Meeting of the Central Valley Flood Protection Board
May 29, 2015

Staff Report

California Department of Water Resources
Little Baja Fish Release Site – Sherman Island
Sacramento County

1.0 – ITEM

Consider approval of Draft Permit No. 18985-3
(Attachment B).

2.0 – APPLICANT

California Department of Water Resources (DWR)

3.0 – LOCATION

The project is located along West Sherman Island Road on Sherman Island.
(Sacramento River, Sacramento County, see Attachment A).

4.0 – PROJECT DESCRIPTION

The applicant proposes to construct the Little Baja Fish Release Site that will include a fish release system, an automated site access gate, site lighting, downspout for the fish release site and a pipe gate perpendicular to the levee road, along the waterside of the left (south) bank levee of the Sacramento River.

5.0 - AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 - 8710

California Code of Regulations, Title 23 (Title 23)

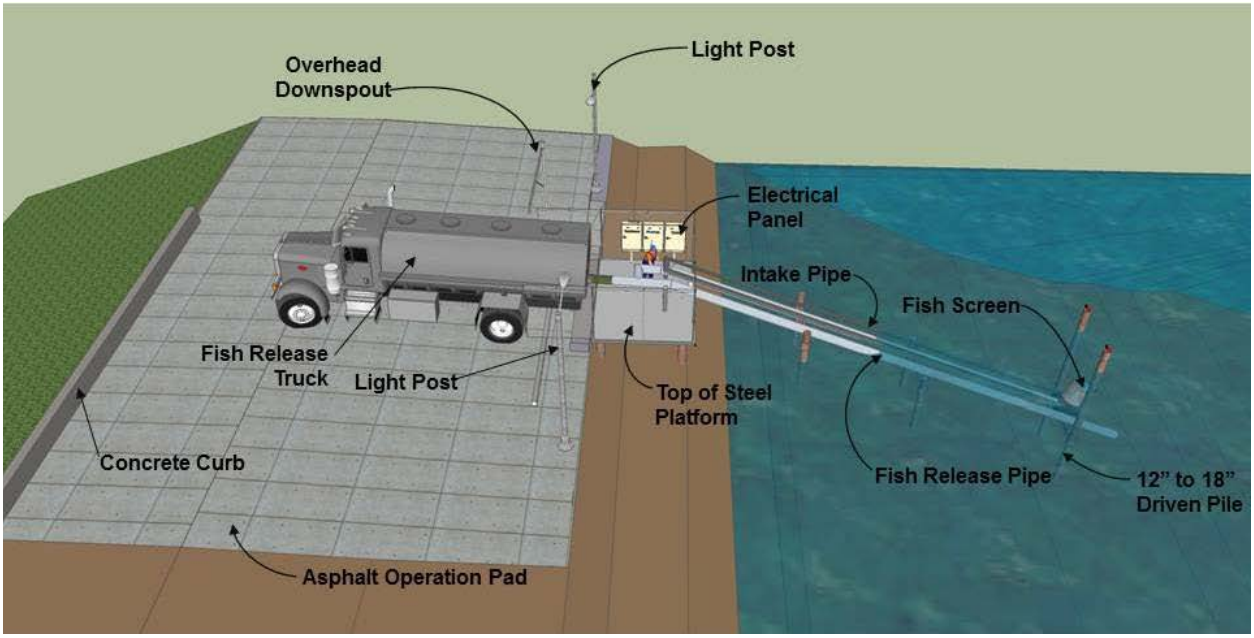
- § 6, Need for a Permit
- § 13, Evidentiary Hearings
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 120, Levees
- § 126, Fences and Gates

6.0 – PROJECT ANALYSIS

The California Department of Water Resources proposes to construct the Little Baja and Manzo Ranch fish release sites on Sherman Island to comply with the National Marine and Fisheries Services' (NMFS) Biological Opinion (BiOp) on the Long-term Operations of the Central Valley Project and State Water Project (2009) and the California Department of Fish and Wildlife's (CDFW) Longfin Smelt Incidental Take Permit (ITP) for the California State Water Project Delta Facilities and Operations (2009). Specific requirements are to reduce predation of salvaged fish at the fish release sites and increase salvaged fish survival rates.

Construction of the Manzo and Little Baja fish releases site will require widening and lengthening of the levee. The expanded levee crown at each fish release site will be approximately 50 feet wide and 64 feet long to accommodate the large trucks that will be used to release fish. In addition the levee will be raised to account for levee settlement and potential sea level rise. The two fish release sites will be located on the levee crown about 0.5 miles apart. West Sherman Island Road will transition off the levee crown just before each site. The levee crown between the two fish release sites will be limited to authorized vehicles only for security reasons and to provide safe access to the two fish release sites. Automated gates will control access.

A fish release system will be built at each site. The fish release system will consist of a pile-supported grated steel-framed equipment platform, a fish release pipe, a water intake pump with a water intake pipe, a retrievable fish screen for the intake pipe, supporting in-water steel framing and piles, and an overhead downspout.



6.1 – Hydraulic Analysis

A hydraulic blockage calculation was done to assess the hydraulic blockage potential of the Sacramento River due to the construction of the Little Baja Fish Release Site. Calculations indicate that approximately 0.2 percent of the Sacramento River floodway will be blocked as a result of the new facility. The Corps of Engineers requires a hydraulic analysis if blockage is calculated to be 1 percent or more. In addition to the hydraulic blockage calculation a hydraulic analysis was also conducted using the Delta Simulation Model 2 for the 100-year event. The model results showed that the addition of the new fish release sites caused no noticeable changes in water surface elevation in the area.

6.2 – Geotechnical Analysis

DWR's Division of Engineering Project Geology Section (DOE Project Geology) conducted site explorations for the design of the proposed salvaged fish release facilities. Geologic exploration related to the proposed fish release sites included land-based cone penetrometer test (CPT), land-based and over-water soil borings, and laboratory testing.

Levee improvements to support the fish release facilities are designed to accommodate the weak marsh deposits underlying the levee system. Up to fifteen feet of fill is required to construct the fifty foot wide crests necessary for the fish release facilities. To avoid

overstressing the underlying marsh deposits, broad landside berms will buttress the sites. The levee will be constructed in stages as the foundation materials will gain strength as the soil consolidates, allowing subsequent stages of fill to be placed. It is estimated that stages of fill up to four (4) feet thick would require a minimum waiting period of four (4) months before the next stage. The stage construction method has been successfully used for other projects on Sherman Island, however, it is anticipated that the levee will deform and settle as is typical of Delta levees. The time rate of settlement will vary depending on the inherent variability of the marsh soils, permeabilities of soils, and drainage paths. Additional fill may need to be placed to maintain the design crest elevation. The levee will be monitored during construction, but some risk of extensive movement during fills placement remains. The project has been designed with flexible couplings for utilities to account for settlement of structures spanning from the levee to the pile supported structures. The piles are not expected to settle appreciably. The design also includes providing camber for settlement.

The existing levee at the two fish release sites contains predominately very loose to very dense sand with zones of very dense sand above groundwater tables that may be prone to liquefaction during an earthquake. Seismic impacts to the fish release sites due to earthquakes were considered. The fish release facilities are designed to accommodate such ground shaking in accordance with existing codes. No known active faults pass through the site and it was concluded that the risk of fault rupture is low. If a large earthquake were to occur it is anticipated that liquefaction would occur within the upper five feet (or less) of the foundation sand.

7.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project, from all pertinent agencies are shown below:

- The local maintaining agency for the project area is RD-341 and they have endorsed the project with conditions. The conditions have been incorporated into the permit.

- The U.S. Army Corps of Engineers 208.10 comment letter has not been received for this application. Staff anticipates receipt of a letter indicating that the USACE District Engineer has no objection to the project, subject to conditions. Upon receipt of the letter, staff will review to ensure conformity with the permit language and incorporate it into the permit as Exhibit A.

8.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA findings:

The Board, as a responsible agency under CEQA, has reviewed an Initial Study/Mitigated Negative Declaration (IS/MND) (SCH Number: 2014052035, July 2014) and Mitigation Monitoring and Reporting Program for the Sherman Island "Little Baja and Manzo Ranch" Fish Release Sites Project prepared by the lead agency, the Department of Water Resources. These documents, including project design, may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2015/05-29-2015.cfm under a link for this agenda item. These documents are also available for review in hard copy at the Board and the Department of Water Resources offices.

The Department of Water Resources determined that the project would not have a significant effect on the environment on November 10, 2014 and filed a Notice of Determination on November 12, 2014 with the State. Board staff finds that although the proposed project could have a potentially significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project proponent has incorporated mandatory mitigation measures into the project plans to avoid identified impacts or to mitigate such impacts to a point where no significant impacts will occur. These mitigation measures are included in the project proponent's IS/MND and address impacts to air quality, biological resources and hazards and hazardous materials. The description of the mitigation measures are further described in the adopted IS/MND.

9.0 – WATER CODE 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 has considered all the evidence presented in this matter, including the original and updated applications and supporting documents, this Staff Report and attachments, all other evidence presented by any individual or group, and all letters and other correspondence received by the Board and in the Board's files related to this matter.

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.

   The accepted industry standards for the earth work proposed and water delivery channels under this permit as regulated by Title 23 have been applied to the review of this permit.

3. Effects of the decision on facilities of the State Plan of Flood Control, and consistency of the proposed project with the Central Valley Flood Protection Plan as adopted by Board Resolution 2012-25 on June 29, 2012.

   The proposed project will improve the structural stability of the levee; therefore there will be no adverse effect on facilities of the State Plan of Flood Control. In addition the project is consistent with the 2012 Central Valley Flood Protection Plan.

   The Delta Stewardship Council (DSC), and its authorizing statutes, requires that any actions in the Delta be consistent with the Delta Plan. DWR staff and DSC staff met to discuss the entire Sherman Island “Little Baja and Manzo Ranch” Fish Release Sites Project (Project) and it was determined that (under Step 3 of the DSC review process) the Project was not covered by any of the regulatory policies of the Delta Plan since the primary purpose of the Project was for releasing fish. Therefore, policies ER P4 (proposed actions that would construct or rehabilitate levees) and RR P1 (proposed actions that involve discretionary State investments in Delta flood risk management) would not be applicable to this Project.

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

   There will be no effects of reasonable projected future events to the project. Rising sea levels due to global warming may result in the need to raise the crown elevation of the levee.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Adopt:

- the CEQA findings;

Approve:

- draft Encroachment Permit No. 18985-3 in substantially the form provided; and

Direct:

- the Executive officer to take the necessary actions to execute the permit and file a Notice of Determination pursuant to CEQA with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A. Location Maps and Photos
B. Draft Permit No. 18985-3
C. Project Drawings
D. Geotechnical Report

Design Review:	Gary W. Lemon P.E.
Environmental Review:	Andrea Buckley, Senior Environmental Scientist
Document Review:	Mitra Emami P.E., Branch Chief - Permitting and Enforcement
	Len Marino P.E., Chief Engineer
Legal Review:	Nicole Rinke, Counsel

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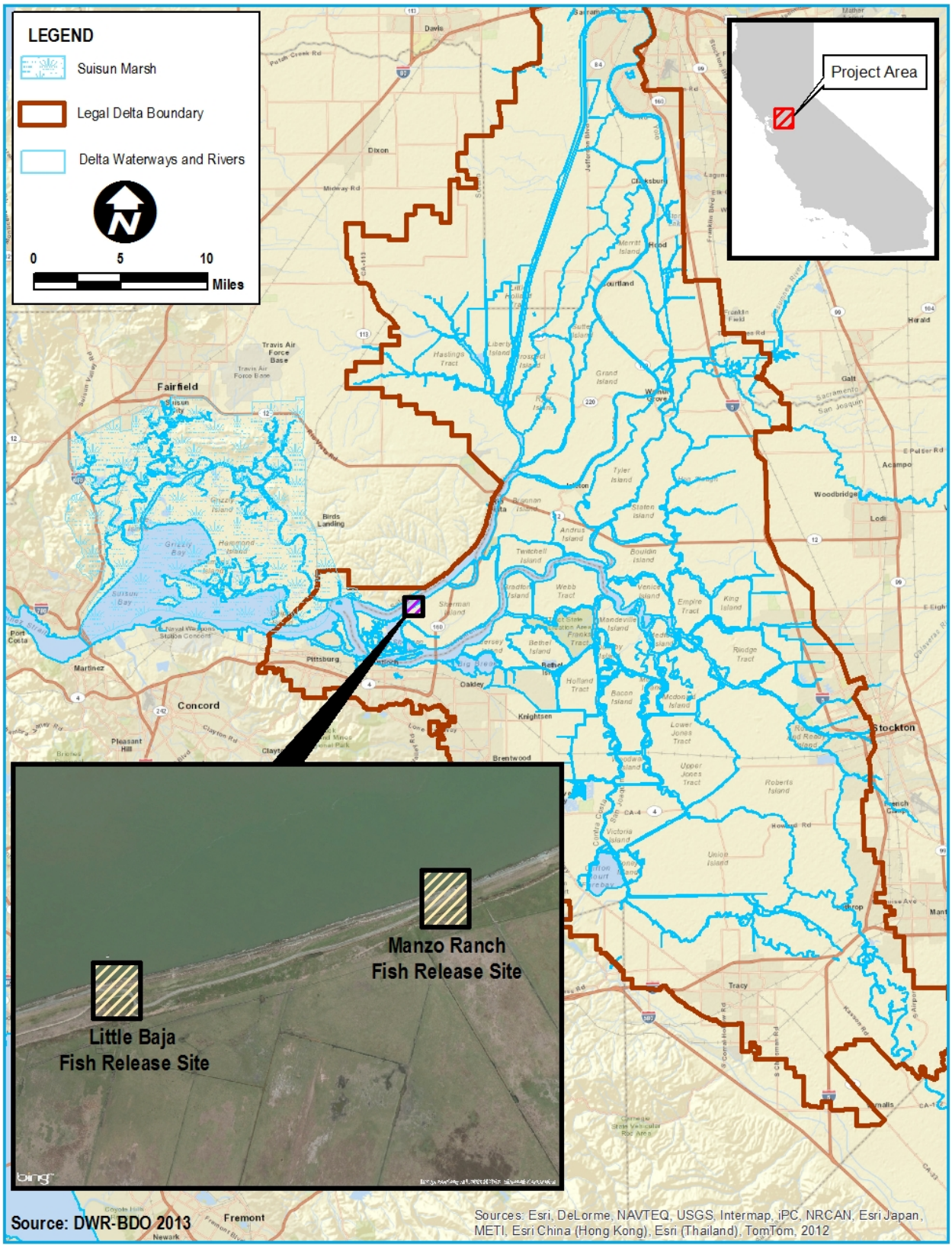


Figure 1: Little Baja and Manzo Ranch Fish Release Sites Location Map

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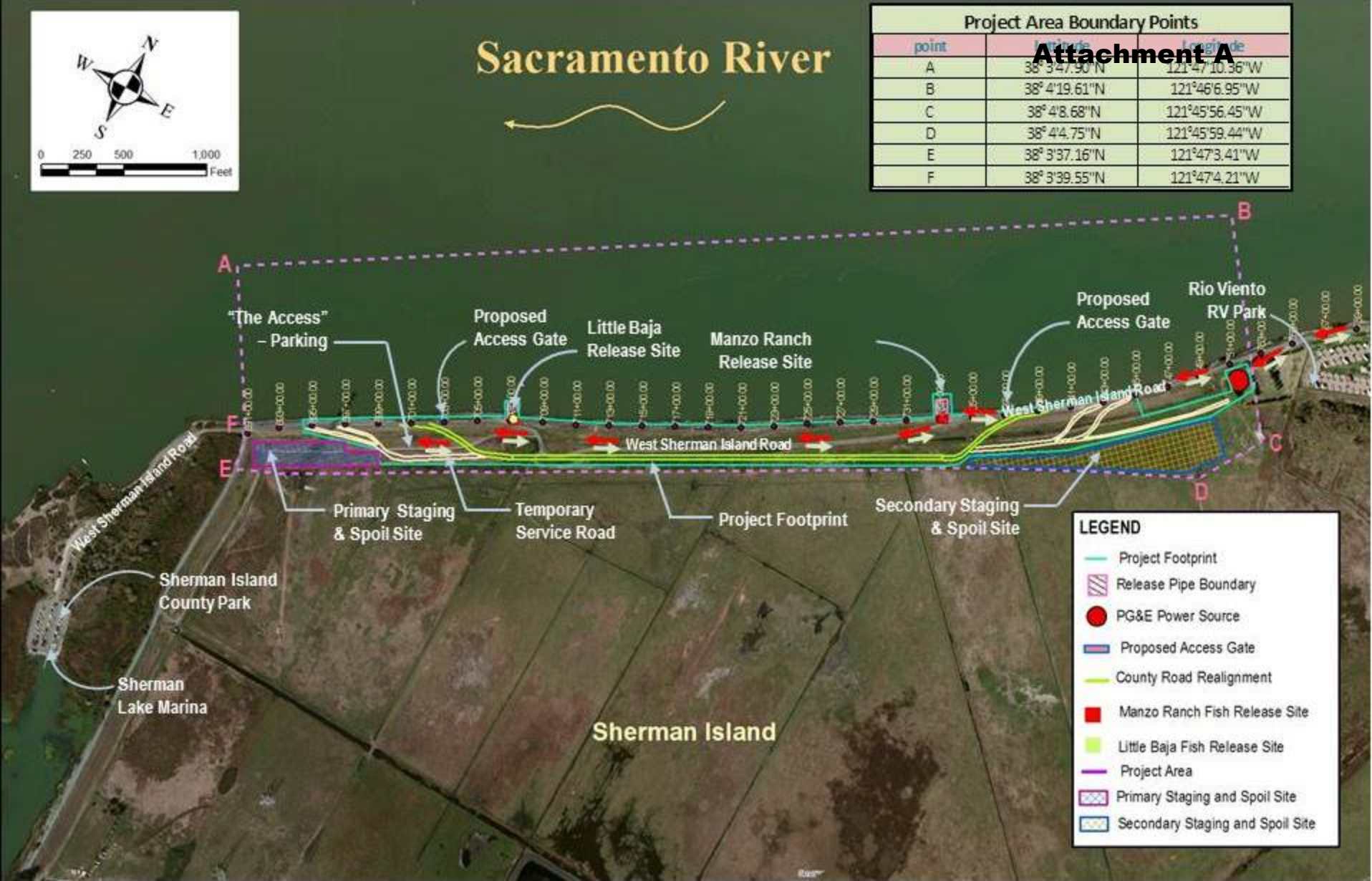

Sacramento River
N
W
E
S
0 250 500 1,000
Feet
Project Area Boundary Points
point | Latitude | Longitude
A | 38° 3'47.90"N | 121°47'10.36"W
B | 38° 4'19.61"N | 121°46'6.95"W
C | 38° 4'8.68"N | 121°45'56.45"W
D | 38° 4'4.75"N | 121°45'59.44"W
E | 38° 3'37.16"N | 121°47'3.41"W
F | 38° 3'39.55"N | 121°47'4.21"W
Attachment A
A
B
C
D
E
F
"The Access" – Parking
Proposed Access Gate
Little Baja Release Site
Manzo Ranch Release Site
Proposed Access Gate
Rio Viento RV Park
West Sherman Island Road
West Sherman Island Road
West Sherman Island Road
Primary Staging & Spoil Site
Temporary Service Road
Project Footprint
Secondary Staging & Spoil Site
Sherman Island County Park
Sherman Lake Marina
Sherman Island
LEGEND
Project Footprint
Release Pipe Boundary
PG&E Power Source
Proposed Access Gate
County Road Realignment
Manzo Ranch Fish Release Site
Little Baja Fish Release Site
Project Area
Primary Staging and Spoil Site
Secondary Staging and Spoil Site



Figure 12: Little Baja Fish Release Site Plan

Attachment B

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18985-3 BD

This Permit is issued to:

California Department of Water Resources (DWR)
1416 9th Street, Room 215-37
Sacramento, California 95814

To construct the Little Baja Fish Release Site that will include a fish release system, an automated site access gate, site lighting, downspout for the fish release site and a pipe gate perpendicular to the levee road, along the waterside of the left (south) bank levee of the Sacramento River.

The project is located along West Sherman Island Road, on Sherman Island. (Section 32, T3N, R2E, MDB&M, Reclamation District 341, Sacramento River, Sacramento 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. 18985-3 BD

LIABILITY AND INDEMNIFICATION

THIRTEEN: 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.

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 Central Valley Flood Protection Board, Department of Water Resources, and Reclamation District No. 341 shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

AGENCY CONDITIONS

SIXTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications 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 Central Valley Flood Protection Board.

SEVENTEEN: Construction work of any type shall not be done on levees or within the levee section during the flood season from November 1st to April 15th.

EIGHTEEN: The permittee shall be responsible for repair of any damages to the project levee and other flood control facilities due to construction, operation, or maintenance of the proposed project.

NINETEEN: The permittee shall comply with all conditions set forth in the letter from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated _____, which is attached to this permit as Exhibit __ and is incorporated by reference.

PRE-CONSTRUCTION

TWENTY: Upon receipt of a signed copy of the issued permit the permittee shall contact the Central Valley Flood Protection Board by telephone at (916) 574-0609, and submit the enclosed postcard, to schedule a preconstruction conference with the inspector that is assigned to your project. Failure to do so at least 10 working days prior to start of work may result in a delay of the project.

CONSTRUCTION

TWENTY-ONE: All 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 1st to April 15th.

TWENTY-TWO: Prior to placement of fill for the toe berm and against the levee slope all surface vegetation shall be removed to a depth of 6 inches. Organic soil and roots larger than 1-1/2 inches in diameter shall be removed to a depth of 3 feet.

TWENTY-THREE: All fill material shall be imported impervious material with 20 percent or more passing the No. 200 sieve, a plasticity index of 8 or more, and a liquid limit of less than 50 and free of lumps or stones exceeding 3 inches in greatest dimension, vegetative matter, or other unsatisfactory material. Fill material shall be compacted in 4- to 6-inch layers to a minimum of 90 percent relative compaction as measured by ASTM Method D1557-91 or equivalent.

TWENTY-FOUR: Fill on the levee slope shall be keyed into the existing levee section with each lift.

TWENTY-FIVE: The steel piling shells shall be lowered (jacked) into the predrilled hole, as drilling progresses, and shall not be driven into the levee section or foundation.

VEGETATION / ENVIRONMENTAL MITIGATION

TWENTY-SIX: The mitigation measures approved by the CEQA lead agency and the permittee are found in its Mitigation and Monitoring Reporting Program (MMRP) adopted by the CEQA lead agency. The permittee shall implement all such mitigation measures.

POST-CONSTRUCTION

TWENTY-SEVEN: All debris generated by this project shall be disposed of outside the Project Works.

TWENTY-EIGHT: The project area shall be restored to at least the condition that existed prior to commencement of work.

TWENTY-NINE: Upon completion of the project, the permittee shall submit as-constructed drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite 256, Sacramento, California 95821.

OPERATIONS AND MAINTENANCE

THIRTY: Debris that may accumulate on the permitted encroachment(s) and related facilities shall be cleared off and disposed of outside the floodway after each period of high water.

THIRTY-ONE: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Central Valley Flood Protection Board, the Department of Water Resources, or any other agency responsible for maintenance.

THIRTY-TWO: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

THIRTY-THREE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

THIRTY-FOUR: Reclamation District No. 341 and the Department of Water Resources' Flood Project Inspection Section shall have 24/7 access to the levee crown between the Little Baja and the Manzo Ranch Fish Release Sites.

REAL ESTATE

THIRTY-FIVE: The permittee shall provide the Central Valley Flood Protection Board with a permanent easement granting the Sacramento and San Joaquin Drainage District flood control rights upon, over, and across the property to be occupied by the proposed levee modification that will accomodate the Little Baja Fish Release Site. Contact Real Estate at (916) 653-7654.

PROJECT ABANDONMENT / CHANGE IN PLAN OF FLOOD CONTROL

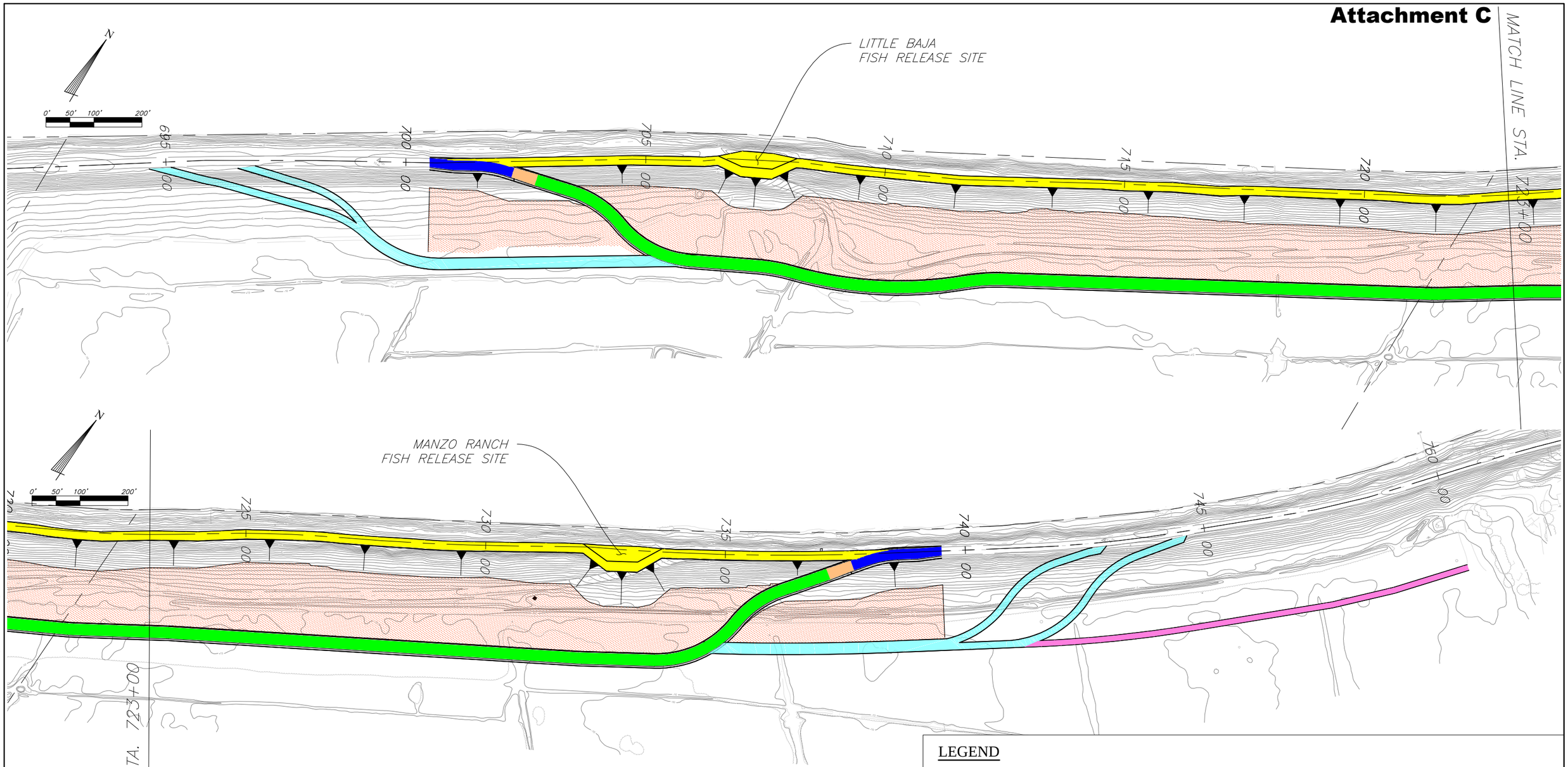
THIRTY-SIX: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

THIRTY-SEVEN: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if in the discretion of the Central Valley Flood Protection Board the removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if the Project is not maintained or is damaged by any cause. If the permittee does not comply, or in the event of an emergency, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

END OF CONDITIONS

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Attachment C



LEGEND

- 16' ASPHALT-CONCRETE RECLAMATION DISTRICT ROAD
- 20' ASPHALT-CONCRETE COUNTY ROAD TIE-IN TO EXISTING LEVEE CREST ROAD
- 22' ASPHALT-CONCRETE COUNTY ROAD, PERMANENT ALIGNMENT
- TRANSITION FROM 20' ASPHALT-CONCRETE ROAD TO 22' ASPHALT-CONCRETE ROAD
- UTILITY MAINTENANCE ROAD
- TEMPORARY ACCESS ROADS
- STABILITY BERM, SLOPE VARIES

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File Name: CVFPB Project Overview Figure - 11-17-14.dwg
Scale Factor: XX
Plot Date: 11-17-2014

NOTE:
BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 06/29/2010

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
Suite 100
Sacramento, California 95833
Ph: 916-441-6850
Fx: 916-448-3866

REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 23013 EXP. 12/31/14 CIVIL STATE OF CALIFORNIA

DRAFT

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PROJECT OVERVIEW

SHEET 1 OF 1 SHEETS

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RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND
"LITTLE BAJA" AND "MANZO RANCH"
FISH RELEASE SITES

Sacramento County **California**

WAGNER & BONSIGNORE • CONSULTING CIVIL ENGINEERS • A CORPORATION
2151 RIVER PLAZA DRIVE, SUITE 100 • SACRAMENTO, CALIFORNIA

NOT FOR PUBLIC USE
OR DISTRIBUTION

Attachment C

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File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOT FOR PUBLIC USE OR DISTRIBUTION

REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

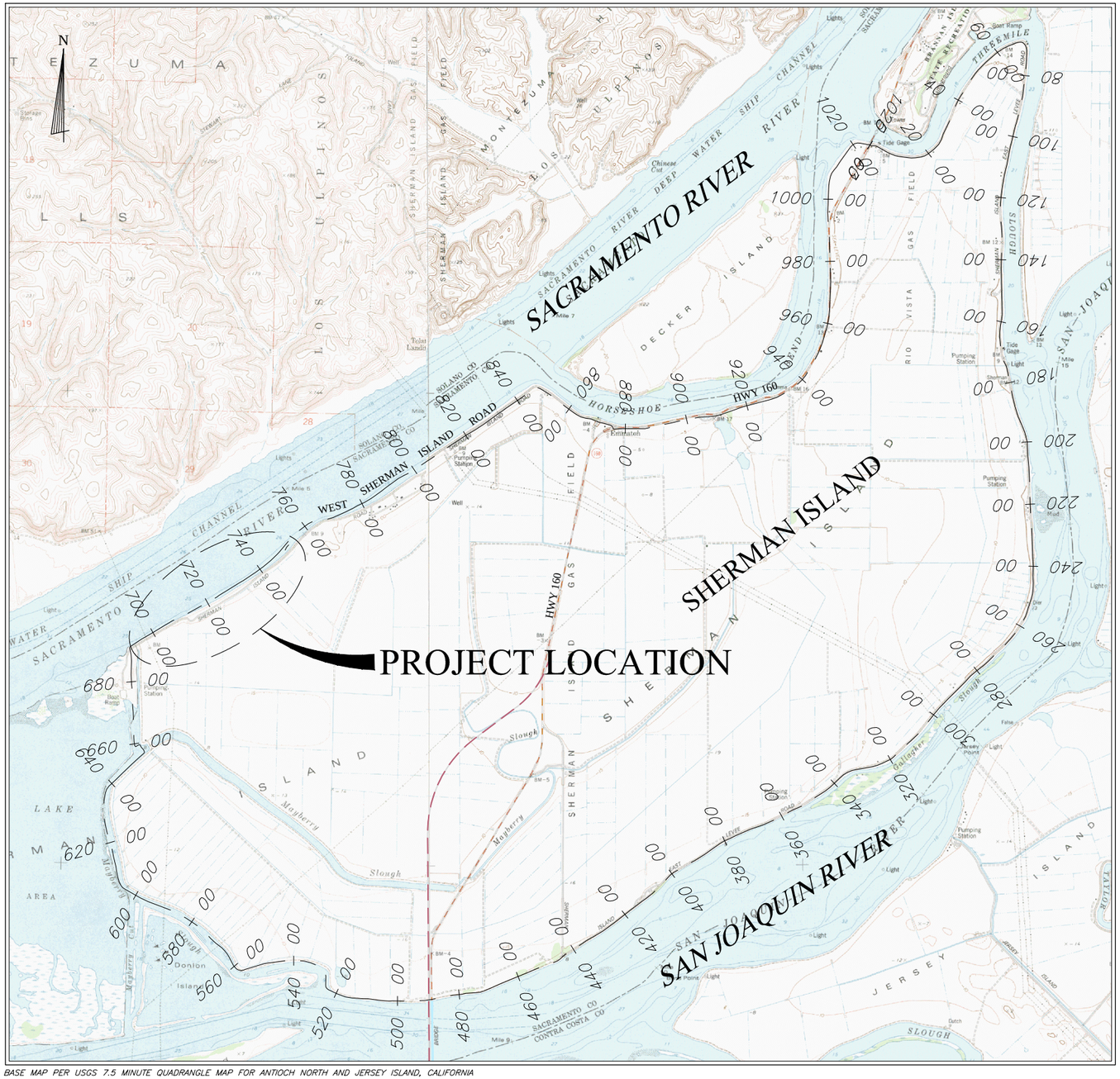
Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
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Sacramento, California 95833
Ph: 916-441-6850
Fx: 916-779-3120

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 23803
12/31/14
CIVIL
STATE OF CALIFORNIA

DRAFT

RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
SHEET INDEX

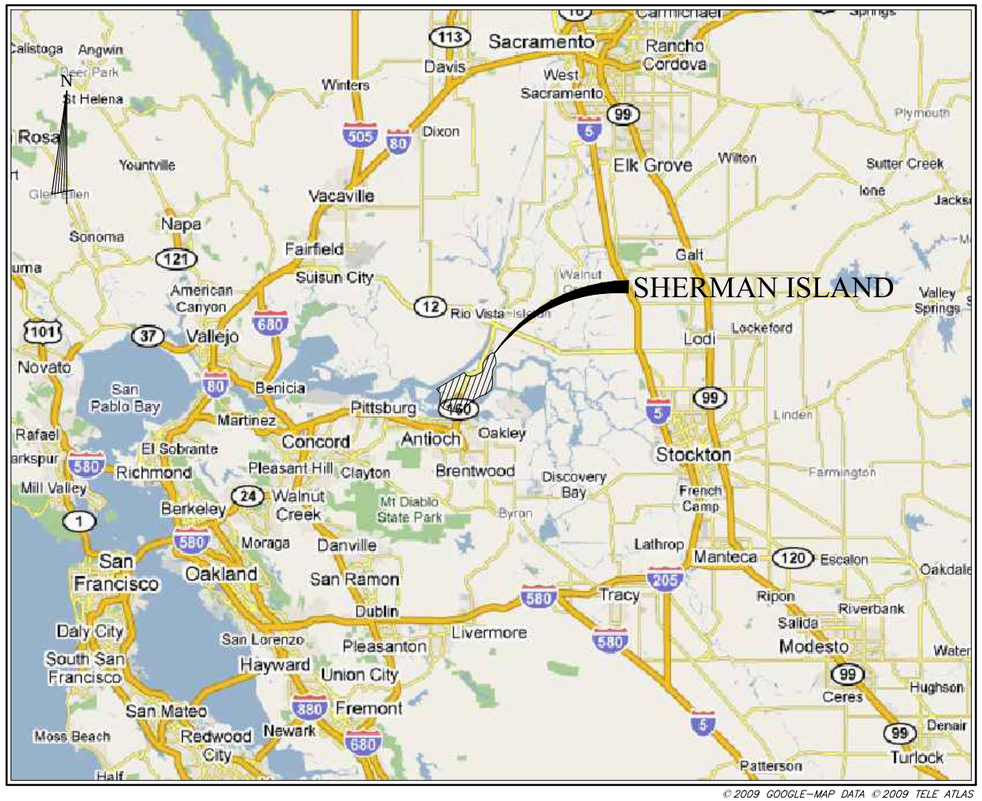
SHEET 1 OF 45 SHEETS



BASE MAP PER USGS 7.5 MINUTE QUADRANGLE MAP FOR ANTIOCH NORTH AND JERSEY ISLAND, CALIFORNIA

LOCATION MAP

0' 1000' 2000' 4000'


SHERMAN ISLAND
Sacramento
Davis
Winters
Vacaville
Dixon
Elk Grove
Rancho Cordova
West Sacramento
Rio Vista
Fairfield
Suisun City
Vallejo
Benicia
Martinez
Pittsburg
Antioch
Oakley
Concord
Pleasant Hill
Clayton
Brentwood
Discovery Bay
Stockton
Lodi
Manteca
Tracy
Livermore
Pleasanton
Dublin
San Ramon
Oakland
San Francisco
Berkeley
Richmond
San Rafael
Napa
Sonoma
Yountville
St Helena
Calistoga
Modesto
Ceres
Turlock
Merced
Los Banos
Patterson
Newman
Gustine
Escalon
Ripon
Riverbank
Salida
Oakdale
Sutter Creek
Plymouth
Galt
Lockeford
Linden
Farmington
French Camp
Lathrop
Byron
Mt Diablo State Park
Walnut Creek
Danville
Hayward
Union City
Fremont
Newark
Redwood City
San Mateo
Moss Beach
South San Francisco
Daly City
San Lorenzo
Half
Corning
Willows
Orland
Chico
Oroville
Yuba City
Marysville
Colusa
Williams
Woodland
Dixon
Rosa
Glen Ellen
Angwin
Novato
San Pablo Bay
Mill Valley
El Sobrante
Pinole
Hercules
Crockett
Martinez
Walnut Creek
Alamo
Danville
San Ramon
Dublin
Pleasanton
Livermore
Tracy
Lathrop
Manteca
Escalon
Ripon
Riverbank
Salida
Modesto
Ceres
Turlock
Denair
Hughson
Waterford
Patterson
Newman
Gustine
Los Banos
Dos Palos
Firebaugh
Mendota
Coalinga
Huron
Avenal
Kettleman City
Lemoore
Hanford
Visalia
Tulare
Porterville
Exeter
Lindsay
Strathmore
Farmersville
Woodlake
Orosi
Sanger
Reedley
Dinuba
Selma
Kingsburg
Fowler
Parlier
Madera
Chowchilla
Oakhurst
Coarsegold
Ahwahnee
Mariposa
Merced
Atwater
Livingston
Delhi
Hilmar
Winton
Planada
Le Grand
Chowchilla
Madera
Fresno
Clovis
Sanger
Reedley
Dinuba
Selma
Kingsburg
Fowler
Parlier
Orosi
Woodlake
Lemoore
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Visalia
Tulare
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Plymouth
Galt
Lockeford
Linden
Farmington
French Camp
Lathrop
Byron
Mt Diablo State Park
Walnut Creek
Danville
San Ramon
Dublin
Pleasanton
Livermore
Tracy
Manteca
Stockton
Lodi
Valley Springs
Wilton
Sutter Creek
Ione
Jackson
Amador City
Volcano
Pine Grove
Pioneer
Jackson
Sutter Creek
Ione
Wilton
Elk Grove
Galt
Walnut Grove
Isleton
Rio Vista
Suisun City
Fairfield
American Canyon
Vallejo
Benicia
Martinez
Pittsburg
Antioch
Oakley
Concord
Pleasant Hill
Clayton
Brentwood
Discovery Bay
Stockton
Lodi
Manteca
Tracy
Livermore
Pleasanton
Dublin
San Ramon
Oakland
San Francisco
Berkeley
Richmond
San Rafael
Napa
Sonoma
Yountville
St Helena
Calistoga
Angwin
Rosa
Glen Ellen

Attachment C

Station	Levee Embankment		Stability Toe Berm		New County Road	Utility Easement Road	Misc.
	Distance from Construction Reference Line to Compacted Embankment Control Point	Elevation at Compacted Embankment Control Point	Approximate Distance from Construction Reference Line to Toe of Existing Levee	Approximate distance from Construction Reference Line to Stability Toe Berm Hinge	Approximate Distance from Construction Reference Line to CL of New County Road	Approximate Distance from Construction Reference Line to CL of Utility Easement Road	Approximate Distance from Construction Reference Line to Waterside Hinge of Existing Levee
694+00	-	-	-	-	-	-	20.5 *
695+00	-	-	-	-	-	-	21.2 *
696+00	-	-	-	-	-	-	26.4 *
697+00	-	-	-	-	-	-	27.0 *
698+00	-	-	-	-	-	-	25.6 *
699+00	-	-	-	-	-	-	22.8 *
700+00	Match Existing Levee	Match Existing Levee	50	-	-	-	15.8 *
701+00	21.4	13.8	53	167	5	-	11.7 *
702+00	32.7	13.8	58	160	16	-	10.6 *
703+00	12.0	13.8	59	160	49	-	15.9 *
704+00	12.0	13.8	68	160	92	-	12.2 *
705+00	12.0	13.8	60	160	178	-	10.1 *
706+00	12.0	13.8	62	160	209	-	19.0 *
707+00	35.6	16.0	84	184	218	-	18.0 *
708+00	19.3	14.4	84	186	221	-	20.3 *
709+00	12.0	13.8	75	160	217	-	11.4 *
710+00	12.0	13.8	108	160	211	-	17.3 *
711+00	12.0	13.8	109	160	207	-	18.8 *
712+00	12.0	13.8	116	160	205	-	17.9 *
713+00	12.0	13.8	117	160	206	-	11.7 *
714+00	12.0	13.8	114	160	206	-	14.1 *
715+00	14.0	13.8	118	162	207	-	8.4 *
716+00	12.0	13.8	113	160	206	-	9.9 *
717+00	16.0	13.8	116	164	205	-	6.7 *
718+00	12.0	13.8	112	160	204	-	11.6 *
719+00	12.0	13.8	102	160	203	-	8.8 *
720+00	12.0	13.8	100	160	203	-	9.0 *
721+00	16.0	13.8	96	164	204	-	5.4 *
722+00	17.0	13.8	96	165	202	-	4.3 *
723+00	12.0	13.8	100	160	203	-	8.4 *
724+00	15.0	13.8	107	163	210	-	5.2 *
725+00	12.0	13.8	94	160	217	-	8.6 *
726+00	12.0	13.8	92	160	220	-	10.5 *
727+00	12.0	13.8	105	160	220	-	9.0 *
728+00	12.0	13.8	99	160	219	-	9.0 *
729+00	13.0	13.8	93	161	219	-	7.3 *
730+00	12.0	13.8	85	160	222	-	10.0 *
731+00	12.0	13.8	103	160	227	-	10.0 *
732+00	13.0	13.8	106	195	232	-	7.2 *
733+00	45.4	16.3	110	193	228	-	11.0 *
734+00	13.0	13.8	89	168	222	-	12.6 *
735+00	12.0	13.8	81	160	168	195	15.6 *
736+00	12.0	13.8	81	160	80	195	13.6 *
737+00	12.0	13.8	72	160	45	195	15.2 *
738+00	28.5	13.8	98	160	11	195	19.0 *
739+00	19.8	13.8	96	165	3	195	13.8 *
740+00	Match Existing Levee	Match Existing Levee	94	-	-	200	11.5 *
741+00	-	-	-	-	-	200	17.6 *
742+00	-	-	-	-	-	200	12.6 *
743+00	-	-	-	-	-	200	15.3 *
744+00	-	-	-	-	-	200	13.6 *
745+00	-	-	-	-	-	200	14.2 *
746+00	-	-	-	-	-	200	13.9 *
747+00	-	-	-	-	-	200	12.9 *
748+00	-	-	-	-	-	200	11.1 *
749+00	-	-	-	-	-	200	6.1 *
750+00	-	-	-	-	-	200	10.3 *

PROJECT CONTROL

* WATERSIDE LIMIT OF CONSTRUCTION. FIELD VERIFY LOCATION PRIOR TO CONSTRUCTION ACTIVITIES.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOT FOR PUBLIC USE OR DISTRIBUTION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By: S.R. HERINGER
Drawn By: S.R. HERINGER
Checked By: H.S. MATSUNAGA
Approved By: R.C. WAGNER
Date: NOVEMBER 2014

Wagner & Bonsignore
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REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 23903
12/31/14
CIVIL
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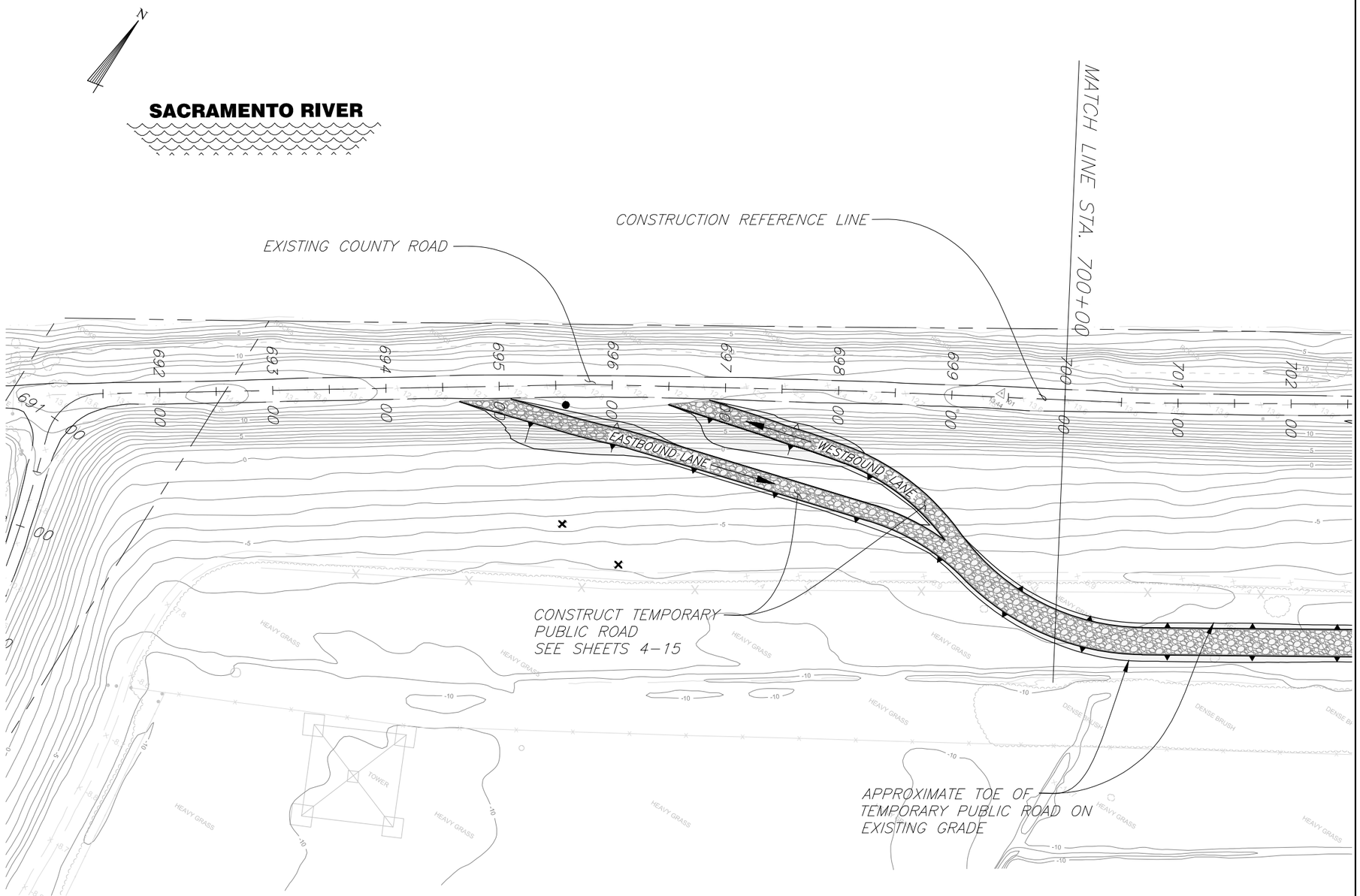
RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
PROJECT CONTROL

SHEET 3 OF 45 SHEETS

Station	Temporary Road Approximate Distance from Construction Reference Line to CL of Temporary Road
694+00	-
695+00	19
696+00	45
697+00	23, 71
698+00	54, 99
699+00	118, 138
700+00	198
701+00	211
702+00	211
703+00	212
704+00	212
705+00	212
706+00	209
707+00	218
708+00	226
709+00	236
710+00	239
711+00	230
712+00	208
713+00	206
714+00	206
715+00	207
716+00	206
717+00	205
718+00	204
719+00	203
720+00	203
721+00	204
722+00	202

Station	Temporary Road Approximate Distance from Construction Reference Line to CL of Temporary Road
723+00	203
724+00	210
725+00	217
726+00	220
727+00	220
728+00	219
729+00	219
730+00	222
731+00	227
732+00	232
733+00	228
734+00	222
735+00	195
736+00	195
737+00	195
738+00	195
739+00	195
740+00	176, 200
741+00	89, 200
742+00	31, 158
743+00	58
744+00	25
745+00	-
746+00	-
747+00	-
748+00	-
749+00	-
750+00	-

TEMPORARY ROAD CONTROL



APN: 158-0080-008-0000
STATE OF CALIFORNIA

TEMPORARY ROAD PLAN

0' 50' 100'

LEGEND:
- EXISTING INCLINOMETER – PROTECT IN PLACE
- EXISTING INCLINOMETER – MODIFY AS DIRECTED
- EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- APPROXIMATE PARCEL BOUNDARY

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:
1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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REVISIONS			
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PRELIMINARY
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RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD PLAN STATIONS 687+00 - 700+00 AND PROJECT CONTROL

SHEET 4 OF 45 SHEETS

Attachment C

SACRAMENTO RIVER

MATCH LINE STA. 700+00

MATCH LINE STA. 713+00

CONSTRUCTION REFERENCE LINE

WEST BOUND LANE

EAST BOUND LANE

EXISTING COUNTY ROAD

CONSTRUCT TEMPORARY PUBLIC ROAD SEE SHEETS 4–15

APPROXIMATE TOE OF TEMPORARY PUBLIC ROAD ON EXISTING GRADE

APN: 158-0080-008-0000
STATE OF CALIFORNIA

TEMPORARY ROAD PLAN

0' 50' 100'

LEGEND:
- EXISTING INCLINOMETER – PROTECT IN PLACE
- EXISTING INCLINOMETER – MODIFY AS DIRECTED
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Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:

1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

2) BATHYMETRIC TOPOGRAPHY FROM DEPARTMENT OF WATER RESOURCES, SURVEYED MARCH 2014

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REVISIONS			
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Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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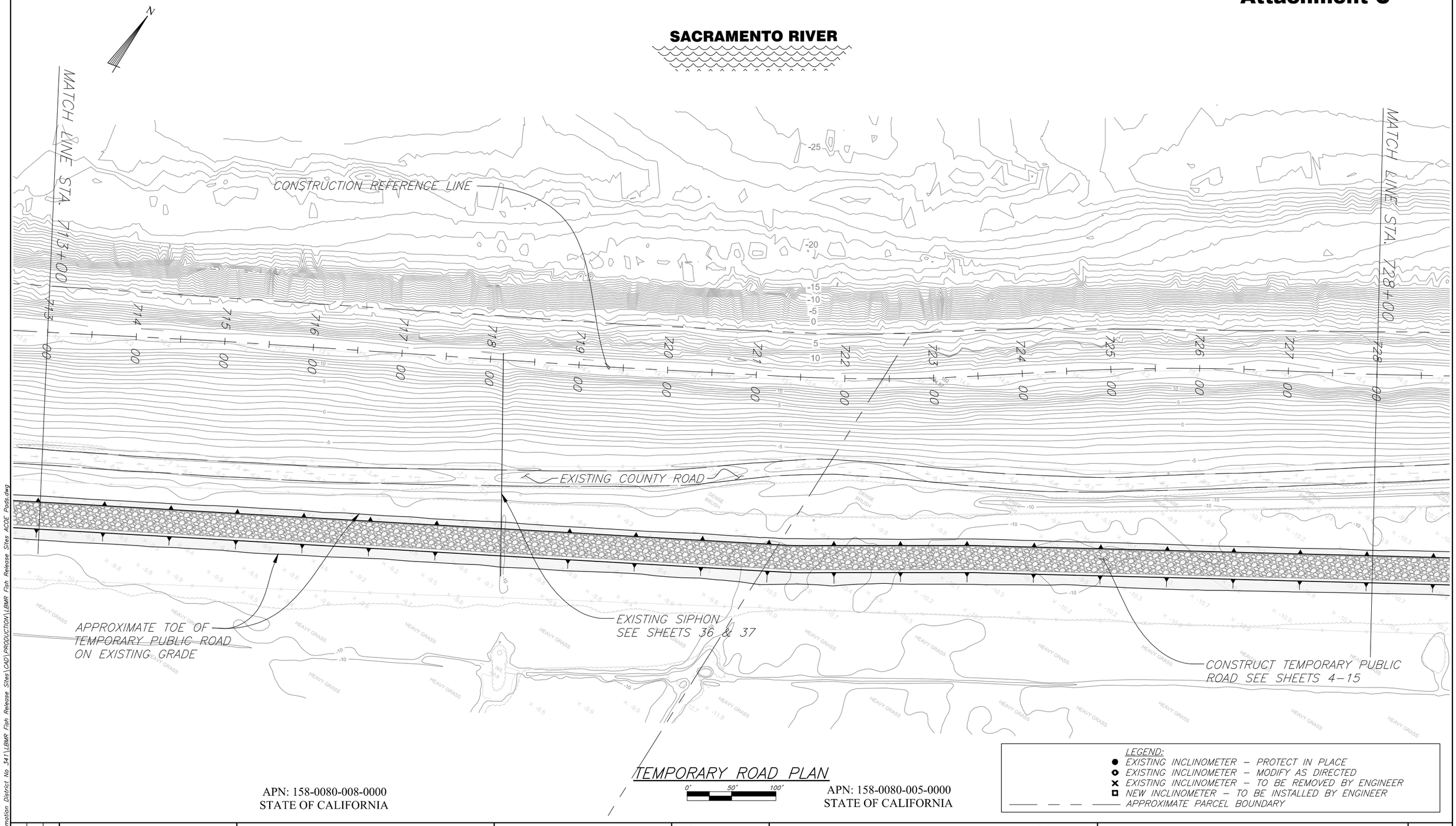
REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 23903 CIVIL STATE OF CALIFORNIA DRAFT 12/31/14

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD PLAN
STATIONS 700+00 - 713+00

SHEET 5 OF 45 SHEETS



TEMPORARY ROAD PLAN

0' 50' 100'

APN: 158-0080-008-0000
STATE OF CALIFORNIA

APN: 158-0080-005-0000
STATE OF CALIFORNIA

LEGEND:
- ● EXISTING INCLINOMETER – PROTECT IN PLACE
- ◎ EXISTING INCLINOMETER – MODIFY AS DIRECTED
- ✕ EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- ◘ NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- APPROXIMATE PARCEL BOUNDARY

H:\CH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:

1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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Approved By	R.C. WAGNER
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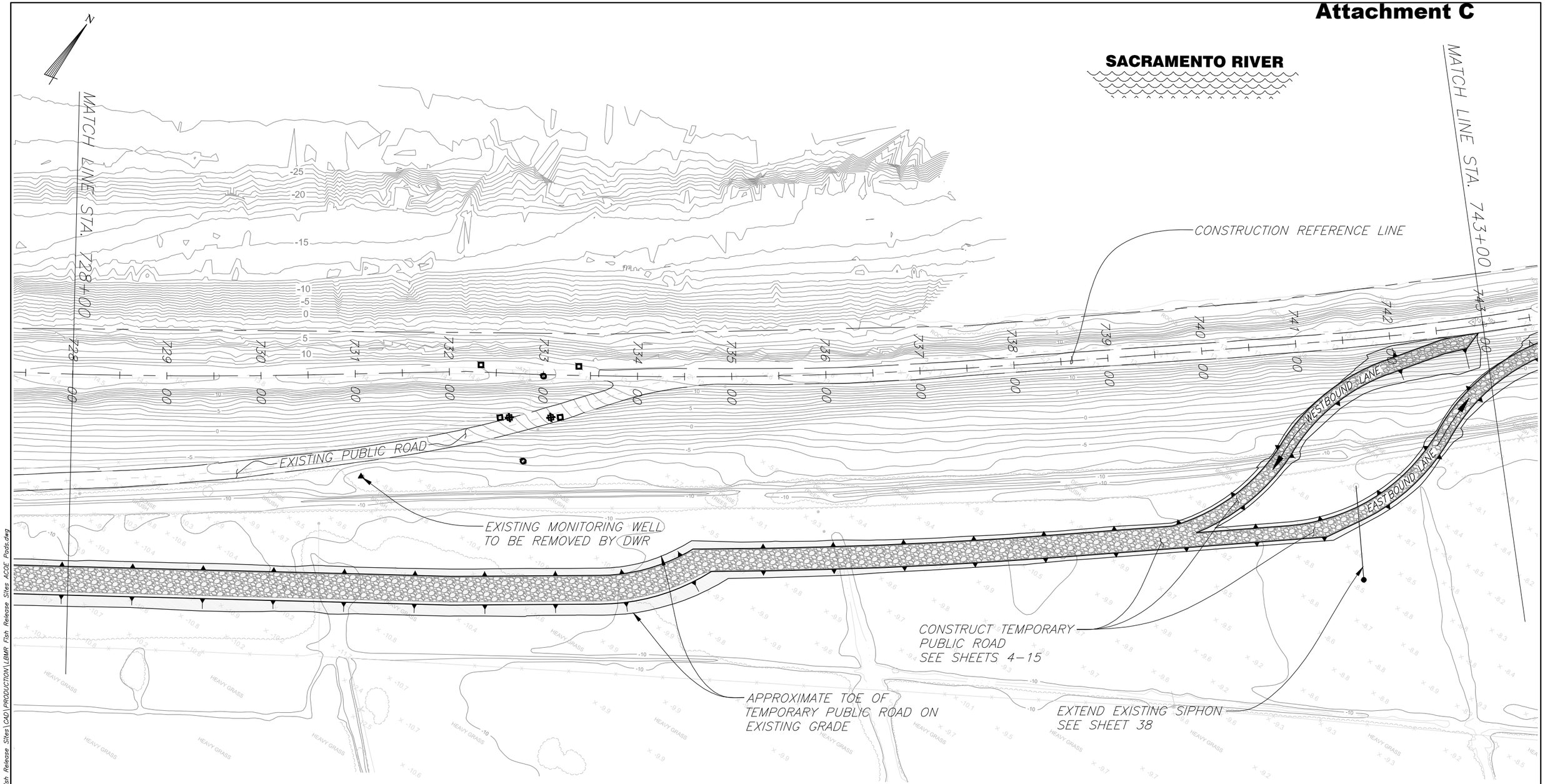
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD PLAN STATIONS 713+00 - 728+00

SHEET 6 OF 45 SHEETS

Attachment C



TEMPORARY ROAD PLAN

0' 50' 100'

APN: 158-0080-005-0000
STATE OF CALIFORNIA

LEGEND:
- EXISTING INCLINOMETER – PROTECT IN PLACE
- EXISTING INCLINOMETER – MODIFY AS DIRECTED
- EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- APPROXIMATE PARCEL BOUNDARY

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Site ACE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:
1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.
2) BATHYMETRIC TOPOGRAPHY FROM DEPARTMENT OF WATER RESOURCES, SURVEYED MARCH 2014

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Date	NOVEMBER 2014

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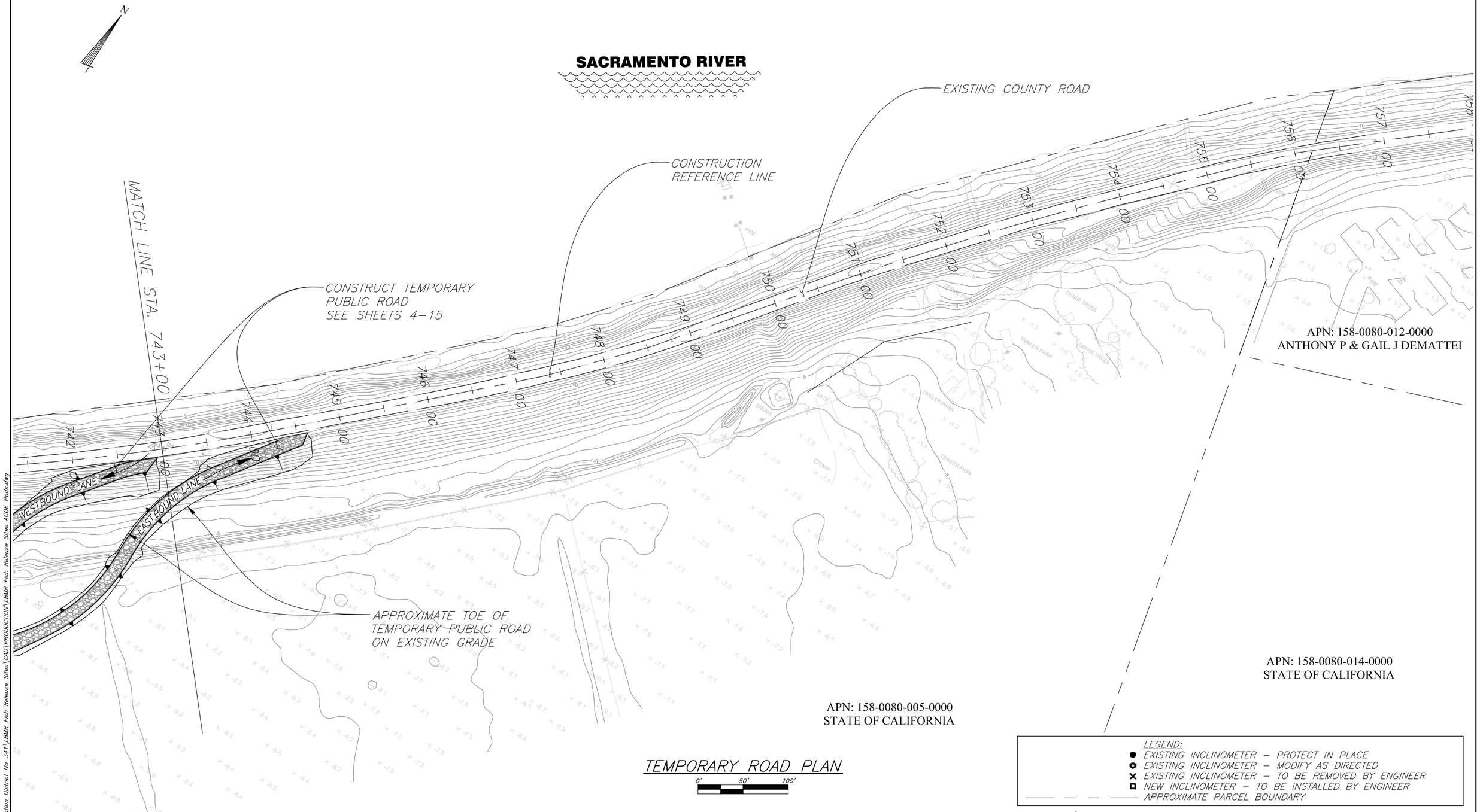
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD PLAN
STATIONS 728+00 - 743+00

SHEET 7 OF 45 SHEETS

Attachment C



TEMPORARY ROAD PLAN

0' 50' 100'

LEGEND:
- ● EXISTING INCLINOMETER – PROTECT IN PLACE
- ⊙ EXISTING INCLINOMETER – MODIFY AS DIRECTED
- × EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- □ NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- —— — — —— APPROXIMATE PARCEL BOUNDARY

NOTES:

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Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 CIVIL STATE OF CALIFORNIA 12/31/14

RECLAMATION DISTRICT NO. 341

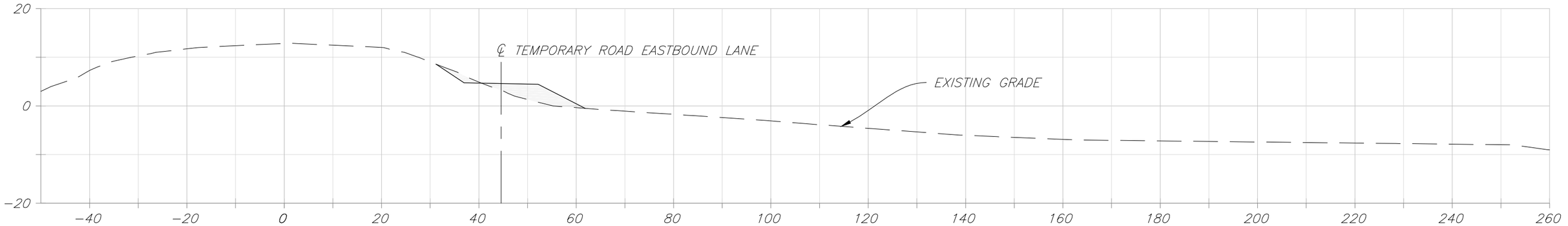
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD PLAN
STATIONS 743+00 - 758+00

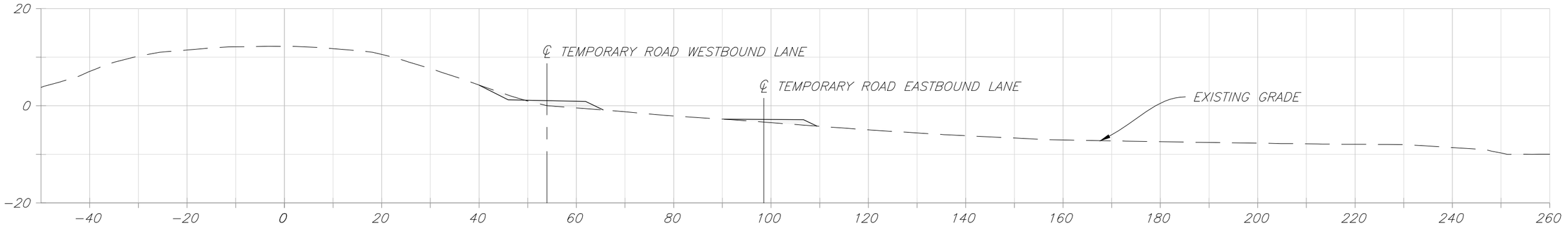
SHEET 8 OF 45 SHEETS

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File Name: LBMR Fish Release Site ROE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

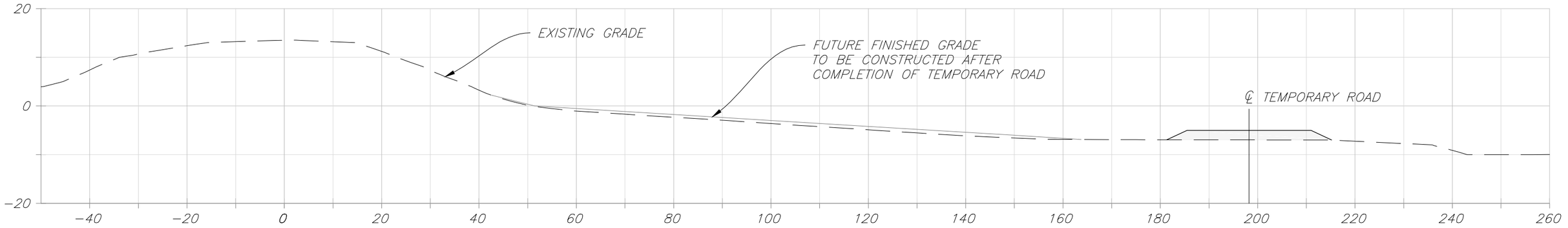
Attachment C



SECTION AT 696+00



SECTION AT 698+00



SECTION AT 700+00

TEMPORARY ROAD CROSS SECTIONS

0' 10' 20'

*TEMPORARY ROAD TO BE CONSTRUCTED PRIOR TO REMOVING EXISTING AC COUNTY ROAD WHERE REQUIRED AND PLACING FIRST LIFT.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
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Fx: 916-779-3120

REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 23983 12/31/14 CIVIL STATE OF CALIFORNIA

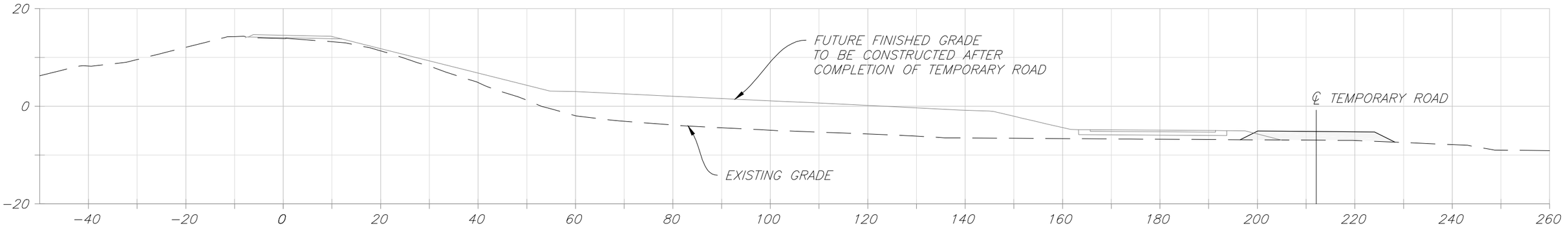
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

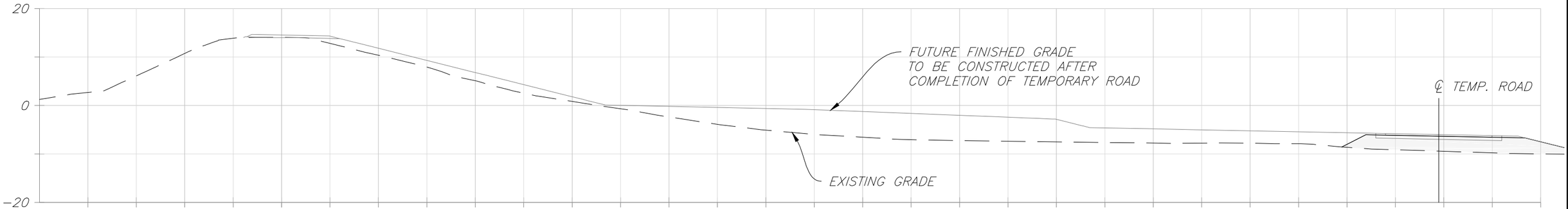
TEMPORARY ROAD CROSS SECTIONS
STATIONS 696+00 - 700+00

SHEET 9 OF 45 SHEETS

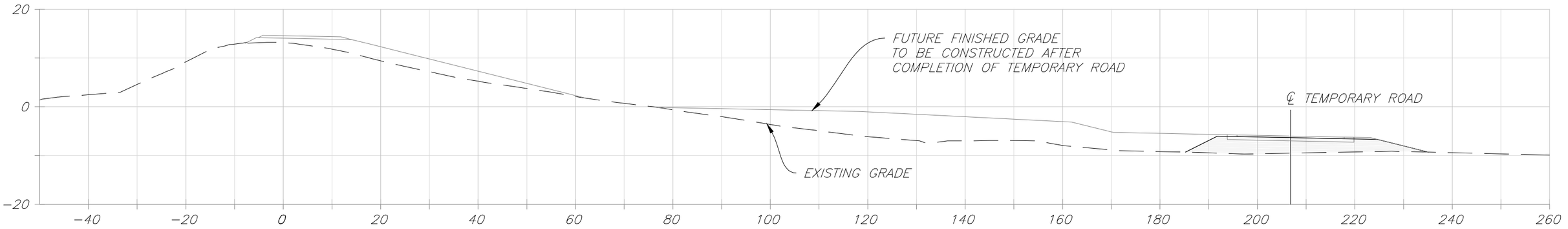
Attachment C



SECTION AT 705+00



SECTION AT 710+00



SECTION AT 715+00

TEMPORARY ROAD CROSS SECTIONS

0' 10' 20'

*TEMPORARY ROAD TO BE CONSTRUCTED PRIOR TO REMOVING EXISTING AC COUNTY ROAD WHERE REQUIRED AND PLACING FIRST LIFT.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOT FOR PUBLIC USE OR DISTRIBUTION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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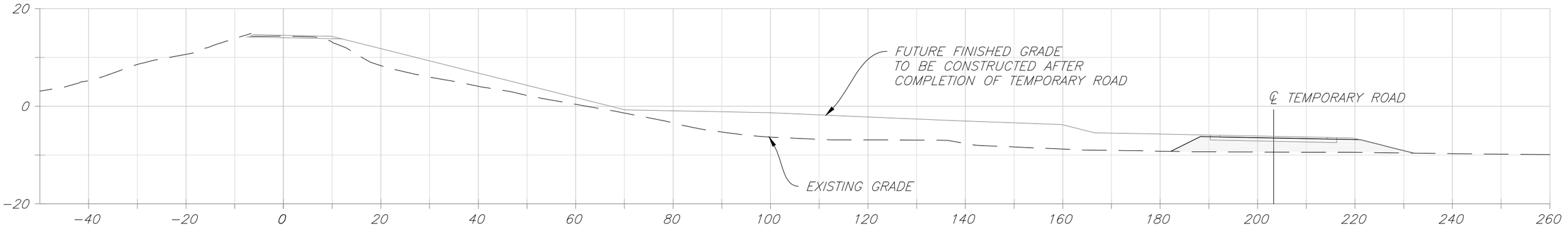
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

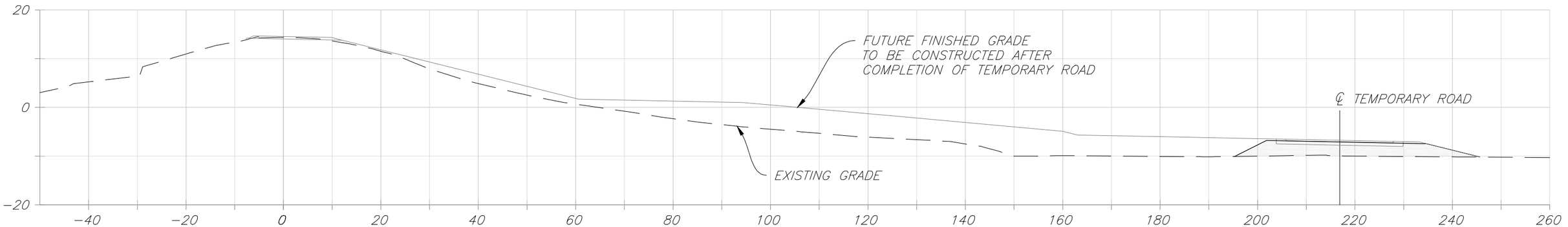
TEMPORARY ROAD CROSS SECTIONS
STATIONS 705+00 - 715+00

SHEET 10 OF 45 SHEETS

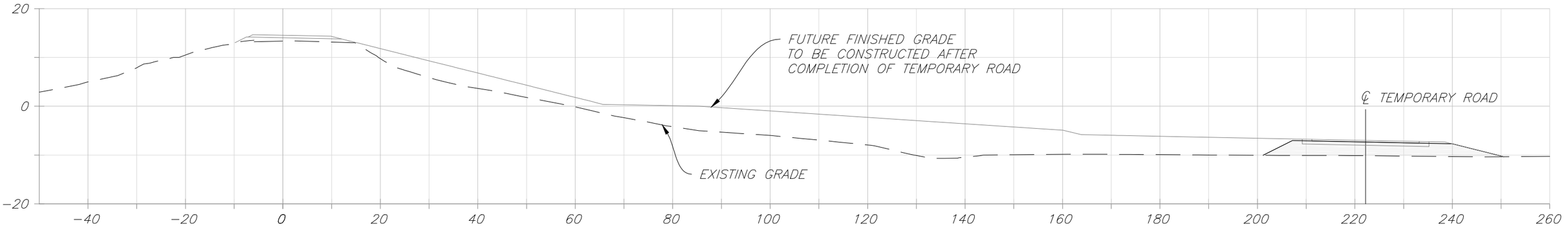
Attachment C



SECTION AT 720+00



SECTION AT 725+00



SECTION AT 730+00

TEMPORARY ROAD CROSS SECTIONS

0' 10' 20'

*TEMPORARY ROAD TO BE CONSTRUCTED PRIOR TO REMOVING EXISTING AC COUNTY ROAD WHERE REQUIRED AND PLACING FIRST LIFT.

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

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CIVIL
STATE OF CALIFORNIA
DRAFT

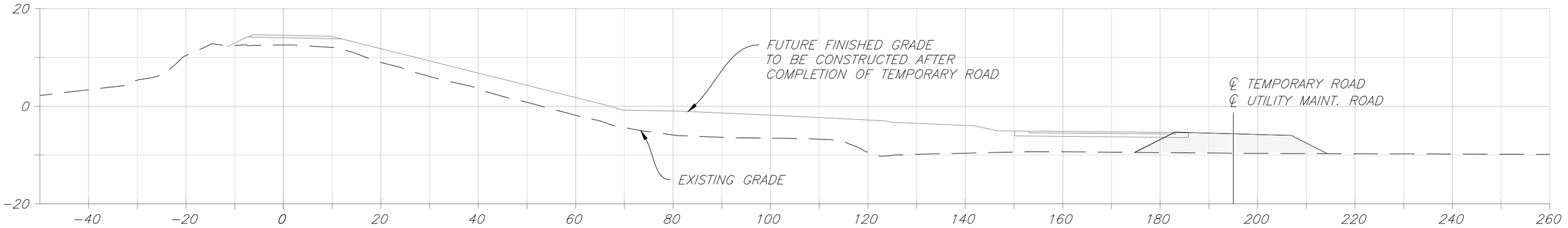
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
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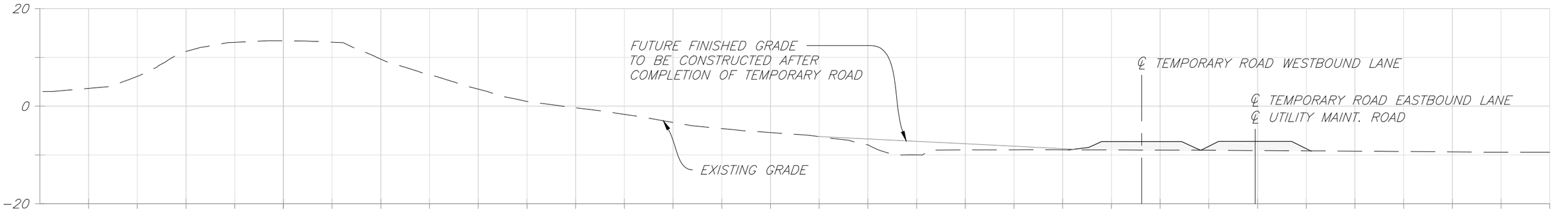
TEMPORARY ROAD CROSS SECTIONS
STATIONS 720+00 - 730+00

SHEET 11 OF 45 SHEETS

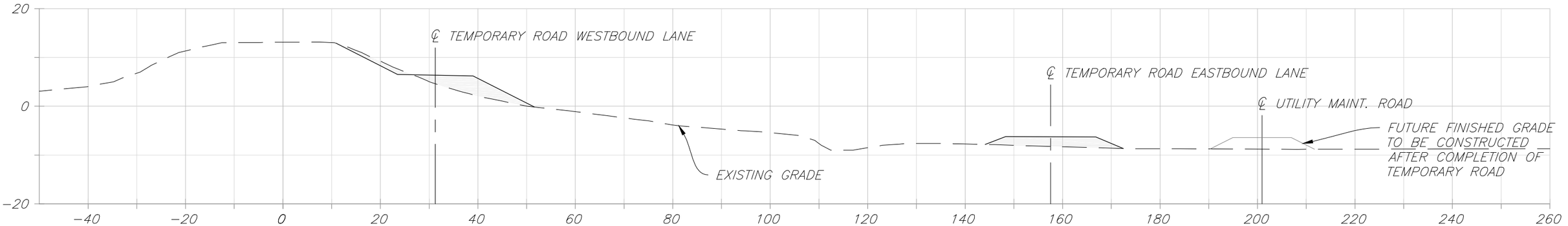
Attachment C



SECTION AT 735+00



SECTION AT 740+00



SECTION AT 742+00

TEMPORARY ROAD CROSS SECTIONS

0' 10' 20'

*TEMPORARY ROAD TO BE CONSTRUCTED PRIOR TO REMOVING EXISTING AC COUNTY ROAD WHERE REQUIRED AND PLACING FIRST LIFT.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

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Date	NOVEMBER 2014

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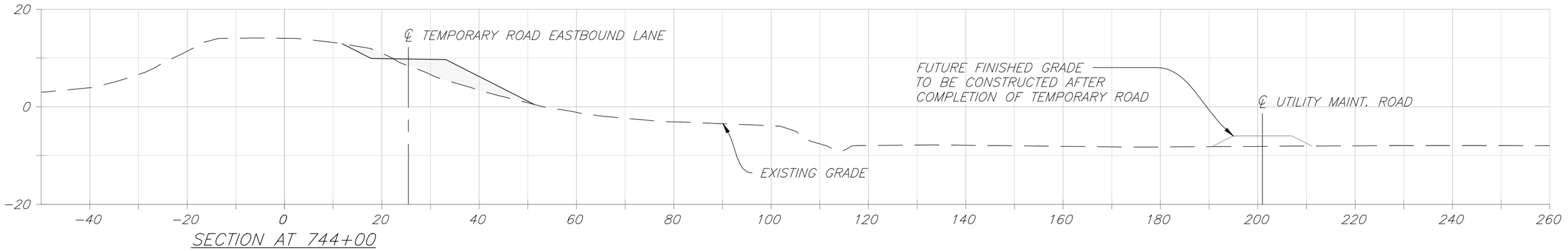
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD CROSS SECTIONS
STATIONS 735+00 - 742+00

SHEET 12 OF 45 SHEETS

Attachment C



SECTION AT 744+00

TEMPORARY ROAD CROSS SECTIONS

0' 10' 20'

*TEMPORARY ROAD TO BE CONSTRUCTED PRIOR TO REMOVING EXISTING AC COUNTY ROAD WHERE REQUIRED AND PLACING FIRST LIFT.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

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Revision Date: 11/24/2014

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Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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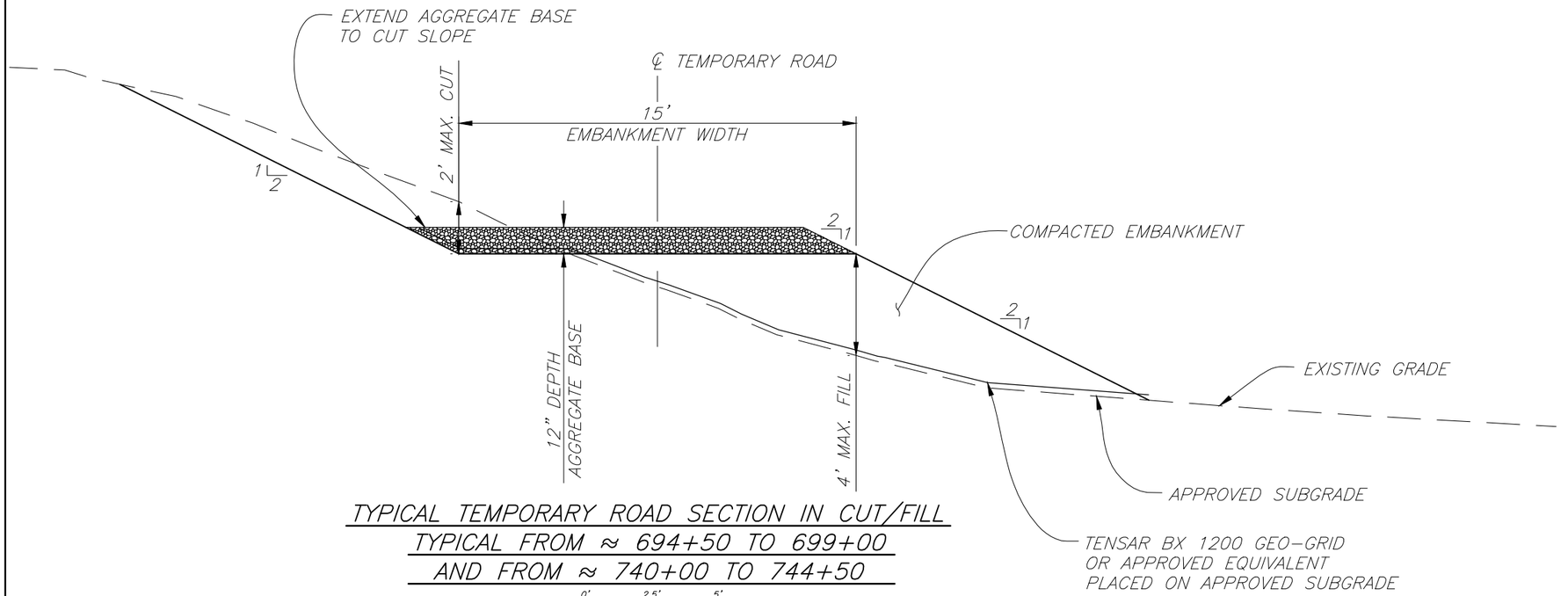
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

TEMPORARY ROAD CROSS SECTIONS
STATION 744+00

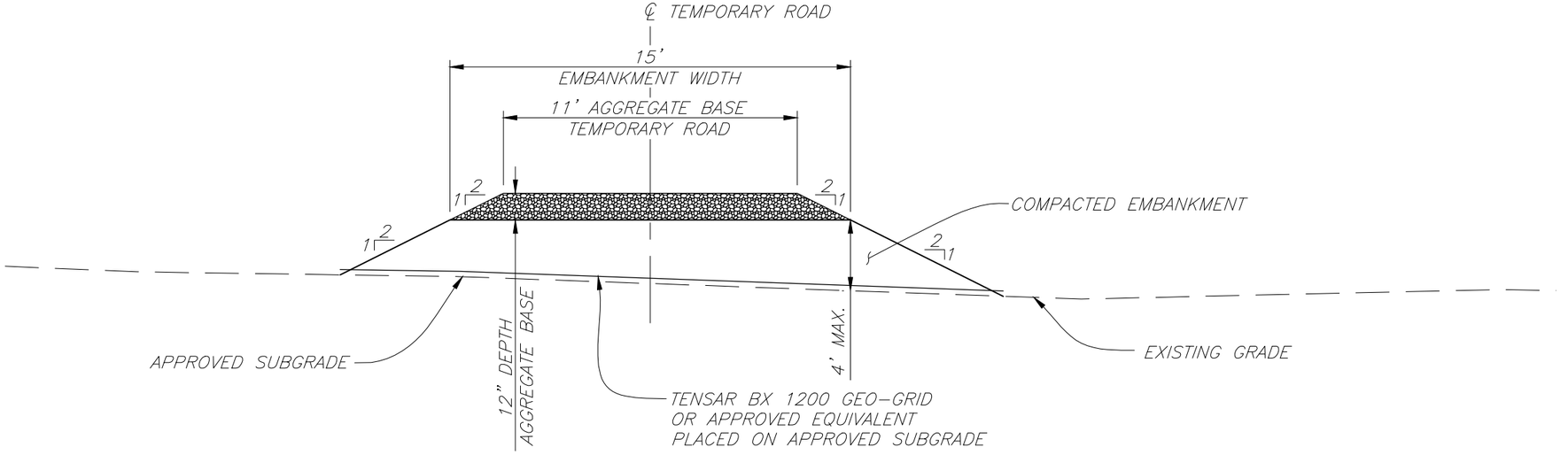
SHEET 13 OF 45 SHEETS

Attachment C



TYPICAL TEMPORARY ROAD SECTION IN CUT/FILL
TYPICAL FROM ≈ 694+50 TO 699+00
AND FROM ≈ 740+00 TO 744+50

0' 2.5' 5'



TYPICAL TEMPORARY ROAD SECTION IN FILL
TYPICAL FROM ≈ 694+50 TO 699+00
AND FROM ≈ 740+00 TO 744+50

0' 2.5' 5'

H:\CH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Site ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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PRELIMINARY
NOT FOR CONSTRUCTION

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Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

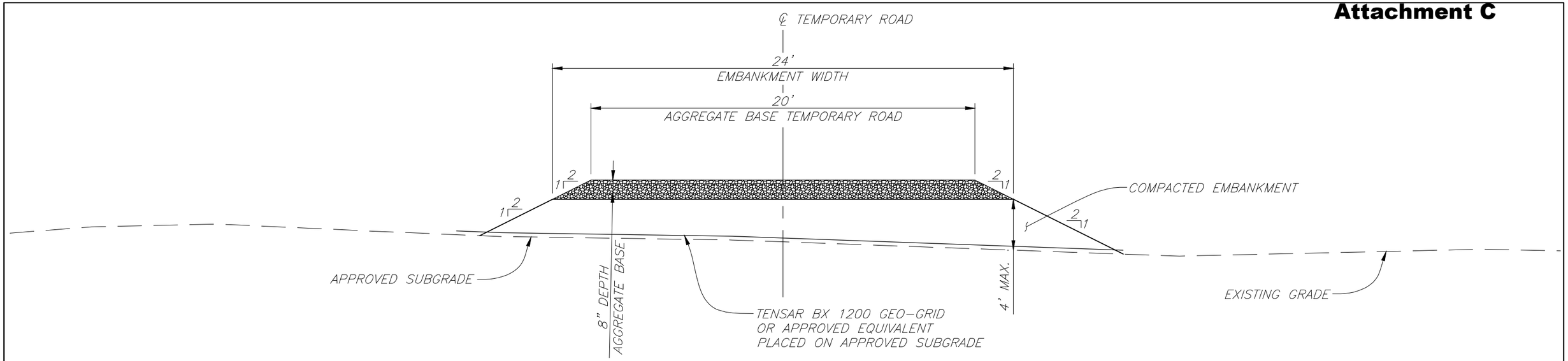
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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 29903 12/31/14 CIVIL STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
TYPICAL TEMPORARY ROAD SECTIONS

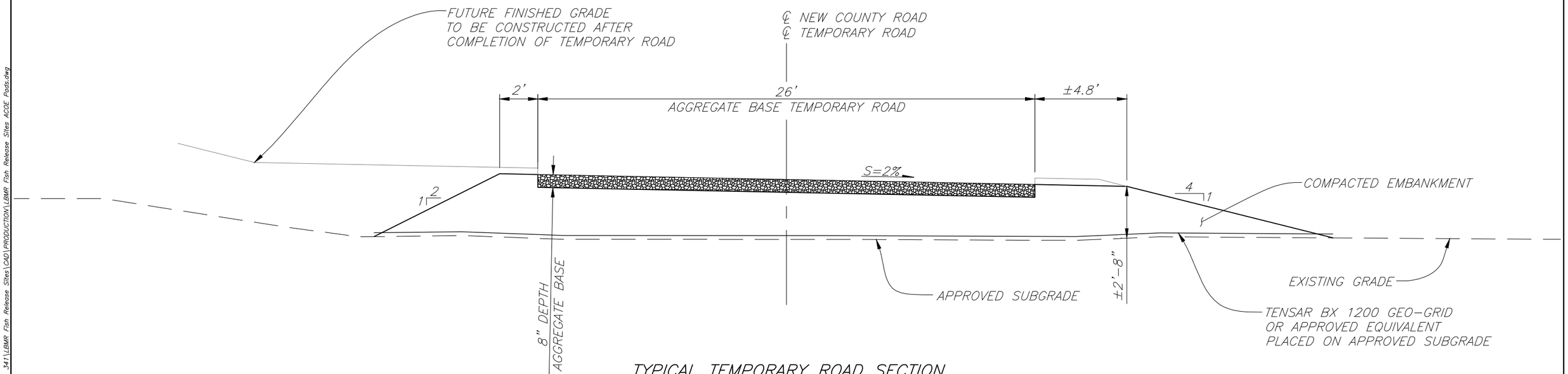
SHEET 14 OF 45 SHEETS

Attachment C



TYPICAL TEMPORARY ROAD SECTION
TYPICAL FROM ≈ 699+00 TO 705+00
AND FROM ≈ 735+00 TO 740+00

0' 2.5' 5'



TYPICAL TEMPORARY ROAD SECTION
TYPICAL FROM ≈ 705+00 TO 735+00

0' 2.5' 5'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
Plot Date: 11/24/2014
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Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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12/31/14
CIVIL
STATE OF CALIFORNIA

DRAFT

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

TYPICAL TEMPORARY ROAD SECTIONS

SHEET 15 OF 45 SHEETS

Attachment C

SACRAMENTO RIVER

EXISTING COUNTY ROAD

CONSTRUCTION REFERENCE LINE

20' ASPHALT-CONCRETE COUNTY ROAD SEE SHEET 34

MATCH LINE STA. 700+00

691+00

692+00

693+00

694+00

695+00

696+00

697+00

698+00

699+00

700+00

701+00

702+00

S=10:1

STABILITY TOE BERM SLOPE VARIES

TEMPORARY PUBLIC ROAD PREVIOUSLY CONSTRUCTED

TOE +15' LIMIT OF A.C.O.E. EASEMENT

APPROXIMATE TOE OF COMPACTED EMBANKMENT ON PREVIOUSLY CONSTRUCTED TEMPORARY PUBLIC ROAD

690+00

689+00

688+00

687+00

686+00

685+00

684

TOWER

APN: 158-0080-001-0000
U.S. BUREAU OF RECLAMATION

APN: 158-0080-008-0000
STATE OF CALIFORNIA

PLAN
0' 50' 100'

LEGEND:
- EXISTING INCLINOMETER – PROTECT IN PLACE
- EXISTING INCLINOMETER – MODIFY AS DIRECTED
- EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- NEW PIEZOMETER – TO BE INSTALLED BY ENGINEER
- E — APPROXIMATE NEW OVERHEAD UTILITY POLE ALIGNMENT
- APPROXIMATE BURIED ELECTRICAL TRENCH ALIGNMENT
- APPROXIMATE PARCEL BOUNDARY

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:

1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 25803 12/31/14 CIVIL STATE OF CALIFORNIA

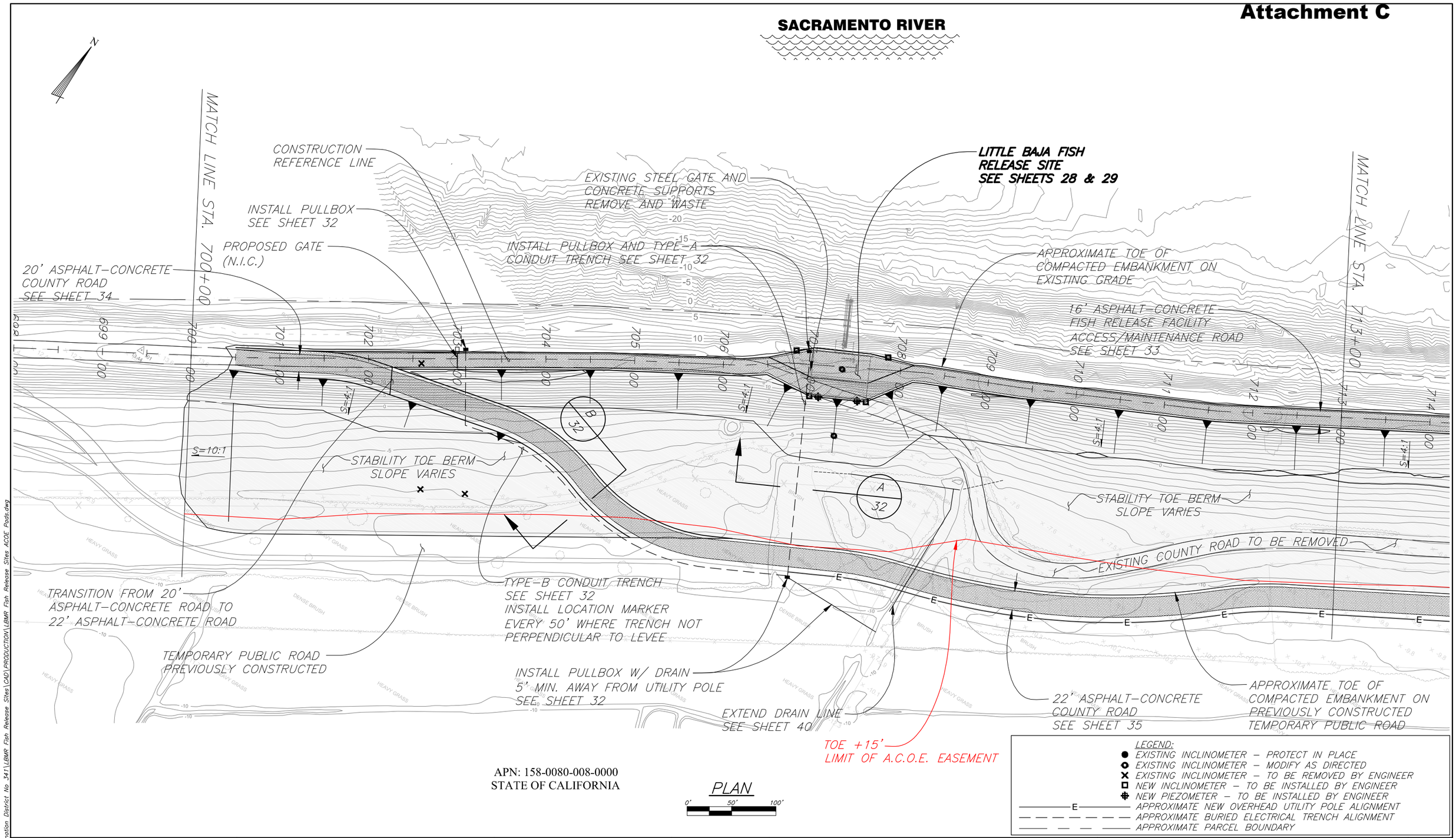
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN
STATIONS 687+00 - 700+00

SHEET 16 OF 45 SHEETS

Attachment C



APN: 158-0080-008-0000
STATE OF CALIFORNIA

PLAN
0' 50' 100'

LEGEND:
- EXISTING INCLINOMETER – PROTECT IN PLACE
- EXISTING INCLINOMETER – MODIFY AS DIRECTED
- EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
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- E — APPROXIMATE NEW OVERHEAD UTILITY POLE ALIGNMENT
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- APPROXIMATE PARCEL BOUNDARY

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:
1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.
2) BATHYMETRIC TOPOGRAPHY FROM DEPARTMENT OF WATER RESOURCES, SURVEYED MARCH 2014

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 12/31/14 CIVIL STATE OF CALIFORNIA

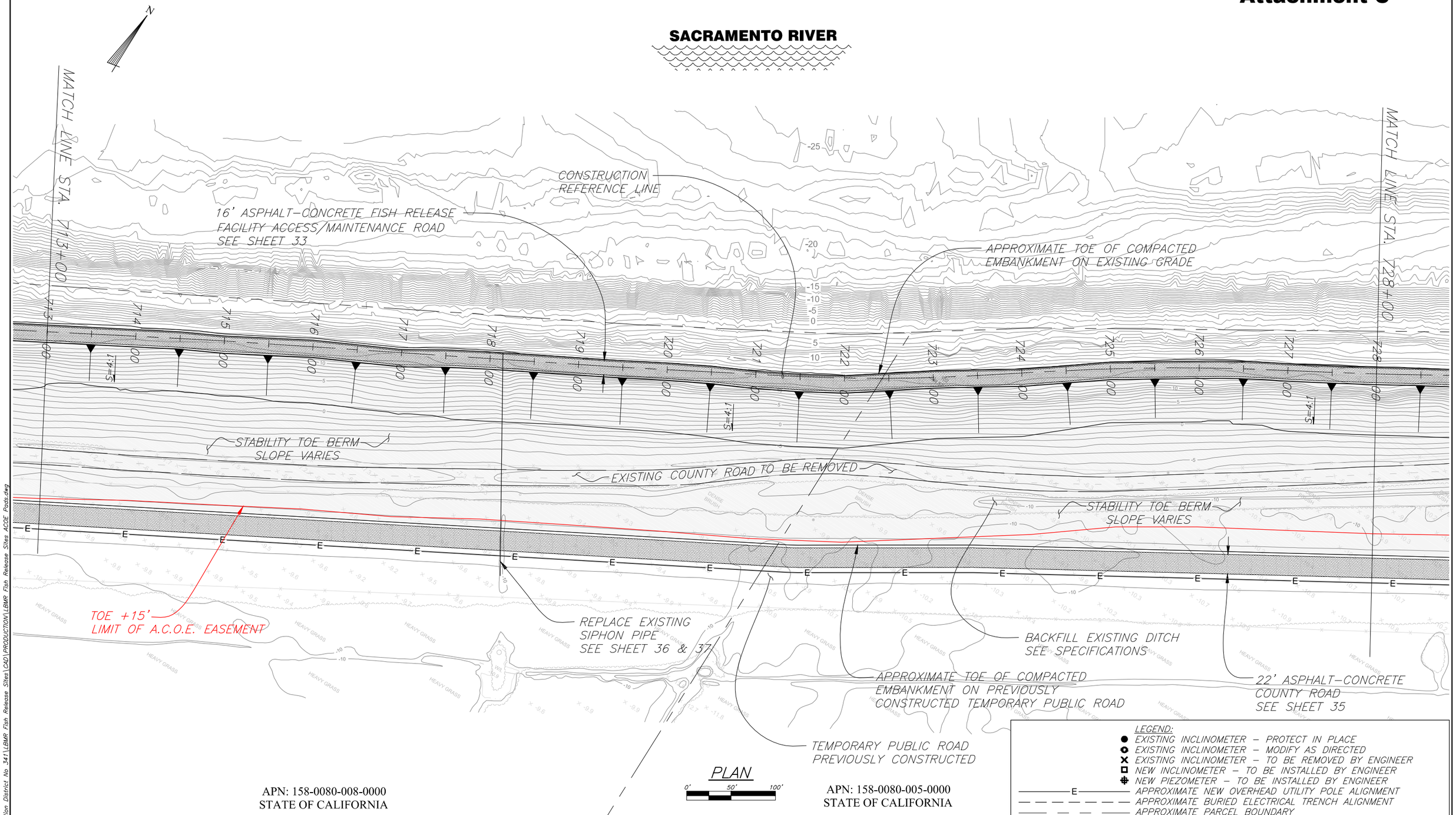
DRAFT

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN
STATIONS 700+00 - 713+00

SHEET 17 OF 45 SHEETS



PLAN

0' 50' 100'

APN: 158-0080-008-0000
STATE OF CALIFORNIA

APN: 158-0080-005-0000
STATE OF CALIFORNIA

LEGEND:
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File Name: LBMR Fish Release Sites ACOE Podsdwg
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Approved By	R.C. WAGNER
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DRAFT 12/31/14

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN
STATIONS 713+00 - 728+00

SHEET 18 OF 45 SHEETS

Attachment C

N

MANZO RANCH
FISH RELEASE SITE
SEE SHEET 30 & 31

SACRAMENTO RIVER

MATCH LINE STA. 728+00

MATCH LINE STA. 743+00

EXISTING STEEL GATE AND CONCRETE SUPPORTS REMOVE AND WASTE

CONSTRUCTION REFERENCE LINE

16' ASPHALT-CONCRETE FISH RELEASE FACILITY ACCESS/MAINTENANCE ROAD SEE SHEET 33

PULLBOX AND TYPE-A CONDUIT TRENCH SEE SHEET 32

APPROXIMATE TOE OF COMPACTED EMBANKMENT ON EXISTING GRADE

INSTALL PULLBOX SEE SHEET 32

PROPOSED GATE (N.I.C.)

20' ASPHALT-CONCRETE COUNTY ROAD SEE SHEET 34

EXISTING PUBLIC ROAD TO BE REMOVED

STABILITY TOE BERM SLOPE VARIES

STABILITY TOE BERM SLOPE VARIES

S=4:1

S=4:1

S=10:1

A
32

B
32

TYPE-B CONDUIT TRENCH SEE SHEET 32 INSTALL LOCATION MARKER EVERY 50' WHERE TRENCH NOT PERPENDICULAR TO LEVEE

TRANSITION FROM 20' ASPHALT-CONCRETE ROAD TO 22' ASPHALT-CONCRETE ROAD

18"ø C.M.P. INSTALL BENEATH ROAD AS DIRECTED

22' ASPHALT-CONCRETE COUNTY ROAD SEE SHEET 35

INSTALL PULLBOX W/ DRAIN 5' MIN. AWAY FROM UTILITY POLE SEE SHEET 32

EXTEND EXISTING SIPHON SEE SHEET 38

CONSTRUCT NEW UTILITY MAINTENANCE ROAD SEE DETAIL, SHEET 35

TOE +15'
LIMIT OF A.C.O.E. EASEMENT

BACKFILL EXISTING DITCH SEE SPECIFICATIONS

APPROXIMATE TOE OF COMPACTED EMBANKMENT ON PREVIOUSLY CONSTRUCTED TEMPORARY PUBLIC ROAD

PLAN
0' 50' 100'

APN: 158-0080-005-0000
STATE OF CALIFORNIA

LEGEND:
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Approved By	R.C. WAGNER
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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 23903 12/31/14 CIVIL STATE OF CALIFORNIA

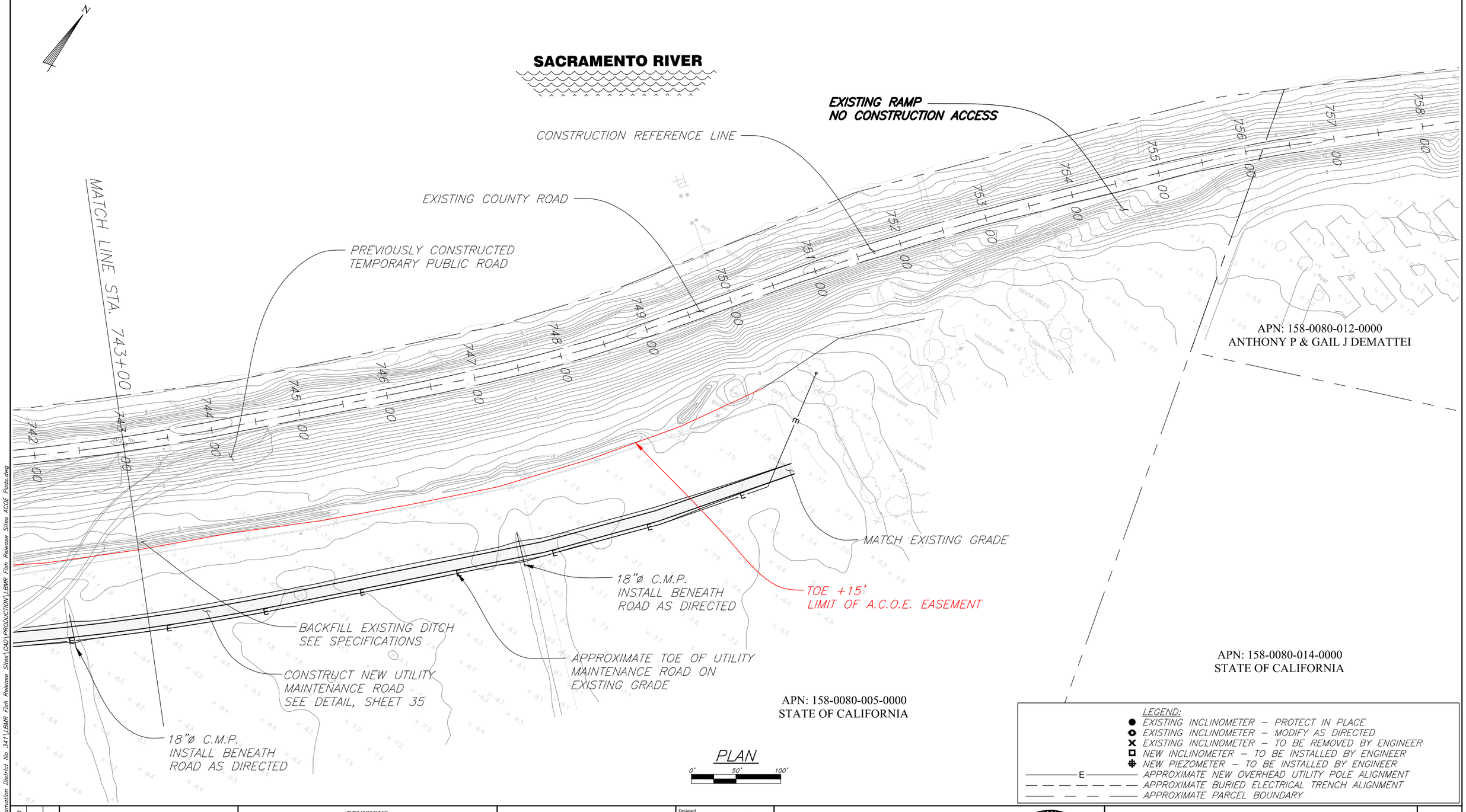
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN
STATIONS 728+00 - 743+00

SHEET 19 OF 45 SHEETS

Attachment C



H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

NOTES:

1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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REVISIONS

REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
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Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 23903 CIVIL STATE OF CALIFORNIA 12/31/14

DRAFT

RECLAMATION DISTRICT NO. 341

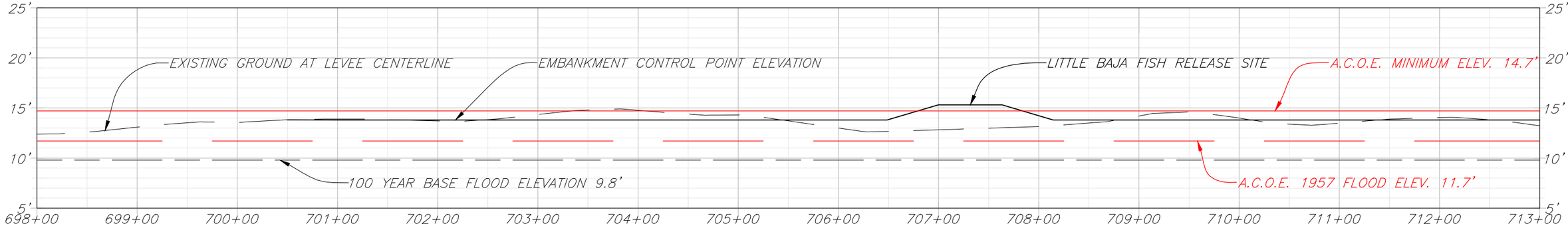
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN
STATIONS 743+00 - 758+00

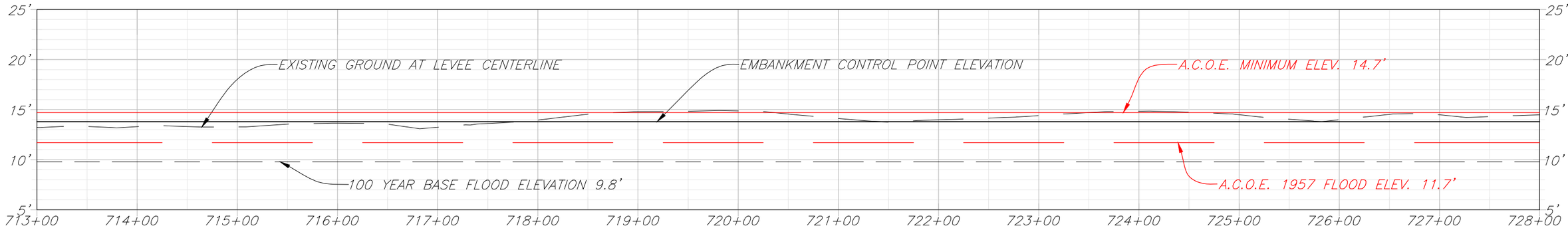
SHEET 20 OF 45 SHEETS

Attachment C

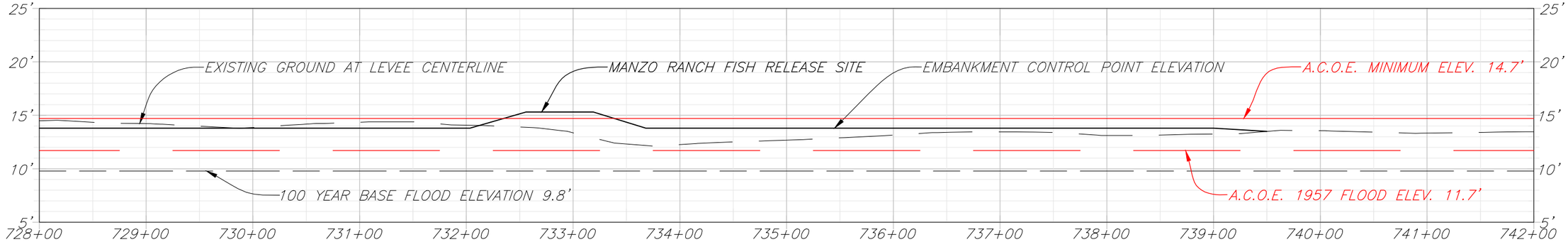
LEVEE PROFILE
STA. 698+00 TO STA. 713+00



LEVEE PROFILE
STA. 713+00 TO STA. 728+00



LEVEE PROFILE
STA. 728+00 TO STA. 742+00



PROFILES

HORIZ. SCALE: 0' 50' 100'

VERT. SCALE: 0' 5' 10'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
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Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 25093 CIVIL 12/31/14 STATE OF CALIFORNIA

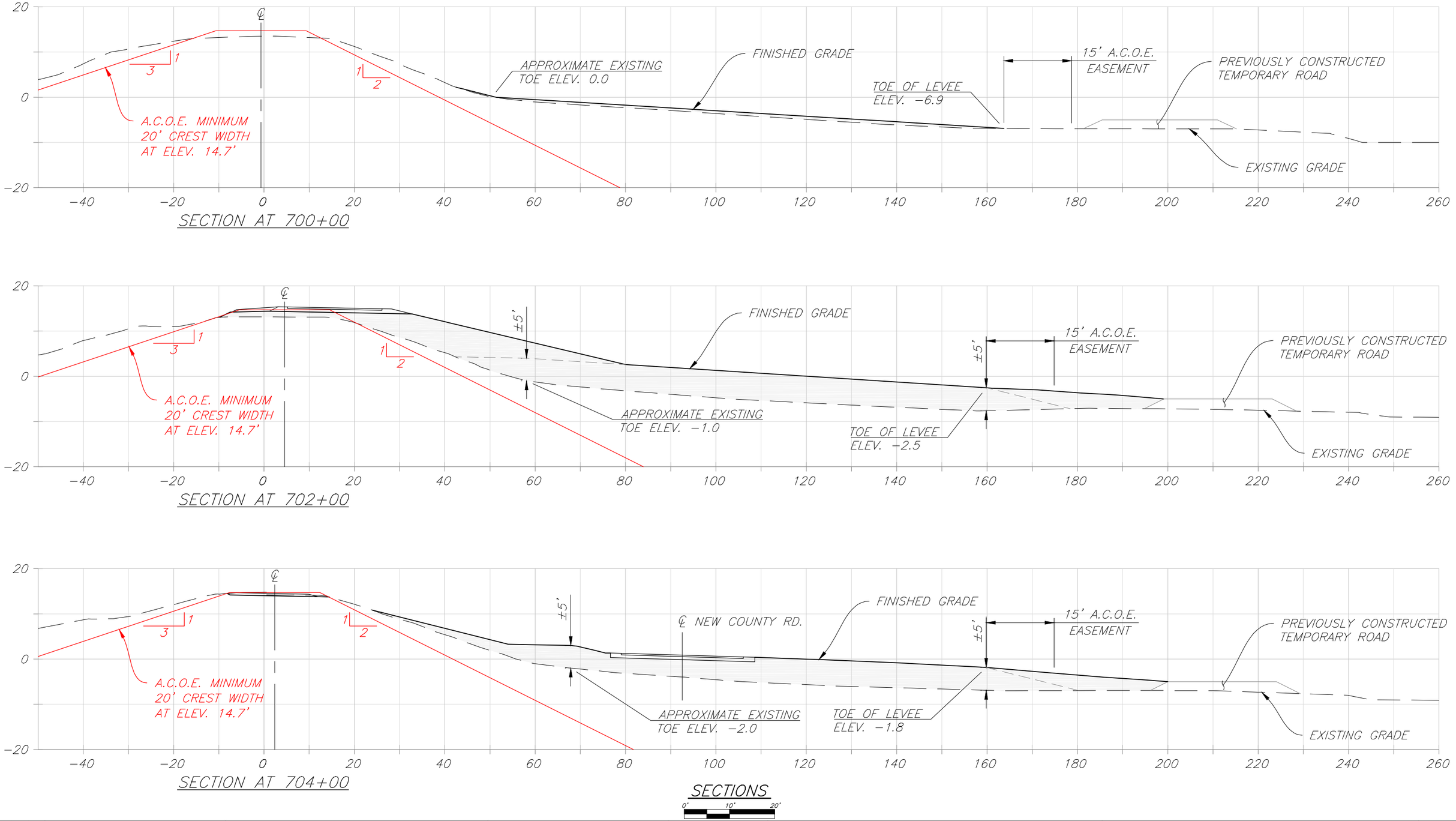
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PROFILES

SHEET 21 OF 45 SHEETS

Attachment C



SECTIONS

0' 10' 20'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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PRELIMINARY
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Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 29303 12/31/14 CIVIL STATE OF CALIFORNIA

DRAFT

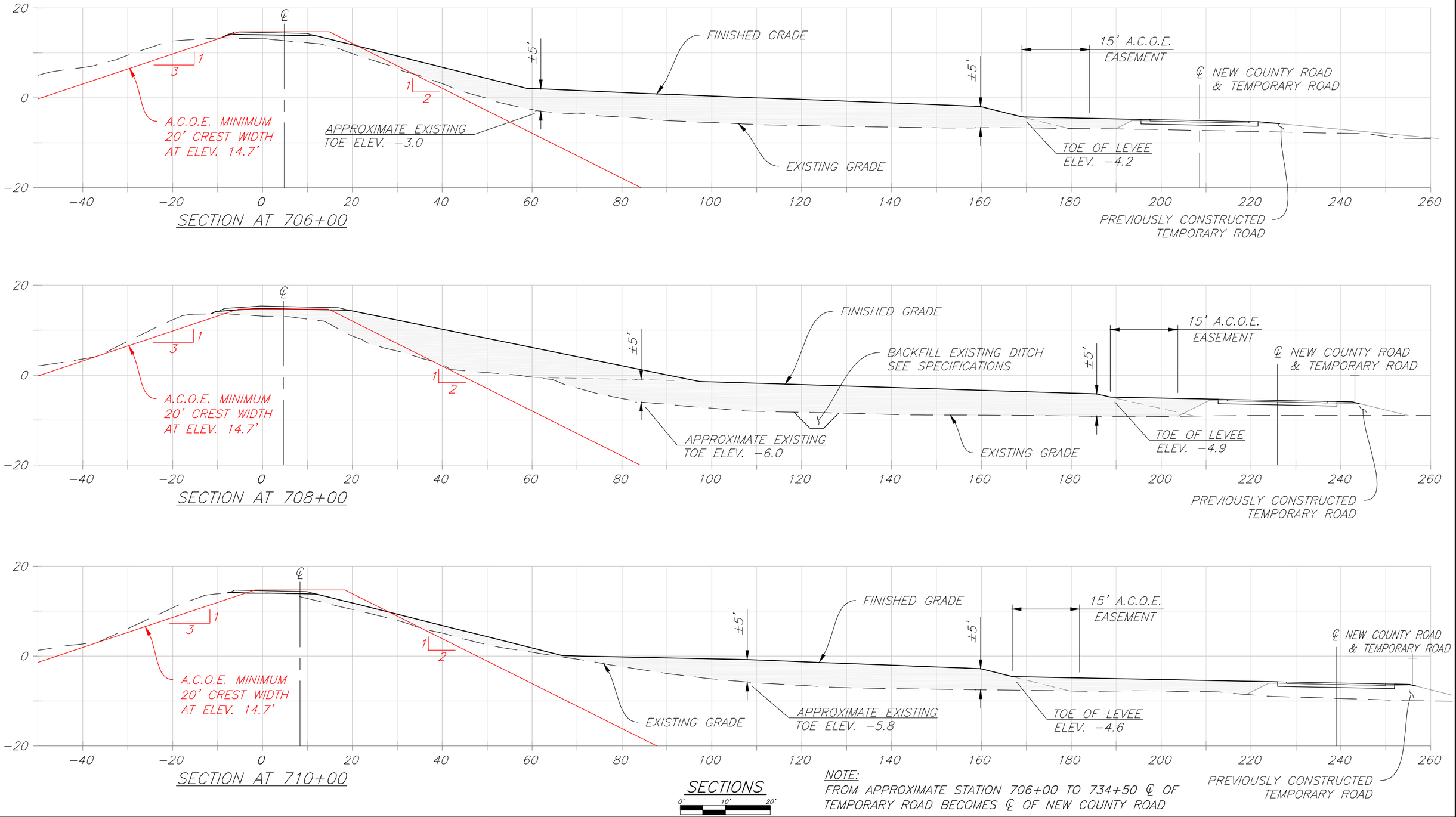
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

CROSS SECTIONS
STATIONS 700+00 - 704+00

SHEET 22 OF 45 SHEETS

Attachment C



SECTIONS
0' 10' 20'

NOTE:
FROM APPROXIMATE STATION 706+00 TO 734+50 ℄ OF TEMPORARY ROAD BECOMES ℄ OF NEW COUNTY ROAD

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

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Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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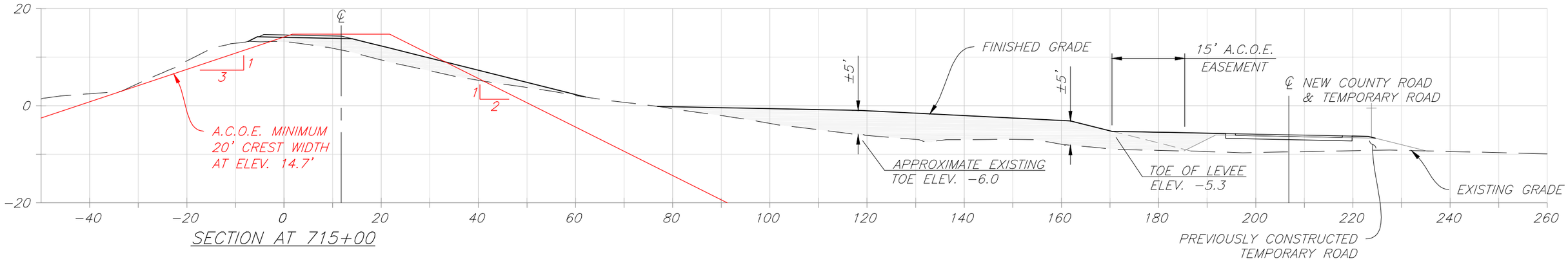
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

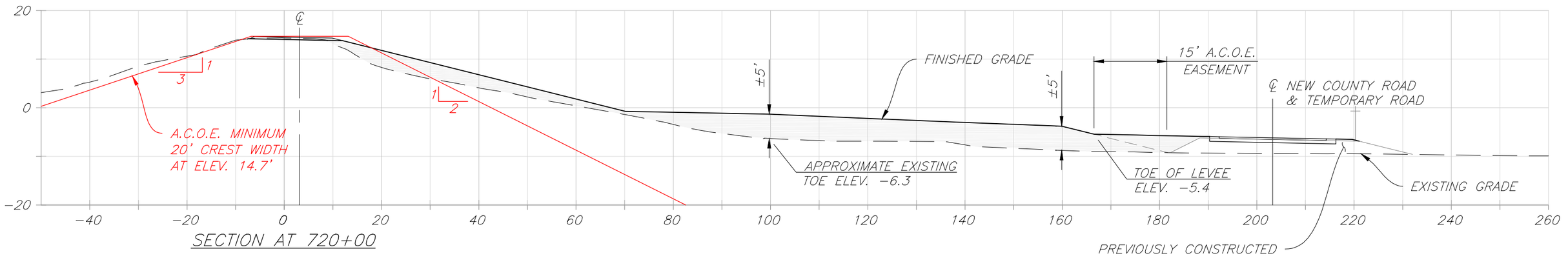
CROSS SECTIONS
STATIONS 706+00 - 710+00

SHEET 23 OF 45 SHEETS

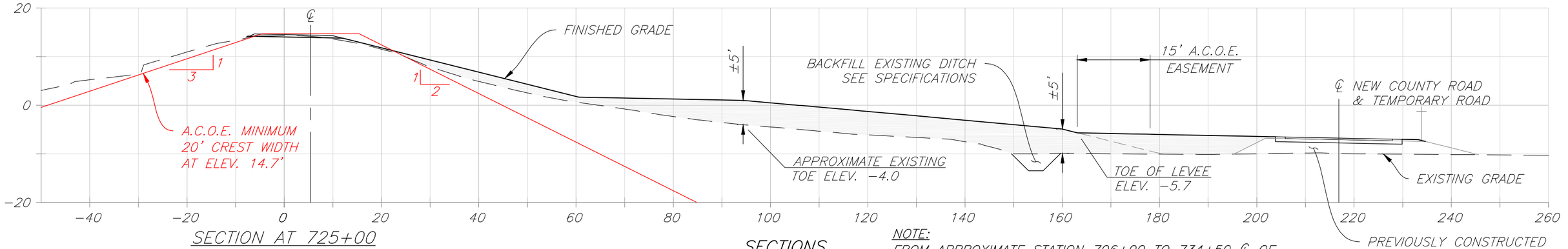
Attachment C



SECTION AT 715+00



SECTION AT 720+00



SECTION AT 725+00

SECTIONS

0' 10' 20'

NOTE:
FROM APPROXIMATE STATION 706+00 TO 734+50 ℄ OF TEMPORARY ROAD BECOMES ℄ OF NEW COUNTY ROAD

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
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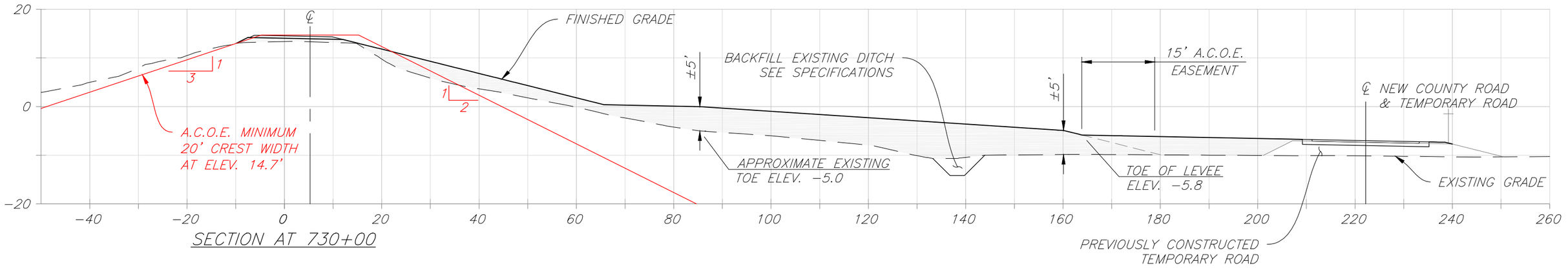
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

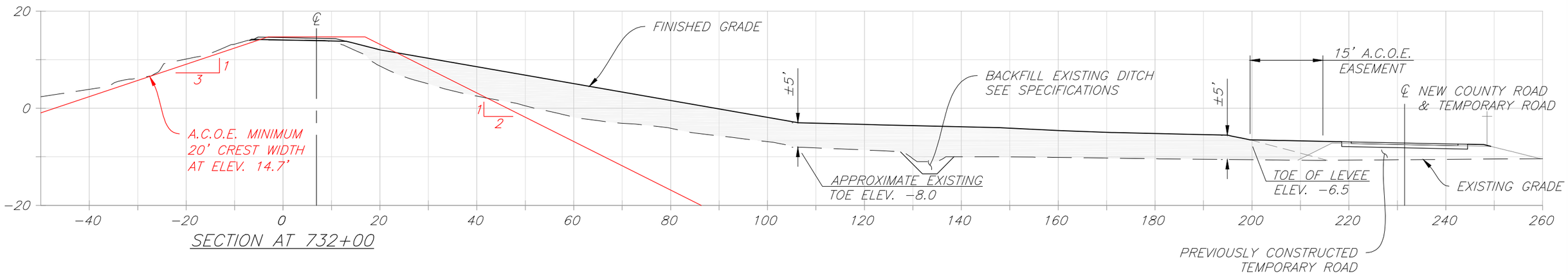
CROSS SECTIONS
STATIONS 715+00 - 725+00

SHEET 24 OF 45 SHEETS

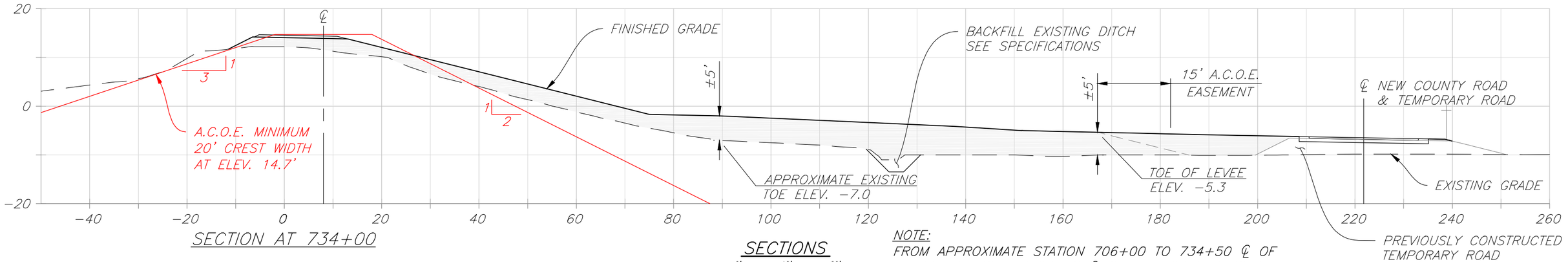
Attachment C



SECTION AT 730+00



SECTION AT 732+00



SECTION AT 734+00

SECTIONS

0' 10' 20'

NOTE:
FROM APPROXIMATE STATION 706+00 TO 734+50 ℄ OF TEMPORARY ROAD BECOMES ℄ OF NEW COUNTY ROAD

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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STATE OF CALIFORNIA

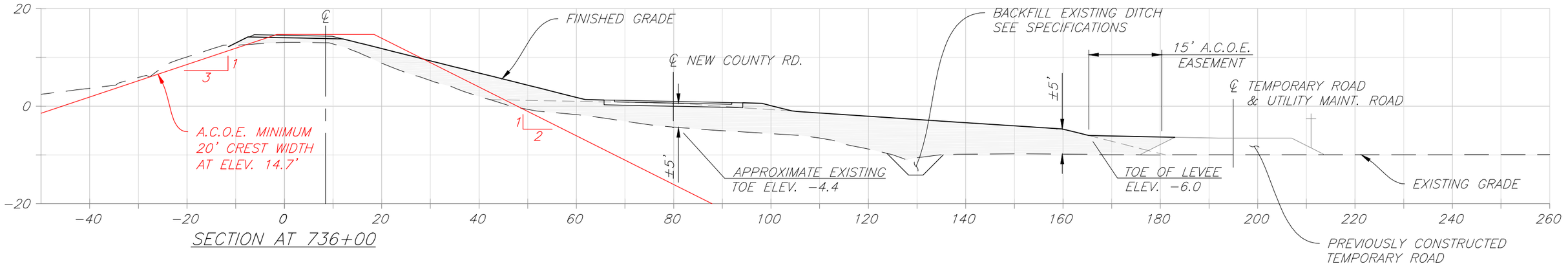
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

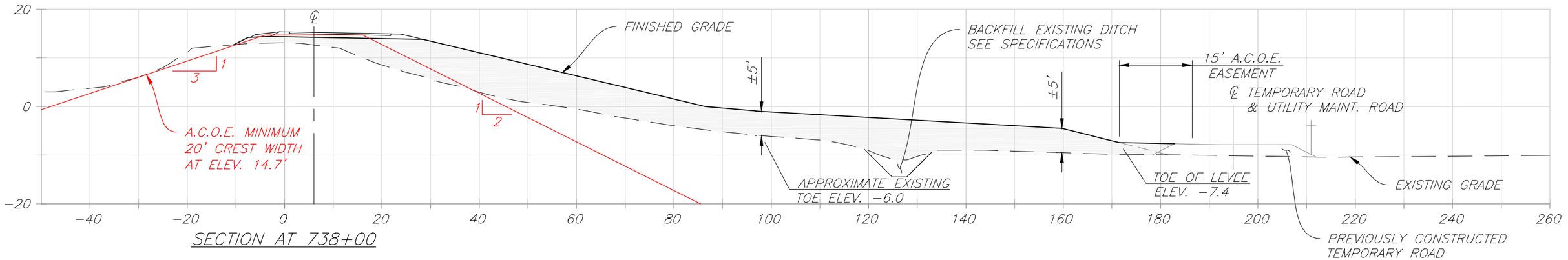
CROSS SECTIONS
STATIONS 730+00 - 734+00

SHEET 25 OF 45 SHEETS

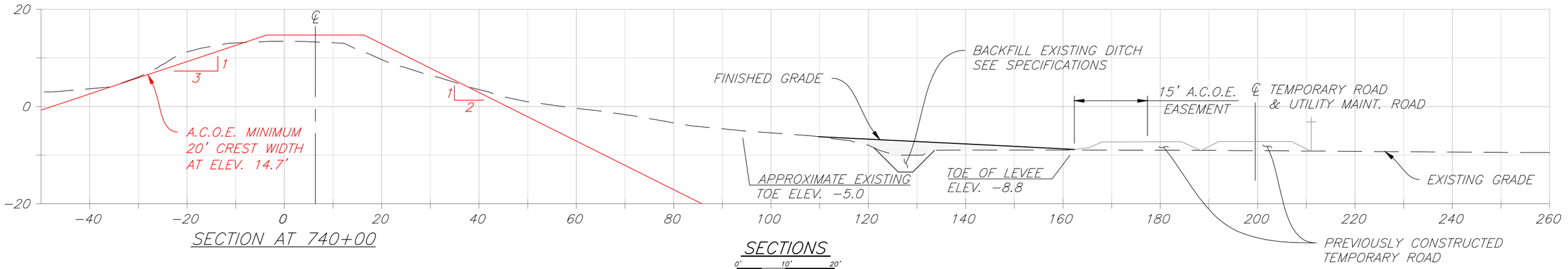
Attachment C



SECTION AT 736+00



SECTION AT 738+00



SECTION AT 740+00

SECTIONS

0' 10' 20'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
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Designed By	S.R. HERINGER
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Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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STATE OF CALIFORNIA

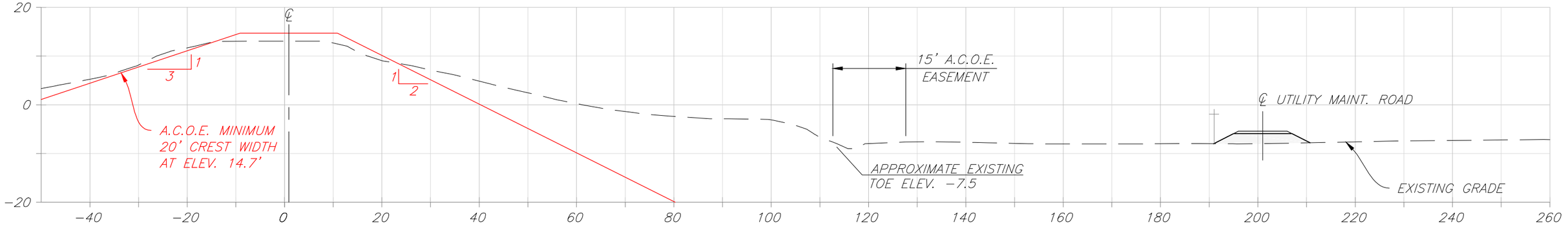
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

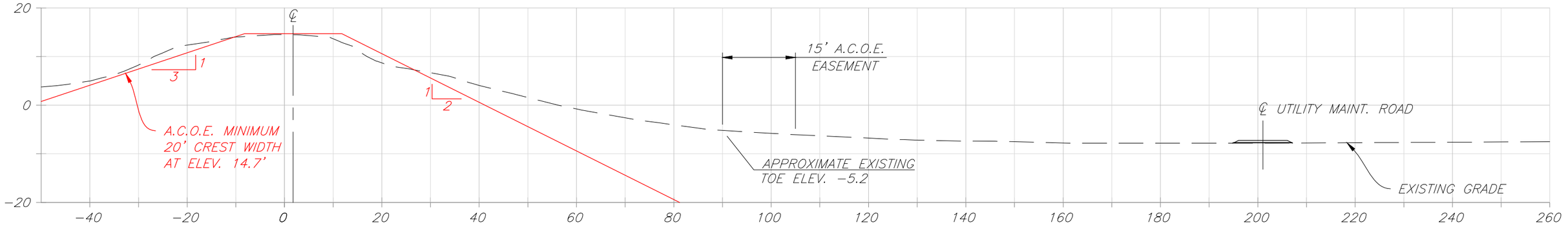
CROSS SECTIONS
STATIONS 736+00 - 740+00

SHEET 26 OF 45 SHEETS

Attachment C



SECTION AT 745+00



SECTION AT 750+00

SECTIONS

0' 10' 20'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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REVISIONS

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PRELIMINARY
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Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
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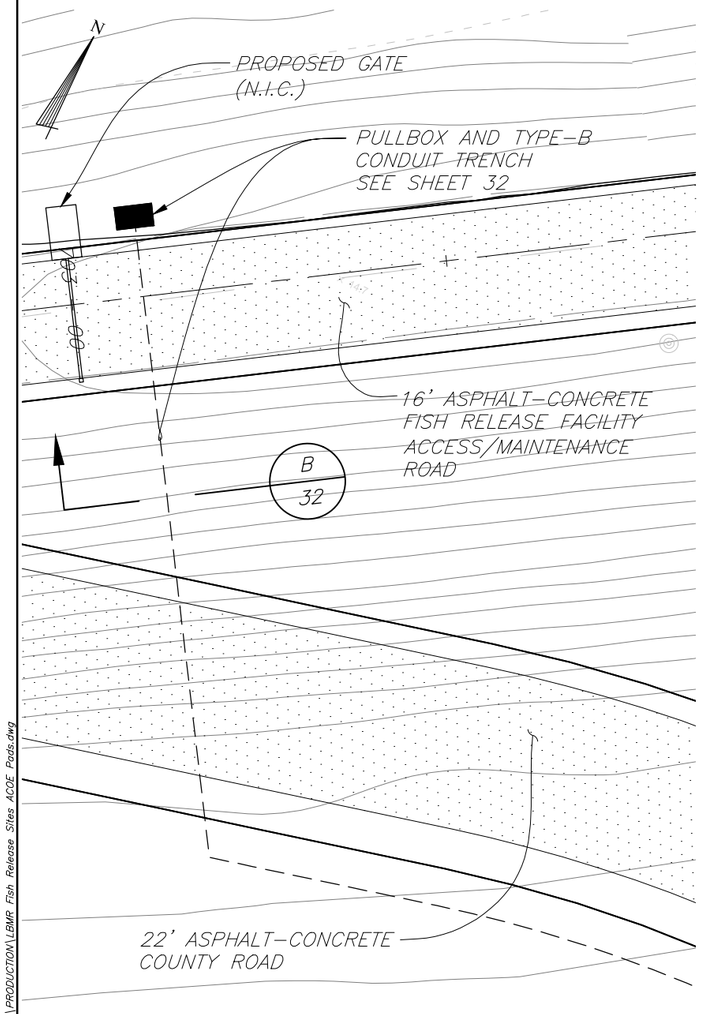
REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 25893
12/31/14
CIVIL
STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341

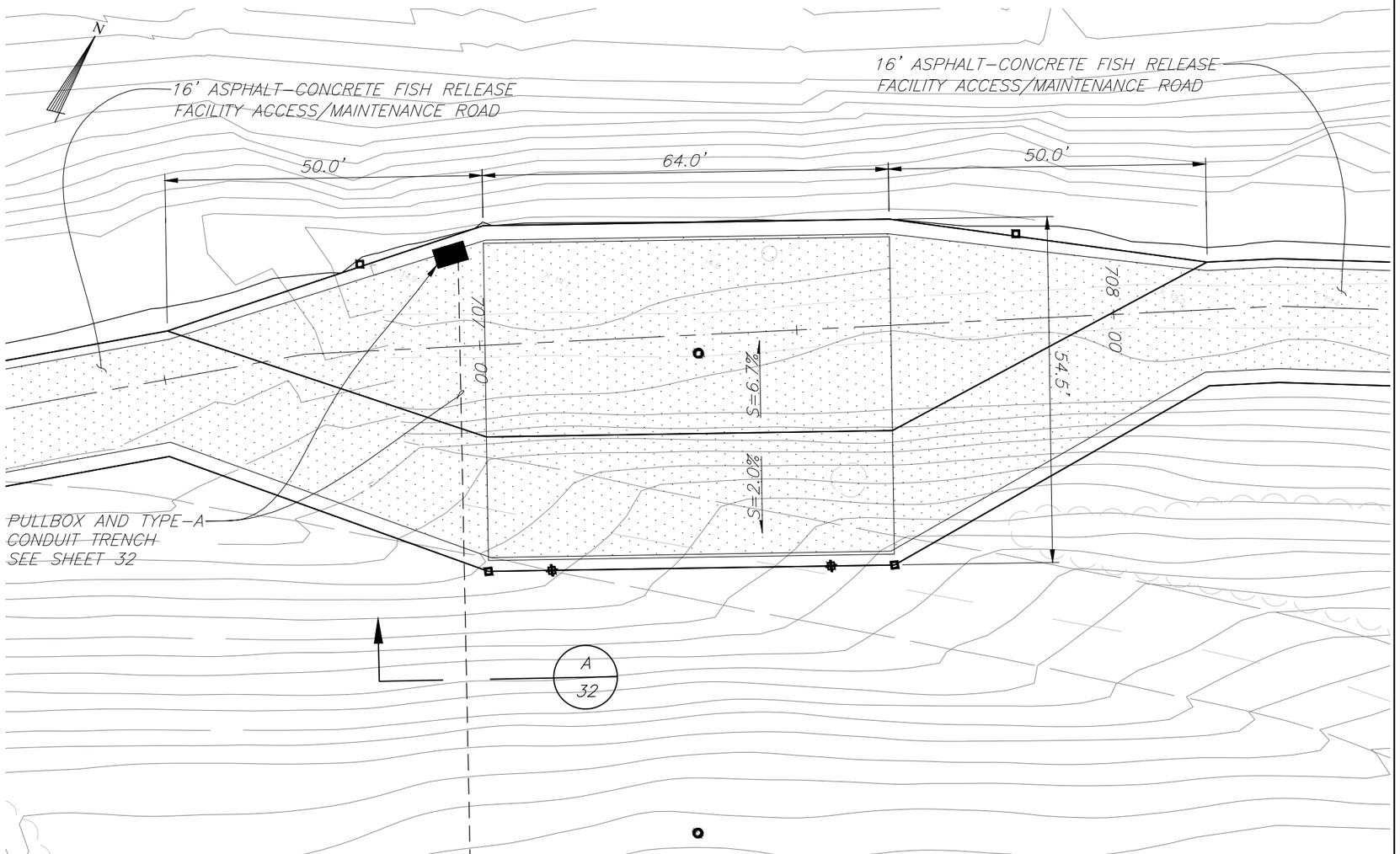
SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

CROSS SECTIONS
STATIONS 745+00 - 750+00

SHEET 27 OF 45 SHEETS



PLAN
LITTLE BAJA ACCESS GATE
0' 10' 20'



PLAN
LITTLE BAJA FISH RELEASE PAD
0' 10' 20'

LEGEND:
- ● EXISTING INCLINOMETER – PROTECT IN PLACE
- ⊙ EXISTING INCLINOMETER – MODIFY AS DIRECTED
- ✕ EXISTING INCLINOMETER – TO BE REMOVED BY ENGINEER
- □ NEW INCLINOMETER – TO BE INSTALLED BY ENGINEER
- ⊞ NEW PIEZOMETER – TO BE INSTALLED BY ENGINEER

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Pads.dwg
Plot Date: 11/24/2014
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NOT FOR CONSTRUCTION

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Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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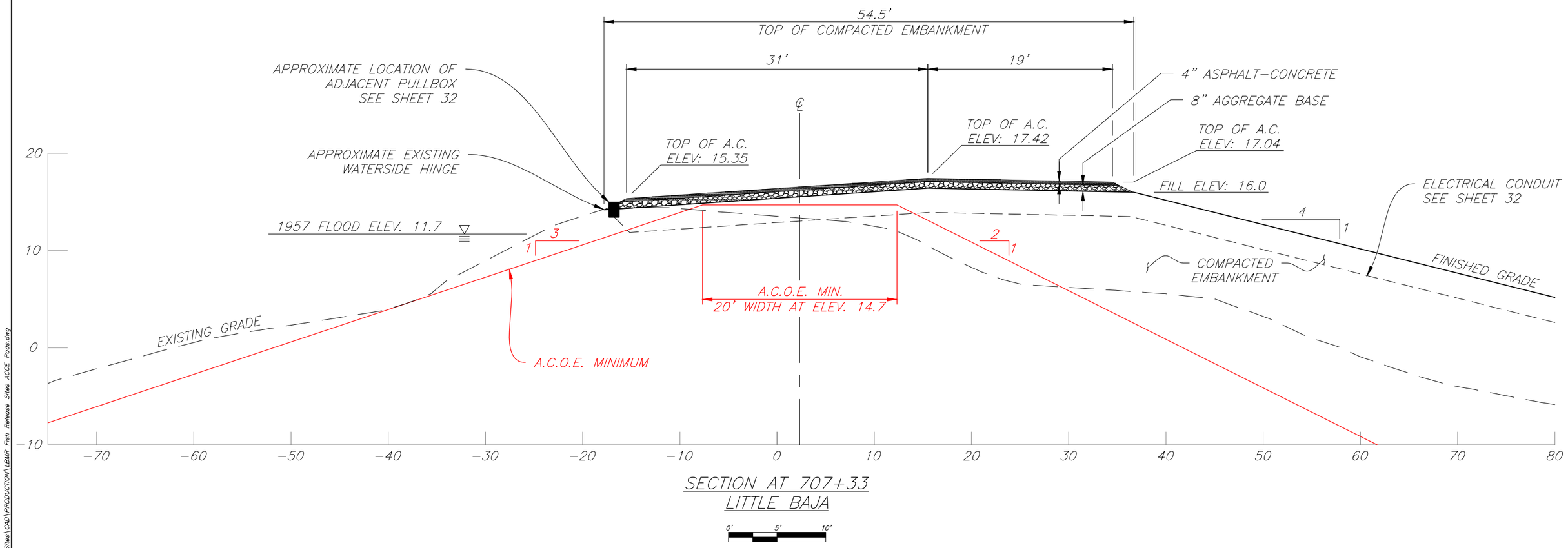
REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 23033
11/24/14
CIVIL
STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN - LITTLE BAJA ACCESS GATE &
PLAN - LITTLE BAJA FISH RELEASE PAD

SHEET 28 OF 45 SHEETS



SECTION AT 707+33
LITTLE BAJA

0' 5' 10'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

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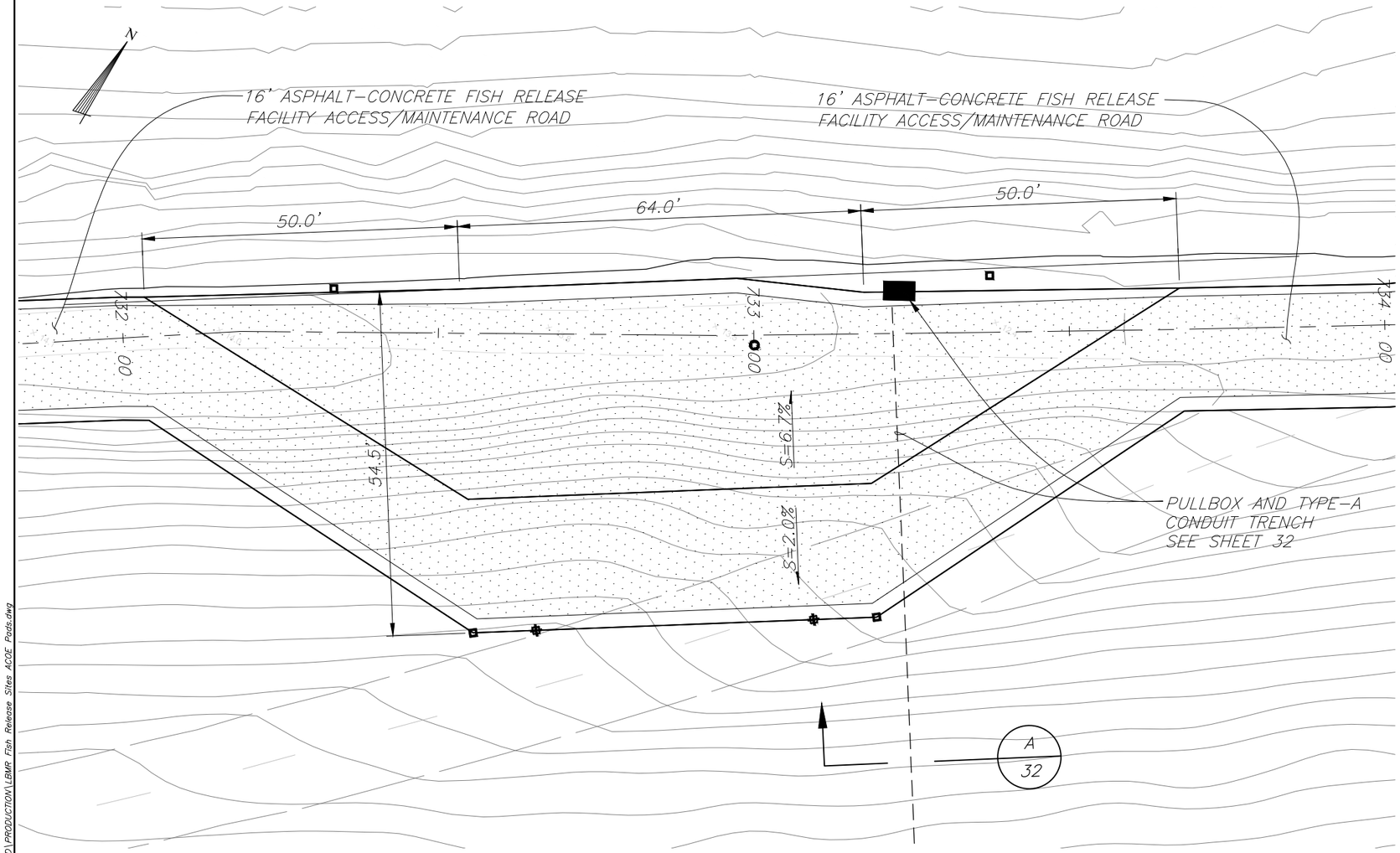
Wagner&Bonsignore
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REGISTERED PROFESSIONAL ENGINEER
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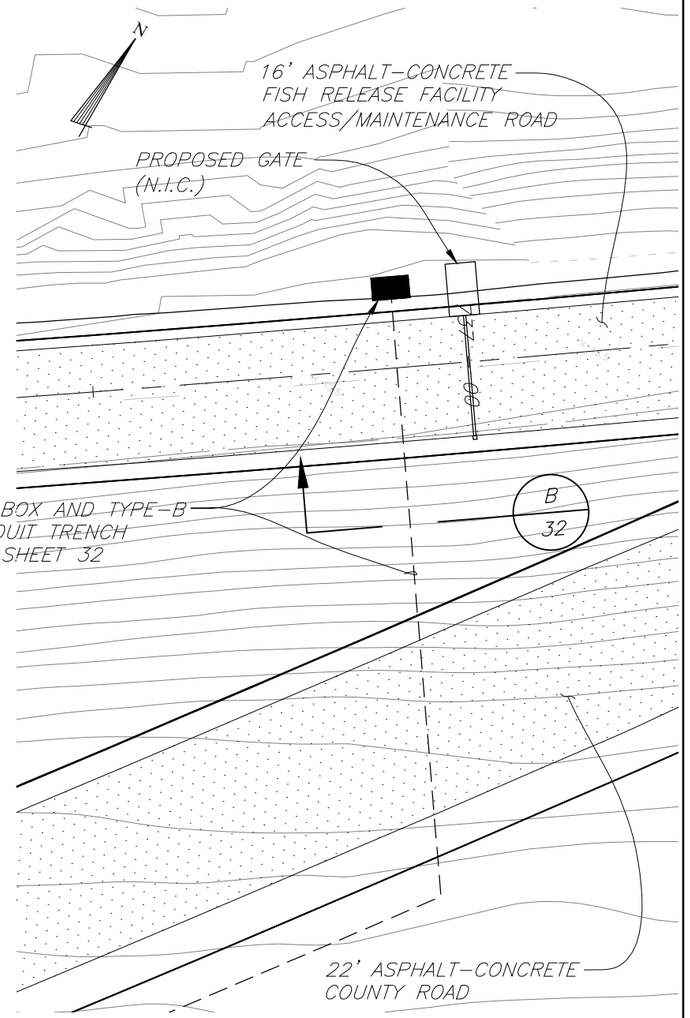
RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
SECTION AT 707+33, LITTLE BAJA

SHEET 29 OF 45 SHEETS

Attachment C



PLAN
MANZO RANCH FISH RELEASE PAD
0' 10' 20'



PLAN
MANZO RANCH ACCESS GATE
0' 10' 20'

LEGEND:
- EXISTING INCLINOMETER - PROTECT IN PLACE
- EXISTING INCLINOMETER - MODIFY AS DIRECTED
- EXISTING INCLINOMETER - TO BE REMOVED BY ENGINEER
- NEW INCLINOMETER - TO BE INSTALLED BY ENGINEER
- NEW PIEZOMETER - TO BE INSTALLED BY ENGINEER

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

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Plot Date: 11/24/2014
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Approved By	R.C. WAGNER
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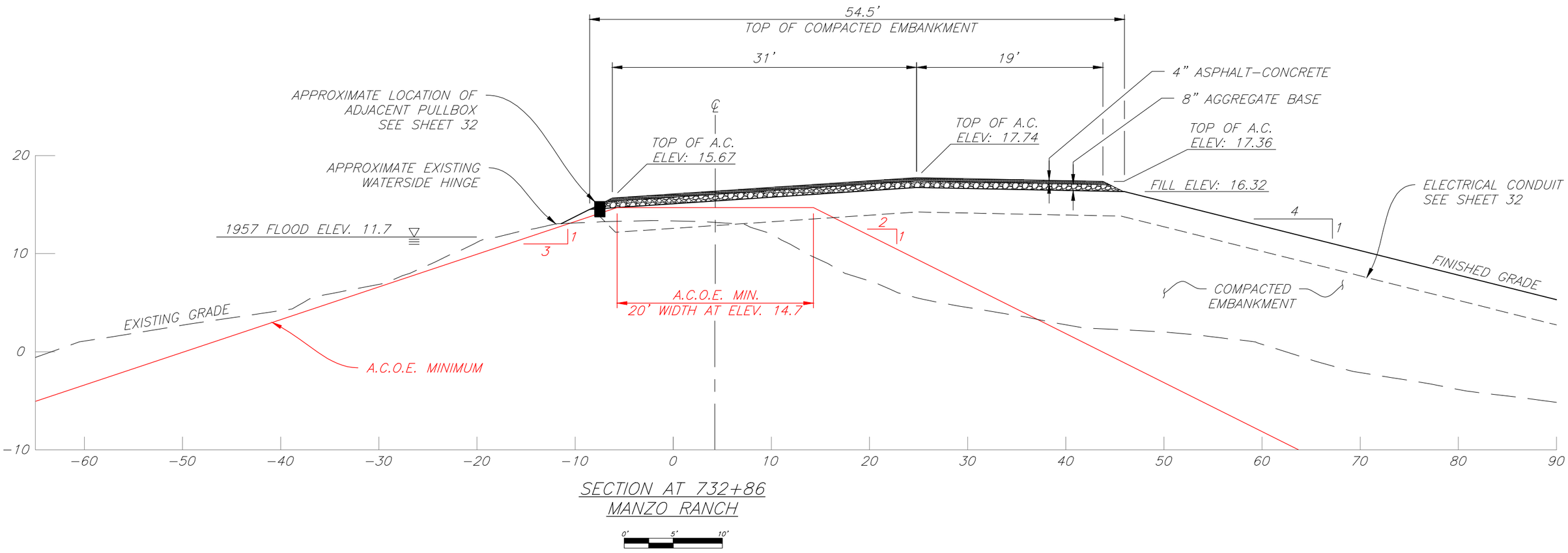
REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 Exp. 12/31/14 CIVIL STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PLAN - MANZO RANCH ACCESS GATE &
PLAN - MANZO RANCH FISH RELEASE PAD

SHEET 30 OF 45 SHEETS



SECTION AT 732+86
MANZO RANCH

0' 5' 10'

H:\CH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg
File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

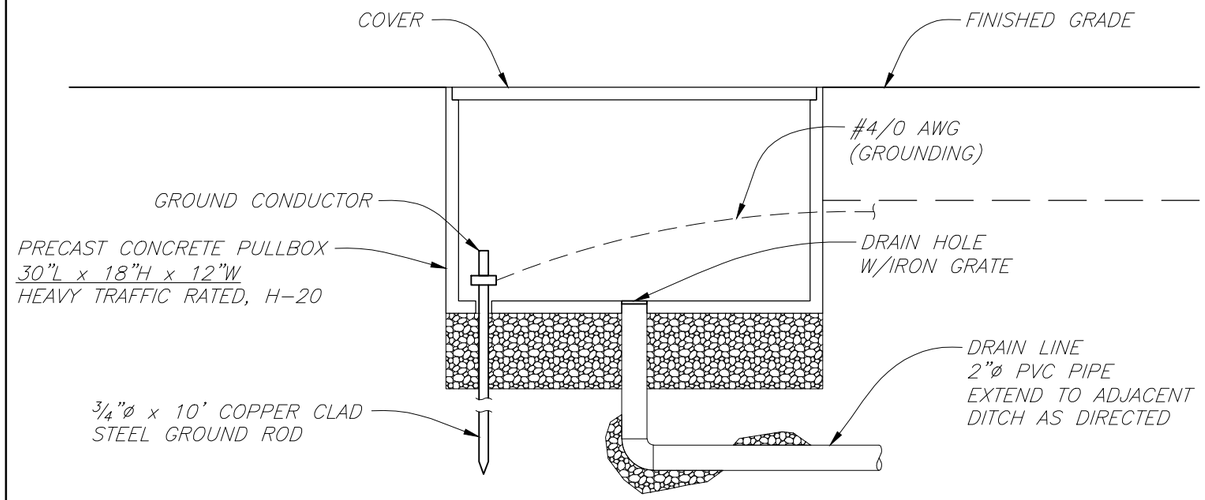
Wagner&Bonsignore
Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
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Fx: 916-779-3120

REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 12/31/14 CIVIL STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
SECTION AT 732+86, MANZO RANCH

SHEET 31 OF 45 SHEETS

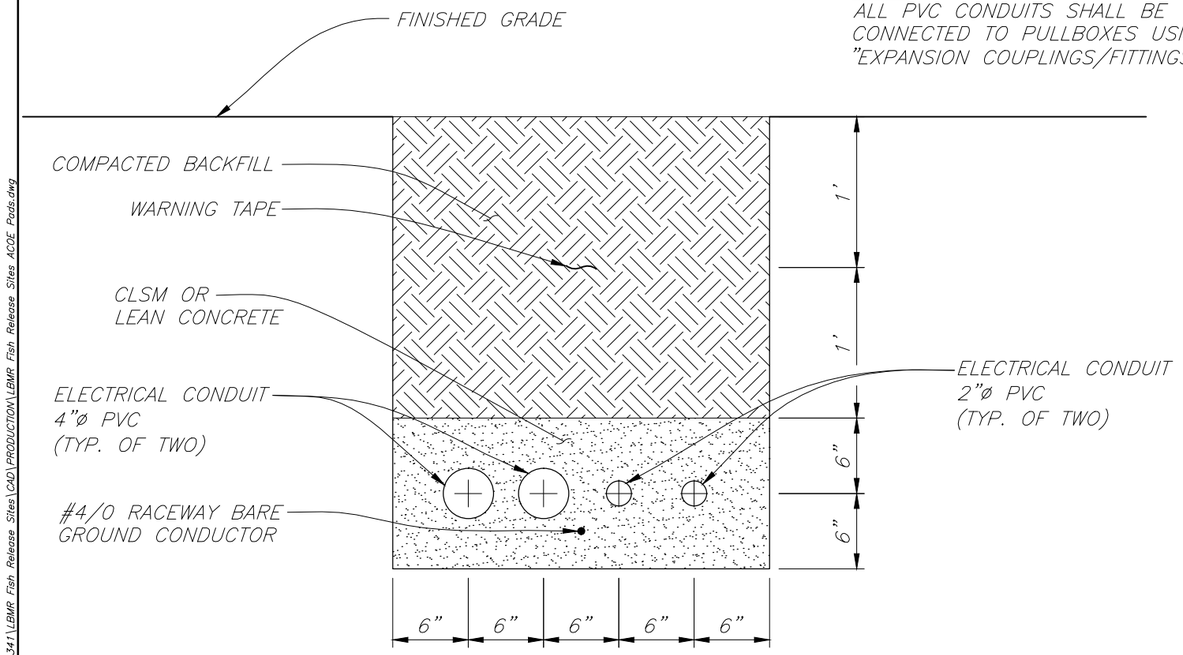
Attachment C



PULLBOX W/ DRAIN DETAIL

0' 0.5' 1'

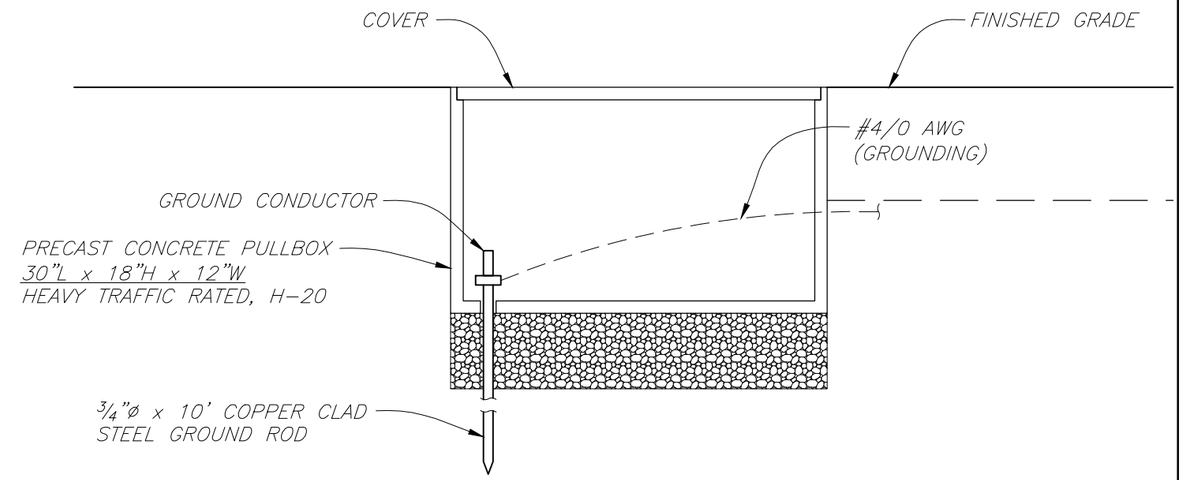
NOTE:
ALL PVC CONDUITS SHALL BE CONNECTED TO PULLBOXES USING "EXPANSION COUPLINGS/FITTINGS"



TYPE-A CONDUIT TRENCH SECTION

A
17,19
28,30

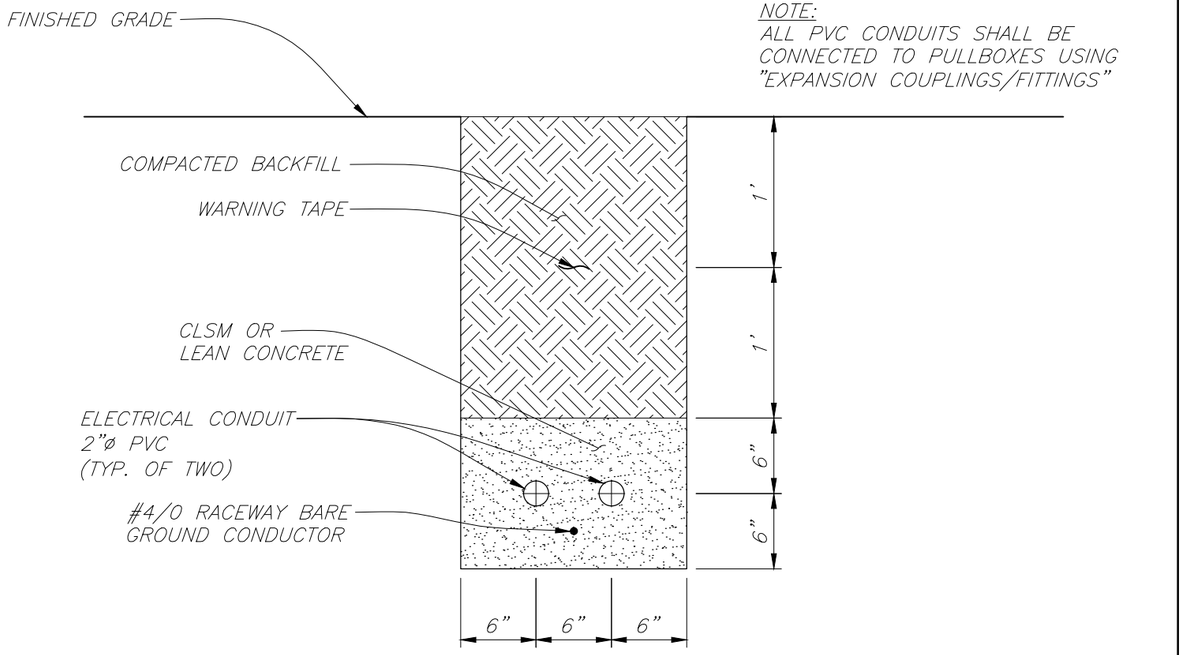
0' 0.5' 1'



PULLBOX DETAIL

0' 0.5' 1'

NOTE:
ALL PVC CONDUITS SHALL BE CONNECTED TO PULLBOXES USING "EXPANSION COUPLINGS/FITTINGS"



TYPE-B CONDUIT TRENCH SECTION

B
17,19
28,30

0' 0.5' 1'

H:\CH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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REVISIONS

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PRELIMINARY
NOT FOR CONSTRUCTION

Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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2151 River Plaza Drive
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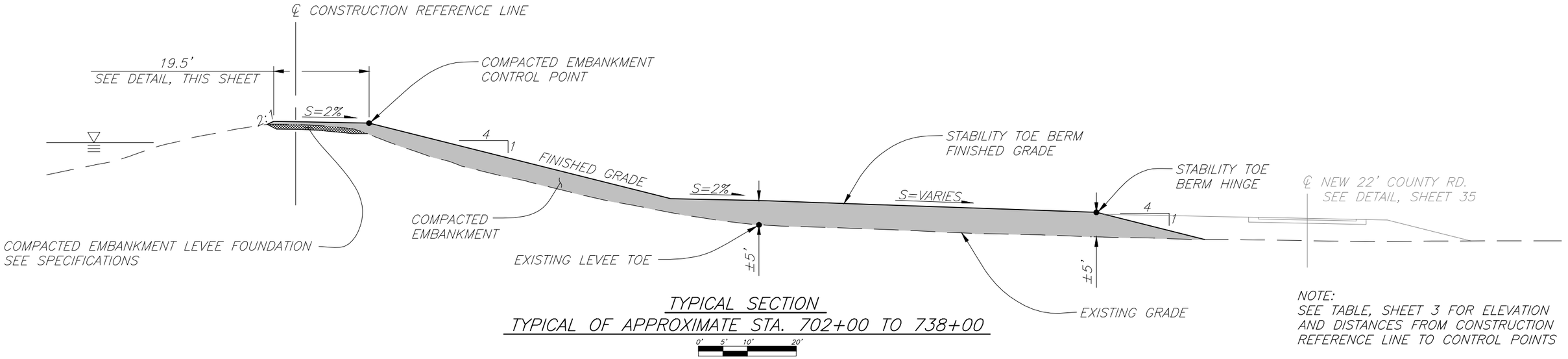
REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 42903
12/31/14
CIVIL
STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

PULLBOX DETAILS & CONDUIT TRENCH SECTIONS

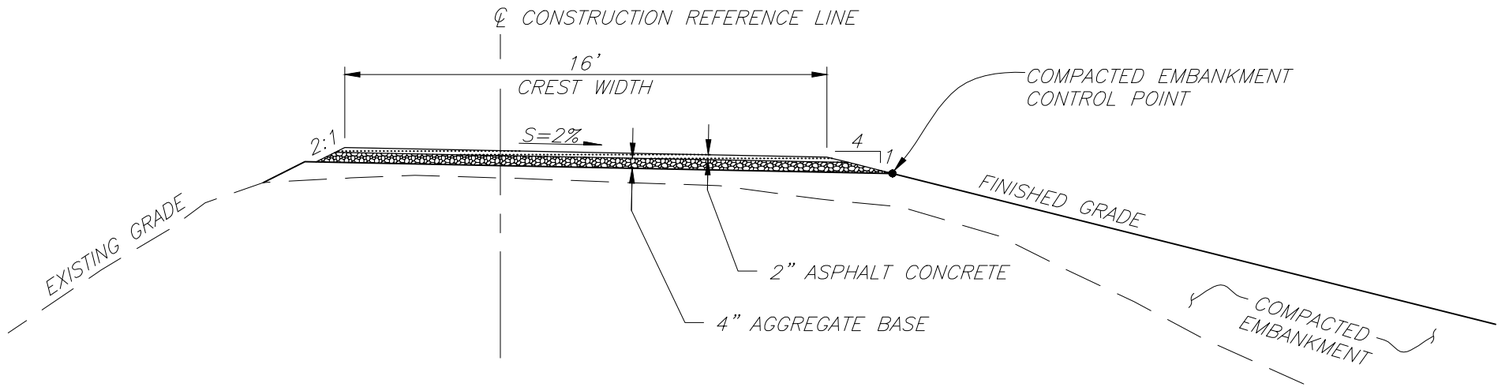
SHEET 32 OF 45 SHEETS



TYPICAL SECTION
TYPICAL OF APPROXIMATE STA. 702+00 TO 738+00

0' 5' 10' 20'

NOTE:
SEE TABLE, SHEET 3 FOR ELEVATION AND DISTANCES FROM CONSTRUCTION REFERENCE LINE TO CONTROL POINTS



16' ASPHALT-CONCRETE FISH RELEASE FACILITY
ACCESS/MAINTENANCE ROAD DETAIL

0' 2.5' 5'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
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REF.	DESCRIPTION	APVD.	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

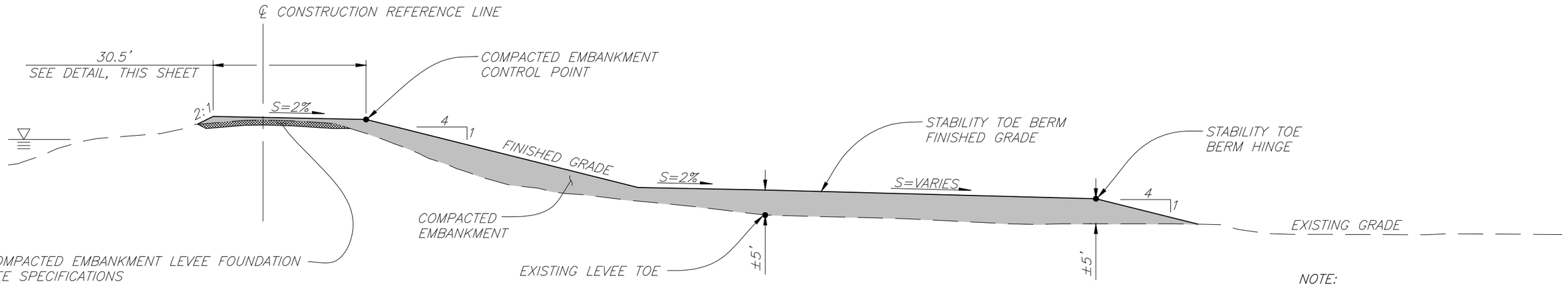
Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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STATE OF CALIFORNIA
DRAFT
7/31/14

RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
TYPICAL SECTION AND DETAIL
APPROXIMATE STA. 702+00 TO 738+00

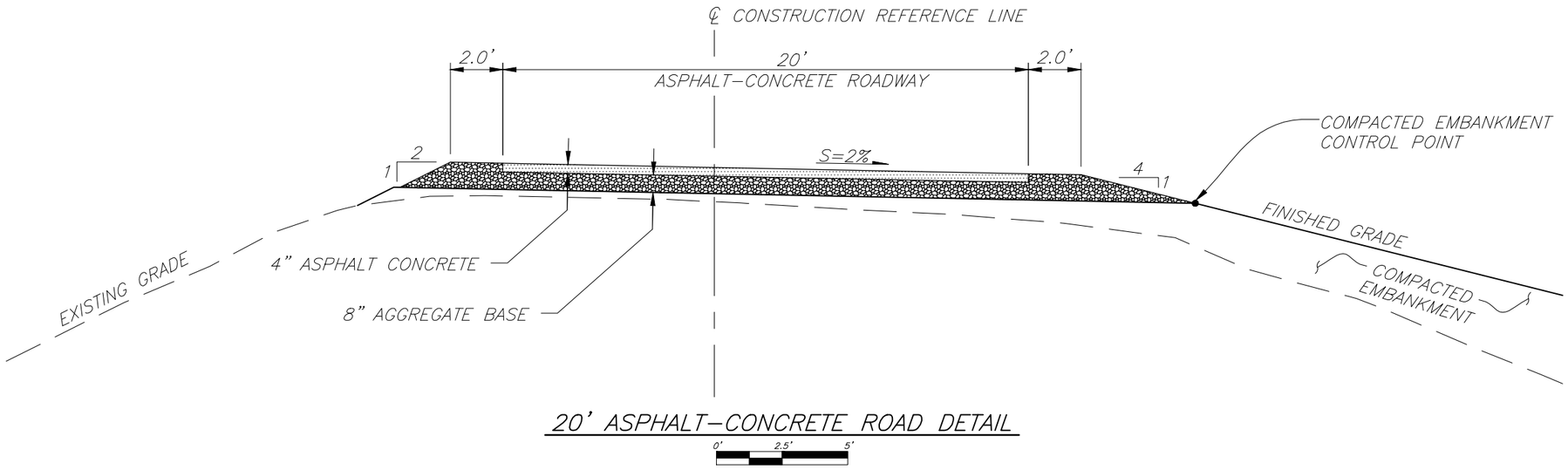
SHEET 33 OF 45 SHEETS



NOTE:
SEE TABLE, SHEET 3 FOR ELEVATION AND DISTANCES FROM CONSTRUCTION REFERENCE LINE TO CONTROL POINTS

TYPICAL SECTION
TYPICAL OF APPROXIMATE STA. 700+00 TO 702+00 & 738+00 TO 740+00

0' 5' 10' 20'



20' ASPHALT-CONCRETE ROAD DETAIL

0' 2.5' 5'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

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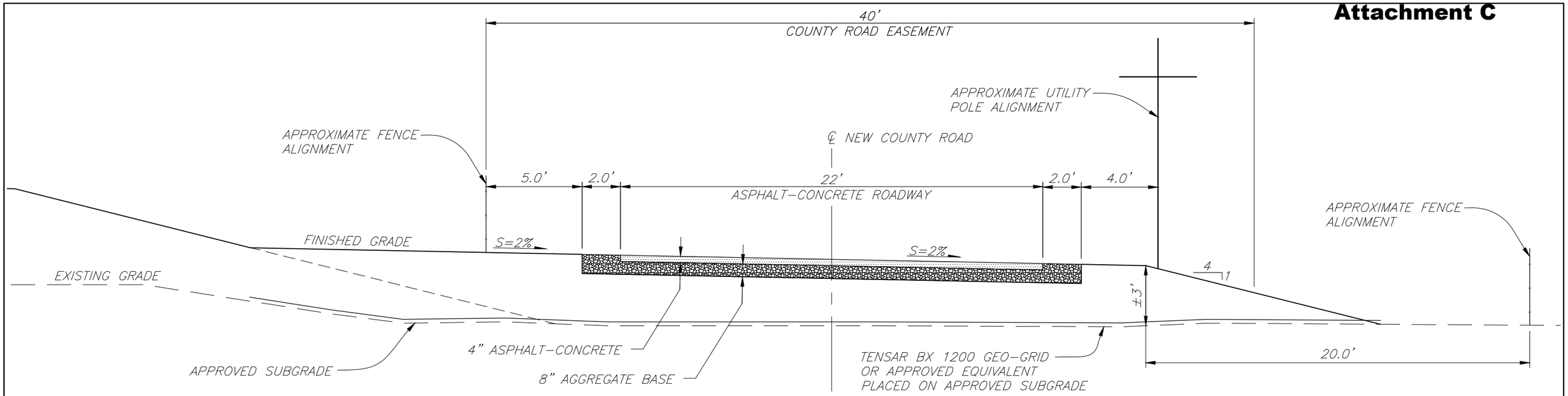
Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 12/31/14 CIVIL STATE OF CALIFORNIA
DRAFT

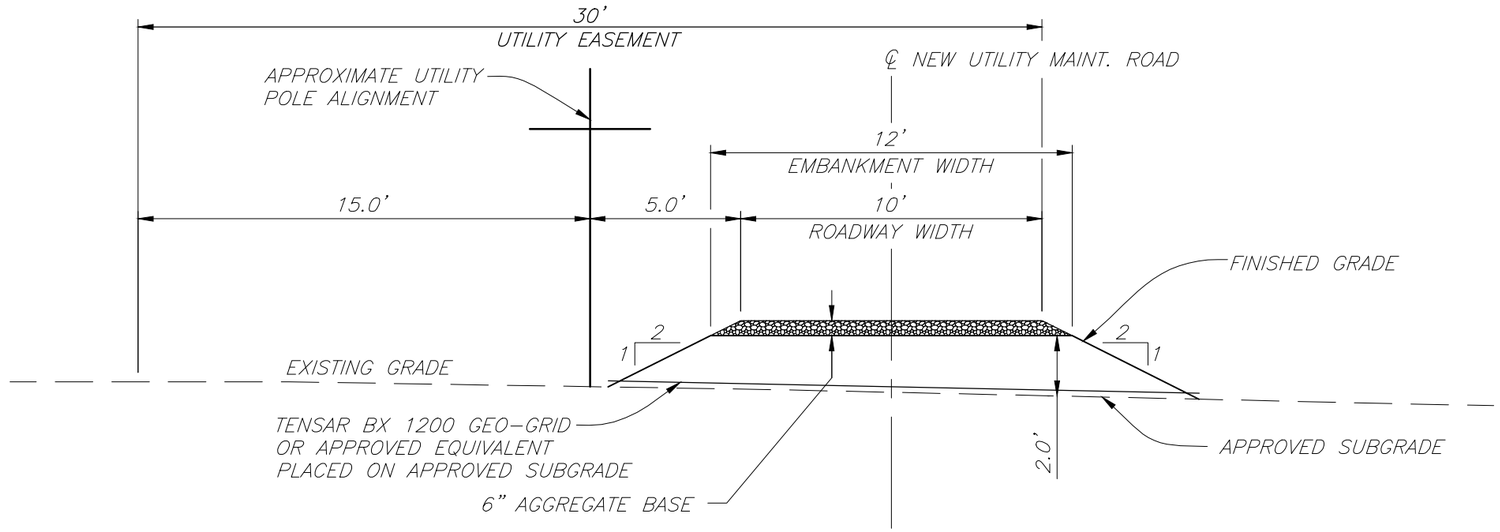
RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
TYPICAL SECTION AND DETAIL
APPROX. STA. 700+00 TO 702+00 AND 738+00 TO 740+00

Attachment C



22' ASPHALT-CONCRETE COUNTY ROAD AND EASEMENT DETAIL
TYPICAL OF APPROXIMATE STA. 703+00 TO 737+00

0' 2.5' 5'



UTILITY MAINTENANCE ROAD AND EASEMENT DETAIL
TYPICAL OF APPROXIMATE STA. 740+00 TO 750+00

0' 2.5' 5'

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Site ACE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

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NOT FOR CONSTRUCTION

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Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 CIVIL STATE OF CALIFORNIA
DRAFT
12/31/14

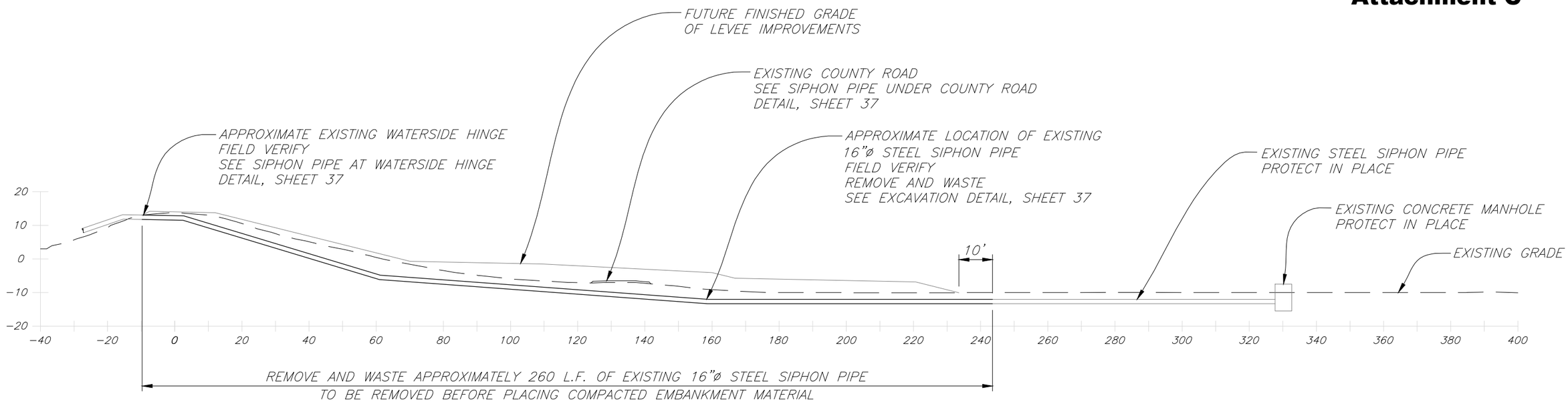
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

22' ASPHALT-CONCRETE COUNTY ROAD AND EASEMENT DETAIL APPROX. STA. 703+00 TO 737+00, UTILITY MAINTENANCE ROAD AND EASEMENT DETAIL APPROX. STA. 740+00 TO 750+00

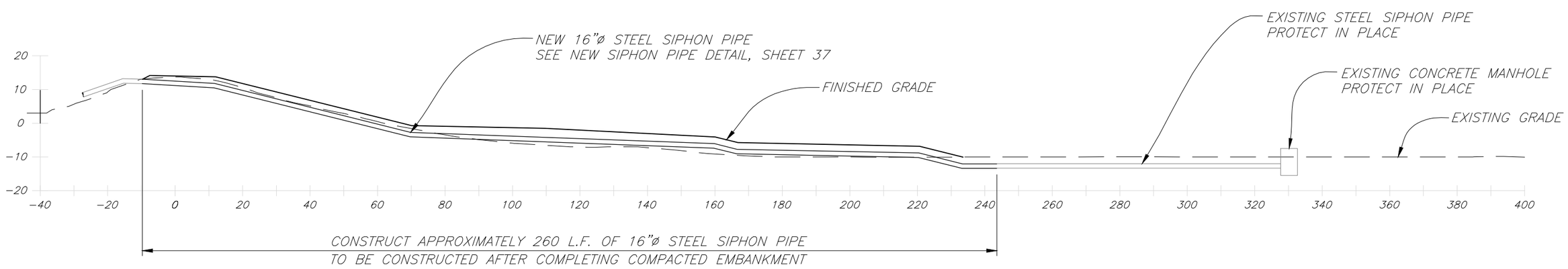
SHEET 35 OF 45 SHEETS

Attachment C



EXISTING SIPHON AT ≈ STA. 718+13
PROFILE

0' 15' 30'



NEW SIPHON AT ≈ STA. 718+13
PROFILE

0' 15' 30'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
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12/31/14
CIVIL
STATE OF CALIFORNIA

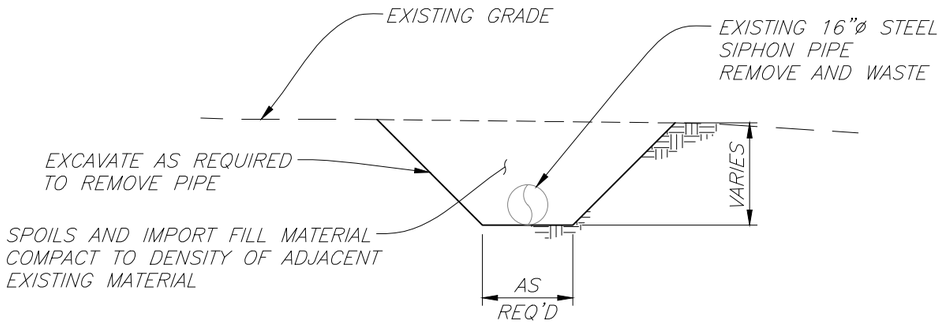
DRAFT

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

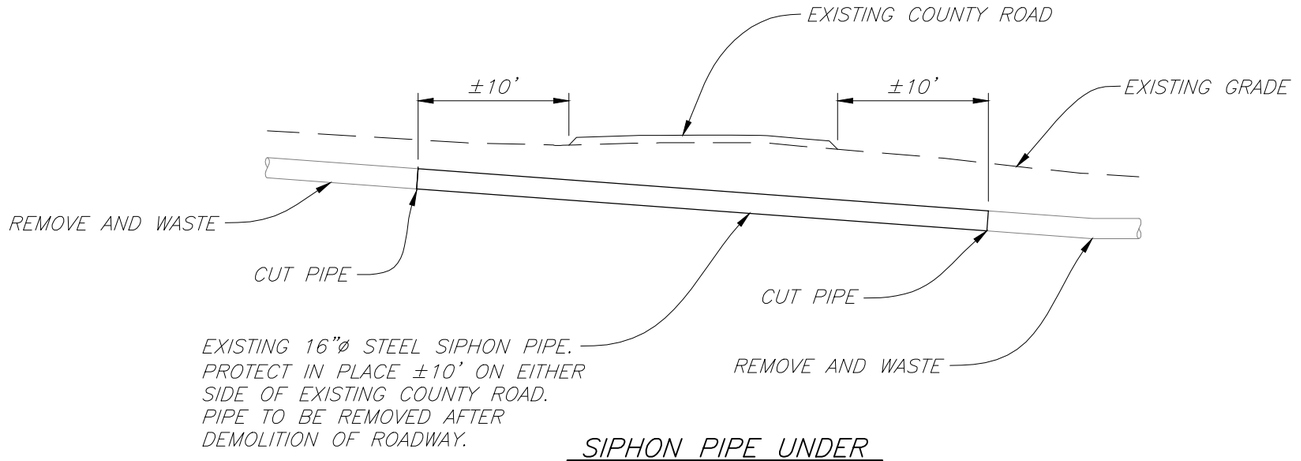
EXISTING SIPHON AT ≈ 718+13
PROFILES

SHEET 36 OF 45 SHEETS



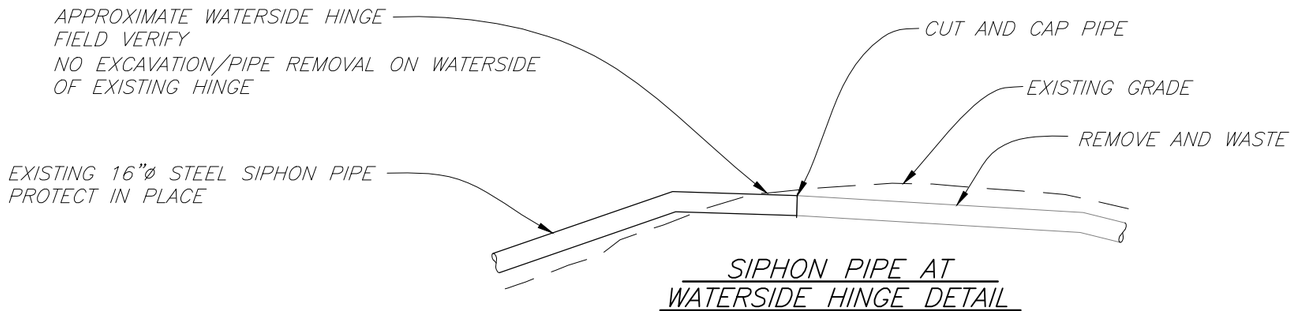
EXCAVATION DETAIL

0' 2.5' 5'



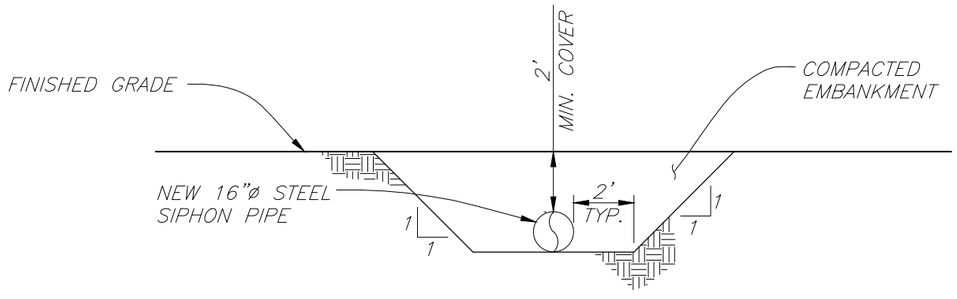
SIPHON PIPE UNDER COUNTY ROAD DETAIL

0' 5' 10'



SIPHON PIPE AT WATERSIDE HINGE DETAIL

0' 5' 10'



NEW SIPHON PIPE DETAIL

0' 2.5' 5'

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
Plot Date: 11/24/2014
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REVISIONS			
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PRELIMINARY
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Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

Wagner & Bonsignore
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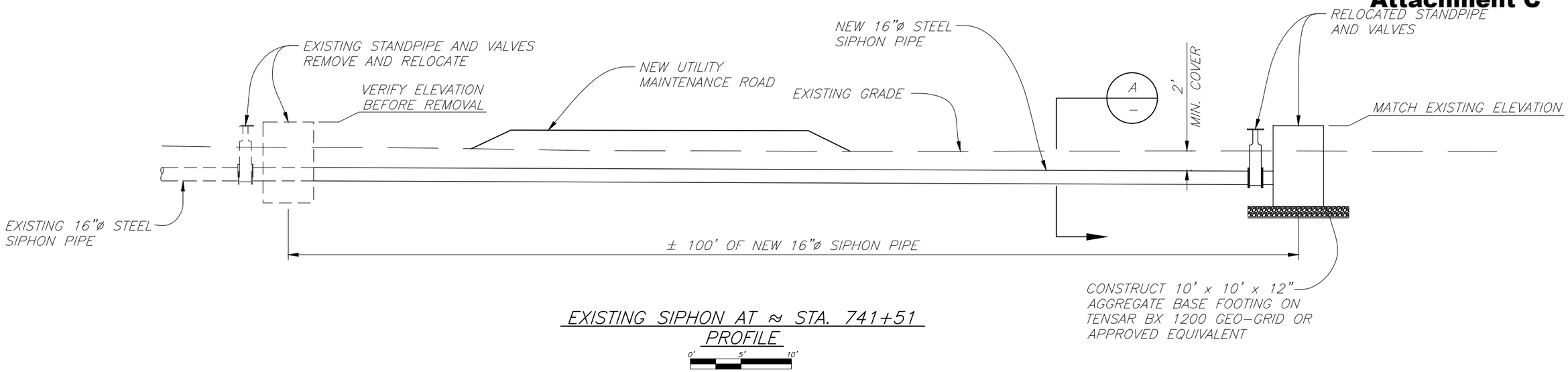
REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 29303 12/31/14 CIVIL STATE OF CALIFORNIA

DRAFT

RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
NEW SIPHON AT ≈ 718+13 DETAILS

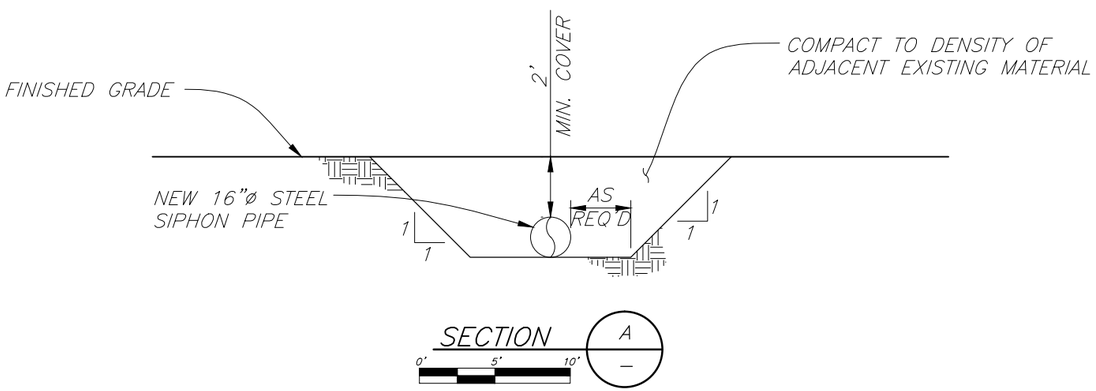
SHEET 37 OF 45 SHEETS

Attachment C



EXISTING SIPHON AT ≈ STA. 741+51
PROFILE

0' 5' 10'



H:\UCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pads.dwg

File Name: LBMR Fish Release Sites ACOE Padsdwg
Plot Date: 11/24/2014
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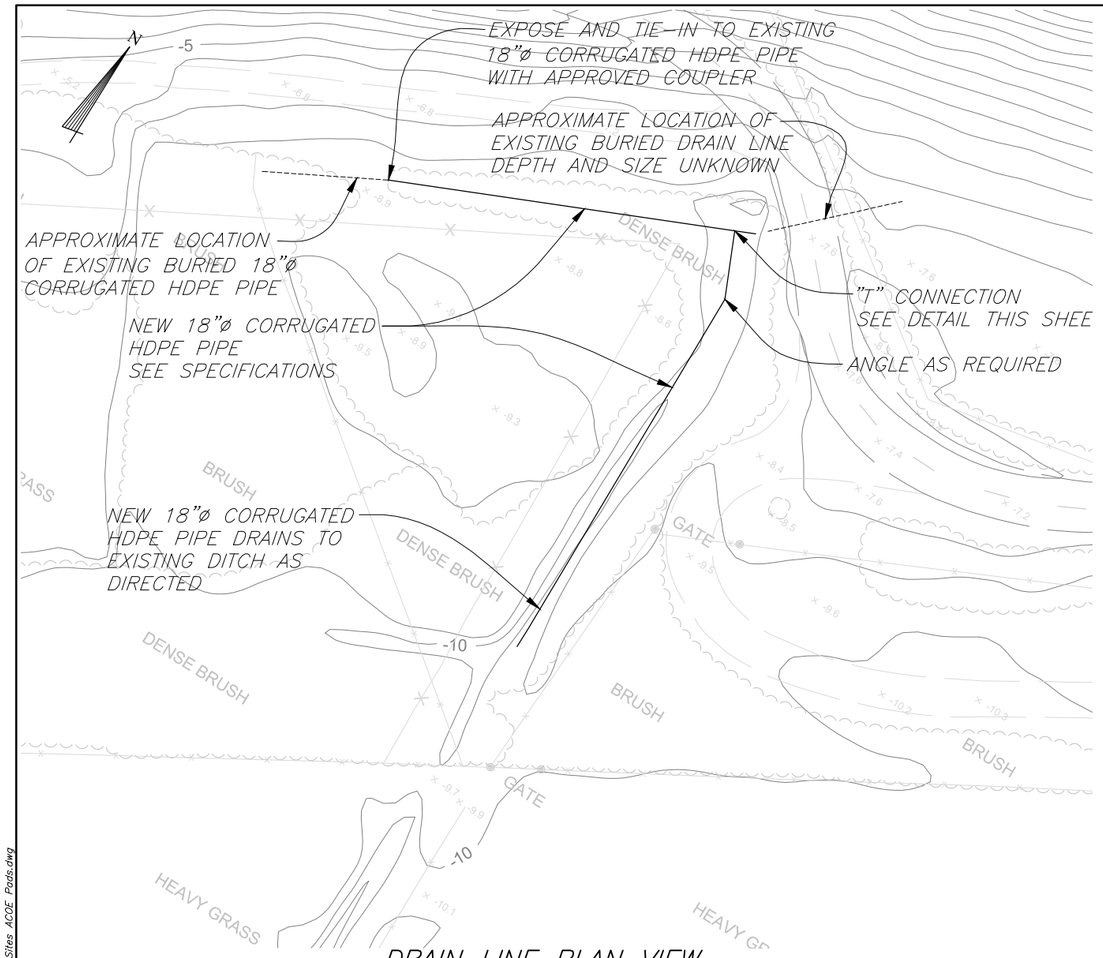
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

EXISTING SIPHON AT ≈ 741+51
PROFILE AND SECTIONS

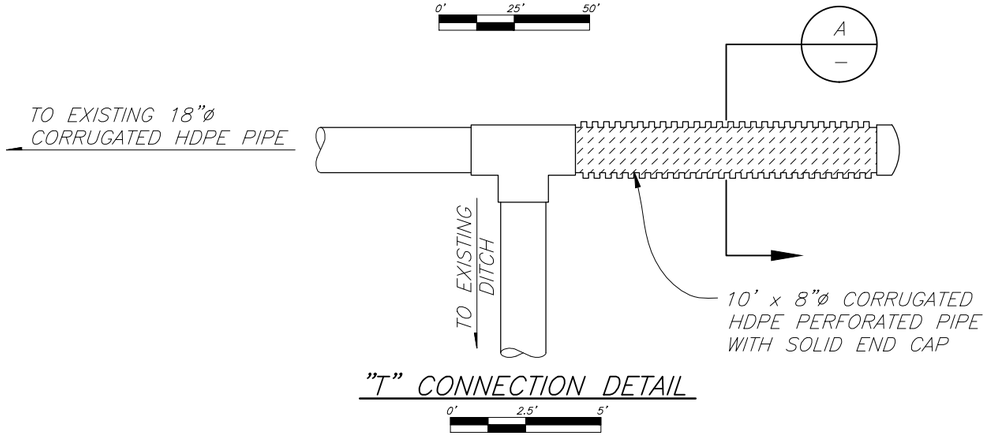
SHEET 38 OF 45 SHEETS

Attachment C



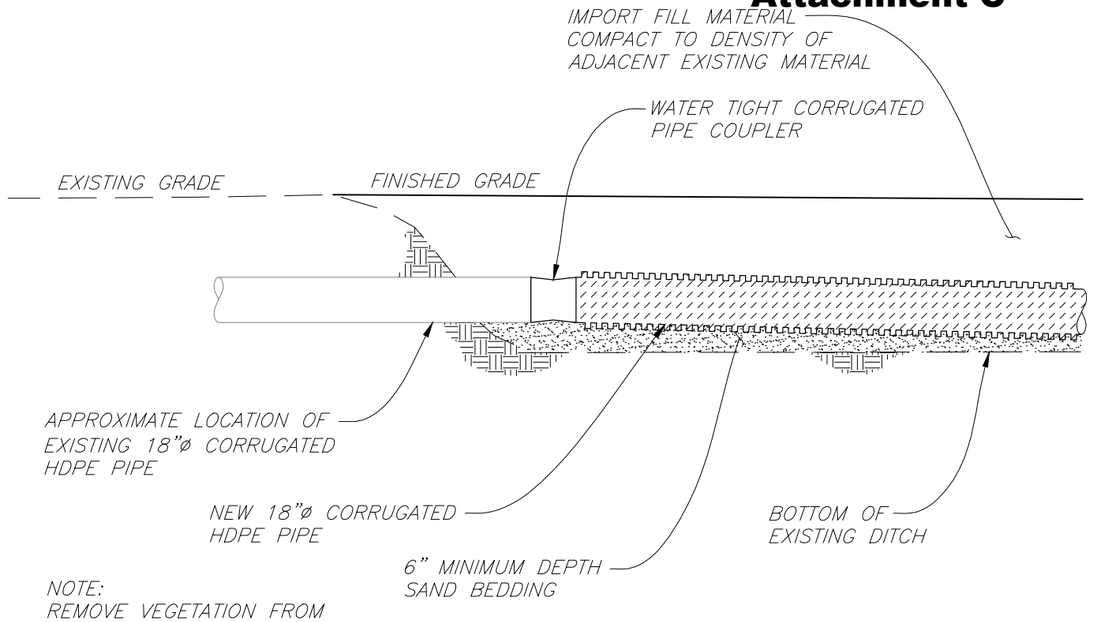
DRAIN LINE PLAN VIEW

0' 25' 50'



"T" CONNECTION DETAIL

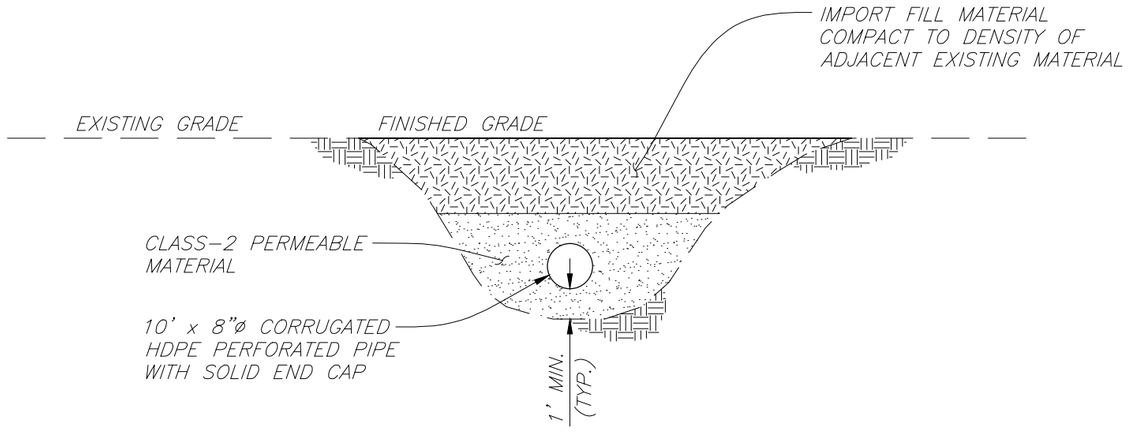
0' 2.5' 5'



NOTE:
REMOVE VEGETATION FROM EXISTING DITCH BEFORE PLACING NEW PIPE

PIPE CONNECTION DETAIL
CONNECTION TO EXISTING 18"ø PIPE

0' 2.5' 5'



SECTION A

0' 2.5' 5'

NOTES:

1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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PRELIMINARY
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Designed By	S.R. HERINGER
Drawn By	S.R. HERINGER
Checked By	H.S. MATSUNAGA
Approved By	R.C. WAGNER
Date	NOVEMBER 2014

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REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 42903 EXP. 12/31/14 CIVIL STATE OF CALIFORNIA

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

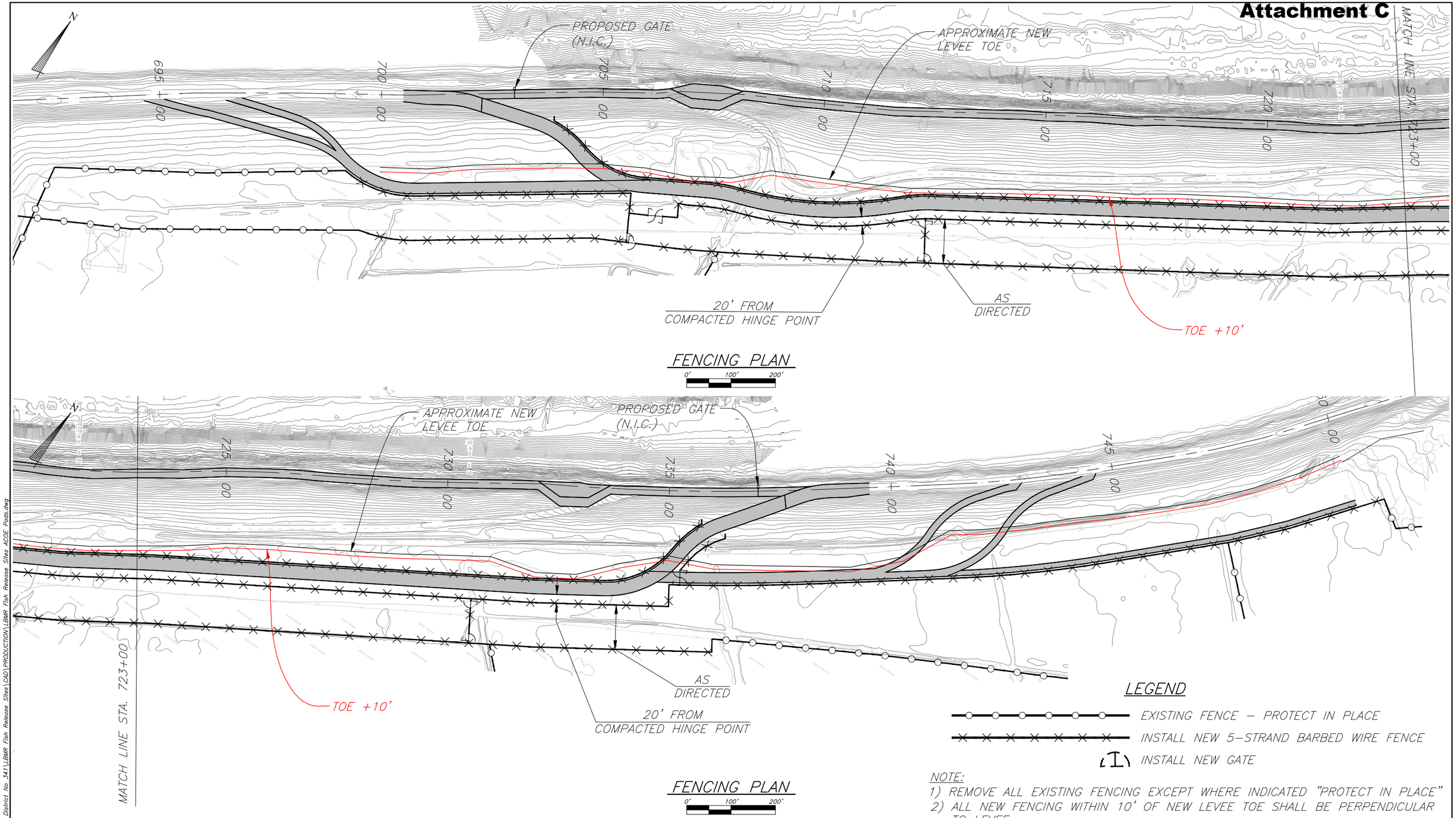
DRAIN LINE PLAN VIEW, DETAILS AND SECTION

SHEET 39 OF 45 SHEETS

File Name: LBMR Fish Release Sites ADE Pods.dwg
Plot Date: 11/24/2014
Revision Date: 11/24/2014

H:\JCH Job Drawings\Reclamation District No. 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ADE Pods.dwg

Attachment C



FENCING PLAN

0' 100' 200'

FENCING PLAN

0' 100' 200'

LEGEND

- EXISTING FENCE – PROTECT IN PLACE
- INSTALL NEW 5–STRAND BARBED WIRE FENCE
- INSTALL NEW GATE

NOTE:

1) REMOVE ALL EXISTING FENCING EXCEPT WHERE INDICATED "PROTECT IN PLACE"
2) ALL NEW FENCING WITHIN 10' OF NEW LEVEE TOE SHALL BE PERPENDICULAR TO LEVEE

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Pods.dwg

File Name: LBMR Fish Release Sites ACOE Pods.dwg
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1) BASE TOPOGRAPHY FROM AMERICAN AERIAL MAPPING, INC. FLOWN 6/29/2010.

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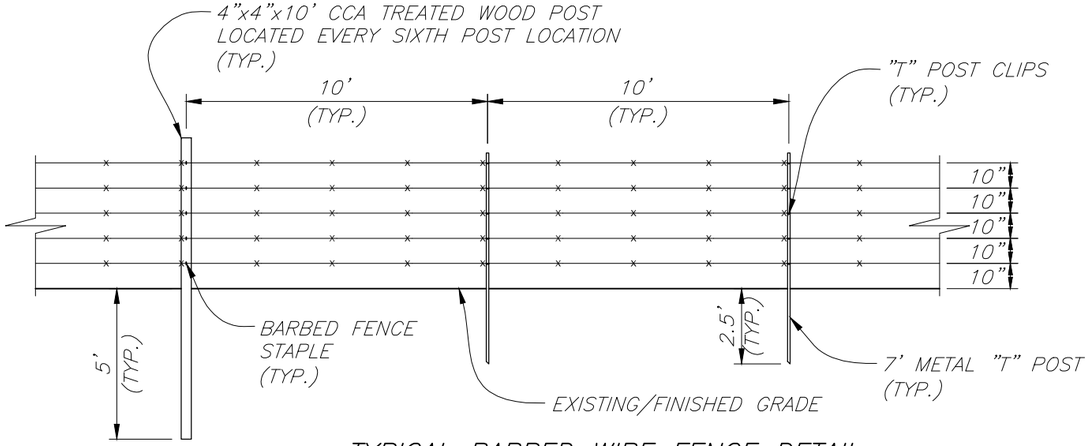
REGISTERED PROFESSIONAL ENGINEER ROBERT C. WAGNER No. 25803 CIVIL STATE OF CALIFORNIA 12/31/14

RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

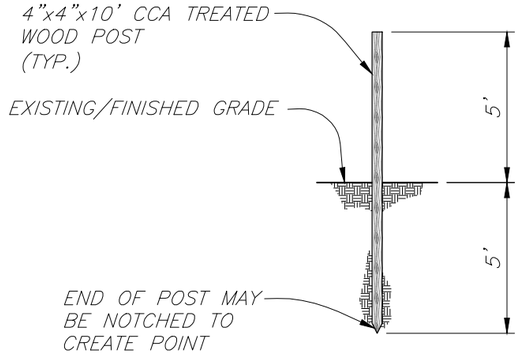
FENCING PLAN

SHEET 40 OF 45 SHEETS



TYPICAL BARBED WIRE FENCE DETAIL

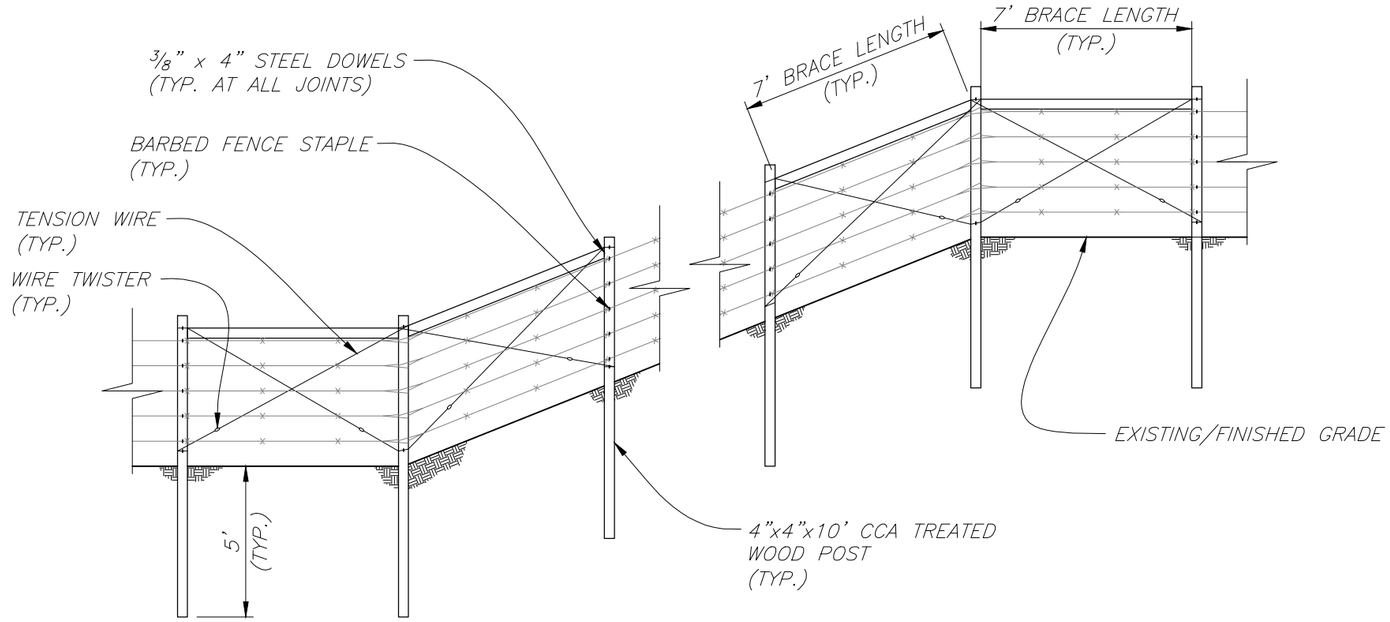
0' 2.5' 5'



TYPICAL WOOD POST INSTALLATION DETAIL

0' 2.5' 5'

NOTE:
4"ø x 10' GALVANIZED PIPE MAY BE SUBSTITUTED FOR WOOD POSTS AT CONTRACTORS OPTION. ALL CUTS AND WELDS SHALL BE COLD SPRAYED GALVANIZED.



TYPICAL FENCE ON SHARP GRADE BREAK DETAIL

0' 2.5' 5'

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File Name: LBMR Fish Release Sites ACOE Pods.dwg
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Drawn By	S.R. HERINGER
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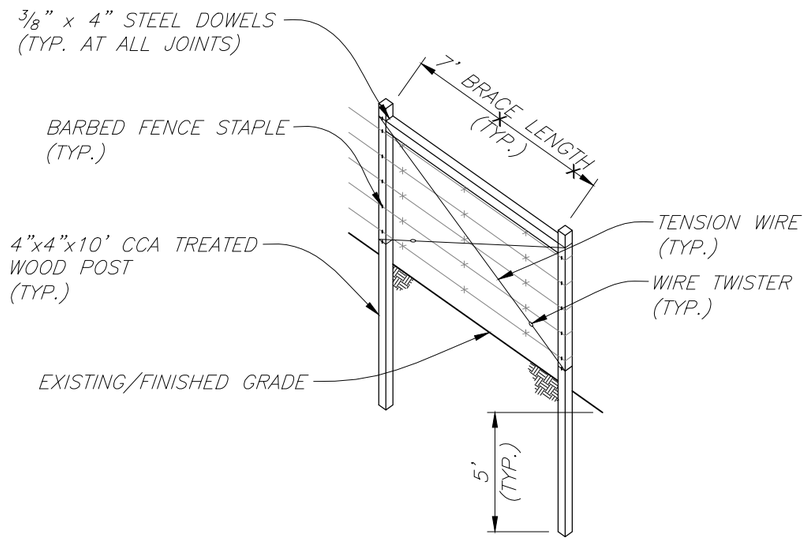
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

NEW BARBED WIRE FENCE DETAILS

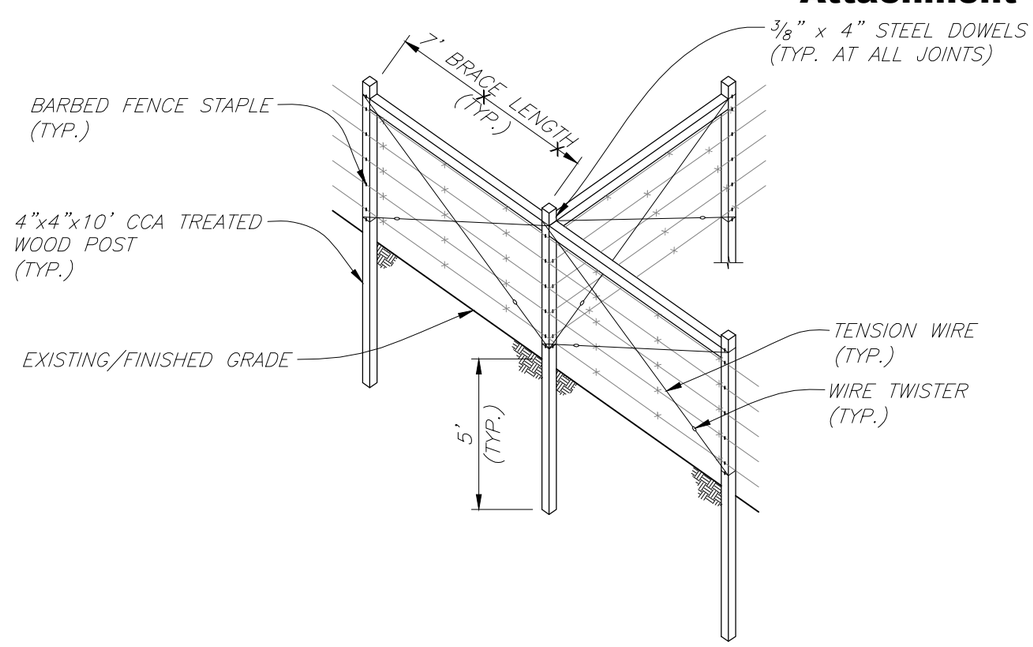
SHEET 41 OF 45 SHEETS

Attachment C



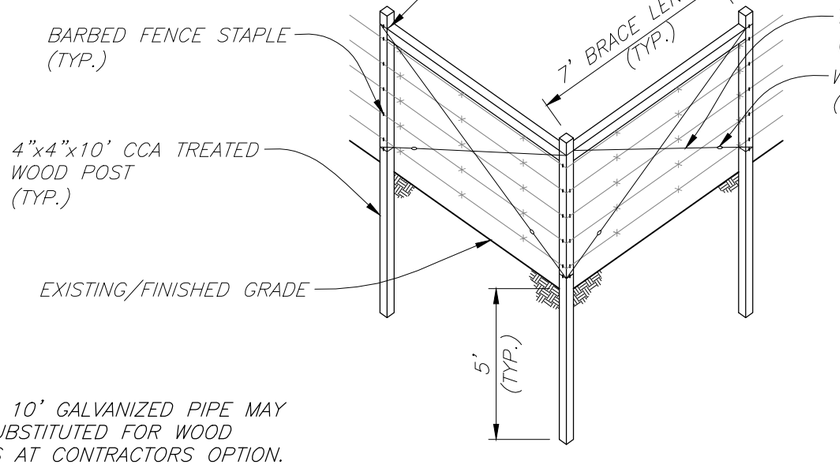
TYPICAL END POST DETAIL

0' 2.5' 5'



TYPICAL "T-INTERSECTION" POST DETAIL

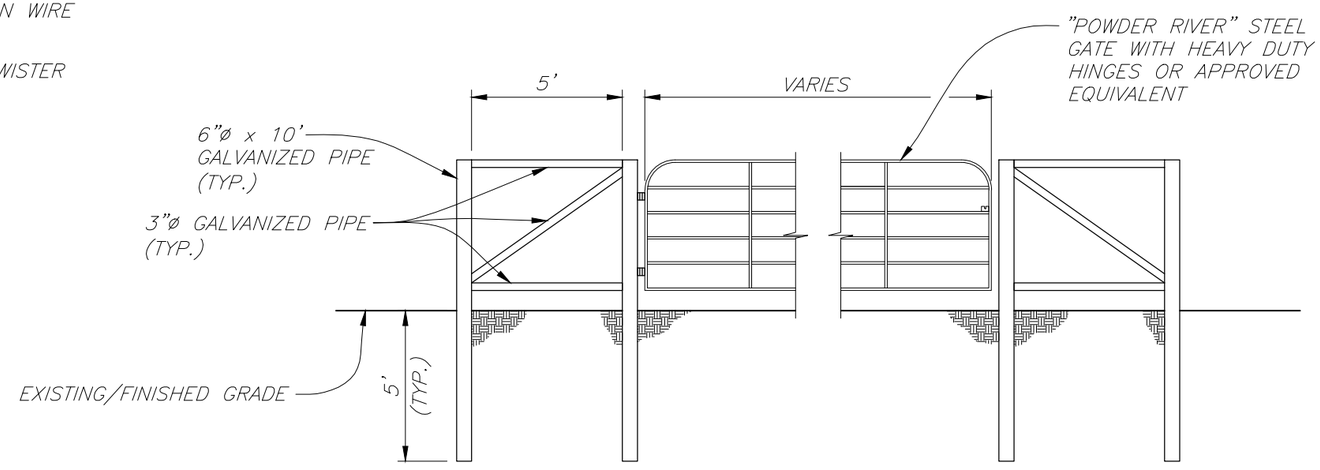
0' 2.5' 5'



NOTE:
4"ø x 10' GALVANIZED PIPE MAY BE SUBSTITUTED FOR WOOD POSTS AT CONTRACTORS OPTION. ALL CUTS AND WELDS SHALL BE COLD SPRAYED GALVANIZED.

TYPICAL CORNER POST DETAIL

0' 2.5' 5'



TYPICAL GATE DETAIL

0' 2.5' 5'

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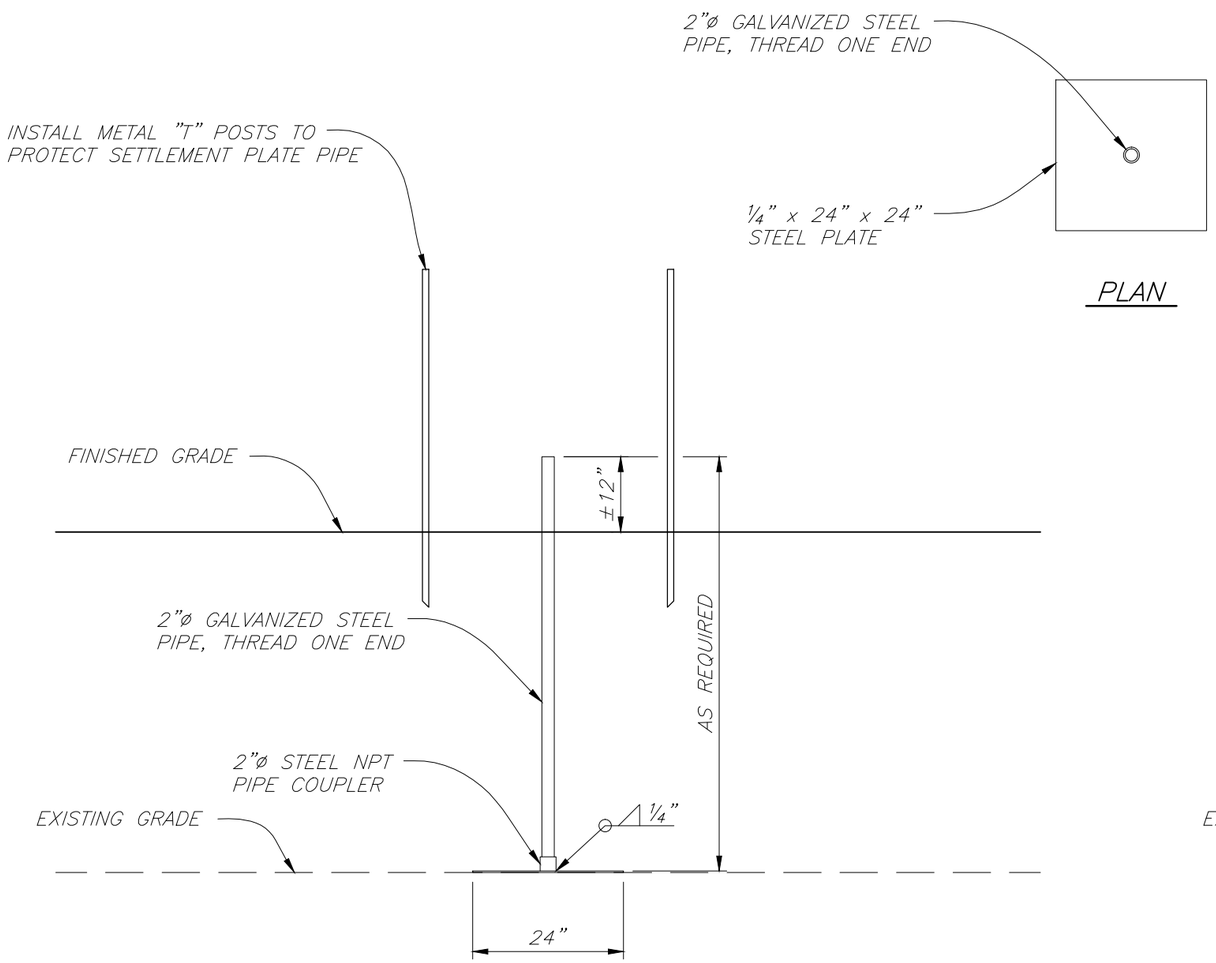
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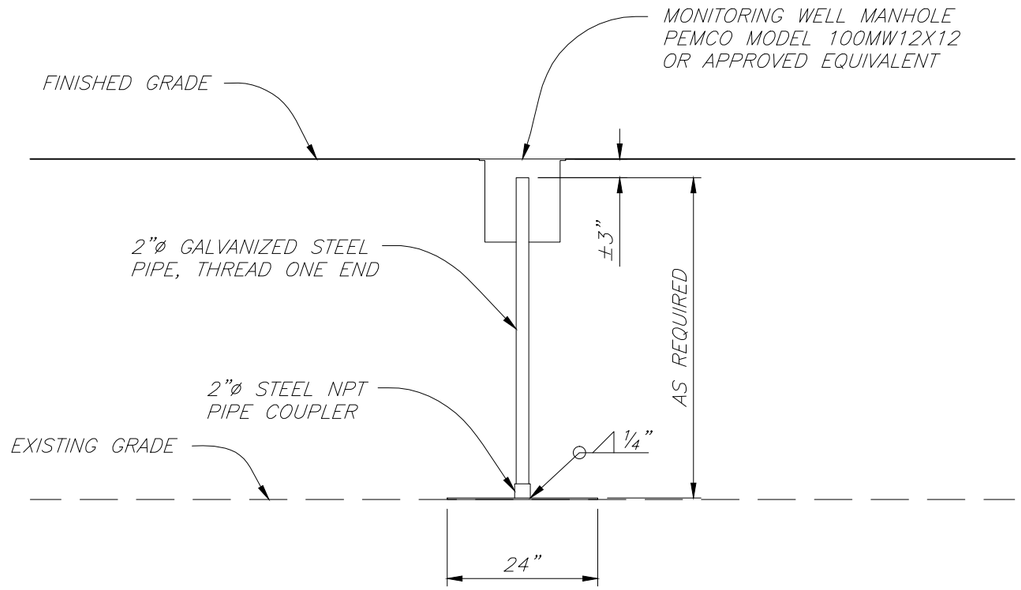
SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

NEW BARBED WIRE FENCE DETAILS
NEW GATE DETAIL

SHEET 42 OF 45 SHEETS



ELEVATION
SETTLEMENT PLATE ON BENCH
TYPICAL OF 5 INSTALLATIONS



ELEVATION
SETTLEMENT PLATE ON CREST
TYPICAL OF 5 INSTALLATIONS

NOTE:
INSTALL SETTLEMENT PLATES AT LOCATIONS AS DIRECTED BY ENGINEER

SETTLEMENT PLATE DETAIL

0' 1' 2'

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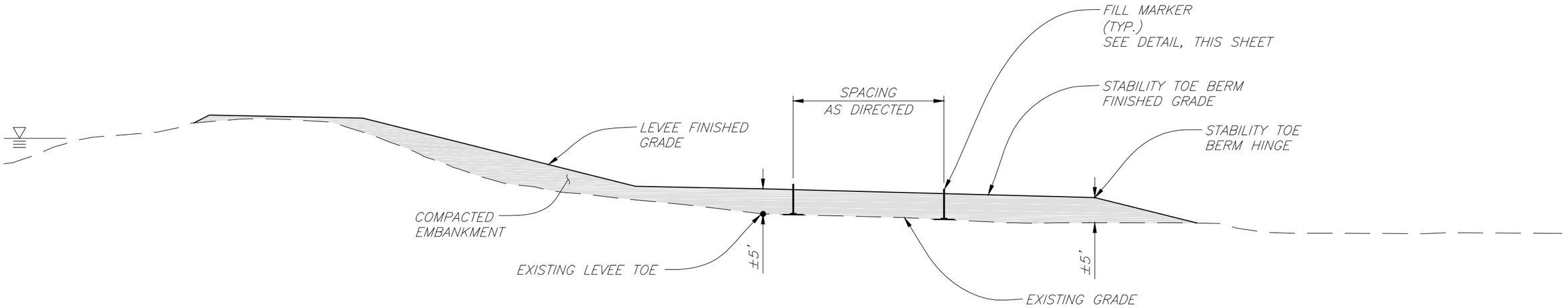
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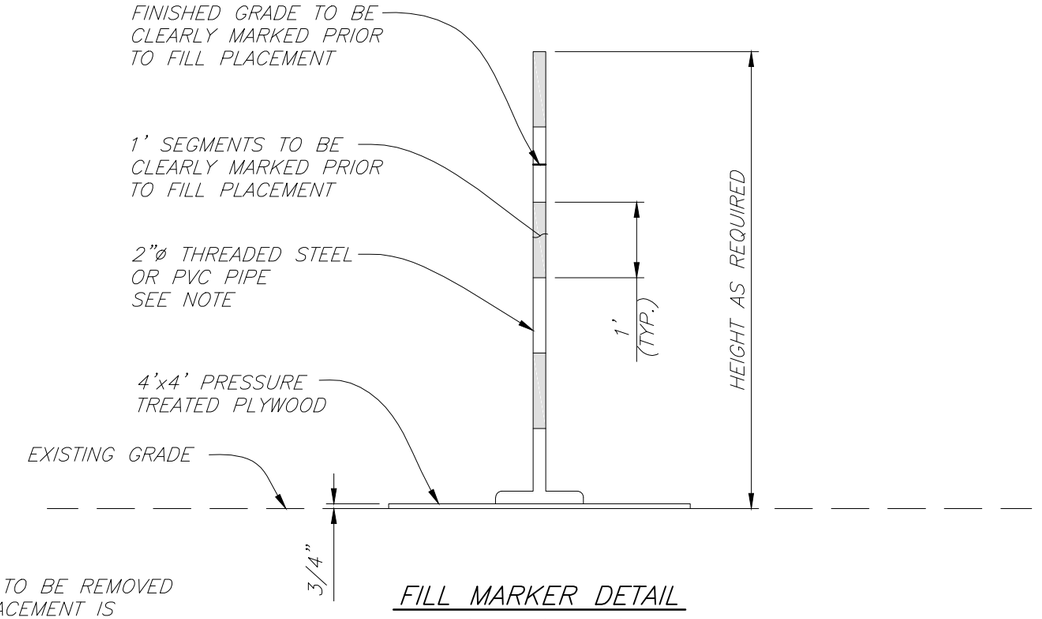
RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES
SETTLEMENT PLATE DETAIL

SHEET 43 OF 45 SHEETS



TYPICAL FILL MARKER PLACEMENT SECTION

0' 5' 10' 20'



NOTE:
FILL THICKNESS MARKER POLE TO BE REMOVED TO FULL DEPTH AFTER FILL PLACEMENT IS COMPLETED AND ACCEPTED BY ENGINEER

FILL MARKER DETAIL

0' 1' 2'

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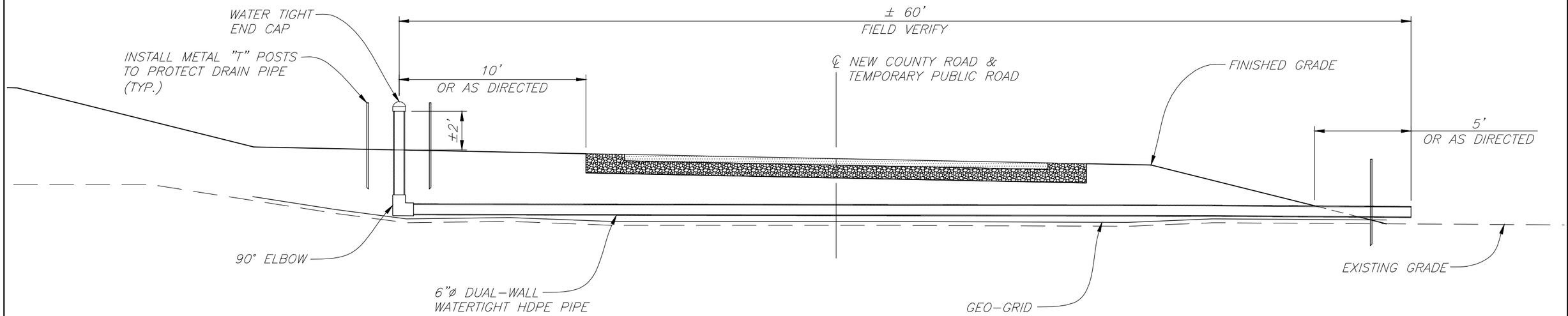
RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA"
AND "MANZO RANCH" FISH RELEASE SITES

TYPICAL FILL MARKER PLACEMENT SECTION
AND FILL MARKER DETAIL

SHEET 44 OF 45 SHEETS

Attachment C



TYPICAL ROAD DRAIN PIPE SECTION

0' 2.5' 5'

NOTE:
PLACE DRAINS ALONG TEMPORARY PUBLIC ROAD AND NEW COUNTY ROAD EVERY 400' OR AS DIRECTED.
APPROXIMATELY TEN REQUIRED.

H:\JCH Job Drawings\Reclamation District No 341\LBMR Fish Release Sites\CAD\PRODUCTION\LBMR Fish Release Sites ACOE Posts.dwg

File Name: LBMR Fish Release Sites ACOE Posts.dwg
Plot Date: 11/24/2014
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RECLAMATION DISTRICT NO. 341

SHERMAN ISLAND "LITTLE BAJA" AND "MANZO RANCH" FISH RELEASE SITES

TYPICAL ROAD DRAIN PIPE SECTION

SHEET 45 OF 45 SHEETS

Attachment D

GEOTECHNICAL EVALUATION

SHERMAN ISLAND – TWO FISH RELEASE SITES
RECLAMATION DISTRICT 341
SACRAMENTO COUNTY, CALIFORNIA

Project No. 789.04
November 12, 2014

Prepared by

Hultgren – Tillis Engineers

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I. INTRODUCTION

This report presents the results of our geotechnical evaluation for the two New Salvaged Fish Release Sites for Reclamation District 341 (District) on Sherman Island in Sacramento County, California. The California Department of Water Resources (DWR) plans to construct two salvaged fish release facilities on the northwest side of Sherman Island along the Sacramento River: the Little Baja Site (at approximately District Station 707) and the Manzo Ranch Site (at approximately District Station 733). Each salvaged fish release site will require widening the existing crest to at least 50 feet and raising the crest. The levee crest will be paved with asphalt concrete and a fish release system will be constructed on the waterside slope. The fish release system will consist of a fish discharge pipe extending down the waterside slope into the water, a water intake pipe, and an equipment platform (approximately 20 feet wide by 12 feet long). The pipes and platform will be supported by pile foundations which will be designed by DWR. The platform will extend over the waterside slope. The levee between the fish release sites and the county road will be realigned as part of this project. Our evaluation for the levee improvements and the county road realignment between the two fish release sites are presented in a separate report.

Sherman Island and the surrounding areas are shown on the Vicinity Map, Plate 1. The two fish release sites and locations of borings and cone penetration test soundings (CPT) are shown on the Site Plans, Plates 2 and 3. The elevations in this report are referenced to the North American Vertical Datum of 1988 (NAVD88). However, some of the published data (Geologic map and previous boring and drill logs) were recorded using the National Geographic Vertical Datum of 1929 (NGVD29). A correction of +2.4 feet is used to convert from NGVD29 to NAVD88 elevations for this project.

The criteria for this levee reach is outlined in the Operation and Maintenance (O&M) Manual for Reclamation District No. 341 dated February 1962. The O&M Manual indicates that the design prism for the reach is a 20 foot wide crest with maximum landside and waterside slopes of 2H:1V (horizontal to vertical) and 3H:1V, respectively. The freeboard requirement is 3 feet above the adopted design flood level. The adopted flood level for this reach is Elevation 11.7 feet North American Vertical Datum of 1988 (NAVD88).

Our scope of services was outlined in our proposals dated June 25, 2013 and November 18, 2013. Our scope of services is for design of improvements for the fish release sites. The results of our geotechnical evaluation are presented in this report.

II. EXISTING DATA

DWR collected subsurface data in 2013 for the two salvaged fish release sites and presented the data in the Project Geology Report 80-10-39 dated January 2014. DWR previously collected data for the Salinity Control Barrier projects in the 1950's.

The approximate boring and CPT locations are presented on the Site Plans, Plates 2 and 3. The logs of borings and CPT's from the January 2014 report and also the 1950's DWR drill logs are presented in our report, titled "Geotechnical Evaluation, Sherman Island – Stations 700 to 850, Sacramento County, California", dated November 11, 2014.

III. SITE CONDITIONS

A. Geology

The United States Geological Survey (USGS) has published geologic maps for the Sacramento-San Joaquin Delta (Atwater 1982). The Atwater geologic map that includes Sherman Island and the geologic descriptions of the map (geology) units are presented on Plate 4. The geology map shows that Sherman Island is covered by peat and mud (Qpm), except one relatively small area (between approximately Stations 755 and 805) along the Sacramento River where hydraulic fill (Qds) blankets the surface.

The present configuration of the Sacramento-San Joaquin River Delta began to form after the last ice age, about 10,000 years ago. During the ice age, sea levels were 200 to 300 feet below present levels. Sea levels rose rapidly for several thousand years then the rate of sea level rise slowed. As sea levels rose, the Delta was inundated. The sea level rise was slow enough to allow for the accretion of marsh vegetation and formation of a widespread peat marsh (mapped as Qpm).

The peat continued to accumulate as sea levels rose. The marsh formation was halted upon reclamation of land in the late 1800's and early 1900's within the Delta.

The reclamation of the Delta allowed the peat materials to dry. The process of drying an organic material such as the peat causes it to oxidize and deplete. The ground surface within Sherman Island has subsided since the island was reclaimed predominately due to soil oxidation and disappearance of the peat. Oxidation continues to occur throughout the Delta.

B. Surface Conditions

1. Little Baja Site (Station 707)

The topographic survey data indicates that the crest centerline varies from Elevation 12.9 feet to Elevation 14.9 feet. The levee crest width ranges from 28 feet to 30 feet. The levee crest is covered with aggregate base. The island interior near the levee varies from about Elevation -7 feet to Elevation -10 feet. The landside slope is inclined at about 3H:1V (horizontal to vertical) to 4H:1V. The landside levee slope and toe are covered by vegetation that consists of grass and brush.

The waterside slope is inclined at 3H:1V. Based on the bathymetric data, the mudline near the waterside slope is at approximately Elevation -30 feet. The upper portion of most of the waterside slope is not covered by riprap.

2. Manzo Ranch Site (Station 733)

The topographic survey data indicates that the crest centerline varies from Elevation 12.1 feet to Elevation 14.1 feet. The levee crest width ranges from 16 feet to 20 feet. The levee crest is covered with aggregate base.

The island interior near the levee is at Elevation -10 feet to Elevation -11 feet. The landside slope is inclined at 3H:1V to 4H:1V. The landside levee slope and toe are covered by vegetation that consists of grass and brush.

The waterside slope is inclined at 3H:1V. The mudline near the waterside slope is at approximately Elevation -25 feet. The upper portion of most of the waterside slope is not covered by riprap.

C. Subsurface Conditions

The island is below sea level and groundwater levels within the island are artificially controlled by evapo-transpiration and pumping. Conditions are expected to vary across the site with time, and depend on several factors including changes in moisture content resulting from seasonal precipitation, irrigation practices, and tides.

The typical daily tidal range at Sherman Island varies from about Elevation 2 feet to Elevation 6 feet. Extreme low tides are near Elevation 1 foot and extreme high tides are near Elevation 7 feet. The 100-year base flood level used by the District and the design team is Elevation 9.8 feet.

1. Little Baja Site

The levee consists of fill over marsh deposits. The crest is covered with aggregate base. Beneath the aggregate base is a heterogeneous mixture of fill consisting predominately of silty sand. The consistency of the silty sand fill ranges from very loose to loose. The fill thickness ranges from 15 to 20 feet at the boring and CPT locations.

The fill is underlain by marsh deposits. The marsh deposits consist predominately of weak and compressible peat and organic silt and clay. The base of the marsh deposits ranges from approximately Elevation -53 feet to Elevation -61 feet. Our interpretation of the elevation of the base of marsh deposits beneath the levee is presented on Plate 5.

The material beneath the marsh deposits varies with several locations underlain by sand to the depths explored and with other locations underlain by variable zones of silt and sand. The consistency of the sand is variable and ranges from loose to dense. The loosest sand is typically located directly below the marsh soils. The geologic sections at the Little Baja Site (from the DWR Project Geology Report) are presented on Plates 6 through 8.

2. Manzo Ranch Site

The levee consists of fill over marsh deposits. The crest is covered with aggregate base. Beneath the aggregate base is a heterogeneous mixture of fill consisting of sand, silt, and clay. The consistency of the sand fill ranges from very loose to very dense. The consistency of the silt and clay fill ranges from medium stiff to stiff. The fill thickness ranges from 19 to 23 feet at the boring and CPT locations.

The fill is underlain by marsh deposits. The marsh deposits consist predominately of weak and compressible peat and organic silt and clay. The base of the marsh deposits ranges from approximately Elevation -44 feet to Elevation -47 feet.

The material beneath the marsh deposits is similar to the Little Baja Site, including variable zones of silt and sand. The consistency of the sand is variable and ranges from loose to dense. The geologic sections at the Manzo Ranch Site (from the DWR Project Geology Report) are presented on Plates 9 through 11.

IV. DISCUSSION AND CONCLUSIONS

A. General

The significant geotechnical considerations for this project are the presence of marsh soils below the levee, short term stability of the levee during fill placement, and settlement and lateral deformation of the levee. These issues and other considerations for design and construction of the project are discussed below.

This report is limited to the evaluation of levee improvements needed to construct the wider crest at the two sites. Our recommendations for construction of other levee improvements and the seepage analysis parameters and results are presented in our report titled "Geotechnical Evaluation, Sherman Island - Stations 700 to 850, Sacramento County, California", dated November 11, 2014.

The levee on Sherman Island is founded on weak marsh deposits consisting predominately of peat and organic soil. More than 15 feet of fill is required to construct the 50-foot wide crests. To avoid overstressing the underlying marsh deposits, we conclude that the fish release sites will need broad landside berms to buttress the sites and will need to be constructed in stages. The stage construction method has been used successfully on Sherman Island and other Delta projects. The levee will deform and settle as is typical of Delta levees. The levee will need to be monitored and there is still some risk of extensive movement occurring during fill placement.

DWR plans to install foundation and utilities within the levee crest. The improvements should not be placed within the theoretical levee section except as approved by the Central Valley Flood Protection Board.

B. Slope Stability

The fish release sites are part of a larger levee improvement project. Slope stability and seepage analysis for the larger levee project is presented in a separate report. The slope stability analysis in this report is limited to the two fish release sites. We performed analysis for the existing levee and for the reconfigured levee for effective stress conditions with the results shown below.

A concern for fill on soft ground is overstressing the ground and causing ground failure. The levee is underlain by a thick deposit of marsh soils. Fills placed too quickly could exceed the strength capacity of weak foundation materials (marsh soils) at the site. We checked the factor of safety for placement of the fill in one lift and conclude that the levee should not be constructed in one lift without the potential for larger levee movements. We conclude that the levee should be constructed in stages. The foundation materials will gain strength as the soil consolidates allowing subsequent stages of fill to be placed.

We performed an analysis for stages of filling. Our analysis included placing stages of fill up to 4 feet thick with a minimum waiting period between stages of 4 months. The number of stages required will depend on the thickness of fill needed to achieve grade and the magnitude of settlement that occurs during and after filling. The settlement that occurs during the stages of filling will increase the thickness of fill needed to construct the project and number of stages. The settlement of the fill must be considered when evaluating the number of lifts required and time for construction. For purposes of this report, we have shown four stages of filling. The typical design configurations, including four stages of fill placement, are presented on Plates 12 through 15.

We developed the basis for the stages of filling and time between stages through analysis and judgment. The stage analysis used undrained shear strengths for the marsh soils presented on Plate 16 and parameters on Plates 17 through 22 for the remaining soil layers. The parameters used for the marsh soils were based mainly on data collected by us over the years and are published separately. We reviewed the lab data from the DWR report and concluded that the data is consistent with our typical parameters.

We used Spencer's Method of Analysis and computer program SLOPE/W for the analysis of consolidation. The results of the analysis are presented on Plates 17 through 22 and in Tables 1 through 4.

The stability analysis and settlement were performed together as an iterative process. The time for complete consolidation and strength gain is too long to meet the construction schedule. The second and subsequent stages for fill need to be placed while consolidation continues. We used the pore pressure dissipation and estimate of effective stress from CONSOL to estimate the undrained shear strength for each stage.

The analysis was performed for the Manzo Ranch Site with conclusions used by us for both sites. We chose the Manzo Ranch Site because the fill thickness required to construct the levee is larger, requiring more stages of fill. The base of the marsh soils is deeper at the Little Baja Site. In some sites the thicker zone of marsh soils can lead to lower factors of safety. The slope stability results indicate that the critical failure planes do not extend to the base of the marsh soil at the Manzo Ranch Site as shown on Plates 17 through 22. We conclude that the factor of safety and stage loading developed from the Manzo Ranch Site can be used as the basis for filling at the Little Baja Site. Given the assumptions on the rate of consolidation and strength gain required for a stage analysis, it will be important to monitor during construction to allow confirmation of some of our assumptions.

Table 1: Factors of Safety for Landside Slopes – Stage Analysis

Site	Existing Levee	Rehabilitated Levee – End of Construction			
	Undrained Strength	Undrained Strength			
		Stage 1	Stage 2	Stage 3	Stage 4
Manzo Ranch	1.42	1.46	1.45	1.48	1.39

Table 2: Factors of Safety for Waterside Slopes – Stage Analysis

Site	Existing Levee	Rehabilitated Levee – End of Construction			
	Undrained Strength	Undrained Strength			
		Stage 1	Stage 2	Stage 3	Stage 4
Manzo Ranch	1.43	1.42	1.42	1.42	1.36

Table 3: Factors of Safety for Slopes – Manzo Ranch

Site	Existing Levee	Rehabilitated Levee Long Term
	Effective	Effective
Landside	1.47	2.39
Waterside	1.80	1.71

Table 4: Factors of Safety for Slopes – Little Baja

Site	Existing Levee	Rehabilitated Levee Long Term
	Effective	Effective
Landside	1.40	2.20
Waterside	1.56	1.53

The factor of safety for the effective stress analysis for the landside and waterside slope is above the USACE minimum of 1.4.

The undrained factor of safety for each stage of fill is near 1.4. The intent of the stage filling is to not reduce the existing factor of safety during each stage of fill. After the fill is completed, the marsh soil will consolidate and gain strength leading to higher factors of safety in the long term.

C. Settlement

To estimate the magnitude of ground settlement from placement of new fill on the levee we used computer program CONSOL. The properties used for the settlement analysis are presented in Table 5. Our settlement models assumed double drainage. The estimates are based on raising the levee crest to Elevation 16.7 feet at the fish release sites.

Our estimate of settlement is based on the fill thicknesses shown in Table 6. We estimated settlement at four locations: the waterside top of slope, center of the fish release pad, the landside top of slope (hinge), and the catch point between the toe berm and the 4H:1V landside slope.

The analysis indicated that the levee crest will settle about 0.6 feet near the waterside hinge, about 1.2 feet near the center of the pad, about 3.3 feet near the landside slope hinge, and about 3.5 feet at the toe berm. Some of the settlement will occur while the project waits for the stages of fill to be placed and the remainder will occur after the project is completed.

The time rate of settlement will vary depending on the inherent variability of the marsh soils, permeabilities of soils, and drainage paths. Under the new fill loading, the levee

may settle to design crest elevation earlier than our estimates. Additional fill may need to be placed to maintain the design crest elevation.

The crest will continue to settle for many years after the fill is placed and the improvements are completed. The crest will need to be raised to maintain its elevation. DWR will need to consider the effects of settlement and deformation on the design of the improvements. The pile supported structures will not settle appreciably. DWR should make accommodations for settlement for structures spanning from the levee to the pile supported structures and for maintaining the height of the levee to meet permit requirements. Flexible couplings should be included for utilities. Other maintenance activities may include releveling of gates and raising of the levee.

Table 5: Properties of Marsh Soils for Settlement Analysis

Properties	Peat	Silt
Unit Weight (pcf)	70	100
Initial Void Ratio, e_0	5	2
Compression Index, C_c	3	0.7
Recompression Index, C_r	0.3	0.07
Coefficient of Consolidation, C_v (ft^2/year)	80 to 150	40

Table 6: Settlement with Engineering Judgments

	Time after Stage 1 fill (year)	W/S Hinge		Center of Pad		L/S Hinge		Catch Point	
		Settlement (feet)	Total Fill Thickness (feet)	Settlement (feet)	Total Fill Thickness (feet)	Settlement (feet)	Total Fill Thickness (feet)	Settlement (feet)	Total Fill Thickness (feet)
Stage 1	0	0	2.9	0	4	0	4	0	4
Stage 2	0.33	0.1	2.9	0.1	6.8	0.3	8	0.7	5
Stage 3	0.67	0.2	2.9	0.4	6.8	0.7	12	1.0	5
Stage 4	1	0.2	2.9	0.5	6.8	1.0	16	1.2	5
	2	0.3	2.9	0.6	6.8	1.7	16	1.5	5
	5	0.4	2.9	1.0	6.8	2.7	16	2.3	5
	10	0.5	2.9	1.2	6.8	3.3	16	2.8	5

D. Seismic Hazards and Performance

1. Seismic Hazards

The predominant seismic hazard for this site is strong groundshaking resulting from earthquakes. The fish release facilities should be designed to accommodate such groundshaking in accordance with existing codes. No known active faults pass through the site and we conclude that the risk of fault rupture is low. A site-specific response analysis was performed by DWR to evaluate ground motions and develop spectra for design of the facilities. Methodology and results of the analysis are presented in DWR's Project Geology Report 80-10-39 dated January 2014.

2. Soil Liquefaction

Soil liquefaction is a phenomenon in which a loose- to medium-dense saturated granular soil undergoes reduction of internal strength as a result of increased pore water pressure generated by shear strains within the soil mass. This behavior is most commonly induced by strong groundshaking associated with earthquakes.

We analyzed the liquefaction potential using the method described in Idriss and Boulanger (2008 and 2010) which includes procedures for liquefaction triggering. Our analysis indicates that some of the fill will liquefy and that liquefaction will occur within the upper five feet (or less) of the foundation sand. Table 7 lists the zones most susceptible to liquefaction based on the simplified analysis under the design earthquake.

Other Delta studies have concluded that large deformation may occur if the levee fill liquefies.

Table 7: Liquefaction Zones

Boring / CPT	Fill Depth (feet)
LBS2 – Boring	5 to 15
MRS2 – Boring	10 to 19
LBC1 and LBC2 – CPTs	9 to 16
LBC4 – CPT	20 to 26
MRC1, MRC2, and MRC4 – CPTs	14 to 20
	Foundation Sand Depth (feet)
LBC1 and LBC3 – CPTs	74 to 77
MRC1, MRC3, and MRC4 – CPTs	59 to 64
(LB = Little Baja / MR – Manzo Ranch)	

V. RECOMMENDATIONS

A. Levee Configuration

The levee at the fish release sites should be constructed in accordance with the details provided on Plates 12 through 15. The existing inclinometer should be checked during and after episodes of filling. Additional inclinometers and piezometers should be installed to monitor the fill placement. The levee crest, slope, and toe area should be inspected daily during construction to check for signs of deformation and cracking.

B. Earthwork

1. Site Preparation

The footprint of the levee and toe berm fill should be cleared and grubbed of surface and subsurface deleterious matter including trees, grasses, other vegetation, and debris designated for removal. The site should be stripped to sufficient depth to remove vegetation and soil containing roots. Tree roots greater than 1-inch in diameter should be removed. Stripped and grubbed materials should be removed from the site and should not be used as fill.

2. Compaction

Surfaces exposed by stripping or excavation should be scarified to a depth of at least 8-inches except where peat is exposed. Scarification is not required where peat exists at the ground surface. The scarified soil should be moisture conditioned to at least optimum moisture content and compacted to at least 95 percent relative compaction. ASTM D698 should be used to establish the reference values for computing optimum moisture content and relative compaction.

Fill should be placed in lifts 8-inches or less in loose thickness and moisture conditioned to between one percent below optimum moisture content and 3 percent over optimum moisture content. Moisture conditioning should be performed prior to compaction. Each lift should be methodically compacted to at least 95 percent relative compaction. Material that fails to meet the moisture or compaction criteria should be loosened by ripping or scarifying, moisture conditioned, and then recompacted. Fill should be placed on horizontal surfaces. The fill should be benched into the existing landside levee slope to allow recompaction of some of the existing soil. The horizontal bench width into the existing slopes should not exceed 5 feet.

In pavement areas subject to vehicle traffic, the upper 6-inches of subgrade should be compacted to at least 95 percent relative compaction and rolled to provide a smooth, non-yielding surface. Subgrade soils should be proof-rolled before placing aggregate base. Proof-rolling should be performed with the heaviest available rubber-tired construction equipment and should be observed by the geotechnical engineer. Soft or pumping areas should be aerated or excavated and recompacted.

Aggregate base should be placed in thin lifts no greater than 8-inches in loose thickness and in a manner that avoids segregation, moisture conditioned as necessary, and compacted to at least 95 percent relative compaction.

3. Slopes

Fill slopes should be inclined at 4H:1V or flatter except as noted. Fill slopes should be constructed fat and trimmed back to expose well-compacted fill. Finished slopes and toe berms should be trackwalked perpendicular to the slope face with a bulldozer after completion. The slopes should be hydroseeded to promote vegetation.

4. Fill

We recommend that new fill conform to the typical fill requirements from the Central Valley Flood Control Board. Fill placed at the site should be a soil or soil/rock mixture free of deleterious matter and contain no rocks or hard fragments larger than 4-inches in maximum dimension with less than 15 percent larger than 1-inch in maximum dimension. The fill should have at least 20 percent passing the No. 200 sieve. The fill should have a liquid limit below 50 and a minimum plasticity index of 8.

Attachment D

REFERENCES

REFERENCES

Atwater, Brian F. 1982. United Stated Department of the Interior Geological Survey, Geologic Maps of the Sacramento-San Joaquin Delta, California.

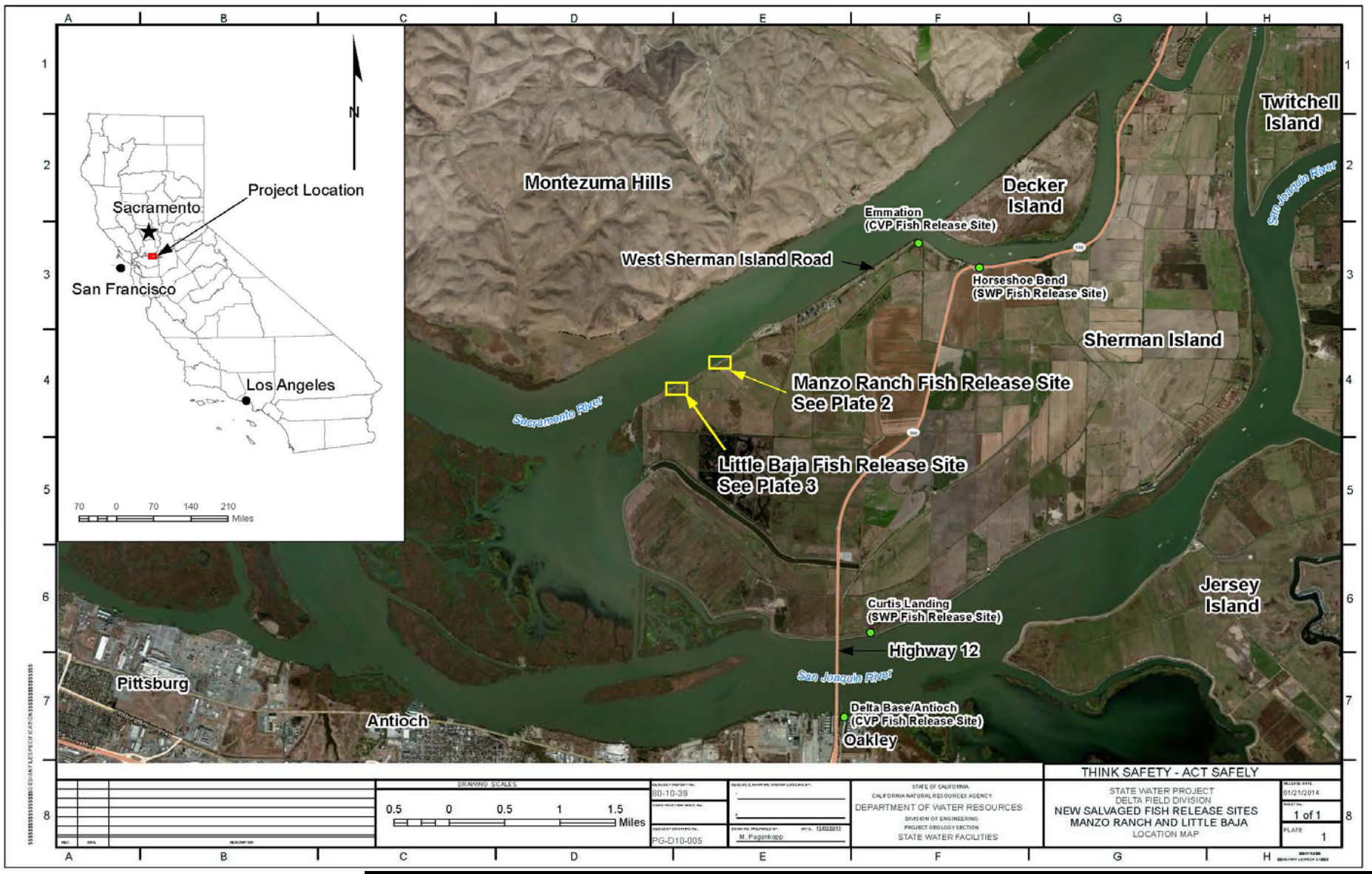
California Department of Water Resources. 2014. Sherman Island New Salvaged Fish Release Sites Exploration Geology Report, Project Geology Report 80-10-39, January 2014.

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Hultgren – Tillis Engineers. 2014. Sherman Island – Stations 700 to 850, Geotechnical Evaluation. Prepared for Reclamation District 341, Sacramento County, California, November 11, 2014.

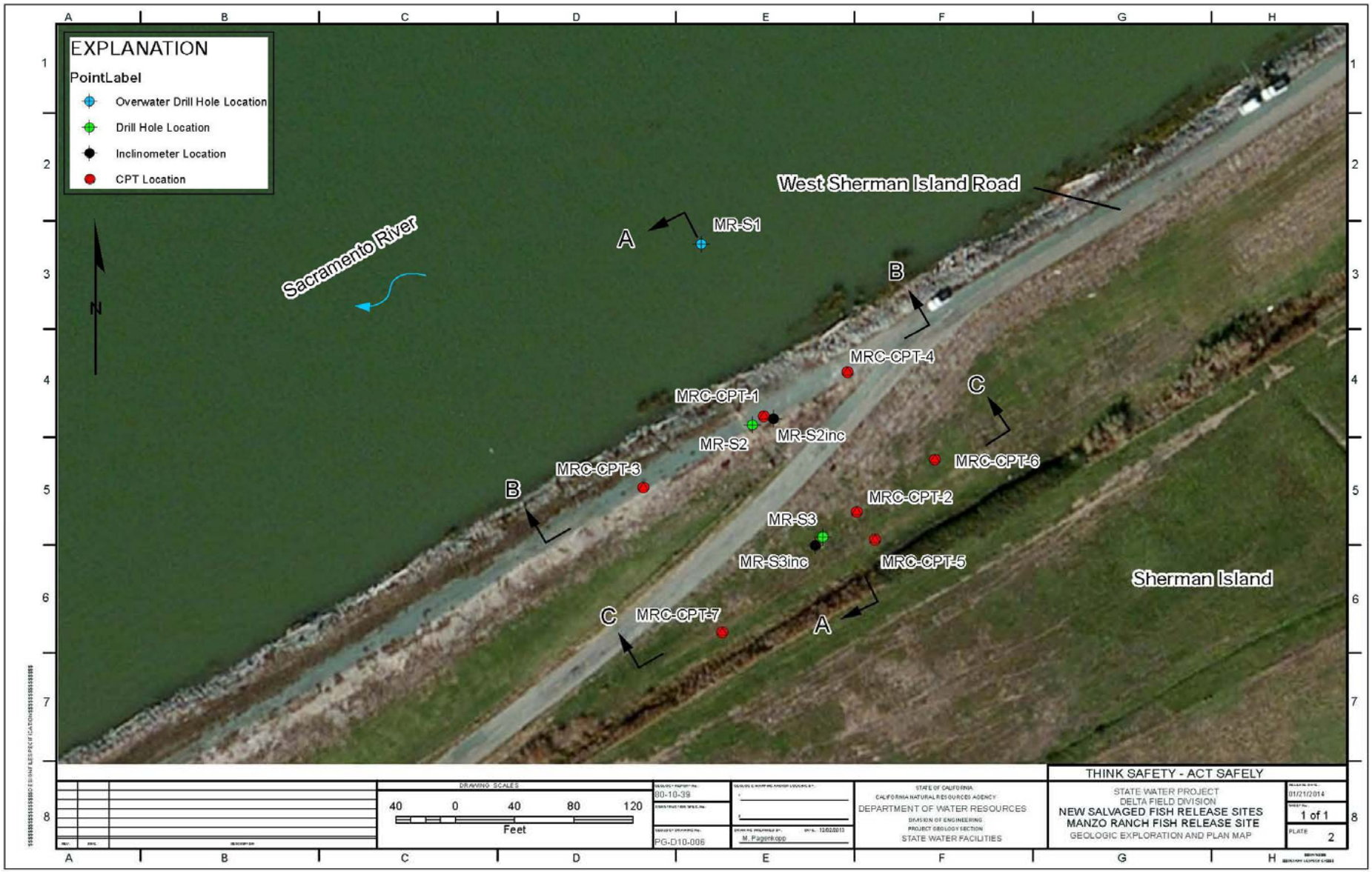
PLATES



Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Vicinity Map

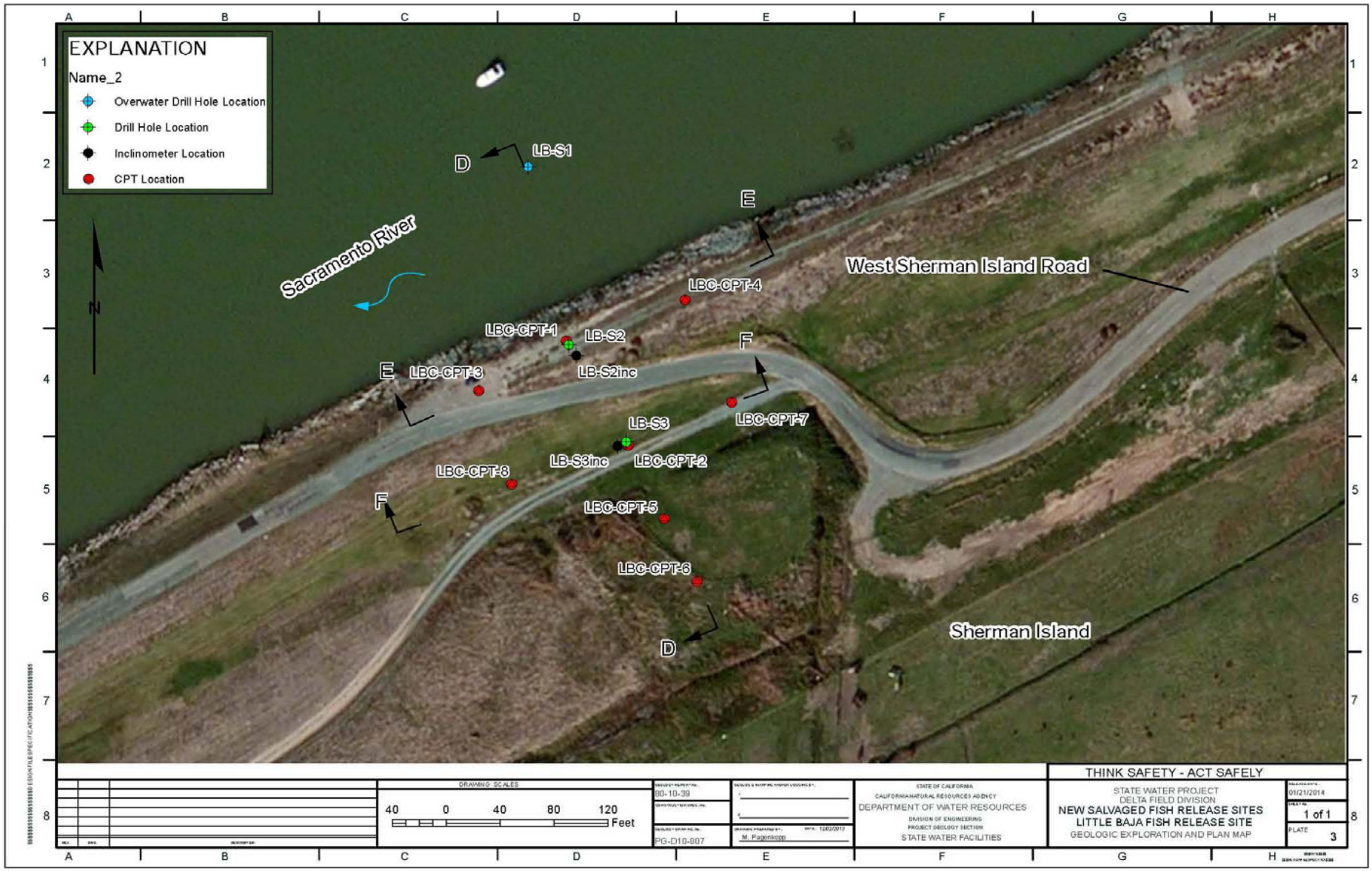
Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 1



Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Site Plan - Manzo Ranch Site

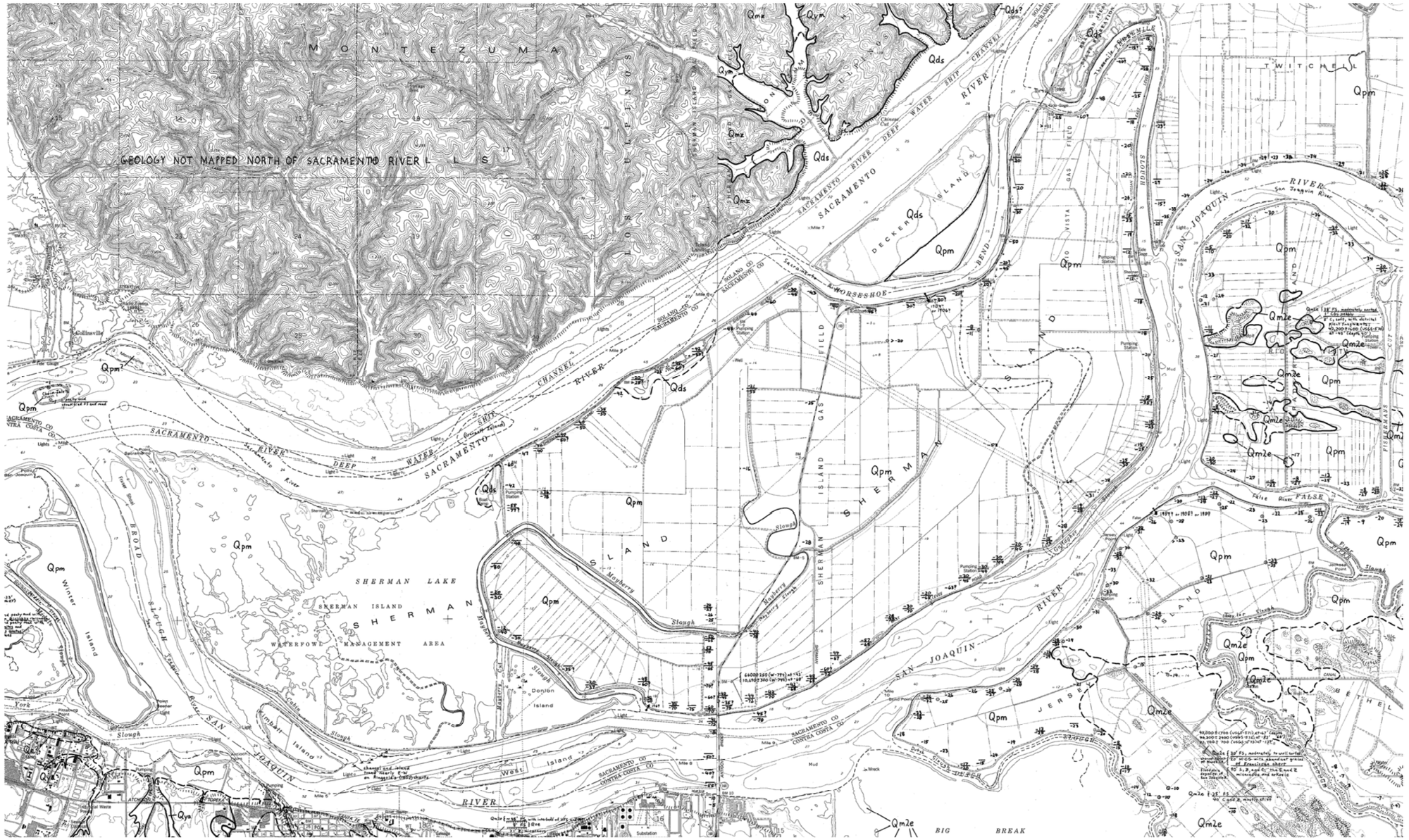
Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 2



Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Site Plan - Little Baja Site

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 3



Qds: Hydraulic-dredge soils (Holocene; post-1900)
Qpm: Peat and mud of tidal wetlands and waterways (Holocene)
Qm2e: Eolian deposits of upper member of Modesto Formation (Upper Pleistocene)
Qym: Younger alluvium of Montezuma Hills and vicinity (Holocene)
Qya: Youngest alluvium of Antioch and vicinity (Holocene)
Qmz: Montezuma Formation (Pleistocene)

Source: Map by Brian F. Atwater 1982.

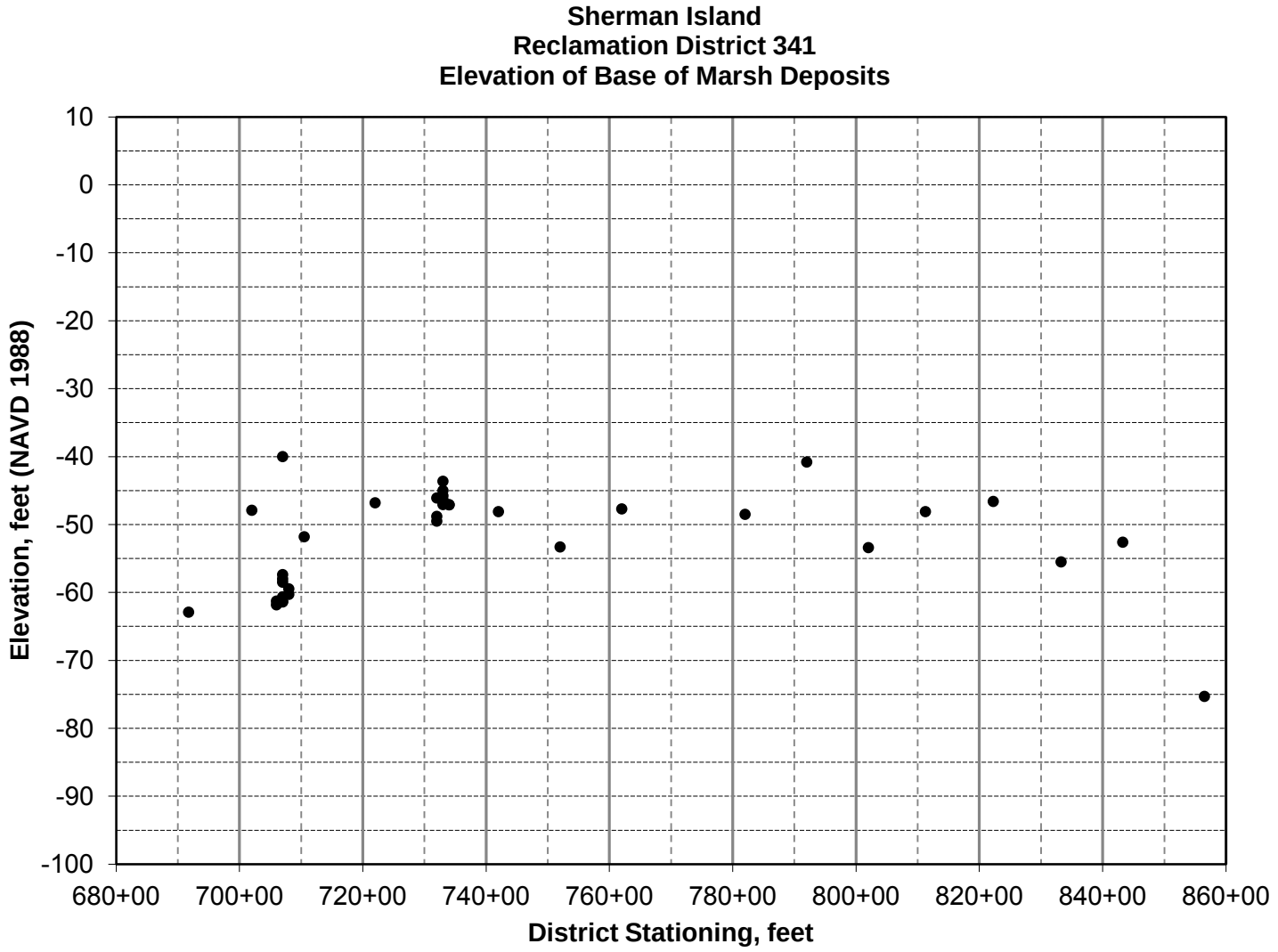
Not to Scale

Elevations at base of soft deposits
-11: Basal deposits peat or peaty mud
-16: Basal deposits mud
(-1): Soft deposits missing; firm or stiff deposits at ground surface at indicated elevation

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Geologic Map

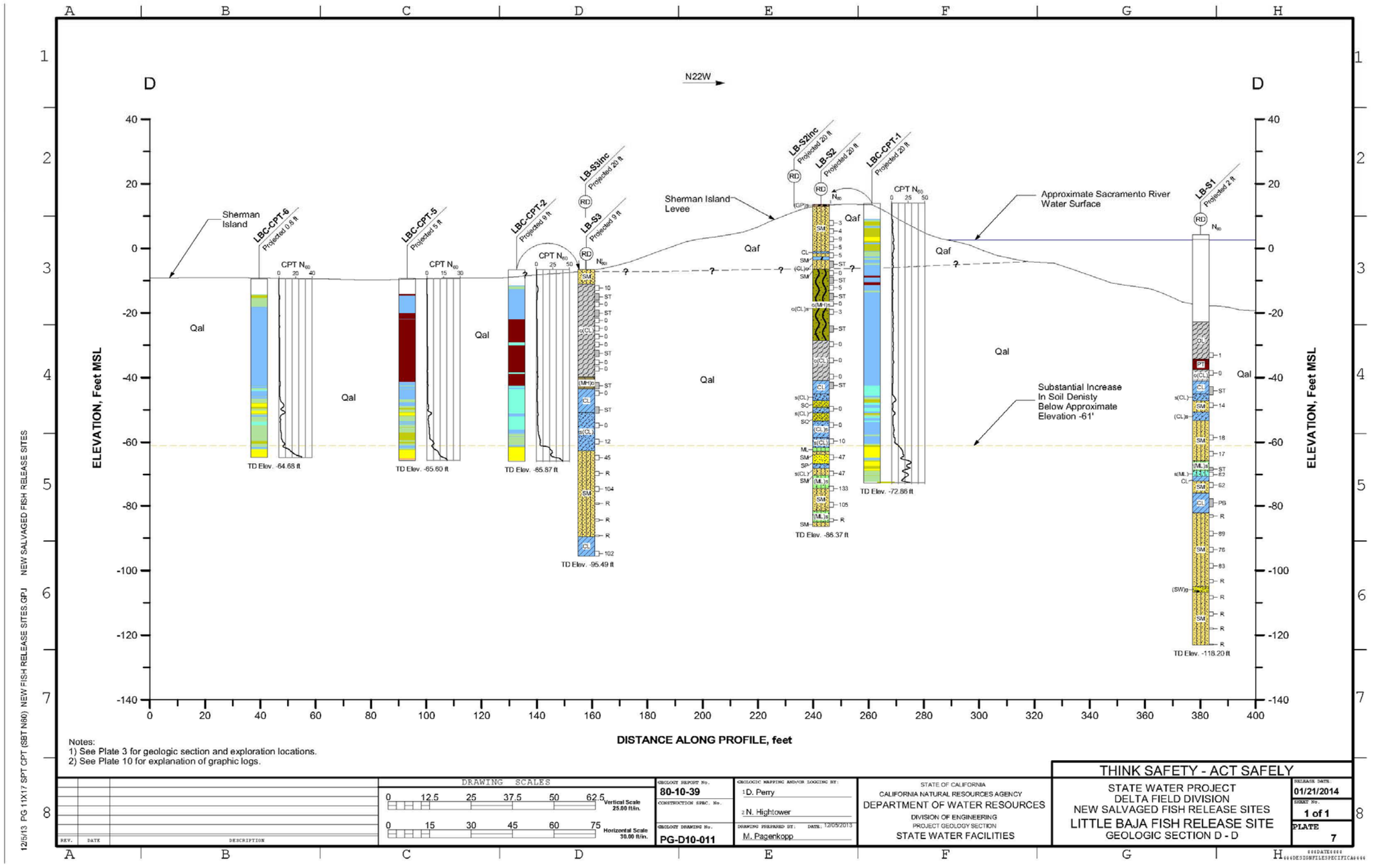
Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 4



Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Base of Marsh Deposits

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 5



Notes:
1) See Plate 3 for geologic section and exploration locations.
2) See Plate 10 for explanation of graphic logs.

DRAWING SCALES
Vertical Scale 25.00 ft/in.
Horizontal Scale 30.00 ft/in.

GEOLOGY REPORT No.	80-10-39
CONSTRUCTION SPEC. No.	
GEOLOGY DRAWING No.	PG-D10-011
GEOLOGIC MAPPING AND/OR LOGGING BY:	1 D. Perry 2 N. Hightower
DRAWING PREPARED BY: DATE: 12/05/2013	M. Pagenkopp

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING
PROJECT GEOLOGY SECTION
STATE WATER FACILITIES

THINK SAFETY - ACT SAFELY

STATE WATER PROJECT
DELTA FIELD DIVISION
NEW SALVAGED FISH RELEASE SITES
LITTLE BAJA FISH RELEASE SITE
GEOLOGIC SECTION D - D

RELEASE DATE: 01/21/2014
SHEET No.: 1 of 1
PLATE 7

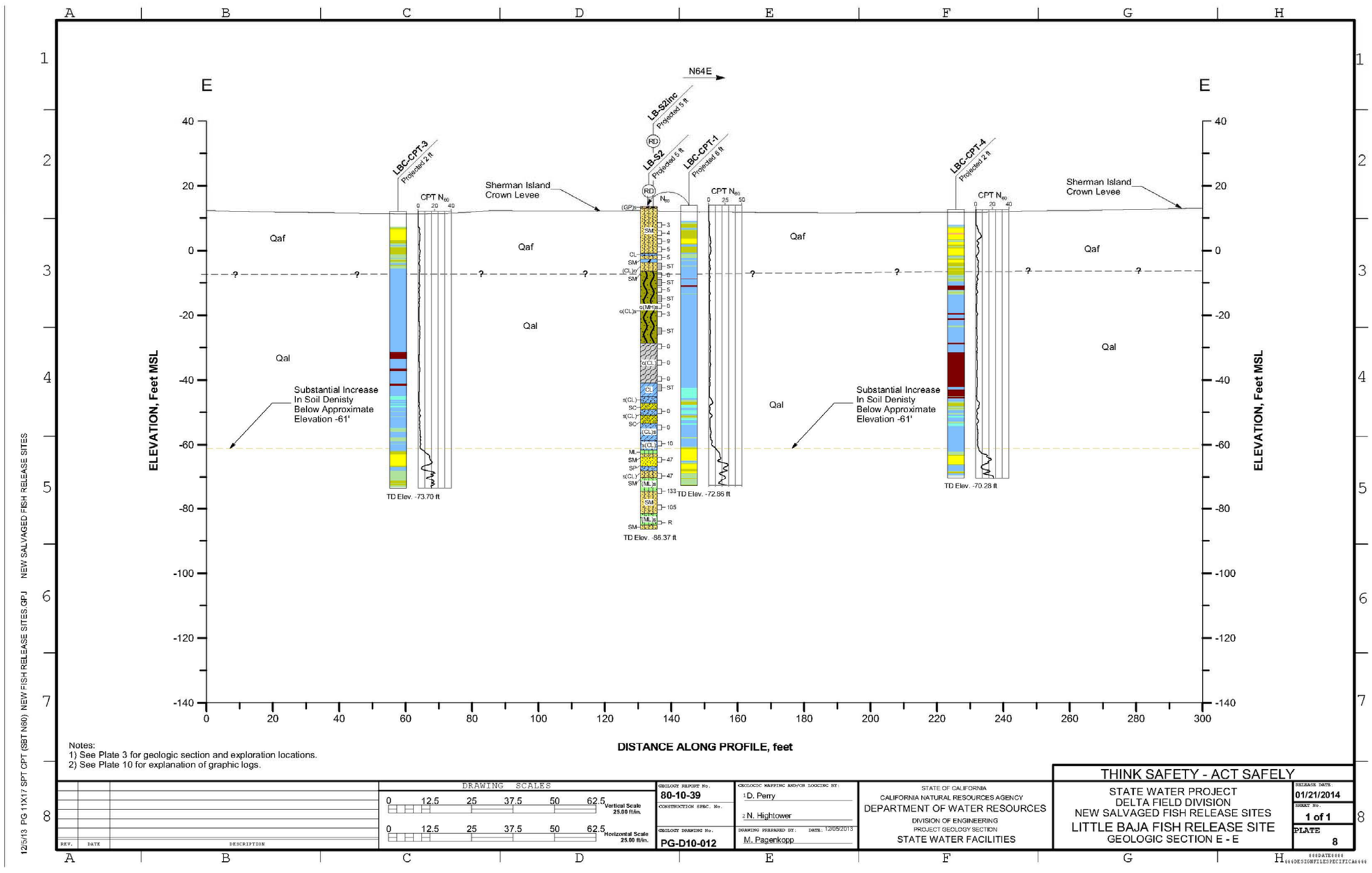
12/5/13 PG 11X17 SPT CPT (SBT N60) NEW FISH RELEASE SITES.GPJ NEW SALVAGED FISH RELEASE SITES

Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

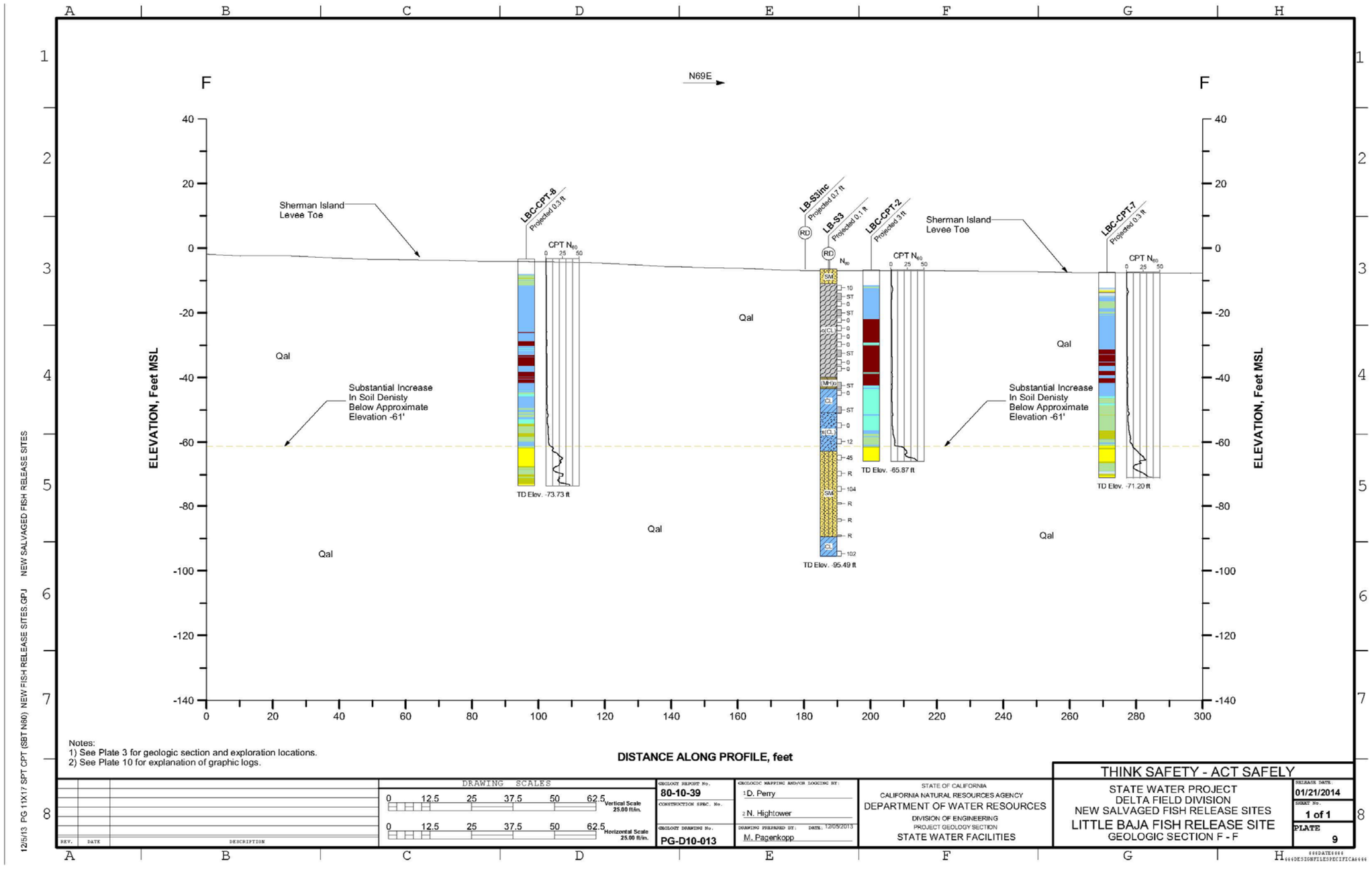
Geologic Sections - Little Baja

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 6



Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California		**Geologic Sections - Little Baja**
Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 7



Notes:
1) See Plate 3 for geologic section and exploration locations.
2) See Plate 10 for explanation of graphic logs.

12/5/13 PG 11X17 SPT CPT (SBT N60) NEW FISH RELEASE SITES.GPJ NEW SALVAGED FISH

REV.	DATE	DESCRIPTION

DRAWING SCALES
Vertical Scale 25.00 ft/in.
Horizontal Scale 25.00 ft/in.

GEOLOGY REPORT No. 80-10-39
CONSTRUCTION SPEC. No.
GEOLOGY DRAWING No. PG-D10-013

GEOLOGIC MAPPING AND/OR LOGGING BY:
1 D. Perry
2 N. Hightower
DRAWING PREPARED BY: M. Pagenkopp DATE: 12/05/2013

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
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PROJECT GEOLOGY SECTION
STATE WATER FACILITIES

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STATE WATER PROJECT
DELTA FIELD DIVISION
NEW SALVAGED FISH RELEASE SITES
LITTLE BAJA FISH RELEASE SITE
GEOLOGIC SECTION F - F

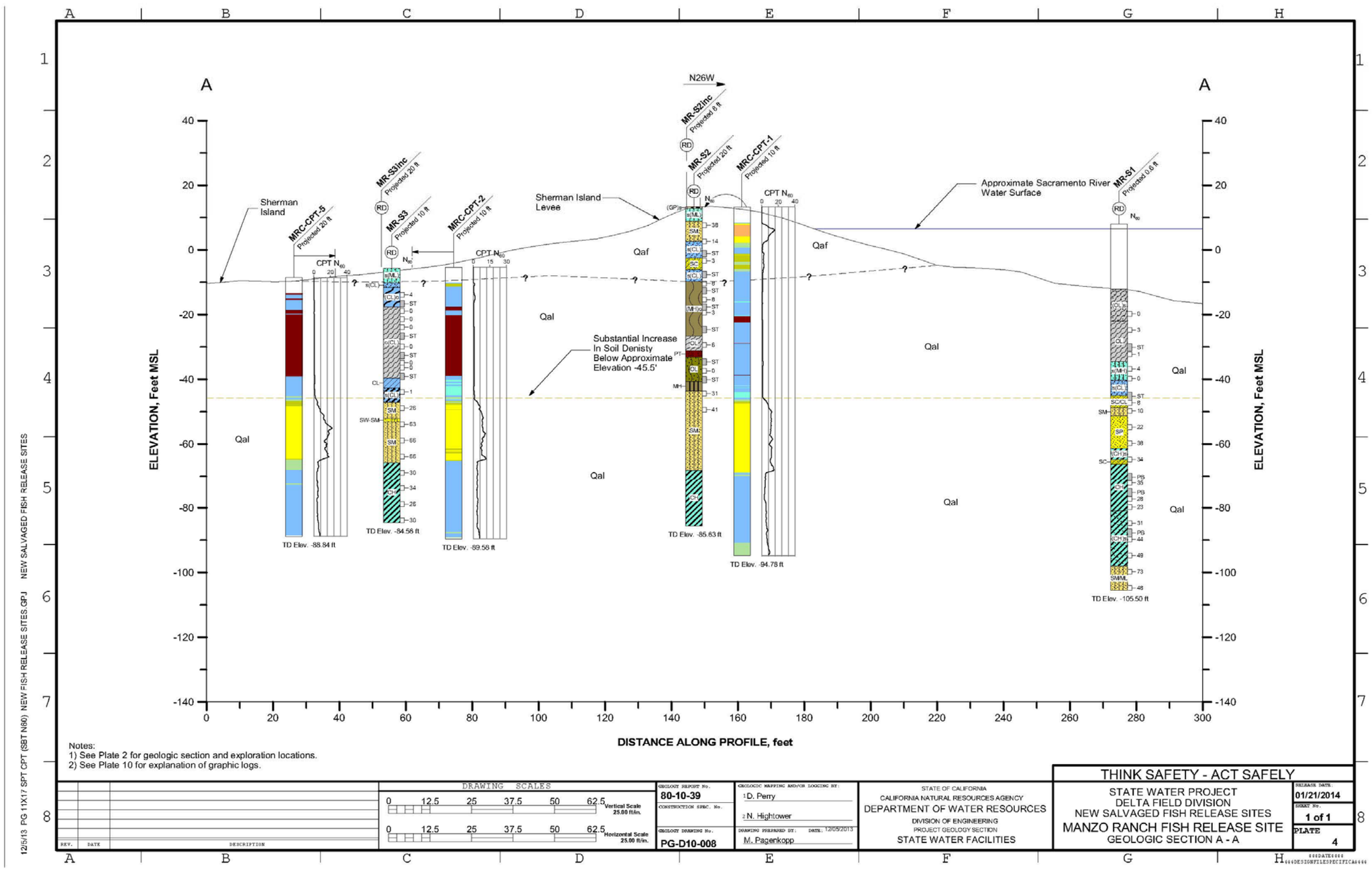
RELEASE DATE: 01/21/2014
SHEET No.: 1 of 1
PLATE: 9

Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Geologic Sections - Little Baja

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 8

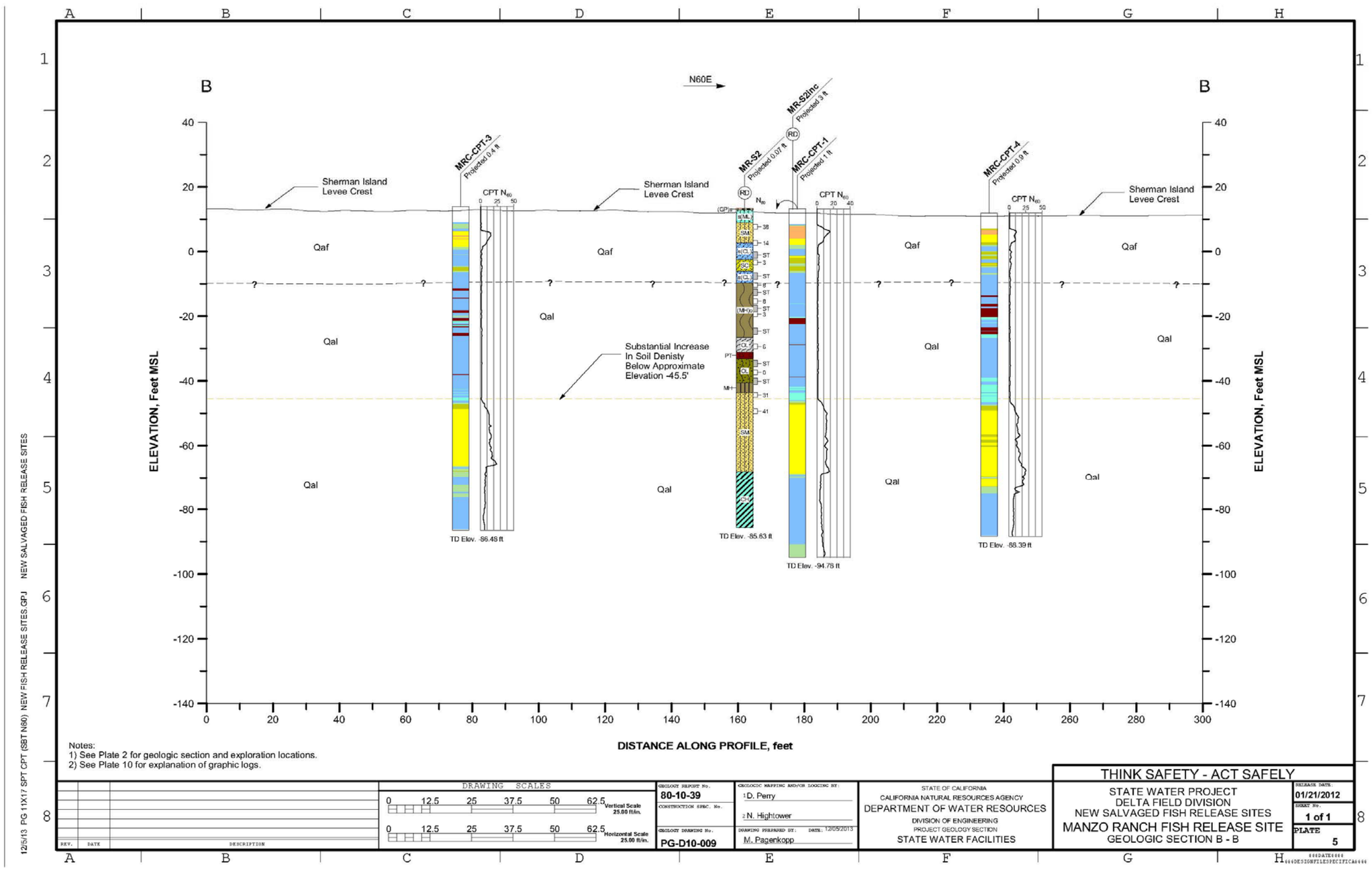


Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Geologic Sections - Manzo Ranch

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 9



Notes:
1) See Plate 2 for geologic section and exploration locations.
2) See Plate 10 for explanation of graphic logs.

DRAWING SCALES
Vertical Scale 25.00 ft/in.
Horizontal Scale 25.00 ft/in.

GEOLOGY REPORT No. 80-10-39
CONSTRUCTION SPEC. No.
GEOLOGY DRAWING No. PG-D10-009

GEOLOGIC MAPPING AND/OR LOGGING BY:
1 D. Perry
2 N. Hightower
DRAWING PREPARED BY: M. Pagenkopp DATE: 12/05/2013

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DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING
PROJECT GEOLOGY SECTION
STATE WATER FACILITIES

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STATE WATER PROJECT
DELTA FIELD DIVISION
NEW SALVAGED FISH RELEASE SITES
MANZO RANCH FISH RELEASE SITE
GEOLOGIC SECTION B - B

RELEASE DATE: 01/21/2012
SHEET No.: 1 of 1
PLATE: 5

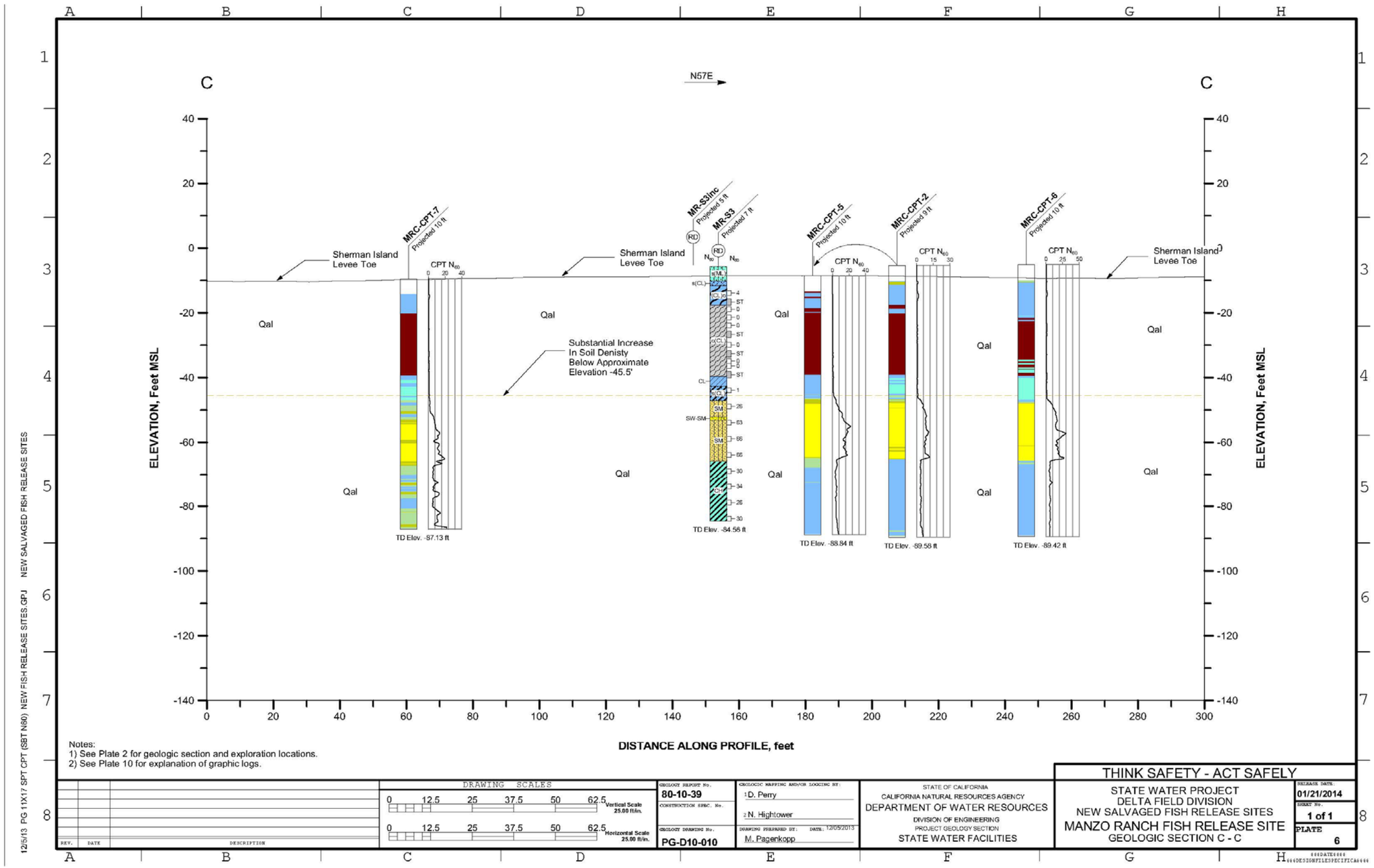
12/5/13 PG 11X17 SPT CPT (SBT N60) NEW FISH RELEASE SITES.GPJ NEW SALVAGED FISH RELEASE SITES

Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Geologic Sections - Manzo Ranch

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 10



Notes:
1) See Plate 2 for geologic section and exploration locations.
2) See Plate 10 for explanation of graphic logs.

DRAWING SCALES
Vertical Scale 25.00 ft/in.
Horizontal Scale 25.00 ft/in.

GEOLOGY REPORT No. 80-10-39
CONSTRUCTION SPEC. No.
GEOLOGY DRAWING No. PG-D10-010
GEOLOGIC MAPPING AND/OR LOGGING BY: 1 D. Perry; 2 N. Hightower
DRAWING PREPARED BY: M. Pagenkopp DATE: 12/05/2013

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING
PROJECT GEOLOGY SECTION
STATE WATER FACILITIES

THINK SAFETY - ACT SAFELY
STATE WATER PROJECT
DELTA FIELD DIVISION
NEW SALVAGED FISH RELEASE SITES
MANZO RANCH FISH RELEASE SITE
GEOLOGIC SECTION C - C

RELEASE DATE: 01/21/2014
SHEET No.: 1 of 1
PLATE: 6

12/5/13 PG 11X17 SPT CPT (SBT N60) NEW FISH RELEASE SITES.GPJ NEW SALVAGED FISH RELEASE SITES

Note: Geologic cross-section from the DWR Project Geology Report 80-10-39.

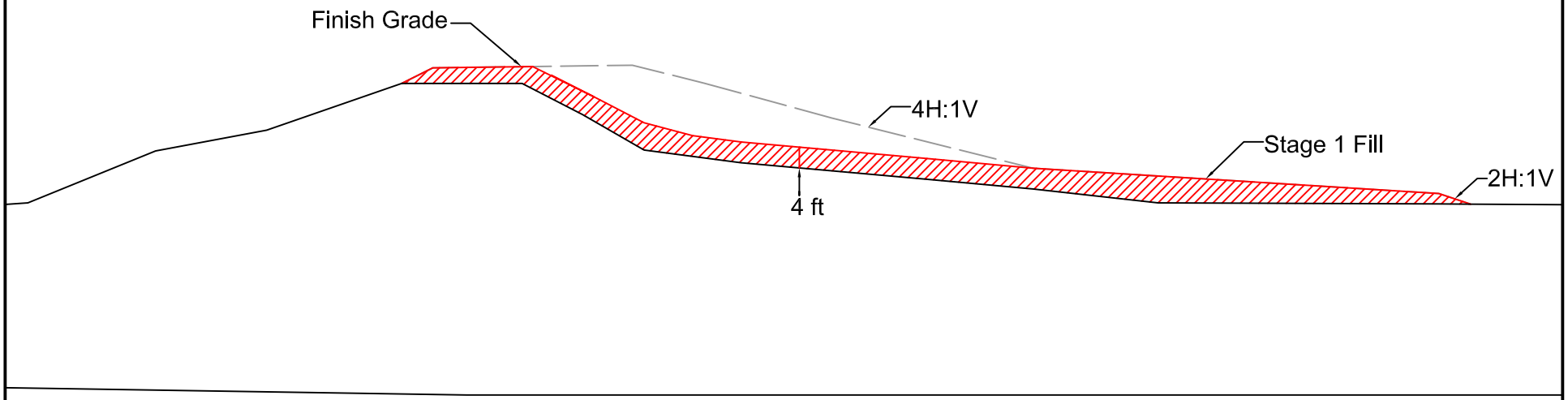
Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Geologic Sections - Manzo Ranch

Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 11

Attachment D

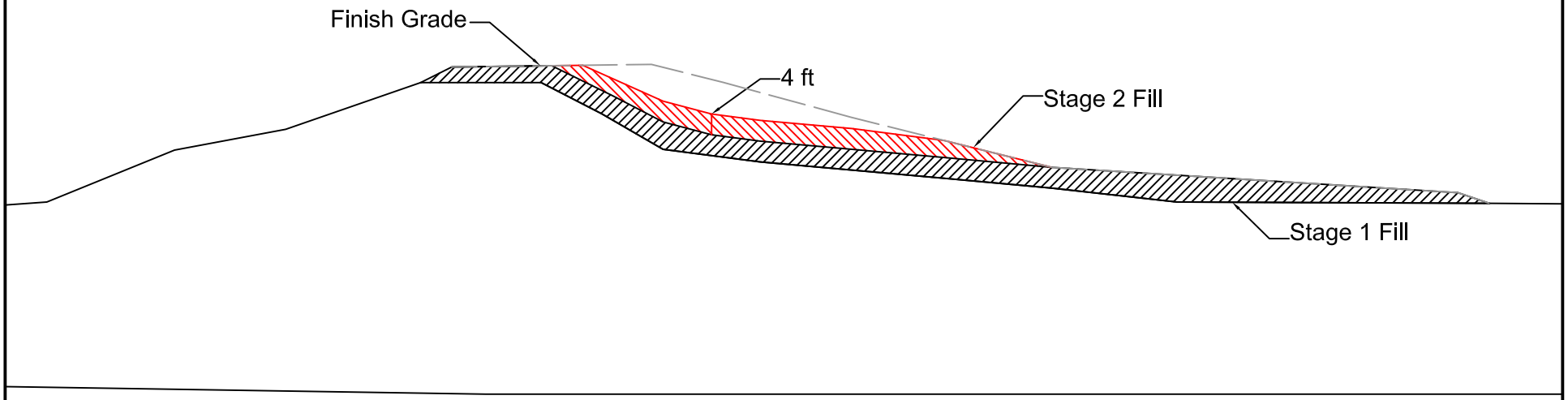
Stage 1



Notes:
1. New fill of up to 4 feet thick should be placed on the levee crest / slope and toe berm area.
2. The toe berms should be constructed before the slope is graded.

Not to Scale	Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California	**Typical Design Configuration - Stage 1**	
	Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 12

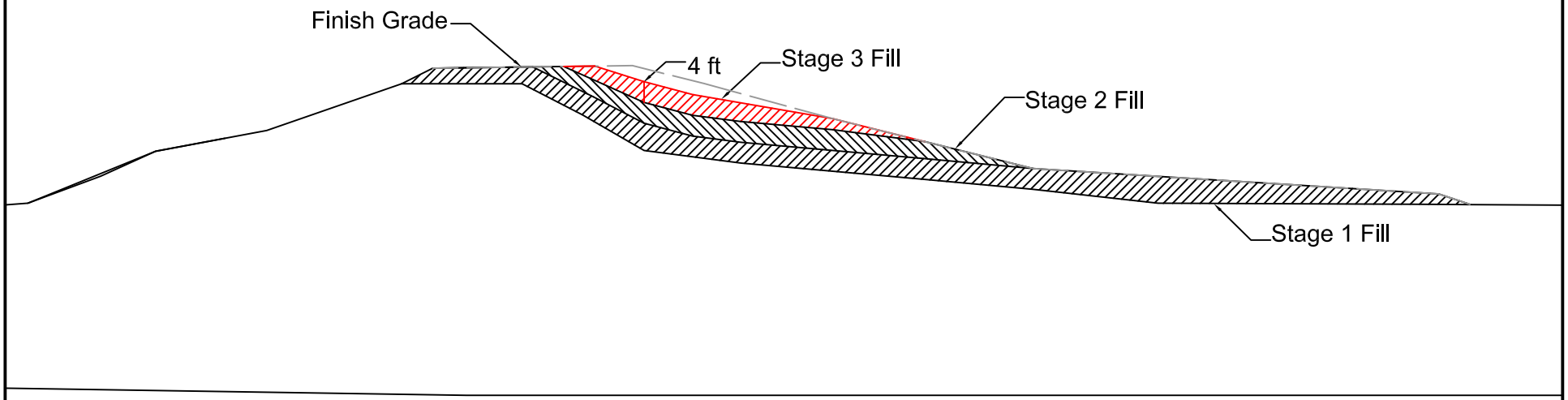
Stage 2 (4 months)



Notes:
1. Stage 2 fill should be placed at least 4 months after Stage 1.

Not to Scale	Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California	**Typical Design Configuration - Stage 2**	
	Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 13

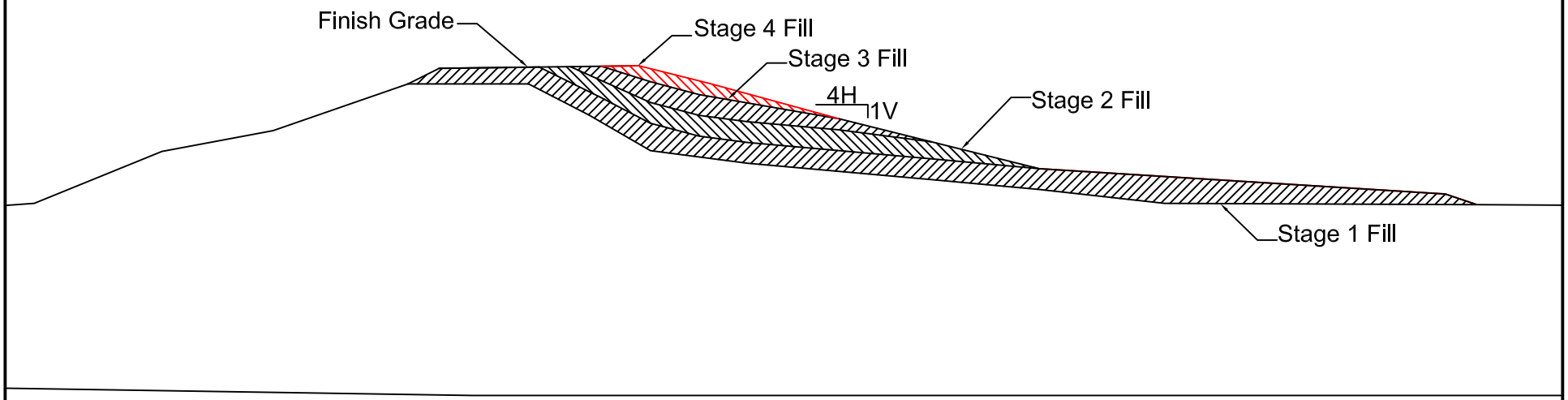
Stage 3 (8 months)



Notes:
1. Stage 3 fill should be placed at least 4 months after Stage 2.

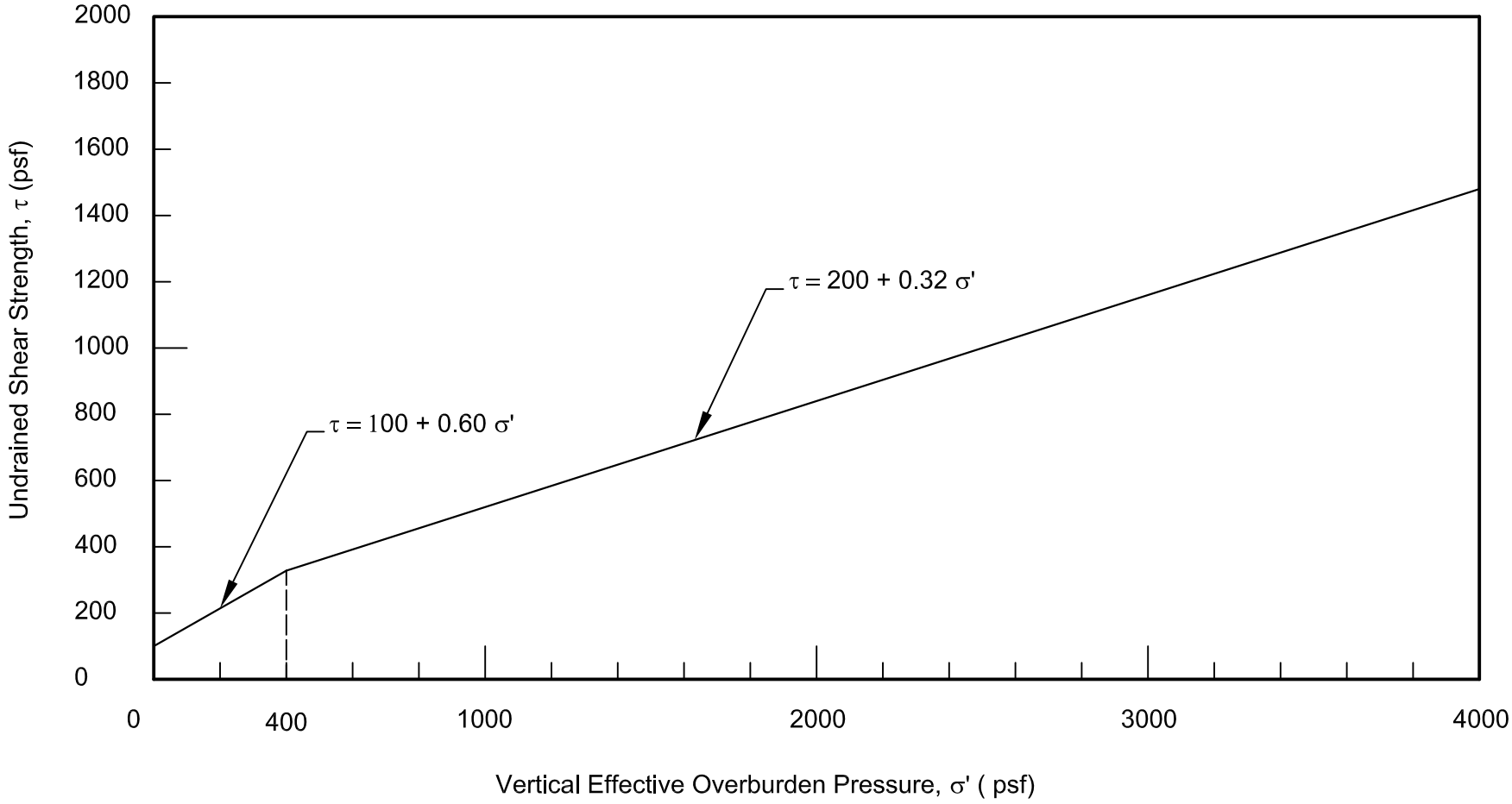
Not to Scale	Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California	**Typical Design Configuration - Stage 3**	
	Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 14

Stage 4 (12 months)

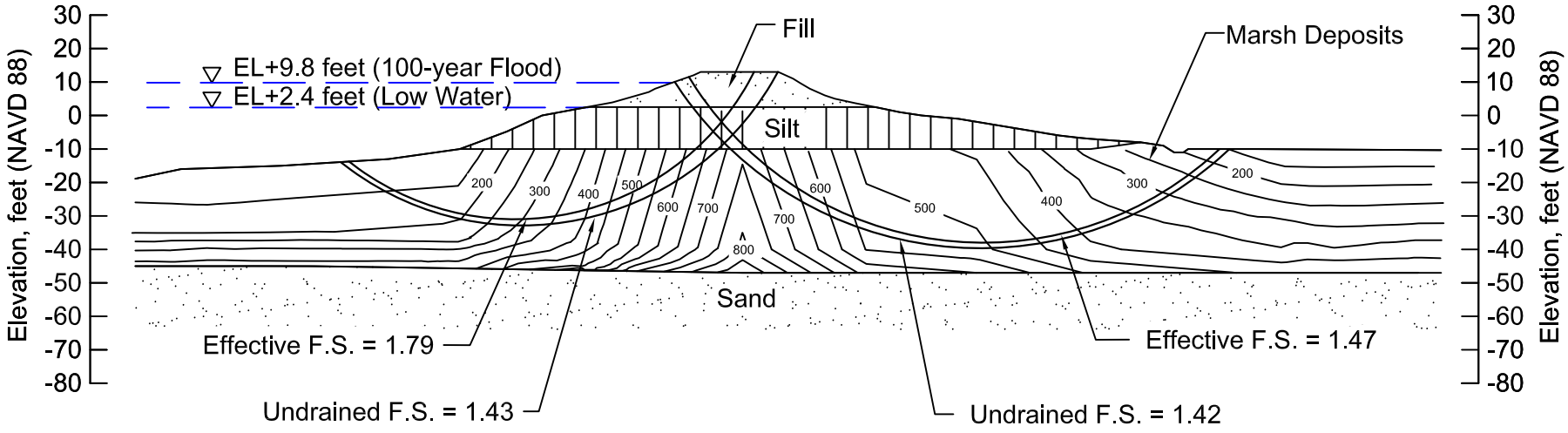


Notes:
1. Stage 4 fill should be placed at least 4 months after Stage 3.
2. Raise crest as needed to accommodate the first year settlement and future settlement.

Not to Scale	Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California	**Typical Design Configuration - Stage 4**	
	Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 15



Not to Scale	Sherman Island - Two Fish Release Sites Reclamation District 341 Sacramento County, California	**Undrained Strength Envelope for Stability Analysis (End of Construction Conditions)**	
	Hultgren - Tillis Engineers	Project No. 789.04	Plate No. 16



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70	*		100	32
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

*See Undrained Strength Contours above

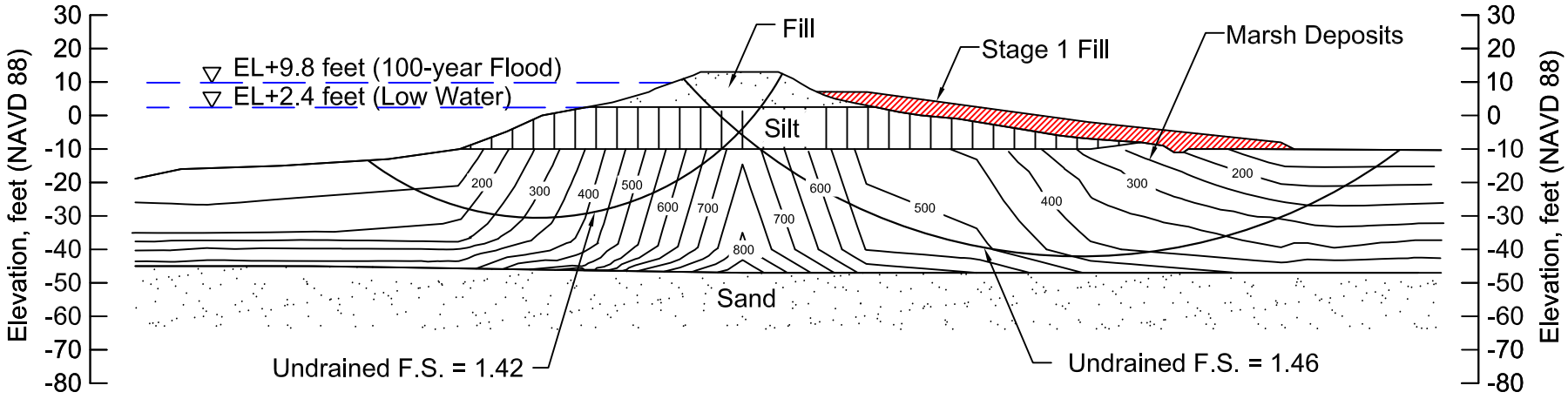
Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

SCALE
0 50 feet
1 inch = 50 feet

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
Existing Levee
Manzo Ranch

Hultgren - Tillis Engineers | Project No. 789.04 | Plate No. 17



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70	See Undrained Strength Contours above			
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

SCALE
0 50 feet
1 inch = 50 feet

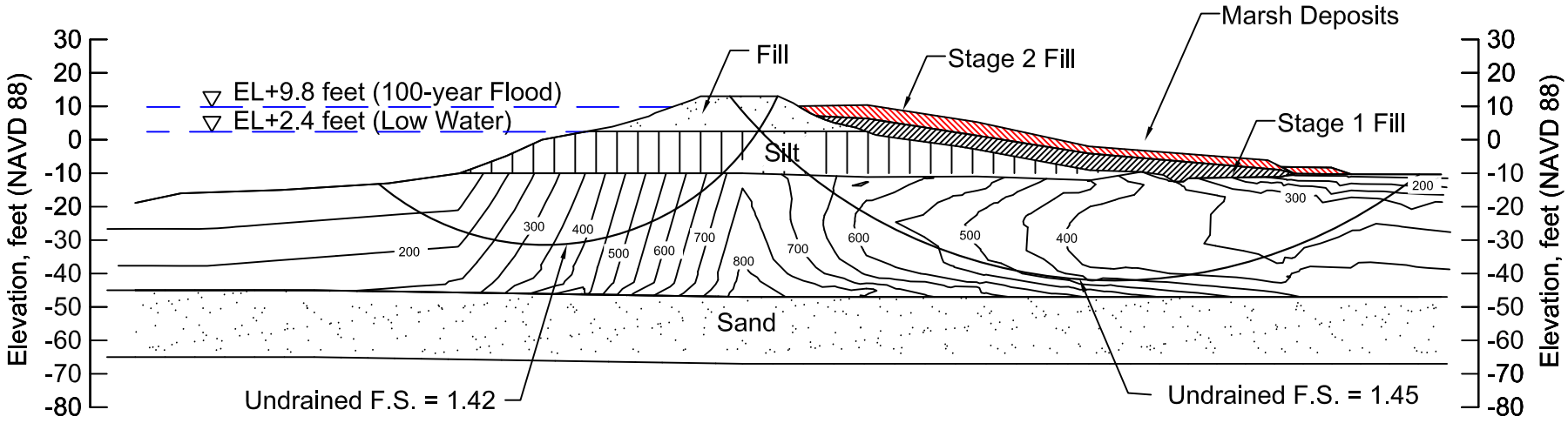
Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
End of Construction - Stage 1
Manzo Ranch

Hultgren - Tillis Engineers

Project No. 789.04

Plate No. 18



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70	See Undrained Strength Contours above			
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

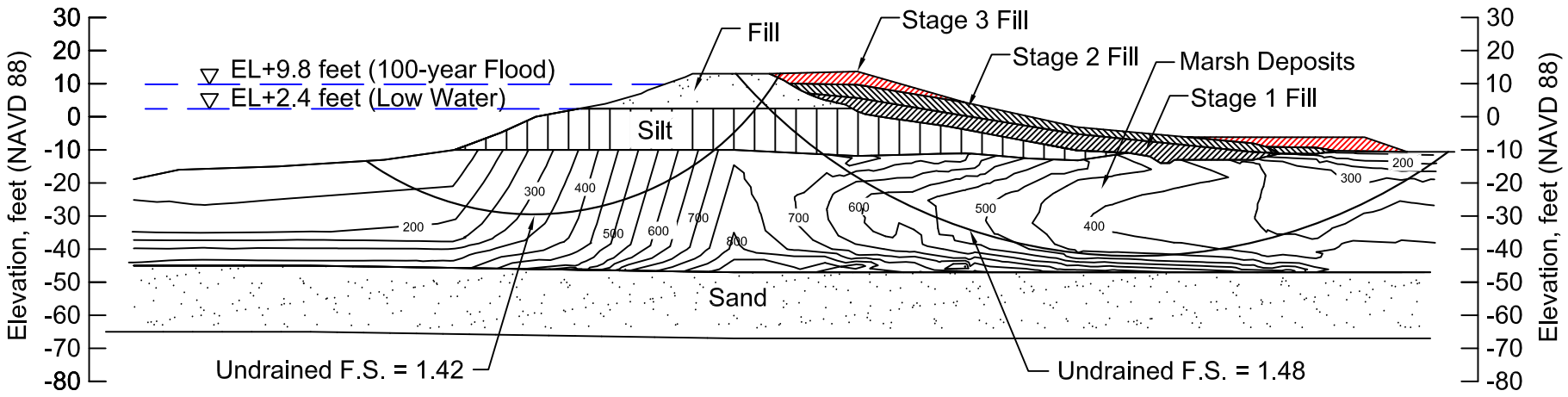
SCALE
0 50 feet
1 inch = 50 feet

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
End of Construction - Stage 2
Manzo Ranch

Hultgren - Tillis Engineers | Project No. 789.04 | Plate No. 19

Attachment D



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70	See Undrained Strength Contours above			
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

SCALE
0 50 feet
1 inch = 50 feet

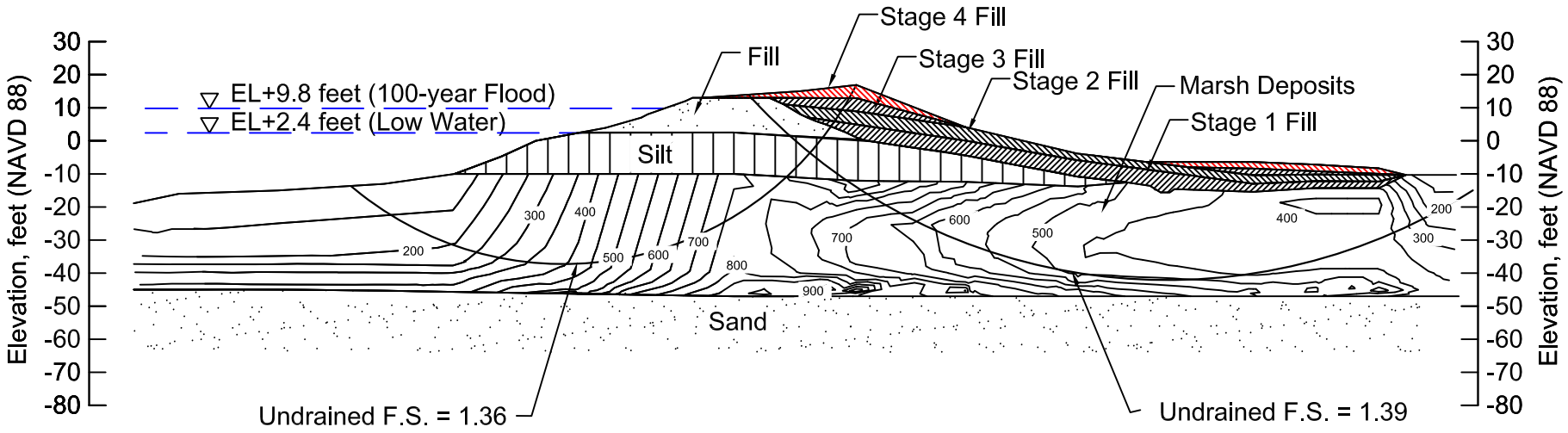
Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
End of Construction - Stage 3
Manzo Ranch

Hultgren - Tillis Engineers

Project No. 789.04

Plate No. 20



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70	See Undrained Strength Contours above			
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

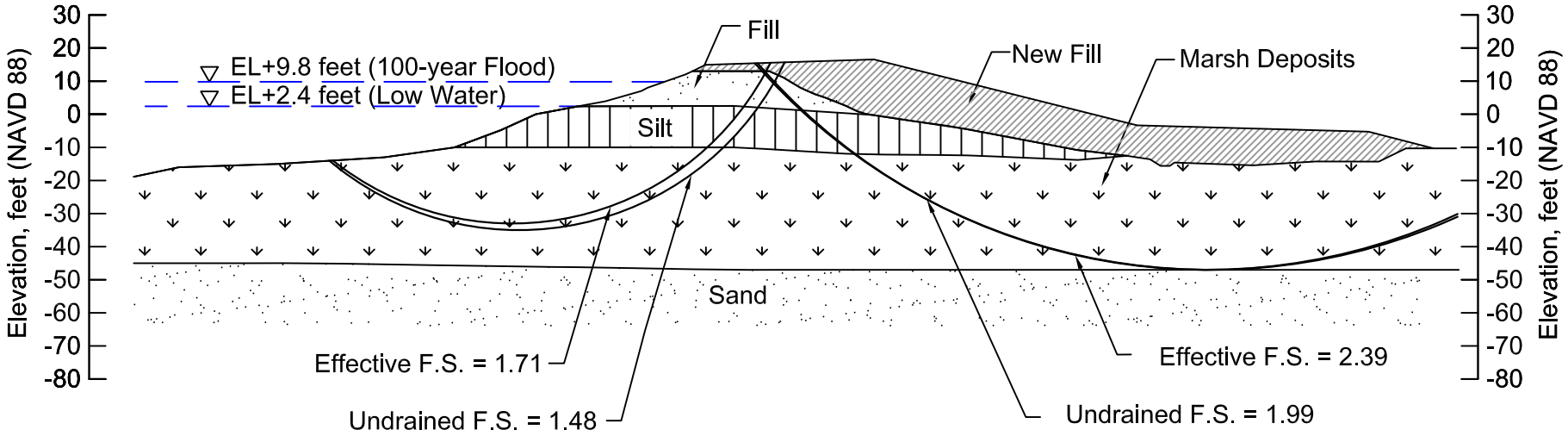
Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

SCALE
0 50 feet
1 inch = 50 feet

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
End of Construction - Stage 4
Manzo Ranch

Hultgren - Tillis Engineers | Project No. 789.04 | Plate No. 21



SOIL PARAMETERS

Soil Type	Unit Weight (pcf)	Undrained Strength		Effective Strength	
		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)
Fill	115	-	-	50	32
Marsh Deposits	70			100	32
Silt	100	500	-	100	32
Sand	125	-	-	50	38
New Fill	115	-	-	50	32

Note: River stages at 9.8 ft flood level and at 2.4 ft low water level were used in the slope stability analysis for the landside and waterside, respectively.

SCALE
0 50 feet
1 inch = 50 feet

Sherman Island - Two Fish Release Sites
Reclamation District 341
Sacramento County, California

Slope Stability Results
Long-Term After Construction
Manzo Ranch

Hultgren - Tillis Engineers

Project No. 789.04

Plate No. 22