVERVIEW FROM THE LITERATURE AND FIELD RESEARCH

STRATIGRAPHIC OCCURRENCE OF PALEONTOLOGICAL RESOURCES

Cenozoic–Quaternary

Late Cenozoic Sediments. Sediments of early and middle Pleistocene age east, west, and south of the study area contain significant vertebrate fossils. These include a significant, diverse assemblage of fossil reptiles, birds, and large and small mammals. Small mammals are extremely important for determining the age of sedimentary deposits. Large mammals are also present in these sediments and include mammoth, mastodon, giant ground sloth, camel, horse, and deer.

Quaternary–Pleistocene

Quaternary sediments near and within the study area were deposited during early and middle Pleistocene Epochs. After the Pleistocene (9,000 years ago), drainages cut gullies and filled them with Holocene sediments. Geologic mapping (Morton and Miller 2003) has divided the sediments by possible age range, based on soil profiles and degree of surficial erosion, into early Pleistocene (Qvof), middle Pleistocene (Qof), and Holocene (Qyf). The Quaternary Period includes the Pleistocene and Holocene Epochs. The Holocene includes the last 9,000 years of geological time, which is considered to be "Recent," but which contains fossil evidence of the transition from the Pleistocene "Ice Ages" into the warmer and drier Holocene. Mammoths (*Mammuthus* sp.) are the indicator fossil for the Pleistocene Epoch, which is divided into the older Irvingtonian NALMA and the later Rancholabrean NALMA, which spans the last 200,000 years of the Pleistocene. The indicator fossil for the Rancholabrean NALMA is bison. Both NALMAs contain other fossils, such as horse, coyote, rodents, birds, reptiles, and fish, that help describe climatic and habitat conditions during the last 2 million years.

Holocene Sediments. Holocene sediments in the study area are coarse channel deposits that are not conducive to the preservation of vertebrate fossils in a meaningful stratigraphic relationship.

LITERATURE REVIEW

The potential for near-surface late Pleistocene fossils from the northern Perris block has been noted (Reynolds and Reynolds 1991) and the shallow depth of occurrence of Pleistocene fossils is consistent with that elsewhere in the northern Peninsular Range Province near San Bernardino, Fontana, Rancho Cucamonga, and in the Pomona Valley near Chino (Reynolds and Reynolds 1991). The literature review indicated that the following 10 paleontological resource localities are known from this area (Reynolds and Reynolds 1991):

- Jurupa Flood Control Basin in western Fontana, approximately 12.5 miles (mi) west of the I-215/ Barton Road interchange, where a mastodon (*Mammut* sp.) was located approximately 3 to 4 ft below ground surface (bgs) in Pleistocene sediments (Q. Lake, personal communication to Bob Reynolds at LSA, 2007).
- A saber-tooth cat (*Smilodon* sp.) in Pleistocene sediments (Qof) that was reported 5 ft bgs near Declezville, approximately 9 mi west of the I-215/Barton Road interchange (Reynolds and Reynolds 1991).
- Fossil Ice Age rodents in Pleistocene sediments were located at the corner of Base Line Road and Etiwanda Avenue, approximately 13 mi west/northwest of the I-215/Barton Road interchange (Reynolds 2004a).
- A mammoth (*Mammuthus* sp.) was recovered from a depth of 5 ft in Pleistocene sediments at Champagne on the east side of Interstate 15 (I-15), approximately 13 mi west of the I-215/Barton Road interchange (Reynolds and Reynolds 1991).
- The Corona area has produced three localities with an Ice Age horse (*Equus* sp.), deer (*Odocoileus* sp.), and antelope (*Antilocapra* sp.) recovered in Pleistocene sediments (Qvoa) from cuts along the east side of I-15, 1 mi north of State Route 91 (SR-91) in Norco (SBCM Regional Paleontological Locality Inventory).
- Fossils from Pleistocene sediments (Qvoa) similar to those on the project site include a fossil bison rib located east of the project site near Redlands Boulevard in Moreno Valley, approximately 12 mi southeast of the I-215/Barton Road interchange (Reynolds 2004d).
- Campbell Sand Pit is located in Pleistocene sediments along the Santa Ana River, approximately 9 mi southwest of the I-215/Barton Road interchange. This locality has produced giant ground sloth, mammoth, camel, and horse from late Pleistocene time.
- Fossil mammals and lizards have been recorded from late Pleistocene sediments in Pleistocene sediments (Qof) in the Riverside area on the east side of the Santa Ana River where La Sierra Avenue crosses SR-91, 12 mi south of the project site (Reynolds, 2005).

LOCALITY SEARCH

The LACM does not have any recorded localities in the project area. Its closest locality, LACM 1207, is located south-southwest of the project area between Norco and Corona, within sediments that may be older than those that occur in the study area. A fossil deer (*Odocoileus* sp.) was found there. The LACM believes excavations that extend into older Quaternary deposits (older Pleistocene deposits of Morton and Miller 2003) may contain paleontological resources and should be monitored closely to quickly and professionally recover fossil resources without impeding construction. The LACM further recommends that any collected resources be placed in an accredited scientific institution.

The SBCM indicates that the project area is underlain by Pleistocene alluvial deposits with a high paleontological sensitivity. The high sensitivity is based on the occurrence of numerous paleontological finds throughout San Bernardino and Riverside Counties, including mammoth, mastodon, giant ground sloth, dire wolf, saber-tooth cat, large and small horses, camels, and bison.

The literature review and locality searches indicate that many paleontological resource localities are known from this part of the western San Bernardino Basin (Reynolds and Reynolds 1991; Reynolds 2004 a–d; SBCM Regional Paleontological Locality Inventory) and those Pleistocene sediments in the study area may contain paleontological resources. The documented localities of paleontological resources in this area have all been found during construction excavation. This suggests there is a high potential for important vertebrate fossils to be encountered during excavation where Pleistocene sediments crop out at the surface in the San Bernardino Basin (Reynolds and Reynolds 1991).

FIELD INSPECTION

Based on geologic mapping of the area (Morton and Miller 2003), older Pleistocene sediments (Qvof) are exposed on the surface over most of the study area. Older Pleistocene sediments are well exposed in the railroad cuts along the western margins of the study area. Middle Pleistocene sediments (Qof; Morton and Miller 2003) are exposed on the surface in the study area along Canal Street, south of Barton Road, and at the west end of Barton Road at La Cadena Drive. The cover of vegetation and introduced materials made examination of the middle Pleistocene sediments difficult. In the APD, excavation would cut through thin surficial soils and contact native older Pleistocene alluvial sediments.

The field inspection verified the results of the geologic mapping. Sediments referable to Qvof were located in field exposures and fit the description of "Very old alluvial-fan deposits, (middle to early Pleistocene)…extensively developed in the Grand Terrace area…consists of thick, yellowish-brown, massive to moderately well bedded, sparsely conglomeratic arkose. Moderately well consolidated. Matrix supported, sparsely distributed pebble beds are common locally" (Morton and Miller 2003).

The middle Pleistocene sediments of the study area (Qof) are described as "Old alluvial-fan deposits (late to middle Pleistocene)…reddish-brown alluvial fan deposits of primarily sand- to boulder-sized clasts are moderately consolidated and slightly, to moderately dissected" (Morton and Miller 2003). The cover of vegetation and nonnative materials prevented these reddish-brown sands from being distinguished from the yellowish-brown sands of the older Qvof.

PALEONTOLOGICAL RESOURCES SENSITIVITY

The APD is on older Pleistocene sediments with a high potential to contain significant vertebrate fossils. Formations with paleontological sensitivity have resource sensitivity ratings, defined as follows:

- High sensitivity (**H**) is based on formations or mappable rock units that are known to contain, or have the correct age and depositional conditions to contain, significant paleontological resources.
    - **Ha** includes areas where nonrenewable paleontological resources are known from surface outcrops.
    - **Hb** indicates areas of high sensitivity where sediments containing paleontological resources are expected at depth.
- Low sensitivity (**L**) is determined by a qualified vertebrate paleontologist conducting a literature and records review and a field survey. Low sensitivity cannot be determined simply by looking at

rock unit descriptions on a geologic map. For instance, an area mapped Qal may actually be a thin, surficial layer of nonfossiliferous sediments covering fossil-rich Pleistocene sediments. An area mapped as granite may be covered by a Pleistocene soil horizon that contains fossils. The actual sensitivity must be determined by a records search and field inspection.

- Areas underlain by sedimentary rocks for which literature and unpublished studies are not available have undetermined sensitivity (**U**) for containing significant nonrenewable paleontological resources.

Construction excavation will affect areas designated Ha and Hb in a similar fashion, so both may be considered cumulatively as having high sensitivity for containing paleontological resources.

Based on the literature research and the field surveys, the paleontological resources sensitivity for the sediments underlying the APD has now been identified as high (Ha/Hb). The U category is not applicable to this project because all the sedimentary exposures in the project area have been the subject of research and field review and identified as high sensitivity for paleontological resources.

RECOMMENDATIONS FOR PALEONTOLOGICAL MITIGATION PLAN

The Department and the SVP present similar guidelines for mitigation of adverse impacts to significant, nonrenewable paleontological resources. Excerpts from individual guidelines for the development of a PMP are provided below. Because the APD is in an area identified as high sensitivity, a PMP will be provided for the project, as discussed below.

California Department of Transportation

The Department has developed a set of guidelines similar to the 1995 SVP guidelines to avoid and minimize adverse project impacts to paleontological resources. These recommendations include avoidance of resources and recommendations for impact mitigation measures during construction excavation, as described below.

Avoidance. Avoidance of project impacts can often be achieved by minor project modifications or redesign so that paleontological resources are completely outside the APD for the project. This could include a modified construction approach that does not entail construction excavation that would impact fossiliferous strata.

Environmentally Sensitive Areas. A related strategy creates Environmentally Sensitive Areas (ESAs) around paleontological localities. ESAs are a standard part of the Department and Federal Highway Administration (FHWA) toolkit to protect resources within or adjacent to a project site while concurrently delivering the project. Generally, these involve some combination of fencing or cyclic monitoring as an alternative to excavation monitoring. In the event that these measures prove ineffective for one reason or another, more traditional mitigation is necessarily required. This can sometimes impacts delivery schedules and/or total project costs. If viable and properly implemented, however, ESAs can reduce costs and time associated with more extensive traditional mitigation approaches.

Paleontological Mitigation Plan. Because the geology of California is diverse and the nature of the fossils that it contains varies from one outcrop to the next, the Department does not provide generic paleontological resource impact mitigation but instead presents a format for the PMP that can be used by the project paleontologist to manage paleontological resources during project construction.

Society of Vertebrate Paleontology

The SVP has published recommended general guidelines for conformable impact mitigation to significant nonrenewable paleontological resources (1995), along with conditions of receivership that the repository institution can require when receiving fossils recovered from construction projects (1996). In an area determined, through a records check and field survey, to have a high potential for significant paleontological resources, an adequate program for mitigating the impact of development should include:

- A preliminary survey and surface salvage of any observed fossils prior to construction;
- Monitoring and salvage during project excavation;
- Specimen preparation, including screen washing to recover small specimens (if applicable) to a point of stabilization and identification;
- Identification, cataloging, curation, and storage at a museum or university that has a curator who can retrieve the specimens on request; and
- A final report of the finds and their paleontological significance after all operations are completed.

All phases of mitigation are to be supervised by a professional paleontologist who maintains the necessary paleontological collecting permits and repository agreements. The project Lead Agency will ensure compliance with the measures developed to mitigate the impacts of excavation on paleontological resources. To ensure compliance from the beginning of the project, a statement that confirms the site's potential sensitivity, confirms the repository agreement with an established institution, and describes the program for impact mitigation should be deposited with the Lead Agency, the Project Engineer, and the construction contractors before work begins. The program will be reviewed and accepted by the Lead Agency's designated vertebrate paleontologist. If a mitigation program is initiated early during the course of project planning, construction delays due to paleontological salvage activities can be minimized or avoided.

San Bernardino County

The San Bernardino County Land Use Services Department presents summaries of State and federal laws, ordinances, regulations, and statutes that apply to impact mitigation for paleontological resources in the State of California (County of San Bernardino, Conservation Background Report [3341 (1989), Title 8, Division 5, Chapter 3, Article 5] and Chapter 82.20 of the San Bernardino County Development Code, as amended April 12, 2007; see also Appendix A).

SUMMARY

Construction for the proposed I-215/Barton Road Interchange Improvement Project has the potential to encounter two fossiliferous Pleistocene formations with sediments deposited during the last 2 million years. These fossiliferous sediments crop out at the surface and will also be encountered below the surface of the APD. This study presents definitions of paleontological significance and sensitivity, the results of records search requests, and reviews of geological and paleontological literature, and appends 10 paleontological resource locality records (Appendix C) from sediments similar to those found at, and in the vicinity of, the APD.

This study does not anticipate special paleontological situations that would require project redesign to avoid critical localities or strata. Consequently, preparation of a paleontological PMP for implementation during project construction is recommended prior to completion of final design for the selected alternative. The PMP should be synthesized from outlines and guidelines provided by the Department, the SVP, and San Bernardino County, and specifically tailored to the resources and sedimentary formations in the APD. It is recommended that the PMP be written early enough for the mitigation requirements to be addressed in the Plans, Specifications, and Estimates (PS&E) for the project.

This study recommends that the section of the PMP describing the excavation monitoring for the project include the following:

- A preconstruction field survey, including salvage of any observed surface paleontological resources, prior to the beginning of grading.
- Attendance at the pregrade meeting by a qualified paleontologist or his/her representative. At this meeting, the paleontologist will explain the likelihood for encountering paleontological resources, what resources may be discovered, and the methods that will be employed if paleontological resources are discovered.
- During construction excavation, a qualified vertebrate paleontological monitor will initially be present on a full-time basis whenever excavation will occur within sediments that have a high sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating (monitoring reductions and when they occur will be determined by the qualified Principal Paleontologist). The monitor will inspect fresh cuts and/or spoils piles to recover paleontological resources. The monitor will be empowered to temporarily divert construction equipment away from the immediate area of a 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, the Department and SANBAG will consider using heavy equipment to assist in the speedy and safe removal and collection of large materials.
- Localized concentrations of small (or micro-) vertebrates may be found in all native sediments. Therefore, it is recommended that these native sediments occasionally be spot-tested by screening through $^{1}/_{20}$-inch mesh screens to determine whether microfossils are present. If microfossils are

encountered, sediment samples (up to 12 cubic yards, or 6,000 pounds) will be collected and processed through $^{1}/_{20}$-inch mesh screens to recover additional fossils.

- Recovered specimens will be prepared to the point of identification and permanent preservation. This includes the sorting of 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 the storage cost, and the addition of approved chemical hardeners/ stabilizers to fragile specimens.
- Specimens will be identified to the most specific taxonomic level possible and curated at an institutional repository with retrievable storage. Repository institutions usually charge a one-time fee based on the volume of material, 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. The Department and SVP require that a draft curation agreement be in place with an approved curation facility prior to the initiation of any paleontological monitoring or mitigation activities.

By following these guidelines, impacts to nonrenewable paleontological resources will be minimized. During the development of the PMP, additional details may be added because this list provides only a summary of mitigation that may be applicable to the proposed project.

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APPENDIX A

SUMMARY OF LEGISLATION

APPENDIX A

SUMMARY OF LEGISLATION

SUMMARY OF LEGISLATION

Laws, Regulations, and Guidance

This section summarizes federal and State laws and regulations pertaining to paleontological resources and how these integrate with project development and delivery activities. In the event that a project involves land owned or administered by another federal or State agency, that agency should be contacted to ascertain specific requirements that agency may have relative to paleontological resources. In addition to federal and State requirements, project proponents may also be subject to local ordinances concerning paleontological resources. Local ordinances are not summarized in this summarized in this appendix, and local entities such as cities and counties should be contacted to determine if there are additional local requirements that must be met.

Federal Legislation

A variety of federal statutes specifically address paleontological resources. They are generally applicable to specific projects if the project crosses federal lands or involves a federal agency license, permit, approval, or funding.

Antiquities Act of 1906 (16 United States Code [USC] 431-433). The Antiquities Act of 1906 states, in part: "That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court." Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR 3]), "objects of antiquity" has been interpreted to include fossils by the National Park Service (NPS), the United States Bureau of Land Management (BLM), the United States Forest Service (USFS), and other federal agencies. Permits to collect fossils on lands administered by federal agencies are authorized under this Act (see "Permit Requirements of Federal Agencies" section below). Therefore, projects involving federal lands will require permits for both paleontological resource evaluation and mitigation efforts.

Archaeological and Paleontological Salvage (23 USC 305). This statute amends the Antiquities Act of 1906. Specifically, it states: "Funds authorized to be appropriated to carry out this title to the extent approved as necessary, by the highway department of any State, may be used for archaeological and paleontological salvage in that state in compliance with the Act entitled 'An Act for the preservation of American Antiquities,' approved June 8, 1906 (Public Law [PL] 59-209; 16 USC 431-433), and State laws where applicable."

This statute allows funding for mitigation of paleontological resources recovered pursuant to federal aid highway projects, provided that "…excavated objects and information are to be used for public purposes without private gain to any individual or organization" (Federal Register [FR] 46(19): 9570) Refer also to the Federal Highway Administration (FHWA) policy section below.

Federal-Aid Highway Act of 1956 (20 USC 78). Section 305 of the Federal Aid Highway Act of 1956 (20 USC 78, 78a) gives FHWA authority to use federal funds to salvage archaeological and paleontological sites affected by highway projects.

National Registry of Natural Landmarks (16 USC 461-467). The National Natural Landmarks (NNL) Program was established in 1962 and is administered under the Historic Sites Act of 1935. Implementing regulations for the NNL Program were first published in 1980 under 36 CFR 1212 and the Program was redesignated as 36 CFR 62 in 1981. An NNL is defined as:

> *…an area designated by the Secretary of the Interior as being of national significance to the United States because it is an outstanding example(s) of major biological and geological features found within the boundaries of the United States or its Territories or on the Outer Continental Shelf (36 CFR 62.2).*

National significance describes:

> *…an area that is one of the best examples of a biological community or geological feature within a natural region of the United States, including terrestrial communities, landforms, geological features and processes, habitats of native plant and animal species, or fossil evidence of the development of life (36 CFR 62.2).*

Federal agencies, such as FHWA, and their agents, such as the California Department of Transportation (Department), should consider the existence and location of designated NNLs, and of areas found to meet the criteria for national significance, in assessing the effects of their activities on the environment under Section 102(2)(c) of the National Environmental Policy Act (NEPA) (42 USC 4321). The NPS is responsible for providing requested information about the NNL Program for these assessments (36 CFR 62.6(f)). However, other than consideration under NEPA, NNLs are afforded no special protection. Furthermore, there is no requirement to evaluate a paleontological resource for listing as an NNL. Finally, project proponents (State and local) are not obligated to prepare an application for listing potential NNLs, should such a resource be encountered during project planning and delivery.

Examples of paleontological NNLs in California include:

- Rancho La Brea in Hancock Park, Wilshire Boulevard, Los Angeles
- Sharktooth Hill in Kern County
- Rainbow Basin near Barstow, San Bernardino County

A current listing of NNLs in California is available on the National Natural Landmarks website.

National Historic Preservation Act of 1966 (NHPA; 16 USC 470). Section 106 of the NHPA does not apply to paleontological resources unless the paleontological specimens are found in culturally related contexts (e.g., fossil shell included as a mortuary offering in a burial or a culturally related site such as a petrified wood locale used as a chipped stone quarry). In such instances, the materials are considered cultural resources and are treated in the manner prescribed for the site in question; mitigation being almost exclusively limited to sites determined eligible for or listed on the National Register of Historic Places (National Register). It should be emphasized that cooperation between the cultural resource and paleontological disciplines is expected in such instances.

Section 4(f) of the Department of Transportation Act of 1966 (23 USC 138; 49 USC 1653). Section 4(f) of the Department of Transportation Act does not specifically address paleontological resources. This section of the law prohibits FHWA to take land from Section 4(f) properties (which include parks, recreation areas, wildlife or waterfowl refuges, and National Register eligible or listed resources) for transportation projects unless there is no prudent and feasible alternative to that take. Paleontological resources would only be addressed under this law if located within a 4(f) property.

National Environmental Policy Act of 1969 (42 USC 4321). NEPA directs federal agencies to use all practicable means to "Preserve important historic, cultural, and natural aspects of our national heritage…" (Section 101(b) (4)). Regulations for implementing the procedural provisions of NEPA are found in 40 CFR 1500 1508.

If the presence of a significant environmental resource is identified during the scoping process, federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for development on federal land, or land under federal jurisdiction, for projects requiring a federal action (approval, permit, license, or funding). The level of consideration depends on the federal agency involved (see "Identification of Regulatory/Management Agencies" section below).

1872 Mining Law, amended 1988. This law excludes fossils (including petrified wood) from claim or patent. The USFS and BLM regulate surface effects of development under this law. BLM regulations specifically state that operators may not knowingly disturb or destroy any scientifically important paleontological remains on federal lands, that they notify an authorized officer of such finds, and that said officer shall take action to protect or remove the resource(s).

Mineral Leasing Act of 1920 (Section 30). This Act requires and provides for the protection of interests of the United States. Natural resources, including paleontologic resources, are commonly regarded as such interests.

Executive Order (EO) 11593, May 31, 1971, Protection and Enhancement of the Cultural Environment (36 CFR 8921). This EO requires federal agencies to inventory and protect properties under their jurisdiction. NPS regulations under 36 CFR provide that paleontological specimens may not be disturbed or removed without a permit.

Archaeological and Historic Data Preservation Act of 1974 (PL 86-253, as amended by PL 93-921, 16 USC 469) Act of May 24, 1974 (88 Statute 174, Section. 3 a0, 4a). This Act provides for the survey, recovery, and preservation of significant scientific, prehistoric, historic, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project. A "Statement of Program Approach" was published in the *Federal Register* on March 26, 1979 (40 FR 18117) to advise the manner in which this law will be implemented.

36 CFR Part 800 (39 Federal Register [FR] 3365, January 25, 1974, and 44 FR 6068, January 30, 1979): These publications provide procedures for the protection of historic and cultural properties including specific procedures to ensure that historic and cultural resources are given proper consideration in the preparation of Environmental Impact Statements.

Federal Land Management and Policy Act of 1976 (FLPMA, PL 94-579, 43 USC 1701-1782). This Act provides authority for the BLM to regulate lands under its jurisdiction, managed in a manner to "…protect the quality of scientific, scenic, historic, ecological, environmental...and archaeological values." Specific authority is given to establish areas of critical environmental concern (ACEC).

Surface Mining Control and Reclamation Act of 1977 (SMCRA, PL 95-87, 30 USC 1201-1328). This Act regulates surface coal mining and provides the authority to designate an area as unsuitable for surface mining if mining would "...result in significant damage to important cultural, scientific, and esthetic values and natural systems...."

Paleontological Resource Management 1998, BLM Handbook H-8270-1. This Handbook provides general procedural guidance for paleontological resources management on lands under the jurisdiction of the BLM.

State of California Legislation

The following state laws and regulations are applicable, or potentially applicable, to the Department and locally sponsored projects.

California Environmental Quality Act of 1970 (CEQA, 13 Public Resources Code [PRC], 2100, et seq.). CEQA requires identification of potential adverse impacts of a project to any object or site of scientific importance (Division. 1, PRC 5020.1(b)). Chapter 1, Section 21002, of CEQA specifically states:

…it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

Guidelines for the California Environmental Quality Act (Title 14, Chapter 3, California Code of Regulations §15000, et seq.). The CEQA Guidelines require mitigation of adverse impacts to a paleontological site from development on public land by construction monitoring. Article 1, Section 15002(a)(3)), of the CEQA Guidelines states that CEQA is intended to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.

Guidelines for the Implementation of CEQA, 1992, Appendix G, Section V (Cultural Resources). Appendix G of the CEQA Guidelines states, in part, that: A project will "normally" have a significant effect on the environment if it, among other things, will "directly or indirectly destroy a unique paleontological resource on site or unique geologic feature." If paleontological resources are identified during the Preliminary Environmental Analysis Report (PEAR), or other initial project scoping studies, as being within or in the vicinity of the project site, the sponsoring agency (the Department or the local agency) must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

Periodic review of CEQA-related court cases for decisions related to paleontology is also recommended. These cases can be found at the California Environmental Resources Evaluation System (CERES) website.

California Coastal Act (CCA). The California Coastal Act, in part, authorizes the California Coastal Commission (CCC) to review permit applications for development within the defined coastal zone and, where necessary, to require reasonable mitigation measures to offset effects of that development. Permits for development are issued with "special conditions" to ensure implementation of these mitigation measures. Section 30244 of the CCA, "Archaeological or Paleontological Resources," states that: "Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required."

If the CCC determines that a paleontological resource is present within a project site, that agency generally looks for evidence that the applicant has taken the resource into consideration (e.g., through formal survey by a professional paleontologist with implementation of resulting recommendations). If a paleontological site is present, special permit conditions may range from avoidance of the site to construction monitoring and/or salvage of significant fossils. This approach virtually parallels the level of protection afforded to paleontological resources under CEQA. Additionally, the CCC relies

heavily on project sponsoring or permitting agencies to ensure compliance with CEQA and, consequently, the CCA.

Warren-Alquist Act (PRC 25000 et seq.). This Act requires the California Energy Commission to evaluate energy facility siting in unique areas of scientific concern (Section 26627).

PRC, Section 5097.5 (State 1965, c. 1136, p. 2792). Section 50987.5 of PRC Section 5097.5 states: "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."

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. Consequently, the Department and local agency project proponents are required to comply with PRC 5097.5 for their activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

PRC, Section 30244. This section requires reasonable mitigation of adverse impacts to paleontological resources resulting from development on public land.

California Administrative Code (CAC). The following four sections of the CAC (Title 14, State Division of Beaches and Parks), administered by the California Department of Parks and Recreation (CDPR), address paleontological resources:

- Section 4306, Geological Features: "No person shall destroy, disturb, mutilate, or remove earth, sand, gravel, oil, minerals, rocks, or features of caves."
- Section 4307, Archaeological Features: "No person shall remove, injure, disfigure, deface, or destroy any object of paleontological, archaeological, or historical interest or value."
- Section 4308, Property: "No person shall disturb, destroy, remove, deface, or injure any property of the state park system. No person shall cut, carve, paint, mark, paste, or fasten on any tree, fence, wall, building, monument, or other property in the state parks, any bill, advertisement, or inscription."
- Section 4309, Special Permits: "Upon a finding that it will be for the best interest of the state park system and for state park purposes, the director may grant a permit to remove, treat, disturb, or destroy plants or animals or geological, historical, archaeological, or paleontological materials; and any person who has been properly granted such a permit shall to that extent not be liable for prosecution for violation of the foregoing."

These sections of the CAC establish authority and processes to protect paleontological resources while allowing mitigation through the permit process.

Local Laws and Regulations

Various cities and counties have passed ordinances and resolutions related to paleontological resources within their jurisdictions. Examples include Orange, Riverside, and San Bernardino Counties, and the Cities of San Diego, Carlsbad, Palmdale, and Chula Vista. These regulations generally provide additional guidance on assessment and treatment measures for projects subject to CEQA compliance.

Further Reference

Additional information regarding the protection of paleontological resources is posted on the SVP's website. In the event that a project involves lands administered by federal or State agencies, the local offices of those agencies should also be contacted earlier in the project development phase for guidance and direction.

APPENDIX B

RECORDS SEARCH RESULTS

Natural History Museum of Los Angeles County
900 Exposition Boulevard • Los Angeles, CA 90007

Vertebrate Paleontology Section
Telephone: (213) 763-3325
FAX: (213) 746-7431
e-mail: smcleod@nhm.org

4 August 2008

LSA Associates, Inc.
1500 Iowa Avenue, Suite 200
Riverside, California 92507

Attn: Michael R. Pasenko, Paleontological Resource Manager

re: Paleontological Resources Records Check for the proposed I-215 / Barton Road Interchange Improvement Project, LSA Project No. SBA330, Grand Terrace and Colton, San Bernardino County, project area

Dear Michael:

I have conducted a thorough check of our paleontology collection records for the locality and specimen data for the proposed I-215 / Barton Road Interchange Improvement Project, LSA Project No. SBA330, Grand Terrace and Colton, San Bernardino County, project area as outlined on section of the San Bernardino South USGS topographic quadrangle map that you sent to me on 2 July 2008. We do not have any vertebrate fossil localities that lie directly within the proposed project boundaries, but we do have a locality somewhat nearby that occurs in the similar sedimentary deposits as occur in the proposed project area either as surficial exposures or as subsurface deposits.

Surficial deposits in the entire proposed project area are composed of older Quaternary Alluvium, derived as fan deposits from Blue Mountain immediately to the east. We do not have any vertebrate fossil localities from these deposits in the immediate vicinity, and they are unlikely to contain significant fossil vertebrate remains in the uppermost layers. Our closest fossil vertebrate locality in somewhat similar older Quaternary sediments is LACM 1207, situated just north of the city of Corona southwest of the proposed project area, where a specimen of a fossil deer, *Odocoileus*, was found.

Surface grading or shallow excavations in the uppermost few feet of the Quaternary Alluvium as exposed in the proposed project area are unlikely to uncover significant vertebrate fossil remains. Deeper excavations in the older Quaternary deposits, however, may encounter significant fossil vertebrates. Any substantial and deep excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: draft invoice

SAN BERNARDINO COUNTY MUSEUM

2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462

COUNTY OF SAN BERNARDINO
PUBLIC AND SUPPORT
SERVICES GROUP

ROBERT L. McKERNAN
Director

22 July 2008

LSA Associates, Inc.
attn: Michael R. Pasenko
1500 Iowa Avenue, Suite 200
Riverside, CA 92507

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, INTERSTATE 215/BARTON ROAD INTERCHANGE IMPROVEMENT PROJECT, SAN BERNARDINO COUNTY, CALIFORNIA**

Dear Mr. Pasenko,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named project near the La Loma Hills in San Bernardino County, California. The proposed project is located in portions of section 32, Township 1 South, Range 4 West, and section 5, Township 2 South, Range 4 West, San Bernardino Base and Meridian, as seen on the San Bernardino South, California 7.5' United States Geological Survey topographic quadrangle map (1967 edition, photorevised 1980).

Geologic mapping (Rogers, 1965; Morton and Miller, 2003) indicates that the proposed project is located upon surface exposures of Quaternary fan deposits laid down during the early to middle Pleistocene Epoch (= unit **Qvof**). Quaternary fan deposits have high potential to yield significant nonrenewable paleontologic resources, and so are assigned high paleontologic sensitivity. Pleistocene older alluvium (including Pleistocene alluvial fan alluvium) throughout San Bernardino and Riverside Counties and the Inland Empire has been repeatedly demonstrated to have high paleontologic sensitivity (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Springer and Scott, 1994; Scott, 1997; Springer and others, 1998, 1999, 2007; Anderson and others, 2002). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, short-faced bears, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Springer and Scott, 1994; Scott, 1997; Springer and others, 1998, 1999, 2007).

For this review, Craig R. Manker of the Division of Geological Sciences, SBCM conducted a search of the Regional Paleontologic Locality Inventory (RPLI). The results of this search indicate that no previously-known paleontologic resource localities are recorded by the SBCM within the boundaries of the proposed study area, nor from within at least one mile in any direction.

Recommendations

The results of the literature review and the search of the RPLl at the SBCM demonstrate that the proposed project property is situated upon surface sediments with high potential to contain significant paleontologic resources. A qualified vertebrate paleontologist must develop a program to mitigate impacts to nonrenewable paleontologic resources. Such a mitigation program must be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of San Bernardino and the proposed guidelines of the Society of Vertebrate Paleontology.

The County of San Bernardino (Development Code §82.20.040) defines a qualified vertebrate paleontologist as meeting the following criteria:

Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).

Professional experience: At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) Field survey before grading. In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

(b) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(c) Recovered specimens. Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

(d) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

(e) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

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Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

APPENDIX C

RESOURCE LOCALITIES

CONFIDENTIAL - NOT FOR DISTRIBUTION

APPENDIX D

RESUMES

ROBERT E. REYNOLDS

PALEONTOLOGIST / ASSOCIATE

EXPERTISE

Paleontological Resources Assessment
Paleontological Resources Impact Mitigation
Fossil Preparation and Identification
Comparative Osteology and Skeletal Identification
Cultural Resource Assessment and Mitigation
Specimen and Artifact Curation

EDUCATION

B.A., Geology, University of California, Riverside, 1966.

A.A., Geology, Pasadena City College; minor Anthropology.

PROFESSIONAL EXPERIENCE

Associate, Paleontologist, LSA Associates, Inc., Riverside office, 1999 to present.

Curator of Geology/Earth Sciences, San Bernardino County Museum, Redlands, 1992 to 1999, 1970 to 1990, 1969 to 1978 (Acting Museum Director 1969 to 1970).
Deputy Director of Resource Management, San Bernardino County Museum, 1990 to 1992.

Consultant, paleontology, geology, 1970 to 1999, U.S. Geological Survey, U.S. Forest Service, University of California, Riverside, Bureau of Land Management, California and Nevada, San Bernardino County Museum Association, Southern California Edison Company, Federal Aviation Administration, San Bernardino County Planning Department, Santa Fe railroad, Southern Pacific Railroad, Army Corps of Engineers, and private-sector consulting firms.

Archaeologic Technician, U.S. Forest Service, San Bernardino National Forest, 1972 to 1981.

Fossil Quarry Supervisor/Laboratory Technician, Department of Geological Sciences, University of California, Riverside, 1964 to 1965.

Laboratory Technician, Department of Geology, Pasadena City College, 1963.

PROFESSIONAL RESPONSIBILITIES

Initial assessments of paleontological resources in early planning phases. Evaluation of paleontological resources for Environmental Impact Reports: literature and records review, field surveys, development of impact mitigation programs, directing field monitoring and resource salvage operations. Management of locality data, specimen preparation and identification and analysis of fossils for curator. Inventories of recovered specimens and reports of findings signaling compliance with agency guidelines for the impact mitigation program.

PROJECT EXPERIENCE

Paleontological Resources Assessment, Mid County Parkway, Corona to San Jacinto
Western Riverside County, California
Riverside County Transportation and Land Management Services

LSA provided the paleontological resources assessment PIR/PER for the master-planned 32 miles of alternate routes under consideration for the Mid County Parkway in western Riverside County. This paleontological resources assessment program literature search located 176 fossil localities in the 15 sedimentary formations crossed by the project. The environmental documents were prepared to meet the Department's format for a PIR, PER, and PMP, and took 3.5 years to prepare. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number: JCV531, T4430.*

Paleontological Resources Assessment PIR/PER for Iowa Avenue Grade Separation
City of Riverside, Riverside County, California

LSA provided the paleontological resource assessment PIR/PER for the Iowa Avenue Grade Separation project in the western portion of the City of Riverside, in western Riverside County. This paleontological resources assessment program was prepared to meet the Department's format for a PIR, PER, and PMP. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number LIM0706, T2.2.*

Paleontological Resources Assessment PIR/PER for the Glen Helen Parkway Grade Separation
Community of Devore, San Bernardino County, California

LSA provided the paleontological resources assessment PIR/PER for the Glen Helen Parkway Grade Separation project at Devore, in the southwestern portion of San Bernardino County. This paleontological resource assessment program was prepared to meet the Department's format for a PIR, PER. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. A PMP report was not determined to be necessary. *Project Number LIM531, T010.*

Paleontological Resources Assessment PIR/PER for Needles Highway Improvement Project
North of the City of Needles, San Bernardino County, California
California Department of Transportation

LSA provided the paleontological resources assessment PIR/PER for the Needles Highway Improvement Project north of the City of Needles, in the eastern portion of San Bernardino County. This paleontological resources assessment program was prepared to meet the Department's format for a PIR, PER, and PMP. The 15 miles of field inspection was accomplished in summer months. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number AEN430.*

Paleontological Resources Assessment PIR for the SR 91 HOV Lane Project
City of Riverside, Riverside County, California
California Department of Transportation

LSA provided the paleontological resources assessment PIR for the Stare Route 91 HOV lane project in the western portion of the City of Riverside, in western Riverside County. This paleontological resources assessment program was prepared to meet the Department's format for a PIR. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number SAE230.*

Paleontological Resources Assessment PIR/PER for the I-10/Cedar Avenue Interchange Project
Community of Bloomington, San Bernardino County, California
California Department of Transportation

LSA provided the paleontological resources assessment PIR/PER for the I-10/Cedar Avenue Interchange Project in the community of Bloomington, southwestern San Bernardino County, California. This paleontological resources assessment program was prepared to meet the Department's format for a PIR, PER, and PMP. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number LIM230, T4.08.*

Paleontological Resources Assessment PIR/PER for the I-10/Cherry Avenue Interchange Project
City of Fontana, San Bernardino County, California
California Department of Transportation

LSA provided the paleontological resources assessment PIR/PER for the I-10/Cherry Avenue Interchange Project in the City of Fontana, southwestern San Bernardino County. This paleontological resources assessment program was prepared to meet the Department's format for a PIR, PER, and PMP. Applicable legislation was analyzed and programs for mitigation of impacts to significant, nonrenewable paleontological resources were prepared. *Project Number SBE231.*

Paleontological Resources Monitoring for the Flint Ridge Development, City of Chino Hills
San Bernardino County, California
Richmond American Homes

LSA conducted monitoring and fossil recovery for the Flint Ridge Development in Chino Hills. A single LSA paleontological monitor managed three months of excavation monitoring. More than 273 specimens representing 25 fossil taxa of plants, marine algae, and invertebrate fossils were recovered. The abundant leaf fossils allowed interpretation and evaluation of fossil floras and habitats that occupied the adjacent continental margin 10 million years ago.

Paleontological Resources Monitoring for Laband Village, City of Chino Hills
San Bernardino County, California
Danoff-Kraus Development

LSA conducted monitoring and fossil recovery for the Laband Village Development in Chino Hills. A single LSA paleontological monitor managed eight months of excavation monitoring. More than 330 specimens representing 24 fossil taxa of fish plants, marine algae, and invertebrate fossils were recovered. The unusual fish fossils were preserved as three-dimensional specimens in sandstone and

allowed new opportunities for study and research of fossil fish that occupied the margin of the Pacific Ocean ten million years ago.

PERMITS AND LICENSES

Federal Antiquities Permit, Bureau of Land Management, California Desert Region, for paleontological research, assessment, and salvage.

Federal Antiquities Permit, Bureau of Land Management, Nevada, for paleontological research, assessment, and salvage.

Federal Antiquities Permit, Bureau of Land Management, Arizona, for paleontological research, assessment, and salvage.
National Park Service collecting permits, various.

U.S. Forest Service collecting permits, various.

California State Department of Fish and Wildlife collecting permit.

PROFESSIONAL AFFILIATIONS AND AWARDS

Research Associate, Convener – Desert Studies Symposium at the Desert Studies Center, Zzyzx, California, under management of California State University Fullerton.

Research Associate, Los Angeles County Museum of Natural History.

Research Associate, George C. Page Museum.

President, Southern California Chapter, Friends of Mineralogy, 1991–Present.

American Geological Institute.

Geological Society of America.

Society of Vertebrate Paleontology (Chair, Committee on Conformable Impact Mitigation, 1989 1998; Member, Outreach committee, 1992–present; Government Liaison Committee, 1992–present).

Western Association of Vertebrate Paleontologists.

Southern California Academy of Sciences.

American Association for the Advancement of Science.

Inland Geological Society (charter member; President, 1986).

Mojave Desert Quaternary Research Center (Steering Committee and Advisory Board, 1986–present).

Intermountain Paleontological Advisory Committee.

Shoshone Museum Association (Board of Directors, 1987–1988).

San Bernardino County Museum Association.

Past member, San Bernardino County Environmental Review Committee.

Past member, San Bernardino County Environmental Review Board.

Recipient, San Bernardino County Annual Appreciation Award.

PEER-REVIEWED PUBLICATIONS

Reynolds, R.E., 1967. Exploring the Calico Mining District: Bloomington, San Bernardino County Museum Association Quarterly, vol. XV, no. 2.

Reynolds, R.E., 1984. Miocene faunas in the lower Crowder Formation, Cajon Pass, California—a preliminary discussion, in Guidebook for the San Andreas fault—Cajon Pass to Wrightwood: Pacific Section, American Association of Petroleum Geologists.

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Reynolds, R.E., ed., 1989. The west-central Mojave Desert: Quaternary studies between Kramer and Afton Canyon. Redlands, San Bernardino County Museum Association Special Publication.

Reynolds, R.E., 1989. Mid-Pleistocene faunas of the west-central Mojave Desert, in The west-central Mojave Desert: Quaternary studies between Kramer and Afton Canyon. Redlands, San Bernardino County Museum Association Special Publication.

Reynolds, R.E., 1990. Erosion, Deposition, and Detachment: the Halloran Hills Sequence. Redlands, San Bernardino County Museum Association Special Publication, MDQRC Guidebook.

Reynolds, R.E., 1991. Biostratigraphic relationships of Tertiary small vertebrates from Cajon Valley, San Bernardino County, California, in Inland southern California: the last 70 million years,

M.O. Woodburne, R.E. Reynolds, and D.P. Whistler, ed. Redlands, San Bernardino County Museum Association Quarterly 38(3, 4):54-59.

Reynolds, R.E., 1991. The Cadiz Fauna: Possible Irvingtonian Land Mammal Age sediments in Bristol basin, San Bernardino County, California. San Bernardino County Museum Association Quarterly, 38(2):53-54.

Reynolds, R.E., 1991. Hemingfordian/Barstovian Land Mammal Age faunas in the central Mojave Desert, exclusive of the Barstow Fossil Beds, in Inland Southern California: the last 70 million years, M.O. Woodburne, R.E. Reynolds, and D.P. Whistler, ed. Redlands, San Bernardino County Museum Association Quarterly 38(3, 4):88-90.

Reynolds, R.E., 1991. Irvingtonian Land Mammal Age indicators in the west-central Mojave Desert. San Bernardino County Museum Association Quarterly, 38(3, 4):106-107.

Reynolds, R.E., 1992. Quaternary movement on the Calico Fault, Mojave Desert, California, in Deformation associated with the Neogene Eastern California Shear Zone, southeastern California and southwestern Arizona, S.M. Richards, ed. Redlands, San Bernardino County Museums Special Publication 92-1:64-65.

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Reynolds, R.E., 1993. Road log through the 1992 Landers surface rupture, in Landers: Earthquakes and aftershocks, R.E. Reynolds (ed). San Bernardino County Museum Association Quarterly, 40(1): 3-39.

Reynolds, R.E., 1993. The Devil Peak Sloth, *in* Abstracts of Proceedings, the 1993 Desert Research Symposium, J. Reynolds, compiler. Redlands, San Bernardino County Museum Association Quarterly, 40(2):31.

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Reynolds, R.E., 1995. Grandview Gorge: research involving the Mid Hills tectonic block, *in* Ancient surfaces of the East Mojave Desert, Reynolds, R.E. (compiler) and J. Reynolds (ed). San Bernardino County Museum Association Quarterly, 42(3): in prep.

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Reynolds, R.E., 1995. New York Mountains Pegmatite in Ancient surfaces of the East Mojave Desert, Reynolds, R.E. (compiler) and J. Reynolds (ed). San Bernardino County Museum Association Quarterly, 42(3).

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Reynolds, R.E., 1998b. Paleontologic partners in the Mojave Desert. Journal of Vertebrate Paleontology, Abstracts of Papers, 18(3): 72A.

Reynolds, R.E., 1999. Fossil footprints. San Bernardino County Museum Association Quarterly, 46(2): 55p.

Reynolds, R.E., 1999. Pleistocene mammal tracks near Shoshone, southern Death Valley, *in* Reynolds, R.E., 1999. Fossil footprints. San Bernardino County Museum Association Quarterly, 46(2): 27-30

Reynolds, R.E., 1999. Gomphothere tracks in southern California, *in* Reynolds, R.E., 1999. Fossil footprints. San Bernardino County Museum Association Quarterly, 46(2): 31-32.

Reynolds, R.E., 2000. Marker units suggest correlation between the Calico Mountains and the Mud Hills, central Mojave Desert, California, *in* Reynolds, R.E. and Reynolds, J. (eds), Empty Basins, Vanished Lakes. San Bernardino County Museum Association Quarterly, 47(2): 3-20.

Reynolds, R.E. (ed.), 2001. The changing face of the east Mojave Desert. California State University, Desert Studies Center: 76 p.

Reynolds, R.E., 2001. Wolves of Shoshone, southern Death Valley, *in* Reynolds, R.E. (ed.), 2001. The changing face of the east Mojave Desert. California State University, Desert Studies Center: 58-60.

Reynolds, R.E., 2001. The changing face of the east Mojave Desert: field trip guide, *in* Reynolds, R.E. (ed.), 2001. The changing face of the east Mojave Desert. California State University, Desert Studies Center: 3-14.

Reynolds, R.E., 2001. Tracking Big Game in the Mojave Desert: a partnership in education. Federal Millennium Conference, May, Barstow California.

Reynolds, R.E., 2001. Ancient lakes of the Mojave Desert: a field trip to Miocene and Pleistocene fossiliferous strata of the Central Mojave Desert. Federal Millennium Conference, May, Barstow California.

Reynolds, R.E. 2001. A billion years of life in the Amargosa Valley–Death Valley region. Interpretive trail text for Bureau of Land Management, August.

Reynolds, R.E. 2001. Marker bed correlations between the Mud Hills, Calico Mountains, and Daggett Ridge, central Mojave Desert, California. Geological Society of America Abstracts with Programs, Cordilleran section, GSA and Pacific Section 33(3):A-70.

Reynolds, R.E., (ed), 2002. Between the basins: exploring the western Mojave and southern Basin and Range Province. California State University, Desert Studies Consortium: 83 p.

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Reynolds, R.E., 2002. Impressions: Late Tertiary Mammalian Footprints in Various Substrates. Journal of Vertebrate Paleontology, Abstracts of Papers.

Reynolds, R.E., (ed), 2003. Land of Lost Lakes. California State University, Desert Studies Consortium: 68 p.

Reynolds, R.E., 2003. Fossil footprints in the Calico Mountains, *in* Guide to the Calicos: Calico Mining Camps and Scenic Areas, Bill Mann. Gem Books.

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Reynolds, R.E., 2003. Widespread early Miocene marker beds unite the Barstow Formation, central Mojave Desert. Western Association of Vertebrate Paleontologists, Abstracts and Program.
Reynolds, R.E., 2003. Miocene horse tracks in California and Nevada: morphology, motion, and tribes. Western Association of Vertebrate Paleontologists, Abstracts and Program.
Reynolds, R.E., 2003. Reunite Barstow. Presentation, Michael O. Woodburne convocation, University of California, Riverside.
Reynolds, R.E., 2004. Miocene cat tracks in the Mojave Desert of California. Journal of Vertebrate Paleontology, Abstracts of Papers. V. 25, 104a.
Reynolds, R.E., 2005. Morphometric categorization of California's Jurassic quadruped tracks. Journal of Vertebrate Paleontology, Abstracts of Papers. V. 24, 103a.
Reynolds, R.E., 2005. Old Ores: Mining History in the eastern Mojave Desert. California State University, Desert Studies Consortium 92p.
Reynolds, R.E., and Ted Weasma, 2005. Old Ores: Mines and mineral marketing in the eastern Mojave Desert—a field trip guide. California State University, Desert Studies Consortium: 3-19.
Reynolds, R.E., 2005. Halloran turquoise: a thousand years of mining history. California State University, Desert Studies Consortium: 63-67.
Reynolds, R.E., 2006. Making Tracks across the Southwest. California State University, Desert Studies Consortium, 80p.
Reynolds, R.E., 2006. Jurassic Tracks in California. California State University, Desert Studies Consortium: 19-24.
Reynolds, R.E., 2006. Horse Hoof Prints in the Fossil Record. California State University, Desert Studies Consortium: 25-28.
Reynolds, R.E., 2006. Way out west: California's only dinosaur tracks. Presentation, 2006 Federal Fossil Conference, Albuquerque New Mexico.
Reynolds, R.E., 2006. Tracks missing: extinct camel tracks from the BLM Owl Canyon Campground, Miocene Barstow Formation, Mojave Desert, California. Presentation, 2006 Federal Fossil Conference, Albuquerque, New Mexico.
Reynolds, R.E., in press 2006. Preserving California's Fossil Heritage During Construction Excavation. CDMG Special Publication, Engineering Practice in Northern California.
Reynolds, R. E., in press 2006. Way out West: Jurassic tracks on the Continental Margin. New Mexico Museum of Natural History.
Reynolds, Robert E., 2007. Wild, scenic and rapid: a trip down the Colorado River Trough. 2007 Desert Symposium Volume, California State University, Desert Studies Consortium. p. 116.
Reynolds, Robert E. (ed), 2008. Trough to Trough: the Colorado River and the Salton Sea. 2008 Desert Symposium Volume, California State University, Desert Studies Consortium. p. 146.
Reynolds, Robert E., 2008. Review of freshwater mollusks from the Bouse Formation, Lake Havasu area, California. 2008 Desert Symposium Volume, California State University, Desert Studies Consortium. p. 54-57.
Reynolds, Robert E., 2008. New Pleistocene records of the Tiger Salamander (Ambystoma tigrinum) in Riverside County, California. 2008 Desert Symposium Volume, California State University, Desert Studies Consortium. p. 143-146.

Major Previous Projects, Paleontological Assessments and Mitigation, or Paleontological Excavation and Research

CALIFORNIA

Riverside County, Eastern

1985 All American Pipeline

1986 Mecca Hills, Indio

1989 Eagle Mountain Land Fill

Riverside County, North Central

1989 Denizen Heights, Hemet

1989 Portrero Ranch, Beaumont

1989 Landmark/ Oak Valley, Beaumont

1991 Shutt Ranch, Calimesa

1991 Olive Dell Ranch, El Casco

1991 De Anza Cycle Park

1990 Badlands Landfill Expansion

1995 Jackrabbit Trail Paleo Salvage

San Bernardino County, Eastern

1979 Lugo-Mira Loma T/L, SCE

1979 Solar One, SCE, Daggett

1981 Salvage, Barstow Fossil Beds

1981 Tower M7-T3, SCE, Cajon Pass

1981 Coolwater Coal Gasification Plant, SCE, Daggett

1982 Hackberry Mtn Salvage, Goffs

1983 Klein Camel Salvage, Barstow

1983 Solar Ponds, Daggett

1982 Hwy. 138 Alignment, Cajon Pass

1983 Santa Fe Widening, Cajon Pass

1983 Antelope Cave Salvage, Mescal Range

1984 Robbins Quarry, Barstow

1984 LUZ-Wismer & Becker Solar Trough Site, Daggett

1984 Calico Lakes, Yermo

1984 United Energy, Yermo

1984 Coolwater SCE Solid Waste Site, Daggett

1984 Intermountain Power Project, Stateline to Adelanto

1985 All American Pipeline, Blythe to Ventura
1985 IPP South Electrode, Coyote Lake
1985 Luz SEGS II, Daggett
1986 Luz SEGS I, Daggett
1986 Newberry Ballast, SPRR,
1986 MCI Fiber Optics, Cajon Pass
1986 Bitter Spring Playa Salvage, Ft. Irwin
1986 Luz Evaporation Ponds, Daggett
1986 WilTel Fiber Optics, Stateline to Cajon
1988 Ward Valley Low Level Repository
1988 Silurian Valley Low Level Repository
1989 Broadwell Lake Repository
1990 Mojave Pipeline, Blythe to Bakersfield
1990 Kern River Pipeline, Mesquite, Nev. to Santa Barbara
1990 Coolwater Texaco Syngas, Daggett
1990 Pacific Agriculture, Cadiz Land
1991 Hidden Valley Repository, Cady Mts.
1991 Railcycle, Amboy
1991 Las Vegas Truck Stop, Yermo
1991 Indian Trails, Oro Grande
1991 Campbell Hill, Twentynine Palms Gravel Pit
1992 Little Piute Mts Bonebed Quarry
1994 Old Woman Sandstone, Lucerne Valley
1995 Hackberry Wash Salvage
1997 Piute Valley Hazen Quarry, Needles
1998 Robbins Quarry, Barstow
2001 KRGT, Daggett Compressor Station
2006 Needles Highway Improvement Project

MICHAEL R. PASENKO

PALEONTOLOGICAL RESOURCE MANAGER

EXPERTISE

Paleontological Resource Assessment and Mitigation
Fossil Preparation and Identification
Comparative Osteology and Systematics
Cultural Resource Assessment

EDUCATION

Northern Arizona University, Flagstaff, Arizona. M.S., Paleontology, Quaternary Sciences Program, 2000. Thesis: *Rhynchotherium falconeri* (Proboscidea, Gomphotheriidae) from the 111 Ranch, Southeastern Arizona with a discussion of the status of the genus. Study areas included geology in the Pliocene and Pleistocene Periods, mammals of the Pleistocene, Zooarchaeology, and the Clovis Period. Minor was in geology.

Northern Arizona University, Flagstaff, Arizona. B.A., Anthropology, 1997. Research interests were cultures of the Southwest (Hohokam, Anasazi, Mogollon, and Sinagua).

PROFESSIONAL RESPONSIBILITIES

Assessments of paleontological resources. Evaluation of paleontological resources for Environmental Impact Reports, literature and record reviews, field surveys, and directing field monitoring and resource salvage operations. Specimen preparation and identification. Systematics and biogeography.

PROFESSIONAL EXPERIENCE

Paleontological Resources Manager. LSA Associates, Inc., Riverside, California. 2008 to present.

Archaeology Field Crew for pipeline project (Prescott–Phoenix, Arizona). TRC Environmental Solutions, Albuquerque, New Mexico and Rio Salado Archaeology, Phoenix, Arizona. November 2007 to Present. Duties include data recovery (surveying, mapping), soil profiles, and mitigation (test trenches, test plots, and excavations).

Environmental Specialist, Paleontologist, and Cultural Resources Associate. Carothers Environmental, LLC, Sedona, Arizona. June 2005 to November 2007. Duties included Phase I environmental assessments; Phase II environmental assessments; environmental consulting and compliance (NEPA, HUD, FEMA, USDA, USFWS, NHPA, RCRA, ADEQ); assisting with archaeological surveys; paleontological surveys, monitoring, and mitigation; assisting with wetlands delineation, endangered species surveys; and marketing and establishing relationships with clients.

Environmental Scientist. City of Flagstaff, Flagstaff, Arizona. November 2003 to May 2005. Duties included water and gas sampling for Arizona Department of Environmental Quality quarterly reports; surveying (surveyors level and Total Station); geotechnical duties; and preparing reports.

Environmental Scientist. American Environmental Corporation, Springfield, Illinois. August 2001 to October 2003. Duties included geological profiles and hydrogeology of contaminated sites (LUST); soil and water sampling; logging soil borings (Unified Soil Classification System); Phase I and II Environmental Assessments; remediation of leaking underground tanks; prepare budgets and reports; surveying; NPDES permitting and reporting; and project management.

Archaeological Technician, Assisted Mike Wiant of the Illinois State Museum, Springfield, Illinois. October 2000 to December 2000. Duties included Archaeological Survey over 800 acres for a coal mining operation (200 hours in the field and 120 hours in the lab). This consisted of a visual walkover, shovel-testing, mapping artifacts, creating a map of the site, and cataloguing artifacts.

Research Assistant, Northern Arizona University, Quaternary Sciences Paleontology Lab, Flagstaff, Arizona. August 1999 to May 2000. Duties included screenwashing sediments; fossil analysis and preservation; data entry for collections; and research.

PROJECT EXPERIENCE

2009. Principal Investigator for Uniti on the Hill Project, San Diego, California. Preparing monitoring exhibit, final monitoring report (Lindavista formation, Scripps formation) marine invertebrates.

2008. BNSF 3MT Paleontological Monitoring and progress Reports, Cajon Pass, San Bernardino County, California. Crew monitored excavation in the Miocene Cajon Valley Beds and Crowder Formation and recovered Barstovian age vertebrate fossils and processed 35,000 pounds of fossiliferous sediment o recover hedge hogs, moles and rodents.

2008. Eagle Crest Paleontological Monitoring in Bakersfield, Kern County California. Crew monitored excavation for over two years in Miocene marine sediments and Pleistocene terrace deposits. The Miocene marine Round Mountain Silt Formation contained the Shark Tooth Hill bone bed that produced a great variety of cetaceans, pinnipeds, land mammals, fish, sharks, rays, marine mollusks and terrestrial leaves.

2008. The Resorts in Mira Loma, western Riverside County, California. This late Pleistocene locality produced abundant and large specimens of mammoth, bison, llama, Camel, horse, rodent and gastropods.

2008. Centex Homes Eagle Crest Project, Alfred Harrell Highway, Bakersfield, California. Project Management and management for logistics of fossil preparation.

2007. Geology of site and analyses and systematics of Pleistocene fossils (*Mammuthus columbi*, *Equus conversidens*, *Bison* sp.) in Prescott Valley, Arizona (with Sharlot Hall Museum).

2007. Paleontological Resource Assessment for pipeline project in the Kutz Canyon Paleontological Area, New Mexico for Paleocene fossils (Technical Report, Carothers Environmental).

2007. Assisted with a Pima Pineapple Cactus Survey and Biological Resources Assessment of 600 acres near Green Valley, Arizona.

2007–present. Volunteer at the Mesa Southwest Museum (Arizona Museum of Natural History). Working on morphology and taxonomy of mastodonts (Families Gomphotheriidae and Mammutidae).

2007. Principal Investigator and preparer of a Paleontological Resources Assessment for a transmission line and pipeline project in northwest New Mexico.

2007. Assisted with a Biological Resources Assessment of a 5-mile right-of-way near Kirkland, Arizona.

2007. Performed an archaeological survey for a private development (in association with SWCA) near Clarkdale, Arizona.

OTHER QUALIFICATIONS

- Certified Environmental Inspector
- Permitted to perform paleontological work on state and BLM Lands in Arizona, New Mexico, Colorado, Utah, and Nevada. Have applied for paleontological permits for California, Montana, and Wyoming.

PROFESSIONAL AFFILIATIONS

- Society of Vertebrate Paleontology
- PaleoBios
- Arizona Archaeological and Historical Society
- Arizona-Nevada Academy of Science

PUBLICATIONS

Pasenko, Michael R.

2009 New Gomphotheriidae remains from 111 Ranch Locality, southeastern Arizona. Submitted to *PaleoBios*.

Pasenko, Michael R.

2009 Late Pleistocene Fauna from Prescott Valley, West-Central Arizona. Submitted to *Southwestern Naturalist*.

Pasenko, Michael R.

2008 A young adult *Stegomastodon* (Proboscidea, Gomphotheriidae) skull from central Arizona. *PaleoBios* 27(3):81–85.

Pasenko, Michael R.

2008 Spatial distribution of *Mammuthus columbi* in North America. *Current Research in the Pleistocene* 24:180–182.

Pasenko, Michael R.

2007 Paleontological Resources Assessment of Transmission Line Project in the Kutz Canyon Paleontological Area, northwest New Mexico. Technical Report for Kinder Morgan and Ecosphere Environmental Services.

Pasenko, Michael R.

2007 *Rhynchotherium falconeri* (Proboscidea, Gomphotheriidae) from 111 Ranch, southeastern Arizona with a discussion of the genus. *Journal of Vertebrate Paleontology* 27(1):195–203.

Pasenko, Michael R.

2007 Preliminary analysis of new Gomphotheriid (Proboscidea, Mammalia) material from Central and Southeast Arizona. *Proceedings of the Arizona-Nevada Academy of Science* Abstracts for annual meeting 42:27–28.

Pasenko, Michael R.

2007 Paleontological Resources Assessment for the State Route 179 Construction Project. Technical Report for Southwest Asphalt Paving & the United States Forest Service.

Pasenko, Michael R. (Carothers Environmental)

2007 Paleontological Resource Assessment (Permian Fossils) for the State Route 179 Construction Project. Technical Report for Southwest Asphalt Paving and the United States Forest Service.

Pasenko, Michael R.

2006 Spatial Distribution of *Mammuthus primigenius* in the United States. *Current Research in the Pleistocene* 23:176–178.

Pasenko, Michael R.

2005 *Rhynchotherium falconeri* (Proboscidea, Gomphotheriidae) from the 111 Ranch, southeastern Arizona. Abstract and Poster Presentation for the Society of Vertebrate Paleontology Annual Conference, Mesa, Arizona.

Pasenko, Michael R., and Blaine Schubert

2004 *Mammuthus jeffersonii* from Northern Illinois. *PaleoBios* 24(3):19–24.

ADDENDUM
PALEONTOLOGICAL IDENTIFICATION AND EVALUATION REPORT

FOR

INTERSTATE 215/BARTON ROAD INTERCHANGE IMPROVEMENT PROJECT

CITIES OF GRAND TERRACE AND COLTON

COUNTY OF SAN BERNARDINO, CALIFORNIA

08-SBd-215-PM 0.58/1.66
EA 0J070
(0800000282)

Prepared by:

Brooks Smith
LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

Reviewed and Approved by: 8/3/11

Ms. Gabrielle Duff
Branch Chief, Cultural Studies
Principal Investigator, Prehistoric Archaeology
California Department of Transportation, District 8
464 W. 4th Street, 8th Floor MS 825
San Bernardino, California 92401-1400

July 2011

SUMMARY OF FINDINGS

The California Department of Transportation (Department), in cooperation with the San Bernardino Associated Governments (SANBAG), the Riverside County Transportation Commission (RCTC), and the City of Grand Terrace, proposes to improve the Interstate 215 (I-215)/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. On Barton Road, the project limits extend from approximately 0.3 mile (mi) west of I-215 to 0.4 mi east of I-215. The project limits on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road.

This addendum to the Paleontological Investigation Report (PIR)/Paleontological Evaluation Report (PER) (Reynolds and Pasenko, 2010) is being prepared to address the addition of a new alternative, Alternative 7 (Modified Cloverleaf/Spread Diamond), that was not included as part of the original PIR/PER. The area of potential disturbance (APD) covers all areas that have a potential to be disturbed by construction of this new Build Alternative, including areas for staging and access, temporary construction easements (TCEs), temporary construction signage, grading, and project construction activities.

The APD for Alternative 7 contains three types of sediments. Geologic mapping indicates that the APD is located on early Pleistocene alluvium (Qvof), middle Pleistocene alluvium (Qof), and recently active Holocene wash sediments (Qw). Very old Pleistocene sediments and middle Pleistocene sediments within the APD are present on and just below the surface. Based on the literature review and records searches through museums and field surveys conducted during preparation of the PIR/ PER in 2010 (Reynolds and Pasenko, 2010), sediments dating from the Pleistocene Period will be encountered during the development of Alternative 7, and these sediments have the potential to contain significant nonrenewable paleontological resources.

National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) recommendations, as well as guidelines from the County of San Bernardino, are consistent with recommendations of the Society of Vertebrate Paleontology (SVP, 1995) and the California Department of Transportation (2008) and require that impacts to nonrenewable paleontological resources must be considered during project design and construction within undisturbed Pleistocene sediments. Consequently, potential impacts to paleontological resources are anticipated as a result of the proposed Alternative 7, and it will be necessary to prepare a Paleontological Mitigation Plan (PMP) if Alternative 7 is chosen.

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APPENDIX

INTRODUCTION

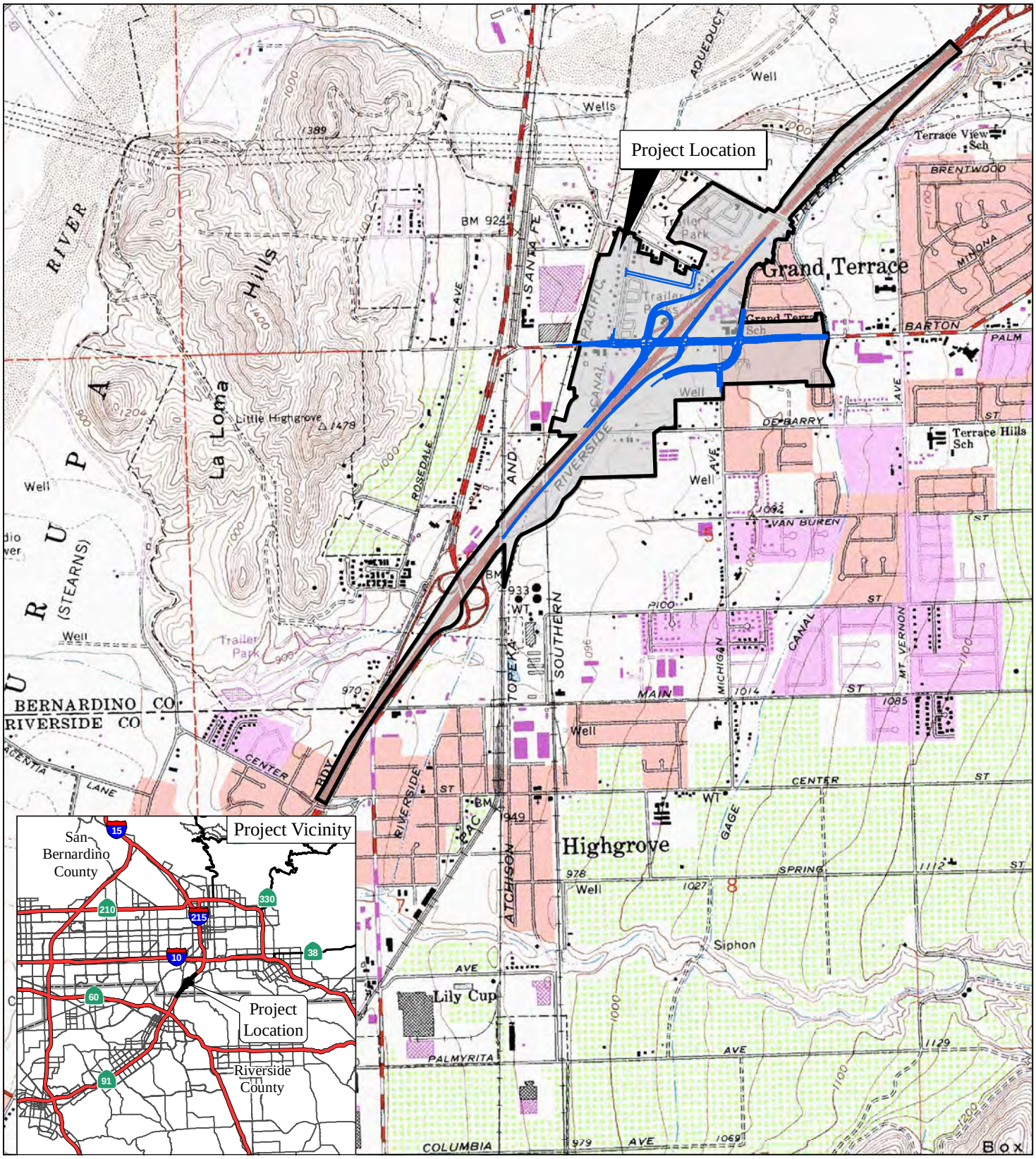
The Department, in cooperation with SANBAG, the RCTC, and the City of Grand Terrace, proposes to improve the I-215/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. On Barton Road, the project limits extend from approximately 0.3 mi west of I-215 to 0.4 mi east of I-215. The project limits for Alternative 7 on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road. Figure 1 shows project location and vicinity maps. This addendum to the I-215 Barton Road Interchange Improvement Project has been prepared to address the addition of Alternative 7, which was not addressed in the PIR/PER that was prepared for the project by Reynolds and Pasenko (2010).

I-215 is a major north-south freeway facility that begins at the southern junction of Interstate 15 (I-15) in the City of Murrieta in Riverside County and terminates at the northern junction with I-15, near Devore in San Bernardino County. It is an alternative route of I-15. The portion of I-215 within the project limits currently provides three through lanes in each direction and a paved median.

The existing I-215/Barton Road interchange is a compact diamond interchange with single-lane entrance and exit ramps. Both of the exit ramp approaches expand to two lanes to accommodate turning traffic. The existing northbound ramp intersection and southbound ramp intersection are spaced approximately 350 feet (ft) apart. The existing overcrossing is a single lane in each direction with back-to-back left-turn pockets for the entrance ramps.

Barton Road is an east-west primary arterial in the County of San Bernardino. It extends from La Cadena Drive in the City of Colton to east of San Mateo Street in the City of Redlands. Within the project limits, Barton Road is a two-lane roadway west of I-215. East of I-215, Barton Road is a four-lane facility with turn lanes at various intersections. Within the project limits, there are several intersections:

- Grand Terrace Road (unsignalized T-intersection)
- Southbound ramps and La Crosse Avenue intersection (signalized)
- Northbound ramps intersection (signalized)
- Michigan Avenue intersection (signalized T-intersection)
- Vivienda Avenue intersection (unsignalized T-intersection)



LEGEND

Area of Potential Disturbance

Alternative 7

N

0 1000 2000

FEET

FIGURE 1

I-215 Barton Road Interchange Project

Project Location Map

08-SBd-215 PM 0.8/1.8

EA# 0J0700

SOURCE: USGS 7.5' QUAD - SAN BERNARDINO SOUTH ('80); CALIF.

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PURPOSE AND NEED

Purpose

The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/Barton Road interchange and facilities served by the interchange.

Need

The proposed project is needed to increase capacity, improve operations, and reduce congestion at the I-215/Barton Road interchange. Based on traffic projections and the existing and future land uses in the vicinity, the facility is forecast to degrade to level of service (LOS) F (breakdown condition) by 2040 without improvements. Due to its nonstandard design, the existing interchange restricts large truck movements, as well as pedestrian and bicyclist access to local streets.

PROJECT DESCRIPTION

The Project Description describes the proposed action and the design for Alternative 7 (Modified Cloverleaf/Spread Diamond) that was developed to meet the identified need through accomplishing the defined purposes while avoiding or minimizing environmental impacts. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County, California. Within the limits of the proposed project, I-215 currently provides three lanes in each direction. Barton Road is a two-lane roadway west of I-215 and a four-lane facility with turn lanes at various intersections east of I-215. Barton Road provides four ramps that connect to I-215: southbound on- and off-ramps and northbound on- and off-ramps.

The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/Barton Road interchange. The existing interchange has a nonstandard southbound off-ramp, and the existing interchange restricts large truck movements and pedestrian and bicyclist access. Without the interchange improvement, the operation of this facility will deteriorate over time to reach unacceptable LOS in the future.

The project area for the I-215/Barton Road Interchange Improvement Project overlaps the project area with the I-215 High-Occupancy Vehicle (HOV) Lane Gap Closure Project at the BNSF Railroad two-track underpass (bridge over the freeway) and the Union Pacific Railroad (UPRR) single-track underpass between the Iowa Avenue/La Cadena Drive interchange and the Barton Road interchange. Both projects would require the reconstruction of these two structures. For the I-215/Barton Road Interchange Improvement Project, the reconstruction is needed to accommodate an auxiliary lane that is proposed between the northbound La Cadena entrance ramp and the proposed Barton Road exit ramp. The underpass replacements are required for I-215/Barton Road interchange Alternatives 3, 5, 6, and 7. For the I-215 Bi-County HOV Lane Gap Closure Project, the reconstruction is necessary due to inadequate horizontal clearance between the existing structure supports and the proposed HOV lane addition. The reconstructed bridges would be raised to provide adequate vertical clearance with the freeway.

Because the I-215 Bi-County HOV Lane Gap Closure Project analyzed the environmental impacts of reconstruction of the two railroad structures as well as construction of temporary railroad bridges to be utilized during reconstruction of the existing structures (railroad shooflies), and this project was approved in April 2011, these impacts are not evaluated as part of this document.

PROJECT ALTERNATIVES

The other Project Alternatives (Alternatives 1, 3, 5, and 6) have been covered in the PIR/PER that was prepared for the project by Reynolds and Pasenko (2010) and will not be discussed again. Only the new Build Alternative 7 (Modified Cloverleaf/Spread Diamond) is discussed below.

Proposed Build Alternative

Alternative 7 (Modified Cloverleaf/Spread Diamond) (Locally Preferred Alternative). Under Alternative 7, Barton Road would be widened to two through lanes in each direction plus one left-turn lane and one right-turn lane. The existing overcrossing would be replaced with a new structure with four through lanes and two turn lanes. The conceptual design for Alternative 7 is shown in Figure 2 and described in the following sections.

Interchange Components. This alternative includes the components listed below:

- A new southbound off-ramp, southbound loop on-ramp, northbound on-ramp, and northbound off-ramp.
- The new southbound off-ramp would make a new connection at Barton Road with one right-turn lane, one left-turn lane, and one shared through/left-turn lane; La Crosse Avenue north of Barton Road would be removed.
- The new northbound off-ramp would intersect with Barton Road in a spread diamond configuration with one left-turn lane, one right-turn lane, and one shared through/right-turn lane, and the northbound on-ramp is a spread diamond configuration with two lanes at Barton Road.
- Drainage for the entire interchange would be improved.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of the Barton Road overcrossing.
- Storm water treatment devices as needed to address storm water runoff in the project limits.
- Replacement landscaping consistent with the I-215/State Route-91 Corridor Master Plan Conceptual Interchange design.
- Potential sound barriers in the vicinity of new on- and off-ramps.
- Utility relocation or protection in place during construction.

LEGEND

Alternative 7

Area of Potential Disturbance

FIGURE 2

N

0 425 850

FEET

SOURCE: Bing Maps (c. 2008)

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I-215 Barton Road Interchange Project

Alternative 7

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EA# 0J070

- Design exceptions for interchange spacing, intersection spacing, superelevation design on the northbound on-ramp and off-ramp, weaving distance factor between the La Cadena on-ramp and northbound Barton exit ramp, curb ramps (one ramp at each of the four corners at the intersection of Barton Road and the southbound on- and off-ramps), minimum traffic width during construction (three 11 ft inside traffic lanes and one 12 ft outside traffic lane), and access control opposite the southbound on- and off-ramps.
- New right-of-way to accommodate the reconfigured ramps (full acquisitions, partial acquisitions, and temporary construction easements).

Local Circulation Components. Alternative 7 includes the following local circulation components:

- Reconfigure Commerce Way to intersect with Barton Road at Vivienda Avenue.
- Eliminate the intersection of Michigan Avenue at Barton Road; Michigan Avenue will form a T-intersection with Commerce Way.
- Widen Barton Road to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Construct a new two-lane road between La Crosse Avenue and Grand Terrace Road adjacent to Vivienda Avenue.
- Modified drainage facilities consistent with other project improvements.
- Traffic signal modifications.
- New right-of-way to accommodate the reconfigured local streets (full acquisitions, partial acquisitions, and temporary construction easements).

PARAMETERS OF EXCAVATION

The ramps for the project will be on an embankment requiring minimal excavation, and it is anticipated that excavation for surface streets will be on the order of 3–5 ft; excavation for sound wall footings would be on the order of 3–5 ft; and excavation for structure footings would be up to 10–15 ft deep, as will any excavation associated with utilities such as storm drains and sewer lines.

PURPOSE OF INVESTIGATION

The paleontological locality search and field assessment were conducted pursuant to CEQA; Public Resources Code (PRC) 21000 (Division 13); California Code of Regulations (CCR) 15000 (Title 14, Division 3, Chapter 1); and CEQA Appendix G; PRC 5097.5. This assessment documents the potential for paleontological resources older than 9,000 years to occur in the study area and the need for a PMP.

This assessment was also prepared in accord with guidelines on a national level, including those from NEPA (Public Law [PL] 91–190, 83 Stat. 852, 42 United States Code [USC] 4321–4327), the Federal Land Policy and Management Act of 1976 (FLPMA, PL 94–579, 43 USC 1701–1782), and the Paleontological Resource Management 1998 Bureau of Land Management (BLM) Handbook H-8270-1.

Discussions on the significance and sensitivity of paleontological resources are fully covered in the PIR/PER that was prepared for the project by Reynolds and Pasenko (2010) and are not included in this addendum.

METHODS

The study area for paleontological resources for the project is larger than the area of direct effects and consists of an approximately 1,000 ft radius beyond the APD. The APD is defined as the area that would be disturbed during construction of Build Alternative 7 and is also referred to as the project area. Alternative 7 is completely within the APD and study area for the PIR/PER that was prepared in 2010 by Reynolds and Pasenko (2010), and no new sediments are present or anticipated to be encountered. The study area includes additional areas to check for exposure of sediments outside the APD. The study area is shown on the United States Geological Survey (USGS) *San Bernardino South, California* 7.5-minute topographic quadrangle (1967, photorevised 1980) in Sections 31 and 32, Township 1 South, Range 4 West, and in Sections 5 and 6, Township 2 South, Range 4 West, San Bernardino Baseline and Meridian (SBBM), included as Figure 3.

Prior to the field survey conducted as part of the 2010 PIR/PER for the project (Reynolds and Pasenko, 2010), research was conducted to locate previously documented fossil localities in the study area and in western San Bernardino and Riverside Counties. That research focused on identifying sediments and formations conducive to the preservation of paleontological resources and included review of available geological and paleontological literature concerning or related to the Pleistocene stratigraphy of the project area and requests for paleontological locality data from museums in the vicinity of the project site.

Within Appendix A for the PIR/PER prepared for the project in 2010 (Reynolds and Pasenko, 2010), there is a summary of applicable legislation; Appendix B includes the records search results; and Appendix C includes the resource localities.

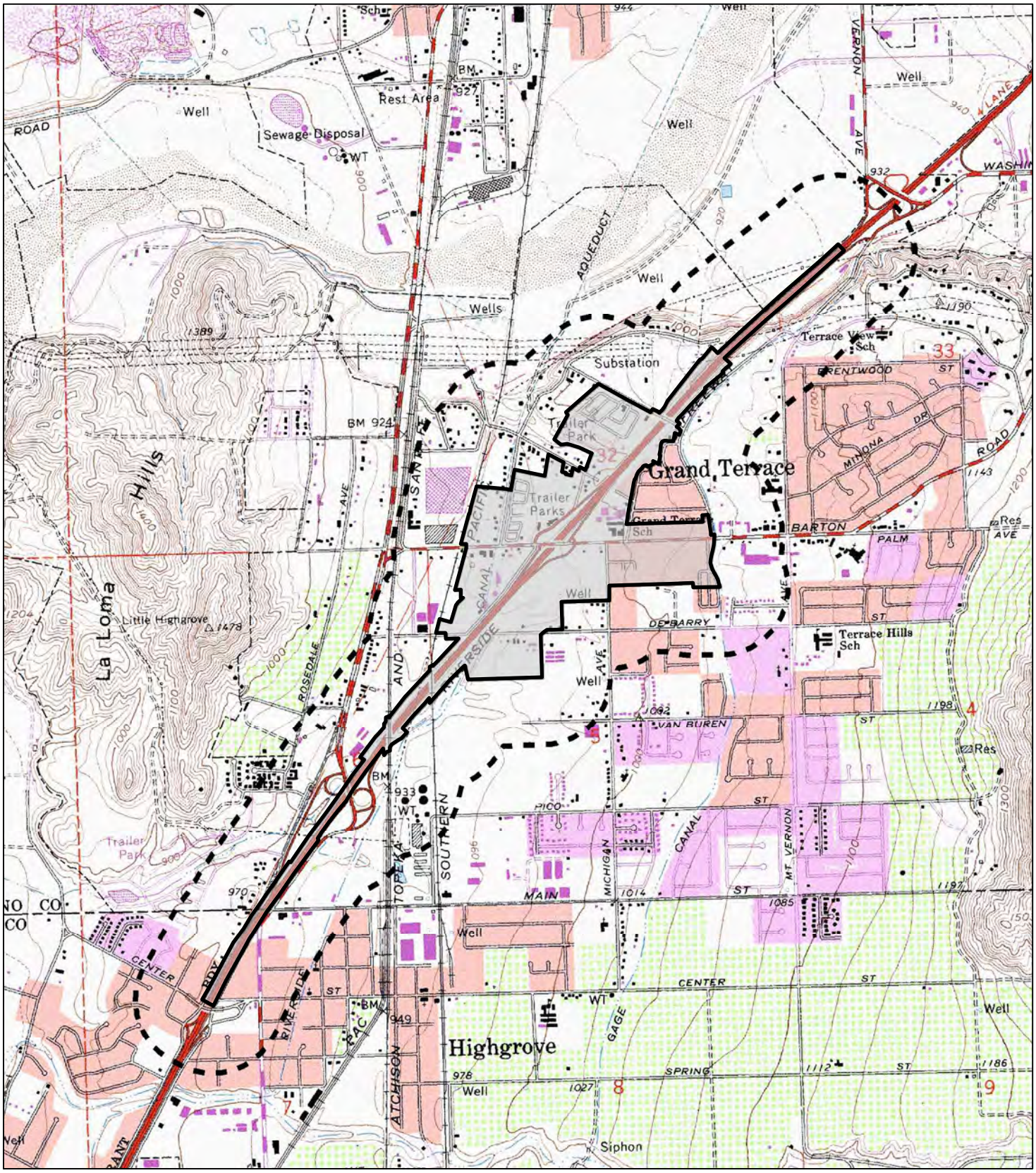
LITERATURE REVIEW AND LOCALITY SEARCH

A paleontological literature review was conducted for the proposed project using unpublished reports, paleontological assessment and monitoring reports, field notes, and published literature. A paleontological resource locality search was conducted through the San Bernardino County Museum (SBCM) and the Natural History Museum of Los Angeles County (LACM). Paleontological resource locality forms housed in those institutions record fossil localities in sediments equivalent in age to those in the study area.

FIELD INSPECTION

Vehicular Survey

A vehicular survey of the study area was conducted by Paleontologists Michael R. Pasenko, M.A., and Robert E. Reynolds on February 10, 2009. The survey was conducted to verify the geologic mapping (Morton and Miller, 2003) and locate areas within the project study area where more detailed pedestrian surveys could be conducted.



LEGEND

Area of Potential Disturbance

StudyArea

FIGURE 3

I-215 Barton Road Interchange Project

Study Area -
Area of Potential Disturbance

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EA# 0J070

0 1000 2000
FEET

SOURCE: USGS 7.5' Quad. (San Bernardino South, 1980)

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Pedestrian Survey

Although these surveys were conducted prior to the development of Alternative 7, they included areas that are within the Alternative 7 footprint depicted on Figure 2. The surveys were conducted in open areas and road cuts that had the potential to contain sediment outcrops.

PERSONNEL

Robert E. Reynolds, Paleontologist, completed the paleontological resource literature review and original report preparation and participated in the conduct of the vehicular and foot surveys. Mr. Reynolds' resume, provided in Appendix D of the PIR/PER that was prepared for the project in 2010 (Reynolds and Pasenko, 2010), shows that he was the paleontological program manager at LSA's Riverside office; a research associate of the LACM and California State University, Fullerton Desert Studies Consortium; and former Curator of Earth Sciences at the SBCM. He has 26 years of experience with paleontological salvage programs and 40 years of research experience collecting biostratigraphic specimens from sediments in Southern California, Arizona, and Nevada. Mr. Reynolds developed the Paleontological Resource Sensitivity Map for the San Bernardino County Planning Department in 1985.

Michael R. Pasenko, M.A., Paleontological Resources Manager, assisted with the original report preparation and the vehicular and foot surveys for the PIR/PER that was prepared for the project in 2010 (Reynolds and Pasenko, 2010). As shown in Mr. Pasenko's resume in Appendix D of the original report, he has over 10 years of experience in Late Cenozoic faunas and paleontological mitigation projects.

Brooks Smith, Senior Cultural Resources Manager, prepared this Addendum PIR/PER that covers the addition of Alternative 7 to the I-215/Barton Road Interchange Improvement Project. Mr. Smith (Appendix A) has over 18 years of experience with paleontological salvage programs and has extensive experience collecting paleontological resources, surveying for paleontological resources; salvage of large fossil specimens; fossil identification and curation; writing paleontological assessment reports; developing paleontological mitigation monitoring programs; and preparing final mitigation monitoring reports at the conclusion of construction projects.

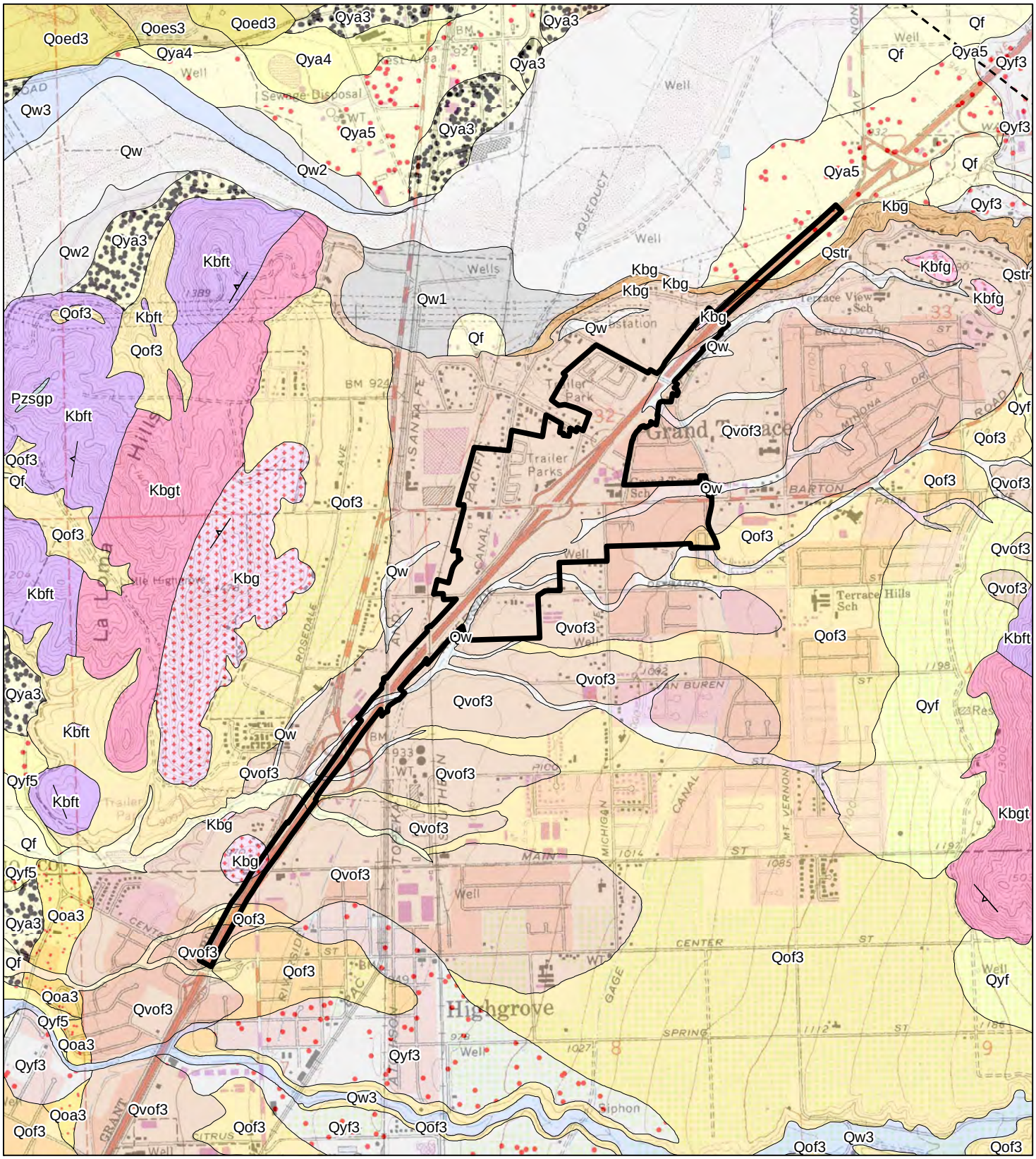
BACKGROUND

GEOLOGICAL PROVINCES

The APD for Alternative 7 is located within the northwestern Peninsular Range Province of Southern California. It is near the northern end of the Perris Block of the Peninsular Range Province (Jahns, 1954). The Perris Block extends from the southern foot of the San Gabriel and San Bernardino Mountains (Bailey and Jahns, 1954) southeast to the vicinity of Bachelor Mountain and Poly Butte. The Perris Block is bounded on the southwest by the Elsinore Fault Zone and on the northeast by the San Jacinto Fault (Morton, 1977). The surface of the Perris Block consists of granitic exposures that have been tectonically tilted eastward, leaving granitic outcrops elevated and exposed on the west side of the Perris Block (Jurupa Hills) and allowing Pleistocene sediments to cover the east side, filling the eastern San Bernardino, Moreno, Lakeview, and San Jacinto Valleys. The block tilted eastward prior to late Pleistocene time. The Santa Ana River, which is immediately north and west of the project site, has incised the Perris Block from its northern margin to the Elsinore Fault Zone.

Geologic mapping (Morton and Miller, 2003) indicates that the APD for Alternative 7 is located on early Pleistocene alluvium (Qvof), middle Pleistocene alluvium (Qof) and young (Holocene) alluvial sediments (Qw), as shown in Figure 4. To the west, similar basin-filling sediments are truncated at the eastern edge of the Chino Hills by the Chino Fault, part of the Whittier Fault system (Rogers, 1965, Morton and Miller 2003). The Red Hill Fault and Cucamonga Fault Zone are to the northwest. The Rialto-Colton, San Jacinto, and San Andreas Faults are to the north and northeast (Bortugno and Spittler, 1986, Morton and Miller, 2003). The Chino Hills to the west contain fossiliferous Miocene marine and continental sediments. The sedimentary rocks in the Santa Ana Mountains to the southwest consist of fossiliferous early Tertiary marine sandstones and Pleistocene to Holocene alluvial deposits. The San Gabriel Mountains to the north are composed of granitic and metamorphic rocks, as are the San Bernardino Mountains to the northeast. The Jurupa Hills and La Loma Hills to the west and Blue Mountain to the east are also composed of granitic and metamorphic rocks, including Paleozoic limestone that has metamorphosed to marble.

More detailed discussions on the geology of the project area and vicinity are covered in the PIR/PER that was prepared for the project in 2010 (Reynolds and Pasenko, 2010)



Area of Potential Disturbance

Geologic Units

Kbfg	Kbht	Qoa3	Qw	Qya4	Contact, certain		
Kbft	Kbt	Qoed3	Qw1	Qya5	Fault, inferred		
Kbg	Pzmp	Qoes3	Qw2	Qyf			
Kbgt	Pzsgp	Qof3	Qw3	Qyf3	Foliation, igneous, inclined		
Kbhg1	Qa	Qstr	Qya1	Qyf5			
	Qf	Qvof3	Qya3				

FIGURE 4

I-215 Barton Road Interchange Project

Geology Map

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FEET

SOURCE: USGS 7.5' Quad. (San Bernardino South, 1980); USGS (Morton and Miller, 2006)

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PALEONTOLOGICAL RESOURCES OVERVIEW FROM THE LITERATURE AND FIELD RESEARCH

STRATIGRAPHIC OCCURRENCE OF PALEONTOLOGICAL RESOURCES

Cenozoic–Quaternary

Late Cenozoic Sediments. Sediments of early and middle Pleistocene age east, west, and south of the study area contain significant vertebrate fossils. These include a significant, diverse assemblage of fossil reptiles, birds, and large and small mammals. Small mammals are extremely important for determining the age of sedimentary deposits. Large mammals are also present in these sediments and include mammoth, mastodon, giant ground sloth, camel, horse, and deer.

Quaternary

Sediments near and within the study area were deposited between the early Pleistocene to late Holocene Epochs (1.8 million years ago to the present). After the Pleistocene (9,000 years ago), drainages cut gullies through the Pleistocene sediments and filled them with Holocene sediments. Geologic mapping (Morton and Miller, 2003) has divided the sediments within the Alternative 7 study area by possible age range, based on soil profiles and degree of surficial erosion, into early Pleistocene (Qvof), middle Pleistocene (Qof), and Holocene (Qw).

Pleistocene Sediments. Pleistocene sediments make up the dominant sediments that are exposed within Alternative 7 (see Figure 4). Mammoths (*Mammuthus* sp.) are the indicator fossil for the Pleistocene Epoch, which is divided into the older Irvingtonian North American Land Mammal Age (NALMA) and the later Rancholabrean NALMA, which spans the last 200,000 years of the Pleistocene. The indicator fossil for the Rancholabrean NALMA is bison. Both NALMAs contain other fossils, such as horse, coyote, rodents, birds, reptiles, and fish, that help describe climatic and habitat conditions during the last 2 million years.

Holocene Sediments. Holocene sediments within the project area are restricted to some very small drainage channels that cross the project area (see Figure 4). The Holocene includes the last 9,000 to 10,000 years of geological time, which is considered to be “Recent,” but which contains fossil evidence of the transition from the Pleistocene “Ice Ages” into the warmer and drier Holocene. Although these Holocene sediments in the study area (Qw) can contain remains of plants and animals, generally, not enough time has passed for the remains to become fossilized; in addition, the remains are contemporaneous with modern species, and these remains are usually not considered to be significant.

It should be noted that although an area may be mapped with Holocene sediments on the surface, deposits of older sediments are often encountered as shallowly as 5–10 ft below the surface in

Riverside and San Bernardino Counties (Reynolds and Reynolds, 1991), and these older sediments can and do contain fossils (see discussion on Pleistocene sediments, above).

LITERATURE REVIEW

The potential for near-surface late Pleistocene fossils from the northern Perris block has been noted (Reynolds and Reynolds, 1991), and the shallow depth of occurrence of Pleistocene fossils is consistent with that elsewhere in the northern Peninsular Range Province near San Bernardino, Fontana, Rancho Cucamonga, and in the Pomona Valley near Chino (Reynolds and Reynolds, 1991). The literature review from the 2010 PIR/PER prepared for the project by Reynolds and Pasenko (2010) revealed that within an approximate 13 mi radius, there are at least 10 known paleontological localities from Pleistocene alluvial sediments similar to the alluvial sediments that are present within the project, the closest of which is located approximately 9 mi away.

LOCALITY SEARCH

The LACM does not have any recorded localities in the project area. Its closest locality, LACM 1207, is located south-southwest of the project area between Norco and Corona, within sediments that may be older than those that occur in the study area. A fossil deer (*Odocoileus* sp.) was found there.

The SBCM indicates that the project area is underlain by Pleistocene alluvial deposits with a high paleontological sensitivity. The high sensitivity is based on the occurrence of numerous paleontological finds throughout San Bernardino and Riverside Counties, including mammoth, mastodon, giant ground sloth, dire wolf, saber-tooth cat, large and small horses, camels, and bison. The SBCM does not have any records of fossil localities within the Alternative 7 study area.

The literature review and locality searches indicate that many paleontological resource localities are known from this part of the western San Bernardino Basin. The documented localities of paleontological resources in this area have all been found during construction excavation. This suggests there is a high potential for important vertebrate fossils to be encountered during excavation where Pleistocene sediments crop out at the surface in the San Bernardino Basin. A more detailed discussion is included in the original PIR/PER that was prepared for the project by Reynolds and Pasenko (2010).

FIELD INSPECTION

The vehicular and pedestrian surveys verified the results of the literature review and analysis of the geologic mapping by Morton and Miller (2003) within the study area (Reynolds and Pasenko, 2010). Older Pleistocene sediments are well exposed in the railroad cuts along the western margins of the study area. Middle Pleistocene sediments (Qof; Morton and Miller, 2003) are exposed on the surface in the study area along Canal Street, south of Barton Road, and at the west end of Barton Road at La Cadena Drive. However, the cover of vegetation and introduced materials made examination of the middle Pleistocene sediments difficult. The older Pleistocene sediments that were observed to outcrop within the APD are appropriate for the preservation of vertebrate fossils. The full results of the

pedestrian surveys are included in the PIR/PER that was prepared for the project (Reynolds and Pasenko, 2010)

PALEONTOLOGICAL RESOURCES SENSITIVITY

A more detailed discussion on resource sensitivity is contained in the PIR/PER that was prepared for the project by Reynolds and Pasenko (2010). In general, high sensitivity is based on formations or mappable rock units that are known to contain, or have the correct age and depositional conditions to contain, significant paleontological resources. Low sensitivity is based on sediments that are potentially fossiliferous, but have not yielded significant fossils in the past; sediments that contain common and/or widespread invertebrate fossils; or rock units that are nonsedimentary such as igneous rocks (granite and volcanic) or metamorphic rocks.

Based on the literature research and the field surveys, the sediments exposed within the APD for Alternative 7 are old enough to contain paleontological resources, and significant paleontological resources have been found within similar sediments in the vicinity of the project area. Therefore, the APD for Alternative 7 is considered to be located on sediments with a high potential to contain significant vertebrate fossils.

RECOMMENDATIONS FOR PALEONTOLOGICAL MITIGATION PLAN

Because the APD for Alternative 7 is located on sediments identified as high sensitivity, a PMP will need to be prepared if Alternative 7 is chosen. The Department and the SVP (SVP, 1995 and 1996) present similar guidelines for mitigation of adverse impacts to significant, nonrenewable paleontological resources. Discussions on preparing the PMP are included in the PIR/PER that was prepared for the project by Reynolds and Pasenko (2010). Excerpts from individual guidelines for the development of a PMP are provided below. Because the APD is in an area identified as high sensitivity, a PMP will be provided for the project, as discussed below.

California Department of Transportation

The Department has developed a set of guidelines similar to the 1995 SVP guidelines to avoid and minimize adverse project impacts to paleontological resources. These recommendations include avoidance of resources and recommendations for impact mitigation measures during construction excavation, as described below.

Avoidance. Avoidance of project impacts can often be achieved by minor project modifications or redesign so that paleontological resources are completely outside the APD for the project. This could include a modified construction approach that does not entail construction excavation that would impact fossiliferous strata.

Environmentally Sensitive Areas. A related strategy creates Environmentally Sensitive Areas (ESAs) around paleontological localities. ESAs are a standard part of the Department and Federal Highway Administration (FHWA) toolkit to protect resources within or adjacent to a project site

while concurrently delivering the project. Generally, these involve some combination of fencing or cyclic monitoring as an alternative to excavation monitoring. In the event that these measures prove ineffective for one reason or another, more traditional mitigation is necessarily required. This can sometimes impact delivery schedules and/or total project costs. If viable and properly implemented, however, ESAs can reduce costs and time associated with more extensive traditional mitigation approaches.

Paleontological Mitigation Plan. Because the geology of California is diverse and the nature of the fossils that it contains varies from one outcrop to the next, the Department does not provide generic paleontological resource impact mitigation but instead presents a format for the PMP that can be used by the project paleontologist to manage paleontological resources during project construction.

SUMMARY

Construction for Alternative 7 of the I-215/Barton Road Interchange Improvement Project has the potential to encounter two fossiliferous Pleistocene formations with sediments deposited during the last 2 million years (Qvof and Qof of Morton, 2003; see Figure 4). These fossiliferous sediments crop out at the surface and will also be encountered below the surface of the APD during excavation associated with development of the project.

This study does not anticipate special paleontological situations that would require project redesign to avoid critical localities or strata. Consequently, preparation of a paleontological PMP for implementation during project construction is recommended prior to completion of final design for the selected alternative. The PMP should be synthesized from outlines and guidelines provided by the Department, the SVP, and San Bernardino County, and specifically tailored to the resources and sedimentary formations in the APD. It is recommended that the PMP be written early enough for the mitigation requirements to be addressed in the Plans, Specifications, and Estimates (PS&E) for the project. If Alternative 7 is chosen as the preferred alternative, it is recommended that a PMP be prepared that follows the Department guidelines that are contained in the Department's Standard Environmental Reference, Environmental Handbook, Volume 1, Chapter 8 (California Department of Transportation, 2008) and as outlined in the original PIR/PER that was prepared for the project, see Reynolds and Pasenko (2010). A brief summary of the mitigation measures that should be part of the PMP include:

- A preconstruction field survey, including salvage of any observed surface paleontological resources, prior to the beginning of grading once vegetation has been removed.
- Attendance at the pregrade meeting by a qualified paleontologist or his/her representative. At this meeting, the paleontologist will explain the likelihood for encountering paleontological resources, what resources may be discovered, and the methods that will be employed if paleontological resources are discovered.
- Monitoring for paleontological during construction excavation by a qualified vertebrate paleontological monitor in areas with high paleontological sensitivity.
- Screening for small (or micro-) vertebrates through $^{1}/_{20}$-inch mesh screens.
- Preparation of any recovered specimens to the point of identification and permanent preservation.
- Identification of recovered specimens to the most specific taxonomic level possible.
- Curation of collected specimens into an institutional repository with retrievable storage.

By following these guidelines, impacts to nonrenewable paleontological resources will be minimized. During the development of the PMP, additional details will likely be added, as this list provides only a summary of mitigation that may be applicable to the proposed project.

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Reynolds, Robert E, and Michael Pasenko
2010 *Paleontological Identification and Evaluation Report for Interstate 215/Barton Road Interchange Improvement Project. Cities of Grand Terrace and Colton, County Of San Bernardino, California. 08-Sbd-215-PM 0.58/1.95. EA 0J070*. Prepared for the California Department of Transportation, District 8 by LSA Associates, Inc. August 2010.

Reynolds, Robert E., and Richard L. Reynolds
1991 *The Pleistocene Beneath our Feet: Near-surface Pleistocene Fossils in Inland Southern California Basins*. Division of Earth Sciences, San Bernardino County Museum, Redlands, California.

Rogers, T.H.
1965 Geologic Map of California, Santa Ana Sheet, CDMG, scale: 1:250,000.

San Bernardino County Museum
n.d. Regional Paleontological Locality Inventory files, Division of Geology, Redlands, California.

Society of Vertebrate Paleontology (SVP)
1995 Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines. SVP News Bulletin No. 163:22–27.

1996 Conditions of Receivership for Paleontologic Salvage Collections. SVP News Bulletin No. 166:31–32.

United States Geological Survey
1967 *San Bernardino South, California* 7.5-minute topographic quadrangle map. Photorevised 1980.

APPENDIX A

RESUME

BROOKS SMITH

BROOKS R. SMITH

SENIOR CULTURAL RESOURCES MANAGER/PALEONTOLOGIST

EXPERTISE

Paleontological and Archaeological Resource Monitoring
Archaeological Excavation
Fossil Collection, Salvage, Identification and Curation
Geologic Data Collection and Interpretation
GPS Data Collection and Analysis
Paleontological Assessment Reports
Final Archaeological and Paleontological Mitigation Monitoring Reports

EDUCATION

University of California, Santa Cruz, B.S., Earth Science (Geology), 1989.

California State University, Fullerton, Archaeological field methods course on San Nicolas Island, June–July 1993.

CERTIFICATIONS

40-Hour Hazardous Materials Handling and Response, current through August 2011
County of Orange, Certified Paleontologist
City of San Diego Qualified Paleontologist

PROFESSIONAL EXPERIENCE

Archaeological and Paleontological Surveyor, Monitor, Excavator and Report Preparer; and Paleontological Field Director, LSA Associates, Inc., Irvine, California, July 1992–present.

Geologist, Mission Geoscience, Newport Beach, California, November 1993–February 1994.

Paleontologist, John Minch and Associates, San Juan Capistrano, California, February–June 1992.

Geologist, Soil and Testing Engineers, Inc., Placentia, California, September 1989–February 1992.

PRINCIPAL PROFESSIONAL RESPONSIBILITIES

Intensive field surveys for paleontological and archaeological remains prior to grading activities; monitoring for and collecting cultural and scientific resources during grading activities; documentation and testing of archaeological sites; salvage of large fossil remains with the use of plaster casts; large-scale wet and dry screening of sediments for fossils; identification and curation of fossils after they have been collected; collection and analysis of data from hand held global positioning system (GPS) units; collection of geologic data; and archaeological and paleontological report preparation.

RECENT REPORTS

Draft Paleontological Identification and Evaluation Report for State Route 91 Westbound Widening (Northbound State Route 55 to the Westbound State Route 91 Connector through the Tustin Avenue Interchange), City of Anaheim, Orange County, California. Prepared for the California Department of Transportation, District 12. LSA project number CDT0806B. January 2010.

Paleontological Resources Assessment for the Imperial Valley Photovoltaic Project. Prepared for SDG&E Environmental Services. LSA project number SGE0905-T009B. December 2009.

Cultural Resource Monitoring for the Del Obispo Street Undergrounding of Overhead Utilities and Widening, City of San Juan Capistrano, Orange County, California. (With Deborah McLean as primary author.) Prepared for the City of San Juan Capistrano. LSA project number CSJ0803. September 2009.

Paleontological Mitigation Plan State Route 91 Eastbound Lane Addition Project Between State Route 241 and State Route 71, Orange County, California, and Riverside County, California. Prepared for the California Department of Transportation, District 12. LSA project number CDT0805. May 2009.

Paleontological Resources Letter Report for the Moro Ridge Radio Site Project, Orange County, California. Prepared for the County of Orange. LSA project number ORG0801. May 2009.

Paleontological Identification and Evaluation Report for I-10/Tippecanoe Avenue Interchange Project, Cities of Loma Linda and San Bernardino, San Bernardino County, California. Prepared for the California Department of Transportation, District 8. LSA project number RMN0802. April 2009.

Paleontological Resources Assessment for the Hanford Municipal Airport Improvements Project, City of Hanford, Kings County, California. Prepared for Mead & Hunt, Inc. LSA project number MHN0801. February 2009.

Paleontological Resources Identification and Evaluation Report for SR-73 Basin Sedimentation Project Between Jamboree Road and I-5/SR-73 Interchange; Cities of Laguna Niguel, Aliso Viejo, Laguna Beach, Irvine, and Newport Beach; County of Orange, California. Prepared for the California Department of Transportation, District 12. LSA project number CDT0807. January 2009.

Paleontological Identification and Evaluation Report for Gene Autry Way (West), City of Anaheim, Orange County, California. Prepared for the California Department of Transportation, District 12. LSA project number DMJ0802. December 2008.

Paleontological Resources Assessment 1235 Long Beach Boulevard Mixed-Use Project, City of Long Beach, Los Angeles County, California. Prepared for the City of Long Beach. LSA project number CLB0805. December 2008.

Draft Paleontological Resources Assessment Foothill Transit West Covina Park-and-Ride Parking Structure, City of West Covina, Los Angeles County, California. Prepared for Foothill Transit. LSA project number WTY0702. December 2008.

Paleontological Resources Letter Report for the Newport Coastal Coverage Solution Project, Orange County, California. LSA project number ORG0801. December 2008.

Draft Paleontological Resources Assessment for the Montebello Hills Specific Plan Project, City of Montebello Hills, Los Angeles County, California. Prepared for Nossaman, LLP. LSA project number NGK0801. November 2008.

Paleontological Resources Letter Report for the Approximately 15-Acre Robertson Ranch Parcel South of SR-91 and East of Gypsum Canyon Road, City of Anaheim, Orange County, California. Prepared for Anaheim Planning Department – Planning Services. LSA project number AHM0803. September 2008.

Paleontological Identification and Evaluation Report for Interstate 5 and Gene Autry Way Roadway Project, City of Anaheim, Orange County, California. Prepared for the California Department of Transportation, District 12. LSA project number DMJ0802. August 2008.

Paleontological Identification and Evaluation Report for State Route 57 Northbound Widening Project Between Lincoln and Katella Avenues, City of Anaheim, Orange County, California. Prepared for the California Department of Transportation, District 12. LSA project number HDR0801. August 2008.

Predeliberative Draft Paleontological Resource Assessment Great Park-Spectrum Guideway Demonstration Project, City of Irvine, Orange County, California. Prepared for the City of Irvine, Department of Public Works. LSA project number IBI0801. August 2008.

Survey Report SDG&E Loop-In Tieline 13825 Meadowlark Junction to Shadowridge Substation, San Diego, California. (With Terri Fulton and Ivan Strudwick.) Prepared for SDG&E. LSA project number SGE0702. July 2008.

Results of Paleontological Resource Mitigation Monitoring for Laguna Canyon Road (State Route 133) Widening and Realignment Project, Cities of Irvine and Laguna Beach and Unincorporated Areas of Orange County, California. (With Meredith Staley, Lawrence G. Barnes, Steven W. Conkling, Robert R. Reynolds, and Benjamin Matzen.) Prepared for the California Department of Transportation. LSA project numbers SEM330 and BOT0701E. June 2008.

Paleontological Resources Identification and Evaluation Report for State Route 74 Widening Project, City of San Juan Capistrano, Orange County, California. Prepared for the California Department of Transportation, District 12. LSA project number CDT0802A. May 2008.

Results of Paleontological Monitoring for the Our Lady Queen of Angels Catholic Church Project, City of Newport Beach, Orange County, California. (With Meredith Staley as lead author.) Prepared for Barnard Ventures, LLC. LSA project number DOO0701. May 2008.

Draft Survey Report SDG&E Loop-In Tieline 13825 Meadowlark Junction to Shadowridge Substation, San Diego, California. (With Terri Fulton and Ivan Strudwick.) Prepared for SDG&E. LSA project number SGE0702. February 2008.

Results of Paleontological Resources Mitigation Monitoring for a 23-Acre Inland Empire Utilities Agency Parcel, City of Chino Hills, San Bernardino County, California. Prepared for McKenna Construction. LSA project number MKG0601. July 2007.

Paleontological Resources Assessment Widening of El Camino Real North of Cougar Drive in the City of Carlsbad, San Diego County, California. Prepared for the City of Carlsbad – Design Division. LSA project number HCR0701. June 2007.

Results of Paleontological Resources Mitigation Monitoring Villa Del Lago, City of Newport Beach, Orange County, California. (With Meredith Staley as lead author.) Prepared for One Pelican Hill North, LP. LSA project number MRE430. April 2007.

Cultural Resources Mitigation Monitoring Report, Villa Del Lago, City of Newport Beach, Orange County, California. (With Antonina Delu as lead author.) Prepared for One Pelican Hill North, LP. LSA project number MRE430. April 2007.

Paleontological Identification and Evaluation Report – S-91 Eastbound Lane Addition Project Between SR-241 and SR-71. Orange County California District 12-ORA-91 PM15.9/19.9 and Riverside County, California, District 8-RIV-91 PM 0.0/2.9. Prepared for the Orange County Transportation Authority, under contract to Kimley Horn and Associates. LSA project number KHA0601. May 2007.

Archaeological Investigations at Saint Margaret's Episcopal School and Church, 31641 La Novia Avenue, San Juan Capistrano, Orange County, California. Prepared for Saint Margaret's Episcopal School and Church. (With Antonina Delu as primary author.) LSA project number SMU0601. February 2007.

Results of Paleontological Assessment for the 4000 Metropolitan Project, City and County of Orange, California. Letter report to West Millennium Homes. LSA project number WHM0602. January 2007.

Paleontological Resource Assessment of 33.54 Acres In the City of Perris, Riverside County, California. Prepared for DMC Design Group, Inc. LSA project number DMP0601. January 2007.

Paleontological Resources Assessment Chula Vista Energy Efficiency Upgrade Project In the City of Chula Vista San Diego County, California. Prepared MMC Energy, Inc. LSA project number MME0601. December 2006.

Paleontological Resources Mitigation Monitoring Report – Saint Mark Presbyterian Church Project, City of Newport Beach, Orange County, California. Prepared for Barnard Ventures, LLC. LSA project number BAV530. December 2006.

Paleontological Resource Assessment Canyon Ridge Residential Development – Upper Lots Assessor's Parcel Number 643-090-032 City of La Quinta, Riverside County, California. Prepared for Laing Luxury Homes. LSA project number LAH0601. November 2006.

Paleontological Resource Assessment – Del Mar Fairgrounds Master Plan Project, in the Cities of Del Mar and San Diego, San Diego County, California. Prepared for the 22nd District Agricultural Association. LSA project number DLM0601. November 2006.

Paleontological Resource Assessment Report – Integrated Waste Management District Frank R. Bowerman Landfill Master Development Plan, Orange County, California. (With Steven Conkling.) Prepared for the Integrated Waste Management District. LSA project number PND0601. September 2006.

Archaeological l Mitigation Monitoring Report – Orange County Regional Sheriff Training Facility, City of Tustin, Orange County California. (With Deborah K. B. McLean.) Prepared for Rancho Santiago Community College District. LSA project number RSC531. September 2006.

Paleontological Mitigation Monitoring Report – Orange County Regional Sheriff Training Facility, City of Tustin, Orange County California. (With Steven W. Conkling.) Prepared for Rancho Santiago Community College District. LSA project number RSC531. September 2006.

Cultural Resources Survey for the Frank R. Bowerman Landfill Master Development Plan, Orange County, California. (With Ivan H. Strudwick, Dustin R. Kay, and Antonia M. Delu.) Prepared for the

County of Orange Integrated Waste Management Department. LSA project number PND0601. August 2006.

Archaeological Survey Report for the Proposed South Orange County Transportation Infrastructure Improvements Project in Orange and San Diego Counties. (With Phil Fulton, Ivan Strudwick, Terri Fulton, and Roderic McLean.) Prepared for the Federal Highway Administration, California Division. LSA project number PND130. May 2006. Revised October 2006.

Pedestrian Survey, San Mateo and Cristianitos Valleys, Marine Corps Base Camp Pendleton, California. (With Phil Fulton, Roderic McLean, and Ivan Strudwick.) Prepared for the Marine Corps Base Camp Pendleton. LSA project number PND130. May 2006. Revised October 2006

Results of Archaeological Resource Mitigation Monitoring for Crystal Cove Planning Areas 4A and 4B, Phase II, Upper Merchants Area D Rough Grading and Storm Drain Improvements, Crystal Cove Area, Orange County, California. (With Deborah K. B. McLean.) Prepared for Irvine Community Development Company. LSA project number ICD431. April 2006.

Results of Paleontological Resource Mitigation Monitoring for Crystal Cove Planning Areas 4A and 4B, Phase II, Upper Merchants Area D Rough Grading and Storm Drain Improvements, Crystal Cove Area, Orange County, California. (With Steven W. Conkling.) Prepared for Irvine Community Development Company. LSA project number ICD431. April 2006.

Archaeological Monitoring Report for the Orchard at Saddleback, Phase II, City of Lake Forest, Orange County, California. Prepared for Wetrust America, Inc. (With Deborah K. B. McLean.) LSA project number MPX531. April 2006.

Paleontological Monitoring Report for the Orchard at Saddleback, Phase II, City of Lake Forest, Orange County, California. Prepared for Wetrust America, Inc. (With Steven W. Conkling.) LSA project number MPX531. April 2006.

A Glimpse of the Past on Pimu: Cultural Resource Survey, Santa Catalina Island, Los Angeles County, California. (With Ivan H. Strudwick, Roderic McLean, Jay Michalsky, and Joseph E. Baumann.) Prepared for Southern California Edison. LSA project number SCE330C. March 2006.

Paleontological Resource Assessment for the Lambert Ranch, City of Irvine, Northern Sphere, Orange County, California. Prepared for Sapetto Group, Inc. LSA project number LAE430. January 2006.

Results of Archaeological Resource Mitigation Monitoring for Crystal Cove Planning Areas 4A and 4B, Phase II, Lower Customs Areas A and B and Upper Customs Area C including Disposal Site Grading, Sewer and Storm Drain Improvements, Crystal Cove Area, Orange County, California. (With Deborah K. B. McLean.) Prepared for Irvine Community Development Company. LSA project number ICD351. January 2006.

Results of Paleontological Resource Mitigation Monitoring for Crystal Cove Planning Areas 4A and 4B, Phase II, Lower Customs Areas A and B and Upper Customs Area C, including Disposal Site Grading, Sewer and Storm Drain Improvements, Crystal Cove Area, Orange County, California. (With Steven W. Conkling.) Prepared for Irvine Community Development Company. LSA project number ICD351. January 2006.

Archaeological Monitoring Report, Chino Hills Corporate Park, City of Chino Hills, San Bernardino County, California. (With Shannon Carmack and Deborah K. B. McLean.) Prepared for Chino Hills Corporate Park, L. P. LSA project number RIL430. January 2006.

Paleontological Monitoring Report, Chino Hills Corporate Park, City of Chino Hills, San Bernardino County, California. (With Shannon Carmack and Steven W. Conkling.) Prepared for Chino Hills Corporate Park, L. P. LSA project number RIL430. January 2006.

Paleontological Resource Assessment, The Peninsular Village Overlay Zone, City of Rolling Hills Estates, Los Angeles County, California. (With Shannon Carmack.) Prepared for the Planning Department, City of Rolling Hills Estates. LSA project number RHT530. January 2006.

Archaeological Mitigation Monitoring Report, New Drainage Pond and Slide Repair, Joplin Youth Center, Trabuco Canyon, Orange County, California. (With Deborah K. B. McLean.) Prepared for DMJMH+N. LSA project number DMJ431. December 2005.

Paleontological Mitigation Monitoring Report, New Drainage Pond and Slide Repair, Joplin Youth Center, Trabuco Canyon, Orange County, California. (With Steven W. Conkling.) Prepared for DMJMH+N. LSA project number DMJ431. December 2005.

Results of Archaeological Mitigation Monitoring for Newport Coast, Phase IV-4 Residential Planning Areas 2C, 5 and 6, Newport Coast, Orange County, California. Prepared for Irvine Community Development Company. LSA project number ICD238. November 2005.

Results of Paleontological Mitigation Monitoring for Newport Coast, Phase IV-4 Residential Planning Areas 2C, 5 and 6, Newport Coast, Orange County, California. Prepared for Irvine Community Development Company. LSA project number ICD238. November 2005.

Paleontological Monitoring Report for the Orchard at Saddleback, City of Lake Forest, Orange County, California. Prepared for W.A.L.F., LLC. LSA project number MPX530. June 2005.

Archaeological Mitigation Monitoring Report January 2003–June 2004, Integrated Waste Management District, Frank R. Bowerman Landfill, Orange County, California. Prepared for Integrated Waste Management District. LSA project number IWM030. January 2005.

Paleontological Mitigation Monitoring Report January 2003–June 2004, Integrated Waste Management District, Frank R. Bowerman Landfill, Orange County, California. Prepared for Integrated Waste Management District. LSA project number IWM030. January 2005.

Archaeological Mitigation Monitoring Summary Report January 2001–June 2004, Integrated Waste Management District, Frank R. Bowerman Landfill, Orange County, California. Prepared for Integrated Waste Management District. LSA project number IWM030. January 2005.

Paleontological Mitigation Monitoring Report January 2001–June 2004, Integrated Waste Management District, Frank R. Bowerman Landfill, Orange County, California. Prepared for Integrated Waste Management District. LSA project number IWM030. January 2005.

Paleontological Resource Assessment for the Melrose Triangle Project, City of West Hollywood, Los Angeles County, California. Prepared for the City of West Hollywood. LSA project number CWH430. January 2005.

PROFESSIONAL MEMBERSHIPS/AFFILIATIONS

San Diego Association of Geologists
UCSC Alumni Association
Society of Vertebrate Paleontology

PROJECT EXPERIENCE

Survey

Orange County.

- Laguna Canyon Road Widening
- Planning Area 10, Irvine
- Planning Area 12, Irvine
- Planning Area 22, Irvine
- Donna O'Neill Land Conservancy

Riverside County.

- Sea West Wind Farms
- Ryan Oil Properties
- SCG 6902 Pipeline Route
- Kohl Ranch
- Far West Housing

San Bernardino County.

- California Speedway (Kaiser Steel), Fontana,
- Tentative Tract 14232, Redlands

San Diego County.

- MCB Camp Pendleton
- Los Coches Creek Middle School, El Cajon

Testing

Orange County.

- Muddy Canyon Area, Newport Coast: CA-ORA-927/1403, -1207, -1405, -1406
- San Joaquin Marsh Restoration: CA-ORA 121
- Michelson Bridge widening: CA-ORA-196H
- Shell Western/CalResources: CA-ORA-294,-366

- Laguna Canyon Road Widening: CA-ORA-305, -308, -1055
- Hicks Canyon Retarding Basin: CA-ORA-378 (Locus C), -1371H, -1453, -1454
- MacArthur Boulevard Widening: CA-ORA-1461

Los Angeles County.

- Malibu Creek Bridge: CA-LAN-264H
- U.S. Forest Service Testing: CA-LAN-2117, -2118, -2119, -2120

San Diego County.

- Camp Pendleton Marine Base: CA-SDI-10156H

Monitoring

Kern County.

- Equilon Pipeline, McKittrick

Los Angeles County.

- Mobil M-70 Pipeline

Orange County.

- Agua Chinon Retention Basin
- Alipaz Housing Development, San Juan Capistrano
- Bonita Canyon Sports Park, Newport Beach
- Casa de Amma Assisted Living Facility, San Juan Capistrano
- Coyote Canyon Landfill
- Concordia, East, Irvine
- Duck Ponds, Irvine
- El Morro School, Laguna Beach
- El Toro Materials
- Gateway Community Church, San Juan Capistrano
- Hicks Canyon Retarding Basin

- FRB Landfill
- Laguna Canyon Road Widening, Laguna Beach
- LDS Church, Irvine
- MacArthur Boulevard Widening, Newport Beach
- Michelson Bridge Widening, Irvine
- Newport Coast Drive Extension, Newport Beach
- Northwood 5 Development, Irvine
- Park Place Apartments, Irvine
- Pelican Cove Office Complex, San Clemente
- Prima Deshecha Landfill, San Juan Capistrano
- Sage Hill School, Newport Beach
- San Joaquin Marsh Restoration, Irvine
- San Juan Capistrano Ford, San Juan Capistrano
- Serra Vista Medical Building, San Juan Capistrano
- Serrano Heights, East Development, Orange
- Shell Western/CalResources, Garden Grove
- Tea House on Los Rios, San Juan Capistrano
- Texaco, San Juan Capistrano
- The Bluffs Retail Center, Newport Beach
- Trabuco Retention Basin, Irvine

Riverside County.

- SCG 6902 Pipeline

San Bernardino County.

- Airtouch Cellular tower, Cadiz
- Kern River Gas Transmission Pipeline Expansion, 2002
- Mars Space Center, Victorville

San Diego County.

- La Jolla Shores, La Jolla
- Vons, La Jolla
- Cingular Wireless, Lemon Grove

Ventura County.

- Point Mugu Naval Weapons Station, Port Hueneme

Out of State.

- Badlands National Park, Jackson and Pennington Counties, South Dakota
- Kern River Gas Transmission Pipeline, 2002 Expansion, Clark County, Nevada

The Bluffs Retail Center, Newport Beach, CA. LSA was retained by the Irvine Company to provide cultural and paleontological resource mitigation monitoring during grading associated with the Bluffs Retail Center located in Newport Beach. Mr. Smith provided archaeological and paleontological monitoring for this project. Mr. Smith also assisted with the salvage of several fossil localities that contained significant fossil shark teeth. Mr. Smith was also the lead author for the final paleontological mitigation monitoring report.

Orchard at Saddleback, Phase I, Lake Forest, CA. LSA was retained by W.A.L.F. LLC to provide cultural and paleontological resource mitigation monitoring during grading associated with the Phase I portion of the Orchard at Saddleback, located within the City of Lake Forest. Mr. Smith provided archaeological and paleontological monitoring during grading and was the lead author for the final paleontological mitigation monitoring report.

Orchard at Saddleback, Phase II, Lake Forest, CA. LSA was retained by Wetrust America to provide cultural and paleontological resource mitigation monitoring during grading associated with the Phase II portion of the Orchard at Saddleback, located within the City of Lake Forest. Mr. Smith provided archaeological and paleontological monitoring during grading and was the lead author for the final paleontological mitigation monitoring report, as well as co-author for the cultural resources monitoring report.

Del Mar Fairgrounds, Del Mar, CA. LSA was retained by the 22nd District Agricultural Association to provide technical studies needed to assist the 22nd District Agricultural Association during future expansion plans at the Fairgrounds. Mr. Smith authored the paleontological resources assessment report.

Laguna Canyon Road, Orange County, CA. LSA was retained by Caltrans to provide cultural and paleontological resource mitigation monitoring along Laguna Canyon Road (SR-133) during its widening and realignment between State Route 73 and Old Laguna Canyon Road. Mr. Smith provided archaeological and paleontological monitoring for this project. Mr. Smith also assisted on the excavation of archaeological site CA-ORA-1055 and was the lead author for the final paleontological mitigation monitoring report and a contributing author for the final archaeological mitigation monitoring report.

Los Coches Creek Area Middle School, El Cajon, CA. Mr. Smith performed a cultural resources survey of an 80-acre parcel as part of an assessment report prior to the construction of the school. During the survey, Mr. Smith recorded numerous undiscovered prehistoric and historic cultural resources.

Camp Pendleton Archaeological Testing of Site CA-SDI-10156, Camp Pendleton, CA. LSA was contracted to conduct extensive testing of an ethnographically recorded village site. Mr. Smith provided cultural resource testing of Site CA-SDI-10156/H.

La Jolla Shores, La Jolla, CA. Mr. Smith provided cultural and paleontological resource monitoring during grading activities associated with the construction of a private residence.

Southern California Edison (SCE) On-Call, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties, CA. LSA performs archaeological resource assessments for SCE's pole replacement program. Assessments include record searches for previously recorded resources and studies; field surveys around poles; recordation observed resources, if any; and recommendations. To date, over 1,000 poles have been assessed. Mr. Smith performed field surveys, recorded resources, and synthesized data.

State Route 73 (SR-73) Widening, Costa Mesa, CA. LSA was contracted to provide paleontological monitoring during the widening of SR-73 between stations 74+00 and 82+00. The project area is located in the median of SR-73 within an approximately 0.5 mi stretch between the Birch Street overcrossing on the south and the northbound Bristol Street overcrossing on the north. Mr. Smith provided paleontological monitoring and fossil identification, and wrote the mitigation monitoring report.

San Joaquin Hills Transportation Corridor (State Route 73), Orange County, CA. LSA was contracted to provide paleontological mitigation monitoring for the San Joaquin Hills Transportation Corridor between El Toro Road in the south and Newport Coast Drive in the north. Mr. Smith provided paleontological resource monitoring (scheduling up to five monitors), fossil identification and curation, and assistance with writing the final mitigation monitoring report.

State Route 71 (SR-71) Widening, El Cajon, CA. LSA was contracted to provide paleontological and cultural resource monitoring during the widening of SR-71. Mr. Smith provided paleontological and cultural resource monitoring, fossil identification, and curation of collected paleontological remains.

El Camino Real Widening North of Cougar Drive, Carlsbad, CA. LSA provided paleontological resources mitigation monitoring during the widening of a portion of El Camino Real north of Cougar Drive in the City of Carlsbad from two lanes to three. The project involved removing a section of hill measuring approximately 100 ft long, 30 ft wide, and up to 15 ft high in the Cretaceous Point Loma Formation. LSA collected several fossil localities containing clams, snails, crabs, and plant material. Mr. Smith provided some of the monitoring for this project.

San Diego Gas & Electric (SDG&E), On-Call Environmental Services, CA. LSA provides support documentation to SDG&E to satisfy Natural Communities Conservation Plan (NCCP), California Environmental Quality Act, California Public Utility Commission (CPUC), California Coastal Commission, United States Army Corps of Engineers (Corps), California Department of Fish and Game (CDFG), and Regional Water Quality Control Board requirements. Mr. Smith mainly works on SDG&E projects that require cultural resource studies. Representative projects include the following:

- **Shadowridge-Meadowlark Tap: Rebuild TL 13811:** LSA provided a cultural resources assessment for an approximately 4-mile transmission line located in San Diego. The assessment included a cultural resources search through the South Coastal Information Center, and an intensive pedestrian survey for all proposed new pole locations and staging areas. Finally, LSA made recommendations for each separate pole location. Mr. Smith was involved in all aspects of the cultural resource assessment.
- **Firestorm 2007 Environmental and Biological Monitoring:** LSA provided on-call support for monitoring services immediately following the October 2007 wildfires in San Diego, including documentation of access road regrading and erosion control consultation; data compilation, analysis, and interpretation; and data form entry for compliance with Corps Regional General Permit 63. Mr. Smith provided both cultural and biological surveys along several of the burned pole alignments.

Southern California Gas Company (SCG), Los Angeles County, CA. LSA was retained by SCG to provide cultural resource monitoring for its Line 85 and Line 225 located in the Angeles National Forest (ANF) north of Castaic Lake. As these lines pass through the ANF, it was necessary for LSA to apply for an Archaeological Resources Protection Act (ARPA) Permit for each line. LSA's role on these ongoing projects is to ensure that mitigation measures developed by the ANF to protect cultural resources are being implemented and followed. Some of these measures include: providing worker training for the identification and importance of cultural resources; protecting the National Register of Historic Places-listed Old Ridge Route, a historic road built in 1915 between Los Angeles and Bakersfield; monitoring for cultural resources during construction and having a monitor present at each work area; counting and documenting the numbers and types of vehicles traveling along the Old Ridge Route on a daily basis; and providing video documentation of the Old Ridge Route both before

and after the project is completed. Mr. Smith is the project manager for these two SCG lines and schedules up to three monitors per day at various locations, depending on daily construction needs; provides cumulative vehicle counts on a weekly basis to the ANF; and coordinates between the ANF archaeologist and SCG as needed.

South Orange County Infrastructure Improvement Project, State Route 241 (SR-241), Orange and San Diego Counties, CA. The Transportation Corridor Agencies (TCA) proposes extending the existing SR-241 from its current terminus at Oso Parkway south to Interstate 5, just south of San Clemente. The project is located in portions of both southern Orange County and northern San Diego County. Mr. Smith assisted during surveying all the unsurveyed portions of the project, recording new cultural resources that were discovered and writing the survey reports and other cultural resource documents associated with this project. Mr. Smith also provided cultural resource clearance during the initial geotechnical investigations associated with the project to ensure no undiscovered cultural resources were impacted.