

Attachment F  
Preliminary Site-Specific Best Management Practices (BMP) Plan  
Construction of Pier 4  
Pier 4 Inter-Island Cargo Terminal Hilo Harbor

August 2013

## **1 MAPS**

### **1.1 Location Map**

The new Pier 4 will be located west of the existing Pier 3. A location map is shown in Figure 1.

### **1.2 Project Site Map**

The project site map is shown in Figure 2.

## **2 SITE CHARACTERIZATION**

Substrate at the above-ground portion of the project consists of sandy soils with occasional volcanic rock outcroppings. The shoreline varies between coral and volcanic rubble to solid volcanic rock. The NRCS soil classification for the site is "Keaukaha extremely rocky muck, 6 to 20 percent slopes."

Mean Tide Level at Hilo Harbor is 1.13 ft (refer to mean lower low water), and the mean range of 1.67 ft. Spring tides can bring 2.4 ft changes. Circulation and water currents are described in Chapter 3 of Final Environmental Impact Statement for the Hawaii Commercial Harbors 2020 Master Plan (FEIS) dated July 2001. Waters in Hilo Bay are contiguous with the open ocean, and thus have salinity comparable to that of the Pacific Ocean. No substantial freshwater springs are located in the project area. Marine biology reports in the aforementioned FEIS indicated a freshwater layer at the surface of the nearby Radio Bay due to poor circulation.

Isolation afforded Hilo Harbor by its breakwater, particularly near the project area, has resulted in relatively turbid waters. Visibility in the project area during three site visits did not exceed 10 feet. Hilo Bay inshore of the breakwater and nearshore waters from Wainaku to Paukaa are listed as 303(d) Impaired Water by the State of Hawaii's Department of Health for nutrients and turbidity.

About 400 feet of shoreline along the proposed pier site was previously armored with articulated concrete block (ACB) mattress as part of the recent harbor dredging project to protect the 2:1 slope against wave action. Figure 3 shows the installed ACB mattress at the project site. Another 300 feet of shoreline adjacent to the Pier 3 berth will also be protected by installing ACB mattress in the Pier 4 construction project. The above-water portion of the undredged shoreline at the project site does not support any substantial biological communities. Weedy grasses, herbs and shrubs cover most of the lot, with occasional Ironwood trees and Coconut Palms. The residences planned for removal have a variety of ornamental vegetation. Water depth ranges from 0 to 35 feet in the project area. Cores collected from the proposed project area varied between silt to sandy coral rubble to gravelly rubble of volcanic origin. Much of the rubble is cemented together by a coralline sand-silt matrix that crumbles when disturbed.

A benthic habitat survey in January 2009 for the project area revealed the benthic and fish communities existing there were neither abundant nor diverse. Habitat structure is scarce leading to scarce fish resources, limited benthic flora, and invertebrate taxa dominated by sponges and worms. No threatened or endangered species have been

observed in the proposed project area, and of these species, only sea turtles are likely to utilize the area for foraging. Studies as part of the EIS noted sparse corals and common reef fish in the vicinity of the proposed Pier 4 construction site. This benthic survey will be updated prior to construction.

No endangered species are found on or around the project site, with the possible exception of the Hawaiian Green Sea Turtle which on algae growing on substrate. Water and substrate conditions in the project area are not a conducive feeding habitat for these turtles, and thus the presence of turtles would likely be temporary during transit between feeding habitats.

### **3 CONSTRUCTION SEQUENCE**

The pier deck is 602 feet, 4 inches long by 54 feet, 5 inches wide. The pier will be supported by 485 20-inch octagonal pre-stressed, precast concrete piles. A second support system will be installed and is comprised of a concrete tie-back system anchored with a 5 feet by 12 feet concrete tie-block 'deadman' located land side 50 feet from the pier edge. A seven-inch thick cast-in-place concrete slab will be placed on precast prestressed 11-inch thick concrete plank. The entire pier deck will be protected by 1-inch thick asphalt concrete (AC) pavement. Pier deck surface drain will flow into two directions. An 11-foot, 6-inch zone is sloped waterside, and the rest of pier deck is sloped toward the landside and water will flow into a trench drain. The drainage will discharge to the ocean. See Figure 4.

Construction timing and sequence shall be planned and executed such that adverse impacts from proposed construction activities are minimized, including under a worst-case scenario. The Pier 4 construction is expected to occur over two years between November 2013 and November 2015.

Pier 4 construction tasks will be executed in the general sequence shown below. Specific tasks are described on sheets 25 and 26 of the construction plans and section 4.

1. Mobilization and shop drawing submittals
2. Concrete pile furnishing and installation (grid lines 29 to 10)
3. Slope protection repair
4. Install temporary steel sheet piles and concrete installation
5. Concrete pile furnishing and installation (grid lines 1 to 10)
6. Install temporary steel sheet piles and concrete installation
7. Slope protection repair
8. Backfill and pour concrete deck
9. Pier precast plank installation
10. Install topping concrete

11. Install 1" thick AC pavement
12. Install drain trench and cover
13. Install concrete bull rail
14. Install 2'-6" thick concrete paving
15. Fender installation
16. Cleaning
17. Demobilization

#### **4 SPECIFIC CONSTRUCTION METHODS**

Construction methods were developed based on specific task requirements and the underwater slope situation. The new pier support structure between grid lines 29 and 10 (Area B) will inherit the ACB mattress, which was installed as part of the harbor dredging project to protect the 2:1 slope against wave action. Between grid lines 1 and 10 (Area A) a steep slope in the shoreline area exists, where about a 10 foot high backfill is required. The specific construction methods for Areas A and B are described below. See Figures 5 and 6.

Two types of barges are proposed; one is a working barge, and the other one is a material barge. The size of each barge is assumed to be 50 feet wide and 150 feet long with two anchors at each corner of the barge and steel sheet piles at the landside of the barge at 25-foot spacing. As work progresses, the barges move along with the working area. The corner anchors shall move together with the barges, while the steel sheet piles shall remain. See Figure 7.

Silt or turbidity curtains are proposed to control the spread of sediment and turbidity during in-water construction is described in paragraph 7.1.

After finishing the pile driving and repair of the ACB mattress, the barges and anchors shall be removed except the steel sheet piles at Grid Line A. These piles together with concrete piles at grid lines at B, C, and D will support steel frames which will be part of the concrete formwork for deck beams.

##### **4.1 Precast Prestressed 20-inch Octagonal Concrete Pile Driving and ACB Mattress Repair between grid lines 29 and 10, Area B**

Predrilling is required prior to pile driving to set the exact position and maintain plumbness especially on the sloped grade underwater. Predrilling work can be done by coring or spudding. A designated deposition area for displaced water and sediment on land will be provided by the contractor.

Manta Ray anchors shall be installed at designated areas of the existing ACB mattress. Carefully remove the existing ACB mattress between grid line B and C, predrill, drive piles, install armor stone riprap at the locations the existing ACB are removed.

Predrill, and then drive piles at grid lines D, F and G. The concrete piles can be driven with a heavy crane mounted on land or a heavy crane mounted on a barge placed in the water.

#### 4.2 Slope Protection Repair

Install geotextile filter cloth and horizontal crib piles at the toe of the ACB mattress slope at grid line A. Repair ACB damage at grid line D.

#### 4.3 Steel Sheet Piles and Concrete Construction

Drive temporary sheet piles at grid lines E and H. Remove existing ACB mattress at grid line E to the baseline. Pour the concrete bulkhead up to the horizontal construction joint and pull out the temporary sheet piles at grid lines E and H. Construct concrete pavement and finish deck construction at this location.

#### 4.4 Precast Prestressed 20-inch octagonal Concrete Pile Driving and ACB Mattress Repair between grid lines 1 to 10, Area A

Predrill, and then drive piles at grid lines B,C,D and F.

#### 4.5 Steel Sheet Piles and Concrete Bulkhead Construction

Drive temporary sheet piles at grid lines E and H. Backfill between grid lines E and H up to the bottom of the concrete bulkhead. Place bulkhead concrete up to horizontal construction joint. Backfill between existing grade and finish grade under the pier. Pull out temporary sheet piles at grid lines E and H.

#### 4.6 Slope Protection Repair

Install geotextile filter cloth and horizontal crib piles at the toe of the ACB mattress slope at grid line A. Install ACB mattress.

#### 4.7 Concrete Deck Construction

Place backfill and construct concrete pavement.

#### 4.8 Other Concrete Work

Finish pier deck construction including landside bulkhead, concrete beam, water side end beam, pier precast plank, bull rail and fender and 2-foot, 6-inch thick concrete.

#### 4.9 Asphalt Concrete (AC) Pavement Construction and drain

Placement of 1-inch thick AC pavement, including trench drain and cover.

#### 4.10 Cleaning and Demobilization

### **5 FILL OR DISCHARGE DESCRIPTION**

#### 5.1 Materials to be placed in State Waters

##### 5.1.1 Temporary Discharge

Temporary discharges include the temporary steel sheet pile formwork for the concrete bulkhead construction. The temporary sheet pile volume is 35 cubic yards, and the surface area is 272 square feet.

##### 5.1.2 Permanent Discharge

Blocks 21 and 22 in the application list the permanent discharges in terms of volume (cubic yards) and surface area (square feet and acres) associated with construction activities.

#### 5.2 Materials that May Enter State Waters as a Result of Construction Activities

No additional materials associated with construction activities are expected to enter State waters.

#### 5.3 Materials that May Re-enter State Waters

No materials associated with construction activities are expected to re-enter State waters.

#### 5.4 Discharges Associated with Operation and Maintenance of Equipment Involved

Discharges into State waters associated with operation and maintenance of equipment are prohibited. Since heavy construction equipment will be used, the contractor will be required to have proper equipment and provisions to contain and clean up spills of fuel or lubricants. Accidental discharges will be handled in accordance with federal, state, and local regulations. Equipment operators will inspect their equipment daily to ensure that there are no problems that could result in contamination from fuels, lubricants, hydraulic fluid, or other pollutants. Any required maintenance will be done using methods that will not result in pollution of the water or land area. Any waste oils or lubricants will be removed from the site and disposed of according to applicable federal or state regulations.

Oil absorbent pads and spill kits will be on barges to immediately clean up small petroleum product spills that may occur. In the unlikely event of a larger spill, oil

absorbent pads will be used to contain the spill while an environmental emergency response crew is called in.

The selected contractor shall provide a pollution response plan prior to commencement of construction.

#### 5.5 Temporary Structure(s) Construction, Removal and Restoration Related Discharges

No temporary structures associated with construction activities are anticipated.

### **6 DESCRIPTION OF THE DREDGED/EXCAVATED MATERIAL**

#### 6.1 Type, Composition and Quantity of Material to be Excavated/Dredged

No material will be dredged for this project.

### **7 CONTROL MEASURES**

#### 7.1 Silt or Turbidity Curtains

Two separate silt or turbidity curtains are required; one that encompasses the work area and one that surrounds the barges. The curtain will surround the work area, including the supporting anchors and will start at grid line 29 tie to the existing container yard and attach to the temporary steel sheet piles. As the work moves east the silt curtain will expand to contain the area and tie back to the container yard. The curtains that run perpendicular to the shoreline will remain in place. The curtain around the barge will move laterally with the barge. See Figure 7.

Maintenance of the silt curtains will be in conformance with the manufacturer's specifications.

The contractor will inspect the silt curtains daily to assess their condition. Inspection and monitoring of the effectiveness of the silt curtains will generally be throughout the construction period. The contractor shall stop work if breaks or tears in the silt curtain or other conditions likely to render the silt curtains ineffective are observed. These conditions must be corrected prior to continuing construction.

#### 7.2 Watertight Formwork for Concrete Pouring

Watertight formwork that is not chemically treated will be used to build working sections for each concrete pouring operation. Water will be displaced by the placement of concrete to create the bulkhead. As each section is poured, the water will be displaced into the adjoining unpoured section.

#### 7.3 Other General Concrete Work

All other concrete work will be contained within watertight formwork that is not chemically treated prior to pouring.

#### 7.4 Concrete Washout Area

A concrete washout system will be installed on the project site and implemented by a licensed operator for concrete washout wastewater containment and recycling of residual concrete waste. The tasks involved with the concrete washout system include the containment, removal, and disposal of concrete waste and concrete wash water by furnishing, maintaining and removing portable concrete washout bins.

The contractor shall setup the concrete wash area on land with an impervious liner. Concrete wastewater will be left to evaporate before the dried material is taken to the South Hilo Landfill.

### 8 PROTECTED SPECIES BMP'S

*[Taken from National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office, Protected Resources Division]*

The National Marine Fisheries Service, Pacific Islands Regional Office recommends that the following measures, as appropriate and germane to specific projects, be incorporated into projects to minimize impacts on protected resources. These supplement, but do not supersede the BMPs above.

Turbidity and siltation from project-related work should be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and curtailment of work during adverse tidal and weather conditions.

Any construction-related debris that may pose an entanglement hazard to marine protected species must be removed from the project site if not actively being used and/or at the conclusion of the construction work.

All project-related materials and equipment placed in the water should be free of pollutants.

No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, etc.).

No contamination (trash or debris disposal, alien species introductions, etc.) of marine (reef flats, lagoons, open ocean, etc.) environments adjacent to the project site should result from project-related activities.

Fueling of project-related vehicles and equipment should take place away from the water. A contingency plan to control the accidental spills of petroleum products at the construction site should be developed. Absorbent pads, containment booms, and skimmers will be stored on-site to facilitate the cleanup of petroleum spills.

Underlayer fills will be protected from erosion with core-loc units (or stones) as soon after placement as practical.

Return flow of or run-off from material stored at inland dewatering or storage sites must be prevented.

#### Mitigation Measures to Reduce Impacts to Protected Species

The silt or turbidity curtains have the added benefit of creating a barrier that will prevent sea life from entering construction work areas where they could be harmed.

A visual survey must be performed by State personnel of the project area just prior to commencement or resumption of construction activity to ensure that no protected species are in the project area. If protected species are detected, construction activities must be postponed until the animal(s) voluntarily leave the area.

If any listed species enters the area during the conduct of construction activities, all activities must cease until the animal(s) voluntarily depart the area.

All on-site project personnel must be apprised of the status of any listed species potentially present in the project area and the protections afforded to those species under federal laws. A brochure explaining the laws and guidelines for listed species in Hawaii, American Samoa, and Guam may be downloaded from:

[http://www.nmfs.noaa.gov/prot\\_res/mmwatch/hawaii.htm](http://www.nmfs.noaa.gov/prot_res/mmwatch/hawaii.htm)

Any incidental take of marine mammals must be reported immediately to NOAA Fisheries' 24-hour hotline at 1-888-256-9840. Hawaii only: any injuries to sea turtles must be reported immediately to NOAA Fisheries at 1-808-983-5370. Information reported must include the name and phone number of a point of contact, location of the incident, and nature of the take and/or injury.

## **9 SUMMARY**

This document serves as a preliminary site-specific best management practices plan and serves as a guideline for the selected contractor. The contractor will submit a final site-specific best management practices plan, which may include modifications, prior to commencement of construction activities.

Preliminary Site-Specific BMP Plan  
Construction of Pier 4  
Pier 4 Inter-Island Cargo Terminal Hilo Harbor:

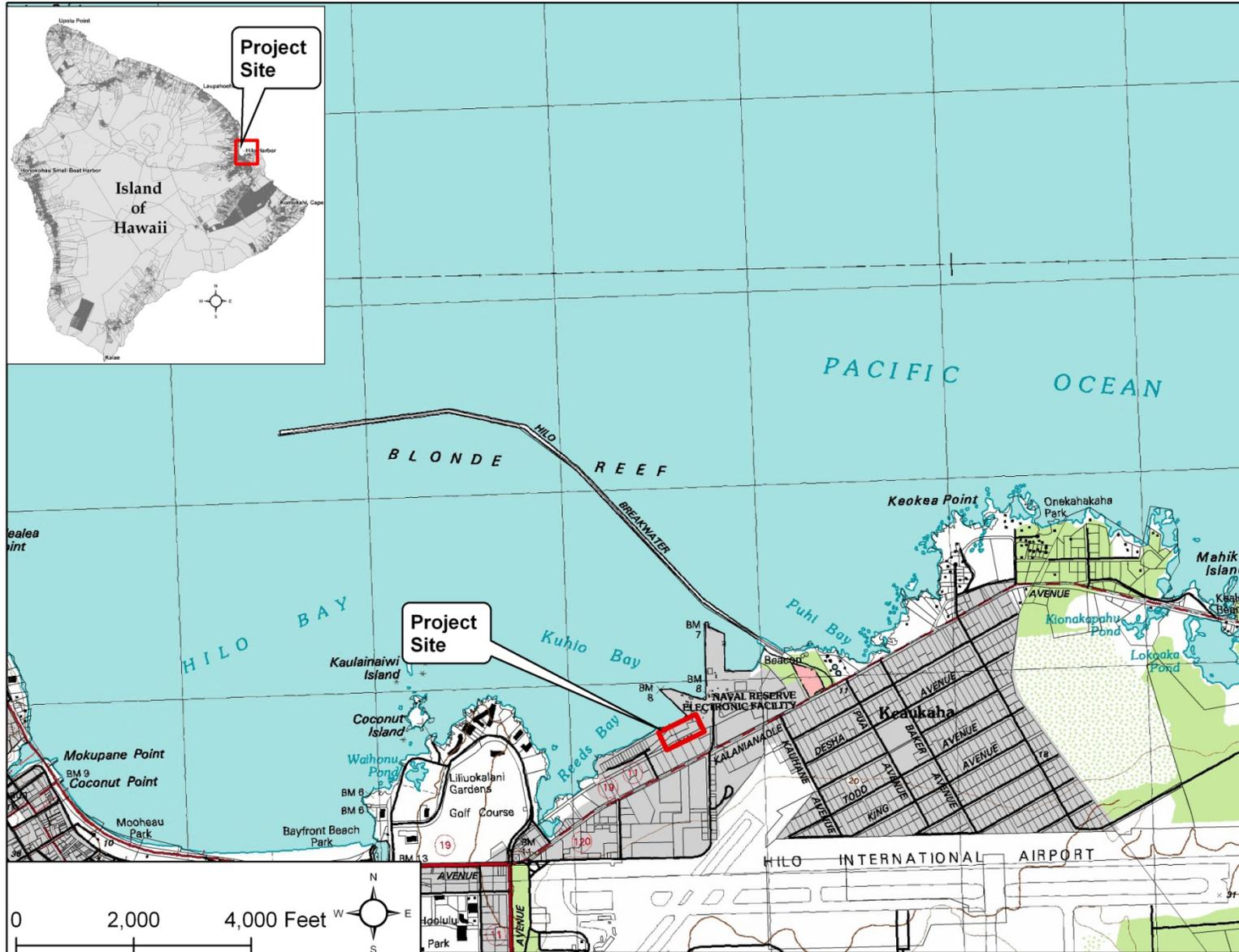


Figure 1 Project Location Map

Preliminary Site-Specific BMP Plan  
 Construction of Pier 4  
 Pier 4 Inter-Island Cargo Terminal Hilo Harbor

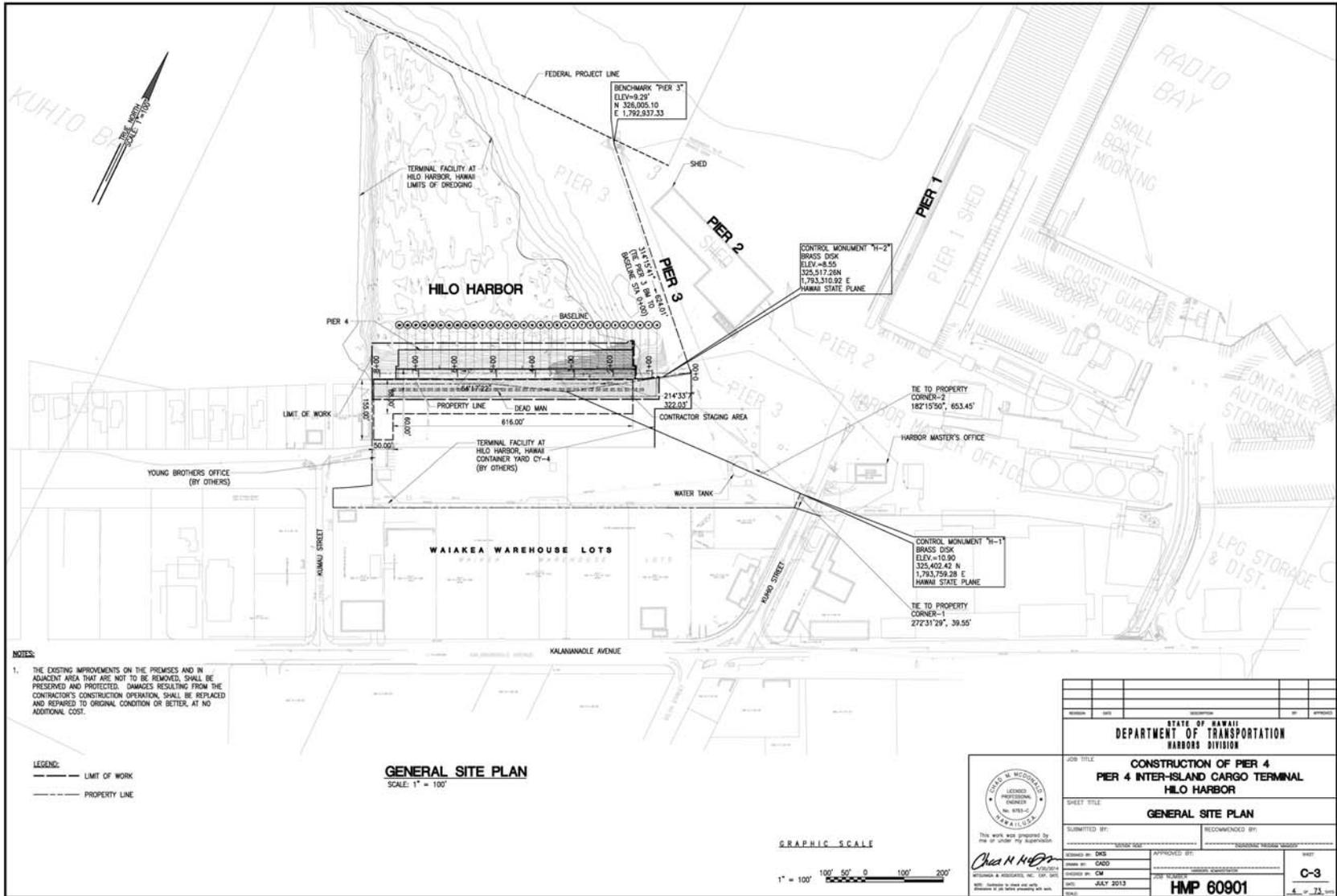


Figure 2 General Site Plan



**Figure 3 Existing ACB Mattress**

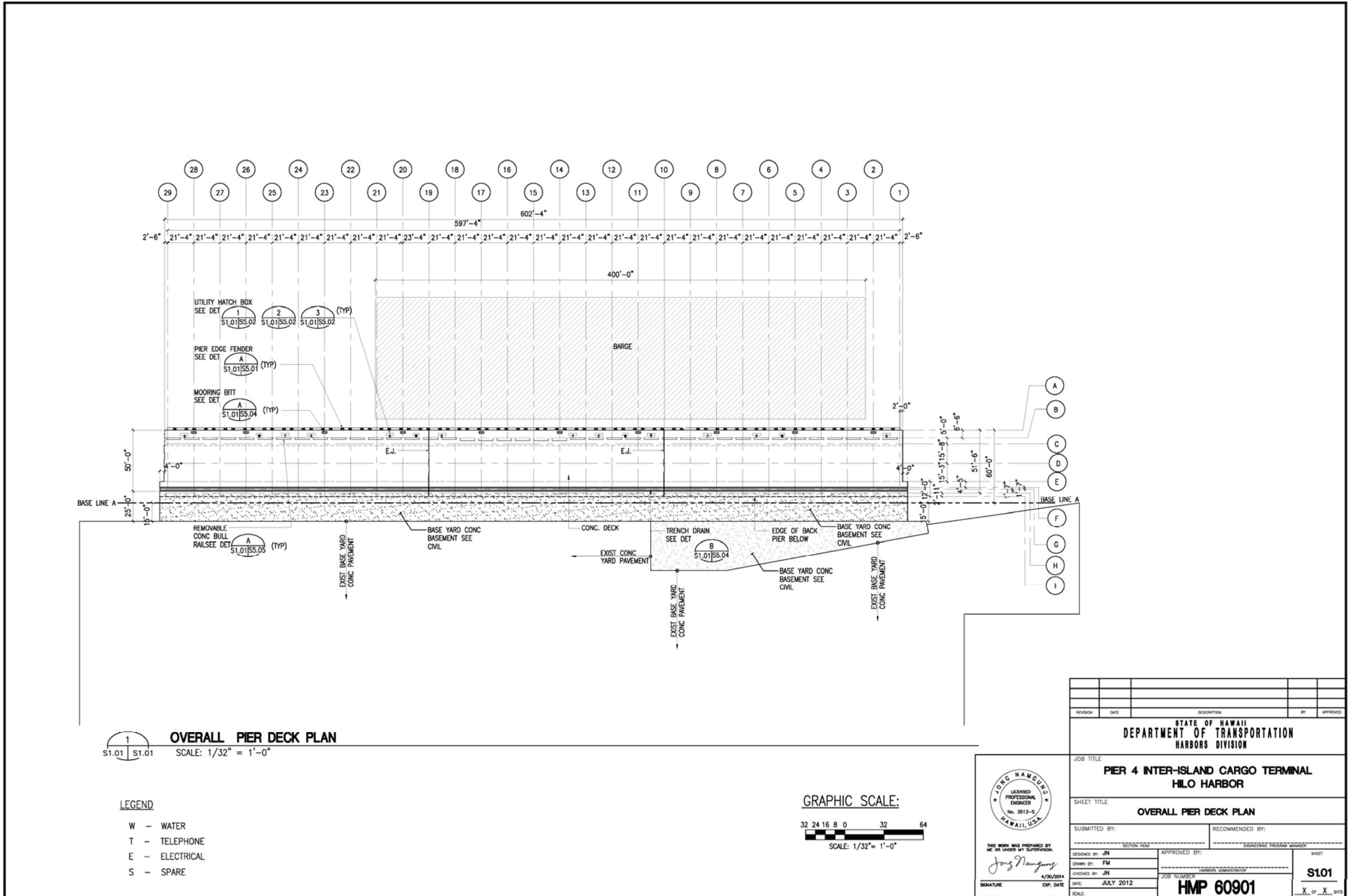


Figure 4 Overall Pier Deck Plan

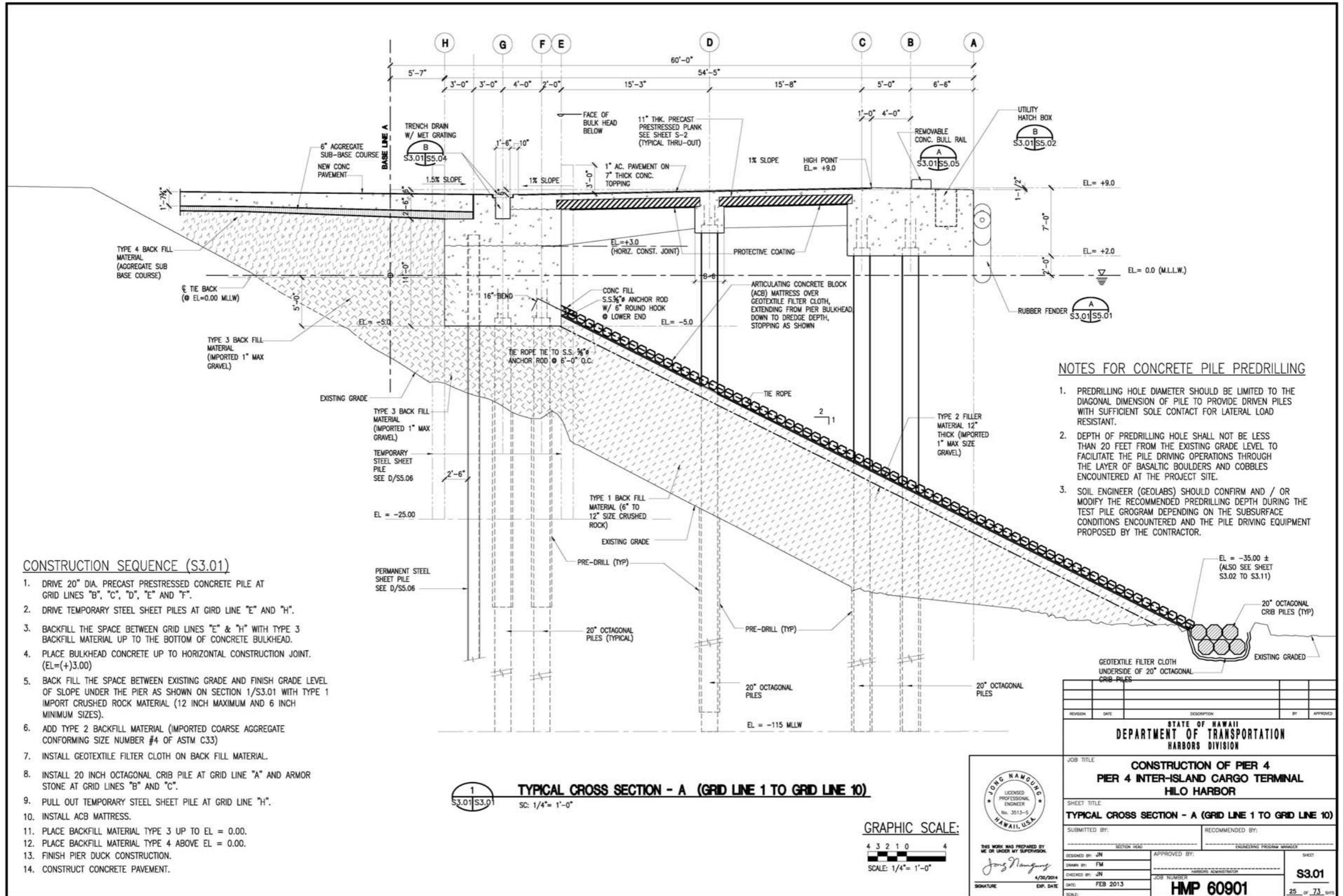
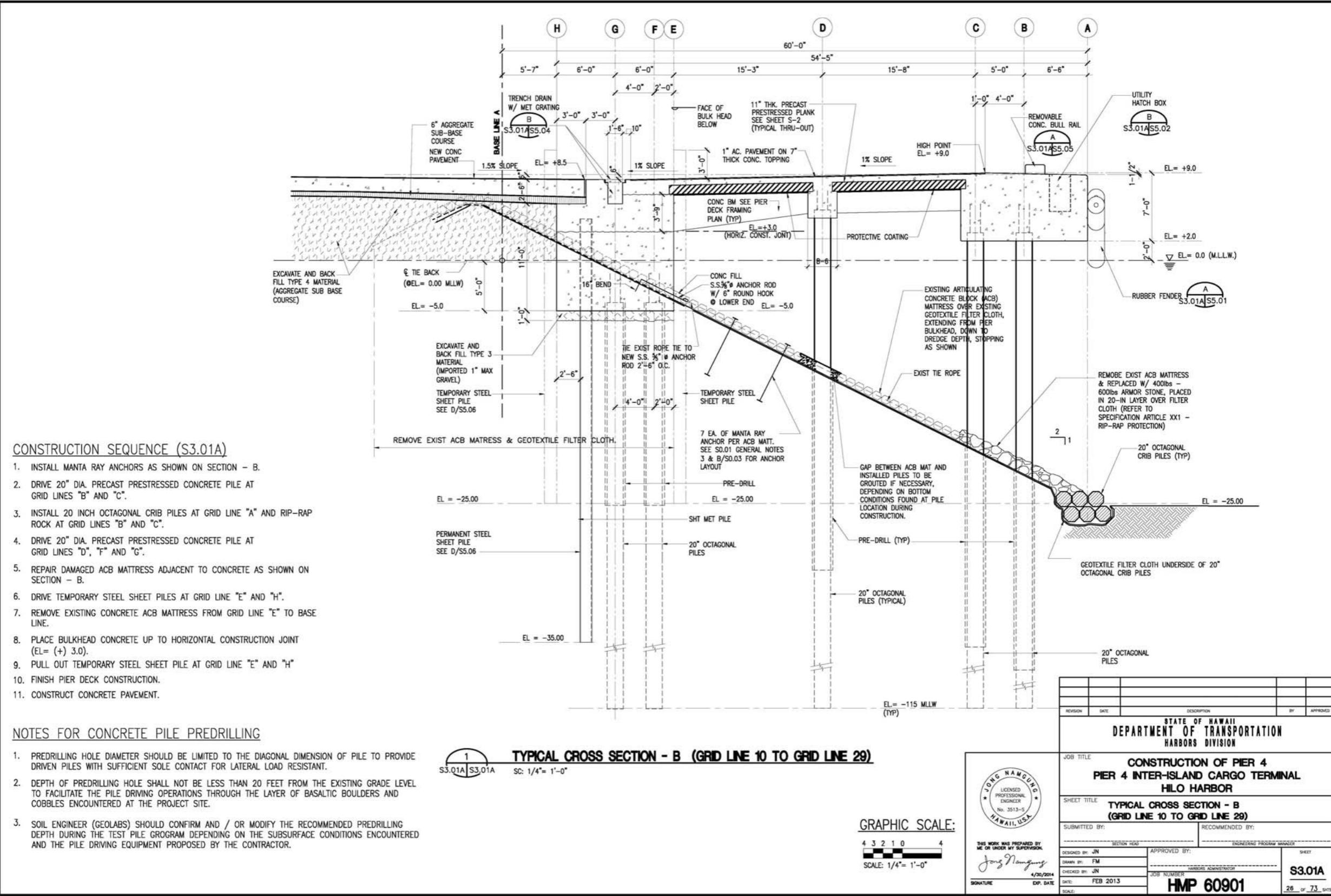


Figure 5 Typical Cross-Section A



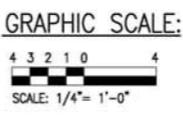
**CONSTRUCTION SEQUENCE (S3.01A)**

1. INSTALL MANTA RAY ANCHORS AS SHOWN ON SECTION - B.
2. DRIVE 20" DIA. PRECAST PRESTRESSED CONCRETE PILE AT GRID LINES "B" AND "C".
3. INSTALL 20 INCH OCTAGONAL CRIB PILES AT GRID LINE "A" AND RIP-RAP ROCK AT GRID LINES "B" AND "C".
4. DRIVE 20" DIA. PRECAST PRESTRESSED CONCRETE PILE AT GRID LINES "D", "F" AND "G".
5. REPAIR DAMAGED ACB MATTRESS ADJACENT TO CONCRETE AS SHOWN ON SECTION - B.
6. DRIVE TEMPORARY STEEL SHEET PILES AT GRID LINE "E" AND "H".
7. REMOVE EXISTING CONCRETE ACB MATTRESS FROM GRID LINE "E" TO BASE LINE.
8. PLACE BULKHEAD CONCRETE UP TO HORIZONTAL CONSTRUCTION JOINT (EL= (+) 3.0).
9. PULL OUT TEMPORARY STEEL SHEET PILE AT GRID LINE "E" AND "H"
10. FINISH PIER DECK CONSTRUCTION.
11. CONSTRUCT CONCRETE PAVEMENT.

**NOTES FOR CONCRETE PILE PREDRILLING**

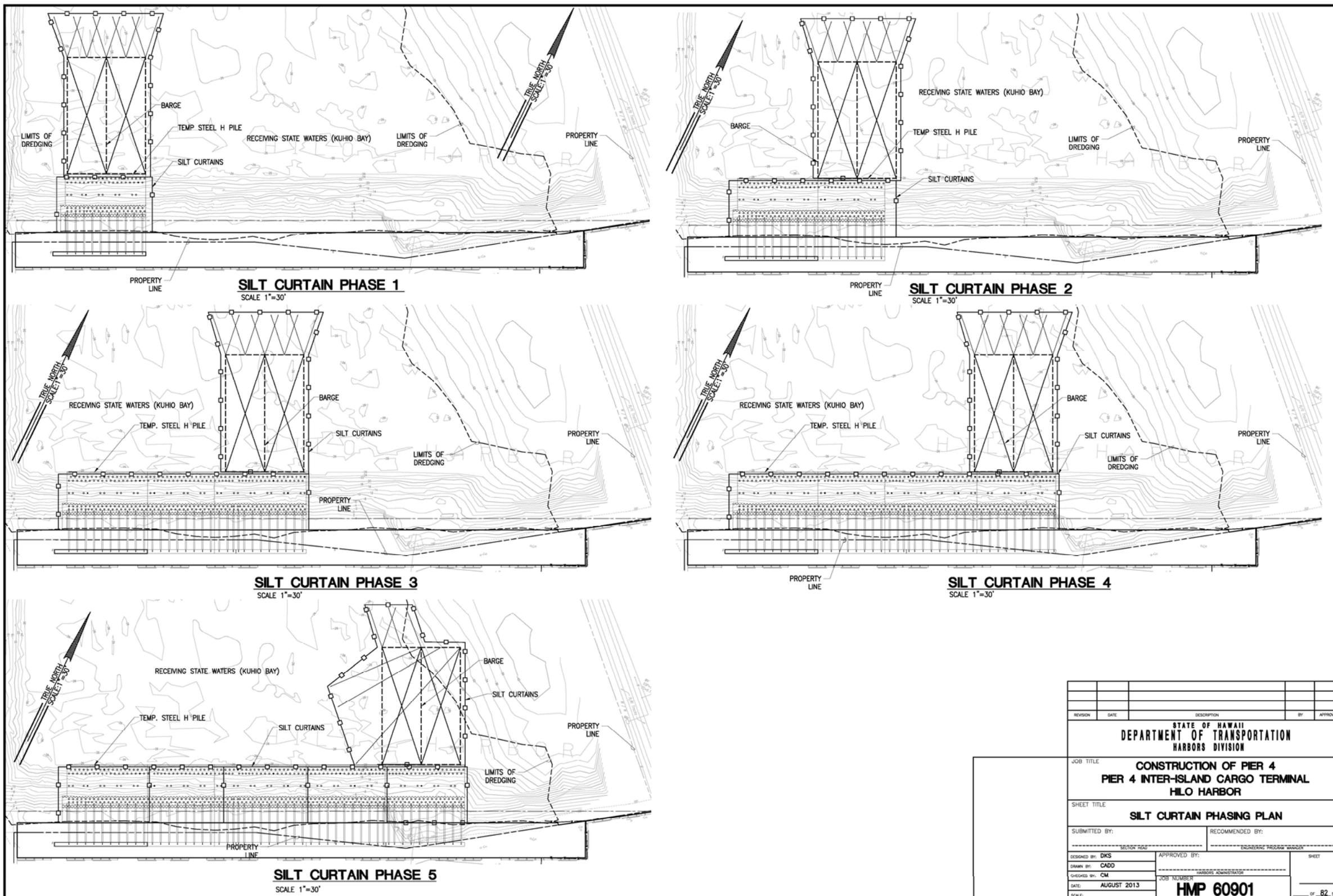
1. PREDRILLING HOLE DIAMETER SHOULD BE LIMITED TO THE DIAGONAL DIMENSION OF PILE TO PROVIDE DRIVEN PILES WITH SUFFICIENT SOLE CONTACT FOR LATERAL LOAD RESISTANT.
2. DEPTH OF PREDRILLING HOLE SHALL NOT BE LESS THAN 20 FEET FROM THE EXISTING GRADE LEVEL TO FACILITATE THE PILE DRIVING OPERATIONS THROUGH THE LAYER OF BASALTIC BOULDERS AND COBBLES ENCOUNTERED AT THE PROJECT SITE.
3. SOIL ENGINEER (GEOLABS) SHOULD CONFIRM AND / OR MODIFY THE RECOMMENDED PREDRILLING DEPTH DURING THE TEST PILE GROGRAM DEPENDING ON THE SUBSURFACE CONDITIONS ENCOUNTERED AND THE PILE DRIVING EQUIPMENT PROPOSED BY THE CONTRACTOR.

**TYPICAL CROSS SECTION - B (GRID LINE 10 TO GRID LINE 29)**  
 S3.01A S3.01A SC: 1/4" = 1'-0"



REVISION	DATE	DESCRIPTION	BY	APPROVED
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HARBORS DIVISION				
<b>CONSTRUCTION OF PIER 4                  PIER 4 INTER-ISLAND CARGO TERMINAL                  HILO HARBOR</b>				
JOB TITLE				
SHEET TITLE				
SUBMITTED BY:		RECOMMENDED BY:		
DESIGNED BY: JN	SECTION HEAD:	APPROVED BY:		SHEET
DRAWN BY: FM	CHECKED BY: JN	DATE: FEB 2013		<b>S3.01A</b>
DATE: 4/30/2014		JOB NUMBER: <b>HMP 60901</b>		26 of 73 SHTS

Figure 6 Typical Cross-Section B



REVISION	DATE	DESCRIPTION	BY	APPROVED
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HARBORS DIVISION				
JOB TITLE <b>CONSTRUCTION OF PIER 4                  PIER 4 INTER-ISLAND CARGO TERMINAL                  HILO HARBOR</b>				
SHEET TITLE <b>SILT CURTAIN PHASING PLAN</b>				
SUBMITTED BY:		RECOMMENDED BY:		
DESIGNED BY: DKS		APPROVED BY:		SHEET
DRAWN BY: CADD		HARBORS ADMINISTRATOR		of 82 SHEETS <b>HMP 60901</b>
CHECKED BY: CM		DATE: AUGUST 2013		
DATE: AUGUST 2013		SCALE:		

Figure 7 Silt Curtain Phasing Plan

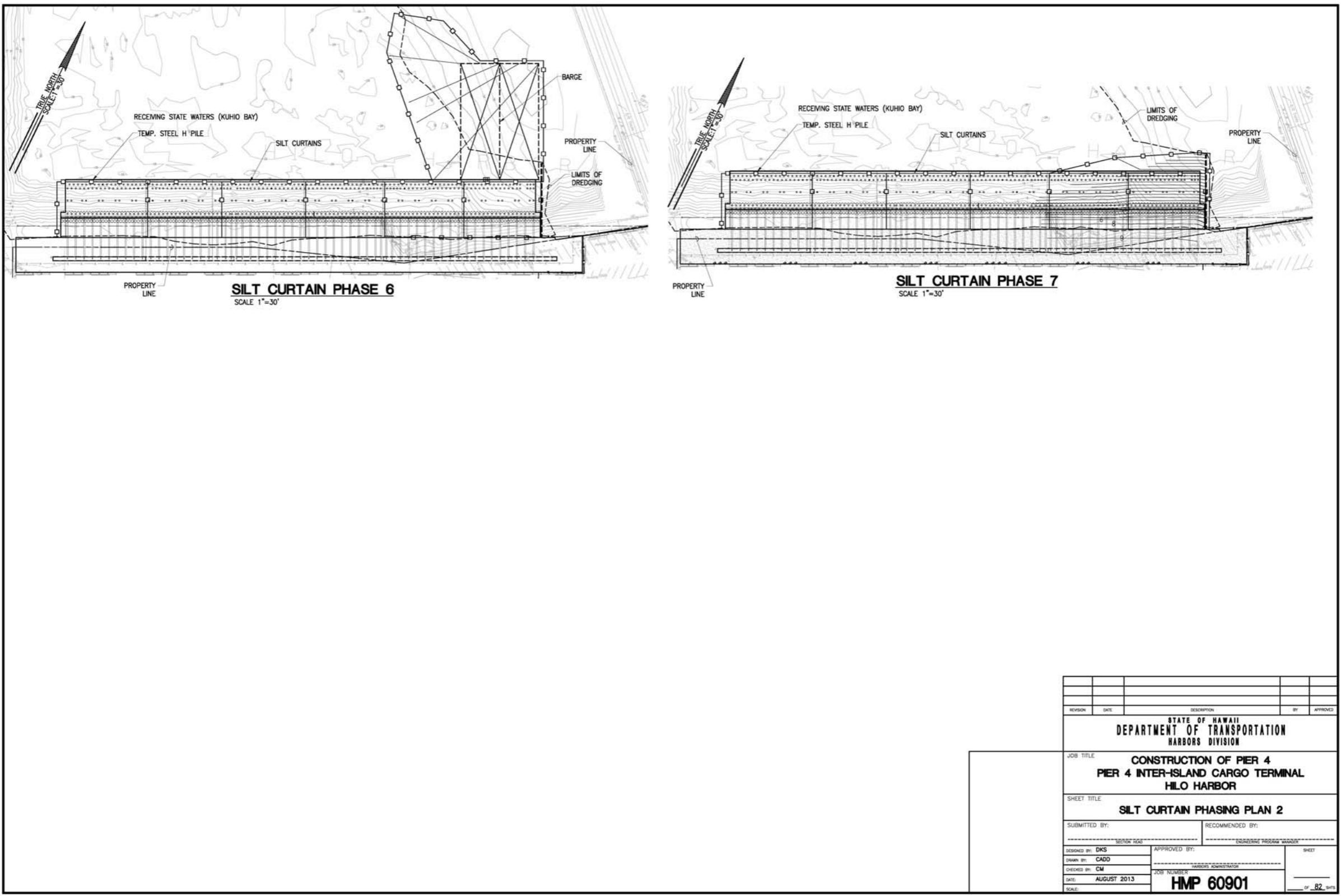


Figure 7 Silt Curtain Phasing Plan (continuation)