April 16, 2009

Milford W. Donaldson
c/o William Soule
State Historic Preservation Officer
California State Department of Parks and Recreation
Post Office Box 942896
Sacramento, California 94296

Subject: Identification, Evaluation and Determination of Adverse Effects – Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault Project, Fremont, Alameda County California

Dear Mr. Donaldson:

The SFPUC has requested authorization to construct the Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault Project, a component of the San Francisco Public Utilities Commission (SFPUC) Water System Improvement Program. The Corps of Engineers, San Francisco District (USACE), is processing a permit application pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. Code 403), and Section 404 of the Clean Water Act (33 CFR Part 325 and 330) for the proposed BDPL Nos. 3 and 4 Project. USACE has identified these permitting actions as an undertaking pursuant to the National Historic Preservation Act (36 CFR 800). The SFPUC has taken into account the effects of the proposed project on historic properties.

ESA+Orion, a joint venture, has been authorized to provide this letter at the request of the USACE. At this time we are requesting your review and comment on our Area of Potential Effects (APE), Identification and Evaluation of Historic Properties, and Assessment of Adverse Effects.

Project Location and Description

BDPL Nos. 3 and 4 cross the Hayward fault in the city of Fremont, Alameda County as shown on the USGS Fremont 7.5-minute topographic quadrangle (Figures 1 and 2). The sections of the pipeline to be upgraded are located within the 80-foot SFPUC right-of-way between the existing South and North Shutoff Stations near the intersection of Interstate 680 (I-680) and Mission Boulevard (Figure 3). Within the project area, the pipelines cross I-680, three I-680 on-ramps, Mission Boulevard, Agua Caliente Creek (contained within a concrete culvert), and Agua Fria

Creek (a creek that crosses the pipeline right-of-way and flows within its natural bed within the right-of-way). The SFPUC right-of-way traverses residential areas on both the north and south ends.

The proposed project includes installation of approximately 2,360 feet of 72-to 78-inch diameter welded steel pipe (BDPL No. 3X) directly adjacent to the existing 78-inch diameter BDPL No. 3 between the North and South Shutoff Stations. In addition, minor upgrades to the existing BDPL No. 4 will be implemented to seismically strengthen the pipeline where it crosses two traces of the Hayward fault, and prevent damage to the new BDPL No. 3X should BDPL No. 4 fail. The new BDPL No. 3X would parallel the two existing pipelines at a depth comparable to or below the existing BDPL Nos. 3 and 4, and all facilities with the exception of access manholes would be constructed below ground. All improvements would be constructed within the 80-foot SFPUC right-of-way between the existing South and North Shutoff Stations. For planning purposes, the project area has been divided into the eight construction zones indicated on Figure 3, and includes four staging areas where grading, but no excavation would occur.

Installation of the new BDPL No. 3X would require construction activities along the entire 2,360-foot segment of pipeline to be replaced. The method of construction and dimensions of planned excavation in each zone are summarized in Table 1. Construction methods would include pipeline installation within existing corrugated-metal pipes (under I-680), open-trench excavation, and cut-and-cover excavation. Jack-and-bore or open-trench excavation could be used to cross Agua Fria Creek in Construction Zone 1, and jack and bore may be used under I-680 and the southbound on-ramp (Zones 2 and 4) if the corrugated-metal pipes are not sound enough. In addition, several utilities that cross the proposed BDPL No. 3X alignment would require abandonment, relocation, or protection during construction. Improvements to BDPL No. 4 would be made in the vicinity of an existing slip-joint valve in Zone 5 and in Zone 8. In all zones, excavation sidewalls would be shored or sloped for safety and protection of adjacent structures, including the existing BDPL Nos. 3 and 4.

Area of Potential Effects

The APE for cultural resources includes all the areas, surface and subsurface, that could experience ground disturbance as a result of proposed project activities including locations of pipeline construction as well as locations of affected utilities, temporary bridges, and staging areas. For the proposed project, the horizontal APE includes the entire 80-foot-wide SFPUC right-of-way and the four staging areas shown on Figure 3. The vertical APE corresponds to the depth of excavation in each construction zone, outlined above in Table 1.

Identification Efforts and Evaluation

To determine the presence or absence of potential historic properties within the APE a records search and a pedestrian survey were conducted. The records search was conducted by the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University, Rohnert Park, California (NWIC File No. 07-1065). The records search included a 1.6-kilometer (one-mile) buffer around the project construction limits.

TABLE 1
COMPONENTS OF THE SEISMIC UPGRADE OF BDPL NOS. 3 AND 4 AT HAYWARD FAULT PROJECT

Construction Zone	Construction Method	Length	Width	Depth
BDPL No. 3 Improvements				
Zone 1 (Point of Connection)	Install wye and valves on BDPL No. 3X	40 ft.	30 ft.	25 ft.
Zone 1 – Option A: Jack-and-bore	Creek crossing by jack-and-bore	125 ft.	30 ft.	30 ft.
		40 ft.	20 ft.	30 ft.
Zone 1 – Option B: Open-cut excavation	Creek crossing by open-cut excavation	125 ft.	10 ft.	30 ft.
Zone 2 – Option A: Use existing CMP	Place BDPL No. 3X in existing CMP3	Approx. 75 ft.	8 ft.	13 ft.
Zone 2 – Option B: Jack-and-bore	Jack-and-bore beneath I-680 on-ramp (one pit)	125 ft.	30 ft.	25 ft.
Zone 3	Place BDPL No. 3X in open cut excavation	60 ft.	8 ft.	35 ft.
Zone 4 – Option A: Use existing CMP	Place BDPL No. 3X in existing CMP2	No excavation required. Access to the corrugated metal pipeline would be through the open cut excavation in Zones 3 and 5.		
Zone 4 – Option B: Jack-and-bore	Jack-and-bore beneath I-680 (two pits)	125 ft.	30 ft.	30 ft.
		40 ft.	20 ft.	30 ft.
Zone 5	Place BDPL No. 3X in open cut excavation	200 ft.	8 ft.	18 ft.
Zone 6	Install and remove temporary bridge at northbound loop on-ramp	No excavation required. Bridge would be supported on installed piles.		
	Place BDPL No. 3X in open cut excavation	40 ft.	8 ft.	15 ft.
Zone 7	Install and remove temporary bridges at Mission Boulevard and northbound diamond on-ramp	No excavation required. Bridge would be supported on installed piles.		
	Construct articulated vault beneath Mission Boulevard	400 ft.	30 ft.	28 ft.
Zone 8	Place BDPL No. 3X in open cut excavation	980 ft.	8 ft.	27 ft.
Zone 8 (Point of Connection)	Install wye and valves on BDPL No. 3X	40 ft.	30 ft.	21 ft.
BDPL No. 4 Improvements				
Zone 6	Encase BDPL No. 4 on either side of existing slip-joint vault at Trace B	120 ft.	35 ft.	20 ft.
Zone 8	Sliplining or replacement of BDPL No. 4 at Trace C	400 ft.	35 ft.	15 ft.

Fifty-seven previous surveys, 12 recorded cultural resource sites, and one isolate were identified within the search radius (TetraTech, 2008). One prehistoric archaeological site, **CA-ALA-576** was found to be within the APE (Figure 3). The currently mapped site boundary places the site south of Mission Boulevard and east of I-680 extending southeast into a modern residential development along Curtner Road and Mary Beth Court. The deposit is described as a deeply stratified site, with an extensive midden, numerous burials, rock ovens, and a variety of other features and artifacts (King, 1968; Gmoser et al., 1999). Previously, the site had been identified as two separate deposits, CA-ALA-342 on the north side of Agua Caliente Creek (Conger and Burris, 1966) and CA-ALA-509 between Agua Caliente and Agua Fria Creeks (Cartier, 1989).

CA-ALA-576 was first excavated in 1968 (King, 1968). Numerous human burials, rock cooking features, and a wide variety of artifacts were uncovered. The original site maps indicated that the primary midden deposit was located north of Agua Caliente Creek, west of Curtner Street, south of Mission Boulevard, and southeast of BDPLs 3 and 4. Additional investigations by Galvan and Thompson (n.d.; as mentioned in Rosenthal, 2006) focused on deposits within a housing development located south of the original excavation between Agua Caliente Creek and Agua Fria Creek (resulting in the separate designation). Several burials were also encountered as well as rock features and an additional variety of artifacts.

Investigations in 1999 showed that the site was one large deposit, and it was assigned a new trinomial and primary number by the NWIC. Testing demonstrated that cultural materials are located on both sides of Agua Fria and Agua Caliente creeks and despite the extensive modern disturbances in the area, a substantial amount of the site is intact and extends to a depth of three meters (9.8 feet) or more below present-day ground surface (Gmoser, 1999; Gmoser et al., 1999). The site boundaries were enlarged to include the work areas of both King and Galvan and Thompson as well as extended southwest to I-680. Over 135 cubic meters of backhoe trenches were excavated in the 1999 investigation with approximately 41 cubic meters within the site boundaries. Two stratigraphic components, representing two primary periods of occupation were identified; one dating to the early Middle Period (ca. 1900–1800 years before present) and the other to the Late Period (ca. 1300–600 years before present). The project produced a wide range of flaked and ground stone tools, abundant floral and faunal remains, cooking features, and human burials.

Additional testing in 2006 adjusted the southern boundary of the site to the northern bank of Agua Fria Creek, in the vicinity of the Mission Boulevard northbound off-ramp of I-680 (Rosenthal, 2006). Subsurface testing by Pacific Legacy on the south side of Mission Boulevard, west of I-680, and north of Agua Fria Creek confirmed that the site does not extend to that side of I-680 (Price and Holson, 1999).

Gmoser, et al. (1999:III-2) recommended the site as eligible to the National Register under Criterion d, because it has yielded or may be likely to yield additional information important to prehistory.

The records search also revealed that one additional archaeological resource has been recorded within 0.8 kilometers (½-mile) of the APE consisting of an isolate (CA-ALA-ISO-13) that was

found on the west side of I-680 within the Agua Caliente Creek bed, approximately 183 meters (600 feet) northwest of the APE (Bryne, 1992). Agua Caliente Creek runs through **CA-ALA-576** and there are notations in site records, surveys, and subsurface testing programs (Banet et al., 1991:10; Cartier, 1989; Rosenthal, 2006:5) of eroding materials observed in the creek banks of Agua Fria Creek within the boundaries of **CA-ALA-576**; thus, the assumption is that this isolated Franciscan chert scraper originated from **CA-ALA-576** and was transported downstream.

Other cultural resources located within 1.6 kilometers (one mile) of the APE include three prehistoric habitation sites (P-01-000004, P-01-000013, and P-01-000153), one bedrock milling station (P-01-000141), a burial locality (P-01-002120), two historic-period railroad alignments (P-01-001783 and P-01-010625), and two historic-period architectural resources (C-921 and P-01-001624).

In addition to the records search, the SFPUC also contacted the California Native American Heritage Commission (NAHC) with a request for a search of its sacred lands file covering the APE. A list of local Native Americans who may have an interest or knowledge of the project area was also requested. There is no federally recognized tribe associated with the area. The NAHC did not have any sacred sites recorded within the APE, however, they recommended that eight Native Americans with lineal ties to the area be contacted to identify any resources not on file with the NAHC. The SFPUC initiated these consultations via letters mailed on April 1, 2008. As of this writing; no response has been received.

The pedestrian archaeological field survey of the APE was undertaken specifically for this project by Tetra Tech, Inc. archaeologists on January 16, 2008 (Tetra Tech, Inc., 2008) with additional survey by an ESA archaeologist on March 19, 2008. A portion of the project area to the east of Staging Area 3 is on private property, although the area was open to observation during a field meeting with SFPUC staff; this area was densely landscaped with little ground surface visibility. The survey of Staging Area 4 was conducted in 15-meter (50-foot) transects with surface scrapes due to the dense vegetation encountered. Digital photograph overviews were taken of the surveyed area. The mapped location of **ALA-576** and Staging Area 2 were found to be entirely paved, disturbed, or covered in fill from freeway and on-ramp construction. All other areas have been extensively disturbed by pipeline installation, freeway construction, culvert construction, or residential construction.

Although potions of site **ALA-576** are disturbed, the USACE believes that due to the large subsurface component, depth of deposits, numerous features present, and previously discovered burials, site **ALA-576**, in accordance with the National Register of Historic Place Guidelines 36 CFR 60, qualifies as significant under Criterion d.

Assessment of Effects

Construction of the new BDPL No. 3X and improvements to BDPL No. 4 will directly impact site ALA-576 due to excavation required to install pipeline facilities. Excavation could destroy portions of the site including features that may contribute to site ALA-576's qualities of significance. The USACE has determined that the impact to the site constitutes an adverse effect.

Previous studies have determined there is a high probability that site boundaries also extend into other portions of the project area. Avoidance is not feasible. The proposed replacement route maximizes the use of existing utility corridors and rights-of-way, while bypassing residential communities and sensitive environmental areas to the extent possible. In addition, there is an imminent need to upgrade these facilities to withstand seismic disturbance.

Resolution of Adverse Effects and Continuing Consultation

The USACE is requesting your review and comment regarding our APE, identification efforts, and evaluation of historic properties. As described above, the USACE has determined that the APE for the project consists of all construction components related to the seismic upgrade of BDPL Nos. 3 and 4. Although the pedestrian survey of the project area did not reveal archaeological material, much of the area has been previously disturbed and the surface is not visible. The records search for the project revealed that 12 potential cultural resources and one isolate have been recorded within a mile of the APE. It was also determined that one eligible prehistoric property (**CA-ALA-567)** is situated within the APE. The site has been evaluated in accordance with Section 106 of the NHPA and under criterion D of 36 CFR 60. There is no federally recognized Native American Tribe affiliated with the area, however the USACE and SFPUC have consulted with groups identified by the NAHC as having ancestral ties to the area. The USACE has determined that the proposed undertaking may result in an adverse effect to site **CA-ALA-576**. In accordance with Section 106 (36 CFR 800), in an effort to resolve the adverse effects, a Memorandum of Agreement (MOA) and an Historic Properties Treatment Plan (HPTP) will be prepared and submitted to your office for review. We will continue consultation with you, interested Native American tribes, and the Advisory Council on Historic Preservation regarding the MOA and resolution of adverse effects. If you have any questions regarding this project please contact Kathleen Ungvarsky, Archaeologist, at (415) 503-6842, or email, kathleen.ungvarsky@usace.army.mil or Mitch Marken at (310) 971-1500, or email at mmarken@esassoc.com. Our return address for correspondence is 225 Bush St., Suite 1700, San Francisco, California 94104.

Sincerely,

Mitch Marken, Ph.D.
Practice Leader
Cultural Resources Director
ESA, Inc.

Cc: K. Ungvarsky, Corps
B. Smith, Corps
Y. Zhang, SFPUC

Enc: Figures 1 through 3
ESA+Orion 2009
S-22501_Gmoser 1999 (Included in ESA+Orion 2009)

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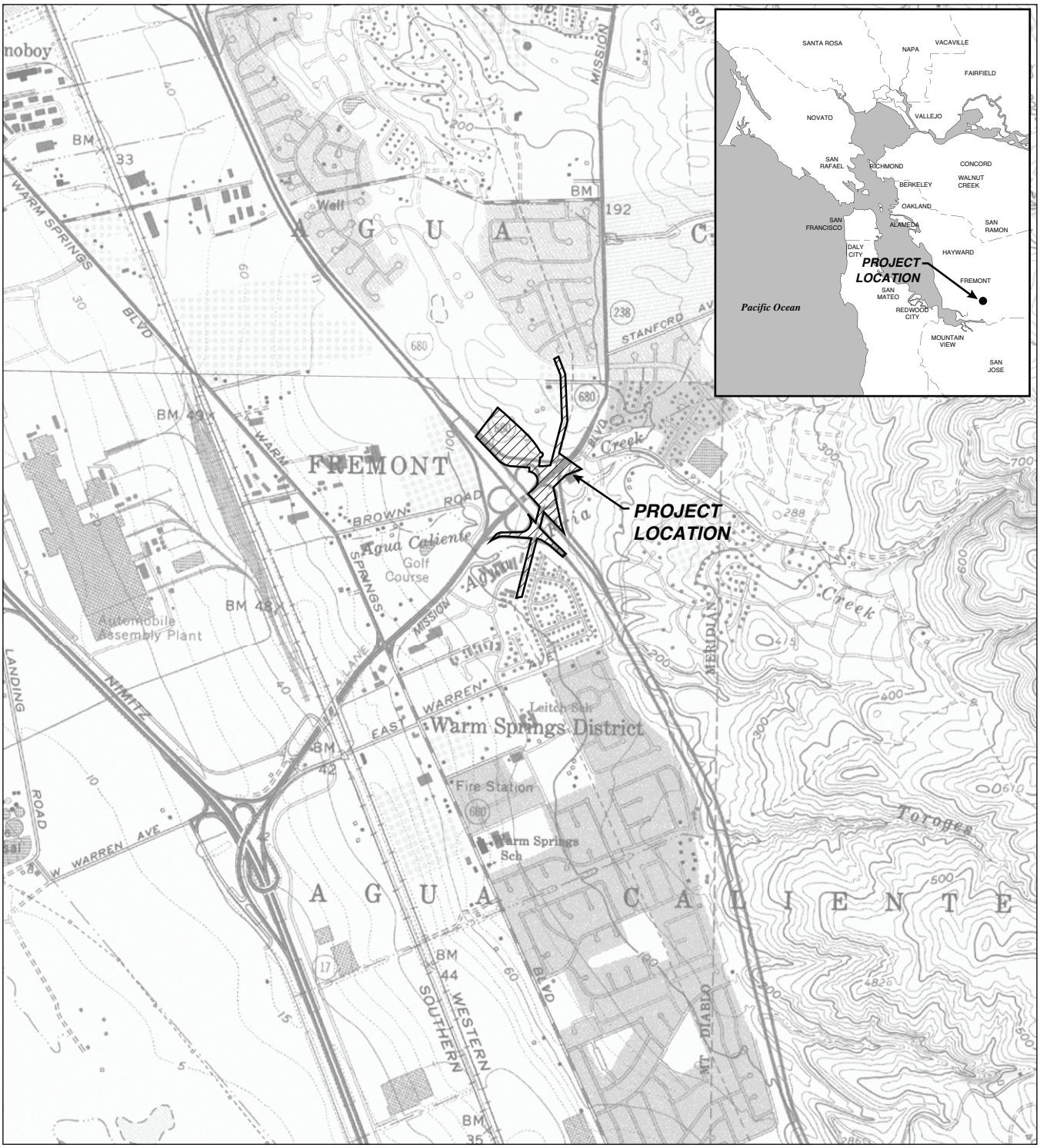
Rosenthal, Jeffrey, *Extended Phase 1 Test Investigation of the Southern Boundary of CA-ALA-576 for the Ala-680 Drainage Improvement Project, Alameda County, California. 04-ALA-680 PM 2.4, EA2S4601.* Prepared by Far Western Anthropological Research Group, Inc., Davis, California. Prepared for California Department of Transportation, District 4, Oakland, California. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, California. Survey No. S-31226, 2006.

Tetra Tech, Inc. *Survey of Existing Historical Architectural and Archaeological Resources - Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault Project.* Prepared for the San Francisco Public Utilities Commission. April, 2008.



0 2000
Feet

SOURCE: ESA

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

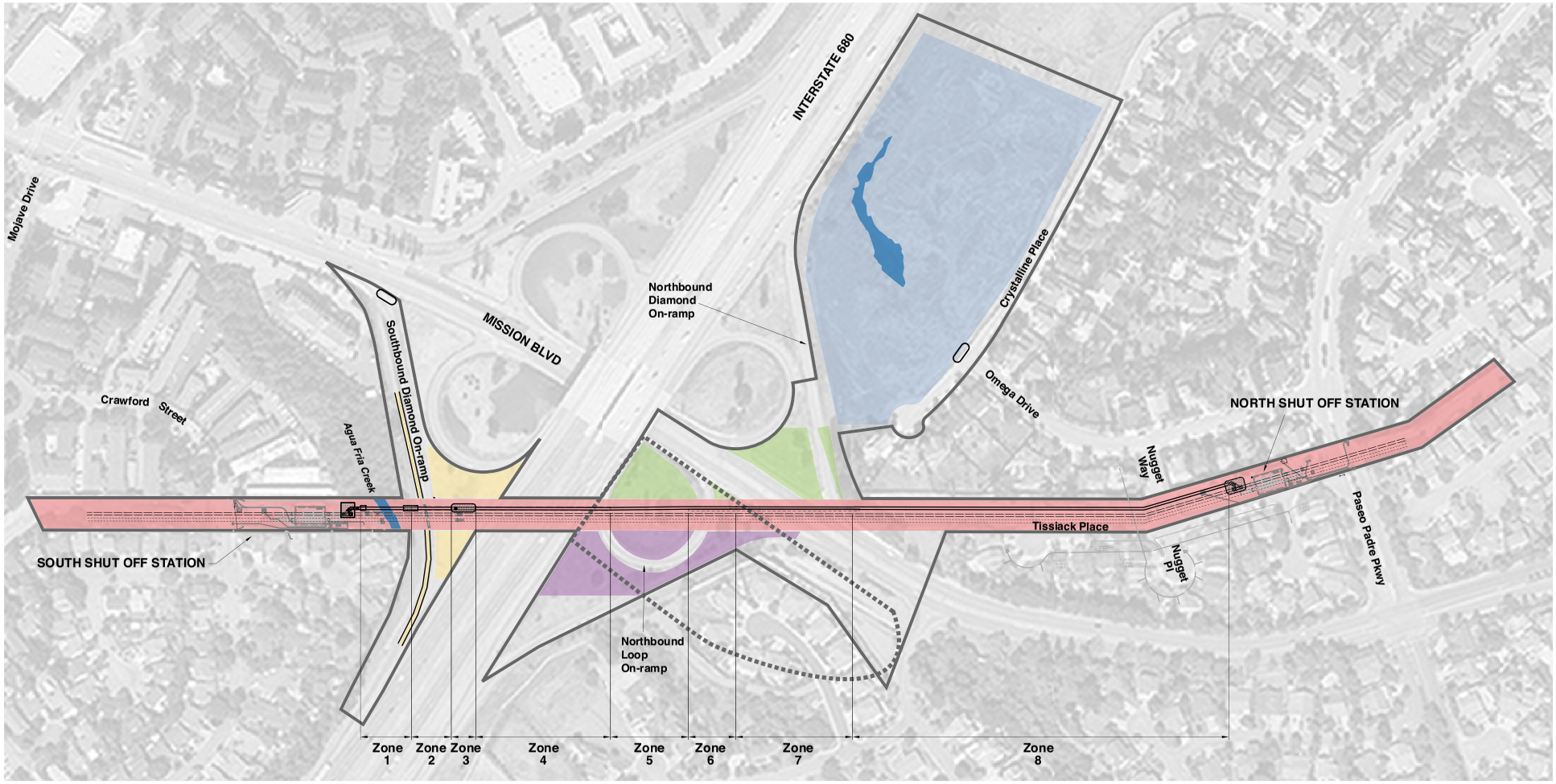
Figure 1
Project Location

0 1000
Feet

SOURCE: GlobeXplorer

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 2
Project Location



Area of Potential Effects
Archaeological Site CA-ALA-576
Existing BDPL No. 3
Existing BDPL No. 4
SFPUC Right of Way
New BDPL No. 3X
Staging Area 1
Staging Area 2
Staging Area 3
Staging Area 4
Seep and Potential Other Waters of the United States

0 400
Feet

SOURCE: GlobeXplorer; ESA, 2008; URS, 2008a
Note: the entire project area may be used for construction staging

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 3
Archaeological Area of Potential Effects

DRAFT

SEISMIC UPGRADE OF BAY DIVISION PIPELINE NOS. 3 AND 4 AT HAYWARD FAULT PROJECT

FREMONT, ALAMEDA COUNTY, CALIFORNIA

Historic Context and Archaeological Survey Report

Prepared for

San Francisco
Planning Department,
Major Environmental
Analysis

and

San Francisco Public
Utilities Commission

April 2009

Prepared by

ESA+Orion

ESA+ORION
a joint venture

STATEMENT OF CONFIDENTIALITY

This report contains confidential cultural resources location information; report distribution should be restricted to those with a need to know. Cultural resources are nonrenewable, and their scientific, cultural, and aesthetic values can be significantly impaired by disturbance. To deter vandalism, artifact hunting, and other activities that can damage cultural resources, the locations of cultural resources should be kept confidential. The legal authority to restrict cultural resources information is in California Government Code Section 6254.10 and the National Historic Preservation Act of 1966, as amended, Section 304.

SUMMARY OF FINDINGS

This report was prepared for the San Francisco Planning Department, Office of Major Environmental Analysis (MEA), and the San Francisco Public Utilities Commission (SFPUC) and documents the archaeological survey for the Seismic Upgrade of Bay Division Pipeline (BDPL) Nos. 3 and 4 at Hayward Fault Project. The proposed project is a component of the SFPUC's Water System Improvement Program (WSIP). The BDPL Nos. 3 and 4 carry water from the Irvington Tunnel in Fremont to customers in the East Bay, South Bay, and Peninsula through turnouts along the pipelines. These pipelines cross the Hayward fault in Fremont. Without the proposed improvements, a large earthquake on the Hayward fault could rupture both pipelines at the project location, causing substantial damage to surrounding features, localized flooding, as well as loss of water supply to the San Francisco Bay Area.

Because implementation of the proposed project includes obtaining a federal Section 404 permit from the U.S. Army Corps of Engineers, the project is required to comply with federal environmental laws as well as the California Environmental Quality Act (CEQA). Tasks completed for this study include a records search at the Northwest Information Center of the California Historical Resources Information System, development of a historic context, a field survey, and contact with Native American organizations/individuals.

The Area of Potential Effects (APE) for archaeological resources is the area, surface and subsurface, that could experience ground disturbance as a result of proposed project activities including locations of pipeline construction and maintenance as well as locations of affected utilities, temporary bridges, and staging areas. The horizontal APE includes the entire 80-ft.-wide SFPUC right-of-way and four staging areas. The vertical APE corresponds to the individual ground-disturbing project components, with a maximum depth of 35 feet below ground surface.

One archaeological site CA-ALA-576 has been previously identified within the APE. Testing demonstrated that cultural materials are located on both sides of Agua Fria and Agua Caliente Creeks and despite the extensive modern disturbances in the area, a substantial amount of the site is intact and extends to a depth of three meters (9.8 feet) or more below present-day ground surface (Gmoser, 1999; Gmoser et al., 1999). Much of the site is buried beneath the imported artificial fill used for the construction of I-680. Gmoser et al. (1999:III-2) recommended the site as eligible to the National Register under criterion d, because it has yielded or may be likely to yield additional information important to prehistory. Cultural constituents include an extensive midden, numerous burials, rock ovens, and a variety of other features and artifacts with two distinct stratigraphic components, representing two primary periods of occupation; one dating to the early Middle Period (ca. 1900–1800 years BP) and the other to the Late Period (ca. 1300–600 years BP).

The site is buried beneath artificial fill and pavement. No surface manifestations of the site were recorded during the current surface survey and no additional archaeological resources were recorded.

TABLE OF CONTENTS

Page

Statement of Confidentiality ..... **i**

Summary of Findings ..... **iii**

Table of Contents ..... **v**

I. Introduction **1**
Project Description 2
Construction Activities 2
Area of Potential Effects 2
Regulatory Context 4

II. Context **6**
Environment 6
Prehistoric Context 7
Ethnography 9
Historic-period Background 9

III. Study Methods **12**
Records Search and Literature Review 12
Native American Consultation 15
Archaeological Field Survey Methods 16

IV. Study Findings **16**
Field Survey Summary 16

V. Conclusions **17**
Summary Statement 17

VI. References Cited **18**

Figures follow References Cited

Appendix A – Gmoser et al., 1999 ..... **A-1**
Appendix B – Correspondence **B-1**

List of Tables

1. Components of the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project 3
2. Previous Surveys Conducted within Portions of the Archaeological APE 13

I. Introduction

This Historic Context and Archaeological Survey Report (HCASR) was prepared for the San Francisco Planning Department, Office of Major Environmental Analysis (MEA) and the San Francisco Public Utilities Commission (SFPUC). The HCASR documents the archaeological inventory for the Bay Division Pipeline (BDPL) Nos. 3 and 4 Project. The proposed project is a component of the SFPUC's Water System Improvement Program (WSIP). The BDPL Nos. 3 and 4 carry water from the Irvington Tunnel in Fremont to customers in the East Bay, South Bay, and Peninsula through turnouts along the pipelines. These pipelines cross the Hayward fault in Fremont. Without the proposed improvements, a large earthquake on the Hayward fault could rupture both pipelines at the project location, causing substantial damage to surrounding features, localized flooding, as well as loss of water supply to the San Francisco Bay Area.

BDPL Nos. 3 and 4 cross the Hayward fault in the city of Fremont, Alameda County as shown on the USGS Fremont 7.5-minute topographic quadrangle (see Figures 1 and 2 for the project location). The sections of the pipeline to be upgraded are located within the 80-foot SFPUC right-of-way between the existing South and North Shutoff Stations near the intersection of Interstate 680 (I-680) and Mission Boulevard. Within the project area, the pipelines cross I-680, three I-680 on-ramps, Mission Boulevard, Agua Caliente Creek (contained within a concrete culvert), and Agua Fria Creek. The SFPUC right-of-way traverses residential areas on both the north and south ends.

Because implementation of the proposed project includes a Section 404 permit from the U.S. Army Corps of Engineers (Corps), the project is required to comply with federal environmental laws, specifically Section 106, as amended, of the National Historic Preservation Act (NHPA; see Regulatory Context) as well as the California Environmental Quality Act (CEQA). The purpose of this HCASR, in accordance with Section 106 of the NHPA and CEQA, is to:

- Identify prehistoric and historic-period archaeological resources within the Area of Potential Effects (APE);
- Recommend procedures to evaluate the legal significance of archaeological resources that may be affected by the undertaking;
- Assess whether the proposed project may impact potentially-significant archaeological resources; and
- Recommend procedures for minimizing impacts on unanticipated archaeological resources and/or human remains.

This HCASR is based on information presented in the Survey of Existing Historic Architectural and Archaeological Resources prepared by Tetra Tech, Inc. (2008). The update was completed by Heidi Koenig (Registered Professional Archaeologist with an M.A. in Cultural Resources Management), a member of the ESA+Orion team, who has conducted archaeological research in California for eight years.

Project Description

Currently BDPL No. 3 is constructed primarily of reinforced-concrete cylinder pipe between the North and South Shutoff Stations, although portions beneath Agua Fria Creek and across Trace B of the Hayward fault are constructed of welded steel. BDPL No. 4 is constructed of prestressed-concrete cylinder pipe and welded steel. Portions of both pipelines are lightly encased in concrete to add strength, and a portion of BDPL No. 4 is constructed within an existing steel pipe.

Improvements under the proposed project include construction of a new BDPL No. 3X between the two shutoff stations (with seismic design features at each fault trace crossing to prevent rupture of the pipeline in the event of a major earthquake on the Hayward fault); abandonment of the existing BDPL No. 3A between the North and South Shutoff Stations once the new BDPL No. 3X is operational; and seismic improvements to BDPL No. 4 to control where breakage would occur and prevent damage to BDPL No. 3X should the pipeline rupture. The new BDPL No. 3X would parallel the two existing pipelines at a depth comparable to or below the existing BDPL Nos. 3 and 4, and all facilities with the exception of access manholes would be constructed below ground. All improvements would be constructed within the 80-foot SFPUC right-of-way between the existing South and North Shutoff Stations. For planning purposes, the project area has been divided into the eight construction zones indicated on Figure 3, and includes four staging areas where grading, but no excavation would occur.

Construction Activities

Installation of the new BDPL No. 3X would require construction activities along the entire 2,360-foot segment of pipeline to be replaced. The method of construction and dimensions of planned excavation in each zone are summarized in Table 1. Construction methods would include pipeline installation within existing corrugated-metal pipes, open-trench excavation, and cut-and-cover excavation. Jack-and-bore or open-trench excavation could be used to cross Agua Fria Creek in Construction Zone 1. In addition, several utilities that cross the proposed BDPL No. 3X alignment would require abandonment, relocation, or protection during construction. Improvements to BDPL No. 4 would be made in the vicinity of an existing slip-joint valve in Zone 5 and in Zone 8. In all zones, excavation sidewalls would be shored or sloped for safety and protection of adjacent structures, including the existing BDPL Nos. 3 and 4.

Area of Potential Effects

According to Section 106, as amended of the NHPA, the APE is defined as:

> …the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking [36 CFR 800.16(d)].

The APE for cultural resources includes all the areas, surface and subsurface, that could experience ground disturbance as a result of proposed project activities including locations of

TABLE 1
COMPONENTS OF THE SEISMIC UPGRADE OF BDPL NOS. 3 AND 4 AT HAYWARD FAULT PROJECT

Construction Zone	Construction Method	Length	Width	Depth
BDPL No. 3 Improvements				
Zone 1 (Point of Connection)	Install wye and valves on BDPL No. 3X	40 ft.	30 ft.	25 ft.
Zone 1 – Option A: Jack-and-bore	Creek crossing by jack-and-bore	125 ft.	30 ft.	30 ft.
		40 ft.	20 ft.	30 ft.
Zone 1 – Option B: Open-cut excavation	Creek crossing by open-cut excavation	125 ft.	10 ft.	30 ft.
Zone 2 – Option A: Use existing CMP	Place BDPL No. 3X in existing CMP3	Approx. 75 ft.	8 ft.	13 ft.
Zone 2 – Option B: Jack-and-bore	Jack-and-bore beneath I-680 on-ramp	60 ft.	60 ft.	25 ft.
Zone 3	Place BDPL No. 3X in open cut excavation	60 ft.	8 ft.	35 ft.
Zone 4 – Option A: Use existing CMP	Place BDPL No. 3X in existing CMP2	No excavation required. Access to the corrugated metal pipeline would be through the open cut excavation in Zones 3 and 5.		
Zone 4 – Option B: Jack-and-bore	Jack-and-bore beneath I-680	60 ft.	60 ft.	30 ft.
Zone 5	Place BDPL No. 3X in open cut excavation	200 ft.	8 ft.	18 ft.
Zone 6	Install and remove temporary bridge at northbound loop on-ramp	No excavation required. Bridge would be supported on installed piles.		
	Place BDPL No. 3X in open cut excavation	40 ft.	8 ft.	15 ft.
Zone 7	Install and remove temporary bridges at Mission Boulevard and northbound diamond on-ramp	No excavation required. Bridge would be supported on installed piles.		
	Construct articulated vault beneath Mission Boulevard	400 ft.	30 ft.	28 ft.
Zone 8	Place BDPL No. 3X in open cut excavation	980 ft.	8 ft.	27 ft.
Zone 8 (Point of Connection)	Install wye and valves on BDPL No. 3X	40 ft.	30 ft.	21 ft.
BDPL No. 4 Improvements				
Zone 6	Encase BDPL No. 4 on either side of existing slip-joint vault at Trace B	120 ft.	35 ft.	20 ft.
Zone 8	Sliplining or replacement of BDPL No. 4 at Trace C	400 ft.	35 ft.	15 ft.

pipeline construction as well as locations of affected utilities, temporary bridges, and staging areas. For the proposed project, the horizontal APE includes the entire 80-foot-wide SFPUC right-of-way and the four staging areas shown on Figure 3. The vertical APE corresponds to the depth of excavation in each construction zone, outlined above in Table 1. Kathleen Ungvarsky, archaeologist at the Corps, approved the APE on January 30, 2009.

The project is also required to comply with CEQA and a discussion of impacts on potentially-significant archaeological resources will be included in the Environmental Impact Report (EIR) for the project. In the Cultural Resources section of the EIR, the APE will be referred to as the CEQA Area of Potential Effects (C-APE). The C-APE is identical to the APE.

Regulatory Context

Federal Regulations

Archaeological resources are protected through the NHPA of 1966, as amended (16 USC 470f), and its implementing regulations, Prior to implementing an "undertaking" (e.g., issuing a federal permit), Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register of Historic Places. Under the NHPA, a find is considered significant if it meets the National Register listing criteria at 36 CFR 60.4, as stated below:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> a) That are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> b) That are associated with the lives of persons significant in our past, or
>
> c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
>
> d) That have yielded, or may be likely to yield, information important in prehistory or history.

Federal review of projects is normally referred to as the Section 106 process. This process is the responsibility of the federal lead agency. The Section 106 review normally involves a four-step procedure, which is described in detail in the implementing regulations (36 CFR Part 800):

- Identify historic properties in consultation with the State Historic Preservation Officer and interested parties;

- Assess the effects of the undertaking on historic properties;
- Consult with the State Historic Preservation Officer, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation; and finally,
- Proceed with the project according to the conditions of the agreement.

State Regulations and Legal Compliance

The State of California implements the NHPA through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation (OHP), as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The OHP also maintains the California Historic Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdictions.

California Environmental Quality Act

CEQA, as codified at PRC Sections 21000 et seq., is the principal statute governing the environmental review of projects in the state. CEQA requires lead agencies to determine if a proposed project would have a significant effect on archaeological resources. As defined in PRC Section 21083.2, a "unique" archaeological resource is an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

- Contains information needed to answer important scientific research questions, and there is a demonstrable public interest in that information;
- Has a special and particular quality, such as being the oldest of its type or the best available example of its type; and/or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

The CEQA Guidelines define a historical resource as: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique

archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3) Is directly associated with a scientifically recognized important prehistoric or historic event or person [PRC Section 21083.2 (g)]."

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

II. Context

Environment

The APE is located at the foot of the Diablo Range, between the southern San Francisco Bay and Mission Peak. It includes the BDPL Nos. 3 and 4 ROW as well as adjacent staging areas on California Department of Transportation (Caltrans) and private property. The surrounding area is mostly developed with private residences, business parks, and landscaping as well as Interstate 680 (I-680), Mission Boulevard, and other roadways. Within the APE, Agua Caliente Creek has been entirely diverted into a culvert near Mission Boulevard and crossing I-680. Upstream of the APE, Agua Fria Creek exists as a natural drainage until it becomes culverted under I-680. Downstream of the I-680 box culvert, the creek enters the APE where approximately 1,000 feet of creek, including that portion within the APE, flows as a natural drainage. The creek is culverted again at the west end of the Extended Stay Hotel parking lot. Areas of the APE that have not been developed or landscaped are generally covered with dense grasses, ruderal vegetation, trees, thick brush, and riparian vegetation.

The climate of the APE is classified as Mediterranean, characterized by seasonal precipitation of wet mild winters and dry summers. It is west of the Coast Range. While the Coast Range provides a wind buffer to the east, the areas west of the Coast Range are unprotected. Summers in the area are characterized by cool marine air and persistent coastal clouds and fog. Spring and fall often bring the warmest and most cloud-free periods to the Bay Area. Rainfall during the spring is infrequent and is considered rare between May and September, when often only around one inch of rainfall accumulates. The polar jet stream and associated periodic storms reach into the lower latitudes of the Mediterranean zones, bringing rain to the region, mostly between November and March. Temperatures are generally moderate, with a comparatively small range of temperatures between the winter low and summer high (Ritter, 2006; Golden Gate Weather Service, 2008).

BDPL Nos. 3 and 4 traverse a terrain that gently slopes from east to west. The soils and sediments within the SFPUC ROW and APE are composed of a series of Pleistocene age (pre-10,000 Before Present [BP]) and Holocene age (10,000 BP to present) deposits (Gmoser et al., 1999:II-68, II-77). The Pleistocene deposits, consisting predominantly of clay, form a raised barrier between Agua Fria and Agua Caliente Creeks (Gmoser et al., 1999:II-77) and provide the base landform upon which subsequent depositional episodes occurred.

Agua Fria and Agua Caliente Creeks played a crucial role in the development of the project vicinity. Over time, the changing creek channels in the vicinity of modern-day Mission Boulevard and I-680 cut into the Pleistocene clay, creating terraces of Holocene-age deposits between the creeks. The creek flows also contributed to the development of an alluvial fan downslope from the Pleistocene clay, to the west of the Mission Boulevard/I-680 intersection (Gmoser et al., 1999:II-81). With time, the alluvial fan stabilized and alluvium also began to cover the Pleistocene clay. Several deposits of Holocene alluvium, from 1.8 and 2.5 meters (5.9 and 8.2 feet) deep, sit atop the clay. Prehistorically, episodic flooding of creeks in this area created raised areas that became desirable for human settlement (Hylkema, 2002:236).

During the historical development of the project area, artificial fill material of varying depths was introduced atop this alluvium, particularly during the construction of I-680 and installation of BDPL Nos. 3 and 4. However, in some areas the Holocene soil deposits are at the ground surface (Gmoser et al., 1999:II-68, II-77). Archaeological subsurface testing programs conducted in the vicinity of the southeastern part of the Mission Boulevard/I-680 intersection identified recent fill deposits between 1.5 and 3 meters (5 and 10 feet) in depth (Gmoser et al., 1999; Rosenthal, 2006:8).

The APE is entirely within a modern landscape of paved streets and highways and residential neighborhoods. Most vegetation is contained within landscaped areas and along Agua Fria Creek, west of I-680.

Historically, the area was dominated by a southern oak woodland environment (Baumhoff, 1978:19) and grassland (Hylkema, 2002:235). The presence of freshwater in Agua Caliente and Agua Fria Creeks likely attracted terrestrial fauna and birds, including elk and migratory birds along the Pacific Flyway (Hylkema, 2002:236; Moratto, 1984:221). Additionally, marine mammals and pinnipeds may have been present along the bayshore, which was only 1.75 miles to the west in 1899 (USGS, 1899). Historically, nearby shorelines would also have offered opportunities for nearshore fishing, shellfish collecting, and hunting in tidal marshes (Hylkema, 2002:233, 235; Moratto, 1984:221).

Prehistoric Context

Many of the first surveys of archaeological sites in the San Francisco Bay region, including the East Bay, were conducted between 1906 and 1908; these surveys yielded the initial documentation of nearly 425 “earth mounds and shell heaps” along the bay shoreline (Nelson, 1909). The most notable of these sites were excavated, such as the Emeryville shellmound (CA-ALA-309), the Ellis Landing site (CA-CCO-295) in Richmond, the Fernandez site (CA-CCO-

259) in Rodeo Valley, and the West Berkeley site (CA-ALA-307) (Morrato, 1984). These dense midden sites have been carbon-14 dated to be 2,310 (±220 years) old, but other evidence from around the bay suggests that human occupation in the region dates back farther, to about 7,000 years ago (Davis and Treganza, 1959).

Archaeologists have developed individual cultural chronological sequences tailored to the archaeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. Hylkema (2002:237–250) identified a sequence of four general cultural periods for the southern San Francisco Bay Area based on changes in bead types and on sequences developed by earlier research:

- Early Period, circa (ca.) 2000 to 500 BC
- Middle Period, ca. 500 BC to AD 700
- Middle to Late Transition, ca. AD 700 to 1200
- Late Period, ca. AD 1200 to 1769

The Early Period of the present-day southern San Francisco Bay Area included characteristics similar to those of cultural groups along the southern California coast. In addition to shell bead typologies, this cultural period is characterized based on the presence of flexed burials with red pigment. Most Early Period traits are distinct to the immediate Bay Area, but some are considered similar to traits identified in the Sacramento–San Joaquin Delta (Hylkema, 2002:243–244).

The presence of large and small cobble mortars and varied pestle types is common in Middle Period assemblages and suggests an increased reliance on acorns. Manos and milling stones continue to be present in Middle Period assemblages of the South Bay as well, suggesting a similar continued reliance on hard seeds. Contracting-stemmed and lanceolate projectile points are the most common forms of points, but this artifact type is less common than during the Early Period as a whole. Other artifact types common in Middle Period assemblages include bone fish spears, serrated bone scapulas, beveled elk antler wedges, flexed burials in residential sites, and expressions of cosmological beliefs, such as animal burials, charmstones, quartz crystals, and bone whistles (Hylkema, 2002: 244–247).

The Middle to Late Transition Period initiates a phase of significant social change, including increased social hierarchy and localized economic systems. Burials and associated grave goods indicate an emphasis on wealth. During this period, the importance of *Olivella* shell beads rises; edge-incised and banjo-style *Haliotis* pendants become common; tubular tobacco pipes appear; and bone fish spears are replaced by new harpoon styles (Hylkema, 2002:247).

The social change that began during the Middle to Late Transition Period continued and developed further during the Late Period, as indicated by the elaboration of associated ceremonial grave goods. Various artifacts exhibit stylistic changes, with fine workmanship, decoration, and elaboration of forms. Small obsidian Stockton serrated points increase in Late Period assemblages, indicating the introduction of the bow and arrow during this time. An

additional indication of external interactions comes from the introduction of bone and antler harpoon styles from northern California. This has led some researchers to hypothesize a movement of northern populations south into the San Francisco Bay Area following the withdrawal of the Middle Period Meganos Culture (Hylkema, 2002:247–250).

Ethnography

The APE is within the traditional territory of the Costanoan people, also referred to as Ohlone, Mutsun, and Rumsun (Levy, 1978:485–495). These people, collectively referred to by ethnographers as Costanoan, were actually distinct sociopolitical groups that spoke at least eight languages of the same Penutian language group. The Costanoan occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The primary sociopolitical unit was the tribelet, or village community, which was overseen by one or more chiefs. The APE is in the greater *Chochenyo* language area and was occupied by the *lisyan* tribelet (Levy, 1978:485).

Economically, the Costanoan engaged in hunting and gathering. Their territory encompassed both coastal and open valley environments that contained a wide variety of resources, including grass seeds, acorns, bulbs and tubers, bear, deer, elk, antelope, a variety of bird species, marine resources, and small mammals. The Costanoan acknowledged private ownership of goods and songs, and village ownership of rights to land and/or natural resources; they appear to have aggressively protected their village territories, requiring monetary payment for access rights in the form of clamshell beads, and even shooting trespassers if caught. After European contact, Costanoan society was severely disrupted by missionization, disease, and displacement.

Historic-period Background

In 1769, Francisco Ortega and Juan Crespi viewed San Francisco Bay from Pacifica, on the northern portion of the San Francisco Peninsula. Crespi and his expedition reached the southern end of the bay and crossed the Guadalupe River into what is present-day Santa Clara County, then crossed Alameda Creek to the Niles area of Fremont. In 1795, another Spanish expedition, led by Pedro Amador from Monterey, settled Mission San Jose in the southern portion of Alameda County, 4.7 kilometers (2.9 miles) southwest of the APE. Mission lands extended from the town of Alviso in the south to San Leandro Creek in the north, and into the San Joaquin Valley to the east. Mexico seized all of its mission lands in the 1830s, and all missions in "Alta" California became secularized. Mission lands were then divided among individual landowners in the form of large land grants called ranchos. The APE is on land that was once a part of Rancho Agua Caliente, which was 3,870 hectares (9,564 acres) granted to Fulgencio Higuero in 1858 (Tetra Tech, 2008).

The 1840s and 1850s was a period of change for the San Francisco Bay Area. When gold was discovered in 1848, a wave of immigrants came to the region, either passing through on their way to the gold mines in the foothills or to settle in the area, attracted by the fertile soil. Many settled on the lands adjacent to Mission San Jose, just southwest of the APE, and established farms. Portuguese immigrants came to the area during this period to work in the many orchards and fields. New communities were established as more settlers came to the region to work as farmers

and ranchers. Schools, churches, stores, and residences were developed during the period between 1848 and 1860. The area that is now Fremont became part of Washington Township in 1853, made up of Niles, Centerville, Newark, Alvarado, Irvington, Decoto, Mission San Jose, and Warm Springs. The township became established as an agricultural center that shifted from cattle raising to wheat production in the late 1890s. Fruit trees were imported from other parts of the western U.S., and orchards and vineyards replaced grain fields by the 1900s (City of Fremont, 2008). Farming was the primary economic mainstay of Fremont throughout the late 19th and into the 20th century. The general project area remained largely undeveloped throughout the 19th century, but by the mid-20th century the area was covered with orchards (Tetra Tech, 2008).

The years following World War II brought a period of dramatic growth to California, as the state transformed from a largely agricultural to an industrial society. Suburban development increased as residents moved out of urban centers to communities where housing was less expensive. Tract homes were first built in Oakland but slowly began to be built in Washington Township (although not within the APE). Washington Township continued to be governed by the Alameda County Board of Supervisors in Oakland, but eventually the residents realized that infrastructure was needed to prepare for the increase in residents that was inevitable. Alameda County was slow to assist the township, so businessmen and the Chambers of Commerce organized a plan to incorporate five of the eight towns into the City of Fremont in 1956.

Construction of the portion of I-680 that connects Highway 101 near San Jose with Highway 780 in Benicia (in 1964), and construction of the Nimitz Freeway (I-880) that links Oakland with San Jose (in 1957), spurred residential growth in Washington township. Further growth was expected and infrastructure was needed to support the increased population with expanded sewer and street systems. In 1956, the town of Fremont, which included the towns of Niles, Mission San Jose, Centerville, Irvington, and Warm Springs, was incorporated. The stretch of I-680 that is within the APE, between Mission Boulevard and Highway 237, was completed in 1971. The portion of Mission Boulevard that is within the APE, also known as CA-262, is the short section of Mission Boulevard linking I-680 and I-880 in Fremont. Construction was completed on this stretch of Mission Boulevard in 1970 (Tetra Tech, 2008).

The first residential subdivisions in the vicinity of the project area were constructed during the early 1960s among orchards and fields (Gardiner, 2002). The Franciscan Park Subdivision, established around the south portion of the project area in 1964, consisted of Mohave Drive, Crawford and Bradley Streets, and Crawford, Bradley, and Aztec Courts, adjacent to lands owned by Lemos. U.S. Geological Survey (USGS) topographic maps depict this housing tract surrounded by orchards and fields until the early 1970s. The residential subdivisions that abut the north end of the project area were developed in the mid-1980s.

San Francisco Water System. The following narrative summary is adapted from the WSIP PEIR cultural resource chapter (San Francisco Planning Department, 2007:4.7-20).

The history of the SFPUC water system begins with the need for water in San Francisco, a semi-arid peninsula. Although San Francisco is surrounded by the Pacific Ocean and the bay, there is

little freshwater nearby. The few creeks and springs in the region were not sufficient to support the population of San Francisco as it grew after the mid-1800s with the discovery of gold. San Francisco's first private water companies formed in the 1850s and underwent consolidation, a pattern that was similar to other urban water companies. The Spring Valley Water Company (SVWC), founded in 1860, was the dominant city water distributor and began to buy other water companies in the area.

SVWC slowly began developing sources of water within San Francisco, then turned to boundaries outside of the city. At the same time that SVWC had dams under construction along the Peninsula, it also looked eastward across the bay to seek additional water sources in Alameda County. One of the means of obtaining more water was from Alameda Creek. In 1887, Spring Valley Water Company diverted water from Alameda Creek to San Francisco, and by 1900, SVWC was diverting over 21.5 million gallons of water a day from the Alameda Creek watershed to San Francisco (San Francisco Planning Department, 2007:4.7-20)

The SFPUC water facilities in the survey population are associated with the Bay Division of the Hetch Hetchy Aqueduct, which delivers water from an impounded section of the Tuolumne River through a series of pipes, tunnels, and reservoirs to the City and County of San Francisco. In total, the Hetch Hetchy system includes multiple dams and reservoirs, conduits, power plants, and approximately 241 kilometers (150 miles) of aqueduct. The Bay Division portion of the aqueduct extends from the Irvington Portal, along the eastern edge of the bayshore plain near Fremont, to the Pulgas Portal/Pulgas Tunnel interface southwest of the Crystal Springs Reservoir on the San Francisco Peninsula. The planning and construction of the Hetch Hetchy Aqueduct stemmed from San Francisco's desire for a municipally owned water supply. Before Hetch Hetchy's construction began in 1913, the city relied primarily on the privately owned SVWC for its water supply. This relationship was forged largely through SVWC's virtual monopoly over the Peninsula's water supply, secured through acquisitions of water sources in San Mateo, Santa Clara, and Alameda Counties and coupled with construction of major reservoirs and dams, including Crystal Springs along San Mateo Creek (SFPUC, 2008).

BDPL 1 was built in 1924 by the City and County of San Francisco as part of the Hetch Hetchy project, but the SVWC leased the pipeline for delivery of Calaveras water to Crystal Springs under a Railroad Commission order engineered by San Francisco's engineers and attorneys. In the 1930s the SFPUC continued to expand its water storage, transmission, and delivery system and to increase the capacity of its power generation facilities. In 1938, the O'Shaughnessy Dam was raised to its current height of 95 meters (312 feet), expanding the capacity of Hetch Hetchy Reservoir (SFPUC, 2008). The construction of the Calaveras Dam and Reservoir created the largest of the Bay Area impoundments and, as such, was consequential to the development and growth of San Francisco. In 1936, BDPL 2 was added, parallel to the first. In 1952, BDPL 3 was added to the system but was routed on a path that skirted the southern end of the bay rather than crossing it. Another portion of BDPL 3 was constructed sometime after 1968, as described below. BDPL 4 was installed in 1973 and also traverses the south end of the bay parallel to BDPL 3.

The *Proposal for Relocation of Bay Division Pipeline No. 3 & No.4 at Agua Caliente Creek Alameda County"* dated September 1968, describes the location and description of the relocation of BDPL 3 San Francisco Public Utilities Commission 1968:title page). Based on the date of the proposal, it can be inferred that the pipeline was actually relocated in the late 1960s or early 1970's, less than 40 years ago. BDPL 3 was relocated at the Mission Boulevard and I-680 interchange at Agua Caliente Creek. The specifications of the relocation plan note that "State Freeway Route 680 will be under construction during this contract." (San Francisco Public Utilities Commission, 1968:30) It is likely that the pipeline was relocated to accommodate the new I-680 freeway alignment that was to pass directly over the pipeline route. Six pipeline appurtenances were relocated, portions of the existing pipelines were removed and abandoned in place, and 118 linear feet (36 linear meters) of pipe were added (San Francisco Public Utilities Commission, 1968:30). The relocation project also called for the removal of 5 concrete manhole riser boxes and metal covers and furnishing and installing 3-20" new manholes (San Francisco Public Utilities Commission, 1968:95). As noted, the realigned portion of BDPL 3 and the newly furnished manhole facilities are the portions of the pipeline that are within the study area and were not constructed in the historic period.

III. Study Methods

Records Search and Literature Review

Research Methods

A records search was conducted by the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University, Rohnert Park, California in January 2008 (NWIC File No. 07-1065). The records search included a 1.6-kilometer (one-mile) buffer around the project construction limits. Fifty-seven previous surveys on file at the NWIC have been conducted within search radius; twelve recorded cultural resource sites and one isolate were also identified within the search radius.

Included in the review were the California Inventory of Historical Resources (California Department of Parks and Recreation, 1976), California Historical Landmarks (DPR, 1990), California Points of Historical Interest (DPR, 1992), and the Historic Properties Directory Listing (OHP, 2006). The Historic Properties Directory includes listings of the National Register and the California Register, and the most recent listing of the California Historical Landmarks and California Points of Historical Interest. Historic topographic quadrangles from 1899 through 1961 were also reviewed.

Records Search and Literature Findings

Eight cultural resources surveys and studies covered portions of the APE and are summarized in Table 2 below.

TABLE 2
PREVIOUS SURVEYS CONDUCTED WITHIN PORTIONS OF THE ARCHAEOLOGICAL APE

Study Number	Date	Author	Title	Results
S-11968	1989	Archaeological Resource Management	Cultural Resource Evaluation for Parcel APN 519-1601-019 on Agua Fria Creek and Interstate 680	Positive (CA-ALA-576)
S-22501	1999	Glenn Gmoser, et al. (Caltrans)	Historic Property Survey Report and Finding of No Historic Properties Affected for the I-680 "Sunol Grade" Southbound Improvement Project	Positive (CA-ALA-576), National Register-eligible
S-22507	1999	Heather Price, John Holson (Pacific Legacy, Inc.)	Extended Archaeological Survey Results for Extended Stay America	Negative
S-31189	2002	Alicia R. Langford (Caltrans)	Historic Architecture Survey Report for the I-680 Sunol Grade Northbound HOV Lane Project	Negative within search radius
S-31226	2006	Jeff Rosenthal (Far Western Anthropological Resources, Inc.)	Extended Phase 1 Test Investigation of the Southern Boundary of CA-ALA-576 for the Ala-680 Drainage Improvement Project	Positive (CA-ALA-576)
S-32251	2002	Caltrans	Historic Architecture Survey Report for the I-680 Sunol Grade Northbound HOV Lane Project	Negative within search radius
S-33143	1983	Robert Jurmain, et al. (San Jose State University, Department of Anthropology)	The Skeletal Biology of CA-ALA-342	Positive (CA-ALA-576)
S-33814	2004	Alicia R. Langford, et al. (Caltrans)	Finding of Effect, No Historic Properties Affected for the I-680 Sunol Grade Northbound HOV Lane Project	Nation Register finding

One archaeological site—CA-ALA-576 (formerly CA-ALA-342 and CA-ALA-509)—was identified within the APE. The currently mapped site boundary places the site south of Mission Boulevard and east of I-680, extending southeast into a modern residential development along Curtner Road and Mary Beth Court. The deposit is described as a deeply stratified site, with an extensive midden, numerous burials, rock ovens, and a variety of other features and artifacts (King, 1968; Gmoser et al., 1999). Previously, the site had been identified as two separate deposits, CA-ALA-342 on the north side of Agua Caliente Creek (Conger and Burris, 1966) and CA-ALA-509 between Agua Caliente and Agua Fria Creeks (Cartier, 1989).

The site was first excavated in 1968 (King, 1968). Numerous human burials, rock cooking features, and a wide variety of artifacts were uncovered. The original site maps indicated that the primary midden deposit was located north of Agua Caliente Creek, west of Curtner Street, south of Mission Boulevard, and southeast of BDPL Nos. 3 and 4. Additional investigations by Galvan and Thompson (n.d.; as mentioned in Rosenthal, 2006) focused on deposits within a housing

development located south of the original excavation between Agua Caliente Creek and Agua Fria Creek (resulting in the separate designation). Several burials were also encountered as well as rock features and an additional variety of artifacts.

Investigations in 1999 showed that the site was one large deposit, and the NWIC assigned it a new trinomial and primary number (CA-ALA-576). Testing demonstrated that cultural materials are located on both sides of Agua Fria and Agua Caliente Creeks and, despite the extensive modern disturbances in the area, a substantial amount of the site is intact and extends to a depth of 3 meters (9.8 feet) or more below the present-day ground surface (Gmoser, 1999; Gmoser et al., 1999). The site boundaries were enlarged to include the work areas of both King and Galvan and Thompson, and were extended southwest to I-680. Over 135 cubic meters of backhoe trenches were excavated in the 1999 investigation, with approximately 41 cubic meters excavated within the site boundaries. Two stratigraphic components representing two primary periods of occupation were identified: one dating to the early Middle Period (ca. 1900–1800 years BP) and the other to the Late Period (ca. 1300–600 years BP). The project produced a wide range of flaked and ground stone tools, abundant floral and faunal remains, cooking features, and human burials.

Additional testing in 2006 adjusted the southern boundary of the site to the northern bank of Agua Fria Creek, in the vicinity of the Mission Boulevard northbound off-ramp of I-680 (Rosenthal, 2006). Subsurface testing by Pacific Legacy on the south side of Mission Boulevard, west of I-680, and north of Agua Fria Creek confirmed that the site does not extend to that side of I-680 (Price and Holson, 1999). Gmoser et al. (1999:III-2) recommended the site as eligible to the National Register under Criterion d, because it has yielded or may be likely to yield additional information important to prehistory (Appendix A). The currently known site boundaries are shown on Figure 3.

Archaeological Resources Outside of the APE. One additional archaeological resource has been recorded close to the APE. An isolate (CA-ALA-ISO-13) was found on the west side of I-680 within the Agua Caliente Creek bed, approximately 183 meters (600 feet) northwest of the APE (Bryne, 1992). Agua Caliente Creek runs through CA-ALA-576, and there are notations in site records, surveys, and subsurface testing programs of eroding materials observed in the creek banks within the boundaries of CA-ALA-576 (Banet et al., 1991:10; Cartier, 1989; Rosenthal, 2006:5); thus, the assumption is that this isolated Franciscan chert scraper originated from CA-ALA-576 and was transported downstream.

Other cultural resources located within 1.6 kilometers (1 mile) of the APE include three prehistoric habitation sites (P-01-000004, P-01-000013, and P-01-000153), one bedrock milling station (P-01-000141), a burial (P-01-002120), two historic-period railroad alignments (P-01-001783 and P-01-010625), and two historic-period architectural resources (C-921 and P-01-001624).

Archaeological Resource Predictions

Based on the property types and settings of recorded archaeological sites within the NWIC records search radius, the ethnographic context of the area, and the archaeological materials and features from CA-ALA-576, the following archaeological property types could be present within the APE:

- *Habitation middens*. Midden sites have distinct boundaries and large amounts of shell, living surfaces, and the remains of daily life activities, and can include burials with associated grave goods. These sites would have been more permanent, used over an extended period, and located in or near productive habitats, such as Agua Caliente and Agua Fria Creeks.

- *Temporary camps or food processing localities*. These are ephemeral sites with little to no shell and remains of casual use activities, such as food processing and tool manufacture. Such sites would have been more random and would represent mobile short-term activities. They would be expected in areas that supported subsistence practices, such as fishing along Agua Caliente and Agua Fria Creeks.

- *Isolated artifacts*. These artifacts generally possess limited information and are unlikely to provide data that addresses important research issues. However, important information can be gained through dating items made of obsidian or artifacts with temporally distinctive styles.

- *Human remains*. Sites that contain human burials and associated grave goods would be located in native soil (non-fill), within or away from habitation sites.

Modern urban development covers almost the entirety of the APE, and artificial fill is present within the top 1.5 to 3 meters (4.9 to 9.8 feet) of elevation. With the exception of the initial installation of BDPL Nos. 3 and 4, subsurface disturbances resulting from development are likely confined to this layer of fill. As such, the fill would act as a cap over the native soils and archaeological deposits below it, as demonstrated by the subsurface testing programs at site CA-ALA-576.

Historic-period archaeological property types in the general vicinity might include Spanish colonial and Mexican residential and agricultural features as well as early American agricultural features, especially barns and outbuildings, associated with the dairy and agricultural industries. Artifacts and features might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. However, based on a review of historic USGS and Thompson and West (1878) maps, there appears to be a low possibility that historic-period archaeological resources are located within the APE.

Native American Consultation

The San Francisco Planning Department requested that the California Native American Heritage Commission (NAHC) search its sacred lands file covering the APE and requested a list of local Native Americans for consultation purposes. The NAHC did not have records of any Native American sacred sites, but recommended eight Native Americans with lineal descent from the area who might be able to identify resources not on file with the NAHC. The NAHC also

suggested contact with the listed Native Americans in the event they had any concerns regarding the project.

The San Francisco Planning Department initiated these consultations via letters mailed on April 1, 2008. As of this publication, no response has been received. These letters are provided in Appendix B of this report.

Archaeological Field Survey Methods

A pedestrian archaeological field survey was undertaken by Tetra Tech archaeologists on January 16 and by an ESA archaeologist on March 19, 2008. A portion of the project area north of Mission Boulevard and south of the SFPUC ROW is on private property, but the area was observed during a field meeting with SFPUC staff. The area was landscaped and had little ground surface visibility. The archaeologists conducted the survey of Staging Area 4 by walking 15-meter (50-foot) transects and using surface scrapes due to the dense vegetation. Digital photograph overviews were taken of the surveyed area. The mapped location of CA-ALA-576 and Staging Area 2 was paved, disturbed, or covered in fill as a result of freeway and on-ramp construction. All other areas have been extensively disturbed by pipeline installation, freeway construction, culvert construction, or residential construction.

IV. Study Findings

Field Survey Summary

No archaeological resources were observed on the surface within the BDPL Nos. 3 and 4 APE during the archaeological surface survey.

Known Archaeological Resources

One archaeological site CA-ALA-576 has been previously identified within the APE. Testing demonstrated that cultural materials are located on both sides of Agua Fria and Agua Caliente Creeks and despite the extensive modern disturbances in the area, a substantial amount of the site is intact and extends to a depth of three meters (9.8 feet) or more below present-day ground surface (Gmoser, 1999; Gmoser et al., 1999). Much of the site is buried beneath the imported artificial fill used for the construction of I-680. Gmoser et al. (1999:III-2) recommended the site as eligible to the National Register under criterion d, because it has yielded or may be likely to yield additional information important to prehistory. Cultural constituents include an extensive midden, numerous burials, rock ovens, and a variety of other features and artifacts with two distinct stratigraphic components, representing two primary periods of occupation; one dating to the early Middle Period (ca. 1900–1800 years BP) and the other to the Late Period (ca. 1300–600 years BP).

V. Conclusions

Summary Statement

Construction under the proposed project could encounter known archaeological resources within archaeological site CA-ALA-576 and previously unidentified resources outside of this site as discussed below.

Known Archaeological Resources

Prehistoric archaeological site CA-ALA-576 is located within the BDPL Nos. 3 and 4 APE. The site has been previously evaluated as eligible to the National Register. This assessment appears to be an adequate determination and should be used during future decision making regarding implementation of the proposed project. The site cannot be avoided by the project-related construction activities.

Unanticipated Archaeological Resources

Although no additional archaeological sites were identified by the records search or found during the surface survey of the APE, the inadvertent discovery of cultural materials and/or human remains is a high possibility because of the known sensitivity of the area. Previously unidentified archaeological resources and human remains could be encountered during excavations for the installation of the new BDPL No. 3X and improvements to the existing BDPL No. 4 outside of the known archaeological site (CA-ALA-576).

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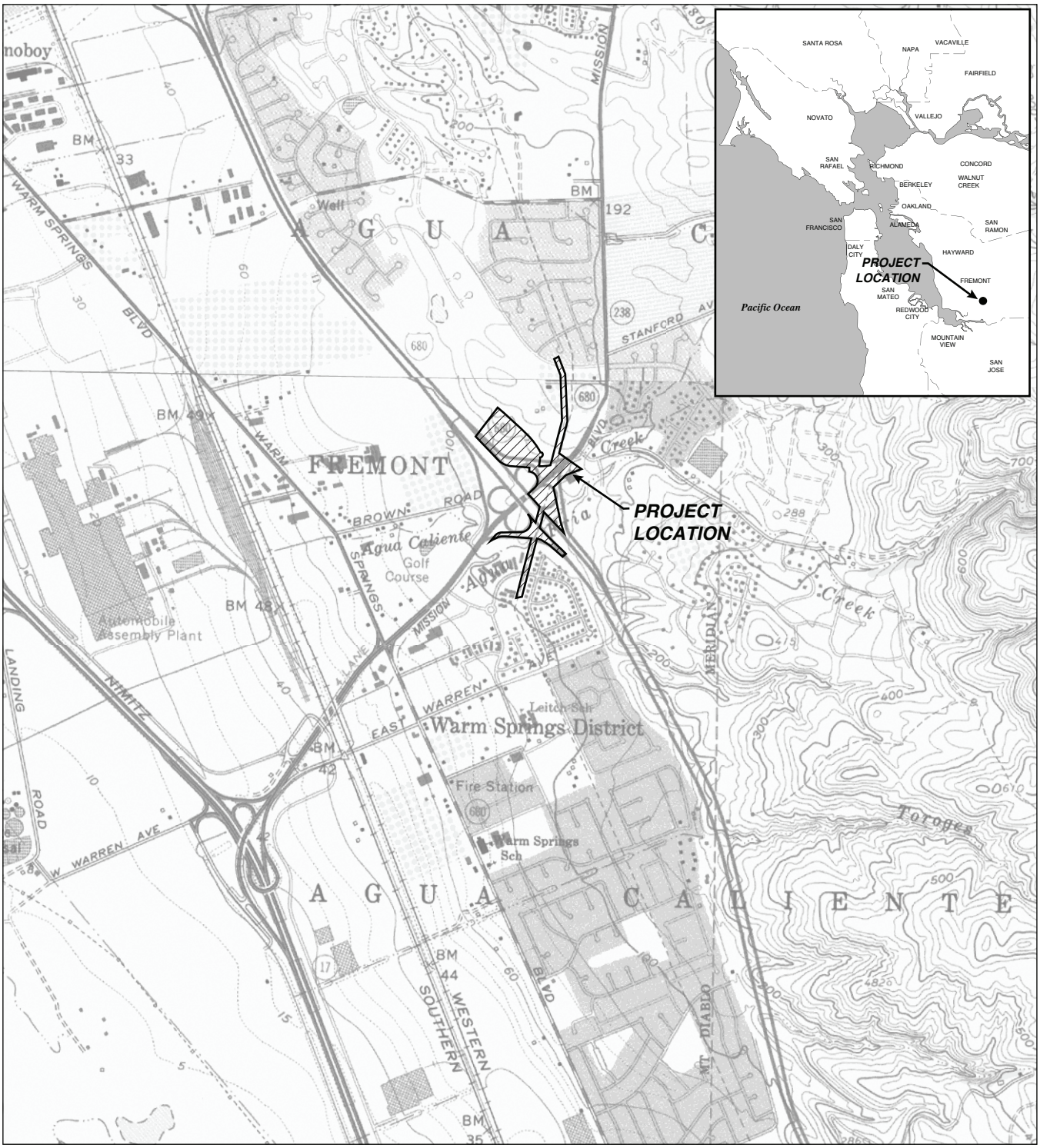


0 2000
Feet

SOURCE: ESA

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

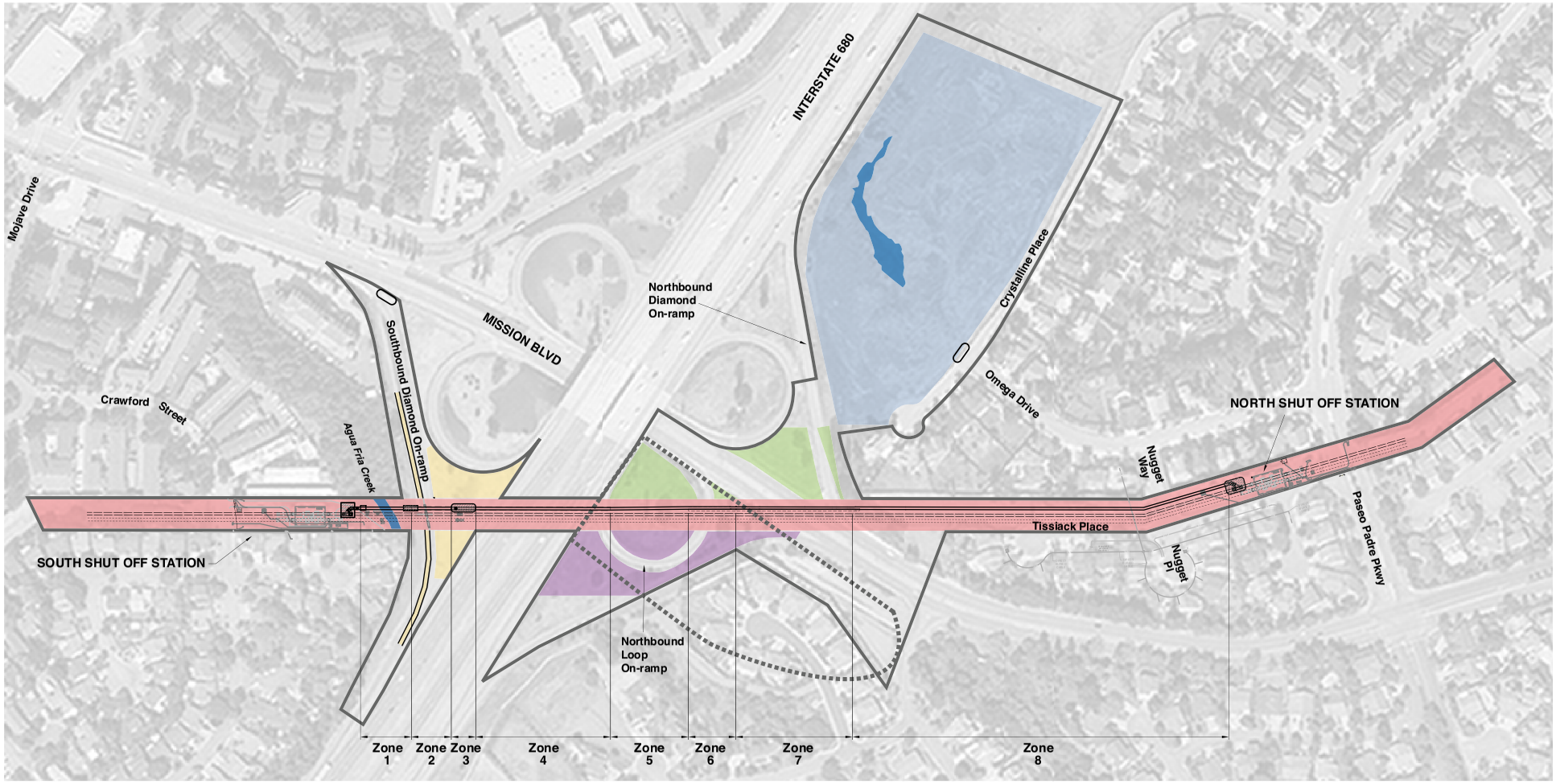
Figure 1
Project Location

0 1000
Feet

SOURCE: GlobeXplorer

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 2
Project Location



Area of Potential Effects
Archaeological Site CA-ALA-576
Existing BDPL No. 3
Existing BDPL No. 4
SFPUC Right of Way
New BDPL No. 3X
Staging Area 1
Staging Area 2
Staging Area 3
Staging Area 4
Seep and Potential Other Waters of the United States

0 400
Feet

SOURCE: GlobeXplorer; ESA, 2008; URS, 2008a
Note: the entire project area may be used for construction staging

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 3
Archaeological Area of Potential Effects

APPENDIX A – GMOSER ET AL., 1999

Archaeological Survey of the I-680 Corridor between Dublin and Milpitas in Alameda and Santa Clara Counties for the "Sunol Grade" Southbound Improvement Project

04-Ala-680 PM 0.0/21.9 and 04-SCl-680 PM 7.6/9.9 : EA 04-259-253700

with

Results of Extended Phase I/Phase II Archaeological Investigations at CA-ALA-574, CA-ALA-575, and CA-ALA-576 (a.k.a. CA-ALA- 342/509)

Prepared and edited by:

Glenn Gmoser

with

Jeff Rosenthal, William Hildebrandt, and Pat Mikkelsen

November 1999

California Department of Transportation, District 4
Office of Environmental Planning South

SITE REPORT: CA-ALA-576
MISSION BLVD - HWY-680 PROJECT AREA

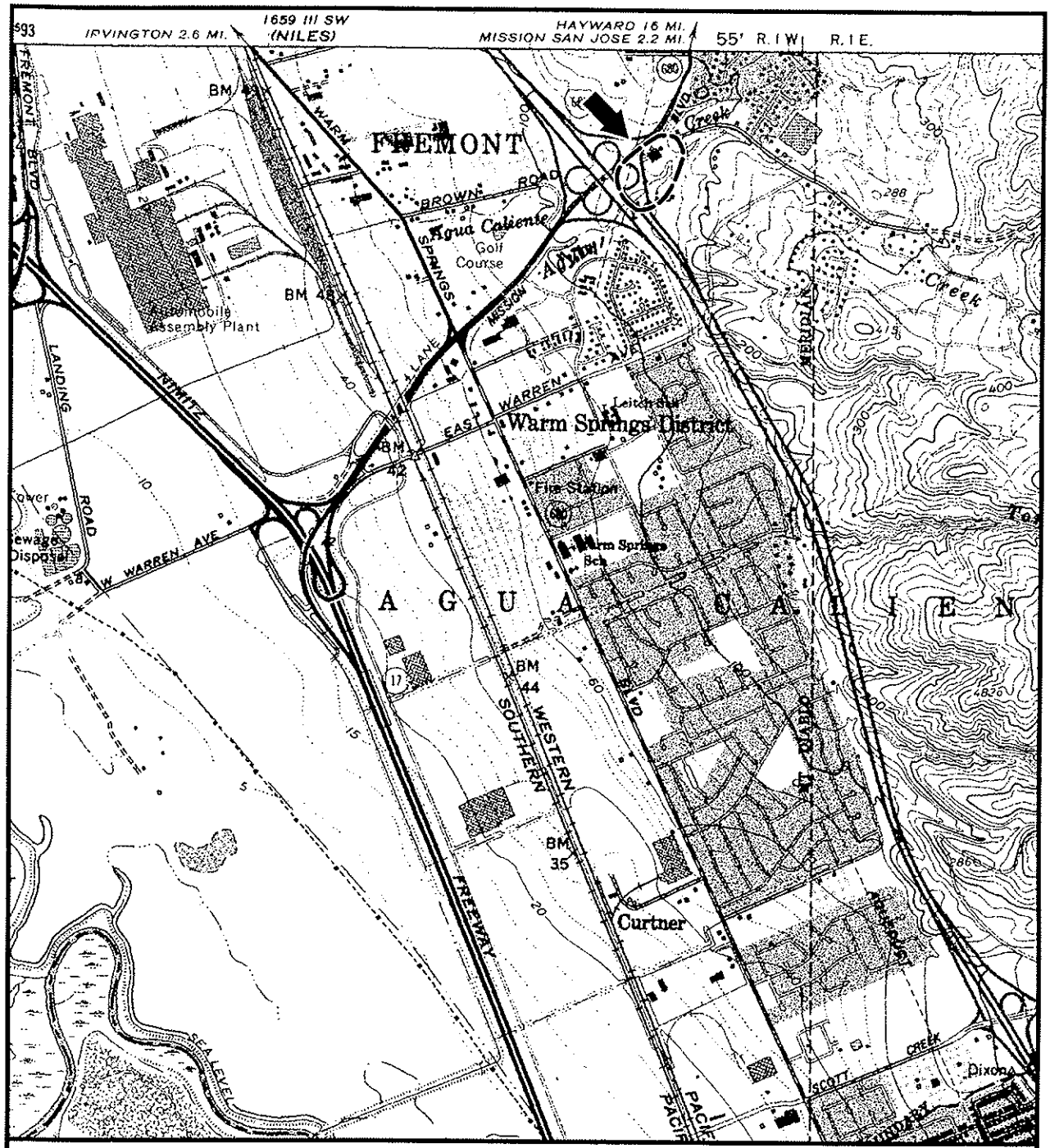
Archaeological investigations were conducted at the Mission Blvd - Hwy-680 interchange with the goal of identifying the presence/absence of archaeological deposits within the Caltrans Right-of-Way (ROW; Map II-7). This interchange was considered particularly sensitive because previous excavations at the locality revealed the presence of two prehistoric sites (ALA-342 and ALA-509), both containing numerous human burials. King (1968) originally investigated ALA-342 just prior to the construction of Hwy-680 and, based on the review of a variety of maps and air photos, it appears the site extends into the southeast quadrant of the interchange (see below). More recent excavations just south of ALA-342 by Galvan and Thompson (n.d.) indicated that another deposit could also intrude into the southeast quad of the interchange. As a result of these findings, a test excavation program was developed to map the horizontal and vertical location of these and any other archaeological deposits that may exist within or adjacent to the Caltrans ROW. Based on consultation with the Northwest Information Center, Sonoma State University, the deposit identified as ALA-509/342 has been subsumed under the trinomial ALA-576.

PREFIELD RESEARCH

King's (1968) excavations at ALA-342 encountered numerous human burials, rock cooking features, and a wide variety of artifacts. A review of King's (1968) original ALA-342 site maps indicated that the primary midden deposit was located north of Aqua Caliente Creek, west of Curtner Street, south of Mission Blvd, and southeast of the Hetch-Hetchy aqueduct (Map II-7, II-8, and II-9). When overlaying this map on the modern as-built map of the interchange, it appeared that the north bound off-ramp traversed the midden, creating the possibility that intact deposits still exist within the Caltrans ROW, south of Mission and on either side of the north bound off-ramp.

Analysis of a preliminary map of ALA-509 produced by Galvan and Thompson (n.d.) revealed similar results. Their excavations were focused on deposits associated with a housing development located south of Aqua Caliente Creek (resulting in a separate trinomial), north of Aqua Fria Creek, and east of the Caltrans ROW (Map II-9). This work also encountered several burials and rock features, some located only a few meters east of the ROW fence (see cluster near Datum C), clearly indicating that the ALA-509 deposits could extend into the Caltrans ROW.

Archaeological survey, combined with an extensive archival records search, revealed no evidence of archaeological deposits elsewhere within the Mission Blvd - Hwy-680 interchange. Nevertheless, the entire interchange was considered highly sensitive due to the proximity of ALA-342 and ALA-509, particularly given that portions of the original stream side terraces of Aqua Fria Creek still exist west of Hwy-680. As a result of these findings, an Extended Phase-I testing effort was conducted throughout the entire interchange.



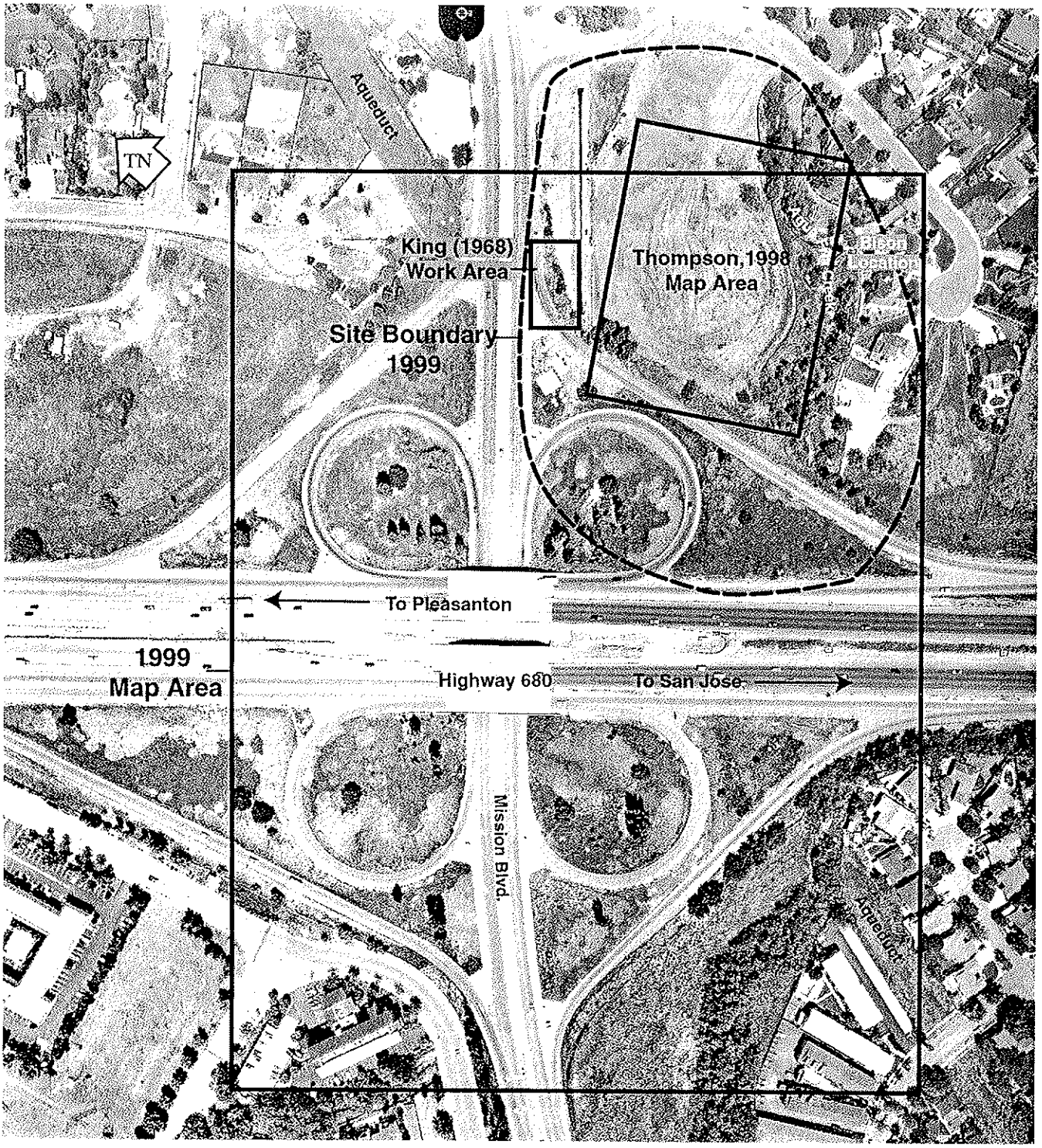
A PORTION OF
MILPITAS QUADRANGLE
7.5 MINUTE
1961 PHOTOREVISED 1980

TN

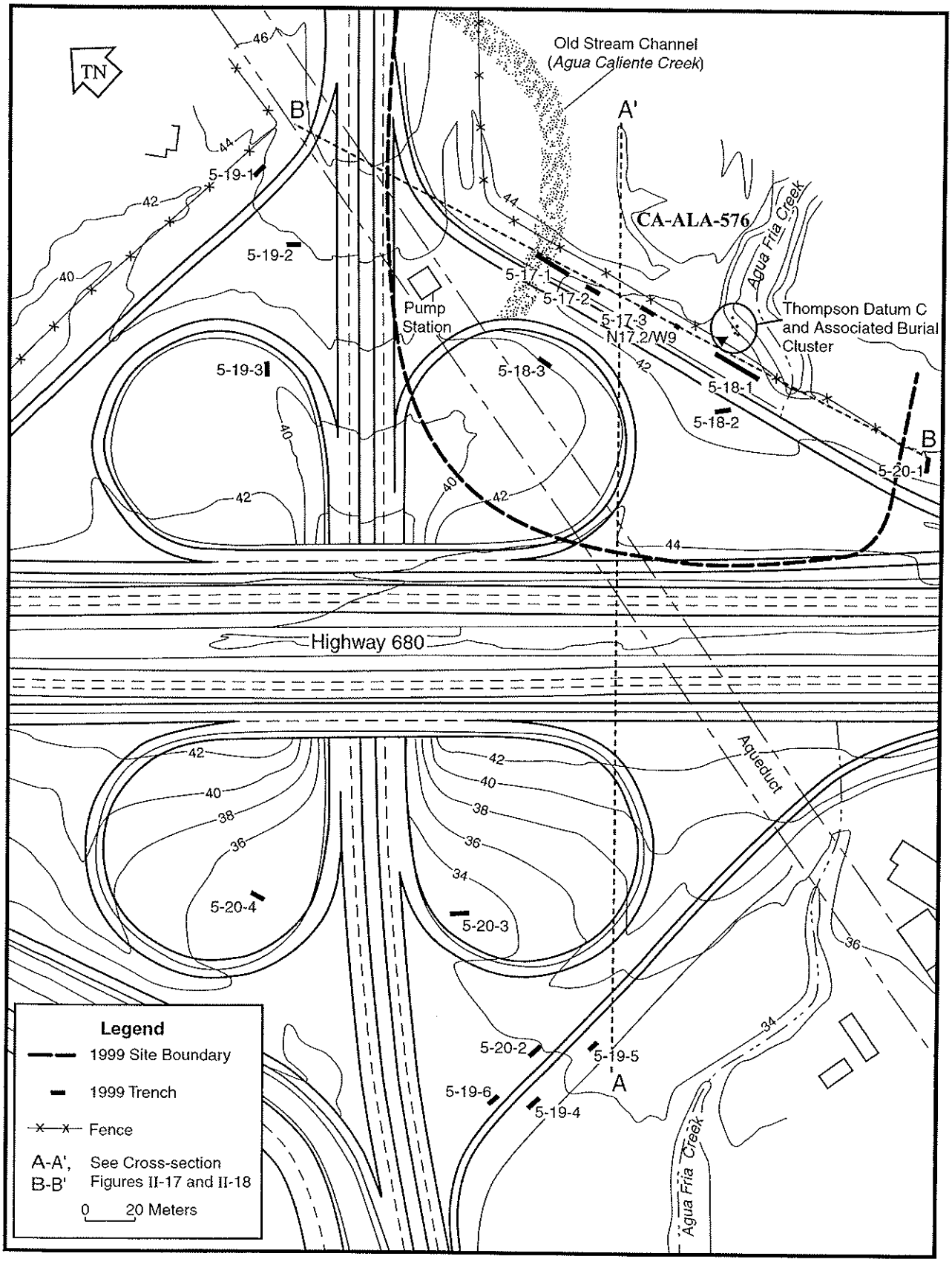
1 0 KILOMETERS 1 2
1000 0 METERS 1000 2000

1 0 1
MILES

Map II-7. Location of CA-ALA-576.



Map II-8. Aerial Photo of the CA-ALA-576 Locality.



Map II-9. Site Map of CA-ALA-576.

FIELD METHODS

Because most of the original ground surface had either been removed or covered with fill during construction of the modern interchange, it was necessary to use mechanized equipment to efficiently search for intact archaeological deposits. This was accomplished with a backhoe equipped with a flat bladed, three foot bucket. Backhoe excavations were conducted with great care, pealing off the sediments in 10-20 cm levels. Two archaeological monitors assisted the backhoe operator, one watching the trench and the other raking through the spoils in search of artifacts and other cultural material. Once the trenches were completed, the stratigraphic profile was described, with emphasis given to the presence/absence of intact soils, particularly those containing archaeological material. The location, length, and orientation of each trench was plotted on the project map, which was adapted from the project planning maps produced by Caltrans. These maps have surface contour intervals of 50 cm, providing outstanding vertical control of the stratigraphic relationships observed in each trench.

Hand excavation was limited to areas where significant archaeological deposits were discovered with the backhoe. This work included a 1x1 m unit (dry screened through 1/4" mesh), as well as the exposure and removal of four rock features, also processed with 1/4" screens. To insure the full recovery of smaller, more fragile constituents from these contexts (e.g., fish bone, plant macrofossils), several large flotation samples were also collected. The flotation samples and all other materials recovered from the project area were processed at the Far Western laboratory facilities in Davis, California.

Fieldwork began along the north bound off-ramp, between the off-ramp and the sound wall built for the new housing development overlying the ALA-509 deposit. The first step was to relocate Galvan and Thompson's (n.d.) Datum C, and use it to set up a grid within the southeast portion of the project area. Datum C served as the N0/E0 coordinate on a metric grid system aligned on true north (16.5° declination). Project maps were then reviewed and it was ascertained that the original ALA-342 midden deposit excavated by King (1968) had essentially been destroyed by: (1) construction of the north bound off-ramp; (2) expansion of Mission Blvd; (3) re-channeling of Aqua Caliente Creek; and (4) trenching for underground utilities. As a result of these considerations, the first backhoe trench (Trench 5-17-1) was placed at the northernmost end of where intact deposits still might exist (Map II-9; Table II-18). It was excavated parallel to the off-ramp, and encountered the old stream channel of Aqua Caliente Creek which was filled with a mixture of midden and non-midden soils; reworked soils were also found at the southern end of the trench, south of the old stream channel.

Trench 5-17-2 was excavated about 10 m south of Trench 5-17-1 (Map II-9; Table II-18). In contrast to Trench 5-17-1, it encountered intact midden deposits, including a rock cooking feature (Feature 1) similar to those reported by King (1968). Feature 1 was formally excavated, and several large flotation samples were also collected. Because this midden deposit lies south of original channel of Aqua Caliente Creek, it is considered the northern boundary of ALA-509.

We then moved 36 m south and excavated Trench 5-17-3 (Map II-9; Table II-18). This trench also found intact midden soils, but clipped the top of a human burial at a depth of 89 cm below surface (Burial 1). As a result of this finding, excavations stopped, and the burial was protected with plastic tarps and an hopper insert screen, and backfilled.

Table II-18. List of Trench and Excavation Units at CA-ALA-576.

Designation	Location	Length (m)	Width (m)	Depth (m)	Cubic Meters[a]
Southeast Quadrant					
Trench 5-17-1	-	6.0	1.0	1.5	8.6
Trench 5-17-2	-	3.0	1.0	0.5	1.5
Trench 5-17-3	-	4.0	1.0	0.9	3.2
Trench 5-18-1	-	18.0	1.0	1-3	20.0
Trench 5-18-2	-	4.5	1.0	1.4	5.9
Trench 5-18-3	-	4.0	1.0	2.2	8.4
Trench 5-20-1	-	5.0	1.0	2.5	12.1
Control Unit	N17.2/W9	1.0	1.0	1.5	1.1
Flotation Sample 1	Feature 1; Tr. 5-17-2				
Flotation Sample 2	Feature 2; Tr 5-18-1				
Flotation Sample 3	Feature 3; Tr 5-18-1				
Flotation Sample 5	Feature 4; N17.2/W9				
Flotation Sample 6	Feature 3: Tr 5-18-1				
Northeast Quadrant					
Trench 5-19-1	-	5.0	1.0	2.1	10.1
Trench 5-19-2	-	5.0	1.0	1.5	7.1
Trench 5-19-3	-	5.0	1.0	1.2	5.6
Southwestern Quadrant					
Trench 5-19-4	-	3.6	1.0	1.7	5.7
Trench 5-19-5	-	5.0	1.0	1.8	8.6
Trench 5-19-6	-	5.0	1.0	2.7	13.1
Trench 5-20-2	-	3.0	1.0	3.0	8.6
Trench 5-20-3	-	5.0	1.0	1.5	7.1
Northwestern Quadrant					
5-20-4	-	5.0	1.0	2.15	10.6
Total					137.3

Note: [a] - cubic meter estimates account for the slope of the backhoe trench ends.

Due to the obvious significance of this area, we moved approximately 20 m to the south and excavated a 1x1 m control unit (N17.2/W9; 1/4" dry screened). The purpose of this excavation was to obtain a quantitative sample of the midden constituents from the site, and augment the more coarse grained findings produced by the backhoe trenching. This unit was excavated to a depth of 150 cm, and encountered a rock feature between 89-109 cm below surface (Feature 4; see below).

The third trench excavated between the off-ramp and the Caltrans ROW fence was placed south of Datum C (Trench 5-18-1; Map II-9; Table II-18). Its southern end exposed historic fill used to level the slope down to Aqua Fria Creek. The north end of the trench encountered two additional rock features (Features 2 and 3) and a relatively sparse midden deposit. Both features were formally excavated, including the collection of multiple flotation samples. We also collected a flotation sample from a deeply buried soil underlying an old stream channel where a biface was observed in the profile (see below).

The presence of disturbed sediments at the south end of the trench defines the southern extent of the ALA-509 midden deposit within the Caltrans ROW. This finding was also confirmed by the excavation of Trench 5-20-1 (south of Aqua Fria Creek; Map II-9), where no cultural materials were encountered.

The final backhoe trenches excavated in the southeastern quadrant were placed west of the north bound off-ramp (Map II-9; Table II-18). Trench 5-18-2 was placed just west of Trench 5-18-1, only three meters from the edge of pavement. It showed an upper zone of road fill, underlaid by the same soil package found east of the off-ramp. An isolated human skull fragment was also found, which was reburied in the trench. Trench 5-18-3 was placed within the southeast quadrant clover leaf, not far from the Hetch-Hetchy aqueduct. The upper 190 cm consisted of either road fill (0-120 cm) or disturbed soils (120-190 cm), while an intact soil horizon containing cultural material was found below 190 cm. These findings indicate that the archaeological deposits extend under the freeway fill, but were probably truncated by the Hetch-Hetchy aqueduct.

Northeast Quadrant Methods

Three backhoe trenches were excavated in the northeast quadrant (Map II-9; Table II-18). Trench 5-19-1 was placed east of the north bound on-ramp, between the ramp and drainage ditch that runs along the Caltrans ROW. This trench revealed a profile characterized by an upper layer of highway fill, overlaying intact soils lacking cultural material. The other two trenches were placed west of the on-ramp, one between the on-ramp and clover leaf (Trench 5-19-2), and the other within the clover leaf (Trench 5-19-3). Both trenches encountered road fill lying directly on ancient marine sediments, clearly documenting the absence of archaeological deposits within this portion of the project area.

Southwest Quadrant Methods

Initial work in the southwest quadrant included two trenches west of the south bound on-ramp (Trenches 5-19-4 and 5-19-5; Map II-9; Table II-18). Both trenches exposed an upper unit of reworked fill, underlaid by an intact profile (see below); however, no cultural material was encountered in either context.

Two additional trenches were excavated just east of the south bound on-ramp (Trenches 5-19-6 and 5-20-2). Both trenches lacked cultural material, but did have intact soils below an upper zone of road fill. The final trench excavated within the southwest quadrant (Trench 5-20-3) was placed in the clover leaf; it also lacked cultural material. Based on these findings, no hand excavations occurred within this portion of the project area.

Northwest Quadrant Methods

Work in the northwest quadrant was limited to one backhoe trench (Map II-9; Table II-18). Trench 5-20-4 was placed within the clover leaf, and encountered sterile sediments to a depth of 215

cm. Given the absence of cultural materials within this trench, combined with previous disturbances associated with the re-channeling of Aqua Caliente Creek, construction and removal of Brown Road, and placement of multiple underground utilities, no further work was warranted within this portion of the project area.

LABORATORY METHODS (with Deborah Jones)

Archaeological materials recovered from ALA-576 excavations were returned to the Far Western laboratory in Davis for processing. The materials were washed and then catalogued by A. Ruby into a Microsoft Access computer file, under the guidelines and accession number provided by Sonoma State University. Tools were assigned individual catalogue numbers, whereas bulk samples such as debitage, bone, shell, and soil samples were assigned a group or lot number on the basis of provenience. All items were packaged in 4.0-mil zip-loc plastic bags, accompanied by an artifact/provenience label produced on acid free paper. Analysis of the collection commenced with the packaging and delivery of appropriate items (fish bone, obsidian, etc.) to the specialists. The catalogue, collection, and field paperwork are housed at Sonoma State University, Rohnert Park, California.

Chronological definition was accomplished through stratigraphic profiles (Jack Meyer), radiocarbon analysis (six samples; Beta Analytic Inc.), obsidian hydration (five samples; Tom Origer) and X-ray fluorescence spectroscopy (five samples; Richard Hughes). The radiocarbon samples consisted of charred materials from Feature 1 through 4, and two bulk soils from natural deposits. The obsidian specimens included two flakes and a biface fragment recovered from hand excavation and trench contexts. Additional studies included analysis of a flaked stone tools and debitage, ground and battered stone items, a single modified clay object, vertebrate and invertebrate faunal remains, and floral specimens (see specific analytical sections for a view of the methods used).

LANDFORM DEVELOPMENT

A sequence of natural alluvial strata exposed in backhoe trenches and in the cut bank of Agua Fria Creek are described below and provide the basis for the following discussion of local landscape evolution. Recorded within these strata are several episodes of deposition and erosion that extend from the Pleistocene through recent times. Two extensive Holocene-age soils (surface and buried) and several localized deposits of historic and late Holocene alluvium were identified. While certain soil units were correlated across the interchange on the basis of age (using radiocarbon dates), superposition, or gross physical characteristics, no comprehensive correlation of all stratigraphic units was attempted. Consequently, soil units are ordered from oldest to youngest and numbered I through VI in each individual trench; but soil unit designations do no necessarily correlate from trench to trench.

Below and in Table II-19, the six soil units are further subdivided as either channel (c) or floodplain (f) facies. Master soil horizons are assigned capital letters (A, B, or C) and are numbered from the top down (1 is not used), while subordinate horizons are designated by the following small

Table II-19. Trench Descriptions, CA-ALA-576.

Trench	Elevation AMSL	Depth (cm)	Soil Horizon	Soil Unit	Description	Cultural Material
5-17-1	42.25'	0-70	Ap	VI	Black redeposited midden, Clayey-loam	FCR, bone
		70-90	Cub	V	Brown silty-sand	-
		90-120	Ab	IV	Very dark brown clayey-loam	-
		120-150	Cub	IV	Dark brown sandy-loam	-
		25-120	Apb	IIIf	Redeposited; mix of olive clay and black clayey-loam	-
		105-150	Ab	IIf	Black clayey-loam	historic debris, glass and metal
		25-150	2ABtb/ 2Btyb	I	olive clay	-
5-17-2	41.75'	0-50	A	If	Very dark brown clayey-loam	Feature 1: FCR scatter, bone, shellfish
5-17-3	41.75'	0-90	A	If	Black clayey-loam	FCR zone beginning at 60 cm; Burial 1 encountered at 89 cm (reburied)
5-18-1	41.50'	0-120	Ap	VI	Disturbed, backfilled trench, mixed clayey-loam	-
		0-50	Ap	V	Recent fill; many poorly sorted medium to large gravels	-
		50-120	Apb	IV	Fill; redeposited olive clay	-
		25-120	Apb	III	Fill; black clayey loam with few gravels	-
		20-110	2Ab	IIf	Very dark grey clayey-loam	Feature 2: FCR concentration, baked clay, shell fish, charcoal
		110-140	2Btjb	IIf	Very dark brown clayey-loam	-
		140-200	2Cub	IIf	Greyish brown sandy-loam	Feature 3: FCR concentration, bone, shell fish, charcoal
		200-250	2Cub	IIc	Sorted, rounded gravels with some cobbles	-
		250-300	3A/Bb	If	Very dark brown clayey-loam	FCR, obsidian biface, basalt flake
5-18-2	41.25'	0-60	Ap	II	Construction fill; dark brown	-
		60-140	2Ab	If	Very dark grey clayey-loam	Fragment of human cranium (reburied)
5-18-3	42.00'	0-120	Ap	II	Construction fill; dark brown	-
		120-220	2Ab	If	Very dark grey clayey-loam	FCR, baked clay
5-19-1	44.00'	0-80	Ap	III	Construction fill; dark brown	-
		80-120	2Ab	IIf	Very-dark grey clayey-loam	-
		120-180	2Bktb	II	Very dark brown clayey-loam	-
		180-210	3Ab	If	Very-dark brown clayey-loam	-
5-19-2	43.75'	0-60	Ap	II	Construction fill, dark brown clayey-loam with gravels	-
		60-150	2Btyb	I	olive clay	-

Table II-19. Trench Descriptions, CA-ALA-576 (continued).

Trench	Elevation AMSL	Depth (cm)	Soil Horizon	Soil Unit	Description	Cultural Material
5-19-3	40.25'	0-60	Ap	II	Mixed; construction fill and disturbed A Horizon, dark brown clayey loam	-
		60-120	2Btyb	I	olive clay	-
5-19-4	33.50'	0-40	Ap	II	Construction fill, dark brown clayey loam	-
		40-100	2Ab	If	Very dark grey clayey loam	-
		100-170	2Btb	If	Brown clayey-loam	
5-19-5	34.25'	0-40	Ap	IV	Construction fill; dark brown clayey-loam	-
		40-130	2Ab	IIIf	Very dark brown clayey-loam	-
		130-150	3Cb??	IIc	Medium to large rounded cobbles	-
		150-180	4Ab	If	Brown clayey-loam	-
5-19-6	33.00'	0-60	Ap	III	Construction fill; highly compacted	-
		60-180	2Ab	IIf	Dark brown clayey-loam	-
		180-210	2Btb	IIf	Dark brown clayey-loam	-
		210-270	3Ab	If	Dark brown clayey-loam with dispersed rounded gravel and cobble lens at contact	-
5-20-1	41.00'	0-50	Ap	II	Construction fill, greyish-brown clayey-loam	-
		50-110	2Apb	If	Disturbed; very dark grey clayey-loam	-
		110-250	2Btj	If	Very dark grey clayey-loam	-
5-20-2	34.00'	0-120	Ap	II	Disturbed; construction fill and dark brown clayey-loam	-
		120-250	Bt	IIf	Brown clayey-loam	-
		250-300	2Ab	If	Brown clayey-loam	One obsidian flake
5-20-3	33.00'	0-110	Ap	If	Brown silty-clay	-
		110-150	Cu	Ic	Moderately sorted sands and gravels	-
5-20-4	34.50'	0-40	Ap	IV	Construction fill/disturbance	-
		40-130	2Ab	IIIf	Dark brown clayey-loam	-
		130-180	2Btb	IIIf	Brown clayey-loam	-
		180-195	3Cb	IIc	Medium to large, rounded gravels and cobbles	-
		195-215	4Ab	If	Dark brown clayey-loam	-

Note: AMSL -average mean sea level.

letters: "b" indicates that the horizon is buried at the location where it was described; "j" indicates that the horizon is in a juvenile state of development; "k" indicates that the horizon contains a concentration of calcium carbonate; "ox" indicates that the horizon contains oxidized parent material; "p" indicates that the horizon has been mechanically disturbed (plowing, construction, etc.); "t" indicates that the horizon contains a concentration of translocated clay; and "u" indicates that the horizon consists of relatively unweathered parent material.

Backhoe Trenches

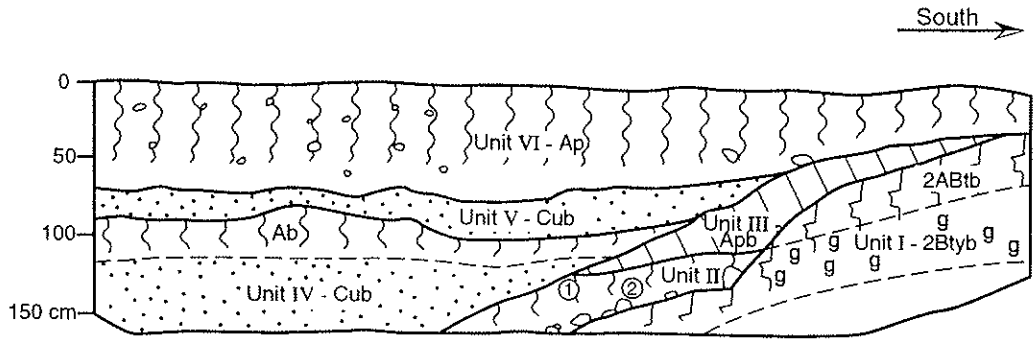
The sixteen backhoe trenches excavated at various points throughout the interchange revealed a complex series of Holocene age alluvial deposits and historic channel fills, inset into a Pleistocene-age deposit. Along with the presence of an intact cultural deposit associated with the surface soil (i.e. ALA-576), a deeply buried soil (200 + cm) containing cultural material was also identified. The results of the backhoe work are summarized in Table II-19.

Southeastern Quadrant

Trench 5-17-1 was located on the east side of the north bound off ramp of Hwy-680 to Mission Blvd. Designed to intersect the former channel of Agua Caliente Creek, the trench was oriented roughly north-south (parallel to the off-ramp) and excavated to maximum depth of 150 cm. The exposure measured approximately 6.0 m long and encountered a complex series of strata composed of recent fill and alluvial sediments set into and overlying a Plio-Pleistocene-age clay deposit (Figure II-14; Table II-19). On the northern end of the trench, historic fill/alluvium extended the full depth of the excavation (Units IV, V, and VI); an eroded and steeply sloping deposit of olive clay (Unit I) marked the former creek bank on the southern end of the trench. This Pleistocene deposit, was capped by several strata of recent alluvium (Units II, III, IV and V) and disturbed midden-fill (Unit VI) used to bury the former stream. Historic material, including glass and metal was found in the stratum (Unit II) immediately overlying the Pleistocene clay deposit. This trench was halted when the contact between the creek channel fill and stream bank was distinguished.

Trench 5-17-2 was placed approximately 3.0 m south of 5-17-1 on the east side of the Hwy-680 to Mission Blvd off-ramp. The trench measured 3.0 m long and was halted at a depth of about 50 cm when Feature 1 was encountered. This rock feature was exposed in a dark-brown A Horizon (Unit I: A) which incorporated a low to moderate amount of cultural debris. Following the formal investigation of Feature 1 (a rock concentration; see feature descriptions), a flotation sample was collected and the trench was backfilled. A charcoal sample collected from Feature 1 produced a radiocarbon date of 620 +/-40 B.P. (598 cal. B.P.).

Located on the east side of the northbound 680 off ramp, Trench 5-17-3 measured about 4.0 m long and like the previous trench, exposed a dark-brown A Horizon to a depth of 90 cm (Unit I). The soil horizon contained moderate amounts of cultural material, with a clear increase in fire affected rock beginning at approximately 60 cm below surface; at 89 cm, a human burial was encountered and excavation was halted. A hopper-screen insert was placed over the exposed cranium and the trench was backfilled (following consultation with the project MLD).



① Iron Object

② Green Bottle Glass (Champagne)

g Gypsum Crystals

Unit VI - Ap1: Black silty clay construction fill (2.5Y 2.5/1).

Unit V: Dark greyish brown silt loam (10YR 4/2) construction fill.

Unit IV: Very dark greyish brown silty clay loam (10YR 3/2) recent alluvium.

Unit III: Black clay (2.5Y 2.5/1) historic fill.

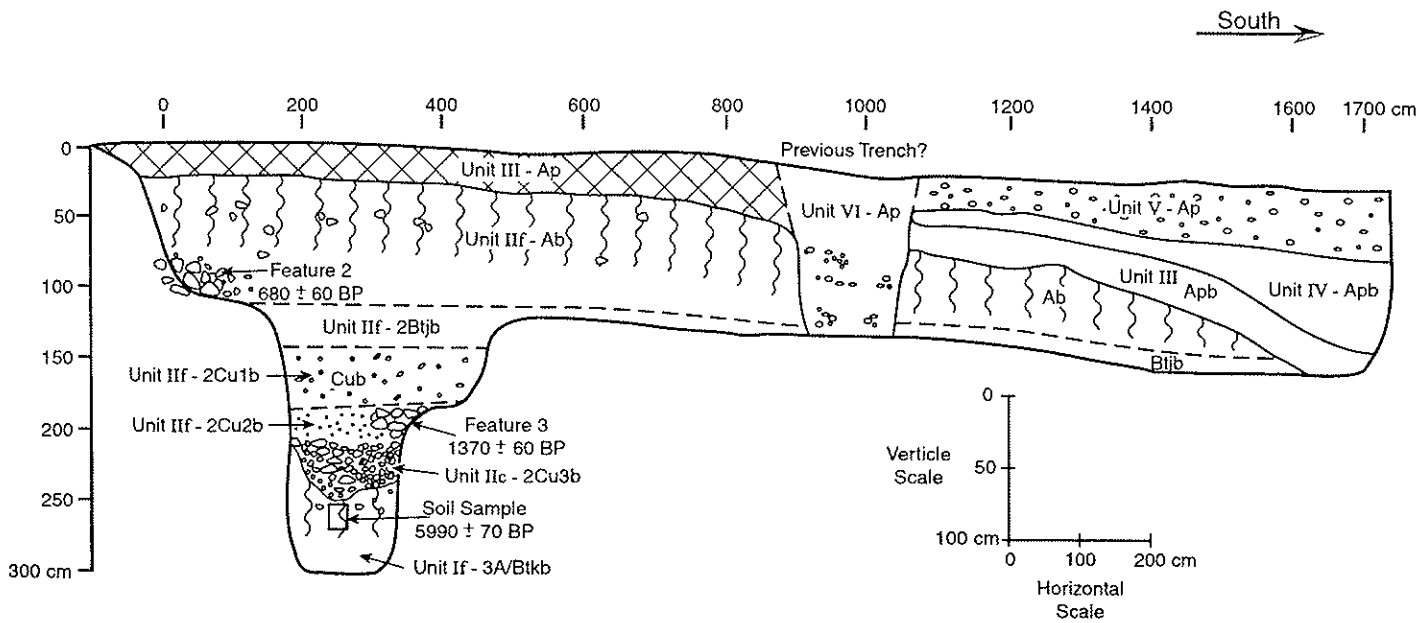
Unit II: Black clay (2.5Y 2.5/1) historic fill.

Unit I - 2ABtb: Olive clay (5Y 5/3), eroded Pleistocene deposit.

Unit I - 2Btyb: Olive clay (5Y 5/3).

Figure II-14. Trench 5-17-1 Profile, Facing East.

Trench 5-18-1 was placed just north of Agua Fria Creek, on the east side of the north bound Hwy-680 off-ramp. It measured approximately 18 m long and was placed near the bank of Agua Fria Creek, encountering a complex series of recent and Holocene age strata (Figure II-15). The southern two thirds of the trench was excavated to a depth of about 100 cm, while the extreme northern part of the trench was excavated to a maximum depth of almost 3.0 m. Similar to the excavation on the former bank of Agua Caliente Creek, this trench cross-cut a series of historic fill and alluvial deposits (Units III, IV, and V) in the southern end of the exposure. In the deeper northern end of the trench, a buried soil (Unit If: 3A/Btkb) was encountered at approximately 200 cm below surface. This soil was found to contain a sparse deposit of cultural material, including an obsidian biface. A bulk soil sample collected from Unit I returned a radiocarbon date of 5990 +/- 70 B.P. (6790 cal. B.P.), indicating that the soil was exposed at the surface during the early Holocene. Unit I was immediately capped by channel gravels (Unit IIc: 2Cu3b) which formed the basement of the overlying soil unit (Unit II). Within this upper unit, two cultural features were exposed, one contained in the C horizon (Unit II: 2Cu2b) and another closer to the surface in the Ab horizon of Unit II. Radiocarbon dates of 1370 +/- 60 (1290 cal. B.P.) and 680 +/- 60 B.P. (655 cal. B.P.) were obtained from these features. Unit II was capped at the surface by a 20 cm-thick deposit of construction fill. The features found in this trench were recorded, photographed, and flotation samples were collected. A large flotation sample was also obtained from the deeper buried soil, Unit If .



Unit VI - Ap: Mixed trench? fill.

Unit V - Ap: Brown clay loam (10YR 4/3) construction fill.

Unit IV - Apb Olive clay (5Y 4/3) construction fill.

Unit III - Apb Black clay (10YR 3/1) construction fill.

Unit IIf - 2Ab: Very dark grayish brown silty clay loam (2.5Y 3/1)(historic ground surface).

Unit IIf - 2Btjb: Very dark grayish brown silty clay loam (10YR 3/2).

Unit IIf - 2Cu1b: Grayish brown silt loam (10YR 4/2).

Unit IIf - 2Cu2b: Grayish brown loam (10YR 4/2).

Unit IIc - 2Cu3b: Week to moderately sorted coarse sand and gravel (channel deposit).

Unit If - 3A/Btkb: Very dark grayish brown clay loam (10YR 3/2)(buried paleosol).

Figure II-15. Trench 5-18-1 Profile, East Wall.

Trench 5-18-2 was excavated on the western side of the northbound Hwy-680 to Mission Blvd. off-ramp, just opposite to Trench 5-18-1. The trench measured almost 4.5 m long and was excavated to a total depth of 140 cm. The upper 80 cm of the deposit was found to be construction fill (Unit II: Ap), while the lower 60 cm appeared to be the same dark-brown A Horizon encountered at the top of the other trenches (Unit If: 2Ab). Dispersed pieces of fire-affected rock were found throughout the A Horizon and at 120 cm, a small piece of human cranium was identified. At the request of the project MLD, the fragment was placed in the bottom of the trench and reburied.

Excavated within the loop of the northbound 680 on-ramp, Trench 5-18-3 measured 4.0 long by 2.2 m deep and was designed to trace the western extent of the cultural deposit. The upper 190 cm of the trench was composed of construction fill (Unit II: Ap) containing some redeposited FCR. Below 190 cm, the intact A horizon (Unit If) was encountered. Within this stratum, several pieces of FCR and baked clay were observed. The trench was abandoned when the intact cultural deposit was identified.

Trench 5-20-1 was excavated at the tow of the road bed, south of Agua Fria Creek and just east of the north bound Hwy-680 off-ramp. The 5.0 m long excavation encountered construction fill to a depth of about 50 cm (Unit II: Ap). Below, lay a disturbed A Horizon which graded into a moderately developed B horizon around 110 cm (Unit I). The very dark brown, clay-rich B horizon continued to the bottom of the trench at 250 cm. No cultural material was identified within this excavation.

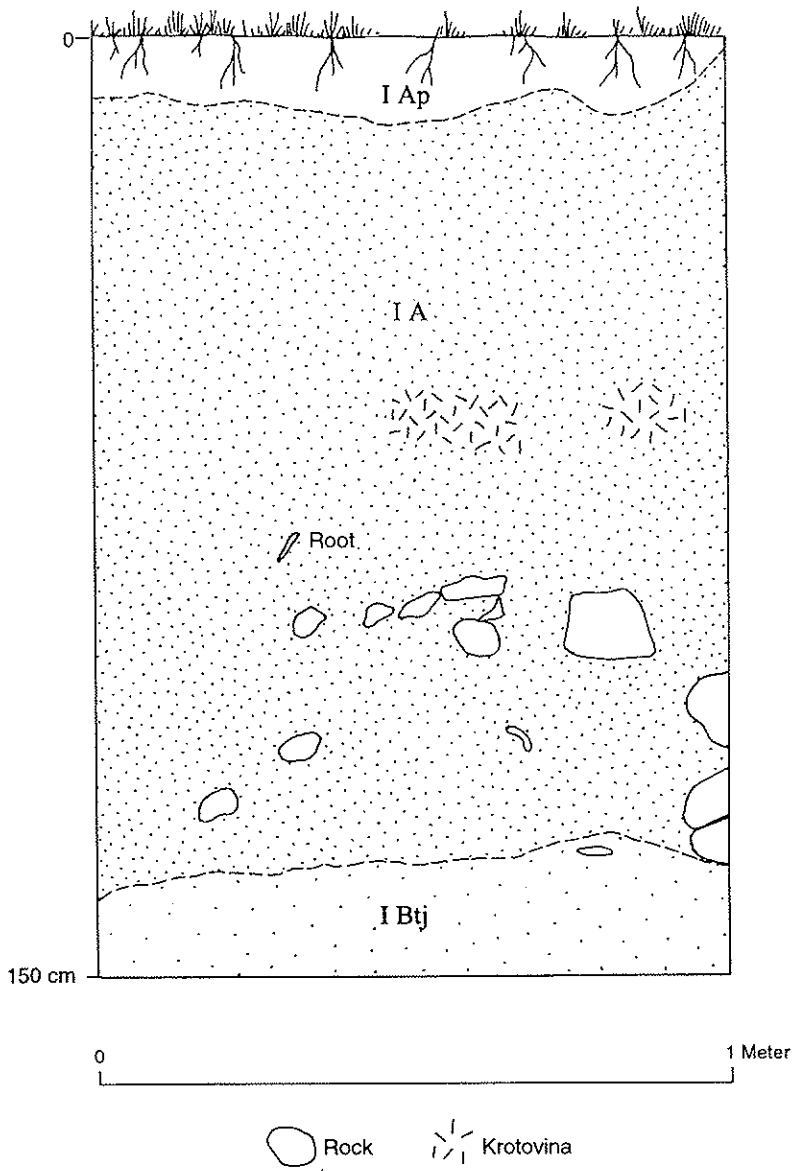
Unit N17.2/W9 was located in the southeast quadrant of the interchange on the east side of the off-ramp between Trenches 5-17-3 and 5-18-1 (Figure II-16). This 1x1 meter unit was excavated to 150 cm and exposed the same over thickened, dark-brown A horizon exposed in the adjacent trenches. The A horizon extended to a depth of almost 130 cm at which point it graded into a clay-rich B horizon (Btj). Beginning around 80 cm, there was a marked increase in the frequency of fire-affected rock and shell fish. Feature 4 was identified between 90 and 110 cm, apparently marking a former occupation zone. Charcoal collected from this feature returned a radiocarbon date of 1890 +/- 50 BP (1835 cal. BP).

Northeastern Quadrant

To test for the northern site boundary, Trench 5-19-1 was placed on the north side of Mission Blvd., just north of the north-bound on ramp of Hwy 680. This trench measured approximately 5.0 m long and was excavated to a depth of 2.1 m. The upper 80 cm consisted of construction fill (Unit III: Ap) used to make the sloping shoulder of the on ramp. Below the fill-zone an intact soil was encountered (Unit IIf), displaying moderately developed A and B horizons. A second soil (Unit If: 3Ab) was identified below 180 cm. Neither of these former ground surfaces were found to contain cultural material.

Trench 5-19-2 was excavated North of Mission Blvd and west of the north-bound on ramp of Hwy- 680. The trench was approximately 5.0 m long and was excavated to a maximum depth of 150 cm. The excavation revealed 60 cm of construction fill (Unit II: Ap) and gravels immediately overlying the Pleistocene, olive-clay deposits (Unit I). The trench was continued another 60 cm into the clay, but was stopped at 120 cm.

Further to the west, Trench 5-19-3 was excavated in the loop of the north bound off-ramp of Hwy-680. Measuring 5.0 m long, the trench was excavated to a maximum depth of 120 cm. Here too, the trench encountered approximately 60 cm of construction fill (Unit II: Ap) capping the Pleistocene, olive-clay deposit (Unit I). No intact Holocene age sediments were encountered.



Unit I - Ap: Brown Clay Loam (10YR 4/3) Disturbed.

Unit I - A: Very Dark Grayish Brown Silty Clay Loam (2.5Y 3/1).

Unit I - Btj: Very Dark Grayish Brown Silty Clay Loam (10YR 3/2).

Figure II-16. North Sidewall Profile of Unit N17.2/W9.

Southwestern Quadrant

Trench 5-19-4 measured 3.6 m long by 1.7 m deep and was placed on the south side of the south bound on-ramp to Hwy-680. The exposure revealed approximately 40 cm of fill and construction disturbance (Unit II: Ap) overlying an intact soil with well developed A and B horizons (Unit I). The excavation was stopped at 170 cm as no cultural material was identified.

Trench 5-19-5 was located about 12 m east of the previous trench, on the south side of the south bound on-ramp to Hwy-680. The exposure measured 5.0 m long by 1.8 m deep and revealed a profile composed of 40 cm of construction fill (Unit IV: Ap) capping a dark brown A Horizon (Unit III: 2Ab). This soil extended to a depth of 130 cm where it overlay a 20 cm-thick stratum of lag cobbles (Unit II: 3Cb). These rounded sandstone cobbles were resting on the surface of a buried soil (Unit I: 4Ab) which stretched from 150 cm to the bottom of the excavation at 180 cm. No cultural material was observed in either of the exposed soils.

Located just north of the south-bound on-ramp to Hwy-680, Trench 5-19-6 measured approximately 5.0 m long by 270 cm deep. A highly compacted zone of fill was encountered from the surface to a depth of about 60 cm (Unit III: Ap). Below the construction material lay a well developed, dark-brown soil composed of A and B horizons reaching to a depth of 210 cm (Unit II: 2Ab). Below lay a second soil (210 to 270 cm), capped by a thin veneer of lag gravels and a few cobbles (Unit I: 3Ab). Neither soil unit was found to contain cultural material.

Trench 5-20-2 was placed just 7.0 m east of Trench 5-19-6, on the north side of the south-bound Hwy-680 on-ramp. This 3.0 m long trench exposed construction fill and a disturbed A horizon to a depth of approximately 120 cm (Unit II: Ap). From 120 cm to 250 cm, a well developed, clay-rich B Horizon was identified (Unit II: Bt). Below an unconformable contact lay a buried soil (Unit I: 2Ab) which extended from 250 cm to the bottom of the trench, at about 300 cm. A small Napa Valley obsidian flake was recovered from the buried soil, collected from matrix contained in the backhoe bucket. Following this discovery, the trench was stepped back approximately four meters, and the paleosol was examined in situ. Several matrix samples were collected from the buried soil, but no additional cultural material was identified. A bulk soil sample from this trench was submitted for radiocarbon dating, returning a date of 6830 +/- 40 B.P. (7665 cal. B.P.).

Placed in the inside loop of the south bound Hwy-680 off-ramp to Mission Blvd. east, Trench 5-20-3 measured approximately 5.0 m long and was excavated to a depth of 150 cm. The exposure encountered a disturbed A horizon which extended to a maximum depth of about 110 cm (Unit If: Ap). Between 110 and 150 cm, a sequence of bedded sands and gravels was identified (Unit Ic: Cu), fining upward to form the silty-clay A Horizon in the upper profile. No cultural material was identified within this exposure.

Northwestern Quadrant

Trench 5-20-4 was excavated inside the loop of the south-bound Hwy-680 on-ramp from Mission Blvd west. The trench measured 5.0 m long by 215 cm deep and exposed four primary strata. The upper deposit was approximately 40 cm thick, consisting of construction fill and disturbed soil (Unit IV: Ap). Below this stratum lay a well developed soil composed of A and B horizons which extended to a depth of 180 cm (Unit III: 2Ab\Btb). This soil capped a lens of deflated sandstone cobbles which were as large as 15 cm in diameter (Unit II: 3Cb). A buried soil (Unit I: 4Ab) was identified immediately below the cobble stratum beginning at a depth of 195 cm. This soil was traced to the bottom of the excavation at a maximum depth 215 cm. No cultural material was recovered from the trench.

Trench Summary

The sixteen trenches excavated within the interchange revealed a complex series of Pleistocene and Holocene age soils and sediments, summarized below (Map II-8; Figures II-17 and II-18). The upper portion of the alluvial fan in the southeastern section of the interchange was composed of a series of historic and Holocene age alluvial sediments inset and capping a Pleistocene landform. This ancient deposit extends into the northeastern portion of the interchange, where it was capped by a thin deposit of construction fill. Up stream from the right-of-way along Agua Fria Creek, the occipital portion and horn core of a *Bison antiquus* was found in the cutbank at a depth of 6.2 m (Figure II-19). This Pleistocene-age fauna was contained in a channel deposit carved into the Pleistocene landform (see Map II-9). The presence of this now-extinct fauna within the deposit, confirms that the ancient clay stratum is at least Pleistocene in age.

Set into the Pleistocene deposit along Agua Fria Creek was an early to middle Holocene soil (Unit I), found in Trench 5-18-1 at a depth of over 2.5 meters. An obsidian biface, several pieces of FCR and flaked stone debitage was observed within this soil. Immediately above this stratum was another soil horizon which contained the primary deposit of cultural material. Locally, this soil unit was capped by construction fill, but in most portions of the northeastern quadrant, it formed the modern ground surface. Radiocarbon dates indicate that this deposit began capping the early Holocene soil around 1300 years ago. Between Agua Caliente Creek and Trench 5-18-1, this late Holocene surface soil appeared to rest directly on the Pleistocene deposit. However, based on a date of 1890 +/- 50 B.P. (1835 cal. B.P.) from Feature 4, it appears that this soil merges with a slightly older alluvial deposit that previously capped the clay lobe. It appears the soil formation has erased the contact between the earlier and later alluvial caps.

The five trenches excavated in the southwestern quadrant and the single trench placed in the northwestern quadrant, exposed a relatively wide-spread buried soil between 1.8 and 2.5 meters below surface. Although a single obsidian flake was recovered from this stratum (in Trench 5-20-2), no additional cultural material was found. Based on a radiocarbon date of 6830 +/- 40 B.P., this soil appears to be roughly contemporaneous with the inset early Holocene soil found up slope in the Southeastern quadrant, suggesting extensive lateral continuity in the distribution of this buried landform.

Landform Development

The oldest deposit identified within the project area is a Pleistocene deposit, which forms a structural barrier between the historic channels of Agua Caliente and Agua Fria Creeks. Sometime during the Pleistocene, this landform was eroded along it's north and south sides, probably creating a prominent knoll. This knoll appears to have been flanked by eroded terraces carved by the ancestral creeks. Evidence of one of these ancient stream channels was found incised into the Pleistocene clay deposit exposed in the cutbank of the modern Agua Fria creek. As noted above, this channel contained the remains of an extinct fauna (*Bison antiquus*) that dates to the late Pleistocene.

At some point during the late Pleistocene-early Holocene, an alluvial terrace formed along the southern edge of the knoll, creating an inset floodplain (i.e. Unit If in Trench 5-18-1). At the

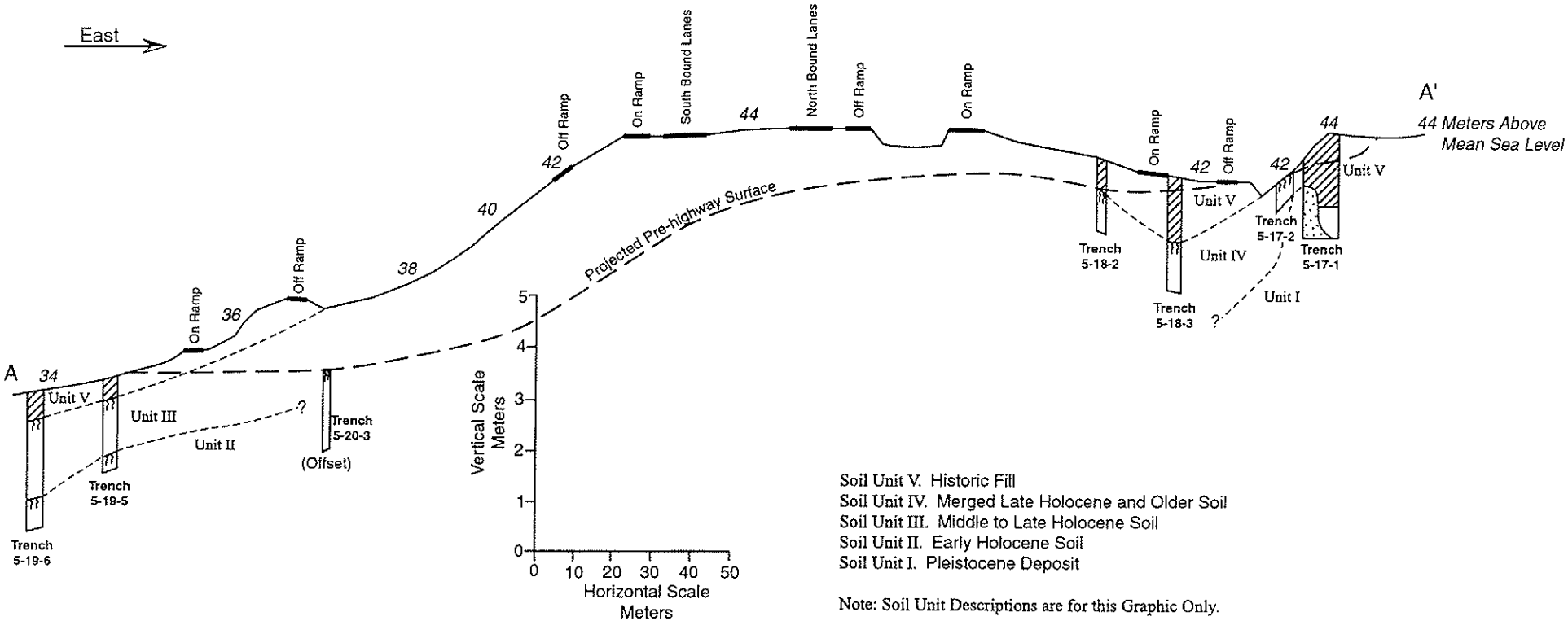


Figure II-17. Schematic Profile A - A' at CA-ALA-576.

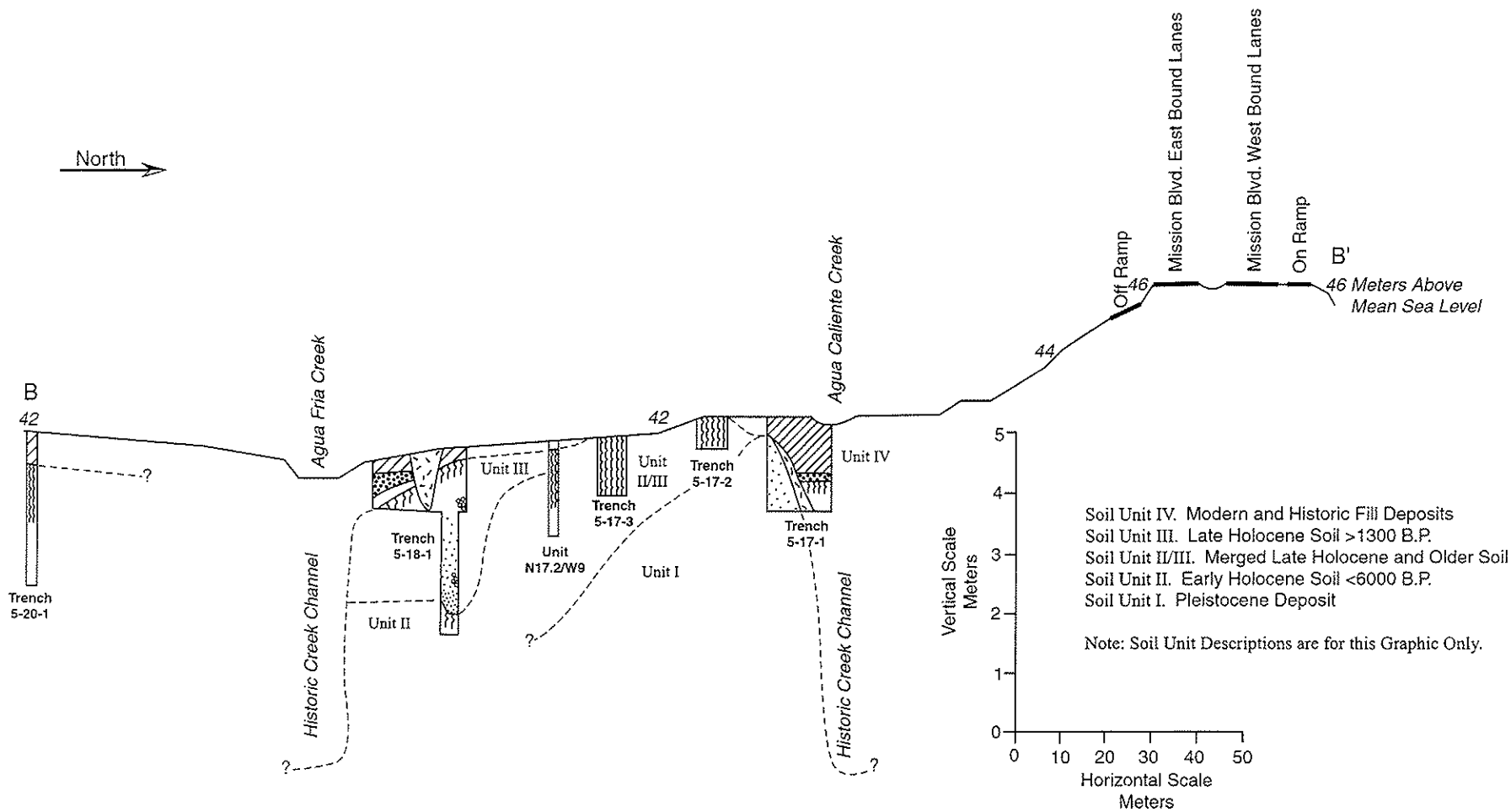


Figure II-18. Schematic Profile B - B' at CA-ALA-576.

Figure II-19. Occipital and Horn Core Fragments from *Bison antiquus* Found in South Bank of Agua Fria Creek.

same time, a relatively broad alluvial fan was aggrading down slope; identified as a buried soil in several trenches (e.g. Trench 5-20-2, Unit 2Ab). During the early Holocene, these landforms appear to have been relatively stable, and may have witnessed at least limited human occupation. Before the Middle Holocene, it appears that the lower portion of the fan was scoured and partially eroded, based on the presence of lag gravels and cobbles found on the surface of the buried A horizon in several of the trenches (e.g. Trench 5-19-5 and 5-19-6). A comparatively rapid aggradation in the lower portion of the fan occurred again, probably sometime during the Middle Holocene. A moderately well developed soil profile (A/Bt) in this depositional unit suggests that it stabilized quickly and has remained at the surface for a comparatively long period.

The upper portion of the fan, represented by the inset early Holocene terrace, appears to have remained relatively stable until around 1300 years ago, when an episode of channel deposition occurred. That this terrace was buried somewhat later than the early Holocene soil in the lower portion of the fan, is also reflected by the slightly later soil humate date from this deposit. Prior to being buried, the terrace was available for at least limited human occupation, based on the presence of cultural material.

Channel aggradation after 1300 years ago only seems to be reflected in the upper portion of the study area, suggesting that Agua Fria Creek shifted south, leaving the lower portion of the fan exposed until the present. When the inset channel began to aggrade during the late Holocene, it appears that people were already intensively occupying the site, judging from the 1800 year old date from Feature 4, and the occurrence of Feature 3 in the C horizon of the aggrading soil unit. Deposition in the inset channel occurred until the point at which alluvium began to spill over the Pleistocene deposit and interfinger with slightly older alluvium which already capped the surface of the lobe. Eventually, most of the Pleistocene landform was capped and the surface of the fan became relatively uniform. The primary deposit of cultural material occurs within this surface soil. The baseline of the creek probably remained relatively high through the late Holocene, periodically contributing some sediment to the fan, based on the depth at which some of the features were buried. However, sometime after around 600 years ago (based on radiocarbon dates from two slightly buried features), the channel of Agua Fria Creek became incised, probably at or near its current baseline. The stream has since been unable to contribute additional sediments to the surface of the fan.

CHRONOSTRATIGRAPHY

As described above, multiple episodes of deposition and soil formation have been identified in the project area, expressed as a series of alluvial fan deposits and inset terraces. During the current investigation, two of these soil units were found to contain evidence of prehistoric human occupation. The oldest of these deposits is an early Holocene soil recognized in Trench 5-18-1 and in Trenches 5-19-4 through -6, 5-20-2 and 5-20-4. In each of these trenches, the buried soil horizon was encountered between 2.0 and 2.5 meters below the surface. Although the buried soil was laterally extensive, only Trench 5-18-1 encountered a substantial cultural deposit; a single obsidian flake was collected from this buried soil in Trench 5-20-2.

Three radiocarbon dates bracket the age of this early Holocene soil: dates of 6830 +/-40 (7665 cal. B.P.), and 5990 +/- 70 (6790 cal. B.P.) obtained from bulk sediment samples collected

from the soil itself; and a date of 1370+/- 60 B.P. (1290 cal. B.P.) obtained from Feature 4, contained in the C horizon of the overlying soil unit. In Trench 5-18-1, the radiocarbon date of 6790 cal. B.P. suggests that the soil stabilized by at least the early Holocene; however, the 1300 year old date from the C horizon immediately above the soil, indicates that it was available for human occupation throughout most of the Holocene. The overlying deposit in Trench 5-20-2 has soil characteristics which suggest that the buried soil was capped somewhat earlier than 1300 years ago, but associated cultural material could still date to any time between the early and late-middle Holocene. The age of these deposits does not agree with the Pleistocene-age alluvial fan deposits as mapped by Helley and Graymer (1997).

The primary deposit of cultural material was contained in the surface soil, which immediately capped the early Holocene soil in trench 5-18-1 and rested directly on the Plio-Pleistocene lobe in other portions of the project right-of-way. Within this soil unit, four processing features, a human burial and an extensive deposit of habitation debris was encountered. Where this soil caps the early Holocene terrace in trench 5-18-1, it has a maximum age of around 1300 B.P., based on the radiocarbon date obtained from Feature 3 situated within it's C horizon. Judging from the 1800 year old date from Feature 4, the soil overlying the Pleistovene landform may be as much as 2,000 years old or older.

Features

A total of four cultural features were exposed in backhoe trenches excavated in the northeastern quadrant of the interchange; all four were associated with the surface soil unit. Two debris scatters, a rock-lined hearth and an occupation surface were identified, along with a single human burial.

Feature 1

Feature 1 was found at a depth of 37 to 49 cm below surface at the south end of Trench 5-17-2 (Figure II-20). It consists of a scatter of sandstone cobbles approximately 1x1 m in size. The cobbles range between 3-13 cm in maximum dimension, and the vast majority show evidence of thermal alteration. A medium sized goose bone (probably a femur) and several horn snail (*Cerithidea californica*) shells were found within the concentration of rocks, as were a chert core, and several pieces of mammal and marine fish bone. Two large flotation samples were collected from the feature matrix. These samples yielded a high frequency of Farewell-to-Spring (*Clarkia* sp.) and a few other nuts and seeds (see below). Charcoal from the flotation sample returned a radiocarbon date of 620 +/- 40 B.P. (598 cal. B.P.). Judging from these findings, it appears that Feature 1 was probably a dispersed rock hearth or scatter of discarded cooking stones.

Feature 2

Feature 2 was located at a depth of 75 to 105 cm below surface in Trench 5-18-1. The feature was exposed in cross-section in the northern and eastern walls of the trench and consisted of a dense, 30 cm-thick concentration of fire-affected sandstone cobbles and large (ca. 15 cm in maximum

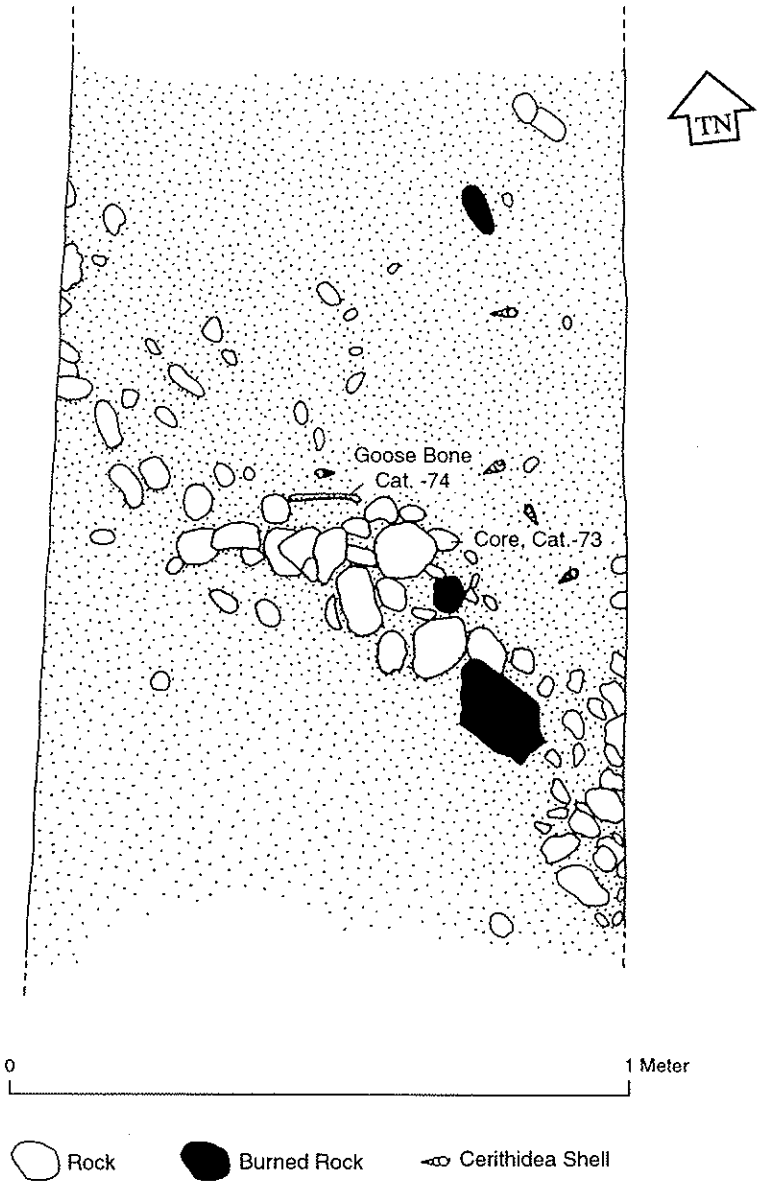


Figure II-20. Feature 1, Trench 5-17-2, 37 cm bs.

diameter) lumps of baked-clay. The maximum horizontal dimensions of the feature were not defined, but exceeded one meter in diameter. A flotation sample collected from Feature 2 produced a moderate amount of mammal and marine fish bone and a comparatively high frequency of bulb fragments and small seeds. Judging from these findings, it appears that Feature 2 is quite similar to those encountered by King (1968) and probably represents an earth oven or material discarded from one of these facilities.

Feature 3

Feature 3 was encountered in the bottom of Trench 5-18-1, at a depth of 167-190 cm below surface. The feature consisted of a dense, 20 cm-thick concentration of fist-sized, thermally-altered cobbles which stretched for approximately 120 cm along the bottom of the exposure. The edges of the rock cluster extended for an undetermined distance into the east and west side-walls of the trench. Contained within the feature matrix was a comparatively high frequency of wood charcoal, horn snail shells, and burned mammal bone fragments. Two flotation samples from the feature matrix (Samples 3 and 6) produced hundreds of small marine fish bones and scales, as well as, an abundance of acorn and bay nutshell and other smaller seeds. A charcoal sample from Feature 3 returned a radiocarbon date of 1370 +/- 60 B.P. (1290 cal. B.P.). The diversity of material recovered from Feature 2, implies that it probably functioned as a rock-lined hearth or similar cooking/roasting facility.

Feature 4

Feature 4 was identified at a depth of 89 to 109 cm below surface in excavation unit N17.2/W9. The feature was composed of a well shaped pestle and loose aggregation of thermally altered sandstone cobbles occurring as a uniform stratum across the bottom of the excavation unit (Figure II-21). Rather than representing a discrete processing facility or domestic hearth, this feature appears to be a debris accumulation resting on a former occupation surface. Although no clear stratigraphic break was evident in the surrounding sediments, an increase in habitation debris between 90 and 100 cm (and in subsequent levels) is consistent with a separate occupational zone. A flotation sample collected from matrix supporting one of the rock clusters, produced a variety of small seeds, nutshells, and *Brodiaea* bulb fragments. Charcoal recovered from the flotation sample returned a radiocarbon date of 1890 +/- 50 B.P. (1835 cal. B.P.).

Burial 1

Burial 1 was identified in Trench 5-17-2 at a depth of 89 cm below surface. During backhoe excavation of the trench, the top of a human cranium was clipped, displacing several fragments of the cranial vault; the ovoid cross-section of the cranium was visible *in situ*. At the request of the project Native American Most Likely Descendant, no attempt to expose the remains was made, the displaced cranial fragments were returned to the exposure, and the trench was backfilled.

Chronological Indicators

Chronological analysis of material recovered from ALA-576 is primarily based on radiocarbon dates obtained from cultural features and natural stratigraphic contexts. These data are supplemented by a limited number of obsidian hydration rim values from specimens collected in backhoe trenches and the single hand excavated unit (N17.2/W9).

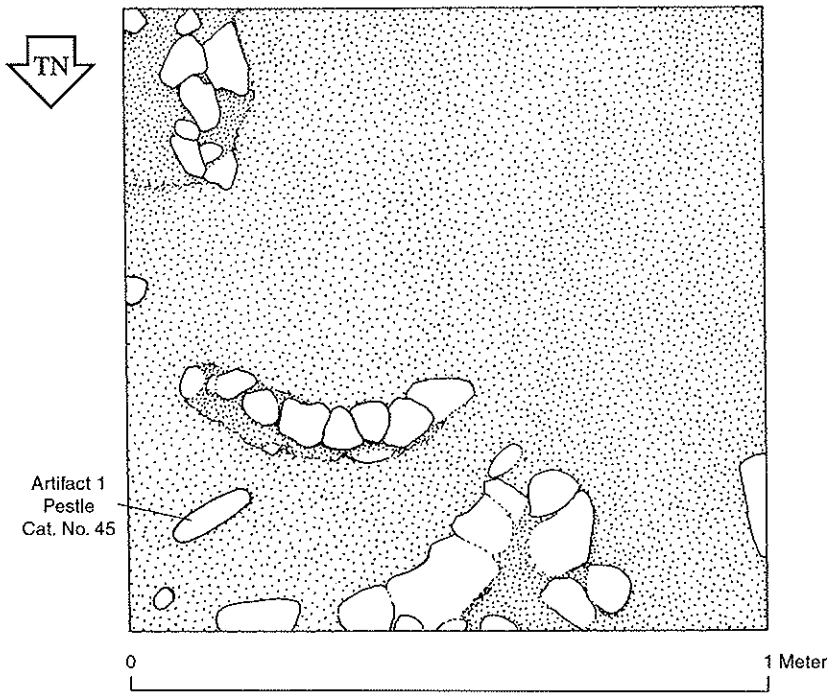


Figure II-21. Plan View of Feature 4, Unit N17.2/W9, 89-109 cm bs.

Radiocarbon Assays

A total of six radiocarbon dates was obtained from ALA-576, including dates from each of the four cultural features (Features 1-4) and from two buried soil horizons (Table II-20). As described above and presented in Table II-20, cultural dates from the site ranged between 1835 and 598 cal. B.P. Buried soils identified in trenches 5-18-1 and 5-20-2 produced dates of 7665 and 6790 cal. B.P.

Table II-20. CA-ALA-576 Radiocarbon Dates.

Cultural Contexts

Beta #	Material	Provenience	Soil Unit	Depth	Conventional Radiocarbon Age	Calibrated Intercept
Beta-132424	C	Feature 1	T 5-17-2:If	37-49 cm	620 ± 40 B.P.	598 B.P.[1]
Beta-132425	C	Feature 2	T 5-18-1:IIf	75-105 cm	680 ± 60 B.P.	655 B.P.
Beta-132426	C	Feature 3	T 5-18-1:IIf	167-190 cm	1370 ± 60 B.P.	1290 B.P.
Beta-132427	C	Feature 4	N17.2/W9:If	89-109 cm	1890 ± 50 B.P.	1835 B.P.

Natural Dates

Beta #	Material	Provenience	Soil Unit	Depth	Conventional Radiocarbon Age	Calibrated Intercept
Beta-131930	BS	T 5-20-2	T 5-20-2:If	260-280 cm	6830 ± 40 B.P.	7665 B.P.
Beta-131931	BS	T 5-18-1	T 5-18-1:If	250-270 cm	5990 ± 70 B.P.	6790 B.P.

Note: C - charred material; BS - bulk soil; [1] - mean of three intercepts (640, 590 and 565 B.P.).

Obsidian Hydration

All five obsidian specimens recovered during site testing were submitted for geochemical source identification and obsidian hydration analysis (Table II-21). Four of the five specimens were collected from the buried soil identified in either Trench 5-18-1 or 5-20-2. The fifth specimen was from the 120-130 cm level of Unit N17.2/W9.

Table II-21. CA-ALA-576 Obsidian Hydration.

Catalogue Number	Description	Provenience	Soil Unit	Depth	Mean (μ)	Source
54	Debitage	N17.5/W9	N17.2/W9:If	120-130 cm	3.4	Napa Valley
92	Debitage	T 5-20-2	T 5-20-2:If	270-270 cm	1.1	Napa Valley
87	Biface Fragment	T 5-18-1	T 5-18-1:If	252-252 cm	0.9	Annadel
139A	Debitage	T 5-18-1	T 5-18-1:If	250-270 cm	0.9	Annadel
139B	Debitage	T 5-18-1	T 5-18-1:If	250-270 cm	3.7	Bodie Hills

The combined obsidian sample from the buried soil produced a mean hydration value of 1.7μ with a range of 3.7μ to 0.9μ and a standard deviation of 1.4μ. Despite being collected from deeply buried contexts, these samples produced unusually low (young) hydration values; only the Bodie Hills specimen (-128B), with a mean of 3.7μ, falls within an expected age range, given other chronostratigraphic information. In fact, the hydration values imply an age even younger than that of the cultural deposit found at the surface. Other deeply buried deposits in nearby regions (Meyer and Rosenthal 1997; Gmoser 1998) have consistently produced equally low hydration values, indicating that perhaps the depth of burial or the chemical composition of the soil matrix may negatively affect the hydration process. It appears, therefore, that most of the specimens from the buried soil at ALA-576 may not be truly indicative of the age of the associated cultural deposit.

Component Definition

The following discussion integrates the stratigraphic, radiocarbon, and obsidian hydration information presented above. Two temporal components (Late Period and early Middle Period) and an undated component are defined.

The oldest cultural component identified at ALA-576 is associated with the lower levels of Unit N17.2/W9 and the buried soil (Unit If) found in trench 5-18-1. A radiocarbon date of 1835 cal. B.P. from Feature 4 found in Unit N17.2/W9, indicates that the associated occupation zone, and the underlying levels (90 -150 cm), date to the early part of the Middle Period as defined by Bennyhoff and Hughes (1987: Figure 10). A single rim value of 3.4μ (Napa Valley obsidian) from the 120-130 cm level of Unit N17.2/W9 is consistent with this time frame (Origer 1982: 91-92). In addition, based on a rim value of 3.7μ (Bodie Hills), the cultural deposit associated with the buried soil (Unit If) found in trench 5-18-1, is also tentatively assigned to the early Middle Period. Although this buried soil was available for human occupation more than 6790 years ago (cal. B.P.), a radiocarbon date from the overlying stratum indicates that it was capped as late as 1300 years ago. There is no evidence to suggest that an early or middle Holocene cultural component is associated within this stratum.

The most extensive deposit of cultural material from the site appears to date to the Late Prehistoric Period. Included in this component are Features 1 through 3 and materials collected from Trench 5-17-2 and the 0-90 cm levels of excavation unit N17.2/W9. A date of 1290 B.P. obtained from Feature 3 provides a maximum age, while dates of 598 and 655 B.P. from Features 1 and 2 respectively, bracket the later part of this occupation. In Trench 5-18-1, the Late component is associated with soil Unit IIf. However, in the excavation unit, Soil Unit IIf appears to imperceptibly overlay an older alluvial deposit (Unit If), the boundary of which may have been obscured by soil formation processes. The division of the upper and lower portions of Unit N17.2/W9 into two separate temporal components is based on the date of 1835 B.P. from Feature 4. This feature predates the deposition of Unit IIf in Trench 5-18-1 and is thought to mark the former ground surface (see Feature 4 above). Consequently, the alluvial deposits (and associated cultural deposit) capping Feature 4 appear to be stratigraphically equivalent to Soil Unit IIf and therefore post date about 1300 B.P.

In total, two cultural components are defined within the project area (Table II-22). The oldest of these components dates to the early Middle period and is associated with the buried soil (Unit If) in Trench 5-18-1 and the lower levels (90-150 cm) of excavation Unit N17.2/W9. A Late Prehistoric component is also defined, associated with soil Unit IIf in Trench 5-18-1, soil Unit If in Trench 5-17-2, and in the upper levels (0-90 cm) of the excavation unit N17.2/W9.

ARTIFACT INVENTORY (with Deborah Jones)

The ALA-576 artifact inventory consists of three flaked stone tools and cores, 62 pieces of debitage, five ground or battered stone items, 1658 mammal bones, 1990 fish bones, 664.6 gms of shell, a shaped clay object, and an assortment of ochre, baked clay, charcoal, and floral remains (Table II-23). The materials are distributed between two temporal components as well as an undated

Table II-22. CA-ALA-576 Component Areas

Component	Provenience	Stratigraphic Unit	Features
Late Period	N17.2/W9: 0-90 cm	If	-
	T 5-17-2: 0-50 cm	If	Feature 1
	T 5-18-1: 0-200 cm	IIf	Features 2 and 3
Early Middle Period	N17.2/W9: 90-150 cm	If	Feature 4
	T 5-18-1: 250-300 cm	If	-
Undated	T 5-20-2: 250-300 cm	If	-
	T 5-18-3: 120-220 cm	If	-
	T 5-18-2: 0-140 cm	If	-
	T 5-17-3: 0-90 cm	If	Burial 1

context. The early Middle Period consists largely of materials retrieved from the lower depths of Unit N17.2/W9 and Trench T-18-1, and includes Feature 4. The upper levels of the CU and Trenches 5-17-2 and 5-18-1, including Features 1-3, constitute the Late Period component. Materials recovered from all other areas are from undated contexts, and include a meager sample of two flakes and two pieces of mammal bone. The following discussion presents the results of the various analysis from flaked stone to floral remains; each section is organized per temporal component disregarding the two pieces of debitage and two mammal bones recovered from undated contexts.

Table II-23. CA-ALA-576 Artifactual Material Inventory per Component.

	Early Middle		**Late**				**Undated**	
	Non-F	F-4	Non-F	F-1	F-2	F-3		**Total**
Biface	1	-	-	-	-	-	-	1
Core	-	-	1	1	-	-	-	2
Debitage	20	8	27	2	-	3	2	62
Pestle	1	1	-	-	-	-	-	2
Handstone	-	-	-	-	-	1	-	1
Battered Cobble	-	-	1	-	-	1	-	2
Bone - Bird/Mammal	323	120	40	55	298	820	2	1,658
Bone - Fish	3	13	2	11	189	1,772	-	1,990
Clay Object	-	-	1	-	-	-	-	1
Ochre	-	-	1	-	-	-	-	1
Baked Clay	3	-	-	-	13	-	-	16
Charcoal	-	-	-	-	-	1	-	1
Total	351	142	73	69	500	2,598	4	3,737
Shell (gms)	283.5	87.2	130.1	10.7	1.4	148.1	3.6	664.6

Note: F = feature; Misc. = miscellaneous.

Flaked Stone Assemblage

Three artifact categories were identified within the flaked stone assemblage: bifaces, cores, and debitage. All tools and cores were measured (maximum length, width, and thickness), weighed, with material type and condition (i.e., whole, proximal fragment, distal piece, etc.) recorded. Debitage was sorted by material type per unit or stratum level, counted, and weighed. Each artifact class was analyzed to determine technological origin, evidence and kind of use-wear, type of reworking, and reason for discard. The following section outlines and defines the artifact categories and basic analytical procedures applied to each class.

Bifaces are artifacts that show flake scars on opposing surfaces which form a continuous margin. Based on a combination of technological and morphological characteristics, five stages of biface reduction are recognized. Stage 1 bifaces display rough bifacial edges, thick, sinuous margins, with less than 60% of the perimeter edge shaped. Stage 2 bifaces are percussion shaped specimens with a rough outline. Stage 3 bifaces are percussion thinned, well formed specimens. Evidence of intermittent pressure-flaking is seen on Stage 4 bifaces, which are of further reduced, more-or-less symmetrical preforms with fairly regular margins and uniform cross-sections. Stage 5 bifaces are extensively pressure-flaked implements, displaying opposing surfaces completely (or nearly so) covered by closely-spaced flake removal scars. Considered "finished tools", Stage 5 forms constitute non-diagnostic projectile points or formalized bifacial knives/blades. Biface origin, evidence of reworking or use, presence or absence of cortex, and reason for rejection were recorded.

Cores are flaked stone items reduced from an original cobble, nodule, or chunk and used as a source of flakes for the production of formed artifacts or for expedient, casual tools. Cores must show evidence of three of more flake removals. Attributes pertinent to the examination of cores include: (1) length of detachment scars; (2) platform configuration (unidirectional, bidirectional, bipolar, bifacial, etc.); (3) core form (tabular cobble, flake, assayed cobble, etc.); and (4) platform type (cortical, interior, prepared, etc.).

Debitage is the flake debris related to biface and core reduction. Lithic debris was classified by broad flake types termed: (1) primary reduction, decortication flakes and chunky pieces of shatter with cortex; (2) core reduction, flakes with straight longitudinal cross-sections and dorsal surfaces with few to multiple arises, salient bulbs of force, "U"-shaped platforms, and no cortex; (3) early biface thinning, flakes with curved longitudinal cross-sections, platform angles less than 70 degrees, and few dorsal surface arrises; (4) late thinning flakes, displaying curved longitudinal cross-section, thinner and with greater dorsal flake scar complexity; (5) shatter, chunky, thick or cuboidal debitage pieces; (6) edge preparation flakes, are small with remnant tool or core margin platforms and complex dorsal surfaces; (7) pressure, flakes are generally small, with salient bulbs of force, minute and oblique platforms, and simple dorsal surfaces; (8) edge preparation/pressure flakes, include small flakes with attributes of both flake types; and (9) indeterminate flake fragments, are non-diagnostic flake parts. These categories provide a means of assessing the relative presence or absence of the various stages of lithic reduction from initial cobble reduction to tool finishing.

The flaked stone collection from ALA-576 consists of one biface, two cores, and 62 pieces of debitage. Assemblage composition includes an array of lithic materials including chert, quartz,

Early Middle Period Assemblage

Both of the early Middle Period pestles are complete. The first is a small sandstone specimen measuring 73.4 mm long, and 6.8 mm in diameter (#44). Lightly shaped, the tiny pestle is fashioned from a natural elongate pebble and exhibits battering on one end. The second tool is a well shaped, large cylindrical pestle (157.3 mm long and 49.5 mm in diameter; #45; Figure II-22). One end of the tool is smoothly ground and beveled indicating use in heavy grinding and pulverized activities. The latter tool was recovered in association with Feature 4; one can only speculate that the tool was used in processing various nuts and seeds identified within the feature matrix.

Late Period Assemblage

All of the Late Period tools are fashioned from sandstone. The handstone is a small fist sized tool (63.4 mm in diameter and 38.4 mm thick) exhibiting grinding and polish on a single face and beveling and grinding around the tool perimeter (#81). One of the battered cobbles is complete (74.4 mm wide and 39.1 mm thick) and shows extensive battering along one tool margin (#85). The other tool is the distal end of a slender, cylindrical stone measuring 56.6 mm long, 36.9 mm wide, and 19.7 mm thick (# 9). Heavy end battering marked by a flake spall are found on the implement. The presence of the well-worn handstone and battered cobble within Feature 3, a hearth feature with various nut and seed remains, strongly suggests the implements were used to process these resources (i.e., cracking nutshells and grinding nuts and seeds).

Miscellaneous Artifact

A single piece of cylindrical shaped and heat-altered clay was found in Unit N17.2/W9 in the Late Period, non-feature context (#19). The clay object measures 21.3 mm long, and 10.7 mm in diameter, and appears to have been intentionally modified into a small flat-ended cylinder. One end of the object has been fractured. It is unclear for what purpose this item was intended.

FAUNAL REMAINS

Analysis of the faunal remains from ALA-576 was completed by three separate specialists. Ken Gobalet directed the identification and speciation of the fish remains, Kim Holanda completed the analysis of bird and mammal remains, and Deborah Jones analyzed the shellfish. Recovery techniques ranged from ad hoc retrieval of large bone fragments from surface locations or unscreened trench contexts, to 1/4" screening of the hand excavation unit and features. The latter resulted in the controlled collection of both shell and bone remains. Fine-grained samples which are necessary to evaluate the presence and density of the more fragile shellfish and smaller fish species were collected as flotation samples. These samples were obtained from feature contexts and consisted of bulk soil samples (Feature 1, 16.8 liters; Feature 2, 25.0 liters; Feature 3; 10.3 and 12.5 liters; and Feature 4; 8.0 liters) as well as one non-feature sample (21.0 liters). Once processed the 1/4 and 1/8 inch mesh heavy fraction was sorted and any faunal (bird, mammal, fish, or shell) remains were catalogued. The 1/6" mesh samples were sorted solely for fish remains.

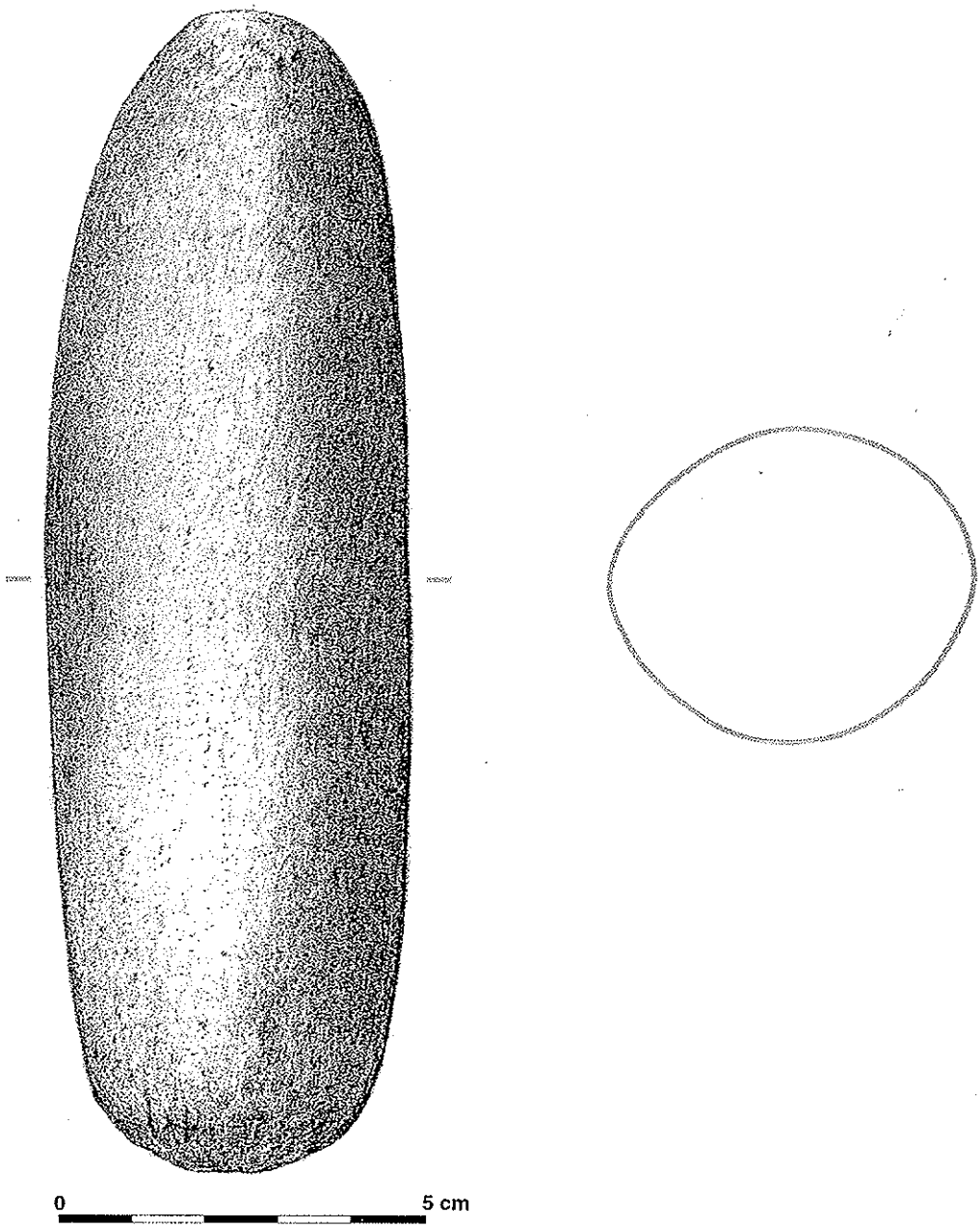


Figure II-22. Well Shaped, Cylindical Pestle from CA-ALA-576.

surrounding the site, as well as small schooling fishes (e.g., anchovy, silversides) and marine mammals (e.g., sea otters) from San Francisco Bay.

Late Period

The Late Period fauna from this site are represented by 3,191 specimens. This assemblage appears to be less fragmented than that from the early/Middle assemblage as less than a third (31.3%) are indeterminate vertebrate (compared to 80.7%) from the early Middle period. About 28.7% of the remaining fauna could be identified only to class. Combined, only 61.3% of the fauna from the Late Component (compared to 92.8% of that from the early Middle component) could not be identified beyond the level of class, leaving 38.7% which could be identified to a more specific level. An overwhelming majority of these are fish (n=1180; 95.5%), specifically, various species of freshwater, saltwater, and pelagic fishes. Other identified taxa include rodents (n=47), birds (n=5), artiodactyls (n=2) and a single sea otter.

Of the fishes identified in Late Period contexts, most are from the herring famility, including undifferentiated herrings (81.6%), anchovy (4.7%), and sardine (3.4%). Other important fishes include minnow/carp (4.7%) and silverside (2.5%), followed by only minor percentages of other taxa like perch, chub, hitch, blackfish, mudsucker, and ray (1.2% combined). The high proportion of small schooling fish (i.e., anchovy and sardine) probably indicates that prehistoric fishermen captured them using watercraft and nets on San Fracisco Bay where they occur in great numbers, from spring to summer. Most of the other species from the site are bottom feeders, preferring the shallow muddy backwater habitats provided by shallow bays, deltas and lagoons (Gotshall 1989; McGinnis 1984; Moyle 1976).

Invertebrate Remains with Deborah Jones

A total of 662.8 grams of dietary shell was recovered from ALA-576 (Table II-27). The invertebrate remains are distributed between early Middle and Late period components, in both feature and non-feature contexts. Most abundant among the collection is the mudflat dwelling California horn snail (78%), with additional estuarine or bay dwellers including the Pacific piddock (a thin shelled boring clam; 9.5%) and the gravelly sand and mud dwelling Pacific oyster (11.4%). Freshwater indicators are limited to a small sample of freshwater mussel (0.3%) found exclusively within Feature 3. Additional shell remains recovered from the deposit consist of a small amount of non-diagnostic crab remains (0.4%) and a trace amount of indeterminate shell fragments.

Early Middle Period Shell Remains

The early Middle Period invertebrate assemblage was derived from 1/4" screened materials from the control unit, as well as a 1/4 and 1/8" processed soil sample from Feature 4. California horn snail dominates the assemblage in both contexts, with the exception of the 1/8" screened sample; Cerithidea simply has a much more robust and durable shell than that of the fragile, thin shelled piddock resulting in a greater abundance of fine debris for the latter. Altogether the assemblage reflects a rather narrow exploitation of nearby, bay mudflat dwelling invertebrate species by early Middle Period aboriginal site inhabitants.

Table II-27. Invertebrate Species from CA-ALA-576 per Component.

	early Middle			Late							U	Total
	Non-F	F-4		Non-F	F-1		F-2		F-3			
	1/4"	1/4"	1/8"	1/4"	1/4"	1/8"	1/4"	1/8"	1/4"	1/8"		
Common Name:												
California horn snail[1]	212.6	58.7	2.2	103.5	6.9	0.7	0.5	0.1	117.9	11.1	3.5	517.7
Pacific piddock[2]	27.8	7.6	6.2	8.0	-	2.4	-	0.6	2.8	8.1	0.1	63.6
California oyster[3]	40.5	10.0	1.2	18.4	-	0.1	-	0.1	4.8	0.5	-	75.6
freshwater mussel[4]	-	-	-	-	-	-	-	-	1.6	0.5	-	2.1
Crab	0.8	0.1	0.4	0.2	0.4	0.1	-	0.1	-	0.4	-	2.5
Indeterminate	-	0.8	-	-	-	0.1	-	-	-	0.4	-	1.3
Total	281.7	77.2	10.0	130.1	7.3	3.4	0.5	0.9	127.1	21.0	3.6	662.8

Note: [1] - *Cerithidea californica*; [2] - *Barnea subtruncata*; [3] - *Ostrea lurida*; [4] - *Anodonta* spp.; and U - Undated context. All shell weights in grams.

Late Period Shell Remains

The assemblage of Late Period shell consists of 290.3 grams of shell composed of California horn snail (82.9%), and lesser amounts of Pacific piddock (7.5%), California oyster (8.2%), freshwater mussel (0.7%), and crab (0.1%). As mentioned in the above discussion, while horn snail dominates both feature and non-feature contexts, piddock tends to be better represented within the fine-meshed samples. Of note, is the small amount of freshwater mussel recovered from Feature 3; the only ALA-576 feature containing freshwater shellfish. The presence of these remains indicates some harvesting of freshwater resources in conjunction with the more intense exploitation of bay/estuary resources during Late Period site occupation.

HUMAN REMAINS

A single human burial was encountered during the test excavation at ALA-576. During excavation of Trench 5-17-3, the top of a human cranium (Burial 1) was observed at 89 cm. Trench excavation was immediately halted, and upon consultation with the Most Likely Descendant (MLD), the burial was carefully covered with plastic tarp, and a hopper insert screen, and the area was backfilled. An isolated cranial fragment was also recovered. The fragment was found in Trench 5-18-2 and following the wishes of the MLD was placed in the bottom of the trench and reburied. Three small fragments of human bone were also found during analysis of the site faunal material. The remains will be appropriately reburied.

PLANT MACRO-FOSSILS with Eric Wohlgemuth

The recovery of flotation samples was limited to feature contexts with the exception of a single non-feature bulk sample. Soil samples were processed and analyzed by Eric Wohlgemuth at the Far Western laboratory in Davis. After recording the soil sample volume to the nearest 0.1 liter, flotation was performed in a washtub, where buoyant light fraction materials were skimmed and then decanted through 40" mesh (0.38 mm). The non-buoyant heavy fraction was washed through 1/8" and 1/16" window mesh (1.0 mm). Light fractions was sorted and examined to 0.5 mm grade at 10X. All floral remains were classified as charred or non-charred and, if possible, identified to genus and species level.

Plant remains were recovered from 93.6 liters of sediment flotation-processed from four cultural features and one midden sample. Constituents identified include 466 pieces of large seeds (remains of nuts and fruit capsule), 216 underground plant part fragments (hereafter referred to as "bulbs"), and 625 small seeds identified to family, of which 397 were identified to genus. Wood charcoal identification was not attempted.

Table II-28 lists frequencies per liter of sediment for large seeds, bulbs, and wood charcoal, while Table II-29 lists small seed frequencies. Several unusual patterns can be discerned in these data, particularly in the context of plant remains data from previously investigated sites in central California (e.g., Wohlgemuth 1996; 1997a; 1997b). Discussion will be organized by feature context, followed by a review of common characteristics of the site samples, and a final discussion of possible diachronic trends in feature use at the site.

Feature 4 is the oldest deposit sampled, radiocarbon dated to cal 1930-1710 B.P. (this and all other radiocarbon dates presented give the two sigma calibrated range). Charcoal is uncommon, as are nutshell remains of all kinds, although inedible capsule fragments of *Clarkia* (farewell to spring) are common. In contrast, small seeds are common, and while a variety of genera are represented, seeds of *Chenopodium* (goosefoot) are dominant (73.9% of small seeds identified to genus; see Table II-30) to an extent very rarely seen in central California small seed assemblages. Also very unusual is a high frequency of bulb fragments, notably of the genus *Brodiaea*, and/or the related genera *Triteleia* and *Dichelostemma* (hereafter referred to simply as *Brodiaea* bulbs). A measure of the atypical nature of Feature 4 is that bulbs are nearly as common than acorn nutshell, an unheard of relationship in central California.

Feature 3, radiocarbon dated to cal 1365-1180 B.P., differs from Feature 4 and all other samples examined from the site in that nutshell is common, particularly of acorn and bay. While not as common proportionally due to the more frequent acorn and bay residues, *Clarkia* capsule is as frequent or nearly so as in any other site sample. Small seeds are also common, and slightly more diverse than in Feature 4, and are dominated by *Chenopodium*, (52.8% of seeds identified to genus). Bulbs are also quite common in Feature 3.

Feature 2, radiocarbon dated to cal 700-545 B.P., contains low frequencies of nutshell, including acorn. In contrast, *Clarkia* capsule is abundant, more so than acorn, another unprecedented finding in central California. Small seeds are very abundant (83.6% identified to family per liter of sediment), fitting well within the range of frequencies found in Late Period sites in central California (Wohlgemuth 1996). A variety of genera are present, but *Chenopodium* remains the most common small seed, although at the lowest frequency (25.7% of seeds identified to genus) of site samples. Like Feature 4, bulbs are very common, so much so that their frequency far exceeds that of acorn nutshell (2.5 bulb fragments per piece of acorn nutshell); again, this is an unprecedented finding in central California.

Feature 1, radiocarbon dated to cal 660-540 B.P., also features low frequencies of nutshell, again so that *Clarkia* capsule is more common than acorn or any other nut residue. Small seeds are present in low numbers, albeit with some diversity, although still *Chenopodium* dominated. Bulbs are also found in somewhat low numbers. The low frequency of small seeds is quite aberrant of central California samples of this age, as is the low frequency of wood charcoal (Wohlgemuth 1996).

Table II-28. CA- ALA-576 Large Taxa Density per Liter of Sediment.

Feature Number		4	3	3	2	1	--
Soil Unit							
Sample Number		5	3	6	2	1	7
Sample Volume (liters)		8.0	12.5	10.3	25.0	16.8	21.0
^{14}C Date (cal B.P., 2 sigma range)		1930-1710	1365-1180	1365-1180	700-545	660-540	--
TAXON	COMMON NAME						
Quercus sp.	Oak acorn						
#		3.6	51.3	29.2	2.6	.71	.05
mg		1.1	21.8	16.6	.70	.43	.005
Marah sp.	Wild cucumber						
#		.25	2.3	1.7	.88	.12	.05
mg		.05	1.0	.56	.46	.07	.02
Umbellularia californica	Bay						
#		1.1	11.5	7.1	.84	.36	-
mg		.68	17.4	3.1	.30	.14	-
Aesculus californica	Buckeye						
#		.13	.64	-	-	.06	-
mg		.06	.19	-	-	.02	-
Corylus cornuta var. *californica*							
#		-	-	-	.16	.06	.05
mg		-	-	-	.40	.15	.05
Clarkia sp. capsule	Farewell to Spring						
#		2.1	4.5	5.0	6.0	2.3	-
mg		.73	1.0	1.7	1.4	.58	-
Total							
#		7.2	70.2	43.0	10.5	3.6	.15
mg		2.6	41.4	22.0	3.3	1.4	.08
Quercus sp. attachment disks (#)		-	-	.10	-	-	-
Brodiaea type bulbs (#)		1.5	.96	.87	1.5	.06	-
Possible *Chlorogalum* bulb fragments (#)		.88	1.2	.68	4.6	.18	.05
Other bulbs (#)		.13	.32	-	.40	-	.05
Total bulbs (#)		2.51	2.48	1.55	6.5	.24	.10
Wood charcoal* gm		.125	.464	.439	1.22	.048	.010

Note: * - to 1 mm grade.

Sample 7, the only non-feature sample collected, is distinguished by very low frequencies of all types of remains, including large seeds, small seeds, bulbs, and wood charcoal. Relationships between these types of remains are obscured by their scarcity, rendering sample 7 much less informative than the four feature samples.

While there are few samples, all dating to different time periods, there are some common characteristics unique to ALA-576. All samples feature bulb and *Clarkia* capsule residue in quantity,

Table II-29. CA-ALA-576 Small Taxa Ddensity per Liter of Sediment.

Feature Number		4	3	3	2	1	--
Soil Unit							
Sample Number		5	3	6	2	1	7
Sample Volume (liters)		8.0	12.5	10.3	25.0	16.8	21.0
^{14}C Date (cal B.P., 2 sigma range)		1930-1710	1365-1180	1365-1180	700-545	660-540	--
GENUS	COMMON NAME						
cf. *Amsinckia* sp.	Fiddleneck	-	-	-	3.3	-	-
Atriplex sp.	Saltbush	.13	-	.19	-	-	-
Bromus sp.	Brome Grass	-	-	-	.04	.30	-
Calandrinia sp.	Red Maids	.25	.24	.97	.80	-	-
Chenopodium sp.	Goosefoot	13.9	13.1	10.8	13.0	2.0	.38
Clarkia sp.	Farewell to Spring	2.0	-	3.9	12.2	.65	.05
Claytonia sp.	Miners Lettuce	-	-	.19	-	-	-
Deschampsia sp.	Hairgrass	.25	5.4	.19	2.6	.71	.05
Galium sp.	Bedstraw	.25	-	-	.72	-	-
Helianthus sp.	Sunflower	-	-	-	.64	-	-
Hordeum sp.	Wild Barley	.63	.48	-	1.9	.12	.05
Madia sp.	Tarweed	-	1.3	.19	1.4	.06	-
Phacelia sp.	Wild Heliotrope	.13	-	.10	-	.06	-
Phalaris sp.	Maygrass	.25	1.6	.78	1.6	.36	-
Ranunculus sp.	Buttercup	.13	-	-	-	-	-
Rumex/Polygonum	Dock or Knotweed	.13	-	-	-	-	-
Sambucus sp.	Elderberry	-	.64	.78	1.3	.12	-
Scirpus sp.	Tule	.13	.64	.19	-	-	-
Solanum sp.	Nightshade	-	.16	-	.32	-	-
Trifolium sp.	Clover	.25	1.1	-	3.8	.30	-
Vulpia/Festuca	Fescue Grass	.38	1.3	.78	1.9	.18	-
Asteraceae A		-	-	.10	5.1	-	-
FAMILY							
Apiaceae	Carrot	-	.08	-	.16	-	-
Asteraceae	Sunflower	.25	1.6	1.7	-	.12	-
Fabaceae	Bean	.13	3.4	3.9	10.4	.54	-
Poaceae	Grass						
Unidentified		-	.16	.78	.52	.18	.05
Fragments		2.0	1.1	10.3	20.6	4.0	.05
Rosaceae	Rose	-	-	-	1.3	-	-
Unidentified seeds		.25	.72	.19	2.0	.12	-
Unidentified seed fragments		2.5	7.4	1.3	14.9	1.0	.05
Total Identified genus		18.8	26.0	19.2	50.6	4.9	.53
Total Identified family		21.2	32.3	35.8	83.6	9.7	.63
Total		23.9	40.4	37.3	100.5	10.8	.68

Table II-30. Diachronic Trends in CA-ALA-576 Plant Remains.

Feature	4	3	2	1
Radiocarbon Date	1930-	1365-	700-	660-
(cal B.P., 2 sigmas)	1710	1180	545	540
% of Small Seeds				
Chenopodium[1]	73.9	52.8	25.7	40.8
Poaceae[2]	9.4	18.1	25.3	43.1
% of Large Seeds				
Acorn nutshell	42.3	60.6	21.2	30.7
Clarkia capsule	28.1	4.3	42.4	41.4

Note: [1] seeds identified to genus; [2] seeds identified to family.

mostly (excepting Feature 1 bulb numbers) far exceeding those found elsewhere in central California. Large seeds in all samples include acorn, wild cucumber, and bay nutshell. Small seeds are dominated by *Chenopodium* to an extent not seen before. Seed of *Clarkia* is also well represented, not surprising given the abundant capsule fragments. While dominated by these two genera, especially *Chenopodium*, a diverse assemblage of small seeds is found in all feature samples. With the exception of Feature 3, which has abundant acorn debris, the samples from ALA-576 are consistent with an interpretation of feature function for processing resources other than nuts. Given the very high relative frequencies (vs. other central California assemblages) of bulbs, *Clarkia* capsule, and *Chenopodium* in all features, functions relating to the use and/or processing of these resources seem quite plausible.

Diachronic trends may also be visible in the contents of the four features (Table II-30). While *Chenopodium* dominates the small seed assemblages of each feature, the proportion of this genus declines through time. Second, and tied to the decline in *Chenopodium* proportion through time, grass seed and seed fragments (proportion of small seeds identified to family) become more common through time. Third, the two older features have higher acorn proportion of large seeds than the two younger ones. Fourth, and tied to the decline in acorn proportion through time, is the rise in *Clarkia* capsule proportion of large seeds in later contexts. Also tied to the decline in acorn proportion is the appearance of hazel nutshell, which is present in the two later features. Just what these trends mean is not entirely certain, but there does appear to be a decrease in the importance of acorns in feature use later in time, and use of a greater variety of small-seeded resources as well (possibly more use of *Clarkia* and perhaps grass seeds at the expense of *Chenopodium*).

SUMMARY OF FINDINGS

Archaeological investigations at the interchange of Mission Blvd Hwy-680 uncovered a rich archaeological deposits within the southeastern quadrant of the interchange. These deposits were associated with two prehistoric sites originally known as ALA-342 and ALA-509, but have now been subsumed under the single trinomial of ALA-576. The current project produced a wide range of flaked and ground stone tools, floral and faunal remains, cooking features, and human burials. These

materials appear to represent two primary periods of occupation, one dating to the early Middle Period (ca. 1900-1800 cal B.P.) and the other corresponding to the Late Period (ca. 1300-600 cal B.P.). A radiocarbon assay of 6790 cal B.P. was obtained to date a deeply buried soil at the site; however, no cultural materials were found within this early Holocene context. Just east of the project area skull and horn core fragments from a *Bison antiquus* were found deep within Agua Fria Creek, helping identify a basal, Pleistocene stratigraphic unit at the site.

Over 135 cubic meters of backhoe trenches were excavated within the project area, roughly 94 cubic meters outside of the ALA-576 site boundary, and approximately 41 cubic meters within the confines of the site. Most of the latter excavation occurred in non-archaeological fill and submidden deposits, as it was our goal to disturb as little intact archaeological deposit as possible. This effort discovered four features, one dating to the early Middle Period and three to the Late Period. All of the features appear to represent the remains of hearths or stone ovens, the latter probably used to roast bulbs. Hand excavations were limited to the four features and a single 1x1 m test unit.

The early Middle period component produced one biface and two pestles, and a vertebrate faunal assemblage composed largely of terrestrial game (mostly jackrabbits) and small schooling fishes from San Francisco Bay (e.g., species of the herring family like sardine and anchovy). Bay resources are also well represented within the invertebrate assemblage, including a dominant presence of horn snail, followed by lesser frequencies of California oyster and Pacific piddock. Flotation samples obtained from the four features produced a rich assortment of floral remains, including high densities of burnt bulbs (largely *Brodiaea*), acorn nut shell, and a variety of small-seeded taxa including *Chenopodium* and *Clarkia*.

Artifact yields remain quite low in the Late Period component, limited to two cores, a handstone, and one battered cobble. The overall density and diversity of the vertebrate faunal assemblage, however, increases significantly through time, and show higher proportions of fish (herrings from the Bay, but also freshwater species). Shellfish also diversify to a limited degree, with slightly higher representations of oyster, piddock, and freshwater mussel relative to horn snail. This is also the case for the plant macrofossil collection, where the proportion of acorn goes down relative to small-seeded taxa like *Clarkia* and various grass seeds, and to hazelnut which appears at the site for the first time. Finally, the single intact burial encountered lies at a depth of only 80 cm below surface, which could be associated with the Late Period occupation of the site, but is not confirmed.

The presence of features rich in charred plant remains (particularly bulbs) is totally consistent with King's (1968) previous work at the site (i.e., ALA-342). This is also the case with the finding human burials, as King (1968) and Galvan and Thompson (n.d.) both encountered multiple interments during their respective excavation efforts at ALA-342 and ALA-509. Based on these findings, it is concluded that the ALA-576 site complex is clearly eligible for listing in the California Register of Historic Resources, and any future development plans by Caltrans should consider this fact early in the planning process.

PART III

MANAGEMENT SUMMARY AND EVALUATIONS

MANAGEMENT SUMMARY AND EVALUATIONS

Summary Statement

The archaeological survey and test excavations reported above were carried out to provide an overall archaeological inventory of the project corridor for general management purposes and specifically to evaluate potential effects to cultural resources by the Sunol Grade Southbound Improvements Project. Additionally, evaluations of National Register eligibility are provided for two of the sites identified. While the general level inventory can be considered complete with a high level of confidence, future management actions within the corridor must still be individually assessed to determine the likelihood of affect to any of the resources identified here, or the potential for encountering unknown resources. The problems of recent landscape alteration, extensive fills and natural deposition obscuring sites and limiting boundary definition are factors which must be addressed on a case by case basis.

The data presented below and in the documentation above are provided to support a finding of *No historic properties affected* pursuant to 36 CFR 800.4d(1), regulations implementing Section 106 of the National Historic Preservation Act. The evaluation of effect is meant to address the current Sunol Grade Southbound Improvement Project only. The current project is relatively limited in scope (see Part I-Project Description and Exhibits 1-4) consisting largely of grading on existing structural sections of the highway to add an HOV lane in the median and selected auxiliary lanes on the outside shoulder of the southbound direction. Ground modification may also occur in relation to associated structure widening to accommodate the additional lanes, removal of a never used interchange overcrossing, and construction of soundwalls at selected locations. Minor ground modification may also occur in association with installation of ramp metering equipment at the southbound on-ramps. All project work is proposed to take place within the existing Caltrans ROW, which was used to define the limits of the Area of Potential Effects (APE) for this project.

The project as described will take place largely on previously altered terrain of construction fills and cuts. The surface survey completely covered areas likely to be affected. Where the original ground was not visible, survey of adjacent terrain and review of as-builts in conjunction with current project plans were used to assess the potential for project related work to encounter archaeologically sensitive surfaces. A total of five sites; Ca-ALA-576, CA-ALA-02, CA-ALA-391, CA-ALA-575 and CA-ALA-574, were noted within or adjacent to the project APE. These sites are assessed individually below. Additional sites were noted nearby the survey corridor but not within or immediately adjacent to the APE. Those sites; CA-ALA-483, CA-ALA-554, CA-ALA-555 and the location of the Verona Band-Alisal Rancheria, were not evaluated further at this time (site descriptions are available in Part I-Survey Results).

A complicating factor for site evaluations was that all of the sites are located predominately on private land. The current assessments are primarily concerned with

documenting the extent and integrity of any connected deposits in relation to the project APE. Work to accomplish the site evaluations ranged from surface survey and review of the site's landform setting in relation to the highway facility (CA-ALA-02 and CA-ALA-391) to subsurface test excavations (CA-ALA-576, CA-ALA-575 and CA-ALA-574). Evaluation of eligibility for the National Register was a secondary concern. Statements regarding eligibility are provided only where there was clear evidence of significant intact deposits within the Caltrans right of way supported by additional work previously undertaken on the adjacent private parcels (CA-ALA-576 and CA-ALA-574). It is concluded that the current project will not affect any of the sites. Future work in the vicinity of any of the properties identified within the survey corridor may require further evaluation efforts.

Individual Site Evaluations

CA-ALA-576

Description and Significance

Extended Phase I subsurface testing was accomplished within the limits of the Mission Blvd.-Rte.262/ Highway 680 interchange. Intact deposits were encountered under construction fills in the southeast quadrant of the interchange. These deposits are clearly remnants of and an extension of previously excavated sites CA-ALA-342 (King 1968) and CA-ALA-509 (Galvan and Thompson 1998). The current and earlier investigations revealed a dense midden and an array of artifacts, archaeological features, and burials in well-dated and stratigraphically coherent contexts. The new site number was assigned to recognize the continuity of these deposits as well as the previously unidentified remnants within the Caltrans right of way.

Boundary determination within the Caltrans right of way was based on extensive backhoeing throughout the interchange and interpreting the results in conjunction with earlier as-built maps and historic air photos to recreate the pre-highway topography and the geomorphic setting of the deposits encountered. While the absolute limits of the site are still obscured under the current highway fills, the maximum extent was indicated by the negative finds in trenches outside the southeast quadrant of the interchange, further supported by projection of pre-construction topographic features that mark the limits of potentially sensitive surfaces. Details are presented in the individual site report in Part II of this volume.

Ca-ALA-576 is clearly eligible for the National Register of Historic Places under criterion D, "potential to yield information important in understanding prehistory". The data recovered to date indicates a clearly stratified site with numerous features and a substantial number of burials. These data can address questions related to cultural affiliation and change over time, especially questions relating to the interaction of south bay and east bay interior and bayshore populations. The burial associated assemblages

already recovered not only anchor the site within a larger regional chronology but provide social identity markers as well. Equally significant is the settlement and subsistence pattern questions that may be addressed, notably from the feature data, for example, the unique set of bulb roasting features and the fish bone encountered in the deeper features. These can provide information regarding patterns of seasonal use or change over time to more intensive settlement patterns, data suitable for application to diet breadth based models of subsistence pattern change. The ability to correlate subsistence pattern changes with either changing environmental conditions or sociocultural factors is enhanced by the excellent temporal control provided by the stratigraphic superpositioning of the components, abundance of datable materials and association with the burial assemblages. Beyond the potential scientific data, the burials have special significance for the contemporary Native American community.

Effects

No project related work is planned within the CA-ALA-576 site limits. Work in the vicinity of the Mission-262/ Highway 680 interchange will include widening in the highway median for a southbound HOV lane and on the outside southbound shoulder for continuation of an auxiliary lane. All this work will take place on construction fills or previously disturbed soils away from the site. Widening of the existing overpass over Mission Blvd. will be required to facilitate the widening, but this work would also be confined to the road deck, abutment fills, and current footings in Mission Blvd., not within the site limits. Ramp metering equipment for the southbound on- ramps will be linked up through existing conduits. No widening or ramp metering work will take place on the northbound side of the interchange. Soundwalls will be constructed on the southbound side of the highway, south of Mission Blvd. and on the northbound side, north of Mission Blvd. Extended phase I testing established that those areas are outside of the site limits.

While no work is planned within the existing site limits, protection from inadvertent effects will be insured by designating an Environmentally Sensitive Area (ESA) on project plans and specifications (PS&E). The Caltrans Permits Agreements and Mitigation (PAM) tracking process will be used throughout project development and implementation to insure ongoing review of project plans and coordination during the construction phase.

The photos below show the current facility and where proposed work will occur. Additional maps and information are available in the site report in Part II of this volume.

Figure III-576.1 is a wide angle overview of the site and the southeast quadrant of the interchange, looking generally north and east from the farthest edge of the site on the fill next to the northbound travelway and exit ramp. All work would take place behind the point where the photo was taken. The old channel of Agua Caliente is in the approximate location of the tall trees to the left of the soundwall. The Agua Fria channel is visible on the right hand side of the photo. The King (1968) excavations took place in the left

background of the photo while the Galvan and Thompson (1998) excavations took place largely behind the soundwall in the middle of the photo.

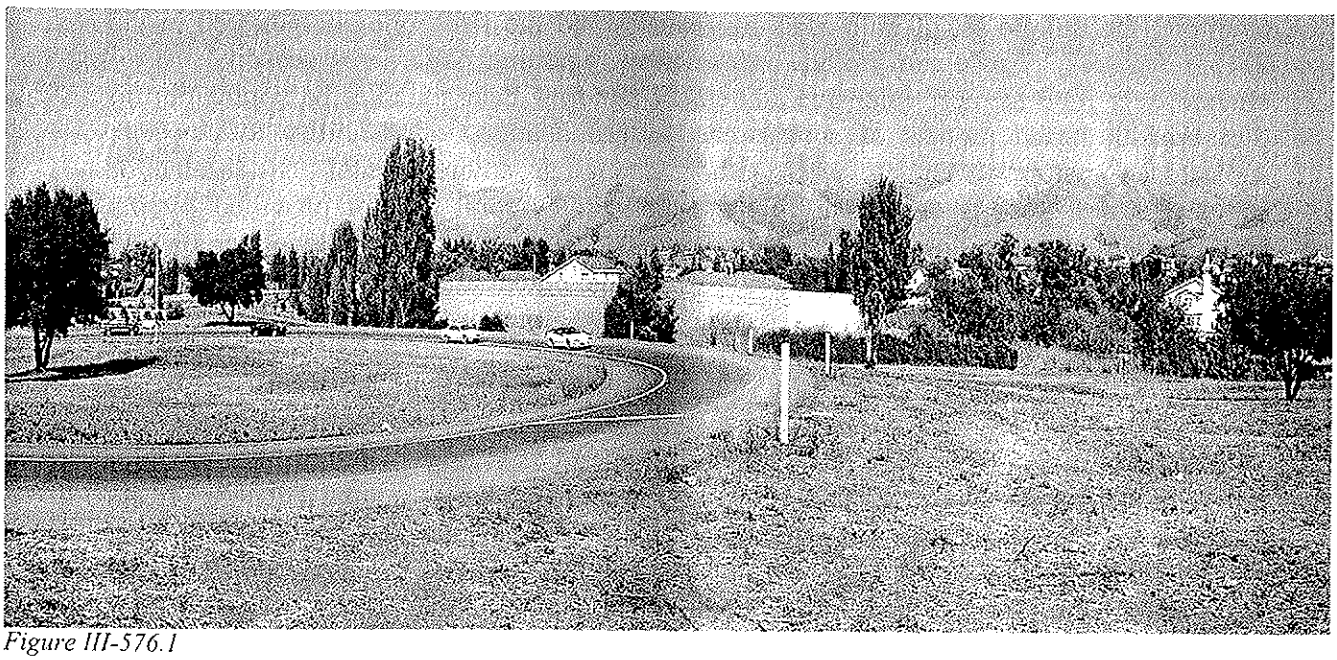


Figure III-576.1

Figure III-576.2 is a view generally northeast from the median of Mission Blvd. The Highway 680 overpass structure which will be widened is visible in the midground. The site is situated to the right of Mission Blvd. (southeast quadrant of the interchange) on top of the rise visible through the structure. Note that the highway is raised on fills above the natural contour and below the rise on which the site is situated.

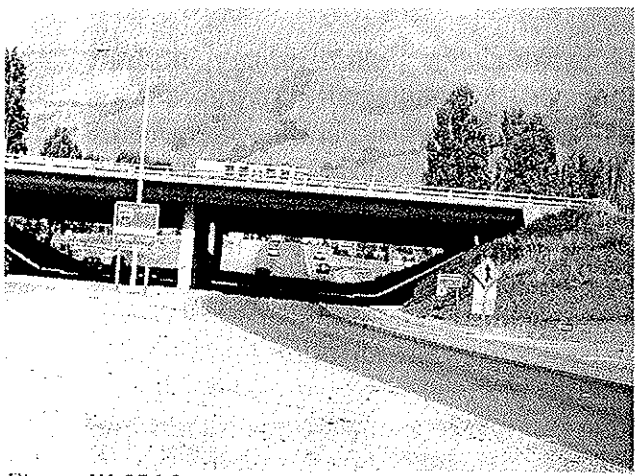


Figure III-576.2

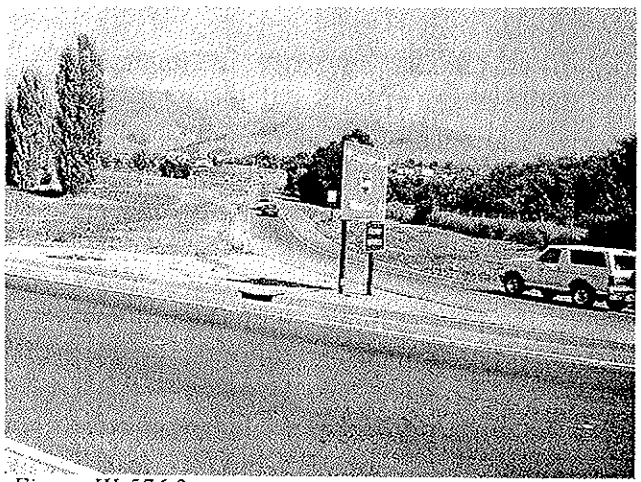


Figure III-576.3

Figure III-576.3 is a view generally east of the southwest quadrant of the interchange and southbound on ramp. Agua Fria Creek is visible on the far right of the photo. A soundwall may be constructed to the right of the on-ramp. Trenches along this ramp were negative. The site is <u>not</u> visible and is situated beyond the highway fills to the left.

APPENDIX B – CORRESPONDENCE

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

January 31, 2008

Erin King, M.A, RPA
Archaeologist
TETRA TECH
180 Howard Street, Suite 250
San Francisco, CA 94105

Sent by Fax: 415-974-5914
Number of Pages: 2

Re: Proposed SFPUC's BDPL 3&4 Seismic Upgrade project; Alameda County.

Dear Ms. King:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
Alameda County
January 29, 2008

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Ohlone/Costanoan

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Ohlone/Costanoan

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Ohlone/Costanoan
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Bay Miwok

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Ohlone / Costanoan

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(510) 687-9393 - Fax

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Amah/MutsunTribal Band
Irene Zwierlein, Chairperson
789 Canada Road
Woodside , CA 94062
amah_mutsun@yahoo.com
(650) 851-7747 - Home
(650) 851-7489 - Fax

Ohlone/Costanoan

Trina Marine Ruano Family
Ramona Garibay, Representative
16010 Halmar Lane
Lathrop , CA 95330
510-300-5971 - cell

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed SFPUC's BDPL 3&4 Seismic Upgrade project, Alameda County.

SAN FRANCISCO
PLANNING DEPARTMENT

1650 Mission St.
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CA 94103-2479

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Information:
415.558.6377

April 1, 2008

Ms. Jakki Kehl
Cultural Resource Coordinator
Ohlone/Costanoan Tribal Band
720 North 2nd Street
Patterson, CA 95363

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Kehl,

The purpose of this letter is to inform the Ohlone/Costanoan Tribal Band about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

The San Francisco Public Utilities Commission (SFPUC) is proposing to install replacement pipelines to seismically upgrade Bay Division Pipelines (BDPLs) Nos. 3 and 4, vital components of the SFPUC water transmission system that delivers water from the Hetch Hetchy Reservoir in Yosemite National Park to the San Francisco Bay Area. The location of this project is where these pipelines cross the Hayward Fault near the intersection of Interstate 680 (I-680) and Mission Boulevard in the City of Fremont.

The attached map indicates the limits of construction for this project. The 80-foot-wide SFPUC right-of-way sets the construction limits for most of the work performed outside of the I-680 Interchange. Most heavy construction activities such as major excavation, the use of cranes to install the new concrete vault sections, and the jack and bore operation will be confined to the I-680 interchange area. Standard cut and cover construction of new buried pipe will take place in the Crawford and Tissiack ROWs.

As part of the project's Environmental Review process under CEQA, a records search has been conducted via the Northwest Information Center (File No. 07-1065). The records search indicated one prehistoric archaeological site that is partly within the construction area, P-2162 (CA-ALA-576, formerly CA-ALA-342 and CA-ALA-509). This recorded site extends under a proposed staging area along the I-680 north off-ramp to Mission Boulevard. It is not within an area of excavation. The project study area has been expanded to include the boundaries of this recorded site. The site record describes the deposit as deeply stratified with an extensive midden, numerous burials, a variety of features and artifacts situated where the hills and the bay plain meet. Previously, the site had been identified as two separate deposits, CA-ALA-342 on the north side Agua Caliente Creek and CA-ALA-509 between Agua Caliente and Agua Fria creeks. Investigations in 1999 showed that the site was one large deposit and it was given a new trinomial and primary number by the State Historic Preservation Office. It is situated south of Mission

Boulevard and east of I-680, and extends southeast under modern residential development along Curtner Road and Mary Beth Court. Cal Trans testing in 1999 showed that deposits are also present on both sides of Agua Fria and Agua Caliente Creeks. Despite of the extensive modern disturbances in the area, a substantial amount of the recorded site is still intact and in some places extends to a depth of three meters or more.

An archaeological resources survey has been conducted for this project. The survey covered a previously unsurveyed and undeveloped area within the spoils pile/staging area between I-680 and Crystalline Drive. No new archaeological resources were identified by the survey. An attempt was made to monitor the portion of P-2162 that is within the construction boundary limits; however, it was found that the entirety of this area is now paved or developed. As such, monitoring of P-2162 was not possible.

If you are interested in receiving more information or wish to be consulted by San Francisco Planning Department staff, please let me know by **Monday, May 5th, 2008** so that we may begin this process. Letters may be sent to my attention at 1650 Mission Street, Suite 400, San Francisco, CA 94103. Alternatively, I may be reached by phone at (415) 575-9042 or by email at Colleen.Culver-Jaffe@sfgov.org. Thank you for your consideration. I look forward to our interaction and discussion.

Sincerely,

Colleen Culver-Jaffe
Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
Elisa Gill, Environmental Project Manager, San Francisco Public Utilities Commission
Christine Kerby, Communications Officer, San Francisco Public Utilities Commission

Enclosures:
Construction Limits Map

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April 1, 2008

Ms. Ann Marie Sayers
Chairperson
Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, CA 95024

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Sayers,

The purpose of this letter is to inform the Indian Canyon Mutsun Band of Costanoan about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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Sincerely,

Colleen Culver-Jaffe
Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
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April 1, 2008

Ms. Katherine Erolinda Perez
Ohlone/Costanoan
P.O. Box 717
Linden, CA 95236

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Perez,

The purpose of this letter is to inform the Ohlone/Costanoan Tribe about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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Sincerely,

Colleen Culver-Jaffe
Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
Elisa Gill, Environmental Project Manager, San Francisco Public Utilities Commission
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Enclosures:
Construction Limits Map

SAN FRANCISCO
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April 1, 2008

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Ms. Rosemary Cambra
Chairperson
Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
P.O. Box 360791
Milpitas, CA 95036

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Cambra,

The purpose of this letter is to inform the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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Sincerely,

Colleen Culver-Jaffe
Environmental Planner
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cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
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April 1, 2008

Ms. Michelle Zimmer
Cultural Resource Coordinator
Amah/Mutsun Tribal Band
P.O. Box 3892
Clear Lake, CA 95422

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Zimmer,

The purpose of this letter is to inform the Amah/Mutsun Tribal Band about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

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April 1, 2008

Mr. Andrew Galvan
Ohlone Indian Tribe
P.O. Box 3152
Mission San Jose, CA 94539

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Mr. Galvan,

The purpose of this letter is to inform the Ohlone Indian Tribe about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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April 1, 2008

Ms. Irene Zwierlein
Chairperson
Amah/Mutsun Tribal Band
789 Canada Road
Woodside, CA 94062

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Zwierlein,

The purpose of this letter is to inform the Amah/Mutsun Tribal Band about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

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If you are interested in receiving more information or wish to be consulted by San Francisco Planning Department staff, please let me know by **Monday, May 5th, 2008** so that we may begin this process. Letters may be sent to my attention at 1650 Mission Street, Suite 400, San Francisco, CA 94103. Alternatively, I may be reached by phone at (415) 575-9042 or by email at Colleen.Culver-Jaffe@sfgov.org. Thank you for your consideration. I look forward to our interaction and discussion.

Sincerely,

Colleen Culver-Jaffe
Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
Elisa Gill, Environmental Project Manager, San Francisco Public Utilities Commission
Christine Kerby, Communications Officer, San Francisco Public Utilities Commission

Enclosures:
Construction Limits Map

SAN FRANCISCO
PLANNING DEPARTMENT

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San Francisco,
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April 1, 2008

Ms. Ramona Garibay
Representative
Trina Marine Ruano Family
16010 Halmar Lane
Lathrop, CA 95330

Subject: Bay Division Pipelines 3 & 4 Seismic Upgrade Project, Fremont, Alameda County, California

Dear Ms. Garibay,

The purpose of this letter is to inform the Trina Marine Ruano Family about a water utility infrastructure project that will involve archaeological resource surveys. Pursuant to Government Code §65352.3(a)(2), the San Francisco Planning Department (the California Environmental Quality Act [CEQA] lead agency) is inviting your participation in government-to-government consultation to identify possible cultural resources impacts associated with the project. Your participation in this process is important.

The San Francisco Public Utilities Commission (SFPUC) is proposing to install replacement pipelines to seismically upgrade Bay Division Pipelines (BDPLs) Nos. 3 and 4, vital components of the SFPUC water transmission system that delivers water from the Hetch Hetchy Reservoir in Yosemite National Park to the San Francisco Bay Area. The location of this project is where these pipelines cross the Hayward Fault near the intersection of Interstate 680 (I-680) and Mission Boulevard in the City of Fremont.

The attached map indicates the limits of construction for this project. The 80-foot-wide SFPUC right-of-way sets the construction limits for most of the work performed outside of the I-680 Interchange. Most heavy construction activities such as major excavation, the use of cranes to install the new concrete vault sections, and the jack and bore operation will be confined to the I-680 interchange area. Standard cut and cover construction of new buried pipe will take place in the Crawford and Tissiack ROWs.

As part of the project's Environmental Review process under CEQA, a records search has been conducted via the Northwest Information Center (File No. 07-1065). The records search indicated one prehistoric archaeological site that is partly within the construction area, P-2162 (CA-ALA-576, formerly CA-ALA-342 and CA-ALA-509). This recorded site extends under a proposed staging area along the I-680 north off-ramp to Mission Boulevard. It is not within an area of excavation. The project study area has been expanded to include the boundaries of this recorded site. The site record describes the deposit as deeply stratified with an extensive midden, numerous burials, a variety of features and artifacts situated where the hills and the bay plain meet. Previously, the site had been identified as two separate deposits, CA-ALA-342 on the north side Agua Caliente Creek and CA-ALA-509 between Agua Caliente and Agua Fria creeks. Investigations in 1999 showed that the site was one large deposit and it was given a new trinomial and primary number by the State Historic Preservation Office. It is situated south of Mission

Boulevard and east of I-680, and extends southeast under modern residential development along Curtner Road and Mary Beth Court. Cal Trans testing in 1999 showed that deposits are also present on both sides of Agua Fria and Agua Caliente Creeks. Despite of the extensive modern disturbances in the area, a substantial amount of the recorded site is still intact and in some places extends to a depth of three meters or more.

An archaeological resources survey has been conducted for this project. The survey covered a previously unsurveyed and undeveloped area within the spoils pile/staging area between I-680 and Crystalline Drive. No new archaeological resources were identified by the survey. An attempt was made to monitor the portion of P-2162 that is within the construction boundary limits; however, it was found that the entirety of this area is now paved or developed. As such, monitoring of P-2162 was not possible.

If you are interested in receiving more information or wish to be consulted by San Francisco Planning Department staff, please let me know by **Monday, May 5th, 2008** so that we may begin this process. Letters may be sent to my attention at 1650 Mission Street, Suite 400, San Francisco, CA 94103. Alternatively, I may be reached by phone at (415) 575-9042 or by email at Colleen.Culver-Jaffe@sfgov.org. Thank you for your consideration. I look forward to our interaction and discussion.

Sincerely,

Colleen Culver-Jaffe
Environmental Planner
Department of Major Environmental Analysis
San Francisco Planning Department

cc: Bryan Dessaure, Project Manager, San Francisco Public Utilities Commission
Elisa Gill, Environmental Project Manager, San Francisco Public Utilities Commission
Christine Kerby, Communications Officer, San Francisco Public Utilities Commission

Enclosures:
Construction Limits Map

S-31226

Extended Phase 1 Test Investigation of the Southern Boundary of CA-ALA-576 for the Ala-680 Drainage Improvement Project, Alameda County, California

04-ALA-680 PM 2.4
EA 2S4601

By:
Jeffrey Rosenthal, M.A.
Far Western Anthropological Research Group, Inc.

February 2006

USGS Topographic Quadrangle:
Milpitas 7.5-minute
Township and Range:
T5S R1W
Sites:
CA-ALA-576
Keywords:
Phase 1.5, Trenching

Prepared for:

Todd Jaffke
California Department of Transportation, District 4
111 Grand Avenue
Oakland, CA 94623

RECEIVED
FEB - 7 2006
NWIC

FAR WESTERN ANTHROPOLOGICAL RESEARCH GROUP, INC.
2727 Del Rio Place, Suite A, Davis, California, 95616
http://www.farwestern.com 530-756-3941

S31226

Extended Phase 1 Test Investigation of the Southern Boundary of CA-ALA-576 for the Ala-680 Drainage Improvement Project, Alameda County, California

04-ALA-680 PM 2.4
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Far Western Anthropological Research Group, Inc.

February 2006

Prepared for:
Todd Jaffke
California Department of Transportation, District 4
111 Grand Avenue
Oakland, CA 94623

SUMMARY OF FINDINGS

Far Western Anthropological Research Group, Inc. conducted an Extended Phase I investigation in support of the proposed drainage improvement project on the Mission Boulevard off ramp from Interstate 680. Project plans call for the reconstruction of an exiting drainage ditch located south of the creek channel within National Register eligible archaeological site CA-ALA-576. Three backhoe trenches were excavated for the current project within the previously recorded southern boundaries of ALA-576. No archaeological materials were identified. A fourth trench excavated by Gmoser in 1999 also failed to identify archaeological material in this location. As a result of the negative findings, site boundaries have been redefined to include only that portion of the Mission Boulevard off-ramp north of Agua Fria Creek. Throughout the tested area, recent fill deposits extend between 1.5 and 3.0 meters below the current surface elevation. The deepest fill deposit was identified at the northern end of the study area where the drainage ditch intersects Agua Fria Creek. Here, both the erosional cut-bank and a trench revealed up to three meters of imported material used to fill the historical channel of Agua Fria Creek. Due to the extensive amount of non-native fill material and the absence of archaeological deposits south of the creek, the current drainage improvement project will have no effect on National Register eligible site ALA-576.

TABLE OF CONTENTS

SUMMARY OF FINDINGS i
INTRODUCTION 1
SITE CONTEXT 4
FIELDWORK 5
RESULTS 5
CONCLUSIONS 8
REFERENCES CITED 9

APPENDICES

Appendix A. Site Records.

LIST OF FIGURES

Figure 1. Project Location. 2
Figure 2. Erosion of Drainage Ditch, South Side Agua Fria Creek. 3
Figure 3. Backhoe Trench Locations. 6
Figure 4. Profile of Southern Bank Agua Fria Creek, Showing Fill Deposits 7
Figure 5. Trench 12-27-1, 0-320 cm, Showing Recent Trash Deposits. 7

LIST OF TABLES

Table 1. Summary of Backhoe Trenches. 5
Table 2. Trench Descriptions 8

INTRODUCTION

Far Western Anthropological Research Group, Inc. (Far Western) conducted an Extended Phase I investigation in support of the proposed drainage improvement project on the Mission Boulevard off-ramp from Interstate 680 (PM 2.4), approximately 7.2 kilometers (4.5 miles) southeast of the City of Fremont in Alameda County (Figure 1). The current project area lies south of Agua Fria Creek within the extreme southern boundaries of National Register eligible (Criterion D) prehistoric site CA-ALA-576. Project plans call for the reconstruction of an exiting drainage ditch that runs perpendicular to the creek, extending south for several hundred meters along the eastern edge of the Caltrans right-of-way. Where the current ditch intersects the channel of Agua Fria Creek, the bank has eroded and undermined the existing chain-link right-of-way fence, leaving a two-meter-deep vertical exposure of the eastern creek bank. The current drainage improvement project is designed to eliminate erosion and restore the integrity of the creek bank (Figure 2).

The project proposes to install a 230-meter-long concrete-lined ditch with a perforated plastic drain directly underneath. This would feed into a new G2 inlet, 8.6 meters away from an existing wing-wall around Agua Fria Creek. From the inlet, an 8.6-meter-long, 375-millimeter-diameter, plastic pipe will take the water from the ditch and under-drain down to the top of the existing wing-wall where the water will empty into Agua Fria Creek. In the area between the creek and the inlet, a chain-link fence will be removed and replaced, and an existing 200-millimeter steel pipe will be removed.

The entire project Area of Potential Effects was surveyed as part of the Interstate 680 Sunol Grade Southbound Improvement Project (Gmoser 1999). As part of that project, Phase II test investigations were conducted by Caltrans and Far Western at ALA-576 within the Mission Boulevard Interchange (Gmoser 1999). This work identified intact archaeological deposits north of Agua Fria Creek; only a single backhoe trench was excavated south of the creek and no archaeological materials were discovered (Gmoser 1999). Revised site boundaries were drawn between the negative backhoe trench and the southern bank of Agua Fria Creek, including a portion of the current project area. Nevertheless, no surface evidence of an archaeological deposit was present south of the creek and no previous archaeological testing has occurred in that portion of the current project area within recorded site boundaries.

To determine if archaeological deposits are present in the area of potential effects for the drainage improvement project, the current extended Phase 1 investigation included detailed examination of the existing creek cut-bank, and excavation of three backhoe trenches to depths exceeding 2.5 meters (the maximum depth of proposed project impacts).

The nature of the proposed activities and the involvement of federal funds requires compliance with: (1) Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800, revised 1999); and (2) the California Environmental Quality Act (CEQA; Public Resources code, Section 21000 et seq., revised January 1999), which mandates federal and California public agencies to consider the effects of projects on historic properties. Compliance with Section 106 is being carried out in accordance with the January 1, 2004, *Programmatic Agreement Among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as it Pertains to the Administration of the Federal-Aid Highway Program in California* (hereafter Programmatic Agreement).

The Ohlone community was consulted about the project prior to the initiation of the extended Phase 1 study. The field investigation occurred on December 27, 2005, and was conducted under the direction of Jeff Rosenthal, M.A., and Mike Darcangelo, B.A. Both individuals have more than 15 years experience in California archaeology and exceed the minimum certification levels required by the California Department of Transportation (Caltrans). Caltrans archaeologist Todd Jaffke joined the Far Western team during fieldwork. Andrew Galvan of the Ohlone Indian Tribe was present during fieldwork and was consulted about previous investigations at ALA-576. Underground Service Alert (USA) was contacted several days before beginning the project; no utilities were identified in the project area. Backhoe services were provided by Bay Area Backhoe.

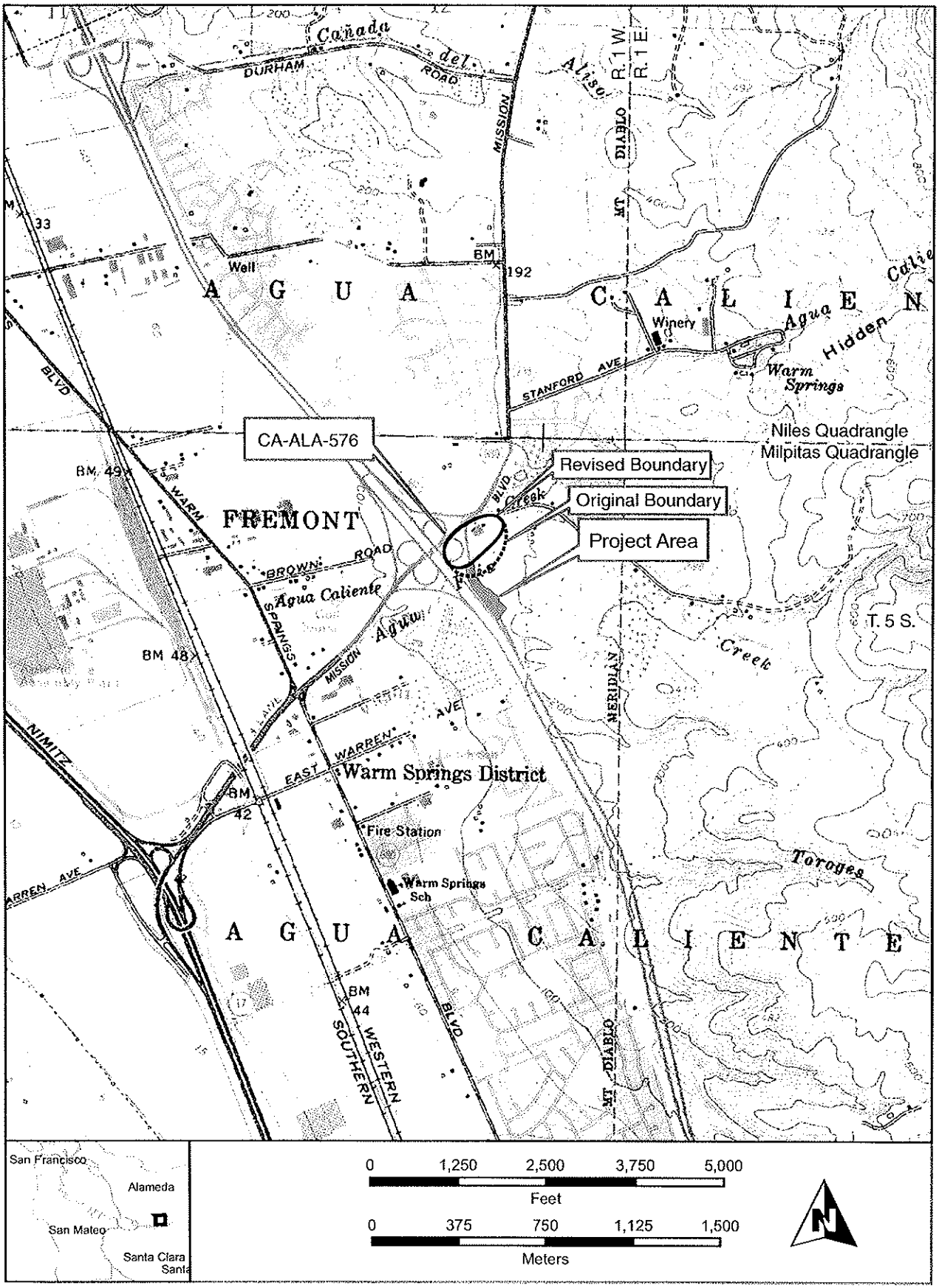

Figure 1. Project Location.

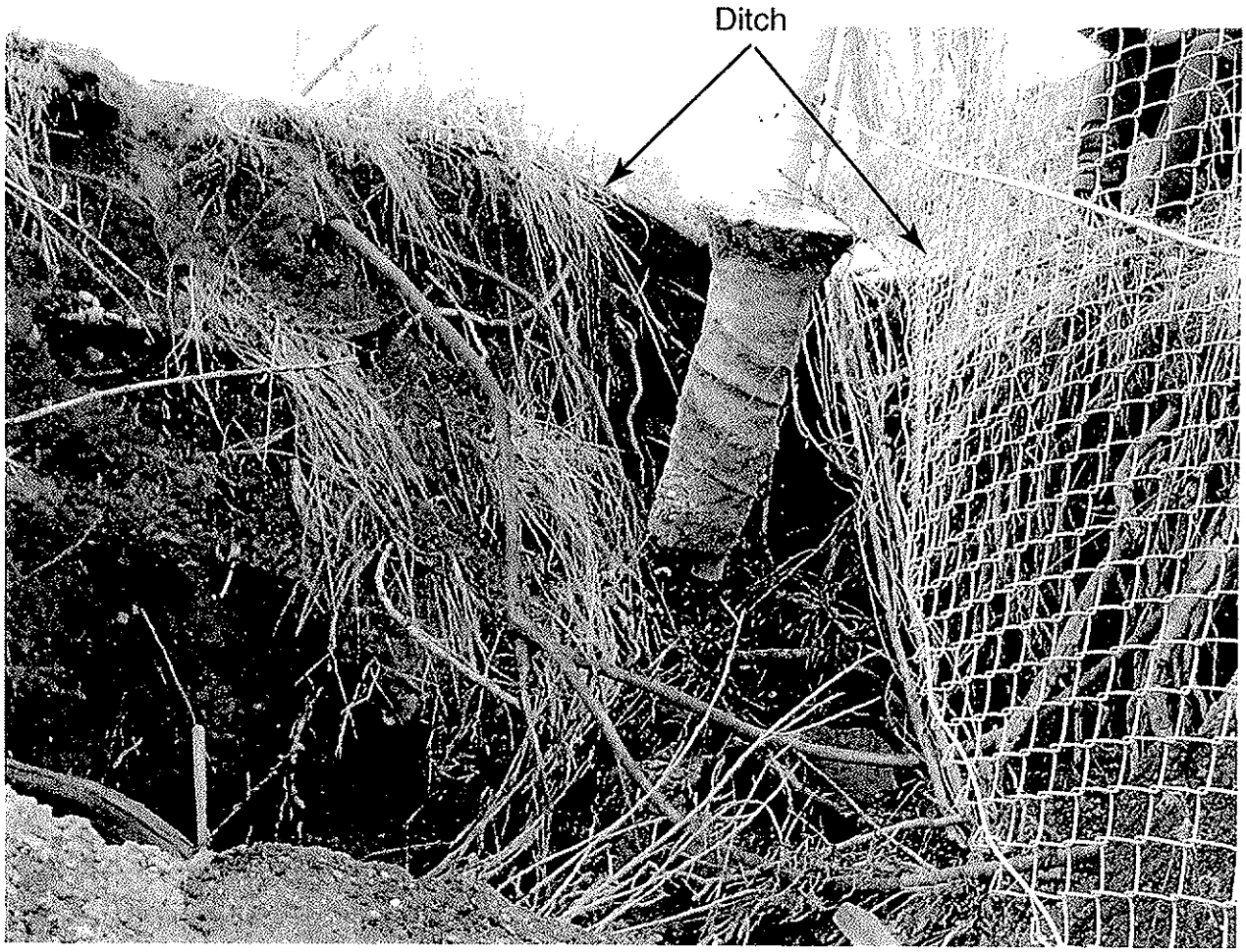

Figure 2. Erosion of Drainage Ditch, South Side Agua Fria Creek.

SITE CONTEXT

The current project area sits on a Pleistocene-age alluvial fan that emerges from the western slope of the Diablo Range, overlooking San Francisco Bay. Agua Fria Creek skirts the southern edge of ALA-576, while Agua Caliente Creek lies to the north. Modern development has had a profound effect on the local landscape which is almost completely built-over. Interstate 680 and the Mission Boulevard interchange are constructed on large elevated fill prisms, a concrete bridge spans Mission Boulevard, the underground pipe of the Hetch-Hetchy Aquaduct crosses through the interchange to the north; and the channels of Agua Fria and Agua Caliente Creeks have both been engineered, with large sections realigned through underground culverts.

Archaeological and ethnographic background relevant to the current project area is provided in Gmoser (1999). Previous archaeological investigations at ALA-576 began in the mid-1960s when Chester King excavated a portion of the site just prior to construction of Interstate 680. At that time, the site was identified as ALA-342. King's (1968) work revealed a shallow midden deposit containing several human graves; numerous features interpreted as bulb-roasting ovens and storage pits; a variety of ground and flaked stone tools; and shell, stone, and glass beads. A later analysis of the human burials from ALA-342 is presented in Jurmain (1983) and more recently, obsidian hydration and sourcing studies were completed by Wilson (1999). Diagnostic artifacts and obsidian hydration results from ALA-342 indicate the site was occupied from the Late Prehistoric Period into the Mission Period (Gmoser 1999). A review of King's (1968) original ALA-342 site map indicates that the primary midden deposit was located north of Aqua Fria Creek, south of Agua Caliente Creek, west of Curtner Street, and south of Mission Blvd

Due to a mapping error at the Northwest Information Center of the California Historical Resources Information System, the location of ALA-342 was later given a second trinomial (ALA-509), following a survey of the area by Cartier (1989). At that time, midden was visible in the northern bank of Agua Fria Creek. Ten years later, portions of ALA-509 were excavated by Galvan and Thompson (n.d.) as part of a housing development located just east of the Mission Boulevard off-ramp. As part of that project, 52 human burials were removed, several rock features were identified, and a variety of artifacts were recovered; however, no report of findings has been completed. Based on descriptions of the recovered artifacts, this portion of the site appears to contain both Middle and Late period occupation components (Gmoser 1999). Analysis of a preliminary map of ALA-509 produced by Galvan and Thompson (n.d.) revealed intact archaeological deposits located south of Aqua Caliente Creek, north of Aqua Fria Creek, and east of the Caltrans right-of-way.

At the same time Galvan and Thompson (n.d.) were completing their work at ALA-509, Caltrans and Far Western began Phase II test excavations within the adjacent Mission Boulevard Interchange. This work uncovered rich archaeological deposits only within the southeastern quadrant of the interchange, north of Agua Fria Creek. More than 120 cubic meters of backhoe trenches were excavated within the interchange, roughly 94 cubic meters in sterile soils, and approximately 27 cubic meters within the archaeological deposit. This effort discovered four features, one dating to the early Middle Period and three to the Late Period. Hand excavations were limited to the four features and a single 1-x-1-meter test unit placed in the midden deposit found east of the Mission Boulevard off-ramp and north of Agua Fria Creek. This latter area contained high densities of subsistence debris (i.e., bone, shell, and plant remains), all of the residential features, and one human burial (Gmoser 1999). Scattered archaeological materials were also found west of the off-ramp below the fill-prism of the interchange. Radiocarbon dates and obsidian hydration information revealed that the near-surface midden deposits were associated with the Late Period, while more deeply buried portions of the site dated to the Middle Period.

It was not until Caltrans began background research for the Sunol Grade project that it was discovered ALA-342 and -509 were actually the same site (Gmoser 1999). To resolve the issue, the Information Center decided to subsume both ALA-342 and -509 under a third trinomial (ALA-576).

FIELDWORK

Fieldwork for the current project occurred on December 27, 2005 and included an examination of the eroded southern bank of Agua Fria Creek and mechanical excavation of three trenches perpendicular to the existing asphalt-lined drainage ditch (Figure 3). The first trench was excavated immediately adjacent to the creek channel, while the subsequent two trenches were excavated sequentially to the south (see Figure 1). All trenches were excavated with a tractor-mounted backhoe equipped with an extend-a-hoe boom and a 0.75-meter (2-foot-) wide bucket. The trenches ranged between 3.5 and 3.8 meters (11.5 and 12.35 feet) in length and 3.0 and 3.3 meters (9.85 and 10.8 feet) in depth (Table 1). Trenches were carefully monitored by two archaeologists; one watched the trench excavation and the other examined and raked spoils removed by the backhoe. Records were maintained for each trench, including dimensions, general location, and a brief description of the subsurface soil profile and stratigraphy. Photographs were taken of the three trenches and the location plotted on a project engineering map. A total of 25.7 cubic meters of material was examined from the three trench excavations (Table 1).

Table 1. Summary of Backhoe Trenches.

Trench	Length (m)	Width (m)	Depth (m)	m^3
12-27-1	3.5	0.75	3.2	8.4
12-27-2	3.5	0.75	3.3	8.7
12-27-3	3.8	0.75	3.0	8.6
Total				25.7

RESULTS

From the outset of the project, it was clear that much of the study area had been covered by artificial fill as part of the construction of the Mission Boulevard off ramp. The current roadway sits some five to six feet (1.5 to 1.8 meters) higher than the natural ground surface on private property to the east. The fill deposits slope directly from the shoulder of the roadway to the existing asphalt-lined ditch; the right-of-way fence lies immediately east of the ditch. Examination of the eroded cut-bank at the intersection of the ditch and Agua Fria Creek revealed more than 1.5 meters of fill material in the exposure on the east side of the ditch. The historical surface horizon was visible below the fill material and appeared to be sloping steeply westward beneath the existing drainage ditch (Figure 4). The buried surface horizon is a dark brown clayey loam with moderate subangular blocky structure. The creek profile also indicated that the base of the ditch is formed in fill material, but the original surface horizon could not be observed in the erosional scar beneath the ditch. The original surface horizon exposed in the creek bank was cleaned with a hand-pick and carefully examined for archaeological material, but none was observed.

Trench 12-27-1 was excavated just three meters south of the erosional cut adjacent to the west side of the ditch (Figure 5). The trench was excavated to more than three meters in depth and no intact natural surface horizons were observed. The upper 2.5 meters of the trench consisted of various layers of fill material, including stiff clays and light-brown crushed rock (Table 1). At the base of the trench, beginning about 2.5 meters below surface, a sand and gravel deposit was encountered containing abundant modern debris, including rusty metal pieces, soda-pop bottles, window screen, flower pot fragments, and various burned pieces of glass and other debris. This trench appears to have been placed in the former alignment of Agua Fria Creek, prior to channelization in the 1960s. The extensive deposits of fill between the trench and ditch outlet probably account for the poor integrity of the creek bank.

Trench 12-27-2 was excavated six meters south of Trench 12-27-1, and encountered fill material to a depth of 1.5 meters below surface. Below this depth, the original surface horizon (2Ab Horizon) was encountered, consisting of dark-brown clay with medium, moderate, subangular blocky structure. Careful examination of the excavated spoils failed to identify any archaeological material within this buried surface

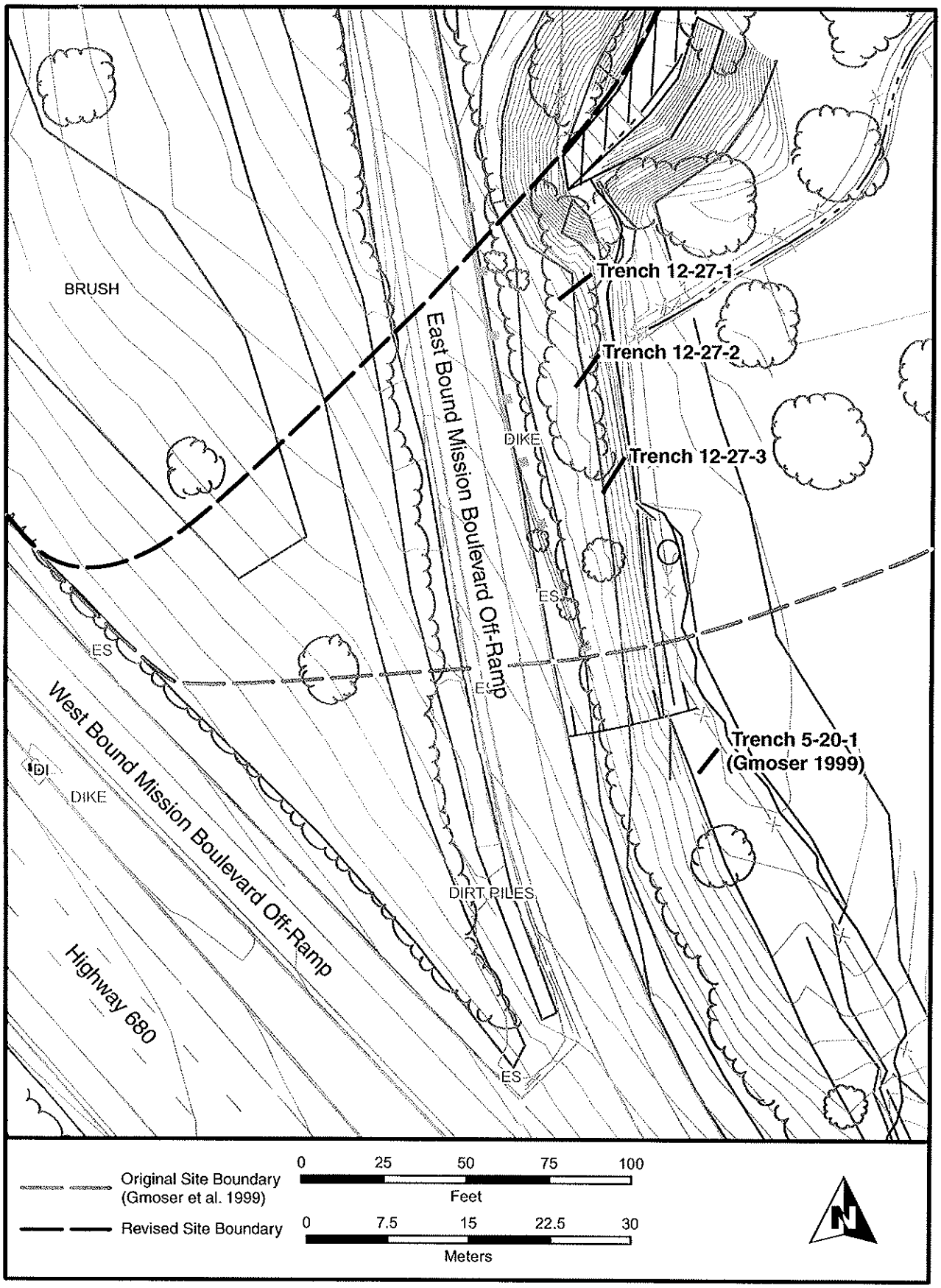

Figure 3. Backhoe Trench Locations.

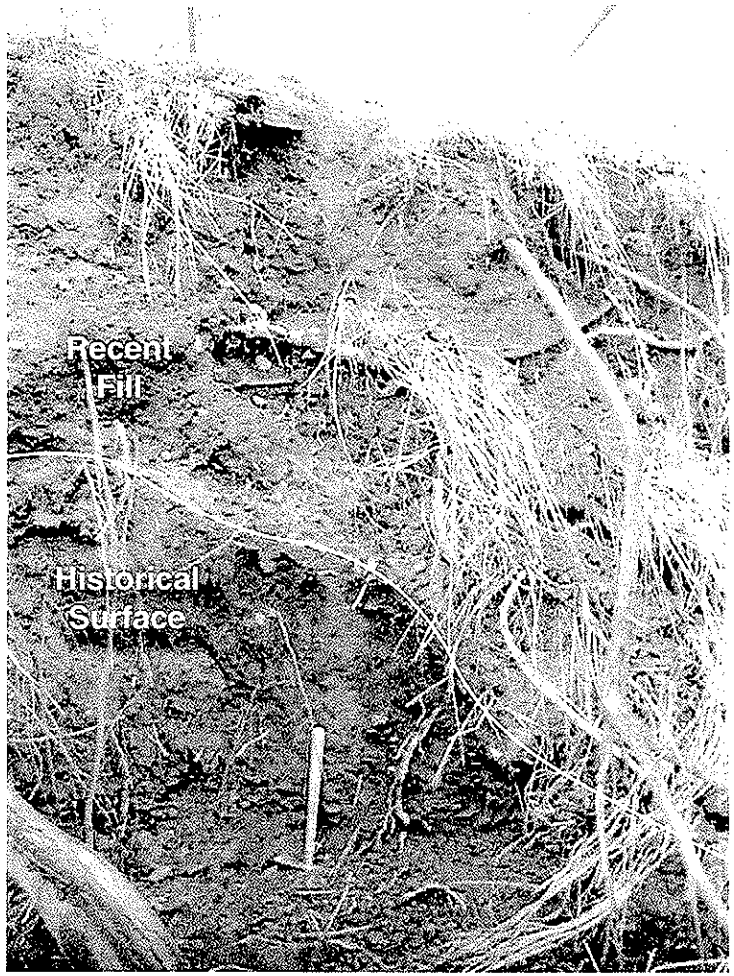

Figure 4. Profile of Southern Bank Agua Fria Creek, Showing Fill Deposits.

Figure 5. Trench 12-27-1, 0-320 cm, Showing Recent Trash Deposits.

Table 2. Trench Descriptions.

Trench	Depth (cm)	Soil Horizon	Description
5-27-1	0-250	Ap	Mixed fill material containing historical debris; clay and imported crushed yellow stone
	250-320	C	sand and gravel deposits containing concentrations of modern debris (glass, metal, plastic, window screen, flower pot) in old creek channel
5-27-2	0-155	Ap	Mixed fill material; dark brown clay and crushed yellow stone
	150-280	2A/Btb	Historical surface horizon; dark-brown clay; medium, moderate, subangular-blocky structure; prominent clay films line root holes
	280-330	2Btb	Light olive clay, massive structure; iron oxide concretions
5-27-3	0-150	Ap	Mixed fill material; dark brown clay and crushed yellow stone
	150-280	2A/Btb	Historical surface horizon; dark-brown clay; medium, moderate, subangular-blocky structure; prominent clay films line root holes
	280-300	2Btb	Light olive clay, massive structure; iron-oxide concretions

horizon. In deeper levels of the trench (Table 2), the surface A horizon transitioned into a well developed light-olive B horizon with moderate structure and prominent clay films. This profile is consistent with horizon development identified elsewhere on the local Pleistocene fan (Gmoser 1999:II-69).

Trench 12-7-3 was located ten meters south of Trench 12-27-2 and produced a very similar profile. The upper 1.5 meters consisted of fill material associated with the road prism (Table 2). Below the recent fill, well-developed A and B horizons were encountered, representing the original surface soil of the alluvial fan. The A horizon consisted of a dark-brown clay with moderate, medium, subangular blocky structure that transitioned into a light olive B horizon with prominent clay films and iron-oxide concretions. Despite careful examination, no archaeological materials were identified in this trench.

Previous testing by Gmoser (1999) included a backhoe trench approximately 25 meters south of current Trench 12-27-3. No archaeological materials were observed in Gmoser's trench. Given the negative findings of both the current and earlier work, no additional trenches were excavated. As no archaeological materials have been identified south of Agua Fria Creek, the boundaries of ALA-576 were revised to include only the defined area north of the creek (Appendix A).

CONCLUSIONS

Three backhoe trenches excavated within the previously recorded southern boundaries of ALA-576, south of Agua Fria Creek, failed to identify any archaeological materials. A fourth trench excavated by Gmoser in 1999 also failed to identify archaeological material in this location. As a result, the site boundaries have been redefined to include only that portion of the Mission Boulevard off-ramp north of Agua Fria Creek. Throughout the area tested, recent fill deposits extend between 1.5 and 3.0 meters below the current surface elevation. The deepest fill deposit was identified at the northern end of the study area where the drainage ditch intersects Agua Fria Creek. Here, both the erosional cut-bank and Trench 12-27-1 revealed up to three meters of imported material used to fill the historical channel of Agua Fria Creek. Due to the extensive amount of non-native fill material and the absence of archaeological deposits south of the creek, the current drainage improvement project will have no effect on National Register eligible site ALA-576.

If previously unidentified cultural materials are unearthed during construction, it is Caltrans' policy that work be halted in the area until a qualified archaeologist can assess the significance of the find. Additional archaeological survey will be needed if project limits are extended beyond the previous survey boundary (Caltrans 2001:E-76 to E-77).

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APPENDIX A

SITE RECORDS

*Recorded By: Jeff Rosenthal and Mike Darcangelo *Date: 12/28/2005 ☐ Continuation ☑ Update

On December 27, 2005 Jeff Rosenthal and Mike Darcangelo (Far Western), Todd Jaffke (Caltrans), and Andrew Galvan (Native American monitor) conducted extended Phase I backhoe excavations to determine if site CA-ALA-576 extends south of Aqua Fria Creek. The work was initiated in support of a Caltrans drainage improvement project east of the Mission Boulevard off ramp, adjacent to Interstate 680, and south of Agua Fria Creek.

Previous test excavations at ALA-576 by Caltrans (Gmoser 1999) identified intact archaeological deposits north of Agua Fria Creek; only limited backhoe trenching was conducted south of the creek and no archaeological materials were identified. Although surface inspection and backhoe trenching failed to identify archaeological materials, the revised 1999 site boundaries were drawn to include the southern bank of Agua Fria Creek.

The current work was undertaken to determine if archaeological materials are present south of the creek. Three backhoe trenches were excavated in the proposed drainage improvement location within the Caltrans ROW south of Aqua Fria Creek and east of the Mission Boulevard off ramp (see site map). Trench excavations reached an average depth of 3.16 meters. Trench 12-27-1 consisted of imported fill and was terminated when modern refuse (glass, metal, and brick) was encountered in an old stream channel at a depth of 3.2 meters. Trenches 12-12-2 and -3 had imported fill to a depth of 150 centimeters, below this was a dark brown Ab Horizon down to 280 centimeters. Backhoe excavation continued into the underlying 2B horizon of olive clay with iron oxide concentrations, halting at a depth of 330 centimeters. No prehistoric cultural deposits were encounter in any of the trenches excavated south of Aqua Fria Creek. Based on these results, boundaries of ALA-576 were revised to include only the north bank of Agua Fria Creek (sees attached site map).

REFERENCES:

Gmoser, Glenn, with Jeff Rosenthal, William Hildebrandt, and Pat Mikkelsen (1999) Archaeological Survey of the I-680 Corridor between Dublin and Milpitas in Alameda and Santa Clara Counties for the "Sunol Grade" Southbound Improvement Project with Results of Extended Phase I / Phase II Archaeological Investigations at CA-ALA- 574, CA-ALA-575, and CA-ALA-576 (a.k.a. CA-ALA-342/509). California Department of Transportation, District 4, Oakland.

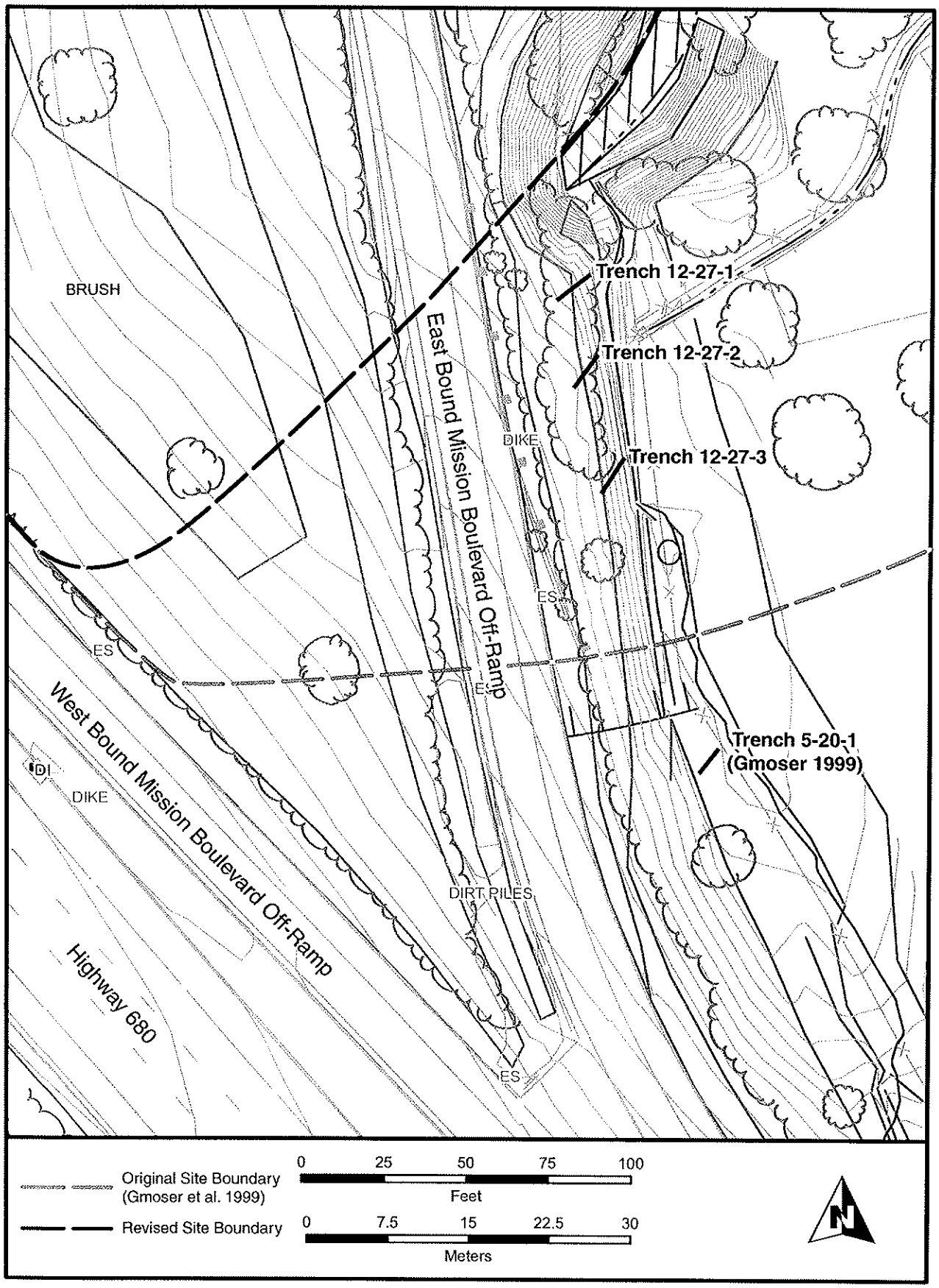
Rosenthal, Jeff (2006) Extended Phase I Investigation of the southern Boundary of CA-ALA-576 for the Ala 680 Drainage Improvement Project, Alameda County, California. Far Western Anthropological Research Group, Inc. Prepared for Caltrans District 4, Oakland.

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

SKETCH MAP

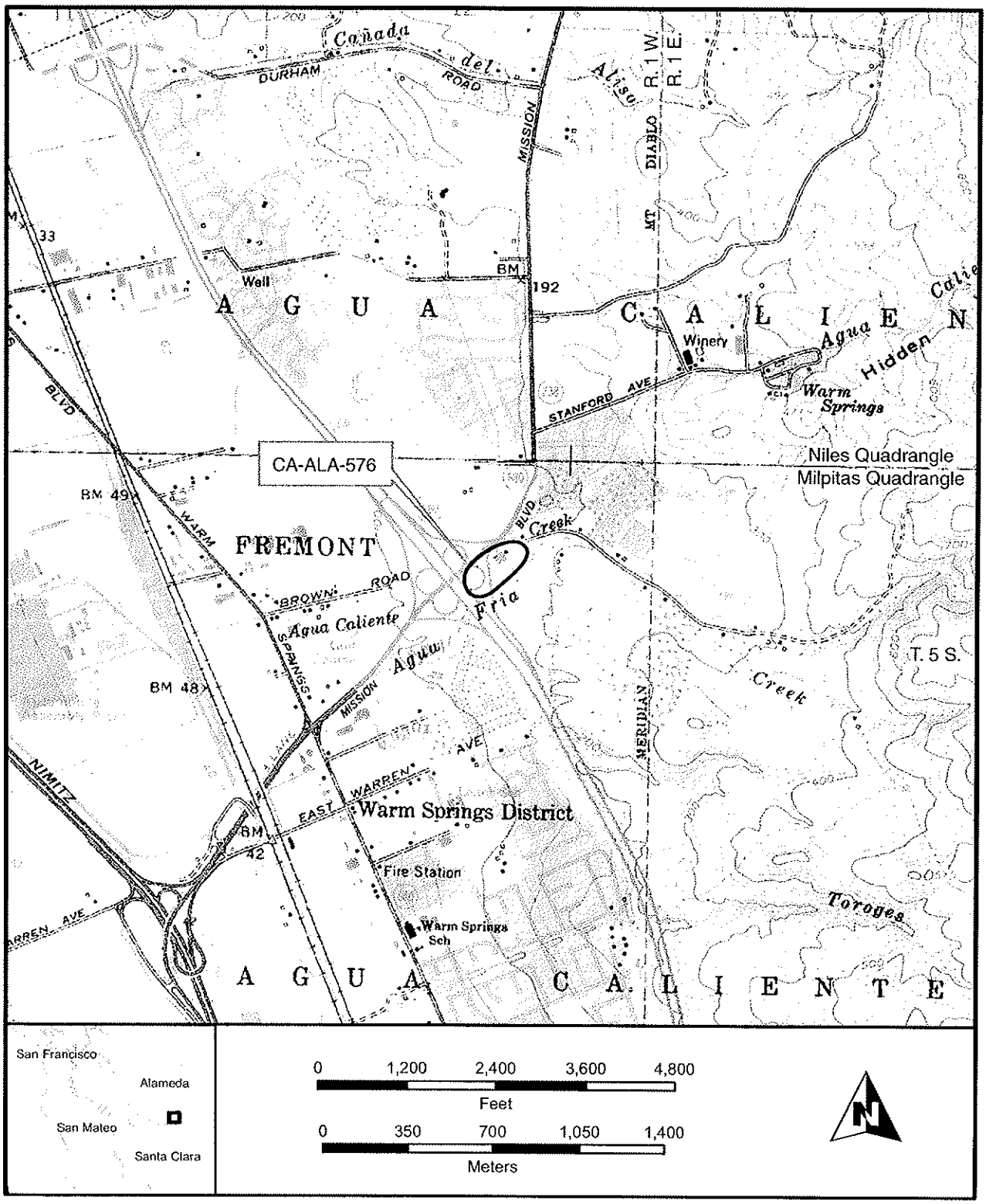
Primary # _____
HRI # _____
Trinomial CA-ALA-576

*Resource Name or #: (Assigned by recorder)



State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary # _____
HRI # _____
Trinomial CA-ALA-576

*Resource Name or #: (Assigned by recorder)