SUPPLEMENTAL HISTORIC PROPERTY SURVEY REPORT

1. UNDERTAKING DESCRIPTION AND LOCATION

District	County	Route	Post Miles	Unit	E-FIS Project Number	Phase
6	Kern	58	T31.7/55.6		06-0000-0484	
6	Kern	99	21.2/26.2		06-0000-0484	

District	County	*Federal Project. Number.* *(Prefix, Agency Code, Project No.)*	*Location*

Project Description:

The proposed Centennial Corridor project is located along portions of State Route (SR) 99 and SR 58 in Bakersfield, Kern County, California (Attachment A: Exhibit 1). The California Department of Transportation (Caltrans) proposes to establish with the Centennial Corridor Project a new alignment for SR 58. The new alignment would be an east-west transportation route from SR 99 to Interstate 5. The proposed Centennial Corridor has been divided into three segments, the easternmost of which (Segment 1) consists of three build alternatives. Alternative B of Segment 1, the preferred alternative subject to this Extended Phase I, Stage II investigation, would connect the Westside Parkway, between Mohawk Street and Coffee Road, to the existing SR 58 (East) freeway at Cottonwood Road. The Centennial Corridor Project is one of the roadway projects developed under the Thomas Road Improvement Program (TRIP). The detailed project description is provided in the 2013 *Historic Property Survey Report for the Centennial Corridor Project, City of Bakersfield and Kern County, CA* (Maxon 2013). The primary project proponent is the City of Bakersfield.

This supplemental Historic Property Survey Report (HPSR) documents: (1) the addition of a small area to the APE; and, (2) the completion of efforts to identify the potential for buried archaeological properties. The initial model for the buried archaeological sensitivity has been provided in the 2012 *Extended Phase I Geoarchaeological Report: Stage I Geomorphic Sensitivity Model* by J.D. Sindingstad, J.A. Homburg, and K.M. Becker (Maxon 2013: Attachment 3). The field results for Stage II of this Extended Phase I investigation are provided in this report (Attachment B). The location of this investigation is shown on the Gosford, CA 7.5’ USGS Topographic Quadrangle Map (1954) in T 29S, R 27E, Sections 26, 27, 34, 35, and 36; and in T30S, R27E, Sections 1 and 2 (Attachment A: Exhibit 2).

These efforts are conducted in accordance with the *First Amended 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* (PA), executed January 1, 2014.

2. AREA OF POTENTIAL EFFECTS

The project Area of Potential Effects (APE) for the Centennial Corridor project was established in consultation with Dr. Jeanne Binning, Principal Investigator – Prehistoric Archaeology, and Stephen Milton, Project Manager, on February 15, 2013. The APE maps are located in the initial HPSR for this undertaking (Maxon 2013). That map depicts the areas considered for indirect as well as direct effects from the undertaking. The maximum vertical area for direct effects for all alternatives was determined to be the maximum depth of construction grading, 40 feet below the present ground surface.

This supplemental HPSR provides documentation for a small shift in the portion of APE depicted on Exhibit 3K of the APE Map. The biological mitigation for this undertaking requires that the location for a new PG&E transmission tower between the Kern River and Truxton Avenue be shifted several feet southward. This will add a small wedge-shaped area (3,085 ft^2.) of property to the area of direct effects.

SUPPLEMENTAL HISTORIC PROPERTY SURVEY REPORT

This change to the undertaking's APE was established in consultation with Brian Wickstrom, Principal Investigator – Prehistoric Archaeology, and Stephen Milton, Project Manager, on April 8, 2015. The change to the APE is depicted in this supplemental HPSR as Attachment A, Exhibit 3K.

3. CONSULTING PARTIES / PUBLIC PARTICIPATION

X Native American Tribes, Groups and Individuals

Documentation of consultation is provided under *Native American Consultation* in the original HPSR narrative and Attachment 1 (Maxon 2013).

For the Extended Phase I, Stage II investigation, Native American coordination involved communications regarding cultural monitoring for fieldwork. All Native American coordination for this stage was conducted via telephone and email correspondence.

Mandy Marine, Native American Coordinator at Caltrans District 6, initiated contact with the Santa Rosa Tachi Yokuts and the Tejon Tribe (Kitanemuk). Because tribal monitors were unavailable from these two groups during the first round of fieldwork, Ms. Marine provided contact information for several alternative tribal monitors, including: Chairman Robert Gomez, Jr., of the Tubatulabal Tribe; Mr. Bob Robinson, THPO with the Kern Valley Indian Council; and Mr. Joseph Garfield, Tribal Archaeological Monitor at the Tule River Indian Reservation. After leaving phone messages with the three alternative contacts on October 30, 2014, Mr. Garfield was first to respond and request to be present to monitor excavations. Mr. Robinson responded on November 3, 2014 that he would not be able to provide a monitor, and no response was received from Chairman Gomez. Mr. Garfield was present for monitoring during the first (trenching) round of fieldwork, on November 4 and 6, 2014.

For the second (coring) rotation of fieldwork, Mr. Garfield communicated via telephone that he did not feel the need to be present for monitoring of coring excavations, based on results of the earlier trenching fieldwork and limited extent of the coring effort. Although Ms. Shana Brum of the Santa Rosa Tachi Yokuts expressed an interest in monitoring the second round of fieldwork through an email to Ms. Marine on December 2, 2014, Ms. Brum was not able to provide a monitor during the scheduled fieldwork, which occurred December 2 and 3, 2014.

The consulting parties listed below are being supplied with a copy of this supplemental HPSR in compliance with 36 CFR Part 800.11 for a 30-day comment period:

- Kudzubitchwanap Palap Tribe
- Eshom Valley Band of Indians
- Native American Heritage Preservation Council
- Tule River Indian Tribe
- Carol Pulido, Frazier Park
- Santa Rosa Rancheria
- Kawaiisu Tribe
- Kern Valley Indian Council
- Tejon Indian Tribe
- Kitanemuk and Yowlumne Tejon Indians
- Yokuts, Tubatulabal
- Chumash Council of Bakersfield
- Tubatulabals of Kern Valley

X Other

Charles Webb, Real Property Agent with the City of Bakersfield assigned to TRIP, granted permission to survey and excavate at proposed trench and core locations in properties owned by the

City of Bakersfield on October 22, 2014. The remaining two cores were excavated in a private parcel (149-233-05) at 3618 Elcia Drive, and in a materials storage yard owned by the State of California. Permission to core in the parcel 149-233-05 was granted by the property owner on November 14, 2014. Permission to core in the materials storage yard was granted by Joel Martin of Caltrans on November 25, 2014.

4. SUMMARY OF IDENTIFICATION EFFORTS

X **Results:**

Identification efforts for the Extended Phase I, Stage II investigation included subsurface geoarchaeological testing and pedestrian field survey. The following summarizes the various efforts:

- Geoarchaeological testing found minimal development for buried soils and did not identify any prehistoric or historic cultural deposits:
  - Seven subsurface exploration trenches were excavated using a tractor-mounted backhoe. Backhoe trenches measured 0.6 m (2.0 ft) wide, and ranged in length from 2.9 to 4.0 m (9.5 to 13.1 ft). Trenches were excavated at least to the proposed depth of subsurface impact at the particular retention basin under investigation, with depths ranging from 2.5 to 5.2 m (8.2 to 17.1 ft). Trench spoils were visually examined for cultural materials by raking, and samples from buried soils were screened through 0.25-inch mesh. Where appropriate, at depths up to 1.5 m (5.0 ft), trench sidewalls were also examined for cultural materials.

  - Seven core samples taken with a truck mounted, direct push Geoprobe equipped with dual wall DT 22 tooling. Cores measured 1.125 inch diameter and were excavated at least to the depth of proposed subsurface impact at the coring location, ranging in depth from about 4.6 m (15 ft) to 10.6 m (35.0 ft).

  - One manual 10 cm diameter auger was excavated on the privately owned parcel at 3618 Elcia Dr. The auger was excavated to about 3.1 m (10 ft), the design depth of the proposed retention basin.

- The small pedestrian survey of 3,085 ft^2 between the modern Kern River channel and Truxton Avenue produced negative results in conditions of excellent ground visibility on un-vegetated sediment. The ground surface at this location is comprised of fluvial sand graded and contoured into the modern levee system adjacent to the Kern River.

Observed subsurface sediments consisted primarily of sandy alluvium nearly devoid of soil formation, suggesting a very active, dynamic depositional environment with little evidence of landform surface stability or preservation potential. No prehistoric or historic period cultural materials were observed during the fieldwork performed for this investigation.

5. PROPERTIES IDENTIFIED

X **No cultural resources** are present within the APE. The identification efforts presented in this supplemental HPSR found no additional cultural resources.

6. HPSR to District File

X Caltrans, in accordance with Section 106 Programmatic Agreement Stipulation VIII, has determined that there are no cultural resources present in the APE and/or there are properties within the APE that **are exempt from evaluation;** see Section 5.

7. HPSR to SHPO

X Not applicable.

8. HPSR to CSO

X Not applicable.

9. Findings for State-Owned Properties

Findings to District File

X Not applicable; project does not involve Caltrans right-of-way or there are no Caltrans-owned cultural resources within the APE. The identification efforts presented in this supplemental HPSR found no additional cultural resources.

Findings to SHPO

X Not applicable.

Findings to CSO

X Not applicable.

10. CEQA Considerations

X Caltrans PQS staff has determined there are **no historical resources** within the Project Area limits, as outlined in CEQA Guidelines 15064.5(a). The identification efforts presented in this supplemental HPSR found no additional cultural resources.

11. List of Attached Documentation

X Project Vicinity, Location, and APE Maps (**Attachment A**)

Exhibit 1. Project Vicinity
Exhibit 2. Project Location
Exhibit 3K. Project APE

X Other

Dalldorf, Graham

2015 *Extended Phase I, Stage II Geoarchaeological Investigation for Alternative B of the Centennial Corridor Project Kern County, California*. Pacific Legacy, Inc., El Dorado Hills. Submitted to the California Department of Transportation, District 6, Fresno. (**Attachment B**)

12. HPSR Preparation and Caltrans Approval

Prepared by:		2/26/2015
Consultant / discipline: Affiliation	*Graham Dalldorf, M.A./ Geoarchaeology* *Pacific Legacy, Inc. 4919 Windplay Dr. Ste. 4, El Dorado Hills, California 95762*	Date
Reviewed for approval by:		4/9/15
District 6 Caltrans PQS discipline/level:	*Brian Wickstrom, M.A.* *Principal Investigator-Prehistoric Archaeology*	Date
Approved by: *(sign on line)*		4/9/2015
District 6 EBC:	*Jeanne Day Binning, Ph.D.* *Branch Chief* *Central California Cultural Resources Branch* *Caltrans Central Region Environmental Region*	Date

Attachment A

Project Maps

Refer to *Historic Property Survey Report for the Centennial Corridor Project, City of Bakersfield and Kern County, CA* (Maxon 2013) for the complete set of APE maps.

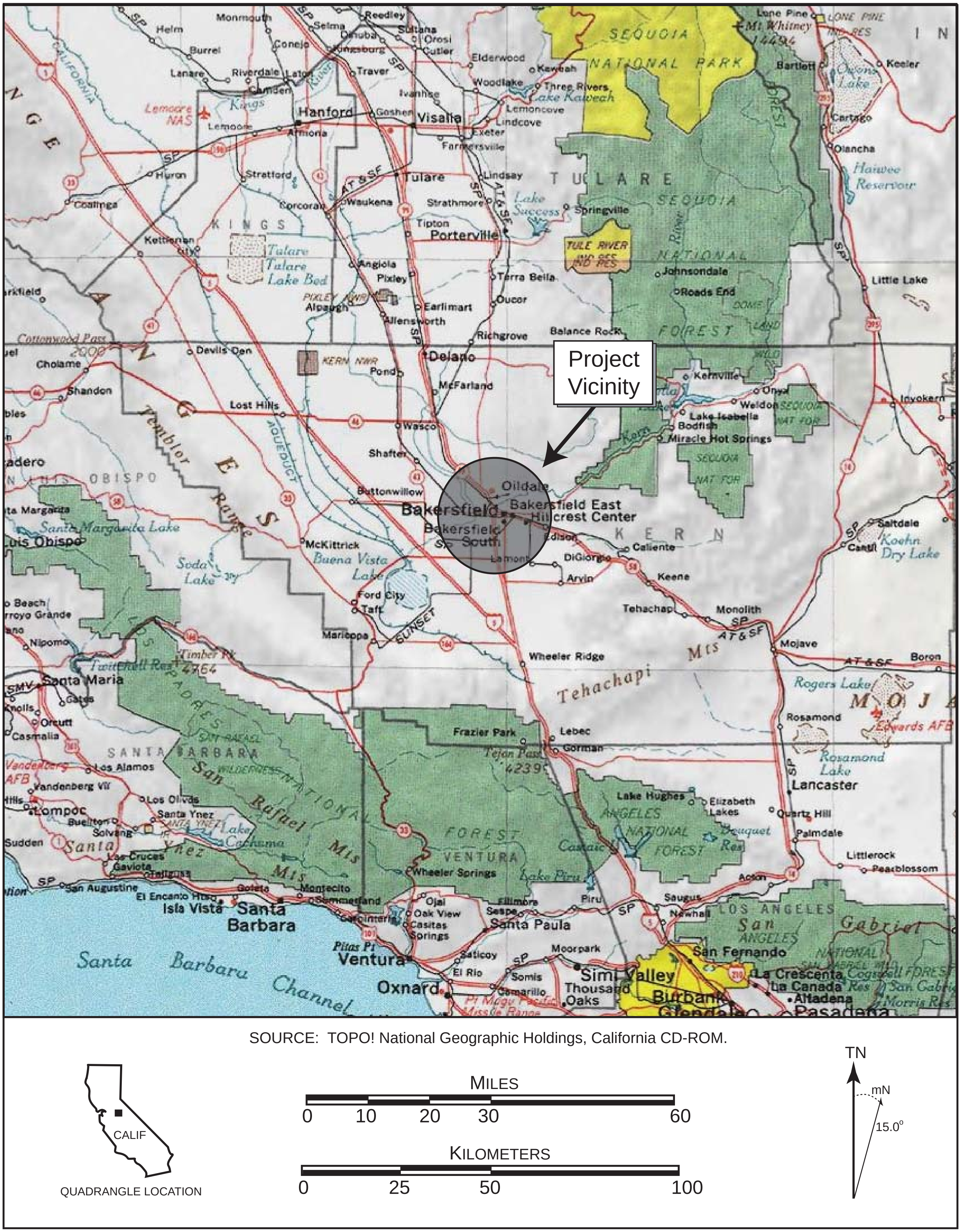


Exhibit 1. Project Vicinity Map.

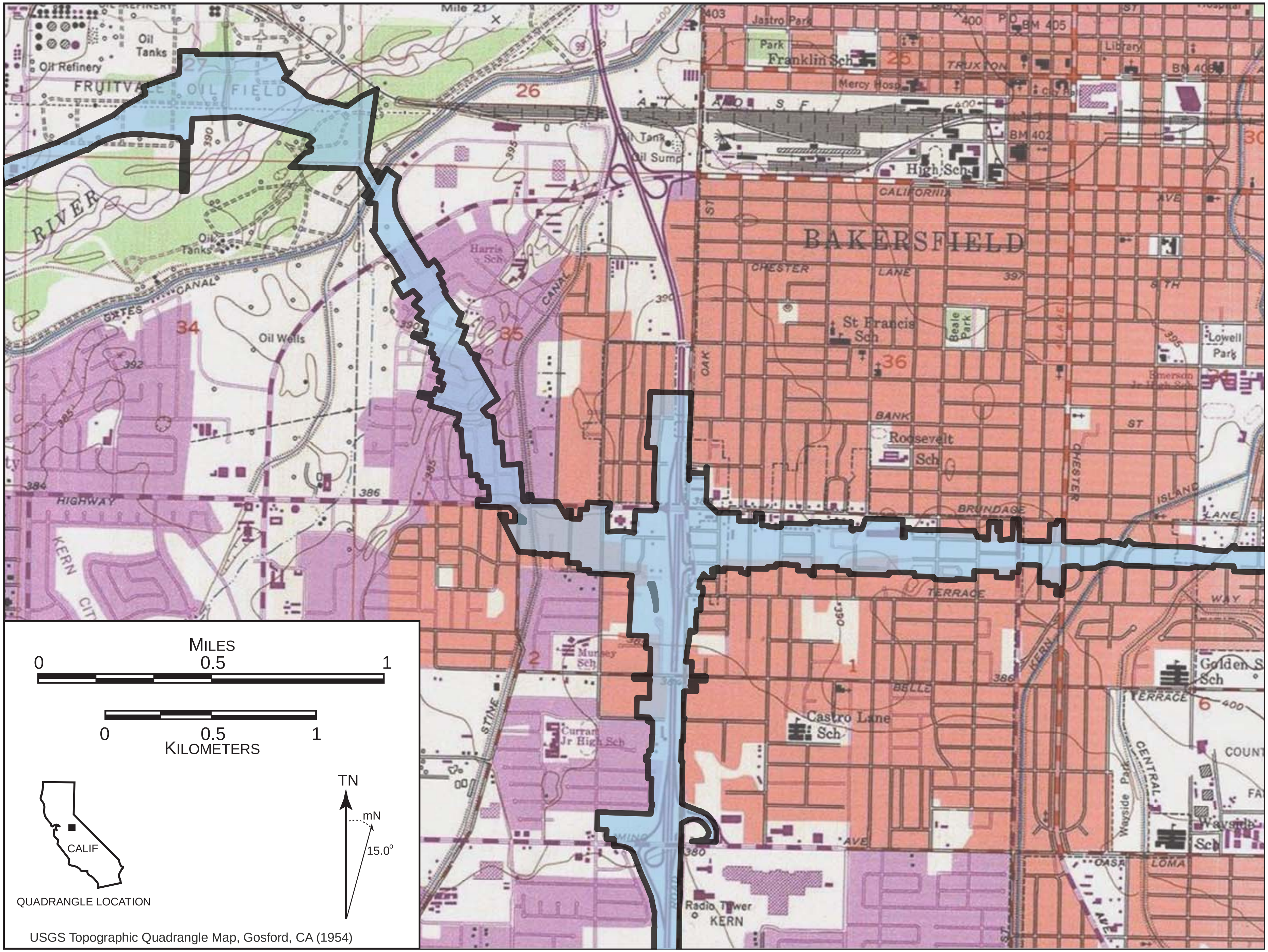
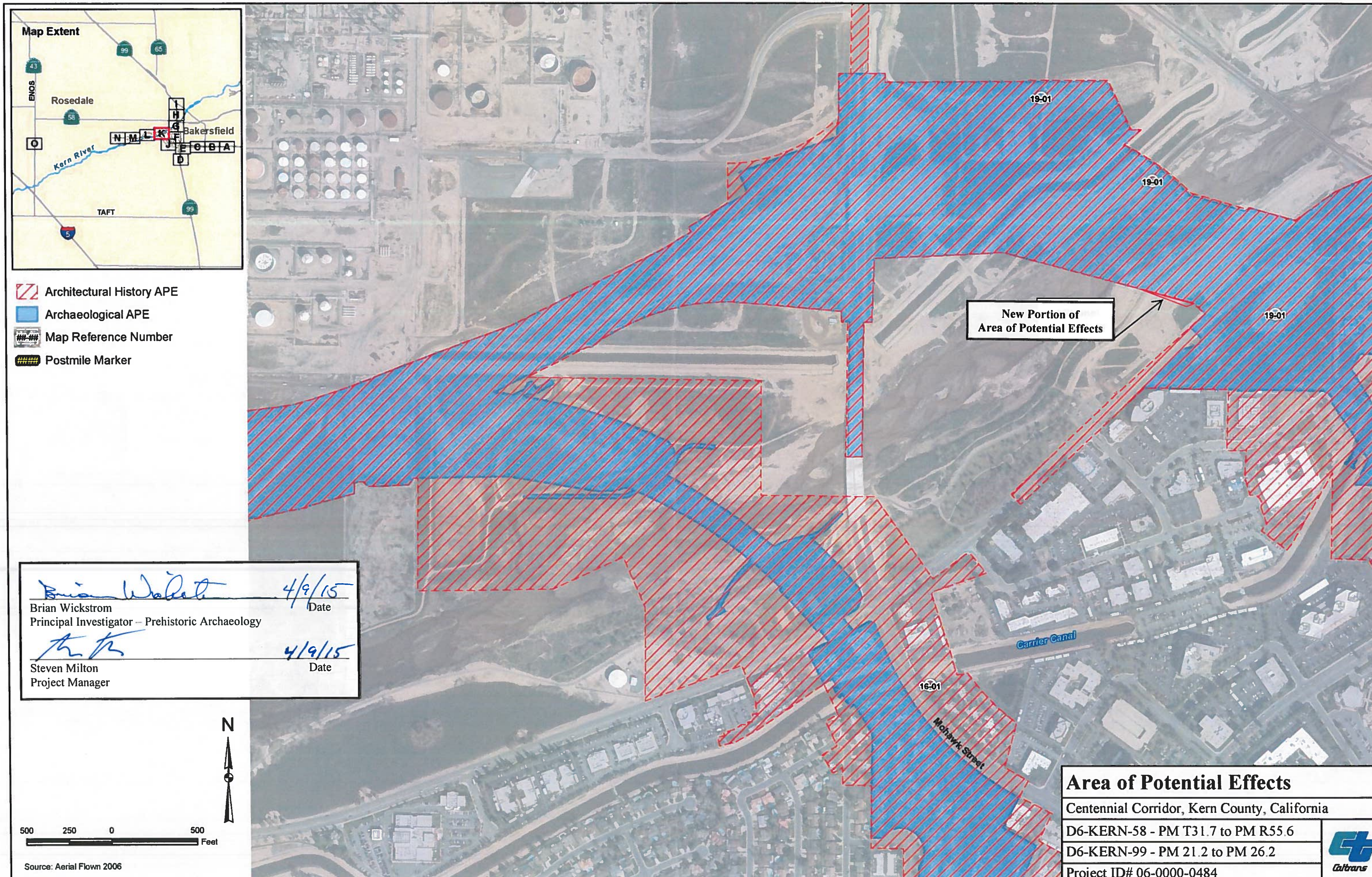


Exhibit 2. Project Location Showing Centennial Corridor APE, and Approximate Extent of Alternative B Subject to Extended Phase I, Stage II Investigations.



4/9/15
Brian Wickstrom
Date
Principal Investigator – Prehistoric Archaeology

4/9/15
Steven Milton
Date
Project Manager

Area of Potential Effects

Centennial Corridor, Kern County, California

D6-KERN-58 - PM T31.7 to PM R55.6

D6-KERN-99 - PM 21.2 to PM 26.2

Project ID# 06-0000-0484

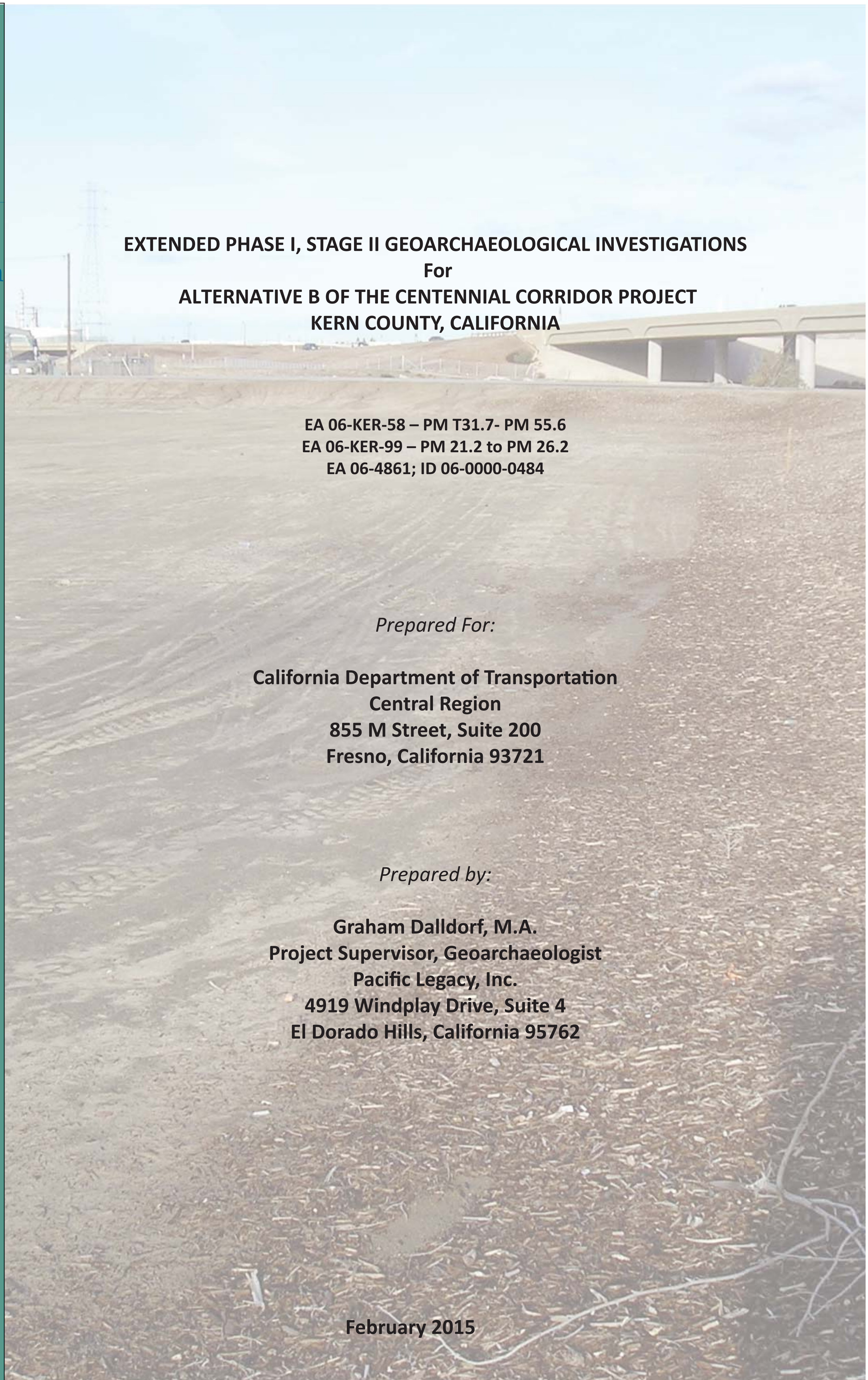
Exhibit 3K

Attachment B

Extended Phase I, Stage II Geoarchaeological Investigation for Alternative B of the Centennial Corridor Report

Pacific Legacy

Historic Preservation



EXTENDED PHASE I, STAGE II GEOARCHAEOLOGICAL INVESTIGATIONS
For
ALTERNATIVE B OF THE CENTENNIAL CORRIDOR PROJECT
KERN COUNTY, CALIFORNIA

EA 06-KER-58 – PM T31.7- PM 55.6
EA 06-KER-99 – PM 21.2 to PM 26.2
EA 06-4861; ID 06-0000-0484

Prepared For:

California Department of Transportation
Central Region
855 M Street, Suite 200
Fresno, California 93721

Prepared by:

Graham Dalldorf, M.A.
Project Supervisor, Geoarchaeologist
Pacific Legacy, Inc.
4919 Windplay Drive, Suite 4
El Dorado Hills, California 95762

February 2015

Extended Phase I, Stage II Geoarchaeological Investigations for Alternative B of the Centennial Corridor Project
Kern County, California
District 06-KER-58 – PM T31.7- PM 55.6
District 06-KER-99 – PM 21.2 to PM 26.2

Prepared For:
Caltrans District 6
855 M Street, Suite 200
Fresno, CA 93721

U.S. Geological Survey Gosford, CA (1954) 7.5-minute topographic quadrangle

Reviewed by: ______________________ Date: 4/9/15
Brian P. Wickstrom
Associate Environmental Planner (Archaeology)
Caltrans District 6
855 M Street, Suite 200
Fresno, California 93721

Approved by: ______________________ Date: 4/9/2015
Jeanne Binning
Chief, Central California Cultural Resources Branch
Caltrans District 6
855 M Street, Suite 200
Fresno, California 93721

Prepared by: ______________________ Date: 01/12/15
Graham Dalldorf
Project Supervisor/Geoarchaeologist
Pacific Legacy, Inc.
4919 Windplay Drive, Suite 4
El Dorado Hills, California 95762

January 2015

Confidential Information

Archaeological and other heritage resources can be damaged or destroyed through uncontrolled public disclosure of information regarding their location. This document contains sensitive information regarding the nature and location of archaeological sites that should not be disclosed to unauthorized persons.

Information regarding the location, character or ownership of a historic resource is exempt from the Freedom of Information Act pursuant to 16 U.S.C. 470w-3 (National Historic Preservation Act) and 16 U.S.C. § 470hh (Archaeological Resources Protection Act) and California State Government Code, Section 6254.10.

If any information in this document is to be released for public review, all locational information associated with archaeological resources must be redacted before distribution.

SUMMARY OF FINDINGS

This report documents an Extended Phase I, Stage II geoarchaeological investigation conducted for Alternative B of the proposed Centennial Corridor Project in Kern County, California. The primary purpose of this Extended Phase I, Stage II investigation was to determine if buried archaeological deposits are present within the Area of Potential Effects (APE) established for Alternative B. The Extended Phase I, Stage II investigation was carried out by Pacific Legacy, Inc. (Pacific Legacy), under contract with Parsons Corporation (Parsons).

The California Department of Transportation (Caltrans), in conjunction with the City of Bakersfield and the Federal Highway Administration (FHWA), is proposing with the Centennial Corridor Project to establish a new alignment for State Route (SR) 58. The new alignment would be an east-west route from SR 99 to Interstate 5. Planning for the proposed Centennial Corridor has been divided into three segments, the easternmost of which (Segment 1) consists of three build alternatives. Alternative B of Segment 1 has been identified as the preferred alternative and would connect the Westside Parkway between Mohawk Street and Coffee Road to the existing SR 58 (East) freeway at Cottonwood Road. In support of the project and in compliance with Section 106 of the National Historic Preservation Act, an Extended Phase I, Stage II investigation was conducted to determine if subsurface archaeological deposits are present in the Area of Potential Effects (APE) of Alternative B. The vertical APE extends to the depth of proposed subsurface impacts, which range from 3.0 m (10.0 ft) below surface for retention basins, and up to about 10.0 m (32.8 ft) below surface for depressed portions of the freeway.

Although no archaeological sites have been recorded by previous surveys of the APE (Maxon 2013), a buried site model has been developed that indicates most of Alternative B possesses very high or high potential for such resources (Windingstad et al. 2012). Building upon the regional sensitivity model (Meyer et al. 2010), the project-specific buried site model was based primarily on the documented widespread presence of late Holocene deposits in the APE, as well as the presence of several drainages that traverse it, as revealed by an analysis of pre-urbanization aerial photos of the Centennial Corridor.

The present Extended Phase I, Stage II investigation included the excavation of approximately 49.9 m^3 from seven exploratory backhoe trenches, and the recovery of seven cores ranging in depth from 3.1 m (10.0 ft) to 10.7 m (35.0 ft). Trenches and cores were focused on areas of modeled very high or high sensitivity, and placed in or adjacent to areas of proposed subsurface impacts (i.e., retention basins and depressed freeway sections). Analysis and interpretation of the trenches and cores, which were excavated to the maximum depth of proposed impacts, confirmed the ubiquity of relatively deep Holocene sediments throughout the APE, generally in accordance with the geomorphic framework provided by Windingstad et al. (2012). However, the present investigation found no subsurface cultural deposits in sampled areas of proposed subsurface impact for the construction of Alternative B. Furthermore, the deposits exposed during the course of this investigation indicate there are no intact, laterally extensive buried soils, due to the relatively active, high energy Holocene depositional setting of the APE.

Supplemental to the Extended Phase I, Stage II tasks, a small (3,085 ft^2) sliver of the Centennial Corridor was also subject to pedestrian archaeological survey, resulting in negative findings.

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APPENDICES

1.0 INTRODUCTION

1.1 PROJECT LOCATION AND DESCRIPTION

The proposed Centennial Corridor project is located along portions of State Route (SR) 99 and SR 58 in Bakersfield, Kern County, California (Figure 1). The California Department of Transportation (Caltrans) proposes to establish with the Centennial Corridor Project a new alignment for SR 58. The new alignment would be an east-west transportation route from SR 99 to Interstate 5. The proposed Centennial Corridor has been divided into three segments, the easternmost of which (Segment 1) consists of three build alternatives. Alternative B of Segment 1, the preferred alternative subject to this Extended Phase I, Stage II investigation, would connect the Westside Parkway, between Mohawk Street and Coffee Road, to the existing SR 58 (East) freeway at Cottonwood Road. The Centennial Corridor Project is one of the roadway projects developed under the Thomas Road Improvement Program (TRIP). The primary project proponent is the City of Bakersfield. The project location is shown on the Gosford, CA 7.5' USGS Topographic Quadrangle Map (1954) in T 29S, R 27E, Sections 26, 27, 34, 35, and 36; and in T30S, R27E, Sections 1 and 2 (Figure 2).

The horizontal extent of the Area of Potential Effects (APE) has been defined by Caltrans for the entire Centennial Corridor project, and includes all build alternatives of Segment 1. The portion of the APE containing Alternative B of Segment 1 is an irregularly shaped polygon measuring roughly 8.5 km (5.3 mi) east to west from Mohawk Street and Coffee Road to SR 58 (East) at Cottonwood Road. This portion of the APE also extends from the alignment to the south along SR 99 approximately 2.2 km (1.4 mi) to Wilson Road. Construction of Alternative B will entail substantial earth moving and grading activities, including the excavation of eight retention basins and of two main depressed portions of freeway. These subsurface impacts may extend to 3.0 m (10.0 ft) below surface for retention basins, and up to about 10.0 m (32.8 ft) below surface for depressed portions of the freeway, depths which serve to define the extent of the vertical APE.

Although no archaeological sites have been recorded by previous surveys in the APE (Maxon 2013), a buried site model has been developed as part of the Extended Phase I, Stage I study that indicates most of Alternative B possesses very high or high potential for such resources (Windingstad et al. 2012). The buried site model was based primarily on the documented widespread presence of late Holocene deposits in the APE, as well as the presence of several drainages that traverse it, as revealed by an analysis of pre-urbanization aerial photos of the Centennial Corridor. Due to the likelihood that buried archaeological deposits may exist in the APE covered by recent (e.g. late and latest Holocene) sediments, geoarchaeological field investigations are warranted to determine if such deposits are actually present within the APE. Secondarily, geoarchaeological field investigations are needed to test and further refine the buried site model developed for the Centennial Corridor (Windingstad et al. 2012). To accomplish these tasks, an Extended Phase I, Stage II investigation was conducted by Pacific Legacy, Inc. (Pacific Legacy) as reported herein.

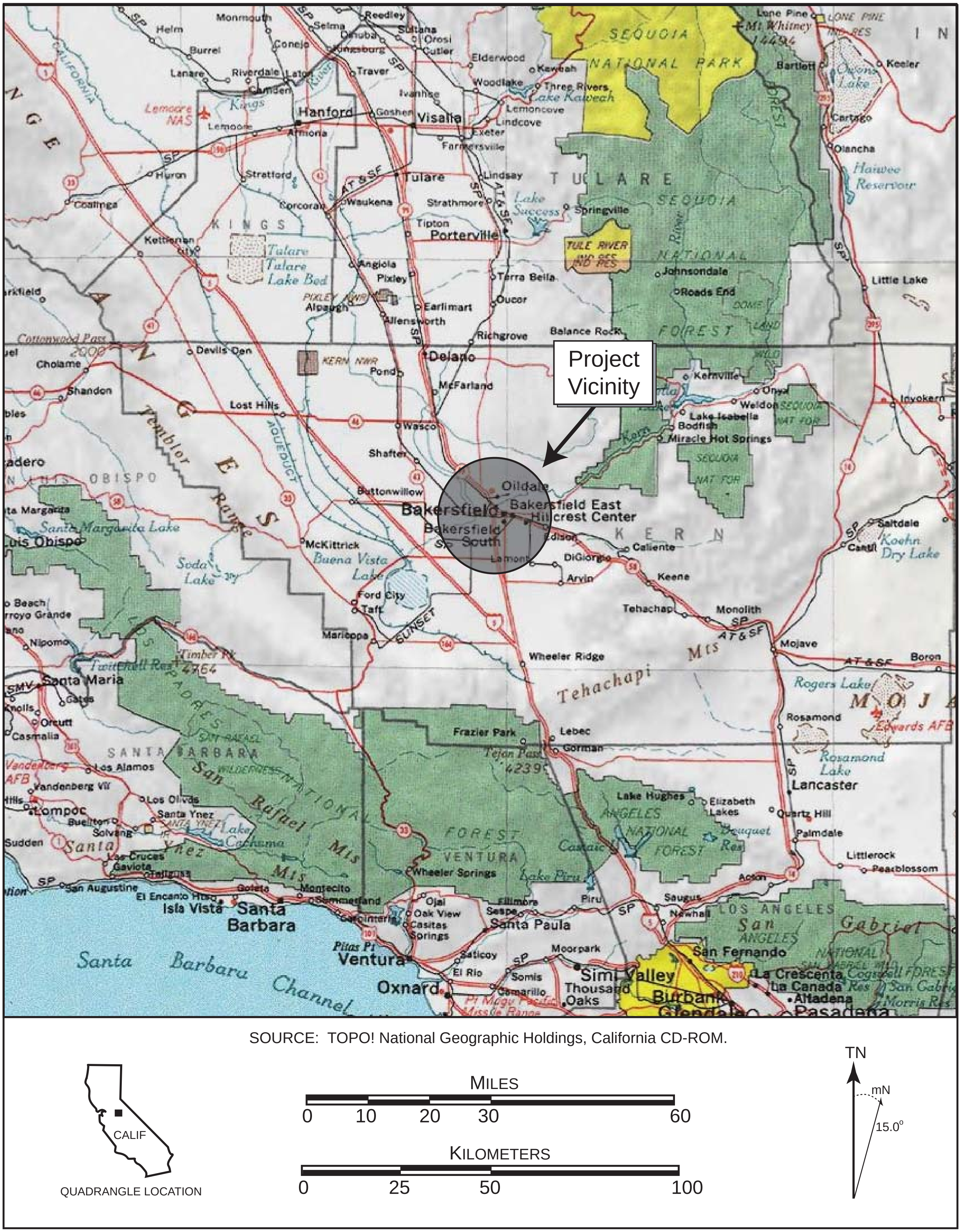


Figure 1. Project Vicinity Map.

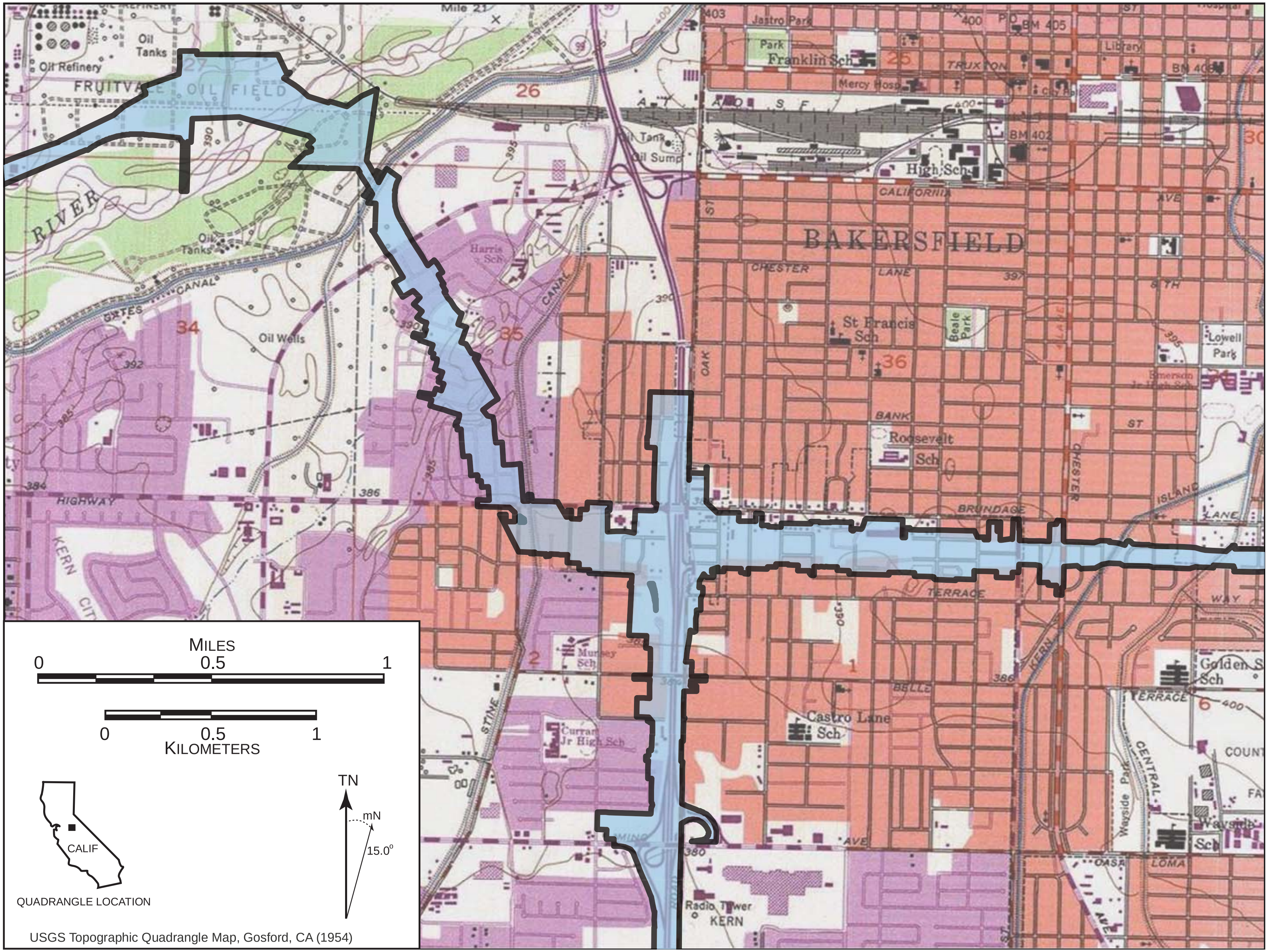


Figure 2. Project Location Showing Centennial Corridor APE, and Approximate Extent of Alternative B Subject to Extended Phase I, Stage II Investigations.

During the course of the Extended Phase I, Stage II investigation, a slight modification was made to the Centennial Corridor APE. The change was made as a result of an adjustment to proposed PG&E transmission tower relocations due to biological mitigation, and resulted in a small sliver of the APE that required archaeological survey. Hence, supplemental to the main Extended Phase I, Stage II tasks, a small (3,085 ft^2) sliver of the Centennial Corridor adjacent to the Kern River was subject to pedestrian archaeological survey, resulting in negative findings.

1.1.1 Regulatory Requirements

An Extended Phase I, Stage II geoarchaeological investigation of the Centennial Corridor's Alternative B serves to assist Caltrans/FHWA to meet obligations under Stipulation XI of the *First Amended 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* (Section 106 PA), which became effective in January 2014. Stipulation XI governs the resolution of adverse effects resulting from undertakings covered by the Section 106 PA. This report was prepared in accordance with Caltrans' (2014) *Standard Environmental Reference, Vol. 2: Cultural Resources,* and more specifically with Exhibit 5.3 contained therein, which provides guidance for Extended Phase I reports.

Caltrans is also responsible for compliance with the California Environmental Quality Act (CEQA), which requires that California public agencies consider the consequences of their actions on the environment, including cultural resources. Public Resources Codes provide specific guidance that supports CEQA compliance. Such guidance includes the evaluation of resources in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using criteria outlined in Section 5024.1 of the California Public Resources Code to determine whether any cultural resources potentially affected by the project are historical resources for the purposes of CEQA.

1.2 Management Objectives of Extended Phase I Investigations

The Extended Phase I, Stage II investigation for Alternative B of the Centennial Corridor project was primarily focused on establishing whether intact buried archaeological deposits are present within areas of proposed subsurface disturbance (i.e., retention basins and depressed freeway portions) in the APE. The results of Extended Phase I, Stage II investigations would thus assist Caltrans in determining whether further archaeological investigation would be necessary for the undertaking per the Section 106 PA.

1.3 Project Administration

The format and content of this report follow that outlined in Caltrans' (2014) *Standard Environmental Reference, Vol. 2: Cultural Resources*, Exhibit 5.3 Extended Phase I Report Format and Content Guide.

1.3.1 Dates of Fieldwork and Personnel

Fieldwork for Extended Phase I, Stage II investigations was divided into a trenching phase, conducted November 4-6, 2014, and a coring phase, conducted December 2-3, 2014. The supplemental survey task of 3,085 ft^2 was performed during the coring phase on December 3, 2014.

Following fieldwork, report writing and production was conducted at Pacific Legacy's El Dorado Hills office in December 2014 and January 2015.

The Principal Investigator for the project, Robert Jackson, M.A., has over 35 years of experience in California cultural resources management and meets the Secretary of the Interior's Professional Qualifications Standards. Graham Dalldorf, M.A., served as Project Supervisor/Geoarchaeologist and meets the Secretary of Interior's Professional Standards. Mr. Dalldorf was responsible for directing the fieldwork and report composition. Appendix A of this report contains abbreviated résumés for the above project personnel.

1.3.2 Land Ownership, Permits, and Permission

All exploratory trenches and six of the cores were excavated on property owned by the City of Bakersfield. The 3,085 ft^2 sliver of APE that required survey is located partly on City of Bakersfield property and on publicly accessible portions of a private parcel owned by Wanamaker (332-280-48). Charles Webb, Real Property Agent with the City of Bakersfield and assigned to TRIP, granted permission to survey and excavate at proposed trench and core locations in properties owned by the City of Bakersfield on October 22, 2014. The remaining two cores were excavated in a private parcel (149-233-05) at 3618 Elcia Drive, and in a materials storage yard owned by the State of California. Permission to core in the parcel 149-233-05 was granted by the property owner on November 14, 2014. Permission to core in the materials storage yard was granted by Joel Martin of Caltrans on November 25, 2014.

Beginning on October 24, 2014, a number of attempts were made to obtain permission to excavate an exploratory trench at a proposed retention basin within Caltrans Right-of-Way (R/W) in the southeast quadrant of SR 99 and SR 58. These attempts were ultimately unsuccessful within the time constraints of this Extended Phase I, Stage II investigation.

Prior to field excavations, Mr. Dalldorf notified Underground Service Alert (USA) of the impending excavations for clearance of buried utilities. USA member utility representatives inspected and marked the location of underground utilities in the project area prior to fieldwork.

1.3.3 Native American Coordination

Caltrans was responsible for consulting with the Native American Heritage Commission (NAHC) and local Native American groups regarding the proposed project and field investigation. Pacific Legacy assisted Caltrans in arranging for the presence of Native American monitors during the fieldwork. Mandy Marine, Native American Coordinator at Caltrans District 6, initiated contact with the Santa Rosa Tachi Yokuts and the Tejon Tribe (Kitanemuk). Because tribal monitors were unavailable from these two groups during the first round of fieldwork, Ms. Marine provided contact information for several alternative tribal monitors, including: Chairman Robert Gomez, Jr., of the Tubatulabal Tribe; Mr. Bob Robinson, THPO with the Kern Valley Indian Council; and Mr. Joseph Garfield, Tribal Archaeological Monitor at the Tule River Indian Reservation. After leaving phone messages with the three alternative contacts on October 30, 2014, Mr. Garfield was first to respond and request to be present to monitor excavations. Mr. Robinson responded on November 3, 2014 that he would not be able to provide a monitor, and no response was received from Chairman Gomez. Mr. Garfield was present for monitoring during the first (trenching) round of fieldwork, on November 4 and 6, 2014.

For the second (coring) round of fieldwork, Mr. Garfield communicated that he did not feel the need to be present for monitoring of coring excavations, based on results of the earlier trenching fieldwork and limited extent of the coring effort. Although Shana Brum of the Santa Rosa Tachi Yokuts expressed an interest in monitoring the second round of fieldwork through an email to Ms. Marine on December 2, 2014, Ms. Brum was not able to provide a monitor during the scheduled fieldwork, which occurred December 2 and 3, 2014.

1.3.4 Curation Agreements

Arrangements for curation of materials recovered from any archaeological deposits encountered had not been finalized at the time of fieldwork for this investigation, but an appropriate facility was to be selected in consultation with Caltrans and TRIP, per the Extended Phase I, Stage II work plan. Because there were no archaeological deposits or artifacts encountered during the course of this investigation, there is no material to curate.

2.0 SITE CONTEXT

The archaeological survey report (ASR) for the Centennial Corridor project (Maxon 2013) provides an overview of the regional environmental and archaeological context. A thorough overview of late Quaternary landscape evolution in central California, as well as its influence on the archaeological record, is provided by Meyer et al. (2010). Based on guidance contained in Caltrans' (2014) *Standard Environmental Reference, Vol. 2: Cultural Resources*, Exhibit 5.3 Extended Phase I Report Format and Content Guide, this section will only briefly summarize the buried site model (Windingstad et al. 2012) developed for the Extended Phase I, Stage I investigation. In addition to discussing several new sources of information not fully addressed by Windingstad et al. (2012), the summary will provide a geomorphic context through which the results of the Extended Phase I, Stage II investigation may be understood.

2.1 SETTING

2.1.1 Surficial Geology, Soils, and Buried Site Sensitivity

Alternative B of the Centennial Corridor is situated on the Kern River alluvial fan. More specifically, it is located near the fan apex, or the proximal section of the youngest fan lobe. The deposits that comprise the youngest fan lobe have been mapped as Holocene and late Pleistocene younger alluvium (Qya) by Bartow (1984). More recent mapping has subdivided the youngest fan lobe deposits into several different units spanning the late Holocene to late Pleistocene (Haydon and Hayhurst 2011), with the majority of Alternative B being located on late Holocene alluvial wash (Qw), alluvial fan (Qf), and alluvial valley (Qa) units. A smaller section of Alternative B, roughly between South Real Road and North McDonald Way, is mapped as Holocene to late Pleistocene young alluvial fan (Qyf) deposits. The Haydon and Hayhurst (2011) mapping relied heavily on soil data, as did the Extended Phase I, Stage I study by Windingstad et al. (2012).

Expanding on the existing regional buried site model (Meyer et al. 2010), Windingstad et al. (2012) subdivided the youngest lobe of the Kern River alluvial fan into four distinct late Quaternary surfaces (Figure 3) to develop a project-specific buried site model, as follows:

- Qa3: Upper Modesto (latest Pleistocene) fan alluvium capped with late Holocene deposits – generally high potential for buried archaeology
- Qa2: Post Modesto II (late Holocene) fan terrace – generally high potential for buried archaeology
- Qa1: Post Modesto III (latest Holocene) fan terrace along the modern channel of the Kern River – generally very high sensitivity for buried archaeology
- Qa0: Post Modesto IV modern channel and bar deposits of the Kern River – generally low potential for buried archaeology

These units were distinguished primarily on the basis of soil-landform associations, and Alternative B crosses the latter three units. The buried site model was developed by assigning a ranking to these four late Quaternary surfaces – a relative ranking based on age that estimated the likelihood for a buried soil (former surface) to be present. Typical of buried site models, younger deposits are thought to have a greater relative likelihood of burying a former surface where archaeological

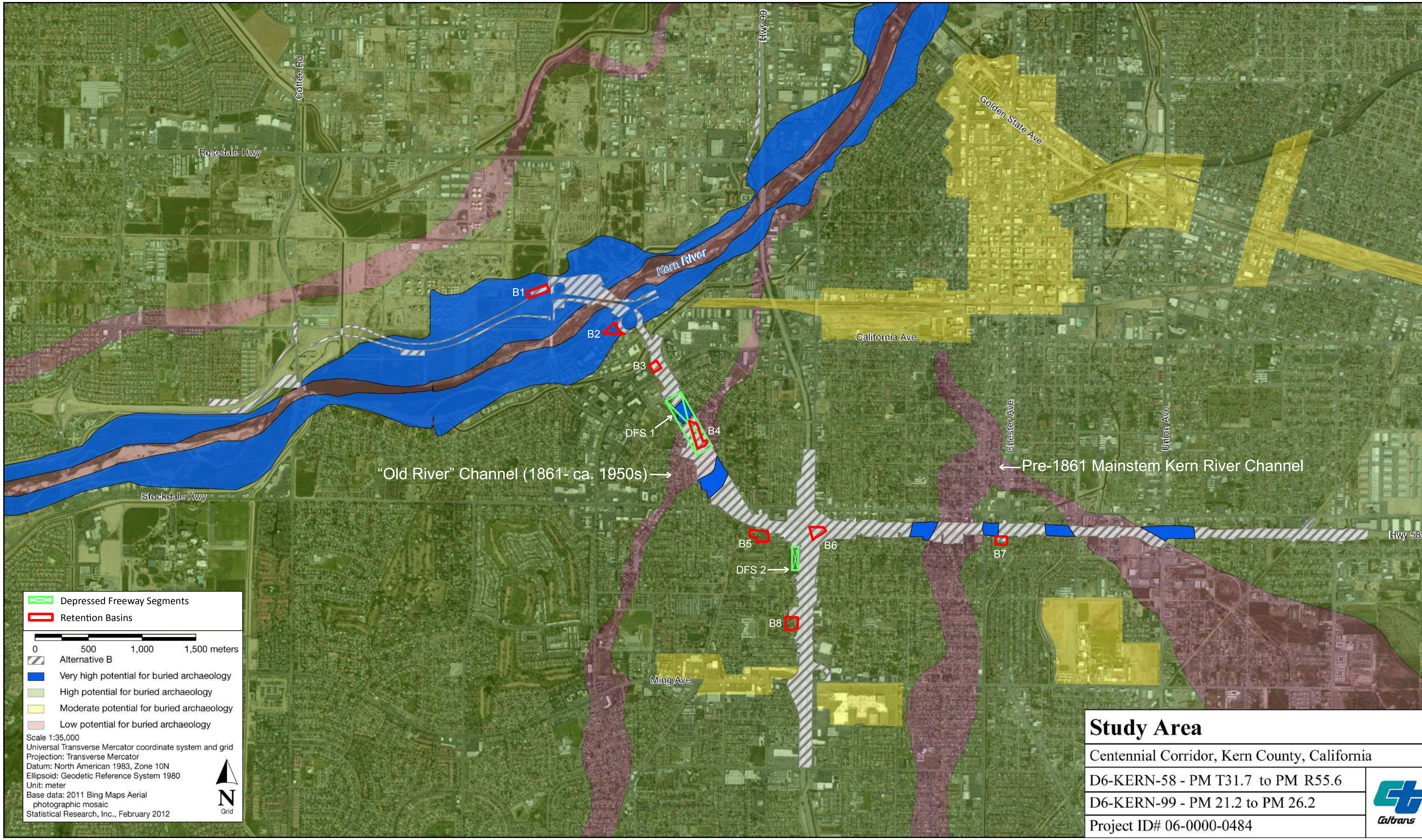


Figure 3 . Project APE Map Showing Areas of Buried Site Sensitivity and Proposed Subsurface Impact. (Modified from Windingstad et al., 2012)

deposits might be present. As an exception, channel deposits associated with modern drainages were assigned a lower likelihood, due to the lack of preservation potential in such areas.

Windingstad et al. (2012) also used pre-urbanization (1954) aerial photographs to map the location of former historic channels of the Kern River. Areas of Qa3 or Qa2 within ~200 m (656 ft) to these former drainage locations were assigned an increased level of sensitivity, due to prehistoric settlement patterns that tend to favor proximity to watercourses. To complete the four part sensitivity scheme, a category ("moderate") was added that accounted for the decreased sensitivity of heavily modified urbanized/industrial portions of any late Quaternary surfaces. Figure 3 shows the results of the Windingstad et al. (2012) Extended Phase I, Stage II study, overlain by design elements of Alternative B that will entail substantial subsurface impact. Alternative B is estimated to have 30 acres of very high sensitivity, 291 acres of high sensitivity, 133 acres of moderate sensitivity, and 50 acres of low sensitivity.

2.1.2 Historic Kern River Channel Migration

One aspect of the Kern River alluvial fan's geomorphic history only briefly covered in the Windingstad et al. (2012) report is the historic record of flooding. Several catastrophic floods were recorded during the mid-19th century that altered the course of the Kern River on the alluvial fan (Austin 2012: 163), with the active main stem channel migrating westward with each successive flood. Prior to the 1861-62 flood, the primary (mainstem) Kern River channel was located approximately where the Kern Island Canal flows through Bakersfield. During the 1861-62 flood, a new mainstem channel was scoured out to the west, and drained through the central portion of the Alternative B APE (Figure 3) in a channel labeled "Old River" on 1932 USGS Gosford, Calif. quadrangle map. The 1861-62 flood is estimated to have a 200 year recurrence interval (Austin 2012: 31), suggesting the volume of flow required to produce dramatic channel change on the Kern River alluvial fan occurred repeatedly during the late Holocene and earlier.

In the winter of 1867-1868, constant precipitation and resulting soil saturation caused a landslide to dam the North Fork of the Kern River about 30 miles north of Kernville (Austin 2012: 178). A large lake formed behind the dam, which failed catastrophically, unleashing a massive flood that scoured the walls of Kern Canyon above Bakersfield. Emerging from the mouth of the Kern River canyon at the apex of the alluvial fan, the flood waters reached a depth of 61 m (200 ft), as evidenced by a large uprooted cedar log deposited at that height near the canyon mouth. Although records of eye-witness accounts are unavailable, the bore (frontal wall) of this catastrophic flood must have been an awesome sight, and Bakersfield residents reportedly awoke to loud roaring sounds that accompanied a trembling of the earth. The height of flood waters decreased significantly as the deluge spread out across the fan, but a large log jam appears to have blocked the Old River channel, causing the Kern River to flow even further to the west, creating the modern channel.

Regardless of the exact timing and magnitude of these historic flood events, frequent changes in the Kern River channel on the alluvial fan were likely common throughout the Holocene. Distributary drainage patterns on alluvial fans in arid and semi-arid climates, such as those on the Kern River alluvial fan, are notoriously dynamic and subject to frequent change (Cooke et al. 1993: 170). In this sense, the Kern River may have been simply re-occupying older channels as its course changed in response to floods during the mid-19th century. Early soil surveys implied this, remarking that the "Kern River fan has a close network of old stream channels, indicating that the river has changed its course many times and during high floods has branched out in many channels" (Cole et al. 1945: 6). The dynamic, high energy depositional setting of the Kern River alluvial fan in the project area may suggest a lack of landform surface stability and soil formation, both of which may translate to a decreased likelihood for buried archaeological resources to be present in the Alternative B APE, despite the widespread presence of late Holocene surficial deposits.

3.0 SCOPE OF WORK

Given the relatively recent depositional context and the predominantly urban/suburban character of most of Alternative B, a field strategy was designed that would employ methods appropriate for the particular area of the APE subject to subsurface testing. First, proposed design elements of Alternative B that require substantial subsurface impact (depressed freeway sections and retention basins) were selected for testing, especially those in areas of modeled high or very high sensitivity. Outside of residential neighborhoods, exploratory trenching was chosen as a means of subsurface testing in order to assess the nature, extent, and integrity of natural and artificial deposits, and to confirm the presence or absence of buried archaeological materials. Within residential neighborhoods, mechanical and manual coring was employed to accomplish these same tasks, but with minimal amount of disturbance to residents, coupled with the ability to test areas of limited access due to the built environment. Due to the expedited project schedule, parcels subject to either trenching or coring were limited to those owned by the City of Bakersfield, or those for which the City had already obtained an existing permit to enter.

In addition to the subsurface exploration, as described above, a small area (3, 085 ft^2) adjacent to the Kern River was subject to pedestrian surface survey.

3.1 EXTENDED PHASE I, STAGE II FIELDWORK

3.1.1 Backhoe Trenching

Subsurface exploration trenches were excavated using a tractor-mounted backhoe operated by Danny Black with Mr. Backhoe of Bakersfield, California. Trenches were excavated every 50 to 100 m (164 to 328 ft), depending on property ownership and other access constraints. Each trench was numbered according to the sequence in which it was excavated. Backhoe trenches measured 0.6 m (2.0 ft) wide, and ranged in length from 2.9 to 4.0 m (9.5 to 13.1 ft). Trenches were excavated at least to the proposed depth of subsurface impact at the particular retention basin under investigation, with depths ranging from 2.5 to 5.2 m (8.2 to 17.1 ft). The latter depth represents the maximum reach of the backhoe. Dimensions for each trench excavated are provided in Appendix C. Project personnel were not allowed to enter a trench more than 1.5 m (5.0 ft.) in depth until the trench was secured with hydraulic-shoring devices in accordance with the Occupational Safety and Health Administration (OSHA) standards. All of the trenching and shoring was supervised by the project geoarchaeologist. Dust mitigation during excavation and backfilling of trenches was performed by watering the surface from a portable water trailer (Figure 4). Trenches were backfilled and tamped down to approximate original surface conditions.

Trench spoils were visually examined for cultural materials by raking, and samples from buried soils were screened through 1/4" mesh. Where appropriate, at depths up to 1.5 m (5.0 ft), trench sidewalls were also examined for cultural materials. The depth and general nature of the deposits were recorded in the field, with additional attention given to those trenches that contained buried soils, if present. Selected trenches were described in greater detail. The trench locations were plotted by hand on a Caltrans project map and recorded using a Trimble GeoXT global positioning system (GPS) unit. Soil samples were collected from appropriate contexts for radiocarbon-dating analysis.

Figure 4. Dust Mitigation at Trench 3 Excavation (top) and Coring at Core 6 Location (bottom).

3.1.2 Coring and Manual Augering

In areas of limited access in the urbanized vicinity of the depressed freeway section and adjacent retention basin roughly between Marella Way and La Mirada Drive, coring was conducted using a truck mounted, direct push Geoprobe equipped with dual wall DT 22 tooling that extracted 1.125 inch diameter continuous cores (Figure 4). Cores were retrieved from most of the parcels owned by the City of Bakersfield at the time of this study in areas of proposed subsurface impact. Cores were excavated at least to the depth of proposed subsurface impact at the coring location, ranging in depth from about 4.6 m (15 ft) to 10.6 m (35.0 ft), and were backfilled with standard cement slurry mix. In the field, cores were sealed in their sample tubes and then transported to Pacific Legacy's laboratory in El Dorado Hills for analysis. To the extent possible, soil stratigraphy of cores was described using similar methods for describing exploratory backhoe trenches, as detailed below. Buried soils or cultural deposits, if evident, were subject to detailed examination in the laboratory, and samples were obtained for radiocarbon analysis.

Manual (hand) augering was conducted in a privately owned parcel at 3618 Elcia Dr., for which the City of Bakersfield had previously obtained an existing permit to enter. At this location, one 10 cm (4 in) auger unit was excavated with a bucket auger to inspect subsurface deposits to about 3.1 m (10 ft), the design depth of the proposed retention basin. Subsurface deposits recovered from the auger were visually inspected for cultural materials and buried soils, using descriptive methods outlined below.

3.1.3 Soil Stratigraphic Identification and Description

The natural and cultural stratigraphy, if evident, was identified by carefully examining the deposits exposed in the sidewalls of the subsurface exploration trenches, as well as those evident in the core sample tubes. Stratigraphic units (strata) were identified on the basis of physical composition, superposition, relative soil development, and/or textural transitions. Each stratum was assigned a Roman numeral (I, II, III, etc.) beginning with the oldest or lowermost stratum identified in each trench or core, as described in Appendix C. Buried soils (i.e., paleosols), representing formerly stable ground surfaces, were identified in the field on the basis of color, structure, horizon development, bioturbation, lateral continuity, and the nature of the upper boundary (contact) with the overlying deposit (Birkeland et al. 1991; Retallack 1988).

The master soil horizons were designated by upper-case letters (O, A, B, C, or R) and preceded by Arabic numerals (2, 3, etc.) when the horizon is associated with a different stratum (i.e., 2Cu); number 1 is understood but not shown. The upper part of a complete soil profile is usually called the A-horizon, with a B-horizon being the zone of accumulation in the middle of a profile, and the C-horizon representing the relatively unweathered parent material near the base of a profile. Lower-case letters were used to designate subordinate soil horizons as indicated below:

Horizon suffix	**Description**
b	Buried horizon at the location it was described (not used with C-horizons)
k	Pedogenic accumulation of carbonate
ox	Residual pedogenic sesquioxide accumulation
p	Zone of artificial fill or disturbance
q	Pedogenic accumulation of secondary silica
t	Subsurface accumulation of silicate clay

u	Unweathered parent material (C-horizon)
w	Weak color or structure within B-horizon

Combinations of these numbers and letters indicate the important characteristics of each major stratum and soil horizon; they are consistent with those outlined by Birkeland et al. (1991), Schoeneberger et al. (1998), and the Soil Survey Staff (1998).

3.1.4 Radiocarbon Samples and Dating

Radiometric analysis was conducted to establish and refine the chronology of cultural and non-cultural samples from the study area. Radiocarbon (14C) is produced primarily by the interaction of cosmic radiation with nitrogen in the earth's atmosphere. After mixing with carbon dioxide, 14C is readily assimilated by plants and other living organisms. When plants and animals die, however, 14C levels start to decrease because new carbon is no longer absorbed. Since 14C is known to decay at a rate that approaches a half-life of 5,730 years, the amount of decay reflects the age of biogenic carbon as compared to modern levels of 14C activity (Geyh and Schleicher 1990). For historical reasons, the half-life of 14C as developed by radiocarbon pioneer Willard Libby, 5,568 years, is the one used by international convention. Details regarding the methods and techniques used to date the samples are provided in Appendix B.

Soils and sediments can be dated if they contain biogenic carbon in the form of organic matter, or humates (i.e., soil organic matter, or SOM). The differential decomposition, humification, and translocation of biogenic carbon in a given deposit determine the type and amount of SOM available for dating. The accuracy of soil dates depends on the researcher's ability to select samples that will minimize potential contaminants (Scharpenseel 1979) and to properly interpret the context of the sample (Matthews 1985). The radiocarbon age of a soil or sediment reflects the apparent mean residence time (AMRT) of the total organic content of the analyzed material. Since soil formation is time transgressive, AMRT dates are usually younger than the true age of the soil. Understood in this way, the radiocarbon age of a soil does not mark a single time or event, but reflects the influence of multiple processes that affect the soil–carbon system over time.

Measured 14C ages also reflect the enrichment or depletion (fractionation) of stable carbon isotopes 12C and 13C as determined by the metabolic and environmental history of a sample (Geyh and Schleicher 1990). For this reason, 12C/13C ratios are often used to correct measured 14C ages to conventional 14C ages, which are expressed in years before present (B.P.), with present equaling A.D. 1950. In addition, fluctuations in the concentration of atmospheric 14C over time (the de Vries effect), conventional 14C ages can differ from the actual ages in solar years. This difference amounts to only +200 years over the past 2,000 years, but increases to -800 years between 2,000 and 7,300 years ago, and to -1,100 years between 8,000 and 11,000 years ago (Geyh and Schleicher 1990:168). To compensate for these differences, high-precision calibration programs (Stuvier and Reimer 1993) are used convert conventional 14C ages into calibrated years (cal B.P.).

Four soil samples were submitted to Beta Analytic, Inc., in Coral Gables, Florida, for radiocarbon-dating analysis. The methods used to date and calibrate these samples, along with the dating results, are provided in Appendix B. The significance of the results is discussed in the body of this report.

3.1.5 Pedestrian Surface Survey

Pedestrian surface survey of the 3,085 ft^2 area between the Kern River and Truxton Avenue (see Figure 6) was performed in two transects, spaced roughly 5 m (16 ft) apart. The ground surface in this area was visually inspected for cultural materials greater than 45 years old. The ASR for the Centennial Corridor (Maxon 2013) suggests that prehistoric cultural deposits in the area may be characterized by dark midden soil with shell and/or burned bone, angular fire affected rock, flaked stone tools, and flaked stone tool manufacturing debris (e.g., chert or obsidian debitage). Historic cultural materials in the area may include glass, metal, or ceramic artifacts.

3.2 Trench and Core Mapping and Recording

Standard recording procedures were used during the fieldwork and included the use of soil description sheets and photo records. Site overviews and all exploratory trenches were photographed by digital camera. Trimble GeoXT GPS data with sub-meter accuracy representing the location of excavations was collected.

4.0 STUDY RESULTS

Extended Phase I, Stage II investigations resulted in the excavation of seven exploratory trenches between November 4 and 6, 2014, and coring/augering at eight locations between December 3 and 4, 2014. Trenches were excavated by a tractor-mounted backhoe operated by Danny Black of Mr. Backhoe in Bakersfield, California. The seven trenches were excavated in or adjacent to four of the proposed retention basins, and in the southernmost depressed freeway section. Approximately 49.9 cubic meters (m^3) of material was excavated from the trenches and inspected for archaeological materials, for an average of about 7.1 m^3 per trench (see Appendix C for trench descriptions and dimensions). The subsurface deposits exposed in these trenches were examined, described, and photographed in the field, per methods described in the preceeding section.

Six mechanical cores were obtained from six city-owned parcels (one per parcel) in the northernmost depressed freeway section, roughly between Marella Way and La Mirada Drive. One core was excavated in the southernmost depressed freeway section, and one manual auger was excavated in the location of a proposed retention basin at 3618 Elcia Drive. Approximately 56.4 m (185 ft) of mechanically and manually excavated core/auger samples were extracted as a result of the coring effort (see Appendix C for core descriptions and depths).

Observed subsurface sediments consisted primarily of sandy alluvium nearly devoid of soil formation, suggesting a very active, dynamic depositional environment with little evidence of landform surface stability or preservation potential. No prehistoric cultural materials were observed during the fieldwork performed for this investigation. Moreover, no historic cultural materials were observed. As a result of the field investigations, relatively young (latest Holocene) and remarkably uniform alluvial deposits were identified at or just below the surface across the entire APE. Relatively younger and higher energy fluvial deposits were identified adjacent to the modern Kern River channel, extending about 500 m (1640 ft) north and 700 m (2297 ft) south of the current channel's centerline.

The remainder of this section provides a detailed description of the soil stratigraphy (or rather lack thereof) observed during exploratory trenching and coring. The lack of laterally extensive soil stratigraphic markers in this active depositional environment of relatively uniform alluvial sediments makes stratigraphic correlation extremely difficult and highly suspect. For this reason, strata have not been correlated across excavations, except where specifically mentioned in the report text. For organizational purposes, the observations will be divided into geographical segments within the APE: northwestern, central, and southeastern. The first two segments roughly correspond with the current and "Old River" channels of the Kern River, respectively. The southeastern segment corresponds roughly with the location of Stine Canal and a drainage marked as Panama Slough on the 1932 USGS Gosford, Calif. quadrangle map.

The small pedestrian survey of 3,085 ft^2 between the modern Kern River channel and Truxton Avenue (Figure 6) produced negative results in conditions of excellent ground visibility on unvegetated sediment. The ground surface at this location is comprised of fluvial sand graded and contoured into the modern levee system adjacent to the Kern River. As described in the following section, trenches excavated south of the survey area across Truxton Avenue indicate that the fluvial sediments are relatively deep and nearly devoid of soil formation.

4.1 Soils and Stratigraphy

4.1.1 Northwestern Segment

Descriptions of soil stratigraphy for the northwestern segment of Alternative B come from observations at five exploratory trenches (Trenches 1 through 5). The northwestern segment of the APE lies on both sides of the modern Kern River channel, roughly from Mohawk Street and Westside Parkway to California Avenue. Based on the Windingstad et al. (2012) geomorphic model, the northwestern segment is comprised of the Qa0 (low sensitivity) and Qa1 (very high sensitivity) units (Figure 3).

Three strata were observed down to depths of 3.4 m (11.2 ft). The observed strata appear to be deposited by the Kern River or adjacent distributary channels, and the uppermost strata were likely deposited during one of the catastrophic flood events described in Section 2.1.2 south of the modern Kern River channel. North of the Kern River channel, the entire profile may be related to the historic flooding. The only cultural constituents observed in trenches were modern refuse. Table 1 lists the characteristics of each trench, and descriptions of each stratum follow. Maps showing the locations of these five trenches are shown in Figures 5, 6, and 7. Photographs and profiles of selected trenches are shown in Figure 8. Details regarding radiocarbon dates referenced below are provided in Appendix B.

Table 1. Exploratory Trench Summary.

Backhoe Trench	Size (m)	Depth Below Surface (cm)	Volume (m^3)*	Findings (recorded by depth [cmbs] below surface)
1	3.6 x 0.6	300	6.8	No cultural material
2	3.5 x 0.6	310	6.5	Modern refuse (colorless bottle glass, 0-55)
3	3.6 x 0.6	340	7.3	Modern refuse (colorless bottle glass, 0-75)
4	3.1 x 0.6	360	6.7	No cultural material
5	3.4 x 0.6	280	5.7	No cultural material
6	4.0 x 0.6	520	12.5	No cultural material
7	2.9 x 0.6	250	4.4	Modern refuse (various, 0-58)

*Total Volume = 49.9 m^3 (estimated maximum volume, as trenches were ramped at one end).

Stratum I consists of relatively coarse grained alluvium with textures ranging from medium to coarse gravelly sand. Stratum I exhibits very little to no soil formation, and is generally designated as unweathered sediment (i.e., C horizon). The unweathered sediment has strong channel cross bedding, and is well sorted, suggesting a relatively high energy, fluvial depositional environment. In Trench 3 an incipient, buried soil was evident in Stratum I at 260 cmbs. A radiocarbon date of 5415 cal years BP (Beta-400222) was obtained on soil organic matter from the upper portion of Stratum I at this location. The incipient soil was not observed elsewhere, including in nearby Trench 4, and may represent an intact buried former surface of an isolated landform, perhaps a channel bar.

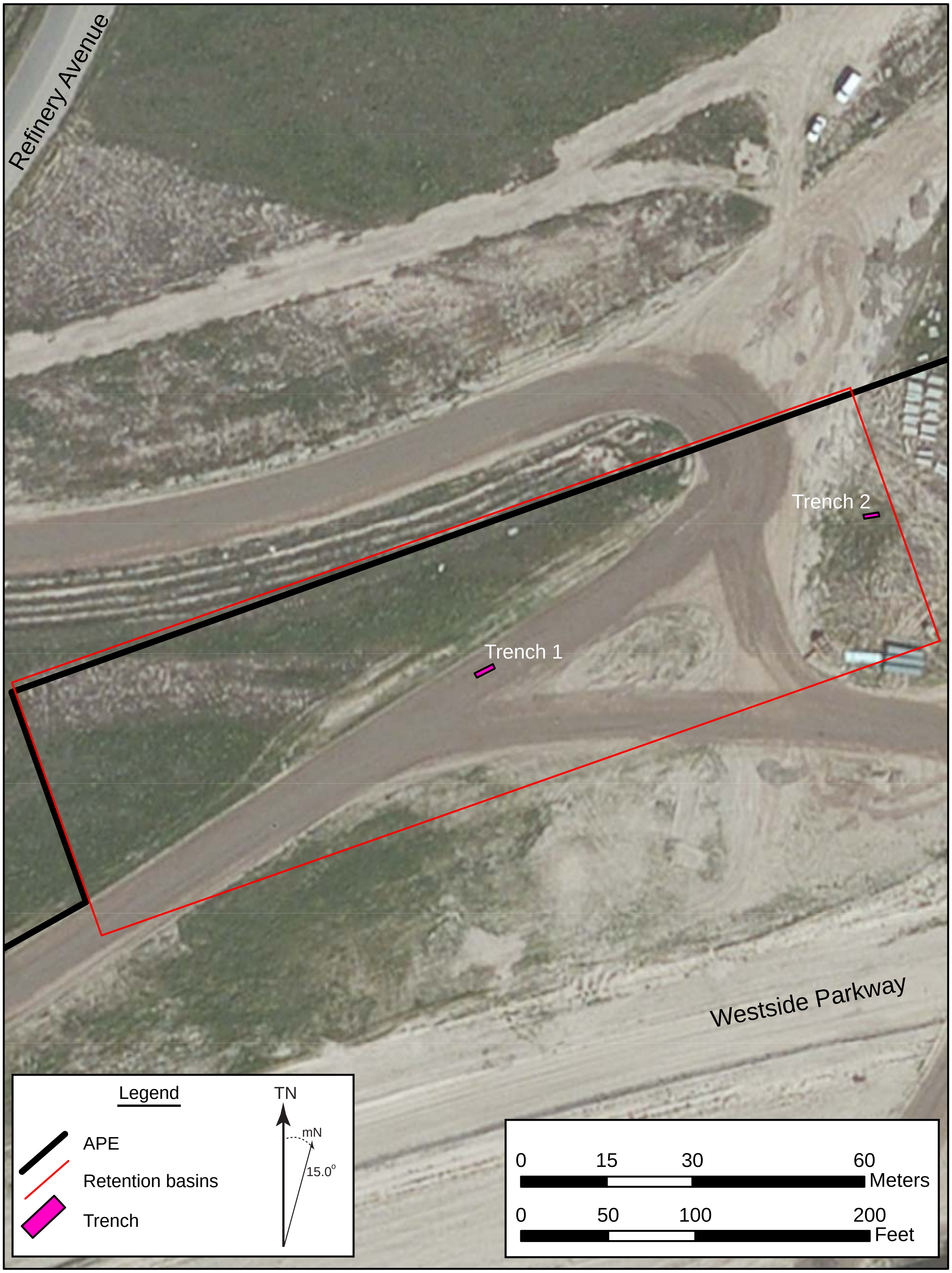


Figure 5. Retention Basin B1.

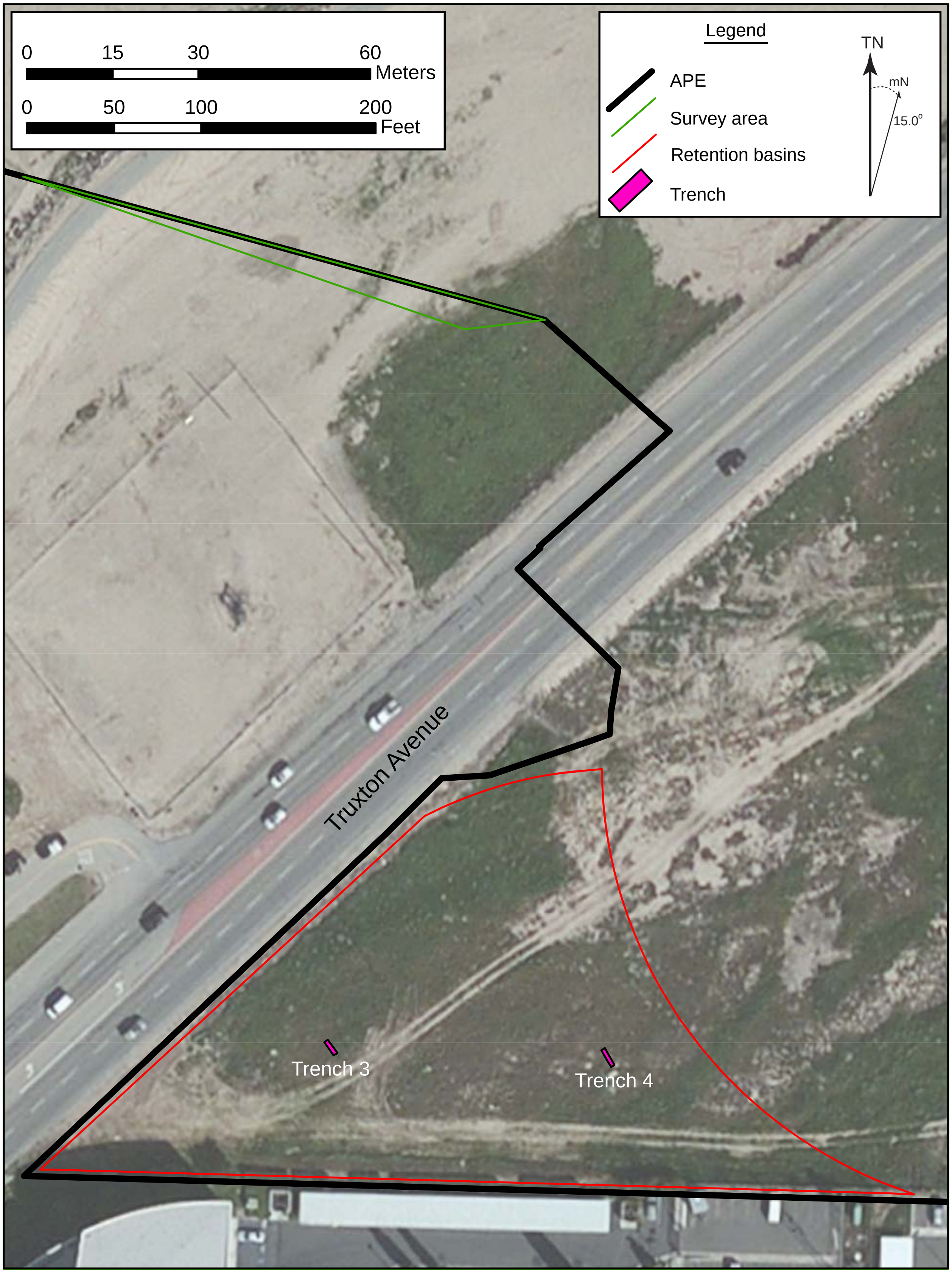


Figure 6. Retention Basin B2 and Additional Survey Area.

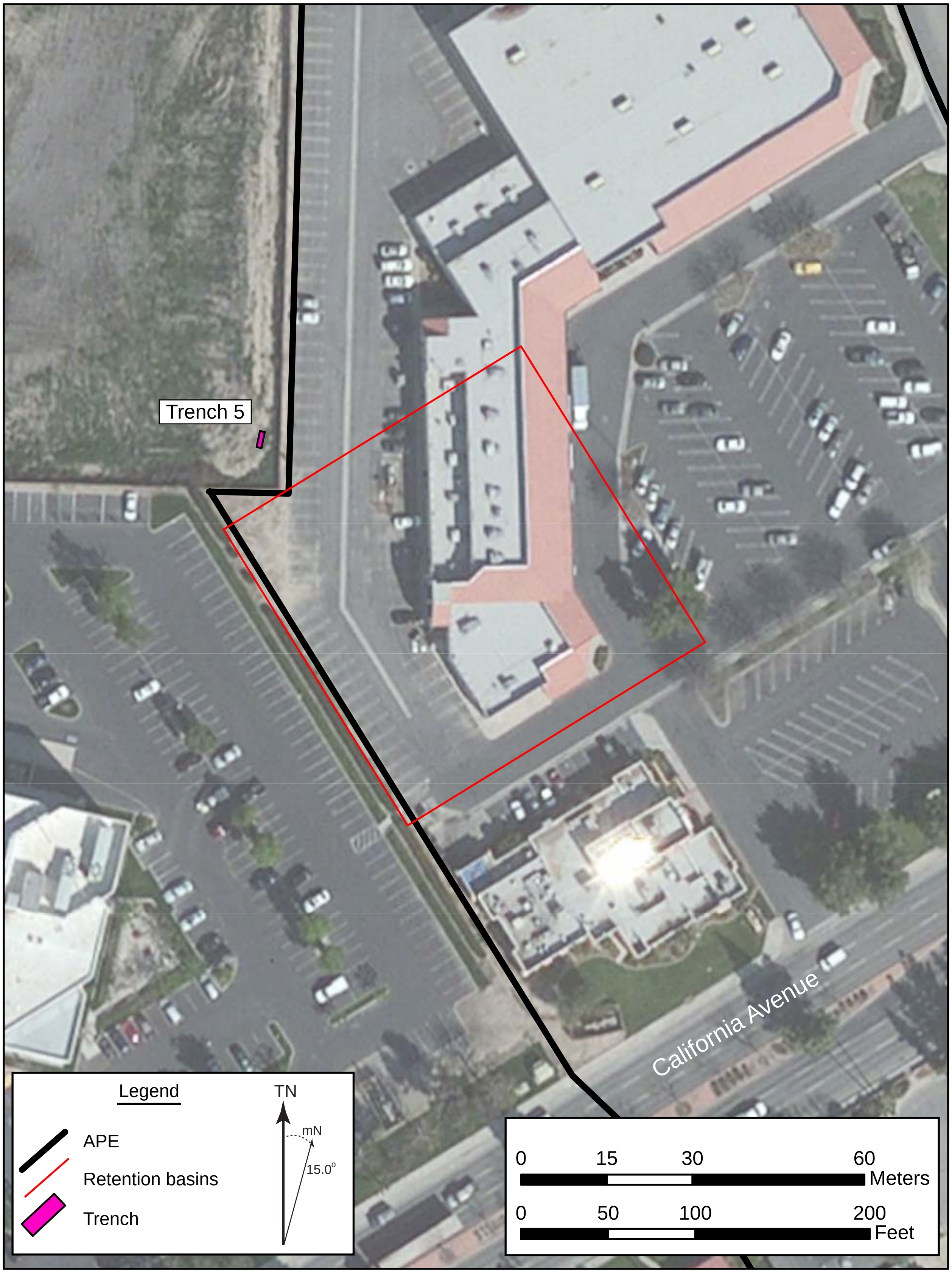
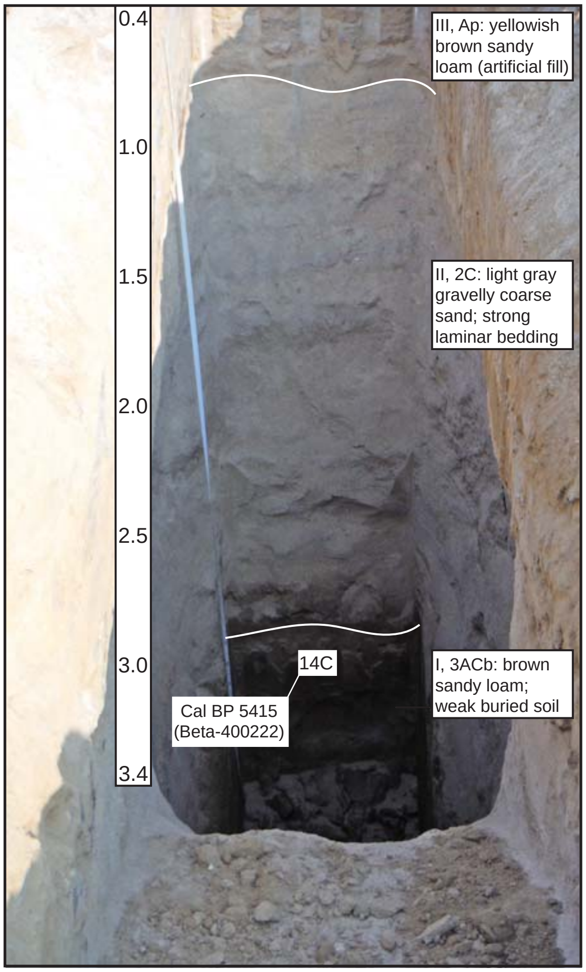
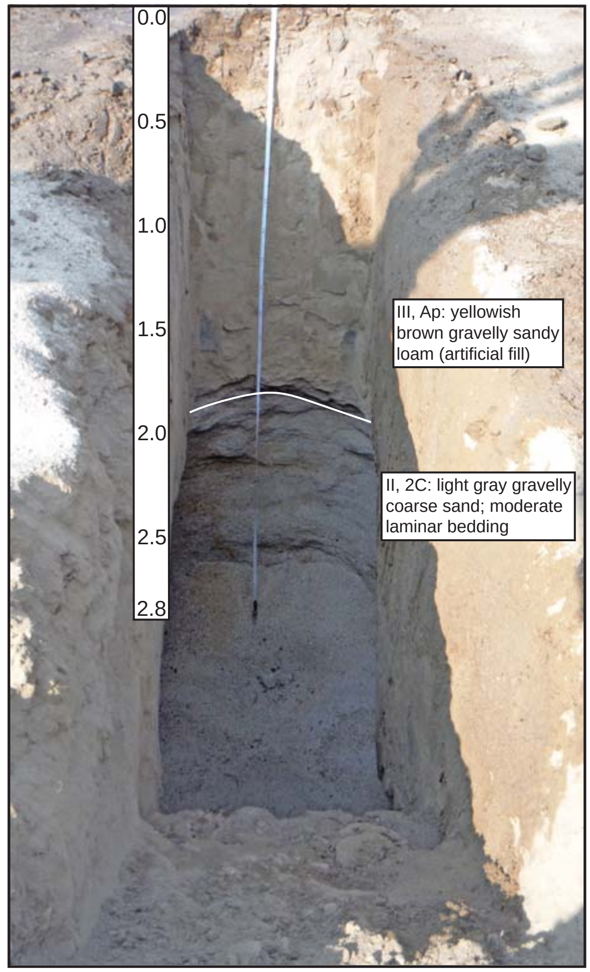


Figure 7. Retention Basin B3.



Trench 3 North Wall



Trench 5 North Wall

Figure 8. Trench 3 (left) and Trench 5 (right) Profiles (scale in meters approximate due to oblique perspective).

An alternative interpretation is that the incipient soil represents the intact buried former surface of a more extensive landform, such as an inset terrace, that was subsequently eroded, leaving an isolated landform fragment remaining before burial during the late Holocene.

In several trenches, an additional stratum (Stratum II) of unweathered fluvial sediments was noted, and divided based on subtle differences in channel cross bedding or sorting. Otherwise, Stratum II is very similar to Stratum I, and is generally devoid of any soil formation. Where present, Stratum II appeared to be at least partly deposited during one of the historic flood events, as evidenced by a lack of soil formation and the laminar and channel cross bedding structures in Trench 1 and 2, for example. Based on the historic accounts of channel change in this part of the Kern River, and the sedimentary structures evident in these fluvial strata, it appears that the Qf0 landform of Windingstad et al. (2012) may be more extensive than originally mapped, and likely incorporates the entire area roughly from the intersection of Mohawk Street and Refinery Avenue in the north to California Avenue in the south. Given the scale of the mid-19th century floods, it is likely even more widespread, and includes the "Old River" central segment of Alternative B, as described in the following section.

Stratum III ranges from the surface down to depths of 27-125 cmbs, depending on the location of the trench, and is usually comprised of sandy loam with occasional gravels. Yellowish brown in color, Stratum III has incipient soil formation with platy and/or cloddy structures that change to massive with depth. Based on this soil structure, the presence of modern refuse, and the lack of sedimentary bedding structures present in underlying strata; Stratum III is interpreted as artificial fill. In some locations, Stratum III is interpreted as mixed or disturbed native soil, rather than artificial fill.

4.1.2 Central Segment

Descriptions of soil stratigraphy for the central segment of Alternative B come from observations at six cores (Cores 1 through 6). The central segment of the APE straddles the "Old River" channel, generally from California Avenue to Stockdale Highway, but coring was conducted only in and on the western side of the "Old River" channel in the vicinity of proposed project impacts where access had been granted to parcels near La Mirada Drive and Marella Way. Based on the Windingstad et al. (2012) geomorphic model, the central segment is comprised of an abandoned channel (low sensitivity) unit and the Qa2 (high sensitivity) unit. Areas of the Qa2 surface adjacent to the abandoned "Old River" channel are assigned an increased level of very high sensitivity (Figure 3).

Four strata were observed down to depths of 10.7 m (35 ft). The observed strata appear to be deposited by the Kern River or adjacent distributary channels, and the uppermost strata were likely deposited during one of the catastrophic flood events described in Section 2.1.2. However, several buried soils were noted, although they appear to be laterally restricted based on recovered core deposits. Radiocarbon dating on bulk organic sediment suggests that these buried soils represent older fan surfaces that were eroded during the Holocene, and subsequently buried. No cultural materials were recovered from any of the cores. Table 2 lists the characteristics of each core, and descriptions of each stratum follow. Maps showing the locations of the cores in the central segment are shown in Figure 9, and uncorrelated stratigraphic profiles of these cores are shown in Figure 10. Details regarding radiocarbon dates referenced below are provided in Appendix B.

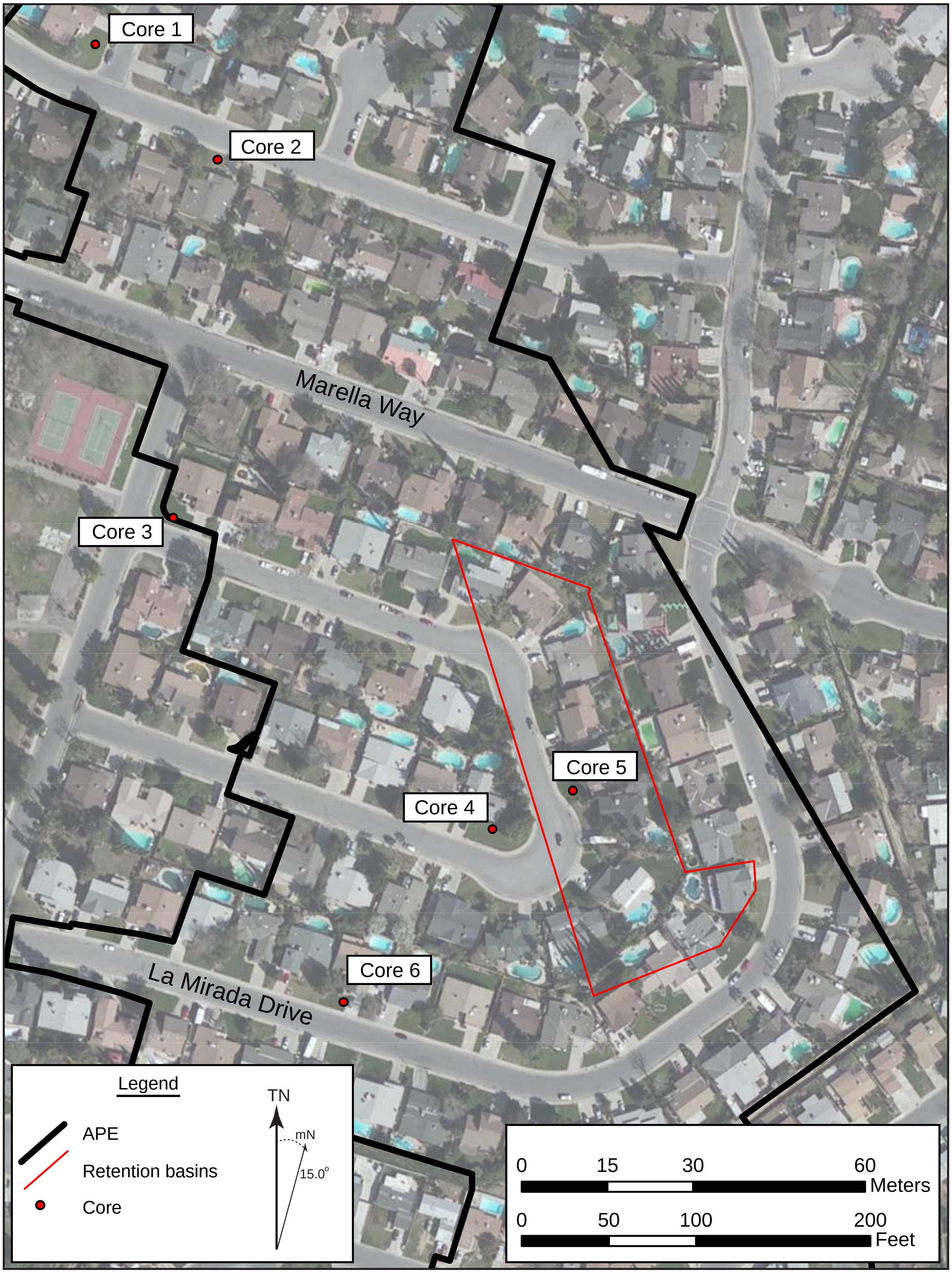


Figure 9. Core Locations in the Central Segments: Depressed Freeway Section 1 and Retention Basin B4.

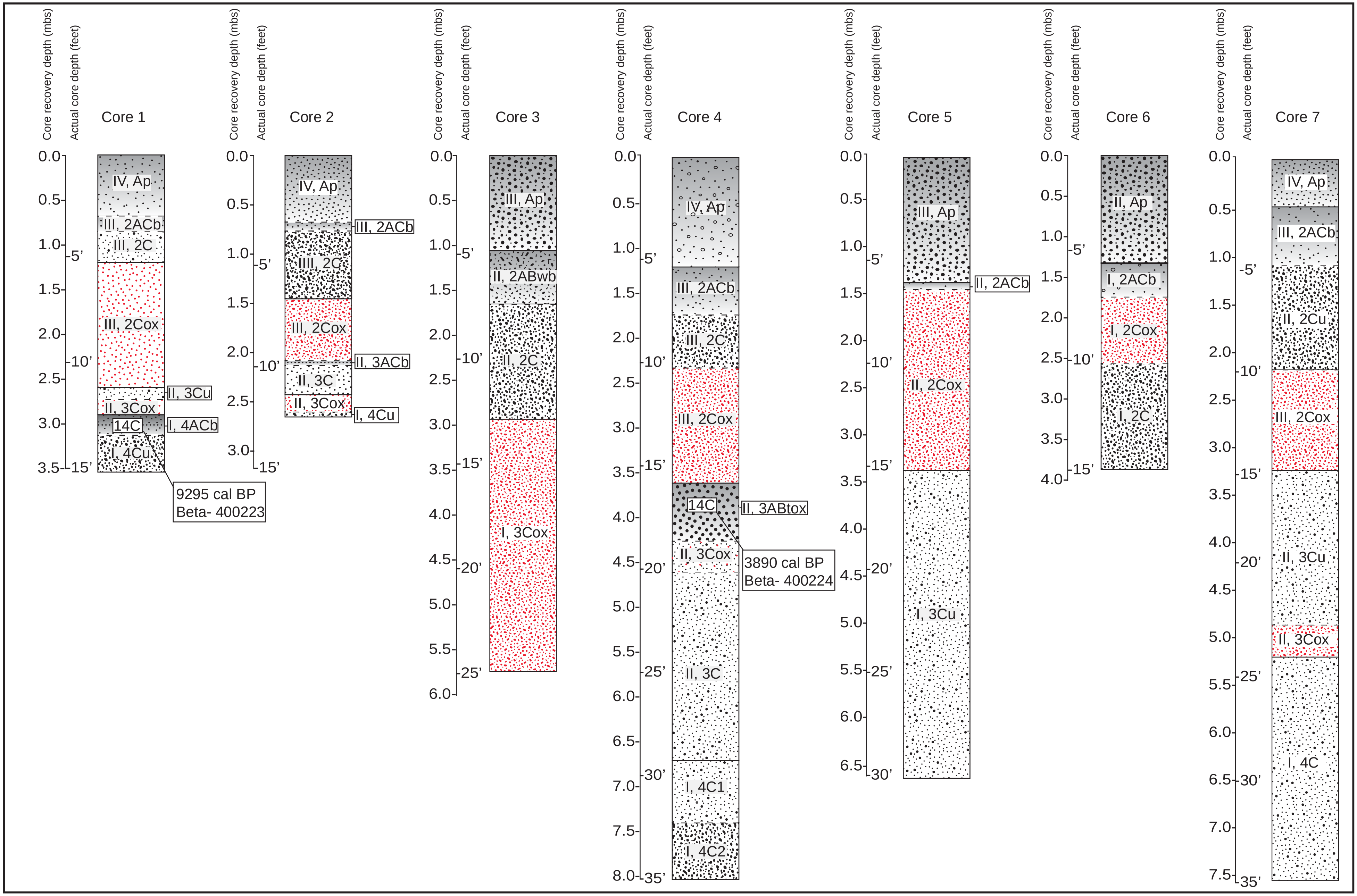


Figure 10. Profiles of Core Samples from the Central Segment.

Table 2. Core and Auger Summary.

Core (C) Auger (A)	Excavated Depth (ft)	Recovered Length (cm)	Street Address	Findings (recorded by depth [cmbs] below surface)
C1	15	347	4508 Woodlake Dr.	No cultural material
C2	12.5	320	4415 Kensington Ave.	No cultural material
C3	25	580	4412 Hillsborough Dr.	No cultural material
C4	35	762	4300 Kentfield Dr.	No cultural material
C5	35	655	4208 Hillsborough Dr.	No cultural material
C6	15	308	4404 La Mirada Dr.	No cultural material
C7	35	758	End of Alamo St.	No cultural material
A1	10	310	3618 Elcia Dr.	No cultural material

Stratum I consists of relatively coarse grained alluvium with textures ranging from medium to coarse gravelly sand. Stratum I exhibits very little to no soil formation, and is generally designated as unweathered or oxidized sediment (i.e., "C" or "Cox" horizons, respectively). Sedimentary structures (laminar or channel cross bedding) were not observed in the core samples, but core samples may be too small to observe these structures, and they may be present in larger exposures, such as exploratory trenches. However, a fining upward sequence is generally evident in the stratum exposed in the cores. In Core 1, a weakly developed, truncated soil (4ACb; clay loam texture) is evident at the top of Stratum I at a depth of 380 cmbs. A radiocarbon date of 9295 cal years BP (Beta-400223) was obtained on soil organic matter from the upper portion of Stratum I at this location. The incipient soil was not observed elsewhere, including in nearby Core 2, and may represent an intact buried former surface of an isolated landform, perhaps a channel bar. An alternative interpretation is that the incipient soil represents the intact buried former surface of a more extensive landform, such as an inset terrace, that was subsequently eroded, leaving an isolated landform fragment remaining before burial during the early or middle Holocene. Assuming the radiocarbon date is correct and uncontaminated by older carbon, Stratum I may represent a buried but isolated Qa3 (upper Modesto) surface, as proposed by Windingstad et al. (2012), but the weak soil formation exhibited contradicts this idea.

Stratum II also consists of unweathered or oxidized alluvial sediments, similar to Stratum I. Stratum II also does not appear to have any bedding structures, although there is generally a fining upward sequence. In Core 4, a moderately developed, truncated soil (4ABtbox; sandy clay loam texture) is evident at the top of Stratum II at a depth of 486 cmbs. A radiocarbon date of 3890 cal years BP (Beta-400223) was obtained on soil organic matter from the upper portion of Stratum II at this location. The truncated soil was not observed elsewhere, including in nearby Core 5, suggesting that it is a buried soil on an isolated landform or remnant of a landform that was eroded and subsequently buried during the late Holocene. If the date of this soil is correct, its younger age and greater depth relative to Stratum I may be interpreted as an early or middle Holocene cut/fill episode, which would lend support to the idea that the "Old River" channel may have simply reoccupied a previously existing channel during the mid-19th century flood events.

Stratum III consists of a weakly developed soil in sandy alluvial sediments. It typically has an ACb/Cu/Cox profile, and is widespread across the central portion of Alternative B. It generally underlies artificial fill and mixed surface deposits in suburban neighborhoods at depths ranging from 82 to 177 cmbs. Greater depths correspond with closer proximity to the "Old River" channel. Stratum III is interpreted as latest Holocene alluvium, some or most of which may have been deposited during the catastrophic floods of the mid-19th century. If much of Stratum III dates to the historic period, then Qa0 (Windingstad et al. 2012) likely extends from the current Kern River channel south to the "Old River" channel, and comprises a large swath of the Alternative B APE.

Stratum IV in the central segment consists of an incipient soil in mixed sediments with loamy textures. The lack of sedimentary and soil structures, coupled with occasional landscaping mulch fragments, suggest this is modern artificial fill or disturbed native surface deposits. As such, it corresponds with Stratum III in the northwestern segment of the APE.

4.1.3 Southeastern Segment

Descriptions of soil stratigraphy for the southeastern segment of Alternative B come from observations at Trenches 6 and 7, Core 7, and Auger 1. The southeastern segment of the APE is located in the vicinity of Stine Canal and a channel marked as Panama Slough on the 1932 USGS Gosford, Calif. quadrangle map, generally from Stockdale Highway south to Wood Lane. Based on the Windingstad et al. (2012) geomorphic model, the southeastern segment is comprised entirely of the high sensitivity Qa2 unit (Figure 3). It should be noted that two retention basins were not investigated during the course of this study: Retention Basins B6 and B7.

Four strata were observed down to depths of 10.7 m (35 ft). The observed strata appear to be deposited by the Kern River or adjacent distributary channels, and the uppermost strata were likely deposited during one of the catastrophic flood events described in Section 2.1.2. One incipient buried soil with detrital charcoal was noted, although it appears to be laterally restricted based on its absence from nearby recovered core deposits. Radiocarbon dating on the detrital charcoal suggests that this buried soil represents an isolated intact portion of an older fan surface that was buried during the latest Holocene. No cultural material was recovered from any of the excavations. Tables 1 and 2 list the characteristics of the excavations, and descriptions of each stratum follow below. Maps showing the locations of the core, auger, and exploratory trenches are shown in Figures 11, 12, and 13. A profile of Core 7 is shown in Figure 10, and profiles of Trenches 6 and 7 are shown in Figure 14. Details regarding radiocarbon dates referenced below are provided in Appendix B.

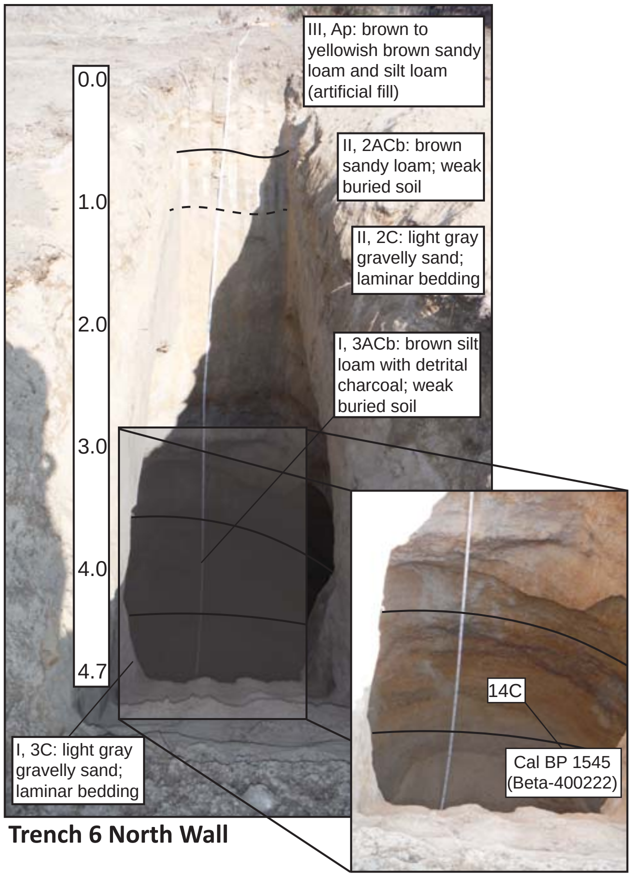
Strata I and II generally consist of relatively coarse grained alluvium with textures ranging from medium to coarse gravelly sand. The strata exhibits very little to no soil formation, and are generally designated as unweathered or oxidized sediment (i.e., "C" or "Cox" horizons, respectively). In Trench 6, an incipient soil was evident at the top of Stratum I (AC horizon; silt loam) at a depth of 370 cmbs. A radiocarbon date of 1545 cal years BP (Beta-400221) was obtained on detrital (i.e., non-cultural) charred material from the upper portion of Stratum I at this location. The incipient soil was not observed elsewhere, including in nearby Core 7, suggesting that it is a buried soil on an isolated landform or remnant of a landform that was eroded and subsequently buried during the latest Holocene. The relatively great depth of this latest Holocene date may be the result of a cut/fill episode in the Panama Slough channel, or some other unknown channel in the area, during the late or latest Holocene.

Stratum III consists of a weakly developed soil in sandy alluvial sediments. It typically has an ACb/Cu/Cox profile, and is widespread across the central portion of Alternative B. It generally underlies artificial fill and mixed surface deposits in suburban neighborhoods up to depths of 70 cmbs. Stratum III is interpreted as latest Holocene alluvium, some or most of which may have been deposited during the catastrophic floods of the mid-19th century.

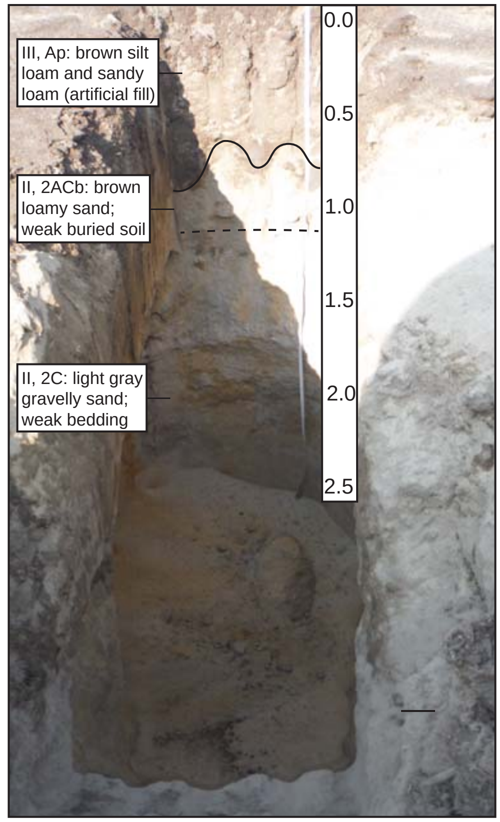
Figure 11. Auguer 1 and Retention Basin B5.

Figure 12. Core 7 and Trench 6 at Depressed Freeway Section 2 (entire area shown is within APE).

Figure 13. Trench 7 and Retention Basin B8.



Trench 6 North Wall



Trench 7 North Wall

Auger 1 Sediments (0-310 cmbs, depth increases left to right, front to back)

Figure 14. Trench 6 (left) and Trench 7 (right) Profiles (scale in meters approximate due to oblique perspective) and Auger 1 Sediments.

Stratum IV in the southeastern segment consists of an incipient soil in mixed sediments with loamy textures. The lack of sedimentary and soil structures, coupled with modern refuse, suggest this is artificial fill or disturbed native surface deposits. As such, it corresponds with Stratum IV in the central segment of the APE, and Stratum III in the northwestern segment of the APE.

4.2 Cultural Deposits

This Extended Phase I, Stage II investigation included excavation of 7 trenches totaling an estimated maximum of 49.9 m^3 in soil volume, and the excavation of about 56.4 m (185 ft) of core samples across the Alternative B APE. Aside from modern refuse, no cultural material was noted. The pedestrian survey of 3,085 ft^2 near the modern Kern River channel also produced negative results in conditions of excellent ground visibility.

5.0 SUMMARY AND CONCLUSIONS

The Extended Phase I, Stage II investigation for Alternative B of the Centennial Corridor project did not identify any prehistoric or historic cultural deposits in the APE, including a 3,085 ft^2 area subject to pedestrian survey. Other fieldwork involved exploratory backhoe trenching and coring in areas of proposed subsurface impacts (depressed freeway sections and retention basins) within accessible parcels, especially those that were located in areas of high or very high sensitivity, as mapped by the Extended Phase I, Stage I study (Windingstad et al. 2012). The excavation of approximately 49.9 cubic meters from exploratory trenches, as well as about 56.4 m (185 ft) of mechanical and manual core samples, indicates the widespread presence of primarily late and latest Holocene deposits up to depths of ~5 m (16.4ft). However, these deposits are remarkably uniform and devoid of laterally extensive, moderate or well developed soil profiles that would indicate periods of landform stability and associated archaeological sensitivity in the proximal portion of the youngest Kern River alluvial fan lobe. Buried soils, where present, usually exhibit minimal development and are of limited lateral extent, suggesting a dynamic depositional setting that led to the destruction or truncation of formerly stable fan surfaces much more frequently than their intact burial. A similar geomorphic and depositional setting has recently been documented through Extended Phase I studies in proximal portions of the Kings River alluvial fan (Kaijankoski et al. 2014).

The lack of laterally continuous, buried soils in the APE of the Centennial Corridor's Alternative B, coupled with the uniformity and ubiquity of unweathered deposits, translates to decreased sensitivity for buried archaeological resources. Qa0 and Qa1 surfaces, as defined by Windingstad et al. (2012), appear much more widespread based on the results of this study, and likely stretch from the modern Kern River channel to the "Old River" channel, and perhaps beyond. This landscape interpretation comports with accounts of historic flooding and channel change during the mid-19th century. Holocene Qa2 and Qa3 surfaces may be buried in the APE, as suggested by radiocarbon dates noted herein, but these surfaces appear to be neither intact nor laterally extensive. As such, this study has confirmed the widespread presence of relatively deep Holocene deposits throughout the APE, generally in accordance with the geomorphic framework provided by Windingstad et al. (2012). However, these Holocene deposits should be considered to have a low sensitivity to contain buried archaeological resources in the APE.

In addition to the subsurface findings of the present investigation, the pedestrian survey of 3,085 ft^2 produced negative results.

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Appendix A

Resumes

Graham Dalldorf
Robert Jackson

E-mail
dalldorf@pacificlegacy.com

Graham Dalldorf

Project Supervisor/Geoarchaeologist

Summary of Qualifications

Graham Dalldorf has academic, teaching, and contract experience consisting of 19 years in the fields of archaeology and geoarchaeology. As a graduate student at the University of Oregon from 2000-2003, he taught courses in physical geography and geomorphology, and served as the instructor for the summer 2001 soils and geomorphology course taught in conjunction with the Northern Great Basin Prehistory Project archaeological field school. From 2003-2007, he worked as Staff Geoarchaeologist with Jack Meyer at the Anthropological Studies Center at Sonoma State University, conducting geoarchaeological research and sensitivity studies throughout California for public and private clients, including the Presidio of San Francisco and Point Reyes National Seashore. Thereafter, Mr. Dalldorf joined the research faculty at the Desert Research Institute in Reno as Staff Geomorphologist, a role in which he conducted soils, geomorphological, and geoarchaeological research throughout the desert southwest and Great Basin. Since 2012 Mr. Dalldorf has served as a Geoarchaeologist and Project Supervisor for Pacific Legacy, Inc., supervising numerous geoarchaeological projects, including many for Caltrans where potentially buried archaeological deposits are a concern.

Mr. Dalldorf's areas of expertise include:

- Site formation processes
- Soils and stratigraphic analysis
- Geomorphic and Quaternary geologic mapping
- Landscape evolution and the archaeological record
- Sensitivity modeling of the potential for buried archaeological resources using GIS

Education

M.A., Geography, University of Oregon, Eugene, Oregon, 2003
B.A., Anthropology, University of California at Berkeley, California 1996
Certificate in Archaeological Technology, Cabrillo College, California 1996

Recent Key Projects

2014 — Project director for Extended Phase I investigations in the Mitigation Parcels of the Willits Bypass Project, including field testing of existing predictive models across much of Little Lake Valley in Mendocino County.

2013 — Project director for Extended Phase I investigations at the Collier Rest Area, documenting previously unrecorded, buried Late Archaic portions of the site.

2012 — Developed a GIS-based buried site sensitivity model for the Olancha-Cartago Highway 395 project in Inyo County. Model was based on soil and surficail geologic mapping.

Professional Experience

2012-Present — Project Supervisor/Geoarchaeologist, Pacific Legacy Inc. Conducting geoarchaeological studies in California and constructing buried resource sensitivity models using GIS.

2006-2011 — Staff Geomorphologist, Desert Research Institute. Directed and co-directed numerous geomorphic and soils investigations in California, Arizona, and Nevada. Constructed a geomorphic-based archaeological sensitivity model for Yuma Proving ground and conducted several geoarchaeological studies.

Additional Publications

Co-author or contributor to more than 30 peer reviewed publications, technical reports, and professional presentations.

Professional Affiliations & Memberships

Society for California Archaeology
Register of Professional Archaeologists

E-mail
jacksonrob@pacificlegacy.com

Robert J. Jackson

Principal Investigator

Summary of Qualifications

Mr. Jackson is a Principal of Pacific Legacy, Inc., and a nationally recognized expert in historic preservation regulatory compliance. Mr. Jackson has more than 30 years of experience as a professional archaeologist in cultural resources management. Mr. Jackson meets the Secretary of Interior's standards as an archaeological Principal Investigator.

Mr. Jackson's areas of expertise include:

- Cultural resources project scoping and management
- Compliance with Federal and State of California historic preservation laws
- Federal and California State agency consultation
- Preparing research designs and historic contexts for prehistoric archeology
- Principal Investigator for surveys, test and data recovery excavations
- Development of Historic Property Treatment Plans
- Archeological Resource Protection Act Assessments
- Programmatic Agreements and Resource Management Plans
- Obsidian studies and flaked-stone analyses

Education

M.A., Anthropology, University of California, Davis, California, 1981.
B.A., Environmental Studies (Major), Archaeology (Minor), San Jose State University, 1974.

Recent Key Projects

2014-Present — Principal Investigator and Contract Manager for Caltrans Northern Region On-Call Services contract. In 2014 alone, 26 task orders were issued for a value of more than $2,000,000, ranging geographically from east to west from Lake County to Placer County, and from Sacramento County to the south all the way north to the Oregon border. Notable among the task orders is the large Willits Bypass project, involving the discovery and evaluation of dozens of archaeological sites as well as mitigation is the form of data recovery.

2013-Present — Co-Principal Investigator for the San Luis Transmission Line Project. Pacific Legacy was tasked with completing a Class I context report and cultural resource field inventory of approximately 85 miles of new transmission lines that traverse Alameda, San Joaquin, Stanislaus, and Merced counties along the western foothills of the San Joaquin Valley in California in order to ensure compliance with Section 106 of the National Historic Preservation Act and the California Environmental Quality Act. Client: Aspen Environmental and Western Area Power Administration.

2008-2013 — Principal Investigator and Contract Manager for Caltrans Northern Region On-Call Services contract involving more than 50 task orders ranging geographically from Sacramento north to the Oregon border and involving a variety of tasks including cultural resource inventories, site evaluations, and data recovery.

Selected Professional Experience

1994-present — Co-founder and Principal of Pacific Legacy, Inc., Senior archaeologist and Chief Executive Officer. Offices in Berkeley, El Dorado Hills, and Santa Cruz in California, and in Kailua (Oahu) Hawaii.

Publications

Author, co-author or contributor to more than 250 technical reports, management plans, research designs and professional presentations.

Professional Affiliations & Memberships

International Association for Obsidian Studies
Society for California Archaeology
Society for American Archaeology
Register of Professional Archaeologists

Appendix B

Radiocarbon Dating Results

BETA

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Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

January 5, 2015

Mr. Graham Dalldorf
Pacific Legacy Incorporated
4919 Windplay Drive, Suite 4
El Dorado Hills, CA 95762
USA

RE: Radiocarbon Dating Results For Samples Cent Geo T6, Cent Geo T3, Cent Geo C1, Cent Geo C4

Dear Mr. Dalldorf:

Enclosed are the radiocarbon dating results for four samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Graham Dalldorf — Report Date: 1/5/2015

Pacific Legacy Incorporated — Material Received: 12/22/2014

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 400221	1590 +/- 30 BP	-21.8 o/oo	1640 +/- 30 BP

SAMPLE : Cent Geo T6
ANALYSIS : AMS-PRIORITY delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 345 to 430 (Cal BP 1605 to 1520) and Cal AD 490 to 530 (Cal BP 1460 to 1420)

Beta - 400222	4610 +/- 30 BP	-22.5 o/oo	4650 +/- 30 BP

SAMPLE : Cent Geo T3
ANALYSIS : AMS-PRIORITY delivery
MATERIAL/PRETREATMENT : (organic sediment): acid washes
2 SIGMA CALIBRATION : Cal BC 3515 to 3395 (Cal BP 5465 to 5345) and Cal BC 3385 to 3360 (Cal BP 5335 to 5310)

Beta - 400223	8250 +/- 30 BP	-22.7 o/oo	8290 +/- 30 BP

SAMPLE : Cent Geo C1
ANALYSIS : AMS-PRIORITY delivery
MATERIAL/PRETREATMENT : (organic sediment): acid washes
2 SIGMA CALIBRATION : Cal BC 7465 to 7295 (Cal BP 9415 to 9245) and Cal BC 7220 to 7195 (Cal BP 9170 to 9145)

Beta - 400224	3560 +/- 30 BP	-23.3 o/oo	3590 +/- 30 BP

SAMPLE : Cent Geo C4
ANALYSIS : AMS-PRIORITY delivery
MATERIAL/PRETREATMENT : (organic sediment): acid washes
2 SIGMA CALIBRATION : Cal BC 2025 to 1885 (Cal BP 3975 to 3835)

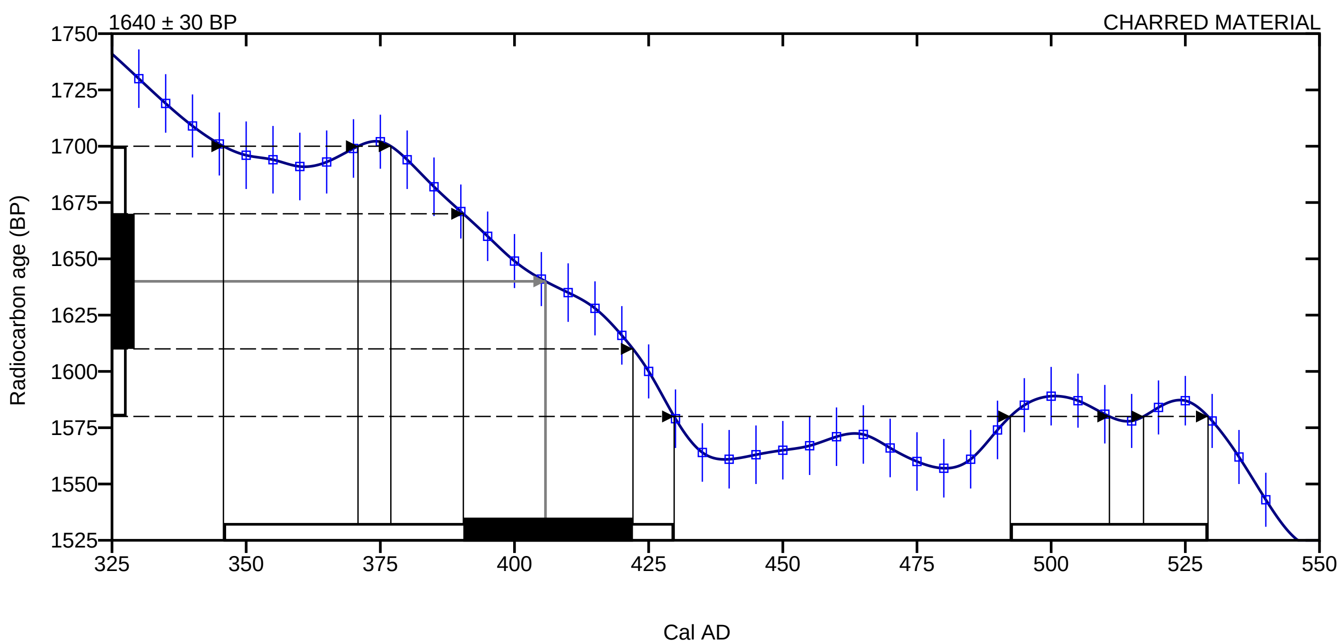
Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -21.8 o/oo : lab. mult = 1)

Laboratory number	**Beta-400221**
Conventional radiocarbon age	**1640 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal AD 345 to 430 (Cal BP 1605 to 1520)** **Cal AD 490 to 530 (Cal BP 1460 to 1420)**
Intercept of radiocarbon age with calibration curve	Cal AD 405 (Cal BP 1545)
1 Sigma calibrated results 68% probability	Cal AD 390 to 420 (Cal BP 1560 to 1530)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

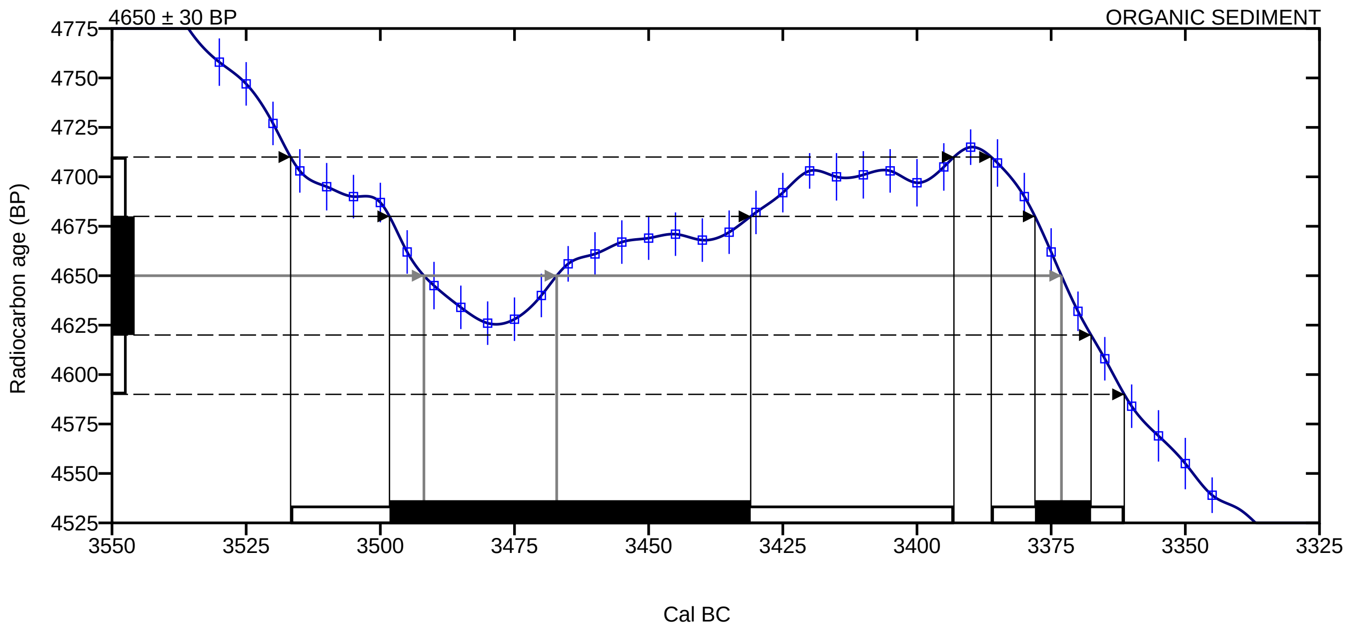
References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0– 50,000 years cal BP. Radiocarbon 55(4):1869– 1887., 2013.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -22.5 o/oo : lab. mult = 1)

Laboratory number	**Beta-400222**
Conventional radiocarbon age	**4650 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal BC 3515 to 3395 (Cal BP 5465 to 5345)** **Cal BC 3385 to 3360 (Cal BP 5335 to 5310)**
Intercept of radiocarbon age with calibration curve	Cal BC 3490 (Cal BP 5440) Cal BC 3465 (Cal BP 5415) Cal BC 3375 (Cal BP 5325)
1 Sigma calibrated results 68% probability	Cal BC 3500 to 3430 (Cal BP 5450 to 5380) Cal BC 3380 to 3370 (Cal BP 5330 to 5320)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0– 50,000 years cal BP. Radiocarbon 55(4):1869– 1887., 2013.

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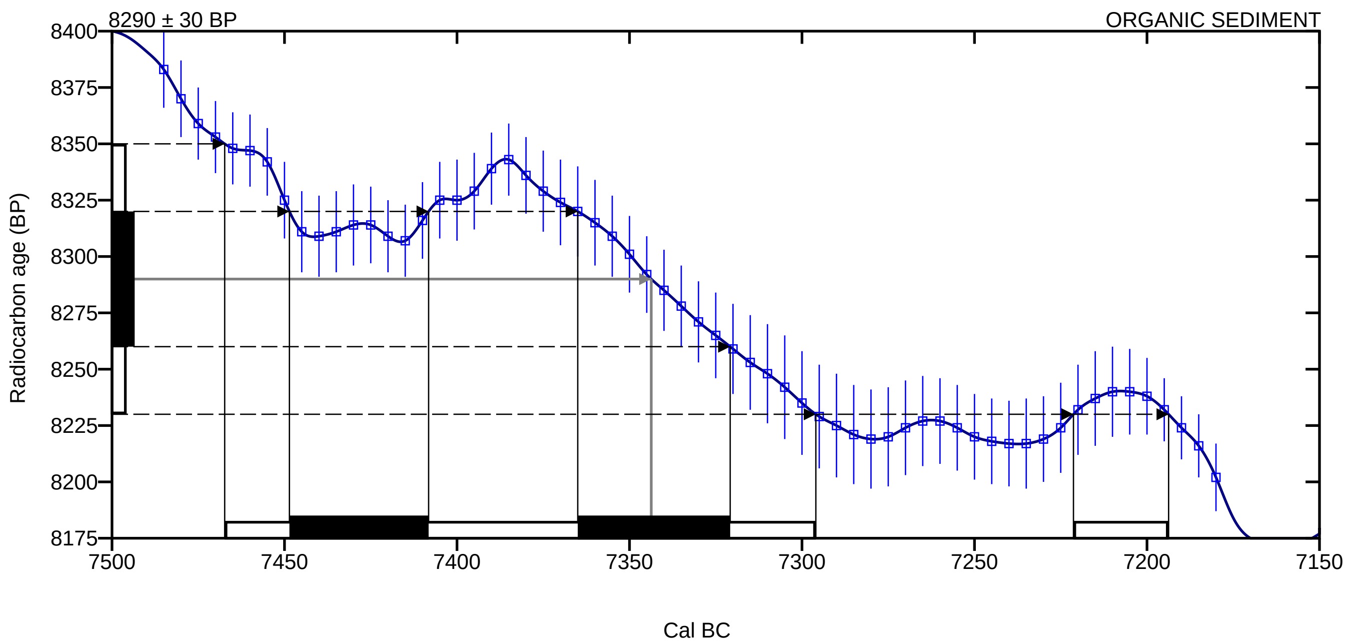
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -22.7 o/oo : lab. mult = 1)

Laboratory number	**Beta-400223**
Conventional radiocarbon age	**8290 ± 30 BP**
2 Sigma calibrated result 95% probability	**Cal BC 7465 to 7295 (Cal BP 9415 to 9245)** **Cal BC 7220 to 7195 (Cal BP 9170 to 9145)**
Intercept of radiocarbon age with calibration curve	Cal BC 7345 (Cal BP 9295)
1 Sigma calibrated results 68% probability	Cal BC 7450 to 7410 (Cal BP 9400 to 9360) Cal BC 7365 to 7320 (Cal BP 9315 to 9270)



Database used
INTCAL13

References
Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -23.3 o/oo : lab. mult = 1)

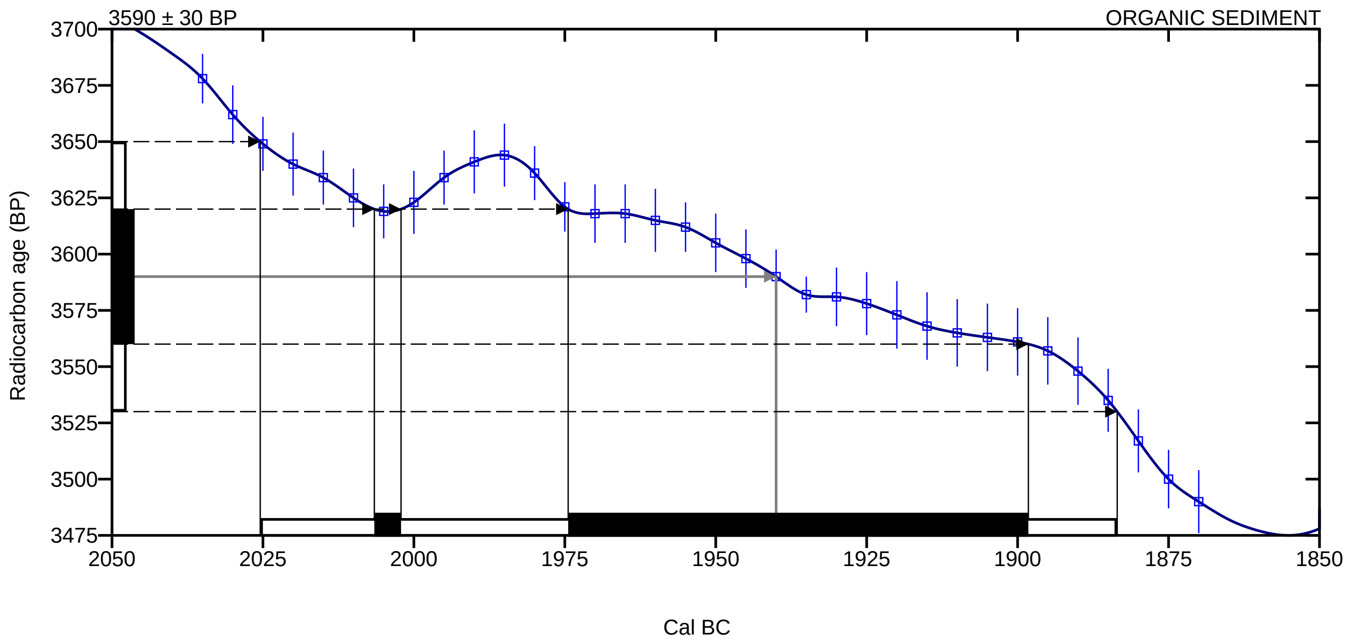
Laboratory number **Beta-400224**

Conventional radiocarbon age **3590 ± 30 BP**

2 Sigma calibrated result 95% probability **Cal BC 2025 to 1885 (Cal BP 3975 to 3835)**

Intercept of radiocarbon age with calibration curve Cal BC 1940 (Cal BP 3890)

1 Sigma calibrated results 68% probability
Cal BC 2005 to 2000 (Cal BP 3955 to 3950)
Cal BC 1975 to 1900 (Cal BP 3925 to 3850)



Database used
INTCAL13

References
Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0– 50,000 years cal BP. Radiocarbon 55(4):1869– 1887., 2013.

Beta Analytic Radiocarbon Dating Laboratory
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Appendix C

Trench and Core Descriptions

Appendix C – Trench and Core Descriptions and Dimensions

The following trench descriptions are from field notes with little subsequent modification. Strata have not been correlated between trenches. Where data are absent (i.e., Munsell color designations), such data were not collected in that trench or for that soil horizon. All trenches were 0.6 m wide.

Trench 1: 3.8 m long, 3.0 m deep. Coordinates in UTM, Zone 11, NAD 83: NW corner- 312195 mE, 3916270 mN; NE corner 312198 mE, 3916271 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-27	III	Ap	10YR 5/2 (D) grayish brown sandy loam; moderate, massive to cloddy structure; 5% fine to medium, subangular to subrounded gravel; common very coarse clods of separate soil aggregates; likely artificial fill/mixed layer.
27-58	II	2C1	10YR 7/2 (D) light gray gravelly medium to coarse sand; single grain; 20% fine to medium, subangular to well rounded gravel; abrupt and smooth boundary; weakly bedded with moderate sorting.
58-80	II	2C2	10YR 5/2 (D) grayish brown loamy sand; single grain; 5% fine to medium, subangular to well rounded gravel; abrupt and smooth boundary; no apparent bedding but well sorted.
80-180	I	3C1	10YR 7/2 (D) light gray gravelly coarse sand; single grain; 20% fine to medium, rounded to well rounded gravel; abrupt and smooth boundary; moderate laminar bedding; well sorted.
180-300	I	3C2	10YR 7/2 (D) light gray gravelly coarse sand; single grain; 25% fine to medium, rounded to well rounded gravel; boundary unexcavated; strong channel cross bedding; well sorted.

Trench 2: 3.5 m long, 3.1 m deep. Coordinates in UTM, Zone 11, NAD 83: NW corner- 312263 mE, 3916297 mN; NE corner 312266 mE, 3916298 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-55	II	Ap	10YR 5/2 (D) grayish brown sandy loam; strong, medium to coarse cloddy and platy structures; 5% fine to medium, subangular to subrounded gravel; abrupt and wavy boundary; common very coarse clods of separate soil aggregates; few modern artifacts including colorless bottle glass fragments; likely artificial fill/mixed layer.
55-310	I	2C	10YR 7/2 (D) light gray gravelly coarse sand; single grain; 25% fine to medium, rounded to well rounded gravel usually as stringers at base of bedding planes; boundary unexcavated; strong channel cross bedding; well sorted.

Trench 3: 3.6 m long, 3.3 m deep. Coordinates in UTM, Zone 11, NAD 83: NW corner- 312878 mE, 3915902 mN; SW corner 312880 mE, 3915900 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-75	III	Ap	10YR 5/6 (M) yellowish brown sandy loam; moderate, medium to coarse platy parting to massive structure; 10% fine to medium, subangular to subrounded gravel; abrupt and smooth boundary; few modern artifacts including colorless bottle glass fragments and plastic; likely artificial fill/mixed layer.
75-260	II	2C	10YR 7/2 (M) light gray gravelly coarse sand; single grain; 25% fine to medium, subrounded to well rounded gravel ; abrupt and smooth boundary; strong laminar bedding 1-2 cm thick dipping slightly to NNW (to rive channel); well sorted.
260-340	I	3ACb	10YR 4/3 (M) brown sandy loam; weak, medium, subangular blocky parting to massive structure; 10% fine, rounded to well rounded gravel ; boundary unexcavated; few fine root holes and tubular pores at upper 20 cmbs; very weakly developed, incipient buried soil; radiocarbon date of cal BP 5415 (Beta-400222) bulk organic sediment.

Trench 4: 3.1 m long, 3.6 m deep. Coordinates in UTM, Zone 11, NAD 83: NE corner- 312926 mE, 3915901 mN; SE corner 312928 mE, 3915898 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-48	II	Ap	10YR 5/6 (M) yellowish brown gravelly sandy loam; moderate, medium to coarse platy parting to massive structure; 25% fine to medium, subangular to subrounded gravel; clear and smooth boundary; likely artificial fill/mixed layer.
48-310	I	2C	10YR 7/2 (M) light gray gravelly coarse sand; single grain; 20% fine to medium, subrounded to well rounded gravel usually concentrated as gravel stringers at base of bedding planes; boundary unexcavated; moderate laminar bedding 1-2 cm thick; well sorted.

Trench 5: 3.4 m long, 2.8 m deep. Coordinates in UTM, Zone 11, NAD 83: NE corner- 313233 mE, 3915580 mN; SE corner 313233 mE, 3915577 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-125	II	Ap	10YR 4/3 (M) brown gravelly silt loam; weak, medium, platy structure parting to massive; abrupt and smooth boundary; 20% fine to coarse, subangular to subrounded gravels; common fine to medium roots and tubular pores in upper 20 cm; likely artificial fill.
125-280	I	2C	10YR 7/2 (M) light gray very gravelly coarse sand; single grain; 50% fine to medium, subrounded to well rounded gravel usually as gravel stringers at base of bedding planes; boundary unexcavated;

Depth (cmbs)	Stratum	Horizon	Description
			weak laminar bedding at base of trench; well sorted.

Trench 6: 4.7 m long, 5.2 m deep. Coordinates in UTM, Zone 11, NAD 83: NE corner- 314590 mE, 3913687 mN; SE corner 314590 mE, 3913683 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-70	III	Ap	10YR 5/3 to 5/6 (M) brown to yellowish brown sandy loam and silt loam; weak, medium, platy structure parting to massive; abrupt and smooth boundary; 20% fine to coarse, subangular to subrounded gravels; common fine to medium roots and tubular pores in upper 20 cm; likely artificial fill in several layers.
70-95	II	2ACb	10YR 4/3 (M) brown sandy loam; weak, medium, subangular blocky structure; clear and wavy boundary; 5% fine to medium, subangular to subrounded gravel; common fine tubular pores and root holes.
95-370	II	2C	10YR 7/2 (M) light gray gravelly medium and coarse sand; single grain; 25% fine to medium, subrounded to well rounded gravel usually as gravel stringers at base of bedding planes; clear and smooth boundary; weak laminar bedding; well sorted.
370-395	I	3ACb	10YR 4/3 (M) brown silt loam; weak, medium, subangular blocky structure; 5% fine to medium subrounded to well rounded gravels; clear and wavy boundary; radiocarbon date of cal BP 1545 (Beta-400221) on detrital charcoal.
395-520	I	3C	10YR 7/2 (M) light gray gravelly medium and coarse sand; single grain; 25% fine to medium, subrounded to well rounded gravel usually as gravel stringers at base of bedding planes; boundary unexcavated; weak laminar bedding; well sorted.

Trench 7: 4.7 m long, 5.2 m deep. Coordinates in UTM, Zone 11, NAD 83: NE corner- 314570 mE, 3913288 mN; SE corner 314570 mE, 3913286 mN.

Depth (cmbs)	Stratum	Horizon	Description
0-58	II	Ap	10YR 4/3 (M) brown silt loam and sandy loam; weak to moderate, medium, granular structure parting to massive structure; clear and wavy boundary; 5% fine to medium, subangular to subrounded gravels; common fine to medium roots and tubular pores in upper 20 cm; common modern refuse (colorless plate window glass, milled wood, and plastic); likely artificial fill/mixed layer
58-82	I	2ACb	10YR 5/3 (M) brown loamy sand; massive; clear and smooth boundary; 5% fine to medium, subangular to well rounded gravel; few very fine to fine tubular pores and root holes.
82-250	I	2C	10YR 7/2 (M) light gray gravelly medium sand; single grain; 25% fine to medium, subrounded to well rounded gravel usually as

Depth (cmbs)	Stratum	Horizon	Description
			gravel stringers at base of bedding planes; boundary unexcavated; weak laminar bedding; well sorted.

Core 1: 15 ft deep, 3.47 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313488 mE, 3915153 mN

Depth (cmbs)	Stratum	Horizon	Description
0-82	IV	Ap	10YR 3/3 to 5/4 (M) very dark grayish brown to yellowish brown sandy loam and sand; weak, fine, granular parting to massive structure; soft; clear boundary; common fine to medium roots; common fine tubular pores; likely artificial fill/mixed layer.
82-108	III	2ACb	10YR 4/3 (M) brown loamy sand; weak, fine, granular structure; soft; gradual boundary; 10% fine, subrounded to rounded gravel; few fine tubular pores and rootlets.
108-152	III	2C	10YR 4/4 (M) brown fine sand; single grain; loose; clear boundary; 10% fine, subrounded to rounded gravel.
152-339	III	2Cox	10YR 4/6 (M) dark yellowish brown loamy sand; single grain; loose; abrupt boundary; 10% fine, subrounded to rounded gravel; common distinct mottles.
339-354	II	3Cu	10YR 6/8 (M) brownish yellow medium sand; single grain; loose; abrupt boundary; 10% fine, subrounded to rounded gravel.
354-380	II	3Cox	10YR 4/6 (M) dark yellowish brown loamy sand; single grain; loose; abrupt boundary; 10% fine, subrounded to rounded gravel; common distinct mottles.
380-416	I	4ACb	10YR 4/4 (M) brown clay loam; weak, fine, granular and subangular blocky structure; soft to slightly hard; clear boundary; few, very fine to fine tubular pores; radiocarbon date of cal BP 9295 (Beta-400223) on bulk organic sediment.
416-456	I	4Cu	10YR 5/6 (M) yellowish brown coarse sand; single grain; loose; boundary unexcavated; <10% fine, subrounded to rounded gravel; common distinct mottles.

Core 2: 12.5 ft deep, 3.2 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313539 mE, 3915104 mN

Depth (cmbs)	Stratum	Horizon	Description
0-90	IV	Ap	10YR 3/1 to 5/4 (M) very dark gray to yellowish brown loamy sand; weak, fine, granular parting to massive structure; soft; abrupt boundary; common fine roots; common fine tubular pores; likely artificial fill/mixed layer.
90-98	III	2ACb	10YR 3/1 (M) brown loamy sand; weak, fine to medium, granular structure; slightly hard; abrupt boundary; few fine tubular pores and rootlets.
98-198	III	2C	10YR 5/3 (M) brown coarse sand and loamy sand; single grain; loose; clear boundary; 5% fine, subrounded to rounded gravel;

Depth (cmbs)	Stratum	Horizon	Description
			fining upward sequence.
198-298	III	2Cox	10YR 5/3 (M) brown coarse sand; single grain; loose; abrupt boundary; 10% fine, subrounded to rounded gravel; common distinct 7.5YR 5/6 strong brown mottles.
298-304	II	3ACb	10YR 4/4 (M) dark yellowish brown silty clay loam; weak, fine, granular structure; slighty hard; abrupt boundary.
304-344	II	3C	10YR 4/4 (M) dark yellowish brown fine loamy sand; single grain; loose; abrupt boundary.
344-374	II	3Cox	10YR 4/4 (M) dark yellowish brown medium to coarse sand; single grain; loose; clear boundary; <5% fine, subrounded to rounded gravel; fining upward sequence; common distinct 7.5YR 5/6 strong brown mottles.
374-380	I	4Cu	10YR 5/4 (M) yellowish brown coarse sand; single grain; loose; boundary unexcavated; 10% fine, subrounded to rounded gravel.

Core 3: 25 ft deep, 5.8 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313520 mE, 3914954 mN

Depth (cmbs)	Stratum	Horizon	Description
0-130	III	Ap	10YR 3/3 to 4/4 (M) dark brown to brown silty clay loam; weak, fine, granular parting to massive structure; soft; abrupt boundary; common fine to medium rootlets; common fine tubular pores; likely artificial fill/mixed layer.
130-152	II	2Ab	10YR 4/1 (M) dark gray silty clay loam; weak, fine, granular structure; soft; clear boundary; few fine tubular pores and rootlets.
152-215	II	2ABwb	10YR 4/2 (M) dark grayish brown silty clay; weak to moderate, fine, subangular blocky structure; slightly hard; abrupt boundary.
215-384	II	2C	10YR 5/3 (M) brown medium to coarse sand; single grain; loose; abrupt boundary; 15% fine to coarse, subrounded to rounded gravel; fining upward sequence.
384-760	I	3Cox	10YR 5/6 (M) yellowish brown medium to coarse sand; single grain; loose; boundary unexcavated; 10% fine, subrounded to rounded gravel; fining upward sequence.

Core 4: 35 ft deep, 7.62 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313654 mE, 3914823 mN

Depth (cmbs)	Stratum	Horizon	Description
0-152	IV	Ap	10YR 4/3 (M) brown loam; weak, fine to medium, granular parting to massive structure; loose; clear boundary; common fine to medium roots in upper 20 cm; common fine tubular pores; likely artificial fill/mixed layer.
152-222	III	2ACb	10YR 4/3 (M) brown sandy loam; weak, fine to medium, granular structure; soft; clear boundary; <5% fine, subrounded to rounded gravel; few fine tubular pores and rootlets.

Depth (cmbs)	Stratum	Horizon	Description
222-304	III	2C	10YR 5/4 (M) yellowish brown coarse sand; single grain; loose; clear boundary; 10%+ fine, subrounded to rounded gravel.
304-486	III	2Cox	10YR 5/4 (M) yellowish brown coarse sand; single grain; loose; abrupt boundary; 25% fine to large, subrounded to rounded gravel; common distinct mottles and yellow concretions.
486-562	II	3ABtox	10YR 4/3 (M) brown sandy clay loam; weak, fine to medium, subangular blocky structure; hard to very hard; abrupt boundary; very few, faint clay films in pores and coating/bridging grains; unit appears truncated; radiocarbon date of cal BP 3890 (Beta-400224) on bulk organic sediment.
562-608	II	3Cox	10YR 5/4 (M) yellowish brown fine to medium sand; single grain; loose; clear boundary; 5% fine, subrounded to rounded gravel; common distinct mottles.
608-882	II	3C	10YR 5/4 (M) yellowish brown sand; single grain; loose; abrupt boundary; 10%+ fine to medium, subrounded to rounded gravel.
882-977	I	4C1	10YR 4/3 (M) brown medium sand; single grain; loose; abrupt boundary; <5% fine, subrounded to rounded gravel; few distinct mottles; fining upward sequence.
977-1064	I	4C2	10YR 6/3 (M) pale brown coarse sand; single grain; loose; 15%+ fine, subrounded to rounded gravel; few distinct mottles; fining upward sequence.

Core 5: 30 ft deep, 6.55 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313688 mE, 3914840 mN

Depth (cmbs)	Stratum	Horizon	Description
0-177	III	Ap	10YR 3/4 to 4/4 (M) dark yellowish brown silty clay loam and loamy sand; weak, fine, granular parting to massive structure; soft; abrupt boundary; 10-25% fine to medium, subrounded to rounded gravel ; common fine to medium rootlets in upper 70 cm; common fine tubular pores; likely artificial fill/mixed layer.
177-187	II	2ACb	10YR 4/3 (M) brown sandy loam; weak, fine, granular structure; soft; clear boundary; 10% fine to medium, subrounded to rounded gravel; few fine tubular pores and rootlets.
187-456	II	2Cox	10YR 5/6 (M) yellowish brown coarse sand; single grain; loose; clear boundary; 25% fine, subrounded to rounded gravel; common distinct oxidized mottles; fining upward sequence.
456-912	I	3Cu	10YR 6/8 (M) brownish yellow medium sand; single grain; loose; abrupt boundary; 10% fine, subrounded to rounded gravel.
912+	I	3Cu	Refusal on large, well rounded gravel at ~1000 cmbs.

Core 6: 15 ft deep, 3.08 m recovered. Coordinates in UTM, Zone 11, NAD 83: 313591 mE, 3914751 mN

Depth (cmbs)	Stratum	Horizon	Description
0-152	II	Ap	10YR 3/1 to 4/3 (M) very dark gray to brown silty clay loam and silt loam; weak, fine, granular parting to massive structure; soft; clear boundary; <5% fine, subrounded to rounded gravel ; common fine to medium roots; common fine tubular pores; likely artificial fill/mixed layer.
152-204	I	2ACb	10YR 4/2 (M) dark grayish brown silt loam; weak, fine, granular structure parting to massive; soft; clear boundary; very few fine tubular pores and rootlets.
204-304	I	2Cox	10YR 5/6 (M) yellowish brown medium to coarse sand; single grain; loose; clear boundary; 10%+ fine to medium, subrounded to rounded gravel; common distinct oxidized mottles; fining upward sequence.
304-456	I	2C	10YR 5/6 (M) dark yellowish brown coarse sand; single grain; loose; abrupt boundary; 25% fine to medium, subrounded to rounded gravel; common distinct mottles.

Core 7: 35 ft deep, 7.58 m recovered. Coordinates in UTM, Zone 11, NAD 83: 314611 mE, 3913869 mN

Depth (cmbs)	Stratum	Horizon	Description
0-60	IV	Ap	10YR 4/4 to 5/3 (M) dark yellowish brown to brown sandy and loamy sand; weak, fine, granular parting to massive structure; soft; clear boundary; 25% fine to coarse, subangular to rounded gravel; few fine to medium roots; few fine tubular pores; likely artificial fill/mixed layer.
60-152	III	2ACb	10YR 3/3 (M) dark brown sandy loam; weak, fine, granular parting to single grain structure; loose; clear boundary; <5% fine, subrounded to rounded gravel; few fine tubular pores and rootlets.
152-304	III	2Cu	10YR 5/6 (M) yellowish brown coarse sand; single grain; loose; clear boundary; 25% fine to coarse, subrounded to rounded gravel; fining upward sequence.
304-456	III	2Cox	10YR 5/6 (M) yellowish brown very coarse sand; single grain; loose; clear boundary; 10%+ fine to medium, subrounded to rounded gravel; common distinct mottles.
456-685	II	3Cu	10YR 5/6 (M) yellowish brown medium to coarse sand; single grain; loose; clear boundary; 10% fine to medium, subrounded to rounded gravel; fining upward sequence
685-730	II	3Cox	10YR 5/6 (M) yellowish brown coarse sand; single grain; loose; clear boundary; 10% fine to medium, subrounded to rounded gravel; common distinct mottles.
730-1065	I	4C	10YR 4/3 to 5/6 (M) brown to yellowish brown medium to coarse sand; single grain; loose; 10% fine, subrounded to rounded gravel;

Depth (cmbs)	Stratum	Horizon	Description
			fining upward sequence.

Hand Auger 1: 3.1 m recovered. Coordinates in UTM, Zone 11, NAD 83: 314235 mE, 3913933 mN

Depth (cmbs)	Stratum	Horizon	Description
0-25	I	A	10YR 4/2 (D) dark grayish brown sandy clay loam; moderate, fine, granular parting structure; slightly hard; clear boundary; <5% fine, subangular to subrounded gravel; common fine roots; common fine tubular pores.
25-220	I	C	10YR 6/2 to 7/3 (D) light brownish gray to very pale brown fine to medium loamy sand; single grain; loose; clear boundary (?).
220-310	I	Cox	10YR 6/4 (M) light yellowish brown fine sand; single grain; loose; common oxidized mottling throughout.