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July 26, 2021

Ms. Theresa Dickerson
Supervising Planner
WSP USA
1100 W. Town and Country Road, Suite 200
Orange, CA 92868
Transmitted via email to Theresa.Dickerson@wsp.com

RE: Paleontological Technical Memorandum for the Replacement of Two Timber Bridges on Railroad Avenue, Riverside County, California

Dear Ms. Dickerson,

At the request of WSP USA, Inc., Applied EarthWorks, Inc. (*Æ*) completed a paleontological resource assessment for the Replacement of Two Timber Bridges on Railroad Avenue (Project) in Riverside County (County), California. The California Department of Transportation (Caltrans) is the lead agency for compliance with the National Environmental Policy Act (NEPA) and the County is the lead agency for compliance with the California Environmental Quality Act (CEQA).

Æ's scope of work included desktop review of geologic maps, paleontological literature, museum records searches, and preparation of this technical memorandum (memo). This memo, which serves as a summary of our findings, was written in accordance with guidelines set forth by Caltrans (2020) and satisfies the requirements of NEPA and CEQA.

PROJECT DESCRIPTION AND BACKGROUND

The County, in cooperation with Caltrans, proposes to replace two existing structurally deficient bridges along Railroad Avenue near the community of Whitewater in Riverside County, California. The two bridges are the Railroad Avenue Bridge over Fornat Wash (Bridge Number 56C0099) (Federal Aid Project Number [FPN] BRLO-5956 [228]) and the Railroad Avenue Bridge over East Channel Stubbe Wash (Bridge Number 56C0101) (FPN BRLO-5956 [229]). The two bridges are adjacent to and south of Interstate 10 (I-10) between Post Mile (PM) R21.6 and PM R24.6. The Project area includes two discontiguous segments centered around each individual bridge and totals approximately 2.27 acres. One of the bridges is in Sections 11 and 12 of Township 3 South, Range 2 East and the other bridge is approximately 2.5 miles to the east in Section 8 of Township 3 South, Range 3 East, as shown on the Whitewater, California 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle map.

The Project will replace the two existing 2-lane timber bridges with 2-lane concrete bridges, each with a curb-to-curb roadway width of 32 feet. The proposed roadway will consist of two 12-foot-wide travel lanes with one lane in each direction and a 4-foot-wide shoulder on each side. Modern traffic barriers/railings that meet current Caltrans safety design standards will be installed. Each proposed bridge will be approximately 60 feet long. Additionally, approach roadway improvements will be

provided, and channel improvements will be administered to avoid future scour problems. It is envisioned that the channel bottom will remain earthen.

All proposed Project construction, with the exception of a temporary construction easement (TCE) located within Union Pacific Railroad (UPRR) right-of-way (ROW), will occur within the existing roadway ROW, with construction staging and material laydown areas on the roadway itself. The TCE areas are located south of both bridges within UPRR ROW and will be required for access to the channel bottom. However, construction activities are expected to stay at least 50 feet from the live rail tracks to eliminate any effects on the railroad operation. Project-related ground disturbance will reach a maximum depth of 20 feet bgs for excavations associated with bridge construction.

REGULATORY CONTEXT

Paleontological resources are protected under federal and state laws as well as local goals and policies. The *Caltrans Standard Environmental Reference (SER) Environmental Handbook*, Volume 1, Chapter 8 on Paleontology (Caltrans, 2020) provides an overview of relevant laws and regulations and explains the Caltrans policies and procedures used to identify, and, if necessary, mitigate paleontological resources.

Federal

When a proposed project is on federal land or land under federal jurisdiction, Section 101(b)(4) of the Regulations for Implementing the Procedural Provisions of the NEPA directs federal agencies to use all practicable means to "preserve important historic, cultural, and natural aspects of our national heritage." Paleontological resources are "natural aspects of our national heritage." Although funding from the Federal Highway Administration (FHWA) is anticipated, the Project is local and is not subject to federal compliance for paleontological resources. Consequently, paleontological resources are strictly covered under CEQA for this Project.

State

At the state level, paleontological resources are protected under CEQA, which requires detailed studies that analyze the environmental effects of a proposed project. If a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. Specifically, in Section VII(f) of Appendix G of the CEQA Guidelines, the Environmental Checklist Form, the question is posed, "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" If paleontological resources are identified as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

Local

There are several policies covering paleontological resources within the County's *General Plan*, *Multipurpose Open Space (OS) Element* (County of Riverside, 2015:OS-51):

- **OS 19.6:** Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, paleontological resource impact mitigation

program (PRIMP) shall be filed with the Riverside County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.

- **OS 19.7:** Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the Riverside County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.

- **OS 19.8:** Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the Riverside County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

- **OS 19.9:** Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the Western Science Center in the City of Hemet.

PALEONTOLOGICAL RESOURCE POTENTIAL

As stipulated in the Project's services agreement, this assessment follows guidelines outlined in the *Caltrans SER Environmental Handbook*, Volume 1, Chapter 8 (Caltrans, 2020), which provides specific criteria for determining paleontological significance and assessing paleontological sensitivity. Following their guidelines, two types of paleontological significance are recognized: (1) resources that are eligible for National Natural Landmark status, as defined under 36 CFR 62, and (2) scientifically significant paleontological resources. Because fossil resources with National Natural Landmark status are relatively rare, the scientific significance of paleontological resources is typically evaluated. Significance also may be attributed to a rock unit as a whole, predicated on the research potential of its resources. The preservation potential of a geologic unit for significant paleontological resources is described as sensitivity.

Baseline information gathered during a paleontological resource assessment is used to assign the paleontological sensitivity of a geologic unit(s) (or members thereof) to one of three categories—High Potential, Low Potential, and No Potential (Caltrans, 2020). Geologic units are considered to be sensitive for paleontological resources and have a High Potential if significant vertebrate, invertebrate, plant, or trace fossils have been recovered anywhere in their extent, even if outside the Project area; or if the units are sedimentary rocks that are temporally or lithologically suitable for the preservation of significant fossils. Caltrans considers significant fossils as those that contribute new and useful taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Areas with geologic units considered to have High Potential require monitoring and mitigation.

Geologic units are considered to have a Low Potential if they are sedimentary rocks that have not yielded significant fossils in the past, but may possess the potential for containing fossil remains; or they yield common and widespread invertebrate fossils that do not provide new and useful data. Areas with these units generally do not require monitoring and mitigation. However, as excavation for construction gets underway, it is possible that new and unanticipated paleontological resources might be encountered.

If this occurs, a Construction Change Order (CCO) must be prepared in order to have a qualified paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation is required.

Geologic units with No Potential are intrusive igneous rocks, most extrusive igneous rocks, and moderately to highly metamorphosed rocks that do not preserve fossils. For projects encountering only these types of rock units, paleontological resources can generally be eliminated as a concern.

The County's *General Plan* also includes sensitivity criteria and guidelines for mitigation of paleontological resources (County of Riverside, 2015). Their sensitivity categories include High A (Ha), High B (Hb) Potential, Low, and Undetermined. For comparison, High Potential is split into two categories—Ha and Hb, which area roughly equivalent to High Potential for Caltrans (2020). The County's distinction between Ha and Hb is based on the potential for fossils to occur at the ground surface or to occur at or below 4 feet bgs, respectively. The Low Potential category for the County is roughly equivalent to No Potential and Low Potential for Caltrans (2020). Caltrans (2020) does not include an Undetermined Potential category, for which the sensitivity of a rock unit cannot be determined without additional investigation. The County has assessed the paleontological sensitivity of geologic units on a countywide scale and includes a paleontological sensitivity map in the *General Plan* (County of Riverside, 2015:Figure OS-8, OS-55).

METHODOLOGY

To assess the paleontological sensitivity of geologic units exposed at the ground surface and those likely to occur in the subsurface of the Project area, Æ reviewed published geologic maps and paleontological literature, and conducted museum records searches. For the records searches, Æ retained the Natural History Museum of Los Angeles County (NHMLAC) and the Western Science Center of Hemet (WSC) to conduct a search of fossil localities recorded in their collections (McLeod, 2020; Radford, 2020). Since the NHMLAC collections are divided by fossil type, Æ requested a search for vertebrate fossil localities as the geologic units in and near the Project area are more conducive to the preservation of vertebrate fossils than significant invertebrate, plant, and trace fossils.

To augment these results, Æ also conducted a search of the online database of the University of California Museum of Paleontology (UCMP) and the Raymond M. Alf Museum of Paleontology (RAM), with paleontological collections from across California. Lastly, Æ determined the paleontological sensitivity of the Project area in accordance with Caltrans (2020) guidelines and compared the results to the County's (2015) paleontological sensitivity map.

RESOURCE CONTEXT

The Project area is in the San Gorgonio Pass, which forms a major geologic divide between the Transverse Ranges and the Peninsular Ranges geomorphic provinces (California Geological Survey, 2002). A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and tectonic history (American Geological Institute, 1976). North of the San Gorgonio Pass, the Transverse Ranges are an east-west trending series of mountain ranges and valleys, which extend from offshore portions including the San Miguel, Santa Rosa, and Santa Cruz islands in the west to the San Bernardino Mountains in the east (California Geological Survey, 2002). South of the San Gorgonio Pass, the Peninsular Ranges consist of several northwest-trending mountain

ranges separated by valleys, extending from offshore portions including the Santa Catalina, Santa Barbara, San Clemente, and San Nicolas islands in the west to the Salton Trough in the east (California Geological Survey, 2002). The San Gorgonio Pass represents the single largest discontinuity along the San Andreas Fault, resulting from a system of irregular and discontinuous right-lateral, reverse, thrust, and oblique-normal faults (Yule, 2009). Together, these faults contribute to uplift of the San Bernardino Mountains and overall movement between the North American plate and the Pacific plate (Spotila et al., 1998).

The regional geology of the San Gorgonio Pass consists of Neogene marine and alluvial deposits and Quaternary alluvial, eolian, and landslide deposits above Cretaceous plutonic rocks of the Peninsular Ranges batholith and metasedimentary rocks and batholith remnants from the Paleozoic Era (Dibblee and Minch, 2004). In the Project area, the surficial geology consists of alluvial sediments. Some of the alluvial sediments are older, unindurated and partly dissected, and distributed on Pleistocene alluvial fans—mostly sands and gravels of plutonic and gneissic detritus—derived from the San Bernardino Mountains to the north (Qf). The other alluvial sediments are more recent, unindurated and undissected, and distributed in stream channels—recent Holocene sands and gravels (Qg). Approximately 2 miles north-northwest of the Project area, the Pliocene- to Pleistocene-age Palm Spring Formation and Miocene- to Pliocene-age Imperial Formation are exposed at the surface. The Palm Spring Formation (Tps) consists of stream-laid light gray to white, locally pebbly, arkosic sandstone with interbeds of greenish to reddish claystone and minor pebble-cobble conglomerate. The Palm Spring Formation is possibly equivalent to the fossiliferous San Timoteo beds to the west, and may be present at unknown depths below the alluvial deposits in the San Gorgonio Pass (Dibblee and Minch, 2004). The underlying Imperial Formation (Tpi) consists of arkosic claystone (light gray, weathered tan), siltstone, and sandstone (tan to rusty brown) with abundant shallow marine molluscan shell fragments.

While both the Palm Spring and Imperial formations potentially may yield significant fossils, the modest distance to the nearest outcrops suggests they are unlikely to be encountered at shallow depths within the Project area. Despite this, fossils still may be present within the Pleistocene alluvial fan deposits (Qf). Similar deposits elsewhere throughout inland valleys of Riverside and San Bernardino counties are highly fossiliferous (Reynolds and Reynolds, 1991), with a wide variety of megafauna, such as mammoths, ground sloths, dire wolves, sabre-tooth cats, horses, camels, and bison, as well as numerous invertebrate and plant taxa, reported (Scott, 2007; Springer et al., 2009). In contrast, recent deposits such as the Holocene sands and gravels of stream channels (Qg), are typically too young for the fossilization process to occur (Scott and Springer, 2003; Society of Vertebrate Paleontology [SVP], 2010). However, these may form only thin layers above the older alluvial fan deposits where present, as the sediments were deposited by recent stream channels that cut through the older deposits. Consequently, fossils may be redeposited from the Qf sources either near the surface or at shallow depths throughout the Project area within the Qg deposits.

RECORDS SEARCH RESULTS

McLeod (2020) reports no fossil localities from the NHMLAC vertebrate collections within the Project area. However, he lists a few nearby localities from older Quaternary deposits similar to those that occur in the Project area. The closest locality is LACM 4540, which is west-southwest of the Project area on the northeastern side of the San Jacinto Valley along Jackrabbit Trail near Mount Eden. This locality yielded a specimen of fossil horse (*Equus*). The next closest locality is LACM 1269, east-southeast of

the Project area and northeast of Palm Springs on the southern side of Seven Palms Valley north of Flat Top Mountain. This locality also yielded specimens of horse (*Equus*). Lastly, LACM 5832 farther to the southeast in the Indio Hills yielded specimens of undetermined fossil camel (Camelidae).

McLeod (2020) concludes very shallow excavations in the soil and Quaternary alluvial deposits will not uncover significant vertebrate fossils, although deeper excavations into older deposits may encounter significant vertebrate fossil remains. Any substantial excavations in the Project area, therefore, should be monitored closely to quickly and professional recover any fossil remains discovered while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential of the Project area. Fossils uncovered during mitigation activities should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

Radford (2020) reports no fossil localities from the WSC collections within 5 to 10 miles of the Project area, but she notes the Pleistocene alluvial units within the Project area do have high paleontological sensitivity. Consequently, she advises that excavation activity associated with Project development would impact the sensitive deposits, and recommends a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils.

The UCMP online database lists 21 invertebrate fossil localities from the Imperial Formation near San Gorgonio Pass, which yielded dozens of bivalve, gastropod, and scaphopod taxa (UCMP, 2020). The database also lists six invertebrate fossil localities from the Imperial Formation in Garnet Hill, approximately 5 miles east-southeast of the Project area, which yielded bivalve and echinoid taxa. The database does not list any fossil localities from Pleistocene alluvial deposits within a 10-mile radius of the Project area, nor does it list any nearby vertebrate and plant localities from other types of deposits.

The RAM online database lists 60 results for vertebrate fossils from Riverside County, mostly within the Salton Trough (RAM, 2020). None are within a 10-mile radius of the Project area, and most occur to the southeast on the other side of the San Andreas Fault Zone. The closest locality from these is VI-2010005, a Pleistocene ore deposit with bones from camels, bison, horses, and mammoth.

FINDINGS AND RECOMMENDATIONS

Æ reviewed geologic maps, paleontological literature, and records search results to determine the paleontological sensitivity of the Project area. Based on the findings and in accordance with Caltrans (2020) guidelines, *Æ* assigns the entire Project area to High Potential, although depths at which fossils may be encountered, if present, could vary from being near the surface where unit Qf is exposed, to shallow depths where Qg is exposed. This contrasts with the County's (2015) paleontological sensitivity map, which shows the entire surface area of the Project area to be Low Potential. The difference in assessments suggests the Project area may require additional investigation, such as a pre-construction survey, to ground truth the desktop results.

For construction monitoring, *Æ* recommends a paleontological resource impact mitigation program (PRIMP) be prepared by a qualified professional paleontologist who meets the SVP's (2010) standards (Project Paleontologist). The PRIMP must be completed prior to issuance of grading permits. The purpose of the document is to establish mitigation monitoring procedures and discovery protocols based on industrywide best practices (Murphey et al., 2019), for any paleontological resources encountered as a result of earth-disturbing activities during construction of the Project. For instance, Worker's

Environmental Awareness Program (WEAP) training should be prepared prior to the start of Project-related ground disturbance and presented in-person to all field personnel to describe the types of fossils that may be found and the procedures to follow if any are encountered. A PRIMP also will indicate where construction monitoring will be required for the Project and the frequency of required monitoring (i.e., full-time, spot-checks, etc.).

For this Project, Æ recommends initial full-time monitoring for all ground-disturbing activities in portions where unit Qf is exposed, and for ground-disturbing activities of 4 feet or greater bgs where unit Qg is exposed. Monitoring may be reduced to spot-checks or discontinued at the discretion of the Project Paleontologist if no intact and significant paleontological resources are encountered after the initial period of full-time monitoring. The PRIMP will define and quantify the initial period of full-time monitoring. In addition to monitoring procedures, a PRIMP also will provide details about fossil collection, analysis, and preparation for permanent curation at an approved repository such as the WSC. Lastly, the PRIMP describes the different reporting standards to be used—monitoring with negative findings versus monitoring resulting in fossil discoveries.

It has been a pleasure assisting you with this Project. If you have any questions, please do not hesitate to contact me at (626) 578-0119 x400.

Sincerely,

Chris Shi
Project Paleontologist
Applied EarthWorks, Inc.

Edited and Approved By:

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