FARALLON CONSULTING

NAVIGATION CHANNEL DREDGING IN SAN PABLO BAY NATIONAL WILDLIFE REFUGE

For PG&E Emergency Transmission Towers Replacement Project

October 27, 2022

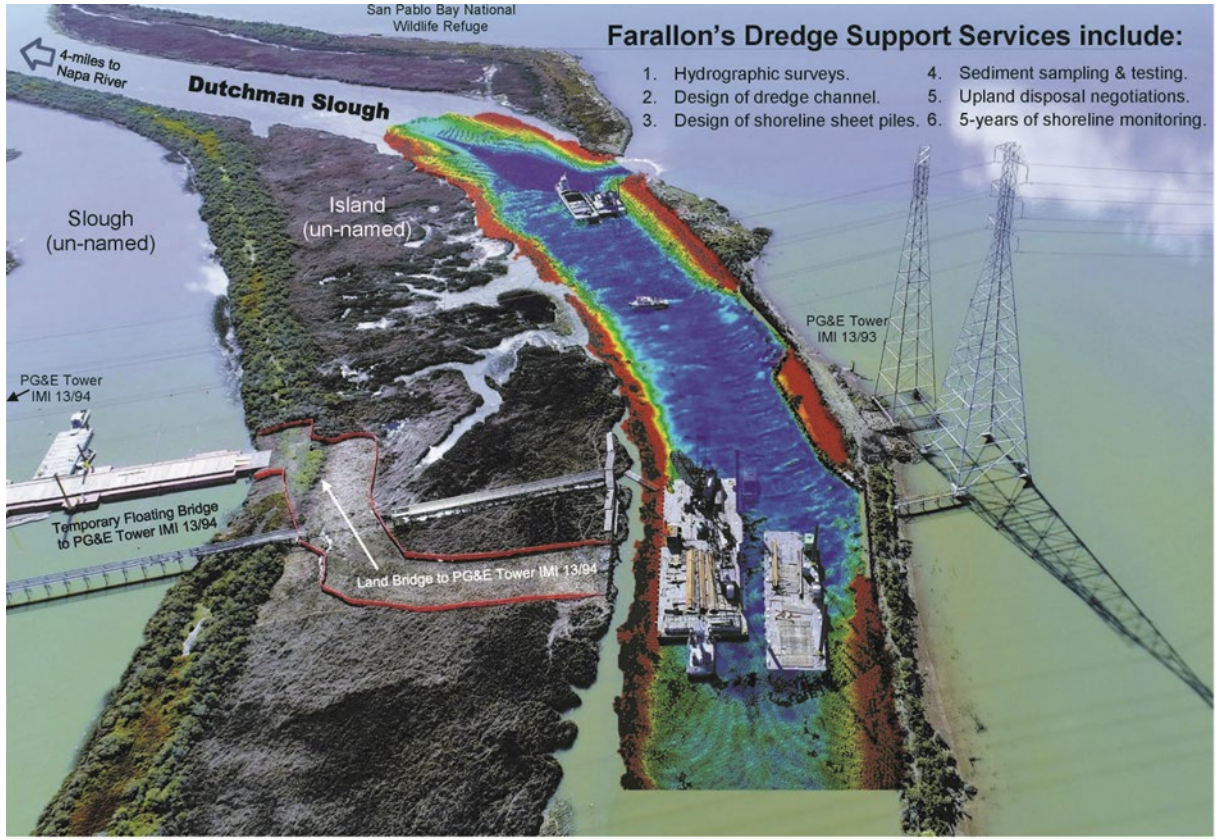
BACKGROUND

In 2019 PG&E began to respond to age-related structural deficiencies in its electric transmission line network, including the Ignacio-Mare Island (IMI) 115-kilovolt line that extends north of the Golden Gate Bridge from Vallejo to Novato, where at least 28 of the towers have been in service since 1921.


Napa River

TIMELINE OF FARALLON'S SERVICES

- May 2000: Route Finding
- August 2000 - Dredging and Bulkhead Design
- September 2000 - Dredge Permitting
- October 2021 - Post Construction Monitoring



PG&E Emergency Tower Replacement Project

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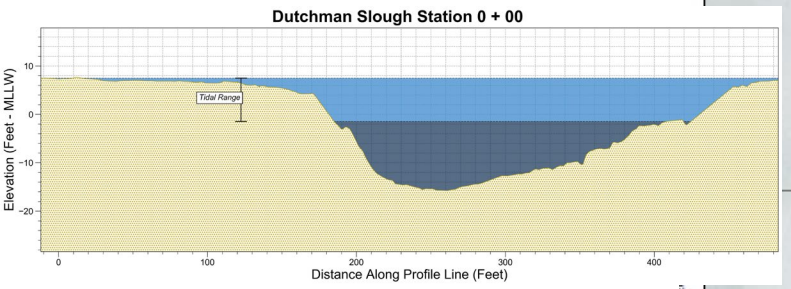
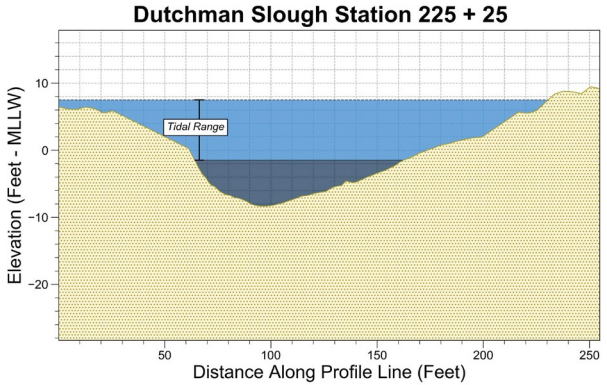
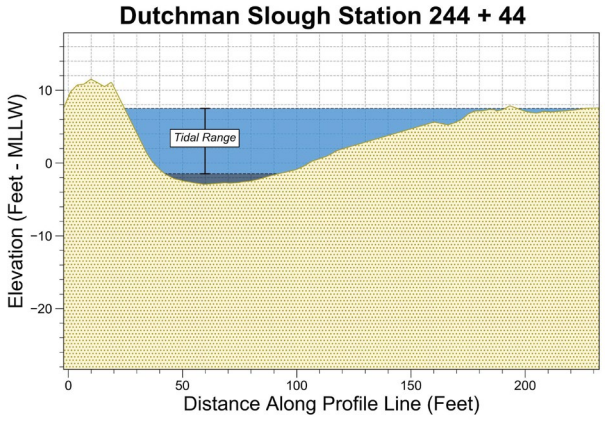
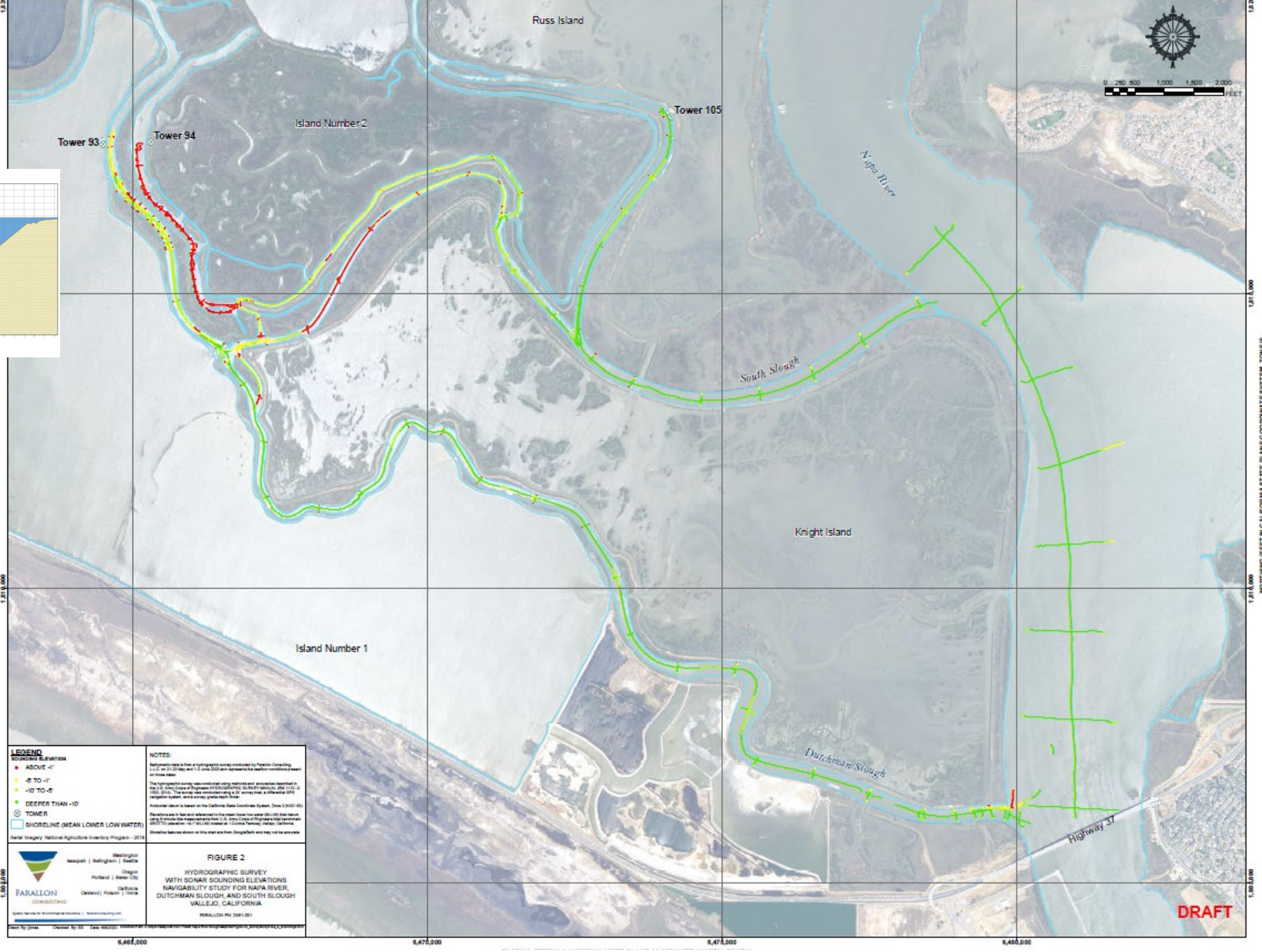
Route Finding





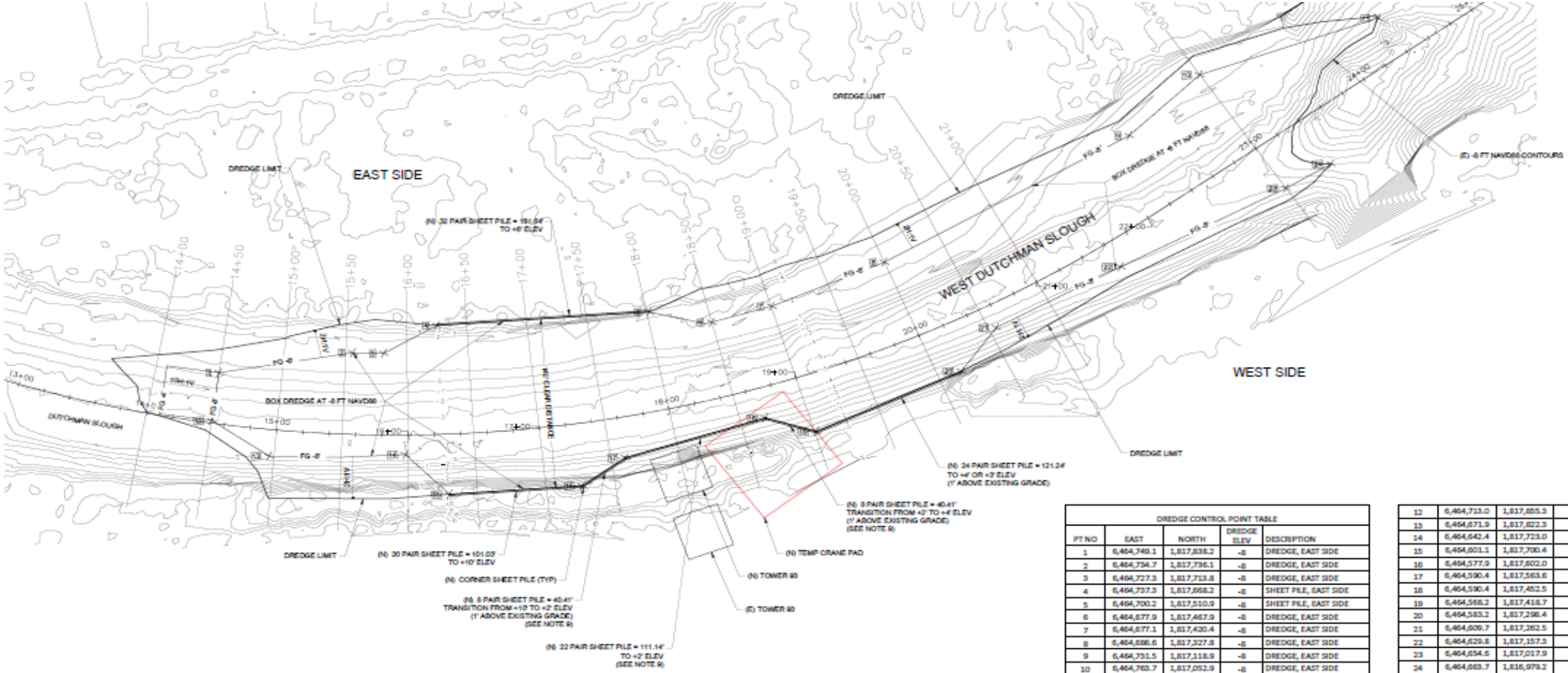




DREDGING & BULKHEAD DESIGN

Two areas considered:

1. Access for barge to dock and transfer crane to access Tower 94 across unnamed island
2. Access for barge to construct new Tower 93



DUTCHMAN SLOUGH DREDGING PLAN

1" = 40'

NOTES

1. DREDGE DEPTH IS TO -8.0 FEET NAVD88, AND THIS IS ALSO THE MAXIMUM DEPTH THAT DREDGE QUANTITY PAYMENT WILL BE BASED ON. MINIMUM DREDGE DEPTH TO BE -7.5 FEET NAVD88.
2. ELEVATIONS ARE IN FEET AND REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). HORIZONTAL DATUM IS BASED ON THE CALIFORNIA STATE COORDINATE SYSTEM, ZONE 2 (NAD-83).
3. EXISTING CHANNEL BATHYMETRY IS CONSTRUCTED BY MERGING THE HYDROGRAPHIC SURVEY AND TOPOGRAPHIC DATA FROM A NOAA LIDAR. SHORELINE FEATURES AND BOARDWALK SHOWN ON THIS CHART ARE FROM GOOGLE EARTH AND MAY NOT BE ACCURATE.
4. BATHYMETRIC DATA IS FROM A HYDROGRAPHIC SURVEY CONDUCTED BY FARALLON CONSULTING, L.L.C. ON 20-21 AUGUST 2020 AND REPRESENTS THE SEAFLOOR CONDITIONS PRESENT ON THOSE DATES. THE HYDROGRAPHIC SURVEY WAS CONDUCTED USING METHODS AND ACCURACIES DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS HYDROGRAPHIC SURVEY MANUAL (EM 1110-2-1003, 2014). THE SURVEY WAS CONDUCTED USING A 24' SURVEY BOAT, A DIFFERENTIAL GPS NAVIGATION SYSTEM, AND A SURVEY-GRADE DEPTH FINDER. WATER DEPTH MEASUREMENTS ARE CORRECTED FOR TIDAL VARIATIONS USING WATER LEVEL ELEVATIONS MEASURED AT 6-MINUTE TIDE INTERVALS FROM FARALLON CONSULTING BENCHMARK CEO AMY AS REFERENCE.
5. TOPOGRAPHIC DATA IS FROM A NOAA LIDAR DERIVED DEM FLOWN IN WINTER OF 2018, FLOWN BY QUANTUM SPATIAL. HORIZONTALLY IN CALIFORNIA STATE PLANE ZONE 2 (FEET) AND VERTICALLY IN NAVD88 (FEET).
6. THE BENCHMARK (ELEVATION +9.34' NAVD88) IS LOCATED ON THE NORTHEAST FOUNDATION OF PG&E ELECTRICAL TRANSMISSION TOWER (M 13/93, AT COORDINATE N1,817,540.4' E6,464,530.9').
7. SHEET PILE LAYOUT BASED ON USING DIMENSIONS & SECTIONS OF EITHER AZ-14-770 OR NZ-14 STEEL SHEET PILES, AND IS BASED ON STRAIGHT LINE ALIGNMENT BETWEEN SHOWN END COORDINATES.
8. SHEET PILE LENGTH AND SECTION MODULUS ARE BASED ON BEST ESTIMATES OF MINIMUM REQUIRED, BUT NOT BASED ON ENGINEERING DESIGNS. THEREFORE IT IS UP TO CONTRACTOR TO MAKE FINAL SELECTIONS.
9. SHEET PILES FROM PT #16 THROUGH PT #19 IN FRONT OF (N) TOWER 93 ARE TO REMAIN AS PERMANENT TO PROTECT TOWER 93, AND SHALL BE DESIGNED BY OTHERS. CONSIST OF 36 PAIRS SHEET PILES & CORNER SECTIONS = 191.94'.
10. TOP OF SHEET PILES ELEVATIONS SHOULD BE APPROXIMATELY ONE FOOT ABOVE EXISTING GRADE ELEVATIONS ON LANDWARD SIDE OF SHEET PILES.
11. DREDGED CHANNEL SIDE SLOPES OF 3H:1V ARE MORE PREFERABLE BUT ARE SHOWN AT 2H:1V TO MAINTAIN WIDER CHANNEL WIDTH TO -8 FT NAVD88. HOWEVER, WHEN AND WHERE POSSIBLE CAN USE 3H:1V SIDE SLOPES TO MINIMIZE SLOUGHING OF CHANNEL SIDE SLOPES. REQUIRES APPROVAL OF OWNERS REPRESENTATIVE.

DREDGE CONTROL POINT TABLE

PT NO	EAST	NORTH	DREDGE ELEV	DESCRIPTION
1	6,464,749.1	1,817,838.2	-8	DREDGE, EAST SIDE
2	6,464,734.7	1,817,736.1	-8	DREDGE, EAST SIDE
3	6,464,727.3	1,817,713.8	-8	DREDGE, EAST SIDE
4	6,464,737.3	1,817,668.2	-8	SHEET PILE, EAST SIDE
5	6,464,700.2	1,817,510.9	-8	SHEET PILE, EAST SIDE
6	6,464,677.9	1,817,467.9	-8	DREDGE, EAST SIDE
7	6,464,677.1	1,817,420.4	-8	DREDGE, EAST SIDE
8	6,464,686.6	1,817,327.8	-8	DREDGE, EAST SIDE
9	6,464,731.5	1,817,118.9	-8	DREDGE, EAST SIDE
10	6,464,763.7	1,817,052.9	-8	DREDGE, EAST SIDE
11	6,464,768.3	1,816,909.5	-8	DREDGE, EAST SIDE
12	6,464,713.0	1,817,855.3	-8	DREDGE, WEST SIDE
13	6,464,671.9	1,817,822.3	-8	DREDGE, WEST SIDE
14	6,464,642.4	1,817,723.0	-8	DREDGE, WEST SIDE
15	6,464,601.1	1,817,700.4	-8	SHEET PILE, WEST SIDE
16	6,464,577.9	1,817,602.0	-8	SHEET PILE, WEST SIDE
17	6,464,590.4	1,817,563.6	-8	SHEET PILE, WEST SIDE
18	6,464,590.4	1,817,462.5	-8	SHEET PILE, WEST SIDE
19	6,464,568.2	1,817,418.7	-8	SHEET PILE, WEST SIDE
20	6,464,583.2	1,817,298.4	-8	SHEET PILE, WEST SIDE
21	6,464,609.7	1,817,262.5	-8	DREDGE, WEST SIDE
22	6,464,629.8	1,817,157.3	-8	DREDGE, WEST SIDE
23	6,464,654.6	1,817,017.9	-8	DREDGE, WEST SIDE
24	6,464,663.7	1,816,979.2	-8	DREDGE, WEST SIDE

40 0 40 80
SCALE IN FEET

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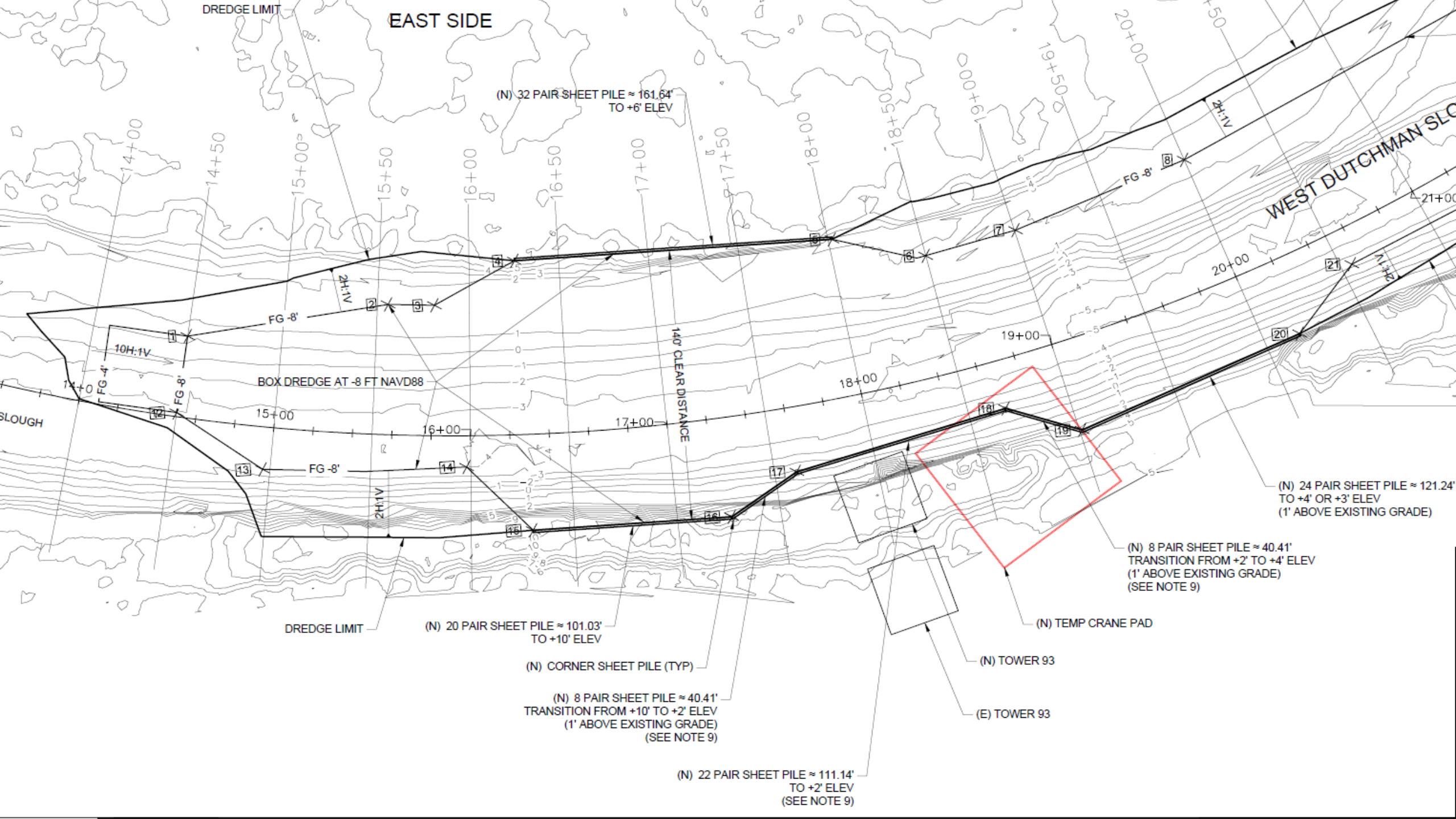
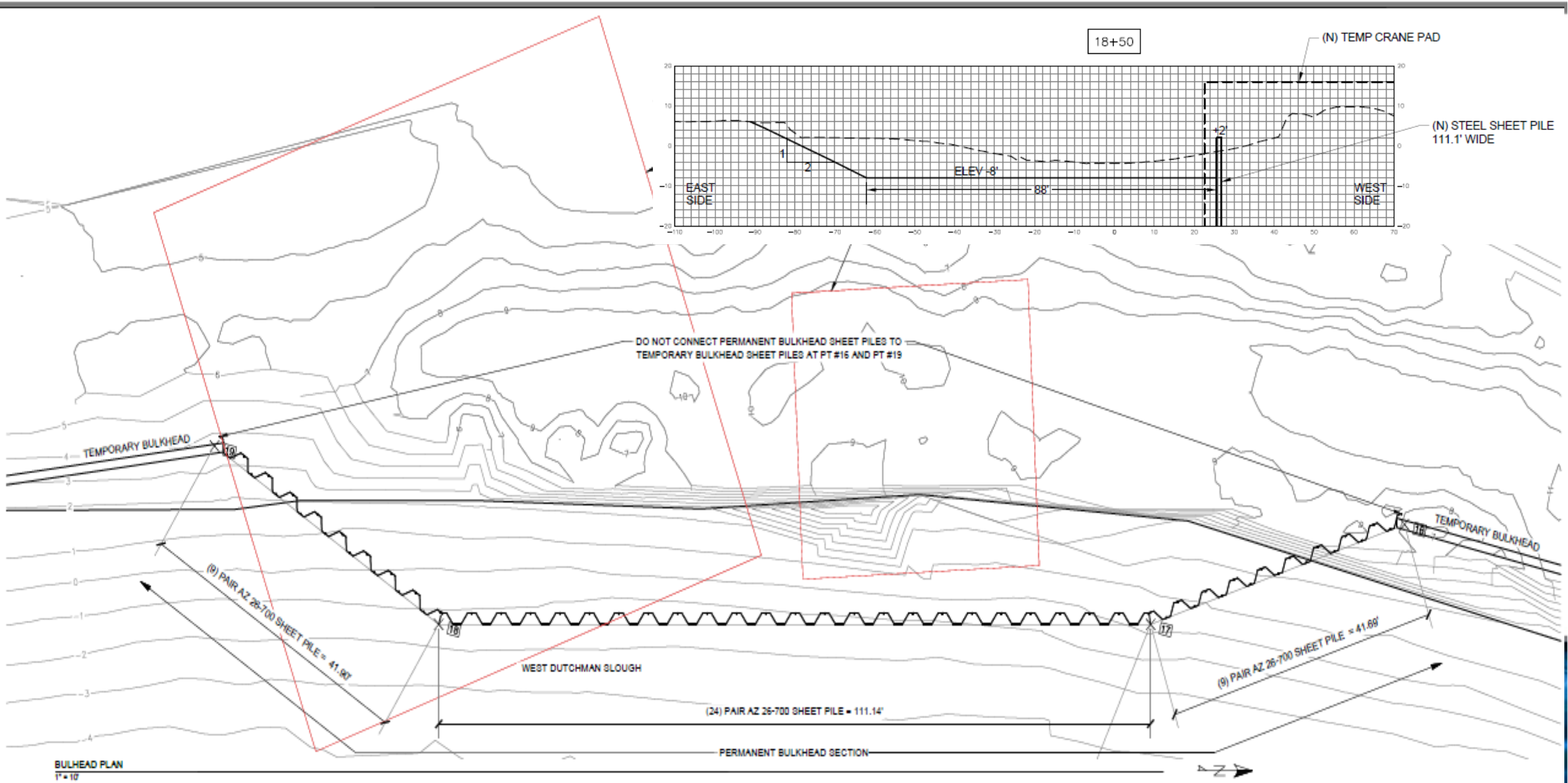
DUTCHMAN SLOUGH
DREDGING PLAN

FARALLON PN: 2461-003

Drawn By: Checked By: Date: 9/30//2020


EAST SIDE
DREDGE LIMIT
(N) 32 PAIR SHEET PILE ≈ 161.64'
TO +6' ELEV
WEST DUTCHMAN SLO
14+00
14+50
15+00
15+50
16+00
16+50
17+00
17+50
18+00
18+50
19+00
19+50
20+00
21+00
2H:1V
FG -8'
FG -4'
10H:1V
BOX DREDGE AT -8 FT NAVD88
140' CLEAR DISTANCE
SLOUGH
(N) 24 PAIR SHEET PILE ≈ 121.24'
TO +4' OR +3' ELEV
(1' ABOVE EXISTING GRADE)
(N) 8 PAIR SHEET PILE ≈ 40.41'
TRANSITION FROM +2' TO +4' ELEV
(1' ABOVE EXISTING GRADE)
(SEE NOTE 9)
(N) TEMP CRANE PAD
DREDGE LIMIT
(N) 20 PAIR SHEET PILE ≈ 101.03'
TO +10' ELEV
(N) CORNER SHEET PILE (TYP)
(N) TOWER 93
(N) 8 PAIR SHEET PILE ≈ 40.41'
TRANSITION FROM +10' TO +2' ELEV
(1' ABOVE EXISTING GRADE)
(SEE NOTE 9)
(E) TOWER 93
(N) 22 PAIR SHEET PILE ≈ 111.14'
TO +2' ELEV
(SEE NOTE 9)

DREDGING & BULKHEAD DESIGN

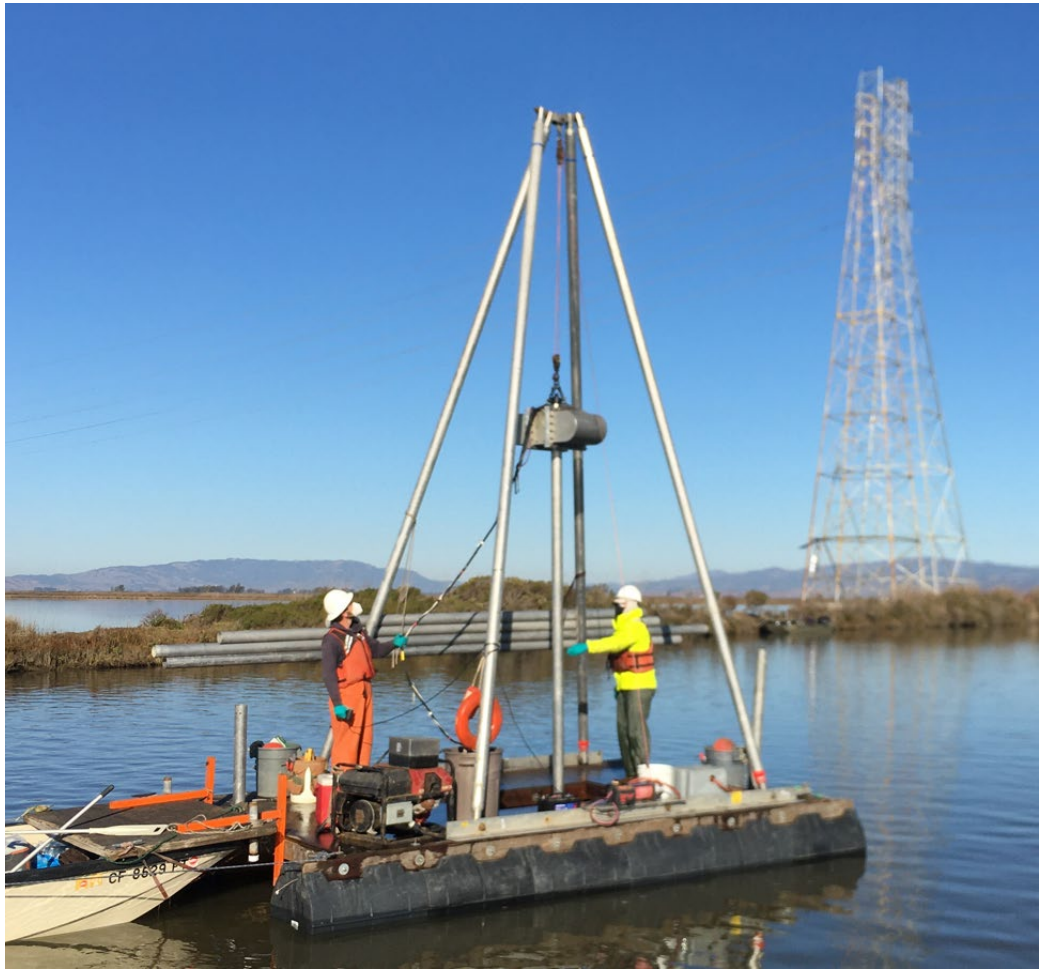


DREDGE PERMITTING

Permit No. SPN-2020-00347N

1. Prepared SAP
2. Completed Sampling
3. Identified Reuse Options

Elevated selenium resulted in the need to reuse material as wetland foundation material at the Montezuma site



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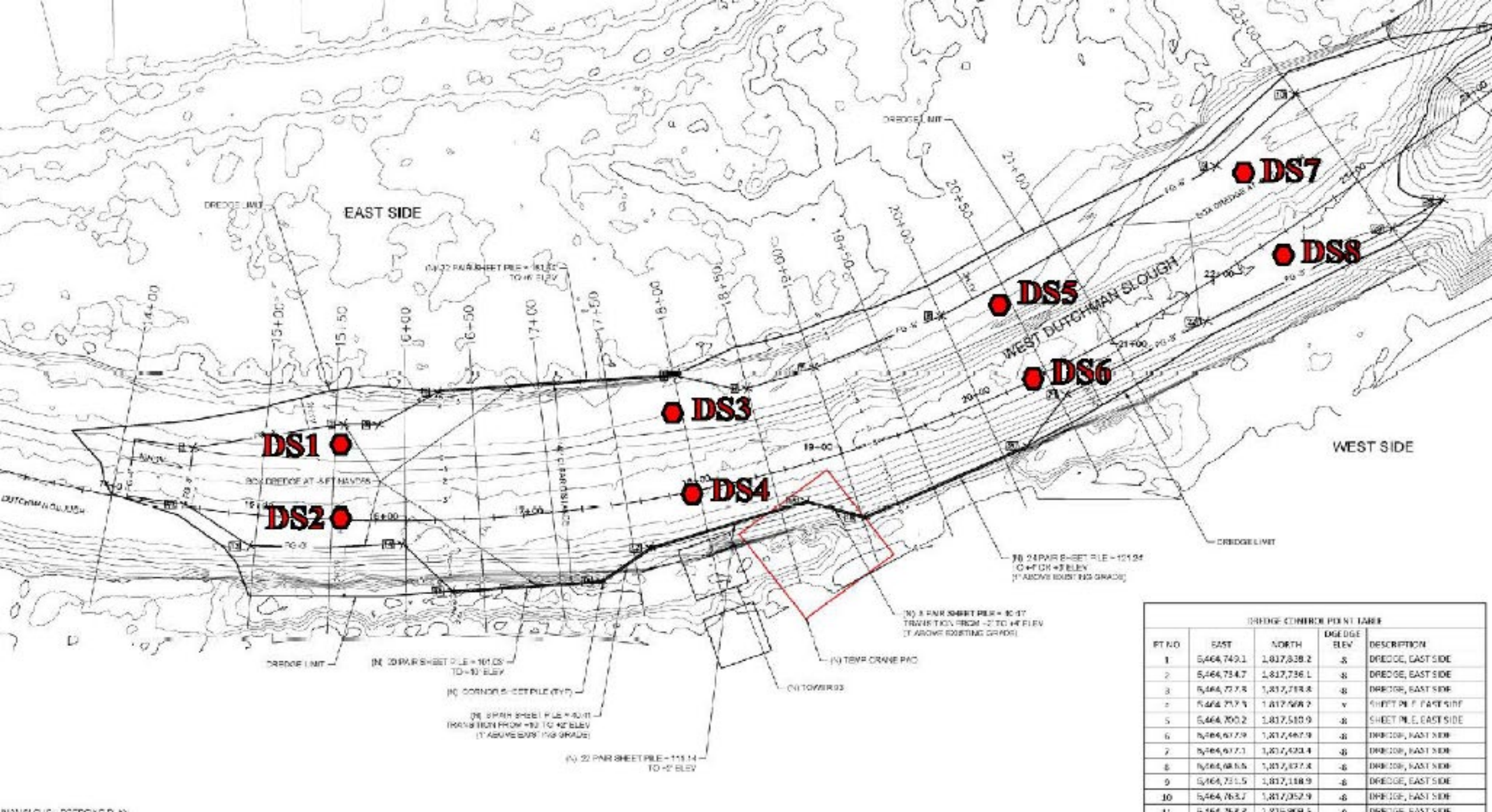

DREDGE CONNER POINT TABLE				
PT NO	EAST	NORTH	EDGE DGE ELEV	DESCRIPTION
1	5,464,749.1	1,817,838.2	-8	DREDGE, EAST SIDE
2	5,464,754.7	1,817,736.1	-8	DREDGE, EAST SIDE
3	5,464,737.8	1,817,718.8	-8	DREDGE, EAST SIDE
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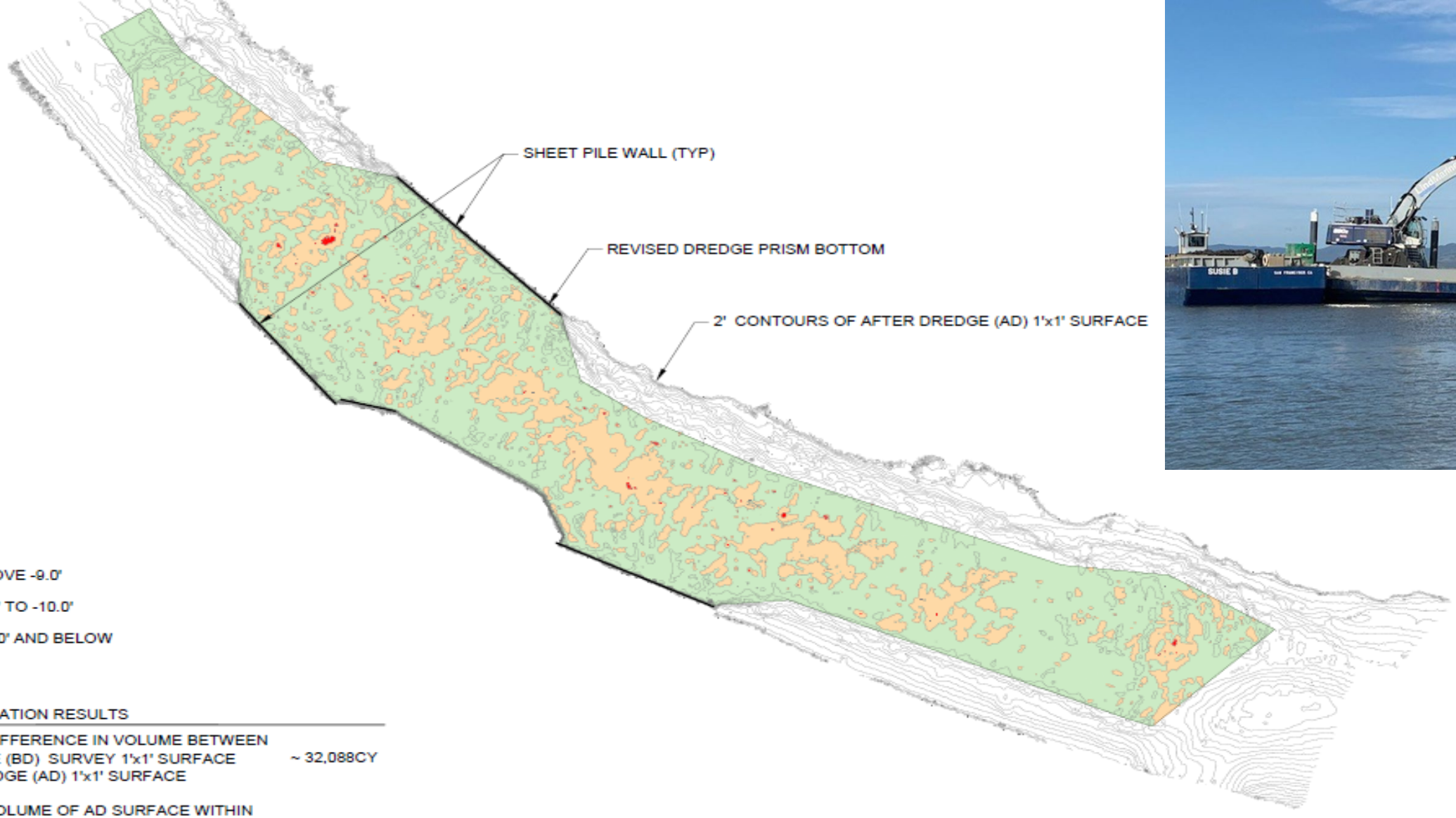
6	5,464,677.9	1,817,467.9	-8	DREDGE, EAST SIDE
7	5,464,677.1	1,817,423.4	-8	DREDGE, EAST SIDE
8	5,464,681.6	1,817,337.4	-8	DREDGE, EAST SIDE
9	5,464,731.5	1,817,188.9	-8	DREDGE, EAST SIDE
10	5,464,763.7	1,817,052.9	-8	DREDGE, EAST SIDE
11	5,464,764.3	1,816,909.5	-8	DREDGE, EAST SIDE

MAIN SLOUGH DREDGING PLAN



ABOVE -9.0'

-9.0' TO -10.0'

-10.0' AND BELOW

VOLUME CALCULATION RESULTS

APPROXIMATE DIFFERENCE IN VOLUME BETWEEN BEFORE DREDGE (BD) SURVEY 1'x1' SURFACE AND AFTER DREDGE (AD) 1'x1' SURFACE	~ 32,088CY
APPROXIMATE VOLUME OF AD SURFACE WITHIN REVISED DREDGE PRISM BOTTOM FOOTPRINT BELOW -9.00'	~ 211 CY

80 0 80

SCALE IN FEET

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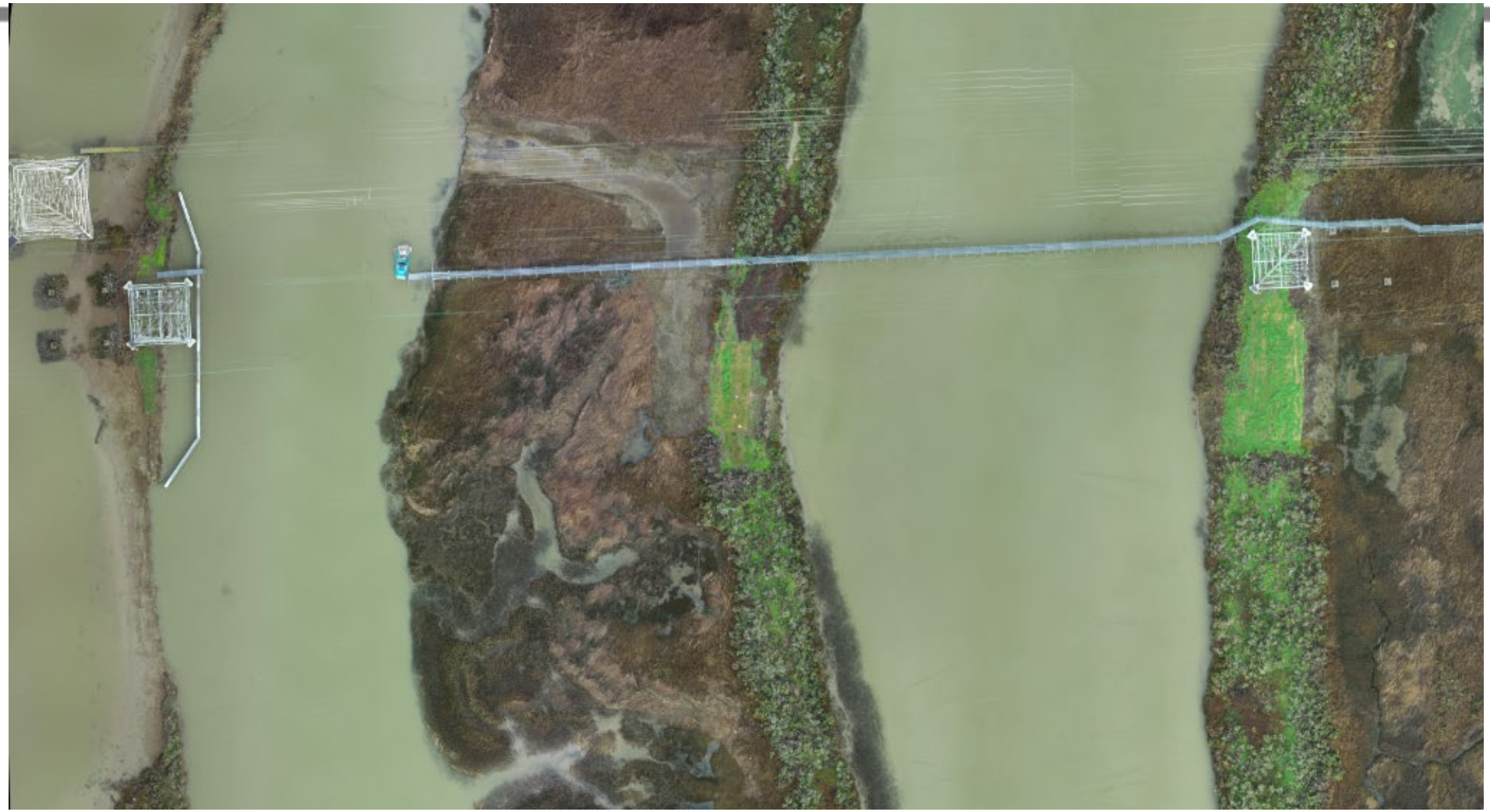
Drawn By: NM Checked By: SS

FIGURE 1

DUTCHMAN SLOUGH
POST DREDGE VOLUME CALCULATION RESULTS

FARALLON PN: 2461-003

POST-CONSTRUCTION MONITORING



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POST-CONSTRUCTION MONITORING

Section 401 certification permit issued by the SF RWQCB requires “monitoring of temporarily impacted and restored areas for a minimum of 5 years…”

POST-CONSTRUCTION MONITORING

- Crane Matting area elevations range from +3.5’NAVD88 to +5.5’NAVD88
- This area will be inundated at least partially each day due to compression from crane matting and construction.
- A daily cycle will have partial or complete inundation at the highest high tides, complete draining at low tide, partial inundation at low high tide and then another complete drain.
- Even the weakest high tide in 2022 (+3.7’) should partially inundate the area
- High tide at the site is experienced about 90 minutes after high tide at Mare Island

TEAM EFFORT

BALLARD MARINE CONSTRUCTION

PCH SURVEY
PACIFIC COAST HABITAT

IMPACT
Naval Architects

ICF

Steve Sullivan

LindMarine

FOUNDATION
DEEP FOUNDATION SOLUTIONS

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Bright People. Right Solutions.

GANDA
GARCIA and ASSOCIATES

Thank You