Meeting of the Central Valley Flood Protection Board
May 24, 2013

Staff Report

Sutter Butte Flood Control Agency
Feather River West Levee Project
Project Area C (Reaches 13 through 24) Construction Permit
Butte and Sutter Counties

1.0 –REQUESTED ITEM

Consider approval of Draft Permit No. 18793-1 (Attachment – B).

2.0 - APPLICANT

Sutter Butte Flood Control Agency (SBFCA) is the applicant. SBFCA is a joint powers agency formed in 2007 by Butte and Sutter Counties, the cities of Biggs, Gridley, Live Oak and Yuba City, and Levee Districts 1 and 9 of Sutter County (LD 1 and LD 9). The agency has the authority to finance and construct regional levee improvements, and is governed by a 13-member board comprised of elected officials from the cities, counties and levee districts.

3.0 – PROJECT LOCATION

The proposed Project Area C is the first construction phase of the Feather River West Levee Project (FRWLP). The entire FRWLP extends from Thermalito Afterbay in Butte County downstream in a southerly direction approximately 41 miles to a point approximately 3.5 miles north of the Feather River's confluence with the Sutter Bypass in Sutter County (Attachment – A). This first phase of construction (Project Area C) includes 14.78 miles of levee improvements in and around the vicinity of Yuba City. SBFCA has designated Project Area C to include Reaches 13 through 24 of the overall FRWLP. Levee maintenance is performed by Levee District 1, Levee District 9, and the California Department of Water Resources (DWR) in State Maintenance Area 16.

4.0 – AUTHORITY OF THE BOARD

- California Code of Regulations, Title 23 (CCR 23), § 106, Existing Encroachments within an Adopted Plan of Flood Control
- CCR 23, § 112, Streams Regulated and Nonpermissible Work Periods
- CCR 23, § 116, Borrow and Excavation Activities – Land and Channel
- CCR 23, § 120, Levees
- CCR 23, § 121, Erosion Control
- CCR 23, § 123, Pipelines, Conduits and Utility Lines
- CCR 23, § 124, Abandonment of Pipelines
- CCR 23, § 128, Bridges
- Rivers and Harbors Act of 1899, Title 33 United States Code, § 408, hereafter referred to as Section 408

5.0 – PROJECT DESCRIPTION

SBFCA proposes to construct approximately 14.78 miles of levee improvements on the west levee of the Feather River, designated as construction Reaches 13 to 24 (Station 844+75 to 1625+00).

The FRWLP Project Area C proposes to construct a cutoff wall ranging from 26 to 105 feet in depth along the centerline of the levee from Station 844+75 to 1625+00 (Reach 13 to Reach 24, respectively). The levee would be degraded by approximately 50% of its overall height with approximately 2,600 feet of the levee being fully degraded. In addition to the cutoff wall, the FRWLP proposes approximately 5,100 feet of depression infill.

The Central Valley Flood Protection Board (Board) staff has identified several encroachments which do not comply with CCR 23. SBFCA is addressing the majority of the encroachments as described later in this staff report.

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project are as follows:

- U.S. Army Corps of Engineers (USACE) Washington DC headquarters Section 408 Record of Decision (ROD, anticipated late July 2013)

- USACE Sacramento District Letter of Permission (LOP, transmitted along with the ROD, anticipated late July 2013). The ROD & LOP will be attached to the permit as Exhibit A, and all conditions of the ROD & LOP will be incorporated into the permit by reference.
- DWR Flood Maintenance Office, Maintenance Area 16 endorsement (Exhibit B, dated May 16, 2013).
- LD 1 and LD 9 Board endorsements (Exhibit C).

7.0 – PROJECT BACKGROUND

The Feather River West Levee was originally constructed in the 19th century by local interests. Construction was driven by frequent flooding in the 1860s due to mining debris raising the thalweg elevation of the river beds. The original levee was generally constructed on the Holocene and late-Pleistocene alluvial and fluvial materials deposited by the ancient and modern Feather River and its tributaries.

The FRWL was subjected to several high water and flood events that led to repeated performance problems including levee breaks in 1909, 1914, and 1955. In the 1955 flood the water level was approximately 21 feet high on the levee at the southern end of Yuba City. The flood of 1986 nearly failed the FRWL, and the Yuba River south levee did fail resulting in rapid drawdown of water levels in the Feather River. Widespread flood fighting was necessary from the 5th Street Bridge in Yuba City downstream during the “1997 New Years” flood.

During these floods the FRWL experienced repeated performance problems at many locations, including under-seepage problems causing boils, piping of soil material, and sinkholes. Some locations along the FRWL also experienced other geotechnical problems associated with through-seepage, under-seepage, landside and waterside instabilities and erosion.

In addition to upgrades completed by the early 1960s various improvements to the FRWL have been made at multiple locations, primarily in response to the performance issues observed during large flood events. These improvements have included construction of stability berms, drainage trenches, relief wells, slurry cutoff walls, and other measures.

Various geotechnical studies have been performed to investigate the performance of the FRWL. Between 2007 and 2010 the DWR Urban Levee Evaluation (ULE)

Program investigated nearly the entire length of the FRWL with extensive subsurface exploration and laboratory testing, geotechnical analyses, and information compiled from previous geotechnical studies. The ULE Program focused on evaluating levee seepage and slope stability and identifying the potential levee deficiencies. SBFCA has used some of the ULE Program data with DWR's permission to evaluate and design proposed project.

After forming in 2007 as a joint powers agency, SBFCA embarked on a comprehensive evaluation of the FRWL protecting their member jurisdictions in collaboration with DWR and the Board. This evaluation was necessary to identify deficiencies of the FRWL, their magnitude and severity, and the remedial measures required to address them.

The results of SBFCA's comprehensive evaluation determined that the existing FRWL does suffer from through- and under-seepage, landside and waterside instabilities, and erosion deficiencies, and that a substantial number of geotechnical and other improvements are necessary to bring the FRWL up to current federal and State flood protection standards.

The Feather River west levee is a facility of the Sacramento River Flood Control Project (SRFCP) and State Plan of Flood Control under USACE and Board jurisdictions. This project was conceived prior to adoption of the Central Valley Flood Protection Plan (CVFPP) in June 2012. The FRWLP has been proposed by SBFCA to be an overall betterment to the SRFCP, is consistent with the CVFPP, and will receive DWR Early Implementation Project (EIP) funding.

In light of the flood risk to the area, SBFCA is pursuing the FRWLP in parallel and coordinated with a separate effort by USACE, SBFCA, DWR, and the Board to determine the federal interest in the federal Sutter Basin Project initiated in 2000. The Sutter Basin Project is being evaluated through a Feasibility Study and was selected as a national pilot project to incorporate more efficient, relevant and cost effective practices into the traditional USACE feasibility study process.

SBFCA's project goals are to achieve a minimum 200-year level of flood protection for urbanized and urbanizing areas within the Sutter Basin. A 200-year flood is a flood having a 0.5 percent chance of occurring in any given year, and is also referred to having a 0.5 percent annual exceedance probability (AEP). SBFCA's project proposes to achieve a 200-year level of protection by rehabilitating the FRWL from Thermalito Afterbay to downstream of Star Bend south of Yuba City. The proposed Project Area C described herein is the first planned construction phase of the

FRWLP. SBFCA anticipates submitting subsequent permit applications for remaining construction phases beginning late in 2013.

7.1– Summary of Repair Measures

The overall site plans (Attachment – G), typical levee cross sections (Attachment – F), and typical pipe drawings (Attachment – G) along with the proposed modification of flood management measures by reach (Attachment – M) provide a general overview of the proposed improvements.

SBFCA is proposing to construct slurry cutoff walls of varying depths. Project Area C also includes various utility relocations and approximately 5,100 linear-feet of landside toe depression infill.

SBFCA has identified, and Board staff has confirmed, several construction elements or existing encroachments which do not meet CCR 23 standards (Attachments – J, – K, and – L). These attachments may not provide a complete list all potential non-conforming items at this time. SBFCA has also determined that the items listed in these attachments represent those elements and encroachments that are cost effective, reasonable, and feasible to be addressed during construction of Project Area C. SBFCA is requesting construction variances to CCR 23 standards for these elements to include pipeline crossings, earthwork, and other technical elements.

If, during construction, additional non-conforming items are discovered by any party SBFCA will consider whether or not they can be brought into compliance during construction, and if they can and SBFCA proposes to do so, Board staff will evaluate the proposal(s) for Board approval to be made either by direct Board action or by delegation to the Executive Officer as appropriate.

More details regarding proposed improvements for Project Area C are as follows:

<u>Reaches 13 thru 17 (Shanghai Bend to UPRR Crossing)</u>

- Approximately 5.4 miles (Station 845+00 to 1130+86)
- Conventional cutoff walls with 50 percent levee degrade & rebuild
- Reaches 14 thru 15 are no work reaches due to the presence of an existing cutoff wall (Stations 927+00 to 968+50)
- Reach 13 includes investigation of existing relief wells describes as follows:

There are 81 existing relief wells in Reach 13 that were installed between 1956 and 1998. Relief well pump testing and video inspection work was performed in 2011 and 2012. This work determined that several wells had obstructions and joint gaps in the well screen, but in general the wells were still functioning properly, and any gaps were effectively filtered. Two wells pumped excessive amounts of sand and another had casing defects, so these wells were abandoned in late 2012. SBFCA plans to leave the remaining 78 wells in place until the proposed cutoff wall has been constructed, so that the wells can be used to observe and monitor groundwater conditions during subsequent high water events to assess whether operation of the proposed cutoff wall is successful. Assuming that the wall works as designed, SBFCA plans to convert the remaining wells to observations wells, as they would no longer be needed as a remedy for under-seepage. SBFCA anticipates that it is likely that not all remaining wells would need to be converted, and that some could be abandoned if appropriate. These determinations will be made at a future time. Section 8.4 provides additional discussion on the relief well.

Two features within the footprint of Project Area C, but excluded from the proposed permit, will be constructed in future applications:

- Reach 16: Closure of a gap in the cutoff wall at the Yuba City 5th Street bridge
- Reach 17: Closure structure at UPRR crossing

<u>Reaches 18 thru 24 (UPRR crossing to northern Live Oak)</u>

- Approximately 9.3 miles (Stations 1130+86 through 1625+50)
- Conventional cutoff walls with 50 percent levee degrade & rebuild
- Reach 22 includes approximately 600 linear-feet of levee to be fully degraded and reconstructed due to severe animal burrowing
- Time variance needed for work during February and March of 2014 for reconstruct pipeline crossings at Sunset Pump Station and Campbell Road

7.2 – Project Area C Design Packages

Board staff received and reviewed the following SBFCA design packages:

- 65 percent design documents for the entire 41-mile project received August 2012 in support of program-level Section 408 approval from USACE.

- A Board Action Request was heard on October 26, 2012 to approve sending a

Section 408 request letter to the USACE Sacramento District to alter 41 miles of project levee. The Board unanimously approved the request (Attachment – D), and the letter was signed October 30, 2012.

- 90 percent design documents for Project Area C received December 2012.

- 100 percent design documents and formal permit application received February 2013. The 100 percent documents include the following six contract volumes:

  Volume 1: General and Special Specifications
  Volume 2: Technical Specifications
  Volume 3: Feather River West Levee Improvement Plans Station 844+75 to 1433+83
  Volume 4: Feather River West Levee Improvement Plans Station 1433+83 to 1625+00
  Volume 5: Feather River West Levee Improvement Plans Station Borrow Site and Haul Roads
  Volume 6: Geotechnical Data Report

- 100 percent "Issued for Bid" plan sets received March 12, 2013.

Board staff has reviewed these submittals to develop its current recommendations to the Board. Future phases of construction will be submitted and reviewed in a manner similar to this proposal for Project Area C. Board staff will assign -2, -3, -4, etc. suffix numbers to the 18793 program number as subsequent permit applications are submitted by SBFCA and deemed complete by Board staff.

7.3 – Other federal Regulatory Reviews

USACE's review of the FRWLP under Section 408 triggered the requirement for USACE to comply with the National Environmental Policy Act. The project is also subject to Section 10 of the Rivers and Harbors Act, and Section 404 of the Clean Water Act; for which the USACE also has regulatory authority.

8.0 – PROJECT ANALYSIS

The proposed levee, cutoff wall, construction and utility relocations will be designed and constructed in accordance with the USACE, DWR Urban Levee Design Criteria (ULDC), and Board CCR 23 regulations. The levee modification will have a cutoff

wall for under-seepage. The construction associated with this permit will be completed in two construction seasons. The proposed projects plan milestones are:

- SBFCA opened bids for this project on April 29, 2013. The lowest responsive bidder was Nordic / Magnus Pacific, a joint venture.
- The SBFCA Board approved the award of the contract on May 8, 2013.
- SBFCA proposes to issue a Notice to Proceed on May 27, 2013 if the Board conditionally approves the Area C project described herein.
- SBFCA proposes to begin mobilizing equipment off site (but not on and SRFCP facilities) near the end of June 2013, and be ready to begin construction upon issuance of the final Board permit.

8.1 – Project Design Review

Board staff completed a technical review of the following documents:

- 100% Plans and Specifications for Project Area C (Station 844+75 to 1625+00)
- 100% "Issued for Bid" Plans and Specifications for Project Area C
- 100% Design Documentation Report for Project Area C
- 100% "Issued for Bid" Design Documentation Report for Project Area C
- 100% Technical Specifications for Project Area C
- 100% "Issued for Bid" Technical Specifications for Project Area C
- Addenda 1 and 2
- Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS)

8.2 – Project Components

Board staff has reviewed the proposed project bid schedule which includes the following four Bid Schedules:

Bid Schedule A, Preconstruction Submittals Required of the Contractor

Bid Schedule B, (Contract Volume 3) Reaches 13 through 21, Stations 844+75 to 1433+83

Work Description	Estimated Quantities
Project fencing	99,800 feet
Remove county parking structure	1 each
Remove well and pumps (Sta. 881+65, 1174+00, 1200+60)	3 each
Remove / dispose 15-inch irrigation pipe (Sta. 1363+50 to 1375+50)	1,200 ft
Remove existing asphalt	13,300 sy

Remove existing ag base	21,500 sy
Topsoil stripping	176,760 cy
Levee excavation	911,700 cy
Toe berm fill (Sta. 1023+40 to 1028+00)	3,400 cy
Random fill: canal (Sta. 1107+00 to 1125+60) and other	122,100 cy
Soil bentonite cutoff wall (open trench)	1,739,600 sf
Soil bentonite cutoff wall (deep trench)	567,600 sf
Levee embankment fill (Type-1, clay)	194,500 cy
Levee embankment fill (Type-2, granular soil)	730,400 cy
New asphalt	1,610 tons
New Class 2 ag base	7,300 tons
Remove and reinstall existing gates	22 each
Erosion control seeding	219.3 acres
Haul & waste (unsuitable soil)	1,000 cy
Concrete lined ditches	575 lf
Steel Sheet Pile Wall, SEWD	3,750 sf
Temporary Irrigation bypasses (1229+41, 1265+59)	2 each
Pipes [6 inch to 60 inch diameter]	30 each

(Attachment – K, Levee Encroachment List for a portion of the pipeline crossings requiring variances to Board standards)

Bid Schedule C (Contract Volume 4) Reaches 22 through 24, Stations 1433+83 to 1625+00

Work Description	Estimated Quantity
Project fencing	39,800 ft
Clearing & grubbing	34 acres
Soil bentonite cutoff wall	665,000 sf
Type-1 levee embankment fill	42,400 cy
Type-2 levee embankment fill	105,000 cy
Random fill	24,000 cy
Class 2 aggregate surfacing	6,700 tons
Asphalt concrete paving	395 tons
Top soil stripping	39,900 cy
Steel sheet pile wall, Lateral 12 (Station 1610+92)	3,255 sf
Remove and salvage existing aggregate road surfacing	18,000 lf
Caltrans temporary K-rails	370 lf
Remove and reinstall existing gates	14 each
Erosion control seeding	219.3 acres
Haul & waste (unsuitable soil)	1,000 cy
Pipes [6 inch to 36 inch diameter]	7 each

(Attachment – K, Levee Encroachment List for a portion of the pipeline crossings requiring variances to Board standards)

Bid Schedule D (Owner-furnished borrow material)

Mobilization, Traffic Control, Clearing & Grubbing, Public Road maintenance, storm water pollution control, borrow restoration	
Excavation	270,000 cy
Top soil stripping, restoration, erosion control	22.5 acres

Real Estate

Board staff reviewed adjacent project landowner maps created with Parcel Quest software (Attachment – I). Staff then mailed those landowners standard Adjacent Landowner Letters alerting them of the proposed project and their right to protest under CCR 23, § 12, Protests. As of May 16, 2013 Board staff has not received any formal written protests.

8.3 – Hydraulic Analysis

Board staff has reviewed SBFCA's hydraulic analysis. The analysis computed various design water surface profiles and evaluated the incremental hydraulic impacts resulting from levee improvement measures designed to achieve a 200-year level of flood protection for the urban and urbanizing northern portion of the Sutter-Yuba City Basin, and to achieve 100-year protection south of Star Bend downstream of Yuba City. The analysis modeled 44 miles of the Feather River from Thermalito Afterbay to the Sutter Bypass to include proper boundary conditions. This modeling included both the 41-miles of project in the Section 408 request to the USACE, and the Project Area C construction project described herein.

SBFCA and their consultant, Peterson Brustad, Inc (PBI) stated in their Design Water Surface Profile for the FRWLP dated March 2012, and in their hydraulic Addendum No.1 dated July 2012, that the project will have no incremental adverse impacts to the Feather River West Levee or the SRFCP.

The hydraulic analysis computed the 100-, 200- and 500-year design water surface profiles and evaluated the incremental hydraulic impacts resulting from levee improvement measures designed to achieve a 200-year level of flood protection for the urban and urbanizing northern portion of the Sutter-Yuba City Basin, and 100-year protection south of Yuba City. The analysis modeled the entire 44 miles of the Feather River from Thermalito Afterbay to the Sutter Bypass. The water surface profile is attached to this Staff Report as Attachment – H.

PBI modeled the FRWLP using the “Shanghai” storm centering and the inflows were applied to the most upstream cross sections of the HEC-RAS model. The annual exceedance probability (AEP) peak inflow values were modeled as:

1/100 AEP = 150,000 cfs
1/200 AEP = 174,000 cfs (goal of this project)
1/500 AEP = 327,000 cfs

By comparison the USACE Levee and Channel profile dated March 15, 1957 lists the design flow rate in the Feather River through Project Area C to the Yuba River confluence at 210,000 cfs. Below the Yuba River confluence the design flow rate is 300,000 cfs.

The hydraulic analysis utilized the USACE HEC-RAS model that is also being used by the USACE as part of the Sutter Basin Feasibility Study (SBFS). The SBFS is a separate collaborative effort between the USACE, DWR and SBFCA to evaluate flood damage reduction, ecosystem restoration, and recreation projects within the Sutter-Yuba City basin. The HEC-RAS model was calibrated using gage data and surveyed high water marks from two historical flood events that occurred in 1997 and 2006.

The results of the hydraulic analysis indicate that the 100-year plus 3 feet water surface profile and the 200-year plus 3 feet water surface profile are contained within the channel, with one exception occurring at the Union Pacific Railroad Bridge (Station 1131+00). The model results predict that this location will be submerged at the 200-year flood discharge. SBFCA is proposing a closure structure where the railroad tracks intersect the levee; however, this work is not part of Project Area C. Board staff will continue to work with SBFCA over the next year on the physical solution to the railroad crossing.

8.4 – Geotechnical Analysis

This section provides a detailed report on the geotechnical aspects of the project.

The Project Area C is approximately a 14.78-mile long segment of the overall four segments of the proposed FRWL improvement project. The Project Area C extends from north of Shanghai Bend (Station 844+75) to a point approximately ¼ mile north of Campbell Road in the City of Live Oak (Station 1625+00). In terms of reaches, the Project Area C has been divided into 12 reaches which extend from reach 13 (south) through Reach 24 (north). Each reach in the Project Area C has been

evaluated for susceptibility to through seepage, under-seepage, slope stability, and geometry deficiencies. Predominant deficiencies at the Project Area C determined by the geotechnical analyses are the levee through seepage and under-seepage. The Project Area C will entail the construction of approximately 13 miles of soil-bentonite cutoff wall along with 400 linear feet of toe berm construction.

The recommended depths for the cutoff walls range from approximately 26 to 105 feet in depth. The recommended wall depths are not constant over the length of a reach, but vary along the reach to correspond to the varying subsurface conditions. In addition to the seepage mitigation, the removal, relocation, and modification of a large number of levee encroachments are included as a part of the project.

Where necessary within Project Area C levee encroachments will be addressed where no new seepage mitigation has been proposed. For example, pipes will be fitted with positive closure devices at the Gilsizer Slough Drainage Outfall Pipe location, where an existing cutoff wall is located already. Therefore, no new seepage mitigation has been proposed at this location. Table 1 provides a summary of levee deficiencies by reach for Project Area C.

Table 1. Summary of Levee Deficiencies by Reach

Study Reach	Through-Seepage[a]	Under-Seepage[b]	Slope Stability[c]	Erosion	Encroachments
13	X	X	*		X
14					
15	X	X	*		X
16			X	X	X
17	X	X	*		X
18	X	X	*		X
19	X	X	*		X
20		X	*		X
21		X	*		X
22	X	X	*		X
23		X	*		X
24		X	*		X

Notes: An X signifies the levee deficiency applies to the levee reach.
[a] Through-seepage issues based on phreatic surface existing on the landside slope.
[b] Under-seepage issues based on exit gradient greater than 0.5 at the landside levee toe.
[c] A * signifies areas where through- and under-seepage issues exist and slope stability was not independently verified.

Among all the reaches within the Project Area C, Reach 13 is the most challenging reach in terms of geotechnical stability as Reach 13 experienced levee breaches and seepage problems in 1955, 1986 and 1997 flood events. In 1955 flood event, the levee at this reach breached. The levee alignment was then setback from its previous alignment that experienced the 1955 levee breach occurred. In 1986 and

1997 flood events, seepage boils occurred at the landside of the levee. The mitigation measures presently associated with this reach include the relief wells that were constructed in 1956 and in the 1990s. Reach 13 extends from Station 845+00 to Station 927+00 which is located at the north of Shanghai Bend. This reach is approximately 8,200 feet long.

Geotechnical analyses conducted in Reach 13 include steady-state seepage analyses, landside slope stability analyses, and waterside rapid drawdown analyses. Geotechnical analyses were performed at locations identified as being the most critical for the design in order to confirm the effectiveness of the design. Sensitivity analyses were performed at many locations to support the conclusions and recommendations of the design.

Based on the geotechnical evaluations prepared for Reach 13, DWR recommended additional geotechnical explorations to check the depth and continuity of the deep aquiclude layer beneath the levee. Based on the DWR's recommendations, a total of eight (8) additional explorations were performed in Reach 13 to provide additional information regarding the depth and continuity of the deep aquiclude layer. Using the results of the additional explorations along with the existing explorations, further geotechnical analyses were conducted at two cross-sections located at Stations 861+33 and 907+00 in Reach 13. Based on the updated analyses, along with the results of the 2012 pump tests of the existing relief wells, SBFCA's consultant team, the URS Corporation, updated the mitigation measure recommendations at this reach.

A total of eight exploratory borings were performed (boring numbers: SL001_002S through SL001 _009S) from October 2 to October 20, 2012. These exploratory borings were advanced using sonic drilling technique. Five (5) of these exploratory borings were advanced from crown locations and the remaining three (3) exploratory borings were advanced at landside toe locations. The depths of supplemental crown exploratory borings varied between 120 and 135 feet and the depths of landside toe exploratory borings varied between 90 and 97.5 feet. The locations of these exploratory borings were selected generally at areas where a data gap was present. Laboratory testing was also performed on selected soil samples from these supplemental exploratory borings. The laboratory testing included water content tests, Atterberg limits tests, sieve analyses, and gradation analyses.

Based on the updated evaluation, the cutoff wall depths for the central and southern portion of Reach 13 were revised. A greater cutoff wall depth is now recommended and the cutoff wall is expected to be fully penetrating. This option also eliminates

the need for relief wells in Reach 13, provided that the complete penetration of the cutoff wall into the aquiclude layer is confirmed during construction. The recommended cutoff wall depths in Reach 13 range from approximately 90 feet in the southern portion and approximately 45 feet in the northern portion from the landside toe elevations.

Based on the supplemental explorations and geotechnical analyses at Stations 861+33 and 907+00 the cutoff wall tip elevations were updated as follows:

- From Station 844+50 to 848+00, the cutoff wall tip elevation is -20 feet.
- From Station 848+00 to 896+00, the cutoff wall tip elevation is -38 feet.
- From Station 896+00 to 923+75, the cutoff wall tip elevation is +25 feet.

Based on the supplemental explorations and geotechnical analyses at Stations 861+33 and 907+00, URS provided the following recommendations regarding the existing Relief Wells:

- Relief wells that pumped sand, appeared non-functional, or have internal defects based on 2012 relief well testing have been abandoned. An emergency action plan will be implemented until the cutoff wall is in place.
- Relief wells that appeared functional based on 2012 relief well testing will be converted into observation wells as part of future construction contracts.
- Buried collector pipes for the existing relief wells will be abandoned and backfilled, and the release points of the collector pipes should be raised to the ground surface as part of future construction contracts.
- Water levels in observation wells and any flow from them will be monitored and recorded during periods of high water in the river.

At the request of DWR three additional explorations were also conducted in Reaches 22, 23 and 24 within Project Area C. The purpose of these explorations was to explore the continuity of the aquiclude layer landward of the levee. The locations of the three explorations are: SM0016_001B at Reach 22 (Station 1499+00); SM0016_002B at Reach 23 (Station 1517+00); and SM0016_003B at Reach 24 (Station 1615+00).

SM0016_001B was drilled to a depth of 46.5 feet below the ground surface (bgs), at the toe of the levee, adjacent to the existing crown exploration, WM0016_ 010C which identified approximately 7-foot thick aquiclude layer between elevations +52 feet and +59 feet. SM0016_002B was drilled to a depth of 51.5 feet bgs, at the toe of the levee, adjacent to the existing crown exploration, WM0016_ 012C which

identified approximately 9-foot thick aquiclude layer between elevations +58 feet and +69 feet. SM0016_003B was drilled to a depth of 72 feet bgs, at the toe of the levee, adjacent to the existing crown exploration, WM0016_ 020B which identified an aquiclude layer at a depth of approximately 50 feet below the landside toe (elevation +32 feet). Based on the findings of the three additional explorations, the landward continuity of the aquiclude layer was confirmed in all cases.

Based on the geotechnical analyses performed for Project Area C, the seepage and stability issues are not apparent with the proposed project mitigation. Rapid drawdown issues are also not apparent in this segment.

During construction of the cutoff wall the levee will be degraded completely between Stations 844+50 and Stations 896+00 within Reach 13. Rock slope protection is presently installed between Stations 844+50 and 896+00. DWR has requested SBFCA to replace the waterside rip-rap when the levee is rebuilt at these locations.

No settlement analyses were conducted within Project Area C. Additional settlement is not expected as the foundation soils are consolidated and no additional materials are proposed to be added.

The use of existing sandy soils to reconstruct the levee in areas outside of the cutoff wall cap zone is not expected to pose a threat to levee stability. However the use of existing sandy soils to reconstruct the levee at the waterside may result in long-term erosion issues that could require a long-term maintenance commitment to address.

A toe berm will be constructed at the tunnel beneath the 10th Street Bridge in Yuba City at Reach 16 by placing fill to a height of approximately seven feet. The 400-foot long toe berm will be constructed at this location to close a gap that currently exists between two existing cutoff walls. This toe berm is expected to mitigate for through-seepage. Gaps in the cutoff wall at the 5th Street Bridge, located in Reach 16, and the UPRR railroad crossing, will not be closed as part of the Area C construction project. These cutoff wall gaps will be addressed in a future construction phase to allow additional time to coordinate work with the City of Yuba City and UPRR.

As per the technical specifications the compaction of the cohesive soils are proposed to be performed as a percentage of the maximum dry density per ASTM D698, and the compaction of the cohesionless soils are proposed to be performed as a percentage of the relative density as per ASTM D4253 and ASTM D4254. When ASTM D698 will be used for compaction, the relative compaction will be at least ninety seven (97) percent of the maximum laboratory dry density with a

moisture content ranging between -1% and +3% of optimum moisture content. The moisture content requirement proposed by SBFCA will require a variance to the Board's standards in CCR 23, § 120 since this section requires that compaction be performed at above optimum moisture content. The use of ASTM D4253 and ASTM D4254 for compacting cohesionless soils will also require a variance to the standards as CCR 23, § 120 only allows to use of either ASTM D 693 or ASTM D 1557 for soil compaction.

8.5 – Variances to Board Standards per CCR 23, § 11(a) and (b)

Section 11 of the Board's CCR 23 regulations state:

"(a) An applicant for an encroachment permit for a use that is not consistent with the board's standards as outlined in Article 8 of CCR 23 requires a variance approved by the board.
(b) When approval of an encroachment requires a variance, the applicant must clearly state in the application why compliance with the board's standards is infeasible or not appropriate."

SBFCA is requesting variances to the following Board CCR 23 Standards:

- CCR 23, § 120; Levees
- CCR 23, § 123, Pipelines, Conduits, and Utility Lines
- CCR 23, § 124; Abandoned Pipelines and Conduits

8.5.1 - <u>Variance Category 1</u> – Issues raised by Board staff in their October 2012 Section 408 Request Staff Report (Attachment – J)

Addresses Project Area C items, from the Section 408 Request Staff Report for Application No. 18793 approved by the Board on October 26, 2012.

The October 2012 Section 408 request Staff Report listed 17 items that were to be resolved between Board and SBFCA staffs. Attachment – J states Board staff's original concerns, SBFCA responses, and Board staff's final response.

<u>Six</u> items (E, F, L, M, N, and Q) are addressed through proposed variances to Board standards.

<u>Nine</u> items (B, C, D, G, H, J, K, O, and P) have been resolved by Board and SBFCA staff collaboration.

Two items (A and I) are addressed by draft permit conditions SEVENTY THREE AND EIGHTY FOUR in the draft permit (Attachment – B).

8.5.2 - Variance Category 2 – Pipeline crossings deviating from CCR 23: (Attachment – K)

SBFCA is requesting construction variances to CCR 23 § 123 -Pipelines, Conduits, and Utility Lines for the following twenty-two pipeline crossings:

Reach	Station	Pipe
13	856+08	24” storm drain pump station
13	856+23	24” seepage interceptor pump station
~~13~~	~~881+43~~	~~14” relief well pump station~~ (to be removed, no variance)
~~13~~	~~881+40~~	~~6” relief well pump station~~ (to be removed, no variance)
13	893+78	16” storm drain
13	893+34	12” storm drain
16	972+29	2” waterline
16	1043+03	16” storm drain
16	1043+22	24” storm drain
16	1043+27	24” wrapped steel pipe
16	1043+45	36” discharge pipe
17	1096+62	42” waterline crossing
17	1096+71	24” waterline crossing
17	1096+81	28” waterline crossing
17	1111+46	16” storm drain discharge pipe
17	1127+48	10” outfall pipe
17	1132+09	9” fuel line
19	1229+41	16” steel pipe through levee
19	1265+59	14” steel pipe through levee
20	1314+80	20” steel discharge pipe
21	1430+40	36” steel pipe through levee
21	1430+47	60” steel pipe through levee
21	1430+55	60” steel pipe through levee
~~23~~	~~1536+12~~	~~36” cement mortar pipe through levee~~ (to be removed, no variance)
24	1610+92	18” cement mortar pipe through levee

The following subsections of CCR 23 § 123 are stated here in their entirety and are provided in an abbreviated form as part of Attachment – K which lists the specific variances to § 123 proposed for construction.

Subsection (d)(7) *"Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) feet of the landside levee toe."*

Subsection (d)(9) *"The side slopes of trenches excavated for the installation of pipelines, conduits, or utility lines may be no steeper than one (1) foot horizontal to one (1) foot vertical…"*

Subsection (d)(11) *"The minimum cover for pipelines, conduits, and utility lines installed through the levee crown is twenty-four (24) inches. If it becomes necessary to raise a levee crown to provide minimum cover, the longitudinal slope of the crown must be a minimum of ten (10) feet horizontal to one (1) foot vertical. Where twenty-four (24) inches of cover is not practical, a concrete or other engineered cover is required."*

Subsection (d)(13) " *When practical, pipelines, conduits, and utility lines installed within a levee section must be separated from parallel pipelines conduits, and utility lines by a minimum of twelve (12) inches, or the diameter of the largest pipeline, conduits, and utility lines whichever is larger, to a maximum of thirty-six (36) inches."*

Subsection (d)(20) *"Within the levee or within ten (10) feet of levee toes, any excavation for the installation of a pipeline, conduit, or utility line must be backfilled in four (4) to six- (6) inch layers with approved material and compacted to a relative compaction of not less than ninety (90) percent. Per ASTM D1557-91, dated 1991, which is incorporated by reference and above optimum moisture content or ninety-seven (97) percent, per ASTM D698-91, dated 1991, which is incorporated by reference and at or above optimum moisture content. Compaction tests by a certified soils laboratory will be required to verify compaction of backfill within a levee."*

Subsection (e)(1) *" One or more of the following conditions must apply: (A)The pipeline, conduit, or utility line will be maintained by a public agency with a history of good maintenance based upon annual maintenance or inspection reports. (B) The levee is designed to withstand a depth of less than six (6) feet of water measured with respect to the elevation of the landside levee toe. (C) The levee is designed to withstand a depth of less than twelve (12) feet of water measured with respect to the elevation of the landside levee toe and*

provides flood protection for a rural area, or an area where the board anticipates little future urban development."

Subsection (g)(7) *" Steel pipe may be used for all types of pipeline or conduit installations through a levee above the design flood plane if the pipe meets the following requirements:*
(A) The steel pipe is resilient and not materially reduced in quality due to weathering, prior use or other deteriorating conditions.
(B) The steel pipe joints are butt-welded or threaded.
(C) The steel pipe installations are corrosion-proofed externally with a coating of material such as coal-tar enamel, asphalt-dipped wrap, mortar, PVC tape, or polyethylene tape wrapped to a thickness of thirty (30) mils, high solids epoxy, or equivalent.
(D) Unless a continuous internal lining of cement, mortar, or equivalent is provided, as appropriate for the fluid to be conveyed, new steel pipe installations may convey only non- corrosive material, and water is considered corrosive.
(E) Steel pipe installations must be designed to resist all anticipated loading conditions, and the design calculations must be submitted to the board. Steel pipe meeting the following criteria may be used without submittal of design calculations to the board:
(i) Twelve- (12) inches in diameter or less ten- (10) gauge steel pipe.
(ii) Greater than twelve- (12) inches and a maximum of thirty- (30) inches in diameter seven- (7) gauge steel pipe.
(iii) Greater than thirty- (30) inches and a maximum of forty-eight (48) inches in diameter three- (3) gauge steel pipe.

Staff agrees with SBFCA's assessment of requested pipeline crossing variances to CCR 23 § 123 standards as described in Attachment – K and recommends approval of the requested variances.

8.5.3 - Variance Category 3; Major Time Variance Requests:

Four Major Time Variance Requests (TVR) to CCR 23, § 112, Streams Regulated and Nonpermissible work periods, sub-paragraph (b)(2), for work proposed to be performed during the flood season between November 1 and April 15. (Attachment – K)

SBFCA is requesting time variances to perform work between February 1 and April 15 at the following pipeline crossings:

- Station 1430+40 36" steel low pressure through levee (Sunset Pump Sta.)
- Station 1430+47 60" steel low pressure through levee (Sunset Pump Sta.)
- Station 1430+55 60" steel low pressure through levee (Sunset Pump Sta.)
- Station 1610+92 36" gravity storm drain (RD 777 lateral 12)

These four crossings are on SBFCA's critical path for construction and require draining the Sutter Butte Main Canal in order to perform the pipe removal and replacement work. The irrigation canal must be operable to irrigate crops between March 20 and January 31, which would therefore make construction of these crossings extremely difficult to schedule and construct.

With the Board's acceptance of this TVR, the contractor will be able to remove and replace these pipelines in a safe and expeditious manner between February 1 and March 20, as required to meet the critical path of the proposed construction schedule. The permit conditions require that if inclement weather occurs the Board's Chief Engineer has the authority to stop work.

8.5.4 – Variance Category 4; Levee Earthwork Variances deviating from CCR 23, § 120 Levees

Detailed descriptions of three earthwork variance categories (EW-1, 2 and 3 are described in detail in Attachment – L.

EW-1. Use of Non-Impervious Soil in Outer Shells for Reconstructed Zoned Levee.
EW-2. Compaction Requirements for Cohesionless Fill.
EW-3. Moisture Content for Cohesive Fill.

Staff agrees with SBFCA's assessment of requested earthwork variances to CCR 23 § 120 standards as described in Attachment – L and recommends Board approval of the requested variances.

8.5.5 – Pipe Owner Permits; Project Area C:

There are 38 pipeline encroachments (excluding lines owned by PG&E or AT&T) within Project Area C. SBFCA proposes to:

- remove or replace 22 pipelines
- remove and dispose 15 pipelines
- abandon in place 1 pipeline

These pipeline crossings fall into the following categories:

- Owner has an existing Board permit.
- Owner does not have an existing Board permit.

- The pre-1955 pipeline is grandfathered into the SRFCP via the Operations and Maintenance manual.
- Permit status or owner has not been confirmed.

At a meeting held May 13, 2013 staffs from SBFCA, the Board, DWR Levee Inspections, DWR Maintenance, and the USACE agreed to a strategy to (1) update existing permits so they conform to current CCR 23 regulations and USACE policies, or (2) issue permits to previously unpermitted encroachments so that all regulatory parties will be able to effectively track and inspect future operations and maintenance of these encroachments.

SBFCA has agreed to act on each owner's behalf to prepare all required encroachment permit application documents, obtain owner signatures, and support the Board staff's application review and permitting activities. Draft permit condition FORTY ONE is proposed to address these procedures.

Board staff recommends that the Board approve these procedures and delegate authority to the Executive Officer to process these permits throughout the course of the Project Area C construction.

The following table summarizes the pipeline owners, locations, and current permit status:

Pipe Owner	Levee Station	CVFPB Permit
Yuba City c/o Diana Langley	1043+03, 1096+62	Yes, Yes
	1096+71, 1096+81	Yes, Yes
	1111+46	Yes
	856+08, 856+23	Yes, Yes
	893+78, 893+84	Yes, Yes
	1043+52	Abandon
Gilsizer County Drainage District, c/o Diana Langley	1043+22, 1043+27	Yes, Yes
	1043+45	Yes
Sutter County, c/o LD 1	972+29	Unknown
Sutter Extension Water District, c/o Lynn Phillips	1430+40, 1430+47	No, pipe xing
	1430+55	No, pipe xing
Micheli; River Bottom Ranch	1314+80	Yes

Richland Enterprises; c/o Balbir Sohal, Amarjit Sohal	1265+59	Pre-1955
Kewal and Resham Singh	1229+41	Pre-1955
Valley Green Mobil Homes Park	1127+48	Yes
RD 777 claims unknown owner	1610+92	No
Manjinder Bains Property	1536+12	Remove

8.6 – Project Benefits

The Area C project is expected to provide the following benefits:

- Address major geotechnical concerns such as through- and under-seepage, slope stability, and condition and impact of existing encroachments.

- Reduce the risk of flooding for existing urban areas, agricultural commodities, infrastructure, and other properties.

- Increase the level of flood protection to a targeted 200-year level for Yuba City and Live Oak consistent with the adopted CVFPP, and consistent with the legislative mandates of Senate Bill 5 (Statutes of 2008) to provide 200-year flood protection for urban and urbanizing areas.

- Bring encroachments surveyed by SBFCA into CCR 23 compliance while addressing 100 percent of the encroachment issues categorized by the USACE in their 2010 periodic inspections as “Unacceptable – likely to prevent performance in the next flood event.”

9.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA Findings:

The Board, acting as a responsible agency under CEQA, has independently reviewed the Feather River West Levee Project Draft Environmental Impact Report (DEIR) (SCH No. 2011052062, December 2012) the Final Environmental Impact Report (FEIR) (SCH No. 2011052062, April 2013) and the Mitigation Monitoring and Reporting Plan (MMRP) submitted by SBFCA. The SBFCA as lead agency determined the project would have a significant effect on the environment and adopted Resolutions 2013-05 and 2013-06 on April 10, 2013 (including Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding

Considerations and Mitigation Monitoring and Reporting Program) and subsequently filed a Notice of Determination with the State Clearinghouse on April 12, 2013.

These documents including project design and may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2013/5-24-2013.cfm under a link for this agenda item. The documents and other materials which constitute the record of the Central Valley Flood Board's proceedings in this matter are in the custody of Jay Punia, Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Room 151, Sacramento, California 95821. The documents are also available for review in hard copy at the SBFCA office.

9.1 – Impacts that can be Mitigated

The FEIR identified certain potentially significant environmental impacts that can be reduced to less than significant with the implementation of identified mitigation measures. The significant impacts and the mitigation measures to reduce them to less than significant are adopted in the SBFCA Resolution 2013-06 dated April 10, 2013 (which includes a Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations and Mitigation Monitoring and Reporting Program). Based on its independent review of the DEIR, FEIR and SBFCA Resolution 2013-06, the Board finds that for each of the significant impacts described, changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects as identified in the FEIR. Moreover, such changes or alterations are within the responsibility and jurisdiction of another public agency, SBFCA, and such changes have been adopted by that agency.

9.2 - Significant Unavoidable Adverse Impacts of the Project

The FEIR also identified certain potentially significant environmental impacts that were deemed to remain significant even after the adoption of mitigation measures. The following impacts of the proposed project remain significant following adoption and implementation of the mitigation measures described in the FEIR:

- Air quality – The project could exceed applicable thresholds for construction emissions. SBFCA will provide an Advance Notification of Construction Schedule and a 24-Hour Hotline to Residents; implement a Fugitive Dust Control Plan and measures to reduce emissions. Fees will be paid to offset annual construction emissions to net zero (0);

- Noise – The project could result in temporary construction-related noise, up to 24 hours per day. To the extent feasible SBFCA will control noise from construction activity such that noise does not exceed applicable noise standards;

- Vegetation and wetlands - The project would result in loss of wetlands and vegetation. For direct effects on woody riparian trees that cannot be avoided, SBFCA will compensate for the loss of riparian habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site specific information and determined through coordination with the appropriate State and federal agencies during the permitting process;

- Visual resources - The project could result in impacts to visual resources. Residential viewers would experience construction in both rural and urban reaches during more than one construction season (typically April 15 to November 30, subject to conditions). In general, construction operations at the levee and borrow sites, construction traffic, haul trucks, and staging areas would be visible in the foreground and middle-ground to residents, businesses, roadway users, and recreationists;

- Cultural resources - The project could result in cumulative impacts to cultural resources. The project may result in the demolition of individual structures and residences that contribute to rural historic landscapes. Other projects that form the cumulative context may contribute to these effects through plan build-out, levee repair, or other actions requiring demolition of structures forming portions of rural historic landscapes also affected by the FRWLP. For these reasons, the FRWLP may contribute to cumulatively significant and unavoidable effects on rural historic landscapes. SBFCA will develop and implement treatment for avoidance and preservation in place or relocation of individual California Register of Historic Resources that are eligible buildings (noncontributing or unaffected buildings would remain in place). Where avoidance or relocation is not feasible, standard treatment such as documentation through the Historic American Buildings Survey, Historic American Landscape Survey, Historic American Engineering Record, or district documentation will be completed. Interpretive displays, online resource, and historic contexts or walking tours may also be used, as appropriate.

For each of these impacts, as described in the FEIR and SBFCA's Adopted Resolution 2013-06, the Board finds that the impact will remain significant even after the adoption of all mitigation measures.

9.3 – Statement of Overriding Considerations

For each of the unavoidable potentially significant impacts of the project described above, the Board finds that the project's benefits outweigh the unavoidable adverse environmental effects and are, therefore, acceptable. The Board further finds that none of the significant unavoidable adverse impacts of the project are within the Board's jurisdiction.

SBFCA adopted Resolution 2013-06, which includes a Statement of Overriding Considerations. The Board concurs with this Statement.

The Board has also independently considered the significant and unavoidable environmental impacts and benefits of the proposed project. The benefits of the project include increasing the level of flood protection for the Counties of Butte and Sutter and progress towards the state's mandate for 200-year flood protection for urban and urbanizing areas. The Board finds that these benefits outweigh the unavoidable adverse environmental effects of the project. As a result, the Board considers the unavoidable adverse environmental effects of the project to be acceptable.

10.0 – SECTION 8610.5 CONSIDERATIONS

1. Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

   The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group.

2. The best available science that related to the scientific issues presented by the executive officer, legal counsel, the Department or other parties that raise credible scientific issues.

   In making its findings, the Board has used the best available science relating to the issues presented by all parties. On the important issue of hydraulic impacts and the computed water surface profiles, SBFCA used a HEC-RAS one-dimensional unsteady flow model that was also utilized by the USACE for the on-going Sutter Basin Feasibility Study. The model is considered by many experts

as the best available scientific tool for the purpose of modeling river hydraulics for the Feather River.

Geotechnical and overall standards for levee design including the USACE, DWR ULDC, and Board have been taken into consideration and the design is in compliance with these standards.

3. Effects of the decision on the entire State Plan of Flood Control:

   This project has positive effects on the State Plan of Flood Control as it includes features that will provide 200-year protection to urban and urbanizing areas of the Sutter Basin. The Board finds that none of the changes in project design between the 65 to 100 percent issued for bid design levels result in adverse hydraulic impacts on the entire State Plan of Flood Control.

   When USACE Section 408 approval is granted via Record of Decision and Letter of Permission, it will be based upon determination that such alterations will not be injurious to the public interest and will not impair the usefulness of the SRFCP.

   In California Statutes of 2007, Chapter 641 (SB276), the Legislature found and declared that “The projects authorized in Section 12670.14 of the Water Code will increase the ability of the existing flood control system in the Sacramento Valley to protect urbanized areas within Sutter County against very rare floods without altering the design flows and water surface elevations prescribed as part of the SRFCP or impairing the capacity of other segments of the SRFCP to contain these design flows and to maintain water surface elevations. Accordingly, the projects authorized in that section will not result in significant adverse hydraulic impacts to the lands protected by the SRFCP and neither the Board nor any other State agency shall require the authorized projects to include hydraulic mitigation for these protected lands.”

4. Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

   The project would have no net increases in operational greenhouse gas (GHG) emissions impacting climate change. Emissions associated with the project would occur over a finite period of time (2 year) as opposed to operational emissions, which would occur over the lifetime of a project.

11.0 – STAFF RECOMMENDATION

Staff concludes that the proposed Area C construction phase of the FRWLP, to be constructed as described in SBFCA's 100 percent "Issued For Bid Set", dated March 13, 2013, and in Addendum Nos. 1 and 2, will result in an overall betterment to the SRFCP and State Plan of Flood Control, and will be consistent with the adopted 2012 Central Valley Flood Protection Plan.

Staff further concludes that the proposed project alterations can be constructed in a manner not injurious to the public interest and that will not impair the usefulness of the SRFCP.

Staff therefore recommends that the Board:

- approve Draft Permit No. 18793-1, conditioned upon receipt of Section 408 Record of Decision and Letter of Permission from the USACE (See Exhibit A) when received),

- approve, pursuant to CCR 23, §§ 11(a) and (b) with regard to Variances to Board Standards, the requested construction variances summarized in Section 8.5 herein, and further detailed in Attachments – J, – K, and – L,

- delegate authority to the Executive Officer to make non-substantive changes to the draft permit as needed to incorporate additional design changes submitted by SBFCA prior to receipt of the USACE ROD and LOP. If substantive changes to the draft permit are required, the Board staff will bring the permit back to the Board at a future meeting to seek approval for substantive changes,

- adopt the CEQA findings and Resolution 2013-07 (Attachment – C),and direct staff to file a Notice of Determination with the State Clearinghouse.

- direct the Executive Officer to review and issue encroachment permits to owners of pipeline crossings within Project Area C that will be reconstructed as part of the Area C project, and as detailed in Section 8.5.5 herein,

- direct the Executive Officer that if, during construction, additional non-conforming encroachments or constructability issues are discovered by any party SBFCA will consider whether or not they can be brought into compliance during construction, and if they can and SBFCA proposes to do so, Board staff will evaluate the

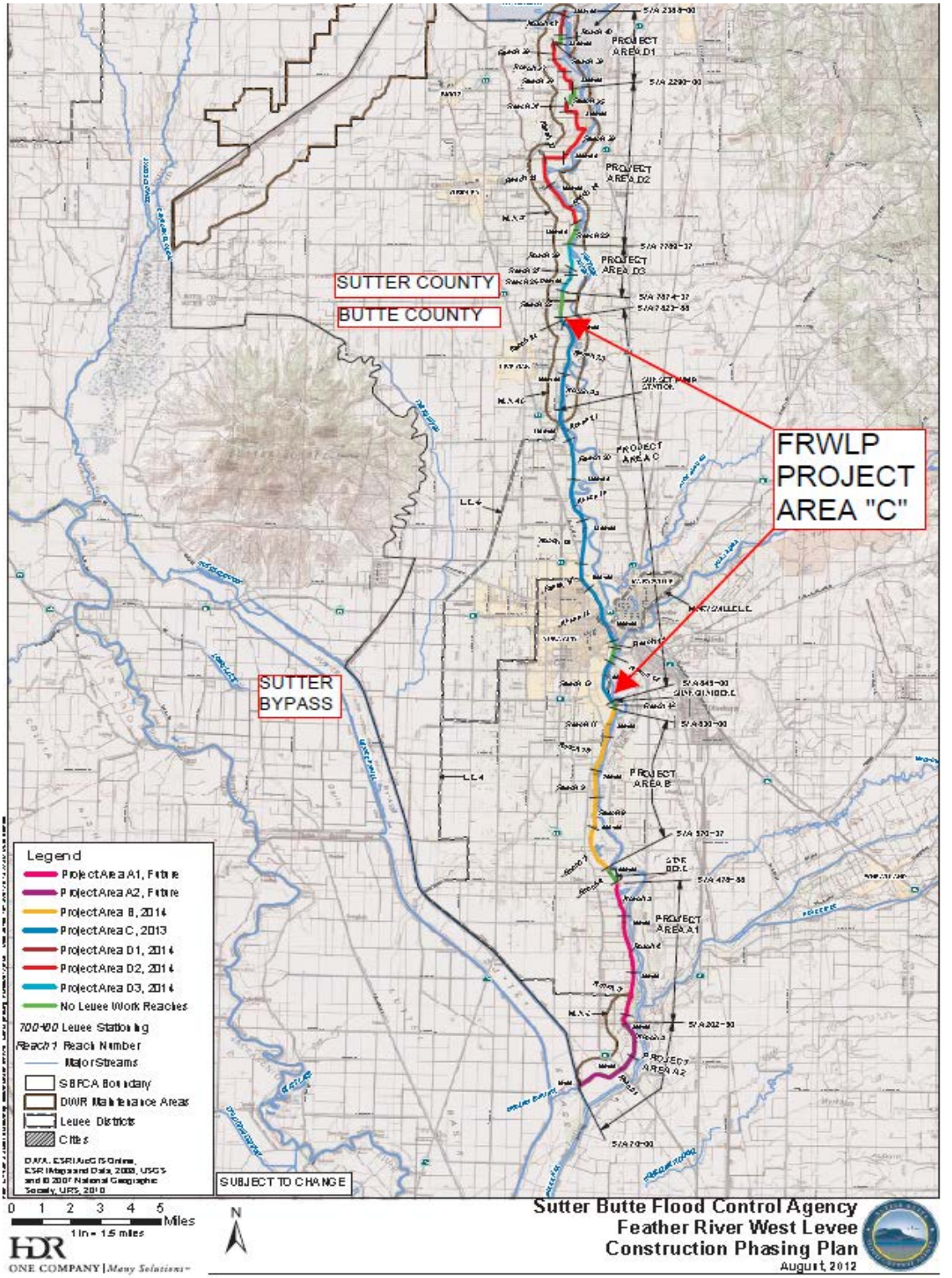
proposal(s) for Board approval to be made either by direct Board action or by delegation to the Executive Officer as appropriate.

12.0 – LIST OF ATTACHMENTS

A. Location Map
B. Draft Permit No. 18793-1
   - Exhibit A: USACE Section 408 Record of Decision and Letter of Permission (anticipated late July 2013)
   - Exhibit B: DWR M.A.16 (RD 777) Endorsement
   - Exhibit C: LD 1 and LD 9 Endorsements
C. Board Resolution 2013-07
D. Section 408 Request Letter, October 30, 2012
E. Construction Phasing Map
F. Typical Cross-Sections
G. Project Plan Views and Details: Volume 3 Dwg.G-007 & G-008; Volume 4 Dwg. G-002; Yuba City pipe Vol.3 Dwg.C-506
H. Water Surface Profiles
I. Parcel Maps and ownership
J. Variance Category 1 – Issues raised by Board staff in October 2012 Section 408 Request Staff Report
K. Variance Categories 2 and 3 – Requested Pipe Variances and Time Variances
L. Variance Category 4 – Levee Earthwork Variances
M. Flood management measures by reach

Coordinated by:	Deb Biswas, Engineer, Projects Section
Prepared by:	David Williams, Senior Engineer, Projects Section
Hydraulics Review:	Sungho Lee, Engineer, Projects Section
Encroachment Review:	Alison Tang, Engineer, Encroachment Section
Geotechnical Review:	Deb Biswas, Engineer, Projects Section
Document Review:	Eric R. Butler, Projects and Environmental Branch Chief
	Len Marino, Chief Engineer

ATTACHMENT A – PROJECT AREA C LOCATION MAP



HDR
ONE COMPANY | Many Solutions

Sutter Butte Flood Control Agency
Feather River West Levee
Construction Phasing Plan
August 2012

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DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18793-1 BD

This Permit is issued to:

Sutter Butte Flood Control Agency
1227 Bridge Street, Suite C
Yuba City, California 95991

This flood system improvement permit is granted to the Sutter Butte Flood Control Agency (SBFCA) to construct the first phase (Project Area C) of the Feather River West Levee Project (FRWLP) to reduce flood risk in the Sutter Basin. The project includes construction of cut-off walls and seepage berms to remediate levee through-seepage and under-seepage problems, and removal, relocation, and modification of several existing levee encroachments to bring them into compliance with federal and State standards through revised or new Board encroachment permits. Other existing encroachments will be relocated or removed in their entirety. These additional encroachment permits will be issued to the individual encroachment owners as required through the Project Area C schedule.

FRWLP Area C extends upstream from Shanghai Bend (Project Reach 13, Station 844+75 in Sutter County) for a distance of approximately 15 miles to approximately 1/4 mile north of Campbell Road in the City of Live Oak (Project Reach 24, Station 1625+00 in Butte County). The levee is operated and maintened by Sutter County Levee Districts 1 and 9, and by the California Department of Water Resources in State (Maintenance Area 16 (Section , T0, R , MDB&M, Levee District 1 Sutter, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18793-1 BD

LIABILITIES / IMDEMNIFICATION

THIRTEEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the Central Valley Flood Protection Board, the Department of Water Resources, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim. This condition shall supersede condition TEN, above.

FOURTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California

Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

FIFTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

SIXTEEN: The Central Valley Flood Protection Board, Department of Water Resources, and Sutter County Levee Districts 1 and 9 shall not be held liable for damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

EASEMENT, LICENSE OR TEMPORARY ENTRY PERMIT

SEVENTEEN: If the construction project extends onto land owned in fee and/or easement by the Sacramento and San Joaquin Drainage District acting by and through the Central Valley Flood Protection Board (hereafter Board), the permittee should secure an easement, license, or temporary entry permit from the Board prior to commencement of work. Contact Angelica Aguilar at (916) 653-5782.

BOARD CONTACTS

EIGHTEEN: The permittee shall contact the Board by telephone at (916) 574-0609, and the Board's Construction Supervisor at (916) 574-2646 to schedule a preconstruction conference. Failure to do so at least 20 working days prior to start of work may result in delay of the project.

PERMITTING AND AGENCY CONDITIONS

NINETEEN: Project Area C is the first phase of the Sutter Butte Flood Control Agency's Feather River West Levee Project, proposed pursuant to federal 33 U.S.C. Section 408 authority of the U.S. Army Corps of Engineers. The Feather River west levee is a facility of the Sacramento River Flood Control Project and State Plan of Flood Control regulated by the Board. By acceptance of this permit, the permittee acknowledges the authority of the Board to regulate all future flood system improvement projects and encroachments along the project levee reach including those that may encroach upon alterations approved by this permit prior to the work being incorporated into the Sacramento River Flood Control Project by the U.S. Army Corps of Engineers.

TWENTY: The permittee shall comply with all conditions set forth in the Record of Decision and Letter of Permission from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated July xx, 2013, which are attached to this permit as Exhibit A and are incorporated by reference.

TWENTY-ONE: The permittee shall address all concerns expressed by the Department of Water Resources (Maintenance Area 16) in its letter dated May 16, 2013, which is attached to the permit as Exhibit B and is incorporated by reference.

TWENTY-TWO: The endorsements of Sutter County Levee Districts 1 and 9, dated April 13, 2013, are attached to this permit as Exhibit C and are incorported by reference.

TWENTY-THREE: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

TWENTY-FOUR: The permittee agrees to incur all costs for compliance with local, State, and federal permitting and resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations it administers and enforces.

TWENTY-FIVE: The permittee shall cooperate with the Board to ensure that any encroachment that must be relocated, modified or otherwise altered to accommodate construction of flood system improvements permitted herein is relocated, modified or otherwise altered in a manner that complies with current applicable State and federal standards. If the affected encroachment has an existing Board permit or is subject to some other applicable Board authorization, the permittee shall cooperate with the Board to ensure the permit or other authorization is appropriately amended to reflect the changed condition as shown on as-built drawings for the encroachment and overall project. If the encroachment does not have a Board permit or other Board authorization, the permittee shall cooperate with the Board to determine whether a Board permit is required. If so, the permittee shall cooperate with the Board to ensure that the required permit application is made and, if granted, the permit reflects the changed condition as shown on as-built drawings for the encroachment and the overall project.

TWENTY-SIX: If the permittee or successor does not comply with the conditions of the permit and enforcement by the Board is required, the permittee or successor shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees.

TWENTY-SEVEN: Upon completion of this flood system improvement project, the permittee will cooperate with the Board to update the applicable project Operations and Maintenance Manual covering the project area, and to cooperate with the Board to obtain federal acceptance of the project works into the Sacramento River Flood Control Project by the U.S. Army Corps of Engineers, followed by federal turnover to the State for Operations and Maintenace through existing assurance agreements.

TWENTY-EIGHT: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted project works if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with implementation of the Central Valley Flood Protection Plan or or other future flood control plan or project, or if damaged by any cause. If the permittee does not comply, the Board may perform this work at the permittee's expense.

PRE-CONSTRUCTION

TWENTY-NINE: The permittee shall provide construction supervision and inspection services acceptable to the Board.

THIRTY: The permittee shall contact the U. S. Army Corps of Engineers regarding inspection of the project during construction as the proposed work is an alteration to an existing federal flood control project that will be incorporated into the Sacramento River Flood Control Project, a facility of the State Plan of Flood Control.

THIRTY-ONE: Prior to commencement of excavation, the permittee shall create a photo record, including associated descriptions, of the levee conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Board within 30 days of beginning the project.

THIRTY-TWO: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior written approval of the Board. This condition excludes removal and replacement of four pipeline crossings approved by the Board pursuant to Title 23, Section 11 under variance to Title 23, Section 112 to perform work during the flood season, at stations 1430+40, 1430+47, 1430+55, and 1610+92. Other construction time variances may be requested by the permittee and approved by the Board's Chief Engineer for two-week periods dependant on weather forecasts. Such time variances may be revoked at any time if inclemental weather is pending.

THIRTY-THREE: Thirty (30) calendar days prior to the start of any demolition and/or construction activities within the floodway or within the existing levee prism, the permittee shall submit to the Board's Chief Engineer two sets of detailed plans and specifications and supporting geotechnical and/or hydraulic impact analyses, for any and all temporary, in channel, or levee prism work that may have an impact during the flood season from November 1 through April 15. The Board may request additional information as needed and will seek comment from the U.S. Army Corps or Engineers and / or the local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) working days.

THIRTY-FOUR: A profile of the existing levee crown roadway and access ramps that will be utilized for access to and from the borrow area shall be submitted to the Board prior to commencement of excavation.

THIRTY-FIVE: Keys shall be provided to local levee maintenance agencies and the Department of Water Resources for all locks on gates providing access to the floodway, levee ramp, levee toe, and along the levee crown.

CONSTRUCTION

THIRTY-SIX: All work approved by this permit shall be in accordance with the final (100% "Issued For Bid" set) of submitted drawings and specifications, and including Addenda Nos. 1 and 2 except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Board.

THIRTY-SEVEN: All addendums and contract change orders made to the submitted documents by the permittee after Board approval of this permit shall be submitted to the Board's Chief Engineer for review and approval prior to incorporation into the permitted project. The submittal shall include all supplemental plans, specifications, and necessary supporting geotechnical, hydrology and hydraulics, or other technical analyses. The Board shall acknowledge receipt of the addendum or change submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review

and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or local maintaining agencies when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed forty five (45) calendar days. Upon approval of submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

THIRTY-EIGHT: Any additional project features proposed by the permittee in the floodway, on or in the levee section, and within thirty (30) feet of the landward levee toe will require either incorporation by amendment to this permit, or will require issuance of a seperate encroachment permit to the encroachment owner from the Board.

THIRTY-NINE: Existing or proposed utility poles and guy anchors shall be relocated or installed a minimum distance of 10 feet landward of the landward levee toe.

FORTY: All debris generated by this project shall be disposed of outside the floodway, levee prism and proposed right-of-way.

FORTY-ONE: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15 without prior approval from the Central Valley Flood Protection Board.

FORTY-TWO: During construction of the project, any and all anticipated or unanticipated conditions encountered which may impact levee integrity or flood control shall be brought to the attention of the Board inspector immediately and prior to continuation. Any encountered abandoned encroachments shall be completely removed or properly abandoned under the direction of the Board inspector.

FORTY-THREE: The stability of the levee shall be maintained at all times during construction.

FORTY-FOUR: Excavations below the design flood plane and within the levee section or within fifty (50) feet of the projected waterward and landward levee slopes shall have side slopes no steeper than 1 horizontal to 1 vertical. Flatter slopes may be required to ensure stability of the excavation.

FORTY-FIVE: Any damage to the levee crown roadway or access ramps that will be utilized for access for this project shall be promptly repaired to the condition that existed prior to this project.

FORTY-SIX: Equipment used in the construction of the cutoff wall shall not exceed the live-load surcharge to a level that causes or contributes to the instability of the levee during construction operations.

FORTY-SEVEN: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

FORTY-EIGHT: All fencing, gates and signs removed during construction of this project shall be replaced in kind and at the original locations. If it necessary to relocate any fence, gate or sign, the permittee is required to obtain written approval from the Board prior to installation at a new location if not shown on the submitted drawings.

FORTY-NINE: Any pipe or conduit being reinstalled in the levee section or within fifteen (15) feet and thirty (30) feet of the waterward and landward levee toes, respectively, shall meet CCR 23 standards or have a Board variance approval per CCR 23 Sections 11(a) and (b).

FIFTY: Fill on the levee slopes shall be keyed into the existing levee section with each lift or as specified in the approved contract plans and specifications.

FIFTY-ONE: The fill surface areas shall be graded to direct drainage away from the toe of the levee.

FIFTY-TWO: Some existing levee slopes are less than 2 horizontal to 1 vertical on the land side and 3 horizontal to 1 vertical on the water side, and will remain so after the work permitted herein. This permit approves these steeper slope by a variance to Board standards.

FIFTY-THREE: A pipeline or conduit to be filled with concrete must have a minimum cover of (3) three feet below the waterward levee slope and (1) foot below the landward levee slope.

CONSTRUCTION MATERIALS

FIFTY-FOUR: All fill material shall be as stated in the Project Area C contract specifications Division 31 - Earthwork and free of lumps or stones exceeding 3 inches in greatest dimension, vegetative matter, or other unsatisfactory material.

FIFTY-FIVE: Backfill material for excavations within the existing and to be constructed levee sections and within fifty (50) feet of the levee toes shall be placed in 4- to 6-inch layers, moisture conditioned ranging from 3 above to 1 below optimum moisture content, and compacted to a minimum of 95 percent relative compaction as measured by ASTM Method D698 or as provided for in the contract specifications Division 31 - Earthwork.

FIFTY-SIX: Earthen material meeting the requirements designated in this permit and included Project Area C specifications shall be used when constructing or reconstructing the waterside levee slope and levee crown fill areas, and no cuts shall remain in the levee section upon completion.

FIFTY-SEVEN: Fill material shall be placed only within the area indicated on the 100% "Issued For Bid" approved plans including Addenda Nos. 1 and 2. Placement of additional fill in excess of 500 cubic yards beyond what is specified in these plans shall required written authorization from the Board's Chief Engineer.

FIFTY-EIGHT: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the levee section and within fifty (50) feet of the levee toes.

FIFTY-NINE: The reconstructed levee crown roadway and access ramps shall be surfaced with a minimum of 4 inches of compacted, Class 2, aggregate base (Caltrans Specification 26-1.02A).

SIXTY: Fluid pressures in the cutoff wall construction zone shall be carefully monitored and controlled to minimize the potential for hydrofracturing.

SIXTY-ONE: Excess bentonite or other cutoff wall fluids shall be properly disposed of outside of the floodway. The bentonite or other cutoff wall fluids can be used as Type-1 or Type-2 backfill material

for levee reconstruction if properly mixed within the borrow or stockpie site and meet the requirements within the contract specification for gradation, moisture and compaction.

SIXTY-TWO: Aggregate base material shall be compacted to a relative compaction of not less than 95 percent per ASTM Method D1557-91, with a moisture content sufficient to obtain the required compaction or per the Project Area C contract specifications Divison 32 - Exterior Improvments, Aggregate base course.

VEGETATION / ENVIRONMENTAL MITIGATION

SIXTY-THREE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

SIXTY-FOUR: The permittee shall replant or re-seed the levee slopes to restore sod, grass, or other non-woody ground covers if damaged during project work.

SIXTY-FIVE: The mitigation measures approved by the permittee and found in its Mitigation and Monitoring Reporting Program (MMRP) are made a condition of this permit. The permittee shall implement all such mitigation measures. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 or 15063 with advance notice of the proposed changes and submittal of supporting documentation for review and comment to the Board's Environmental Section staff.

SIXTY-SIX: In the event existing revetment on the channel bank or levee slope is disturbed or displaced, it shall be restored to its original condition upon completion of the proposed installation.

SIXTY-SEVEN: In the event that levee or bank erosion injurious to facilities of the State Plan of Flood Control occurs at or adjacent to and as a result of the permitted flood system improvement project or related encroachment work, the permittee shall repair the eroded area and propose measures, to be approved by the Board, to prevent further erosion.

CONSTRUCTION COMPLETION

SIXTY-EIGHT: All temporary fencing, gates and signs shall be removed upon completion of project.

SIXTY-NINE: The project site including the levee section and access ramps shall be restored to at least the condition that existed prior to commencement of work.

SEVENTY: Upon completion of the project, the permittee shall perform a levee crown profile survey and create a photo record, including associated descriptions, of "as-built" levee conditions. The levee crown profile survey and photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Board within 120 days of project completion.

SEVENTY-ONE: The permittee acknowledges that some portions of the levee improvements may be overbuilt to account for settlement. The permittee shall perform a levee crown profile survey of the

completed Project Area C and provide it and a comparison against the pre-construction levee crown profile. Prior to final post-construction inspection the permittee shall ensure that the final levee crown profile does not exceed the pre-construction profile, as this permit does not authorize any levee raises.

SEVENTY-TWO: Uncertainties in levee freeboard due to merging data from two different sources are unclear at this time. When DWR releases the completed Central Valley Floodplain Evaluation and Delineation Program (CVFED) data the permittee will recalculate freeboard using only that data for both cross section and top of levee elevations. The permittee will develop a plan for Board approval to correct any freeboard deficiencies under this or a future phase of construction.

SEVENTY-THREE: The potential for earthquake-induced levee damage and displacement along the Feather River West Levee Project will be incorporated into an Emergency Action Plan (EAP) in accordance with DWR Urban Levee Design Criteria (ULDC) requirements. The permittee shall submit the EAP to the Board staff for review and comment 180 days after completion of Project Area C construction.

SEVENTY-FOUR: Upon completion of the construction contract for Project Area C the permittee will conduct a Final Construction Walk-through for Board, Department of Water Resources, and U.S.Army Corps of Engineers staff. The walk-through is a condition for Board project acceptance, State funding, and as predecessor to U.S. Army Corps of Engineers system wide acceptance and eligibility for Public Law 84-99 rehabilitation and inpsection program. This walk-through is critical to successful permit and project close-out.

POST-CONSTRUCTION

SEVENTY-FIVE: Within 120 days of completion of the project, the permittee shall submit to the Board a certification report, stamped and signed by a professional civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with Board permit conditions and the permittee's submitted drawings and specifications, addenda and contract change orders.

SEVENTY-SIX: Within three years from completion of the construction of the work authorized under this permit, the permittee shall provide the Sacramento and San Joaquin Drainage District, acting by and through the Board, a permanent easement or joint use agreement granting all flood control rights upon, over and across the property to be occupied by the existing or to-be-reconstructed levee, including the area of the cutoff wall and levee raise and realignment fill areas. The easement must include the levee section, the area ten (10) feet from the waterward levee toe adjacent to waterside berms which may be used for staging flood protection activities, and the area fifty (50) feet in width adjacent to the existing and new landward levee toes if the areas are not presently encumbered by a Board easement. For information regarding Board easements please contact Angelica Aguilar at (916) 653-5782.

SEVENTY-SEVEN: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor(s) shall abandon the project under direction of the Board and Department of Water Resources, at the permittee's or successor's cost and expense.

OPERATIONS AND MAINTENANCE

SEVENTY-EIGHT: The permittee shall maintain the permitted project works in the manner required and as requested by the authorized representative of the Department of Water Resources, Levee District Nos. 1 and 9 (Sutter), or any other agency responsible for maintenance while under contract to do so.

SEVENTY-NINE: Haul ramps and utilized levee crown roadway shall be maintained in a manner prescribed by authorized representatives of the Board, Department of Water Resources, Levee District or any other agency responsible for maintenance.

EIGHTY: Within 180 days of completion of the project, the permittee shall submit to the Board proposed revisions to the U. S. Army Corps of Engineers, Supplement to Standard Operation and Maintenance Manual, Sacramento River Flood Control Project, and the associated "as-built" drawings for system alterations approved by Exhibit A that are to be incorporated into the federal Sacramento River Flood Control Project.

EIGHTY-ONE: The improvements permitted herein are designed to manage flows from a storm with a probability of occurrence of .005 in any year (200-year protection). Permittee's design assumed that non-urban existing upstream levees will not be raised above the design for the Sacramento River Flood Control Project as shown on the 1957 profile. Permittee's design flow and calculations assumed no upstream levee overtopping where permittee's design storm water surface elevation exceeds the 1957 profile top of levee elevation. Permittee acknowledges that the adopted 2012 Central Valley Flood Protection Plan will be regularly updated by the State and that the plan and future updates could include improvements that would change the flow and water surface elevation associated with permittee's design storm, possibly reducing the level of protection provided by the permitted improvements. Permittee agrees to participate in future modifications to the these levees as may be required by the Central Valley Flood Protection Plan and its subsequent updates. Permittee's level of participation shall be equivalent to the level required of other local jurisdictions by the Plan. Permittee further agrees that should the Plan include measures that reduce the level of protection provided by the permitted improvements, permittee shall have no basis for a claim of hydraulic impacts.

EIGHTY-TWO: The Sutter Butte Main Canal District (SBMCD) is in close proximity to the federal levee and in some cases the east bank of the canal and the landside of the Feather River west levee are one and the same. The Sutter Butte Flood Control Agency has agreed to to help coordinate and develop an agreement between the Department of Water Resources (Maintenance Area 16), levee districts(s), and SBMCD regarding the distinction and seperation of maintenance responsibilities between the LMAs and SBMCD prior to the Board's acceptance of the Feather River West Levee Project Area C. The Board shall have up to 30 days after receipt of the agreement for comment. The Board and / or the Department of Water Resources may extend this review period up to 45 days by written notification.

END OF CONDITIONS

EXHIBIT A

U.S. Army Corps of Engineers 33 U.S.C Section 408 Major

Approval and Letter of Permission

Expected: July 2013

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STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR., Governor

DEPARTMENT OF WATER RESOURCES
DIVISION OF FLOOD MANAGEMENT
P.O. BOX 219000
SACRAMENTO, CA 95821-9000

May 16, 2013

Mr. Michael W. Bessette, P.E.
Director of Engineering
Sutter Butte Flood Control Agency
1227 Bridge Street, Suite C
Yuba City, CA 95991

State Maintenance Area 16 Endorsement for Feather River West Levee Project Area C

Dear Mr. Bessette:

The Department of Water Resources (DWR) Flood Maintenance Office (FMO) is responsible for maintaining Maintenance Area 16 (MA16) in Sutter County. The Sutter Butte Flood Control Agency (SBFCA) is anticipating beginning construction of a flood risk reduction project consisting primarily of a seepage cutoff wall in July 2013. MA16 boundaries within the Project Area C limits extend from approximately Station 1460+00 to Station 1625+00.

MA16 has concerns regarding the extent to which the Project Area C will address known deficiencies. These concerns have been expressed in several plan reviews and in recent meetings with SBFCA and Central Valley Flood Control Board (CVFPB) staff. MA16 expects SBFCA to address the following concerns as part of Project Area C:

- Post-project maintenance on oversteepened levee slopes (greater than 2:1 (H:V) landside and 3:1 waterside) will continue to be difficult. It is understood that the levee slopes will be rebuilt to the pre-project geometry. The U.S. Army Corps of Engineers (USACE) Periodic Inspections along with PL84-99 eligibility require levee slopes to match as-constructed conditions. MA16 needs to be assured that the re-built slopes will not be any steeper than the original as-built drawings show.

- There is concern that the levee material with steep slopes will be very susceptible to erosion, especially before vegetative cover is established. MA16 needs to be assured that post-construction maintenance is included in the project to establish an acceptable vegetative cover on the slopes.

- The Sutter Butte Main Canal travels parallel along the levee toe for a portion of the project. Because of the presence of the canal at the levee toe, the slope is more susceptible to slips and erosion. Maintenance of the levee slope and the canal needs to be clarified before the project is turned back over for operations and maintenance.

- There are many variances being requested to the California Code of Regulations Title 23, many regarding encroachments, such as pipes. MA16 wants to be assured that a clear record of all variances is accepted by CVFPB and USACE, and that the responsible maintainer is identified before the project is complete.

- There is a history of adjacent landowners in the area performing farming operations or disposing of debris within the state right of way which is considered an unacceptable encroachment. We have requested a fence along the right-of-way be established as part of this project since this is a good opportunity to do so. MA16 will have to consider assessing the local beneficiaries in order to install a fence if this project does not intend to provide one.

Provided these concerns are addressed by SBFCA, I hereby endorse the Feather River West Levee Project Area C.

If you have any questions or need additional information, please contact me at (530) 755-0071 or email at karen.hull@water.ca.gov.

Sincerely,

Karen Hull

Karen Hull, Superintendent
Sutter Maintenance Yard

cc: Jennifer Fasani (DWR)
David Williams (CVFPB)
David Pesavento (DWR)

Attachment B, Exhibit C

State of California

DEPARTMENT OF WATER RESOURCES
CENTRAL VALLEY FLOOD PROTECTION BOARD

California Natural Resources Agency

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMIT

Application No. 18793-1
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.
SBFCA - Feather River West Levee; Project Area-C

2. Project Location: _____ County, in Section _____
Township: _____ (N) (S), Range: _____ (E) (W), M. D. B. & M.
Latitude: _____ Longitude: _____
Stream: _____, Levee: _____ Designated Floodway: _____
APN: _____

3. _____ of _____
Name of Applicant / Land Owner — Address
_____ City _____ State _____ Zip Code _____ Telephone Number
_____ E-mail

4. _____ of _____
Name of Applicant's Representative — Company
_____ City _____ State _____ Zip Code _____ Telephone Number
_____ E-mail

5. Endorsement of the proposed project from the Local Maintaining Agency (LMA)

We, the Trustees of LEVEE DISTRICT #1 OF SUTTER approve this plan, subject to the following conditions.
Name of LMA

☐ Conditions listed on back of this form ☐ Conditions Attached ☒ No Conditions

Trustee — Date 4/16/13 — Trustee — Date

Trustee — Date 4/16/13 — Trustee — Date

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMIT

Application No. 18793-1 (For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.
SBFCA - Feather River West Levee; Project Area - C

2. Project Location: ______ County, in Section ______
Township: ______ (N) (S), Range: ______ (E) (W), M. D. B. & M.
Latitude: ______ Longitude: ______
Stream: ______, Levee: ______ Designated Floodway: ______
APN: ______

3. ______ of ______
Name of Applicant / Land Owner — Address
City — State — Zip Code — Telephone Number
E-mail

4. ______ of ______
Name of Applicant's Representative — Company
City — State — Zip Code — Telephone Number
E-mail

5. Endorsement of the proposed project from the Local Maintaining Agency (LMA):

We, the Trustees of Levee District #9 (Name of LMA) approve this plan, subject to the following conditions:

☐ Conditions listed on back of this form ☐ Conditions Attached ☒ No Conditions

[signature] Chairman, LD9 — Trustee — Date 4/16/13 — Trustee — Date

Trustee — Date — Trustee — Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
CENTRAL VALLEY FLOOD PROTECTION BOARD

RESOLUTION NO. 2013-07

FINDINGS AND DECISION AUTHORIZING ISSUANCE OF
FLOOD SYSTEM IMPROVEMENT PROJECT
PERMIT APPLICATION NO. 18793-1

SUTTER BUTTE FLOOD CONTROL AGENCY
FEATHER RIVER WEST LEVEE PROJECT
PROJECT AREA C (REACHES 13 THROUGH 24) CONSTRUCTION PERMIT
BUTTE AND SUTTER COUNTIES

WHEREAS, the Central Valley Flood Protection Board (Board), in support of the Sutter Butte Flood Control Agency (SBFCA), approved on October 26, 2012 a request to the U.S. Army Corps of Engineers (USACE) for 33 U.S.C. Section 408 (Section 408) approval to alter of 41 miles of federal flood control project levee, the Feather River West Levee Project (FRWLP), located on the west side (right bank) of the Feather River from Thermalito Afterbay in Butte County downstream to approximately 3.5 miles north of the Feather River's confluence with Sutter Bypass in Sutter County; and

WHEREAS, the SBFCA submitted an application and supporting documentation to the Board in March 2013 to construct Project Area C, the first phase of the FRWLP, including approximately 14.78 miles of levee improvements in Reaches 13 to 24 within Butte and Sutter Counties; and

WHEREAS, SBFCA released a Notice of Preparation initiating a 30-day public comment period on May 20, 2011 and extended the comment period to July 8, 2011; and

WHEREAS, SBFCA as lead agency under the California Environmental Quality Act, Public Resources Code sections 21000 *et seq*. ("CEQA") prepared a Draft Environmental Impact Report (DEIR) (SCH No. 2011052062, December 2012), and Final Environmental Impact Report (FEIR) (SCH No. 2011052062, April 2013), and Mitigation Monitoring and Reporting Plan (MMRP) for the FRWLP (incorporated herein by reference and available at Board or SBFCA offices); and

WHEREAS, the SBFCA Board approved the FRWLP (SBFCA Resolutions 2013-05 and 2013-06), the FEIR, and MMRP, and approved findings and a Statement of Overriding Considerations pursuant to the CEQA Guidelines (incorporated herein by reference), and filed a Notice of Determination with the State Clearinghouse on April 12, 2013; and

WHEREAS, the Boards of Sutter County Levee District 1 and Sutter County Levee District 9 endorsed the Project Area C application on April 16, 2013 without conditions; and

WHEREAS, the Department of Water Resources (DWR) Flood Maintenance Office conditionally endorsed the Project Area C application on May 16, 2013; and

WHEREAS, the USACE Washington DC headquarters Section 408 Record of Decision (ROD) and USACE Sacramento District Letter of Permission (LOP) are anticipated in late July 2013; and

WHEREAS, if the Section 408 request is approved by USACE, staff will review and incorporate any USACE conditions into the final permit; and

WHEREAS, Board staff completed a comprehensive technical review of SBFCA's Project Area C Permit Application No. 18793-1 including the following documents:

- Hydraulic analysis and geotechnical reports and data
- 100% Plans and Specifications
- 100% "Issued for Bid" Plans and Specifications:
- 100% Design Documentation Report
- 100% Technical Specifications
- 100% "Issued for Bid" Technical Specifications
- Addenda 1 and 2
- All pertinent CEQA / NEPA environmental documents
- Project bid schedules; and

WHEREAS, in accordance with California Code of Regulations, Title 23 (CCR 23), § 11, the Board may grant variances to its standards for uses that are not consistent with the Board's standards. When approval of a permit requires variances, the applicant must clearly state in its application why compliance with the Board's standards is infeasible or not appropriate; and

WHEREAS, SBFCA has requested the Board to grant variances from CCR 23, pursuant to the requirements of CCR 23 § 11, and as summarized in Staff Report Section 8.5 and further detailed in Staff Report Attachments J, K, and L; and

WHEREAS, Board, SBFCA, DWR, and USACE staffs have developed a strategy to (1) update existing encroachment pipeline crossing permits to ensure that they conform to current CCR 23 regulations and USACE policies, and (2) issue encroachment permits to owners of currently unpermitted encroachments to ensure that all regulatory parties, levee maintainers, and owners will be able to accurately and efficiently track and inspect future operations and maintenance of these encroachments; and

WHEREAS, SBFCA has agreed to act on each owner's behalf to prepare all required encroachment permit application documents, obtain owner signatures, and support the Board staff's application review and permitting activities; and

WHEREAS, the SBFCA Area C construction project will:

- address major geotechnical concerns such as through- and under-seepage, slope stability, and condition and impact of existing encroachments,

- reduce the risk of flooding for existing urban areas, agricultural commodities, infrastructure, and other properties,

- increase the level of flood protection to a targeted 200-year level for Yuba City and Live Oak consistent with the adopted CVFPP, and consistent with the legislative mandates of the Central Valley Flood Protection Act of 2008 (Statutes of 2007, Chapter 364, SB 5) to provide 200-year flood protection for urban and urbanizing areas.

- bring encroachments surveyed by SBFCA into CCR 23 compliance while addressing 100 percent of the encroachment issues categorized by the USACE in their 2010 periodic inspections as "Unacceptable – likely to prevent performance in the next flood event."; and

WHEREAS, The Board has conducted a public hearing on Permit Application No. 18793-1 and has reviewed the Staff Report and Attachments, the documents and correspondence in its file, and the environmental documents prepared by the SBFCA.

NOW, THEREFORE, BE IT RESOLVED THAT,

Findings of Fact.

1. The Board hereby adopts as findings the facts set forth in the Staff Report.

2. The Board has reviewed all Attachments, Exhibits, Figures, and References listed in the Staff Report.

CEQA Findings.

3. The Board, as a responsible agency, has independently reviewed the analyses in the DEIR (SCH No. 2011052062, December 2012) and the FEIR (April 2013) for the FRWLP which includes the SBFCA Lead Agency findings, Statement of Overriding Considerations, MMRP, and has reached its own conclusions regarding them.

4. The Board, after consideration of the DEIR (SCH No. 2011052062, December 2012) and the FEIR (April 2013) on the FRWLP, and the SBFCA Lead Agency findings, adopts the project description, analysis and findings which are relevant to the project.

5. **Findings regarding Significant Impacts**. Pursuant to CEQA Guidelines sections 15096(h) and 15091, the Board determines that the SBFCA findings, incorporated herein by reference, summarize the FEIR determinations regarding impacts of the FRWLP, before and after mitigation. Having reviewed the FEIR and the SBFCA findings, the Board makes its findings as follows:

a. **Findings Regarding Significant and Unavoidable Impacts.**

The Board finds that the FRWLP may have the following significant, unavoidable impacts, as more fully described in the SBFCA findings. Mitigation has been adopted for each of these impacts although it does not reduce the impacts to less than significant. The impacts and mitigation measures are set forth in more detail in the SBFCA findings.

A. Air quality - The project could exceed applicable thresholds for construction emissions. SBFCA will provide an Advance Notification of Construction Schedule and a 24-Hour Hotline to Residents; implement a Fugitive Dust Control Plan and measures to reduce emissions. Fees will be paid to offset annual construction emissions to net zero.

B. Noise - The project could result in temporary construction-related noise up to 24 hours per day. To the extent feasible construction contractors shall control noise from construction activity such that noise does not exceed applicable noise standards.

C. Vegetation and wetlands - The project would result in loss of wetlands and vegetation. For direct effects on woody riparian trees that cannot be avoided, SBFCA will compensate for the loss of riparian habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site specific information and determined through coordination with the appropriate State and federal agencies during the permitting process.

D. Visual resources - The project could result in impacts to visual resources. Viewers would experience construction in both rural and urban reaches during more than one construction season (typically April 15 to November 30, subject to conditions). In general, construction operations along the levee and at borrow sites, construction traffic, haul trucks, and staging areas would be visible in the foreground and middleground to residents, businesses, roadway users, and recreationists.

E. Cultural resources - The project could result in cumulative impacts to cultural resources. The project may result in the demolition of individual structures and residences that contribute to rural historic landscapes. Other projects that form the cumulative context may contribute to these effects through plan build-out, levee repair, or other actions requiring demolition of structures forming portions of rural historic landscapes also affected by the FRWLP. For these reasons the FRWLP may contribute to cumulatively significant and unavoidable effects on rural historic landscapes. SBFCA will develop and implement treatment for avoidance and preservation in place or relocation of individual California Register of Historic Resources that are eligible buildings (noncontributing or unaffected buildings would remain in place). Where avoidance or relocation is not feasible standard treatment such as documentation through the Historic American

Buildings Survey, Historic American Landscape Survey, Historic American Engineering Record, or district documentation will be completed. Interpretive displays, online resource, and historic contexts or walking tours may also be used, as appropriate.

Finding: The Board finds that changes or alterations have been required in, or incorporated into, the project which substantially lessen such impacts, as set forth more fully in the SBFCA findings, but that each of the above impacts remains significant after mitigation. Such mitigation measures are within the responsibility of another agency (SBFCA), and should be implemented as described. Specific economic, legal, social, technological or other considerations have rendered infeasible mitigation or alternatives that would have reduced these impacts to less than significant.

b. Findings regarding Significant Impacts that can be Reduced to Less Than Significant.

The significant impacts and the mitigation measures to reduce them to less than significant are described in the FEIR and SBFCA's Adopted Resolution 2013-06 dated April 10, 2013. This Resolution includes a Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program. Based on its independent review of the FEIR and SBFCA Resolution 2013-06, the Board finds that for each of the significant impacts described, changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects as identified in the FEIR. Moreover, such changes or alterations are within the responsibility and jurisdiction of another public agency (SBFCA) and such changes have been adopted by that agency. It is hereby determined that the impacts addressed by these mitigation measures will be mitigated to a less-than-significant level or avoided by incorporation of these mitigation measures into the project.

As a responsible agency, the Board has responsibility for mitigating or avoiding only the direct or indirect environmental effects of those parts of the Project which it decides to carry out, finance, or approve. The Board confirms that it has reviewed the MMRP, and confirmed that SBFCA has adopted and committed to implementation of the measures identified therein. The Board agrees with the analysis in the MMRP and confirms that there are no feasible mitigation measures within its powers that would substantially lessen or avoid any significant effect the project would have on the environment. None of the mitigation measures in the MMRP require implementation by the Board directly, although continued implementation of the MMRP shall be made a condition of issuance of the Permit. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 or 15063.

6. **Statement of Overriding Considerations.** Pursuant to CEQA Guidelines sections 15096(h) and 15093, the Board has balanced the economic, social, technological and other benefits of the Project described in Permit Application No. 18793-1 against its

significant and unavoidable impacts listed in paragraph 5(a) above, and finds that the benefits of the Project outweigh these impacts and they may, therefore, be considered "acceptable".

The Board finds the project will enhance public safety in the Sutter Basin by addressing known levee and encroachment deficiencies on the west bank of the Feather River. The Feather River west levee suffers from risks of levee failure mechanisms including through- and under-seepage, slope stability and geometry, erosion, and levee encroachments result in the immediate need for repairs to protect the people and property at risk within the project area. The health and safety benefits of the project, which would significantly reduce the risk of an uncontrolled flood that would result in a catastrophic loss of property and threat to residents of the area, outweigh the remaining unavoidable environmental impacts.

7. **Custodian of Record.** The custodian of the CEQA record for the Board is its Executive Officer, Jay Punia, at the Board offices at 3310 El Camino Avenue, Room 151, Sacramento, California 95821.

Considerations pursuant to Water Code section 8610.5.

8. **Evidence Admitted into the Record**. The Board has considered all the evidence presented in this matter, including the original application for Permit No. 18793-1 and technical documentation provided by SBFCA on the FRWLP past and present Staff Reports and attachments, the Environmental Impact Report on the FRWLP (Draft and Final Versions), SBFCA Board Resolutions 2013-05 and 2013-06 including findings, Statement of Overriding Considerations, and the MMRP.

9. **Best Available Science**. In making its findings, the Board has used the best available science relating to the issues presented by all parties. On the important issue of hydraulic impacts and the computed water surface profiles, SBFCA used a HEC-RAS one-dimensional unsteady flow model that was also utilized by the USACE for the on-going Sutter Basin Feasibility Study. The model is considered by many experts as the best available scientific tool for the purpose of modeling river hydraulics for the Feather River. Geotechnical and overall standards for levee design including those of the USACE, DWR ULDC, and Board have been taken into consideration and the design is in compliance with these standards.

10. **Effects on State Plan of Flood Control**. This project has positive effects on the State Plan of Flood Control as it includes features that will provide 200-year protection to urban and urbanizing areas of the Sutter Basin. The Board finds that the 65 percent projects designs used to support the program-level Section 408 request, and none of the changes in project design made subsequent to 65 percent design up to and including the 100 percent issued for bid design and Addenda A and B result in adverse hydraulic impacts on the entire State Plan of Flood Control.

The Board further finds that the proposed Area C construction phase of the FRWLP, to be constructed as described in SBFCA's 100 percent "Issued For Bid Set", dated March 13, 2013, and in Addenda Nos. 1 and 2, will result in an overall betterment to the SRFCP and State Plan of Flood Control, and will be consistent with the adopted 2012 Central Valley Flood Protection Plan.

The Board further finds that the proposed project alterations can be constructed in a manner not injurious to the public interest, and that will not impair the usefulness of the SRFCP.

In California Statutes of 2007, Chapter 641 (SB276), the Legislature found and declared that "The projects authorized in Section 12670.14 of the Water Code will increase the ability of the existing flood control system in the Sacramento Valley to protect urbanized areas within Sutter County against very rare floods without altering the design flows and water surface elevations prescribed as part of the SRFCP or impairing the capacity of other segments of the SRFCP to contain these design flows and to maintain water surface elevations. Accordingly, the projects authorized in that section will not result in significant adverse hydraulic impacts to the lands protected by the SRFCP and neither the Board nor any other State agency shall require the authorized projects to include hydraulic mitigation for these protected lands."

11. **Effects of Reasonably Projected Future Events**. The project would have no net increases in operational greenhouse gas (GHG) emissions impacting climate change. Emissions associated with the project would occur over a finite period of time (2 year) as opposed to operational emissions, which would occur over the lifetime of a project. There are no other foreseeable projected future events that would impact this project.

Other Findings/Conclusions regarding Issuance of the Permit.

12. This resolution shall constitute the written decision of the Board in the matter of Permit No. 18793-1.

Approval of Encroachment Permit No. 18793-1.

13. The Board adopts the CEQA findings and Resolution 2013-07, and

14. The Board approves, pursuant to CCR 23, § 11(a) and (b) with regard to Variances to Board Standards, the requested construction variances summarized in Staff Report Section 8.5 and further detailed Staff Report Attachments J, K, and L, and

15. Based on the foregoing, the Board hereby conditionally approves issuance of Permit No. 18793-1 in substantially the form provided in the Staff Report, subject to receipt, review and incorporation of conditions required by the USACE in their Record of Decision and Letter of Permission anticipated to be received by late July 2013, and

16. The Board delegates authority to the Executive Officer to make non-substantive changes to the draft permit as needed to incorporate additional design changes submitted by SBFCA prior to receipt of the USACE ROD and LOP, and that if substantive changes to the draft permit are required, the Board staff will bring the permit back to the Board at a future meeting to seek approval for substantive changes, and

17. The Board directs the Executive Officer to take the necessary actions to prepare and execute Permit No. 18793-1 and all related documents and to prepare and file a Notice of Determination under the California Environmental Quality Act for the Feather River West Levee, Project Area C construction project, and

18. The Board directs the Executive Officer to review and issue encroachment permits to owners of pipeline crossings within Project Area C that will be reconstructed as part of the Area C project, and as detailed in Staff Report Section 8.5.5, and

19. The Board directs the directs the Executive Officer that if, during construction, additional non-conforming encroachments or constructability issues are discovered by any party SBFCA will consider whether or not they can be brought into compliance during construction, and if they can and SBFCA proposes to do so, Board staff will evaluate the proposal(s) for Board approval to be made either by direct Board action or by delegation to the Executive Officer as appropriate.

PASSED AND ADOPTED by vote of the Board on _____, 2013

_____
William H. Edgar
President

_____
Jane Dolan
Secretary

Attachment D

STATE OF CALIFORNIA – THE RESOURCES AGENCY EDMUND G. BROWN JR., GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD
3310 El Camino Ave., Rm. 151SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-2380 FAX: (916) 574-0682

October 30, 2012

Colonel William J. Leady
District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Feather River West Levee Project, Sutter Butte Flood Control Agency

Dear Colonel Leady:

Based on the Policy and Procedural Guidance for the Approval of Modification and Alteration of U.S. Army Corps of Engineers (USACE) Projects dated October 23, 2006, and the Clarification Guidance dated November 17, 2008, and on behalf of Sutter Butte Flood Control Agency (SBFCA) of Sutter and Butte Counties, the Central Valley Flood Protection Board (Board) is requesting permission from the USACE to alter a portion of the Sacramento River Flood Control Project (SRFCP). The Board is making this request pursuant to 33 U.S.C. Section 408.

The Board has conducted a preliminary review of the 65% project plans and specifications, geotechnical and hydraulic analyses, and other reports submitted by SBFCA for the alteration of 41 miles of federal flood control project levee located on the west side (right bank) of the Feather River from Thermalito Afterbay in Butte County, at the northern end of the project (Station 2368+00), to a point approximately four (4) miles north of the Feather River's confluence with Sutter Bypass in Sutter County, at the southern end of the project (Station 202+50). The Board has determined that SBFCA will accomplish this alteration in a manner that will not be injurious to the public interest and will not impair the usefulness of the SRFCP. Attached is the information you require to accompany this request, as outlined in your October 23, 2006 and November 17, 2008 guidance documents.

If the proposed project, upon completion, is formally incorporated within the federal SRFCP by the USACE, the State of California, acting through the Board, will accept the altered project for operation and maintenance and hold and save the United States free from damage due to the constructed works.

Within 180 days of completion of the project alteration, the Board will provide both information to the USACE for the purposes of preparing a revised Operation and Maintenance Manual for this portion of the SRFCP, and as-built Plans and Specifications for the alteration.

In order to achieve the flood control benefits of this work, beginning with the 2013-2014 flood season, the Board is requesting that the USACE make any necessary determination so that SBFCA may proceed with this alteration by June 2013.

If you have any questions, please feel free to contact me at (916) 574-0609, or your staff may contact David R. Williams, Senior Engineer of the Board Projects Section, at (916) 574-2379.

Sincerely,

Jay S. Punia

Jay S. Punia
Executive Officer

Enclosure

cc: Mr. Michael Inamine
Sutter Butte Flood Control Agency
1227 Bridge Street, Suite C
Yuba City, California 95991

Mr. Bill Hampton, General Manager
Levee District No. 1 of Sutter County
243 Second Street
Yuba City, California 95991

Mr. David Lamon, Chairman
Levee District No. 9 of Sutter County
1471 Coats Drive
Yuba City, California 95993

Mr. Mark List, Chief
Maintenance Support Branch
Department of Water Resources
Maintenance Areas 3, 7, & 16
3310 El Camino Ave.
Sacramento, California 95821

Ms. Karen Hull, Superintendent
Sutter maintenance Yard
Department of Water Resources
PO Box 40, State Hwy 20
Sutter, California 95982

Attachment E

THERMALITO AFTERBAY
OROVILLE
OROVILLE WILDLIFE AREA
2368+00
STA 2368+00
Reach 41
Reach 40
2300+00
PROJECT AREA D1
Reach 38
Reach 39
Reach 37
Reach 36
2200+00
STA 2290+00
BIGGS
Reach 35
Reach 34
2100+00
Reach 32
Reach 33
2000+00
PROJECT AREA D2
Reach 31
GRIDLEY
1900+00
Reach 30
M.A.-7
1800+00
Reach 29
STA 1769+31
Reach 28
PROJECT AREA D3
Reach 27
FEATHER RIVER
Reach 26
1700+00
STA 1674+37
STA 1623+86
Reach 25
1600+00
Reach 24
Reach 23
LIVE OAK
1500+00
SUNSET PUMP STATION
Reach 22
M.A.-16
Reach 21
1400+00
PROJECT AREA C
Reach 20
1300+00
Reach 19
L.D.-9
1200+00
Reach 18
1100+00
MARYSVILLE
Reach 17
MARYSVILLE L.D.
Reach 16
1000+00
YUBA CITY
Reach 15
Reach 14
900+00
STA 845+00
SHANGHAI BEND
Reach 13
Reach 12
Reach 11
800+00
STA 830+00
Reach 10
L.D.-1
700+00
PROJECT AREA B
Reach 9
Reach 8
600+00
STA 510+37
Reach 7
500+00
STAR BEND
Reach 6
STA 478+68
Reach 5
400+00
PROJECT AREA A1
Reach 4
300+00
Reach 3
M.A.-3
200+00
STA 202+50
Reach 2
PROJECT AREA A2
100+00
Reach 1
10+00
STA 10+00
NELSON SLOUGH
BUNKHAM SLOUGH
SUTTER BYPASS
SUTTER BUTTES
SUTTER NATIONAL WILDLIFE REFUGE
GRAY LODGE WATERFOWL MANAGEMENT AREA
SUTTER BASIN
SACRAMENTO RIVER
BUTTE SLOUGH
LONG LAKE
HIATT LAKE
SYCAMORE SLOUGH
ANGEL SLOUGH
SANBORN SLOUGH
SNAKE RIVER
JACK SLOUGH
YUBA RIVER
BEAR RIVER
WHEATLAND
SUBJECT TO CHANGE

Legend

- Project Area A1, Future
- Project Area A2, Future
- Project Area B, 2014
- Project Area C, 2013
- Project Area D1, 2014
- Project Area D2, 2014
- Project Area D3, 2014
- No Levee Work Reaches
- *700+00* Levee Stationing
- *Reach 1* Reach Number
- Major Streams
- SBFCA Boundary
- DWR Maintenance Areas
- Levee Districts
- Cities

DATA: ESRI ArcGIS Online; ESRI Maps and Data, 2008; USGS and © 2007 National Geographic Society; URS, 2010

0 1 2 3 4 5 Miles

1 in = 1.5 miles

N

HDR ONE COMPANY | *Many Solutions* SM

Sutter Butte Flood Control Agency
Feather River West Levee
Construction Phasing Plan

August, 2012

SUTTER BUTTE FLOOD CONTROL AGENCY

Path: G:\1436618_Sutter_Buttes\map_docs\mxd\Arc10\FRWL_Const_phasing_Exhibit2012.mxd Date Saved: 10/18/2012 9:18:22 AM User: aarnold

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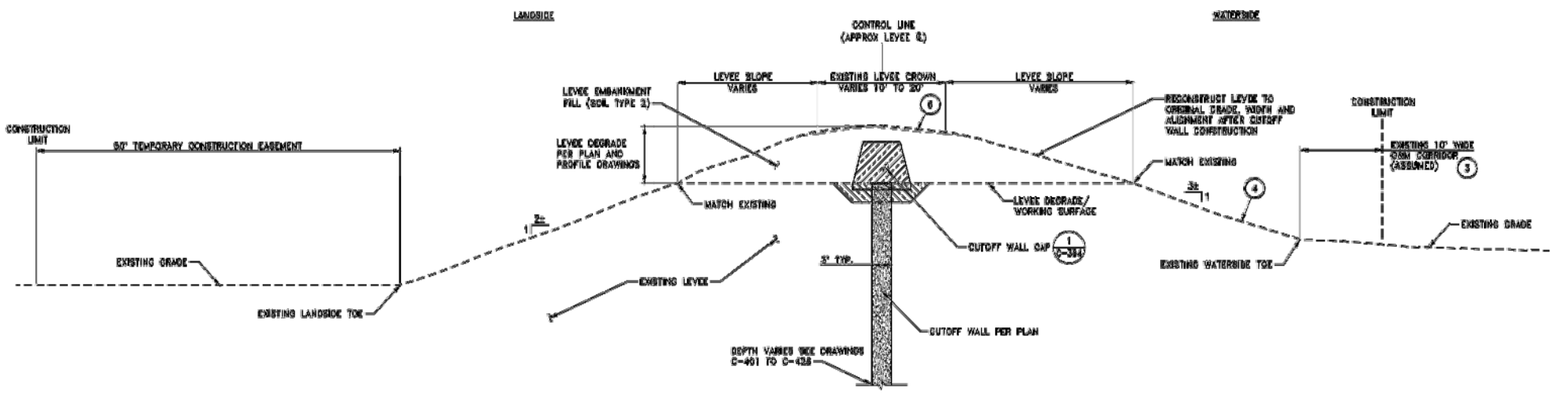
30% DESIGN

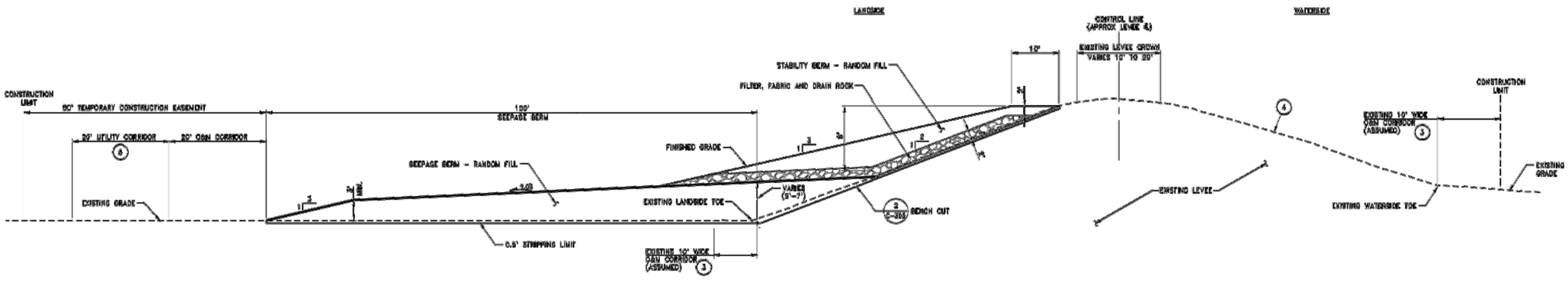


TYPICAL LEVEE SECTION WITH CUTOFF WALL (1/—)
SCALE: 1"=10'

STA. 10+00 TO 129+66
STA. 218+66 TO 456+00
STA. 513+96 TO 830+35
STA. 954+40 TO 968+50
STA. 1080+00 TO 1213+85

NOTES:
1. LEVEE EMBANKMENT FILL MATERIALS SHALL CONSIST OF IMPORT MATERIAL AND EXCAVATED LEVEE MATERIAL BLENDED AS REQUIRED TO MEET THE REQUIREMENTS OF SPECIFICATION 31 00 00.
2. FINISH GRADE LINES SHOWN ARE PRIOR TO PLACEMENT OF TOPSOIL.
3. EXISTING O&M CORRIDOR TO BE USED BY THE CONTRACTOR DURING CONSTRUCTION.
4. EXISTING VEGETATION ON WATERSIDE SHALL NOT BE DISTURBED.
5. NEW 20' UTILITY CORRIDOR ONLY WHERE POWER POLE RELOCATION IS REQUIRED.
6. SALVAGE EXISTING AGGREGATE BASE. RECONSTRUCT LEVEE CROWN ROADWAY IN ACCORDANCE WITH DETAIL ON DRAWING C-305.

BEGIN STATION	END STATION	DETAIL	SHEET	REHABILITATION MEASURE
10+00	129+66	1	C-301	CUTOFF WALL
129+66	181+00	2	C-301	SEEPAGE BERM AND STABILITY BERM
181+00	218+66	3	C-302	CUTOFF WALL AND SEEPAGE BERM
218+66	456+00	1	C-301	CUTOFF WALL
456+00	475+88	3	C-302	CUTOFF WALL AND SEEPAGE BERM
475+88	513+96	–	–	NONE
513+96	830+35	1	C-301	CUTOFF WALL
830+35	844+75	–	–	NONE
844+75	923+73	4	C-302	CUTOFF WALL AND RELIEF WELLS
923+73	954+40	–	–	NONE
954+40	968+50	1	C-301	CUTOFF WALL
968+50	1080+00	A-0	C-303	LEVEE GEOMETRY ADJUSTMENTS
1080+00	1213+85	1	C-301	CUTOFF WALL



TYPICAL LEVEE SECTION WITH SEEPAGE BERM AND STABILITY BERM (2/—)
SCALE: 1"=10'

STA. 129+66 TO 181+00

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION	REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: C. CONTRERAS
DRAWN BY: L. SMILEY, J. PRIEST
CHECKED BY: P. TOBIA
IN CHARGE: J. KORB
DATE: 08/15/2011

PRELIMINARY

WOOD RODGERS
DEVELOPING • INNOVATIVE • DESIGN • SOLUTIONS
3301 C STREET, BLDG. 100-B, SACRAMENTO, CA 95816
PHONE: (916) 341-7760 FAX: (916) 341-7767

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 3: FRWL IMPROVEMENT PLANS
TYPICAL LEVEE SECTIONS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

DRAWING NO. C-301 | SHEET 137

Figure 3

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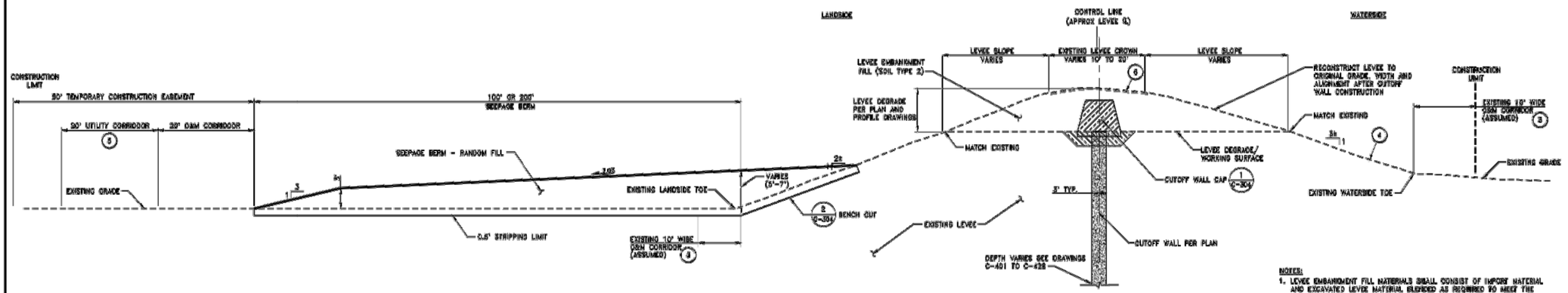
Typical Levee Sections (Wood Rodgers)
Plan Sheet 137

Feather River West Levee Project
Sutter and Butte Counties, CA

Date
AUG 2011

Figure
3

30% DESIGN

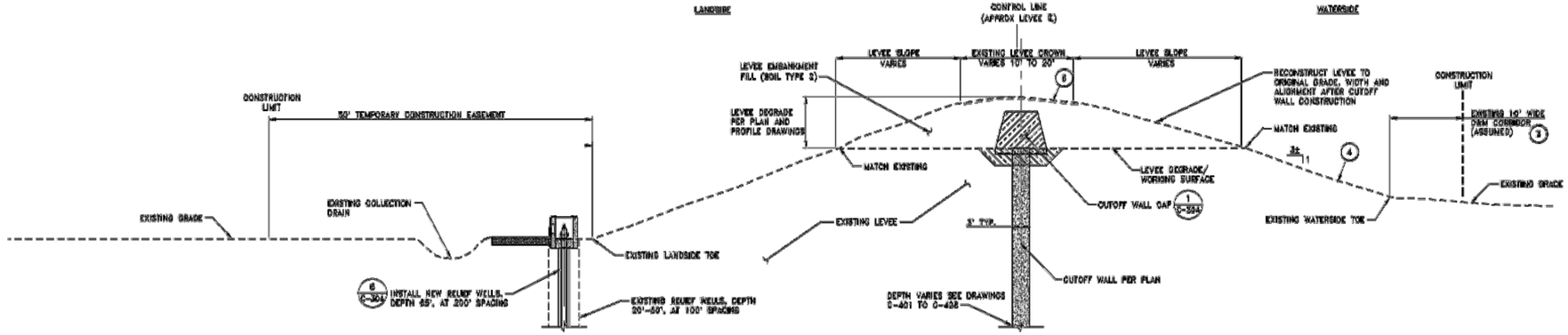


TYPICAL LEVEE SECTION WITH CUTOFF WALL AND SEEPAGE BERM

SCALE: 1"=10'

STA. 181+00 TO 218+86
STA. 436+00 TO 475+86

NOTES:
1. LEVEE EMBANKMENT FILL MATERIALS SHALL CONSIST OF IMPORT MATERIAL AND EXCAVATED LEVEE MATERIAL BLENDED AS REQUIRED TO MEET THE REQUIREMENTS OF SPECIFICATION 31 00 00.
2. FINISH GRADE LINES SHOWN ARE PRIOR TO PLACEMENT OF TOPSOIL.
3. EXISTING O&M CORRIDOR TO BE USED BY THE CONTRACTOR DURING CONSTRUCTION.
4. EXISTING VEGETATION ON WATERSIDE SHALL NOT BE DISTURBED.
5. NEW 20' UTILITY CORRIDOR ONLY WHERE POWER POLE RELOCATION IS REQUIRED.
6. SALVAGE EXISTING AGGREGATE BASE. RECONSTRUCT LEVEE CROWN ROADWAY IN ACCORDANCE WITH DETAIL ON DRAWING C-305.



TYPICAL LEVEE SECTION WITH CUTOFF WALL AND RELIEF WELLS

SCALE: 1"=10'

STA. 844+75 TO 923+73

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: C. CONTRERAS
DRAWN BY: L. BAILEY, J. PRIEST
CHECKED BY: P. TOSIA
IN CHARGE: J. KORE
DATE: 08/18/2011

PRELIMINARY

WOOD RODGERS
DEVELOPING • INNOVATIVE • DESIGN • SOLUTIONS
3301 C STREET, BLDG. 100-B, SACRAMENTO, CA 95816
PHONE: (916) 341-7760 FAX: (916) 341-7767

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 3: FRWL IMPROVEMENT PLANS
TYPICAL LEVEE SECTIONS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0" 1"

DRAWING NO. C-302 | SHEET 138

Figure 4

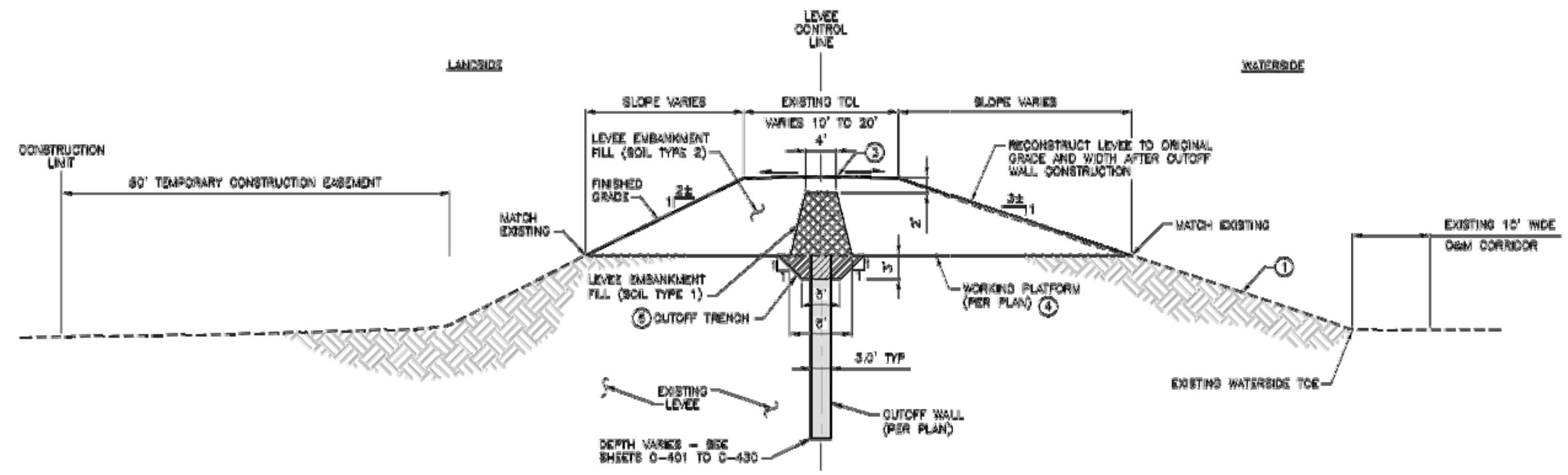
HDR
ONE COMPANY | *Many Solutions*

Typical Levee Sections (Wood Rodgers)
Plan Sheet 138

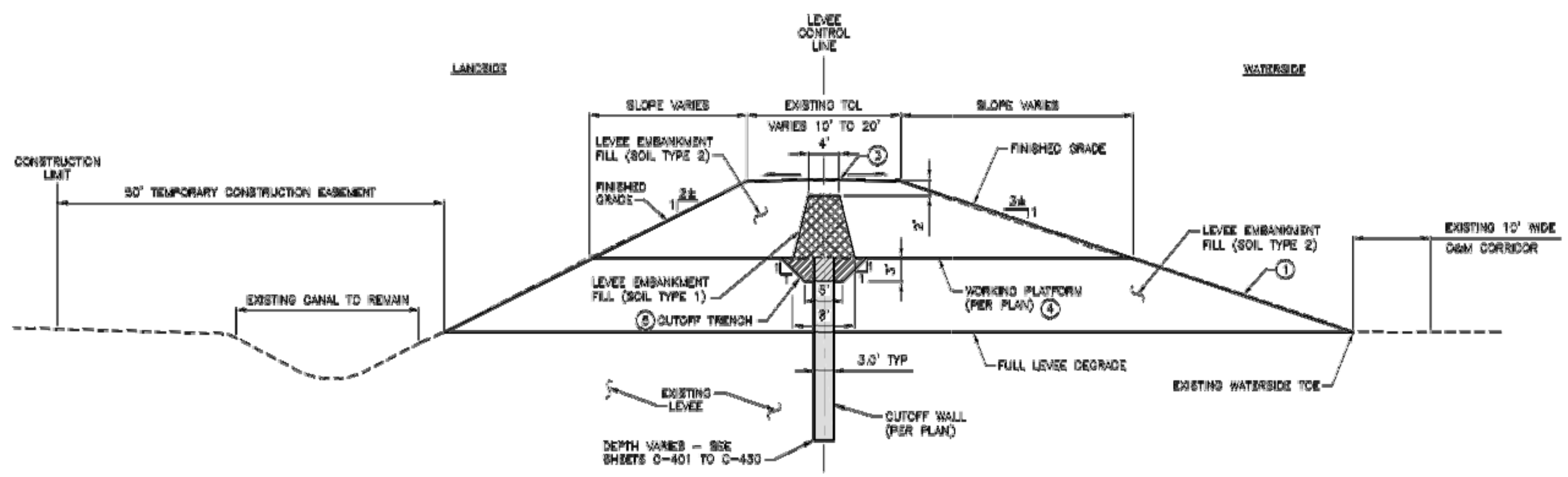
Feather River West Levee Project
Sutter and Butte Counties, CA

Date
AUG 2011

Figure
4



① TYPICAL CUTOFF WALL
N.T.S.



② TYPICAL CUTOFF WALL AND FULL LEVEE DEGRADE
N.T.S.

NOTES:

① EXISTING VEGETATION ON THE WATERSIDE SHALL NOT BE DISTURBED.

② SEE SHEET C-303 FOR BENCHING DETAILS.

③ SALVAGE EXISTING AGGREGATE BASE. CROWN RESURFACING PER DETAIL ON SHEET C-303.

④ SEE LEVEE DEGRADE DETAIL ON SHEET C-303.

⑤ EXCAVATE CUTOFF TRENCH AND FILL WITH TYPE 1 SOIL PRIOR TO EXCAVATING CUTOFF WALL TRENCH.

LEVEE SECTION SCHEDULE				
BEGIN	END	SECTION DESIGNATION	REHABILITATION MEASURE	DRAWING NO.
1213+83	1433+83	1	CUTOFFWALL	C-301
1433+83	1459+77	2	CUTOFF WALL & FULL LEVEE DEGRADE	C-301
1459+77	1609+37	1	CUTOFF WALL	C-301
1609+37	1623+88	3	CUTOFF WALL & LINE CANAL	C-302
1623+88	1647+37	–	NONE	–
1674+37	1789+31	–	NONE	–
1789+31	1813+33	–	NONE	–
1813+33	2128+00	1	CUTOFF WALL	C-301
2138+00	2182+00	–	NONE	–
2182+00	2290+00	1	CUTOFF WALL	C-301
2290+00	2303+00	4	FULL DEGRADE & RECONSTRUCT LEVEE W/5:1 LANDSIDE SLOPE	C-302
2303+00	2319+00	–	NONE	–
2319+00	2369+00	1	CUTOFF WALL	C-301

30% DESIGN

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION	REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: D. JABBOUR
DRAWN BY: A. JACKSON
IN CHARGE: D. JABBOUR
PROJECT MANAGER: C. KRIVANEC
DATE: 8/18/11

PRELIMINARY

HDR Engineering Inc. 2365 Iron Point Rd. Suite 300 Folsom, CA 95630

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY
VOLUME 4: FEATHER RIVER WEST LEVEE IMPROVEMENT PLANS
TYPICAL LEVEE SECTIONS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS
0 1"

DRAWING NO. C-301 | SHEET 138

Figure 5

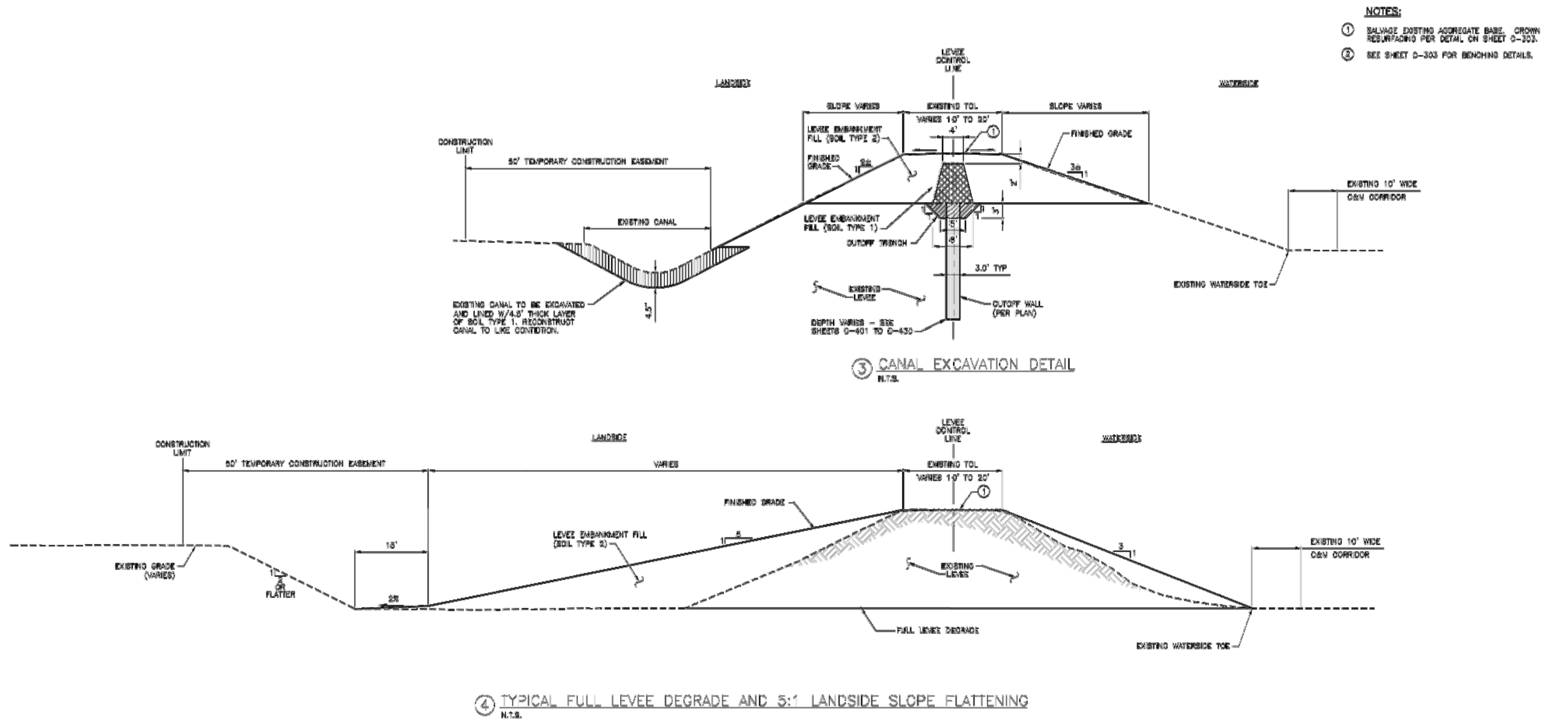
ONE COMPANY | *Many Solutions*

Typical Levee Sections (HDR)
Plan Sheet 138

Feather River West Levee Project
Sutter and Butte Counties, CA

Date
AUG 2011

Figure
5



30% DESIGN

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION	REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: D. JABBOUR
DRAWN BY: A. JACKSON
IN CHARGE: D. JABBOUR
PROJECT MANAGER: G. KRIVANEC
DATE: 8/18/11

HDR Engineering Inc. 2365 Iron Point Rd. Suite 300 Folsom, CA 95630

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY
VOLUME 4: FEATHER RIVER WEST LEVEE IMPROVEMENT PLANS
TYPICAL LEVEE SECTIONS

VERIFY SCALES: BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALES FOR REDUCED PLOTS

DRAWING NO. C-302 | SHEET 139

Figure 6

ONE COMPANY | *Many Solutions*

Typical Levee Sections (HDR)
Plan Sheet 139

Feather River West Levee Project
Sutter and Butte Counties, CA

Date
AUG 2011

Figure
6

SURVEY CONTROL POINTS

1. THE FOLLOWING PRIMARY CONTROL POINTS HAVE BEEN ESTABLISHED BY WOOD RODGERS, INC. AS PART OF THE DEPARTMENT OF WATER RESOURCES (DWR) CENTRAL VALLEY FLOODPLAIN EVALUATION AND DELINEATION (CVFED) PROGRAM'S GLOBAL POSITIONING SYSTEM (GPS) CONTROL NETWORK AND ARE PROVIDED FOR THE CONTRACTOR'S USE:

POINT	NORTHING	EASTING	ELEV	C.S.F.	DESCRIPTION
100	2293149.470	6681087.967	261.102	1.000072215	NGS – DB7123
101	2066713.368	6670787.358	99.800	1.000076046	NGS – DH6482
102	2135857.812	6690073.757	48.284	1.000082487	NGS – DH6487
103	2127260.405	6655023.271	39.806	1.000081587	NGS – DH6497
104	2077733.330	6691927.588	35.187	1.000075086	NGS – JS4847
105	2305980.824	6657591.130	160.721	1.000063184	NGS – KS1013
106	2265576.987	6674260.890	102.785	1.000072325	NGS – KS1056
107	2206777.265	6663164.949	68.107	1.000081207	NGS – KS1832
380	2085772.826	6664942.851	31.834	1.000076356	5/8 REBAR W/CAP – WRC380
390	2163085.802	6649897.825	48.809	1.000083027	5/8 REBAR W/CAP – WRC390
396	2208960.013	6641241.462	67.208	1.000080917	5/8 REBAR W/CAP – WRC396
401	2237497.503	6650065.599	84.662	1.000077446	MAG NAIL/W WASHER – WRC401
403	2254501.397	6681477.825	102.766	1.000074936	MAG NAIL/W WASHER – WRC403
404	2265336.974	6649879.773	95.341	1.000071985	MAG NAIL/W WASHER – WRC404
405	2281532.832	6675849.266	128.103	1.000069305	5/8 REBAR W/CAP – WRC405
406	2292956.969	6649582.716	112.710	1.000065124	5/8 REBAR W/CAP – WRC406
407	2311531.077	6649719.054	130.078	1.000059794	5/8 REBAR W/CAP – WRC407
429	2077432.117	6677235.381	27.966	1.000074706	MAG NAIL/W WASHER – WRC429
431	2103646.020	6673437.005	34.957	1.000079066	5/8 REBAR W/CAP – WRC431
436	2116067.204	6699408.285	54.642	1.000081347	MAG NAIL/W WASHER – WRC436
437	2121089.397	6673853.620	40.459	1.000081137	MAG NAIL/W WASHER – WRC437
438	2127276.570	6654976.336	39.911	1.000081597	5/8 REBAR W/CAP – WRC438
439	2140643.893	6649904.627	39.678	1.000082307	5/8 REBAR W/CAP – WRC439
441	2135151.287	6688271.716	49.449	1.000082507	MAG NAIL/W WASHER – WRC441
445	2149250.819	6699254.573	68.074	1.000083907	MAG NAIL/W WASHER – WRC445
446	2154030.206	6667907.912	53.264	1.000083257	MAG NAIL/W WASHER – WRC446
451	2177143.772	6685135.676	68.733	1.000083577	5/8 REBAR W/CAP – WRC451
455	2184454.206	6650477.415	56.601	1.000082607	MAG NAIL/W WASHER – WRC455
457	2200157.141	6676394.604	70.436	1.000082027	5/8 REBAR W/CAP – WRC457
460	2216899.342	6681909.090	81.083	1.000080596	5/8 REBAR W/CAP – WRC460
461	2219111.570	6657894.541	77.093	1.000080066	5/8 REBAR W/CAP – WRC461
462	2226576.764	6642172.136	76.801	1.000078936	MAG NAIL/W WASHER – WRC462
467	2252619.373	6657154.097	95.364	1.000074946	MAG NAIL/W WASHER – WRC467
468	2265579.587	6671368.449	112.519	1.000072775	MAG NAIL/W WASHER – WRC468
470	2295306.794	6666274.210	144.035	1.000065904	5/8 REBAR W/CAP – WRC470
474	2199365.026	6657402.408	67.395	1.000081947	MAG NAIL/W WASHER – WRC474
475	2243159.943	6675873.741	90.226	1.000076686	MAG NAIL/W WASHER – WRC475

2. THE FOLLOWING SECONDARY CONTROL POINTS HAVE BEEN ESTABLISHED BY WOOD RODGERS, INC. AS PART THE SBFCA PROJECT AND ARE PROVIDED FOR THE CONTRACTOR'S USE:

POINT	NORTHING	EASTING	ELEV	C.S.F.	DESCRIPTION
210	2089060.130	6670461.668	53.41	1.000077903	5/8 REBAR W/CAP
211	2112762.905	6679346.452	64.46	1.000081498	5/8 REBAR W/CAP
212	2148659.566	6672051.998	75.431	1.000084235	5/8 REBAR W/CAP
213	2167715.642	6673370.366	81.441	1.000084494	MAG NAIL/W WASHER
214	2200688.814	6666624.099	86.762	1.000082742	5/8 REBAR W/CAP
215	2228577.973	6665683.804	92.289	1.00007937	5/8 REBAR W/CAP
217	2282454.155	6662377.834	129.408	1.000073999	5/8 REBAR W/CAP
218	2096704.302	6680065.103	60.697	1.000077903	5/8 REBAR W/CAP
219	2125924.082	6676243.106	66.986	1.000081498	5/8 REBAR W/CAP
220	2135676.895	6671580.314	69.557	1.000084235	5/8 REBAR W/CAP
221	2157634.872	6674193.366	78.174	1.000084235	5/8 REBAR W/CAP
~~222~~	~~2185189.204~~	~~6668768.574~~	~~85.551~~	~~1.000082742~~	~~5/8 REBAR W/CAP~~ (DISTURBED)
223	2213409.248	6664969.632	89.231	1.000082742	5/8 REBAR W/CAP
224	2243805.625	6665671.227	95.257	1.00007937	5/8 REBAR W/CAP
225	2272762.854	6665973.832	119.483	1.000073999	5/8 REBAR W/CAP
226	2292741.645	6663371.943	137.655	1.000069069	5/8 REBAR W/CAP

3. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL CONTROL POINTS. WHERE CONTROL POINTS CONFLICT WITH OR WILL BE REMOVED BY LEVEE DEGRADING ACTIVITIES, THE CONTRACTOR SHALL REMOVE AND REPLACE THE CONTROL POINTS AT CONTRACTOR'S EXPENSE.

4. CONTROL POINTS DISTURBED BY CONTRACTOR'S OPERATIONS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

△ CP-1 SURVEY CONTROL POINT

C.S.F. COMBINED SCALE FACTOR

NOTES:

1. SURVEY DATA (AERIAL PHOTO, TOPOGRAPHIC MAPPING, BOUNDARY SURVEY, AND SURVEY CONTROL) SHOWN HEREON IS BASED ON INFORMATION PROVIDED BY: WOOD RODGERS, INC. THE AERIAL PHOTO IS DATED MARCH 16-17, 2008. THE SURVEY CONTROL WAS ESTABLISHED SEPTEMBER 2008.
2. TOPOGRAPHIC MAPPING IS BASED ON LIGHT DETECTION AND RANGING (LIDAR) DATA DATED MARCH 16-27, 2008, UNLESS OTHERWISE NOTED.
3. BASELINE COORDINATES, DISTANCE, AND STATIONING SHOWN ON THE PLANS ARE "GRID" BASED UPON THE GLOBAL POSITIONING SYSTEM (GPS) CONTROL NETWORK, ADJUSTED TO NATIONAL GEODETIC SURVEY (NGS) PUBLISHED UTM ZONE 10 COORDINATES AND ORTHOMETRIC HEIGHT, CONVERTED TO CALIFORNIA COORDINATE SYSTEM, ZONE 2. MULTIPLY GRID DISTANCES WITH THE COMBINED SCALE FACTOR AS FOLLOWS TO OBTAIN GROUND DISTANCES:

STATION	C.S.F.
10+00–200+00	1.0000779030
200+00–480+00	1.0000814981
480+00–800+00	1.0000842354
800+00–1100+00	1.0000844943
1100+00–1410+00	1.0000827419
1410+00–1730+00	1.0000793703
1730+00–2280+00	1.0000739988
2280+00–2368+00	1.0000690691

HORIZONTAL DATUM

THE HORIZONTAL DAUTM OF THIS SURVEY IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) BEING THE CALIFORNIA COORDINATE SYSTEM OF 1983 ZONE 2 (GRID SURFACE).

VERTICAL DATUM

THE VERTICAL DATUM OF THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BEING BASED ON NATIONAL GEODETIC SURVEY (NGS) POINTS LISTED AND DERIVED BY GLOBAL POSITIONING SYSTEM (GPS) STATIC METHOD.

1500' 750' 0 1500'

SCALE: 1" = 1500'

FOR BID

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: C. CONTRERAS, P. BLUM
DRAWN BY: L. SMILEY, J. PRIEST
CHECKED BY: P. TOBIA
IN CHARGE: J. KORS
DATE: 3/18/2013

REGISTERED PROFESSIONAL ENGINEER JONATHAN L. KORS No. C59538 Exp. 12/31/13 CIVIL OF CALIFORNIA

WOOD RODGERS
DEVELOPING • INNOVATIVE • DESIGN • SOLUTIONS
3301 C STREET, BLDG. 100-B, SACRAMENTO, CA 95816
PHONE: (916) 341-7760 FAX: (916) 341-7767

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 3: FRWL IMPROVEMENT PLANS

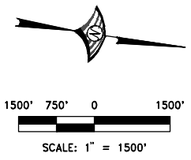
SURVEY CONTROL MAP

1 OF 2

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 1"

DRAWING NO. G-007 | SHEET 7

J:\Jobs\8455_HDR_Sutter_Butte_FCA\FRWL_TO10\Civil\Dwg_G_007_SURCTL-01_FRWL_T010.dwg 3/14/2013 12:57 PM Peter Blum



FOR BID

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION	REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: C. CONTRERAS, P. BLUM
DRAWN BY: L. SMILEY, J. PRIEST
CHECKED BY: P. TOBIA
IN CHARGE: J. KORS
DATE: 3/18/2013

REGISTERED PROFESSIONAL ENGINEER JONATHAN L. KORS No.C59538 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

WOOD RODGERS
DEVELOPING • INNOVATIVE • DESIGN • SOLUTIONS
3301 C STREET, BLDG. 100-B, SACRAMENTO, CA 95816
PHONE: (916) 341-7760 FAX: (916) 341-7767

SUBMITTED | APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 3: FRWL IMPROVEMENT PLANS

SURVEY CONTROL MAP

2 OF 2

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 1"

DRAWING NO. G-008 | SHEET 8

J:\Jobs\8455_HDR Sutter Butte FCA\FRWL_T010\Civil\Dwg\L_G_008_SURCTL-02_FRWL_T010.dwg 3/14/2013 12:58 PM Peter Blum

Attachment G

SUTTER BUTTE FLOOD CONTROL AGENCY

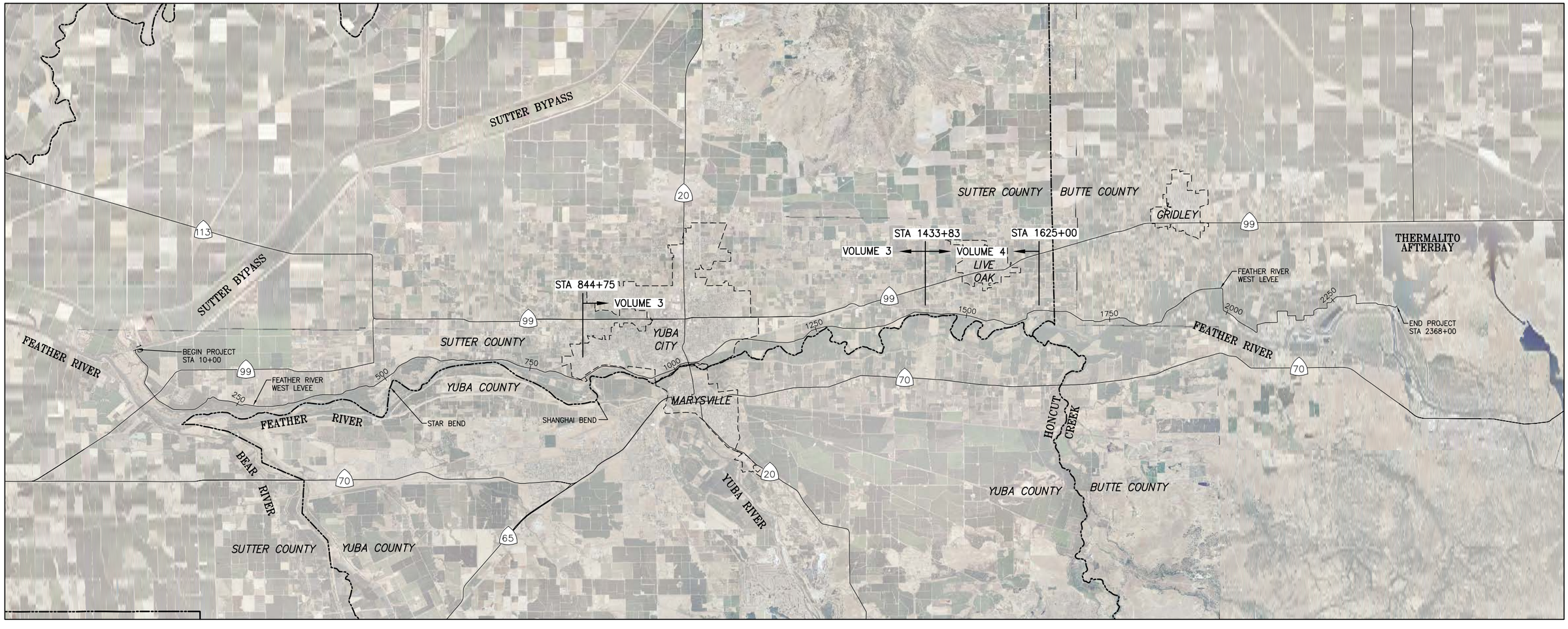
FEATHER RIVER WEST LEVEE PROJECT

VOLUME 3: STA 844+75 TO 1433+83
VOLUME 4: STA 1433+83 TO 1625+00

N

8000 4000 0 8000 16000

SCALE: 1"=8000'



FOR BID

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: J. NETTLETON
DRAWN BY: A. JACKSON
IN CHARGE: D. JABBOUR
PROJECT MANAGER: C. KRIVANEC
DATE: 03/18/13

REGISTERED PROFESSIONAL ENGINEER
DANIEL M. JABBOUR
C 63110
Exp. 6/30/14
CIVIL
STATE OF CALIFORNIA

HDR Engineering Inc.
2365 Iron Point Rd. Suite 300
Folsom, CA 95630

SUBMITTED

APPROVED

SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 4: FEATHER RIVER WEST LEVEE IMPROVEMENT PLANS

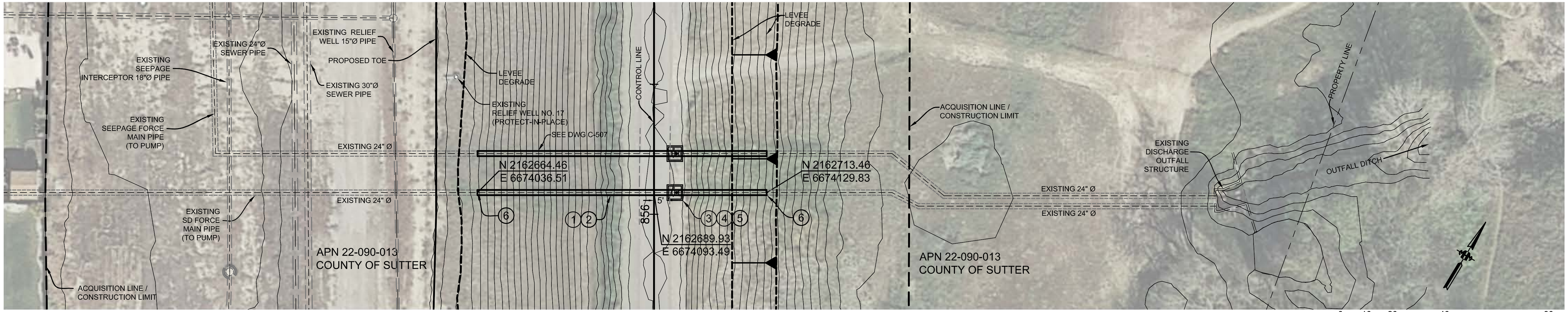
BASIN MAP

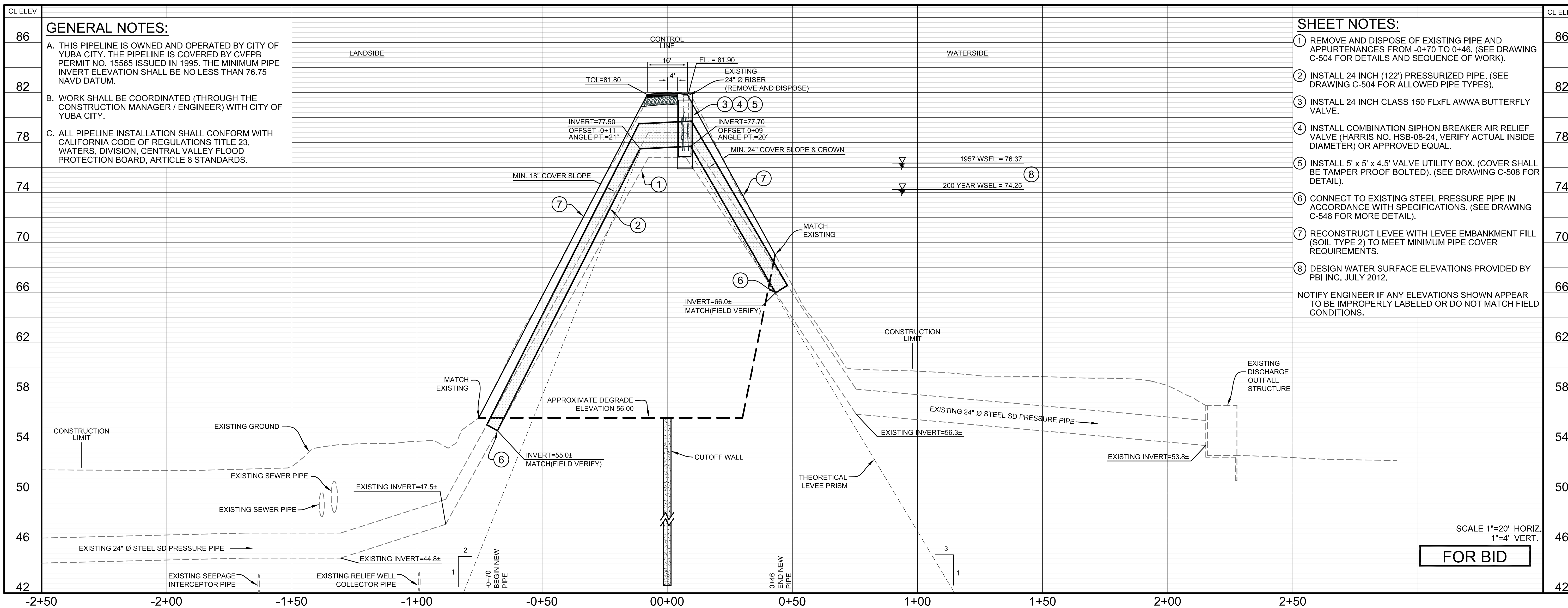
VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 1"

DRAWING NO. G-002

SHEET 2

C:\pw\working\saci\d0381047\01G-002.dwg, 3/13/2013 3:15:49 PM, jnettlet





GENERAL NOTES:

A. THIS PIPELINE IS OWNED AND OPERATED BY CITY OF YUBA CITY. THE PIPELINE IS COVERED BY CVFPB PERMIT NO. 15565 ISSUED IN 1995. THE MINIMUM PIPE INVERT ELEVATION SHALL BE NO LESS THAN 76.75 NAVD DATUM.

B. WORK SHALL BE COORDINATED (THROUGH THE CONSTRUCTION MANAGER / ENGINEER) WITH CITY OF YUBA CITY.

C. ALL PIPELINE INSTALLATION SHALL CONFORM WITH CALIFORNIA CODE OF REGULATIONS TITLE 23, WATERS, DIVISION, CENTRAL VALLEY FLOOD PROTECTION BOARD, ARTICLE 8 STANDARDS.

SHEET NOTES:

1. REMOVE AND DISPOSE OF EXISTING PIPE AND APPURTENANCES FROM -0+70 TO 0+46. (SEE DRAWING C-504 FOR DETAILS AND SEQUENCE OF WORK).
2. INSTALL 24 INCH (122') PRESSURIZED PIPE. (SEE DRAWING C-504 FOR ALLOWED PIPE TYPES).
3. INSTALL 24 INCH CLASS 150 FLxFL AWWA BUTTERFLY VALVE.
4. INSTALL COMBINATION SIPHON BREAKER AIR RELIEF VALVE (HARRIS NO. HSB-08-24, VERIFY ACTUAL INSIDE DIAMETER) OR APPROVED EQUAL.
5. INSTALL 5' x 5' x 4.5' VALVE UTILITY BOX. (COVER SHALL BE TAMPER PROOF BOLTED). (SEE DRAWING C-508 FOR DETAIL).
6. CONNECT TO EXISTING STEEL PRESSURE PIPE IN ACCORDANCE WITH SPECIFICATIONS. (SEE DRAWING C-548 FOR MORE DETAIL).
7. RECONSTRUCT LEVEE WITH LEVEE EMBANKMENT FILL (SOIL TYPE 2) TO MEET MINIMUM PIPE COVER REQUIREMENTS.
8. DESIGN WATER SURFACE ELEVATIONS PROVIDED BY PBI INC. JULY 2012.

NOTIFY ENGINEER IF ANY ELEVATIONS SHOWN APPEAR TO BE IMPROPERLY LABELED OR DO NOT MATCH FIELD CONDITIONS.

REV.	DATE	BY	CHK.	APPR.	DESCRIPTION	REV.	DATE	BY	CHK.	APPR.	DESCRIPTION

DESIGNED BY: J. MALLEN
DRAWN BY: T. MALLEN
CHECKED BY: M. SMITH
IN CHARGE: S. MINARD
DATE: 03/18/2013

REGISTERED PROFESSIONAL ENGINEER — SEAN M. MINARD — No. C52593 — Exp. 12-31-14 — CIVIL — STATE OF CALIFORNIA

M·H·M ENGINEERS & SURVEYORS SINCE 1892
ENGINEERING-SURVEYING
1204 "E" STREET
MARYSVILLE, CALIF. 95901-1674
Ph: (530)742-6485

SUBMITTED
APPROVED

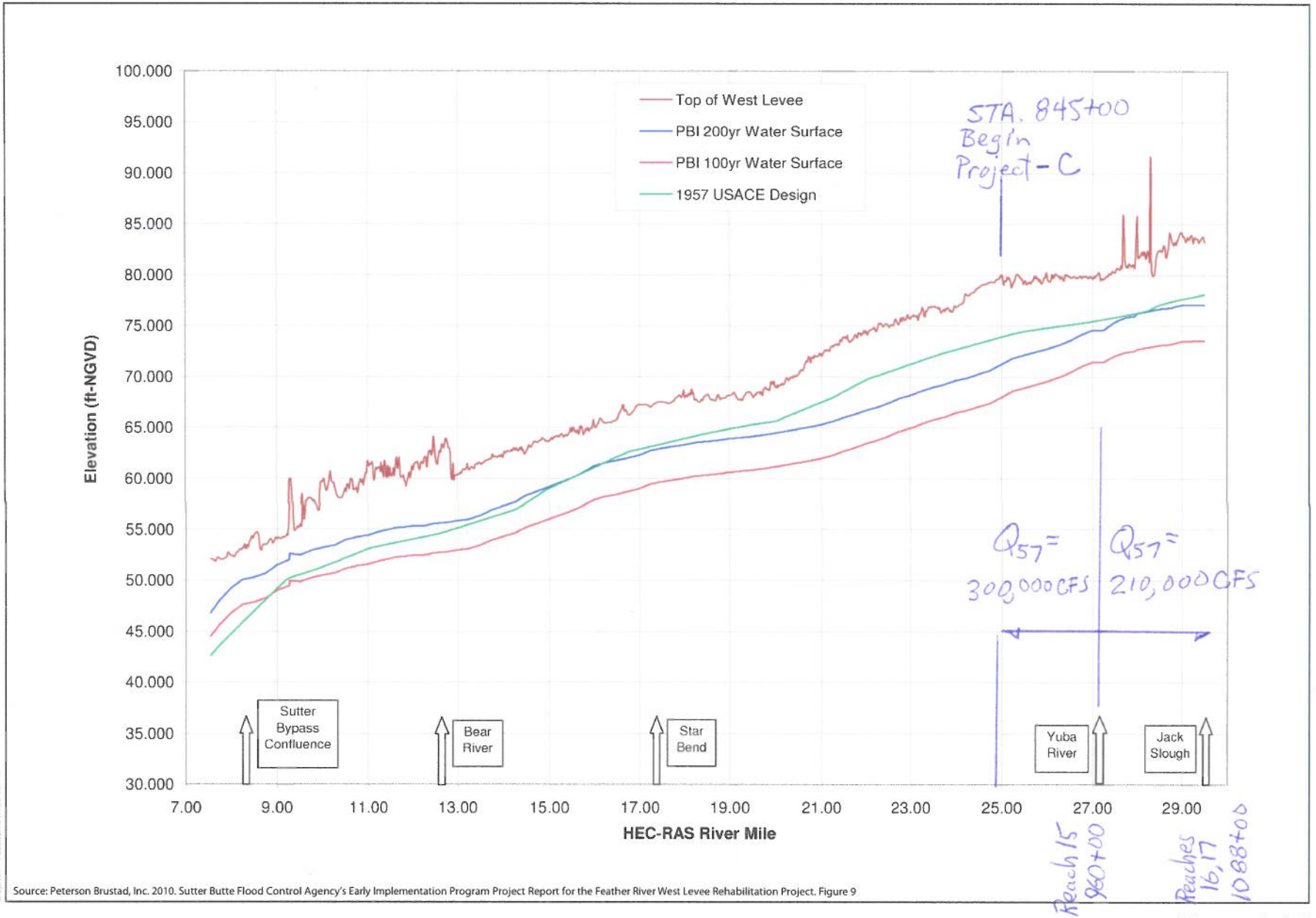
SUTTER BUTTE FLOOD CONTROL AGENCY

VOLUME 3: FRWL IMPROVEMENT PLANS

STA 856+08 - 24 INCH RAISED PIPE
YUBA CITY - SD PS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING, ADJUST SCALES FOR REDUCED PLOTS
0 — 1"

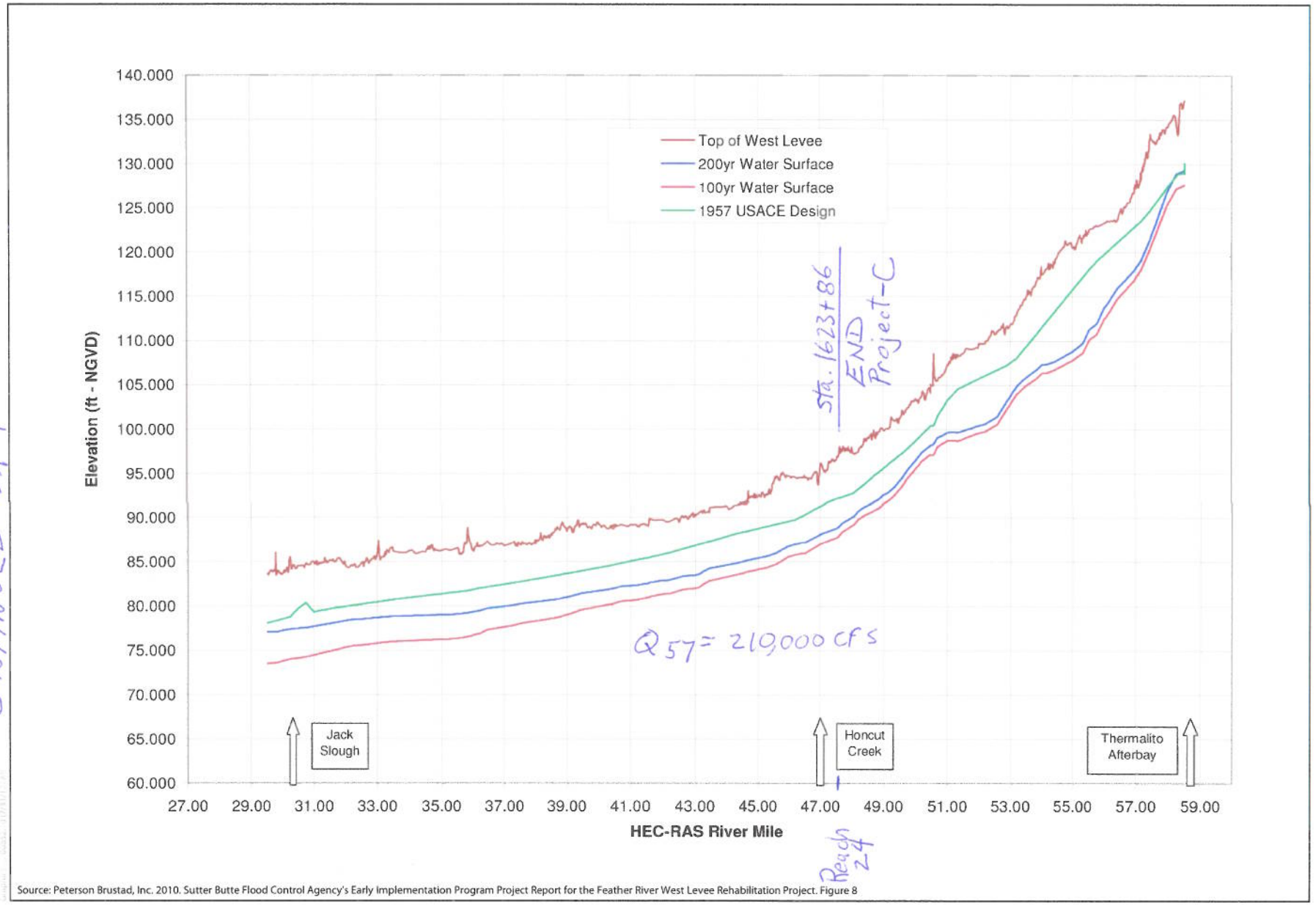
DRAWING NO. C-506
SHEET 206



Source: Peterson Brustad, Inc. 2010. Sutter Butte Flood Control Agency's Early Implementation Program Project Report for the Feather River West Levee Rehabilitation Project. Figure 9

CONTINUED 3.1-2 U/S

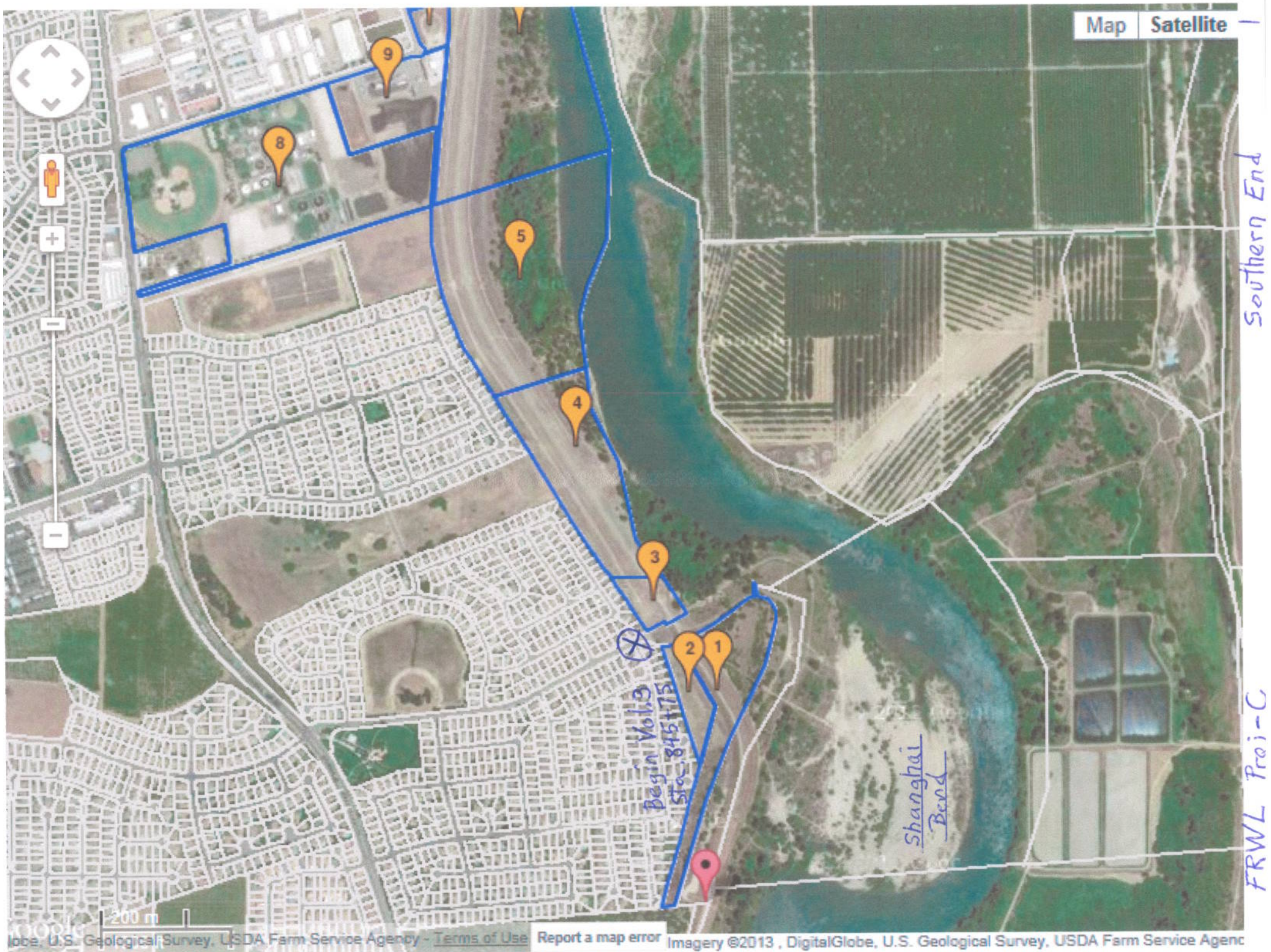
Figure 3.1-1
Lower Feather River Freeboard Profile



Source: Peterson Brustad, Inc. 2010. Sutter Butte Flood Control Agency's Early Implementation Program Project Report for the Feather River West Levee Rehabilitation Project. Figure 8

Plate 3.1-2
Upper Feather River Freeboard Profile

Attachment I



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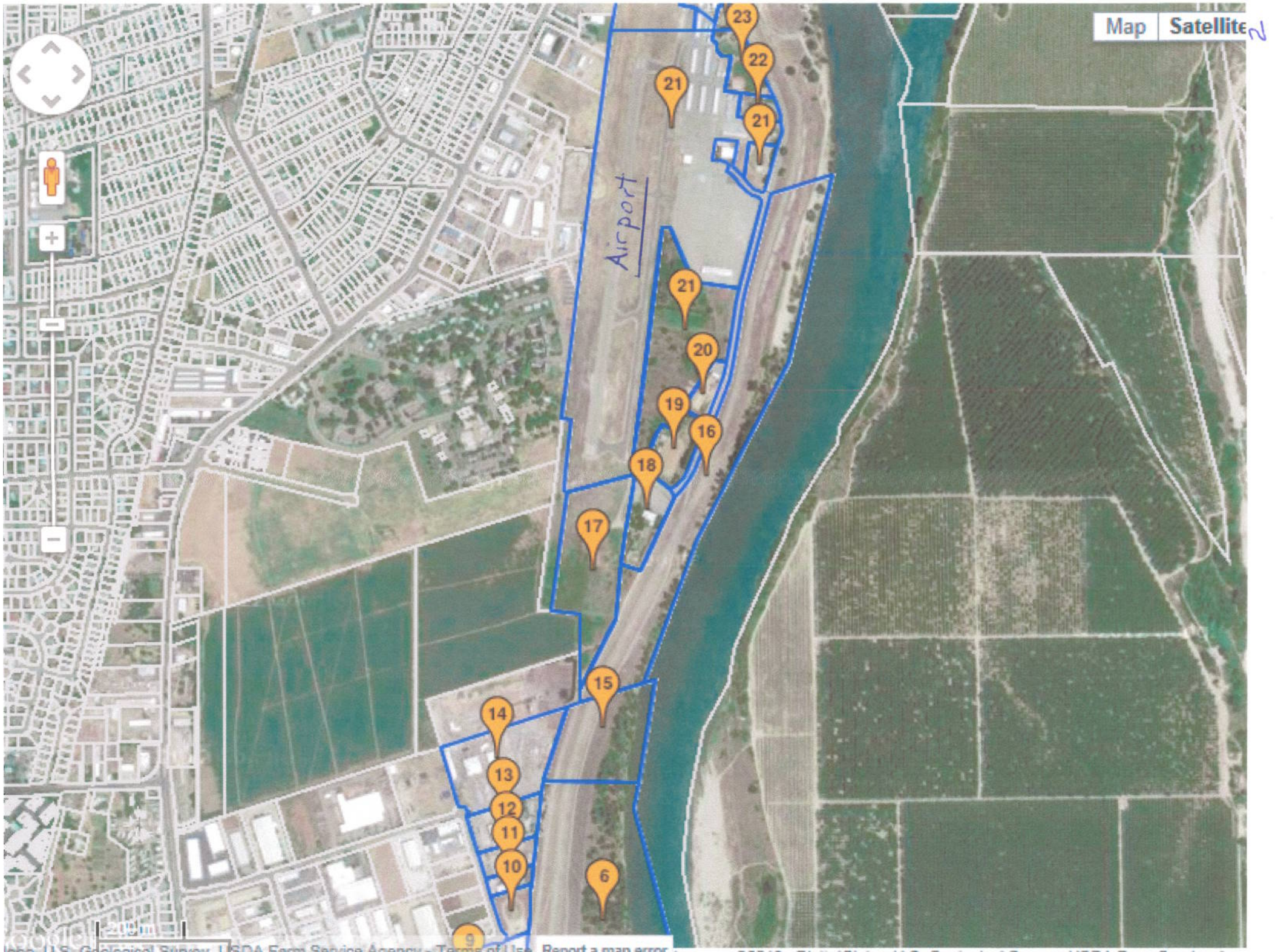

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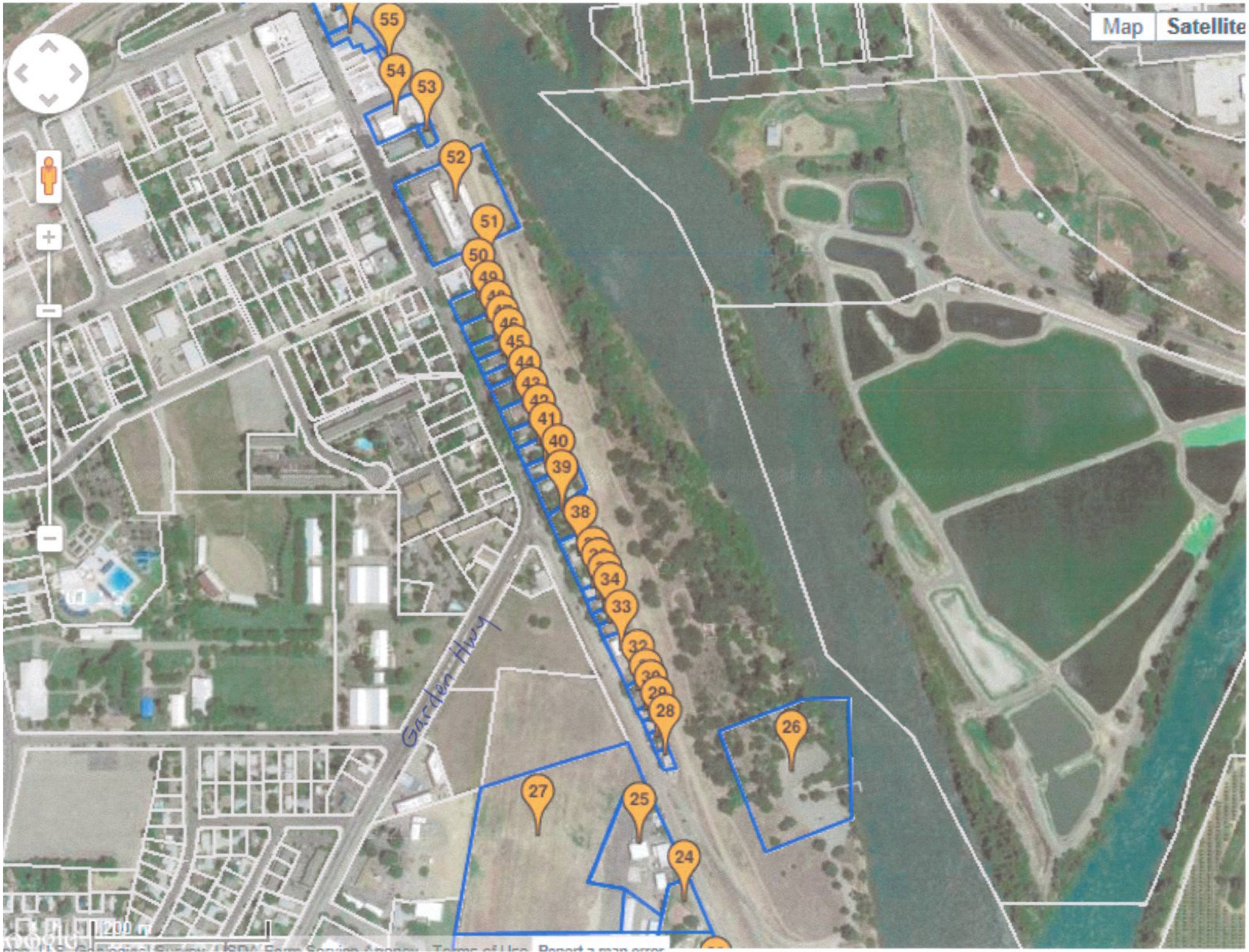

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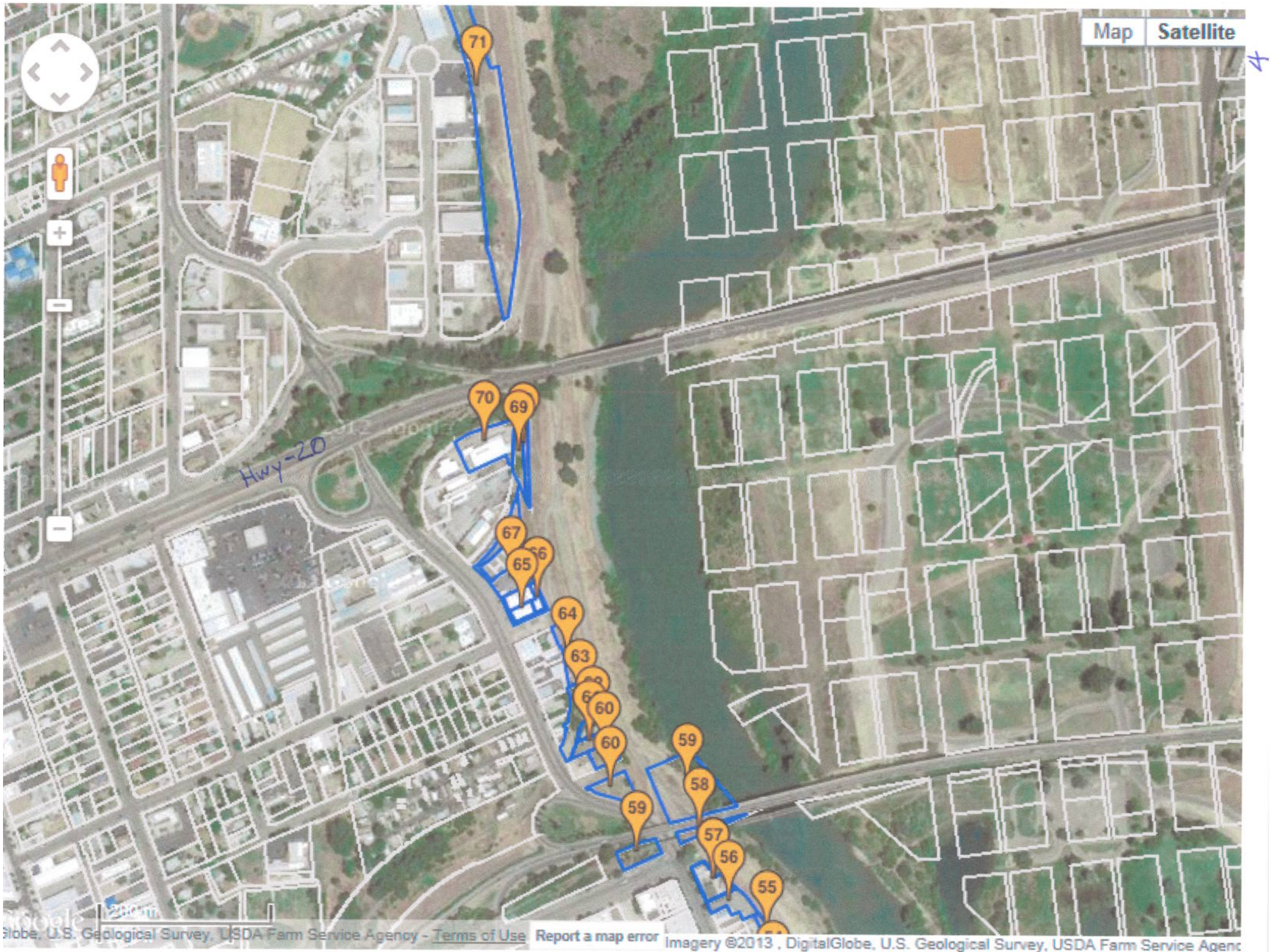

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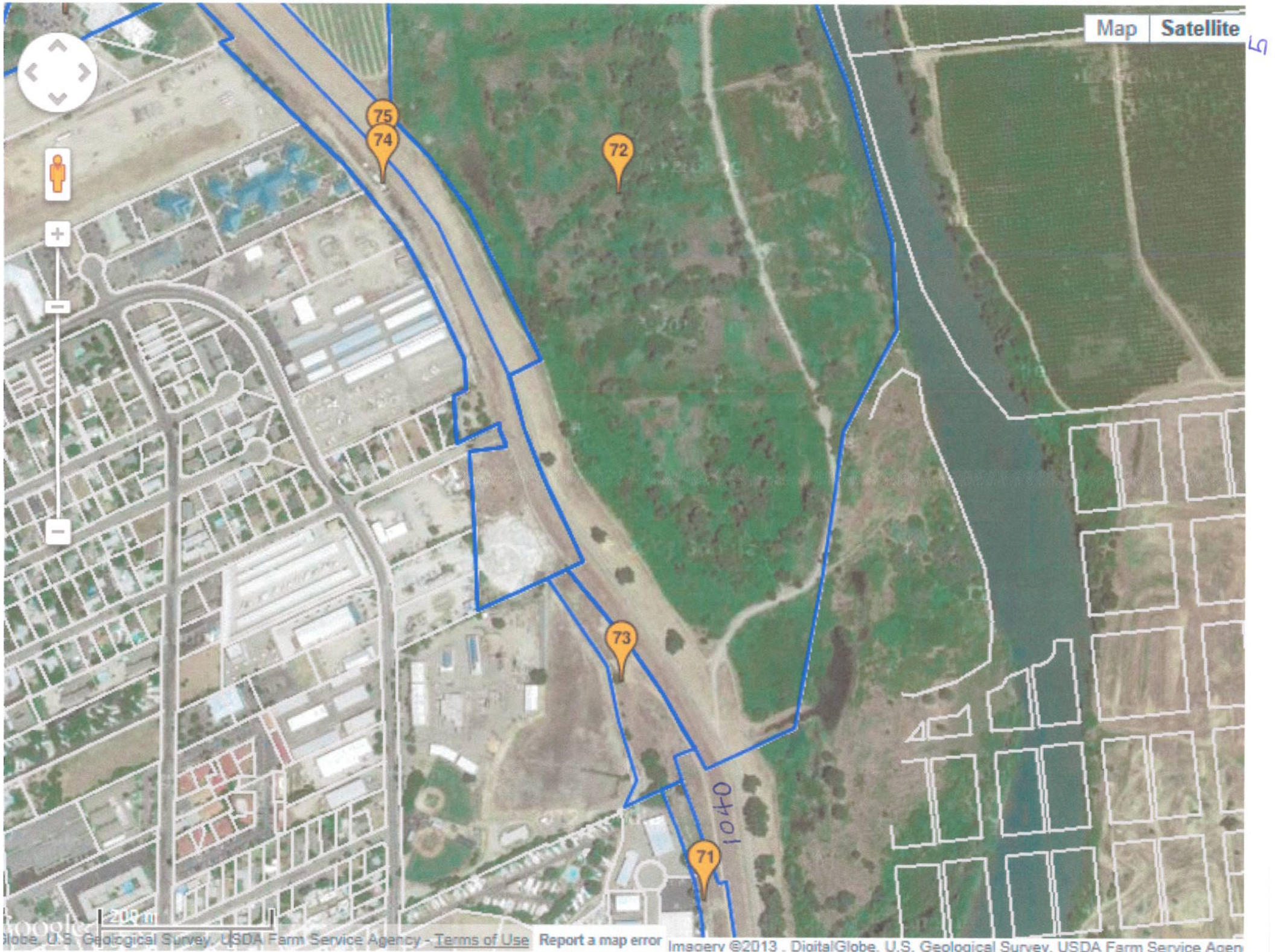
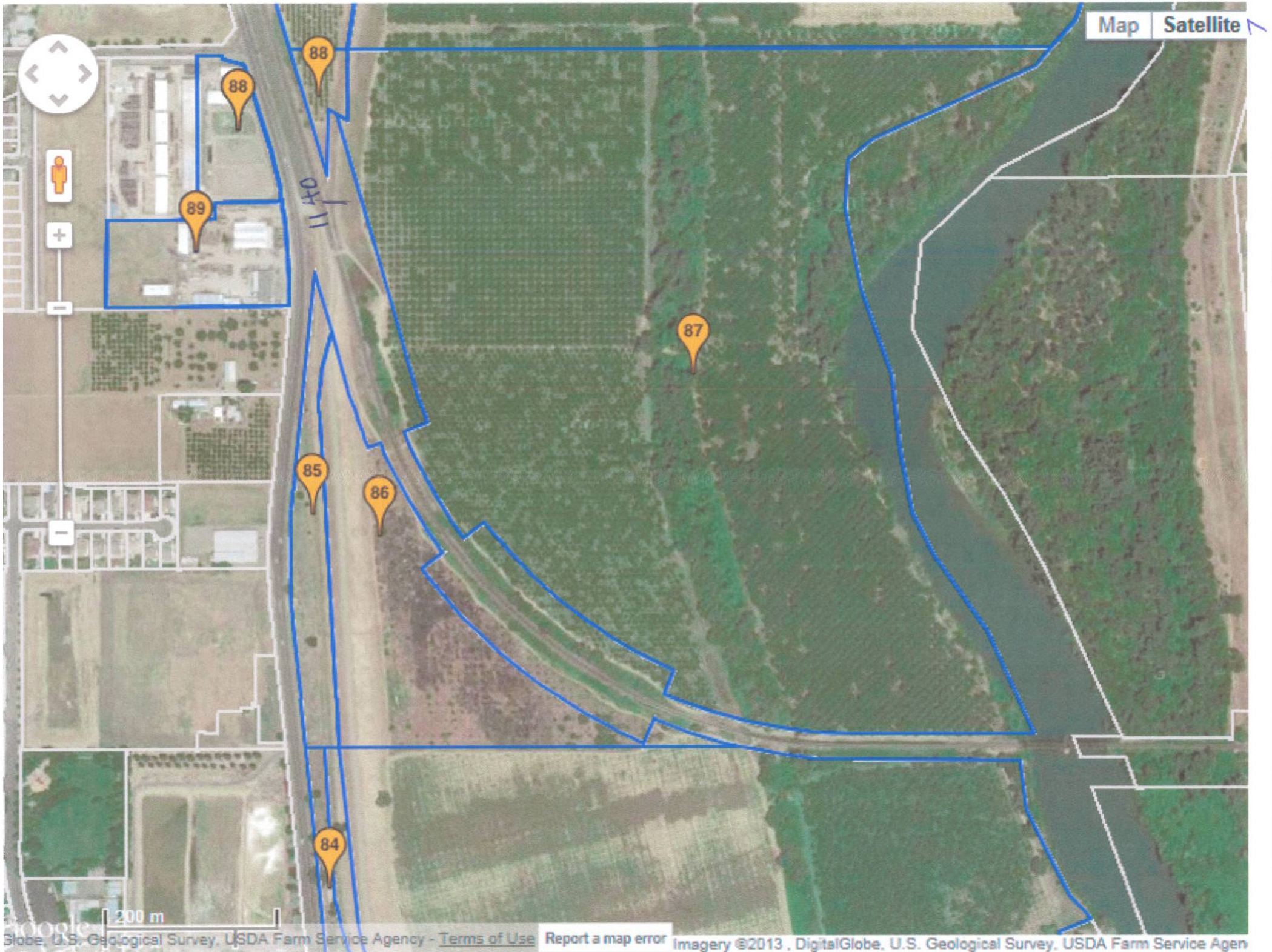


Attachment I

Attachment I



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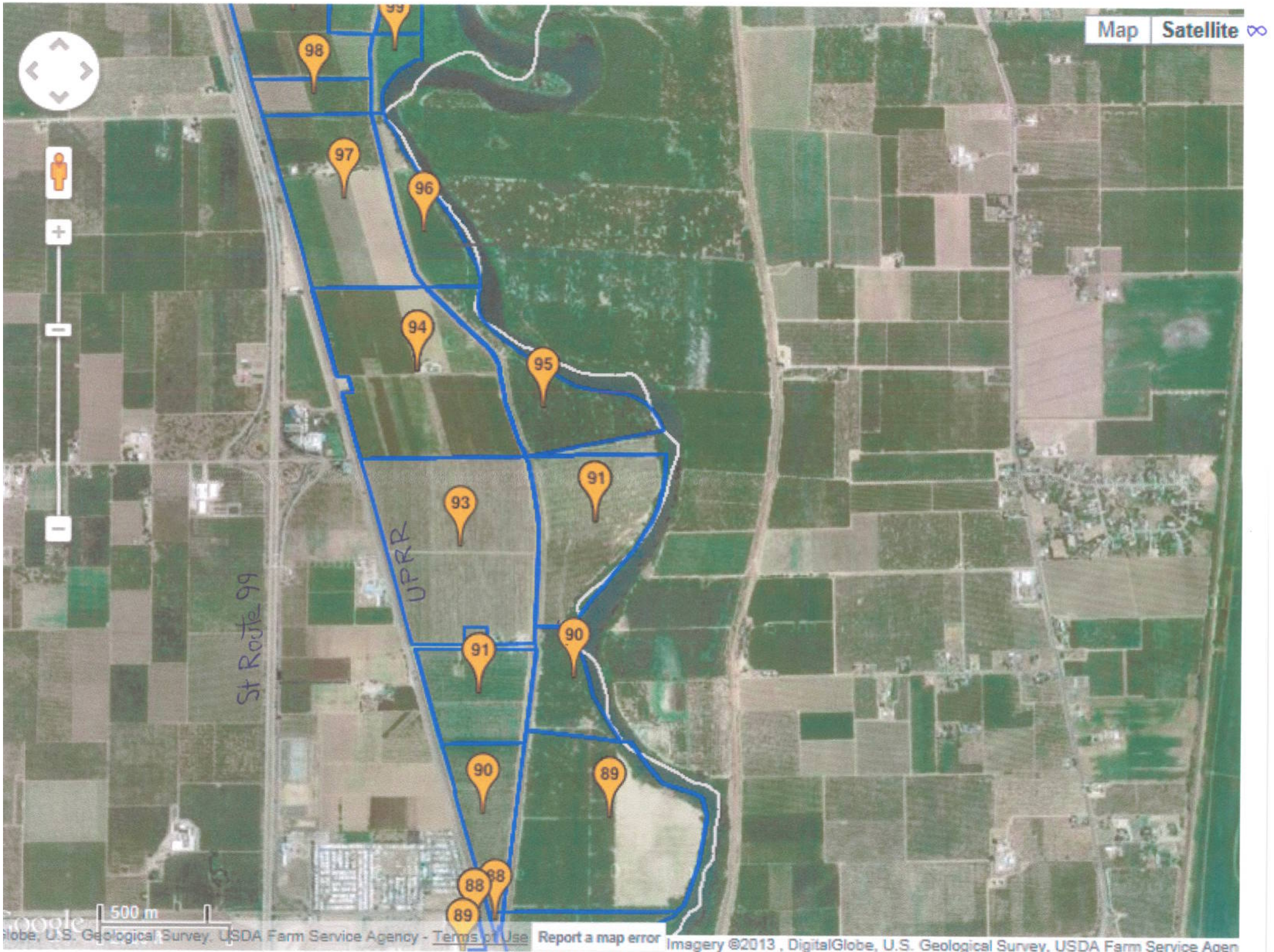

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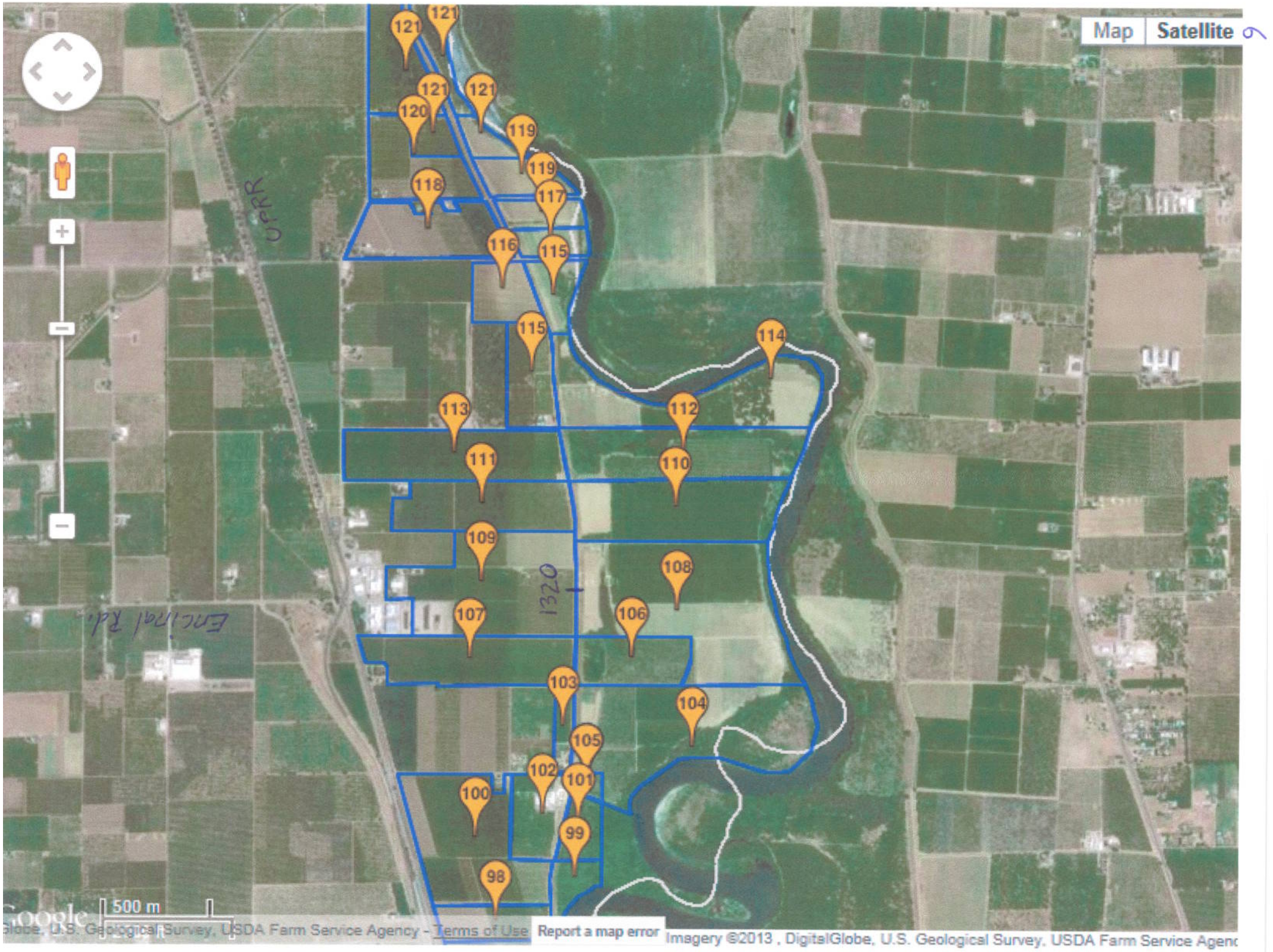

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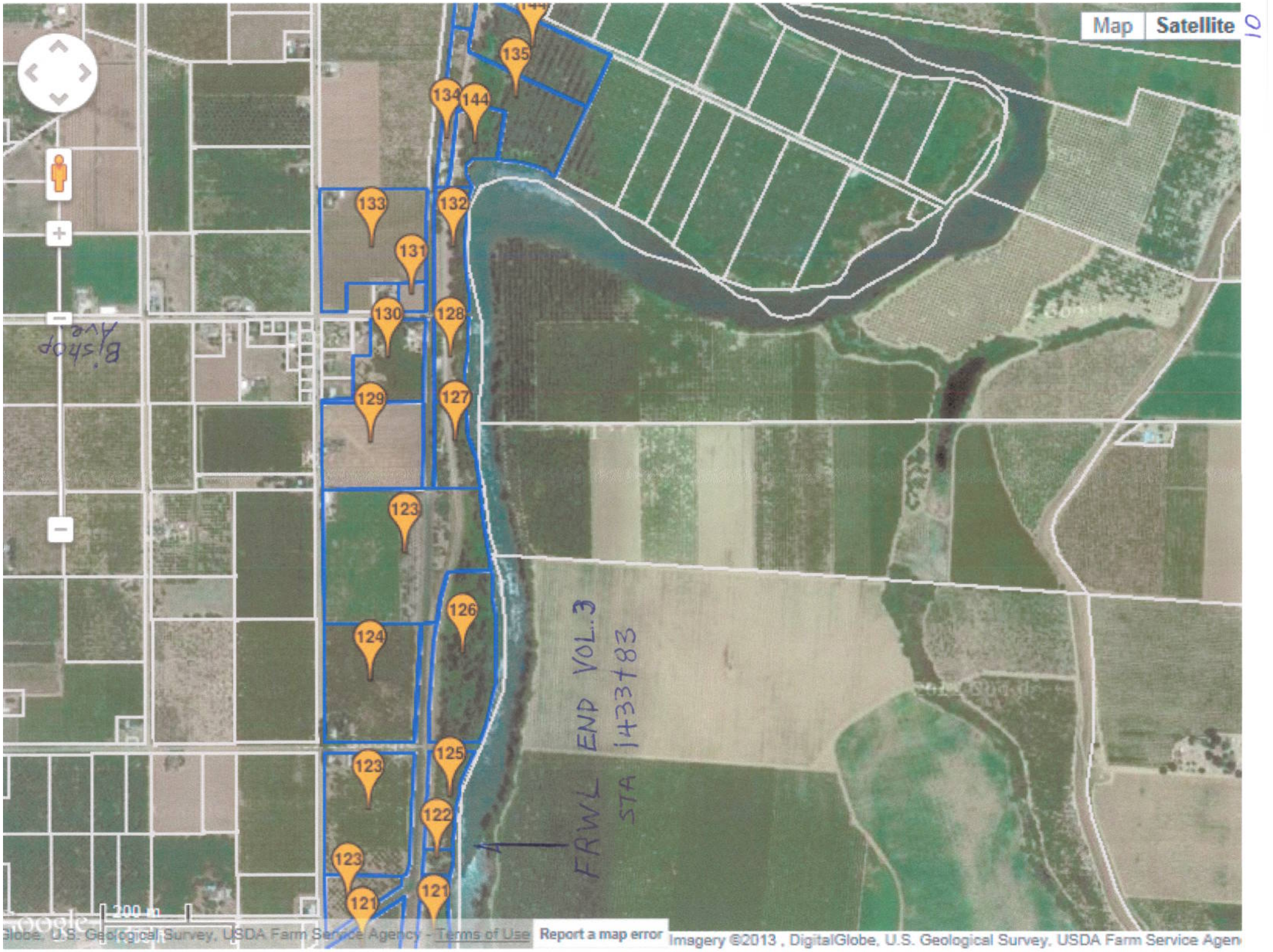

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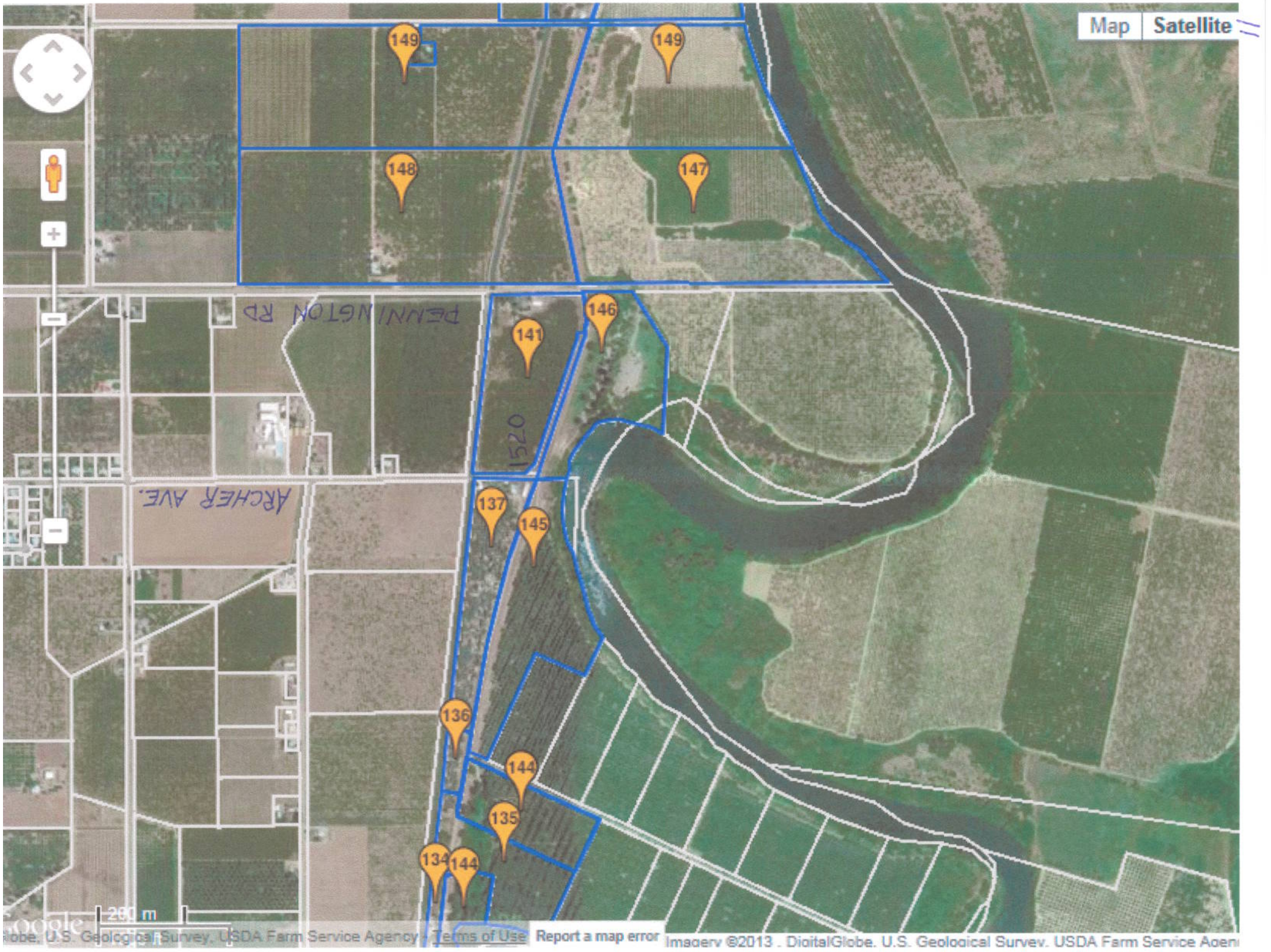

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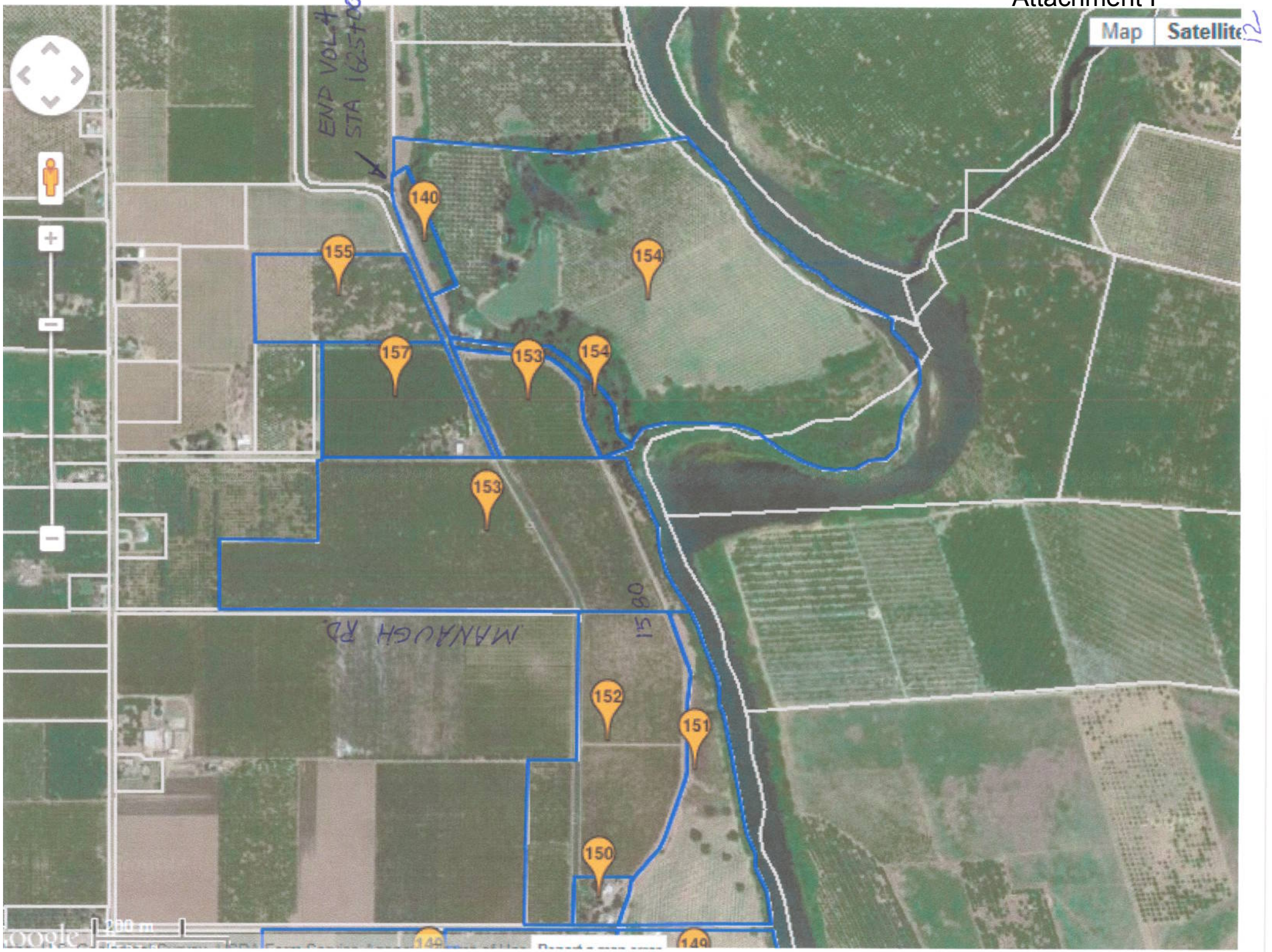

List Report

	Co/APN	Owner Name	Situs Address
1	SUT 09-040-009	SMITH DEAN P ETAL	1671 CAMPBELL RD LIVE OAK CA 95953-9707
2	SUT 09-040-010	SMITH DEAN P ETAL	1671 CAMPBELL RD LIVE OAK CA 95953-9707
3	SUT 09-050-001	RANCHO SANTA MARIA LTD	1340 CAMPBELL RD
4	SUT 09-050-002	SMITH RANCH ETAL	
5	SUT 09-050-004	SMITH JAMES ETAL	
6	SUT 09-130-003	BERRY LEONARD C	COOLEY DR
7	SUT 09-130-006	HATAMIYA REV 08 TR	PENNINGTON RD
8	SUT 09-130-007	FILTER JAMES R TR ETAL	PENNINGTON RD
9	SUT 09-130-010	HATAMIYA REV 08 TR	COOLEY RD
10	SUT 09-130-011	BERRY LEONARD C	1199 COOLEY RD LIVE OAK CA 95953-9705
11	SUT 09-130-012	HATAMIYA REV 08 TR	COOLEY RD
12	SUT 09-213-008	JOHAL LAKHBIR S & HARJIT K	ARCHER AVE
13	SUT 09-223-001	BREEDING RANCH LP	KENT AVE
14	SUT 09-230-001	SAC & SAN JOAQUIN DRAINAGE DIST	1100 PENNINGTON RD
15	SUT 09-230-005	BAINS MANJINDER & BEANT K	1212 PENNINGTON RD LIVE OAK CA
16	SUT 09-240-006	SUTTER BUTTE DUSTERS INC	1339 BISHOP AVE
17	SUT 09-240-007	SUE WAYNE 10 TR	SUTTER BUTTE CANAL
18			
19	SUT 09-240-010	SHUBAT FAM 91 TR	1256 ARCHER AVE LIVE OAK CA 95953-2601
20	SUT 09-241-012	KAULUWAI ORCHARDS	BISHOP AVE

	Co/APN	Owner Name	Situs Address
21	SUT 09-242-001	KAULUWAI ORCHARDS	ARCHER AVE
22	SUT 09-295-002	GHAG MOHINDER S & AMRIK K	KENT AVE
23	SUT 09-295-005	MC COOL KEVIN & MARY ANN	1210 BISHOP AVE LIVE OAK CA 95953-9612
24	SUT 09-295-008	GUSHI MARIKO M ETAL	1320 BISHOP RD LIVE OAK CA 95953-9612
25	SUT 09-295-021	MARTIN JACK L REV TR ETAL	1350 BISHOP AVE LIVE OAK CA 95953-9612
26	SUT 09-295-022	LEA PAUL	BISHOP RD
27	SUT 09-295-023	GREER LYNDA K	BISHOP RD
28	SUT 09-295-025	VAN WINKLE GREER 11 TR	8899 KENT AVE
29	SUT 09-304-001	REEVES FAM REV 02 TR	8021 KENT AVE
30	SUT 09-304-002	REEVES FAM REV 02 TR	RIVER BOTTOMS
31	SUT 09-305-002	SUTTER EX WATER DIST	1330 PASEO AVE
32	SUT 09-305-003	SMITH ALFRED C(EST OF) & NORMA	PASEO AVE
33	SUT 10-045-003	SMITH NORMA	KENT AVE
34	SUT 10-061-004	PURSCH MARGARET M TR	7181 KENT AVE LIVE OAK CA 95953-9604
35	SUT 10-062-003	DPM	HERMANSEN AVE
36	SUT 10-062-004	SCHMIDL JANICE J ETAL	
37	SUT 10-062-008	SCHMIDL JANICE J ETAL	7035 KENT AVE
38	SUT 10-120-003	DHOOT AMANJIT S & KULDEEP K	CLARK RD
39	SUT 10-130-005	MICHELI JUSTIN J ETAL	KENT AVE
40	SUT 10-130-012	SCHMIDL JANICE J ETAL	

	Co/APN	Owner Name	Situs Address
41	SUT 10-130-013	FILTER-CORRELL JULIE M	KOCH LN
42	SUT 10-130-014	MICHELI JUSTIN J ETAL	RIVERBOTTOM
43	SUT 10-130-028	MICHELI ELIZABETH A	KENT AVE
44	SUT 10-130-040	MICHELI ELIZABETH A	KOCH LN
45	SUT 10-130-041	RIVER BOTTOM RANCH II LLC	KOCH LN
46	SUT 10-130-043	RIVER BOTTOM RANCH II LLC	6005 HWY 99 LIVE OAK CA 95953-9749
47	SUT 10-170-010	DEPT OF FISH & GAME	MORSE RD
48	SUT 10-170-011	FILTER JAMES R TR ETAL	RIVERBOTTOM
49	SUT 10-170-012	FILTER FAM 94 TR	MORSE RD/RIVERBOTTOM
50	SUT 10-170-013	DEPT OF FISH & GAME	MORSE RD
51	SUT 10-170-015	FILTER W&M BYPASS 91 TR	
52	SUT 10-170-017	OWEN DAVID J & VICKIE A	1011 MORSE RD LIVE OAK CA 95953-9746
53	SUT 10-170-043	ALBERTINI MARY G TR ETAL	LIVE OAK HWY
54	SUT 10-170-050	FILTER JAMES R TR ETAL	1010 MORSE RD LIVE OAK CA 95953-9746
55	SUT 10-170-052	RICHLAND ENTERPRISES	HWY 99
56	SUT 10-170-054	SJB FARMS LLC	MORSE RD
57	SUT 10-220-008	RICHLAND ENTERPRISES	4817 LIVE OAK HWY
58	SUT 10-220-046	SINGH KEWAL & RESHAM K	RIVERBOTTOM
59	SUT 10-220-047	RICHLAND ENTERPRISES	RIVERBOTTOM
60	SUT 10-220-053	SINGH KEWAL & RESHAM K	LIVE OAK BLVD

	Co/APN	Owner Name	Situs Address
61	SUT 10-270-001	WILBUR REV 94 TR	601 REDNALL RD
62	SUT 10-270-003	WILBUR REV 94 TR	REDNALL RD
63	SUT 10-270-004	RIVER BEND ORCHARDS LLC	
64	SUT 10-270-005	WILBUR REV 94 TR	726 REDNALL RD
65	SUT 10-270-007	RIVER BEND ORCHARDS LLC	
66	SUT 18-070-001	DI FIORE ENTERPRISES LP	
67	SUT 18-070-002	BOONE DECLARATION 91 TR	LIVE OAK BLVD
68			
69			
70			
71			
72			
73			
74			
75	SUT 20-160-071	SUTTER COUNTY OF	2ND ST
76	SUT 22-090-007	SUTTER COUNTY OF	SECOND ST
77	SUT 22-090-010	SUTTER COUNTY OF	SECOND ST
78	SUT 22-090-012	SUTTER COUNTY OF	SECOND ST
79	SUT 22-090-013	SUTTER COUNTY OF	SHANGHAI BEND DR
80	SUT 23-040-036	SUTTER COUNTY OF	SHANGHAI BEND DR

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	Co/APN	Owner Name	Situs Address
81	SUT 51-470-001	SUTTER COUNTY OF	1965 LIVE OAK BLVD
82			
83	SUT 51-490-014	MONTNA LARRY L & NORMA J	2069 LIVE OAK BLVD
84	SUT 51-490-017	FRANCE M&S REV 04 TR	2109 LIVE OAK BLVD
85	SUT 51-490-018	SATIJA FAM 03 TR	2085 LIVE OAK BLVD
86	SUT 51-490-019	YOUNG FAM TRUST A 93 TR	2055 LIVE OAK BLVD
87	SUT 51-490-021	YOUNG FAM 93 TR B	2021 LIVE OAK BLVD
88	SUT 51-490-025	PATEL THAKORBHAI & HEMLATABEN	2129 LIVE OAK BLVD YUBA CITY CA 95991-8801
89	SUT 51-490-026	BHATTI AMERJIT S	LIVE OAK BLVD
90	SUT 51-530-020	LAMON ESTATE TRUST B ETAL	LYNN WAY
91	SUT 51-530-021	JAEGER WILLIAM L & PATRICIA A	LYNN WAY
92	SUT 51-550-003	LAMON FAM TR A ETAL	SUMNER ST
93	SUT 51-580-008	ROHRER BROS INC	2421 LIVE OAK BLVD
94	SUT 51-580-009	BAINS DALJIT S	LIVE OAK BLVD
95	SUT 51-580-020	ROBERT BANES LAND LEVELING INC	2229 LIVE OAK BLVD
96	SUT 51-630-052	BEYMER WELL ENTERPRISES INC	2862 LIVE OAK BLVD
97			
98	SUT 52-430-004	LEVEE DIST #1	SUTTER ST
99	SUT 52-430-008	FLETCHER FAMILY LP	785 SUTTER ST
100	SUT 52-450-007	JENSEN CATHERINE M TR	211 TEEGARDEN AVE

	Co/APN	Owner Name	Situs Address
101	SUT 52-450-009	SUTFIN REV 11 TR	207 TEEGARDEN AVE #4
102	SUT 52-450-017	BOCK INDUSTRIAL CONDO ASSOC	207 TEEGARDEN AVE
103	SUT 52-471-007	BLANCHARD JOHN W & CHRISTINE E	649 SUTTER ST
104	SUT 52-471-008	DHAMI AVTAR S & DAVINDER K	642 SUTTER ST
105	SUT 52-471-015	LAW ALMAE TR ETAL	657 SUTTER ST
106	SUT 52-471-020	LEVEE DIST #1	200 TEEGARDEN AVE
107	SUT 52-471-021	DHAMI AVTAR S & DAVINDER K	SECOND ST
108			
109			
110	SUT 52-515-012	HUST BROTHERS ETAL	563 SECOND ST
111	SUT 52-515-014	PAQUETTE CHRISTIAN E	KEYSER ST
112	SUT 52-515-017	MULCAHY REV I-V 11 TR	547 SECOND ST
113	SUT 52-516-005	FLETCHER ELEANOR M ETAL	511 SECOND ST
114	SUT 52-534-001	SUTTER COUNTY OF	463 SECOND ST
115	SUT 52-535-003	FALCOCCHIA ANTHONY & TRACEY	160 C ST
116	SUT 52-535-004	COSKER SHARRON	423 2ND ST YUBA CITY CA
117	SUT 52-535-005	MC CARLEY FRANK L & LORETTA M	413 SECOND ST YUBA CITY CA 95991-5504
118	SUT 52-535-006	MC CARLEY DENNIS L	407 SECOND ST YUBA CITY CA 95991-5504
119	SUT 52-535-007	NAUMAN MARIA & ANDREW	379 2ND ST YUBA CITY CA 95991-5501
120	SUT 52-552-001	SIMS KAY C	373 2ND ST YUBA CITY CA 95991-5501

	Co/APN	Owner Name	Situs Address
121	SUT 52-552-002	MACKENSEN ERIC R & KATHERINE V	365 SECOND ST YUBA CITY CA 95991-5501
122	SUT 52-552-003	POOLE MARK H	355 SECOND ST
123	SUT 52-552-004	SANDERS CHARLES W JR & JEAN Y	349 SECOND ST
124	SUT 52-552-005	WILKINS REV 02 TR	341 SECOND ST YUBA CITY CA 95991-5501
125	SUT 52-552-006	EDWARDS JOHN M & NOLA D	335 2ND ST YUBA CITY CA 95991-5501
126	SUT 52-552-007	ALBRECHT S&N RV TR ETAL	329 2ND ST
127	SUT 52-570-001	SMITH DOSSIE	219 2ND ST YUBA CITY CA 95991-5520
128	SUT 52-570-002	PERNOD RICHARD A	215 2ND ST
129	SUT 52-570-003	BROCKMAN WILLIAM G	209 2ND ST YUBA CITY CA 95991-5520
130	SUT 52-570-004	STOUT CARL C & SANDRA S	201 2ND ST YUBA CITY CA 95991-5520
131	SUT 52-570-006	LEVEE DIST #1	SECOND ST
132			
133			
134	SUT 52-580-003	SOUZA RONALD	291 SECOND ST
135	SUT 52-580-004	STEVENSON FAM TR ETAL	271 SECOND ST
136	SUT 52-580-005	YUBA SUTTER BODY SHOP INC	265 2ND ST
137	SUT 52-580-006	HODGES GENEVA	261 2ND ST YUBA CITY CA 95991-5520
138	SUT 52-580-007	FILBY TRESIA ETAL	255 SECOND ST
139	SUT 52-580-008	LEVEE DIST #1	243 SECOND ST
140	SUT 52-580-009	COBLE MARVIN ETAL	225 2ND ST

	Co/APN	Owner Name	Situs Address
141	SUT 52-580-015	COAKLEY DENNIS	299 SECOND ST
142			
143			
144	SUT 54-010-054	YUBA CITY CITY OF	302 BURNS DR
145	SUT 54-081-009	SUTTER SIERRA PROPERTIES LLC	1162 PUTMAN AVE
146	SUT 54-081-010	SUTTER SIERRA PROPERTIES LLC	1200 PUTMAN AVE
147	SUT 54-081-012	NELSON MARCUS	1312 PUTMAN AVE
148	SUT 54-081-017	U A LOCAL NO 228 BLDG CORP	1246 PUTMAN AVE YUBA CITY CA 95991-7203
149	SUT 54-081-018	MORGAN ROBERT H REV TR ETAL	1286 PUTMAN AVE
150	SUT 54-081-022	YUBA CITY CITY OF	248 BURNS DR
151	SUT 55-010-019	STATE OF CALIFORNIA ETAL	SHANGHAI BEND RD
152	SUT 55-180-080	YUBA CITY CITY OF	SHANGHAI BEND RD
153	YUB 005-010-002-000	PETERS LAURA HOLMES	10738 HWY 70 MARYSVILLE CA 95901

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A) 8.1.4 Review of Final CVFED Data

Uncertainties associated with merging data from two different sources to calculate freeboard are unclear at this stage. When the full set of CVFED data is released by DWR it will be appropriate to use only the CVFED data for both cross section and top of levee elevations to estimate freeboard. Board staff will continue to work closely with the SBFCA team to further evaluate the hydraulic modeling data and results to be informed with as much certainty as possible with respect to water surface elevations and freeboard.

SBFCA Response: The final CVFED model has not yet been released by DWR and therefore the dual data system will have to suffice for this contract.

Board Staff Response: Staff intends to include a permit condition on this subject.

B) 8.1.5 Super-elevation Considerations and 8.2.8 Levee Bends

There are several river bends along the FRWL alignment where water surface elevations would be expected to rise along the outer bank and fall along the inner bank due to centrifugal forces resulting in the condition known as super-elevation. Board staff will continue to work with the SBFCA team to address this potential and to determine its significance.

The levee system along FRWL project has a number of bends, including 90 degree levee bends. A bend in the channel may cause super elevation along the outside of the bend. In other than straight sections of a channel, super elevation is to be checked with velocity consistent with the 200-year discharge. The ULDC and USACE (EM 1110-2-1601) describe the importance of considering super elevation when performing seepage and stability analyses. It is reasonable to use the principle of superposition for seepage analysis at the 90-degree bends to confirm the adequacy of the cutoff walls.

SBFCA Response: The final design complies with USACE (EM 1110-2-1601) and ULDC (2012) requirements for superelevation. The USACE and ULDC calculation for superelevation is based upon the curvature of the flowlines at flood stage. Most of the river meandering along the Feather River occurs during low flows. During the 200-year event, the vast majority of the river bends are obsolete and the Feather River flowlines are primarily straight. The 90 degree bends in the levee are not representative of river channel bends. However, superelevation was calculated at suspect locations to confirm that the design meets ULDC and USACE standards. The most critical location was found to be just upstream of the Gridley Road bridge, where superelevation was

calculated to be approximately 0.2 ft. According to USACE EM 1110-2-1601, "If the total rise in water surface elevation due to superelevation is less than 0.5 ft, the normally determined channel freeboard should be adequate. No special treatment such as increased wall heights or invert banking and spiral transitions is required."

(From URS/HDR) Regarding the seepage analysis, the proposed cutoff walls at 90 degree bends are fully penetrating, which reduces the porewater pressure on landside of the levee and as such 3-dimensional effects on underseepage and stability at 90 degree bends are negligible. It should also be noted that geotechnical analyses were performed with an additional 1 foot above the 200 year and HTOL WSEs to account for uncertainty.

Board Staff Response: Staff checked critical bend areas from the 100% Issued for Bid plan set. There are 13 river bends which exceed 90 degrees and 4 with bends of 60 to 80 degrees. It is reasonable to understand that the low flow bends are straightened out during the 200 year flood event. Staff retracts this comment.

C) 8.1.7 Roughness Coefficients

SBFCA engineers applied a maximum Manning's "n" roughness coefficient in the HEC-RAS model of 0.1 for vegetated areas. The HEC-RAS Hydraulic Reference Manual suggests use of a roughness coefficient for trees in the flood plain with flows into the branches (vegetated areas) ranging from 0.1 to 0.16.

Staff will continue to work with the SBFCA team to confirm that the current analysis does not underestimate the impact to WSE caused by vegetation.

SBFCA Response: The roughness coefficients have been determined to be accurate through technical reviews that have been completed by PBI, MBK Engineers and the USACE.

Board Staff Response: Staff will retract its comment and address the issue within the permit conditions.

D) 8.1.8 Hydraulic Conclusions

Board staff will work closely with the SBFCA team over the next several months to refine the hydraulic modeling analysis and results discussed herein to ensure continuing confidence in the predicted results and impacts.

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SBFCA Response: There is no Levee waterside work proposed under this Project Area – C and therefore SBFCA is not responsible for improving the Hydraulic Model from the 65% plan submittals.

Board Staff Response: Staff agrees with this statement.

E) 8.2.1 Levee Slopes

Both the USACE (Geotechnical Levee Practice, 2008) and CCR 23 require a minimum landside levee slope of 1V on 2H, and the USACE further requires the levee to have a good history of performance. Certain locations in the project have existing levee landside slopes that are steeper than USACE maximum slope requirements. These sites will be restored to existing conditions after slurry walls are installed. For the FRWLP these reaches include Reach 19, 20, 22, 23, 24 in Project Area-C.

SBFCA Response: The levees along the FRWL system are largely overbuilt levee sections within which the standard USACE, Title 23, and ULDC levee prism fits without daylighting. As such the slopes meet criteria. A 2:1 landside slope is acceptable for existing levees that have not had past performance problems. In addition, the slope criteria is for levees composed of homogeneous materials. Allowances are made for steeper slopes where the levee cross section is zoned. The majority of the FRWL Project levees will have an impervious soil-bentonite slurry cutoff wall in the lower half of the levee and an 8-foot-wide clay core above the slurry wall in the upper half of the levee. These features make the levee a zoned levee that reduces seepage and pore pressures in the landside slope thus improving slope stability. These features allow a steeper landside slope while at the same time providing enhanced levee integrity. Further, geotechnical analyses for the FRWL Project show that the analyses sections meet all applicable slope stability criteria.

Board Staff Response: The 100% Issue for Bid plan sets, for Project Area-C, show existing landside slopes steeper than 2:1. CCR 23, §120 (a)(12) states "…Special construction details (e.g., 4:1 slopes) may be substituted …Where the design of a new levee structure utilizes zones of various materials or soil types, the requirements of this subdivision do not apply."

Staff concurs with the SBFCA response and request that the Board allows the re-construction of steeper levee slopes as currently exists by invoking CCR 23, Section 11(a) and (b).

F) 8.2.2 Seismic Assessment

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The results of liquefaction triggering analyses, as presented in Table 8-3 of the Geotechnical Design Recommendation Report (GDRR, 2012), show that a liquefiable zone exists in the foundations of all of the FRWL reaches from Reach 13 to19 and 21 to 24 of Project Area-C. Also the results of seismic vulnerability (see Table 8-4 of the GDRR; and Table D-13 of Appendix D) (See Attachment E) indicate that post-seismic flood protection ability will be "compromised" and significant damage to internal structures (i.e., cutoff walls) will occur at Reaches 13, and 15, based on the evaluation criteria discussed in Table 6-2 of the GDRR.

In addition, the results of deformation analysis indicate that several levee sections will have potential for large deformation to occur during seismic events. For example the estimated maximum seismic deformation for Reach 19 at Station 1224+00 is about 10 feet.

Furthermore, the post earthquake stability analysis results with mitigation measures (Appendix D) indicate factor of safety of less than 1 for Reaches 13, and 15.

***SBFCA Response*:** None of the state or federal guidance documents (e.g. EM 1110-2-1913, EC 1110-2-6067, California Title 23, or California ULDC) require designing mitigation measures for seismic conditions for levees that only intermittently hold back water. Instead, a few such as the ULDCrecommend considering seismic performance when selecting remedial measures. We did consider seismic performance along with other considerations (reliability, construction, cost, schedule, environmental impacts, potential litigation, etc.) when selecting the preferred remedial measures. Many of the potential seismic issues for compromised locations are related to waterside seismic slope stability and lateral spreading toward the river. Other remedial measures considered (berms and relief wells) would not provide any better seismic performance than cutoff walls for these conditions. When selecting cutoff wall types, we concluded that SB walls would provide better seismic performance since they are more flexible, with the capacity for self-healing, as compared to SCB walls. Due to the more brittle nature of SCB walls, the potential for permanent deformation and open cracks in SCB walls is higher.

The potential for earthquake-induced levee damage and displacements along the FRWL Project will be incorporated into an Emergency Action Plan (EAP) in accordance with the California ULDC requirements. Estimates will be made to identify the amount of imported borrow and effort to temporarily restore a levee geometry corresponding to a 10-year level of protection within 8 weeks will be made and incorporated into the EAP.

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Board Staff Response: Staff concurs and has incorporated the Emergency Action Plan (EAP) into the permit conditions which will be required 180 days after completion of the construction contract.

Staff concurs with the SBFCA response and request that the Board invoke CCR 23, Section 11(a) and (b).

G) 8.2.3 Exit Gradient for Critical Locations and 8.2.4 Relief Wells

A goal of the 65 percent design seepage analysis was to achieve exit gradients of 0.5 of less. The GDRR recognizes that the USACE Geotechnical Levee Practice, 2008 suggests that the maximum allowable exit gradient be lowered to as low as 0.3 at critical locations such as pump stations and swimming pools, or in areas where flood fight operations are difficult. The seepage analyses at the Sunset Pump Station (Reach 21, Station 1430+00) shows an exit gradient for the 200-year plus 4 feet WSE at the bottom of the ditch to be lower than the 200-year plus 1 foot WSE. This appears to be an oversight and will be corrected as the project design advances to ensure compliance with the USACE suggestion.

SBFCA Response: The USACE guidance document only states that a lower gradient between 0.3 and 0.5 should be considered, not mandated, for critical locations such as pump stations or areas where it would be difficult to flood fight. For the case with the Sunset Pump Station, the critical area is a dry or empty canal adjacent to the levee. When the canal is dry, underseepage distress is easy to discover and flood fight. For this site, a deep slurry cutoff wall is planned. As shown by the seepage analysis for Reach 21, Station 1430+00 for this location, the addition of a deep cutoff wall reduces the average exit gradient for the design WSE (200 year +1 foot) to only 0.24 at this location – making that matter moot. There is no need to add additional remedial measures.

The recommendations for Reach 13 have been updated since 65% design and are included in an addendum (Addendum 1 to the GDRR). The current recommendations do not rely upon relief wells in Reach 13. Relief wells are currently proposed for a small section in Reach 7. The spacing and depth of these relief wells were designed with average exit gradients equal or less than 0.5 at the mid-point of the wells, as per USACE EM 1110-2-1913.

The existing relief wells in Reach 13, a total of 81 relief wells were installed in Reach 13 between 1956 and 1998. Relief well pump testing and video inspection work was undertaken in 2011 and 2012. This work identified that numerous wells had obstructions and joint gaps in the well screen, but overall the wells were still functioning properly and

any gaps were effectively filtered. However, two wells did pump excessive amounts of sand and one well had casing defects. These three wells were abandoned in late 2012. For the remaining 78 relief wells, the plan is to leave these wells in place until the proposed cutoff wall has been constructed with the intent that the wells can be used to observe and monitor groundwater conditions during subsequent high water events to assess whether the wall has successfully cutoff the flow of water from the river channel. Assuming that the slurry wall is successful in cutting off under seepage flows, the plan would then be to convert the remaining relief wells to observations wells, as they would no longer be needed from an under seepage perspective. It is likely that not all of the remaining 78 relief wells would need to be converted to monitoring wells and that some of them could be abandoned if desirable. A determination of the exact number to be converted and those that can be abandoned will be made at a future time.

Board Staff Response: Staff concurs with this response and believes it is a sound way to handle the expensive refurbishment of relief wells. When and if it is determined that the cutoff walls do not cut off under seepage flows and there is a need to reintroduce relief wells, then this item will be revisited.

No action on this matter at this time.

H) 8.2.5 Adjacent Canals and 9.2 second bullet Adjacent Canal upstream of Sunset Pump Station

SBFCA's Geotechnical Design Recommendation Repot (GDRR) does not include steady state seepage analysis or landside slope stability analysis from Station 1615+62 to 1623+00 in Reach 24. There is a concern for seepage in this stretch of the levee when the canal is empty and the river is at elevated flood stages. The steep slopes may also cause difficulties for maintenance of these levees. SBFCA plans additional geotechnical explorations and analyses to finalize the design at these locations.
The ULDC requires more stringent criteria for "frequently loaded levees" experiencing water surface elevations one (1) foot or higher above the elevation of the landside levee toe at least once a day for more than 36 days per year on average. The final design and analysis of the existing levee slopes that are adjacent to the Sutter Butte Main Canal, Reach 21 and 22, Station 1430+00 to 1449+00 and Reach 24, Station 1610+50 to 1623+00 should consider the potential seepage concern and difficulty in maintenance.
Staff will confer with DWR staff and the ULDC work group to determine if it is appropriate to apply the "frequently loaded levees" criteria to the final design and analysis of the existing levee slopes.

SBFCA Response: We recognize the concern for underseepage issues into the adjacent canal in these reaches and have formulated remedial measures to address

them. However, it should be clear that all portions of the Feather River West Levee represent intermittently loaded levees and as such the geotechnical analyses comply with the ULDC criteria for an intermittently loaded levee. The presence of canal water at the landside toe of the levee does not make the levee subject to flood loading for extended periods, such as the constant high river/slough waters levels against levees in the Sacramento-San Joaquin Delta for which the frequently-loaded levee requirements were developed.

Board Staff Response: In addition to SBFCA's response above, staff requested slope stability calculations from the applicant and reviewed them for information, adequacy, and relationship to the underseepage issues for adjacent canals. Staff finds that there is no issue and that the factors of safety are above what is required.

I) 9.2 Second bullet ; Adjacent Canal upstream of Sunset Pump Station

The Irrigation Canal upstream of the Sunset Pump Station (Station 1430+00. Reach 22) where the canal slope and the existing levee landside slope are one and the same, should have a 15 feet of separation between levee landside hinge point and top of canal. SBFCA is working with the irrigation district to develop a joint use agreement which would delineate the division of maintenance responsibilities between the irrigation district and levee maintaining agencies.

SBFCA Response: SBFCA has supplied Board staff with documentation that there is no seepage concerns regarding the levee landside canal. Maintenance will be handled by the incorporation of an agreement between SBFCA, the Long Term Maintenance Agency (LMA's) for the levee and the Sutter Butte Main Canal District Maintainers.

Board Staff Response: Staff will insert a permit condition requiring that an agreement between SBFCA and the Sutter Butte Main Canal District on the separation of maintenance responsibilities be enacted prior to the completion of the Project Area-C contract.

J) 8.2.7 Railroad Crossing

At Station 1131+00 the Union Pacific Railroad crosses the FRWL in Project Area "C". More detailed information is needed for this section of the levee including cross sections. The closest seepage/stability analysis presented in the GDRR is at Station 1138+86 upstream and 1125+00 downstream.

SBFCA Response: The closure structure at UPRR crossing is excluded from this permit, but will be included in future work. A separate memorandum addressing the railroad impact during construction of the cutoff wall will be prepared for this area.

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Board Staff Response: No need for further comment on this item at this time.

K) 8.2.10 Site Characterization

The Geotechnical Data Report (GDR, 2012) prepared for FRWL Project includes field investigations and collected geotechnical information to supplement existing data and support the FRWL Project's 65 percent design of rehabilitation measures. In addition to existing information and pertinent geotechnical data, the GDR includes completing exploratory borings, cone penetrometer tests and laboratory testing on selected samples from the explorations. The design team is engaged in further site characterization. Compliance with USACE (Geotechnical Levee Practice, 2008) for final design will be aimed primarily to confirm the landward extent/continuity of the aquiclude layer for the seepage cutoff walls.

SBFCA Response: A large number of existing explorations that were performed under the FRWL Project, DWR's ULE Program, and other previous studies have been utilized for the design of the FRWL Project. Moreover, geomorphology and geophysics data have also been used to assist in site characterization for this levee system. An additional consideration is that the FRWL Project system has already been tested to flood levels comparable to the 200-year DWSE in 1986 and 1997. These previous flood events were generally within a foot or so of the 200-year DWSE and have been extremely useful in calibrating analyses and identifying those areas which have seepage, underseepage, and stability deficiencies. No other system in the Central Valley has had this past performance advantage to call upon.

In addition, we have worked with DWR staff and consultants (Ray Costa and Selva Selvamohon) to develop any additional needs for supplemental field explorations. As a result of this collaboration, supplemental explorations have been identified to be necessary in a few locations, including 8 explorations in Reach 13 to confirm the depth and continuity of aquaclude and aquifer layers and 5 explorations at different reaches to evaluate landward extent/continuity of the aquaclude layer. Furthermore, 9 supplemental explorations are planned at Reaches 26, 27, and 28 to facilitate detailed design once we move forward with this phase of work.

Considering the above, the design team considers that there is adequate information to design the mitigation measures for the FRWL Project. There is also concurrence from USACE, DWR, and SBFCA's IPE Board that the amount of exploration data available is appropriate for detailed design.

Board Staff Response: Staff is fine with the additional information.

L) 8.2.11 Reuse of Levee Degrade Materials

PROJECT AREA – C PERMIT#18793-1; Reaches 13 to 24 (Sta's.844+75 to 1625+00)
CCR 23 VARIANCE; addressing items from 408 Request – Staff Report, permit#18793

Construction of the levee sections with a soil-bentonite wall includes degrading the existing levee and rebuilding the levee's upper section (Type-1 soil) with an 8-foot-wide clay core and shells (Type-2 soil) on both the landside and waterside. The URS Technical Memorandum on "Geotechnical considerations for clay core and shell materials" dated January 23, 2012, and 65 percent design, Addendum No.1, Specification, dated August 16, 2012, Section 2.2.2, have recommended fine contents lower than the requirement in CCR 23. Accordingly, shell materials comprised of coarse-grained soils should have fine contents (i.e., passing #200 sieve) consistent with CCR 23, § 120; or alternatively to design some measures to minimize erosion without increasing levee maintenance.
Board staff will continue to work closely with the SBFCA design team to evaluate and resolve the issues summarized here.

SBFCA Response: CCR 23, § 120 (a)(12) states; "*Impervious material, with twenty (20) percent or more of its passing the No. 200 sieve, and having a plasticity index of eight (8) or more, and having a liquid limit of less than (50), must be used for construction of new levees and the reconstruction of existing levees. Special construction details (e.g., 4:1 slopes) may be substituted where these soil properties are not readily attainable. Where the design of a new levee structure utilizes zones of various materials or soil types, the requirements of this subdivision do not apply.*"

Since this project is a zoned fill (Type-1 fine material in the center core of the levee and Type-2 granular soil in the outer zones of the levee prism) SBFCA does not believe that this subdivision of the regulations apply.

Board Staff Response: While staff believes that the regulation does apply to the reconstruction of existing levees, they do realize that readily attainable soil, both reuse of existing and from borrow sites within a reasonable distance from the project site, are more cohesionless in make-up and do not meet CCR 23 requirements. Therefore, staff is requesting and recommending a variance to CCR 23, § 120 (a)(12) per CCR 23, § 11 (a) and (b) by Board approval.

M) 9.2 Third bullet; Sunset Pump Station three pipes

Three large diameter pipes at Sunset Pump Station (Station 1430+40, 1430+47, and 1430+55, Reach 21) do not meet the CCR 23 criteria.

SBFCA Response: SBFCA requests a construction variance for these items.

Board Staff Response: See also Levee Encroachment List Attachment-I. Staff recommends and requests a Board approved variance per CCR 23, § 11 (a) and (b) as follows:

PROJECT AREA – C PERMIT#18793-1; Reaches 13 to 24 (Sta's.844+75 to 1625+00)
CCR 23 VARIANCE; addressing items from 408 Request – Staff Report, permit#18793

Pipe	Sta.	Pipe	CCR 23
1	1430+55	60" Steel Pipe	§ 112 (b)(2) "*The Board, at the prior written request of the applicant, may allow work to be done during flood season within the floodway, provided that, in the judgment of the board, forecasts for weather and river conditions are favorable."*
			§ 123 (d)(7) "*Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) feet of the landside levee toe.*"
			§ 123 (d)(9) "*The side slopes of trenches excavated for the installation of pipelines, conduit, or utility lines may be no steeper than one (1) foot horizontal to one (1) foot vertical."*
			§ 123 (d)(11) *"The minimum cover for pipelines, conduit, or utility lines, installed through the levee crown is twenty-four (24) inches. If it becomes necessary to raise a levee crown to provide minimum cover, the longitudinal slope of the crown must be a minimum of ten (10) feet to one (1) foot vertical. Where twenty-four (24) inches of cover is not practical, a concrete or other engineered cover is required."*
			§ 123 (d)(20) "*Within the levee or within ten (10) feet of levee toes, any excavation for the installation of a pipeline, conduit, or utility line must be back-filled in four (4) to six (6) inch layers with approved material and compacted to a relative compaction of not less than ninety (90) percent, per ASTM D1557-91, dated 1991, which is incorporated by reference and above optimum moisture content or ninety-seven (97) percent, per ASTM D698-91, dated 1991,which is incorporated by reference and at or above optimum moisture content. Compaction tests by a certified soils laboratory will be required to verify compaction of backfill within a levee,*
			§ 123 (g)(7) "*Steel pipe may be used for all types of pipeline or conduit installation through a levee above the design flood plane*…"
Pipe-2	1430+47	60" Steel Pipe	Same as Pipe-1
Pipe-3	1430+40	36" Steel Pipe	Same as Pipe-1

PROJECT AREA – C PERMIT#18793-1; Reaches 13 to 24 (Sta's.844+75 to 1625+00)
CCR 23 VARIANCE; addressing items from 408 Request – Staff Report, permit#18793

N) 9.2 Fifth bullet, REACH 16; Station 1007+00 (5th Street Bridge/ Memorial Bridge) and Station 1025+74.5 (State Route 20/ Colusa Avenue/ 10th Street Bridge)

SBFCA is working with the cities of Yuba City and Marysville on pedestrian / equestrian access issues under the soffit at the State Route 20 Bridge. The levee has also experienced severe erosion and has overly steep waterside banks in this vicinity. Constructability of proposed cutoff wall and seepage berms may be challenging in this area.

SBFCA Response: There is no work proposed for Project Area-C within 70 feet either side of the 5th Street Bridge and the State Route 20 Bridge does not have any work within the levee proper for about 125 feet on either side of the S.R. 20 Bridge. The only work on S.R. 20 Bridge is 7 feet of landside toe berm and 8 feet of tunnel fill.

While waterside slopes are steeper than CCR 23 allowance, it is the intent of this contract, not to do work on the waterside of the levee except to excavate the existing levee prism by about 50%, place the proposed cut-off wall, and then rebuild to the existing levee geometry.

Board Staff Response: Staff agrees with this argument and recommends that the Board allow a variance to CCR 23, §120 (a)(24) which states "*The finished slope of any project levee construction or reconstruction must be three (3) feet horizontal to one (1) foot vertical, or flatter, on the waterside…".*

O) 9.2 Sixth bullet; Removal of existing Parking Structure at station 995+00

An existing parking structure at the Sutter County Courthouse is embedded within the levee prism just downstream from the 5th Street Bridge (Station 995+00, Reach 16). The structure is proposed to be removed, and additional geotechnical analysis may be needed to assess levee stability and proper backfill design to rebuild the levee prism after the garage is removed.

SBFCA Response: Per Issued for Bid Drawings; Volume 3 Drawing numbers C-116 and G-201 the Sutter County Court Parking Structure will be demolished and the levee embankment slope will be reconstructed on a 2:1 slope (5.5'vertical to 11'horizontal) with Soil Type-2 material, compacted in horizontal 6 to 12 inch lifts with a relative density of 60 percent for cohesionless soils per specification section 31.3.7.2 compaction.

Board Staff Response: Staff concurs.

PROJECT AREA – C PERMIT#18793-1; Reaches 13 to 24 (Sta's.844+75 to 1625+00)
CCR 23 VARIANCE; addressing items from 408 Request – Staff Report, permit#18793

P) 9.2 Seventh bullet; Multiple existing Relief Wells

There are multiple existing relief wells (Station 846+50, Reach 13) just upstream of Shanghai Bend. The exact determination of which wells will be abandoned and which will remain is needed.

SBFCA Response: Assuming that the slurry wall is successful in cutting off under seepage flows, the plan would then be to convert the remaining relief wells to observations wells, as they would no longer be needed from an under seepage perspective. It is likely that not all of the remaining 78 relief wells would need to be converted to monitoring wells and that some of them could be abandoned if desirable. A determination of the exact number to be converted and those that can be abandoned will be made at a future time.

Board Staff Response: Staff concurs with this response and believes it is a sound way to handle the expensive refurbishment of relief wells. When and if it is determined that the cutoff walls do not cut off under seepage flows and there is a need to reintroduce relief wells, then this item will be revisited. No action on this matter at this time.

Q) 10.0 Pipelines, conduits, and utility lines

SBFCA has submitted a list of twenty five (24) existing gravity or pressurized pipelines to be replaced that will fail to meet the standards of CCR 23 § 123 as per their designs, and is requesting construction variances for this permit applications.

SBFCA Response: See Attachment-I for justification

Board Staff Response: Staff recommends that the Board approve the variances listed under the Levee Encroachment List, spreadsheet, Attachment-I.

SUMMARY OF ITEMS	
Requested variances items = E,F,L,M,N,Q	6 each
Items collaborated between board staff and sbfca = B,C,D,G,H,J,K,O,P	9 each
Items to be included in the permit conditions = A,I	2 each

ATTACHMENT - J

PROJECT AREA – C PERMIT#18793-1; Reaches 13 to 24 (Sta's.844+75 to 1625+00)
CCR 23 VARIANCE; addressing items from 408 Request – Staff Report, permit#18793

TOTAL = 17 items

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LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
24/25	1623+86	Reach 24/25 Transition		
24	1610+92	Referred to as RD 777 Lateral 12. An 18 inch CM pipe through levee. Automatic drainage gate on waterside end of pipe. The CVFPB sent an encroachment violation notice on July 26, 2011 to Theodore Bill. The violation was regarding the heavy vegetation on the waterside outfall pipe.	112(b)(2). The flood season for work shall be November 1 through April 15. The variance shall be for work during the month of February 1 through April 15 on landside of sheet pile cutoff wall. 123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. - We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. 123(e)(1). The pipeline is not owned by public agency and levee height is greater than 15 feet. - This will require a variance unless a public agency accept ownership, operation, and maintenance of the pipeline.	112(b)(2). The Sutter Butte Main Canal is operational from April 1 through February 1, therefore the only available construction window occurs within the designated flood season. The scope of work shall be excavation of the levee to complete the replacement of the pipeline connection. The work will occur on the landside of the sheet pile cutoff wall. The backfill around pipe shall be CLSM. The variance shall be for work during the month of February 1 through April 15. 123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The varience will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would subtaintiallly increase the cost of the pipe crossings. 123(e)(1). The current owner is not a public agency.
23/24	1609+37	Reach 23/24 Transition		
23	1536+12	~~RD 777 Lateral 7.~~ There is a 36 inch CM pipe through levee. Automatic drainage gate on waterside end of pipe. The CVFPB sent an encroachment violation notice on August 16, 2011 to Hatamiya Trust. On January 28, 1928, RD 777 abandoned Lateral #7 except that portion of therefore consisting of six hundred and fifty feet extending Westerly from the main canal of said Reclamation District and the plans or works of said District and so far as this District is concerned any person as persons or any Governmental Agency is hereby granted permission to fill the said lateral. County of Sutter also provided email indicating that the pipeline is not their facility. It appears that the landowner that recieved the NOV does not recieve any benefit of the pipeline or pipe crossing levee. The pipe appears to be on Manjinder Bains property	123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The varience will clarify that CLSM is an acceptable backfill. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. This would require a variance to use steel pipe below DWSE. We feel the cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would subtaintiallly increase the cost of the pipe crossings. 123(e)(1). The pipeline is not owned by public agency and levee height is greater than 15 feet. - This will require a variance unless a public agency accept ownership, operation, and maintenance of the pipeline. Both RD 777 and Sutter County have indicated that do not operate and maintain the pipe crossing. RD 777 abandoned O&M of pipeline in 1928 according to their records.	123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The varience will clarify that CLSM is an acceptable backfill. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. This would require a variance to use steel pipe below DWSE. We feel the cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would subtaintiallly increase the cost of the pipe crossings. 123(e)(1). The pipeline is not owned by public agency and levee height is greater than 15 feet. - This will require a variance unless a public agency accept ownership, operation, and maintenance of the pipeline. Both RD 777 and Sutter County have indicated that do not operate and maintain the pipe crossing. RD 777 abandoned O&M of pipeline in 1928 according to their records.

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
22/23	1503+83	Reach 22/23 Transition		
22	1460+00	Levee District No. 9 Levees /Maintenance Area 16 Transition		
21/22	1433+83	Reach 21/22 Transition		
21	1430+55	Sunset Pump Station owned an operated by Sutter Extension Main Pump Station. There is a 60 Inch steel pipe through the levee. Pump end has gate valves on structure. Automatic drainage gates on the landside end.	112(b)(2). The flood season for work shall be November 1 through April 15. The variance shall be for work during the month of February 1 through April 15 on landside of sheet pile cutoff wall. 123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(13). When practical, pipelines installed within a levee section must be separated from parallel pipelines by a minimum of 12 inches or the diameter of the largest pipe to a maximum of 36 inches. - Propose to allow decrease the maximum of 36 inches to 24 inches if CLSM backfill is used. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. - We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. The pipeline is a very low pressure installation at about 6 psi. The common practice is for new pressure pipes to be installed/designed above the design water surface elevation when feasible. USACE EM 1110-2-1913 states above DWSE "in general" but is not a requirement and provides criteria for installation below DWSE. No variance will be required but extra care will be taken. The DWR Urban Levee Design Criteria does make it a requirement for new installation. No variance is requested since no Title 23 requirement.	112(b)(2). The Sutter Butte Main Canal is operational from April 1 through February 1, therefore the only available construction window occurs within the designated flood season. The scope of work shall be excavation of the levee to complete the replacement of the pipeline connection. The work will occur on the landside of the sheet pile cutoff wall. The backfill around pipe shall be CLSM. The variance shall be for work during the month of February 1 through April 15. 123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(13). Pipe diameters are 60 inch and 36 inch would result in a pipe spacing requirement of 36 inches. The existing pipes are less than 36 inches. They currently range from 26 inches to 40 inches. We feel it is not practical since the outfall structure is fixed and the pipes coming into the existing gate riser structure are fixed. This requirement would require a new outfall structure and modifications to the existing gate riser structure. The would substantially increase the cost with little to no benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would substantially increase the cost of the pipe crossings.

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
21	1430+47	Sunset Pump Station owned an operated by Sutter Extension Main Pump Station. There is a 60 Inch steel pipe through the levee. Pump end has gate valves on structure. Automatic drainage gates on the landside end.	112(b)(2). The flood season for work shall be November 1 through April 15. The variance shall be for work during the month of February 1 through April 15 on landside of sheet pile cutoff wall. 123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(13). When practical, pipelines installed within a levee section must be separated from parallel pipelines by a minimum of 12 inches or the diameter of the largest pipe to a maximum of 36 inches. - Propose to allow decrease the maximum of 36 inches to 24 inches if CLSM backfill is used. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. - We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. The pipeline is a very low pressure installation at about 6 psi. The common practice is for new pressure pipes to be installed/designed above the design water surface elevation when feasible. USACE EM 1110-2-1913 states above DWSE "in general" but is not a requirement and provides criteria for installation below DWSE. No variance will be required but extra care will be taken. The DWR Urban Levee Design Criteria does make it a requirement for new installation. No variance is requested since no Title 23 requirement.	112(b)(2). The Sutter Butte Main Canal is operational from April 1 through February 1, therefore the only available construction window occurs within the designated flood season. The scope of work shall be excavation of the levee to complete the replacement of the pipeline connection. The work will occur on the landside of the sheet pile cutoff wall. The backfill around pipe shall be CLSM. The variance shall be for work during the month of February 1 through April 15. 123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(13). Pipe diameters are 60 inch and 36 inch would result in a pipe spacing requirement of 36 inches. The existing pipes are less than 36 inches. They currently range from 26 inches to 40 inches. We feel it is not practical since the outfall structure is fixed and the pipes coming into the existing gate riser structure are fixed. This requirement would require a new outfall structure and modifications to the existing gate riser structure. The would substantially increase the cost with little to no benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would substantially increase the cost of the pipe crossings.
21	1430+40	Sunset Pump Station owned an operated by Sutter Extension Main Pump Station. There is a 36 Inch steel pipe through the levee. Pump end has gate valves on structure. Automatic drainage gates on the landside end.	112(b)(2). The flood season for work shall be November 1 through April 15. The variance shall be for work during the month of February 1 through April 15 on landside of sheet pile cutoff wall. 123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(g)(7). Title 23 states that steel pipe shall be used for installations above the DWSE only. - We propose to allow the contractor to use reinforce concrete cylinder pipe (which is allowed in 123(g)(6)) along with concrete bar-wrapped cylinder pipe, cement mortar lined and coated steel pipe, coal-tar lined and coated steel pipe, and fusion bonded epoxy lined and coated steel pipe. The pipeline is a very low pressure installation at about 6 psi. The common practice is for new pressure pipes to be installed/designed above the design water surface elevation when feasible. USACE EM 1110-2-1913 states above DWSE "in general" but is not a requirement and provides criteria for installation below DWSE. No variance will be required but extra care will be taken. The DWR Urban Levee Design Criteria does make it a requirement for new installation. No variance is requested since no Title 23 requirement.	112(b)(2). The Sutter Butte Main Canal is operational from April 1 through February 1, therefore the only available construction window occurs within the designated flood season. The scope of work shall be excavation of the levee to complete the replacement of the pipeline connection. The work will occur on the landside of the sheet pile cutoff wall. The backfill around pipe shall be CLSM. The variance shall be for work during the month of February 1 through April 15. 123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(g)(7). Cement mortar lined and coated steel pipe with the CLSM backfill will be the most cost effective and provide a design life greater than 50 years. The use of precast reinforced concrete pipe and reinforced cast-in-place concrete is not feasible and would substantially increase the cost of the pipe crossings.
20/21	1374+33	Reach 20/21 Transition		

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
20	1314+80	Micheli Storm Drainage Pump Station. To install a pump with 20 Inch steel discharge pipe through the right bank of the Feather River for the removal of stormwater.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
19/20	1297+83	Reach 19/20 Transition		
19	1265+59	Sullivan Pump Station. 14 inch steel pipe through the levee. Pump and Gate valve in pump house on the channel bank. Concrete well on the bank. Siphon breaker in CMP riser on landside slope. (Sullivan Pump Station)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has
19	1229+41	Kewal Singh IR PS. A 16 inch steel pipe through levee. Pump in pump house on channel bank. Gate valve on the waterside end. Concrete standpipe.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
18/19	1213+85	Reach 18/19 Transition		
18	1132+61	Levee District No. 1 Levees /Levee District No. 9 Transition		
17/18	1130+86	Reach 17/18 Transition		

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
17	1127+48	Village Green Trailer Park - To install a 10 inch outfall pipe through the right bank levee of the Feather River to provide storm drainage for a mobile home park.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
17	1111+46	West Onstott Frontage Road Pump Station and Clark Avenue Pump Station Drainage Area. 16 Inch welded steel 7 GA asphalt coated storm drain discharge pipe over levee connected to 24 inch pipe in overflow area, outfall ditch, and pipes in floodway (Source: City of Yuba City Pump Station No. 4 and City of Yuba City Pump Station No. 2)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
17	1096+81	Yuba City Water Treatment Plant 28" (29 25/32" OD) 7 GA welded steel waterline pipe crossing of levee. New permit included installation of automatic drainage gates on pipelines. (copy of record drawings)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
17	1096+71	Yuba City Water Treatment Plant 24" 7 GA welded steel waterline pipe crossing of levee. New permit included installation of automatic drainage gates on pipelines. (copy of record drawings)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
17	1096+62	Yuba City Water Treatment Plant 42"cement mortar lined and coated welded steel pipe waterline crossing of levee (copy of record drawings)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
16/17	1080+00	Reach 16/17 Transition		
16	1043+45	To install a 36 Inch discharge pipe through right bank of Feather River.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(d)(11). The minimum cover for pipelines installed through the levee crown is twenty-four (24) inches. - All the existing pipe to remain with the current amount of cover regardless if less than 24 inches.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(d)(11). This is a no geotechnical work reach and an existing permitted encroachment reconstructed by USACE in 1998. Our scope of work is to provide the positive closure device. We do not propose to pothole and modify the levee crown. CVFPB should issue a NOV to address this issue if a concern.
16	1043+27	To install a 24 inch wrapped steel pipe through the right bank levee of the Feather River	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(d)(11). The minimum cover for pipelines installed through the levee crown is twenty-four (24) inches. - All the existing pipe to remain with the current amount of cover regardless if less than 24 inches.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(d)(11). This is a no geotechnical work reach and an existing permitted encroachment reconstructed by USACE in 1998. Our scope of work is to provide the positive closure device. We do not propose to pothole and modify the levee crown. CVFPB should issue a NOV to address this issue if a concern.

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
16	1043+22	To construct a 24 inch steel pipe storm drainage discharge pipe crossing the west levee of the Feather River	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(d)(11). The minimum cover for pipelines installed through the levee crown is twenty-four (24) inches. - All the existing pipe to remain with the current amount of cover regardless if less than 24 inches.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(d)(11). This is a no geotechnical work reach and an existing permitted encroachment reconstructed by USACE in 1998. Our scope of work is to provide the positive closure device. We do not propose to pothole and modify the levee crown. CVFPB should issue a NOV to address this issue if a concern.
16	1043+03	Gilsizer Slough Storm Drain Facilities. A 16 inch welded steel discharge pipe crossing of levee. (copy of record drawings)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. 123(d)(11). The minimum cover for pipelines installed through the levee crown is twenty-four (24) inches. - All the existing pipe to remain with the current amount of cover regardless if less than 24 inches.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits. 123(d)(11). This is a no geotechnical work reach and an existing permitted encroachment reconstructed by USACE in 1998. Our scope of work is to provide the positive closure device. We do not propose to pothole and modify the levee crown. CVFPB should issue a NOV to address this issue if a concern.
16	972+29	2 Inch Domestic Water Line serving the Yuba City Boat Dock.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
15/16	968+50	Reach 15/16 Transition		
14/15	954+40	Reach 14/15 Transition		
13/14	927+00	Reach 13/14 Transition		

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
13	893+84	Garden Highway Industrial Park. To install a 12 inch steel storm drain pipeline through the right bank levee of the Feather River (Source: City of Yuba City Pump Station No. 1)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
13	893+78	Burns Drive Storm Water Pump Station. 16 inch steel storm drain discharge pipe through levee. (Source: City of Yuba City Pump Station No. 1)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
13	881+40	Levee District No. 1 Relief Well Pump Station 6" pipes located just southeast of the Waste Water Treatment Plant. The waterside outlet structure has cobbles and the flap gate is damaged or plugged. CVFPB sent a notice of encroachment violation on August 16, 2011 to Sutter County.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
13	881+43	Levee District No. 1 Relief Well Pump Station 14" pipes located just southeast of the Waste Water Treatment Plant. The waterside outlet structure has cobbles and the flap gate is damaged or plugged. CVFPB sent a notice of encroachment violation on August 16, 2011 to Sutter County.	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.

LEVEE ENCROACHMENT LIST

ATTACHMENT - K

SBFCA Reach	SBFCA STA	Encroachment	Title 23 Variances	Title 23 Variances - Justification
13	856+23	South Yuba City Seepage Interceptor Pump Station 24 inch 7 GA Steel Pipe asphalt coated and wrapped with asphalt saturated felt discharge pipe (Source: City of Yuba City Pump Station No. ?)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
13	856+08	South Yuba City Storm Drainage Pump Station 24 inch 7 GA Steel Pipe asphalt coated and wrapped with asphalt saturated felt discharge pipe (Source: City of Yuba City Pump Station No. 3)	123(d)(7). Pipelines carrying gas or fluids under pressure must have a readily accessible rapid closure device located within ten (10) of the landside levee toe - All readily accessible rapid closure device to be located at waterside hinge of levee. 123(d)(9). The side slopes of trenches excavated for the installation of pipeline, conduit, or utility lines may not be steeper than one (1) horizontal to one (1) foot vertical. - Allow vertical slopes from bottom of trench to six (6) above pipe if using CLSM backfill. 123(d)(20). The material shall be compacted to ninety (90) percent per ASTM 1557 which would imply soil. We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe.	123(d)(7). The Design includes a positive closure device located on the waterside edge of levee crown. DWR ULDC requires a closure device to be located at the waterside hinge. The variance shall allow our project to meet DWR ULDC criteria without having two gate/butterfly valves on the pipeline resulting in increased head and O&M. 123(d)(9). We propose to use CLSM backfill to six (6) above pipe at which time we will meet the slope requirement. No sloping is proposed below this location. This variance is for the portion below the DWSE. This is the standard of practice in the field and on previous flood control projects. Sloping of the trench would result in a substantial increase in CLSM backfill with no real benefit. 123(d)(20). We propose to use CLSM backfill from invert of pipe to six (6) inches above pipe. - CLSM has been approved and in some cases required on pervious projects. The variance will clarify that CLSM is an acceptable backfill and no compaction shall be required. CLSM is the standard of practice and has been a requirement on some CVFPB permits.
12/13	845+00	Reach 12/13 Transition		

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Request for Variances on Levee Earthwork Requirements

Introduction

The purpose of this request is to obtain variances from the Central Valley Flood Protection Board on certain levee earthwork requirements for the Feather River West Levee (FRWL) Project. The requested variances per CCR 23 Division 1, Article 8 Standards, Section 120 Levees. involve the following:

EW-1. Use of Non-Impervious Soil in Outer Shells for Reconstructed Zoned Levee

EW-2. Compaction Requirements for Cohesionless Fill

EW-3. Moisture Content for Cohesive Fill

Background

The FRWL Project comprises the work to partially rehabilitate the level of flood protection along approximately 40 miles of the western levee of the Feather River in Sutter and Butte Counties. The target level of flood protection is a 200-year (0.5 percent annual chance) level of protection. The major deficiencies that currently exist along the levee system involve underseepage and slope stability. The principal approach for addressing these deficiencies is to construct a 3-foot-wide soil-bentonite slurry cutoff wall through the levee and into the foundation. The depth of the slurry wall will commonly range from 30 feet to 80 feet, but will extend up to 110 feet in some locations, depending on the aquifers and aquacludes present beneath the levee. The slurry wall will provide an impervious element that will greatly reduce seepage and underseepage during flood events and will also improve the stability of the levee.

The United State Army Corps of Engineers (USACE) requires that the levee be degraded by approximately half its height for the construction of a soil-bentonite slurry wall. This is to preclude hydraulic fracturing of the levee during cutoff wall construction, leaving behind a soft element in the upper half of the levee embankment that might affect slope stability, and to provide an adequate working width and surface for the construction of the cutoff wall. Following the construction of the soil-bentonite cutoff wall, the levee will be constructed back to its previous geometry by reusing the excavated soils from the degrading of the levee. To provide an impervious element in the upper half of the levee above the cutoff wall, an 8-foot-wide clay core zone will be constructed above and connected to the cutoff wall. The sequence of cutoff wall construction and levee rebuilt is illustrated in Figure 1.

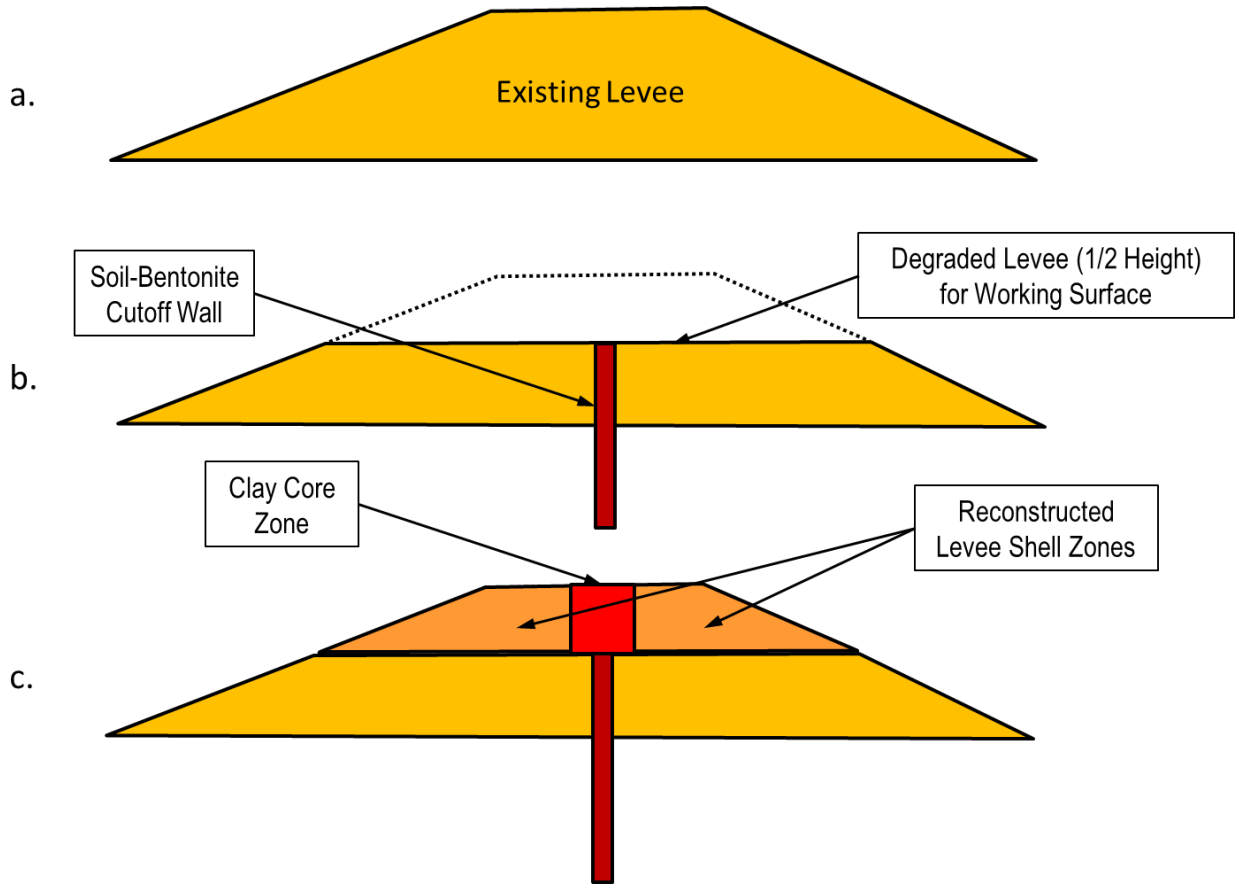

Figure 1: Schematic Sequence of Cutoff Wall Construction and Levee Reconstruction

Issues

The basic approach for rehabilitating the system is an in-place solution where a soil-bentonite cutoff wall is installed into the existing levee embankments. This solves the underseepage, seepage, and slope stability issues. As stated before, the basic plan is to degrade the levee, stockpile the degraded levee soil for reuse, construct the cutoff wall, and then reconstruct the levee back to its original geometry using the stockpiled material, together with the construction of the clay core. The issue is that the existing levee material sometimes does not meet the minimum fines content of 20 percent or the minimum plasticity index of 8 specified for impervious levee embankment material by CCR 23. CCR 23 states:

(12) Impervious material, with twenty (20) percent or more of its passing the No. 200 sieve, and having a plasticity index of eight (8) or more, and having a liquid limit of less than (50), must be used for construction of new levees and the reconstruction of existing levees. Special construction details (e.g., 4:1 slopes) may be substituted where these soil properties are not readily attainable. Where the design of a new levee structure utilizes zones of various materials or soil types, the requirements of this subdivision do not apply.

See also explanation in Attachment – J, item-L.

Much of the existing levee along the FRWL Project contains sandy fill that would not meet the impervious material requirement above if it was to be reused in the levee. However, it is suspected that the intent of these requirements is for a *homogeneous* levee fill. For a zoned levee structure, as is the reconstructed portions of the FRWL with a clay core, these requirements may not be necessary as the clay core provides the seepage protection that is needed for levee integrity. As the last sentence in the CCR 23, Section 120(a)(12) subsection states, ***"Special construction details (e.g., 4:1 slopes) may be substituted where these soil properties are not readily attainable. Where the design of a new levee structure utilizes zones of various materials or soil types, the requirement of this subdivision do not apply."***

Request for Earthwork Variance; EW - 1: Use of Cohesionless Soil in Outer Shells for Reconstructed Zoned Levee

Because there may be some uncertainties and lack of clarity with regard to the use of a zoned levee, this variance is being requested. Specifically, the request is to allow reuse of the existing levee material, including sandy soils, in the outer portions of a zoned levee section for the reconstructed upper portion of the levee. This would be for the upper half of the levee after completing the slurry wall construction and would be in lieu of meeting the CCR 23 impervious material requirements for an overall levee section. Support for this request includes the following:

1. Since the reconstruction of the levee includes the use of a central clay core, it is not subject to the impervious material requirements as it is a new levee structure which utilizes zones of various materials and soil types. Actually, the entire levee section would become a newly zoned levee as the lower half would have an impervious soil-bentonite cutoff wall in it as well.
2. The design of the reconstructed levee section with a central clay core and potentially sandy shell zones outside of the core has been analyzed and it meets all state and federal seepage and slope stability criteria. The clay core zone provides the impervious element in the design.

3. The zoned levee that is proposed for the FRWL Project, including sandy shells, has been accepted by the Soil Design Section of the Sacramento District of the United States Army Corps of Engineers and by an Independent Board of Consultants.
4. The USACE allow sandy shell zones to exist in levees if there is an impervious element such as a cutoff wall. Examples include levees in Marysville, Natomas, the Pocket Area along the Sacramento River, and along the American River.
5. If the existing levee material is not allowed to be used to rebuild the outer portions of the levee embankment, hundreds of thousands of cubic yards of levee material would have to be spoiled and a similar amount of new impervious material will have to be excavated elsewhere and hauled in. This would needlessly cost the State and local agencies many millions of dollars. It would also create additional impacts to the community with regard to traffic, noise, and dust impacts. It would also potentially create additional environmental impacts that would have to be mitigated at the borrow sites for this material.
6. The potentially sandy material that would be reused in the outside shell zones is the same material that is already in place. However, it will better than it is today because after excavation, stockpiling, and recompaction, it will be more blended and compacted.
7. Existing topsoil will be removed prior to degrading the levee and stockpiled. Following reconstruction of the levee embankment, the topsoil will be placed on top of the rebuilt section and seeded to provide erosion protection.

Request for Earthwork Variance; EW - 2: Compaction Requirements for Cohesionless Soils

CCR 23 requires levee material to be compacted to meet either 90 percent relative compaction per ASTM D1557 compaction efforts or 97 percent relative compaction per ASTM D698 compaction requirements. For most of the FRWL Project where cohesive soils will be used, we will adhere to CCR 23 and require 97 percent relative compaction per ASTM D698. However, for the outside shell zones discussed above, there will be cases where the soil is sandy and has relatively few fines. Accordingly, ASTM D698 is not an appropriate compaction standard for such material, and there is no specific guidance in CCR 23 for the compaction of such materials. Therefore, we propose using relative density rather than relative compaction for cohesionless material with less than 15 percent fines contents and to require a minimum of 60% relative density per ASTM D4253/D4254 methods. This approach has been approved by both the Soil Design Section of the Sacramento District of the Corps of Engineers and by an Independent Board of Consultants.

Request for Earthwork Variance; EW - 3: Moisture Content for Cohesive Soils

CCR 23 requires impervious levee material to be compacted wet of optimum. This has proven in the past to be relatively limiting to construction contractors as a high relative compaction is difficult to achieve at moisture contents wetter than about 3 percent above the optimum moisture content. Thus, it allows only a relatively narrow band of 3 percent moisture content (i.e. optimum moisture to 3 percent wet of optimum) to meet compaction requirements. To allow greater flexibility to the contractor and still meet the objectives of a safe levee, a 1 percent moisture content variance is requested to allow the lower allowable moisture content to be 1 percent dry of optimum. Thus, the allowable moisture content would range from 1 percent dry of optimum and up to 3 percent wet of optimum. This has been accepted by the Sacramento District of the United States Army Corps of Engineers and by an Independent Board of Consultants. It is also exactly the same variance that was requested for the Natomas Levee Improvement Project and previously approved by the Central Valley Flood Protection Board.

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Reach	Length (ft)	Proposed Modification/ Flood Management Measure
13	8,200	844+50 to 923+75: cutoff wall tip elevation 35’ and relief well with 200-foot spacing and 65’ deep
14	2,740	No rehabilitation required
15	1,410	No rehabilitation required
16	11,150	992+80 to 1001+80, waterside slope flattening or other remedial measures Closure of gap in cutoff wall at 5th Street bridge crossing around Station 1007+00, cutoff wall tip elevation 40’; Closure of gap in cutoff wall at 10th Street bridge crossing around Station 1026+00, cutoff wall tip elevation 35’; 1077+85 to 1080+00, cutoff wall tip elevation 30’ and backfill landside toe depression
17	5,086	1080+00 to 1089+00, cutoff wall tip elevation 30’ and backfill landside toe depression 1089+00 to 1125+00, cutoff wall tip elevation 35’ and backfill landside toe depression; 1125+00 to 1130+86, cutoff wall tip elevation 0’
18	8,299	1130+86 to 1151+50, cutoff wall tip elevation 0’; 1151+50 to 1159+50: cutoff wall tip elevation 30’; 1159+50 to 1169+50: cutoff wall tip elevation 25’; 1169+50 to 1189+50: cutoff wall tip elevation 30’; 1189+50 to 1209+50: cutoff wall tip elevation 40’; 1209+50 to 1213+85: cutoff wall tip elevation 35’
19	8,398	1213+85 to 1219+75, cutoff wall tip elevation 35’; 1219+75 to 1224+00, cutoff wall tip elevation 5’; 1224+00 to 1238+00, cutoff wall tip elevation 28’; 1238+00 to 1248+00, cutoff wall tip elevation 42’; 1248+00 to 1268+75, cutoff wall tip elevation 3’; 1268+75 to 1297+83, cutoff wall tip elevation 35’
20	7,650	1297+83 to 1298+75, cutoff wall tip elevation 35’; 1298+75 to 1359+00, cutoff wall tip elevation 50’; 1359+00 to 1369+00: cutoff wall tip elevation 40’; 1369+00 to 1374+33: cutoff wall tip elevation 32‘
21	5,950	1297+83 to 1298+75: cutoff wall tip elevation 35’; 1298+75 to 1359+00: cutoff wall tip elevation 50’; 1359+00 to 1369+00: cutoff wall tip elevation 40’; 1369+00 to 1374+33: cutoff wall tip elevation 32’
22	7,000	1433+83 to 1448+75, cutoff wall tip elevation 40’; 1448+75 to 1468+83, cutoff wall tip elevation 50’; 1455+00 to 1461+00, full levee degrade and reconstruction; 1468+83 to 1503+83, cutoff wall tip elevation 55’
23	10,554	1503+83 to 1508+50, cutoff wall tip elevation 55’; 1508+50 to 1528+75, cutoff wall tip elevation 60’; 1528+75 to 1566+50, cutoff wall tip elevation 55’; 1566+50 to 1608+75, cutoff wall tip elevation 60’
24	1,449	1608+75 to 1623+86, cutoff wall tip elevation 28’