Meeting of the Central Valley Flood Protection Board
August 28, 2015

Staff Report

Reclamation District 108
Knight's Landing Outfall Gates Fish Weir Project, Colusa County

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1.0 – ITEM

Consider Central Valley Flood Protection Board (Board) approval to install a positive barrier (fish weir) immediately downstream of the Knights Landing Outfall Gates (KLOG), and to repair an erosion site along 100 linear feet of the right bank of the Colusa Basin Drain (Attachment A) immediately downstream of the KLOG structure by draft Permit No. 19037 (Attachment B).

2.0 – APPLICANT

Reclamation District 108 (RD 108)

3.0 – PROJECT LOCATION

The project is located at the Colusa Basin Drain (CBD) south of Road 108 near the town of Knights Landing (approximate population 1,000 per the 2010 Census) (Attachment A).

4.0 – PROJECT DESCRIPTION

RD 108 proposes to install a positive barrier fish weir (a metal picket or "Alaskan Weir") on the downstream side of the KLOG to prevent adult salmon from entering the CBD. RD 108 also proposes to make erosion repairs on the right bank of the CBD (Attachment C). The barrier will consist of new concrete wingwalls and picket weirs that would be constructed on an existing concrete apron. The picket weirs would be raised and lowered remotely to prevent adult salmonids from passing through the KLOG. The erosion repair would consist of placing riprap along 100 linear feet of bank, and restoring the levee design conditions by restoring the waterside slope to between 2.5:1 and 3:1 (horizontal:vertical).

5.0 – AUTHORITY OF THE BOARD

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

Title 23:

- § 6 – Need for a Permit
- § 108 – Existing Encroachments
- § 112 – Streams Regulated and Nonpermissible Work Periods
- § 113 – Dwelling and Structures Within an Adopted Plan of Flood Control
- § 116 – Borrow and Excavation Activities
- § 120 – Levees
- § 121 – Erosion Control
- § 131 – Vegetation

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

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

- The U.S. Army Corps of Engineers (USACE) 408 Decision Letter was received on August XX, 2015 and indicated that the USACE District Engineer has no objection to the project, subject to conditions. This letter has been incorporated into the permit as Exhibit A.

- The Department of Water Resources (DWR) conditionally approved this project in a letter dated June 19, 2015 (Attachment D).

Board staff has incorporated the intent of DWR's endorsement conditions into the draft permit as follows:

> Bullet No.1 (in Attachment D) has been addressed through DWR staff participation in bi-weekly coordination meetings with the applicant and all permitting agencies where the project design, permitting, and construction plans have been discussed.
>
> Bullet No. 2 has been incorporated into the project drawings.
>
> Bullet No. 3 has been incorporated into permit condition No. 32.

Bullet Nos. 4 and 5 have been incorporated into permit condition Nos. 16 and 17

Bullet No. 6 was not incorporated into the draft permit because Board staff do not dictate specific conditions for the USACE to include in their 408 Decision Letter.

Board staff has discussed the reasoning for inclusion or exclusion of these requested conditions with DWR staff, and DWR understands and accepts the permit as drafted.

7.0 – PROJECT ANALYSIS

7.1 – Project Construction Details

The proposed project consists of construction of new concrete wing walls, installation of a metal picket weir (Alaskan Weir), installation of rock slope protection, and the removal of vegetation for construction access purposes. All project features will be constructed on the downstream side of the KLOG structure. The concrete wing walls and metal picket weir will be constructed on the existing concrete apron, and the metal picket weir will be designed to prevent salmon from entering into the KLOG gates.

The new wing walls will be approximately 37 feet long (including the existing wing walls), 14 feet high, and 14 inches thick. There will be approximately 16 feet between each wall. The new wings walls will be constructed so that they incorporate the existing wing wall and will be constructed in place on the existing and dewatered concrete slab apron. Rebar will be dowelled into the apron and encapsulated by the new wing walls. A total of five (5) 14-inch thick walls will be built creating four (4) individual channels extending out from the KLOG structure, with two (2) flap gates draining into each of the four (4) channels. The existing catwalk will be removed and a new catwalk will be installed approximately two (2) feet higher than existing.

The erosion repair site is at the base of the right bank of the CBD, immediately downstream from the KLOG. The repairs will consist of placing riprap along 100 linear feet of bank and restoring the levee design conditions with a waterside slope between 2.5:1 and 3:1 (horizontal:vertical). Rock placement will extend approximately 30 feet up the bank.

7.2 – Hydraulic Summary

The KLOG is designed to protect the lower CBD from Sacramento River backwater and to help control CBD water levels during the irrigation season. A hydraulic analysis (Attachment E) was conducted by CBEC Engineering for the applicant. An existing CVFED HEC-RAS model data set was truncated down to the limits of the KLOG channel (between the Knights Landing Ridge Cut and the Sacramento River) and used

observed water stage and gate operations data from two time periods in 2010 and 2011 as boundary conditions.

The hydraulic assessment indicated that installation of the proposed fish weir will divert a small portion (less than 4%) of the total CBD discharge from the KLOG (flowing into the Sacramento River) to the Ridge Cut (flowing into the Yolo Bypass) due to the backwater effect of the weir (see Table 2 of Attachment E). A conservative 5% of the total value was added to the estimated maximum daily flow diverted to the Yolo Bypass during four historic flood events (1986, 1997, 2006, and 2011). The additional computed volume of flow diverted to the Yolo Bypass is insignificant (less than 0.01%) and should therefore not adversely affect peak stages during future flood events.

Based on review of the submitted hydraulic analysis results Board staff has determined that the proposed KLOG project is expected to result in no adverse hydraulic impacts to the CBD, KLOG structure, or any facilities or channels of the Sacramento River Flood Control Project and State Plan of Flood Control.

7.3 – Geotechnical Summary

A geotechnical analysis was not completed for this project. The work proposed will be conducted either in channel or above ground with minimal penetration or excavation therefore a geotechnical analysis is not required.

8.0 – CEQA ANALYSIS

Board staff has prepared the following California Environmental Quality Act (CEQA) determination:

The Board, as a responsible agency under CEQA, has reviewed the Initial Study and Mitigated Negative Declaration (IS/MND) (SCH No. 2015062004, June 2015) and the Mitigation Monitoring and Reporting Plan for the Knights Landing Outfall Gates Project, prepared by the lead agency, Reclamation District 108. These documents, including project design, may be viewed or downloaded from the Board's website at http://www.cvfpb.ca.gov/meetings/2015/08-28-2015.cfm under a link for this agenda item. These documents are available for review in hard copy at the Board and Reclamation District 108 offices.

Reclamation District 108 determined that the project would not have a significant effect on the environment on July 16, 2015 and filed a Notice of Determination on July 21, 2015 with the State Clearinghouse. 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 biological resources, cultural resources, hazards and hazardous materials, hydrology and water quality, and noise. The description of the mitigation measures are further described in the adopted IS/MND.

9.0 – CALIFORNIA WATER CODE SECTION 8610.5 CONSIDERATIONS

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

  The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group. Scientific and technical review of the scope of work has been coordinated throughout the design and permit application review process with the USACE, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, National Marine Fisheries Service, DWR, and California Department of Fish and Wildlife.

- The best available science related to the scientific issues presented by the executive officer, legal counsel, the Department of Water Resources, or other parties that raise credible scientific issues:

  The accepted industry standards for the work proposed under this permit as regulated by Title 23 have been applied to the review of this permit. On the important issue of hydraulic impacts, RD 108 has had its hydraulic engineering consultant evaluate the proposed weir and has determined that the project will not cause adverse hydraulic impacts to Yolo Bypass.

- Effects of the decision on the 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:

  This project has no adverse effect on facilities of the State Plan of Flood Control and is consistent with the Central Valley Flood Protection Plan and current Title 23 standards because the proposed project is expected to cause no significant increase in WSE, no substantial increase in channel velocities, and no adverse geotechnical impacts to the Colusa Basin Drain, Yolo Bypass or any SPFC facilities.

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

  There are no foreseeable projected future events that would impact this project.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Adopt:

- the CEQA findings;

Approve:

- draft Encroachment Permit No. 19037 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 Map and Photos

B – Draft Permit No. 19037

Exhibit A: USACE 408 Decision Letter

C – Project Drawings

D – DWR Endorsement Letter

E – Hydraulic Analysis Summary

Prepared By:	Ilene Wellman-Barbree, PE, Senior Engineer, Projects and Environmental Branch
Environmental Review:	Andrea Buckley, Senior Environmental Scientist (Specialist)
Staff Report Review:	Eric Butler, PE, Supervising Engineer, Projects and Environmental Branch Chief
	Mitra Emami, PE for Len Marino, PE, Chief Engineer
	Nicole Rinke, Deputy Attorney General
	Leslie Gallagher, Acting Executive Officer

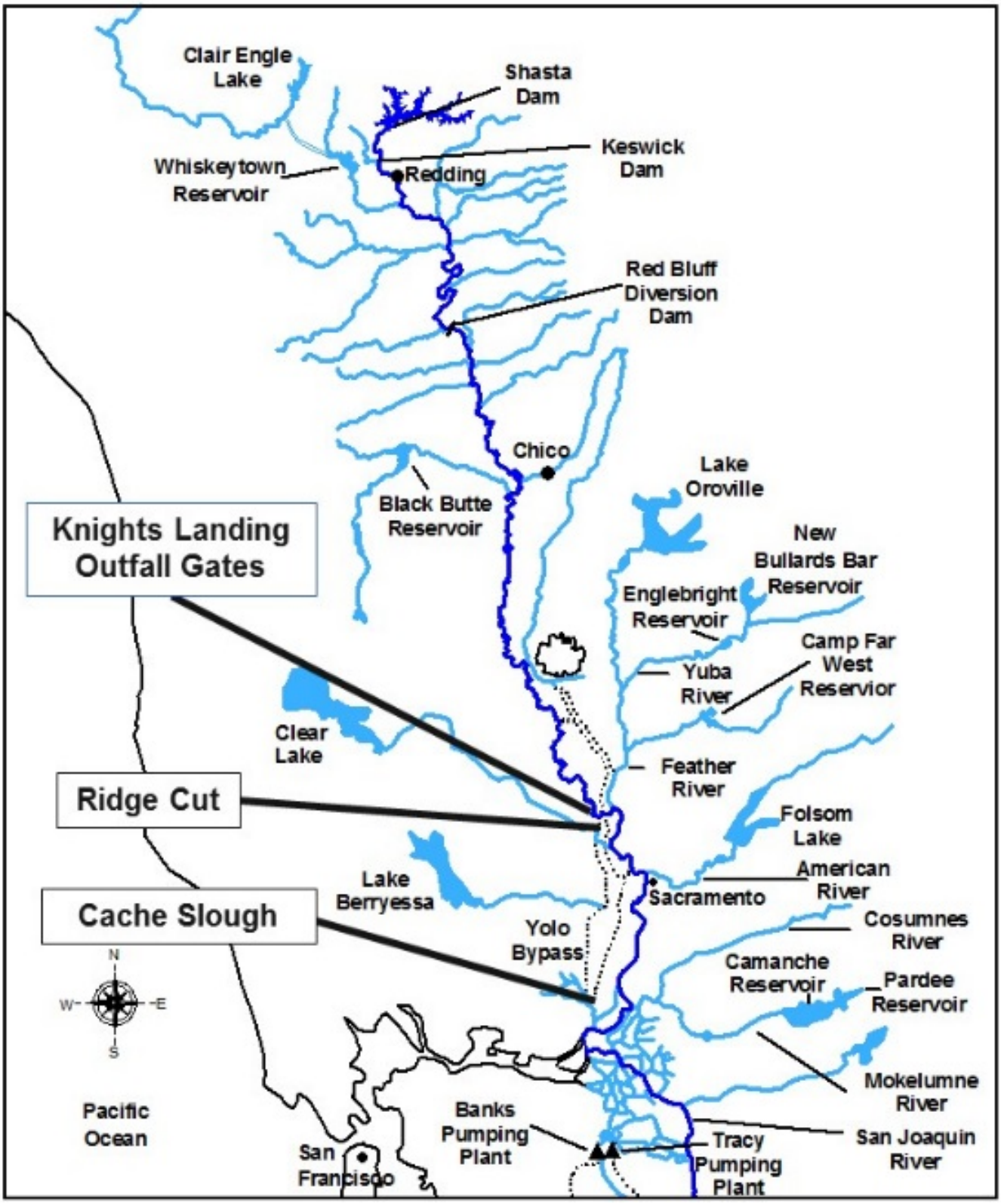
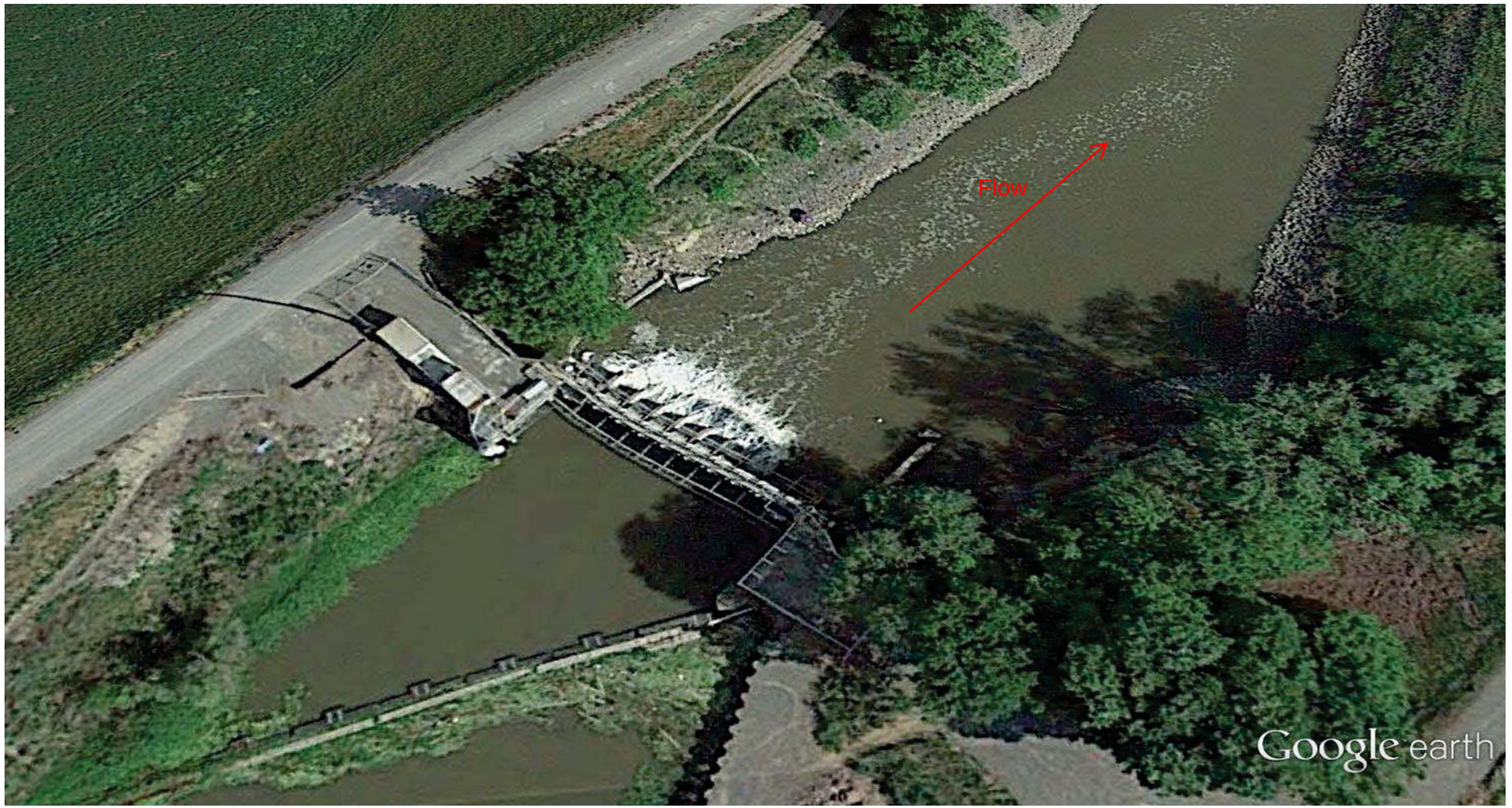
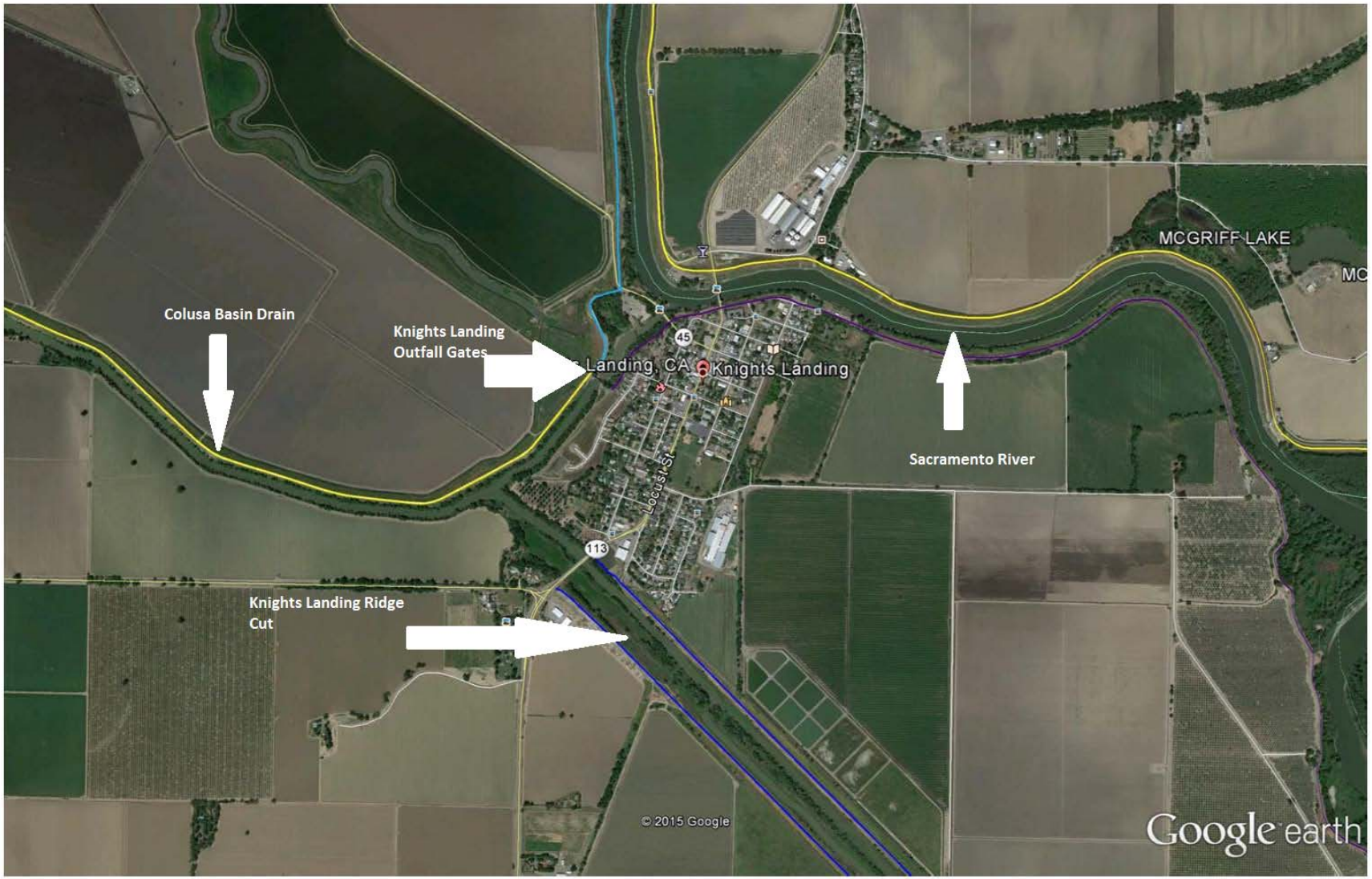


Figure 1 – Knights Landing Outfall Gates - Location Map

Photograph 1 – Aerial View Knights Landing Outfall Gate (KLOG)



Photograph 2 – Aerial View Close-up



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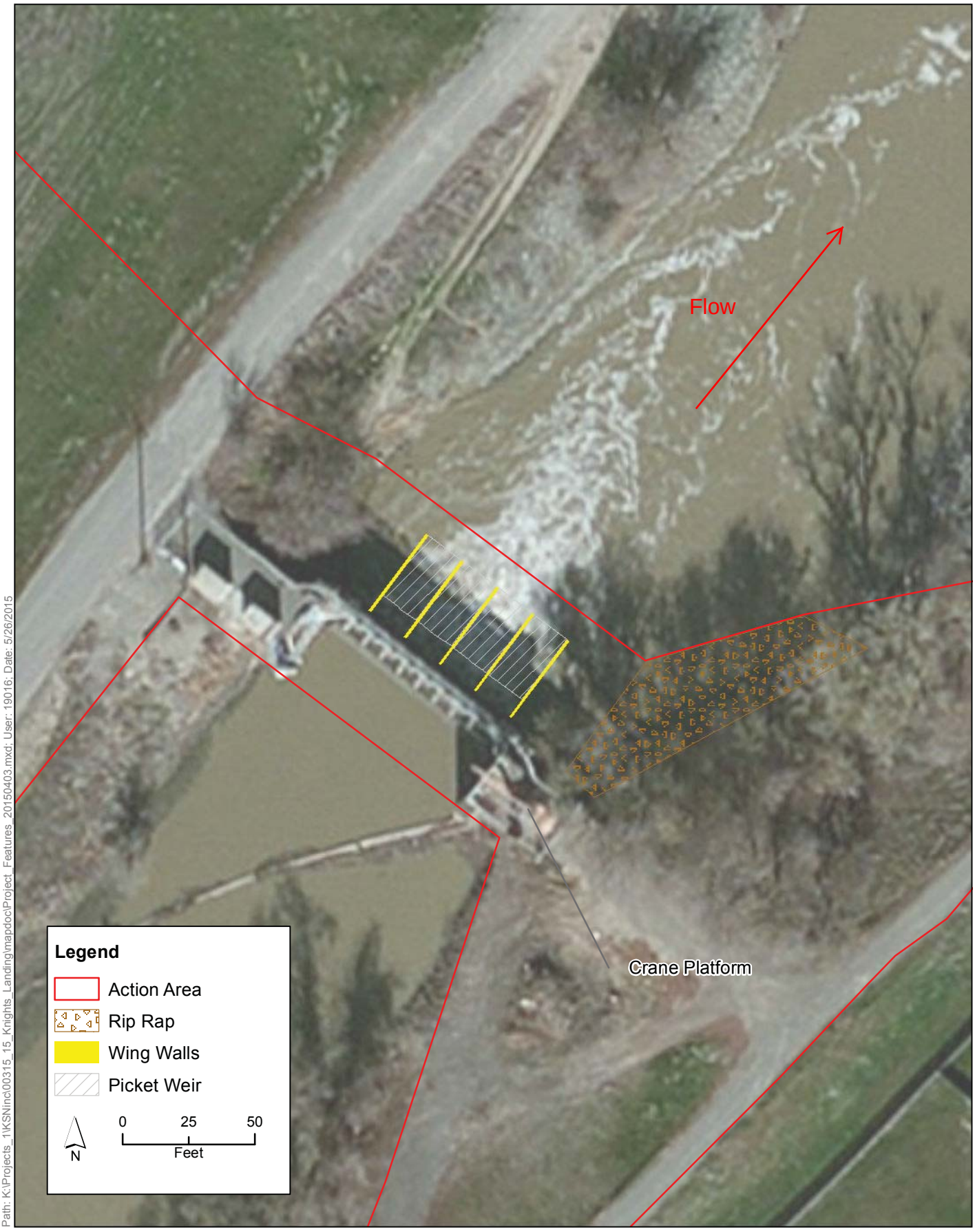


Path: K:\Projects_1\KSNinc\00315_15_Knights_Landing\mapdoc\Project_Features_20150403.mxd; User: 19016; Date: 5/26/2015

Figure 2-2
Construction Features

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19037 BD

This Permit is issued to:

Reclamation District 108
975 Wilson Bend Road
Grimes, California 95950

To install a positive barrier (fish weir) immediately downstream of the Knights Landing Outfall Gates, and to repair an erosion site along 100 linear feet of the right bank of the Colusa Basin Drain immediately downstream of the Outfall Gates.

The project is located at the Colusa Basin Drain south of Road 108 near the town of Knights Landing (Section 14, T11N, R2E, MDB&M, Reclamation District 108, Colusa Basin Drain, Yolo 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. 19037 BD

LIABILITIES / IMDEMNIFICATION

THIRTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board (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 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.

FOURTEEN: The permittee is responsible for all liability and shall defend, indemnify, and hold the 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.

FIFTEEN: The Board and the Department of Water Resources (DWR) shall not be held liable for damages to the permitted project resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

AGENCY CONDITIONS

SIXTEEN: The permittee shall comply with all conditions set forth in the letter from the U.S. Army

Corps of Engineers (USACE) District Engineer dated August XX, 2015, which is attached to this permit as Exhibit A and is incorporated by reference.

SEVENTEEN: The permittee shall comply with all requirements of the Incidental Take Statement set forth in Section 2.8 of the National Marine Fisheries Service's Biological Opinion (Number WCR-2015-2912, dated August 10, 2015), including the "reasonable and prudent measures" and "terms and conditions" set forth therein.

EIGHTEEN: The permittee shall take all necessary steps to comply with the California Endangered Species Act, including, but not limited to, seeking all necessary approvals from the Department of Fish and Wildlife.

NINETEEN: The permittee agrees to incur all costs for compliance with local, State, and Federal permitting. If any conditions issued by other agencies conflict with any of the conditions of this permit, then the permittee shall resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations it administers and enforces.

PRE-CONSTRUCTION

TWENTY: The permittee shall arrange for an inspector from the DWR to be at the site prior to any construction operations. For availability and scheduling of an inspector, contact the Central Valley Flood Protection Board at (916) 574-0609 at least 10 working days prior to the start of work.

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

TWENTY-TWO: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions, of the existing bridge site conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or licensed civil engineer registered in the State of California and submitted to the Board within thirty (30) calendar days of beginning the project.

CONSTRUCTION

TWENTY-THREE: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Board.

TWENTY-FOUR: 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 Board.

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

the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the USACE and / or local maintaining agencies when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days. Upon approval of submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

TWENTY-SIX: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15, and shall be removed after completion of the project.

TWENTY-SEVEN: All debris generated by this project shall be disposed of outside of the Colusa Basin Drain.

TWENTY-EIGHT: The permittee shall be responsible for all damages due to any construction-induced activities.

VEGETATION / ENVIRONMENTAL MITIGATION

TWENTY-NINE: Trees, brush, sediment, and other debris shall be cleared from the site and disposed of outside the floodway to maintain the design flow capacity and flowage area.

THIRTY: No further work, other than that covered by this application, shall be performed in the area without prior approval of the Board.

POST-CONSTRUCTION

THIRTY-ONE: The work area shall be restored to the condition that existed prior to start of work.

THIRTY-TWO: Within 120 days of completion of the project, the permittee shall submit to the Board and DWR as-built drawings, a facilities operations and maintenance manual for the KLOG fish screen structure, and a certification report, stamped and signed by a licensed civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Board permit conditions and submitted drawings and specifications.

THIRTY-THREE: The mitigation measures approved by the CEQA lead agency /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.

OPERATIONS AND MAINTENANCE

THIRTY-FOUR: The permittee shall maintain the permitted project within the utilized area in accordance with applicable current or future local, State, and federal standards in the manner required as requested by an authorized representative of the Board, DWR, or any other agency responsible for maintenance.

THIRTY-FIVE: The permitted project shall not interfere with operation and maintenance of the Sacramento River Flood Control Project. If the permitted project is 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 project under direction of the Board or DWR. If the permittee does not comply, the Board may modify or remove the project at the permittee's expense.

THIRTY-SIX: At the request of either the permittee, Board, or DWR the permittee, Board, and DWR shall conduct joint inspections of the project and floodway after significant flood events or flood seasons to assess the integrity and operation of the project, and to assess and respond to any adverse impacts on the floodway or adjacent properties.

PROJECT ABANDONMENT, CHANGE IN PLAN OF FLOOD CONTROL

THIRTY-SEVEN: If the project, or any portion thereof, is significantly damaged or is to be abandoned in the future, the permittee shall abandon or repair the project under direction of the Board at the permittee's cost and expense.

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

END OF CONDITIONS

The existing configurations of pertinent features on the downstream-side of KLOG are shown in Figures 4 - 6.

ATTACHMENT C - Project Drawings

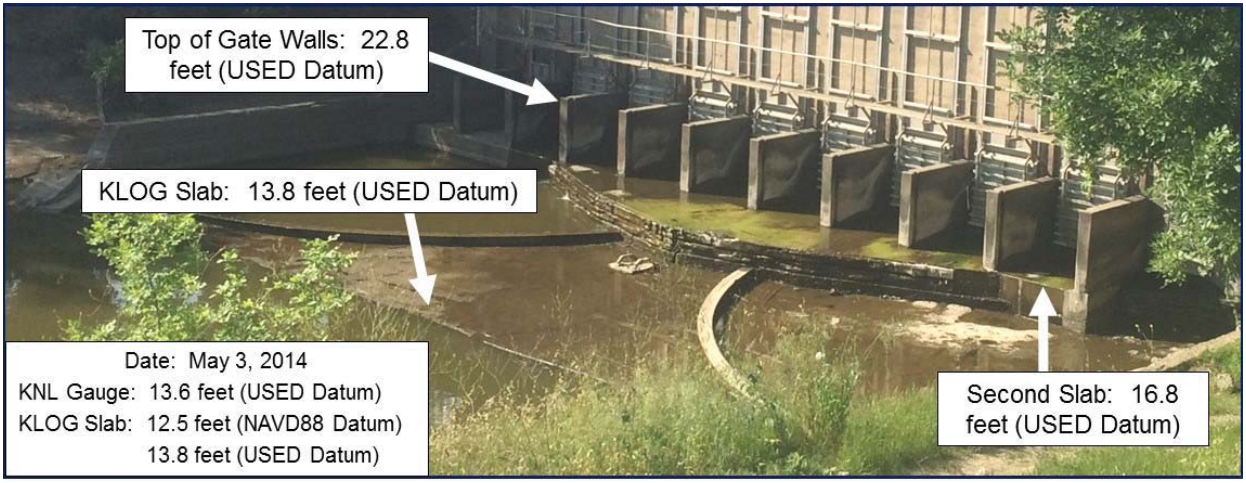
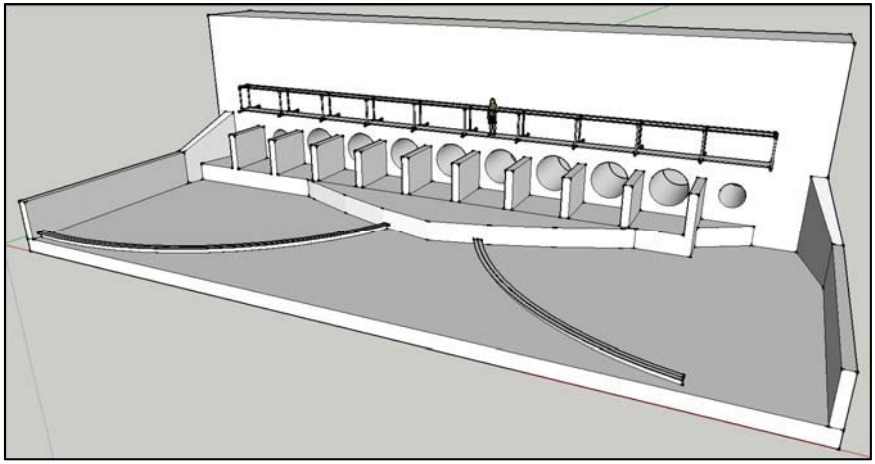
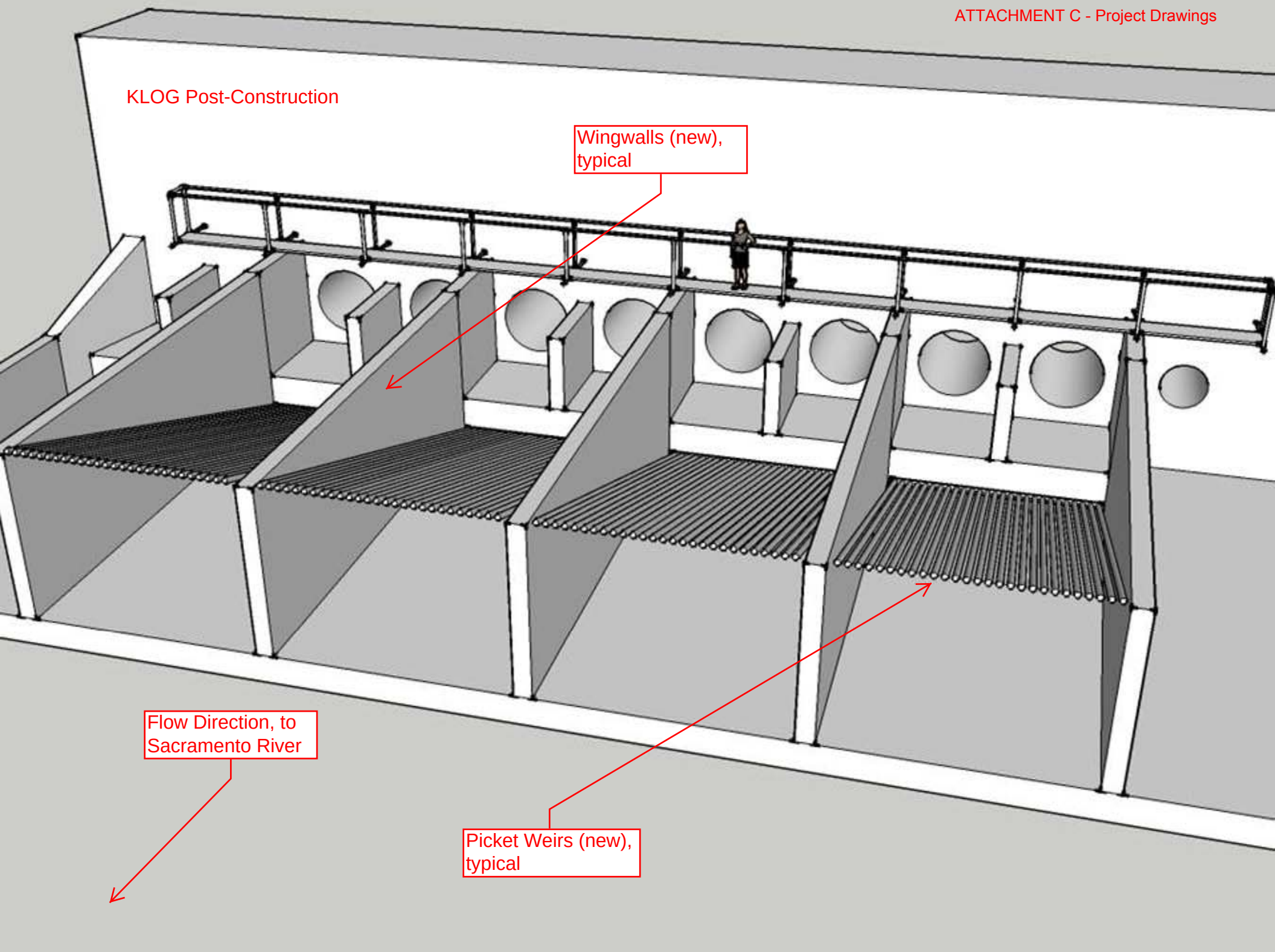


Figure 4. Picture of the downstream portion of KLOG taken by George Heise (DFW) on May 3, 2014. Note the curved concrete bullnose at the base of the gate wall slab (second slab) and the two curved metal rails that were used for the original large wood leaf gates nearly 100 years ago.




KLOG Post-Construction
Wingwalls (new), typical
Flow Direction, to Sacramento River
Picket Weirs (new), typical

GENERAL:

1. INTERPRETATION OF DRAWINGS & SPECIFICATIONS
   A. FOR CONVENIENCE, SPECIFICATIONS HAVE BEEN PREPARED FOR THIS PROJECT AND ARE ARRANGED IN SEVERAL SECTIONS, BUT SUCH SEPARATION SHALL NOT BE CONSIDERED AS THE LIMITS OF THE WORK REQUIRED BY ANY SEPARATE TRADE. THE TERMS AND CONDITIONS OF SUCH LIMITATIONS ARE WHOLLY BETWEEN THE CONTRACTOR AND HIS SUBCONTRACTORS.
   B. IN GENERAL, THE WORKING DETAILS WILL INDICATE DIMENSIONS, POSITIONS AND KIND OF CONSTRUCTION, AND THE SPECIFICATIONS WILL INDICATE QUALITIES AND METHODS. ANY WORK INDICATED ON THE WORKING DETAILS MENTIONED BUT NOT IN THE SPECIFICATIONS, OR VICE VERSA, SHALL BE FURNISHED AS THOUGH FULLY SET FORTH IN BOTH. WORK NOT PARTICULARLY DETAILED, MARKED OR SPECIFIED, SHALL BE THE SAME AS SIMILAR PARTS THAT ARE DETAILED, MARKED OR SPECIFIED. IF CONFLICTS OCCUR BETWEEN DRAWINGS AND SPECIFICATIONS, THE MOST EXPENSIVE MATERIALS OR METHODS WILL PREVAIL.
   C. SHOULD AN ERROR APPEAR IN THE WORKING DETAILS OR SPECIFICATIONS OR IN WORK DONE BY OTHERS AFFECTING THIS WORK, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT ONCE AND IN WRITING. IF THE CONTRACTOR PROCEEDS WITH THE WORK SO AFFECTED WITHOUT HAVING GIVEN SUCH WRITTEN NOTICE AND WITHOUT RECEIVING THE NECESSARY APPROVAL, DECISION OR INSTRUCTION IN WRITING FROM THE OWNER, THEN HE SHALL HAVE NO VALID CLAIM AGAINST THE OWNER, FOR THE COST OF SO PROCEEDING AND SHALL MAKE GOOD ANY RESULTING DAMAGE OR DEFECT. NO VERBAL APPROVAL, DECISION, OR INSTRUCTION SHALL BE VALID OR BE THE BASIS FOR ANY CLAIM AGAINST THE OWNER, ITS OFFICERS, EMPLOYEES, OR AGENTS. THE FOREGOING INCLUDES TYPICAL ERRORS IN THE SPECIFICATIONS OR NOTATIONAL ERRORS IN THE WORKING DETAILS WHERE THE INTERPRETATION IS DOUBTFUL OR WHERE THE ERROR IS SUFFICIENTLY APPARENT AS TO PLACE A REASONABLY PRUDENT CONTRACTOR ON NOTICE THAT, SHOULD HE ELECT TO PROCEED, HE IS DOING SO AT HIS OWN RISK.
2. CONSTRUCTION SHALL CONFORM TO ALL APPLICABLE CODES AND REGULATIONS.
3. SHOP DRAWING NOTE:
   A. SHOP DRAWINGS SHALL BE SUBMITTED IN THE FORM OF ONE REPRODUCIBLE AND TWO COPIES OF EACH SHEET.
   B. THE PURPOSE OF SHOP DRAWING SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE STRUCTURAL ENGINEER THAT HE UNDERSTANDS THE DESIGN CONCEPT BY INDICATING WHICH MATERIALS HE INTENDS TO FURNISH AND INSTALL, AND BY DETAILING THE FABRICATION AND INSTALLATION METHODS HE INTENDS TO USE.
   C. PRIOR TO FABRICATION, SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW TO THE STRUCTURAL ENGINEER. SHOP DRAWING SUBMITTALS SHALL INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO CONCRETE MIX DESIGNS, STRUCTURAL STEEL, REINFORCING STEEL, MASONRY UNITS, GROUT MIX DESIGNS, GLUED LAMINATED BEAMS, AND PRE-FABRICATED WOOD ROOF FRAMING ITEMS SUCH AS I-JOISTS AND TRUSSES WHERE THESE ELEMENTS ARE INDICATED ON THE DRAWINGS.
   D. PRIOR TO SUBMISSION THE CONTRACTOR SHALL REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS AND SHALL STAMP SUBMITTALS AS BEING "REVIEWED FOR CONFORMANCE"
   E. SHOP DRAWING SUBMITTALS PROCESSED BY THE STRUCTURAL ENGINEER ARE NOT CHANGE ORDERS.
   F. ANY DETAIL ON THE SHOP DRAWING THAT DEVIATES FROM THE CONTRACT DOCUMENTS SHALL CLEARLY BE MARKED WITH THE NOTE "THIS IS A CHANGE".
   G. SHOP DRAWINGS OR CALCULATIONS SUBMITTED FOR REVIEW THAT REQUIRE RESUBMITTAL FOR RE-REVIEW SHALL BE BILLED HOURLY FOR SUCH TIME TO THE GENERAL CONTRACTOR. RE-REVIEW WILL NOT PROCEED WITHOUT WRITTEN APPROVAL FROM THE GENERAL CONTRACTOR FOR ADDITIONAL ENGINEERING REVIEW SERVICES.
4. SAFETY NOTE:
   A. IT IS THE CONTRACTORS RESPONSIBILITY TO COMPLY WITH THE PERTINENT SECTIONS, AS THEY APPLY TO THIS PROJECT, OF THE "CONSTRUCTION SAFETY ORDERS" ISSUED BY THE STATE OF CALIFORNIA LATEST EDITION, AND ALL OSHA REQUIREMENTS.
   B. THE OWNER AND THE STRUCTURAL ENGINEER DO NOT ACCEPT ANY RESPONSIBILITY FOR THE CONTRACTOR'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.
   C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE DESIGN AND CONSTRUCTION OF ALL FORMS AND SHORING REQUIRED.
5. THE CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER WHERE A CONFLICT OR A DISCREPANCY OCCURS BETWEEN THE STRUCTURAL DRAWINGS AND ANY OTHER PORTION OF THE CONTRACT DOCUMENTS OR EXISTING FIELD CONDITIONS. SUCH NOTIFICATION SHALL BE GIVEN IN DUE TIME SO AS NOT TO AFFECT THE CONSTRUCTION SCHEDULE. IN CASE OF A CONFLICT BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS, THE MORE RESTRICTIVE CONDITION SHALL TAKE PRECEDENCE UNLESS WRITTEN APPROVAL HAS BEEN GIVEN FOR THE LEAST RESTRICTIVE. CONTRACTOR SHALL VERIFY ALL DIMENSIONS WITH STRUCTURAL DRAWINGS PRIOR TO COMMENCING ANY WORK.
6. WHERE NO SPECIFIC DETAIL IS SHOWN, THE CONSTRUCTION SHALL BE IDENTICAL OR SIMILAR TO THAT INDICATED FOR LIKE CASES OF CONSTRUCTION ON THIS PROJECT. SHOULD THERE BE ANY QUESTION, CONTACT THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING.
7. WHEN CONSTRUCTION ATTACHES TO AN EXISTING BUILDING, A COMPLETE SET OF DRAWINGS OF THE EXISTING BUILDING SHALL BE KEPT ON THE JOB SITE. CONTRACTOR TO OBTAIN THESE DRAWINGS FROM THE OWNER.
8. ANY SUBSTITUTIONS FOR STRUCTURAL MEMBERS, HARDWARE, OR DETAILS SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER. SUCH REVIEW WILL BE BILLED ON A TIME AND MATERIALS BASIS TO THE GENERAL CONTRACTOR WITH NO GUARANTEE THAT THE SUBSTITUTION WILL BE ALLOWED.
9. DO NOT SCALE DRAWINGS. CONTACT THE STRUCTURAL ENGINEER FOR ANY DIMENSIONS NOT SHOWN.
10. THESE DRAWINGS ARE NOT COMPLETE UNTIL REVIEWED AND ACCEPTED BY THE LOCAL BUILDING OFFICIAL AND SIGNED BY THE OWNER AND THE STRUCTURAL ENGINEER.
11. ALL DRAWINGS AND WRITTEN MATERIAL APPEARING HEREIN CONSTITUTES THE ORIGINAL AND UNPUBLISHED WORK OF THE STRUCTURAL ENGINEER AND THE SAME MAY NOT BE DUPLICATED, USED OR DISCLOSED WITHOUT WRITTEN CONSENT OF THE STRUCTURAL ENGINEER.
12. THE STRUCTURE SHOWN ON THESE DRAWINGS IS STRUCTURALLY SOUND ONLY IN ITS COMPLETED FORM. THE STABILITY OF THIS STRUCTURE DEPENDS ON THE DIAPHRAGMS AND THE BRACING MEMBERS SHOWN. THE CONTRACTOR IS TO PROVIDE FOR THE DESIGN AND CONSTRUCTION OF SHORING FOR ALL EARTH, FORMS, CONCRETE, STEEL, WOOD, AND MASONRY TO RESIST GRAVITY, EARTH, WIND, SEISMIC, AND CONSTRUCTION LOADS. SHORING SHALL REMAIN IN PLACE UNTIL ALL DIAPHRAGMS AND LATERAL RESISTING ELEMENTS ARE IN PLACE IN THEIR ENTIRETY.

STRUCTURAL STEEL:

1. FABRICATION, ERECTION AND MATERIALS SHALL CONFORM TO THE SPECIFICATIONS AND STANDARDS OF THE AISC, AS CONTAINED IN THE "AISC 360-05 SPECIFICATIONS OF STRUCTURAL STEEL BUILDINGS" & THE "AISC MANUAL OF STEEL CONSTRUCTION", THIRTEENTH EDITION.
2. STRUCTURAL STEEL W AND WT SHAPES SHALL CONFORM WITH ASTM A992 STEEL. STRUCTURAL STEEL ANGLES, CHANNELS, MISCELLANEOUS CHANNELS, AND PLATES SHALL CONFORM WITH ASTM A36 STEEL UNLESS NOTED OTHERWISE.
3. STEEL PIPE SHALL CONFORM TO ASTM A-53, TYPES E OR S, GRADE B.
4. STRUCTURAL STEEL TUBING SHALL CONFORM TO ASTM A-500, GRADE B.
5. WELDING SHALL BE DONE BY THE ELECTRIC ARC PROCESS IN ACCORDANCE WITH AMERICAN WELDING SOCIETY STANDARDS, USING ONLY CERTIFIED WELDERS. ALL GROOVE WELDS SHALL HAVE COMPLETE PENETRATION UNLESS NOTED OTHERWISE. ALL EXPOSED WELDS SHALL BE GROUND. ALL WELDING TO BE DONE USING E70XX ELECTRODES. IN ADDITION, WELDING OF ASTM A572 GRADE 50 STEEL AND ASTM A992 STEEL SHALL BE DONE WITH ELECTRODES CAPABLE OF DEPOSITING WELD METAL WITH A MAXIMUM DIFFUSIBLE HYDROGEN CONTENT OF 16ML/100G (H16).
6. ALL STRUCTURAL STEEL SHALL BE ERECTED PLUMB AND TRUE TO LINE. TEMPORARY BRACING SHALL BE INSTALLED AND SHALL BE LEFT IN PLACE UNTIL OTHER MEANS ARE PROVIDED TO ADEQUATELY BRACE THE STRUCTURE.
7. PLACE NON-SHRINK GROUT UNDER ALL BASE PLATES BEFORE ADDING VERTICAL LOAD. NON-SHRINK GROUT SHALL BE MASTERFLOW 928 GROUT BY MASTER BUILDERS TECHNOLOGIES OR APPROVED EQUAL WITH A MINIMUM F'c OF 7500 PSI @ 28 DAYS.
8. BOLTED CONNECTIONS SHALL CONSIST OF UNFINISHED BOLTS CONFORMING TO ASTM A-307 UNLESS NOTED OTHERWISE. WHERE HIGH STRENGTH BOLTS ARE INDICATED, BOLTS CONFORMING TO ASTM A325-N SHALL BE PROVIDED (PROVIDE A325-SC BOLTS WHERE INDICATED).
9. HOLES FOR UNFINISHED BOLTS SHALL BE OF THE SAME NOMINAL DIAMETER OF THE BOLT PLUS 1/16". USE STANDARD AISC GAGE AND PITCH FOR BOLTS EXCEPT AS NOTED OTHERWISE.
10. HOLES FOR ANCHOR BOLTS EMBEDDED IN CONCRETE SHALL BE OF THE SAME NOMINAL BOLT DIAMETER PLUS 3/16" UNLESS NOTED OTHERWISE.
11. PROVIDE ½" DIAMETER STITCH BOLTS AND RING FILLS, SPACED AT NOT MORE THAN 24" CC FOR ALL DOUBLE ANGLE MEMBERS.
12. AT WOOD TO STEEL PARALLEL CONTACT, BOLT WITH ½" DIAMETER BOLTS AT MAXIMUM 24" CC, TYPICAL UNLESS NOTED OTHERWISE.
13. ALL STRUCTURAL STEEL, PLATES, AND FASTENERS SHALL BE HOT-DIP GALVANIZED.
14. STRUCTURAL STEEL BELOW GRADE SHALL HAVE 3" MINIMUM OF CONCRETE COVER.

STAINLESS STEEL:

1. FABRICATION, ERECTION AND MATERIALS SHALL CONFORM TO THE SPECIFICATIONS AND STANDARDS OF THE AISC, AS CONTAINED IN THE "AISC 360-05 SPECIFICATIONS OF STRUCTURAL STEEL BUILDINGS" & THE "AISC MANUAL OF STEEL CONSTRUCTION", THIRTEENTH EDITION.
2. ALL W, L, HSS AND PLATES SHALL BE STAINLESS STEEL 304 AND CONFORM WITH ASTM A276.
3. WELDING SHALL BE DONE BY THE ELECTRIC ARC PROCESS IN ACCORDANCE WITH AMERICAN WELDING SOCIETY STANDARDS, USING ONLY CERTIFIED WELDERS. ALL GROOVE WELDS SHALL HAVE COMPLETE PENETRATION UNLESS NOTED OTHERWISE. ALL EXPOSED WELDS SHALL BE GROUND.
4. ALL STEEL SHALL BE ERECTED PLUMB AND TRUE TO LINE. TEMPORARY BRACING SHALL BE INSTALLED AND SHALL BE LEFT IN PLACE UNTIL OTHER MEANS ARE PROVIDED TO ADEQUATELY BRACE THE STRUCTURE.
5. PLACE NON-SHRINK GROUT UNDER ALL BASE PLATES BEFORE ADDING VERTICAL LOAD. NON-SHRINK GROUT SHALL BE MASTERFLOW 928 GROUT BY MASTER BUILDERS TECHNOLOGIES OR APPROVED EQUAL WITH A MINIMUM F'c OF 7500 PSI @ 28 DAYS.
6. BOLTED CONNECTIONS AND THREADED PARTS SHALL CONSIST OF STAINLESS STEEL 316 AND CONFORM TO ASTM F-593 UNLESS NOTED OTHERWISE.
7. HOLES FOR UNFINISHED BOLTS SHALL BE OF THE SAME NOMINAL DIAMETER OF THE BOLT PLUS 1/16". USE STANDARD AISC GAGE AND PITCH FOR BOLTS EXCEPT AS NOTED OTHERWISE.
8. HOLES FOR ANCHOR BOLTS EMBEDDED IN CONCRETE SHALL BE OF THE SAME NOMINAL BOLT DIAMETER PLUS 3/16" UNLESS NOTED OTHERWISE.
9. PROVIDE ½" DIAMETER STITCH BOLTS AND RING FILLS, SPACED AT NOT MORE THAN 24" CC FOR ALL DOUBLE ANGLE MEMBERS.
10. AT WOOD TO STEEL PARALLEL CONTACT, BOLT WITH ½" DIAMETER BOLTS AT MAXIMUM 24" CC, TYPICAL UNLESS NOTED OTHERWISE.
11. STRUCTURAL STEEL BELOW GRADE SHALL HAVE 3" MINIMUM OF CONCRETE COVER.

CONCRETE AND REINFORCING STEEL:

1. CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 318-11 & ACI 350.
2. THE MINIMUM 28 DAY STRENGTH AND TYPE OF CONCRETE SHALL BE AS FOLLOWS:
   CONCRETE 145 PCF
   F'c= 4,000 PSI (MINIMUM 6.5 SACKS CEMENT PER CU. YD.).
3. ALL CONCRETE SHALL BE READY-MIX IN ACCORDANCE WITH ASTM-C94.
4. CONCRETE MIX DESIGN SHALL BE REVIEWED BY THE OWNER'S TESTING LABORATORY AND SUBMITTED TO THE STRUCTURAL ENGINEER FOR APPROVAL. SELECTION OF CONCRETE MIX PROPORTIONS SHALL BE PER 2013 CBC SECTION 1905.3 OR 1905.4.
5. CEMENT SHALL CONFORM TO ASTM C-150 TYPE I OR II.
6. CONCRETE AGGREGATES: NATURAL SAND AND ROCK AGGREGATES CONFORMING TO ASTM C-33.
7. REINFORCING SHALL CONFORM TO ASTM A615 GRADE 60, EXCEPT #3 & #4 STIRRUPS AND TIES MAY BE GRADE 40 EXCEPT REINFORCING STEEL TO BE WELDED SHALL CONFORM TO ASTM A706.
8. WELDING OF REINFORCING STEEL SHALL CONFORM TO AWS D1.4 USING PROPER LOW HYDROGEN ELECTRODES. TACK WELDING TO REBAR IS STRICTLY PROHIBITED. SEE "REBAR WELDING".
9. REINFORCING STEEL SHALL BE DETAILED, FABRICATED, AND INSTALLED ACCORDING TO "MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE CONSTRUCTION" BY WCRSI.
10. WIRE FABRIC SHALL CONFORM TO ASTM A-185.
11. DIMENSIONS SHOWN FOR LOCATION OF REINFORCING ARE TO THE FACE OF MAIN BARS AND DENOTE CLEAR COVERAGE. UNLESS OTHERWISE NOTED, CONCRETE COVERAGE SHALL BE AS FOLLOWS:

CONCRETE DEPOSITED DIRECTLY AGAINST GROUND (EXCEPT SLABS)	3"
FORMED CONCRETE EXPOSED TO WEATHER OR GROUND OR LIQUID	
#6 AND LARGER	2"
#5 AND SMALLER	2"
BEAMS (TOP BARS)	1½"
BEAMS (ALL OTHER MAIN REINFORCING)	2"
COLUMN MAIN REINFORCING	2"
WALLS AND SLABS (INTERIOR DRY FACES)	¾"
SLABS ON GROUND WITH ONE LAYER OF REINFORCEMENT	POSITION IN CENTER OF SLAB

12. REINFORCING STEEL PLACEMENT:
   A. ALL BARS SHOWN WITH LAPS OR SPLICES SHALL HAVE MIN LAP LENGTH UNLESS OTHERWISE NOTED.
   B. DOWEL ALL VERTICAL REBARS IN WALLS AND COLUMNS FROM FOUNDATION WITH SAME SIZE AND SPACING AS FOUNDATION BAR.
   C. SPLICES IN ADJACENT BARS SHALL BE NOT LESS THAN 5'-0" APART.
   D. SPLICE CONTINUOUS BARS IN SOIL-BEARING GRADE BEAMS AS FOLLOWS: BOTTOM BARS AT MID-SPAN, TOP BARS AT CENTERLINE OF SUPPORT, UNLESS NOTED OTHERWISE.
   E. SPLICE CONTINUOUS BARS IN BEAMS, SPANDRELS, WALL BEAMS ETC. AS FOLLOWS: BOTTOM BARS AT CENTERLINE OF SUPPORT, TOP BARS AT MIDSPAN, UNLESS NOTED OTHERWISE.
   F. REINFORCING BARS SHALL BE RUN IN A MANNER THAT FORMS A CONTINUOUS SYSTEM OF BARS TYING ALL PARTS OF THE STRUCTURE TOGETHER. EXTEND ALL REINFORCING BARS AS FAR AS POSSIBLE IN EACH CONCRETE MEMBER AND TERMINATE BAR TO PROVIDE 2" OF CONCRETE COVER END OF BAR OR FACE OR BEND.
   G. BEAM STIRRUPS AND COLUMN TIES SHALL HOOK 135 DEGREES AROUND A CORNER BAR UNLESS NOTED OTHERWISE.
13. GENERAL:
   A. NO PIPES OR DUCTS SHALL BE PLACED IN CONCRETE SLABS, BEAMS, WALLS OR GRADE BEAMS UNLESS SPECIFICALLY DETAILED.
   B. REFER TO ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND MECHANICAL DRAWINGS FOR ALL OPENINGS, FLANGES, MOULDS, GROOVES, CLIPS AND GROUNDS TO BE CAST IN CONCRETE.
14. CONSTRUCTION JOINTS SHALL BE MADE ROUGH AND ALL LAITANCE REMOVED FROM THE SURFACE. CONCRETE MAY BE ROUGHENED BY CHIPPING THE ENTIRE SURFACE, SANDBLASTING, OR HOSING THE SURFACE 4 TO 6 HOURS AFTER THE POUR WITH A FINE SPRAY.
15. REMOVE ALL DEBRIS FROM THE FORMS BEFORE PLACING ANY CONCRETE.
16. REINFORCING, DOWELS, BOLTS, ANCHORS, SLEEVES, ETC. TO BE EMBEDDED IN CONCRETE SHALL BE SECURELY POSITIONED BEFORE PLACING CONCRETE. OBTAIN APPROVAL OF ALL AFFECTED TRADES PRIOR TO PLACING CONCRETE.
17. MAXIMUM FREE FALL OF CONCRETE SHALL BE 4'-0".
18. WALLS SHALL BE PLACED IN HORIZONTAL LAYERS OF 2'-0" MAX DEPTH.
19. CONCRETE IN WALLS, PIERS, OR COLUMNS SHALL SET AT LEAST 2 HOURS BEFORE PLACING CONCRETE IF IT SUPPORTS BEAMS, SPANDRELS, OR SLABS.
20. REINFORCE ALL SLABS ON GRADE AS SHOWN ON DRAWINGS.
21. HORIZONTAL WALL BARS IN DOUBLE LAYER WALLS SHALL BE STAGGERED. USE #2 SPREADERS APPROXIMATELY EVERY THIRD INTERSECTION EACH DIRECTION FOR ALL DOUBLE LAYER WALLS. PLACE SPREADERS IN VERTICAL LINES WITH FORM TIES.
22. NO WOOD SPREADERS ARE ALLOWED. NO WOOD STAKES ARE ALLOWED IN AREAS TO BE CONCRETED.
23. MINIMUM WALL REINFORCING SHALL BE:

WALL THICKNESS	SINGLE LAYER	DOUBLE LAYER
7" OR LESS	#4 @ 12" CC EW	
8"	#4 @ 10" CC EW	
9" AND 10"		#4 @ 16" CC EW
11" AND 12"		#4 @ 12" CC EW

24. NOTIFY THE ENGINEER 48 HOURS PRIOR TO PLACING CONCRETE.
25. REINFORCEMENT LAP SPLICE LENGTHS ARE:

	TOP BARS	OTHER BARS
#6 OR SMALLER	53db	40db
#7 OR LARGER	66db	51db

TOP REINFORCING IS HORIZONTAL REINFORCEMENT THAT HAS MORE THAN 12" OF CONCRETE PLACED BELOW IT.
26. MAXIMUM SPACING OF WALL CONST. JOINTS IS 30ft.

DESIGN CRITERIA:

1. CODE: 2013 CALIFORNIA BUILDING CODE (CBC)
2. DESIGN LIVE LOADS:

AREA	LIVE LOAD	REMARKS
ROOF		
A. FLAT TO < 4:12	Lr= 20 PSF	REDUCIBLE PER CODE
B. 4:12 TO ≤ 12:12	Lr= 12-20 PSF	REDUCIBLE PER CODE
FLOOR	L= N/A PSF	REDUCIBLE PER CODE

3. SNOW DESIGN PARAMETERS:

GROUND SNOW LOAD	Pg= 10 PSF
FLAT-ROOF SNOW LOAD	Pf= 10 PSF
SNOW EXPOSURE FACTOR	Cs= 1.0
SNOW LOAD IMPORTANCE FACTOR	Is= 1.0
THERMAL FACTOR	Cr= 1.0

4. WIND DESIGN PARAMETERS:

BASIC WIND SPEED (3-SEC GUST)	V= 120 MPH
WIND IMPORTANCE FACTOR	Iw= 1.0
RISK CATEGORY	II
EXPOSURE CATEGORY	B

5. EARTHQUAKE DESIGN PARAMETERS:

1. SEISMIC IMPORTANCE FACTOR	Ie= 1.5
2. RISK CATEGORY	II
3. SOIL SITE CLASSIFICATION	'C'
4. SEISMIC DESIGN CATEGORY	'D'
5. DESIGN SPECTRAL RESPONSE ACCEL	
A. SHORT PERIOD	Sds= 0.616g
B. 1-SEC PERIOD	Sd1= 0.377g
6. ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE

TEST & INSPECTIONS:

1. TEST AND INSPECTION SHALL BE PROVIDED BY A QUALIFIED TESTING AGENCY AS REQUIRED BELOW AND SHALL CONFORM TO THE REQUIREMENTS OF THE 2013 CBC SECTIONS 1701 AND 1704.

TESTS:
- ☐ FILL COMPACTION
- ☐ SUB-GRADE PREPARATION
- ☐ REINFORCING STEEL
- ☒ CONCRETE
- ☐ STRUCTURAL STEEL
- ☐ EPOXY & EXPANSION ANCHORS
- ☐ MASONRY
- ☐ GROUT & MORTAR
- ☐ SHOTCRETE

CONTINUOUS INSPECTIONS:
- ☐ EPOXY & EXPANSION ANCHORS
- ☒ SHOP WELDING PENETRATION GROOVE WELDS, FILLET WELDS >5/16", & REBAR
- ☒ FIELD WELDING PENETRATION GROOVE WELDS, FILLET WELDS >5/16", & REBAR
- ☐ HIGH STRENGTH BOLTING, BOLTS PRETENSIONED W/ TURN OF NUT OR CALIBRATED WRENCH METHOD

PERIODIC INSPECTIONS:
- ☐ SPECIAL GRADING, EXCAVATION & FILLING
- ☐ PILE/PIER INSTALLATION
- ☐ REINFORCEMENT PLACEMENT
- ☒ CONCRETE PLACEMENT - SEE NOTE
- ☐ SHOP WELDING UNO
- ☒ FIELD WELDING UNO
- ☐ HIGH STRENGTH BOLTING UNO
- ☐ MASONRY PLACEMENT & GROUTING
- ☐ SHEAR STUD INSTALLATION
- ☐ SHOTCRETE
- ☐ ANCHOR BOLT SIZE & PLACEMENT
- ☐ ROOF, FLOOR, & WALL SHTG NAILING
- ☐ STRAPS & FRAMING CONNECTORS
- ☐ TOP ℄ & LEDGER SPLICE NAILING

NOTE: SPECIAL INSPECTOR SHALL BE PRESENT FOR EACH POUR.

DATUM:

1. THE DATUM USED FOR THIS PROJECT IS USED.

DEFERRED SUBMIT:

1. HOIST, HOIST SKID, AND CABLE SHALL BE DESIGNED AND DETAILED BY A CA CIVIL ENGINEER.
2. SUBMIT DRAWINGS & CALCULATION FOR REVIEW PRIOR TO FABRICATION.

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REGISTERED PROFESSIONAL ENGINEER
CHARLES ALAN FREDERICKS
32780
EXP. 9/30/2015
STRUCTURAL
STATE OF CALIFORNIA

Project

KNIGHTS LANDING OUTFALL GATES

Sheet Title

GENERAL NOTES

Engineer	BAF
Drawn By	RTM
Revisions	

NO.	DATE	DESCRIPTION

Job No.	14125
Date	7/10/2015

Drawing No.

S1.0

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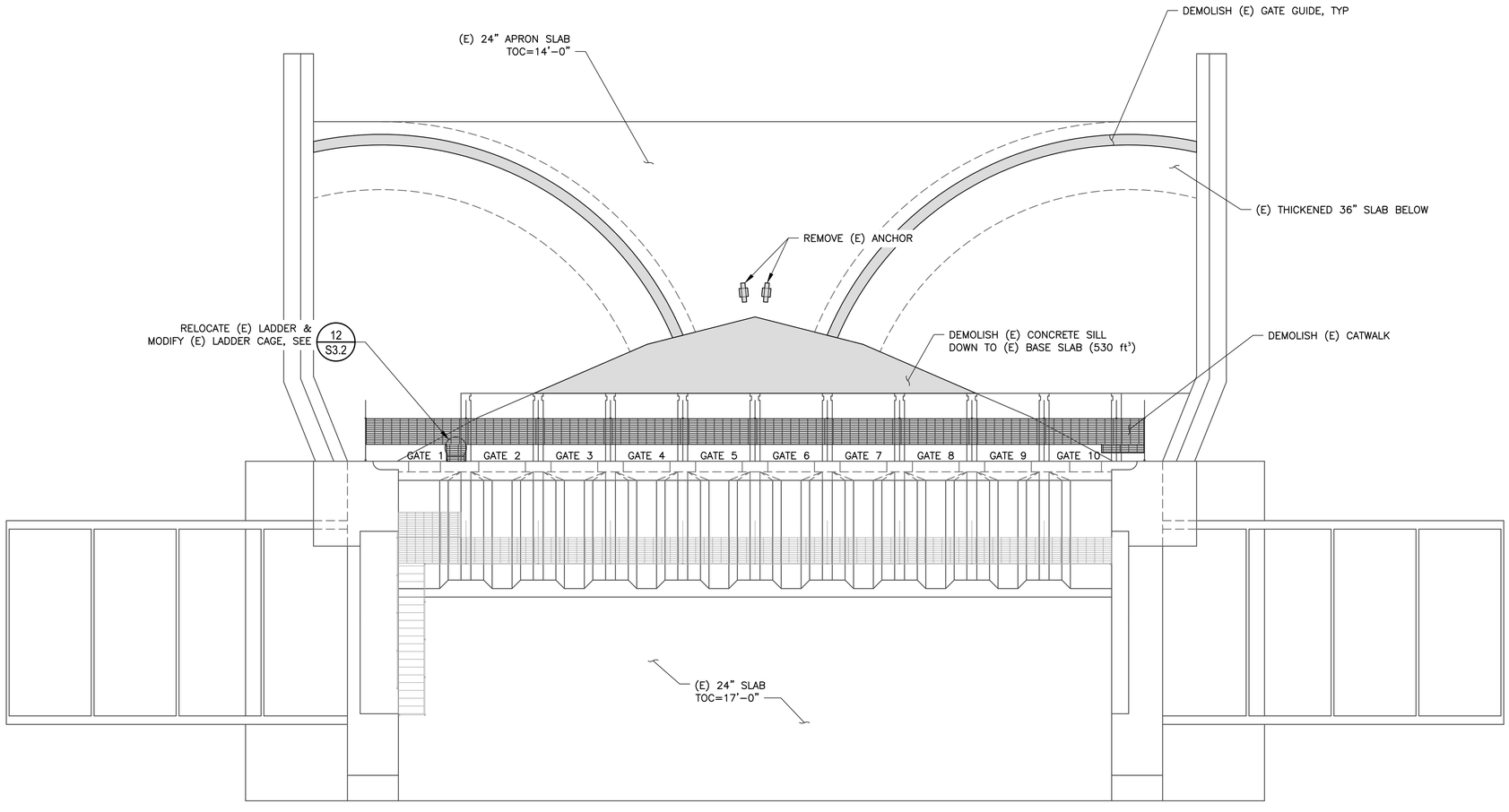

NOTE:
SEE 10 S3.2 FOR STEEL FASTENER/REBAR MODIFACTIONS @ SAWCUT OR CHIPPED FACES.

DEMOLITION PLAN

SCALE: ⅛"=1'-0"

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KNIGHTS LANDING
OUTFALL GATES

Sheet Title

DEMOLITION PLAN

Engineer	BAF
Drawn By	RTM
Revisions	

NO.	*DATE*	*DESCRIPTION*

Job No.	14125
Date	7/10/2015

Drawing No.

S2.0

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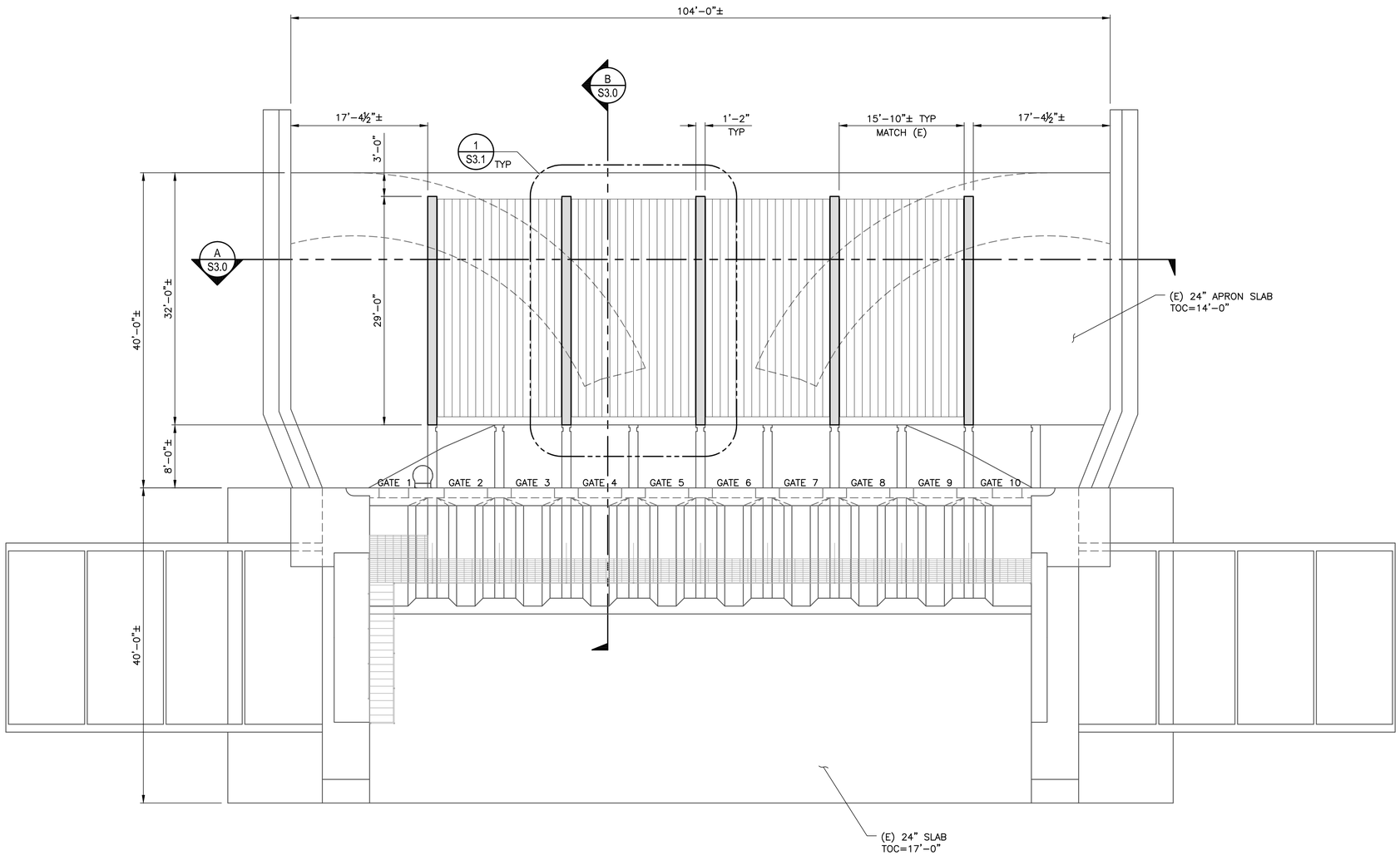

BOTTOM PLAN
SCALE: ⅛"=1'-0"

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PLOT DATE: Jul 10, 2015 - 5:50pm

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KNIGHTS LANDING
OUTFALL GATES

Sheet Title

BOTTOM PLAN

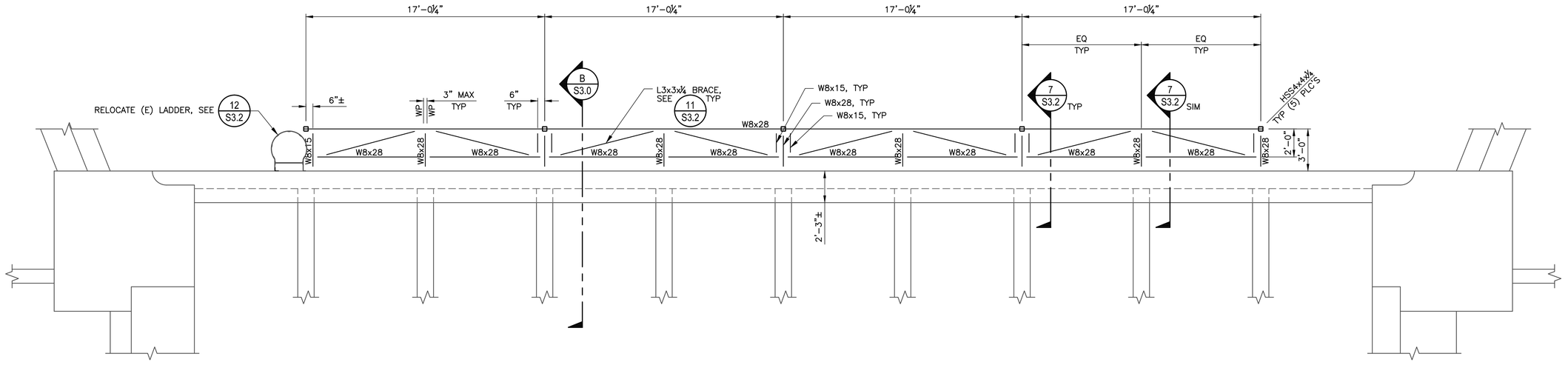
Engineer	BAF
Drawn By	RTM
Revisions	

NO.	DATE	DESCRIPTION

Job No.	14125
Date	7/10/2015

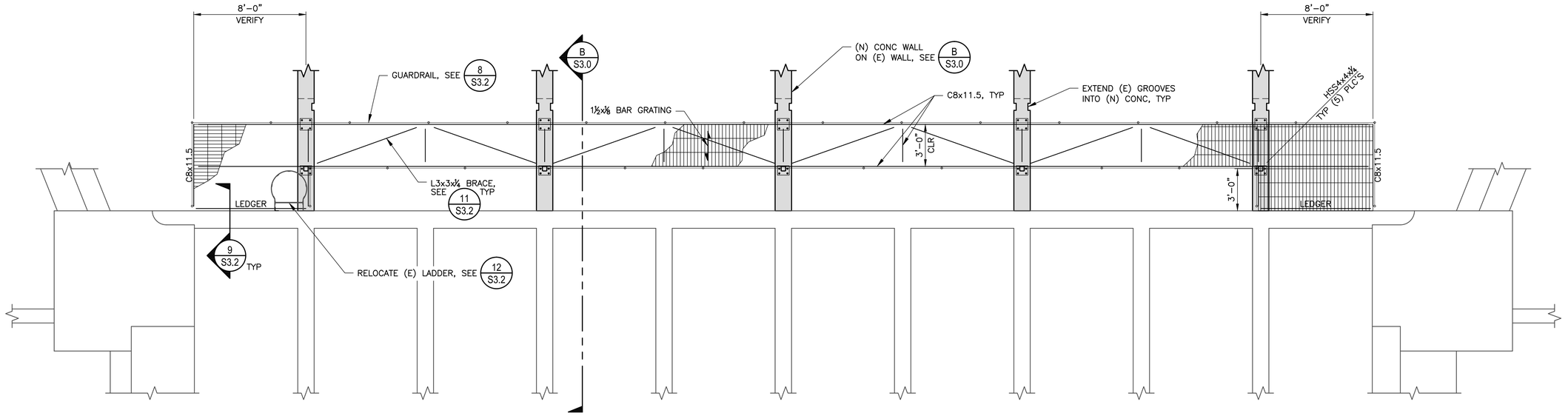
Drawing No.

S2.1



HOIST LEVEL FRAMING PLAN
SCALE: ¼"=1'-0" TOS=43'-5"

NOTE:
ALL MATERIALS THIS SHEET ARE HOT-DIP GALVANIZED STRUCTURAL STEEL.



CATWALK FRAMING PLAN
SCALE: ¼"=1'-0" TOS=29'-0½" VERIFY

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STATE OF CALIFORNIA

Project
KNIGHTS LANDING OUTFALL GATES

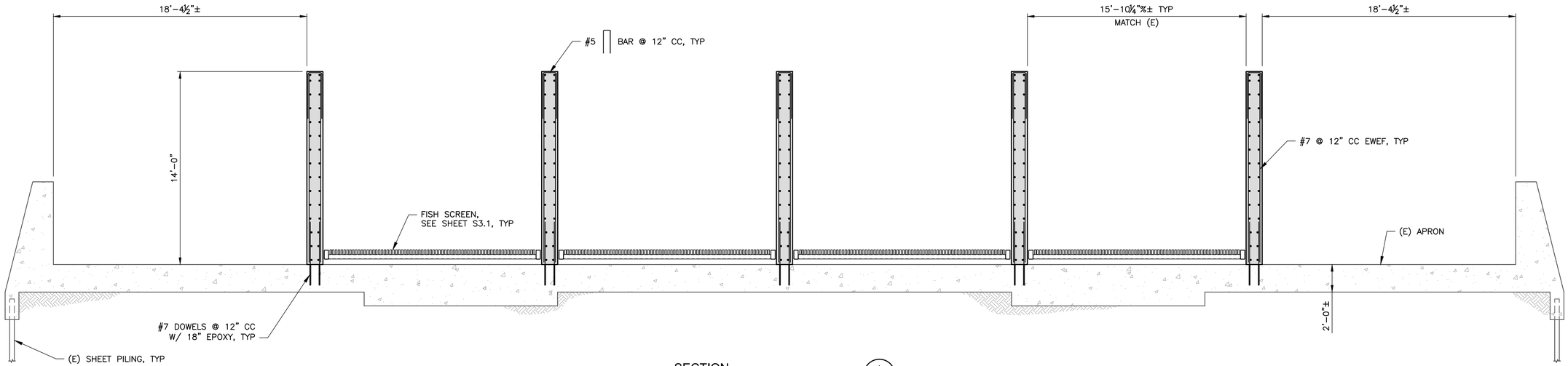
Sheet Title
HOIST LEVEL & CATWALK PLANS

Engineer BAF
Drawn By RTM
Revisions

NO.	DATE	DESCRIPTION

Job No. 14125
Date 7/10/2015

Drawing No.
S2.2



SECTION
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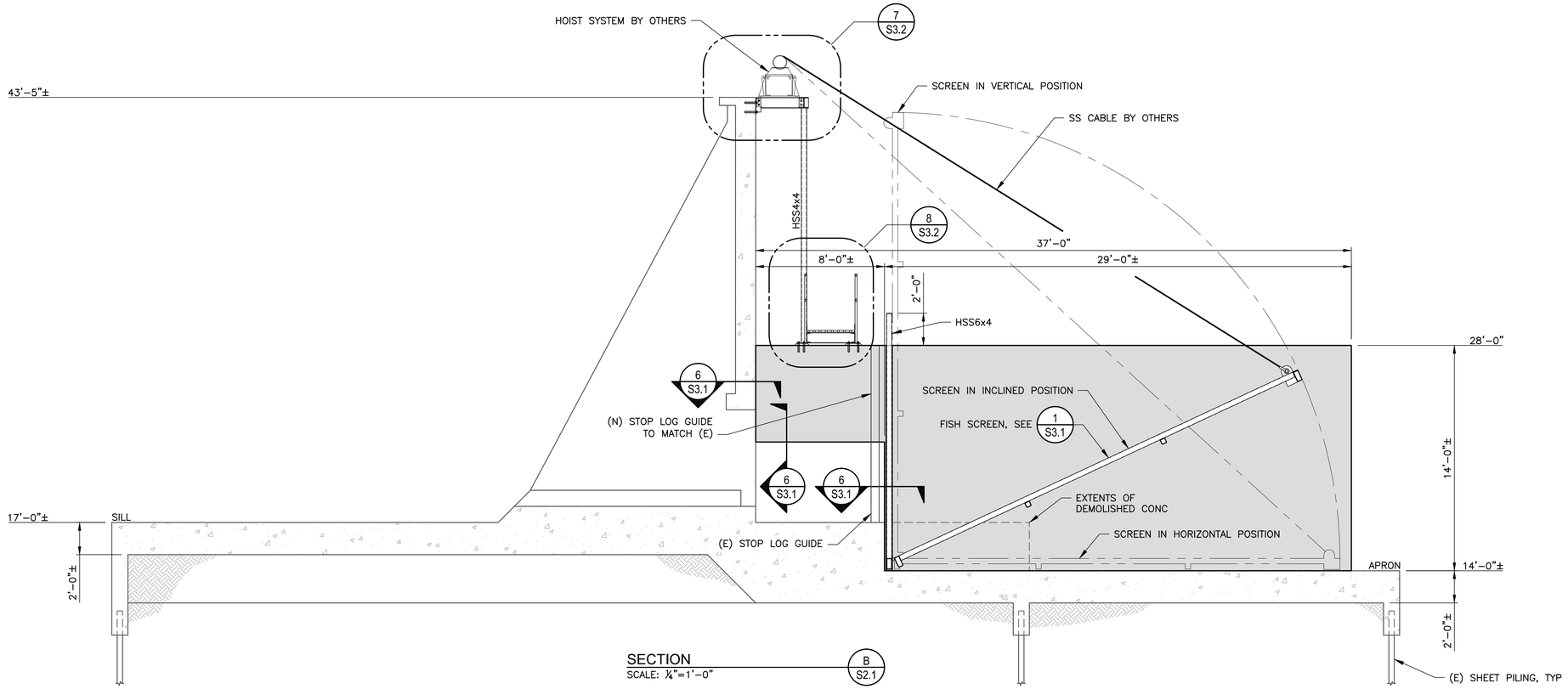
A S2.1



SECTION
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B S2.1

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KNIGHTS LANDING OUTFALL GATES

Sheet Title

SECTIONS

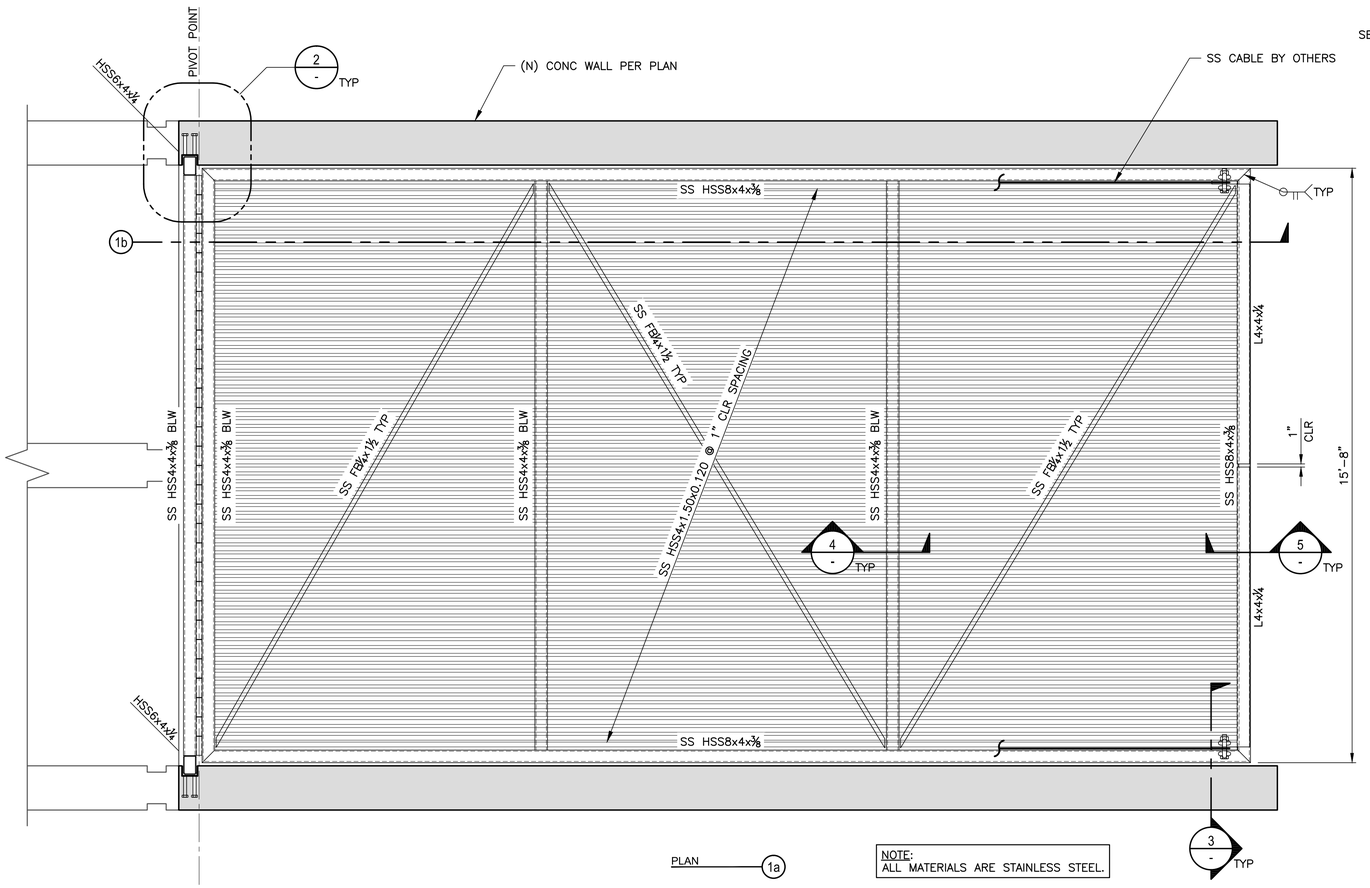
Engineer	BAF
Drawn By	DGG
Revisions	

NO.	*DATE*	*DESCRIPTION*

Job No.	14125
Date	7/10/2015

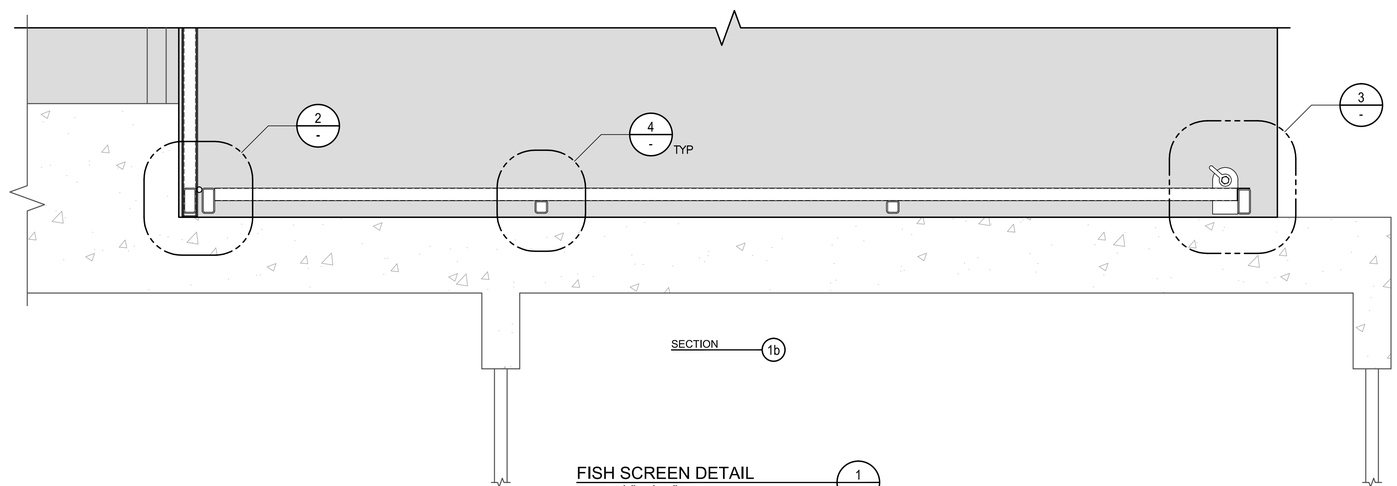
Drawing No.

S3.0



PLAN 1a

NOTE:
ALL MATERIALS ARE STAINLESS STEEL.



SECTION 1b

FISH SCREEN DETAIL
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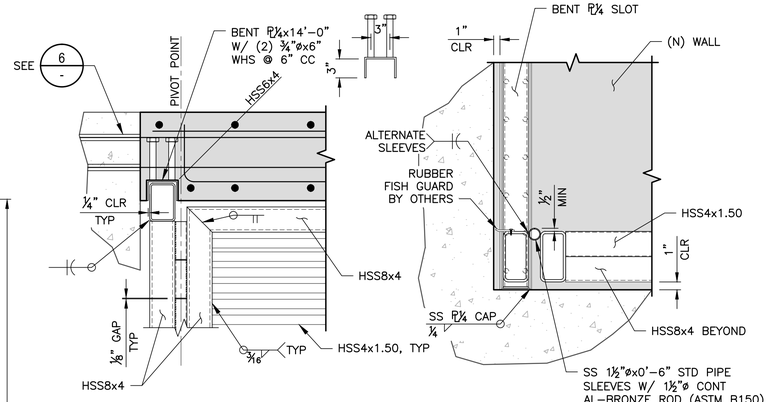

PLAN 2a SECTION 2b

DETAIL
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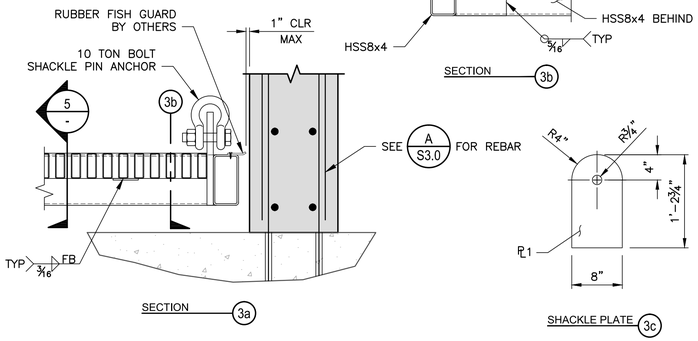

DETAIL
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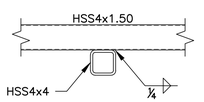

DETAIL
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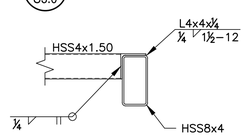

DETAIL
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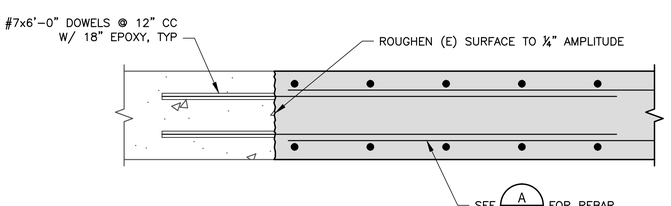

DETAIL
SCALE: 1"=1'-0" 6 S3.0

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EXP. 9/30/2015
STRUCTURAL
STATE OF CALIFORNIA

Project

KNIGHTS LANDING OUTFALL GATES

Sheet Title

FISH SCREEN DETAILS

Engineer	BAF
Drawn By	DGG
Revisions	

NO.	DATE	DESCRIPTION

Job No.	14125
Date	7/10/2015

Drawing No.

S3.1

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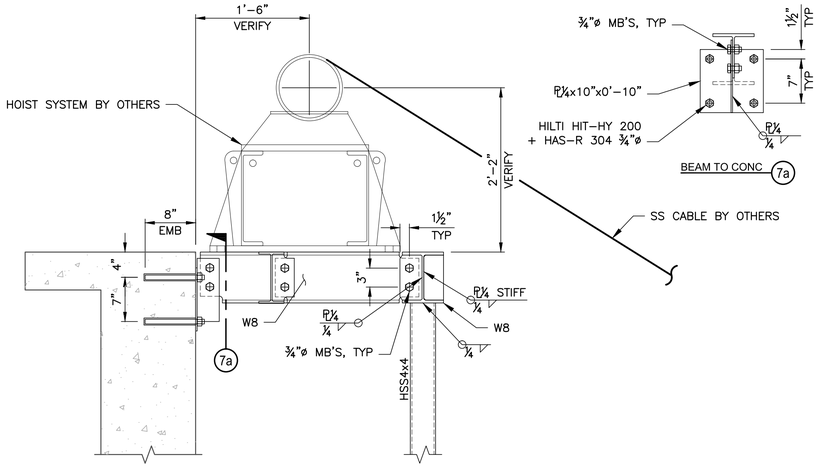
PLOT DATE: Jul 10, 2015 - 5:58pm



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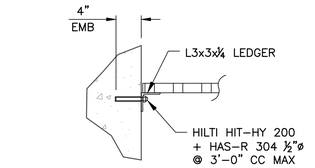

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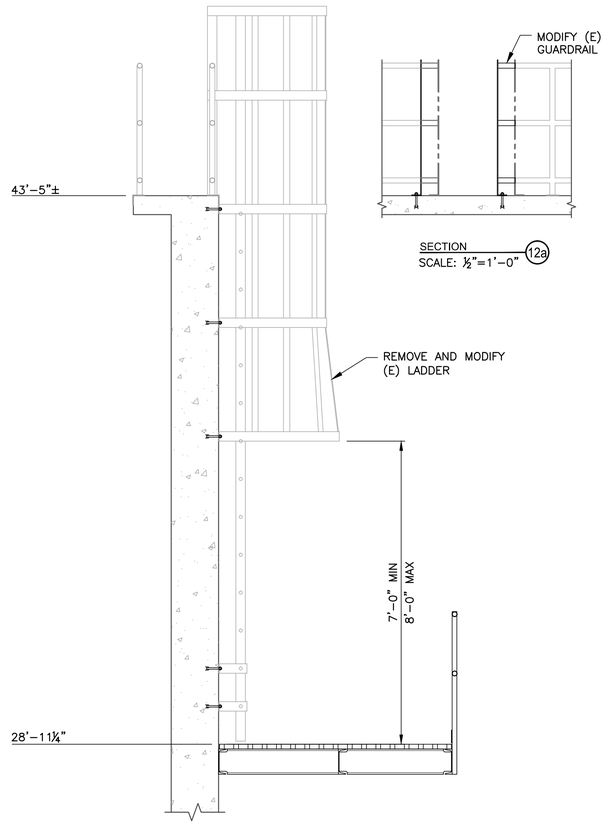

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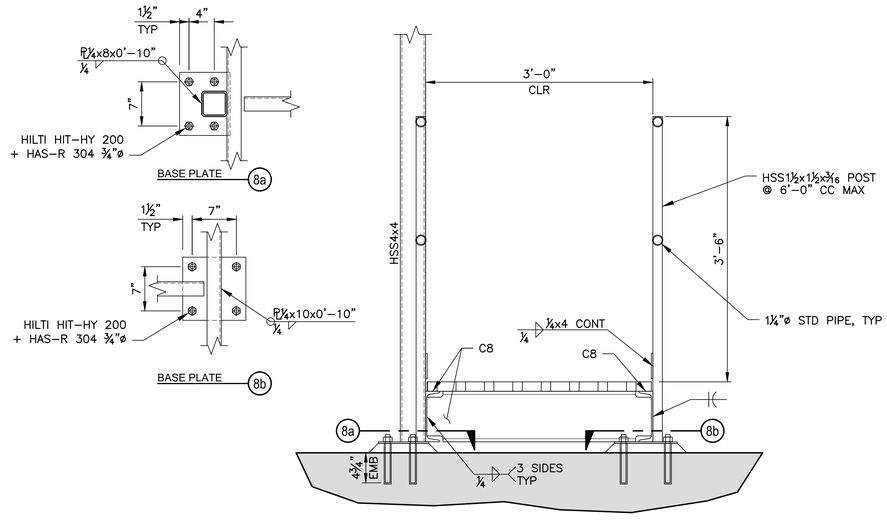

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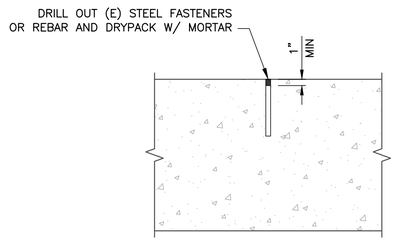

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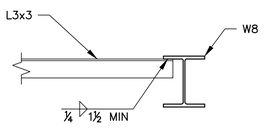

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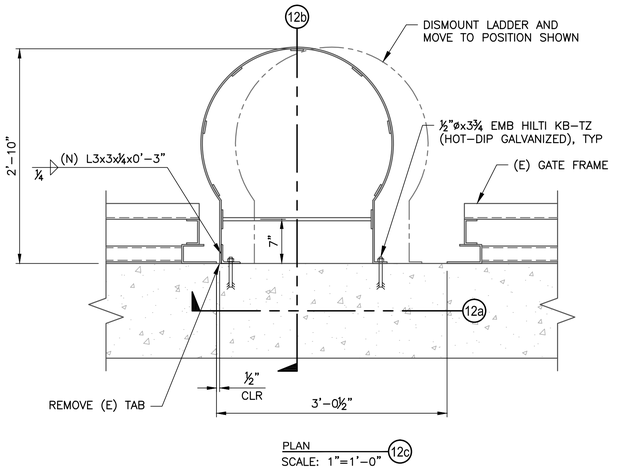

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LADDER MODIFICATION
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S2.2

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S3.2

9 *OF* 9 *SHEETS*

FILE SPEC: V:\Engineering\14000 jobs\14125\14125 Knights Landing Outfall Gates\CAD\14125 S1.dwg
PLOT DATE: Jul 10, 2015 - 5:59pm

ATTACHMENT D - DWR Endorsement Letter

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

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

June 19, 2015

Ms. Leslie Gallagher
Acting Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Suite 151
Sacramento, California 95821

Dear Ms. Gallagher:

The Department of Water Resources (DWR) Flood Maintenance Office (FMO) is responsible for maintaining the Knights Landing Outfall Structure (KLOG) in Yolo County. RD108 is proposing a project to install a positive fish barrier (fish weir) immediately on the downstream side of Knights Landing Outfall Gates to prevent anadromous species from entering the Colusa Basin Drain.

FMO has been involved in reviewing project plans and permits and has offered comments that minimize the Operations and Maintenance (O&M) activities of the fish screen, ensure that the Cal/OSHA standards are applied to the design, and that DWR is not liable for incidental take of Endangered Species Act (ESA) species. Additionally, FMO has concerns regarding the extent to which RD108 will address known deficiencies.

These concerns have been expressed in several meetings with RD108. Our biggest concerns are with minimizing O&M activities, the safety of our personnel that will perform O&M activities, and the potential injury or death to federal and State listed fish due to O&M of the modified structure.

FMO will conditionally endorse this project, provided the following conditions are addressed:

1st • DWR, in the capacity as a reviewer, will be involved in all stages of the project including design, permitting, and construction.

2nd • All personnel and public safety concerns will be addressed and engineered into the design.

3rd • An "Operations and Maintenance Manual" will be provided at project turnover, and appropriate staff training will be provided to DWR staff to properly operate and maintain the facility.

4th • The fish barrier should be described in the USACE 408 Letter of Permission as an experimental design for Sacramento River Flood Control Project facilities. DWR requests USACE, during the ESA consultation with National Marine Fisheries Service (NMFS), acknowledge the potential incidental take and include the following statement in the project biological opinion, or NMFS letter of concurrence for a determination, of "may affect but not likely adversely affect." (Justification: *Relatively few fish should be affected by O&M actions, and actual injury and mortality levels will be low relative to overall population abundance and not likely to cause any long-term, negative population responses.)*

5th

- Appropriate ESA and California ESA incidental take coverage is provided to DWR staff, management, and contractors conducting otherwise lawful operations and maintenance activities for the Knights Landing Outfall Gates facility to address the potential for take of listed or endangered species.

6th

- DWR would also request USACE to include in the 408 Letter of Permission for a condition to establish an adaptive management team for the fish barrier if an incidental take of a listed fish occurred. The adaptive management team would include staff from CVFPB, DWR-DFM, USACE Flood Protection, and Navigation Section, NMFS, and CDFW. This team would determine any remediation actions, the continued operation of the fish barrier, and possible removal of the barrier if deemed to negatively affect listed fish species or proper flood control fuction.

Provided these concerns are addressed, I hereby endorse the Knights Landing Outfall Gates Positive Fish Barrier project. If you should have any questions and/or comments, please contact me at (916) 574-0319 or email at mark.list@water.ca.gov.

Sincerely,

Mark List, Acting Chief
Flood Maintenance Office

Hydraulic Model

To inform the preliminary hydraulic assessment, cbec truncated the CVFED RAS model down to the limits of the KLOG channel (between the Ridge Cut Slough and the Sacramento River), using observed water level data and gate operations to verify the performance of the gates in the CVFED RAS model. Two periods, January 30, 2010 - February 20, 2010 and January 08, 2011 - January 14, 2011, when the gate operations were fairly constant (six 66-inch gates fully open) were modeled.

In addition, the following changes were made to the CVFED RAS model to improve model performance:

- KLOG gates were represented as culverts instead of rectangular gates to enable the flap gate option that would prevent reverse flow when stage in the Sacramento River is higher than stage in Colusa Drain.
- Inverts for gate openings were modified based on spring line elevation (NRS, 2014) and diameter of the gate opening. The invert for 66-inch gates was set at 16.75 ft-NAVD88 and the invert for 42-inch gates was set at 17.75 ft-NAVD88.
- To account for the head loss through flap gates, given that HEC-RAS cannot account for this loss directly, the entrance loss coefficients and culvert lengths were adjusted so modeled flows were similar to DWR's published flows. Figure 5 shows the DWR published flows and the modeled flows in 2011. Figure 6 shows the same comparison for the modeled period in 2010.
- The proposed Alaskan weir was incorporated into the model by cbec to account for head loss, and to assess the potential flow reduction through KLOG. The reduction in flow through KLOG indicates additional flux into the Yolo Bypass.

In HEC-RAS, the Alaskan Weir pickets (typically 1-inch in diameter) and openings (1.625-inch wide) were represented as multiple culvert openings through an embankment. The top of the weir was set to 25 ft-NAVD88 based on the preliminary design configurations provided by KSN, Inc. Due to memory and processing limitations of the HEC-RAS software, roughly 80% of the weir openings were included in the model while the remaining flow area was blocked off. This represents a conservative configuration whereby the head loss and the additional flow to Yolo Bypass are slightly over estimated.

Results

Table 2 shows the preliminary results of estimated additional flows to Yolo Bypass via KLRC due to the proposed Alaskan Weir during the two periods modeled.

Table 2. Preliminary hydraulic model assessment of flow diversion to RCS due to fish exclusion weir

Date	Average Daily Flow through KLOG, cfs	Estimated additional daily flows to KLRC, cfs	Percentage of flow diversion due to the weir	Gate Operation
30 Jan, 2010	686	3.4	0.5%	6 gates (66-inch) fully open
31 Jan, 2010	1,277	3.9	0.3%	6 gates (66-inch) fully open
01 Feb, 2010	1,473	5.8	0.4%	6 gates (66-inch) fully open
02 Feb, 2010	1,560	10.1	0.6%	6 gates (66-inch) fully open
03 Feb, 2010	1,612	23.3	1.4%	6 gates (66-inch) fully open
04 Feb, 2010	1,621	34.6	2.1%	6 gates (66-inch) fully open
05 Feb, 2010	1,658	43.3	2.6%	6 gates (66-inch) fully open
06 Feb, 2010	1,097	3.1	0.3%	6 gates (66-inch) fully open
07 Feb, 2010	492	0.5	0.1%	6 gates (66-inch) fully open
08 Feb, 2010	374	2.0	0.5%	6 gates (66-inch) fully open
09 Feb, 2010	381	2.4	0.6%	6 gates (66-inch) fully open
10 Feb, 2010	544	3.1	0.6%	6 gates (66-inch) fully open
11 Feb, 2010	713	3.4	0.5%	6 gates (66-inch) fully open
12 Feb, 2010	1,022	6.6	0.6%	6 gates (66-inch) fully open
13 Feb, 2010	1,205	13.3	1.1%	6 gates (66-inch) fully open
14 Feb, 2010	1,266	28.4	2.2%	6 gates (66-inch) fully open
15 Feb, 2010	1,299	35.7	2.8%	6 gates (66-inch) fully open
16 Feb, 2010	1,306	35.6	2.7%	6 gates (66-inch) fully open
17 Feb, 2010	1,290	37.8	2.9%	6 gates (66-inch) fully open
18 Feb, 2010	1,219	38.6	3.2%	6 gates (66-inch) fully open
19 Feb, 2010	1,086	37.3	3.4%	6 gates (66-inch) fully open
20 Feb, 2010	981	37.4	3.8%	6 gates (66-inch) fully open
08 Jan, 2011	280	6.2	2.2%	6 gates (66-inch) fully open
09 Jan, 2011	477	7.5	1.6%	6 gates (66-inch) fully open
10 Jan, 2011	512	10.6	2.1%	6 gates (66-inch) fully open
11 Jan, 2011	578	12.3	2.1%	6 gates (66-inch) fully open
12 Jan, 2011	655	16.4	2.5%	6 gates (66-inch) fully open
13 Jan, 2011	657	15.2	2.3%	6 gates (66-inch) fully open
14 Jan 2011	586	14.3	2.4%	6 gates (66-inch) fully open

Results of the preliminary hydraulic assessment indicate that the additional flow to KLRC, due to the Alaskan Weir, is a small portion (< 5 percent) of flow through the KLOG. The head loss through the weir is 0.30 ft under maximum flow of 1,658 cfs through the KLOG on Feb 5, 2010 which appears reasonable given the conservative nature of the weir configuration as discussed before.

Using a conservative value of 5 percent, the estimated maximum daily flow diverted to Yolo Bypass during the four floods is as follows:

- 1986 flood: 38.7 cfs (5 percent of 774 cfs)
- 1997 flood: 8 cfs (5 percent of 147 cfs)
- 2006 flood: 69 cfs (5 percent of 1370 cfs)
- 2011 flood: 0.05 cfs (5 percent of 0.90 cfs)

The cumulative volume of additional flow to Yolo Bypass during the period of flood wave relative to the cumulative volume to Yolo Bypass over the Fremont Weir (CDEC station: FRE) is summarized below:

- 1986 flood: Fremont Weir flow data not available for comparison
- 1997 flood (Dec 04, 1997 – Mar 16, 1997): 16.3 ac-ft vs. 7,821,312 ac-ft (< 0.01 %)
- 2006 flood (Dec 17, 2005 – Feb 24, 2006): 334 ac-ft vs. 4,369,488 ac-ft (< 0.01 %)
- 2011 flood (Mar 14, 2011 – May 04, 2011): 0.10 ac-ft vs. 2,383,868 ac-ft (< 0.01 %)

Based on this assessment, the volume of flow diverted to Yolo Bypass is insignificant and should not affect peak stages during a flood.