GANDA

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To: **Melanie Brent, Caltrans Environmental Planner**

From: **Ferdinand Oberle, Paleontologist**

Date: **October 20, 2010; revised December 2, 2010**

RE: **Paleontological Identification Report (PIR) for the Yerba Buena Interchange Ramps Improvement Project**

Introduction and Statement of Conformity

This Paleontological Identification Report (PIR) describes potential paleontological resources at the Yerba Buena Interchange Ramps Improvement Project, Yerba Buena Island, San Francisco County, California. It has been prepared in conformance with the California Department of Transportation (Caltrans) Standard Environmental Reference, Volume I: Guidance for Compliance, Chapter 8 – Paleontology (Caltrans 2007).

Methods

Paleontological Study Area (PSA)

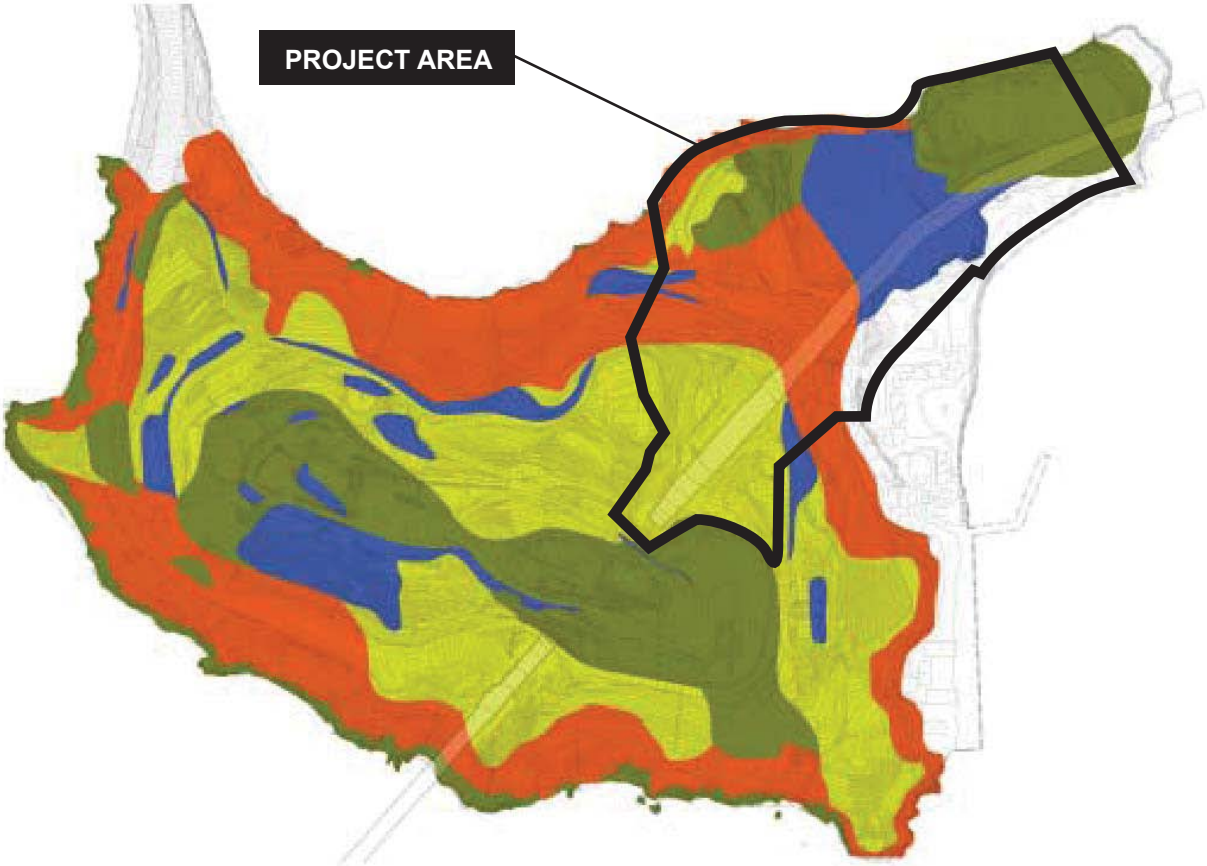
The paleontological study area (PSA) included the area connecting the San Francisco-Oakland Bay Bridge on Interstate 80 (I-80) to Macalla Road on Yerba Buena Island. The literature and map review and fossil locality search was performed for the entire PSA.

Data Sources Consulted

Background research conducted for this project consisted of a literature and map review and a fossil locality search. This research identified the geologic units, previous paleontological studies, fossil localities (i.e., locations at which paleontological resources have been documented), and types of fossils in geologic units that may be within or adjacent to the project area (Figures 1 and 2). An online fossil locality search was conducted on 10.16.2010, using the Berkeley Natural History Museum (BNHM) online database, which includes data from the University of California, Museum of Paleontology (UCMP) (http://bnhm.berkeley.edu/query/index.php).

Results of Field Survey

Background research identified that the geologic units within the project area have low to high paleontological sensitivity. Ferdinand Oberle conducted a field survey of the project site on Oct. 15, 2010 (Figure 1). Mr. Oberle earned a M.Sc. in Environmental and Marine Geology from the University of Bremen in 2005, and has been a staff paleontologist with Garcia and Associates since 2007. He observed all geologic units identified by Graymer *et al.* (2000), Radbruch (1957) and HMP (2009) at the surface within the PSA or adjacent to the project footprint. No paleontological resources were observed during the survey.



Geologic Materials

Franciscan Bedrock:
Sandstone, siltstone.

Dune Sand and Alluvium:
Dense fine sand. Locally cemented with gravel lenses. Covering rock up to 80 feet thick.

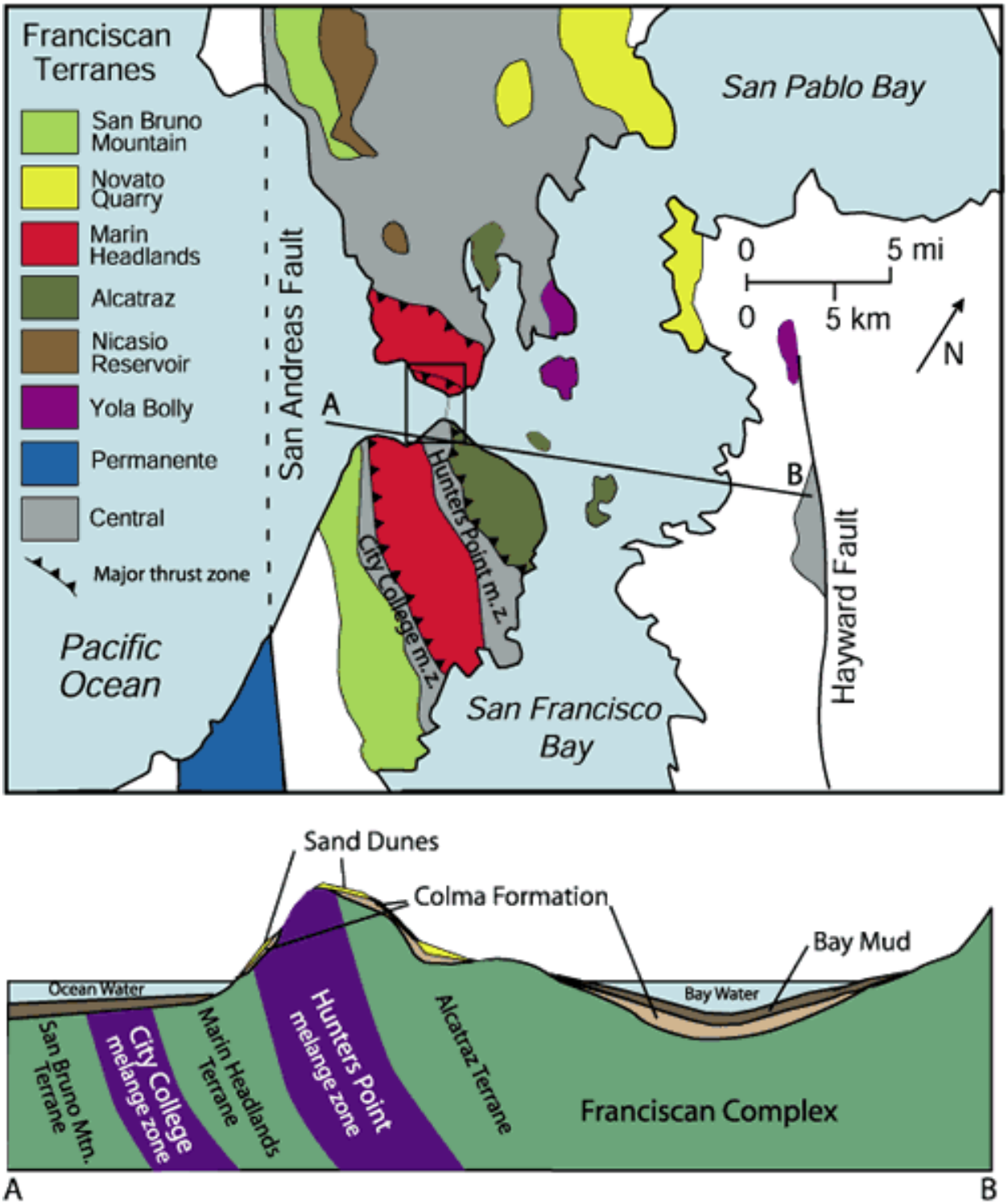
Colluvium and Landslide Debris:
Unstable loose sand and rock debris covering island.

Manmade Fills:
Thin deposits under most roads and building pads. Thick deposits under causeway and Coast Guard port facilities.

Source: Baise et al 2001

Not to Scale

Figure 1
Geologic Units in the Project Area



Source: Elder, W. 2001

Not to Scale

Figure 2
Franciscan Complex and Colma Formation

Geological Setting
The valley in which San Francisco Bay resides began to form around 2 to 3 million years ago, when the surrounding mountains and hills started to rise on either side. YBI lies within the San Francisco Bay and is thought to have been uplifted by faulting along a branch of the Hayward Fault approximately 1 million years ago (CMB *et al.* 2009). Yerba Buena Island is underlain by Franciscan Formation basement rock consisting of interbedded graywacke sandstone, siltstone and claystone of varying proportions. Bedrock on the island is covered by thin sandy deposits from the Pleistocene Colma formation or derived from the underlying sandstone.

Sand covers most of the bedrock on the island, except along the lower parts of the slopes where waves have cleaned the rocks, and on northeast point. Grading in the late 1930s at the northeast point removed up to 50-60 feet off the top of the hill exposing slightly weathered bedrock. Artificial fill at the northeastern tip of the island was created in 1943 by placing cut materials from Yerba Buena Island and dredged bay deposits.

Native soils on YBI range from ten to 40 inches in depth and have been highly altered throughout the island by grading, excavating, filling, and otherwise reshaping topography. (Earth Mechanics 2010, CMB *et al*. 2009).

Jurassic/Cretaceous—The Franciscan Complex
The Jurassic/Cretaceous-age Franciscan Formation forms the bedrock of YBI and consists of interbedded sandstone, siltstone and claystone. The Franciscan Complex is a melange of rock units that were variably deformed and metamorphosed in a subduction zone at the western edge of the North American Plate (Hamilton, 1969; Page, 1981; Wakabayashi, 1992). Franciscan lithologies are predominantly meta-sedimentary rocks with subordinate volcanic rocks that are believed to represent trench fill and volcanic islands, respectively. In the Project area this unit is predominantly thick-bedded to massive sandstone with only a few thin beds of claystone or siltstone thus identifying it as part of the Alcatraz terrane. The bedding orientation dipping to the northeast is consistent with outcrops and other borings on the island (Fugro-EMI, 2001). The rock is commonly soft in the upper 5 to 15 feet where it has been altered by weathering. These weathered rocks are generally brown.

Pleistocene - Colma Formation
The Colma Formation is late Pleistocene in age. The Colma Formation is dated to 0.07-0.13 mya (Clifton *et al.* 1988; Konigsmark 1998). Sediments of the Colma Formation were deposited in either marine or non-marine environment (Clifton *et al*. 1987, 1988; Hengesh and Wakabayashi 1994). The Colma Formation may simply represent a facies change of the geological units known as Old Bay Mud or Yerba Buena Formation, which can be found in the presently marine environment underneath the bay bridge. Yate *et al*. (1990) describes the texture of the Colma Formation as "poorly unconsolidated sands" and muds. On Yerba Buena Island, the Colma Formation underlies Bay Mud and dune sand layers at varying depths and overlies the Franciscan Complex in some areas where it has not eroded away (Figure 2) (Elder, 2001). Surface outcrops of the Colma Formation have not been identified on YBI. The exact depth of Colma Formation on YBI is unknown. The geographically closest data concerning the depth of

the Colma formation comes from cores taken east of YBI from underneath the Bay Bridge. Here, the Colma formation has been identified to exist as close as 3.05 meters (10 feet) below Bay Mud (McGann et al., 2002). Because erosion rates can be higher on land than in a marine setting, it can be expected that the Colma formation exists at a depth of less than 3.05 meters (10 feet). An archaeological excavation identified a stratum that coincides lithologically with the Colma formation on YBI in a nearby location at a depth of 2 meters (6.5 feet) (Morgan et al., 2007). Geotechnical drilling for this project resulted in the identification of a lithological unit that coincides with the Colma Formation at a depth of approximately 2 meters (6.5 feet) (Earth Mechanics Inc., 2010).

Pleistocene to Recent-Colluvium and Landslide Debris

A portion of the project area appears to have experienced shallow landslides. Similar but degraded slide scars can be seen on the slopes around the island indicating that these features have occurred in the past and are a recurring phenomenon. Landslides on YBI consist of two types: thin surficial soil slips and wedge failures involving Franciscan Formation bedrock. These landslides are generally small and occur where slopes have been over-steepened by erosion and excavations. The depth of these slides was on the order of about 2 to 5 feet.

Pleistocene to Recent -Dune Sand and Alluvium

Quaternary dune sands typically cover the Colma Formation. Some of these dune sands were carried by the Sacramento River system through the Golden Gate and were deposited in eolian environment (Konigsmark 1998). The sands, characterized by excessive drainage of water, extended throughout most of western San Francisco before its development (Sullivan and Galehouse 1991), and supported the native grassland and scrub vegetation that once were widely distributed throughout the San Francisco peninsula.

The alluvium is composed primarily of fine-grained sand and silty sand with a few scattered silt and clay lenses. The colors of the alluvium are shades of brown ranging from yellowish-brown, brown, brownish-yellow, and dark brown. The material is loose to very dense and generally moist except on the upper slopes where it is locally dry to moist. The deposits are thick-bedded to unbedded; where bedding occurs it is generally horizontal to dipping about 20 degrees.

The great thickness and fine-grained nature of the sands along with their poor grading and widespread distribution in pockets across the island suggests these materials originated as wind-blown sands similar to those occurring on much of the San Francisco Peninsula. An archaeological excavation identified a stratum that coincides lithologically with the San Dunes on YBI in a nearby location between 0 to 2 meters (0 to 6.5 feet) (Morgan et al., 2007).

Recent- Artificial Fill

Fill occurs locally across the island as road base, foundation support, and landscaping soil. Fill also occurs as uncompacted cast-over or disturbed surficial slough from the various historical development activities. Along the many roads around the island, cast-over grading material from the road building activities overlies, and is gradational with, native slope-wash sedimentary alluvium. Artificial fill occurs along the island shoreline east and south of the

Northeast Point at the Torpedo Building and Torpedo Road, and in the Coast Guard base in the southern Saddle Area. Most of the present U.S. Coast Guard Station is entirely on fill first placed around 1934.

The fill material within the Southern Saddle Area is up to about 9.1 meters (30 feet) thick. Exploratory excavation indicated the upper portion of the fill consists of brown to yellowish brown, moist, loose to medium dense, fine grained sands with some gravel. The lower portion consists of a coarser fraction composed of brown and gray sand and gravel material with large angular cobbles and boulders of the Franciscan Formation sandstone and siltstone.

Paleontological Sensitivity

Paleontological resources include fossil plants and animals and other evidence of past life such as preserved animal tracks and burrows. As identified by the Society of Vertebrate Paleontology (SVP), the paleontological sensitivity of a geologic unit is determined by its potential to contain paleontological resources (SVP 1995). The paleontological sensitivity of a geologic unit may be classified as:

- **High Potential.** Rock units are considered to have a high potential for containing significant non-renewable fossiliferous resources if vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered. These units include, but are not limited to, sedimentary and volcanic formations that contain significant nonrenewable paleontological resources and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both of the following: (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils that are large or small, vertebrate, invertebrate, or botanical; and, (b) the importance of recovered evidence for new and significant taxononic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than Recent and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant.
- **Undetermined Potential.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossilferous 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.
- **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.

Caltrans uses a similar three-part scale for assessing the sensitivity or potential for a particular rock unit to contain paleontological resources (Caltrans 2007). These two classification systems are compatible. In most cases, decisions about how to manage paleontological resources must be based on this potential because the actual situation can not be known until construction

excavation for the project is underway:

- **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. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with very limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive. High sensitivity includes the potential for containing: (1) abundant vertebrate fossils; (2) a few significant fossils (large or small vertebrate, invertebrate, or plant fossils) that may provide new and significant taxonomic, phylogenetic, ecologic, and/or stratigraphic data; (3) areas that may contain datable organic remains older than Recent, including *Neotoma* (sp.) middens; or (4) areas that may contain unique new vertebrate deposits, traces, and/or trackways. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation.
- **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 because vertebrates are generally rare and found in more localized stratum. Rock units designated as low potential 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 Principal Paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation is required.
- **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. For projects encountering only these types of rock units, paleontological resources can generally be eliminated as a concern when the PEAR is prepared and no further action taken.

SVP identifies vertebrate fossils, their taphonomic and associated environmental data, and fossiliferous deposits as significant nonrenewable paleontological resources. Botanical and invertebrate fossils and assemblages may also be considered significant (SVP 1995). Due to the rarity of fossils and the scientific information they provide, a paleontological resource can be considered significant (Scott and Springer 2003) if the resource does any of the following:

- Provides data on the evolutionary relationships and developmental trends among organisms, both living and extinct;

- Provides data useful in determining the age(s) of the geologic unit or stratigraphy, as well as timing of associated geological events;
- Provides data on a community level;
- Demonstrates unusual or spectacular circumstances in the history of life; and / or
- Is not abundant or found in other geographic locations and may be in danger of being depleted or destroyed by the elements or vandalism.

Significant paleontological resources must be diagnostic to determine if any of the criteria above is applicable. Proper identification of paleontological resources is often difficult in the field; therefore, the recovery, preparation and analysis of paleontological resources is necessary to determine their significance (Scott and Springer 2003). This process must be done by, or under the supervision of, a qualified paleontologist (Conformable Impact Mitigation Guidelines Committee 1995). Microvertebrate fossils are generally not visible to the naked eye; although initial sifting may be conducted in the field, analysis for microinvertebrates requires laboratory processing of bulk samples from paleontologically sensitive geologic units (Conformable Impact Mitigation Guidelines Committee 1995; Scott and Springer 2003).

Paleontological Resources within the Project Area

The results of the literature review and the online fossil locality search using the Berkeley Natural History Museum (BNHM) online database, which includes data from the University of California, Museum of Paleontology (UCMP) found 122 fossil localities within San Francisco County. These include 1 specimen from the Jurassic, 4 from the Cretaceous, 3 from the Miocene, 6 from the Pliocene, 102 from the late Quaternary, 1 from the Holocene and 5 of unknown age.

The Franciscan Complex and the Alcatraz Terrane

The Franciscan formation is heavily deformed and metamorphosed in many locations, and whatever fossils existed in these strata have been destroyed. Fossils from the Franciscan formation are therefore generally rare and are all the more important, because they can provide information on the age of a particular sedimentary suite, fixing it in the comparatively vast 150 million years spanned by the formation. Fossils recorded from the Franciscan formation of coastal California include trace fossils (preserved tracks or other signs of the behaviors of animals), mollusks, and marine reptiles.

The Alcatraz Terrane, the portion of the Franciscan complex found within YBI, contains fossils. In fact, the first fossil ever found in what was then called the Franciscan Formation, came from the Alcatraz Terrane (Graymer *et al*. 2000). This fossil consisted of an *Inoceramus ellioti* of Cretaceous age. Subsequent fossil discoveries include several other mulloskan fossils of Cretaceous age. While all other terranes of the Franciscan Complex usually carry a moderate paleontological sensitivity, the fossil finds of the Alcatraz Terrane are highly important in contributing to the understanding of the depositional environment thus giving this unit on YBI a high paleontological sensitivity.

The Colma Formation

The Colma Formation has produced significant marine and terrestrial fossils in the past.

Rodda and Baghai (1993) reported bones and teeth of mammoth and extinct bison from sands and clays unconformably overlying the Franciscan Complex that they refer to as the Colma Formation. Marine facies of the Colma Formation have produced marine megafossils, marine and nonmarine diatoms, and sponge spicules (Schlocker, 1974). Savage (1951) listed other vertebrate fossil localities in the San Francisco Bay region to which he assigned an "undifferentiated Pleistocene" age. Some of these additional vertebrate fossils may also be referable to the Colma Formation. Schlocker (1974) reported fossil plant remains and a peat layer at the top of his Colma Formation possibly representing "an old soil that developed in or near local marshes or lakes." Within San Francisco this geological unit is the most abundant collection of Pleistocene vertebrates. On YBI, the Colma Formation has not been mapped and is not known to occur in surface deposits but is likely to overlie portions of the Alcatraz Terrane, beneath deposits of dune sand or Old Bay Mud. This geological unit has a high paleontological sensitivity.

Colluvium and Landslide Debris
These deposits are generally considered to be too young to contain significant fossils (10,000 years old to recent). They are less likely to contain well-preserved fossils than intact older parent deposits, and are thus considered to have a low paleontological resource potential.

Dune Sand and Alluvium
Dune sand and alluvium are intermixed in the project area and are thus considered together. They consist of Holocene to Pleistocene sediments, increasing in age with depth (Graymer, 2000). Due to their lack of good preservational abilities, Pleistocene dune sands rarely contain fossils. This geological unit has a low paleontological sensitivity.

Artificial Fill
Artificial fill could have fragmentary fossil material transported from other sites. Even if such were the case, this material would be out of stratigraphic context and, therefore, have no scientific value and minimal, if any, educational value due to its lack of context and fragmentary nature. Therefore, artificial fill has a low paleontological sensitivity.

Regulatory Context

Federal
Several federal laws protect paleontological resources on federal lands as well as projects undertaken by federal agencies.

<u>Antiquities Act of 1906</u>
The Antiquities Act of 1906 (16 United States Code [USC] 431-433) has been cited in past efforts to protect paleontological resources on federal lands, and is recognized for regulation of the collecting of vertebrate fossils on land managed by the BLM, National Park Service, Forest Service, Department of Energy and other federal agencies.

<u>National Environmental Policy Act of 1969</u>
The National Environmental Policy Act (NEPA, 42 United States Code [USC] 4321) directs

Federal agencies 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. CEQ NEPA regulations identify mitigation in the NEPA process as measures to avoid, minimize, rectify, reduce, or compensate for environmental impacts (40 CFR 1508.20).

Federal Land Policy and Management Act of 1976

The Federal Land Policy and Management Act (FLPMA, 43 USC 1701-1782) authorizes inventories of paleontologic resources on federal land managed by the Bureau of Land Management (BLM), which now issues permits for collecting paleontological resources (fossils).

Paleontological Resources Preservation Act of 2009

The Paleontological Resources Preservation Act (PRPA), is part of the Omnibus Public Land Management Act of 2009 (Public Law 111-011 Subtitle D). This act directs the Secretary of the Interior or the Secretary of Agriculture to manage and protect paleontological resources on federal land, and develop plans for inventorying, monitoring, and deriving the scientific and educational use of such resources. It prohibits the removal of paleontological resources from federal land without a permit issued under this Act, establishes penalties for violation of this act and establishes a program to increase public awareness about such resources. The bill imposes criminal penalties for violating this Act, which includes serving up to 10 years in prison if convicted.

State and Local

The following State laws pertain to paleontological resources. No local regulations pertaining to paleontological resources were identified.

California Environmental Quality Act

The California Environmental Quality Act requires that a determination be made as to whether a project would directly or indirectly destroy a unique paleontological resource or site or a unique geological feature (CEQA Guidelines, Appendix G (V)c). If an impact is significant, the State CEQA Guidelines require "feasible measures which could minimize significant adverse impacts" (State CEQA Guidelines Section 15126.4). State CEQA Guidelines Section 15370 also defines mitigation as:

> (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
>
> (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
>
> (c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
>
> (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

Public Resources Code § 5097.5
California Public Resources Code § 5097.5 prohibits excavation or removal of any "vertebrate paleontological site, 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." Public lands are defined to include lands owned by or under the jurisdiction of the state or any city, county, district, authority or public corporation, or any agency thereof. Section 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

Potential Impacts to Paleontological Resources
Construction activities can impact paleontologically sensitive geologic units when vehicles or other work equipment impact previously undisturbed sediments by excavating, grading, or crushing bedrock exposed in or underlying a project. This can result in significant impacts to fossils by destroying them or otherwise altering them in such a way that their scientific value is lost.

The proposed project would replace the existing westbound on-ramp and the westbound off-ramp located on the eastern side of YBI with a new westbound on-ramp and a new westbound off-ramp that would improve the functional roles of the current ramps.

Alternative 2b includes removal of the existing westbound on- and off-ramps on the east side of YBI, construction of a westbound hook on-ramp from Macalla Road on the east side of YBI, and construction of a westbound off-ramp to Macalla Road on the east side of YBI. Alternative 4 includes the removal of the existing westbound on- and off-ramps on the east side of YBI, construction of the westbound on-ramp from South Gate Road, and construction of the westbound off-ramp to Macalla Road on the east side of YBI.

Ground-disturbing activities within the PSA could potentially impact paleontological resources. The paleontologically sensitive Franciscan Complex/Alcatraz Terrane can be found directly underneath the paleontologically sensitive Colma Formation (see Figure 1), and both would be affected by construction activities.

Avoidance, Minimization, and Mitigation Measures

In general, avoidance and minimization are not feasible with regard to addressing significant impacts on paleontological resources. Geologic formations are usually extensive, and project design cannot be adjusted sufficiently to effectively avoid or minimize paleontological impacts. As a result, mitigation is the approach generally taken to address paleontological impacts.

Follow Caltrans' mitigation measures for paleontological resources per Standard Environmental Reference guidelines (Caltrans 2007). Caltrans will implement the following measures as

applicable to the selected alternative:

a. A qualified paleontologist will be present to consult with grading and excavation contractors at pre-grading meetings.
b. A paleontological monitor, under the direction of the qualified principal paleontologist, will be on site to inspect cuts for fossils at all times during original grading involving sensitive geologic formations.
c. When fossils are discovered, the paleontologist (or paleontological monitor) will recover them. Construction work in these areas will be halted or diverted to allow recovery of fossil remains in a timely manner.
d. Fossil remains collected during the monitoring and salvage portion of the mitigation program will be cleaned, repaired, sorted, and cataloged.
e. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, will then be deposited in a scientific institution with paleontological collections.
f. A final report will be completed that outlines the results of the mitigation program.

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Additional Recommendations for Mitigating Impacts to Paleontological Resources

Onsite Training

Onsite training should be conducted for all construction personnel who will work in excavated areas in the of the project area (Figure 1). Training will discuss the types of paleontological resources that could be encountered on the project and the procedures to be followed if they are discovered.

Monitoring of Construction Activities

Ground disturbing excavations include pile driving and column foundation construction. The minimum excavation depth for these construction activities is approximately 12.2 meters (40 feet). Ground disturbing activities are expected to penetrate paleontologically sensitive units throughout the PSA.

Monitoring of project-related, ground-disturbing activities within the Franciscan Complex and the overlying Colma formation should occur. The following includes the areas and depth parameters when monitoring should occur:

- In areas where the Franciscan Bedrock is mapped (as shown on Figure 1).
- If ground disturbances exceed 2 meters (6.5 feet) in depth in the areas mapped as Dune Sand and Alluvium (as shown on Figure 1).
- If ground disturbances exceed 2.6 meters (8.5 feet) where Colluvium and Landslide Debris are mapped (2 meters [6.5 feet] for Dune Sands and 0.6 meters [2 feet] for Landslides) (as shown on Figure 1).
- If ground disturbances exceed 9.1 meters (30 feet) in depth the <u>southern saddle area where Manmade Fill is mapped</u> (as shown on Figure 1).

Monitoring should continue until a paleontologist has determined that the paleontologically

sensitive units are not being impacted or do not contain paleontological materials. Periodic sampling of excavated material of the Franciscan Complex and Colma Formation will determine whether they contain sensitive paleontological resources. Monitoring, sampling, data recovery, reporting, and curation activities should take place in accordance with the professional standards determined by the Society of Vertebrate Paleontology (Conformable Impact Mitigation Guidelines Committee 1995).

Unanticipated Discovery

In the event fossils are discovered in an area where monitoring is not being performed, the following guidelines should be followed:

- Stop all construction work within a 15.24 meter (50 foot) radius of the find until a qualified paleontologist can assess the significance of the find. If the discovery is significant or potentially significant, then potential mitigation will include:
    - Data recovery and analysis,
    - Preparation of a data recovery report, and
    - Accessioning recovered fossil material to an accredited paleontological repository, such as the University of California's Museum of Paleontology.

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