

# OAKLAND TURNING BASIN WIDENING FEASIBILITY STUDY

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# FEASIBILITY STUDY AND SCHEDULE



## Feasibility Study

- Determine Federal Interest
  - Economic Benefits
  - Environmental and Social Impacts
  - Cost
- Recommend a Solution
- End state ~ 10 to 30% design
- Submit Feasibility Report to USACE HQ in January 2024

## Congressional Authorization

- *Water Resources Development Act of 2024 (WRDA 24)*

## Pre-Construction Engineering and Design (PED)

- 2025\*

## Construction

- *Start Fall 2027\**
- *2-year duration*

**2005**      **1,139-ft long**  
(6,500 containers)



**Today**      **1,310-ft long**  
(20,000 containers)

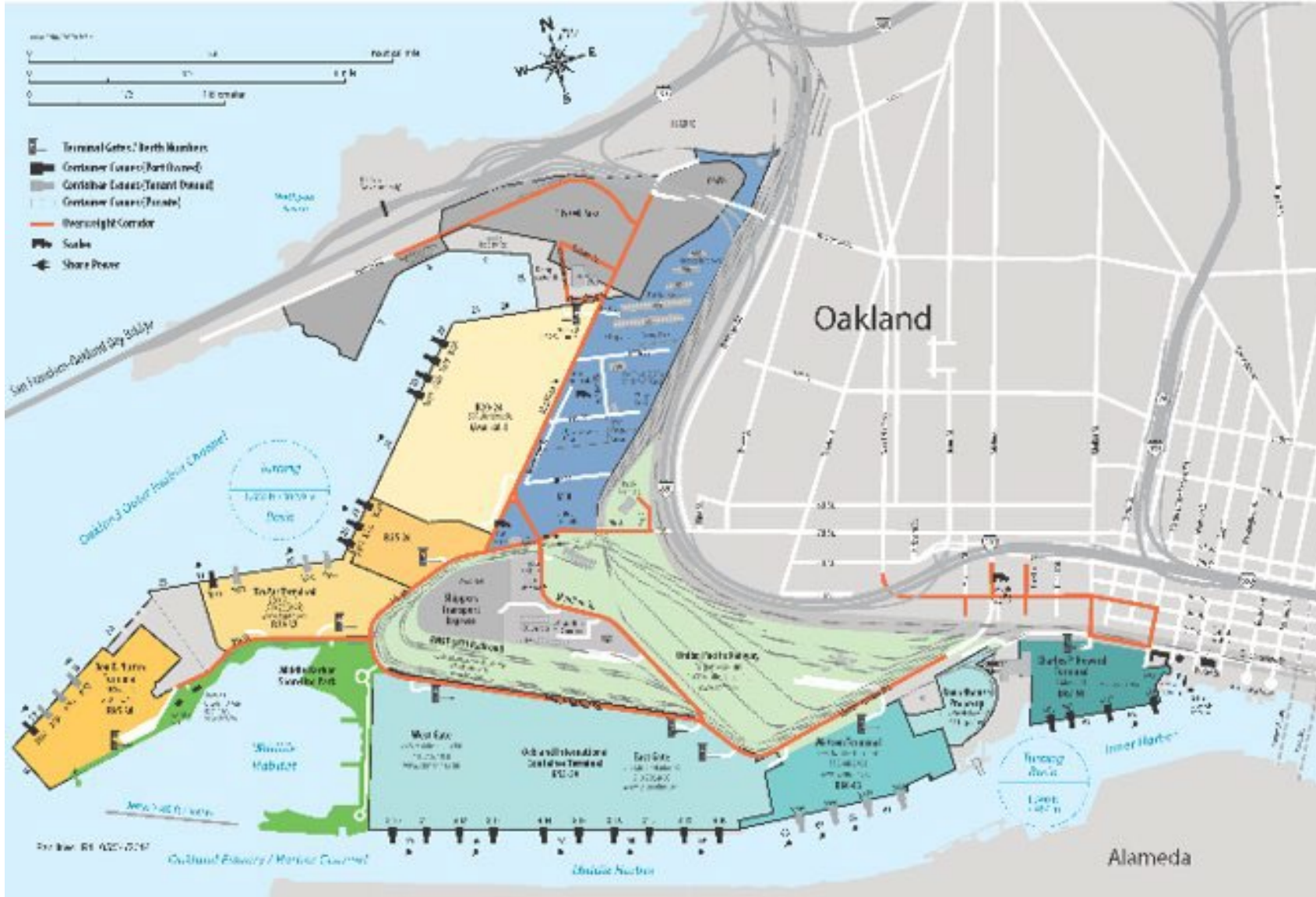


*\*Assumed date*



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# OVERVIEW





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# OUTER HARBOR – EXISTING CONDITIONS

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- TB Diameter = 1,650 ft
- Dredged to El. -50 feet
- 3:1 (H:V) side slopes







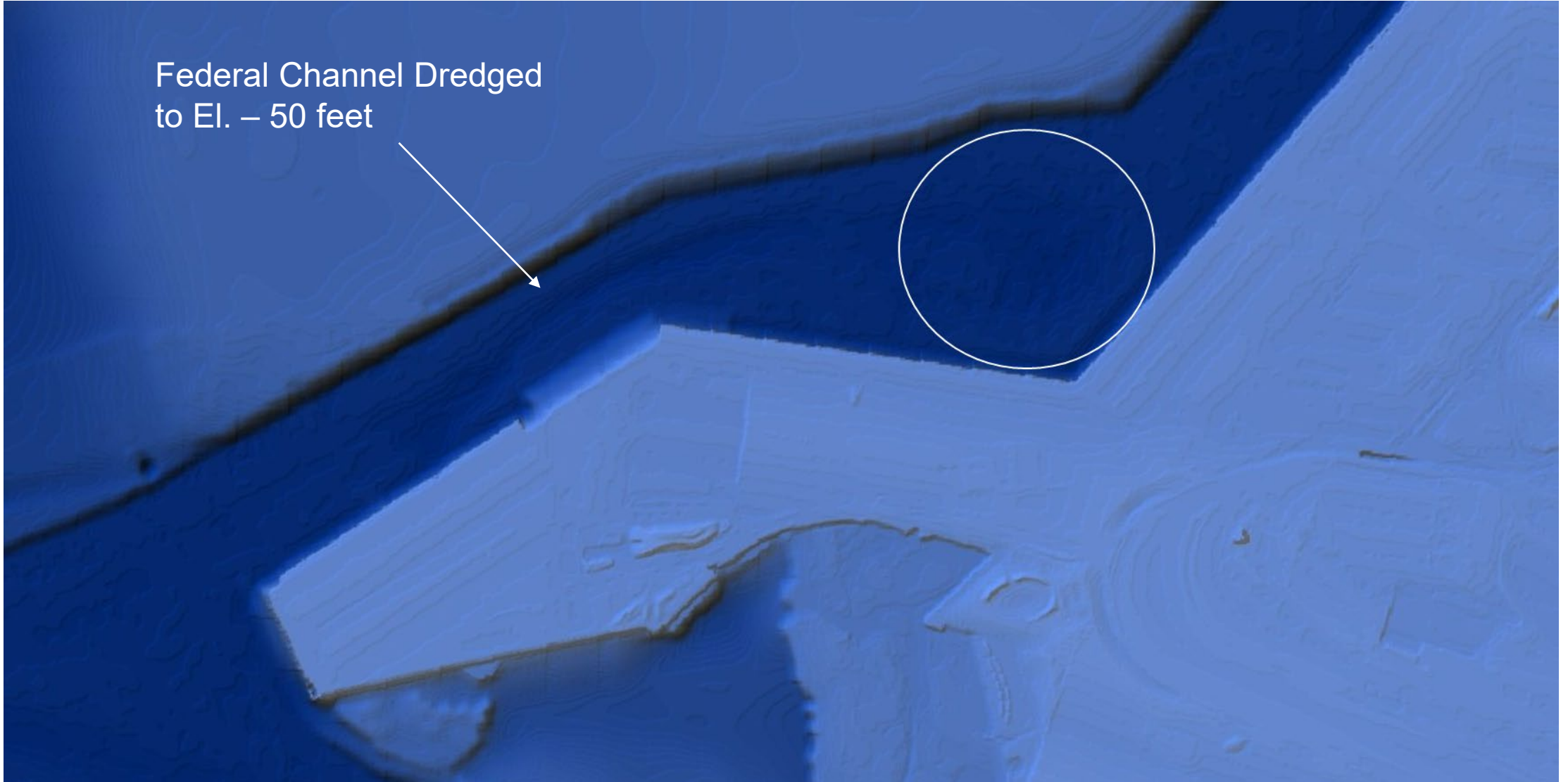
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# OUTER HARBOR – BATHYMETRIC SURVEY

5



Federal Channel Dredged  
to El. – 50 feet





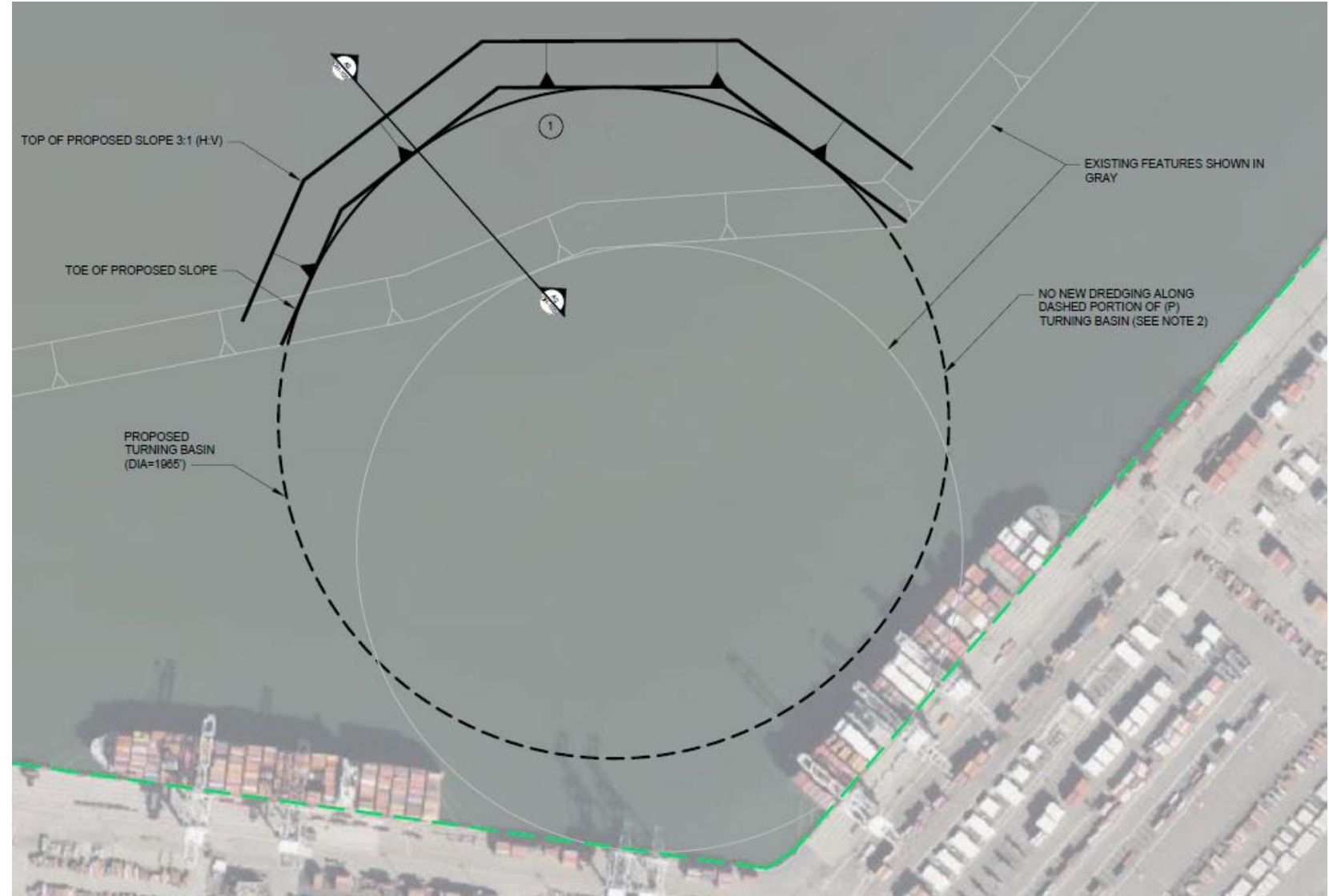
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# OUTER HARBOR – PROPOSED CONDITIONS

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- Proposed TB Diameter = 1,965 ft
- Dredged to El. -50 feet
- 3:1 (H:V) side slopes





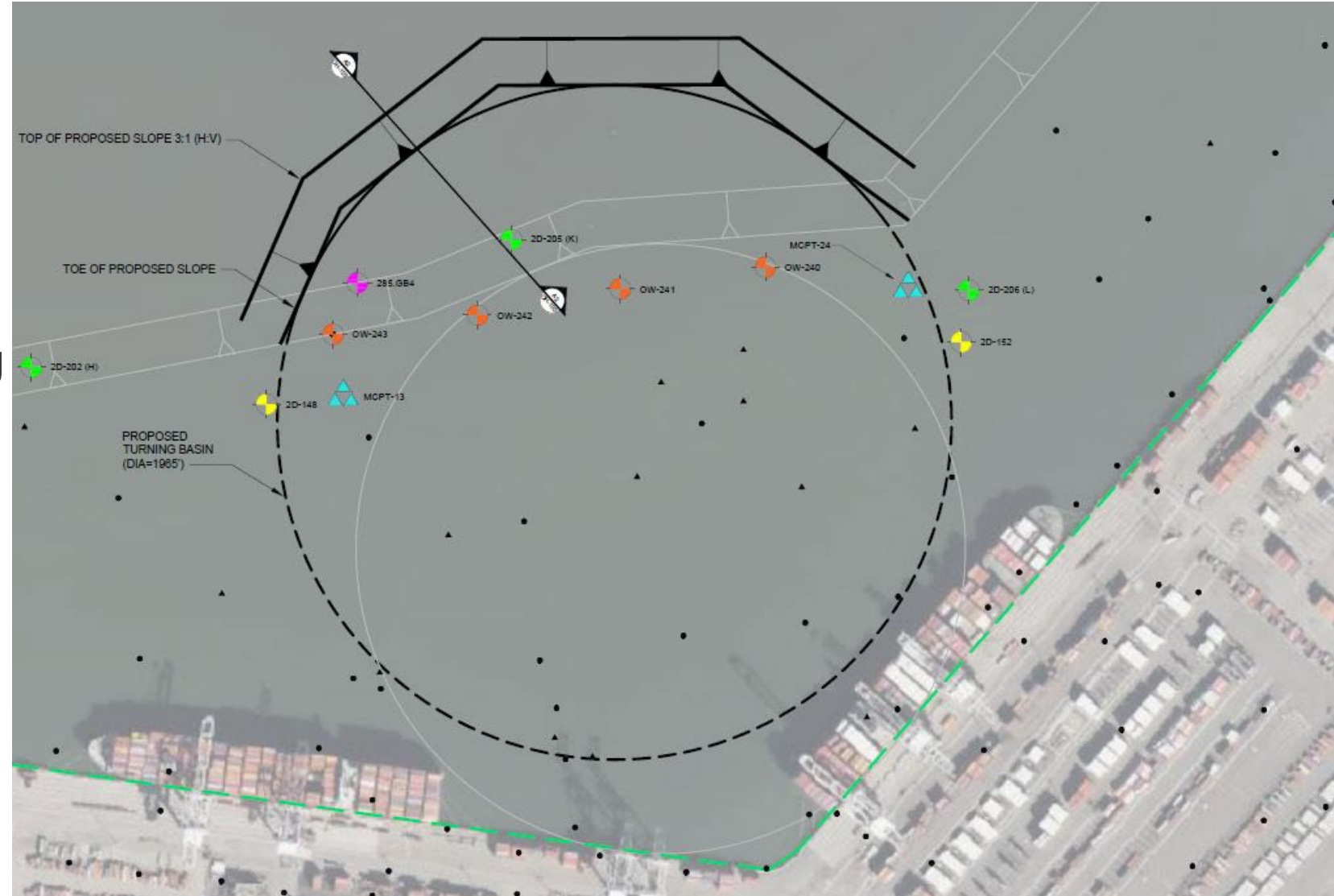
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# OUTER HARBOR – GEOTECHNICAL INFORMATION



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- YBM has been dredged from existing turning basin.
- Lack of information along proposed cut slopes.
- Additional exploration during PED phase to confirm soil conditions.



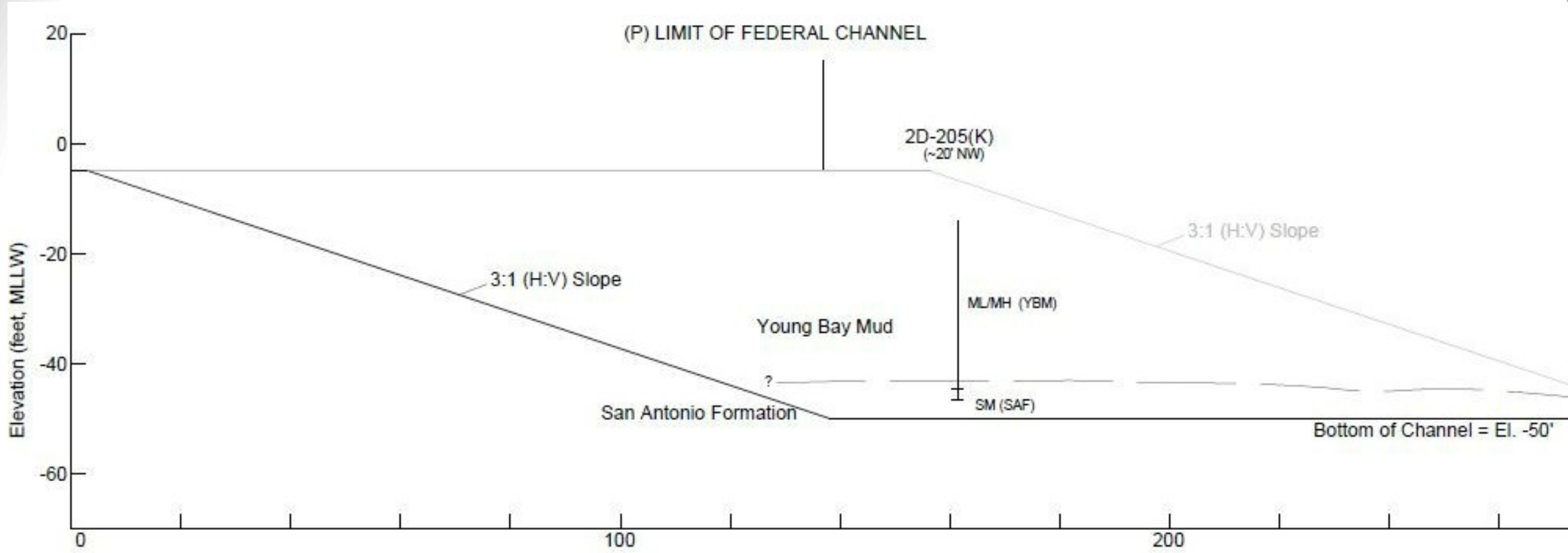


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# OUTER HARBOR – CROSS-SECTION



- Pro







# OUTER HARBOR – STABILITY ANALYSIS

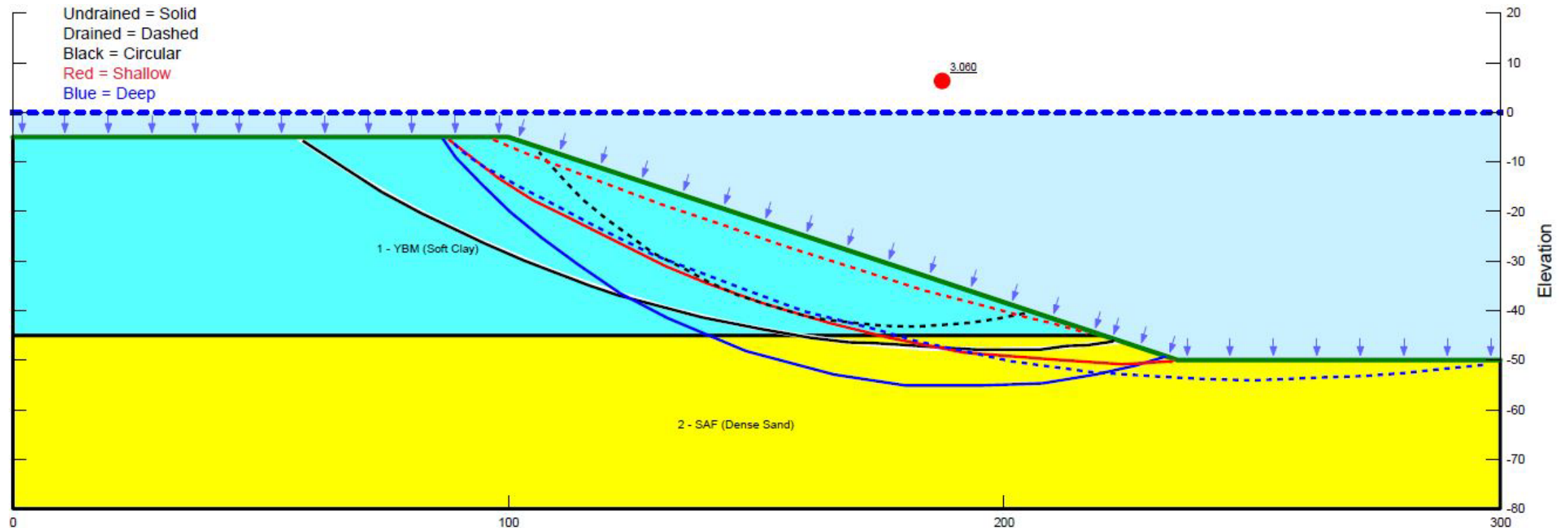


Soil Properties

Material	$\gamma_{sat}$ (pcf)	c (psf)	$\phi$ (deg)	c' (psf)	$\phi$ (deg)
YBM (soft clay)	90	50 + 12/ft	0	0	31
SAF (dense sand)	125	0	35	0	35

Minimum Factor of Safety

Case	Undrained	Drained
Circular (Slope/Toe)	3.06	2.01
Circular (Deep)	3.47	2.94
Wedge (Shallow)	3.36	1.76





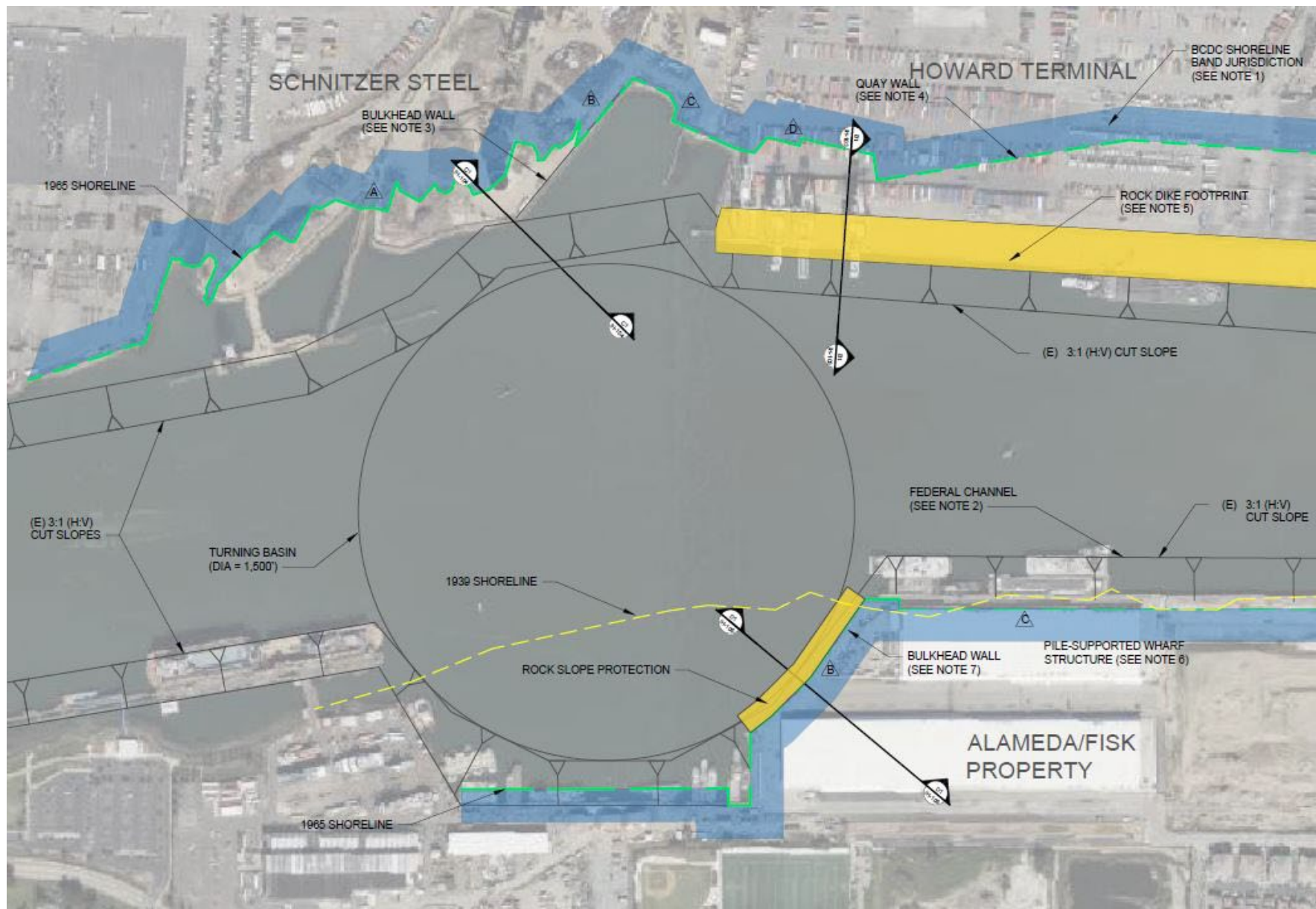
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# INNER HARBOR



Three project areas:

- Alameda
- Howard Terminal
- Schnitzer Steel Cove

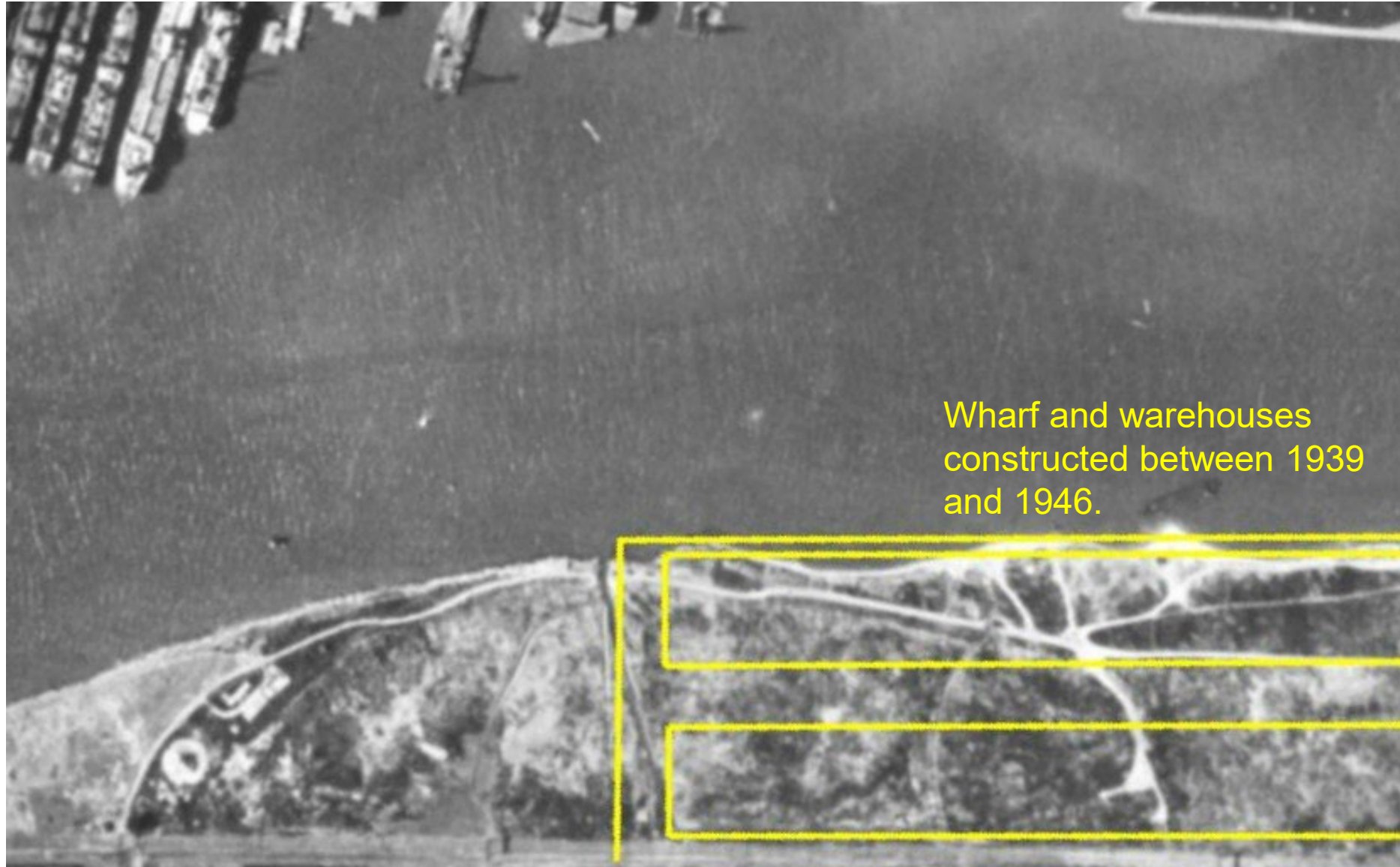




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# ALAMEDA - 1939

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# ALAMEDA - 1946

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# ALAMEDA - 2000



Pre- 50 Foot Deepening  
Project





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# ALAMEDA - 2023



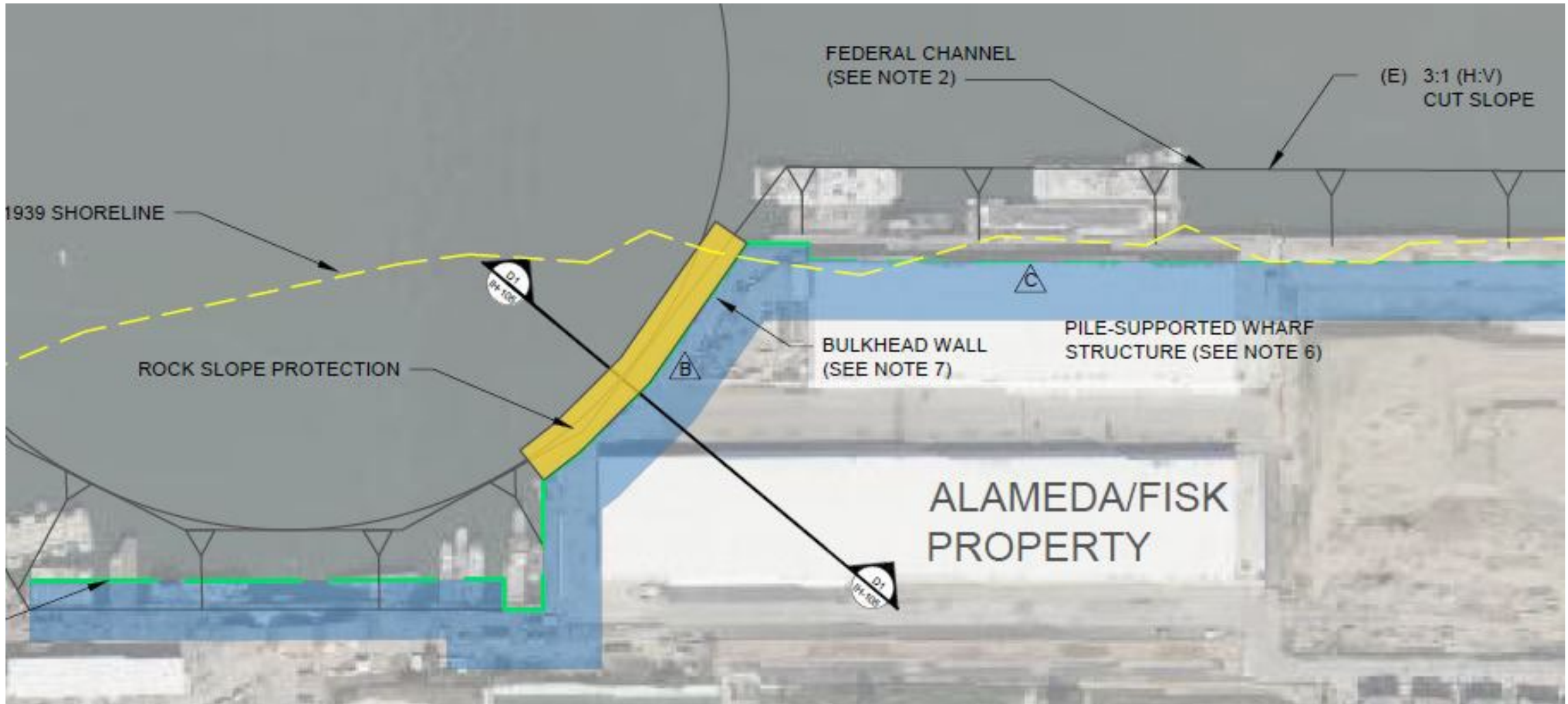
Bulkhead wall  
constructed for the -50  
Foot Deepening Project





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# ALAMEDA – EXISTING CONDITIONS

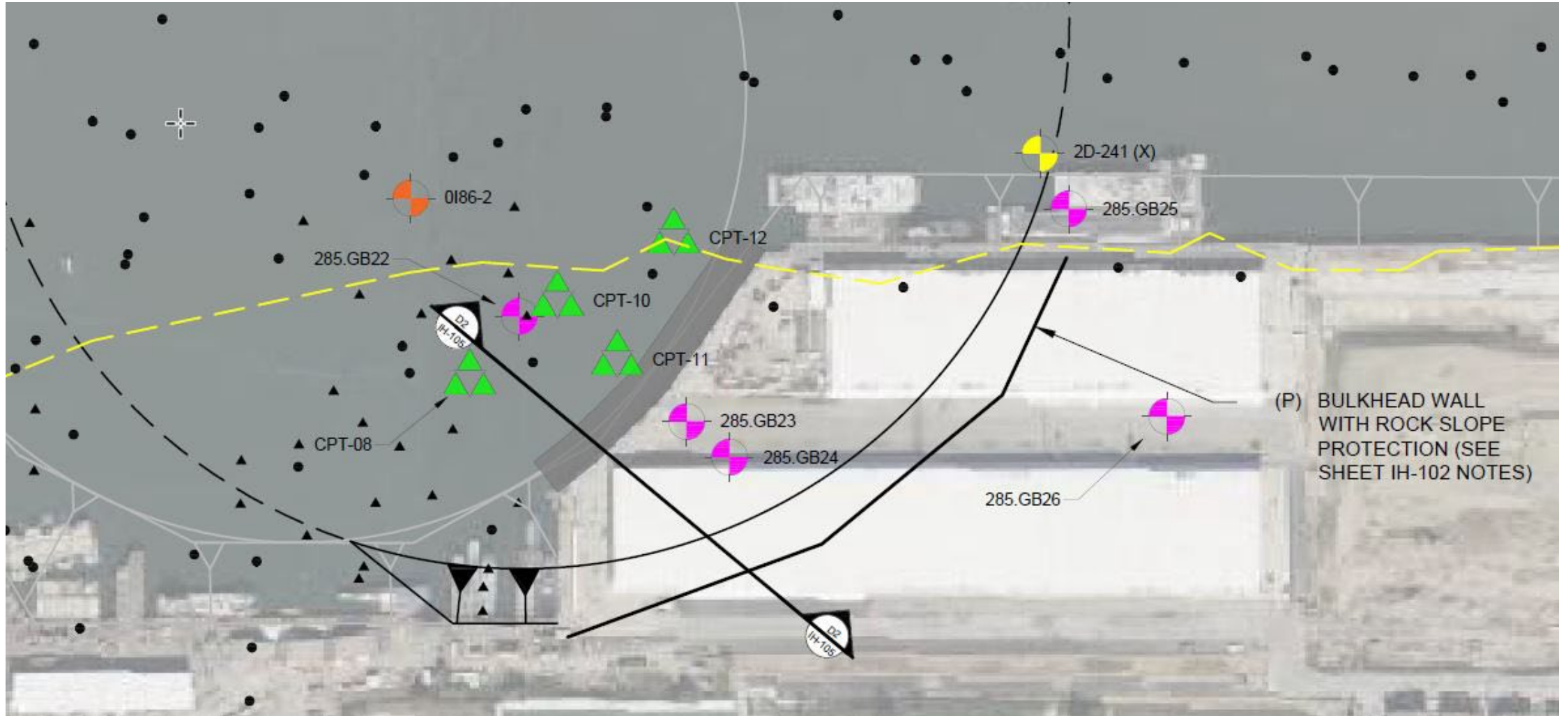






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# ALAMEDA – GEOTECHNICAL INFORMATION



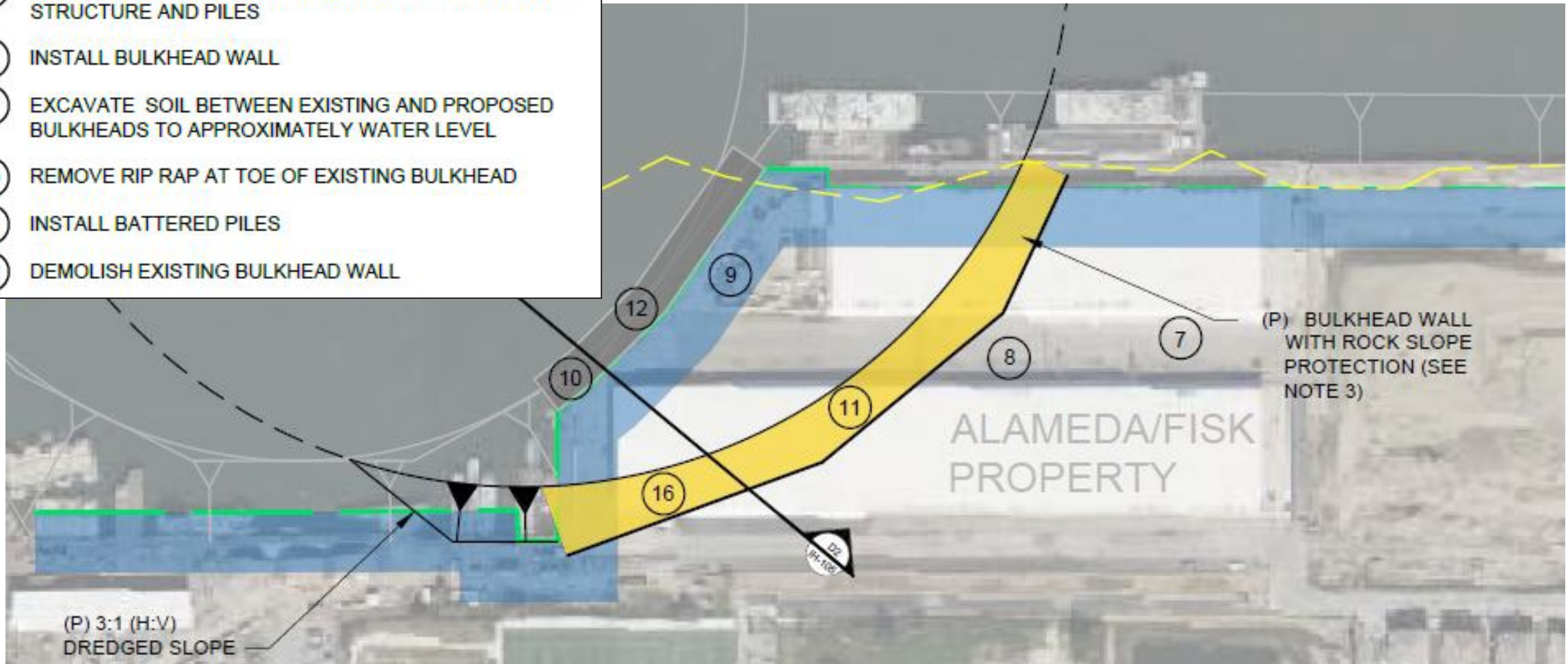


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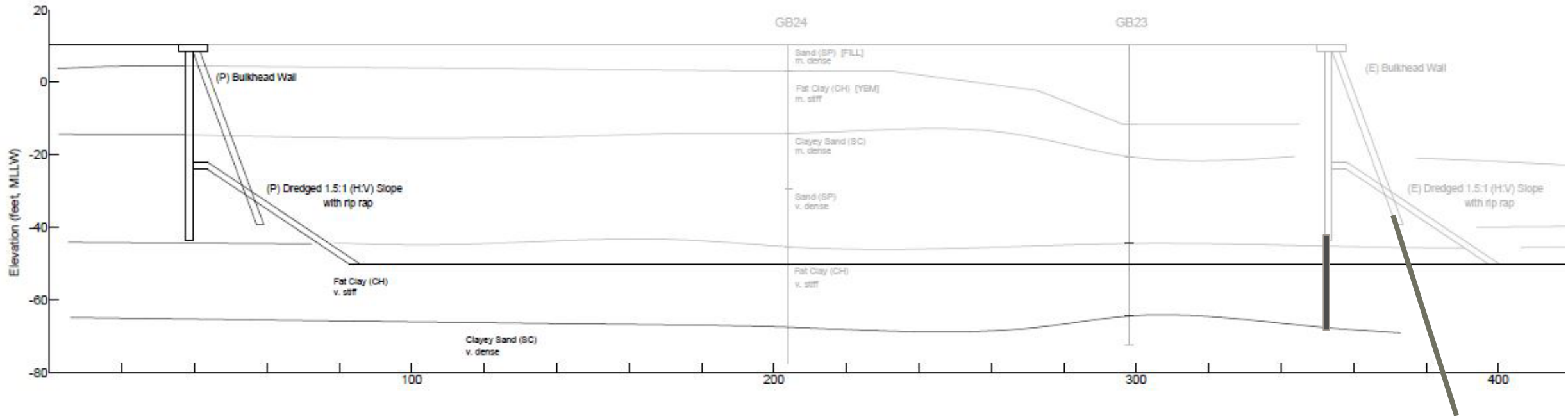
# ALAMEDA – PROPOSED CONDITIONS



- 7 DEMOLISH EXISTING WAREHOUSE BUILDINGS, WHARF STRUCTURE AND PILES
- 8 INSTALL BULKHEAD WALL
- 9 EXCAVATE SOIL BETWEEN EXISTING AND PROPOSED BULKHEADS TO APPROXIMATELY WATER LEVEL
- 10 REMOVE RIP RAP AT TOE OF EXISTING BULKHEAD
- 11 INSTALL BATTERED PILES
- 12 DEMOLISH EXISTING BULKHEAD WALL



# ALAMEDA – CROSS-SECTION



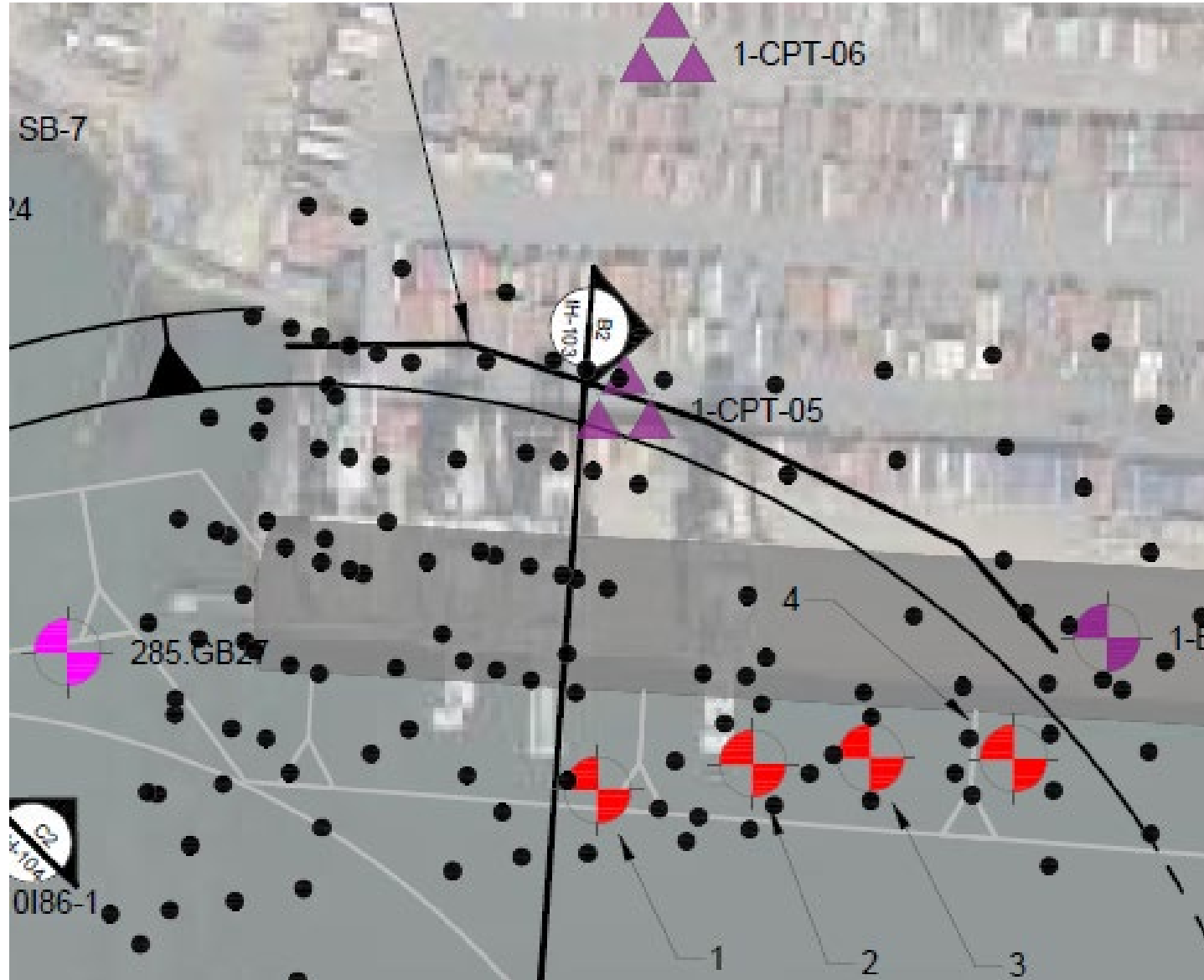
Questions about Alameda?



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# HOWARD TERMINAL – EXISTING CONDITIONS / GEOTECHNICAL

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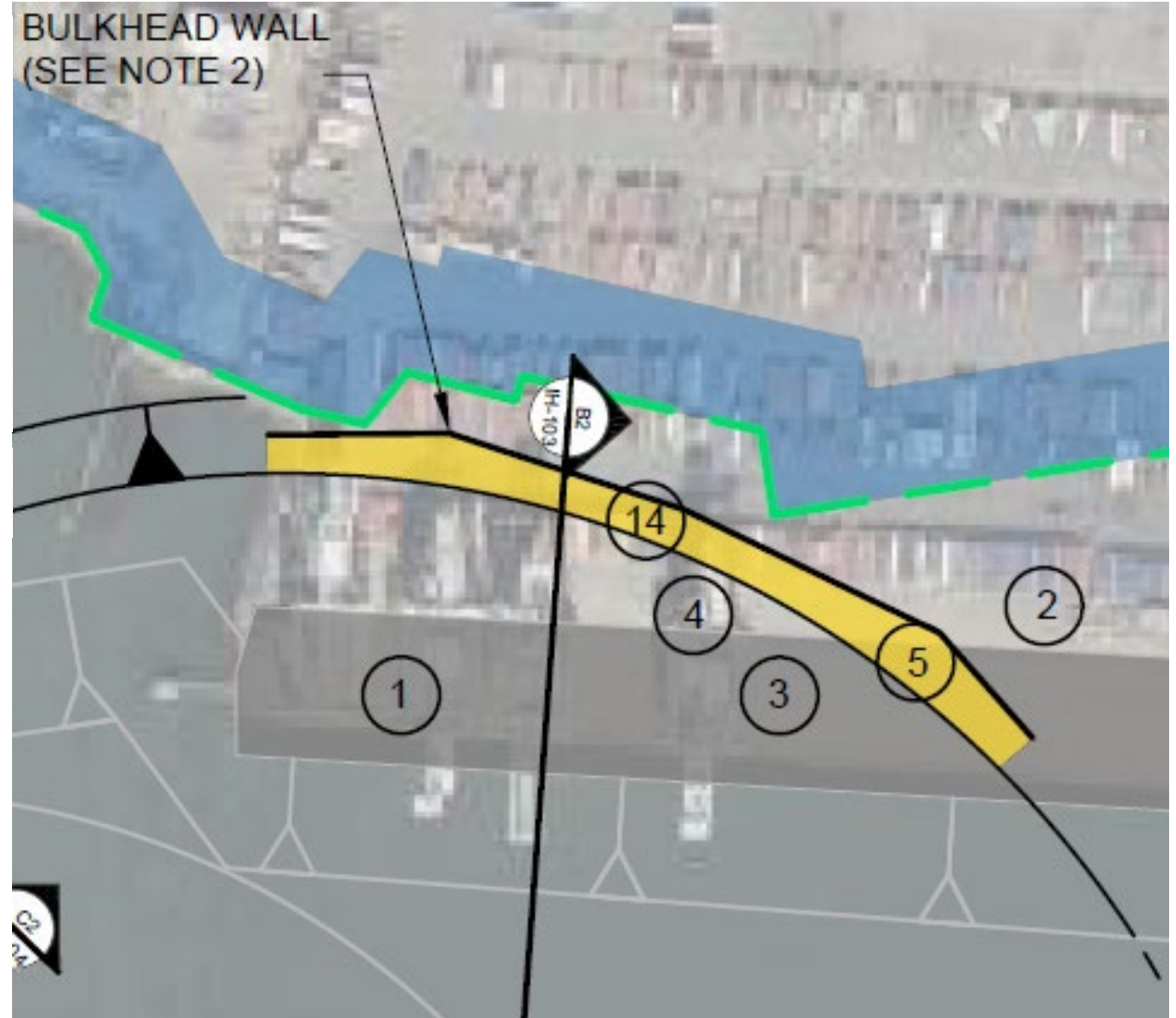
# HOWARD TERMINAL – PROPOSED CONDITIONS

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## CONSTRUCTION SEQUENCING:

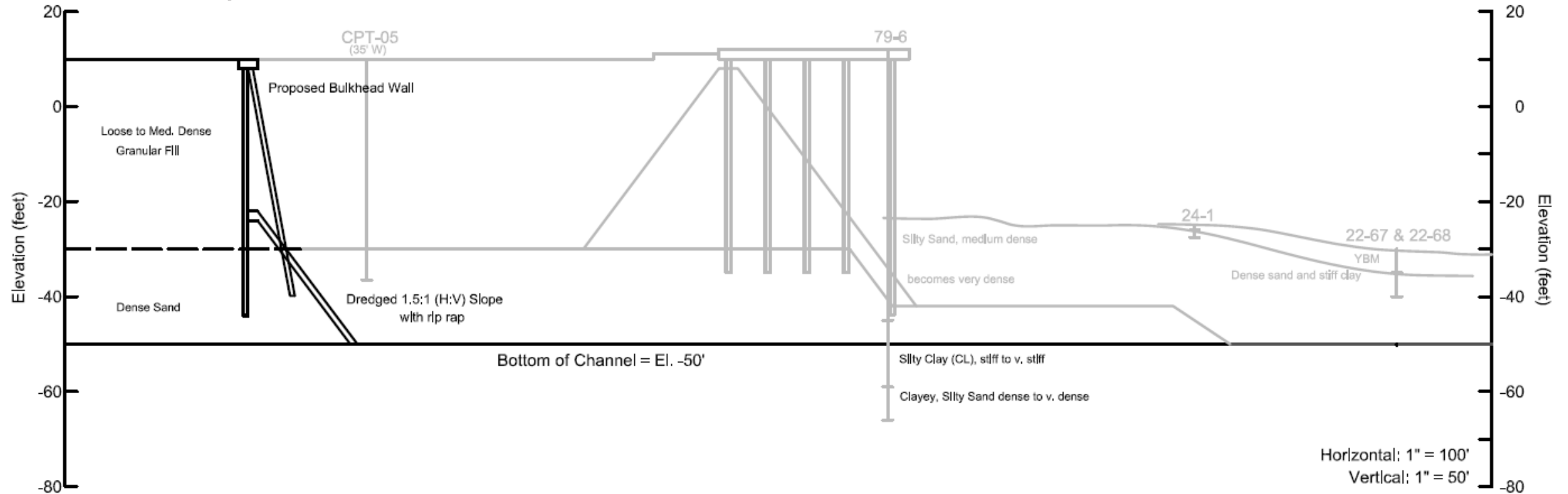
- 1 DEMOLISH PILE-SUPPORTED WHARF
- 2 INSTALL BULKHEAD WALL AND GROUND IMPROVEMENT, IF NECESSARY
- 3 REMOVE ROCK DIKE AND SOIL ABOVE WATER LEVEL
- 4 REMOVE ROCK DIKE AND SOIL ABOVE WATER LEVEL
- 5 INSTALL BATTERED PILES
- 14 INSTALL RIP RAP SLOPE PROTECTION IN FRONT OF HOWARD TERMINAL





# HOWARD TERMINAL – CROSS-SECTION

- Much of potentially-liquefiable material will be removed
- If feasible, construct a bulkhead wall similar to the Alameda bulkhead wall
- If necessary, may require ground improvement to improve soils behind the proposed wall
- CPT's to be performed in October

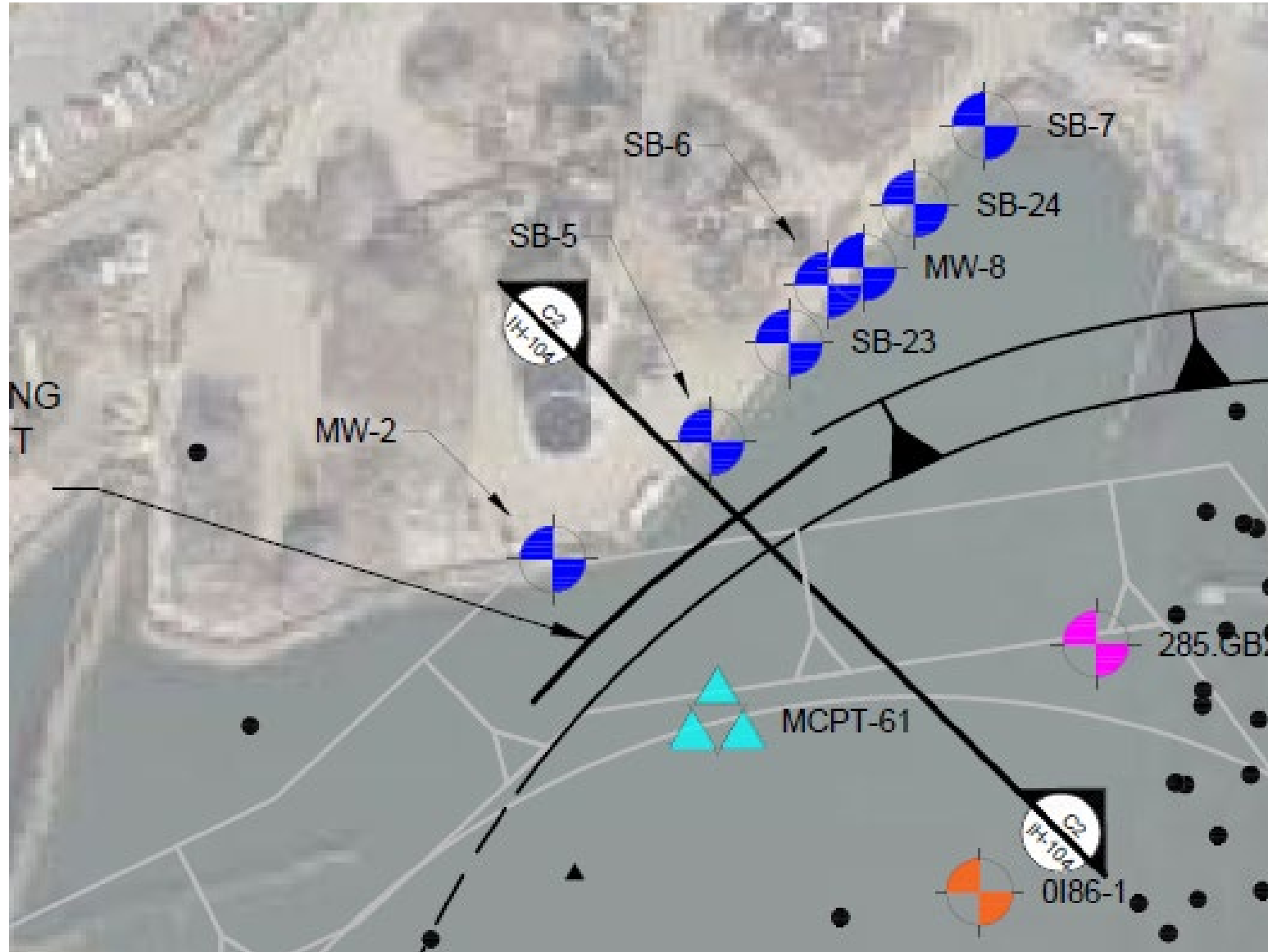


Questions about Howard Terminal?



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# SCHNITZER COVE – EXISTING CONDITIONS / GEOTECHNICAL



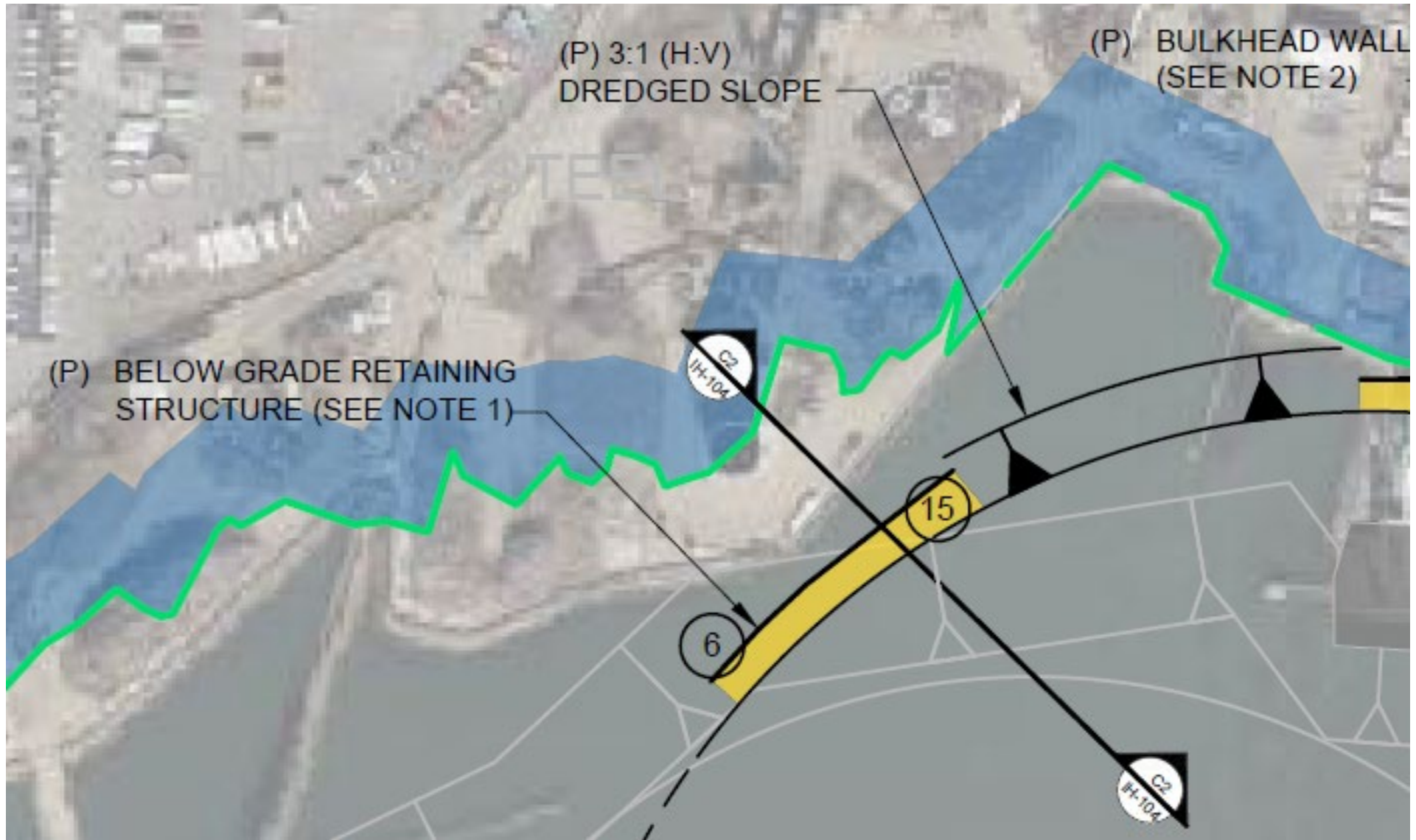




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# SCHNITZER COVE – PROPOSED CONDITIONS

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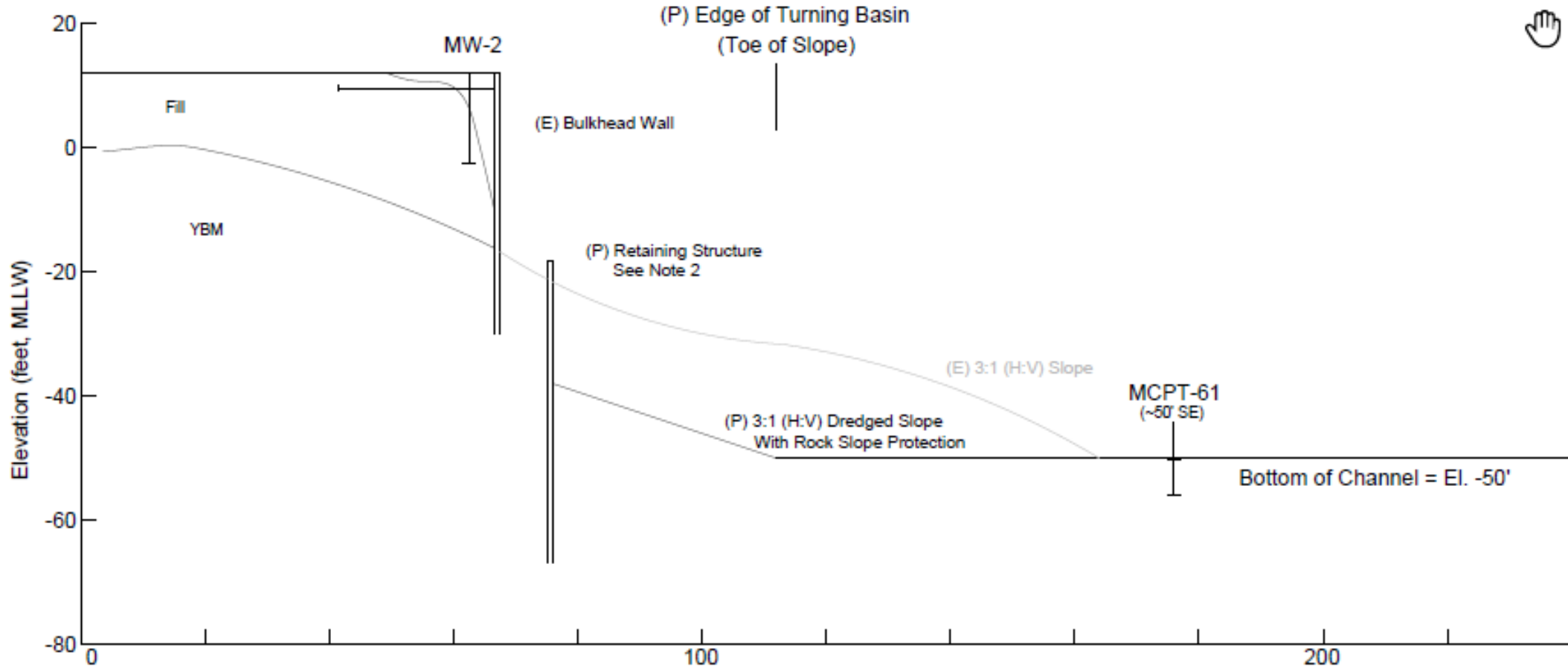


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# SCHNITZER COVE – CROSS-SECTION

- Alternative 1 – Below-Grade Retaining Structure w/ 3:1 (H:V) slope.
- Alternative 2 – Steepen the dredged slope; RSP buttress in lieu of wall.



Questions about Schnitzer Cove?





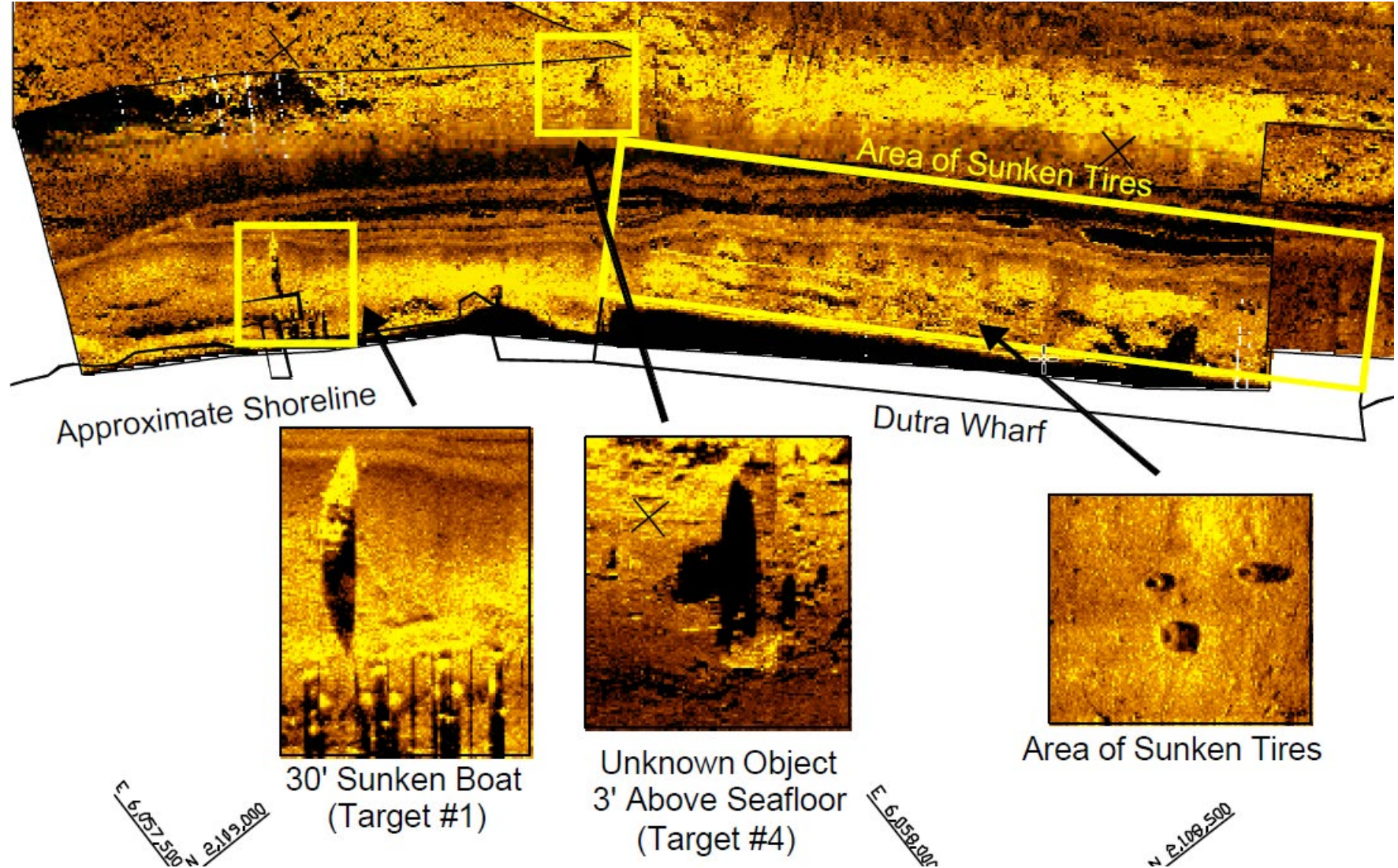
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# UPCOMING WORK (OCT-NOV 2023) (2/3)



## Geophysical Survey

- Bathymetric Survey
- *Side-Scan Sonar*
- Magnetometer
- Subbottom Profiler / Seismic Reflection







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# UPCOMING WORK (OCT-NOV 2023) (1/3)

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- Four CPTs along proposed wall alignment
- Eight sediments sampling locations to characterize soil for disposal
- Geophysical survey of the “Cove” to identify obstructions and estimate depth of soft sediments







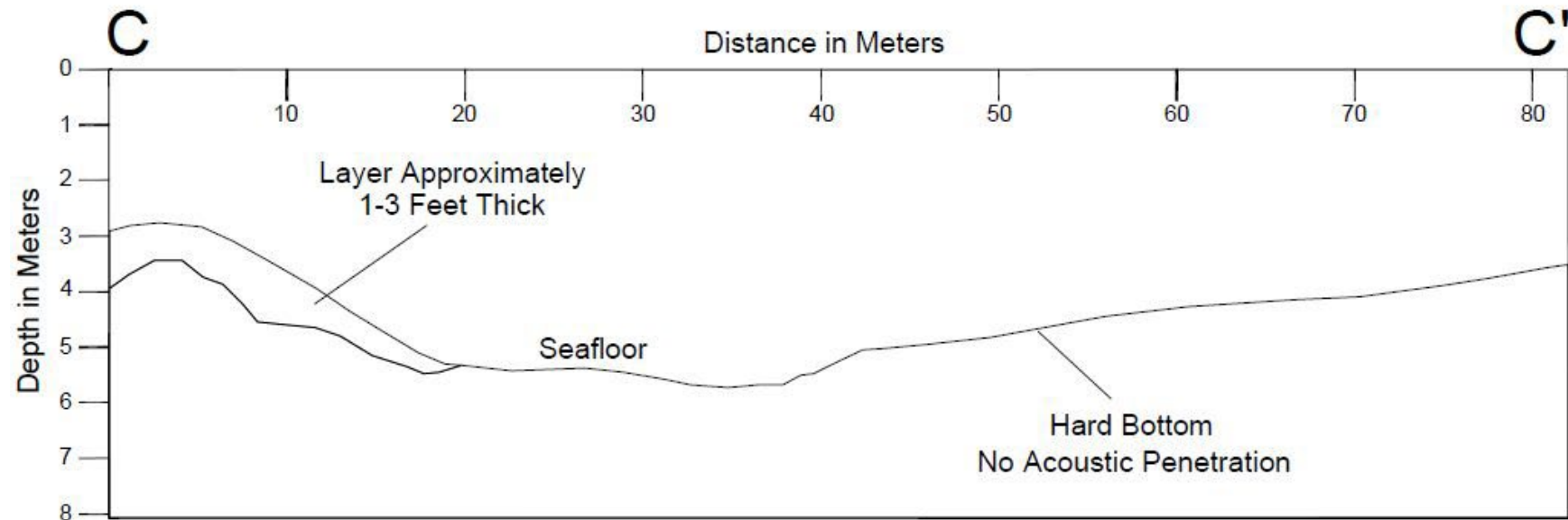
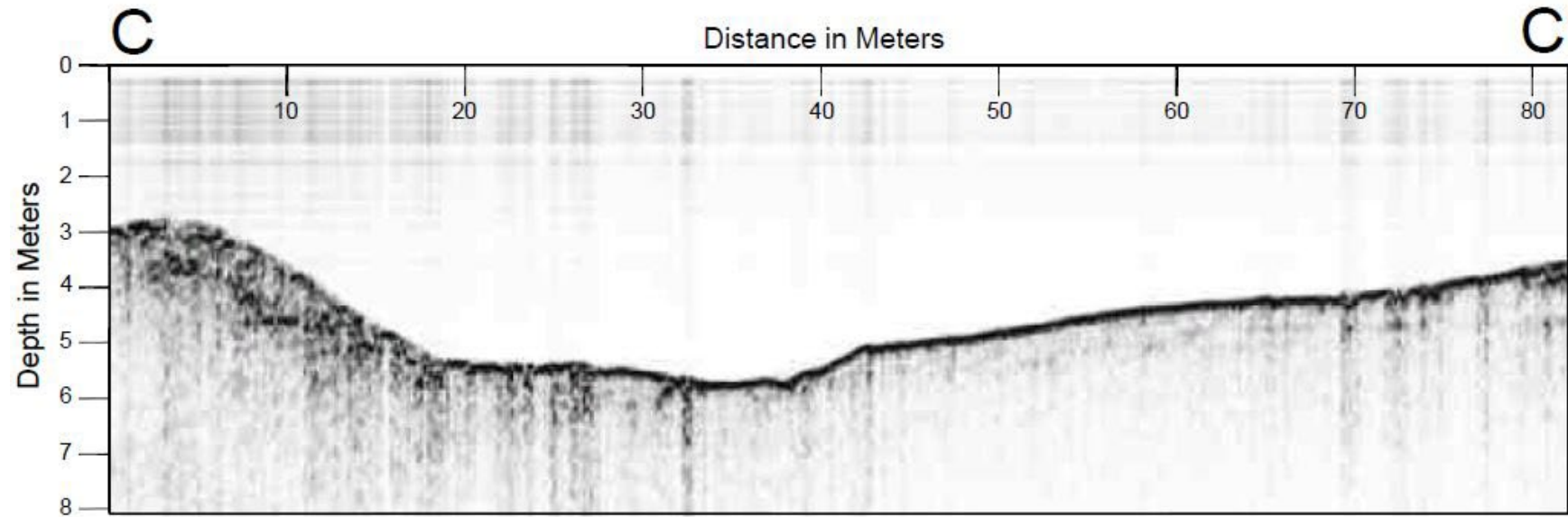
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# UPCOMING WORK (OCT-NOV 2023) (3/3)



## Geophysical Survey

- Bathymetric Survey
- Side-Scan Sonar
- Magnetometer
- *Subbottom Profiler / Seismic Reflection*





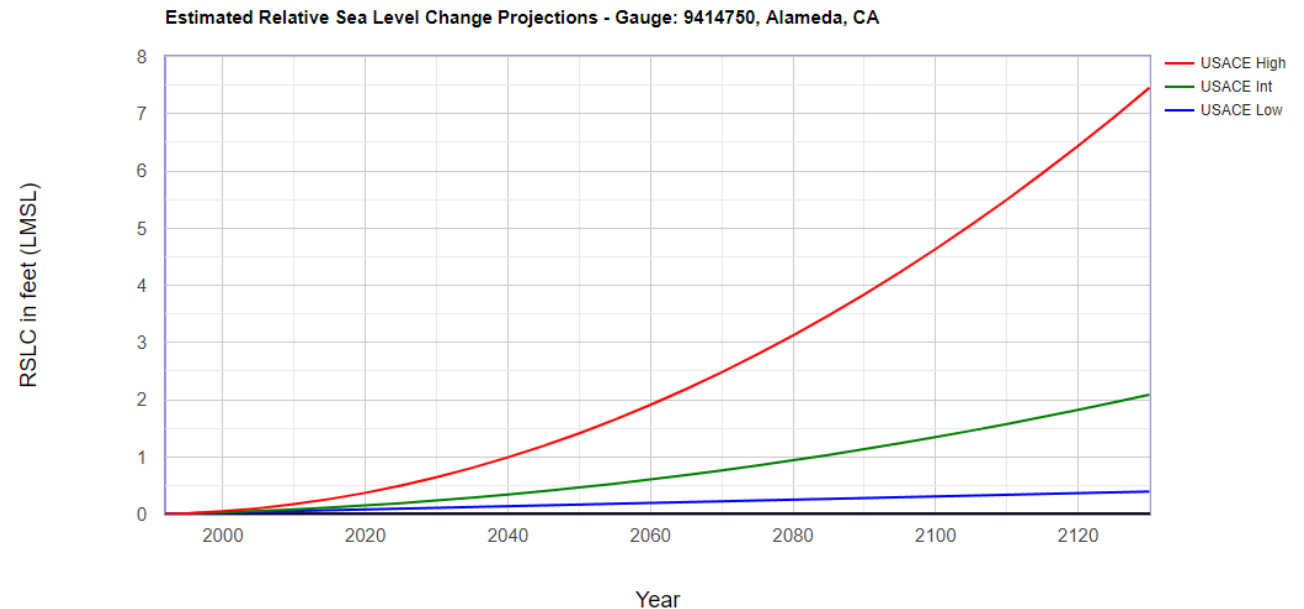
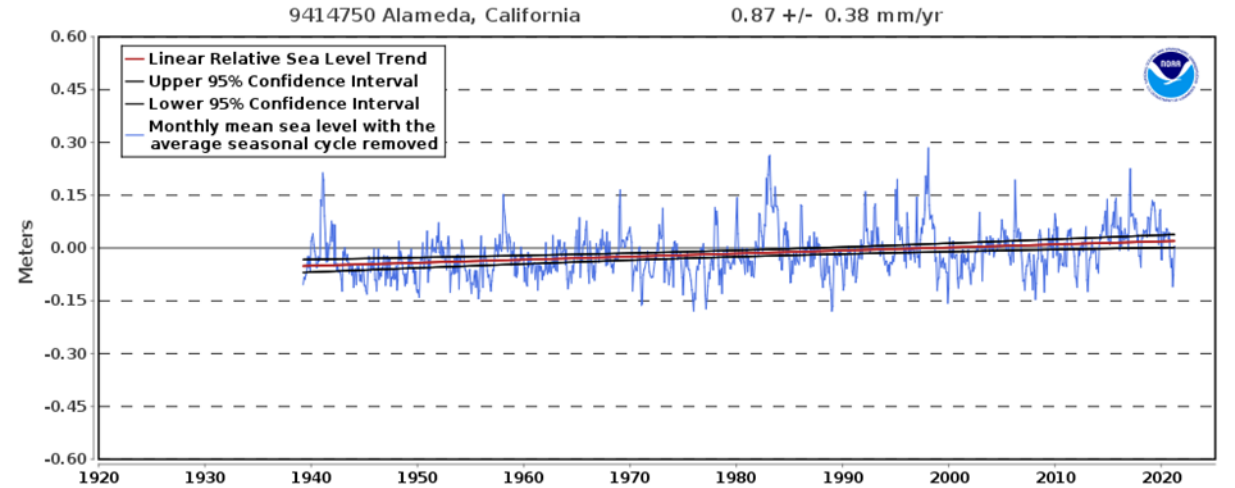
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# SEA LEVEL CHANGE ANALYSIS (1/3)

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- Engineering Regulation 1100-2-8162
- All USACE planning studies and engineering designs are to evaluate three scenarios of sea-level change (SLC) - “low”, “intermediate”, and “high”
- Relative sea level trend of 0.87 mm/yr from NOAA station 9414750, Alameda
- Projections determined using a base year of 1992, date of current tidal to land datum adjustment
- The project base year is 2030, the 50-year economic period of analysis is 2030-2080 and the 100-year adaptation horizon is 2030-2130.





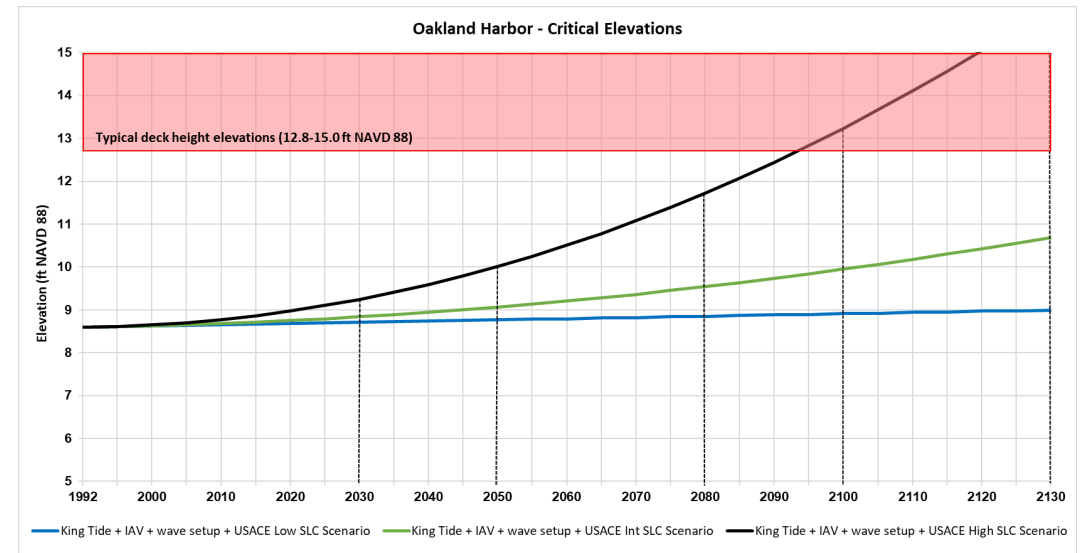
# SEA LEVEL CHANGE ANALYSIS (2/3)



- Analysis was completed to determine functionality of Port during frequently occurring high tide events (king tides) with future projected SLC scenarios
- Inundation of the terminal deck is avoided under the low and medium scenarios for all years, and until approximately year 2095 under the high SLC scenario.
- Low overall risk to the inner and outer harbor crane decks over the 100-year project life cycle for sea level rise impacts over the range of potential trajectories evaluated with USACE SLC scenarios.

	2080 Low SLC	2080 Int SLC	2080 High SLC	2130 Low SLC	2130 Int SLC	2130 High SLC
1. Predicted king tide at Alameda gage (ft NAVD 88)	7.6					
2. Estimated Interannual Variability (ft)	0.7					
3. Estimated Wave Setup (ft)	0.3					
4. Projected RSLC (ft)	0.3	0.9	3.1	0.4	2.1	7.5
<b>5. Total Water Surface Elevation (1+2+3+4) (ft NAVD 88)</b>	<b>8.9</b>	<b>9.5</b>	<b>11.7</b>	<b>9.0</b>	<b>10.7</b>	<b>16.1</b>
<b>Minimum Elevation Threshold for Charles P Howard Terminal Deck Height (ft, NAVD88)</b>	<b>12.5</b>					

Predicted king tide is average of NOAA annual maximum predicted tides for the Alameda station (9414750) from 1983-2001.



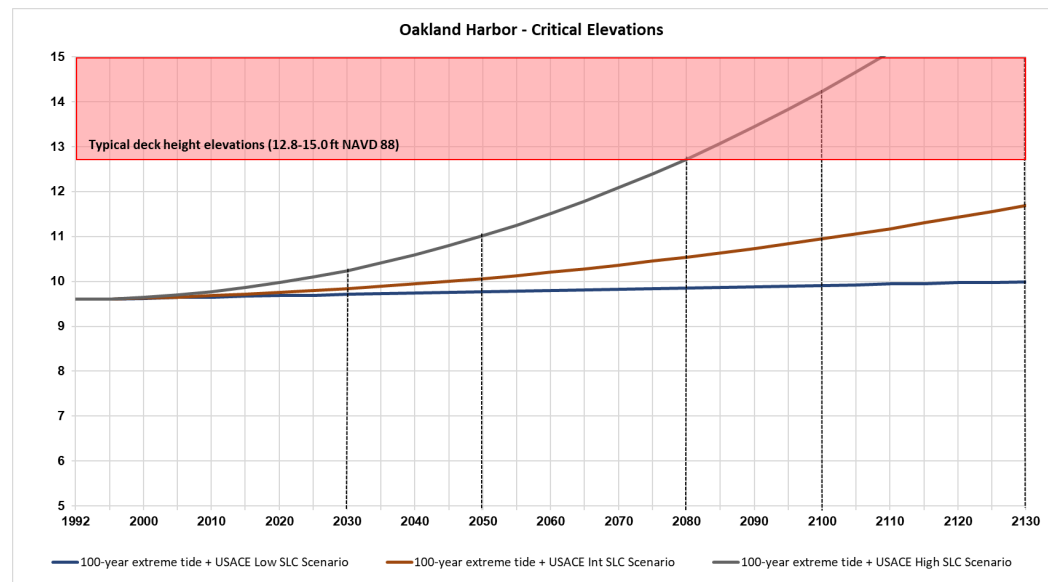


# SEA LEVEL CHANGE ANALYSIS (3/3)



- Additionally, during extreme tide events with projected SLC:
- The terminal decks avoid inundation under extreme tide conditions with projected SLC in 2050 for all scenarios.
- Inundation is avoid under extreme tide conditions with projected SLC in 2100 for all scenarios except the high projection.

	2050 Low SLC	2050 Int SLC	2050 High SLC	2100 Low SLC	2100 Int SLC	2100 High SLC
1. 100-year extreme tide based on AEOCM Report, 2016 (Point ID 560) (ft, NAVD88)	9.6					
2. Projected RSLC per USACE, 2013 (ft)	0.17	0.46	1.41	0.31	1.35	4.63
3. Total Estimated Water Surface Elevation (1+2) (ft NAVD 88)	9.77	10.06	11.01	9.91	10.95	14.23
Minimum Elevation Threshold for Charles P Howard Terminal Deck Height (ft, NAVD88)	12.8					







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# QUESTIONS FOR THE BOARD

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What is the current state-of-the-practice for seismic lateral earth pressures on retaining walls, with and without liquefiable backfill?



# THANK YOU!

Please contact me for more information: [bernard.r.wair@usace.army.mil](mailto:bernard.r.wair@usace.army.mil)