

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

FOR

INTERSTATE 5 HOV LANE EXTENSION PROJECT

**CITIES OF SAN JUAN CAPISTRANO, DANA POINT, AND
SAN CLEMENTE**

ORANGE COUNTY, CALIFORNIA

EA No. OF9600
12-ORA-005
PM 3.0/8.7

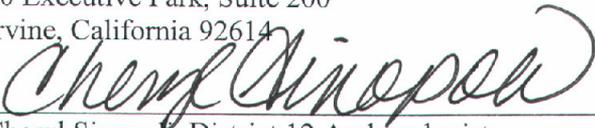
Prepared for: _____


Chris Flynn, Environmental Planning Branch C Chief
California Department of Transportation, District 12
3347 Michelson Drive, Suite 100
Irvine, California 92612-1692

Prepared by: _____


Steven W. Conkling, Paleontologist
LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

Reviewed by: _____


Cheryl Sinopoli, District 12 Archaeologist
California Department of Transportation, District 12
3347 Michelson Drive, Suite 100
Irvine, California 92612-1692

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SUMMARY OF FINDINGS

The Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation (Caltrans), the Cities of Dana Point, San Clemente, and San Juan Capistrano, is proposing to widen Interstate 5 (I-5) between Avenida Pico and San Juan Creek Road. The project objectives are to provide continuity of the I-5 mainline high-occupancy vehicle (HOV) network within the project limits; maximize overall performance within the project limits by minimizing weaving conflicts at the termini of the HOV lanes and maintaining travel speeds for HOV lane users; provide intermittent auxiliary lanes, where needed, to relieve congestion at diverge and merge locations; minimize right-of-way acquisition; relieve congestion at interchange areas, on- and off-ramps, and local intersections; and reduce congestion on I-5 within the project limits. The project limits on I-5 extend from 0.4 mile (mi) south of the Avenida Pico Undercrossing (UC) (Post Mile [PM] 3.0) to 0.1 mi south of the San Juan Creek Road UC (PM 8.7). The proposed project will add one HOV lane in each direction on I-5 throughout the project limits, reestablish existing auxiliary lanes and construct new auxiliary lanes, and improve several existing on- and off-ramps.

The area surveyed for this project is the area of project disturbance (APD) for all areas of the I-5 HOV Lane Extension Project where excavation is proposed. The APD is based on the horizontal and vertical extent of anticipated ground-disturbing activities. For paleontological resources there is no potential for indirect project effects.

The APD, as mapped by Tan (1999a and 1999b), is underlain by four different sediments. Two of these (Quaternary Young Alluvium and Quaternary Wash deposits), because of their relatively young age (less than 10,000 years), do not have the potential to contain paleontological resources. Quaternary Landslide and slope deposits (Qls) within the project vicinity have been shown to contain significant paleontological resources in a localized area (Brock, Harris, Roeder, 1992). In addition, the Miocene Siltstone Member of the Capistrano Formation (Tcs) has been shown to produce significant marine vertebrate, invertebrate, and plant fossils in the immediate project vicinity (Sundberg and Roeder, 1983; and others). In addition, The I-5 HOV Lane Extension Project involves potential excavation that could extend into deposits capped by Holocene or Recent fill deposits. The locality search and literature review conducted for this project identified numerous Pleistocene and Miocene localities from the immediate vicinity of the I-5 HOV Lane Extension Project.

Recommendations from the City of San Juan Capistrano (Policy 601), County of Orange (SCA A05-A07), California Environmental Quality Act (CEQA), and guidelines from Caltrans are consistent with recommendations of the Society of Vertebrate Paleontology (SVP) and indicate that impacts to nonrenewable paleontological resources must be considered during project design and construction within sensitive sediments (see Appendix A for a Summary of Legislation). The literature review and locality search demonstrate that fossils from Pleistocene and Miocene sediments have been collected immediately adjacent to the project APD and show that sediments within the APD have the potential to contain significant nonrenewable paleontological resources. Thus, it is likely that paleontological localities will be encountered during the project excavation phase of construction within these sediments.

This study reviews definitions of paleontological significance and definitions for rock units to have high potential and high sensitivity for the presence of nonrenewable paleontological resources.

To reduce impacts to nonrenewable paleontological resources, recommendations are made for the development of a Paleontological Mitigation Plan (PMP) for those portions of the I-5 HOV Lane Extension Project that are identified as having a high paleontological sensitivity, which would follow the guidelines of Caltrans, and recommendations from the SVP prior to completion of final project design. These recommendations include:

- A preconstruction field survey in areas identified as having high paleontological sensitivity after vegetation and paving have been removed, followed by salvage of any observed surface paleontological resources prior to the beginning of additional grading.
- Attendance at the pregrade meeting by a qualified paleontologist or representative. At this meeting, the paleontologist will explain the likelihood for encountering paleontological resources, what resources may be discovered, and the methods of recovery that will be employed.
- During construction excavation, a qualified vertebrate paleontological monitor shall initially be present on a full-time basis whenever excavation will occur within the sediments that have a high paleontological sensitivity rating and on a spot-check basis in sediments that have a low sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating (monitoring reductions and when they occur will be determined by the qualified Principal Paleontologist). The monitor shall inspect fresh cuts and/or spoils piles to recover paleontological resources. The monitor shall be empowered to temporarily divert construction equipment away from the immediate area of the discovery. The monitor shall 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, Caltrans will consider using heavy equipment on site to assist in the 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 sediments occasionally be spot-screened on site through one-eighth to one-twentieth-inch mesh screens to determine whether microfossils are present. If microfossils are encountered, sediment samples (up to three cubic yards, or 6,000 pounds) shall be collected and processed through one-twentieth-inch mesh screens to recover additional fossils.
- Recovered specimens shall 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 storage cost, and the addition of approved chemical hardeners/stabilizers to fragile specimens.
- Specimens shall be identified to the lowest taxonomic level possible and curated into an institutional repository with retrievable storage. The repository institutions usually charge a one-time fee based on volume, so removing surplus sediment is important. The repository institution may be a local museum or university with a curator who can retrieve the specimens on request. Caltrans requires that a draft curation agreement be in place with an approved curation facility prior to the initiation of any paleontological monitoring or mitigation activities.

- Preparation and submittal of the Paleontological Mitigation Report (PMR) documenting completion of the PMP for the Lead Agency (Caltrans).

Conformance with these generic guidelines will help reduce impacts to nonrenewable paleontological resources to a level that is less than significant. However, more project-specific measures will need to be developed during preparation of the PMP that will further reduce impacts. Final project design and construction logistics may suggest that additional project-specific measures for impact mitigation be added.

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INTRODUCTION

OCTA, in cooperation with Caltrans and the Cities of Dana Point, San Clemente, and San Juan Capistrano, is proposing to widen I-5 between Avenida Pico and San Juan Creek Road.

PROJECT LOCATION

The I-5 HOV Lane Extension Project APD includes the portion of I-5 from 0.1 mi south of San Juan Creek Road to 0.4 mi south of Avenida Pico, a distance of approximately 6 mi (see Figure 1). The project area is depicted on the *Dana Point* and *San Clemente* 7.5-minute series United States Geological Survey (USGS) topographic maps (Figure 2). The project objectives are to provide continuity of the I-5 mainline high-occupancy vehicle (HOV) network within the project limits; maximize overall performance within the project limits by minimizing weaving conflicts at the termini of the HOV lanes and maintaining travel speeds for HOV lane users; provide intermittent auxiliary lanes, where needed, to relieve congestion at diverge and merge locations; minimize right-of-way (ROW) acquisition; relieve congestion at interchange areas, on- and off-ramps, and local intersections; and reduce congestion on I-5 within the project limits. The project limits on I-5 extend from 0.4 mi south of the Avenida Pico UC (PM 3.0) to 0.1 mi south of the San Juan Creek Road UC (PM 8.7). The proposed project will add one HOV lane in each direction on I-5 throughout the project limits, reestablish existing auxiliary lanes and construct new auxiliary lanes, and improve several existing on- and off-ramps.

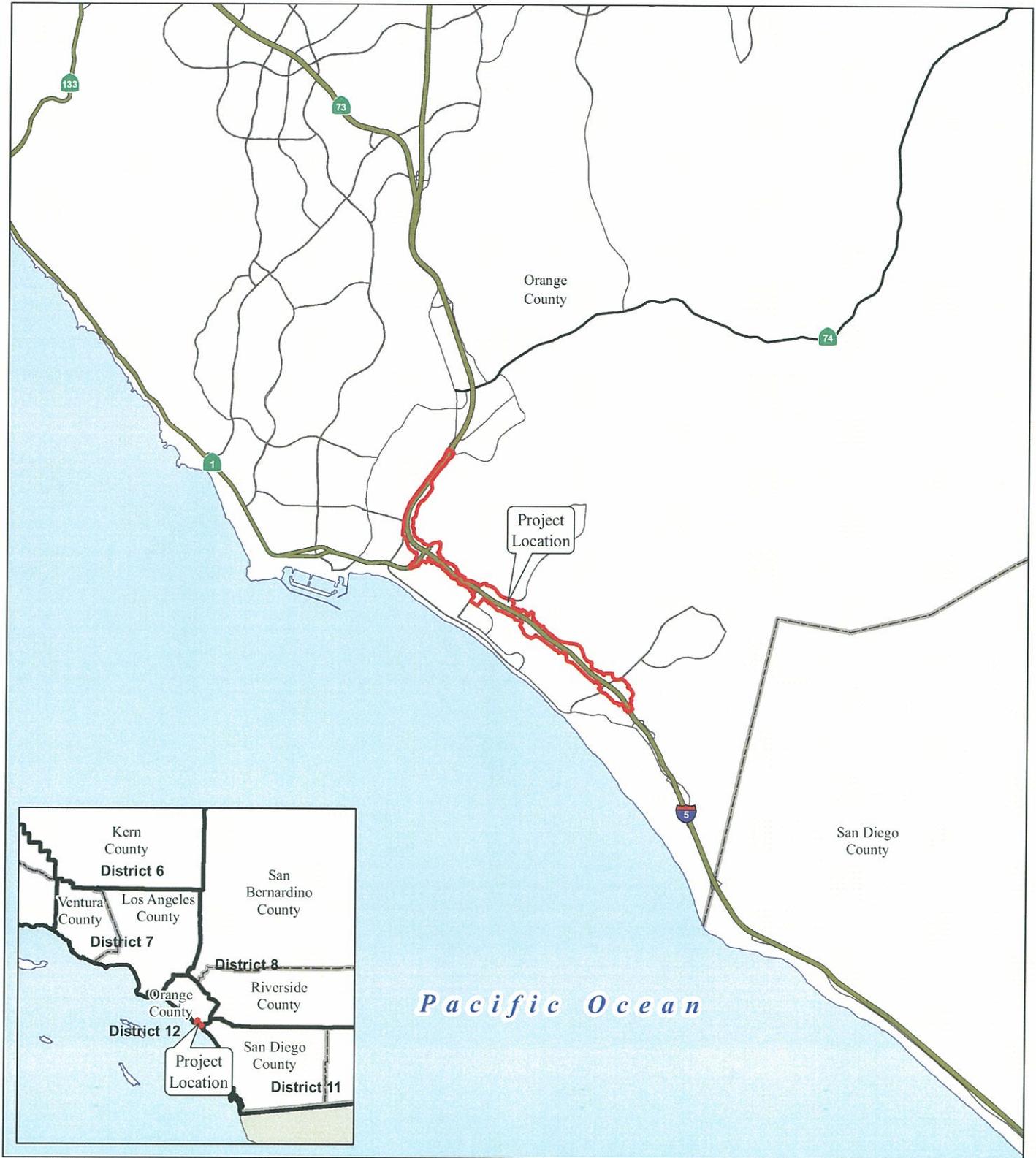
Four alternatives, including the No Build Alternative, will be analyzed as part of the Draft Initial Study/Environmental Assessment (IS/EA). The project alternatives are described below.

Alternative 1: No Build

The No Build Alternative proposes no improvements to I-5, maintaining the existing four general-purpose lanes throughout the project limits in the northbound (NB) and southbound (SB) directions. All freeway facilities would remain as is, with the exception of approved projects that are under development or currently being constructed.

Alternative 2

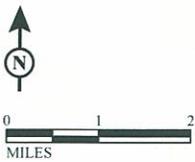
Auxiliary Lanes. Alternative 2 proposes to remove the existing I-5 paved shoulders and construct new traveled way and new shoulder pavement to the outside of the NB and SB lanes to accommodate HOV lanes. This alternative proposes full standard widths, including a 10-foot (ft) inside shoulder, a 12 ft HOV lane, a 4 ft buffer, four 12 ft general-purpose lanes, and a 10 ft outside shoulder throughout the majority of the project limits. Additionally, existing auxiliary lanes through the project



LEGEND

Project Location

MAP 1



I-5 HOV Lane Extension Project

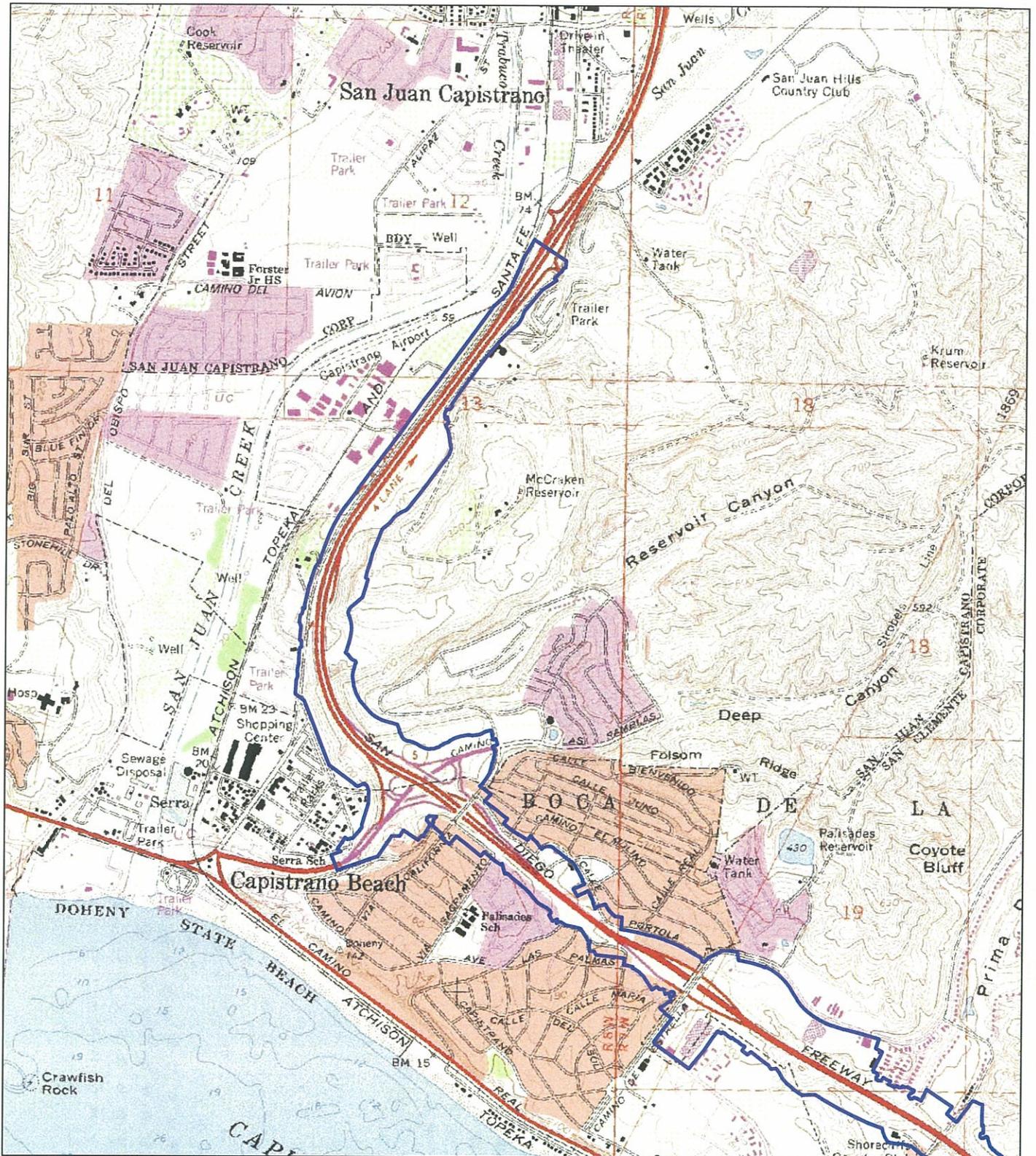
Project Vicinity

12-ORA-005 PM 3.0/8.70

EA# 0F9600

SOURCE: TBM (2009); RBF (2009)

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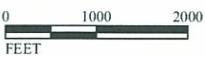


LEGEND

Project Location

MAP 2

Sheet 1 of 2



SOURCE: USGS 7.5' Quad., Dana Point, CA (1975); San Clemente, CA (1975); RBF (2009)

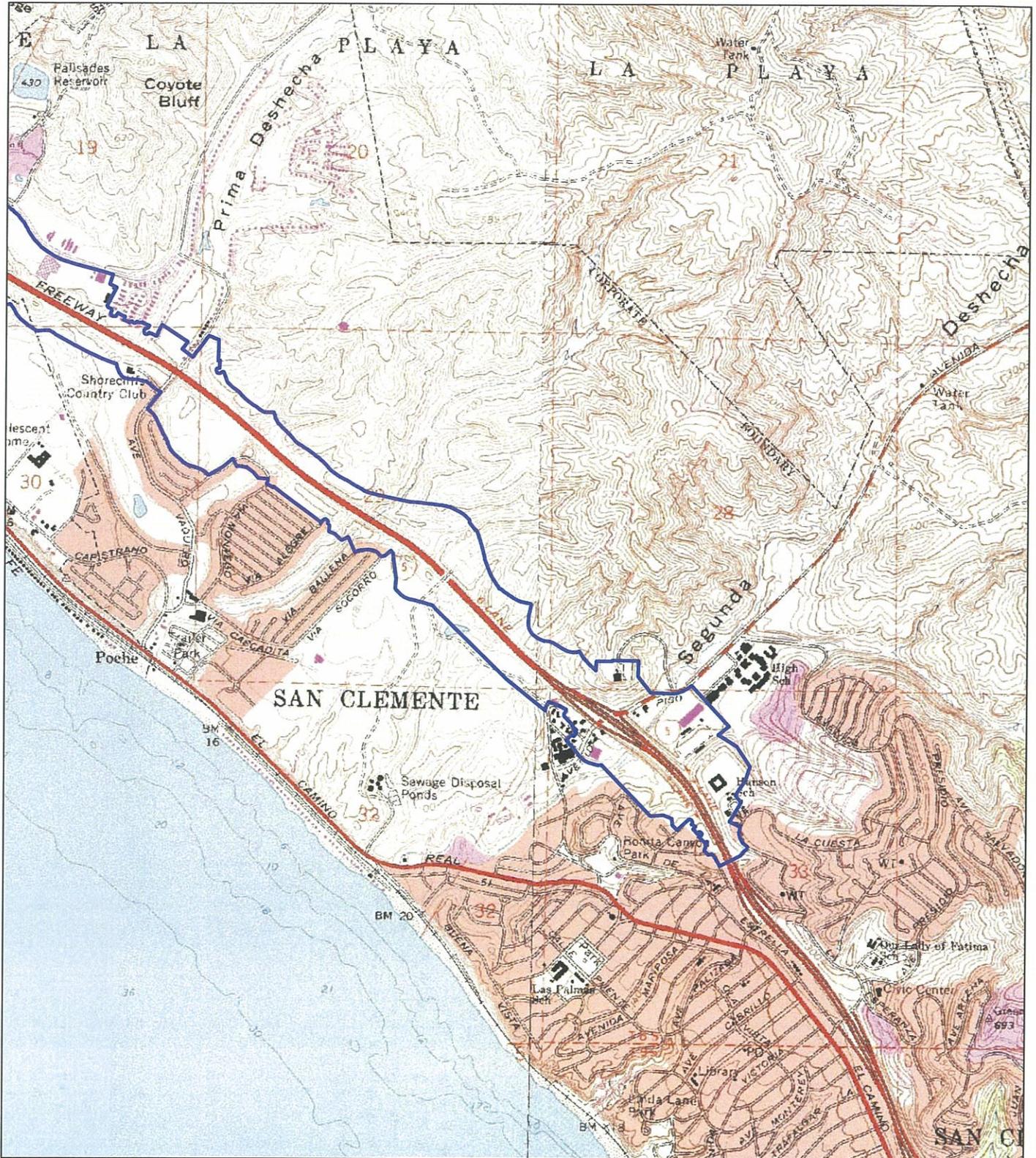
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I-5 HOV Lane Extension Project

Project Location

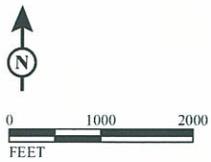
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LEGEND
 Project Location

MAP 2
 Sheet 2 of 2



I-5 HOV Lane Extension Project
Project Location
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limits are proposed to be reestablished, and new auxiliary lanes will be constructed at the following locations (at the specified lengths):

- To the Avenida Vista Hermosa SB off-ramp (1,300 ft)
- From the Avenida Vista Hermosa NB on-ramp (1,600 ft)
- From the Camino de Estrella SB on-ramp (1,600 ft)

Avenida Pico Interchange Improvements. In addition to providing an HOV lane in both directions through the I-5/Avenida Pico interchange, the interchange configuration will also be improved. There are two options under consideration for reconfiguration of the interchange, both of which require replacement of the Avenida Pico Overcrossing (OC) structure.

- **Design Option A – Modified Tight Diamond Interchange:** Under this option, the on- and off-ramps at Avenida Pico will be realigned and the NB on-ramp will be widened to three lanes. The overall configuration of the interchange will be similar to the existing configuration. Additionally, Avenida Pico will be improved under the structure to provide dual left-turn lanes to both the NB and SB on-ramps. This alternative will incorporate an interconnect line to optimize signal timing and operations for the closely spaced intersections at the interchange. The geometry of Avenida Pico will also be improved on the east side of I-5 to remove the existing reverse curves. Bicycle lanes and standard outside shoulders will be provided throughout the majority of the interchange in both the eastbound (EB) and westbound (WB) directions. A sidewalk will be provided through the interchange in the EB direction. In the WB direction, space will be provided to accommodate future construction of a 12 ft lane and sidewalk through the interchange.
- **Design Option B – NB Loop On-Ramp/Realigned NB Off-Ramp:** Under this option, an NB loop on-ramp will be added to allow for the removal of the existing left-turn lane for traffic heading EB on Avenida Pico to access NB I-5. (The existing directional on-ramp would remain in place for traffic heading WB to access NB I-5). Additionally, the NB off-ramp would be reconfigured around the loop, resulting in a partial cloverleaf configuration. The SB ramps will be realigned, and the geometry of Avenida Pico will be improved as proposed in Design Option A. Dual left-turn lanes will be provided under the structure to the SB on-ramp. Bicycle lanes and standard outside shoulders will be provided throughout the majority of the interchange in both the EB and WB directions. A sidewalk will be provided through the interchange in the EB direction. In the WB direction, space will be provided to accommodate future construction of a 12 ft lane and sidewalk through the interchange.

Ramps. All ramps within the project limits will be modified in order to accommodate the HOV lanes. These modifications include improvements ranging from restriping to complete reconstruction. Specifically, ramp modifications under this alternative include:

- **Avenida Pico:** Modify the ramps as described in Design Options A and B above.
- **Avenida Vista Hermosa:** Restripe the NB and SB loop on-ramps. Restripe and reconstruct the NB on- and off-ramps and SB off-ramp.

- **Camino de Estrella:** Realign, reconstruct, and widen the SB off-ramp to a two-lane ramp. Realign and reconstruct the NB and SB on-ramps and NB loop on-ramp. Realign the NB off-ramp.
- **Camino Las Ramblas/Pacific Coast Highway (PCH):** Realign, reconstruct, and widen the SB PCH to SB I-5 connector to a two-lane connector. Realign and reconstruct the SB loop on-ramp. Realign the SB off-ramp and NB on- and off-ramps. Realign the NB I-5 connector.
- **Camino Capistrano (Stonehill Drive):** Realign and reconstruct the NB on-ramp.

Structures.

- **Via California:** Reduced shoulder widths are proposed under the Via California structure in order to avoid replacement of the existing Via California OC (Bridge No. 55-225). The inside shoulder is reduced to approximately 4 ft at the minimum location and the HOV buffer is eliminated in the NB direction.
- **Avenida Pico:** This alternative also proposes to replace the Avenida Pico UC structure (Bridge No. 55-205) to accommodate the HOV lane in each direction through the interchange. In order to achieve minimum vertical clearance for this structure, the I-5 mainline profile will be raised through the interchange area. Additionally, to ensure that all existing mainline lanes are open through construction, the I-5 centerline will be realigned westerly approximately 20 ft through the interchange.
- **Avenida Vaquero UC (Bridge No. 55-223):** Structure widening.
- **NB I-5 to NB PCH Connector (Bridge No. 55-226):** Structure widening.
- **I-5/Camino Las Ramblas UC (Bridge No. 55-510):** Structure widening.
- **Camino Capistrano UC (Stonehill Drive) (Bridge Nos. 55-227L and 55-227R):** Structure widening.

Other Improvements. Alternative 2 proposes to improve the existing compound curve between 0.3 mi south of Stonehill Drive and PCH. This alternative would provide a wide inside shoulder (26 ft at the maximum width) throughout the southern portion of the curve along with increasing the radius from 2,000 ft to 2,200 ft to accommodate full standard stopping sight distance in the SB direction. For the northern portion of the curve, the existing radius is increased from 3,200 ft to 3,300 ft, with a 16 ft shoulder, in order to achieve standard stopping sight distance through this portion of the compound curve. To accommodate the improvements to this compound curve, the median will be reconstructed.

Alternative 3

Alternative 3 is very similar in nature to Alternative 2. The differences are noted.

Auxiliary Lanes. New auxiliary lanes will be constructed at the same locations as noted in Alternative 2.

Avenida Pico Interchange Improvements. Design options for the Avenida Pico interchange reconfiguration will be the same as those noted under Alternative 2.

Ramps. Ramp modifications will be the same as those noted under this Alternative 2, with the exception that the Camino Capistrano (Stonehill Drive) ramp will not be impacted.

Structures. Modifications and improvements to structures are the same as those noted under Alternative 2, with the exception that the I-5 NB Camino Capistrano UC (Stonehill Drive) (Bridge No. 55-227R) will not be widened.

Other Improvements. Unlike Alternative 2, in Alternative 3, for the northern portion of the compound curve, the existing radius would not be changed and a 2 ft median shoulder would be provided, resulting in a nonstandard stopping sight distance. To accommodate the improvements to this compound curve, the median will be reconstructed.

Alternative 4

Alternative 4 includes many of the improvements common to Alternatives 2 and 3 with a few modifications. Alternative 4 proposes no buffer instead of the 4 ft buffer proposed in Alternatives 2 and 3. Under the no buffer scenario, the HOV lane will continuous access throughout the project limits.

Auxiliary Lanes. New auxiliary lanes will be constructed at the same locations as noted in Alternatives 2 and 3.

Avenida Pico Interchange Improvements. Design options for the Avenida Pico interchange reconfiguration will be the same as those noted under Alternative 2.

Ramps. Ramp modifications will be the same as those noted under Alternative 3.

Structures. Modifications and improvements to structures are the same as those noted under Alternatives 2 and 3.

Other Improvements. Unlike Alternatives 2 and 3, for the northern portion of the compound curve, the existing radius would not be changed and a standard 10 ft median shoulder would be provided, which would minimize impacts but result in a nonstandard stopping sight distance condition. To accommodate the improvements to this compound curve, the median will be reconstructed.

The project has the potential to impact paleontological resources within the APD. The APD as defined is generally limited to the proposed and existing ROW and include the horizontal and vertical areas associated with ground-disturbing activities. Since the APD was essentially covered and unavailable for pedestrian survey, reports from adjacent residential and commercial development were used to document sediment sensitivity and previous fossil discoveries from a deposit.

PURPOSE OF INVESTIGATION

Significant nonrenewable paleontological resources, including vertebrate fossils and unique or scientifically important invertebrate fossils and remains of fossil plants, are recognized by the State of California, County of Orange, City of San Juan Capistrano, and National Environmental Policy Act (NEPA) (Appendix A).

The paleontological records search and field assessment for the I-5 HOV Lane Extension Project were conducted pursuant to CEQA, Public Resources Code (PRC) 21000 (Division 13), California Code of Regulations (CCR) 15000 (Title 14, Division 3, Chapter 1); CEQA Appendix G; PRC 5097.5. This assessment documents the potential for paleontological resources older than 10,000 years to occur within the project area. According to Caltrans Standard Environmental Reference (SER) Volume 1, Chapter 8,¹ the usual approach to addressing project-related paleontological resources involves identification, evaluation, and, if necessary, mitigation. These three steps generally entail preparation of several documents that include (1) a Paleontological Identification Report (PIR); (2) a Paleontological Evaluation Report (PER); and, if a potential for encountering significant resources is determined, (3) a Paleontological Mitigation Plan (PMP). At the conclusion of grading, two additional documents may need to be prepared: a Paleontological Mitigation Report (PMR) and a Paleontological Stewardship Summary (PSS).

The paleontological resources assessment was also prepared in accordance with guidelines on a national level, including those from NEPA (P.L. 91–190, 83 Stat. 852, 42 United States Code [USC] 4321–4327), the Federal Land Policy and Management Act of 1976 (FLPMA, P.L. 94–579, 43 USC 1701–1782), and the Paleontological Resource Management 1998, Bureau of Land Management (BLM) Handbook H-8270-1. The assessment also meets the requirements of the County of Orange SCA A05 and relevant portions of the City of San Juan Capistrano's Policy 601.

SIGNIFICANCE

Definitions of Significance

The SVP (1995) provides the following definitions of significance.

- **Significant Nonrenewable Paleontological Resources** are fossils and fossiliferous deposits, here 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, special interest groups, Lead Agencies, or local governments.
- A **Significant Fossiliferous Deposit** is a rock unit or formation that contains significant nonrenewable paleontological resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces, or 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). Paleontological resources are

¹ <http://www.dot.ca.gov/ser/vol1/sec3/physical/Ch08Paleo/chap08paleo.htm>.

considered to be older than recorded history and/or older than 5,000 years before the present (YBP).

According to Caltrans, the significance of a paleontological resource may be stated for a particular fossil species, fossil assemblage, or 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 CFR 62) that contains an outstanding example of fossil evidence of the development of life on earth. This is the only codified definition of paleontological significance.
- **Scientific.** Definitions of a scientifically significant paleontological resource can vary by jurisdictional agency and paleontological practitioner.

Generally, scientifically significant paleontological resources are identified sites or geological deposits containing individual fossils or assemblages of fossils that are unique or unusual, are diagnostically or stratigraphically important, and add to the existing body of knowledge in specific areas stratigraphically, taxonomically, or regionally (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 due to the fact that the best conditions for fossil preservation include little or no disturbance after death and quick burial in oxygen-depleted, fine-grained sediments. While these conditions often exist in marine settings, they are relatively rare in terrestrial settings. This has ramifications 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.

During the development of a model curation program for Orange County, Eisentraut and Cooper (2002) stated that fossils are judged to be scientifically significant if they meet any of the following criteria within the following categories:

- **Taxonomy.** Assemblages that contain rare or unknown taxa, such as defining new (previously unknown to science) species, or that represent a species that is the first or has very limited occurrence within the area or formation.
- **Evolution.** Fossils that represent important stages or links in evolutionary relationships or fill gaps or enhance underrepresented intervals in the stratigraphic record.
- **Biostratigraphy.** Fossils that are important for determining or confining relative geologic (stratigraphic) ages or for use in defining regional to interregional stratigraphic associations. These fossils are often known as biostratigraphic markers and represent plants or animals that existed for only a short and restricted period in the geologic past.

- **Paleoecology.** Fossils that are important for reconstructing the ancient organism community structure and interpretation of ancient sedimentary environments. Depending on which fossils are found, much can be learned about the ancient environment, from water depth, temperature, and salinity to what the substrate was like (muddy, sandy, or rocky), and even to whether the area was in a high energy location (e.g., a beach) or a low energy location (e.g., a bay). Even terrestrial animals can contain information about the ancient environment. For example, an abundance of grazing animals such as horse, bison, and mammoth suggest more of a grassland environment, while an abundance of browsing animals such as deer, mastodon, and camel suggest more of a brushy environment. Preserved parts of plants can also lend insight into what was growing in the area at a particular time. In addition, by studying the ratios of different species to each other's population densities, relationships between predator and prey can be determined.

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

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

Summary of Significance

This document uses an abbreviated summary defining significance in 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 that help to define stratigraphy, age, or taxonomic relationships, are considered significant.

SENSITIVITY

Definitions of Sensitivity

The SVP (1995) provides the following definitions of sensitivity.

- **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 potential for the presence of significant nonrenewable paleontological resources. Review of available literature may further refine the potential of each rock unit, formation, or facies. The SVP has only three categories of sensitivity: high, low, and undetermined. If a geographic area or geological unit is classed as having undetermined potential for paleontological resources, studies must be undertaken to determine if that rock unit has a sensitivity of either high

or low. The field survey may extend outside the defined project to areas where rock units are better exposed. Each of the potentials is defined below in more detail.

- **High Potential.** Rock units from which vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a have potential for containing significant nonrenewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic 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. Sensitivity comprises both (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, and vertebrate, invertebrate, or botanical; and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant.
- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections. These deposits generally will not require protection or salvage operations.
- **Undetermined Potential.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

If an area is determined to have a high potential for containing paleontologic resources, the SVP recommends that a program to mitigate impacts should be developed. In areas of high sensitivity, a preexcavation survey prior to excavation is also recommended to locate surface concentrations of fossils that might need special salvage methods.

During the development of a model curation program for Orange County, Eisentraut and Cooper (2002) developed a slightly more detailed sensitivity scale that is more graduated than the “high,” “low,” and “unknown” sensitivity ratings developed by the SVP (1995) for each formation that exists within Orange County. These sensitivities are based on the fossils that have (or have not) been recovered within each formation. However, Eisentraut and Cooper (2002) state that based on future findings, these ratings can and may change. The rating system by Eisentraut and Cooper (2002) is as follows:

- **Very High.** Scientifically very significant fossils and fossils from critical geologic time periods—very important for scientific study
- **High.** Quality preservation and scientifically significant fossils—important for research and/or very important for public display
- **Moderate.** Abundant fossils of good quality—important for education and public display
- **Low.** Poorly preserved fossils—only useful for educational purposes

- **None.** Contains no fossils; either too young or nondepositional rock units

According to Caltrans, paleontological 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 construction excavation for the project is underway. Paleontological significance may also be stated for a particular rock unit, predicated on the research potential of fossils suspected to occur in that unit. Caltrans uses the following tripartite scale:

- **High Potential.** Rock units which, 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.
- **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.
- **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. In addition, artificial fill falls into this category.

Given the range of criteria that may be used, paleontological 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. Regardless of the format used by a paleontologist to rank formations, the importance of any rock unit must be explicitly stated in terms of specific fossils known or suspected to be present (and, if the latter, why such fossils are suspected), and why these fossils are of paleontological importance. Some land-managing agencies may require the use of specific guidelines to assess significance, whereas others may defer to the expertise of local paleontologists and provide little guidance.

If a paleontological resource is determined to be significant, of high sensitivity, or of scientific importance, a mitigation program must be developed and implemented. Mitigation can be initiated prior to and/or during construction. The latter is more common for Caltrans projects. It should be pointed out that mitigation during construction poses a greater risk of construction delays. Mitigation is an eligible federal project cost, in accordance with 23 USC 305, only if significance documentation acceptable to the Federal Highway Administration (FHWA) is submitted. Thus, coordination between Caltrans, the FHWA, and all jurisdictional agencies is critical to formally establishing the significance of a resource. Any needed coordination on Caltrans projects is usually completed and included as part of the PMP.

As a practical matter, no consideration is generally afforded paleontological sites for which scientific importance cannot be demonstrated. If a paleontological resource assessment results in a determination that the site is insignificant or of low sensitivity, it is recommended that this conclusion be documented in a PER and in the project's environmental document in order to demonstrate compliance with applicable statutory requirements.

Summary of Sensitivity

This document uses the following abbreviated 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 I-5 HOV Lane Extension Project is tightly prescribed by existing development and will be wholly constructed within the APD as defined. To ensure that paleontological locality research was comprehensive, paleontological mitigation reports for residential and commercial development adjacent to the project area were used extensively to assess the potential for the project to encounter fossil resources. This research involved review of available geological and paleontological literature concerning or related to the stratigraphy of the project area and requests for locality data from paleontologists and geologists who have conducted research in the vicinity of I-5 HOV Lane Extension Project. The pedestrian survey was limited to areas within the project footprint where surficial geological exposures were present.

Key Personnel

Steven W. Conkling, Principal Paleontologist, and County of Orange-Certified Paleontologist, completed the paleontological resource literature review and report preparation. Mr. Conkling has 16 years of experience with paleontological salvage programs and has extensive experience collecting paleontological resources as well as writing paleontological assessment reports; surveying for paleontological resources; salvaging large fossil specimens; fossil identification and curation; and final mitigation monitoring reports at the conclusion of construction projects. He is a research associate or a member of several local museums and scientific societies, including the Orange County Natural History Museum, Los Angeles County Museum of Natural History (LACM), San Bernardino County Museum, Mojave Desert Quaternary Research Society, and SVP.

LITERATURE REVIEW AND RECORDS SEARCH

A paleontological literature review was conducted for the proposed I-5 HOV Lane Extension Project using unpublished reports, paleontological assessment and monitoring reports, field notes, published literature, and maps. A paleontological resource records search was not conducted for this project for two reasons: (1) there is no current repository for fossil localities from projects conducted in the County since 1977; and, (2) suitable information existed in reports of paleontological mitigation from surrounding residential and commercial development to prove the sensitivity and significance of any fossils that might be encountered within the project APD.

The purpose of the locality search and archival study was to establish the status and extent of previously recorded paleontological resources within and adjacent to the project APD. With this knowledge, an informed assessment of the potential effects of the I-5 HOV Lane Extension Project on paleontological resources could be made; and the types of fossils that might be uncovered during ground-disturbing activities could be evaluated. In addition, the sensitivity of the sediments expected to be encountered during construction could be determined.

FIELD INSPECTION

Pedestrian Survey

A pedestrian survey of exposures along the I-5 HOV Lane Extension Project APD was conducted by Paleontologist Steven Conkling on various dates in December 2009. During the survey, bedrock exposures along the APD were examined to identify exposures of fossiliferous sediments and verify geological mapping as presented by Tan (1999a and 1999b). The purpose of this survey was to identify whether any paleontological resources might be exposed on the surface.

RESULTS

LOCALITY SEARCH

Geology

The proposed I-5 HOV Lane Extension Project is located at the northern end of the Peninsular Range geomorphic province, a 900 mi-long northwest-southeast-trending structural block that extends from the tip of Baja California to the Transverse Ranges and includes the Los Angeles Basin (Norris and Webb, 1976). The total width of the province is approximately 225 mi, with a maximum landbound width of 65 mi (Sharp, 1976). It contains extensive pre-Cretaceous (more than 65 million years ago) igneous and metamorphic rocks covered by limited exposures of post-Cretaceous sedimentary deposits. Within Orange County, these post-Cretaceous sedimentary deposits are believed to be some of the most important Tertiary marine fossil-producing areas in the world due to the completeness of the geologic record and general abundance of the fossils (Raschke, 1984). Belyea and Minch (1989) report that the Santa Ana Mountains contain exposures of the most complete section of Late Mesozoic and Cenozoic (approximately 150 million years ago to the present) stratigraphy in the entire Peninsular Ranges.

Specifically, the project is located along the San Juan Creek drainage and south along the southern San Joaquin Hills. The San Joaquin Hills are a coastal extension of the Santa Ana Mountains and the westernmost range of the Peninsular Ranges Geomorphic Province (Barrie et al., 1992). The hills extend across approximately 90 square miles, including a 12 mi stretch of rugged coastline. Exposed formations have a combined thickness of 22,000 ft and range in age from the Paleocene to the Late Pleistocene (63 million–10,000 years) (Vedder, 1970). The hills consist of both marine and terrestrial sediments and intrusive igneous rocks. This mix of resistant igneous intrusives and soft to resistant sedimentary rock creates a terrain that is variously rugged or gently sloped, depending on the underlying strata. The seaward-facing hills adjacent to the coast have been shaped by a series of Pleistocene marine terraces and conventional erosion. The inland-facing portions of the hills have been shaped only by conventional erosion.

Geologic mapping (Tan, 1999a and 1999b) indicates that sediments from the Siltstone Member of the Capistrano Formation, large scale Quaternary Landslide deposits, Quaternary Marine and Non-Marine Terraces, Quaternary Younger Alluvium, and Quaternary Wash deposits are mapped as occurring within or immediately adjacent to the APD (Figure 3). Table A lists the ages for the formations and units exposed within the study area. These units are described in more detail below.



Geology Legend

Qya - Younger alluvial flood plain deposit; Paleontological Sensitivity: None/Low

Qls - Landslide deposits; Paleontological Sensitivity: Low

Qomt - Older marine and non-marine terrace deposits above marine wave-cut platform; Paleontological Sensitivity: High

Tn - Niguel Formation; marine fine grained sandstone; Paleontological Sensitivity: Moderate

Tcs - Capistrano Formation; siltstone facies; Paleontological Sensitivity: Very High/High

Tct - Capistrano Formation; turbidite facies; Paleontological Sensitivity: Very High/High

LEGEND

APE - Area of Potential Effects	Paleontological Sensitivity: Very High
ADI - Area of Direct Impact	Paleontological Sensitivity: High
	Paleontological Sensitivity: Low
	Paleontological Sensitivity: None/Low

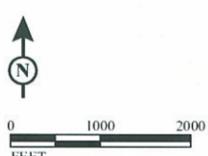


FIGURE 3

I-5 HOV Extension
 Geology
 12-ORA-005 PM 3.30/8.70
 12840-0F960K
 EA# OF9600

SOURCE: USGS 7.5min. Quad. Geology Map (San Clemente - 1999, Dana Point - 1999) by Tan, Siang S.; RMC (08/2009)
 I:\RMN090\GIS\HPSR_Geology.mxd (6/22/2010)

Table A: Geologic Time Periods and Geologic Units within the APD

Epoch	Age (years)	Geologic Formation/Unit	Map Symbol
Quaternary Period			
Holocene	Less than 100 years	Artificial Fill	af
Holocene	Less than 10,000	Young Alluvium	Qya
Holocene	Less than 10,000	Quaternary Wash deposits	Qw
Pleistocene	10,000–1.8 million	Quaternary Landslides	Qls
Pleistocene	10,000–1.8 million	Quaternary Marine (and Nonmarine) Terraces	Qtm
Tertiary Period			
Late Miocene to Early Pliocene	3–7 million	Capistrano Formation – Siltstone Member	Tcs

APD = Area of Project Disturbance

Artificial Fill (af). Artificial fill is mapped throughout the APD. This is consistent with the fact that the project is located in a developed area that has been substantially altered by human activity. Artificial fill consists of sediments that have been removed from one location and transported to another by humans. Sometimes the transportation distance can be a few feet to dozens of miles. Composition is dependent on the source. When it is compacted and dense, it is known as “engineered fill,” but it can be unconsolidated and loosely compacted. Artificial fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material. Depending on the area, thickness can be less than 1 ft or several hundred feet.

Young Alluvium. Young alluvium, also known as recent alluvium and can range in age from Recent to Latest Pleistocene. It is similar to older alluvium, but is usually located closer to an active stream channel. These deposits consist of loosely consolidated gravel, sand, and silt ranging from poorly sorted to well sorted, composed of mainly quartz, but also containing feldspar and biotite. The sand grains are generally subangular to subrounded, while the gravels and cobbles are rounded to well rounded. Color is usually yellow-brown to gray-brown and is somewhat dependent on the nearby, or upstream, geology.

Wash Deposits. Wash deposits are deposited along the active channel of large rivers, creeks, and other drainages. Due to the active nature of San Juan and Trabuco Creeks in the northern reach of the project APD, it is unlikely that any of these deposits are older than 10,000 years and therefore are too young to contain significant fossil resources.

Landslide Deposits. These areas consist of blocks and flows of the underlying sediments. They formed during the last 2 million years as canyon cutting and aqueous erosion caused slope failure. Their composition is dependent on the underlying sediments that have slid. Sometimes they are no deeper than several feet and only involve movement of soil. However, sometimes they are massive, covering several acres with ruptures tens of feet deep, extending well into the underlying bedrock.

Normally because landslides result in significant stratigraphic displacement and specimen damage, fossils are not considered likely in these sediments. However, the Young Alluvium along the eastern bank of the San Juan Creek drainage in the northern segment of the APD is believed to overlie a large landslide (Tan, 1999a). This very large landslide may preserve important fossils in suitable stratigraphic integrity and may be significant.

Quaternary Marine Terrace. The Quaternary (80,000 to 1,230,000 YBP [Barrie et al., 1992]) Marine Terrace deposits consist of light brown, orange-brown, and yellow-brown to gray mixtures of sands, gravels, and pebbles with some minor silt. The sand grains tend to be subangular to subrounded while the gravels and pebbles are generally subrounded to rounded, with occasional angular clasts derived from the underlying formation. Bedding is usually poor; however, lenticular beds and cross-bedding do occur. The deposits tend to be friable to weakly indurated. Sand grains are predominantly quartz and feldspar, while the gravels are quite variable, including plutonics, volcanics, metamorphics, and fragments of the underlying, or nearby, bedrock formations.

Vedder (1970) states that some of the Marine Terrace deposits can be as thick as 125 ft; however, Barrie et al. (1992) encountered terrace deposits only up to 59 ft thick, and geologic work conducted prior to construction of the San Joaquin Hills Transportation Corridor encountered terrace deposits up to 85 ft thick before drilling was ended (Geofon and Zeiser, 1989). These deposits unconformably overlie Pliocene and Miocene Formations in all areas and are unconformably overlain by Quaternary to recent colluvial deposits. To date, seven marine terraces have been identified within the San Joaquin Hills (Table B) (Barrie et al., 1992). Terraces 1 and 2 are both exposed within the project area.

Table B: Pleistocene Marine Terraces in Orange County

Terrace	Age (years before present)	Elevation (amsl) feet
Terrace 1	80,000	52
Terrace 2	125,000	108
Terrace 3	210,000	164
Terrace 4a	320,000	328
Terrace 4b	395,000	328
Terrace 5	695,000	475
Terrace 6	1,050,000	787
Terrace 7	1,230,000	984

Source: From Barrie et al., 1992.
 amsl = above mean sea level

The Capistrano Formation. The Capistrano Formation is a Late Miocene to Early Pliocene marine deposit that was named by Woodford (1925) for exposures in the vicinity of San Juan Capistrano. It was deposited in an ancient marine embayment of moderate depths. The formation is composed of a thick marine succession of mudstone, shale, siltstone, and minor silty sandstone and concretion layers. It has been divided into three distinct members: a Siltstone Member, a primarily sandy member known as the Oso Member, and a Turbidite Facies. The member exposed within the project area is the Siltstone Member.

The Siltstone Member is yellowish-gray to medium-brownish-gray concretionary siltstone and mudstone, with lenticular whitish-gray sandstone and thin calcareous mudstone interbeds. This member can be locally diatomaceous and tuffaceous, and may contain breccia or conglomerate at its base (Morton et al., 1976). The Siltstone Member of the Capistrano Formation is mostly poorly bedded to massive and has a maximum thickness of approximately 2,400 ft (Yerkes et al., 1965). It appears to have a gradational contact with the underlying Monterey Formation in most areas and an unconformable contact west of Oso Creek. The contact with the overlying Niguel Formation has a marked unconformity except in upper Newport Bay. It grades laterally into the Oso Member of the formation and is unconformably overlain by the turbidite facies of the formation.

Paleontology

Artificial Fill. Artificial fill can contain fossils, but these fossils have been removed from their original location and are thus out of context. They are not considered to be important for scientific study.

Young Alluvium. Young alluvium can contain remains of once-living things such as bones, shells, and plants; however, as these are less than 10,000 years old, not enough time has passed to mineralize the remains, and they are not considered to be “fossils.” In addition, most of the remains that are found are contemporaneous with modern species. Occasionally, fossils from older upstream formations are eroded out and transported to a new location. However, it is usually impossible to determine where the fossils originated.

Wash Deposits. Wash deposits can contain remains of once-living things such as bones, shells, and plants; however, as these are less than 10,000 years old, not enough time has passed to mineralize the remains, and they are not considered to be “fossils.” In addition, most of the remains that are found are contemporaneous with modern species. Occasionally, fossils from older upstream formations are eroded out and transported to a new location. However, it is usually impossible to determine where the fossils originated.

Landslide Deposits. Generally, there is a low potential for fossils within these sediments. Usually, any fossils within these sediments are derived from the older formations from which the slide originated; however, there is very large landslide that underlies the Young Alluvium on the eastern side of the San Juan Creek Drainage. This very old Landslide is composed of displaced older alluvium that may contain significant fossil deposits. Fossils have been collected in similar deposits from excavations for roads, housing developments, retention basins, and quarries in the Los Angeles Basin and vicinity (Lander, 2003; Jefferson, 1991a and 1991b; Conkling, 1997 and 1988; Miller, 1971). Remains of Rancholabrean animals, including elephant, horse, bison, camel, saber tooth cat, deer, and sloth, are known from these localities.

Marine Terrace Deposits. Fossils have been recovered from these sediments at the corner of Pacific Coast Highway and MacArthur Boulevard (LACM 4254) and throughout the Newport Back Bay area

(including the Newport Mesa localities [Miller, 1971]). These Marine Terrace Deposit localities contain invertebrate and vertebrate fossils such as bivalves, gastropods, echinoderms, shark, fish, seal, whale, horse, camel, bison, and elephant. North of the northern terminus of the project, between La Paz Road and Moulton Parkway, just to the north of State Route 73 (SR-73), LACM localities LACM 4628 and 4629 produced fossil specimens of mammoth (*Mammuthus* sp.), bison (*Bison* sp.), horse (*Equus* sp.), and a tapir (*Tapirus californicus*) from deposits of this age. Brock, Harris, and Roeder (1992) report a fairly extensive small Pleistocene vertebrate fauna from Marine Terrace deposits along Avenida Pico immediately north of the proposed interchange improvements at I-5 and Pico.

Capistrano Formation. Late Miocene to Early Pliocene (Upper Mohnian, Delmontian, and Repettian) foraminifera have been identified in this member (Smith, 1960). Recent work by John Minch and Associates has identified plants, fish (*Clupeidae* and *Sciaenidae*), aves (cf. *Mancala* sp.), *Desmatophocidae*, pinnipeds (*Otaridae* and *Phocidae*), *Delphinidae*, and *Mysticeti* from this formation, many from the SR-73 alignment (JMA, 1995). An almost complete *Mysticeti* was found and collected at the Greenfield exit on northbound SR-73. LSA and Pertra Resources, Inc. recovered whales, sharks, and terrestrial and marine plants in the Prima Deshecha Landfill in San Juan Capistrano. Eisentraut and Cooper (2002) report that the siltstone member of this formation produced abundant and diverse marine vertebrates, including fish, shark, whale, dolphin, porpoise, sea lion, sea cow, and seagoing birds. They also report that the Marblehead project near San Clemente yielded voluminous and exceptional fauna. Govean (1989) reported an invertebrate fauna from the grading of the Ocean View Plaza project (immediately north of the NB Camino de Estrella ramp). Morgan and Weir (1981), Wills (1985), and Sundberg and Roeder (1983) all report an extensive paleontological collection made during mass construction of the Marblehead residential development immediately north of the project APD. These authors identified significant plant, invertebrate, and vertebrate fossils from the Capistrano Formation.

The closest LACM vertebrate localities in the Capistrano Formation are LACM 4630 and 5465, north of the northern terminus of the project, north of Avila Road, between La Paz Road and Moulton Parkway; and LACM 3184 and 3867, just north of the northern terminus of the project, north of Crown Valley Parkway. These localities produced a small composite fauna, including chimaera (*Chimaeridae*), requiem sharks (*Carchrinidae*), dogfish (*Squalidae*), undetermined bony fish (*Teleostei*), puffin (*Alcidae*), porpoise (*Phocoenidae*), and blue whale (*Balaenoptera musculus*).

Paleontological Sensitivity

The specific sensitivities for formations and units within the study area are listed in Table C. This lists the sensitivities determined by Eisentraut and Cooper (2002) and the corresponding Paleontological Potential Scale used by Caltrans. Sensitivities (and potential) for the older alluvium, the Marine Terrace deposits, and the Capistrano Formation are high or very high based on significant fossil remains that have been recovered from these units in other areas. It is likely that similar significant resources may be encountered if these units are encountered during excavation associated with the I-5 HOV Lane Extension Project. Artificial fill is not rated by Eisentraut and Cooper (2002); however, unless depth is known, it is usually assigned a sensitivity of "low" in the event that excavation extends below the fill to the underlying formation or unit. The young alluvium has no sensitivity according to Eisentraut and Cooper (2002), as it is too young to contain paleontological resources; however, like

Table C: Paleontological Sensitivity of the Geologic Units within the Study Area

Geologic Unit	Paleontological Sensitivity (Eisentraut and Cooper, 2002)	Paleontological Potential (the Department)
Artificial Fill	Not Rated	Low
Young Alluvium	None	Low
Wash Deposits	None	Low
Landslide Deposits	Not Rated ¹	Low
Older Alluvium	High	High
Marine Terrace Deposits	High	High
Capistrano Formation	Very High	High

¹ In the northern portion of the project area of project disturbance (APD), the buried, very large landslide has a high paleontological sensitivity.

the artificial fill, it is usually assigned a sensitivity of “low” as well in case it is shallow and the underlying sediments are encountered.

FIELD SURVEY

The pedestrian survey confirmed much of the geology as it has been mapped. In localized areas artificial fill has been added and some limited exposures of subsurface bedrock are located along the portion of the project area near Marblehead and Stonehill Drive.

RECOMMENDATIONS FOR THE PMP

INTRODUCTION

The Department, the County, and the SVP all present similar guidelines for adequate mitigation of impacts to significant nonrenewable paleontological resources. Excerpts from individual guidelines follow.

ORANGE COUNTY

As far back as the 1970s, the County recognized the need to try to preserve its fossil heritage. The County developed a set of guidelines (Resolution 77-866) that stated that developers on projects that involved earthwork were required to hire a professional paleontologist to:

- Conduct literature and records research prior to the start of grading to determine whether fossils might be encountered during construction;
- Conduct surveys prior to the beginning of grading to determine the significance and extent of fossils of fossil-bearing sediments within the project;
- Provide trained paleontological monitors to collect fossil remains during grading; and
- Preserve any collected fossils by maintaining them in an undisturbed condition, or excavating and salvaging in a scientific manner and keeping the fossils readily accessible for future study, if possible.

These guidelines were further refined by Eisentraut and Cooper (2002) during their preparation of a model curation program for Orange County. This program conforms to the recommendations of the SVP guidelines and is similar to those provided by Caltrans to reduce construction-related impacts to significant nonrenewable paleontological resources. After the potential for paleontological resources has been determined by a records search and field inspection, the following steps are recommended to occur with construction excavation:

- **Monitoring of excavation operations** to discover unearthed fossil remains, generally involving close inspection/surveillance of ongoing excavation exposures. Monitoring time will be in accordance with the paleontological sensitivity rating (see previous discussion of paleontological sensitivity scale) for the particular stratigraphic unit being excavated. Routinely, very-high-sensitivity units will require full-time monitoring; high-sensitivity units will require a minimum of three-quarter-time monitoring; moderate-sensitivity units will require at least half-time monitoring; low-sensitivity units will require one-quarter-time monitoring; no-sensitivity units will require no monitoring. Monitoring time can be increased or decreased over time depending on what is being discovered or not discovered.

- **Salvage of unearthed fossil remains**, typically involving simple excavation of the flagged-off exposed specimen but possibly also plaster-jacketing of large and/or fragile specimens or concentrations of fossils, or more elaborate quarry excavations of richly fossiliferous deposits; decisions about what is collected will be based on an in-field assessment of determined or potential paleontological significance.
- **Recovery of stratigraphic and geologic data** to provide a context for the recovered fossil remains, typically including legible, well-organized field note descriptions of lithologies of fossil-bearing strata, and measurement and description of the overall stratigraphic section if possible.
- **Careful recording of specimen localities** on maps, including site or grading maps, and, most importantly, on standard, most up-to-date USGS 7.5-minute (1:24,000) quadrangle sheets; accurate longitude-latitude and Universal Transverse Mercator (UTM) coordinates should be given for each locality, and global positioning system (GPS) technology should be employed whenever possible. Additional information, such as formation name, sediment description, elevation, field identification, location within the stratigraphic section (if possible), and a general to specific description of the fossil location should also be recorded.
- **Laboratory preparation** to the point of taxonomic identification. This generally involves removal of the enclosing sediment; stabilization of fragile specimens using glue and other hardeners; and repair of broken specimens. In addition, bulk material should be screen-washed to recover small specimens, such as vertebrate bones and teeth, that are difficult to see because of their small size.
- **Cataloguing and identification** of prepared fossil remains to the lowest taxonomic level feasible. Taxonomic experts should be consulted to assist with the identification, ensure that identification is accurate, and note whether the specimen is new and/or unique to the formation or region.
- **Transfer for accessioning and storage** of catalogued fossil remains, including the specimens themselves, copies of all field notes, maps (with locality information accurately posted), stratigraphic sections, and any photographs.
- **Preparation and submittal of a final report** summarizing the project area investigated, the field and laboratory methods used, the stratigraphic units inspected, the types of fossils recovered, the scientific significance of the curated collection, and recommendation for further work, if needed.

SOCIETY OF VERTEBRATE PALEONTOLOGY

Recommended general guidelines for conformable impact mitigation to significant nonrenewable paleontological resources have been published by the SVP (1995) along with conditions of receivership that the repository institution can require when receiving fossils recovered from construction projects (SVP, 1996). In areas 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;

- Preparation, including screen washing to recover small specimens (if applicable) and specimen preparation to a point of stabilization and identification;
- Identification, cataloging, curation, and storage into a museum or university that has a curator who can retrieve the specimens upon request; and
- A final report of the finds and their 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 Lead Agency ensures compliance with the measures developed to mitigate impacts of excavation during the initial assessment. To ensure compliance from the start of the project, a statement that confirms the site's potential sensitivity, confirms the repository agreement with an established institution, and indicates the program for impact mitigation should be deposited with the Lead Agency and 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 paleontologic salvage activities can be minimized or avoided.

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Caltrans has developed a set of guidelines similar to those of the SVP to reduce impacts to paleontological resources. These recommendations start with avoidance of the resource area by the project and continue with recommendations for impact mitigation measures during construction excavation.

Avoidance

Avoidance of project impacts can be achieved by project redesign so that paleontological resources are completely outside the project's impact area (e.g., a different alignment route that misses the resource or a 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 Caltrans and FHWA toolkit to protect resources within or immediately adjacent to a project 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 the special measures prove ineffective for one reason or another, more traditional mitigation is necessarily called for. This fallback 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.

Caltrans PMP

Since the geology of California is diverse and the nature of the fossils that it contains varies from one outcrop to the next, Caltrans does not provide generic paleontological resource impact mitigation, but instead presents a format for the PMP that can be utilized by the professional project paleontologist who has been retained to manage paleontological resources during project development. A full list of sections of the PMP is included in Caltrans SER Environmental Handbook, Volume 1, Chapter 8. Briefly, the PMP sections are:

- **Introduction.** A brief discussion of the goals of the proposed study, a discussion of the construction project effects, and why mitigation is needed (e.g., compliance with CEQA).
- **Background.** Pertinent information should be provided in order to demonstrate familiarity with the project area and the type of fossils and rock units under study.
- **Description of the Resource.** A description of the rock units, boundaries of the fossiliferous formations, and locations of exposures in the vicinity of the project area and in the area of direct impact (ADD).
- **Proposed Research.** A clear, concise description of why the paleontological resource is significant or has scientific importance, and how the study is expected to address current gaps in the paleontological data.
- **Scope of Work.** The work plan to mitigate project effects, including all fieldwork and laboratory efforts. This may include:
 - Procedures for interfacing paleontological and construction personnel developed in consultation with the Resident Engineer (RE).
 - Construction monitoring programs should be outlined.
 - Salvage methods should be outlined from large specimen recovery to collection and processing of microfossils.
 - Recovered specimens should be prepared to a point of identification and stabilized for preservation in conformance with individual repository requirements.
 - All recovered specimens should be cataloged using the format of the proposed curation facility.
 - Not all located fossils need to be recovered. Criteria for the discarding of specific fossil specimens should be made explicit.
- **Decision Thresholds.** How and when fieldwork will achieve the study goals, allowing fieldwork to cease; or any circumstances under which additional effort might be needed to achieve study goals.
- **Schedule.** The schedule for completing the proposed work may appear as text or in graphic form (e.g., a timeline) and include a start date, duration of fieldwork and laboratory processing, and time for report preparation.
- **Justification of Cost Estimate.** Provides narrative support for the cost estimate, including the basis for person-hour estimates, clarification of overhead percentages, and any other costs.

- **Cost Estimate.** Presented as an appendix, this documentation should present a tabular summary of costs for the proposed effort and include all proposed numbers and levels of personnel, time, and costs.
- **Bibliography.** The bibliography should include only those references cited in the plan.
- **Curation.** The curation facility should be identified and a draft curation agreement included. A curation agreement with an approved facility must be in place prior to initiating any paleontological monitoring or mitigation activities.

The plan should be prepared by or under the supervision of a qualified Principal Paleontologist and submitted for review sufficiently in advance of an anticipated start work date so that all involved agencies have time to comment, the Lead Agency has time to adjust the plan to accommodate such input, and the plan may be resubmitted for all necessary approvals. In the case of Caltrans projects, coordination with other agencies should be accomplished through Caltrans staff rather than consultants directly approaching land managing/regulatory agencies. It is imperative that all agencies with jurisdiction over a paleontological site are in agreement as to the level of effort in the mitigation plan, including agreement on the applicability of pertinent laws, regulations, and permit requirements. When properly designed, the PMP serves as a basis for obtaining any necessary permits from other agencies.

Specific interagency issues may include, but are not limited to, health and safety issues, employee access and egress, collection, removal and stockpiling of fossiliferous sediment, water washing, wet screen processing of fossiliferous sediment and disposal of muddy wastewater, and use of chemicals (kerosene) to break down specific types of indurated fossiliferous sediment. Agency permits that may be needed for access or to conduct the work of monitoring and salvage should be applied for and obtained in advance of the project.

CONCLUSION

The I-5 HOV Lane Extension Project in the San Juan Creek drainage and southern San Joaquin Hills of Orange County crosses one fossiliferous Tertiary formation deposited during the last 7 million years and two fossiliferous early to late Pleistocene sediments deposited during the last 1.8 million years. These fossiliferous sediments crop out at the surface and may also be encountered below the surface of the proposed project. This study presents definitions of paleontological significance and sensitivity, the results of paleontological locality research, and reviews of geological and paleontological literature.

This study does not anticipate special paleontological situations that would require project redesign to avoid critical localities or strata. Consequently, a paleontological resources impact mitigation program is recommended prior to completion of final design within those areas of the project identified as having high sensitivity. This PMP should be synthesized from outlines and guidelines provided by Caltrans, the County of Orange, and the SVP, and specifically tailored to the resources and sedimentary formations that will be encountered during excavation required for the I-5 HOV Lane Extension Project. It is recommended that the PMP be written in the early planning stages of reports for the I-5 HOV Lane Extension Project, documenting and describing impact mitigation programs that must accompany project final design and development.

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

- A preconstruction field survey should be conducted in areas identified as having a high paleontological sensitivity after vegetation and any paving is removed, followed by salvaging of any observed surface paleontological resources prior to the beginning of additional ground-disturbing activities.
- 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 anything is discovered (see below).
- During construction excavation, a qualified vertebrate paleontologic monitor shall initially be present on a full-time basis whenever excavation will occur within the sediments that have a high paleontological sensitivity rating and on a spot-check basis for sediments that have a low sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating (monitoring reductions and when they occur will be determined by the qualified Principal Paleontologist). The monitor shall inspect fresh cuts and/or spoils piles to recover paleontological resources. The monitor shall be empowered to temporarily divert construction equipment away from the immediate area of the discovery. The monitor shall 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, Caltrans shall consider using heavy equipment on site to assist in the 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-screened on site through one-eighth to one-twentieth-inch mesh screens to determine whether microfossils are present. If microfossils are encountered, sediment samples (up to 3 cubic yards, or 6,000 pounds) shall be collected and processed through one-twentieth-inch mesh screens to recover additional fossils.
- Any recovered specimens shall 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 storage cost, and the addition of approved chemical hardeners/stabilizers to fragile specimens.
- Specimens shall be identified to the lowest taxonomic level possible and curated into an institutional repository with retrievable storage. The repository institutions usually charge a one-time fee based on volume, so removing surplus sediment is important. The repository institution may be a local museum or university that has a curator who can retrieve the specimens on request. The Department requires that a draft curation agreement be in place with an approved curation facility prior to the initiation of any paleontological monitoring or mitigation activities.
- Preparation and submittal of the Paleontological Mitigation Report (PMR) documenting completion of the PMP for the Lead Agency (Caltrans).

By following the above guidelines, impacts to nonrenewable paleontological resources will be maintained below a level of significance. During the development of the PMP, additional measures may be added; this list is only meant to provide a summary of what may be involved.

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APPENDIX A
SUMMARY OF LEGISLATION

APPENDIX A: 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. Policies and/or contact information for federal and State land managing and regulatory agencies that have paleontological authorities and responsibilities are provided directly or by hotlink. In the event that a project involves land owned or administered by another federal or State agency, that agency should be contacted in order to ascertain specific requirements they 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 document, 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 generally become applicable to specific projects if that delivery crosses federal lands or involves a federal agency license, permits, 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 Bureau of Land Management (BLM), the Forest Service (FS), 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). Statute 23 USC 305 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 (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; [Also see Federal Highway Administration (FHWA) policy section, below]).

Federal-Aid Highway Act of 1935 (20 USC 78). Section 305 of the Federal Aid Highway Act of 1956 (20 USC 78, 78a) gives the 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 were first published in 1980 under 36 CFR 1212, and the program was redesignated as 36 CFR 62 in 1981. A National Natural Landmark 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 (e.g., FHWA) and their agents (e.g., the California Department of Transportation [Caltrans]) 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—Hancock Park, Wilshire Boulevard, Los Angeles
- Sharktooth Hill—Kern County

- Rainbow Basin—near Barstow, San Bernardino County

For an up-to-date listing of NNLs in California, visit the NNL Web site.

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. 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 places restrictions on the ability of FHWA to take publicly owned 4(f) properties (which include parks, recreation areas, wildlife or waterfowl refuges, and National Register of Historic Places eligible or listed properties). 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. The level of consideration depends upon the federal agency involved (see section entitled Identification of Regulatory/Management Agencies, below).

- **1872 Mining Law, amended 1988.** Excludes fossils (including petrified wood) from claim or patent. United States Forest Service and Bureau of Land Management regulate the 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 must 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 (sec. 30).** Requires and provides for the protection of interest of the United States. Natural resources, including paleontologic resources, are commonly regarded as such interests.

- **Executive Order 11593, May 31, 1971, Protection and Enhancement of the Cultural Environment (36 CFR 8921).** Requires federal agencies to inventory and protect properties under their jurisdiction. National Park Service regulations under 36 CFR provide that paleontologic specimens may not be disturbed or removed without a permit.
- **Archaeological and Historic Data Preservation Act of 1974 (P.L. 86-253, as amended by P.L. 93-921, 16 USC 469). Act of May 24, 1974 (88 Stat 174, sec. 3 a0, 4a).** 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 FR 3365, January 25, 1974, and 44 FR 6068, January 30, 1979):** Procedures for the protection of historic and cultural properties. Establishes 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, P.L. 94-579, 43 USC 1701-1782).** Provides authority for BLM to regulate lands under its jurisdiction, managed in a manner to “protect the quality of scientific, scenic, historic, ecological, environmental...and archaeological values.” Authority is given to establish areas of critical environmental concern (ACEC).
- **Surface Mining Control and Reclamation Act of 1977 (SMCRA, P.L. 95-87, 30 USC 1201-1328).** Regulates surface coal mining and provides designation 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, Bureau of Land Management Handbook H-8270-1.** General Procedural Guidance for Paleontological Management.

State of California Legislation

The following State laws and regulations are applicable, or potentially applicable, to Caltrans and locally sponsored projects.

California Environmental Quality Act of 1970 (CEQA, 13 PRC, 2100, et seq.). Requires identification of potential adverse impacts of a project to any object or site of scientific importance (Div. 1, PRC 5020.1(b)).

The California Environmental Quality Act (CEQA) (Chapter 1, Section 21002) states that:

...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 Implementation of the California Environmental Quality Act, as amended May 10, 1980 (14 Cal. Admin. Code: 15000, et seq.). Requires mitigation of adverse impacts to a paleontologic site from development on public land by construction monitoring.

The CEQA Guidelines (Article 1, Section 15002(a)(3)) state 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 J (Significant effects).

CEQA Guidelines, Appendix G, states, in part, that: "A project will 'normally' have a significant effect on the environment if it, among other things, will disrupt or adversely affect . . . a paleontological site except as part of a scientific study." If paleontological resources are identified during the Preliminary Environmental Analysis Report (PEAR) or other initial project scoping studies as being within the proposed project area, the sponsoring agency (Caltrans or local) 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) Web site.

California Environmental Quality Act, State of California Public Resources Code, 2100-21177 as amended January 1, 1999, Appendix G Environmental Checklist Form. Impacts to known, important paleontological resources are specifically covered under CEQA as potentially significant effects (i.e., the project will have a significant effect on the environment). Specifically, each California project must answer the question: "Cultural Resource – would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?" There are four possible answers: Potentially Significant Impact, Potentially Significant Unless Mitigation Incorporated, Less than Significant Impact, and No Impact.

California Coastal Act. The California Coastal Act, in part, authorizes the California Coastal Commission (CCC) to review permit applications for development within the 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 Act, "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 an applicant's proposed project area, they generally look 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 by CEQA. Additionally, the CCC relies heavily on project sponsoring or permitting agencies to ensure compliance with CEQA (and, consequently, the California Coastal Act).

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

Public Resources Code, Section 5097.5 (State 1965, c. 1136, p. 2792). Section 50987.5 of the California Public Code Section 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; any city, county, district, authority, or public corporation; or any agency thereof. Consequently, Caltrans and local project proponents are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

Public Resources Code, Section 30244. Requires reasonable mitigation of adverse impacts to paleontological resources from development on public land.

California Administrative Code. Four sections of the California Administrative Code (Title 14, State Division of Beaches and Parks) administered by the California Department of Parks and Recreation CDPR) address paleontological resources. These include:

- **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 California Administrative Code 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 the Counties of Orange, Riverside, and San Bernardino 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. Project staff should periodically coordinate with local entities to update their knowledge of local requirements.

Further Reference

Additional information is posted on the SVP’s Web site. In the event that a project involves lands administered by either federal or State entities, the local offices of those organizations should also be contacted for guidance and direction.

County of Orange, Standard Conditions of Approval for Grading Permits

A05 PALEONTOLOGY RECORDS SEARCH AND SURVEY. Prior to the issuance of any grading permit, the applicant shall obtain approval from the Manager, HBP/Coastal and Historical Facilities of a report on a literature and records search and field survey of the project site. The applicant shall retain a County-certified paleontologist to complete the literature and records search for recorded sites and previous surveys. The paleontologist shall conduct a field survey unless the entire proposed project site has been documented as previously surveyed in a manner which meets the approval of the Manager, HBP/Coastal and Historical Facilities. The applicant shall implement the mitigation measures in the report in a manner meeting the approval of the Manager, HBP/Coastal and Historical Facilities.

A06 PALEONTOLOGY PREGRADING SALVAGE. Prior to the issuance of any grading permit, the project applicant shall obtain approval from Manager, HBP/Coastal and Historical Facilities of a report of the pre-grade paleontological salvage operation. The applicant shall retain a County-certified paleontologist to conduct pre-grade salvage excavation and prepare a report of the exposed resources. The report shall include methodology, an analysis of artifacts found, a catalogue of artifacts, and their present repository. Applicant shall prepare excavated materials to the point of identification. The applicant shall offer excavated finds for curatorial purposes to the County of Orange, or its designee, on a first refusal basis. Applicant shall pay curatorial fees if an applicable fee program has been adopted by the Board of Supervisors, and such fee program is in effect at the time of presentation of

the materials to the County of Orange or its designee, all in a manner meeting the approval of the Manager, HBP/Coastal and Historical Facilities.

A07 PALEONTOLOGY RESOURCE SURVEILLANCE. Prior to the issuance of any grading permit, the project applicant shall provide written evidence to the Manager, Subdivision and Grading, that applicant has retained a County certified paleontologist to observe grading activities and salvage and catalogue fossils as necessary. The paleontologist shall be present at the pre-grade conference, shall establish procedures for paleontological resource surveillance, and shall establish, in cooperation with the applicant, procedures for temporarily halting or redirecting work to permit sampling, identification, and evaluation of the fossils. If the paleontological resources are found to be significant, the paleontologist shall determine appropriate actions, in cooperation with the applicant, which ensure proper exploration and/or salvage.

Prior to the release of the grading bond the applicant shall submit the paleontologist's follow up report for approval by the Manager, HBP/Coastal and Historical Facilities. The report shall include the period of inspection, a catalogue and analysis of the fossils found, and the present repository of the fossils. Applicant shall prepare excavated material to the point of identification. The applicant shall offer excavated finds for curatorial purposes to the County of Orange, or its designee, on a first refusal basis. These actions, as well as final mitigation and disposition of the resources, shall be subject to approval by the HBP/Coastal and Historical Facilities. Applicant shall pay curatorial fees if an applicable fee program has been adopted by the Board of Supervisors, and such fee program is in effect at the time of presentation of the materials to the County of Orange or its designee, all in a manner meeting the approval of the Manager, HBP/Coastal and Historical Facilities.

City of San Juan Capistrano Council Policy Historic, Archaeological & Paleontological Resource Management Policy No. 601 (edited to reflect only paleo)

1. Intent and Purpose

- a. It is the general intent of the City Council to protect and preserve its unique heritage and valuable built historic, archaeological and paleontological resources within the community. In support of this specific goal the City has adopted an Historic Archaeological Element as a part of the City's General Plan.
- b. Since 1985, the City has conducted extensive archaeological studies in the immediate downtown area of the City which have resulted in the discovery of archaeological resources associated with the community's historic past. In response to these discoveries, the City Council has determined that it is necessary to establish specific procedures and polices to insure that significant historic resources, either known or discovered during construction, will be preserved as a community resource in the most financially equitable method.
- c. To establish administrative procedures for the preparation of site surveys by professionally qualified persons, i.e., with a specific field of expertise in conducting research and on-site surveys regarding potential historic, archaeological and paleontological resources.
- d. To establish review procedures to evaluate historic resource reports, including possible impacts to sites, structures, and artifacts and identification of potential mitigation measures or project alternatives.
- e. To adopt procedures to insure proper mitigation measures and monitoring are implemented during development to provide historic resource protection and preservation.

f. To establish administrative procedures where all significant historic, archaeological and paleontological sites would be recorded with the City and with the proper corresponding research institution.

g. To effect and accomplish the protection, enhancement and perpetuation of historically significant structures, sites, objects and historic districts which represent or reflect elements of the Nation's, State's and/or City's cultural, social, economic, political and architectural history.

2. Definitions – The following definitions shall apply to certain terms included in this policy.

a. *Historic Resource* – a district, site, building, structure or object significant in American history, architecture, engineering, archaeology or culture at the national, state or local level.

b. *Sensitive Area* – an area that is located immediately adjacent to known sites, and/or an area that historic maps or reference materials indicates the presence of possible artifacts.

c. *Significant Historic or Cultural Resource* – an artifact that can be associated with an event or person having a recognized significance in California or American history, or recognized as having scientific importance in the prehistory period, has a special or particular quality such as oldest, best example, or last surviving example of its kind; is at least 50 years old and possesses substantial stratigraphic integrity, or involves important research questions that historical research has shown can be answered only with archaeological methods.

d. *Significant Paleontological Site* – an area where the presence of paleontological artifacts which have a particular scientific importance such as containing a complete species, or located in a unique stratigraphic location and/or geologic formation.

3. Scope and Applicability of Council Policy

The provisions of this policy shall apply to all activities including but not limited to proposed structures, expansions, additions, alterations, grading, excavation, trenching, and/or demolition on properties, premises, existing buildings and structures and their grounds or setting, trees and places classified as follows:

a. Listed on the "Inventory of Historic and Cultural Landmarks" as adopted by City Council Resolution in accordance with Section 9-2.310 of the Municipal Code.

b. Listed as a "State Register of Historic Landmarks" or on the "National Register of Historic Places".

c. Those historic resources which are determined by the Planning Director, the State Historic Preservation Officer, or the National Trust for Historic Preservation to be eligible for listing on the California Register of Historic Resources, the National Register of Historic Places, or the City's Inventory of Historic Resources according to the standards for inclusion on either the State, Federal or Local Registers.

d. In cases where there exists a likelihood that significant historic resources once existed on the property as defined by the "sensitive area survey" as adopted by City Council Resolution.

4. Requirements

All development applications filed subject to the provisions of Title 9, Chapter 2, Administration and Procedures of the Municipal Code and satisfying the above criteria shall be required to submit a historic resource and/or paleontological report to the City as a part of their application submittal except as may be specifically exempted as identified below. A development application shall not be considered complete until said report as required by this chapter is submitted to the City.

The following applications shall be *exempt* from the requirements for submitting reports:

- a. Applications for property for which a previously prepared historic resources and/or paleontological resources report has been accepted by the City, provided that there were no significant errors in methodology or the information presented as determined by the City's Environmental Administrator and the application complies with any applicable mitigation requirements.
- b. Projects which require a permit application and which will not excavate (1) deeper than 18 inches, (2) more than 50 cubic yards of earth, or (3) the Planning Director makes a determination that the geologic strata will not yield subsurface artifacts are exempt from submitting a historic resource or paleontological report unless there is a previously identified historic resource on the site; or the Planning Director makes a determination that a potential historic resource exists on the project; or in the instance of paleontological resources, a survey has already been completed and a report prepared. If the Planning Director determines that the proposed project could potentially affect a known or suspected historic resource adjacent to the project site, then the applicant will be required to submit a historic resource report in order to determine the potential impacts to the historic resource.
- c. Projects that are limited to repair and maintenance of existing facilities and utilities.

5. Administration of Report Preparation

Preparation of archaeological and paleontological reports shall be the responsibility of the applicant. The applicant shall only use certified archaeologists and paleontologists in accordance with the provisions below for reports on historic resources and/or paleontological reports. For reports on built historic resources, the Planning Director must approve of the consultant who will prepare that portion of the historic resources report based on their qualifications in the field of historic preservation.

6. Qualifications for Report Preparation

Reports shall be prepared by individuals or organizations having the following qualifications:

- a. Persons qualified to prepare the preliminary archaeological survey and report shall be certified by the County of Orange and the Society of Professional Archaeologists in the appropriate category of expertise (e.g., field research, historical archaeology, etc.). A list of qualified professionals and their certified categories of expertise is on file with the Department of Planning Services.
- b. Persons qualified to prepare the preliminary paleontological survey and report shall be certified by the County of Orange. A list of qualified professionals is on file with the Department of Planning Services.
- c. Persons qualified to prepare the preliminary historic resources for nonarchaeological resources must be approved by the Department of Planning Services based on the submittal of their qualifications to prepare such reports consistent with the Secretary of the Interior's guidelines for historian and architectural historian.

7. Report Contents

Historic Resource and/or Paleontological Reports shall include the following information:

- a. Document is to be clearly signed by the individual author or authors and dated.
- b. The report shall contain a clear map delineating project/study boundaries.
- c. The report shall include location of specific sites, features, isolates, and structures described within the report. The mapped location of archaeological sites is confidential information, not to be released for public view; it is to be provided to the City as a separable Appendix to the main report, or on a separate sheet.
- d. Reports shall include archaeological record or isolate form (DPR 422) for each site, complete with area map, site map, and trinomial, and form DPR 523 for each historic structure.

- e. The report shall quantify all historic resource and/or paleontological materials observed on the property.
- f. The report shall identify the place from where historic resource and/or paleontological material was collected, or excavated, and presently curated.
- g. The report shall identify the name of all crew persons including supervisors and laboratory personnel involved in the site survey or report preparation.
- h. The report shall include the dates of field survey or excavation; length of time expended on methods and intervals used in the survey; any limitations on ground coverage or visibility; sources of background information; criteria used in evaluating the property.
- i. The report shall include photographs of the potential historic resource or paleontological material, as directed by the Planning Director and any other information required by the Planning Director, the Environmental Administrator or any City Commission which is delegated responsibility to review historic resource or paleontological reports as part of their consideration in making decisions on development or project applications.
- j. Reports shall identify principal investigators, authors, those responsible for directing field work qualified to render such services.
- k. The report shall follow defined orderly process, i.e., inventory (background research and survey), testing methods and results (if necessary), evaluation of significance by defined criteria, and recommendations for potential mitigation measures or project alternatives.

8. Review Process

All development applications subject to the provisions of this policy shall be reviewed in the following manner in order to effectively evaluate significant historic resources and/or paleontological materials that may or may not exist on the project site:

- a. The applicable preliminary report shall be submitted to the Environmental Administrator as part of the responsibility to insure compliance with the California Environmental Quality Act and referral to City boards/commissions.

The Environmental Administrator may take the following actions:

- (1) If the report recommends and the City's Environmental Administrator concurs that no significant historic resources are present, or in the case of a paleontological report that no surface findings were identified in the preliminary site survey, the Environmental Administrator shall require that the project comply with on-site Monitoring and Mitigation Enforcement (see section below). If referral to Cultural Heritage Commission is not required, the Chairman or designate shall be notified of the Environmental Administrator's action. If the Chairman of the Cultural Heritage Commission or designated person determines that the report indicates that a historic resource may be potentially impacted by the proposed project, then a written request for reconsideration shall be submitted within seven (7) days of the Administrator's action.
 - (2) If additional work is necessary or artifacts are present as noted in the report, said report (as amended if additional work is conducted) shall be referred to the Cultural Heritage Commission and considered in accordance with the provisions of Section 8 following.
- b. If the preliminary report is referred by the Environmental Administrator to the Cultural Heritage Commission, said documents shall be reviewed and considered by the Commission. The Commission's recommendation shall be forwarded to the Planning Commission as part of their overall review of the development application.
 - c. The Planning Commission, in reviewing the development proposal, shall evaluate the report and recommendation from the Cultural Heritage

Commission and if the Planning Commission determines it necessary, shall incorporate mitigation conditions for a project in order to preserve any known or identified significant cultural resource. In taking said action the cost of these mitigation measures shall not exceed the limitations identified in the adopted CEQA Guidelines, Appendix K as follows:

.... [specific to cultural resources]

9. On-Site Monitoring and Mitigation Enforcement for Historic Resources (Archaeology/Historic Structures)

.... [specific to cultural resources]

10. On-Site Monitoring and Mitigation Enforcement (Paleontology)

- a. The Building and Safety Division shall be provided with an executed consultant services contract with the individual responsible for supervising on-site monitoring (from approved list of qualified paleontologists) to be present on-site during grading operations.
- b. If paleontological material is present on the site, the paleontologist shall submit a report describing the artifacts that exist on the site. Said report shall include a statement on the significance of the discovery and recommended actions. If the paleontologist finds that the find is insignificant, the Environmental Administrator may allow construction to proceed.
- c. If this report finds that the discovery may be significant it shall be immediately transmitted to the City within 24 hours of notification. Work shall be diverted or halted for a period not to exceed 72 hours in order to schedule and conduct a hearing on the report and recommendations by the City's Environmental Administrator.
- d. The Environmental Administrator shall schedule a special meeting to consider the report and recommendations. Notification of the special meeting shall be as follows:
 - (1) Posting of the meeting agenda at the City Hall lobby, San Juan Hot Springs Dance Hall and San Juan Capistrano Library.
 - (2) Verbal notification to the permit applicant, on-site paleontologist.
 - (3) Verbal notification to the Chairman of the Cultural Heritage Commission.
 - (4) Verbal notification to interested individuals and groups which have submitted a written request for such notification.
- e. The Environmental Administrator, after considering the contents of the report, its recommendations, and review of testimony by interested individuals or groups, may take the following actions:
 - (1) Determine that the find is insignificant and allow work to resume.
 - (2) Determine that additional testing is necessary to evaluate the significance of the artifacts. Said testing and report to be submitted within 14 days.
 - (3) Forward a recommendation to the City Council to initiate data recovery procedures or protect the artifacts in situ.
- f. If additional testing is determined, similar procedures as defined by subsections "d", and "e" shall be followed.
- g. If the Environmental Administrator forwards a recommendation of either data recovery or protection in situ, the item shall be scheduled for consideration at the next meeting of the City Council. The decision of the City Council shall be considered final.
- h. Actions of the Environmental Administrator (subsection "e" above) may be appealed to the City Council.

i. Whether source material is discovered or not, a written report shall be prepared by all monitors summarizing their services and observations.

11. Repair, Rehabilitation, Restoration, Preservation and Relocation of Historic Resources

.... [specific to historic resources]