

Shoreline MGP Site Remediation



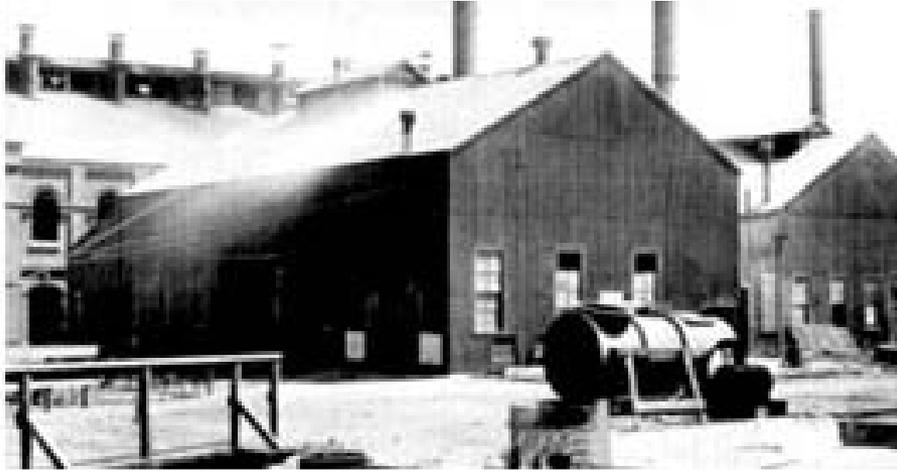
GREAT LAKES
ENVIRONMENTAL &
INFRASTRUCTURE



INTRODUCTION

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- Interim shoreline maintenance project
- Former MGP site and power plant
- Scope of work involved removal of existing debris, excavation of soil and MGP waste, installation of reactive core mat (RCM), placement of rock revetment
- Challenging conditions working in high visibility urban setting and client concerns with environmental regulatory oversight
- Work completed in the winter of 2010
- Contract value approximately \$1M

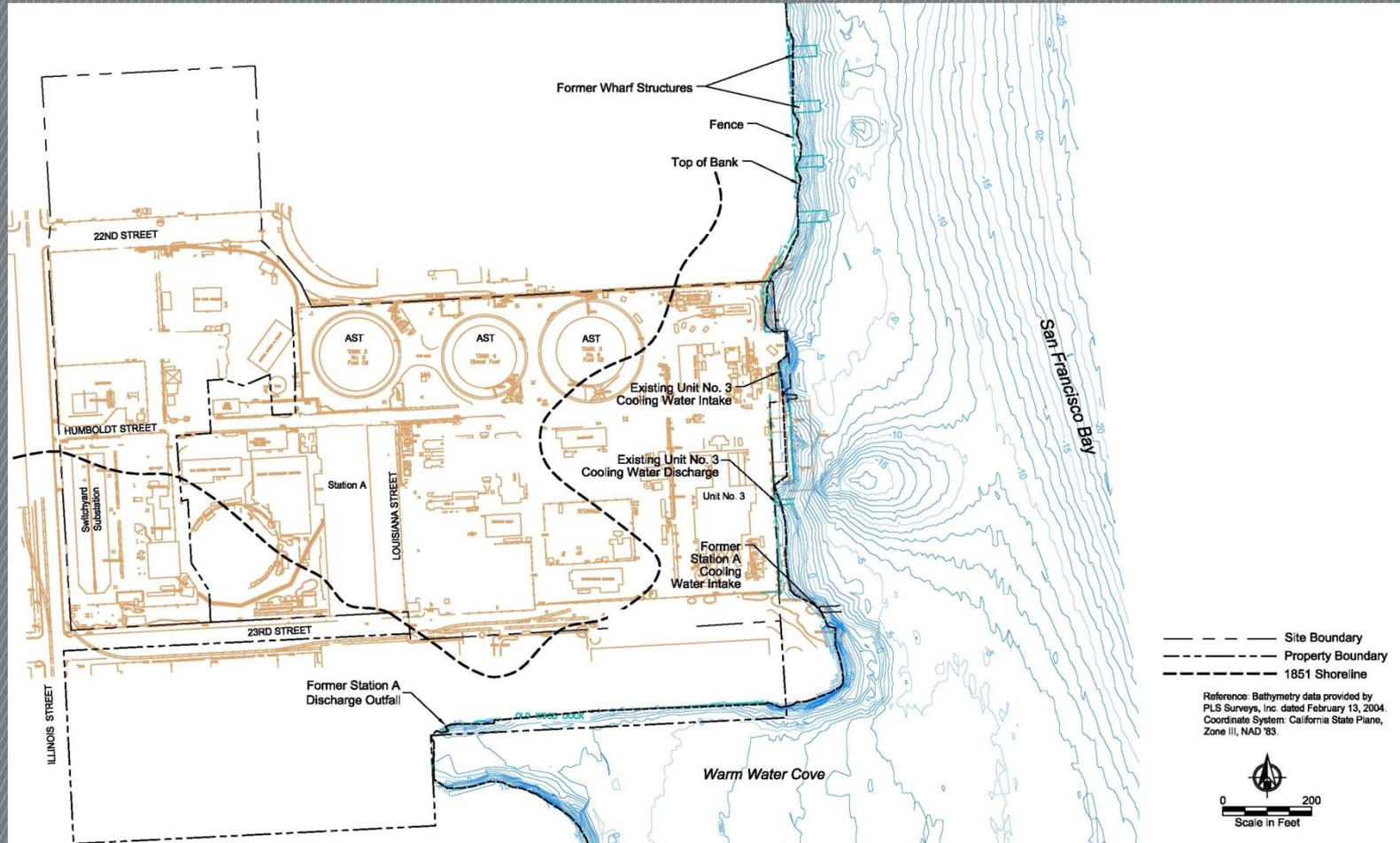


SITE HISTORY

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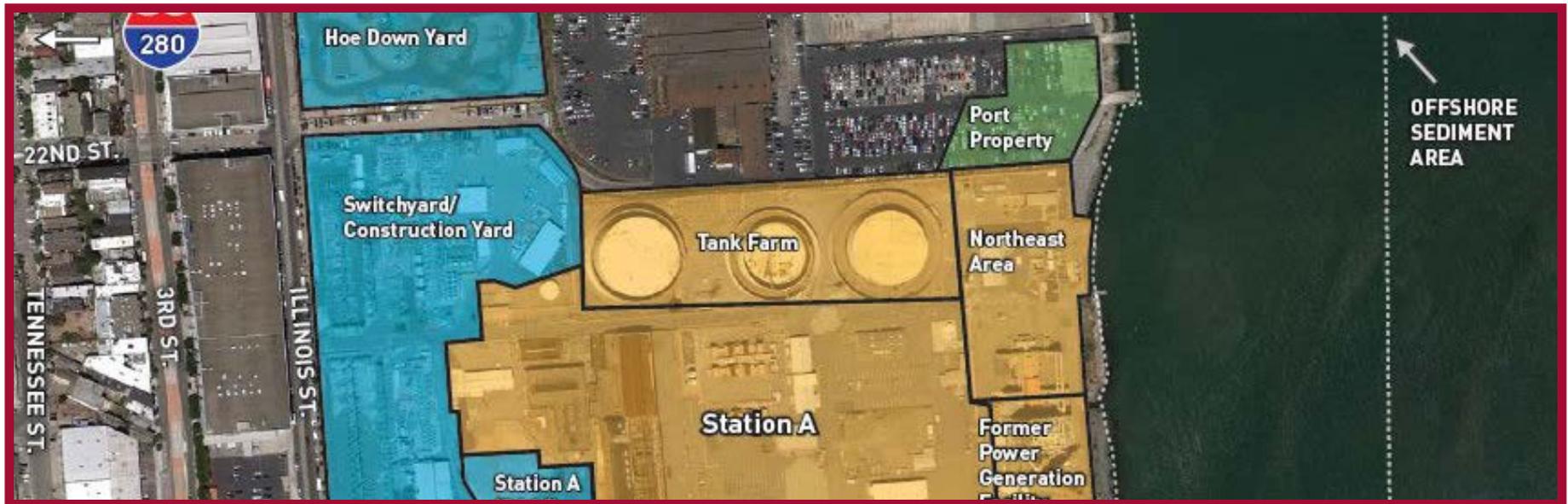
- Industrial activities since mid-1800's
- Operated MGP from 1870's to 1930's.
 - Used coal and oil to produce gas for lighting, heating and cooking
 - Arrival of natural gas in 1930's, MGP were no longer needed
- Existing power plant built in 1910's, expanded in 1960's
- Plant shutdown in 2011 following completion of Trans Bay Cable
- Previous owner taking responsibility of former operations
- Environmental impacts associated with leftover MGP residues
 - Polycyclic aromatic hydrocarbons (PAHs)
 - Volatile organic compounds (VOCs)
 - No health risk to the public

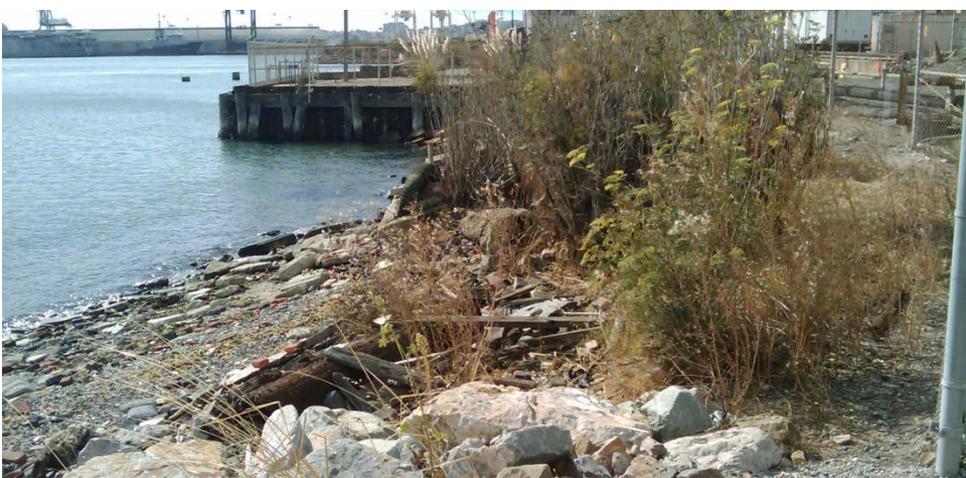
SITE MAP



SITE REMEDIATION

- Site divided into seven (7) work areas
- Work completed in three (3) areas - Hoe-Down Yard, Switchyard / General Construction Yard, Station A
- Our work area not shown – Shoreline Revetment
- Future upland stabilization, offshore sediment excavation / capping



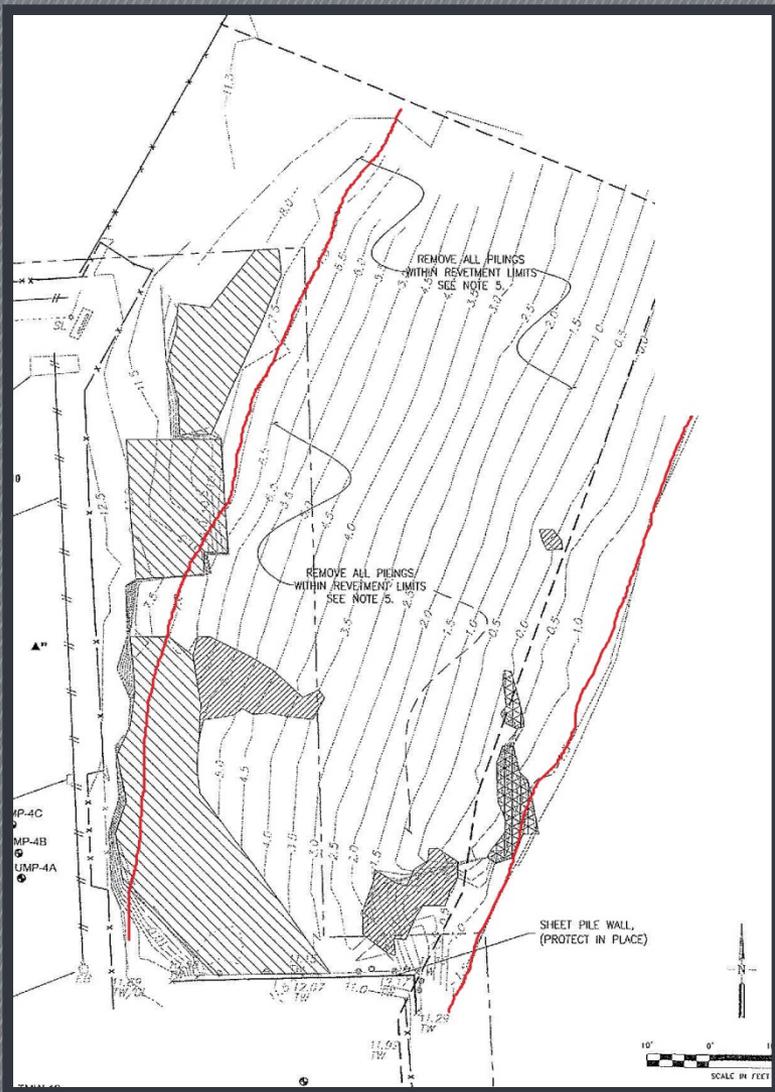


SCOPE OF WORK

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- Staging Area / Site Preparation
- Removal of Site Debris and Demolition
- Turbidity Curtain / Absorbent Boom Installation
- Excavation of MGP Impacted Waste
- Temporary Stockpile of Impacted Waste
- Offsite Transportation and Disposal
- Placement of Reactive Core Mat (RCM)
- Placement of Filter and Revetment Stone
- Site Restoration

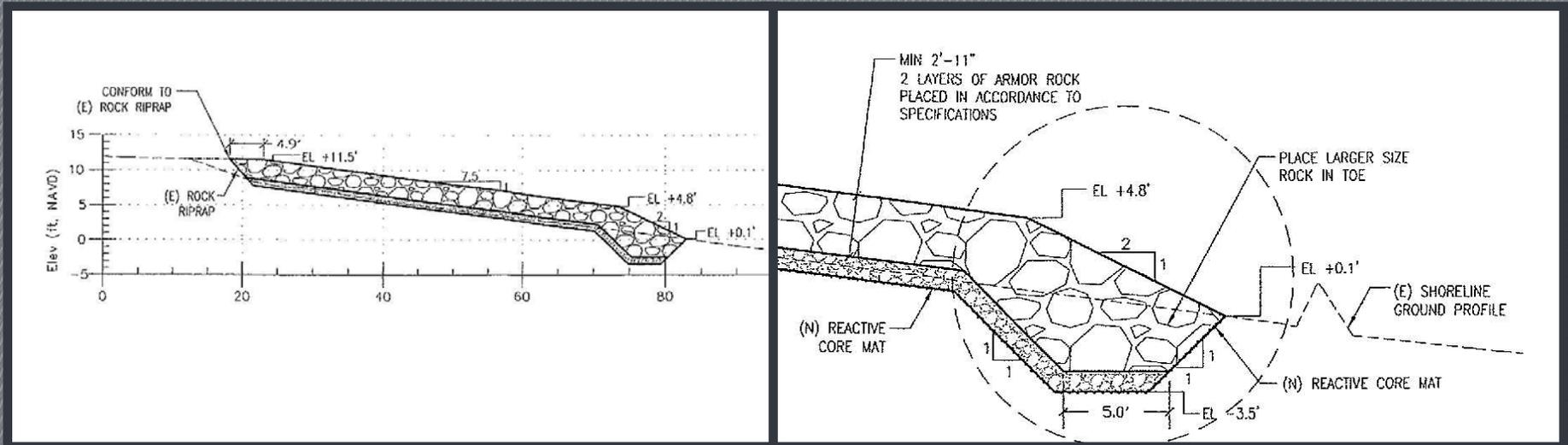
REVETMENT SITE PLAN



- Revetment Area approx. 135' x 65'
- Removal of 100 TN debris
- Excavation of 500 CY MGP waste
- Placement of 9,000 SF RCM
- Placement of 800 TN Filter Rock
- Placement of 1500 TN Armor Rock
- Work within the tidal zone
- Tides range from -1.5 to +7.0 ft-msl
- Work performed during low tide cycles

REVETMENT CROSS SECTION

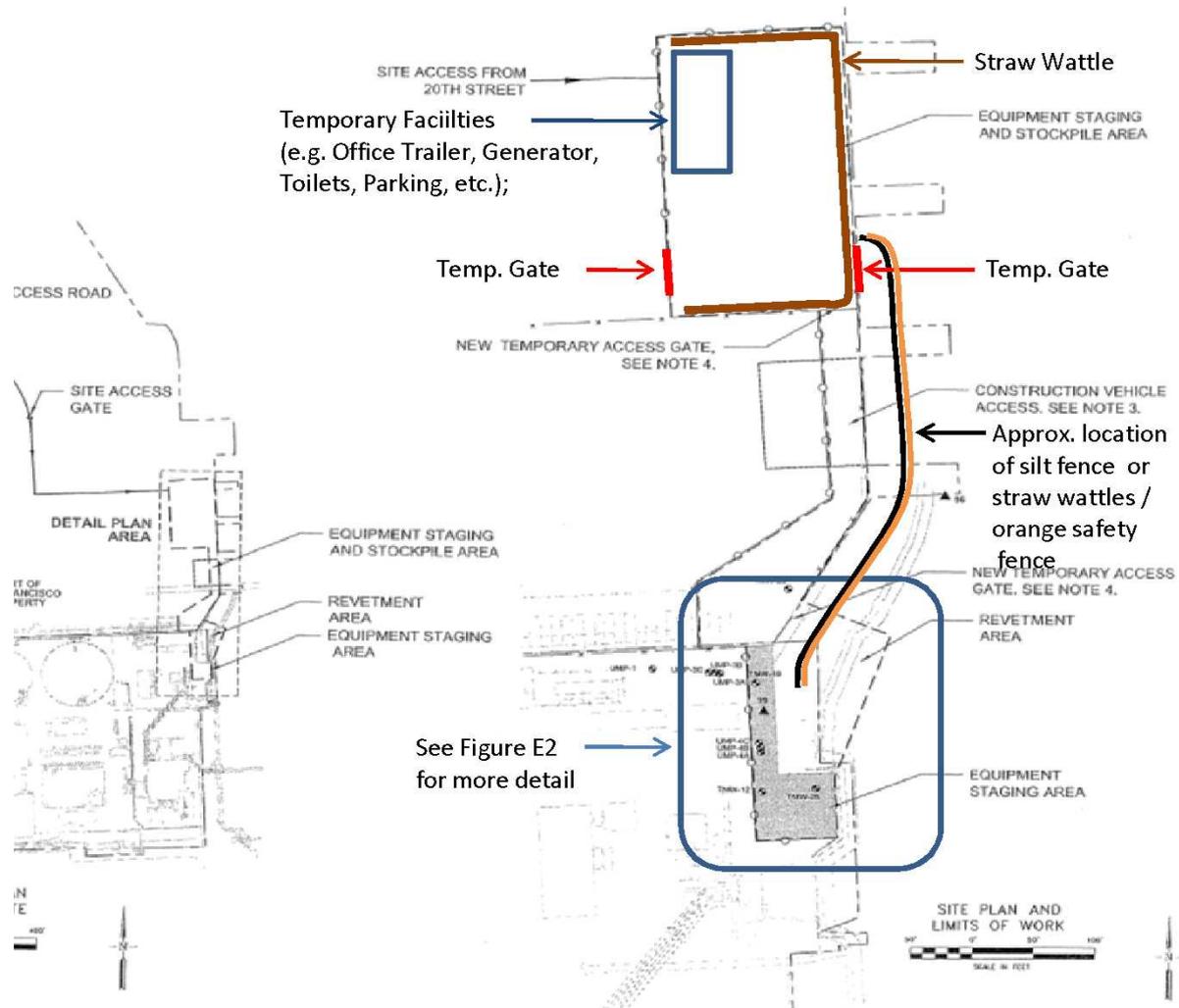
- Excavation primarily at toe of revetment
- RCM placed over excavated surface
- 6" of filter rock, min. 2' 11" of armor rock
- Final slope at 7.5:1 (toe at 2:1)



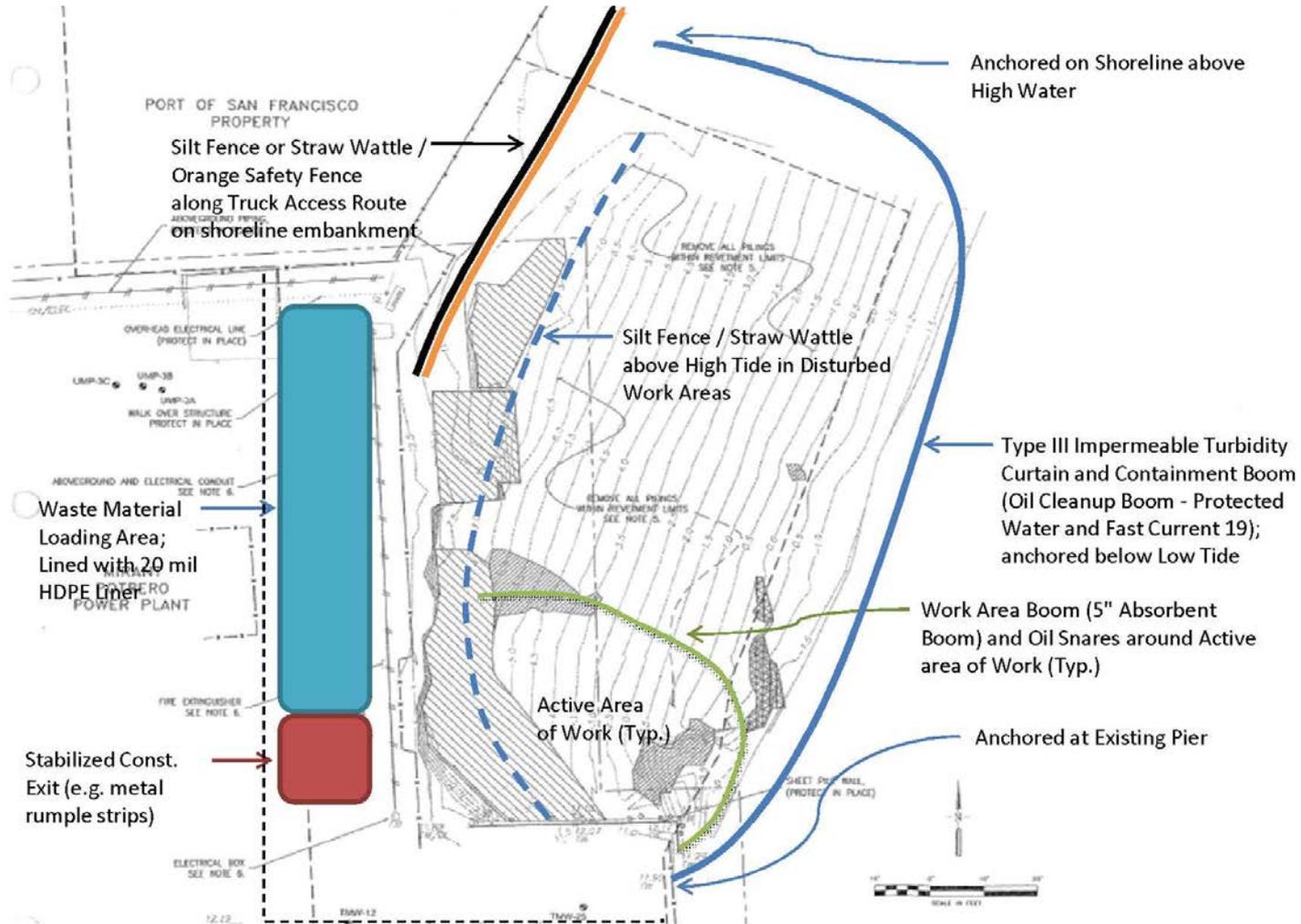


PLANNING AND OPERATIONS

GENERAL SITE MAP



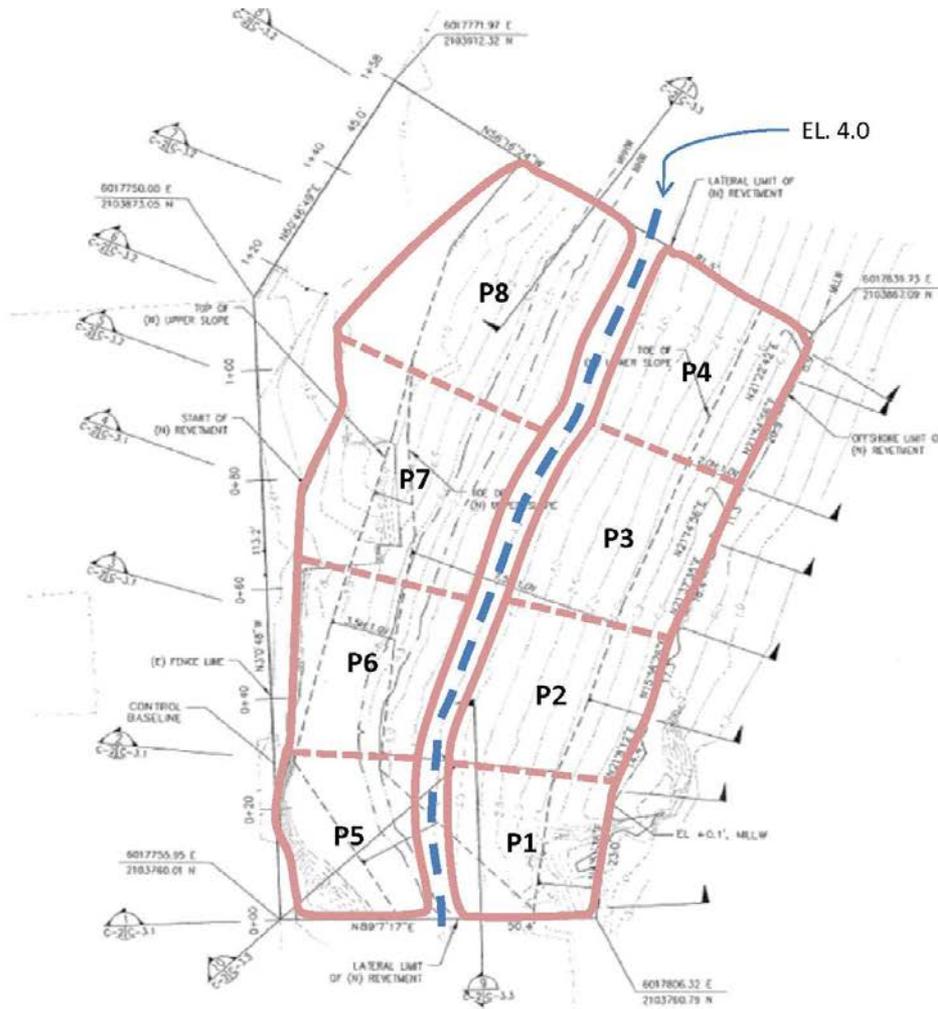
REVETMENT BMP



SITE EXCLUSION ZONE MAP



RCM PANEL LAYOUT



Notes:

1. Panels numbered in order of construction sequence
2. Panel dimensions are approx 30' x 30'; will vary.
3. Each panel will consist of a min. two (2) strips of reactive core mat placed parallel to the direction of slope
4. Longitudinal overlaps will be minimum 12 inches. End-of-roll overlaps will be minimum 24 inches.
5. Mat will be placed immediately upon completion of excavation in each panel; mat will be temporarily anchored with sand bags or drain rock
6. Panels P1 - P 4 will be completely excavated and matted prior to placement of drain rock and armor rock
7. Similar process will be implemented for Panels P5 - P8.

TEMPORARY STOCKPILE AREA



PIPE DEMOLITION



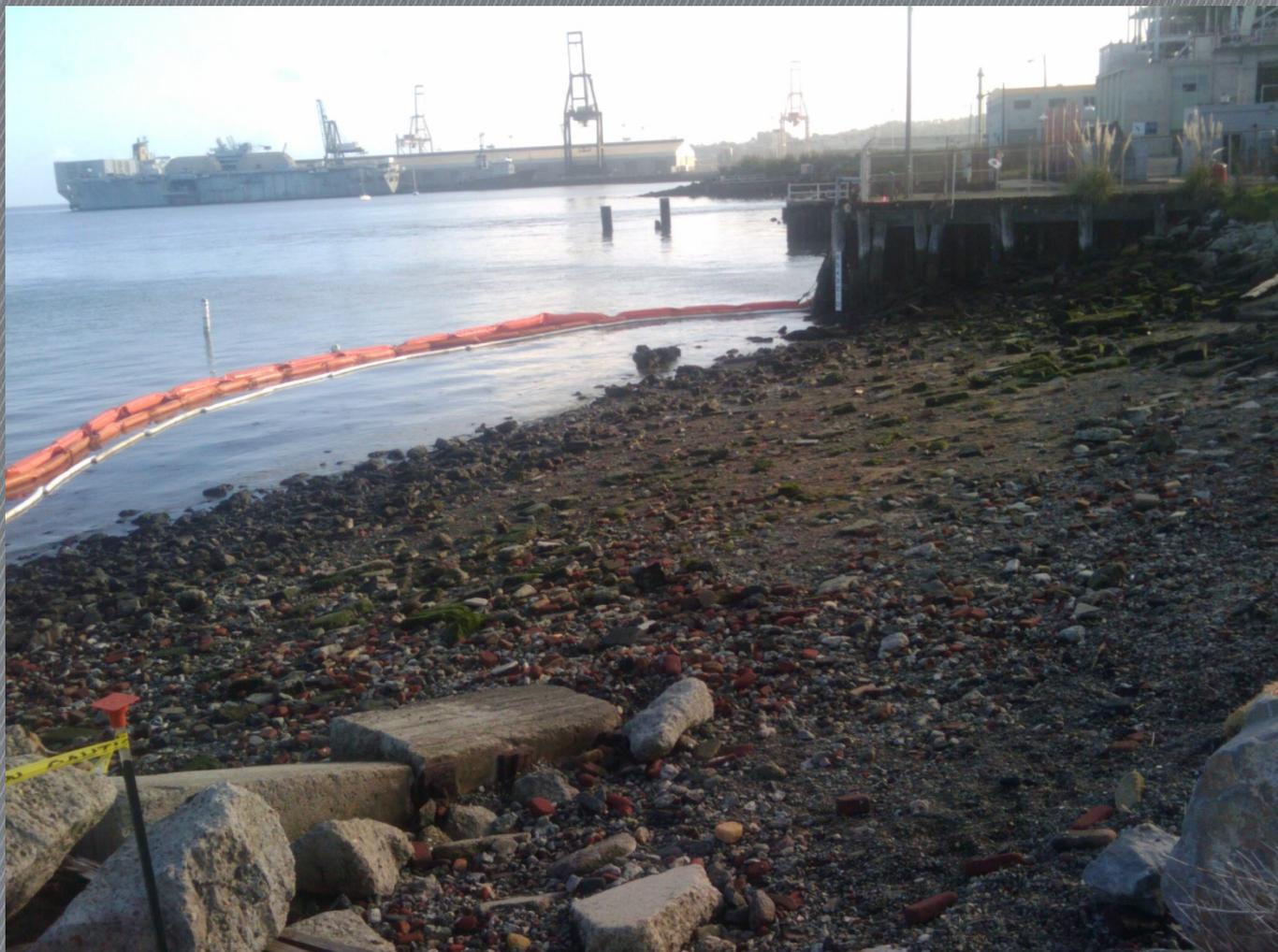
MATERIAL LOAD OUT AREA



TURBIDITY CURTAIN DEPLOYMENT



LOW TIDE / PRE-EXISTING



SITE SAFETY / PPE



SOIL EXCAVATION



SOIL EXCAVATION



RCM DEPLOYMENT



RCM / SUBGRADE PREPARATION



ROCK HANDLING



FILTER ROCK PLACEMENT



ARMOR ROCK PLACEMENT



EXCAVATED SOIL LOAD OUT



BEFORE...



...AFTER





SITE CHALLENGES

SITE CHALLENGES

- General site safety / OSHA 1910.120 HAZWOPER
- High visibility urban setting with difficult logistics and intense oversight
- Work on property with multiple owners
- Biological monitoring for protected species – Pacific Herring
- Major concern for potential environmental release (oil sheen)
- Management of excavated soil with no cross contamination
- Work during low tide cycles required adjustment to work schedule
- Major storm event during construction caused damage and delay

OVERALL PERFORMANCE

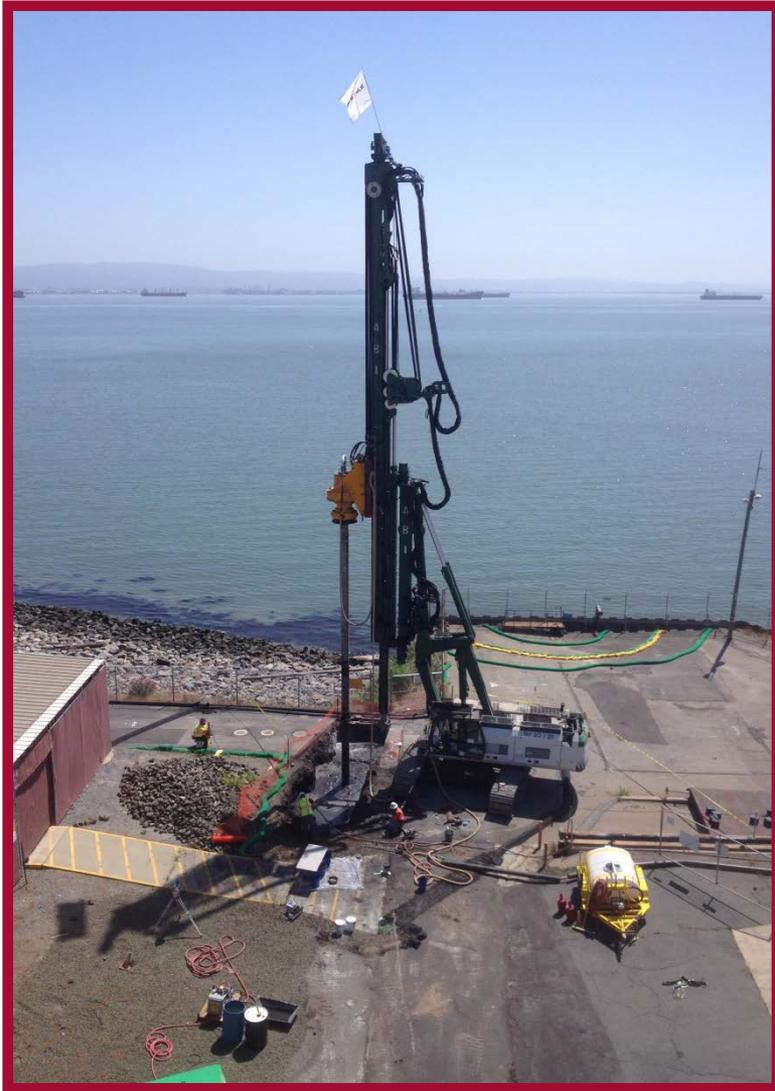
- Compliance with Client performance standards
 - ZERO Injuries
 - ZERO Notices of Violation
 - ZERO Notices to Comply
 - ZERO Adverse Findings
- Completed project on time and on budget
- Ongoing client relationship



FUTURE PHASES OF WORK

UPLAND IN-SITU STABILIZATION (ISS)

- Completed upland ISS pilot study in 2014
- Stabilization of site soils using slag-cement, Portland cement, and bentonite
- Stabilized depths between 35 and 55 ft bgs, using 3 – 8 ft diameter augers
- Multiple mix designs utilized to achieve minimum unconfined compressive strength (UCS) and leachability standards
- Work expected to be performed in 2017



OFFSHORE SEDIMENT AREA

- Dredging of nearshore and offshore sediment
- Long reach excavator / mechanical dredge with Young bucket
- Upland management and disposal of dredged sediment
- Placement of sediment cap
- Work expected to be completed in 2018

