2.2.4 Paleontology

2.2.4.1 Regulatory Setting

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils.

A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized projects.

- 23 United States Code (USC) 1.9(a) requires that the use of federal-aid funds must be in conformity with all federal and state laws.

- 23 United States Code (USC) 305 authorizes the appropriation and use of federal highway funds for paleontological salvage as necessary by the highway department of any state, in compliance with 16 USC 431-433 above and state law.

Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA).

2.2.4.2 Affected Environment

This section is based on the Combined Paleontological Identification Report and Paleontological Evaluation Report (PIR/PER) (April 2017) prepared for the project.

2.2.4.2.1 Stratigraphy

The proposed project area is mapped as Holocene to late Pleistocene (modern to 11,700 120,000-year-old) young alluvium (Saucedo et al. 2016). Holocene to late Pleistocene (Qya2) flood plain deposits consist of poorly sorted, permeable clays to sands. Deposits are poorly consolidated and may be capped by poorly to moderately developed soils. These sediments were deposited by streams and rivers on canyon floors and in the flat flood plains of the area.

2.2.4.2.2 Paleontological Records

Based on the PIR/PER, no fossils are known within the proposed project boundaries. Three fossil localities are present near the project area in non-marine and marine sedimentary deposits, similar to those that occur at depth within the project boundaries. Specimens recovered include rays, sharks, bony fish, turtle, birds, sea otter, camels, dog, gopher, horse, and mammoth.

The nearest locality in Pleistocene alluvium is the Natural History Museum of Los Angeles County (LACM) 7393, approximately 3.9 miles west/southwest of the proposed project area, adjacent to the Bixby Knolls - California State University, Long Beach (CSULB) rise. There, older sediments have been brought to the surface by fault activity. A camel specimen was collected from a depth of 8.5 feet below the surface.

2.2.4.2.3 Survey Results

The reconnaissance survey conducted as part of the PIR/PER determined that native sediments were most visible in the drainage basins of the Los Alamitos Channel. Reddish-brown to brown soils capped the section. Below that were yellowish-green sands which graded to pale green

silty-clays at the base. These yellowish-green sands to pale green sediments were deposited by local rivers on a flood-plain.

A concentration of marine shells and at least one mammal bone fragment was discovered in a horizon 10 centimeters (cm) thick, approximately 250 feet long, and 2 to 3 feet below ground surface on the western side of the Los Alamitos Channel drainage basin. Shells were found in a light gray to tan, silty clay with dark brown to very dark gray staining. Although Pleistocene marine deposits can be found at the surface locally, the nearest place where this may occur is 2.25 to 3.5 miles to the southwest and west of the proposed project site, along the rise running from Bixby Knolls, through Signal Hill, and southeast to the CSULB. These shells and bone fragments are considered to be Holocene materials that were discarded in the Los Alamitos Channel – Coyote Creek drainage. Marine invertebrates observed included scallops and clams (*Pecten sp., Chione sp., Bivalva*), a number of clam bored siltstone cobbles, olive shell snails and other snails (*Olivella sp., Gastropoda*), and sea urchins.

A surface scatter of not in-situ marine shells was also present, adjacent to a concrete-lined ditch paralleling I-605. These shells would have been displaced during the construction of the ditch and reflects the extent of this shell concentration.

2.2.4.2.4 Paleontological Sensitivity

Paleontological resources are considered to be significant if they provide new data on fossil animals, distribution, evolution, or other scientifically important information. Knowledge of the geological formations gleaned from the survey and records of previous fossils recovered from the area are the basis for determining the paleontological sensitivity of projects. Caltrans utilizes a tripartite scale to characterize paleontological sensitivity, as shown in Table 2.2.4-1, Paleontology Sensitivity Scale.

Table 2.2.4-1: Paleontology Sensitivity Scale

Sensitivity	Description
High	Rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include sedimentary formations that contain significant nonrenewable resources anywhere within the geographical extent.
Low	Rock units that are not known to have produced significant fossils in the past, but possess a potential to contain fossils or those that yield common fossil invertebrates.
No	Rock units of igneous origin or metamorphosed transformation.

Source: Combined Paleontological Identification Report and Paleontological Evaluation Report (PIR/PER) (April 2017), Table 2, p. 13.

The surface of the proposed project area is mapped as Holocene to late Pleistocene young alluvium. Near to the Palos Verdes Hills, extinct Pleistocene animals have been found as shallow as 5 feet deep and a camel specimen was recovered from 3.9 miles away, 8.5 feet below ground surface. For the most part, fossils of extinct Pleistocene animals start appearing at about 10 feet below ground surface in California's large valleys. Accordingly, sediments less than 10 feet below the original ground surface are given a low sensitivity and those that are more than 10 feet deep are given a high sensitivity, as shown in Table 2.2.4-2, Paleontology Sensitivity for the Proposed Project.

Table 2.2.4-2: Paleontology Sensitivity for the Proposed Project

Rock Units	Caltrans Sensitivity		
	High	Low	No
Young alluvium, Holocene. Less than 10 feet deep		X	
Young alluvium, Pleistocene. More than 10 feet deep	X		

Source: Combined Paleontological Identification Report and Paleontological Evaluation Report (PIR/PER) (April 2017), Table 3, p. 13.

2.2.4.3 Environmental Consequences

The project footprint for both Build Alternatives is similar; therefore, the discussion of Alternatives 2 and 3 below is combined into a single discussion of Build Alternatives, since implementation of either of the Build Alternative would result in similar impacts.

2.2.4.3.1 Temporary Impacts

Alternative 1 (No-Build Alternative)

Under the No-Build Alternative, no project construction would occur and, therefore, no impact on paleontological resources would occur.

Alternatives 2 and 3 (Build Alternatives)

While there are no known, recorded paleontological resources within the proposed project boundaries, earth-moving activities associated with construction of the Build Alternatives could result in the disturbance or loss of paleontological resources, including scientifically important fossil remains, associated fossil specimen data, and corresponding geologic and geographic locality data. Any loss of paleontological resources would most likely occur in areas underlain by areas in the proposed project boundaries mapped as Pleistocene young alluvium.

Because grading and excavation associated with construction activities could have the potential to adversely impact significant paleontological resources associated with the Pleistocene young alluvium, a project-specific Paleontological Mitigation Program (PMP) would be required, as described in Measure PAL-1 below. With implementation of Measure PAL-1, the Build Alternatives would not result in any adverse effects on paleontological resources as a result of construction activities.

2.2.4.3.2 Permanent Impacts

Alternative 1 (No-Build Alternative)

Under the No-Build Alternative, no improvements to the I-605/Katella Avenue interchange would occur and, therefore, no operational impact on paleontological resources would occur.

Alternatives 2 and 3 (Build Alternatives)

Operation of either of the Build Alternatives would not result in permanent impacts to paleontological resources because operational activities would not involve any disturbance to Pleistocene young alluvium**.**

2.2.4.4 Avoidance, Minimization, and/or Mitigation Measures

PAL-1 Prior to construction activities, Caltrans shall ensure that a project-specific Paleontological Mitigation Plan (PMP) is prepared by a qualified principal paleontologist (MS or PhD in paleontology) once adequate project design information regarding subsurface disturbance location, depth, and lateral extent is available, and implemented during construction of the project in those parts of the project area that have been identified as having a high potential to impact significant nonrenewable paleontological resources. The PMP shall include, but not be limited to, the following:

- Mandatory paleontological training during the Worker Environmental Awareness Program;
- Full-time paleontological monitoring by a qualified principal paleontologist in cuts measuring more than eight feet below ground surface;
- Proposed field and laboratory methods that are consistent with repository requirements;
- Reporting requirements that conform to the Caltrans' PMP format; and
- Submission of the final Paleontological Mitigation Report to Caltrans upon completion of project earth-moving activities.