RECLAMATION DISTRICT NO. 1614

AGENDA FOR
SPECIAL BOARD OF TRUSTEES MEETING
10:00 A.M. JANUARY 18, 2022

NEUMILLER & BEARDSLEE
3121 WEST MARCH LANE, SUITE 100
STOCKTON, CA 95219

State Indoor Face Covering/Mask Requirement

As required by the California Department of Public Health, every person present at the Reclamation District 1614 Trustee Meeting will be required to wear a face covering/mask at all times.

AGENDA

1. Call to Order/Roll Call.
2. Public Comment. The public may comment on any matter within the District's jurisdiction that is not on the agenda. Matters on the agenda may be commented on by the public when the matter is taken up. All comments are limited to 5 minutes for general public comment and per agenda item in accordance with Resolution 2014-06.
3. Encroachment Permit. Discussion and possible action to approve encroachment permit submitted by San Joaquin Area Flood Control Agency
4. Adjournment.

This agenda shall be made available upon request in alternative formats to persons with a disability, as required by the Americans with Disabilities Act of 1990 (42 U.S.C. § 12132) and the Ralph M. Brown Act (California Government Code §54954.2). Persons requesting a disability related modification or accommodation in order to participate in the meeting should contact Rhonda Olmo at 209/948-8200 during regular business hours, at least forty-eight hours prior to the time of the meeting.

Materials related to an item on this Agenda submitted to the Trustees after distribution of the agenda packet are available for public inspection in the office of the District Secretary at Neumiller & Beardslee, 3121 West March Lane, Suite 100, Stockton, California during normal business hours. The agenda is also available on the Reclamation District website at: http://www.rd1614.com/

AGENDA PACKET
RECLAMATION DISTRICT 1614
JANUARY 18, 2022

ITEM **COMMENTARY**

1. Self-explanatory.
2. Self-explanatory.
3. Please see attached.
4. Self-explanatory.

ITEM 3

RECLAMATION DISTRICT 1614
P.O. BOX 4807
STOCKTON, CA 95204

PHONE: (209) 948-8200

Staff Report: September 21, 2021, San Joaquin Area Flood Control Agency Permit Application for Smith Canal Gate Project

Draft conditions as recommended by Consulting Engineer, Ridgeline, are as follows:

1) The plans specify that rock slope protection be installed along the RD 1614 levee 115-feet up and downstream of the dam, per Sheet C-201, and up to elevation 10.4 feet, per Detail C, Sheet C-301. The San Joaquin River Delta Base Flood Elevation Refinement Stage Frequency Analysis report, dated September 2, 2010, estimates the high sea-level rise water surface elevation in excess of 10-feet in elevation in the year 2022, based on a 1/100 annual exceedance probability at a 90% confidence level, per Figure 14. Before a final encroachment permit can be issued, the permittee shall be required to submit to RD1614 the following to the satisfaction of the District Engineer:
    a) A revised stage frequency analysis report indicating current probable flood elevations in conjunction with a wave analysis to support the proposed rock slope protection elevation. Alternatively, an engineering design report may be prepared to justify a revision to the proposed rock slope protection elevation, based on the existing stage frequency analysis in conjunction with a wave analysis or an additional two feet of freeboard.
    b) An engineering design report supporting the proposed rock slope protection elevation in the event the gate is closed.
    c) An engineering design report supporting the proposed up and downstream length of rock slope protection.

2) The Design Documentation Report, revised January 28, 2021, indicates that a sheet pile tip elevation of -45 feet meets design seepage criteria and an elevation of -70 meets design seismic criteria. Before a final encroachment permit can be issued, the permittee shall be required to submit to RD1614 the following to the satisfaction of the District Engineer:
    a) An engineering design report supporting the depth of the flood wall and the length of the PZ sheets with detailed analysis specific to the levee section at the flood wall tie-in location.

3) The project specifications require a ground vibration monitoring and control program, per Section 10-18. The Ground Vibration Monitoring and Control Plan, dated June, 17, 2020, proposes two monitoring stations within the vicinity of the flood wall tie-in location, one approximately 50 feet westerly and the other approximately 100 feet northeasterly. Before a final encroachment permit can be issued, the permittee shall be required to submit to RD1614 the following to the satisfaction of the District Engineer:
    a) An engineering design report supporting the proposed monitoring locations and associated threshold values as they relate to the stability of the specific levee soils.

SJAFCA
San Joaquin Area FLOOD CONTROL Agency

September 21, 2021

Honorable Kevin Kauffman, President
Board of Trustees
Reclamation District 1614
c/o Law Offices of Neumiller & Beardslee
3121 W. March Lane, Suite 100
Stockton, CA 94219

RE: SMITH CANAL GATE PROJECT - ENCROACHMENT PERMIT

Dear President Kauffman:

On behalf of the San Joaquin Area Flood Control Agency (SJAFCA), I am pleased to submit the attached Smith Canal Gate Encroachment Permit application packet for your consideration and approval. In addition to the application, the following items have been included to address any and all technical information you may need to process the Encroachment Permit:

1. Central Valley Flood Protection Board application to construct the Smith Canal Gate project improvements, which includes RD 1614 endorsement of the project.
2. Ground Vibration Monitoring and Control Program included in the project specifications.
3. Draft Operation, Maintenance, Repair, Rehabilitation and Replacement Manual, which will be finalized once the project construction is completed.
4. Summary of information related to the Hydrodynamic Modeling, Alignment, and Width Evaluation (Power Point Presentation).
5. Summary of information related to the Levee bridge Velocity Analysis at Gate Structure (Power Point Presentation).
6. Graphical representation of the sequencing/schedule of proposed improvements.

As noted during the regular meeting of the Board of Trustees on September 7, 2021, we stand ready to work with you for timely processing of the Encroachment Permit application.

If you have any questions or need additional information, please do not hesitate to contact Juan Neira at (209) 937-8113 or juan.neira@stocktonca.gov.

Sincerely,

Chris Elias
Executive Director
CE:JN:lr

FOR OFFICE USE

Index No. _____ *Lot No.* _____

APPLICATION FOR APPROVAL OF PLANS AND/OR ENCROACHMENT PERMIT

1. **Application to the RD 1614 for approval to**_____

Construct improvements on the RD 1614 levee required for connection with the Smith Canal Gate project which primarily include (see attached Sheet C-862 and others for notes and details): Cellular sheet pile wall cells(s), two (2) Single sheet pile walls parallel to the levee, grass pavers area, scour protection along existing levee embankment, ornamental steel gate and fence, and radial anti-climb collars.
Note: Vertical Datum used is North American Vertical Datum 83 (NAVD88), Horizontal Datum used is California Coordinate System - State Zone 3 (CCS83-3)

a. ☑ Location or vicinity map, to scale, showing location of proposed work in relation to known topographic features, to permit visitation and/or inspection of work.

b. ☑ A complete plan of the proposed work, to scale, showing dimensions, materials of construction, and relationship of the proposed work to adjacent or affected project features.

c. ☑ A cross section of the levee, berm, and stream area with dimensions and elevations of the levee crown, levee toes, floodplain, low water levee, etc., with reference to the U.S. Geological Survey, U.S. Corps of Engineers, or other datum generally used within the locale.

d. ☑ Profiles of existing or proposed levees, fills, or other obstructions in the stream or overflow area with reference to the U.S. Geological Survey, U.S. Corps of Engineers, or other datum generally used within the locale.

3. **Please Print or Type:**

Name of Applicant	Address-Zip Code	Telephone Number
Juan Neira, San Joaquin Area Flood Control Agency	22 E Weber Ave #301, Stockton CA 95202	Office 209-397-8113 Home

Signature Juan Neira Date 9/13/21

4. **Endorsement**

We, the Trustees of RD 1614 at its meeting held on the _____ day of _____, 20___, hereby approve and give consent to the execution of the encroachment permit subject to the following conditions:

☐ Conditions listed on the back of this form ☐ Additional attached conditions.

☐ No conditions

Date_____ _____

Board of Trustees,
RD 1614

Appendix A-1

663790-1

FOR OFFICE USE

Index No. _____ *Lot No.* _____

5. Name and address of owners of adjacent land parcels sharing a length of point of common boundary with the land upon which the contents of this application apply.

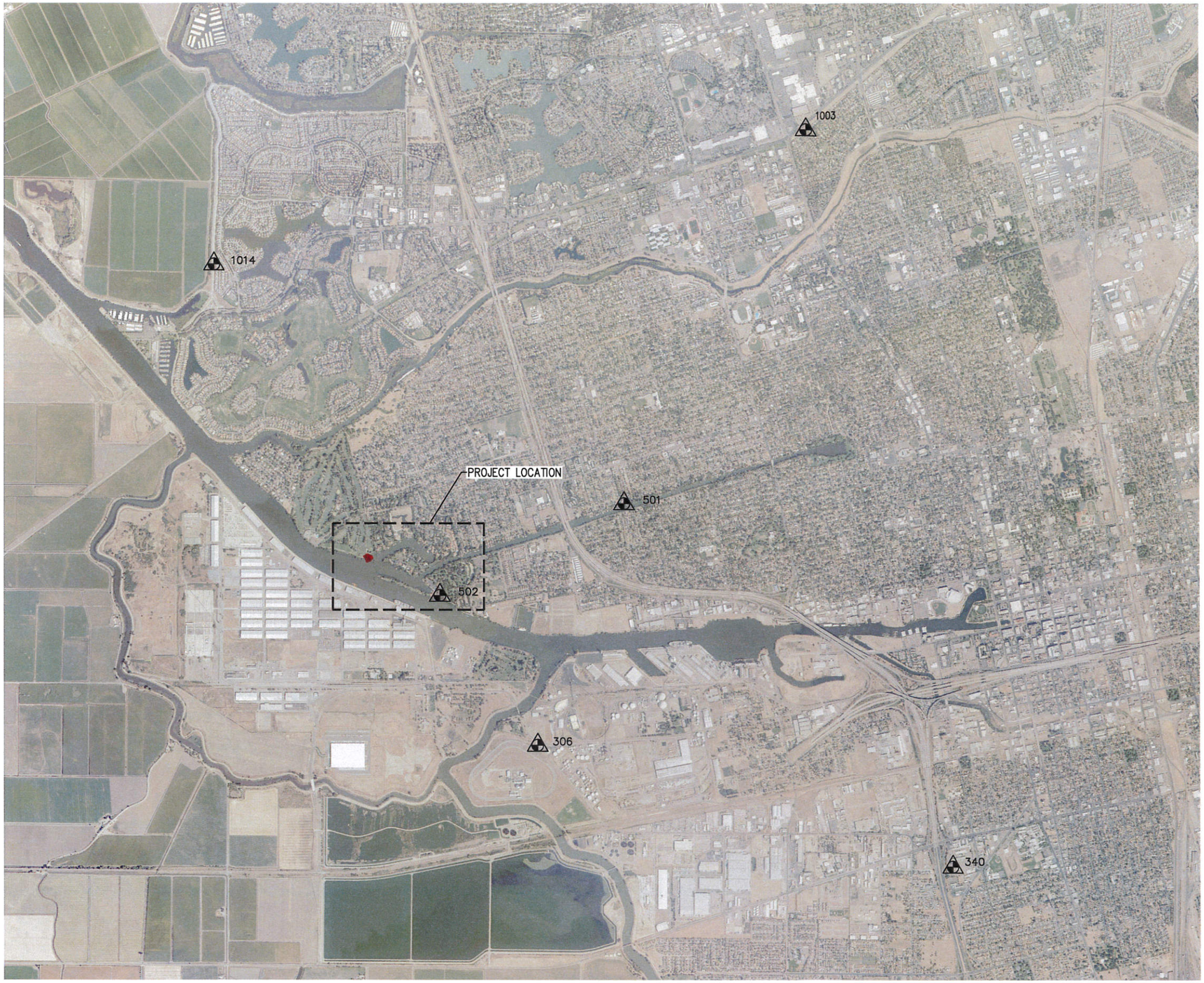
Name	Address	Zip Code
Stockton Golf and County Club	3800 Country Club Blvd	95204

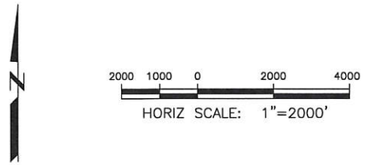
Conditions:

1. Comply with RD 1614 Levee Encroachment Standards.
2. Submit new application for any future encroachment within ten (10) feet of levee toe.
3. Signing and recording of permit
4.
5.
6.
7.

SEE ATTACHED ADDITIONAL CONDITIONS. IF BOX CHECKED ON FRONT PAGE

Section 1 - Project Location





CONTROL TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
306	2167315.40	6320382.12	8.17	COS 306, BRASS DISK MARKING COS MONUMENT STAMPED "10S-2" IN MONUMENT WELL ON WEST SIDE OF TRAFFIC ISLAND AT NAVY DRIVE AND WASHINGTON STREET.
340	2163889.61	6332136.19	9.46	COS 340, 5/8" ALUMINUM ROD DRIVEN TO REFUSAL WITH 2-1/2" DIAMETER ALUMINUM CAP STAMPED "CORP L.S. 4334" IN AN ALUMINUM MONUMENT WELL WITH SCREW LOCKING COVER IN THE COS CORPORATION YARD, 1465 S. LINCOLN STREET. THE POINT IS LOCATED 30' SOUTH OF APPROXIMATE CENTER OF THE TRUCK WASH STRUCTURE. CONTACT THE CITY OF STOCKTON SURVEYS SECTION FOR ACCESS.
501	2174140.65	6322830.80	14.70	5/8" REBAR WITH ALUMINUM CAP STAMPED "KSN CONTROL" SET AT FRANKLIN PUMP STATION ON SMITH TRACK, 5' SOUTHEASTERLY OF THE LAND SIDE HINGE POINT AND 33' NORTH EASTERLY OF THE FENCE LINE.
502	2171542.69	6317623.37	13.29	PK NAIL AND WASHER, SET AT DAD'S POINT BOAT LAUNCH ON WEBB TRACT, ON TOP OF THE BACK OF WALK AT THE ADA RAMP, 9.3' NORTHERLY OF A ADA PARKING SIGN.
1003	2184703.61	6327980.60	15.14	COS 1003, SET IN TOP OF A CONCRETE CYLINDER 8" BELOW THE SURFACE, ALONG THE E.B.M.U.D. AQUEDUCT. NEAR PACIFIC AVENUE AND MARCH LANE, SET 0.15 MILES EAST OF PACIFIC AVENUE STAMPED "STOCKTON S.W. BASE 1954".
1014	2180899.08	6311243.92	17.67	COS 1014, 3/4" REBAR WITH CAP STAMPED "LS4334" MARKING COS MONUMENT NO. "12N-1." MONUMENT IS ON THE EAST SIDE ON 10-MILE LEVEE, 925 FEET NORTH OF MARCH LANE EXTENSION.

NOTES:
BASIS OF SURVEY CONTROL:
BEARINGS AND DISTANCES SHOWN ARE BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD 83) CONVERTED TO THE CALIFORNIA COORDINATE SYSTEM OF 1983, ZONE 3 (CCS83-3) AS REFERENCED BY AVAILABLE CITY OF STOCKTON AND NGS PUBLISHED CONTROL MONUMENTS. ELEVATIONS SHOWN ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AS REFERENCED BY AVAILABLE CITY OF STOCKTON AND NGS BENCHMARKS. UNITS SHOWN ARE BASED ON THE U.S. SURVEY FOOT, EPOCH DATE 1991.35 ADJUSTMENT. ALL COORDINATES AND DISTANCES ARE GRID, TO CONVERT GRID DISTANCES TO GROUND, MULTIPLY BY 1.00005972.

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AAS	CONFORMED SET

SCALE: NTS

DATE: DECEMBER 2019

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED

DRAWN MAH

CHECKED DAP

ASHLEY A. SMITH, PE — 86512 — 3/31/21
PROJECT ENGINEER — NO. — EXP. DATE

DAVID A. PETERSON, PE — 43432 — 6/30/20
PROJECT MANAGER — NO. — EXP. DATE

PROFESSIONAL LAND SURVEYOR KRIS F. NEHMER NO. 8123 EXP. 12/31/2020 STATE OF CALIFORNIA
12/17/2019

SJAFCA San Joaquin Area FLOOD CONTROL Agency

KSN INC. KJELDSEN SINNOCK NEUDECK CIVIL ENGINEERS & LAND SURVEYORS

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

GENERAL LOCATION

SHEET V-001

SHEET 9 OF 139

P:\SJAFCA\Smith Canal Closure Structure_Drawings\From Others\KSN\Smith Canal Gate - Signed Cont\SC-V001 (2017) 12-17-19-Signed-KFN.dwg 5-20-20 09:41:07 AM amartin

LINE TABLE: LIMITS OF WORK						
LINE ID	STATION START	STATION END	LENGTH	BEARING	LINE STARTS	LINE ENDS
L189	0+00.00	0+21.06	21.058	S58° 37' 32.32"W	(6317635.5795,2171478.4609)	(6317636.5795,2171478.4609)
L190	0+21.06	0+42.30	21.236	S58° 29' 53.15"W	(6317635.5795,2171478.4609)	(6317618.0767,2171464.4308)
L191	0+42.30	0+83.51	21.218	S57° 36' 43.07"W	(6317618.0767,2171464.4308)	(6317600.1594,2171453.0653)
L192	0+83.51	0+84.50	20.988	S58° 24' 11.42"W	(6317600.1594,2171453.0653)	(6317580.6444,2171445.3400)
L193	0+84.50	1+05.88	21.382	S53° 44' 54.89"W	(6317580.6444,2171445.3400)	(6317559.3895,2171443.0117)
L194	1+05.88	1+27.49	21.601	N82° 45' 16.10"W	(6317559.3895,2171443.0117)	(6317537.9808,2171445.7361)
L195	1+27.49	1+48.73	21.240	N70° 09' 58.27"W	(6317537.9808,2171445.7361)	(6317517.9802,2171452.9428)
L196	1+48.73	1+69.83	21.101	N60° 07' 44.51"W	(6317517.9802,2171452.9428)	(6317499.6824,2171463.4522)
L197	1+69.83	1+91.09	21.287	N55° 06' 14.71"W	(6317499.6824,2171463.4522)	(6317482.2393,2171475.8188)
L198	1+91.09	2+01.25	10.156	N52° 57' 32.44"W	(6317482.2393,2171475.8188)	(6317472.1594,2171478.8638)
L199	2+01.25	2+94.60	93.350	N51° 39' 03.79"W	(6317472.1594,2171478.8638)	(6317379.7988,2171490.4184)
L200	3+05.81	4+05.53	99.722	N78° 31' 10.19"W	(6317365.8020,2171492.8649)	(6317271.0148,2171512.1160)
L201	4+05.53	4+98.44	90.902	N76° 23' 09.97"W	(6317271.0148,2171512.1160)	(6317183.0632,2171535.0510)
L202	5+21.84	6+15.65	94.011	N71° 28' 48.57"W	(6317158.8995,2171542.2364)	(6317089.7871,2171572.0974)
L203	6+15.65	7+19.28	103.627	N62° 42' 23.03"W	(6317089.7871,2171572.0974)	(6316977.6887,2171619.6157)
L204	7+19.28	7+99.43	80.149	N57° 31' 06.28"W	(6316977.6887,2171619.6157)	(6316903.6084,2171650.2538)
L205	8+22.87	9+13.82	90.947	N77° 06' 39.84"W	(6316881.3030,2171657.3760)	(6316792.6478,2171677.6628)
L206	9+13.82	10+23.06	109.242	N63° 56' 23.26"W	(6316792.6478,2171677.6628)	(6316694.4843,2171725.5673)
L207	10+23.06	11+22.30	99.243	N59° 32' 36.86"W	(6316694.4843,2171725.5673)	(6316608.9358,2171778.9017)
L208	11+22.30	12+17.16	94.863	N66° 53' 33.05"W	(6316608.9358,2171778.9017)	(6316521.6838,2171813.1312)
L209	12+17.16	13+16.36	99.202	N71° 37' 25.66"W	(6316521.6838,2171813.1312)	(6316427.5407,2171844.4051)
L210	13+16.36	14+06.59	90.230	N69° 04' 39.27"W	(6316427.5407,2171844.4051)	(6316343.2598,2171878.6267)
L211	14+17.95	15+07.56	89.606	N73° 43' 31.82"W	(6316332.4988,2171880.2478)	(6316246.4835,2171905.3568)
L212	15+07.56	16+07.35	99.792	N78° 22' 07.39"W	(6316246.4835,2171905.3568)	(6316148.7410,2171925.4781)
L213	16+07.35	16+96.46	88.110	N70° 04' 44.88"W	(6316148.7410,2171925.4781)	(6316065.9032,2171955.4991)
L214	16+96.46	17+18.33	22.874	N71° 01' 33.92"W	(6316065.9032,2171955.4991)	(6316044.2719,2171962.9363)
L215	17+18.33	18+81.34	163.010	N70° 59' 38.44"W	(6316044.2719,2171962.9363)	(6315890.1482,2172016.0234)
L216	18+81.34	28+26.55	745.202	N27° 06' 35.55"W	(6315890.1482,2172016.0234)	(6315550.1750,2172879.1557)
L217	28+26.55	27+07.66	81.117	N62° 54' 02.19"E	(6315550.1750,2172879.1557)	(6315622.3868,2172716.1074)
L218	27+07.66	27+94.55	86.885	N58° 28' 07.41"E	(6315622.3868,2172716.1074)	(6315696.4172,2172781.5882)
L219	27+94.55	28+33.93	39.381	N58° 58' 32.15"E	(6315696.4172,2172781.5882)	(6315730.1648,2172781.8853)
L220	28+33.93	28+53.71	19.777	N58° 58' 17.49"E	(6315730.1648,2172781.8853)	(6315747.1118,2172792.0797)
L221	28+53.71	28+79.93	25.228	N58° 27' 51.53"E	(6315747.1118,2172792.0797)	(6315769.4662,2172805.7976)
L222	28+79.93	28+95.29	15.360	N58° 28' 00.39"E	(6315769.4662,2172805.7976)	(6315782.2898,2172814.2827)
L223	28+95.29	29+09.90	14.607	N46° 50' 14.24"E	(6315782.2898,2172814.2827)	(6315792.9241,2172824.2748)
L224	29+09.90	29+24.27	14.371	N27° 36' 16.00"E	(6315792.9241,2172824.2748)	(6315799.5829,2172837.0095)
L225	29+24.27	29+39.39	15.121	N11° 03' 46.84"E	(6315799.5829,2172837.0095)	(6315802.4844,2172851.8498)
L226	29+39.39	29+54.91	15.521	N00° 57' 58.90"E	(6315802.4844,2172851.8498)	(6315802.7462,2172867.3685)
L227	29+54.91	29+70.01	15.097	N00° 21' 22.85"W	(6315802.7462,2172867.3685)	(6315801.3369,2172882.3997)
L228	29+70.01	29+84.76	14.753	N10° 46' 06.12"W	(6315801.3369,2172882.3997)	(6315798.5805,2172896.8928)
L229	29+84.76	29+99.50	14.737	N15° 31' 36.08"W	(6315798.5805,2172896.8928)	(6315794.6353,2172911.0921)
L230	29+99.50	30+14.36	14.863	N15° 31' 03.30"W	(6315794.6353,2172911.0921)	(6315789.9150,2172925.1853)
L231	30+14.39	30+38.13	23.740	N17° 52' 36.32"W	(6315789.8843,2172925.1754)	(6315782.5968,2172947.7691)
L232	30+38.13	31+21.72	83.581	N15° 11' 59.78"W	(6315782.5968,2172947.7691)	(6315760.6829,2173028.4262)
L233	−38+41.48	−38+08.25	33.205	S14° 58' 19.80"E	(6315781.1598,2173066.9924)	(6315789.7381,2173034.9151)
L234	−38+08.25	−37+28.37	79.879	S15° 23' 37.99"E	(6315789.7381,2173034.9151)	(6315810.9423,2172957.9016)
L235	−37+28.37	−36+90.07	38.306	S17° 52' 38.36"E	(6315810.9423,2172957.9016)	(6315822.7014,2172921.4454)
L236	−36+90.07	−36+85.82	4.244	S17° 30' 49.32"E	(6315822.7014,2172921.4454)	(6315823.9788,2172917.3981)
L237	−36+85.82	−36+55.79	20.033	S12° 37' 01.03"E	(6315823.9788,2172917.3981)	(6315828.3545,2172897.8487)
L238	−36+55.79	−36+46.06	20.735	S10° 03' 31.89"E	(6315828.3545,2172897.8487)	(6315831.9780,2172877.4328)
L239	−36+46.06	−36+23.75	21.309	S04° 48' 46.09"E	(6315831.9780,2172877.4328)	(6315833.7640,2172856.1989)
L240	−36+23.75	−36+03.05	20.699	S04° 27' 30.55"W	(6315833.7640,2172856.1989)	(6315832.1550,2172835.5630)
L241	−36+03.05	−35+83.39	19.656	S19° 38' 54.26"W	(6315832.1550,2172835.5630)	(6315825.5458,2172817.0517)
L242	−35+83.39	−35+63.60	19.789	S39° 01' 32.16"W	(6315825.5458,2172817.0517)	(6315813.0850,2172801.6780)
L243	−35+63.60	−35+42.79	20.811	S46° 36' 06.55"W	(6315813.0850,2172801.6780)	(6315797.2406,2172788.1861)
L244	−35+42.79	−27+02.84	839.950	S27° 13' 18.11"E	(6315797.2406,2172788.1861)	(6316181.4520,2172041.2807)
L245	−27+02.84	−26+06.88	95.961	S78° 22' 07.39"E	(6316181.4520,2172041.2807)	(6316275.4422,2172021.9138)
L246	−26+06.88	−25+12.41	94.471	S73° 43' 31.82"E	(6316275.4422,2172021.9138)	(6316366.1273,2171995.4395)
L247	−24+91.32	−24+03.78	87.564	S69° 04' 39.27"E	(6316366.1120,2171988.7148)	(6316467.9021,2171957.4452)
L248	−24+03.78	−23+02.28	101.492	S71° 37' 25.66"E	(6316467.9021,2171957.4452)	(6316564.2190,2171925.4492)
L249	−23+02.28	−21+94.74	107.528	S66° 53' 33.05"E	(6316564.2190,2171925.4492)	(6316663.1185,2171883.2497)
L250	−21+94.74	−20+92.43	102.308	S59° 32' 36.86"E	(6316663.1185,2171883.2497)	(6316751.3097,2171831.3915)
L251	−20+92.43	−20+01.65	90.782	S63° 56' 23.26"E	(6316751.3097,2171831.3915)	(6316832.8855,2171791.5569)
L252	−20+01.65	−19+24.52	77.128	S77° 08' 39.54"E	(6316832.8855,2171791.5569)	(6316908.0704,2171774.3525)
L253	−18+80.99	−17+95.80	85.192	S67° 31' 06.28"E	(6316949.4948,2171781.1441)	(6317028.2120,2171728.5680)
L254	−17+95.80	−16+96.33	99.464	S62° 42' 23.03"E	(6317028.2120,2171728.5680)	(6317116.6021,2171682.9589)
L255	−16+96.33	−16+11.53	84.805	S71° 28' 48.57"E	(6317116.6021,2171682.9589)	(6317197.0185,2171656.0220)
L256	−15+94.50	−13+75.40	219.105	S79° 33' 13.34"E	(6317213.3297,2171651.1688)	(6317428.8029,2171611.4421)
L257	−13+75.40	−12+46.88	128.519	N25° 30' 22.93"E	(6317428.8029,2171611.4421)	(6317484.1445,2171727.4350)
L258	−12+46.88	−9+86.59	281.294	N46° 12' 56.93"W	(6317484.1445,2171727.4350)	(6317286.2998,2171898.1164)
L259	−9+86.59	−9+72.41	13.174	N15° 31' 39.29"E	(6317286.2998,2171898.1164)	(6317290.0478,2171910.7463)
L260	−9+72.41	−9+59.09	13.324	N00° 37' 27.03"E	(6317290.0478,2171910.7463)	(6317290.1927,2171924.0696)
L261	−9+59.09	−9+45.76	13.327	N24° 30' 41.93"W	(6317290.1927,2171924.0696)	(6317284.6638,2171936.1957)
L262	−9+45.76	−9+32.36	13.403	N44° 30' 31.88"W	(6317284.6638,2171936.1957)	(6317275.2881,2171945.7536)
L263	−9+32.36	−9+18.91	13.448	N29° 38' 08.67"W	(6317275.2881,2171945.7536)	(6317268.6251,2171957.4466)
L264	−9+18.91	−9+05.32	13.591	N10° 01' 54.81"W	(6317268.6251,2171957.4466)	(6317266.2578,2171970.8300)
L265	−9+05.32	−8+92.06	13.258	N15° 57' 51.29"E	(6317266.2578,2171970.8300)	(6317269.9040,2171983.5768)
L266	−8+92.06	−8+78.57	13.495	N40° 01' 02.51"E	(6317269.9040,2171983.5768)	(6317278.5818,2171993.9121)
L267	−8+78.57	−8+65.14	13.427	N60° 44' 27.60"E	(6317278.5818,2171993.9121)	(6317290.2960,2172000.4748)
L268	−8+65.14	−8+51.68	13.460	N83° 43' 18.41"E	(6317290.2960,2172000.4748)	(6317303.6750,2172001.9469)
L269	−8+51.68	−8+38.24	13.438	S73° 10' 43.32"E	(6317303.6750,2172001.9469)	(6317316.5361,2171998.0587)
L270	−8+38.24	−8+25.11	13.135	S52° 46' 45.25"E	(6317316.5361,2171998.0587)	(6317328.9957,2171990.1134)
L271	−8+25.11	−8+10.59	14.517	S25° 30' 28.66"E	(6317326.9957,2171990.1134)	(6317333.2472,2171977.0113)

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AAS	CONFORMED SET

SCALE: 1"=200'

DATE: DECEMBER 2019

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED AAS
DRAWN MAH
CHECKED DAP

ASHLEY A. SMITH, PE	86512	3/31/21
PROJECT ENGINEER	NO.	EXP. DATE
DAVID A. PETERSON, PE	43432	6/30/20
PROJECT MANAGER	NO.	EXP. DATE

REGISTERED PROFESSIONAL ENGINEER ASHLEY A. SMITH 86512 Exp. 03/31/21 CIVIL STATE OF CALIFORNIA 12/17/19

SJAFCA San Joaquin Area FLOOD CONTROL Agency

PBI
80 Blue Ravine Rd, Suite 280
FOLSOM, CA 95630
PH. 916-608-2212
Fax 916-608-2232

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

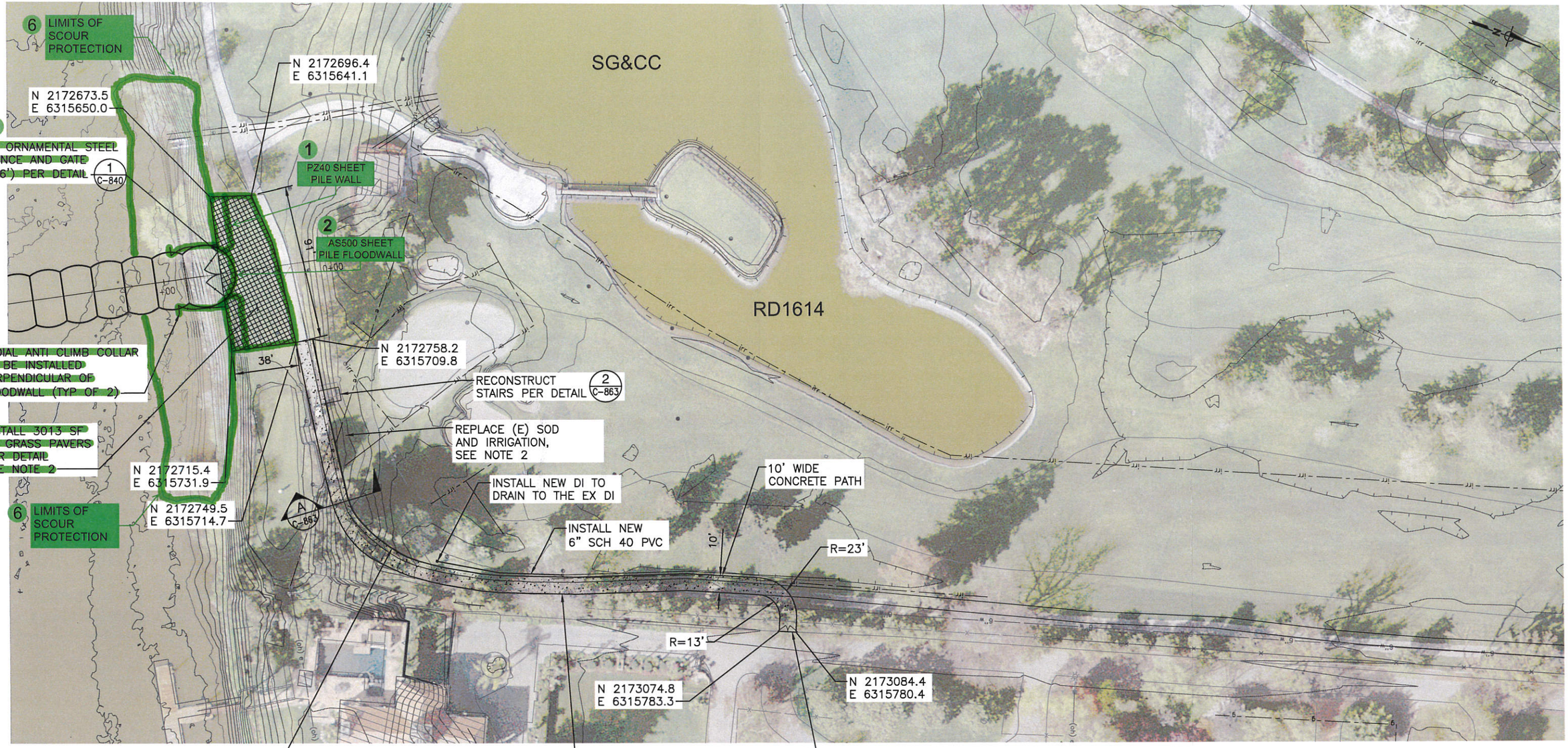
LIMITS OF WORK LINE DATA

SHEET V-003

SHEET 11 OF 139

P:\SJAFCA\Smith Canal Closure Structure_Drawings\CONFORMED - SC-G006-8-V002-4 (2018).dwg 5-20-20 09:27:52 AM amartin

Section 2 - Project Plan of Proposed Work



LEVEE ENCROACHMENTS:

1. PZ40
2. AS500
3. GRASS PAVERS
4. ORNAMENTAL STEEL GATE & FENCE
5. RADIAL ANTI CLIMB COLLAR
6. SCOUR PROTECTION

PLAN
1" = 30'

NOTES:

1. VERIFY ALL DRAIN INVERTS IN THE FIELD. CONFIRM DRAINAGE SLOPES PRIOR TO CONSTRUCTION.
2. EXISTING IRRIGATION SHALL BE REPLACED PRIOR TO INSTALLATION OF GRASS PAVERS OR SOD.
3. GOLF COURSE ACCESS ROAD IMPROVEMENTS IDENTIFIED ON C-861 TO C-863 ARE TO BE CONSTRUCTED ON STOCKTON GOLF AND COUNTRY CLUB PROPERTY. ALL REMAINING IMPROVEMENTS RELATED TO THE FLOODWALL SHALL BE CONSTRUCTED FROM THE WATER.

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AAS	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED AAS
DRAWN MAH
CHECKED DAP

ASHLEY A. SMITH, PE	86512	3/31/21
PROJECT ENGINEER	NO.	EXP. DATE
DAVID A. PETERSON, PE	43432	6/30/20
PROJECT MANAGER	NO.	EXP. DATE

REGISTERED PROFESSIONAL ENGINEER ASHLEY A. SMITH 86512 Exp. 03/31/21 CIVIL STATE OF CALIFORNIA 12/17/19

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SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

GOLF COURSE ACCESS PATH IMPROVEMENTS

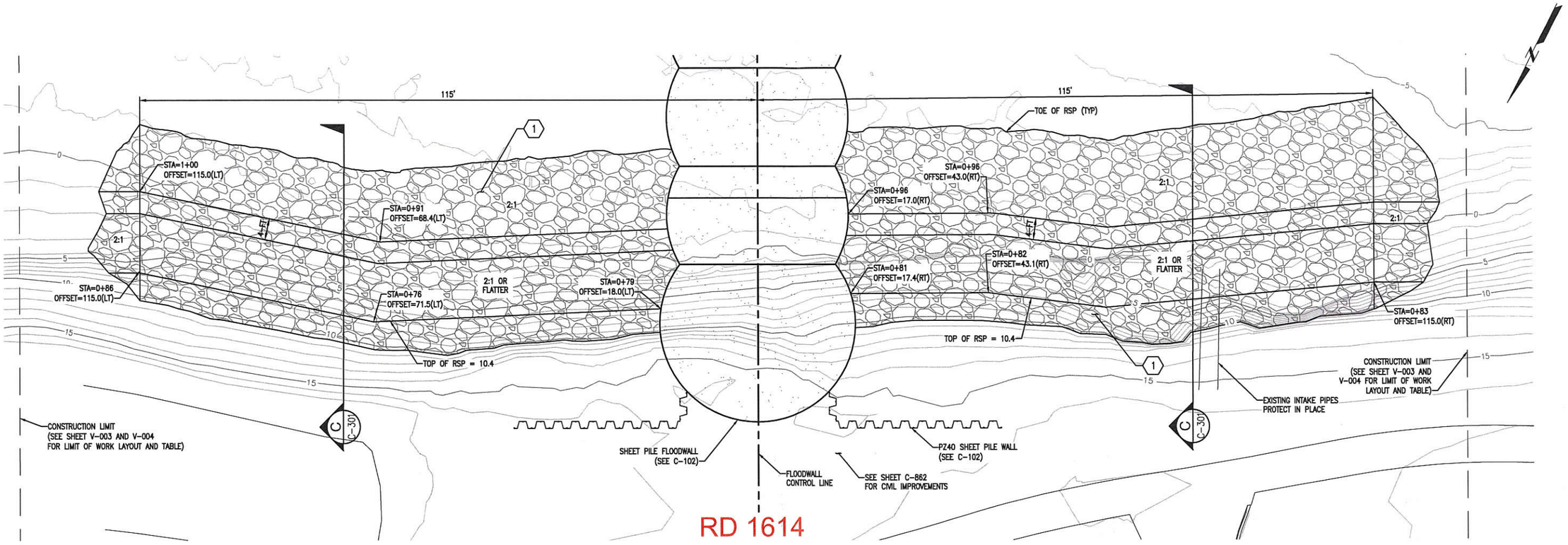
SHEET C-862

SHEET 57 OF 139

P:\SJAFCA\Smith Canal Closure Structure_Drawings\CONFORMED - SC-C861-C863 (2018).dwg 5-20-20 10:51:45 AM amartin

KEY NOTES:

(1) PLACE RSP PER THIS PLAN AND DETAILS ON C-301 AND C-302.



10 5 0 10 20

HORIZ SCALE: 1"=10'

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AJ	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JN
DRAWN AJ
CHECKED DJ

JASON NETTLETON, PE — 73184 — 12/31/20
PROJECT ENGINEER — NO. — EXP. DATE

WES JACOBS
PROJECT MANAGER

REGISTERED PROFESSIONAL ENGINEER
JASON A. NETTLETON
C 73184
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA
12/17/19

SJAFCA
San Joaquin Area FLOOD CONTROL Agency

HDR

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

SCOUR PROTECTION AND ARMORING PLAN

SHEET C-201

SHEET 23 OF 139

KEY NOTES:

1 PLACE RSP PER THIS PLAN AND DETAIL ON C-301.

SMITH CANAL

CONSTRUCTION LIMIT
(SEE V-003 AND V-004 FOR
LIMIT OF WORK LAYOUT AND TABLE)

SEE SHEET C-201 FOR
RSP DESIGN FOR STOCKTON
GOLF AND COUNTRY CLUB

STA 2+27
OFFSET=78.7 (LT)
EL (-)3.7

STA 2+34
OFFSET=34.5 (LT)
TOP OF CONCRETE
SLAB EL (-)7.0/
TOP OF RSP EL (-)10.0

STA 3+12
OFFSET=77.9 (LT)
EL (-)3.7

STA 3+06
OFFSET=34.5 (LT)
TOP OF CONCRETE
SLAB EL (-)7.0/
TOP OF RSP EL (-)10.0

D
C-301

R=36'

STA 2+24
OFFSET=44.5 (LT)
EL (-)10.0

STA 1+90
OFFSET=41.3 (LT)
EL (-)3.7

STA 3+16
OFFSET=44.5 (LT)
EL (-)10.0

R=36'

5:1 OR
FLATTER

STA 3+47
OFFSET=41.5 (LT)
EL (-)4.3

1

2' MIN

10'

10'

10'

0+00

2+00

4+00

RD 1614

FLOODWALL
CONTROL LINE

D
C-301

2' MIN

STA 1+94
OFFSET=44.1 (RT)
EL (-)4.5

STA 3+46
OFFSET=44.6 (RT)
EL (-)4.4

5:1 OR
FLATTER

R=33'

STA 2+24
OFFSET=46.8 (RT)
EL (-)10.0

STA 3+16
OFFSET=46.8 (RT)
EL (-)10.0

R=33'

STA 2+34
OFFSET=36.8 (RT)
TOP OF CONCRETE
SLAB EL (-)7.0/
TOP OF RSP EL (-)10.0

STA 2+26
OFFSET=75.8 (RT)
EL (-)4.8

STA 3+13
OFFSET=77.3 (RT)
EL (-)4.7

STA 3+06
OFFSET=36.8 (RT)
TOP OF CONCRETE
SLAB EL (-)7.0/
TOP OF RSP EL (-)10.0

TOP OF SLOPE, TYP

LIMIT OF DREDGING/RSP

CONSTRUCTION LIMIT
(SEE V-003 AND V-004 FOR
LIMIT OF WORK LAYOUT AND TABLE)

DWSC

CONSTRUCTION
LIMITS

20 10 0 20 40

HORIZ SCALE: 1"=20'

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AJ	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JN
DRAWN AJ
CHECKED DJ

JASON NETTLETON, PE | 73184 | 12/31/20
PROJECT ENGINEER | NO. | EXP. DATE

REGISTERED PROFESSIONAL ENGINEER
JASON A. NETTLETON
C 73184
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA
12/17/19

WES JACOBS
PROJECT MANAGER

SJAFCA
San Joaquin Area FLOOD CONTROL Agency

HDR

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

SCOUR PROTECTION AND
ARMORING PLAN (CONTROL GATE)

SHEET
C-202
SHEET 24 OF 139

GENERAL STRUCTURAL NOTES (GSN)

GENERAL:

G1 SCOPE:
THE NOTES ON THIS SHEET AND THE STANDARD STRUCTURAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT WHETHER SPECIFICALLY CALLED OUT OR NOT, EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY ON STRUCTURAL SHEETS. IF THERE ARE QUESTIONS, THEY SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER AND ANSWERED IN WRITING PRIOR TO CONSTRUCTION.

G2 APPLICABLE SPECIFICATIONS AND CODES:
- A. U.S. ARMY CORPS OF ENGINEERS HURRICANE AND STORM DAMAGE RISK REDUCTION SYSTEM DESIGN GUIDELINES (HSDRRSDG).
- B. U.S. ARMY CORPS OF ENGINEERING TECHNICAL LETTER (ETL 1110-2-584) – PRIMARY STEEL DESIGN REF.
- C. U.S. ARMY CORPS OF ENGINEERING MANUAL (EM 1110-2-2703).
- D. U.S. ARMY CORPS OF ENGINEERING MANUAL (EM 1110-2-2104) – PRIMARY CONCRETE DESIGN REF.
- E. ACI 350-06 ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES.
- F. ACI 318-14 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
- G. AISC 360-14TH ED. STEEL CONSTRUCTION MANUAL.
- H. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES

G3 SAFETY:
SAFETY AND STRUCTURE STABILITY DURING CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. STRUCTURES HAVE BEEN DESIGNED TO RESIST THE DESIGN LOADS ONLY AS A COMPLETED STRUCTURE.

G4 STANDARD DETAILS:
THE STANDARD DETAILS DEPICT TYPICAL DETAILING TO BE USED ON THIS PROJECT. IF CONDITIONS ARE NOT EXPLICITLY SHOWN ON THE DRAWINGS THEY SHALL BE MADE SIMILAR TO THE STANDARD DETAILS. OBTAIN APPROVAL OF ENGINEER IN WRITING FOR SIMILAR CONDITIONS PRIOR TO CONSTRUCTION.

G5 THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION AS REQUIRED TO COORDINATE NEW CONSTRUCTION. SUBMIT REQUIRED CHANGES FOR APPROVAL.

G6 ALL CONSTRUCTION JOINTS, CONTRACTION JOINTS & EXPANSION JOINTS SHALL BE PROVIDED WHERE SHOWN ON THE APPROVED SHOP DRAWINGS. NO OTHER JOINTS SHALL BE INTRODUCED UNLESS APPROVED BY THE ENGINEER BEFORE CONCRETE IS PLACED. WATERSTOP SHALL BE PLACED AT ALL CONSTRUCTION JOINTS.

G7 THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES, UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST MONITOR ALL ADJACENT PROPERTY BY SURVEYING OR OTHER RECORDABLE METHOD AND MUST TAKE ACTION TO PREVENT ADJACENT PROPERTY OR UTILITY DAMAGE.

G8 CONTRACTOR MUST BE RESPONSIBLE FOR ALL CARE OF WATER WITHIN HIS WORK AREA DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE A CARE OF WATER DESCRIPTION AND PLAN FOR REVIEW AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK.

G9 PROVIDE TEMPORARY SUPPORT DURING CONSTRUCTION AS REQUIRED, UNTIL STRUCTURAL ELEMENTS ARE PERMANENTLY ATTACHED. DRAWINGS INDICATE STRUCTURE IN THE FINAL FORM CAPABLE OF SUPPORTING DESIGN LOADS. REFER TO ALL DRAWINGS (CIVIL, ELECTRICAL, MECHANICAL) FOR LOCATION OF DETAILS OF EMBEDDED ITEMS, REQUIRED BLOCKOUTS, ANCHOR BOLTS, AND ACNCHORAGE PLATES. VERIFY THE LOCATION OF EMBEDDED ITEMS PRIOR TO CONCRETING.

G10 THE GATE LATCH ANS ASSOCIATED COMPONENTS ARE NOT SHOWN ON THE STRUCTURAL SHEETS FOR CLARITY. SEE MECHANICAL SHEETS FOR DETAILS.

G11 ALL CONTRACTOR DESIGNED ITEMS SHALL BE PERFORMED, STAMPED, AND SIGNED BY A CALIFORNIA LICENSED CIVIL OR STRUCTURAL ENGINEER

DESIGN CRITERIA:

D1 DEAD LOAD:
A. ACTUAL TRIBUTARY STRUCTURE WEIGHT.
1. ASSUMED CONCRETE UNIT WEIGHT = 150 PCF.
2. ASSUMED STEEL UNIT WEIGHT = 490 PCF.

B. SUPERIMPOSED DEAD LOAD.
1. ASSUMED WATER UNIT WEIGHT = 62.4 PCF.

D2 LIVE LOAD:
- A. WALKWAY, PLATFORM, STAIRS: 100 PSF.
- B. HANDRAILING: 200LB CONCENTRATED LOAD OR 50 PLF UNIFORM LOAD.
- C. SLAB ON GRADE: 200 PSF.

D3 WIND:
50 PSF.

D4 SEISMIC:
1,000 YEAR RETURN PERIOD:

A. NON-LIQUEFIED SOIL CONDITION:
1. HORIZONTAL SPECTRA: PGA= 0.21g, PSA= 0.65g
2. VERTICAL SPECTRA: PGA= 0.32g, PSA= 1.60g

B. LIQUEFIED SOIL CONDITION:
1. HORIZONTAL SPECTRA: PGA= 0.26g, PSA= 0.98g
2. VERTICAL SPECTRA: PGA= 0.35g, PSA= 1.68g

C. SEE GEOTECHNICAL REPORT FOR FULL RESPONSE SPECTRA.

D5 HYDROSTATIC WATER SURFACE ELEVATIONS:
THE FOLLOWING ARE FROM USACE HSDRRSDG:
- A. 200 YEAR ELEVATION WITH PROJECTED SEA LEVEL RISE: 12.0 FT.
- B. DESIGN RESILIENCY CASES: 15.0 FT.
- C. TAILWATER ELEVATION: 4.0 FT.

D6 HYDRODYNAMIC LOADS:
- A. PER USACE CRITERIA USING EITHER WESTERGAARD OR VELOCITY POTENTIAL METHODS AS APPROPRIATE.
- B. HEADWATER ELEVATION: 4.25 FT.
- C. TAILWATER ELEVATION: 2.37 FT.

D7 IMPACT:
50 KIP RECREATIONAL VESSEL POINT LOAD.

D8 GATE MONOLITH PIPE PILES HAVE BEEN DESIGNED FOR MAXIMUM SEISMIC AXIAL LOAD OF 740 KIPS/PILE

CONCRETE:

C1 DESIGN STRENGTHS UNLESS NOTED OTHERWISE:
f'c= 5,000 psi @ 90 DAYS (CONCRETE MIX DESIGN SUBMITTED SHALL STATE A TARGET 28 DAY STRENGTH)
fy= 60,000 psi

C2 CONCRETE CLEAR COVER SHALL BE 4" TYPICAL UNLESS NOTED OTHERWISE

C3 SEE SPECIFICATIONS FOR REINFORCING PLACEMENT REQUIREMENTS

C4 REFER TO OTHER DISCIPLINE DRAWINGS PRIOR TO CONSTRUCTION FOR EMBEDDED ITEMS AND PENETRATIONS NOT SHOWN ON STRUCTURAL DRAWINGS. AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.

C5 PROVIDE 3/4" CHAMFERS AT ALL EXPOSED EDGES AND 1/2" CHAMFERS AT JOINTS AS SHOWN. NOT ALL CHAMFERS MAY BE SHOWN ON DRAWINGS.

C6 FIELD ADJUST REINFORCING AT OPENINGS AND EMBEDDED ITEMS AS INDICATED.

C7 CONTINUOUS WATERSTOP SHALL BE INSTALLED IN JOINTS SUBJECT TO STATIC WATER PRESSURE.

C8 UNLESS SPECIFICALLY INDICATED ON THE PLANS OR AUTHORIZED BY THE ENGINEER IN WRITING, ABSOLUTELY NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED.

C9 CONTRACTOR SHALL SUBMIT A CONCRETE PLACEMENT PLAN PER SPECIFICATION IDENTIFYING JOINT TYPES, JOINT LOCATIONS AND CONCRETE PLACEMENT SEQUENCE.

C10 ALL CAST IN PLACE AND POST-INSTALLED ANCHORS INDICATED IN THE STRUCTURAL DOCUMENTS SHALL COMPLY WITH CHAPTER 17 OF ACI 318 ALL EXPANSION AND ADHESIVE ANCHORS SHALL HAVE THE ICC REPORT. SUBMIT AND INSTALL PER THE ICC EVALUATION REPORT.

C11 UNLESS OTHERWISE NOTED, WALL HORIZONTAL REINFORCING LAYER SHALL BE CLOSEST TO WALL SURFACE, AND WALL VERTICAL REINFORCING LAYERS SHALL BE PLACED ATTACHED TO & BETWEEN HORIZONTAL LAYERS.

C12 ALL CONSTRUCTION JOINTS AND SURFACES BETWEEN 1ST POUR CONCRETE AND 2ND POUR NON-SHRINK GROUT SHALL BE ROUGHENED TO 1/4" AMPLITUDE.

C13 SEE SPECIFICATIONS FOR NON-SHRINK GROUT REQUIREMENTS.

C14 ALL ANCHOR EMBEDMENTS CALLED OUT ARE TO BE MEASURED FROM THE INSIDE HEAD OF THE ANCHOR (INTERFACE BETWEEN ANCHOR HEAD AND ANCHOR SHAFT) TO THE CONCRETE SURFACE OR INTERFACE BETWEEN THE FIRST AND SECOND PLACEMENTS (WHICHEVER IS CLOSER TO THE ANCHOR HEAD).

STEEL – GATE, GUDGEON ASSEMBLY, CLOSURE PILE ASSEMBLY, PINTLE ASSEMBLY, ACTUATOR CONNECTION PLATES:

S1 MATERIAL PROPERTIES:
ALL STRUCTURAL STEEL, UNLESS NOTED OTHERWISE, SHALL CONFORM TO ASTM A709 F2 GRADE 50. (Fy = 50 KSI). SEE SPECIFICATIONS 05 12 00 AND 35 20 16.33 FOR DESCRIPTION OF VARIOUS MATERIALS CALLED OUT IN THIS PLAN SET.

S2 ALL FABRICATION WELDING SHALL CONFORM WITH THE REQUIREMENTS IN AWS D1.5 LATEST EDITION FOR CARBON STEEL AND AWS D1.6 LATEST EDITION FOR STAINLESS STEEL. SEE SPECIFICATIONS 05 12 00 AND 35 20 16.33.

S3 ALL CARBON STEEL BOLTED CONNECTIONS SHALL BE F3125 GRADE A325 SLIP-CRITICAL (TYPE A) UNLESS OTHERWISE NOTED. PROVIDE LOAD INDICATING WASHERS AT SLIP-CRITICAL CONNECTIONS. SEE SPECIFICATION 05 12 00 FOR MORE DETAILS.

S4 ALL STAINLESS STEEL BOLTED CONNECTIONS SHALL BE EITHER ASTM A593 TYPE 316L OR TYPE 410 AS INDICATED ON THE DRAWINGS AND THEY SHALL BE INSTALLED SNUG-TIGHT WITH LOCTITE 262 APPLIED UNLESS NOTED OTHERWISE. SEE SPECIFICATION 35 20 16.33.

S5 PAINTING:
STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH SPECIFICATION 09 91 00.

S6 STAINLESS STEEL:
STAINLESS STEEL CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATION 35 20 16.33.

S7 ALL BOLT HOLES SHALL BE STANDARD SIZE, UNLESS OTHERWISE NOTED.

S8 DRAIN HOLES SHALL BE DRILLED. NO FLAME CUTTING IS PERMITTED.

S9 STRUCTURAL STEEL FRAMING SHALL BE TRUE AND PLUMB BEFORE BOLTING OR WELDING OF CONNECTIONS.

S10 ALL BOLTED ASSEMBLIES CONFORMING TO ASTM F3125 (BOLTS, NUTS, AND WASHERS) SHALL BE MECHANICALLY GALVANIZED PER ASTM B695.

S11 PIPE PILE SHALL BE ASTM A252 GRADE 3 (MOD) (Fy = 50 KSI) AND SHALL MEET REQUIREMENTS IN SPECIFICATION 31 62 18.

S12 ALL WELDING TO BE CERTIFIED FOR THE MATERIALS AND POSITIONS UTILIZED.

S13 SHEET PILE SHALL BE ASTM A572, GRADE 50 (Fy = 50 KSI) AND SHALL MEET REQUIREMENTS IN SPECIFICATION 31 41 16.

S14 ALL EPOXY ANCHORS TO BE HILTI-HIT HY200 WITH STANDARD HAS THREADED ROD OR APPROVED EQUAL. SUBMIT AND INSTALL PER ICC EVALUATION REPORT.

S15 NO SPLICES ARE ALLOWED WITHOUT ENGINEER APPROVAL UNLESS SHOWN ON THESE DESIGN DRAWINGS. UP TO TWO VERTICAL SPLICES MAY BE ALLOWED IN THE SKIN PLATE WITH ENGINEER APPROVAL.

S16 SEE SPECIFICATIONS FOR SEAL AND BUMPER REQUIREMENTS.

S17 ANY LIFTING LUGS REQUIRED FOR HANDLING OR INSTALLATION SHALL BE SUBMITTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.

S18 ALL WELDS SHALL BE WRAPPED USING THE FILLET WELDS SIZE SHOWN ON THE DRAWINGS, OR THE REINFORCING FILLET WELD SIZE PER AWS D1.5. ANY WELDS THAT CANNOT BE WRAPPED SHALL BE SEALED WITH A SEALANT/CAULKING MATERIAL MEETING THE REQUIREMENTS STATED IN THE SPECIFICATIONS 05 12 00. APPLICATIONS AND THAT CANNOT BE SEALED SHALL BE NOTED ON SHOP DRAWINGS AND SENT TO THE ENGINEER FOR REVIEW AND APPROVAL.

STEEL – PLATFORM, WALKWAY AND GUARDRAIL:

S17 DESIGN STRENGTHS:

WIDE FLANGE AND TEES:	Fy = 50 KSI
PIPES:	Fy = 35 KSI
HSS SECTIONS:	Fy = 46 KSI
ALL OTHER PLATES AND SECTIONS:	Fy = 36 KSI

S18 GRATING SHALL BE FISHER LUDLOW TRU WELD BAR GRATING TYPE 19-4 WITH 1 1/4" X 1 3/16" SERRATED GALVANIZED BEARING BARS AT 1 3/16" C/C UNLESS NOTED OTHERWISE ON THE DRAWINGS OR APPROVED EQUAL.

ALL GRATING TO BE FASTENED TO SUPPORTING MEMBERS WITH FIXING CLIPS IN ACCORDANCE WITH MANUFACTURER INSTRUCTION UNLESS NOTED OTHERWISE ON DRAWINGS. BANDING BARS SHALL BE PROVIDED AT GRATING OPENINGS AND GRATING EDGES WHEREVER REQUIRED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

- A. OPEN ENDS OF GRATING AT HEAD OF LADDER APPROACH TO PLATFORM.
- B. ALL DIMENSIONED OPENINGS IN GRATING.
- C. GRATING PANELS WITH 4 OR LESS CROSS BARS.
- D. ALL CUT-OUTS HAVING UNSUPPORTED BEARING BARS.

S19 SEE SPECIFICATIONS 05 50 00 AND 05 52 05 FOR DETAILED REQUIREMENTS.

S20 ALL ACCESS STRUCTURE SHALL BE HOT-DIPPED GALVANIZED PER ASTM A123 OR ASTM A153.

S21 ALL WELDING SHALL CONFORM TO AWS D1.1 FOR THIS PORTION OF THE WORK. ANY WELDING TO THE GATE STRUCTURE SHALL CONFORM TO AWS D1.5.

S22 STAIR GRATING TREADS, GRATING AND CONNECTION DESIGNED BY FABRICATOR. SEE SPECIFICATION SECTION 05 50 00.

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	SML	CONFORMED SET.

SCALE: AS NOTED

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DATE: DECEMBER 2019

DESIGNED BB
DRAWN SL
CHECKED KG

KEVIN GERST P.E. S.E. | S6262 | 9/30/21
PROJECT ENGINEER | NO. | EXP. DATE

WESLEY JACOBS
PROJECT MANAGER

LICENSED PROFESSIONAL ENGINEER KEVIN J. GERST S 6262 STRUCTURAL STATE OF CALIFORNIA 12/17/19

SJAFCA San Joaquin Area FLOOD CONTROL Agency

PBI

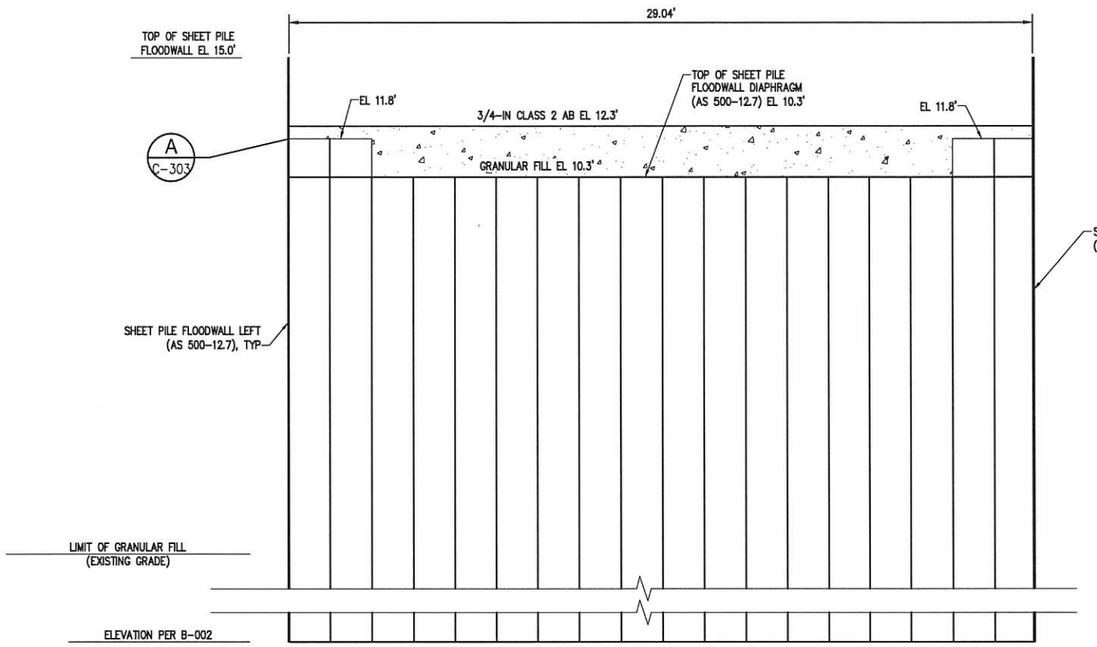
SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

GENERAL STRUCTURAL NOTES

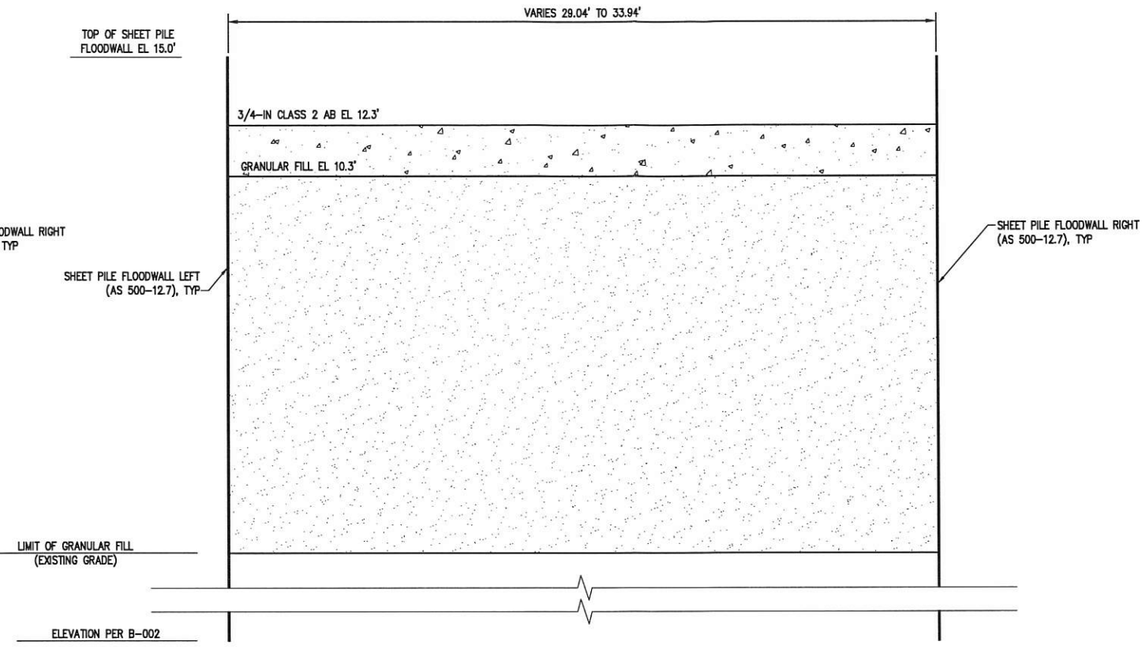
SHEET S-001

SHEET 59 OF 139

Section 3 - Cross Sections



TYPICAL SHEET PILE DIAPHRAGM **A** C-102
NTS



TYPICAL SHEET PILE FLOODWALL **B** C-102
NTS

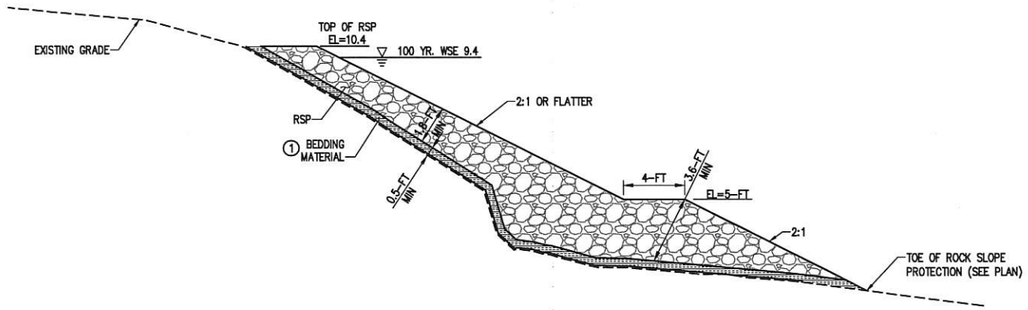
CONSTRUCTON NOTES:

1. BEDDING MATERIAL SHALL BE IN ACCORDANCE WITH CALTRANS ¾" AGGREGATE BASE PER SECTION 26 OF THE CALTRANS STANDARD SPECIFICATIONS.

LEGEND:

BEDDING MATERIAL

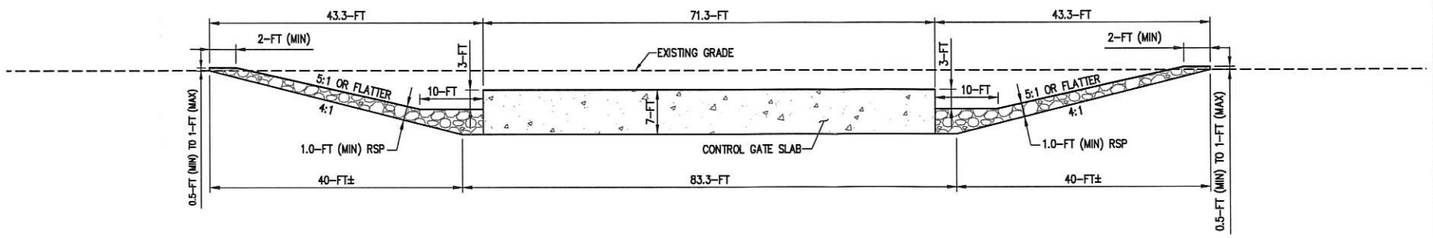
RSP (CALTRANS CLASS 3)



DATUM	ELEVATION (FEET, NAVD88)
DESIGN WATER SURFACE ELEVATION (DWSE)	+12.0
100 YR WSE	+9.4
HIGHEST OBSERVED WATER LEVEL (3/23/2011)*	+8.21
MEAN HIGHER HIGH WATER (MHHW)	+6.11
MEAN HIGH WATER (MHW)	+5.64
MEAN TIDE LEVEL (MTL)	+4.25
MEAN LOW WATER (MLW)	+2.87
MEAN LOWER LOW WATER (MLLW)	+2.37
LOWEST OBSERVED WATER LEVEL (10/22/2007)*	+1.28

SCOUR PROTECTION (STOCKTON GOLF AND COUNTRY CLUB) **C** C-102
NTS

CROSS SECTION OF PROPOSED IMPROVEMENTS TO RD 1614 LEVEE EMBANKMENT



SCOUR PROTECTION (CONTROL GATE) **D** C-202
NTS

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AJ	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED KD
DRAWN AJ
CHECKED DJ

KENNY DOSANJH, PE — 72288 — 6/30/20
PROJECT ENGINEER — NO. — EXP. DATE

WES JACOBS
PROJECT MANAGER

REGISTERED PROFESSIONAL ENGINEER — ABHIJIT S. DOSANJH — C 72288 Exp. 6/30/20 — CIVIL — STATE OF CALIFORNIA — 12/11/2019

SJAFCA San Joaquin Area FLOOD CONTROL Agency

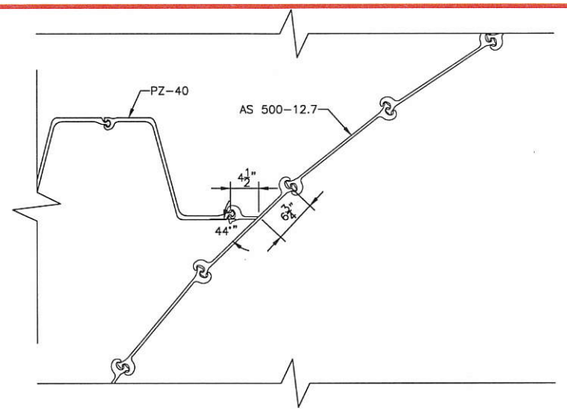
HDR

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

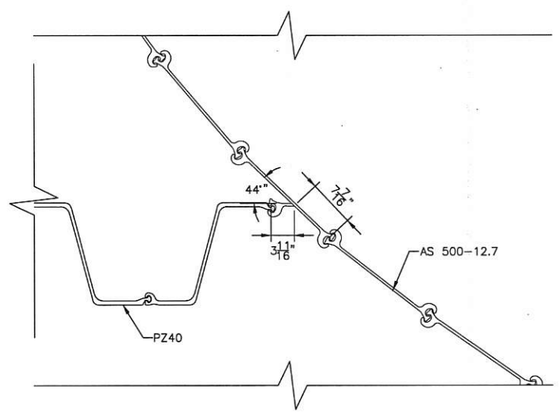
TYPICAL SECTIONS AND DETAILS 1

SHEET C-301

SHEET 25 OF 139

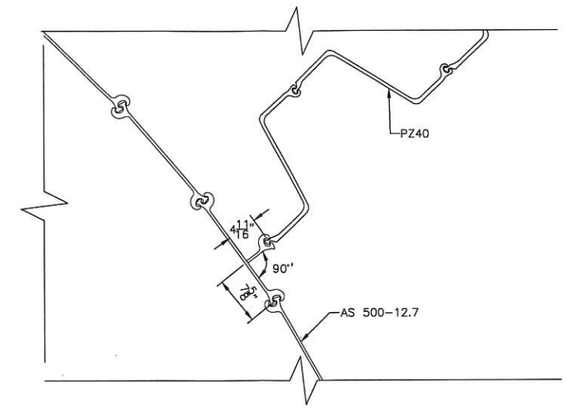


PLAN VIEW – Y-PILE DETAIL STA 0+63 OFF 13.3 (LT) (1 / C-102)
NTS

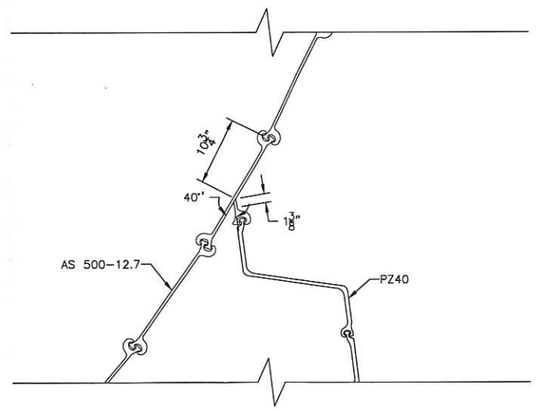


PLAN VIEW – Y-PILE DETAIL STA 0+63 OFF 13.3 (RT) (2 / C-102)
NTS

Y-PILE TIE-INS WITHIN RD 1614 BOUNDARIES



PLAN VIEW – Y-PILE DETAIL STA 8+08 OFF 10.1 (LT) (3 / C-103)
NTS



PLAN VIEW – Y-PILE DETAIL STA 8+09 OFF 9.5 (RT) (4 / C-103)
NTS

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AJ	CONFORMED SET

SCALE: AS NOTED
DATE: DECEMBER 2019
WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.
DESIGNED KD
DRAWN AJ
CHECKED --

KENNY DOSANJH, PE — PROJECT ENGINEER — 72288 — NO. — 6/30/20 — EXP. DATE
WES JACOBS — PROJECT MANAGER

REGISTERED PROFESSIONAL ENGINEER — RANJIT S. DOSANJH — C 72288 Exp. 6/30/20 — CIVIL — STATE OF CALIFORNIA — 12/17/19

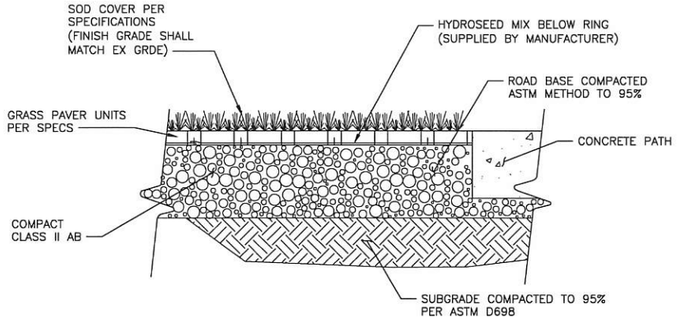
SJAFCA San Joaquin Area FLOOD CONTROL Agency

HDR

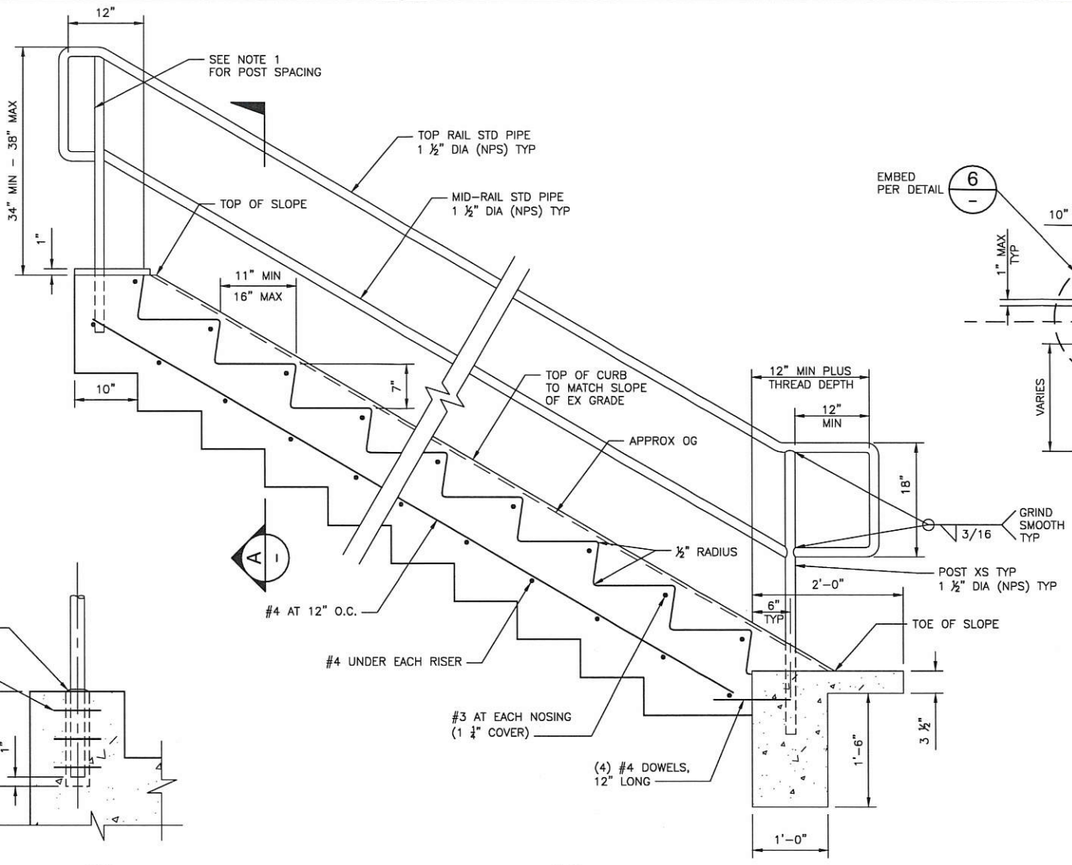
SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

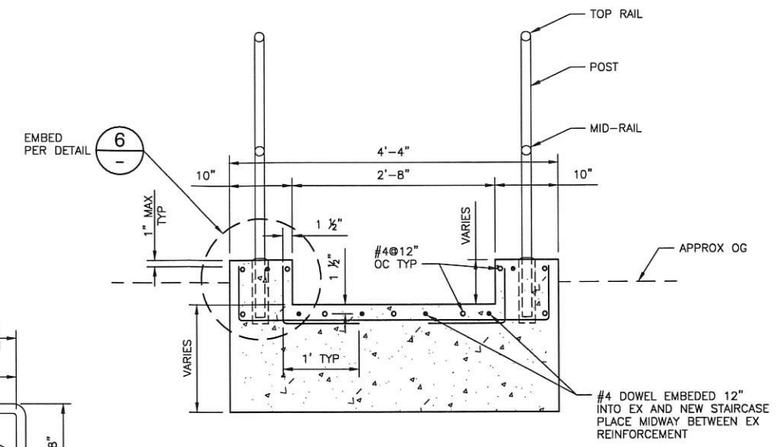
TYPICAL SECTIONS AND DETAILS 4

SHEET C-304
SHEET 28 OF 139



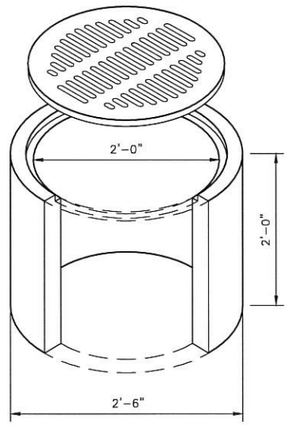
GRASS PAVERS DETAIL 1 / NTS





SECTION A / NTS

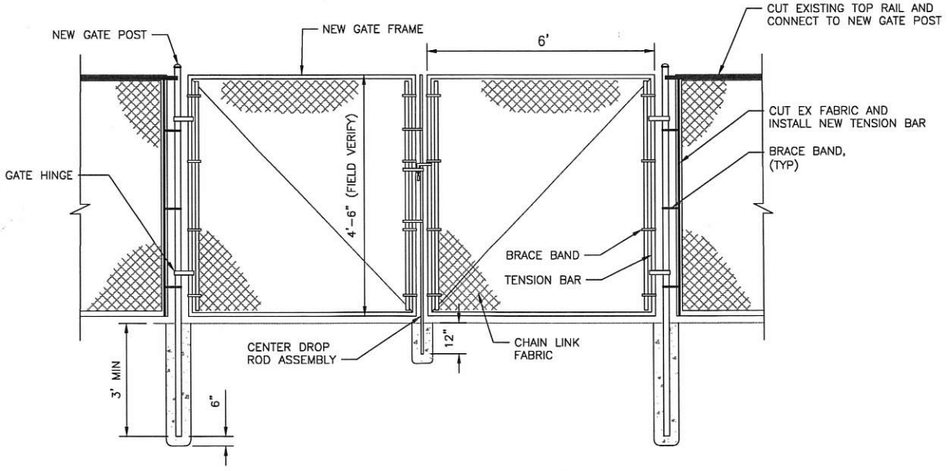
NOTES:
1. MAXIMUM SPACING OF POSTS SHALL BE 5 FEET ON STRAIGHT ALIGNMENTS. SPACING SHALL BE UNIFORM BETWEEN CHANGES IN ALIGNMENT.
2. PROVIDE SLIP JOINTS AT STAIRWAY AND RAMP EXPANSION JOINTS OR AT EVERY 24 FEET ON CENTER MAXIMUM.



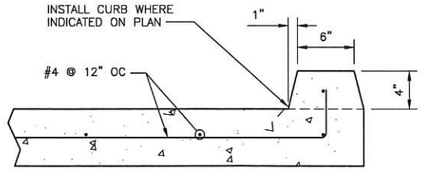
DROP INLET DETAIL 3 / NTS

EMBED DETAIL 6 / NTS

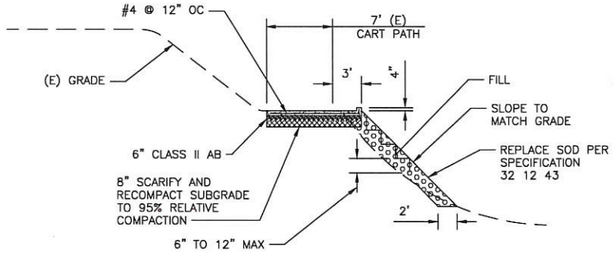
STAIR DETAIL 2 / NTS



GATE DETAIL 5 / C–862



CURB DETAIL 4 / C–862



NOTES:
1. PLACE FILL IN HORIZONTAL LIFT AND KEY INTO SLOPE AS SHOWN.

SECTION B / C–862

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5–20–20	AAS	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING 0 1/2 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED AAS
DRAWN MAH
CHECKED DAP

ASHLEY A. SMITH, PE — 86512 — 3/31/21
PROJECT ENGINEER — NO. — EXP. DATE

DAVID A. PETERSON, PE — 43432 — 6/30/20
PROJECT MANAGER — NO. — EXP. DATE

REGISTERED PROFESSIONAL ENGINEER ASHLEY A. SMITH 86512 Exp 03/31/21 CIVIL STATE OF CALIFORNIA 12/17/18

SJAFCA San Joaquin Area FLOOD CONTROL Agency

PBI
80 Blue Ravine Rd, Suite 280
FOLSOM, CA 95630
PH. 916–608–2212
Fax 916–608–2232

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

GOLF COURSE DETAILS

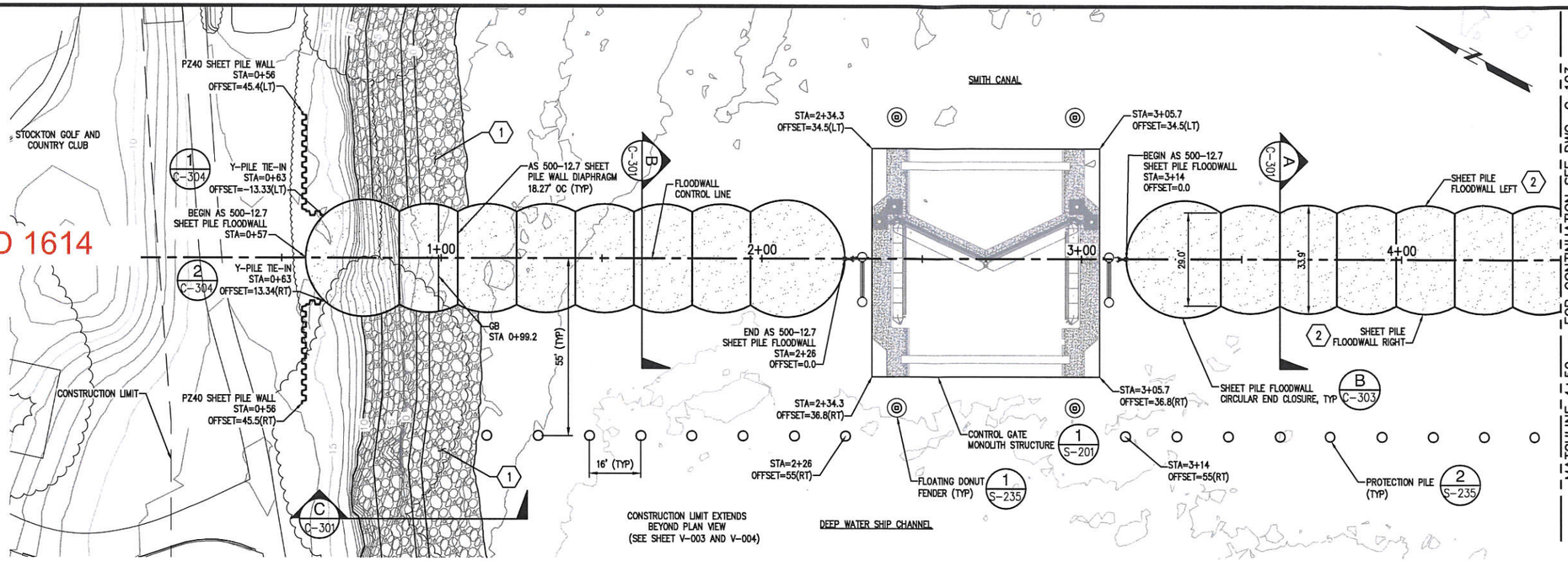
SHEET C–863

SHEET 58 OF 139

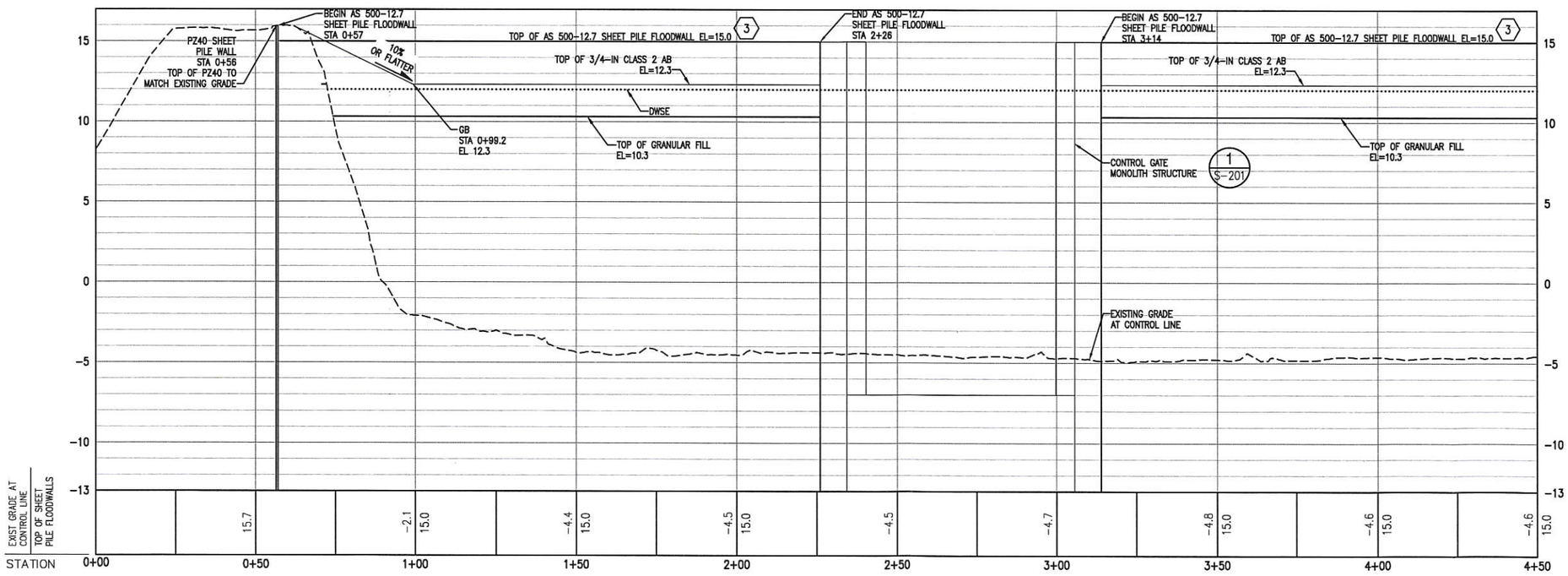
P:\SJAFCA\Smith Canal Closure Structure_Drawings\CONFORMED – SC–C861–C863 (2018).dwg 5–20–20 10:52:03 AM amartin

Section 4 - Profiles

RD 1614



PLAN



PROFILE

KEY NOTES:

1. PLACE RSP PER DETAIL ON C-201.
2. SEE SHEET B-002 FOR SHEET PILE FLOODWALL PROFILES.
3. PLACE COATING ON AS 500-12.7 SHEET PILE WALLS PER DETAIL C ON C-303.

GENERAL NOTES:

1. PROTECTION PILES NOT SHOWN IN PROFILE FOR CLARITY.
2. BOTTOM OF SHEET PILE FLOODWALL DIAPHRAGMS MATCH BOTTOM OF FLOODWALL (EL (-)70.0).
3. BOTTOM OF SHEET PILE WALLS MATCH BOTTOM OF FLOODWALL (EL (-)70.0).
4. SEE SHEET V-003 AND V-004 FOR CONSTRUCTION LIMIT LAYOUT AND TABLES.
5. 36-IN STEEL PIPE PILES NOT SHOWN IN PROFILE FOR CLARITY.

20 10 0 20 40
HORIZ SCALE: 1"=20'
4 2 0 4 8
VERT SCALE: 1"=4'

CONFORMED SET

REV	DATE	BY	DESCRIPTION
0	5-20-20	AJ	CONFORMED SET

SCALE: AS NOTED

DATE: DECEMBER 2019

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JN
DRAWN AJ
CHECKED DJ

JASON NETTLETON, PE — 73184 — 12/31/20
PROJECT ENGINEER — NO. — EXP. DATE

WES JACOBS
PROJECT MANAGER

REGISTERED PROFESSIONAL ENGINEER JASON A. NETTLETON C 73184 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA 12/17/19

SJAFCA San Joaquin Area FLOOD CONTROL Agency

HDR

SAN JOAQUIN AREA FLOOD CONTROL AGENCY
SMITH CANAL GATE PROJECT

FLOODWALL PLAN AND PROFILE
STA 0+00 TO 4+50

SHEET C-102

SHEET 20 OF 139

SAN JOAQUIN COUNTY
FLOOD CONTROL & WATER CONSERVATION DISTRICT
P. O. BOX 1810
1810 EAST HAZELTON AVENUE
STOCKTON, CALIFORNIA 95201
TELEPHONE (209) 468-3000
FAX NO. (209) 468-2999

KRIS BALAJI
DIRECTOR OF PUBLIC WORKS
FLOOD CONTROL ENGINEER

July 26, 2017

The Central Valley Flood Protection Board
3310 El Camino Avenue
Sacramento, California 95821

Attention: Central Valley Flood Protection Board
Floodway Protection Section

SUBJECT: CENTRAL VALLEY FLOOD PROTECTION BOARD PERMIT APPLICATION OF SAN JOAQUIN AREA FLOOD CONTROL AGENCY TO CONSTRUCT A FIXED DUAL SHEET PILE WALL, A SINGLE SHEET PILE FLOODWALL, A SEISMIC WALL AND GATE STRUCTURE AT SMITH CANAL, SAN JOAQUIN COUNTY ASSESSOR'S PARCEL NOS. 133-060-01 AND 109-020-06 (LATITUDE: 37.957707 AND LONGITUDE: -121.352900) (PW-1700008)

Gentlemen:

Reference is made to the Central Valley Flood Protection Board (Board) Permit Application of San Joaquin Area Flood Control Agency (Permittee) to construct a fixed dual sheet pile wall, a single sheet pile floodwall, a seismic wall and the development of a levee and a gate structure at Smith Canal (Project).

The Project is located in Smith Canal, Atherton Island, Atherton Cove, Louis Park (Dad's Point), the Stockton Golf and Country Club and the San Joaquin River, in the City of Stockton, in San Joaquin County, in Sections 5 and 6, and 8 Township 1 North, Range 6 East, Mount Diablo Base and Meridian, San Joaquin County Assessor's Parcel Nos. 133-060-01 and 109-020-06.

The San Joaquin County Flood Control and Water Conservation District (District) has reviewed the Board's Permit Application of the Permittee and endorses the Project subject to the following conditions:

1. The District shall not be held liable for damage(s) to the permitted encroachment(s) due to the District's operation, maintenance, flood fight, inspection, or emergency repairs.

2. The Permittee or Successors-in-Interest shall be responsible for the modification or possible removal of the facilities, as requested by the District, if required for any future flood control plans at the applicant's sole cost and expense.

3. The Permittee shall be liable for any damage to Smith Canal and its levees that may occur as a result of this Project.

4. The Project shall be constructed in accordance with the plans submitted with the application dated July 11, 2017. Any revisions to the Project will require the submittal of the revised plans to the District for review and approval.

5. No work shall be allowed in the Smith Canal's channel between November 1st and April 15th without prior approval of the Board and the District.

6. The Permittee or Successors-in-Interest shall keep the encroachment(s) properly maintained in accordance with applicable current or future local, State and Federal standards.

7. Maintenance of these flood control facilities will be added by amendment to the existing O&M agreement between SJAFCA and SJCFCDWCD, in accordance with a MOU executed on June 30, 2015. Funding for O&M activities is being collected, in perpetuity, from benefiting properties.

Should you have any questions regarding these comments, please contact me at (209) 953-7617, or by email at jmaguire@sjgov.org.

Sincerely,

JOHN I. MAGUIRE P.E.
Engineering Services Manager

JM:SS:mk
FM-17G033-M1

c: Sam Sharideh, Engineer III

State of California

DEPARTMENT OF WATER RESOURCES
CENTRAL VALLEY FLOOD PROTECTION BOARD

California Natural Resources Agency

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD
ENCROACHMENT PERMIT

Application No. _____
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.

The proposed project consists primarily of the following key features: a fixed dual sheet pile wall and miter gate, a single sheet pile floodwall, a seismic wall and the development of a levee. Details of all the features to be constructed as a part of this project are included in the Project Summary Report in Enclosure 1.

2. Project
Location: Stockton County, in Section San Joaquin
Township: 1N (N) (S), Range: 6E (E) (W), M. D. B. & M.
Latitude: 37.957707 N Longitude: 121.352900 W
Stream : Smith Canal, SJR , Levee : Smith Tract Designated Floodway: Smith Canal, SJR
APN: Multiple

3. San Joaquin Area Flood Control Agency (Name of Applicant / Land *Owner*) of 22 E Weber Ave # 301 (Address)

Stockton (City) California (State) 95202 (Zip Code) 209-937-8113 (Telephone Number)

juan.neira@stocktonca.gov (E-mail)

4. Dave Peterson (Name of Applicant's Representative) of Peterson Brustad Inc. (Company)

Folsom (City) California (State) 95630 (Zip Code) 916-608-2212 (Telephone Number)

dpeterson@pbieng.com (E-mail)

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

We, the Trustees of SJFCWCD (Name of LMA) approve this plan, subject to the following conditions:

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

Trustee 7/19/17 Date

Trustee Date

Trustee Date

Trustee Date

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD
ENCROACHMENT PERMIT

6. Names and addresses of adjacent property owners sharing a common boundary with the land upon which the contents of this application apply. If additional space is required, list names and addresses on back of the application form or an attached sheet.

Name	Address	Zip Code
See Project Summary Report (Enclosure 1)		

7. Has an environmental determination been made of the proposed work under the California Environmental Quality Act of 1970? ☑ Yes ☐ No ☐ Pending

If yes or pending, give the name and address of the lead agency and State Clearinghouse Number:
SJAFCA, 22 E. Weber Avenue, Suite 301, Stockton, CA 95202

SCH No. 2014062079

8. When is the project scheduled for construction? Summer 2018-2019

9. Please check exhibits accompanying this application.

   A. ☑ Regional and vicinity maps showing the location of the proposed work.

   B. ☑ Drawings showing plan view(s) of the proposed work to include map scale.

   C. ☑ Drawings showing the cross section dimensions and elevations (vertical datum?) of levees, berms, stream banks, flood plain,

   D. ☑ Drawings showing the profile elevations (vertical datum?) of levees, berms, flood plain, low flow, etc.

   E. ☑ A minimum of four photographs depicting the project site.

Roger Churchwell 7/11/2017
Signature of Applicant Date

Include any additional information:
Attached is the Project Summary Report (Enclosure 1) which includes supplemental information supporting this application including Item 9A and E. Enclosure 2 includes the 65% Design submittal which provides the information required for Items 9 B, C and D.

State of California | DEPARTMENT OF WATER RESOURCES
CENTRAL VALLEY FLOOD PROTECTION BOARD | California Natural Resources Agency

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD
ENCROACHMENT PERMIT

Application No. _____
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.

The proposed project consists primarily of the following key features: a fixed dual sheet pile wall and miter gate, a single sheet pile floodwall, a seismic wall and the development of a levee. Details of all the features to be constructed as a part of this project are included in the Project Summary Report in Enclosure 1.

2. Project Location: Stockton County, In Section San Joaquin
Township: 1N (N) (S), Range: 6E (E) (W), M. D. B. & M.
Latitude: 37.957707 N Longitude: 121.352900 W
Stream : Smith Canal, SJR , Levee : Smith Tract Designated Floodway: Smith Canal, SJR
APN: Multiple

3. San Joaquin Area Flood Control Agency (Name of Applicant / Land Owner) of 22 E Weber Ave # 301 (Address)
Stockton (City) California (State) 95202 (Zip Code) 209-937-8113 (Telephone Number)
juan.neira@stocktonca.gov (E-mail)

4. Dave Peterson (Name of Applicant's Representative) of Peterson Brustad Inc. (Company)
Folsom (City) California (State) 95630 (Zip Code) 916-608-2212 (Telephone Number)
dpeterson@pbieng.com (E-mail)

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

We, the Trustees of RD 1614 (Smith Tract) (Name of LMA) approve this plan, subject to the following conditions:

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

Trustee 7-24-17 Date | Trustee 7/24/17 Date

Trustee 7-24-17 Date | Trustee Date

DWR 3615 (Rev. 10/11)

Kevin Kauffman, President
William Dunning, Trustee
Ben Koch, Trustee

RECLAMATION DISTRICT 1614
P.O. BOX 4807
STOCKTON, CA 95204

Daniel J. Schroeder, Counsel
Christopher A. Neudeck, Engineer
Rhonda L. Olmo, Secretary

PHONE: (209) 948-8200

August 24, 2017

The Trustees of Reclamation District No. 1614 – Smith Tract (the "District") approve the 65% plan of the San Joaquin Area Flood Control Agency ("SJAFCA") for the proposed Smith Canal Closure Structure subject to the following conditions:

1. The District and SJAFCA enter into and execute an encroachment permit agreement for the Smith Canal Closure Structure.
2. District reviews and approves of a final Operation and Maintenance Manual for the Smith Canal Closure Structure.
3. That the Project meet all criteria required by Reclamation District Engineer.

6. Use noise-reducing enclosures around noise-generating equipment.
7. Construct barriers between noise sources and noise-sensitive receptors or take advantage of existing barrier features to block sound transmission to noise-sensitive land uses. The barriers shall be designed to obstruct the line of sight between the noise-sensitive land use and on-site construction equipment.
8. Reschedule construction and reclamation activities to less-sensitive daytime hours when practical.
9. Notify adjacent residents in advance of construction work.

A disturbance coordinator will be identified by the Agency and this person's phone number shall be posted around the project site, in adjacent public spaces, and in construction notifications. The disturbance coordinator shall be responsible for responding to any complaints about construction activities. The disturbance coordinator shall receive all public complaints about construction disturbances and be responsible for determining the cause of the complaint and implementation of feasible measures to be taken to alleviate the problem. The disturbance coordinator shall have the authority to halt activity if necessary to protect public health and safety.

SP-26 GROUND VIBRATION MONITORING AND CONTROL PROGRAM

A ground vibration monitoring and control program as outlined in Section 10-18 of the General Specifications shall be required for this contract for all levee improvement work and in-water construction.

Vibration monitoring equipment shall be placed at the property line adjacent to large equipment and, with owner approval, at the back of the residential structures adjacent to the large equipment. The Contractor shall submit a Ground Vibration Monitoring and Control Plan within 10 days of Notice to Proceed. The Plan shall be prepared and implemented by persons qualified and experienced with vibration and sound monitoring during construction activities. The monitoring stations shall be placed at intervals not to exceed 250 feet along the project limits where residential or commercial properties are located at the property line. A minimum of 2 monitoring stations shall be activated during any work activity. The Agency reserves the right to direct the Contractor to relocate the monitoring stations.

A voluntary pre- and post-construction survey shall be conducted to assess potential architectural damage from levee and floodwall construction vibration at each residence within 650 feet of construction. The survey shall include visual inspection of the structures that could be affected and documentation of structures by means of photographs and video. This documentation shall be reviewed with the individual owners prior to any construction activities. Post construction inspections of structures shall be performed to identify (and repair, if necessary) damage, if any, from construction vibrations. Any damage shall be documented with photographs and video. This documentation shall be reviewed with the individual property owners.

SP-27 BIOLOGICAL MONITOR AND ENVIRONMENTAL AWARENESS TRAINING PROGRAM

The Agency will retain a qualified biologist to monitor construction activities adjacent to sensitive biological resources. The biologist will assist the construction crew, as needed, to comply with all project implementation restrictions and guidelines. In addition, the biologist will be responsible for ensuring that SJAFCA or its contractors maintain the construction barrier fencing adjacent to sensitive biological resources.

Construction personnel shall participate in an environmental awareness training program provided by Agency's biologist at the start of construction and each time new Contractor personnel begin work on the site. The Contractor shall provide a translator during training sessions that include Spanish language speakers and other languages as needed or necessary. Training shall be completed for key contractor personnel prior to any ground disturbing activities. The training will cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on sensitive biological

10-17.04 Portable Power Equipment

1. Portable fire extinguishers shall be located within fifty (50) feet of portable power equipment when in use. Extinguishers shall not be obstructed from view or blocked in any way.
2. Approved spark arresters shall be installed on all portable power equipment.
3. Fueling operations shall only be performed in areas that have first been cleared of flammable materials.

10-17.05 Storage of Flammable Materials and Liquids

1. Flammable Liquids stored at the job site shall be stored in a UL-Approved storage cabinet.
2. Flammable liquids shall only be transported in approved portable tanks and safety cans.

10-17.06 Staging Areas

1. To the extent feasible, the Contractor shall clear flammable vegetation for a distance of fifty (50) feet around staging areas, equipment, and vehicle service areas and areas where flammable materials are stored.
2. Used oil and oil filters shall not be stored on the job site.

10-17.07 Welding and Torch Cutting

1. The Contractor's designated fire protection person shall establish and maintain safe torch cutting and welding procedures.
2. In all areas where welding or torch cutting will occur, the Contractor shall establish an area that has been cleared of flammable material for a distance of ten feet in all directions.
3. During welding or torch cutting operations, the Contractor shall provide one person whose sole duty is to watch for and extinguish minor fires that may be started by the Contractor's activities.
4. Welding or torch cutting shall not take place after noon on any given day unless it is conducted in a staging area suitably cleared of flammable vegetation.
5. Welding or torch cutting shall not take place if the prevailing wind is determined to be blowing fifteen miles per hour or more.
6. Two five-gallon buckets of water (filled 4/5th full), and two four-gallon backpack sprayers shall be at each welding or torch cutting location.

10-18 GROUND VIBRATION MONITORING AND CONTROL PROGRAM

The Contractor shall develop and implement a program to prevent damage to existing structures as a result of ground vibration caused by construction activities. Where ground vibration generating activities are conducted within two hundred (200) feet of vibration sensitive receptors, the Contractor shall continuously measure and record vibration generated as a result of the work activities conducted under this contract. The Contractor shall measure and record ground vibration levels at each activity operation adjacent sensitive receptors. Vibration monitoring equipment shall be placed at the property line adjacent to large equipment and, with owner approval, as near as possible to the residential structures adjacent to the large equipment.

Ground vibrations shall be measured as peak particle velocity in inches per second. Vibration measurements shall be made using an instrument capable of continuously monitoring three (3) orthogonal components with a resolution to within one-hundredth (0.01) inch per second. Vibration shall not exceed one-half (0.50) inch per second at the levee toe and 0.20 inch per second fifty (50) feet landside of the landside levee toe. In areas where homes, buildings or other structures (including pools) are within fifty

(50) feet of the landside levee toe, the maximum allowed vibration shall be 0.10 inch per second and 72 vibration decibels at the levee toe. The Contractor shall be responsible for repairing damage to any building or structure resulting from ground vibrations exceeding the allowances specified.

10-19 NOT USED

10-20 CONSTRUCTION PROTOCOLS FOR USE OF PESTICIDES

10-20.01 General

1. It is the Agency's policy to use pesticides only after other methods of control have been exhausted.

2 The Contractor shall comply with all rules and regulations that govern the use of pesticides required in the performance of the Work, including any certifications that may be required for purchase, use, storage, or application.

3. Pesticides include, but are not limited to, herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliants, desiccants, soil sterilants, and repellants.

4. Any substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant shall be considered a pesticide.

5. Contractor shall be required to justify to the Agency why the use of pesticides should be allowed.

10-20.02 72 Hours' Notice of Pesticide Use

Written notice shall be provided to the Agency a minimum of 72 hours in advance of all proposed pesticide applications.

10-20.03 Content of Written Notice of Pesticide Use

1. Purpose for proposed application.
2 Name of certified applicator(s) and parent company.
3. Date and time of proposed application.
4. Location of proposed application (site specific).
5. Pesticide proposed for use.
6. Method of application.
7. Rate and number of application(s) proposed.
8. Material Data Safety Sheets.
9. Safety precautions proposed.
10. Anticipated weather conditions (temp. POP, wind).
11. Signage – appropriate signage notifying the public of pesticide use shall be posted at the site for a 48-hour period prior to and after application. Signs must be posted at each entrance point and at intermediate points within the work area. Signs between entrance points shall result in a placement of no less than three (3) signs per mile. Signs shall contain a pictorial warning not to enter the area and, at a minimum, shall include the following information:

    a. Date the pesticides was applied
    b. Re-Entry restrictions
    c. Pesticide type
    d. Product name
    e. Locations applied

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

SJAFCA
San Joaquin Area FLOOD CONTROL Agency

Draft

Operation, Maintenance, Repair, Rehabilitation and Replacement Manual

SJAFCA - Smith Canal Floodwall and Control Structure Design

Stockton, California
July 2, 2019

Submitted to:

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HDR

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FOREWARD

Smith Canal Floodwall and Control Structure Design Operation, Maintenance, Repair, Rehabilitation and Replacement Manual

1 General

See Section 4 - Pertinent Information

1.1 Project Description

The Smith Canal Gate Project includes construction of the following components.

- A cellular steel sheet pile floodwall filled with granular material that would extend from Dad's Point to the Stockton Golf and Country Club on the north bank of the San Joaquin River. The sheet pile tie-ins at Dad's Point to the south and Stockton Golf and Country Club to the north will both be lined with Riprap Scour Protection (RSP) to minimize potential future erosion.
- A 50-foot-wide steel miter (double-door) gate structure supported by a reinforced concrete substructure and a steel pipe pile foundation placed within the alignment of the dual sheet pile floodwall.
- Approximately 1,450 feet of seepage cutoff wall along Dad's Point
- Approximately 200 linear feet of single sheet pile floodwall and grade adjustment along Dad's Point to tie into high ground at Louis Park
- Recreational features and habitat improvements on Dad's Point, as well as removal of invasive vegetation.

The normal position for the miter gate will be open. Tides would continue to flow in and out of the Smith Canal. The Smith Canal gate will close on the low tide just prior to when the Delta stage is forecasted to exceed 8.0 ft. This water surface elevation is 1.5 feet below the 200-year stage of 9.5 ft.

For 100-year stage events and greater, the gate would be closed only during high Delta stage events forecasted to exceed the design operating water surface elevation between November and April (rainy season). When a high Delta stage event is anticipated, the gate would normally be closed at the lowest tide prior to the forecasted high Delta stage. The gate would remain closed until interior drainage pumping causes the water level in Smith Canal to approach that of the Delta, at which point the gate will open equalizing the water surface elevation. Note that even during historical 25-year, 30-year and 50-year events, the tidal influence is observed with two high stages and two low stages each day.

For imminent or existing levee breaches, the gate will be closed as soon as possible following notification of the breach.

1.2 Features and Function

1.2.1 Cellular Sheet Pile Flood Wall

An AS500-12.7 straight web steel sheet pile section and marine grade ASTM A690 material was selected. The straight web steel sheet pile section will be used as part of a cellular structure with diaphragm cells. The atmospheric corrosion resistance of this steel is substantially better than that of ordinary carbon steels with or without copper addition. The steel has also shown to have substantially greater resistance to seawater "Splash Zone" corrosion than ordinary carbon steel where exposed to the washing action of rain and the drying action of the wind or sun, or both.

The initial seismic analysis for the straight PZ40 wall with waler and strut resulted in maximum bending occurring between Elevation -10 and Elevation -40 exceeding the capacity of the PZ40 sheet pile section. The upstream and downstream walls showed large deflections in opposite directions of each other within the above stated elevations. It was concluded that a tie between the two walls was needed below the dredge line to reduce the amount of bending in the walls and limit the amount of deflection. The current waler and strut system above grade was not adequate for the bending that was occurring in the liquefiable layer between Elevations -10 and -40.

In order to provide a tie below the dredge line a sheet pile diaphragm would need to be installed; this would meet the goals of reducing the deflection and bending between the walls. The results of replacing the waler-strut system with a sheet pile diaphragm show a major decline of the amount of bending within the upstream and downstream walls. The Z section sheet piles are meant to act in bending vertically along the height of the pile and transfer load down to the foundation. The Z section sheet piles do not have rated interlock strengths, and therefore are not capable of transferring load laterally along the sheet pile section to the diaphragms. Hence for lateral load transfer, a waler system is used in order to transfer load laterally to the strut/ties. A waler system below the dredge line to transfer load laterally to the diaphragms is not practical or constructible and would require removal of the soil and installing walers at multiple levels.

The flat web sheet piles transfer load through tension and bearing through the interlocks rather than through bending moment. The flat web sheet piles have manufacturer rated interlocks that have been tested and approved for transfer. The curved arch face allows load to be transferred longitudinally along the sheet pile and have the cellular structure act as an entire unit rather than a single sheet pile acting in bending as the Z section performs. A semi-circular cell structure along with a diaphragm cell structure was looked at for the replacement of the straight wall system. The benefit of the circular cell structure is that single cells could be filled at one time, thereby reducing the amount of barge rental time, however the number of sheets and footprint required for the circular structure increased drastically (as compared to a diaphragm cell structure). The benefit of the diaphragm cell structure is the reduced number of sheets (as compared to the circular structure), the disadvantage is that filling operations would be required to take place from a barge, but this operation is similar to was required for the straight wall and considered

to be adequate. A king pile wall system was also re-investigated as a potential alternative but simply not feasible due to the much higher costs. The king pile wall system would allow for a straight wall geometry, and would require a waler and tie-back system.

1.2.2 Floodgate Control Structure

The floodgate control structure consists of a concrete monolith with a base slab and two gate bay walls that will house the steel miter gate leaves. The foot print of the monolith is a 71 foot 4 inch square. There will be sixty-four 36-inch diameter x 7/8" thick steel pipe piles supporting the concrete monolith. The bottom of slab elevation is -13.0 feet. The concrete walls are 22 feet tall with a top of wall (TOW) elevation of +15.0 feet. The concrete slab and the typical wall sections are 6 feet thick. The walls are a variable shape due to the gate recess required for when the gate is in the open position. Typical wall reinforcement is comprised of #10 @12 inches horizontally and #10 @6 inches vertically along all faces. No cross-ties are required according to the wall design forces and the applicable provisions of ACI 318. Typical slab reinforcement is #10 @12 inches parallel to the concrete walls (parallel to flow) and #10 @6" normal to the concrete walls. There are also #6 headed cross-ties through the slab thickness at every bar intersection in the reinforcing mats.

The damming barrier between the cellular sheet pile flood wall and the floodgate control structure will be a dual system consisting of a flexible rubber seal (sheet rubber in an accordion configuration) with a more robust, stiffer rubber j-bulb between it and the structure above the mud line and extending down below the mud line to just above the tremie slab. The sealing system will be attached to the sheet pile wall with angles and bolts and to the concrete wall/slab with post-installed anchor bolts in a way that will facilitate replacement if needed (although a little excavation will be required to reach the portion of the sealing assembly below grade). Below the mud line, there will be a continuous sheet pile cut off wall that will span in front of the floodgate control structure. There will be no direct connection between the sealing assembly described above and the sheet pile cut off wall. Instead, both systems will embed into an impervious clay layer, effectively tying the systems together without creating a seepage path. See Section 5.2.4 in the Basis of Design Report (BODR) in Appendix A for the design criteria and Appendix D for detailed calculations.

The floodgate control structure was analyzed for all static cases presented in the BODR as well as a 1,000 year return Maximum Design Earthquake (MDE). A SAP2000 model was created consisting of all solid elements for the walls and slab. For the static cases, a fixed base was assumed by pinning the base of the slab. This is conservative for design checks on the walls and slab, and preliminary calculations revealed that the seismic cases would govern for the piles. For the MDE seismic case, frame elements were used to model the piles and linear springs were used to represent the soil boundary conditions. Four models were created that assumed a cracked concrete modulus of either 0.25 times the modulus or 0.80 times the modulus, and that assumed either non-liquefied or liquefied soil conditions. Two GROUP models were created by the geotechnical engineers, who defined the soil properties for both the non-liquefied and liquefied soil conditions. These GROUP models were iterated with the response spectrum analysis in SAP2000 until the slab base reactions converged. The four

resulting SAP2000 models were saved as a new set of four models with the pile cap fully constrained to idealize a fixed pile connection better resulting in eight total models.

A liquefied and non-liquefied response spectrum were provided by Langan, and they recommended that negligible kinematic loading was present. They did provide maximum pile moment, shear, and axial loading that resulted from their Plaxis analysis which had the mass of the superstructure set to zero. Even though their recommendation was to use no kinematic loading, these maximum pile responses from Plaxis were added to the maximum pile responses from SAP2000 to be conservative. More information on Langan's analysis, findings, and recommendations can be found in the Geotechnical Report.

The pile design used the highest demands from all eight models by simply outputting frame forces, while the concrete slab and walls only used the unconstrained models (the first four) since constraining the cap artificially changes the stress distribution in the concrete slab. Section cuts were defined across the solid concrete elements both globally and locally and checks were performed in spColumn for axial load and biaxial bending, and in excel for shear and torsion where applicable. All components were designed to remain linear elastic during the MDE.

See Section 5.2.4 in the BODR in Appendix A for the design criteria and Appendix D for detailed calculations.

1.2.3 Floodgate

The floodgate consists of a steel miter gate with two gate leaves. Each leaf forms a 65 degree angle with the control structure concrete walls. The top of gate (TOG) elevation is +15.0 with each gate leaf being 22 feet tall. The clear width of the gate bay is 50 feet. The gate is made up of seven girders that are approximately three feet deep. The miter gate leaf components, including the actuator and gudgeon connection assemblies, and all associated bolted connections and anchor bolts are made of either painted or galvanized carbon steel except for the seal assembly components and the female miter block which are made of stainless steel. All embedded steel plates, shapes, and anchors are also stainless steel. Horizontal girder bearing blocks will consist of Columbia Industrial Products (CIP) contacting stainless steel at the quoin (contact surface between the gate leaf and pier wall) and miter (contact surface between gate leaves) interfaces.

The gate is connected to the control structure walls by the gudgeon at the top of the gate and the pintle at the bottom. The gudgeon assembly acts as a cylindrical hinge (longitudinal axis of the hinge/pin is in the vertical direction) and is anchored to the walls by two turnbuckle links that are connected to partially embedded high strength steel (HSS) circular columns. The turnbuckle links allow for adjustability to the gate leaf alignment once installed. One turnbuckle link has a single pin on both ends, while the second turnbuckle link has a double pin on the gate side. This double pin is intended to prevent rotation of the components and provide stability of the gudgeon system during a gate closure under flow. All gudgeon assembly components are made of either painted or galvanized carbon steel. The pintle at the bottom of the gate acts similar to a ball and socket joint. The pintle assembly consists of a base, pintle, and socket. The pintle base is partially embedded in and anchored to the concrete slab. The pintle looks similar to a

shaft with a nearly spherical ball on one end and is shrunk-fit into the base and also attached by drilled and tapped bolts. The pintle socket is attached to the miter gate leaf and rests on the pintle ball and has a pintle cup insert that is shrunk-fit into it. The pintle base and pintle are forged duplex stainless steel, and the pintle cup is forged 17-4 ph stainless steel. The pintle socket is forged carbon steel. Bolts connecting the pintle socket to the miter gate are A490 high strength carbon turned bolts while all bolts/screws and anchor rods for the pintle base and pintle are stainless steel.

The gudgeon and pintle bearing running surfaces are both lined with self-lubricating material (Kamatics Karon V) to prevent the need to run grease lines and reduce the required maintenance. There are additional spherical bearings at the gate actuator clevis that are also lined with self-lubricating Karon V material. The quoin and miter bearing blocks at the end of each horizontal girder that transfer the thrust load between gate leaves and from each gate into the pier when the gate is in the closed position will be CIP Hydro material, which is also self-lubricating. Finally, there are plain bronze bushings around the turnbuckle pins. Even though there is little to no movement expected at these locations, the bronze bushings help reduce galling and mechanical adhesion effects and allow for easier and more cost effective replaceability.

Hand calculations were used to aid with preliminary sizing of the gate components and used for final design of all connecting components such as the gudgeon, pintle, and actuator connection locations. A 3-D SAP2000 model was created for the gate that used shell elements for all components except frame elements for the downstream diagonal channels. All load cases presented in the BODR and operating cases under flow using CFD model results were ran and stresses investigated. A pseudo-static seismic case still needs to be checked and will be done between the 95% and 100% submittals (it is not anticipated to govern anything gate related). The SAP2000 static models conservatively assumed the quoin blocks transferred no load directly to the piers and the entire load went to the gudgeon and pintle assemblies. This was assumed due to known issues with miter quoin blocks maintaining a tight enough tolerance to make this load transfer and known issues with gudgeons becoming overloaded. The SAP2000 reactions at the gudgeon, pintle, and actuator were input into the hand calculations to check the adequacy of those components.

See Section 5.2.3 in the BODR in Appendix A for the design criteria and Appendix D for detailed calculations.

1.2.4 Floodgate Mechanical

The flood control structure will include two powered miter gates and features used to secure the gates in the open and closed position. Mechanical linear gate actuators will be used to move the gates from the open and closed positions.

Each gate will be powered by an ACME screw type linear actuator with integral gearmotor, brake, and means for manual operation via an electric drill input. The actuator housing will be mounted on a gimbal or Cardanic ring mount to allow for vertical and horizontal plane movement of the driving end of the actuator. The gate actuator will have the following operating characteristics:

- 10 hp

- 68,000 lb. maximum load
- 1.0 in./second linear speed (approx. 120 second closing time)
- 118 in. stroke

Each gate will be supplied with a latch assembly to secure the gate in the open and closed positions. The latch assembly consists of a bar driven by an ACME screw type linear actuator. The bar engages a receiver at the gate end. With the gates in the mitered position the lock bars will engage a receiver in the facing gate to hold the gates in contact. When the gates are opened, the lock bars will engage receivers mounted on each pier. The bars are located in the top and bottom of their respective receivers such that they can cross when the gate is mitered.

See Section 5.4 in the BODR in Appendix A for the design criteria and Appendix D for detailed calculations.

1.2.5 Floodgate Electrical

The service tie-in at Dad's point will be from a transformer provided by PG&E, which provides 480 V, 3 phase service to the site.

The new 480 V, 3 phase, 100 A service shall be provided to power to the new gate actuators and latches and a 208Y/120 V transformer. Lighting throughout the site, control and monitoring equipment, a siren, a strobe light, receptacles, cameras, and equipment heaters will be powered off of the transformer via a 100 A panelboard. A new service application has been submitted to PG&E to provide service to the site.

Standby power shall be provided by a 480 V, 3 phase, 4 wire mobile generator brought on site and connected via a generator plug and manual transfer switch located at the incoming service equipment.

The actuators and latches will be controlled via a control station adjacent to the gate structure on the south side of the flood wall. The control station shall control the operation of the actuator motors, actuator motor brakes, latch motors, latch brakes, siren, and strobe light by energizing control relays in the control cabinet. The control cabinet will be sized accordingly to house the PLC system which will provide the future remote control of the gate via the internet provider connection.

New electrical conduit and wiring will be run from the utility tie-in to the electrical distribution equipment and out to the gate actuators and latches for power and control.

Light fixtures will be added along the new flood wall and at the south abutment of the flood wall along Dad's Point. The lighting along Dad's Point will include the removal of existing light fixtures and replacement with new fixtures. New conduit and wiring will be installed throughout the site to power the light fixtures.

Cameras will be provided along the new flood wall. Monitoring of the site will be accomplished via the internet provider connection.

A cabinet will be added near the control cabinet at the south abutment of the flood wall to house the remote monitoring equipment. The remote monitoring will be accomplished via a datalogger or other OneRain supplied equipment. Relay contacts, water level sensors,

directional flow meter, and rain gauge will be connected to and recorded by the datalogger. Data will be sent to the SJAFCA network via the internet provider connection.

New equipment and devices for this project include:

- Actuator motors with integral brakes
- Latch motors with integral brakes
- Gate actuator control stand with the following features:
  - Control Stand Power: on-off
  - Gate 1: open-stop-close
  - Gate 2: open-stop-close
  - Latch 1: unlock-stop-lock
  - Latch 2: unlock-stop-lock
  - Siren: on-off
  - Strobe Light: on-off
  - Emergency Stop
  - Gate 1 Bypass: on-off
  - Gate 2 Bypass: on-off
  - Latch 1 Bypass: on-off
  - Latch 2 Bypass: on-off
- Gate position limit switches
- Latch position limit switches
- Channel gauge lights
- Site lighting
- Siren
- Strobe Light
- Receptacles (120 VAC)
- Camera Equipment (Cameras, poles, mounting kits, media converters, midspan, and power supplies)
- Remote Monitoring Equipment (Rain Gauge, Water Level Sensors, Directional Flow Meter, media converters, and power supplies)
- Control Equipment (relays, Ethernet switches, uninterruptible power supply, circuit breakers, and future PLC system for remote operation capabilities)
- Electrical Distribution equipment (panelboards, transformer, conduit, and wires)

The following describes system interlocks on this project:

- Emergency Stop: deactivates all motors when activated by removing control power to all motor starters.
- Gate Fully Open: prevents the gate from continuing to open once the gate has reached the fully open position.
- Gate Fully Closed: prevents the gate from continuing to close once the gate has reached the fully closed position.
- Gate Locked: prevents the latches from securing the gate when it is not fully closed.
- Latches Fully Unlocked: prevents the latch from continuing to unlock once the latch has reached the fully unlocked position.
- Latches Fully Locked: prevents the latch from continuing to lock once the latch has reached the fully locked position.
- Local/Remote Control: allows only one location to operate the gate at a time (for future remote control capabilities)

See Section 5.5 in the BODR in Appendix A for the design criteria.

1.2.6 Navigation Related Structures and Features

The cellular sheet pile flood wall and floodgate control structure will be protected by 36-inch diameter steel pipe pile dolphins spaced at 16 feet on center. In addition, each of the four corners of the floodgate control structure shall have a pile dolphins with 7-foot 6-inch diameter floating donut fenders on them to protect the structure and help guide vessels through the open bay. Floating buoys with navigation lights will be also be used to identify the alignment of the bay opening. The combination of the donut fenders and floating buoys is put in place in lieu of a timber guidewall system. All navigation structures shall have appropriate navigation lighting installed. See Section 5.2 in the BODR in Appendix A for the design criteria and Appendix E for detailed calculations.

1.2.7 Dad's Point Improvements

Improvements to Dad's Point include approximately 1,450 feet seepage cutoff wall, 200 feet of sheet pile stability wall, and grade adjustment along Dad's Point to tie into high ground at Louis Park. Additionally, included are recreational features and habitat improvements on Dad's Point, as well as removal of invasive species vegetation.

1.2.8 Access Improvements to the Stockton Golf and Country Club

A widened path will be constructed at the Stockton Golf and Country Club to provide maintenance and inspection access for the fixed cellular sheet pile floodwall that meets CVFPB Title 23 requirements.

2 Authorization

The project was included in the Lower San Joaquin River Feasibility Study which authorized through the USACE in 2018.

3 Location

3.1 Project Location

The project is located in the City of Stockton and unincorporated San Joaquin County. The project area includes Atherton Island, Atherton Cove, Louis Park (including Dad's Point), the Stockton Golf and Country Club, and the portions of the San Joaquin River in the immediate vicinity. Atherton Island is at the west end of Smith Canal, and Louis Park is southeast of Atherton Island at the mouth of the Canal. Dad's Point, a land bar that is an extension of Louis Park, is southwest of the mouth of Smith Canal and separates the Louis Park boat launch area from the San Joaquin River. Atherton Cove is a dead-end slough of the river that extends north and east around Atherton Island, and the Stockton Golf and Country Club is along the north bank of the river and southwest shore of Atherton Cove, to the northwest of Smith Canal. A navigable urban waterway, Smith Canal is a human-made, backwater slough that conveys stormwater and urban runoff away from adjacent residential neighborhoods. It extends from Yosemite Lake, approximately 2.5 miles downstream to the San Joaquin River. Because Smith Canal drains a limited stormwater drainage area, its border levees primarily serve to protect adjacent residences from back-flooding from the Delta rather than to confine upland riverine flows.

Figure 1. Smith Canal Gate Project Vicinity

3.1.1 Project Plan

Below is an overview of the project plan.

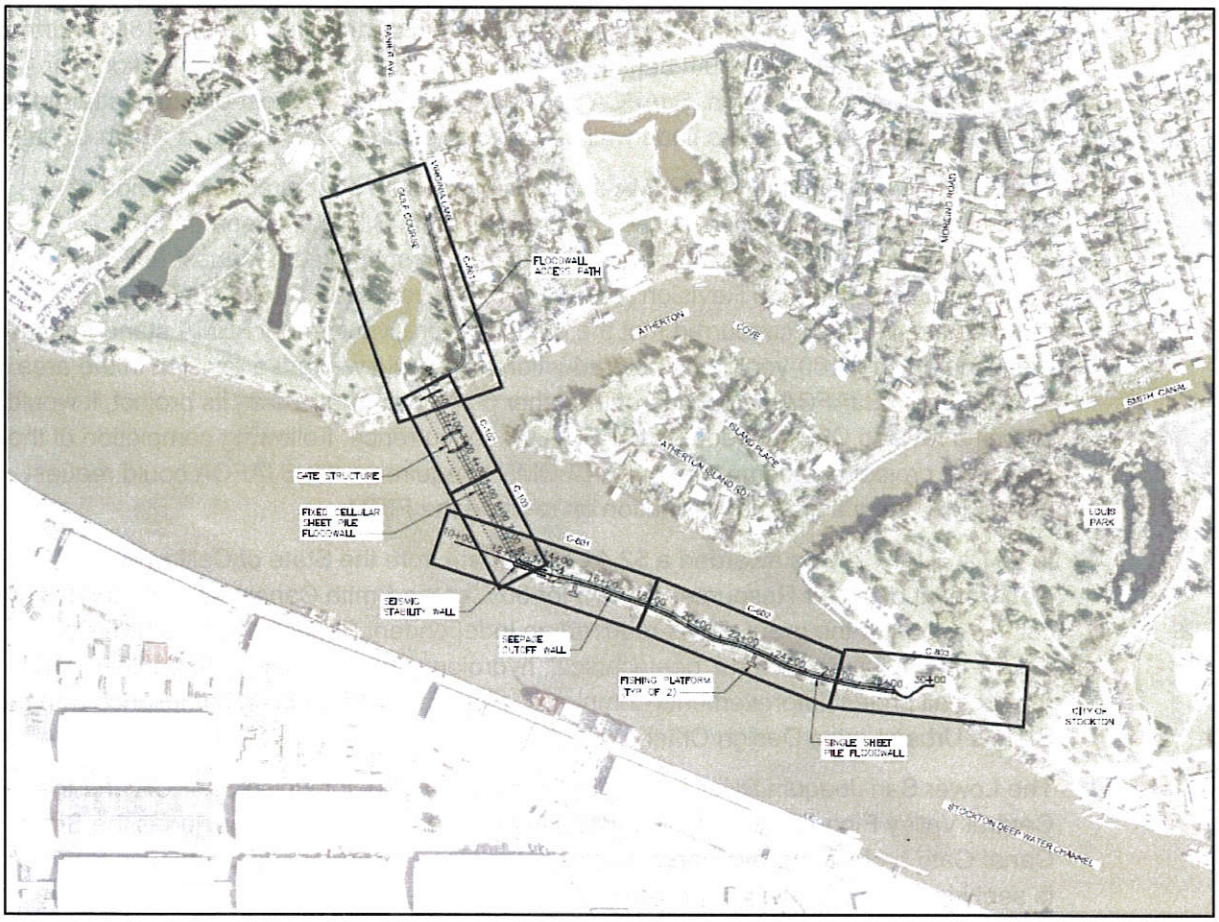


Figure 2. Smith Canal Gate Project Plan

4 Pertinent Information

4.1 History behind Need for Project

In 2005, as part of the Federal Emergency Management Agency (FEMA) Flood Map Modernization Program (MapMod), FEMA began requiring levee owners to submit documentation showing that their levees provided a 100-year level of flood protection. MapMod was an effort by FEMA to update Flood Insurance Rate Maps (FIRMs) and was conducted from 2003 to 2008. RD 1614 and RD 828 both determined that levees along Smith Canal would not meet FEMA criteria.

The Smith Canal levees did not meet FEMA criteria primarily due to encroachments that prevented access for maintenance and inspection. Due to these encroachments, Smith Canal was not able to meet levee certification requirements of the Code of Federal Regulations (CFR), Title 44, Section 65.10, which includes criteria for design, operation plans, maintenance plans, and certification by a registered civil engineer. As a result of

not meeting FEMA criteria, Smith Canal lost its FEMA accreditation. Properties protected by the Smith Canal levees were placed in a Special Flood Hazard Area (SFHA) zone. SFHAs are defined as areas that will be flooded by the 100-year flood.

San Joaquin Area Flood Control Agency (SJAFCA), in partnership with RD 1614 (north bank levee) and RD 828 (south bank levee), led the process of evaluating options for restoring FEMA accreditation. SJAFCA concluded that the most cost-effective alternative would be constructing a fixed flood wall and gate structure at the mouth of Smith Canal.

SJAFCA has coordinated with FEMA on the use of a gate structure as a method of providing flood risk–reduction for the Smith Canal area. SJAFCA prepared 30% engineering design plans of a proposed structure and submitted a request to FEMA for a Conditional Letter of Map Revision (CLOMR). FEMA reviewed SJAFCA's CLOMR request and, in 2011, concurred that the gate structure would meet FEMA standards for providing at least 100-year flood risk-reduction and would warrant a revision in the area FIRM. Should SJAFCA select one of the other project alternatives as its project, it would submit a revised CLOMR request to FEMA for concurrence. Following completion of the proposed project and compliance with CLOMR's requirements, SJAFCA could request that FEMA make a final determination on revising the FIRM.

In 2012, SJAFCA was awarded a $2,412,500 grant from the State of California Department of Water Resources (DWR) for 50% of the Smith Canal Gate Project design costs. As part of the grant, DWR required an Independent Panel of Experts (IPE) to review the design (structural, geotechnical, hydrology and hydraulics). In addition, DWR requires all project improvements completed under the grant to be in compliance with the State's Urban Levee Design Criteria (ULDC).

The Lower San Joaquin River Feasibility Study (LSJRFS), for which SJAFCA and the Central Valley Flood Protection Board are the non-federal sponsors, includes the Smith Canal Gate project improvements as part of the Recommended Plan. Because SJAFCA is seeking credit for advance construction costs for the Smith Canal Gate to be applied to the non-federal interest cost-share of the LSJRFS Recommended Plan, the Smith Canal Gate project needs to meet the U.S. Army Corp of Engineers' (USACE) Safety Assurance Review (SAR) standards, which also requires an IPE to review the design.

To fulfill both DWR and USACE requirements, a common IPE and SAR panel was selected and presented to both Agencies for approval. DWR approved the proposed IPE in July 2014 and USACE approved the SAR panel in February 2016.

In 2016, FEMA requested that additional analyses be conducted relating to interior drainage within the Smith Canal study area. In January 2016, SJAFCA submitted a coincident-frequency analysis concluding that a 25-year rainfall-runoff event represents the largest storm reasonably expected to occur concurrently with a 100-year tide event. Along with the coincident-frequency analysis, SJAFCA also submitted an interior drainage study that analyzed the amount of water that would be pumped into Smith Canal during a 25-year rainfall-runoff event and how high the water surface elevation (WSE) would get in Smith Canal during this rainfall-runoff event if it were to occur during a 100-year tide event when the gate was closed. The study determined that the maximum Smith Canal WSE behind the closed gate ranges between 4.6 ft and 8.8 ft for historical events, depending upon the timing of the storm relative to required gate closure, with an average stage of 7.2 ft. As a follow up to these studies, FEMA requested

that a 100-year interior rainfall-runoff analysis be performed to determine if there are areas of residual flooding within RD 1614 and RD 828. The total runoff exceeded the peak pump or culvert discharge capacities in all subbasins for a short duration during the peak of the storm event, but available street storage was capable of detaining the ponded water in all but two of the 20 drainage basins.

4.2 Climate

Stockton has a mild, Mediterranean-type climate, characterized by a cool, wet season lasting usually from November through April, and a dry, hot summer. Flooding in the Stockton area typically results from a combination of severe winter storms and runoff from the Sierra Nevada to the east. Runoff reaches the Stockton area from several creeks and rivers that drain into the San Joaquin River, which runs through the city of Stockton.

Average annual precipitation is about 18 inches, with approximately 80% of the total rainfall occurring between November and March (The Weather Channel 2014). Cloud-free skies generally prevail throughout the summer months and in much of the spring and fall. Thunderstorms are relatively infrequent, although occasionally occur in the late summer and other times of the year when unstable air masses are situated over the region. The highest rainfall generally occurs in January, when the average precipitation is about 3.4 inches. The driest month is July, during which rainfall is rare.

Monthly average high temperatures for Stockton vary from 94°F in July to 56°F in January.

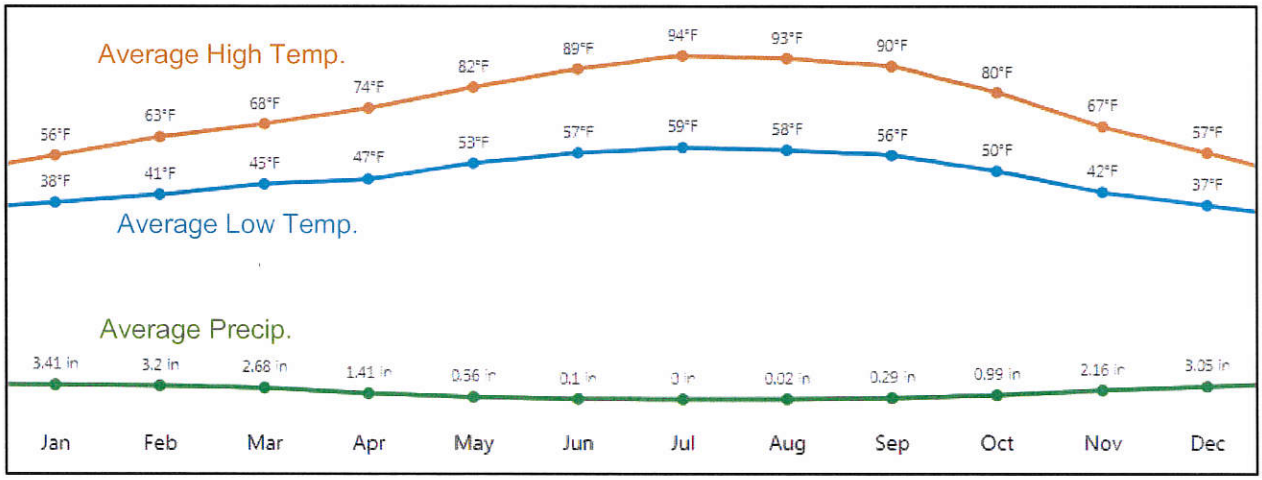


Figure 3. Average monthly temperatures and precipitation for Stockton, CA
(Source: The Weather Channel)

4.3 Tides and Currents

The project area includes portions of the San Joaquin River, Smith Canal, and Atherton Cove. The San Joaquin River watershed drains the southern part of the Central Valley and flows in a generally northward direction into the Delta, which discharges into the San Francisco Bay. Smith Canal extends approximately 3 miles east from the San Joaquin

River. Starting at its eastern limit at Yosemite Lake, the canal receives stormwater from the surrounding urban area that then drains to the west into the San Joaquin River. In addition, there are nine pump stations that discharge into Smith Canal and four gravity discharge pipes.

Smith Canal receives tidal waters from the San Joaquin River; however the tidal exchange is relatively small at the upstream end of the canal. The Delta has a mixed semidiurnal tide cycle, which means there are two high tides and two low tides of differing levels each lunar day (approximately 24.8 hours). A previous study showed that after 20 days of tidal exchange, the fraction of water from the San Joaquin River that had mixed two miles upstream was about 60%, and about 50% river water had mixed at the upstream end at Yosemite Lake (Jones & Stokes 2005:23). Atherton Cove is tidally influenced by the San Joaquin River, with much greater tidal interchange than Smith Canal.

The closest monitoring station for measuring tide stages near the project area is the Rough and Ready Island gage, which is located approximately three-quarters of a mile downstream from the entrance to Smith Canal and is most representative of project area tidal conditions. Tide elevations for Rough and Ready Island are summarized in Table 3.1-1 and are based on gage data from October 1, 2006 to January 1, 2014. Mean higher high water refers to the average of the highest daily tides and does not reflect the peak tide levels. Mean lower low water level is an average of the lowest daily tides and does not reflect the lowest tide levels.

Table 1. Tide Elevations at Rough and Ready Island Gage

Datum	Elevation (feet, NAVD88)
Highest Observed Water Level (03/23/11)	+8.21
Mean Higher High Water (MHHW)	+6.11
Mean High Water (MHW)	+5.64
Mean Tide Level (MTL)	+4.25
Mean Low Water (MLW)	+2.87
Mean Lower Low Water (MLLW)	+2.37
Lowest Observed Water Level (10/22/07)	+1.28
North American Vertical Datum of 1998 (NAVD88)	0.00

Source: California Data Exchange Center (CDEC) Gage RRI

The San Joaquin River has a typical tidal flow of approximately ±8,000 cubic feet per second (cfs). Because of tidal influence in the project area, outflow becomes negative on a daily basis as tides force water up the San Joaquin River, which interchanges with water in Smith Canal and Atherton Cove.

4.4 Hydraulic Data

The typical tide range statistics are given above in Table 1. Stage data used for design of the Smith Canal improvements are discussed in the following sections.

4.4.1 Smith Canal Stage Data

The *San Joaquin River Delta Base Flood Elevation Refinement Study* (PBI, 2009) updated the previous USACE stage frequency analysis from 1978, 1982, and 1992 for two gage stations near the City of Stockton: San Joaquin River at Rindge Pump (Rindge Pump) and Stockton Ship Channel at Burns Cutoff (Burns Cutoff). Figure 3 presents the location of these two gage stations. Table 2 presents the results of the *San Joaquin River Delta Base Flood Elevation Refinement Study.*

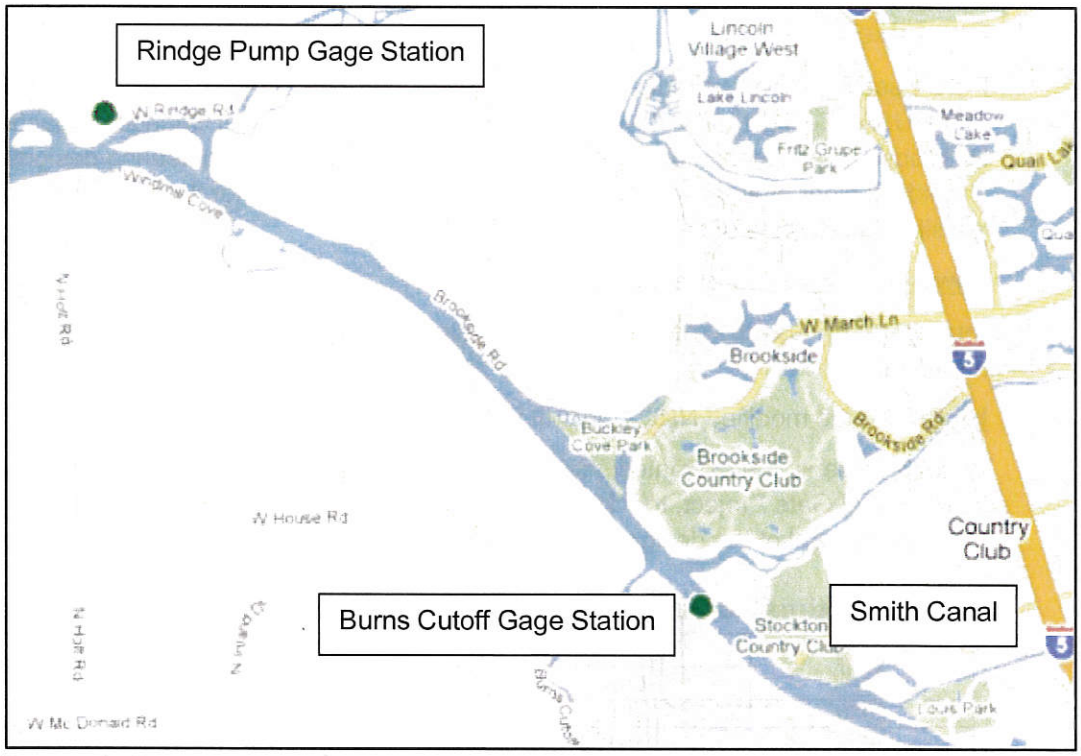


Figure 4. Average monthly temperatures and precipitation for Stockton, CA
(Source: The Weather Channel)

Table 2. Stage Frequency Analysis Results (2009 Sea Level Conditions)

Annual Exceedance Probability	Confidence Limit(1)	Rindge Pump (ft NAVD88)(2)	Burns Cutoff (ft NAVD88)
1/50	95%	8.9	9.0
	50%	9.3	9.3
	5%	9.7	9.6
1/100	95%	9.1	9.0
	50%	9.4	9.4
	5%	9.8	9.8
1/200	95%	9.2	9.1
	50%	9.6	9.5
	5%	10.0	9.9

(1) The confidence limit represents the percent confidence the stage will be exceeded. For example, there is a 95% confidence that a 1/50 flood stage of 8.9 ft would be exceeded and a 5% confidence that a 1/50 flood stage of 9.7 ft would be exceeded at the Rindge Pump gage station. Note that the range of values between the 95% and 5% confidence limits represents the 90% confidence interval – meaning that there is 90% confidence that the given flood stage will occur between the two values.

4.4.2 Hydraulics of Structure

200-Year WSE

The median 200-year water surface elevation (WSE) was taken from the Burns Cutoff Gage Station (DWR No. B95660) located in the San Joaquin River approximately 1 mile downstream of the entrance to Smith Canal. Table 2 shows this elevation to be 9.5 ft NAVD88.

Sea Level Rise

Future sea level rise is predicted to increase the stage frequency results calculated for 2009. USACE ETL 1100-2-1, "Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation," states that planning studies and engineering designs should consider alternatives that are developed and assessed for the entire range of possible future rates of sea level rise.

Low – use local historic rate of sea level rise

Intermediate - use the modified National Research Council (NRC) Curve I for estimating future sea level rise

High - use the modified NRC Curve III for estimating future sea level rise

Table 3 presents the estimated sea level rise at the Burns Cutoff gage station. For the Smith Canal Gate Project, the "high" future sea level rise for 2050 of 1.4 ft was used in the development of the design water surface elevation (DWSE).

Table 3. Estimated Future Sea Level Rise from 2009

Year	Sea Level Rise, ft		
	Low	Intermediate	High
2030	0.1	0.2	0.6
2050	0.3	0.5	1.4
2080	0.5	1.1	3.2
2100	0.6	1.5	4.7

Hydrologic Uncertainty

In addition to sea level rise, to take into consideration uncertainties and future modifications to hydrology, a 1.1-foot factor of safety was added to the 200-year WSE determine the DWSE.

Smith Canal Project DWSE

Based on the discussion above, the DWSE is calculated as follows:

Elev. 9.5 feet (NAVD88) – 200 year still water level (SWL)
+ 1.1 feet for hydraulic uncertainty
+ 1.4 feet for sea level rise through 2050 (high projection)
Elev. 12.0 Design Water Surface Elevation (DWSE)

Design Wind Setup and Wave Runup

The methodology for determining the wind setup and wave runup values for the design of the Smith Canal project followed the requirements presented in the ULDC. The wind setup and wave runup calculations are based on the potential wind speed, wind direction, fetch length, and water depth along the fetch line. Guidance for developing these parameters is given in the following USACE documents:

- *Coastal Engineering Manual*, EM 1110-2-1100 (CEM)
- *Shore Protection Manual* (SPM)
- *Process for the National Flood Insurance Program Levee System Evaluation*, EC 1110-2-6067

Table 4 presents the results of the *Smith Canal Gate Project Wind Setup and Wave Runup Calculations Addendum 1*. Table 4 shows that the maximum combined wind setup and wave runup elevation is 0.83 ft.

Table 4. Combined Wind Setup and Wave Runup Heights

Wind Direction	Wind Setup (ft)	2% Wave Runup (ft)	Combined Wind Setup and Wave Runup Elevation Increase (ft)
Gate Structure			
West	0.02	0.36	**0.38**
Southwest	0.00	0.19	0.19
Dad's Point			
Southwest	0.00	0.36	0.36
South	0.01	0.65	0.66
Southeast	0.02	0.81	**0.83**

Smith Canal Project Minimum Design Elevation

Since the maximum combination of wind setup and wave runup is less than 3 ft, the Minimum Top of Levee (MTOL) was determined by adding 3 ft for freeboard to the DWSE. This MTOL represents the minimum top elevation for the gate, floodwall, and levees included in this project.

Elev. +12.0 feet NAVD88, DWSE
+ 3.0 feet for Freeboard
Elev. +15.0 feet for Minimum Top of Levee

Normal Conditions

The normal position for the miter gate will be open. Tides would continue to flow in and out of the Smith Canal. The Smith Canal gate will close on the low tide just prior to when the Delta stage is forecasted to exceed 8.0 ft. This water surface elevation is 1.5 feet below the 200-year stage of 9.5 ft.

4.4.3 Gate Operation

Opening/Closing Criteria

The normal position for the gate would be open. Tides would continue to flow in and out of the Smith Canal. The purpose of the Smith Canal gate is to create a barrier to block flooding in the event of either an imminent or existing levee breach and during 1% flood events and greater. In these cases, the gate would be closed, preventing flow of water from the Delta into Smith Canal. The Smith Canal gate will close when the Delta stage is forecasted to exceed 8.0 ft NAVD88, which is at a 4-year recurrence interval (San Joaquin River Delta Base Flood Elevation Refinement, September 2010). This water surface elevation is 1.4 feet below the 1% maximum water surface elevation of 9.4 ft NAVD88.

For flood control purposes, the gate would be closed only during high Delta stage events forecasted to approach or exceed the design operating water surface elevation between November and April. When a high Delta stage event is anticipated, the gate would be closed at the lowest tide prior to the forecasted high Delta stage. The gate would open on outgoing tide to release any accumulated storm water whenever the level in the Delta is lower than the level in Smith Canal.

5 Construction History (Pending Construction)

6 Project Performance

6.1 Detailed Project Purpose

The primary purpose of the proposed project is to reacquire FEMA accreditation that was revoked in 2008 and remove the Special Flood Hazard Area designation from a large portion of central Stockton. Approximately 5,000 properties and approximately 15,000 residents were identified by FEMA as being in the FEMA 100-year floodplain, an area identified by FEMA as having an increased risk of flooding. In addition, based on topographical data recently developed by DWR, FEMA is currently proposing to remap the region to include an additional 3,000 parcels and 9,000 residents in the 100-year floodplain. Further, SJAFCA has a goal consistent with California state law to provide a minimum 200-year level of flood risk–reduction performance by 2025. Isolation of Smith Canal from the San Joaquin River would remove the affected area from the 100-year floodplain, thereby improving the FEMA rating, and would contribute toward ultimate 200-year level of performance in combination with other area projects, in compliance with California state law.

Furthermore, SJAFCA has set forth the following project objectives:

- Improve flood performance to secure FEMA accreditation within the funding capability of SJAFCA
- Reduce flood risk to contribute to minimum 200-year level of performance as mandated by SB 5 within the funding capability of SJAFCA

- Construct improvements in accordance with DWR's Urban Levee Design Criteria
- Integrate compatibly with regional flood risk–reduction projects, including the LSJRFS and the Lower San Joaquin and Delta South Regional Flood Management Plan
- Construct a project that is economically, environmentally, politically, and socially acceptable
- Construct a project as soon as possible to reduce flood risk, avoid mandatory flood insurance, and avoid building restrictions
- Construct a project that considers the potential effects of climate change and is resilient to sea level rise while consistent with other project objectives
- Provide multi-objective benefits where consistent with other project objectives, such as water quality and recreation enhancements
- Facilitate compatibility with recreation goals for the area, including continued recreational boating access
- Facilitate compatibility with existing land use in the area

6.2 Consequences of Exceeding Project Design

6.2.1 Rainfall

6.2.2 Wind Tides

6.2.3 Seismic

There are several performance issues that may arise should a seismic event occurs that exceeds the project design. Given the relative low strength and susceptible to liquefaction condition of the foundation, both the floodwall and the gate structure foundations should be expected permanently deform laterally and vertically. These deformations should be expected to include the levee tie-in locations, the mid-span of the floodwall, and the gate structures. Since the floodwall and gate structures are founded on differing systems and possess differing superstructures, the dynamic periods of both are different. Therefore, it is anticipated that the deformations will not be in phase nor equal and will have differing settlements and lateral deformations. Based on the analyses performed in support of the design, it should be anticipated that the results these deformations will have varying degrees of post-event mitigations including non-operational and partial replacement of the facility.

7 Local Cooperation Agreement (LCA)

TBD

8 Operation

8.1 Floodgate

This section contains the details associated with operating the floodgate, screw drive actuator, and portable emergency generator. A general description follows containing information regarding operation. This section covers the information operating personnel need to prepare the floodgate for operation before, during, and after a flood event, and during the rainy season.

8.1.1 Description and Record Keeping

Description

The floodgate control structure consists of a concrete monolith with a base slab and two gate bay walls that will house the steel miter gate leaves. The footprint of the monolith is a 71 foot 4 inch square. There will be sixty-four 36-inch diameter x 7/8" thick steel pipe piles supporting the concrete monolith. The bottom of slab elevation is -13.0 feet. The concrete walls are 22 feet tall with a top of wall (TOW) elevation of +15.0 feet. The concrete slab and the typical wall sections are 6 feet thick. The walls are a variable shape due to the gate recess required for when the gate is in the open position. Typical wall reinforcement is comprised of #10 @12 inches horizontally and #10 @6 inches vertically along all faces. No cross-ties are required according to the wall design forces and the applicable provisions of ACI 318. Typical slab reinforcement is #10 @12 inches parallel to the concrete walls (parallel to flow) and #10 @6" normal to the concrete walls. There are also #6 headed cross-ties through the slab thickness at every bar intersection in the reinforcing mats.

The damming barrier between the dual sheet pile flood wall and the floodgate control structure will be a dual system consisting of a flexible rubber seal (sheet rubber in an accordion configuration) with a more robust, stiffer rubber j-bulb between it and the structure above the mud line and extending down below the mud line to just above the tremie slab. The sealing system will be attached to the sheet pile wall with angles and bolts and to the concrete wall/slab with post-installed anchor bolts in a way that will facilitate replacement if needed (although some excavation will be required to reach the portion of the sealing assembly below grade). Below the mud line, there will be a continuous sheet pile cut off wall that will span in front of the floodgate control structure. There will be no direct connection between the sealing assembly described above and the sheet pile cut off wall. Instead, both systems will embed into an impervious clay layer, effectively tying the systems together without creating a seepage path.

The floodgate consists of a steel miter gate with two gate leaves. Each leaf forms a 65 degree angle with the control structure concrete walls. The top of gate (TOG) elevation is +15.0 with each gate leaf being 22 feet tall. The clear width of the gate bay is 50 feet. The gate is made up of seven girders that are approximately three feet deep. The miter gate leaf components, including the actuator and gudgeon connection assemblies and all associated bolted connections and anchor bolts, are made of either painted or galvanized carbon steel, except the seal assembly components and the female miter block, which are made of stainless steel. All embedded steel plates,

shapes, and anchors are also stainless steel. Horizontal girder bearing blocks will consist of Columbia Industrial Products (CIP) contacting stainless steel at the quoin (contact surface between the gate leaf and pier wall) and miter (contact surface between gate leaves) interfaces.

The gate is connected to the control structure walls by the gudgeon at the top of the gate and the pintle at the bottom. The gudgeon assembly acts as a cylindrical hinge (longitudinal axis of the hinge/pin is in the vertical direction) and is anchored to the walls by two turnbuckle links that are connected to partially embedded HSS circular columns. The turnbuckle links allow for adjustability to the gate leaf alignment once installed. One turnbuckle link has a single pin on both ends, while the second turnbuckle link has a double pin on the gate side. This double pin is intended to prevent rotation of the components and provide stability of the gudgeon system during a gate closure under flow. All gudgeon assembly components are made of either painted or galvanized carbon steel. The pintle at the bottom of the gate acts similar to a ball and socket joint. The pintle assembly consists of a base, pintle, and socket. The pintle base is partially embedded in and anchored to the concrete slab. The pintle looks similar to a shaft with a nearly spherical ball on one end and is shrunk-fit into the base and also attached by drilled and tapped bolts. The pintle socket is attached to the miter gate leaf and rests on the pintle ball and has a pintle cup insert that is shrunk-fit into it. The pintle base and pintle are forged duplex stainless steel, and the pintle cup is forged Type 17-4 PH stainless steel. The pintle socket is forged carbon steel. Bolts connecting the pintle socket to the miter gate are ASTM A490 high strength carbon turned bolts while all bolts/screws and anchor rods for the pintle base and pintle are stainless steel.

The gudgeon and pintle bearing running surfaces are both lined with self-lubricating material (Kamatics Karon V) to prevent the need to run grease lines and reduce the required maintenance. There are additional spherical bearings at the gate actuator clevis that are also lined with self-lubricating Karon V material. The quoin and miter bearing blocks at the end of each horizontal girder that transfer the thrust load between gate leaves and from each gate into the pier when the gate is in the closed position will be CIP Hydro material, which is also self-lubricating. Finally, there are plain bronze bushings around the turnbuckle pins. Even though there is little to no movement expected at these locations, the bronze bushings help reduce galling and mechanical adhesion effects and allow for easier and more cost-effective replaceability.

The gates are electrically operated. Each gate utilizes one actuator for opening and closing by a 1,800 rpm motor that is approximately 10 hp, and one actuator for locking and unlocking the gate by an approximately 3 hp motor. The actuators are located in machinery recesses (abutments) by each gate. Gates are controlled locally via the control cabinet on the south side of the gate structure along the floodwall. All equipment is powered from utility power during normal operation. In the event of a power outage, a back-up generator can be brought on site and connected to the manual transfer switch generator receptacle to operate the gates.

Record Keeping

Record keeping is a basic business practice and is applicable to all facilities. Complete, well organized records (stored in electronic format) can help ensure proper maintenance of facilities and equipment. Record keeping must be coordinated with all applicable

governmental agencies and integrated with the development, operation, maintenance, repair, rehabilitation and replacement of the facility. Records shall include as a minimum:

- The date, exact place, time, name, description of activity, and observations.
- Name of inspector(s) and crew, where applicable.
- Analytical information as to the work done, repair, replacement, tests, and regular maintenance/inspection.
- Electronic photographs of deficiencies and remedial actions taken.
- Classification of event that prompted activity such as hurricane, regular maintenance/inspection, mobilization, reopening, gate closure/opening, or repair.
- Type of action taken for the applicable activity, whether safety, preventive, remedial, or replacement.
- A complete database of all work done in accordance with the OMRRR Manual to ensure adequate backing up of data and maintenance.
- To have an attendant on site and on time to make the operation safe within the required operational constraints.
- To have damaged equipment repaired or replaced in the shortest possible time.
- Inspection and maintenance records keeping is covered in Section 10.2 - Floodgate Component Routine Inspection.

8.1.2 Preparation for Operation

Before The Rainy Season

The steel miter gates are recessed in the cast-in-place monolith, allowing potential debris and drift to collect over time. Therefore, each gate shall be checked for obstructions prior to initiating floodgate closure to ensure the gate can swing unobstructed into the closed position. Tree limbs and trash may get lodged in the recess over time. The operator shall inspect the gates in the recessed position from the deck and flush out accumulated silt, drift and debris using the movement of the gates. The operator shall manually remove as many floating foreign objects as possible using debris hooks or debris rakes to manually move the debris away from the abutment recesses. In the event that heavy debris is clearly obstructing the gate and cannot be removed by operator manual effort, a crane barge and diver may be required to aid in removing heavy objects. To reduce the level of siltation from obstructing the gate, it is suggested that the gates be exercised a minimum of once every six (6) weeks to sweep silt away from the gates and abutment recesses. A full closure operation where the gates are locked together is not necessary for this operation and this operation can be performed more frequently at the operator's discretion and monitoring of the debris build-up in the area.

Both recesses (abutments) and gate sill shall be clean of foreign objects or mud that may hinder operation of the gate. The gate shall be checked for proper operation once the operator confirms both gate recesses are clean and free of debris. Then, the gates should be operated through the entire travel a sufficient number of times to indicate that all parts and equipment are in proper operating condition. The gates shall be positioned

such that, when closed, there shall be negligible leakage at the miter, sill, and machinery block seals. With the gates in the closed position, the operator shall check the entire length of the gatebay sill from the deck, for debris. The operator shall remove all found foreign objects throughout the structure and again may identify heavy objects that may require the use of a crane for removal from the structure. The gates shall be reopened completely and recessed. The operator shall check the condition of the visible cathodic protection system from the deck and reporting any abnormalities.

Prior to operation, machinery slide and pivot areas, including:

- Bearings on the gate operator cardanic rings,
- Clevis connection between gate operator and gate,
- Clevis connection between latch operators and latch, and
- Latch bar and receivers

shall be inspected and cleaned of any foreign debris. Where required, lubrication shall be applied to the lock bar receivers and pivot bearings. Note: the actuator manufacturer shall determine the type of bearings in the cardanic ring. If these bearings are sealed they shall not be lubricated. (*This may require updating after construction).*

Current for each phase of each motor shall be measured and recorded during a full opening and closing operation sequence using calibrated and sufficiently rated clamp-on amp meters. Measurements shall be recorded by qualified personnel utilizing appropriate personal protective equipment (PPE) for exposure to 480 VAC.

During operation, the actuators for each gate leaf shall be monitored for abnormal noise or movement that could indicate foreign debris in pivot bearings or movement of the machinery supports. Similarly, the latch operators and their receivers should be inspected during operation and any abnormalities noted and addressed. The latch bars should drive smoothly and stop when fully driven (bar taper extends just beyond the receiver on the far leaf) and fully pulled (bar end is flush with the receiver on the near leaf).

During The Rainy Season

Certain activities shall be performed during the rainy season to ensure proper functioning when a flood event may threaten the Stockton area. Inspection for evidence of sediment and debris along the floodgate and both recess cavities shall be performed every three weeks. A high pressure hose for blowing sediment out of the notches as well as crane and cabling to remove large objects should be made available as needed. The floodgate shall be operated a minimum of every two (2) weeks or within three (3) days after equipment repair or major debris removal by crane is performed.

Approaching Storm or Flood Event

In the event of an approaching storm or flood threat, preparations shall begin with consideration to its timing. The preparation timing sequence may be found in Appendix A - Activities Plan.

Gate Closure Procedure

Prior to operation, inspect the gate operators, latch operators, latch bars, and latch bar receivers to confirm that no foreign debris is present.

The gate operating system is electrically operated system. There are two actuators for each gate. See photographs of machinery and controls in Appendix E. The following electrical equipment associated with gate operation is located on Dad's Point:

- Incoming service equipment
- Electrical distribution equipment
- Control cabinet and motor control accessories

The control stand is located on the south side of the gate structure along the floodwall and is used to locally operate both gates. The control system as designed and built allows for separate closing of each gate and latch. The control stand panel is lockable when not in use. The layout is equipped with a two-position cylinder lock key to toggle between remote and local control and an emergency stop push button to stop control power to both gates and latches in the event of an emergency. This control stand is also equipped with selector switches for operation of the siren and strobe and indicator lights for status of each gate and latch. Limit switches provide information on gate and latch status and determine the end of travel of the gate leaves and latches in both directions. Each gate and latch has a corresponding three-position selector switch to operate and stop each component. The gate operator locks the panel when operation is complete.

The gate closure procedure is as follows:

- <u>Procedure whether utility power is available or not</u>
    - Assess the marine traffic situation on the canal. Notify the Coast Guard of imminent gate closure by telephone and distribute navigation bulletin via fax from business office of SJAFCA.
    - Visually inspect the actuators, limit switches, control cabinet, control stand, and accessories to verify that the equipment appears to be in serviceable condition.
    - Check for foreign items left on any of the equipment such as tools, rags, etc.
    - Check for loose or broken brackets and parts.
    - Check for leaks in general throughout.
    - Check all conduit for visual damage.
- <u>Procedure continues when utility power is not available</u>
    - Verify that the portable back-up generator appears to be in serviceable condition.
    - Set the manual transfer switch (MTS) to be fed from the back-up generator.
    - Start the generator engine.

- The generator engine will go up to full operational speed automatically.
- Check for oil pressure immediately after the engine starts. If the recommended pressure is not evident in 10 seconds, shut the engine down.
- Continue monitoring the generator engine temperature and pressure until normal conditions are achieved.

- Procedure continues whether utility power is available or not
  - Use the control stand to locally operate the gates and latches.
  - Check that the two-position cylinder lock is in the "LOCAL" control power position and the corresponding "LOCAL OPERATION" white indicator light is illuminated.
- Procedure continues for closing the gates
  - Check that both Gate 1 and Gate 2 green "OPENED" indicator lights are illuminated.
  - Verify there are no obstructions to prohibit the gates from closing.
  - Turn both Latch 1 and Latch 2 selector switches to the unlock "UL" position.
  - Both latches will begin to unlock until the corresponding fully unlocked limit switch stops each latch in the unlocked position. The latches will not actuate unless the gates are in the fully opened position.
  - Observe the movement of each latch during the unlocking operation. If the fully unlocked limit switch fails to stop the corresponding latch in the fully unlocked position and attempts to over-travel, turn the corresponding latch selector switch to the "OFF" position.
  - If either latch fails to move and the corresponding gate is indicated as being fully open, the corresponding latch may need to be bypassed and/or manually actuated. See Section 9 for Emergency Operations.
  - Check that both Latch 1 and Latch 2 amber "UNLOCKED" indicator lights are illuminated. Turn both Latch 1 and Latch 2 selector switches to the "OFF" position.
  - Prior to "CLOSE" operation, turn the Siren and Strobe selector switches to the "ON" position to provide an audible and visual alarm that the gates will begin closing.
  - Turn both Gate 1 and Gate 2 selector switches to the "CLOSE" position.
  - Both gates will begin to close until the fully closed limit switches stop the gates in the fully closed position. Each gate will not actuate unless its corresponding latch is in the fully unlocked position.
  - Observe the movement of each gate during the closure operation. If the fully closed limit switch fails to stop the corresponding gate in the fully

closed position, turn the corresponding gate selector switch to the "OFF" position.

- If either gate fails to move and its corresponding latch is indicated as being in the fully unlocked position, the corresponding gate and/or latch may need to be bypassed or manually actuated. See Section 9 for Emergency Operations.
- Check that both Gate 1 and Gate 2 amber "CLOSED" indicator lights are illuminated. Turn both Gate 1 and Gate 2 selector switches to the "OFF" position.
- Turn the Siren and Strobe selector switches to the "OFF" position.
- Turn both Latch 1 and Latch 2 selector switches to the lock "LK" position.
- Both latches will begin to lock until the corresponding fully locked limit switch stops each latch in the fully locked position. The latches will not actuate unless the gates are in the fully closed position.
- Observe the movement of each latch during the locking operation. If the fully locked limit switch fails to stop the corresponding latch in the fully locked position and attempts to over-travel, turn the corresponding latch selector switch to the "OFF" position.
- If either latch fails to move and the corresponding gate is indicated as being fully closed, the corresponding gate may need to be bypassed or manually actuated. See Section 9 for Emergency Operations.
- Check that both Latch 1 and Latch 2 green "LOCKED" indicator lights are illuminated. Turn both Latch 1 and Latch 2 selector switches to the "OFF" position.

8.1.3 After the Storm

The floodgates will be opened based upon review of water elevations, climatological conditions, and tides later in the day or days. See the decision process in Appendix A - Activities Plan and Appendix H - Standing Instructions for Water Control Manager.

Re-opening Conditions

The decision as to when the floodgate will reopened rests entirely with SJAFCA based on climatological conditions and conditions at site. The operations team will mobilize and proceed accordingly.

A crew to open the floodgate shall be available to remove any sediment or objects that may impede opening the gates.

The crew needed for gate operation should include:

- Equipment operator
- Mechanic

Note: if larger, heavier debris is in the area or obstructing the gate from re-opening, a barge mounted crane or other heavy rigging equipment might be necessary to remove the debris prior to operation.

Mobilization Requirements

Once a decision is made to open the floodgate, the crew and equipment shall mobilize to the site. The equipment required for gate operations should include:

- Mechanics hand tools for troubleshooting and servicing gate and lock operators.
- Portable Generator and drill sized to operate the gate and lock operators in the absence of utility power. Note that the gate operating system has two means of being operated by generators in the loss of utility power. A larger sized generator may be plugged into the manual transfer switch located near the east end of Dad's point to power the gate and lock operators directly. A smaller sized generator may be used to power a corded drill attached to emergency input on the back of each gate or lock actuator. See Section 9 – Emergency Operations.
- Ropes, slings, boat hooks, debris rakes and miscellaneous rigging accessories to rig small and moderate size debris away from the gates.

Gate Opening Procedure

A gate opening criteria for the floodgate was developed to ensure velocities exiting the structure do not substantially exceed 2.5 fps in order to ensure the integrity of the riprap and the operability of the gate. The gate should not be opened with any differential head on the flood side; slack tide is the goal for gate operation unless closing the gate under flow is the only option in the event of an extreme emergency. Should a reverse head of greater than three inches be encountered on the protected side, the gate should be opened.

The gate opening procedure is as follows:

- Procedure whether utility power is available or not
    - Assess the marine traffic situation on the canal. Notify the Coast Guard of imminent opening by telephone and distribute navigation bulletin via fax from business office of SJAFCA.
    - Visually inspect the actuators, limit switches, control cabinet, control stand, and accessories to verify that the equipment appears to be in serviceable condition.
    - Check for foreign items left on any of the equipment such as tools, rags, etc.
    - Check for loose or broken brackets and parts.
    - Check for leaks in general throughout.
    - Check all conduit for visual damage.
- Procedure continues when utility power is not available

- Verify that the portable back-up generator appears to be in serviceable condition.
- Set the manual transfer switch (MTS) to be fed from the back-up generator.
- Start the generator engine.
- The generator engine will go up to full operational speed automatically.
- Check for oil pressure immediately after the engine starts. If the recommended pressure is not evident in 10 seconds, shut the engine down.
- Continue monitoring the generator engine temperature and pressure until normal conditions are achieved.

- Procedure continues whether utility power is available or not
  - Use the control stand to locally operate the gates and latches.
  - Check that the two-position cylinder lock is in the "LOCAL" control power position and the corresponding "LOCAL OPERATION" white indicator light is illuminated.
- Procedure continues for opening the gates
  - Check that both Gate 1 and Gate 2 amber "CLOSED" indicator lights are illuminated.
  - Verify there are no obstructions to prohibit the gates from opening.
  - Turn both Latch 1 and Latch 2 selector switches to the unlock "UL" position.
  - Both latches will begin to unlock until the corresponding fully unlocked limit switch stops each latch in the unlocked position. The latches will not actuate unless the gates are in the fully closed position.
  - Observe the movement of each latch during the unlocking operation. If the fully unlocked limit switch fails to stop the corresponding latch in the fully unlocked position and attempts to over-travel, turn the corresponding latch selector switch to the "OFF" position.
  - If either latch fails to move and the corresponding gate is indicated as being fully closed, the corresponding latch and/or gate may need to be bypassed or manually actuated. See Section 9 for Emergency Operations.
  - Check that both Latch 1 and Latch 2 amber "UNLOCKED" indicator lights are illuminated. Turn both Latch 1 and Latch 2 selector switches to the "OFF" position.
  - Prior to "OPEN" operation, turn the Siren and Strobe selector switches to the "ON" position to provide an audible and visual alarm that the gates will begin opening.
  - Turn both Gate 1 and Gate 2 selector switches to the "OPEN" position.

- Both gates will begin to open until the fully open limit switches stop the gates in the fully opened position. Each gate will not actuate open unless its corresponding latch is in the fully unlocked position.
- Observe the movement of each gate during the opening procedure. If the fully open limit switch fails to stop the corresponding gate in the fully opened position, turn the corresponding gate selector switch to the "OFF" position.
- If either gate fails to move and its corresponding latch is indicated as being in the fully unlocked position, the corresponding gate and/or latch may need to be bypassed or manually actuated. See Section 9 for Emergency Operations.
- Check that both Gate 1 and Gate 2 green "OPENED" indicator lights are illuminated. Turn both Gate 1 and Gate 2 selector switches to the "OFF" position.
- Turn the Siren and Strobe selector switches to the "OFF" position.
- Turn both Latch 1 and Latch 2 selector switches to the lock "LK" position.
- Both latches will begin to lock until the fully locked limit switch stops the each latch in the fully locked position. The latches will not actuate unless the gates are in the fully opened position.
- Observe the movement of each latch during the locking operation. If the fully locked limit switch fails to stop the corresponding latch in the fully locked position and attempts to over-travel, turn the corresponding latch selector switch to the "OFF" position.
- If either latch fails to move and the corresponding gate is indicated as being fully opened, the corresponding gate may need to be bypassed or manually actuated. See Section 9 for Emergency Operations.
- Check that both Latch 1 and Latch 2 green "LOCKED" indicator lights are illuminated. Turn both Latch 1 and Latch 2 selector switches to the "OFF" position.

8.1.4 Gate Operating Machinery

8.1.5 Electrical Equipment

Incoming Service Equipment

Electrical power for the floodgate structure will be 480 V, 3 phase, 100 A. Power is obtained from the utility during normal operations; a back-up generator can be brought on site to operate the gates in the event of a utility power outage. Utility power will come from the southeast side of the site along Dad's Point.

Electrical Distribution Equipment

General

Power for actuators, lighting, controls, receptacles, cameras, heaters, and the strobe/siren is distributed to the entire gate structure from equipment located on the southeast side of the site on Dad's Point.

Safety

Electrical distribution equipment enclosures shall remain locked and only accessible to authorized personnel. Special care shall be taken around electrical distribution equipment in accordance with EM 385-1-1 Safety and Health Requirements Manual and the National Electric Code (NEC). Particular attention shall be paid to loose connections, deteriorated wiring insulation, frayed wires, and inadvertent electrical grounds or shorts.

Panelboards

Circuit breakers inside panelboards must be operated by authorized personnel only. Breakers which are not connected to field wiring (spares) must be left in the off position. Breakers which have tripped (as indicated by the breaker trip indicator) may be switched off, and then on again, once the cause for the initial trip is assessed and corrected.

Transfer Switch

Operating procedures for the manual transfer switch (MTS) are provided in Appendix D - Submittal Data.

Alarm and Indication Systems

General

The alarm and indication systems provide basic equipment and environment status information such as gate and latch positions, control location, control cabinet door status, water levels on both sides of the structure, rain fall quantity, and directional water flow.

Control Stand

The control stand located along the floodwall closest to the gate structure on the south side provides visual indication on the gate and latch positions, control location, and control cabinet door status. Green indicator lights are illuminated when the associated gate is open or the associated latch is locked. A red indicator light is illuminated if the control cabinet door is opened. Amber indicator lights are illuminated when the associated gate is closed or the associated latch is unlocked. White indicator lights are illuminated when the controls are available remotely or locally.

Remote Monitoring Cabinet

The remote monitoring cabinet is located near the electrical distribution equipment on Dad's Point. The equipment logs status information for gate positions (fully opened or fully closed), latch positions (fully locked or fully unlocked), gate statuses (opening or closing), latch statuses (locking or unlocking), bypass switch statuses, control

location (remote or local), siren operation, and strobe operation. Additionally, it will log the height of the water on both sides of the wall, rainfall quantity, and directional water flow. This data stored on a datalogger will then be transmitted to the SJAFCA network via an Internet connection.

Navigation Aids

Both audible and visual navigation signals are controlled via selector switches on the control stand. The control stand is located on the floodwall, southeast of the gate structure. Additional information on the audible and visual signals can be found in Appendix D - Submittal Data.

Lighting Systems

General site lighting is provided for safe access. Light fixtures are LED. All gate wall light fixtures are manually switched via 3-way light switches. Two sets of switches are located on both sides and both ends of the gate structure. All lighting on Dad's Point is controlled via photocells, with one located on each fixture. Additional information on the lighting systems can be found in Appendix C - As-Built Information and Appendix D - Submittal Data.

8.2 Floodwall

8.2.1 Descriptions of the Protection System Elements

The floodwall consists of a cellular structure with diaphragm cells filled with granular material extending from Dad's Point to the Stockton Golf and Country Club on the north bank of the San Joaquin River. The sheets used for the cellular structure will have a top of wall elevation of 15.0 feet and a bottom of wall elevation of -70.8 feet. The sheet pile tie-ins at Dad's Point to the south and Stockton Golf and Country Club to the north will both be lined with RSP to minimize potential future erosion.

An AS500-12.7 straight web steel sheet pile section and marine grade ASTM A690 material was selected. The straight web steel sheet pile section will be used as part of a cellular structure with diaphragm cells. The atmospheric corrosion resistance of this steel is substantially better than that of ordinary carbon steels with or without copper addition. The steel has also shown to have substantially greater resistance to seawater "Splash Zone" corrosion than ordinary carbon steel where exposed to the washing action of rain and the drying action of the wind, sun, or both.

The flat web sheet piles transfer load through tension and bearing through the interlocks rather than through bending moment. The flat web sheet piles have manufacturer rated interlocks that have been tested and approved for transfer. The curved arch face allows load to be transferred longitudinally along the sheet pile and have the cellular structure act as an entire unit rather than a single sheet pile acting in bending as a Z section performs

8.2.2 Flood Event Inspection Patrols

Floodwalls shall be patrolled hourly when the floodwaters rise. Inspectors shall look for evidence of sheet pile wall distortion, interlock damage, overtopping, scour, the presence of leaks, seepage through the wall, boils, etc. Areas of obvious and significant distress to the wall shall be further evaluated and, if determined to be necessary, temporarily repaired as soon as possible.

8.2.3 Post Flood Event Operations

Refer to Section 10 for maintenance and inspection requirements. The floodwall shall be inspected for distortion to the sheet piles, damage to the interlocks, and damage or undesirable movements along the alignment.

If such observations are made during the post event inspection, action shall be taken to schedule repairs, maintenance, or other activities identified in the post-flood event inspection report. The checklists attached to this document shall be completed as part of the post-flood event inspection for the various project components and filed as a part of the record for that event.

9 Emergency Operations

9.1 General

Emergency operations that are most probable due to the environment associated with a flood control and navigation gate are total and complete failure of both utility and mobile back-up electrical power and vessel collisions that substantially weaken or damage the structure, and/or cause an oil spill and attendant potentially dangerous surface water fires. The following sub-sections layout the procedures required to address these emergencies at the time of occurrence for electrical power failure and oil spills.

Surface water fires due to fuel spills are issues that SJAFCA must address with the U.S. Coast Guard at (xxx) xxx-xxxx.

In case of human loss of life or injury due to collision, explosion, or fire, the Search and Rescue Office of the U.S. Coast Guard should be notified at (xxx) xxx-xxxx.

9.2 Floodgate Failures

9.2.1 Opening or Closing Gates Manually

Emergency Procedure for By-passing Gate Machinery

Place "Hand-off-Auto" in "Hand" Position (if applicable)

- Procedure for emergency operation of the floodgates
    - Assess the marine traffic situation on the canal. Notify the Coast Guard of imminent opening by telephone and distribute navigation bulletin via fax from business office of SJAFCA.

- Visually inspect the actuators to verify that the equipment appears to be in serviceable condition.
- Check for foreign items left on any of the equipment such as tools, rags, etc.

- Operate latch bars
  - Engage manual operation of the latch actuators via the interlock on the back of the actuator motor.
  - Attach a portable actuator or drill to each latch actuator and fully unlock the latch bars.
  - Confirm that the latch bars are fully unlocked and that the ends of the bars are flush with the receiver on the near gate.
  - Disengage manual operation of the latch bars.
  - Note: locking the latch bars is the same procedure but the manual operator turns in the opposite direction. The bar taper will extend just beyond the receiver on the far leaf when fully locked.
- Operate floodgates
  - Confirm the latch bars are unlocked at end of each gate.
  - Engage manual operation of the gate actuators via the interlock on the back of the actuator motor.
  - Attach a portable actuator or drill to each gate actuator in turn and fully close/open gates.
  - Confirm that the gates are fully seated on the bumper blocks if open or fully seated on the seals at the miter ends if closed.
  - Disengage manual operation of the gate operators.
  - Lock the latch bars following the procedure above.

9.2.2 Securing Gates in Closed Position during Flood Events

In the event of an electrical power failure requiring the gates to be closed by external means, i.e. a service boat and/or winches, the gates shall be lashed together using marine-type mooring rope or wire rope to ensure that a reversal of hydraulic head on the gates cannot open or separate the miter gates once they have been closed; this procedure will serve as a back up to the latching system. The gate operators should be aware that the current in the canal may cause the closing speed for the miter gates to accelerate and slam against the adjacent gate or gate stops and harm the gate and/or machinery. It is imperative the gates be operated under a slack tide to avoid structural damage due to slamming unless there is a case of extreme emergency.

Prior to operating the gates, the latches must be pulled by auxiliary means. If the latches cannot be operated, the latch assemblies must be unbolted from their base plates and removed from the gate. The gate operators must also be disconnected from the gates and pivoted such that they do not interfere with gate operation.

9.2.3 Closing Gates for Oil Spills

In the interest of preserving the water quality in Smith Canal and the San Joaquin Delta, it is prudent to temporarily close the floodgates and immediately notify the Marine Safety Office of the U.S. Coast Guard Command Center at xxx-xxx-xxxx that navigation has been closed on Smith Canal due to an oil spill. Other contact lists are provided in Section 13 - Notification of Distress.

9.3 Documentation

All emergency actions taken to protect the project and related features shall be reported by date, time of day, nature of emergency, nature of required action, authorities notified, assistance provided, and results achieved to counteract the incidents. All injuries to operating personnel shall be attended to immediately and referred to Emergency Medical Services in the City of Stockton.

9.4 Sources of Assistance

Fire

Police

Medical

Marine Safety

10 Maintenance and Routine Inspection

There are several local agencies that will be responsible for maintenance for various project features including SJAFCA, San Joaquin County, the City of Stockton, and RD 1614. Figure 5 below details the maintenance jurisdiction for these agencies.

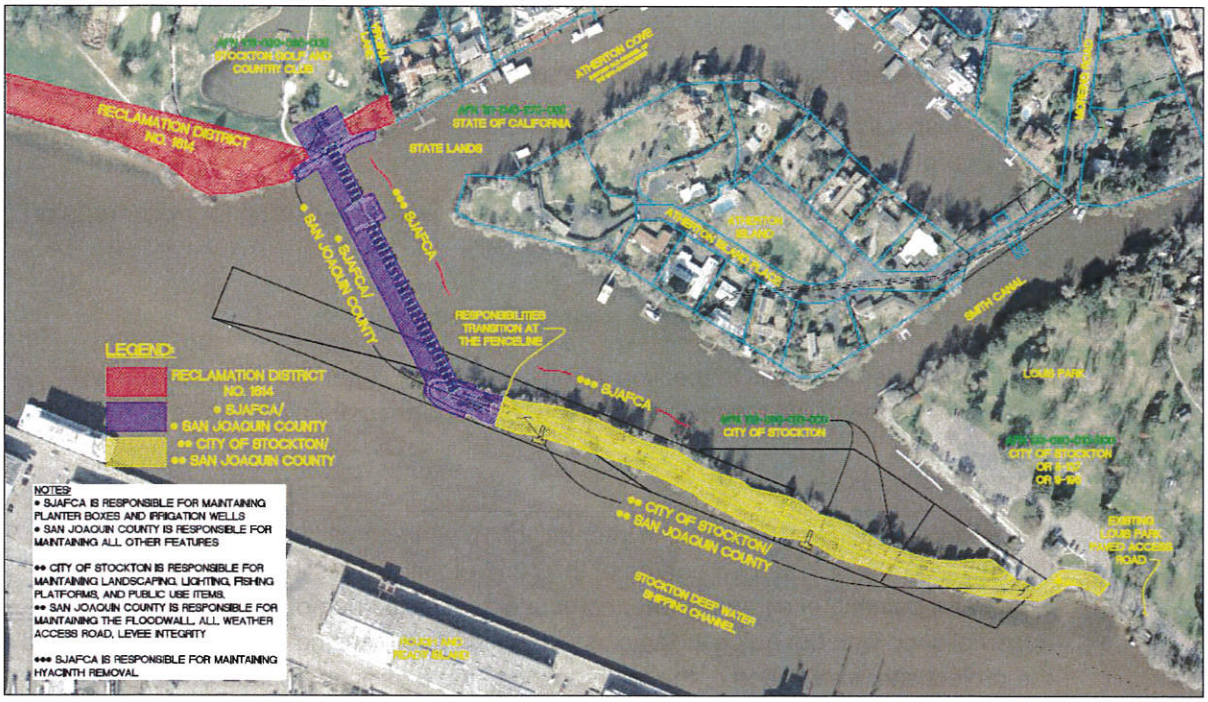


Figure 5. Smith Canal Gate Maintenance Jurisdictions

10.1 Floodgate Component Maintenance

The floodgate is comprised of two steel miter gates hinged to a cast-in place concrete monolith control structure. This floodgate structure blocks flood waters that would naturally flow into Smith Canal. Regular maintenance is required to ensure that the structure performs as expected for its intended purpose. Joint inspections of the exposed structure and machinery shall be made every four years. Major dewaterings shall be made every 15 years. Inspections shall be attended by representatives from SJAFCA, DWR, and the USACE. SJAFCA shall be responsible for coordinating closures to marine traffic with the USCG.

10.1.1 General

The floodgate requires routine inspections of the concrete structure, miter gates, and machinery. This includes features such as joints, walls, bottom, gate recesses, sill, gate frames, gate members, skin plates, gudgeon and pintle assemblies, rack teeth, rubber seals, and any other structural component requiring unwatering for access. Repairs, maintenance, and inspections will include, but not necessarily be limited to:

- Sandblasting of fabricated steel structures and components.
- Painting.
- Replacing the rubber seals.
- Complete cleaning of the floodgate chamber including removal of debris and all foreign matter.

- Inspection of hinge and gudgeon assemblies.
- Any other underwater work that may be necessary.
- Inspection of above water components such as gear teeth, walkways, lift eyes, protection plate.

The public must be notified 120 days in advance of floodgate closing for major repairs and unwatering.

10.1.2 Floodgate Unwatering and Major Repairs

Routine maintenance and inspection before, during, and after the rainy season will dictate the scope of the major repair work to be performed during an unwatering.

Unwater and Re-water

The gatebay shall be unwatered in intervals of 15 years to allow for a thorough inspection of the submerged portion of the concrete structures and sector gates; and repair and painting of all underwater components. Unwatering of the gatebay will be accomplished with the gates in the closed position and by using steel stop logs located at the project site. Installation of the maintenance stop logs is addressed in the Stop Logs section.

Allowable Water Elevations

For unwatering purposes, the gatebay has been designed for maximum water levels of elevation 12.0 NAVD on the DWSE side and elevation 4.0 NAVD on the protected side (Smith Canal Side). Water levels shall be monitored on both sides of the gatebay to ensure that these water elevations are not exceeded during unwatering operations. Re-watering of the gatebay will be required sufficiently in advance of these water elevations being attained. Since the water levels in the Harvey Canal are completely dependent on prevailing climatic conditions in the area, unwatering during the summer season (May-September) will be most favorable.

Allowable Rates of Unwatering

Once the stop logs have been satisfactorily installed to form a temporary dam that holds back the water on the DWSC and Smith Canal sides of the gatebay, the unwatering can begin with a rate not to exceed an average rate of one foot per hour.

Method to Seal Gaps between Stop Logs

The stop logs for the gatebay are addressed under the Stop Logs section; however some seepage between stop log joints might occur. If during the unwatering process, the rate of seepage into the gatebay is unusual and noticeable, unwatering shall cease until the situation is investigated. The operator shall survey all leaks and determine whether sealing of existing gaps between needles joints with oakum is feasible. Oakum is a fibrous material that is fed into gaps to seal openings. Either reseating the stop logs or a diver may be required to apply the Oakum to the poorly sealed joints. Once the gaps are filled with oakum, the unwatering operations may again be initiated. Some seepage can

be expected and sump recesses are provided in the gatebay base slab to collect water for removal using small pumps.

Rates of Re-watering

The maximum re-watering rate shall not be more than two feet per hour.

Procedure if Stop Logs Should Overtop

In the event that rising tides on the DWSE side of the gatebay is predicted to cause overtopping on the DWSE side stop logs, all work inside the unwatered gatebay shall shut down and equipment secured until the tides recede.

Stop Logs

Stop logs are the chosen concept for maintenance unwatering as opposed to needle girders and beams. This unwatering system is to be a contractor-designed and -provided item to provide a method to be able to unwater the gatebay structure for repairs. The system should be designed and fabricated to be self-supporting/sealing and will be stored on site. The stop logs should provide protection up to EL XX. The stop logs can be lifted into place by a barge-mounted crane or by a track crane atop the adjacent floodwall. Divers shall be available when installing the stop logs to sweep clean the recesses and ensure proper seating of the seals in between the stop logs is achieved.

Measurements

Six Settlement Reference Markers (SMR) will be added to the top of the gatebay walls during construction. Additionally, piezometers will be installed on the DWSE and Smith Canal sides of the gatebay structure…. (yet to be determined). A plan showing locations of the SRMs will be attached to Appendix C when available. Measurements shall be taken prior to each inspection. Survey data shall include the control benchmark, date of survey, temperature and weather conditions, and the SRM elevation. Additionally, channel profiles and cross sections as indicated in Appendix C shall be taken by USACE.

Miter Gate Lifting, Removal and Replacement

Miter gate weight and center of gravity shall be calculated and provided with the shop drawing submittal and approved by the engineer.

The proposed lifting lugs and lifting plan for the miter gates shall be provided by the contractor and approved by the engineer.

Repair of Damage

Damage noticed on the gates during routine annual inspections, gate operation check during the rainy season, and following a storm must be documented and a damage assessment with respect to gate operability made. A structural engineer shall make an assessment in consultation with operations personnel. If the damage is discovered during the rainy season, a decision must be made on whether the gate(s) should be repaired immediately or if the repair can wait until the end of the rainy season. This

decision will be based on the extent of the damage and likelihood that the damage could worsen.

Acceptable repairs to underwater or above water damage while the gate(s) is/are in the open position can be done when damage is small and repairs take no more than two days to complete. If the extent of the damage dictates removal of the gate during an approaching storm, a decision will be made on the best course to follow under the conditions. A structural engineer shall always approve all modifications and/or repairs to the floodgate structure whether temporary, emergency, or permanent and oversee work done on critical components.

Pintle and Gudgeon Assembly Refurbishing

The pintle assembly shall be refurbished after gate removal. Refurbishment shall consist of measurement of the existing pintle cup and pintle puck radii. If either of these exceeds allowable manufacturer's tolerances, they shall be replaced and re-finished per manufacturer's recommendations. If the measurements are within manufacturer's tolerances, the surface of the pintle cup and pucks shall be inspected. If the surfaces exceed the finish required by the manufacturer for proper operation, the pintle pucks and cup surfaces shall be re-finished. If re-finishing causes the fit between the pucks and cup to exceed recommended manufacturer tolerances, the pucks and/or pintle cup shall be replaced.

The gudgeon assembly shall be disassembled and inspected. The inspection shall determine the fit between the gudgeon pin and bushing. If the fit exceeds manufacturer's tolerances, the bushing shall be replaced. If the fit is within tolerance, the bushing surface finish shall be inspected. If the finish is not within manufacturer specifications, the bushing may be replaced or it may be operated as a lubricated bushing with the addition of a NGLI Grade 2 grease via the grease ports located on the outside of the gudgeon hub if manual lubrication of the gudgeon pin is selected rather than replacement of the bushing. The gudgeon bushing shall be inspected prior to operation in order to ensure proper lubrication.

Required Equipment for Unwatering and Re-watering

- Two hundred-fifty (250) ton crane barge capable of lifting 350,000 pounds at a 45 degree angle with a 150 foot boom.
- Two (2) welding machines, accessories, and grinders.
- Two (2) 250 psi air compressors.
- Unwatering pumps. (Four (4) 10-inch diameter or three (3) 12-inch diameter for unwatering and two (2) 3-inch diameter sumps for controlling minor leakage.)
- Complete set of diving equipment.
- Work lights, barricades.
- Sandblasting and painting equipment.
- Tugboat, dinghy.
- Rigging equipment – cables, slings, shackles, blocks.

- Night time lighting equipment.

Spare Parts Inventories

- Gate Seals – two (2) sets of vertical rubber seals; two (2) sets of bottom rubber seals at gate sill.
- Replacement limit switches for latch and gate position sensing.
- CADD and As-Built Drawings (not available yet).
- Procurement Specifications (not available yet).
- Actuator starters: one (1) set of contacts and one (1) coil for each starter.
- Indicator lights: six (6) indicating lights for each type used.
- Control relay: one (1) control relay for each type used.
- Navigation light: one (1) spare assembly for each type used included one lens of each color and size used.
- Gauge light: one (1) spare assembly.

Painting

Inspect the above water section of the gate prior to the rainy season every year for corrosion and repair where necessary, sandblasting and cleaning the metal and applying the above mentioned coating system. This touch-up painting may be performed with the gate in the open position. The floodgate should be completely repainted every ten to fifteen years during the dry season when in the dry (unwatered).

10.1.3 Floodgate Components

The floodgate is comprised of numerous steel and concrete elements that function together to block floodwater from the Delta into Smith Canal. The floodgate is founded on 36" diameter steel pipe piles tipped at EL -90.0 (82 feet long) that embed 5 feet into the 6 foot thick reinforced concrete base slab. A concrete sealing corbel protrudes vertically as a "lip" and serves as an emergency gate stop (to prevent gate damage if closed under flow with velocities higher than 2.5 feet per second) and also provide a positive seal closure. Concrete gatebay walls extend up from the base slab 22 feet and vary from 6 feet thick in the main sections to over 10 feet thick at the haunched sections near the hinge points. Each steel miter gate, as described above, is made up of seven girders that are approximately 3 feet deep. The miter gate leaf components, including the actuator and gudgeon connection assemblies, and all associated bolted connections and anchor bolts, are made of either painted or galvanized carbon steel, except for the seal assembly components and the female miter block, which are made of stainless steel. The steel skin plate is ½ inch thick and covers the entire upstream floodside (DWSE). Fenders and rub rails will be installed on the downstream or protected (Smith Canal) side for vessel protection with the gates in the open position. Steel walkways provide access for operation and maintenance activities for both sides of the gate structure. The miter gates are connected at the top and bottom respectively with gudgeon and pintle

assemblies that are described in detail above in Section 8.1.1 - Description and Record Keeping.

10.1.4 Floodgate Operating Machinery

ACME Screw Actuators and Dampening Mechanism

Maintenance of electro-mechanical operators to be performed by the manufacturer per manufacturer requirements as noted in Appendix D - Submittal Data.

Limit Switches

Confirm proper operation of switches at the correct point of movement for the gate and latches. Ensure all wiring connections are not loose.

10.1.5 Floodgate Electrical Equipment

Lighting

- Visually inspect light fixtures for operation when energized.
- Verify power is available at fixtures that do not operate.
- Replace lamps/LED arrays in fixtures that do not operate when energized.
- Test and maintain fixtures as recommended by the manufacturer and per information contained in Appendix D - Submittal Data.

Electrical Distribution

Test equipment as recommended by the manufacturer. Manufacturer's recommendations can be found in Appendix D - Submittal Data.

Control Stand

- Perform full test of gate and latch operation and interlocking annually. For each gate and corresponding latch:
    - With the gate in the fully open position and latch fully unlocked:
        - Temporarily disconnect the latch fully unlocked limit switch input.
        - Operate the control stand as if the gate were to be closed. Verify control logic is correct.
        - Reconnect the latch fully unlocked limit switch input. Verify control logic and indication are connect.
        - Simulate a gate fully closed input with a jumper wire across the gate fully closed limit switch input terminals in the control cabinet.
        - Operate the control stand as if the gate were to be closed. Verify control logic is correct. Once verified, remove jumper.
        - Temporarily disconnect the gate fully open limit switch input.

        - Operate the control stand as if the latch were to lock. Verify control logic is correct.
        - Reconnect the gate fully open limit switch input. Verify control logic and indication are correct.
        - Simulate a latch fully locked input with a jumper wire across the latch fully locked limit switch terminals in the control cabinet.
        - Operate the control stand as if the latch were to lock. Verify control logic is correct. Once verified, remove jumper.
    - With the gate in the fully open position and latch fully locked:
        - Temporarily disconnect the gate fully open limit switch input.
        - Operate the control stand as if latch were to unlock. Verify control logic is correct.
        - Reconnect the gate fully open limit switch input. Verify control logic and indication are correct.
        - Simulate a latch fully unlocked input with a jumper wire across the latch fully unlocked limit switch terminals in the control cabinet.
        - Operate the control stand as if the latch were to unlock. Verify control logic is correct. Once verified, remove jumper.
    - With the gate in the fully closed position and latch fully unlocked:
        - Temporarily disconnect the latch fully unlocked limit switch input.
        - Operate the control stand as if the gate were to open. Verify control logic is correct.
        - Reconnect the latch fully unlocked limit switch input. Verify control logic and indication are correct.
        - Simulate a gate fully open input with a jumper wire across the gate fully open limit switch terminals in the control cabinet.
        - Operate the control stand as if gate were to open. Verify control logic is correct. Once verified, remove jumper.

PLC Components

Maintain PLC components in accordance with the manufacturer's recommendations. Recommendations can be found in Appendix D - Submittal Data.

Cameras and System Components

Maintain camera system components in accordance with the manufacturer's recommendations. Recommendations can be found in Appendix D - Submittal Data.

Navigation Aids

Maintain navigation signaling equipment in accordance with the manufacturer's recommendations. Recommendations can be found in Appendix D - Submittal Data.

10.2 Floodgate Component Routine Inspection

10.2.1 Inspection Records and Record Keeping

Record keeping is a basic business practice and is applicable to all facilities. Complete, well organized records can help ensure proper inspection of facilities and equipment. Record keeping must be coordinated with all applicable governmental agencies and integrated with the development and inspection of the facility. Records shall include as a minimum:

- The date, exact place, time, name, description of activity, and observations.
- Name of inspector(s) and crew, where applicable.
- Analytical information as to the work done, repair, replacement, tests, and regular maintenance/inspection.
- Electronic photographs of deficiencies and remedial actions taken.
- Classification of event that prompted activity such as hurricane, regular maintenance/inspection, mobilization, reopening, gate closure/opening, or repair.
- Type of action taken for the applicable activity, whether safety, preventive, remedial, or replacement.

10.2.2 Gate Operating Machinery

- Visually inspect gate and latch operators before each operation.
    - Check for debris and deformation of operators or supports.
    - Check for corrosion or paint failure on operators or supports.
- If not operated otherwise, perform test operations of the gates in compliance with the minimum operating time frames noted in Section 8.1.2 Preparation for Operation.
    - Confirm smooth operation of latch and gate operators.
    - Confirm proper operation of brake releases on gate and latch operators.
    - Confirm operation of emergency actuator input on gate and latch operators by attaching and operating both latch and gate operators with emergency actuator.
    - Test interlocking on each operator with emergency actuator attached to confirm that internal motor on actuator cannot be operated with emergency actuator attached. Prepare this test such that the emergency actuator and personnel are not damaged or injured. The best method may through the use of a separate hex nut of the size of the auxiliary drive on the actuators that can be placed in the drive to engage the interlocking switch.

10.2.3 Miter Gates – Gate Structure

SMITH CANAL FLOODGATE
INSPECTION AND MAINTENANCE SCHEDULE
EQUIPMENT Gate Structure REF. NO.
SPEC. PAR. DWG. NO.
MODEL NO. SER. NO.
LOCATION Each Miter Gate
MANUFACTURER/SUPPLIER

MONTHLY DURING RAINY SEASON:

Make a careful inspection of the entire assembly of the gudgeon assembly for looseness or abnormal conditions. Examine the gudgeon anchor column and turnbuckles for movement. Examine gate casting for indications of movement and condition of bolts. Visually inspect mitering devices for malfunctioning or damage. Examine for components misalignment, excessive wear, and loose or broken fasteners.

EVERY FOUR YEARS:

Make a detailed inspection of the gudgeon assembly, pintle assembly, and seals for signs of wear, looseness, damage, deterioration, and misalignment. Inspect protective coating. Use a diver for underwater inspection when necessary. Make a test operation of the gate, observing for indication of movement of the pintle assembly on its base casting. Take elevations of the gate in both open and closed positions and compare with previous readings. Visually inspect pins for wear, looseness, damage, or other abnormal conditions. Examine seals, collars, bearings, pins, and bolts. Examine structural backing for signs of cracking or failure. Inspect jacking pads. Inspect diagonals for looseness.

Inspect all welds for signs of cracking.

Inspect members for misalignment and skin plates for impact damage. Repair or replace as required.

Inspect rubber water seal for damage and correct any found deficiencies.

Thoroughly hand or machine clean all exposed chipped or blistered paint spots. Sand and repaint all spots that show signs of corrosion.

UNSCHEDULED:

A general inspection shall be performed by the operator at the time of each operation to ensure that the gates and controls are operating properly and that recesses are clear. Make inspection by diver of underwater portions of gate. Check condition of pintle assemblies, seals, sills, etc.

SMITH CANAL FLOODGATE					
INSPECTION AND MAINTENANCE SERVICE RECORD					
EQUIPMENT: Gate Structure				**REFERENCE NO.**	
DATE	**FREQUENCY**	**COMPONENT DESCRIPTION**	**REMARKS**	**SR**	**SIGNATURE**
	M	Hinge pin assembly wear, misalignment, fastener	Inspect/repair/replace		
	4Y	Hinge pin, pintle assembly	Check wear/deterioration/ movement/ seals/bolts		
	4Y	Existing gate elevation, movement	Record/compare		
	4Y	Structural backing	Check for cracking/repair		
	4Y	Jacking pads	Inspect		
	4Y	Diagonals	Check for looseness		
	4Y	Weld cracking throughout	Inspect		
	4Y	Members and skin plates	Check misalignment/repair/replace		
	4Y	Rubber water seal damage	Inspect/repair		
	4Y	Structure corrosion/blisters/chips	Check/re-coat affected areas		
	U	Gates and controls operation, clearance for operation	General inspection by gate operator each time prior operating gates		
	4Y	Fender system	Inspect/repair		
	5Y	Skin plate	Inspect/touch-up with paint		
	15Y	Unwater and re-water	Floodgate unwatering on major repairs		
FREQUENCY = W - WEEKLY, M - MONTHLY, Q - QUARTERLY, A - ANNUALLY, U - UNSCHEDULED, 4Y - FOUR YEARS, SR - SPECIAL REPORT IN FILE, SM - SEMI-ANNUALLY, 5Y - FIVE YEARS					

10.2.4 Access and Walkway Platforms

The floodgate and floodwall are bridged by galvanized steel access platforms and walkways for safe operation and maintenance. The platforms are framed with channel and angle members with steel grating clip bolted to the framing. Railings are comprised of HSS tube members that are welded to the main floor channels. All walkways, railings, and stairways should be checked for loose panels or connections. These represent potential safety issues should regular inspection and maintenance of these items not be performed.

10.2.5 General Surveillance of Floodgate and Adjacent Features

Surveillance of the structure shall be performed before and after the rainy season. Specifically, surveillance of the structure shall be performed after a flood event. The interfaces and tie-ins between the floodwalls and the floodgate structure shall be inspected for damage and leakage. The gate structure shall be inspected for damage and leakage. The gates shall be inspected to determine if there is flow of water through the gates due to damage or misalignment of the gates, missing gate seals, or a problem with or obstruction at the gate sill. It is expected that the primary hindrance with the gate sill will be that silt settles into the gate bays as well as the possibility of other debris going into the gate frame and recesses. Surveillance of the access walkway platforms shall also be performed. Surveillance of the fence and gates that surround the site shall be performed to identify damage. Damage to the fence or gates becomes a public safety issue to prohibit access to the site by unauthorized personnel. Surveillance of the general site and grounds shall be performed to maintain a safe site and provide a clean appearance to the public.

10.2.6 Electrical System

SMITH CANAL FLOODGATE					
INSPECTION AND MAINTENANCE SERVICE RECORD					
EQUIPMENT: Electrical Components			REFERENCE NO.		
DATE	**FREQUENCY**	**COMPONENT DESCRIPTION**	**REMARKS**	**SR**	**SIGNATURE**
	M	10 hp electric actuator motor	Test for operation		
	M	3 hp electric actuator motor	Test for operation		
	M	Control system	Inspect for loose wiring, inoperable switches, inoperable indicator lights, etc.		
	M	Electrical connections	Inspect for loose wires, blown fuses, etc.		
	A	Panelboards	Inspect latches/lock visual condition and repair/replace as needed		
	4Y	Motor starters	Inspect visual condition and repair/replace as needed		
	U	Circuit breakers	Inspect visual condition and repair/replace as needed		
FREQUENCY = W - WEEKLY, M - MONTHLY, Q - QUARTERLY, A - ANNUALLY, U - UNSCHEDULED, 2Y - TWO YEARS, 4Y - FOUR YEARS, SR - SPECIAL REPORT IN FILE, SM - SEMI-ANNUALLY					

Lighting

- Visually inspect lamps/LED arrays for dark spots or other signs of imminent failure.
- Visually inspect fixture housings for signs of corrosion.
- Inspect fixtures and components as described in the manufacturer's maintenance manual. See Appendix D - Submittal Data.

Electrical Distribution

- Visually inspect panelboards and transformer enclosures for signs of corrosion.
- Visually inspect terminals and bus bars for signs of warping, discoloration, or excessive heating.
- Visually inspect terminals and bus bars with an infrared scanner to identify any hot spots.
- Inspect panel and transformer components in accordance with the manufacturer's maintenance data. See Appendix D - Submittal Data.

Control Cabinet and Control Stand

- Visually inspect enclosures for signs of corrosion.
- Visually inspect relays for discoloration or other signs of impending failure.
- Visually inspect indicator lights for discoloration or other signs of impending failure.

PLC Components

- Visually inspect PLC components in accordance with the manufacturer's instructions. See Appendix D - Submittal Data.

Camera System Components

- Inspect camera system equipment components in accordance with the manufacturer's instructions. See Appendix D - Submittal Data.

Remote Monitoring Components

- Inspect remote monitoring system equipment components in accordance with the manufacturer's instructions. See Appendix D - Submittal Data.

10.2.7 Navigation Aids

- Visually inspect signage for corrosion.
- Inspect navigation signaling lighting/equipment components in accordance with the manufacturer's instructions. See Appendix D - Submittal Data.

10.3 Floodwalls

10.3.1 Description

The floodwall consists of a cellular structure with diaphragm cells filled with granular material extending from Dad's Point to the Stockton Golf and Country Club on the north bank of the San Joaquin River. The sheets used for the cellular structure will have a top of wall elevation of 15.0 feet and a bottom of wall elevation of -70.8 feet. The sheet pile tie-ins at Dad's Point to the south and Stockton Golf and Country Club to the north will both be lined with RSP to minimize potential future erosion.

10.3.2 Inspection Requirements

See Floodwall Inspection Checklist.

Inspections shall be made at least twice a year, preferably prior to the start of flood season and immediately following each major flood event. Particular attention shall be given, where applicable, to the following: condition of the sheet pile and adjacent granular fill materials, presence of sinkholes or other signs of settlement adjacent to the wall, presence of woody vegetation, and apparent seepage through the wall.

The inspection of the sheet piles shall include the recording and monitoring of corrosion, section loss, distortion, distress, and misalignment. Reductions to wall thicknesses shall be recorded along with the identifying location and size in order for future inspections to check against. Distortions/distress shall be measured and recorded. It is recommended that corrosion, section loss, and distortions be photographed.

If inspection data indicates that any of the above are progressing, further investigation by a registered engineer shall be performed. Areas of obvious, significant distress shall be further investigated, and all signs of distress at locations where accessories are (or were) attached to the floodwall shall be recorded and photographed. Repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be in accordance with as-built drawings and specifications by methods acceptable in standard engineering practice.

Floodwall Inspection Checklist

Inspected by_____Date _____

Weather_____

Item	OK	Needs Attention	N/A	Wall Station/Recommendation
Wall Surface:				
Discoloration/staining/graffiti?				
Any corrosion present?				
Any section loss present?				
Any impact damage?				
Any non-impact related distortion?				
Any other signs of distress?				
Wall Stability:				
Visible indication of misalignment?				
Any indication tilting, sliding, or settlement?				
Erosion at wall evident?				
Signs of overtopping?				
Visible separation of joints or interlocks?				
Any leakage evidence?				
No Vegetation Zone:				
Wet areas or seepage?				
Observed ruts or holes?				
Any ground settlement?				
Brush or trees present?				
Observed erosion gullies?				
Trash or debris present?				
Animal burrows?				
Encroachments?				
RSP areas intact?				
Other:				

10.3.3 Maintenance Requirements

All brush, trees, or other vegetation shall be removed within the floodwall. Fill within the floodwall shall be maintained to the design grades and section by correction of low areas caused by slides, settlement, or erosion. It shall be verified that there are no encroachments into the right-of-way that might adversely affect the structure or compromise its intended function. All debris or trash that has accumulated adjacent to the floodwall shall be removed on a regular basis. It shall also be verified that no fires are being built near the wall.

The alignment of the floodwall, both horizontally and vertically, shall be visually checked on a regular basis. If any type of movement is noted, the floodwall shall subsequently be surveyed. Survey results should be compared to as-built documents to determine the magnitude of any perceived movement. Movements considered significant by inspection and/or supervisory personnel will require immediate investigation to determine the cause.

It shall be verified that the sheet piles have not undergone significant corrosion or distortion to an extent that it might begin to affect the integrity of the floodwall or its water-tightness. All graffiti shall be removed from all surfaces, and painted surfaces shall be touched up on an as-needed basis.

10.4 Dad's Point Levee

10.4.1 Inspection

Inspections shall be made prior to the beginning of the flood season, immediately following each major flood event or at intervals not exceeding 90 days, and such intermediate times as may be necessary to ensure the best possible care of the levee.

See EXHIBIT A for the Levee inspection checklist.

Each conduit, pipe, or culvert that passes through a levee shall be inspected every five years using video technology. Repairs found necessary by such inspections shall be undertaken promptly. All repairs shall be in accordance with the as-built drawings and specifications, and accomplished by methods acceptable in standard engineering practice.

10.4.2 Maintenance

All levee components shall be maintained in a good state of repair and in sound condition. Particular attention shall be given to grass maintenance and grass cutting.

Standards for accomplishing the above requirements are as follows:

- The grass shall be maintained to a maximum height of six inches by mowing at least every 30-days from April to October.
- The entire levee shall be mowed to the limits of the 15 feet vegetation-free zone, to the outer edge of drainage swale, or the limit of the permanent easement, whichever is the limiting distance and where it is practical to do so.
- The embankment shall be maintained to the as-built grade and section by the repair of washes, slides, and settlements.

- All brush, trees, or other undesirable woody vegetation shall be removed from the levee embankment and the subgrade material, topsoil, and grass shall be restored per the levee specifications.
- The levee shall be maintained free from all types of animal burrows. The animals shall be removed and the subgrade shall be replaced with compacted material. The topsoil and grass shall then be restored. If active animal burrows are present, an animal abatement program shall be implemented to remove burrowing animals from the levee and to prevent them from returning. Rodent control techniques involving fumigation, bait stations, bait broadcasting, or trapping have proven to be effective in certain situations. However, any chosen course of action must conform to local and state requirements.
- Unauthorized encroachments (excavations, structures, recreational vehicular traffic, or other obstructions) within the project easement area shall be removed or handled appropriately.
- The levee horizontal and vertical alignment shall be checked visually. If movement is noted, the levee shall then be surveyed. The survey results shall be compared to the as-built documents. Movements considered significant by inspection and/or supervisory personnel require immediate investigation to determine the cause.
- Conduits, culverts, and pipes of all diameters, dimensions, and materials that pass through any levee must be assessed using video technology. A structural or geotechnical engineer must review the latest condition assessment reports (video camera inspection report) for the levee system to see if any conditions or performance issues are noted that would reduce the engineer's confidence in the levee system.

10.5 Riprap Scour Protection at Tie-ins

10.5.1 Inspection

Inspections shall be made prior to flood season, immediately following moderate flood events as indicated by NWS river forecasts and warnings, or at intervals not exceeding 180 days. Additionally, bathymetric surveys of the RSP shall be performed every 5 years. During inspections, any indications of riprap being dislodged or scoured shall be noted and the defective areas promptly repaired. All repairs shall be in accordance with the as-built drawings and specifications by methods acceptable in standard engineering practice.

10.5.2 Maintenance

All brush, trees, or other woody growth shall be removed from the riprap. Any indications of dislodged or scoured riprap shall be noted and the defective areas promptly restored to project design conditions.

10.6 Recreational Platforms

10.6.1 Inspection

Inspections shall be made prior to flood season, immediately following moderate flood events as indicated by NWS river forecasts and warnings, or at intervals not exceeding 180 days. During inspections, any indications of pier scour or platform weakening shall be noted and the defective areas promptly repaired. All repairs shall be in accordance with the as-built drawings and specifications by methods acceptable in standard engineering practice.

10.6.2 Maintenance

All brush, trees, or other woody growth shall be removed from under the platforms. Any indications of pier scour or platform weakening shall be noted and the defective areas promptly restored to project design conditions.

11 Periodic Inspections and Instrumentation Evaluations

11.1 Periodic Inspections

11.1.1 General

Periodic inspections are required for those civil works structures whose failure or partial failure could jeopardize the operational integrity of the project, endanger the lives and safety of the public, or cause substantial property damage. Inspections shall be conducted to evaluate the structural stability, safety, and operational adequacy of the current status for the project. The inspections and evaluations shall be supported by an appropriate instrumentation program that provides the timeliness and level of accuracy needed for evaluations under all operating conditions.

11.1.2 Qualifications of the Inspection Team

Inspection team personnel will consist of individuals qualified by experience in the design, construction, and operations of the project, and of individuals with appropriate specialized knowledge in structural project, and of individuals with appropriate specialized knowledge in structural, mechanical, electrical, hydraulic, embankment design, geology, soil mechanics, concrete materials, and construction procedures. As a minimum, the inspection team will consist of professional engineers in the following disciplines: structural engineer, mechanical engineer, electrical engineer, and geotechnical engineer.

11.1.3 Pre-Inspection Brochure Content

A technical packet shall be prepared in advance of the periodic inspection to familiarize inspection team members with general system features. The packet should be formatted

to be incorporated into the final Periodic Inspection Report. This packet shall include, but not be limited to, the following:

a. General description of the project location and description of pertinent system features.

b. Vicinity and detailed map of the project.

c. Typical section drawings.

d. Drawings of closure structures.

e. If available, the most recent instrumentation data and/or plots, evaluation, and plan showing the instrumentation location. Where appropriate, cross-sections showing piezometric data shall show design uplift assumptions along with the current pressure line. Plots of piezometric elevation versus river elevation and plots of relief well or drain flow versus pool elevation shall be included.

f. Technical summary of foundation conditions, including any significant seismic sources.

g. Most recent culvert inspection results.

h. Most recent hydraulic and hydrologic information.

i. Summary of any significant issues that arose during construction that might have an impact on the performance of the system.

j. History of system deficiencies.

k. Most recent inspection report. Provide narrative of any special or unusual situations, as needed. Describe deficiencies corrected since the last inspection and past deficiencies not yet corrected.

l. Identification of fracture critical members.

m. Description of major flood events and system performance during those events.

n. Evaluation of design criteria as described in the Basis of Design Report (BODR) in Appendix A.

o. Federal and/or non-federal responsibilities for Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRRR) including annual O&M cost.

p. Emergency Action Plan.

q. Periodic Inspection Checklist.

r. Any approved variances or waivers that have been approved.

The pre-inspection brochure packet shall be completed and distributed to inspection team members at least 30 days prior to the inspection date.

11.1.4 Report Content

The Periodic Inspection Report shall present the results of each system inspection. The initial report shall provide a general system description and present the results of the inspection. Reports of subsequent inspections shall be supplementary to the initial report and only include the results of the inspection.

11.1.5 Report Format

The reports will be numbered sequentially, i.e., Report No. 2 would describe Periodic Inspection (PI) number 2. Specific details related to the publication of the report are as follows:

a. Text: All sections and paragraphs shall be numbered and shall be on 8 1/2 by 11 inch paper with sufficient margin on the left side for binding. Reproduction shall be accomplished by any available process with printing done head-to-head, if possible.

b. Drawings: Drawings or plates shall normally be 8 1/2 by 11-inch with sufficient margin on the left for binding. Foldouts normally shall not exceed 11 inches by 17 inches. Drawings and photos shall be included in the text or placed entirely in the appendices. However, any figure or drawing in the text shall support the written material. Sufficient plates shall be included to adequately represent the features of the flood protection system.

c. Binding and Cover: Reports shall have flexible paper or card stock, hidden-hinge covers with fasteners that facilitate removal and insertion of pages and drawings. Also, the name of the preparing agency and the date of inspection shall be shown on the cover.

11.1.6 Initial Periodic Inspection

The initial periodic inspection will be conducted by SJAFCA in cooperation with the USACE. The initial pre-inspection brochure and report should be prepared as noted above and should serve as a guide for subsequent documents and inspections throughout the life of the project.

11.1.7 Subsequent Periodic Inspections

Subsequent inspections will be made at one-year intervals for the following two years, at two-year intervals for the next four years and then gradually extended to five-year intervals if warranted by the results of the previous inspections. When the project is in the five-year cycle, an intermediate inspection of all or some of the features may be warranted. Selection shall be based on consequences of failure, age, and degree of routine observation, a natural event such as a flood, performance record, and history of remedial measures. Intermediate inspections shall also be made of any portion of a project exposed during unwatering that could not be accomplished during the scheduled periodic inspection. Periodic inspections should take place several months prior to the start of the rainy season.

11.1.8 Document Submittals

The pre-inspection brochure shall be furnished to USACE SPK Operations Division, Inspection of Completed Works (ICW) Program Manager 30 calendar days prior to the periodic inspection. Two copies of the draft report along with the electronic file shall be submitted to the ICW Program Manager within 45 calendar days after the periodic inspection. Also, all photographs taken by the inspection team shall be furnished to the ICW Program manager within one week after the inspection. The USACE will review the

report and evaluate the proposed remedial actions for adherence to the LCA. Four copies of the final Periodic Inspection Report along the electronic file shall be provided within three months after the inspection.

11.2 Instrumentation Evaluation

11.2.1 General

An adequate level of instrumentation is needed to monitor and evaluate the structural integrity of the floodgate under operating conditions. The basic considerations of the floodgate's instrumentation program are subsurface settlement and channel scour. Reference bolts have been installed on the top of the gatebay and scour surveys will be taken in both approach channels.

11.2.2 Instrumentation Schedule

Data shall be acquired no sooner than three months prior to the next scheduled periodic inspection. The initial data set and survey layout should be contained in the first Periodic Inspection Report.

11.2.3 Data Evaluation

The tabulation of settlement data will be generated by spreadsheet software and plots of scour surveys should be generated such that numerous surveys, as they become available, are plotted along with the initial survey for comparison. An evaluation of the data taken will be included in the pre-inspection brochure and inspection report. A timely reduction and interpretation of instrumentation data are essential for a responsive safety evaluation of the project. Any distress or significant changes noted during the evaluation process should be immediately brought to the attention of SJAFCA and the ICW Program Manager.

11.2.4 Stage Records for Smith Canal

See Section 4.4.1 - Smith Canal Stage Data for Smith Canal stage-frequency data.

See Section 4.3 - Tides and Currents (Table 1) for typical, observed stage data at the Rough and Ready Island stage gage.

11.2.5 Land Surveys including Canal Bottoms

Monitoring by settlement gages and by land surveying shall be performed on the gate structure and the floodwalls. This is to determine if significant settlement has occurred on these structural elements. The outfall flume, floodwalls, and channel bottoms shall be surveyed to determine if significant settlement has occurred and if the canal bottoms require either dredging, hydraulic sweeping, or riprap replacement. Bathymetric surveys shall be performed using side scan sonar.

11.2.6 Documentation

Reports on the surveillance performed as described in Section 11.1 - Periodic Inspections shall be developed and delivered to the USACE SPK Emergency Operations Division and the Operations Division. Stage and discharge records as described in Section 11.2.4 - Stage Records for Smith Canal shall be delivered to the USACE SPK Hydraulics and Hydrologic Branch, Emergency Operations Center, and the Operations Division. Reports on results of settlement gage readings and surveys obtained as described in Section 11.2 - Instrumentation Evaluation shall be developed and delivered to USACE SPK Emergency Operations Center and Operations Division.

12 Repair, Rehabilitation, and Replacement

12.1 Duties of San Joaquin County

Repair is considered to entail those activities of a routine nature that maintains the project in a well-kept condition. Replacement covers those activities taken when a worn-out element or portion thereof is replaced. Rehabilitation refers to a set of activities as necessary to bring a deteriorated project back to its original condition. Repair, replacement, and rehabilitation actions are to conform to the project as-built plans and specifications unless other arrangements are made with the San Joaquin County Flood Control and Water Conservation District (SJCFCWCD) or the USACE SPK District Commander. These activities are the responsibility of the project sponsor.

Outlines of the maintenance and inspection records to be maintained and be made available for Government inspection are provided. Government inspections will be performed in consultation with SJCFCWCD. The District Commander may update the manual for changed conditions or, if warranted, to correct conditions discovered during inspections. Such updating will be performed in consultation with SJAFCA.

Evidence of distress at this structure must be reported immediately to SJAFCA and the District Commander. SJCFCWCD is solely responsible for the operation, maintenance, repair, replacement, or rehabilitation and to pay 100 percent of the associated project costs.

12.2 Duties of the Federal Government

The SPK District Commander must confirm any distress situation and determine if an engineering evaluation of the condition is required and if remedial measures are required. He must immediately report the conditions through commercial (electronic) channels to the Emergency Management Element and Division and HQUSACE Commanders, and the Director of Civil Works.

12.3 Documentation of Maintenance, Repair, Rehabilitation, and Replacement History

This OMRRR Manual will be updated systematically, at least every ten years and after every major rehabilitation by SJAFCA. The update will consist of, at a minimum, a formal

review, with revisions if necessary. A description of the level of maintenance performed on each system and sub-system, including the benefits gained from tracking specific maintenance measurements, should be included in each update. Four copies of the updated manual along with the electronic file for the manual and revised or new drawings shall be furnished to the ICW Program Manager.

13 Notification of Distress

13.1 Reporting Procedures

Reports of distress found on any part of the floodgate, including floodwalls and levee tie-ins, shall be communicated to the U.S. Army Corps of Engineers (USACE), Sacramento District:

Emergency Management - 916-557-6911

Engineering Division - 916-557-5300

13.2 Distress Signals

A general description of items that indicate distress are:

- Water leaking across the control structure or water leaking through floodwalls and levees. Damage to the floodgates and debris in the gate recesses that would not allow the gates to close properly.
- Erratic movement, binding, excessive deflection, or vibration; frequent power interruptions of electric motors and components; or failure of any mechanical equipment should be reported immediately and inspections by competent professionals should be performed in due time.
- Differential settlement between structural components such as sheet piles, control structure, floodwalls and control structure, and floodwalls and levees. Distress would be indicated by significant cracking of reinforced concrete structural components or unusual vertical or horizontal movement or cracking of abutments.
- Significant wear and tear; differential settlement; damage to fences, gates, or guide walls; or any other indications of potential failure that could inhibit the operation or endanger life and property would constitute distress.

13.3 Documentation

At the completion of the intermediate inspection, a report shall be compiled that indicates any distress issues or problems that were identified. For items that were found to be satisfactory, a statement indicating this shall be made in the report. These reports shall be submitted as described in Section 13.1 - Reporting Procedures above.

13.4 Contact List

13.4.1 San Joaquin County Flood Control and Water Conservation District (SJCFCWCD)

Brandon Nakagawa
Water Resources Coordinator
San Joaquin County Flood Control and Water Conservation District
1810 East Hazelton Avenue
Stockton, CA 95205
(209) 468-3000
bnakagawa@sjgov.org

Eric Ambriz
General Foreman
San Joaquin County Flood Control and Water Conservation District
1810 East Hazelton Avenue
Stockton, CA 95205
(209) 468-3000
eambriz@sjgov.org

13.4.2 San Joaquin Area Flood Control Agency (SJAFCA)

Chris Elias
Executive Director
San Joaquin Area Flood Control Agency
22 East Weber Avenue, Suite 301
Stockton CA 95202-2317
(209) 937-7900
Chris.elias@stocktonca.gov

13.4.3 San Joaquin County Office of Emergency Services (OES)

San Joaquin County Office of Emergency Services (OES)
2101 East Earhart Avenue, Suite 300
Stockton, CA 95206
(209) 953-6200

13.4.4 U.S. Coast Guard

USCG Station Rio Vista
900 Beach Drive
Rio Vista, CA
(707) 374-2871

USCG Sector San Francisco
1 Yerba Buena Road
San Francisco, CA
(415) 399-3547

13.4.5 U.S. Environmental Protection Agency

Region 9 (AZ, CA, HI, NV)
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105
Phone: (415) 947-8000
(866) EPA-WEST (toll free in Region 9)
Fax: (415) 947-3553
Email: r9.info@epa.gov

13.4.6 Port of Stockton Police Department

2201 West Washington Street
Stockton, CA 95203
(209) 946-0246

13.4.7 Stockton Fire Department

Fire Administration
400 E. Main Street, 4th Floor
Stockton, CA 95202
Phone: (209) 937-8801

Battalion Chief on Duty
(209) 464-4650

Station 6
1501 Picardy Drive
Stockton, CA 95203

Station 9
550 East Harding Way
Stockton, CA 95204

Appendices

Appendix A

Activities Plan

July 2, 2019

Appendix B

Local Cooperation Agreement

Appendix C

As-Built Information

July 2, 2019

Appendix D

Submittal Data

Appendix E

Project Photographs

July 2, 2019

Appendix F

O&M Manual for ACME Screw Actuator

Appendix G

O&M Manuals for Electrical Components

July 2, 2019

Appendix H

Standing Instructions for Water Control Manager

Appendix I

List of Acronyms

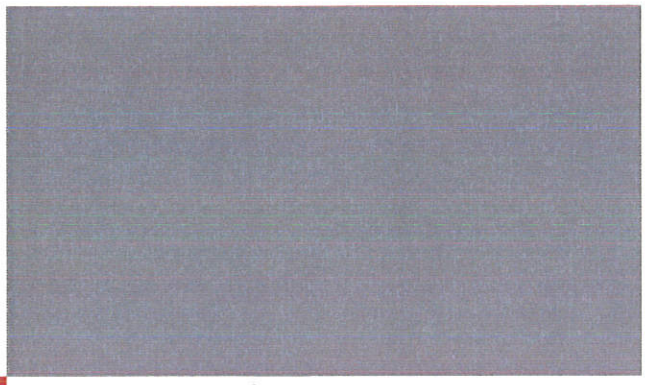
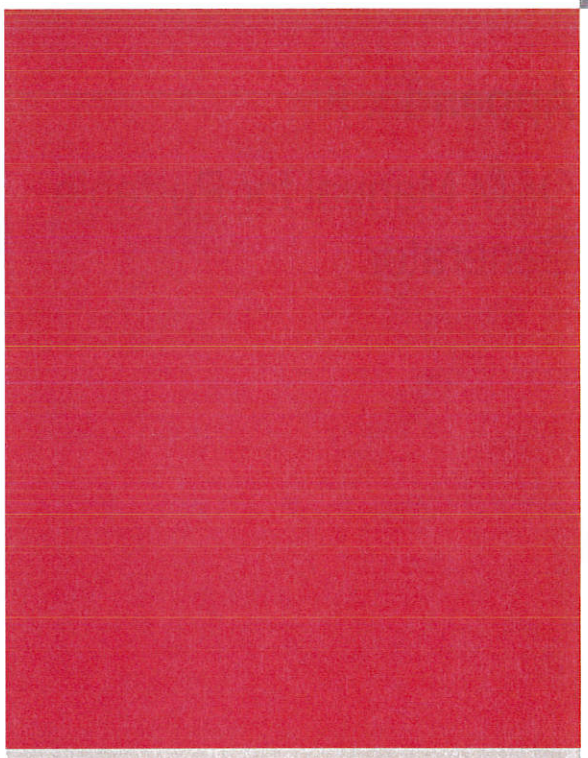
Appendix J

Mechanical System and Electronic Components

Appendix K

O&M Manual for Portable Generator

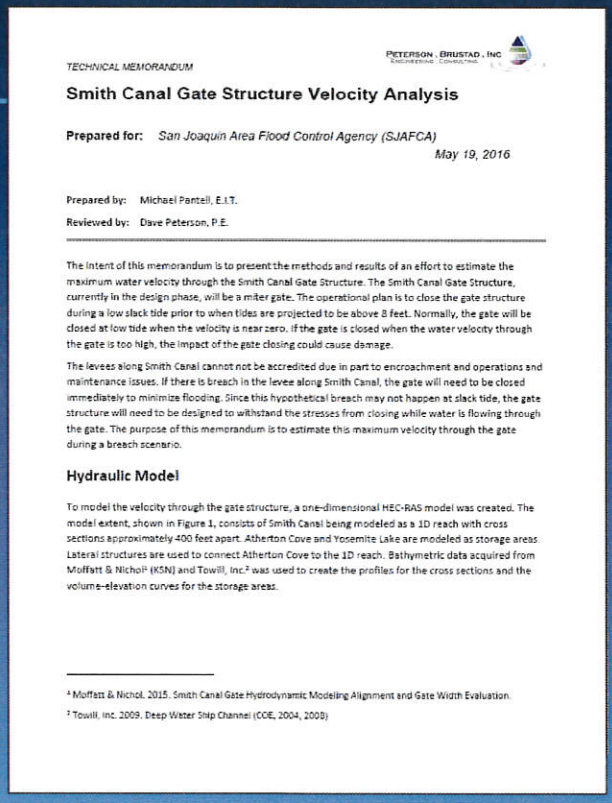
July 2, 2019

July 2, 2019

Levee Breach Velocity Analysis at Gate Structure

a. Purpose
b. Hydraulic Model
c. Boundary Condition and Breach Parameters
d. Results
e. Conclusion



TECHNICAL MEMORANDUM

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

Smith Canal Gate Structure Velocity Analysis

Prepared for: *San Joaquin Area Flood Control Agency (SJAFCA)*
May 19, 2016

Prepared by: Michael Pantell, E.I.T.
Reviewed by: Dave Peterson, P.E.

The intent of this memorandum is to present the methods and results of an effort to estimate the maximum water velocity through the Smith Canal Gate Structure. The Smith Canal Gate Structure, currently in the design phase, will be a miter gate. The operational plan is to close the gate structure during a low slack tide prior to when tides are projected to be above 8 feet. Normally, the gate will be closed at low tide when the velocity is near zero. If the gate is closed when the water velocity through the gate is too high, the impact of the gate closing could cause damage.

The levees along Smith Canal cannot not be accredited due in part to encroachment and operations and maintenance issues. If there is breach in the levee along Smith Canal, the gate will need to be closed immediately to minimize flooding. Since this hypothetical breach may not happen at slack tide, the gate structure will need to be designed to withstand the stresses from closing while water is flowing through the gate. The purpose of this memorandum is to estimate this maximum velocity through the gate during a breach scenario.

Hydraulic Model

To model the velocity through the gate structure, a one-dimensional HEC-RAS model was created. The model extent, shown in Figure 1, consists of Smith Canal being modeled as a 1D reach with cross sections approximately 400 feet apart. Atherton Cove and Yosemite Lake are modeled as storage areas. Lateral structures are used to connect Atherton Cove to the 1D reach. Bathymetric data acquired from Moffatt & Nichol[1] (M&N) and Towill, Inc.[2] was used to create the profiles for the cross sections and the volume-elevation curves for the storage areas.

[1] Moffatt & Nichol. 2015. Smith Canal Gate Hydrodynamic Modeling Alignment and Gate Width Evaluation.

[2] Towill, Inc. 2009. Deep Water Ship Channel (COE, 2004, 2008)

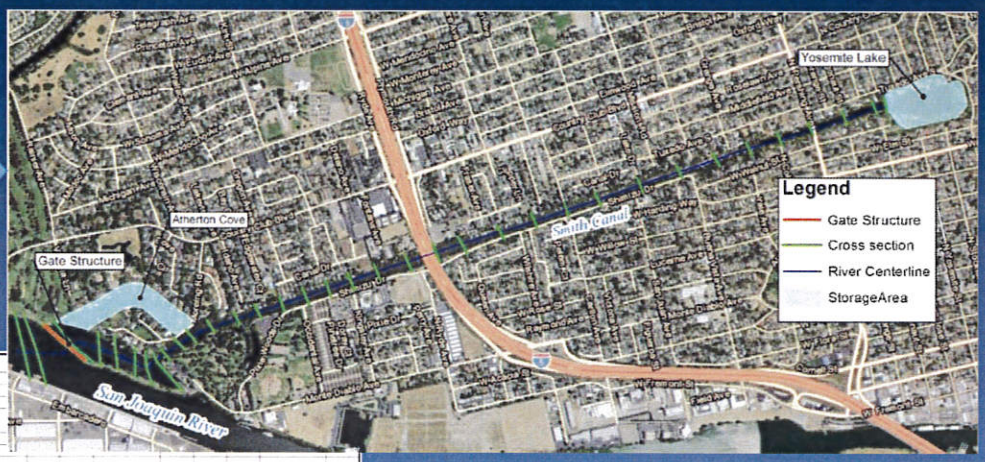
Purpose

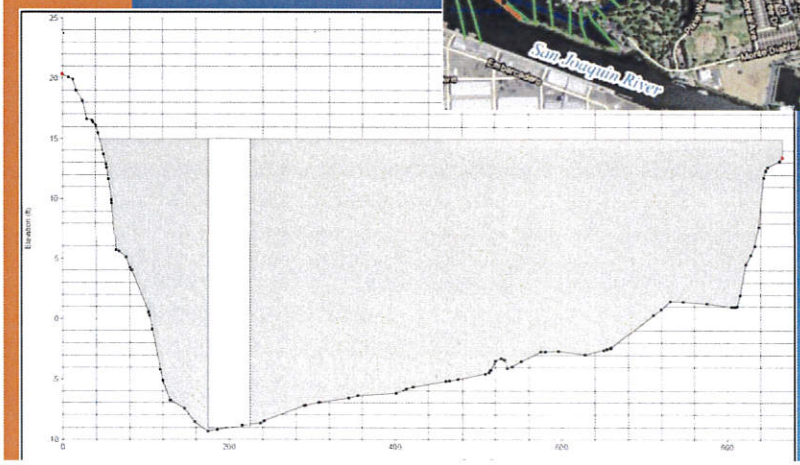
- **Purpose:** Test scenario that would put higher velocities at gate structure
- **Scenario:** If there is breach in the levee along Smith Canal, the gate will need to be closed immediately to minimize flooding

➢ Estimate the maximum velocity through the gate during a breach scenario.

Hydraulic Model

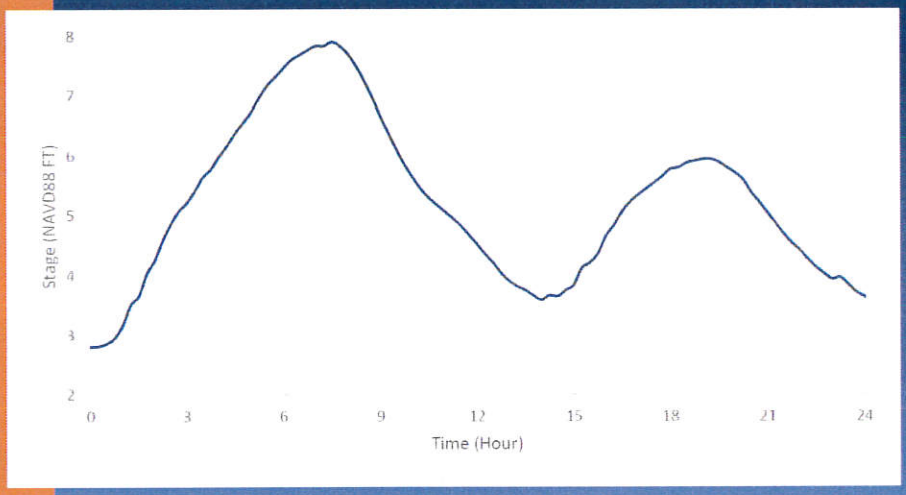
HEC-RAS Model Extents





Smith Canal Gate Structure in HEC-RAS

Boundary Conditions



Stage Hydrograph Used for SJR Boundary Condition at Smith Canal

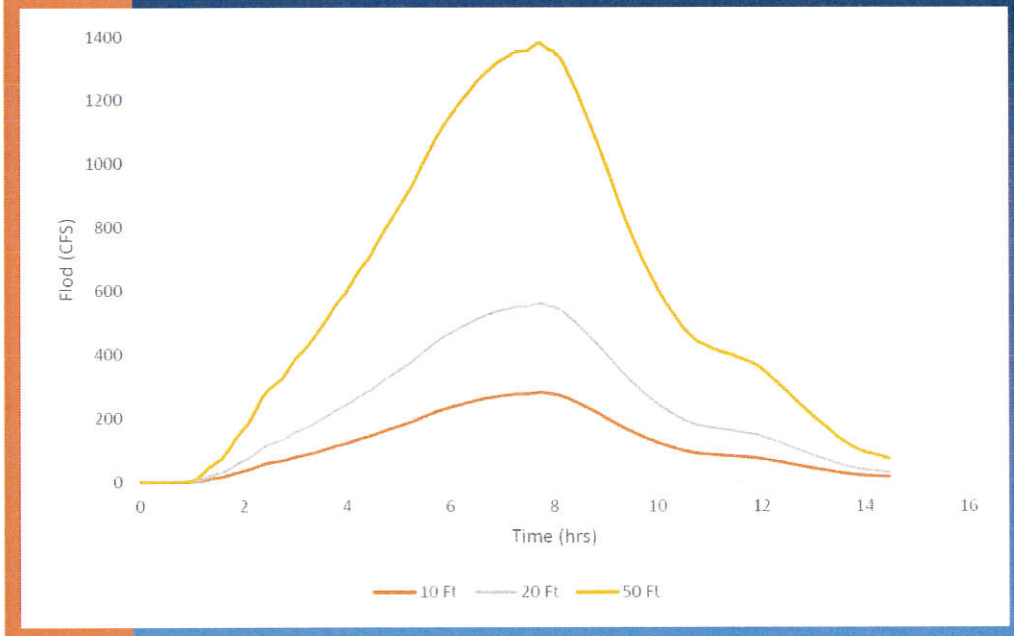
Worst-case scenario created to model max. velocity:

- Max Stage = 7.9 ft-NAVD88
  - Gate closes for predicted stages ≥ 8.0 ft-NAVD88
- Max Change in Stage = 5.1ft from daily minimum, directly to daily max
  - Based on average of annual max from gage records (1985-2010)

Breach Parameters

- 3 Breach Width Scenarios Modeled: 10ft, 20ft, 50ft
- Breach initiated 0.5hrs after daily min. stage and fully formed w/in 15 mins
- Breach locations selected based on proximity to gate and lowest landside toe elevation

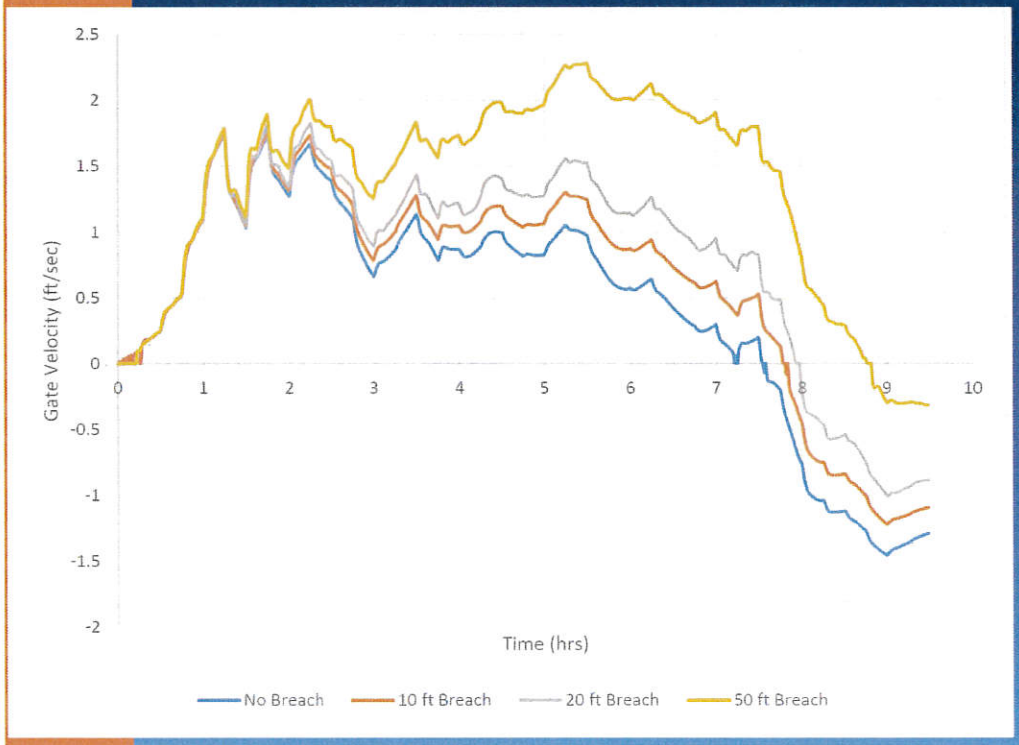
Results – Breach Hydrographs



Breach Scenario Peak Flow through Levee:

- 10ft – 280 cfs
- 20ft – 560 cfs
- 50ft – 1,360 cfs

Results – Velocities through Gate



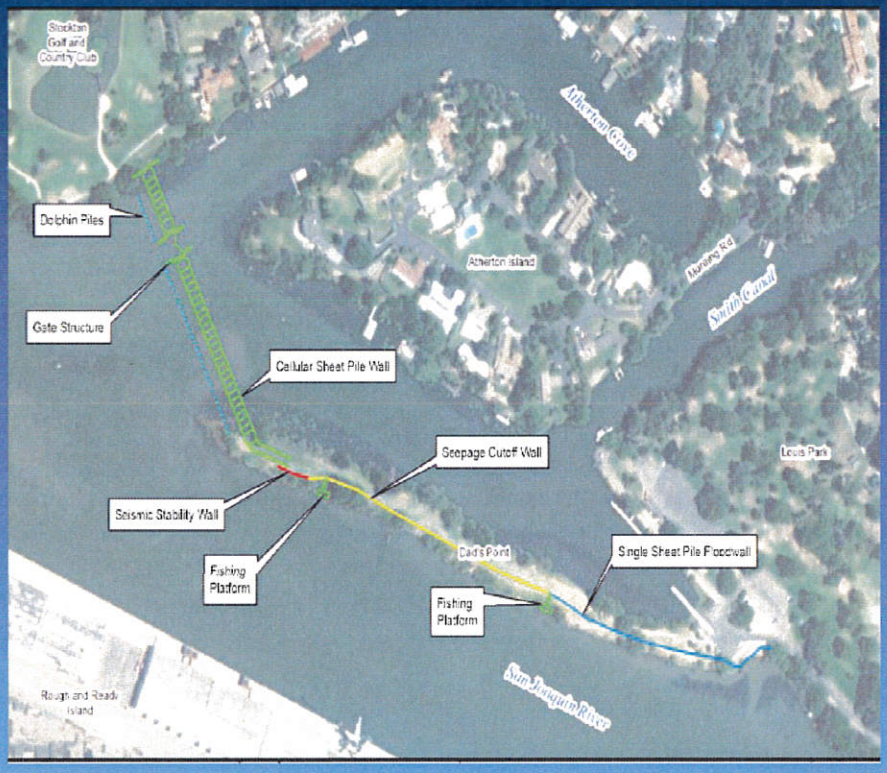
Breach Scenario Peak Velocity through Gate Structure:

- No Breach – 1.73 ft/sec
- 10ft – 1.76 ft/sec
- 20ft – 1.82 ft/sec
- 50ft – 2.28 ft/sec

Conclusion

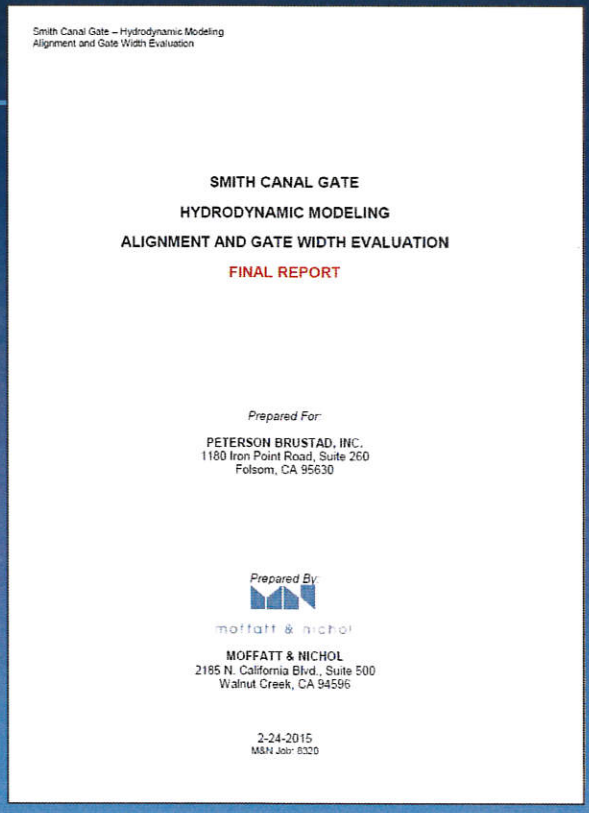
Most Realistic breach scenario for Smith Canal = 20 ft width

- Gate structure to be designed to withstand 1.82 ft/sec velocities at minimum



Hydrodynamic Modeling Alignment and Gate Width Evaluation

a. Background
b. Model Development
c. Results
d. Summary & Conclusions



Smith Canal Gate – Hydrodynamic Modeling
Alignment and Gate Width Evaluation

SMITH CANAL GATE

HYDRODYNAMIC MODELING

ALIGNMENT AND GATE WIDTH EVALUATION

FINAL REPORT

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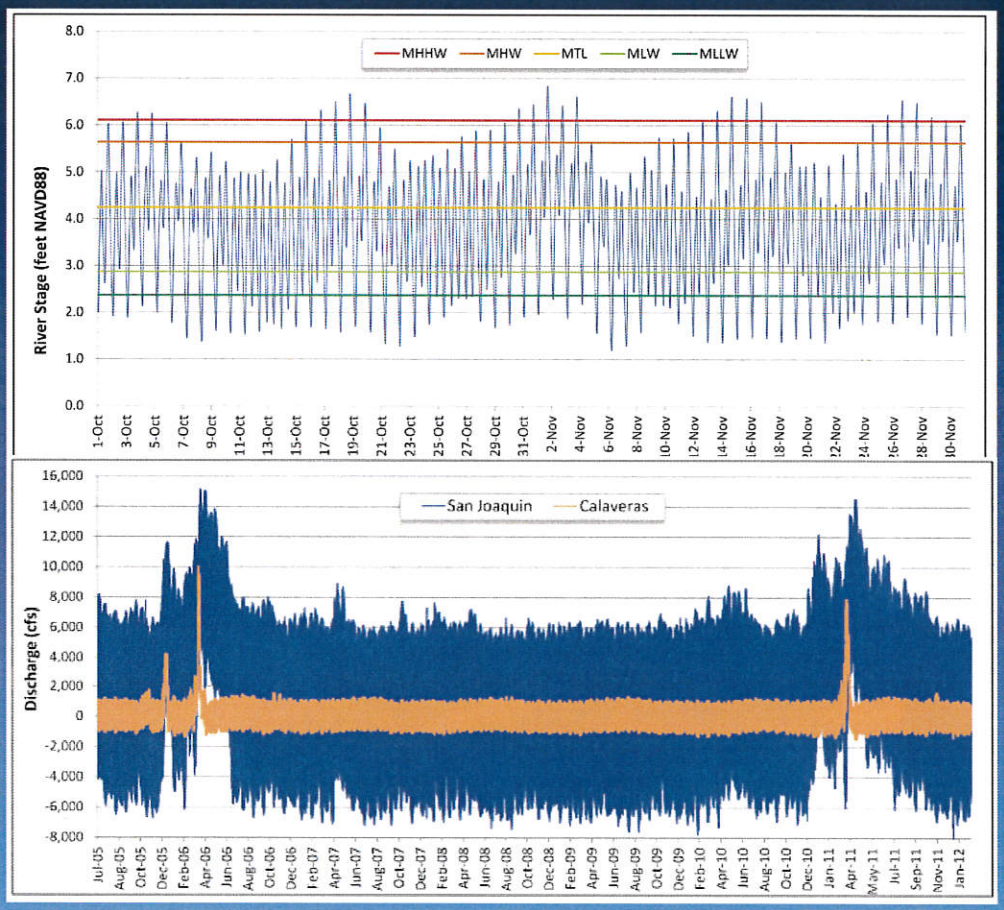
Background

- Need to identify spatial distributions of tidal velocities as well as scouring and sedimentation concerns between project alternatives.
- 3 alignments and 4 water quality improvements were evaluated.

Alignment for Alternative 1 (Selected Project, Figure 1-5, Moffatt & Nichol 2015)

Background: Tidal Influences

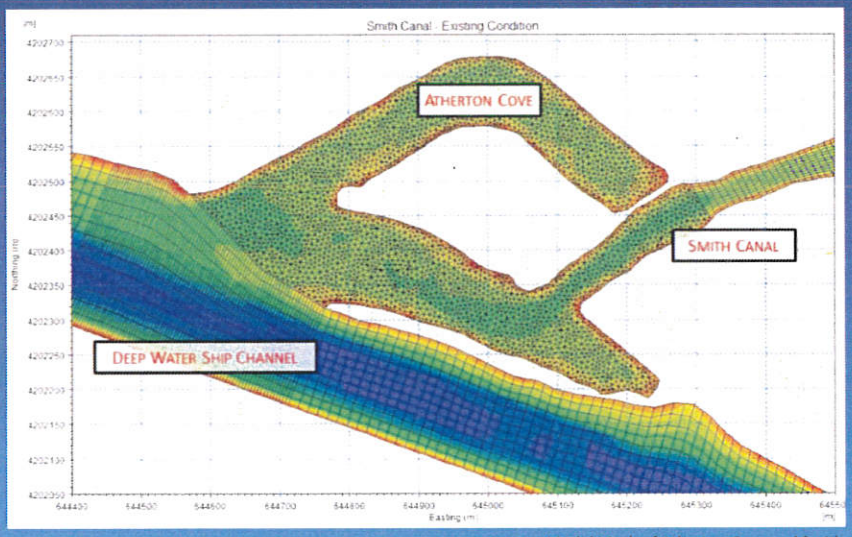


Tidal flows and variations (Figure 1-11 & Figure 1-12, Moffatt & Nichol 2015)

Model Development

- Model developed in MIKE21-FM and calibrated using measured stages and discharges from gages in SDWSC and San Joaquin River

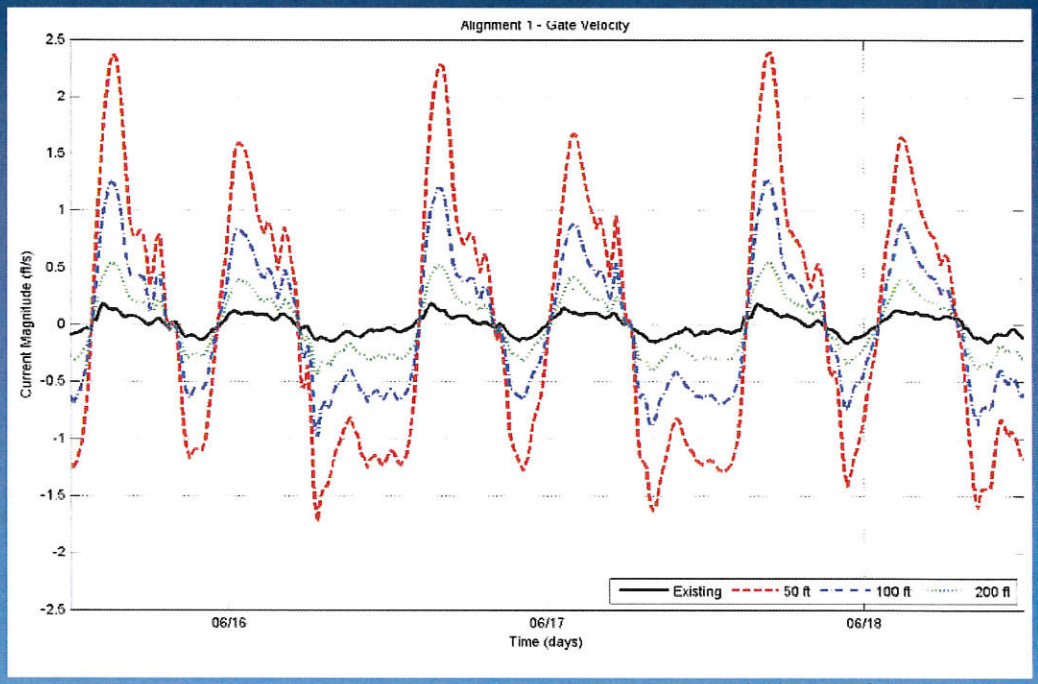
- A separate model was created to evaluate water quality alternatives.



Model Mesh of Atherton Cove and Smith Canal (Figure 4-4, Moffatt & Nichol 2015)

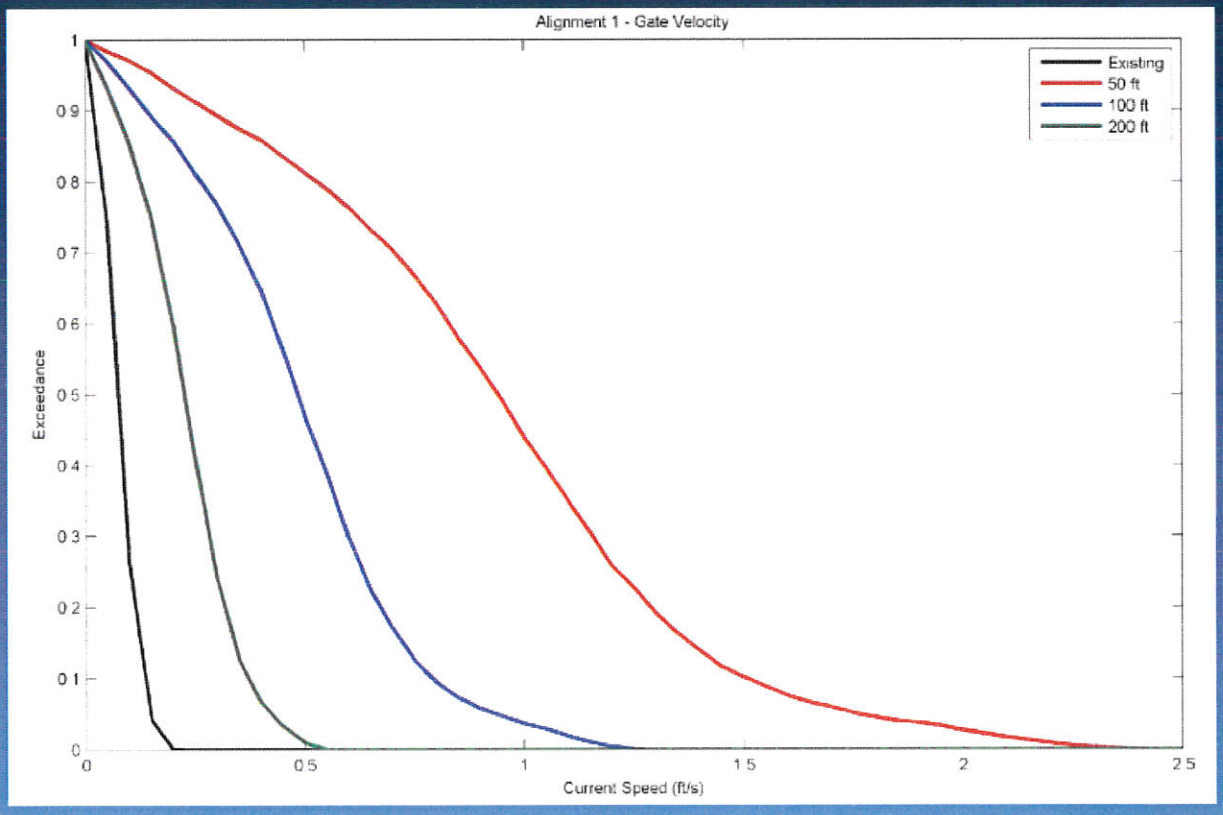
Results: Elevations and Velocities

- The gate structure will not affect variations in tidal elevations or velocities.
- Anticipated changes:
  - Eddies at the gate structure during flood tides.
  - Jet velocities at gate structure less than 2 ft/s.



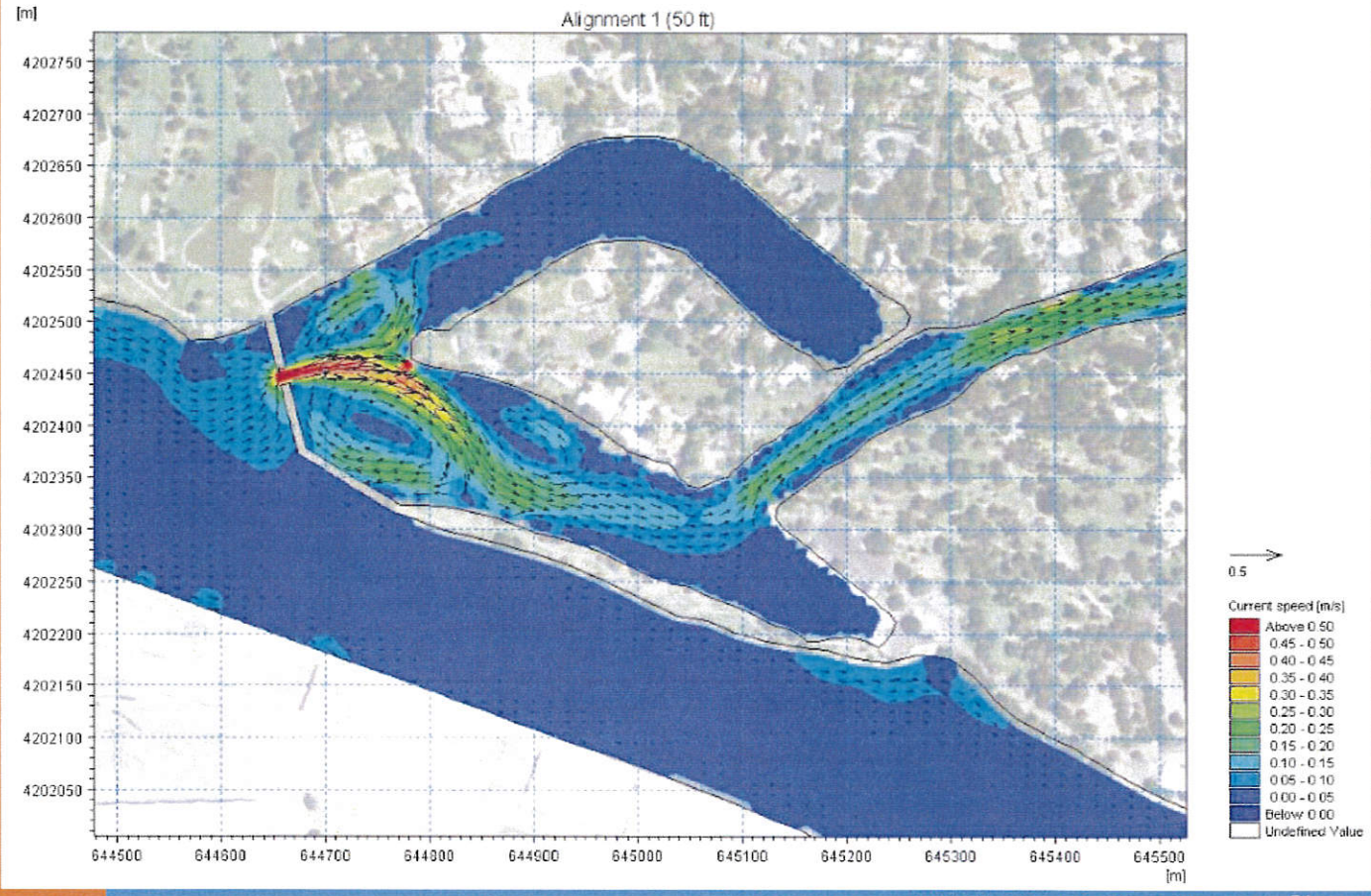
Velocities at gate of Alignment 1l (Figure 5-10, Moffatt & Nichol 2015)

Results: Elevations and Velocities



Current speed exceedance curves at gate of Alignment 1 (Figure 5-14, Moffatt & Nichol 2015)

Results: Elevations and Velocities



Get velocity vector plot for Alignment 1 (Figure 5-19, Moffatt & Nichol 2015)

Results: Water Quality

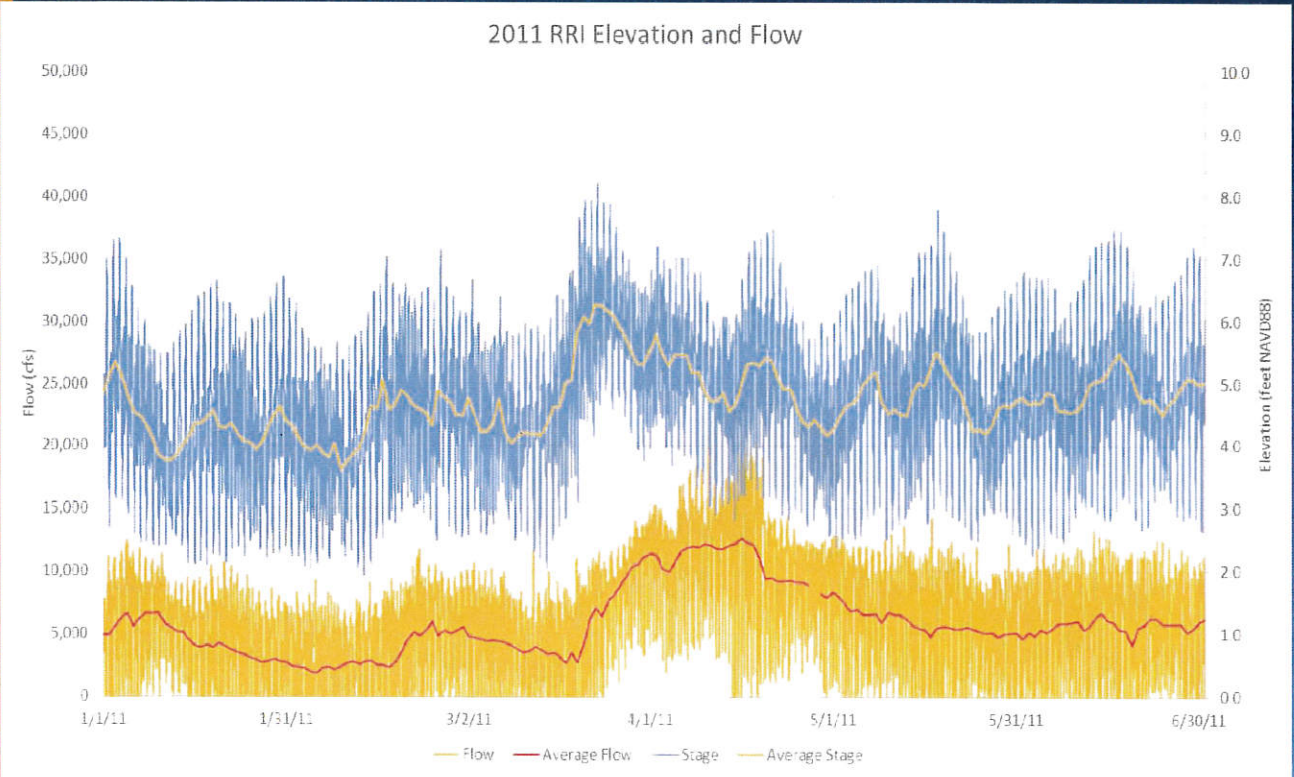
- The installation of a gate structure is not expected to affect water quality in Smith canal or Atherton Cove.
- Hydraulic residence times are high regardless of the structure's installation.
- Water quality concerns identified are present even at existing conditions, but not worsened by the structure.

Station	Existing	Alignment 1	Alignment 2	Alignment 3
Smith Canal 1	1.0	1.0	1.0	1.0
Smith Canal 2	6.1	6.1	6.1	6.1
Smith Canal 3	7.2	7.2	7.2	7.2
Smith Canal 4	11.9	11.9	8.2	8.2
Smith Canal 5	23.8	23.8	23.8	23.8
Smith Canal 6	36.1	36.1	36.1	36.1
Smith Canal 7	41.0	42.0	41.0	41.0
Smith Canal 8	41.5	42.2	41.5	41.5
Atherton Cove 1	1.0	1.0	1.0	1.0
Atherton Cove 2	1.0	1.0	1.0	1.0
Atherton Cove 3	1.1	1.1	1.1	1.1
Atherton Cove 4	1.1	1.1	1.1	1.1
Atherton Cove 5	1.4	1.2	1.3	1.5
Atherton Cove 6	1.5	1.4	1.5	1.6
Atherton Cove 7	1.6	1.5	1.6	1.6

Hydraulic residence times for proposed alternatives (Table 6-1, Moffatt & Nichol 2015)

Results: Application

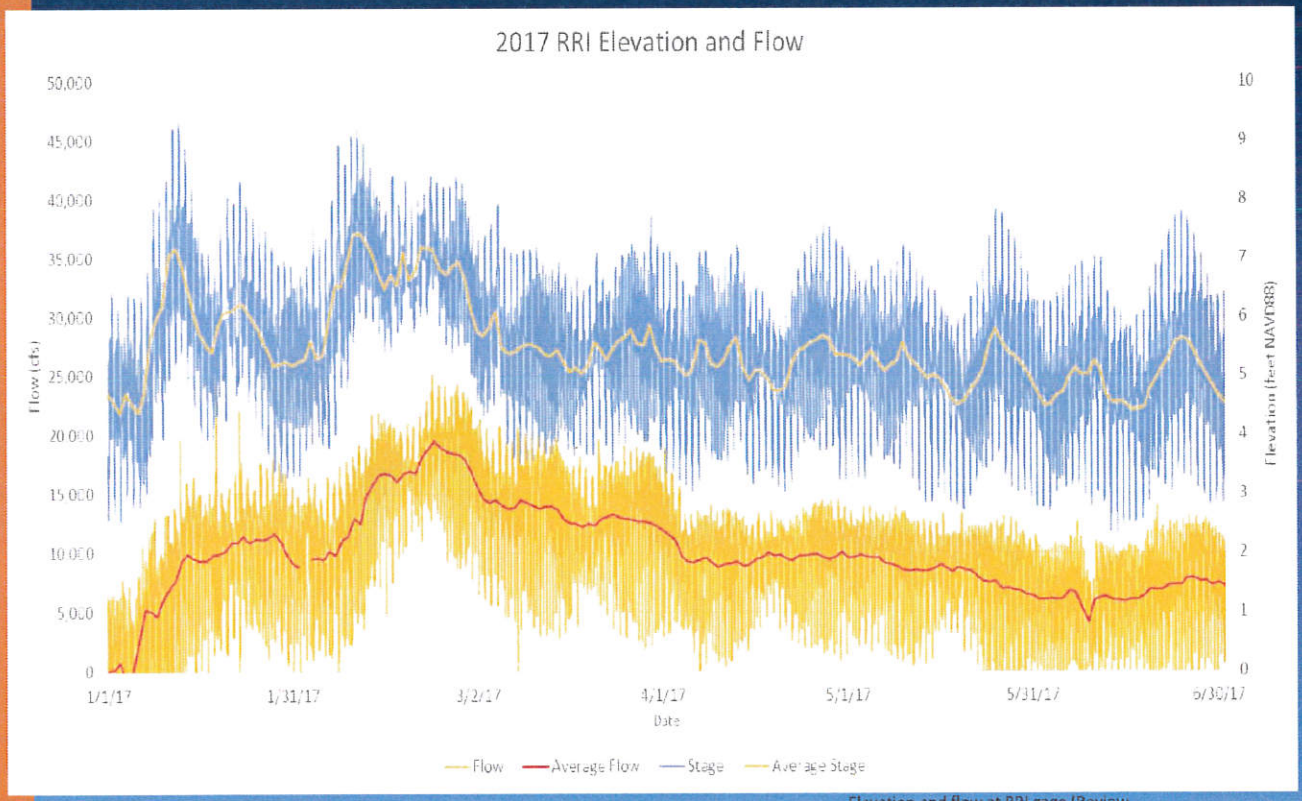
- Measured tidal elevations can also be used to evaluate possible gate operation procedures



Elevation and flow at RRI gage (Review of Smith Canal Hydrodynamic Modelling Report, Russ Brown River Consulting 2015)

Results: Application

- Measured tidal elevations can also be used to evaluate possible gate operation procedures



Elevation and flow at RRI gage (Review of Smith Canal Hydrodynamic Modelling Report, Russ Brown River Consulting 2015)

Summary

Purpose:

Develop a hydrodynamic model that identifies that influence of a flood gate structure on tidal flows, elevations, and water quality and informs the development of a preferred alternative design.

Approach:

Model 3 alignments and 4 water quality improvements using MIKE21-FM-HD and MIKE21-FM-TR.

Result:

A model was developed that provided anticipated and realistic results to be help guide the selection and design of a preferred flood gate structure.

Conclusions

The gate structure will not affect tidal elevations or velocities:

The model shows little difference between the gate structure and existing conditions apart from the immediate vicinity at the gate.

Hydraulic residence times in Smith Canal won't change:

Residence times in Smith Canal are in excess of 30 days with the bulk of mixing being controlled by slow mixing from tidal flows in the San Joaquin River.

Water quality is unaffected by the gate structure:

Water quality issues affecting the Smith Canal exist but are not expected to worsen due to the introduction of the gate structure.

Smith Canal Gate Project Improvements Schedule