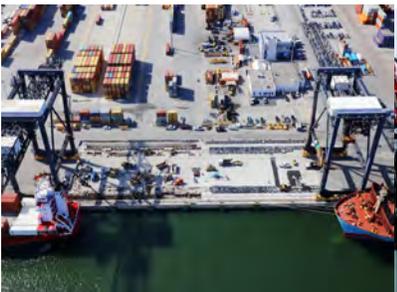


## 8.1 Berths 5-8 Condition Assessment Report



**POINT POTRERO MARINE TERMINAL  
BERTHS 5 TO 8 WHARF CONDITION ASSESSMENT  
PORT OF RICHMOND  
FOR MOFFATT & NICHOL  
SITE VISIT DATE: MARCH 18 & 19, 2025**



**August 22, 2025  
Project 2525**





**POINT POTRERO MARINE TERMINAL  
BERTHS 5 TO 8 WHARF STRUCTURES CONDITION ASSESSMENT  
PORT OF RICHMOND**

**FOR MOFFATT & NICHOL**

**SITE VISIT DATE: MARCH 18 & 19, 2025**

**Prepared by Liftech Consultants Inc.**

**August 22, 2025**

**Project No. 2525**

*Quality Assurance Review  
for Liftech Consultants Inc.*

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## EXECUTIVE SUMMARY

The purpose of the limited and cursory wharf condition assessment is to evaluate the wharf condition and assist the Port to prioritize the capital improvement projects based on the Port's needs and the repair costs. The following are initial conceptual level assessments of the condition and repairs, which will be refined in the next design phase after Port feedback.

Liftech engineered Berths 7 and 8 modifications and repairs in 2010 for TransDevelopment Group to support Ro-Ro automobile import operations.

Liftech Consultants Inc. and ENGEO Incorporated, as a subconsultant to Moffatt & Nichol (M&N), performed a limited above water visual inspection of Berths 5–8. Inspections and assessments are in accordance with ASCE 130 (see Appendix H).

### Berths 7 and 8

The wharf structure is rated between poor and serious in accordance with ASCE 130 Table 2-14. Damage was observed at concrete and timber piles, the wharf soffit (underside of superstructure), concrete sheet pile wall, crane girders, face beams, and seismic tie beams, i.e., all beams. The wharf has many missing and severely damaged timber piles. Many seismic tie beams have settled due to their compromised pile supports. Bollards and fenders are in satisfactory condition with limited localized damage.

There is a significant large area of deck depression observed from above at the southern end of Berth 7. The deck depression was caused by a broken concrete beam at adjacent Berth 6 as shown in Photograph 1. All load should be removed from the depressed deck and over the beam. No construction equipment should be located near the break. This beam repair requires new piling, jacking, and grouting for leveling support.



Photograph 1: Broken concrete beam, damaged and missing timber piles

Since the pile condition is similar to after the 2010 repair work where many damaged or missing piles were left unrepaired, the wharf deck loading limitation as shown in Liftech's 2010 construction drawings should be strictly enforced. This limits the allowed loading locations on the wharf deck as described in Figure 1 and below.

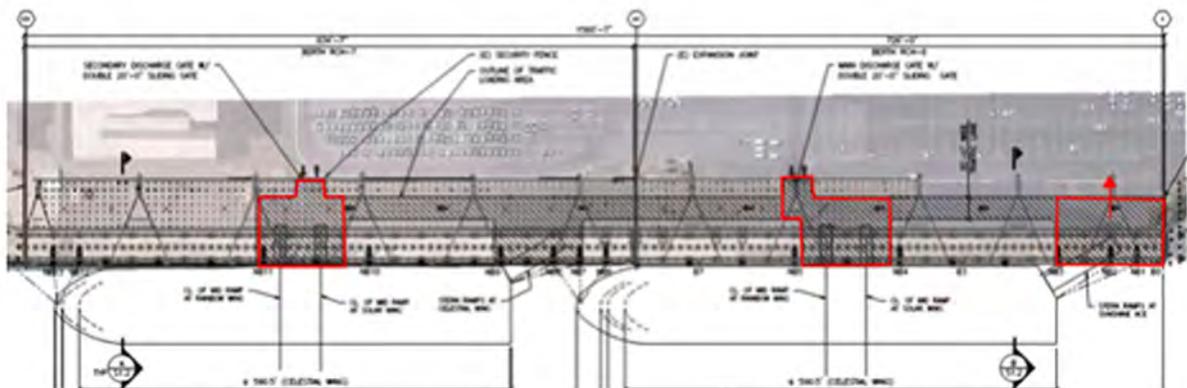


Figure 1: Automobile loading zone shown in cross hatch area, ship ramp landing zones in red

In 2010, the piles where the ship ramps land were repaired as indicated in red areas in Figure 1 above. These areas are adequate for the AASHTO design HS20-44 truck loading. Refer to Appendix K for the current justified allowable wharf deck live load.

Recommended repairs include seismic tie beam support piling at beams 4 through 7, repair of all severely damaged or missing piles, and corrosion repairs or mitigation based on further evaluation.

### Berths 5 and 6

The wharf at Berths 5 and 6 is in poor condition. There is significant corrosion damage ranging from major-to-severe throughout the wharf structure including face beams, concrete struts, soffit, crane beams, steel piles, and the concrete deck surface. Since Berths 5 and 6 have not been in operation, the wharf has not been subjected to cargo loadings, only its own weight. There is no effective fender system at Berths 5 and 6, only a couple of tires. The double bitt bollards are severely corroded, including the bolts and damage to the concrete base, and have limited capacity.

There is no significant structural distress except for a concrete beam at Berth 6 that is broken due to multiple support pile failures.

The pavement at the landside wharf edge has failed at several locations due to embankment erosion below. Refer to Appendix I for ENGEO's report for detailed clarification. This should be repaired by driving a steel sheet pile wall, backfilling, and repairing pavement.

This wharf has not been evaluated to determine an acceptable load capacity. If the Port plans for cargo handling operations, a structural evaluation will be required.

### All Berths

Considering the age of wharves and the significant damage, corrosion and pile damage repair and mitigation measures should be evaluated. One hundred percent (100%) Level 1 inspection including underwater pile inspection should be performed with future periodic inspections every three years for

Berths 7 and 8 and five years for Berths 5 and 6 to monitor the progression of the corrosion and piling damage.

Based on the severity of structural damage and repair priority, six projects are identified with repair priority and budgetary cost estimates as shown in Table 1.

**Table 1: Project Priority, Description, and Budgetary Costs**

Budgetary Cost Estimates Summary			
Project No:	Repair Priority	Descriptions	Budgetary Cost
1	Immediate/Priority	Berth 6 & 7 - Broken Concrete Beam Retrofit	\$1,200,000
2A	Immediate/Priority	Berths 5 & 6 - Sheet Pile Wall Installation and Pavement Settlement Repairs	\$1,550,000
2B	Near term	Berths 7 & 8 - Sheet Pile Wall Installation and Pavement Settlement Repairs	\$1,150,000
3	Near term	Berths 7 & 8 - Seismic Tie-Beam Support Stabilization	\$4,600,000
4	Long term - Based on usage and available funding	Berths 7 & 8 Damaged Concrete Piles, Beams, and Deck Repairs	\$130,000,000
5	Long term - Based on usage and available funding	Berths 5 & 6 - Damaged Concrete Beams, Deck Repairs, and Missing Piles Replacement	\$61,000,000
6	Long term - Based on usage and available funding	Berths 5 & 6 - Discrete Fender and Bollard Upgrades	\$5,400,000

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

Refer to Appendix J for detailed scope description for repairs and cost estimate breakdowns.



Liftech performed two days of site condition review. The condition review was limited and cursory in nature, visual from above the water and from the top of the wharf deck. Underwater pile inspection was not performed. The inspection is intended to:

Verify the previous, circa 2010, inspection findings by Collins Engineers, which are summarized in Liftech's construction documents listed in Appendix A.

Identify and document any significant condition changes from the 2010 inspection.

## WHARF DESCRIPTION

Berths 5 to 8 were constructed in the 1940s and consist of an outer wharf and inner wharf. The inner wharf is intermittent at Berths 5 and 6.

### Berths 7 and 8 Structure

The outer waterside wharf for Berths 7 and 8 consists of a concrete deck supported by concrete piles. The inner landside wharf consists of a concrete deck supported by timber piles. There is a concrete sheet pile wall separating the outer and inner wharves. See Figure 3. Refer to Appendix A for additional wharf structure details.

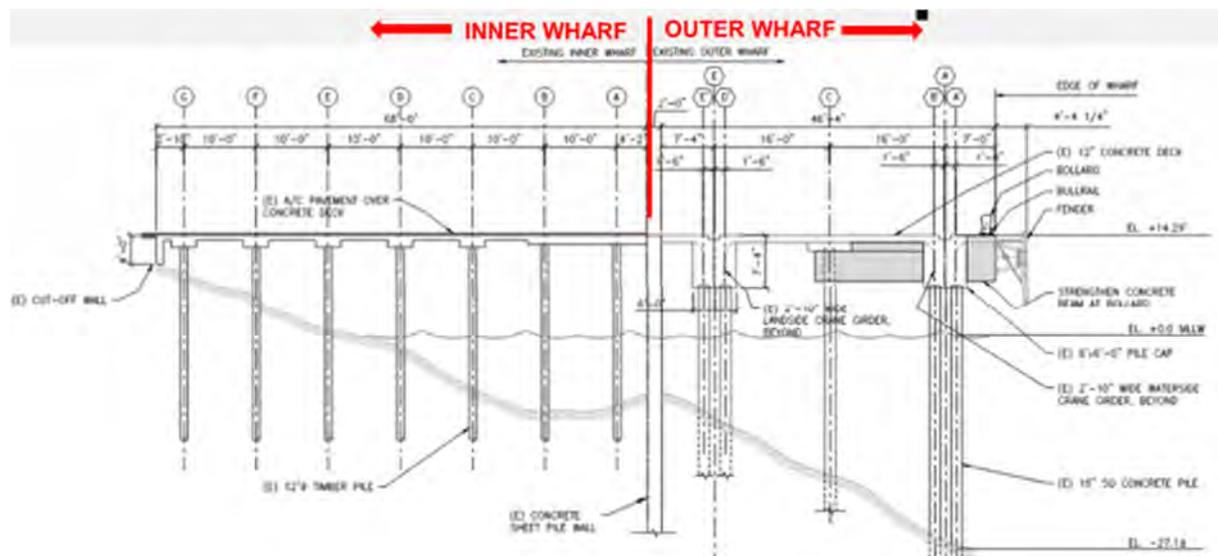


Figure 3: Berths 7 and 8 Wharf Cross Section, water to the right, fender and bollard strengthening beams in gray

The following photographs show the underside of Berths 7 and 8 inner and outer wharves:



Photographs 1 and 2: Berth 7 Inner Wharf Underside (left) and Outer Wharf Underside (right), water to right

It was observed that the fender and bollard strengthening beam between Rows B & C as shown in Figure 3 from the 2010 modification work was not installed.

### Berths 5 and 6 Structure

The outer waterside wharf of Berths 5 and 6 consists of a concrete deck supported by steel piles spaced 36 feet on center. At some locations there is an inner wharf. At locations without an inner wharf, the outer wharf was constructed so it butted into the soil at its landside.

The inner landside wharf, not shown in the figure below, consists of a concrete deck supported by timber piles. However, there is no wall between the outer and the inner wharf. Concrete struts are provided spaced 18 feet along the waterside girder to support the cantilevered wharf deck. Refer to Appendices A and C for additional details of the wharf structure.

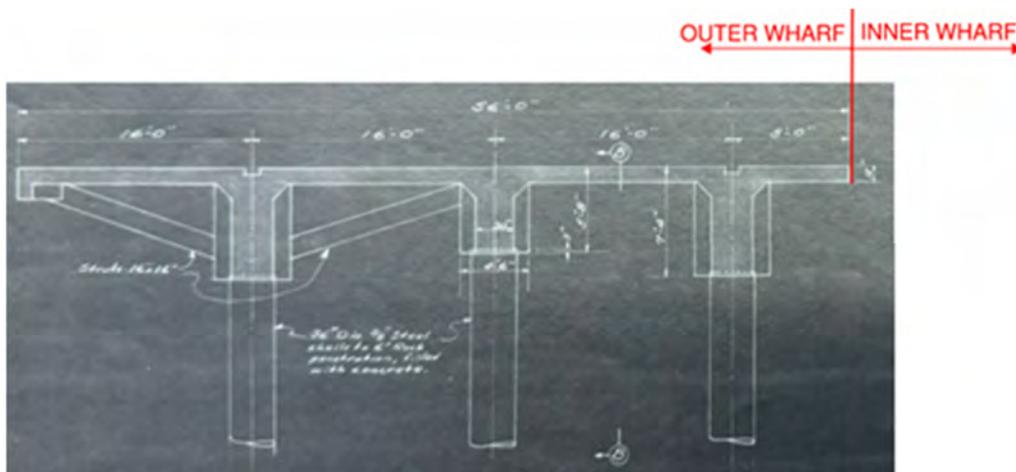


Figure 4: Berths 5 and 6 wharf cross section, water on the left side, inner wharf at some locations (not all)

This is what the outer and inner wharf boundary looks like at Berth 6:



Photograph 3: Inner and outer wharf boundary at Berth 6, water to left, inner wharf at some locations (not all)

### Berths 5 to 8 Fendering and Bollards

Berths 7 and 8 have cone fenders with front panels and double bitt bollards. Berths 5 and 6 typically have no fenders and some double bitt bollards from the original construction. There are a couple of locations with tire fenders.

### CONDITION ASSESSMENT SCOPE

Liftech and ENGEO conducted the following condition assessment on March 18 and 19, 2025.

March 18 included the outer wharf from a boat, provided by Power Engineering Construction Company (PEC), to observe the outer wharf condition from above water including piles, soffit, face beams, sheet pile walls, and fenders. Liftech observed bollard and pavement conditions from above deck. ENGEO's assessment was limited to below deck and above water.

March 19 included the inner wharves. The inner wharf of Berths 7 and 8 is a confined space with the entrance through a manhole. PEC provided safety training and supervision for working in the confined space. Liftech observed the timber piles, soffit, beams, and seismic tie beams. ENGEO observed the embankment that caused the pavement failure from on top of the deck.

On March 27, 2025, Liftech performed the above deck assessment for Berths 5 and 6 that included the wharf deck and bollards.

Underwater inspection was not performed.

### FINDINGS

#### Berths 7 and 8

##### *General*

In 2010, Liftech prepared construction documents for Berths 7 and 8 wharf repairs that addressed areas that require repair, upgrade, or both. The work was performed primarily to address the auto carrier

vessel berthing requirements. The improvement work included upgrading bollards and fenders and repairing select piles and select wharf deck damage. Due to budget limitations, a significant amount of damage identified for repair was not repaired, e.g., piles, soffit areas, face beam areas. At the inner wharf, many damaged and missing piles were not repaired. The top concrete deck damage was covered by asphalt pavement. Due to the limited repairs, traffic areas were limited to portions of the wharf deck. Refer to drawing S1.1 in Appendix A.

In general, the repair work performed in 2010 to bollards, fenders, and concrete piles is in satisfactory condition with localized damage, such as missing UHMW panels at fender frontal panels. The wharf corrosion damage that was not repaired in 2010 has worsened. There are more missing piles than those left unrepaired in 2010. Overall, the outer concrete wharf is in poor condition, and the inner wharf is in poor-to-serious condition due to significant damage to the timber piles and missing piles.

#### *Concrete Deck Depression at Southern end of Berth 7*

A major longitudinal concrete beam supporting the inner wharf deck is broken, resulting in excessive settlement observable from above deck. The timber piles supporting the beam are compromised. Additionally, there are missing piles and damaged timber piles in the adjacent bays, adding more weight on the beam. The loss of pile support caused it to be overloaded, to break, and to displace. The impact of this beam failure that occurred at Berth 6 extends to the southern end of Berth 7, which has deflected downward. This is observable from the above deck. See Photograph 4.



Photograph 4: Broken concrete beam, damaged and missing timber piles

Photographs of select components and structures are provided below. See Appendices D, E, and F for more damage details including locations with images.

#### *Select Damage Locations*

Damage ratings have been assigned for each observed structural component and the overall wharf in accordance with ASCE Manuals and Reports on Engineering Practice No. 130 – Waterfront Facilities

Inspection and Assessment. Pertinent sections of the ASCE damage ratings are provided in Appendix H.

Item	Damage Rating	Comments
2010 Bollard		
	Moderate	Loss of coating and minor surface corrosion.  Concrete cracks at bollard base.
2010 Fender		
	Moderate	Missing UHMW panels at several fender locations.  No damage observed at rubber fender cone.  Minor corrosion at some of the support chains.
Seismic Tie Beam Pavement Crack		
	Major	Some of the seismic tie beams project to the wharf deck as pavement cracks indicating downward displacement of some of the seismic beams.

Item	Damage Rating	Comments
Seismic Tie Beam Support		
	Severe	Missing support pile at seismic tie beam.
	Severe	Concrete pier adjacent to seismic tie beam. The vertical cracking indicates overstressing.
2010 Bull rail		
	Major	Section of concrete bull rail failed with exposed rebar.
2010 Repaired Concrete Piles		
	No damage/defects observed at piles repaired in 2010.	Condition appears favorable; however, condition below water was not evaluated.

Item	Damage Rating	Comments
Damaged Concrete Piles – Outer Wharf		
	Major	Crack and delamination along pile corners (corrosion damage).
Missing Piles – Inner Wharf		
	Severe	Many missing piles. Inner wharf. Mostly in Row F and under tiebacks. Also see Appendix D.
Sheet Pile Wall		
	Major	Concrete cracking and delamination at wall (corrosion damage).
Interior Soffit Damage		
	Major	Corrosion damage with loss of concrete cover (spalling) and exposed corroded rebars.

Item	Damage Rating	Comments
Edge of Deck and Waterside Crane Beam Damage		
	Major	Corrosion damage with concrete spalling and exposed rebar.
Expansion Joint Beam Damage		
	Major	Corrosion damage with concrete spalling and exposed rebar.

**Berths 5 and 6**

*General*

Berths 5 and 6 are currently not being used. There are no fendering systems except a few rubber tires mounted on the wharf face. The mooring bollard bitts have significant corrosion with significant concrete damage at the bollard bitts. There is significant corrosion damage to the concrete structure at the soffit, wharf face, deck support struts, and piles. The inner wharf has missing piles, soffit damage, a damaged beam, and eroding soil along the landside edge of portions of the outer wharf where there is no inner wharf. See sections below and Appendices D and G.

*Pavement Failure Along Landside Wharf Edge - Erosion*

Pavement is failing along portions of the landside edge of the outer wharf at locations without the inner wharf because the soil below is eroding.

Since there is no seawall to protect the soil, the soil has eroded causing the pavement to lose support. The gap between the concrete deck edge and the soil grew bigger over time, requiring steel plates covering the gap as shown in the photograph below. Refer to Appendix I for embankment soil failure in the ENGEO report.



Photographs 5 and 6: Below deck, erosion and pavement failure, outer wharf and water to left, land to right

Select Component and Structure Damage

Item	Damage Rating	Comments
Berth 5 End Strut		
	Major	Loss of concrete cover with exposed corroded rebars.  Concrete spalling at bottom deck.
Face Beam, Diagonal Strut, Soffit, and Waterside Crane Beam		
	Major	Damaged face beam.  Corrosion damage with exposed corroded rebar at diagonal struts.  Concrete cracks and initial delamination at the bottom of the waterside crane beam.

Item	Damage Rating	Comments
Temporary Steel Pile Fendering		
	Major	Significant damage to the face beam, probably caused by vessel impact.
Spalled Beams and Struts		
	Major	Corrosion of concrete and rebar leading to spalling of beams and struts in multiple places. Outer wharf, Berths 5 and 6.
 		

Item	Damage Rating	Comments
Waterside Crane Girder		
	Major	Concrete cracks at the bottom of the crane girder and concrete delamination.
Inner Wharf – Timber Piles Supported Wharf		
	Severe	Berth 5 missing a row of timber piles (5 total). Also piles missing under Berth 6 inner wharf.
	Major	Same location as photograph above. Showing condition at wharf joint between Berth 5 inner and outer wharf

Item	Damage Rating	Comments
Damaged Soffit		
	Major	Corrosion damage with a section of concrete cover spalled with exposed corroded rebar. Multiple locations, Berths 5 and 6.
Damaged and Missing Timber Piles		
	Severe	Damaged and missing timber piles adjacent to the concrete deck joint.
Steel Piles		
	Major	Significant corrosion damage with wall thickness loss.

Item	Damage Rating	Comments
Bollards		
	Severe	Significant corrosion damage at bollard bits and anchor bolts with spalled concrete base and exposed corroded rebars.
Top Deck		
	Major	Sections of the deck have corrosion damage with loss of concrete cover and exposed corroded slab rebars.  Some sections of the slab indicate concrete delamination.
	Moderate	
Pavement Settlement at South End of Berth 5		
	Major	Pavement settlement up to three (3) inches observed at the edge of the concrete deck.

Item	Damage Rating	Comments
Pavement Failure North of Berths 5 and 6		
	Major	Pavement failure covered with steel plates.
	Major	

See Appendices for more details.

**DISCUSSION**

**Berths 7 and 8**

Overall, the outer concrete wharf is in poor condition and the inner wharf is in serious condition due to significant damage to the timber piles and missing piles.

Considering the current operations of offloading automobiles, which is a relatively light loading, the wharf loading limitation shown in the Liftech 2010 construction documents (Appendix A) and as shown in the cross hatch area in Figure 5 is still reasonable and shall be enforced. However, improvements to the support of some of the seismic tie beams should be implemented in the next couple of years.

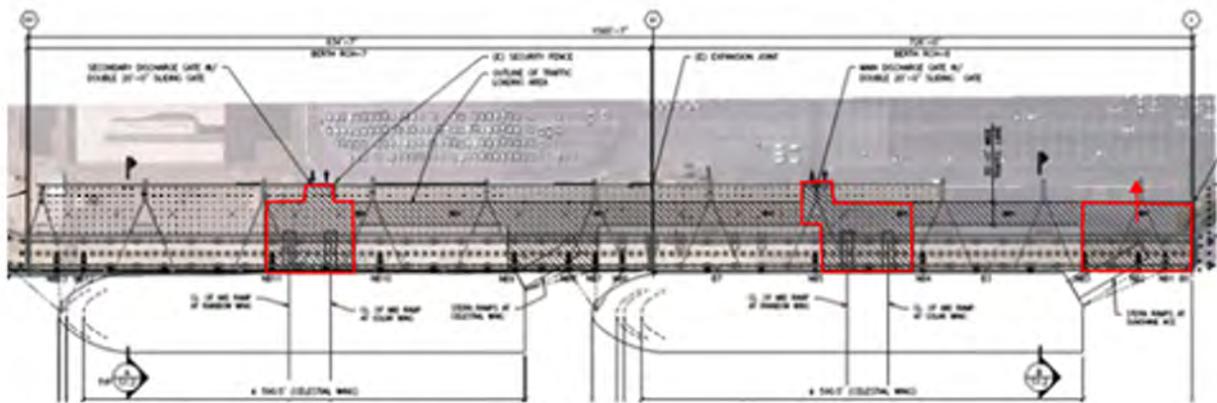


Figure 5: Automobile loading zone shown in cross hatch area, ship ramp landing zones in red

In 2010, the piles where the ship ramps land were repaired as indicated in red areas in Figure 1 above. These areas are adequate for the AASHTO design HS20-44 truck loading. Refer to Appendix K for the currently justified allowable wharf deck live loads.

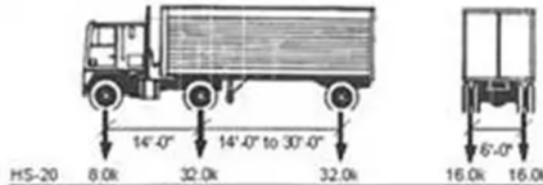


Figure 6: AASHTO HS20-44 design truck loading

Wharf deck slab thicknesses, typical pile spacings, and Liftech calculated allowable uniform live loads are provided below.

Location – Ship Ramp Landing Zone	Slab thickness, inches	Pile spacing, ft	Uniform Loads, psf
Outer Wharf	12	12 x 16	390
Inner Wharf	8	10 x 10	200

Notes:

1. The allowable loads do not apply to areas outside of ramp landing zone as the damaged and missing piles have not yet been repaired.
2. Capacities based on half of the top reinforcing not effective due to damage. Larger load capacities might be justified with more refined evaluation of the reinforcing damage and more refined calculations.

The broken beam that occurred at Berth 6 has significant impact to the deck capacity at the southern end of Berth 7. Any deck load in the impacted area that can be removed should be removed as soon as practical. Equipment loads should be prevented until shoring or repairs. Repairs should be made with immediate priority.

## Berths 5 and 6

Overall, the outer concrete wharf is in poor condition with significant corrosion damage at the top deck surface, underdeck soffit, face beam, diagonal concrete struts, crane beams, and interior concrete beams. The steel pipe piles have corrosion damage with thickness lost above the tidal zone.

The inner wharf that was supported by timber piles is in poor condition due to many missing and damaged timber piles.

The wharf has not been used for cargo handling for a long time and, as such, the current wharf structure has not been subjected to significant live loading, mostly its self-weight. We did not observe overstressing of structural members, such as excessive concrete wharf deflections, except the broken beam at Berth 6, which also has caused the deflection of the deck slab at the southern end of Berth 7.

This wharf has not been evaluated to determine an acceptable load capacity. If the Port plans for cargo handling operations, a structural evaluation will be required.

Repairs, including corrosion mitigation measures, should be evaluated based on planned berth usage.

## CAPITAL IMPROVEMENT PROJECTS PRIORITY

Based on the severity of structural damage and potential impact to operations, we recommend the following capital improvement projects:

Project No:	Priority	Description
1	Immediate/priority	Berth 6 & 7 – Repair broken concrete beams.
2A	Immediate/priority	Berths 5& 6, – Install sheet piles to prevent further soil/embankment erosion causing pavement failure/settlement.
2B	Near term	Berths 7, & 8 – Install sheet piles to prevent further soil/embankment erosion causing pavement failure/settlement.
3	Near term	Berth 7 & 8 – Stabilize seismic tie beam support to prevent further settlement.
4	Long term – based on usage and available funding	Berths 7 & 8, inner and outer wharf – Repair concrete piles, beams, soffit, top deck, timber piles, and replace missing timber piles.
5	Long term – based on usage and available funding	Berths 5 & 6, inner and outer wharf – Repair beams, diagonal struts, soffit, top deck, timber piles, and replace missing timber piles.
6	Long term – based on usage and available funding	Berths 5 & 6 Fenders and Bollards – Install discrete fenders to serve barges and replace existing bollards with new.

For each project, Liftech developed a scope of work with concept repair scheme and quantity take-off to obtain a rough order of magnitude (ROM) of construction cost estimates. Liftech worked with Power Engineering Construction (PEC) for the ROM cost estimates. To arrive at budgetary cost estimates,

construction cost estimates were increased by 30% to account for soft cost, such as EIR, engineering, the exclusions listed in PEC's estimates, and a reasonable contingency. The budgetary cost estimates are based on 2025 labor and material rates and exclude escalation to account for work being performed in the future, e.g., inflation, tariff impact.

Refer to Appendix J for detailed descriptions of scope of work and budgetary cost estimates computation. A summary follows:

Budgetary Cost Estimates Summary			
Project No:	Repair Priority	Descriptions	Budgetary Cost
1	Immediate/Priority	Berth 6 & 7 - Broken Concrete Beam Retrofit	\$1,200,000
2A	Immediate/Priority	Berths 5 & 6 - Sheet Pile Wall Installation and Pavement Settlement Repairs	\$1,550,000
2B	Near term	Berths 7 & 8 - Sheet Pile Wall Installation and Pavement Settlement Repairs	\$1,150,000
3	Near term	Berths 7 & 8 - Seismic Tie-Beam Support Stabilization	\$4,600,000
4	Long term - Based on usage and available funding	Berths 7 & 8 Damaged Concrete Piles, Beams, and Deck Repairs	\$130,000,000
5	Long term - Based on usage and available funding	Berths 5 & 6 - Damaged Concrete Beams, Deck Repairs, and Missing Piles Replacement	\$61,000,000
6	Long term - Based on usage and available funding	Berths 5 & 6 - Discrete Fender and Bollard Upgrades	\$5,400,000

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

## RECOMMENDATIONS

We recommend the following actions:

### Berths 7 and 8

1. General: Ensure, at all times, that the equipment loading plan included in Liftech's 2010 repair drawings is being followed. Refer to Appendix K for the allowable wharf deck loading.
2. Depressed Deck: Remove non-fixed loads over the depressed deck, including removing K-rails, the container if practical, or contents of the container. Do not allow equipment to travel within 20 feet of the low point (break). If it is not practical to keep equipment off the beam, perform a structural evaluation to confirm if acceptable or install temporary shoring until long-term repairs can be implemented.
3. Seismic Tie Beams 4, 5, 6, and 7: Improve support by installing piles through the deck, installing jacking beams between them, jack to load piles and restore to original elevation, shim and grout.
4. Complete the repairs called out in Liftech's construction documents (see Appendix A).
5. Repair bollard coatings.
6. Repair fender frontal frame UHMW panels.
7. Consider/evaluate corrosion repairs including mitigation measures. Perform corrosion repairs and mitigation as worthwhile.
8. Perform comprehensive 100% Level 1 inspection including underwater pile inspection to accurately understand the current condition.
9. Monitor damage with above water Level 1 visual inspection every three years.

**Berths 5 and 6 & Partial 7**

1. Repair broken beam and relevel deck.
2. Repair eroded embankment and gaps between landside of outer wharf and yard pavement by installing sheet piles, cap beam, fill, and repair pavement.
3. Consider/evaluate corrosion repairs including mitigation measures. Perform corrosion repairs and mitigation as worthwhile.
4. If using the wharf (more significant loading) is of interest:
  - i. Perform comprehensive 100% Level 1 inspection, including underwater pile inspection, to accurately understand the current condition.
  - ii. Evaluate wharf structure as other repairs may be required or worthwhile.
5. Monitor damage with above water Level 1 visual inspection every five years.

**APPENDIX A – LIFTECH WHARF REPAIR FOR HONDA PROJECT 2010**

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# POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND

PREPARED FOR



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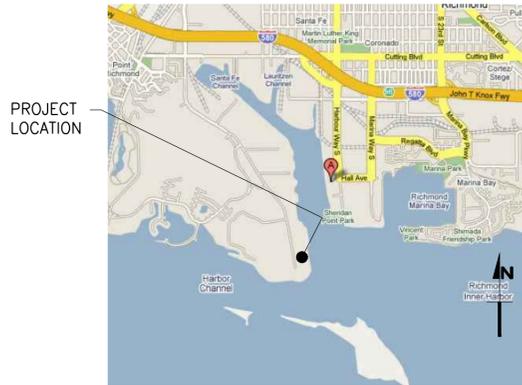
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**LOCATION MAP**



**VICINITY MAP**



**DRAWING INDEX**

SHEET NUMBER	SHEET TITLE		
<b>GENERAL</b>			
G1	TITLE SHEET AND DRAWING INDEX		
G2	GENERAL NOTES - 1		
G3	GENERAL NOTES - 2		
G4	DESIGN LOAD CRITERIA		
<b>STRUCTURAL</b>			
S1.1	SITE PLAN		
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S3.1	RCH-8 DAMAGED AND REPAIR AREAS	△	S3.6 TIMBER PILE REPAIR AND REPLACEMENT DETAILS
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**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
TITLE SHEET AND  
DRAWING INDEX

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Project No. Z1800  
By AH Checked TG/EGS Sheet No. G1  
Approved SL of ----  
Date 01/25/2010 Revision 2

△	ADDED SHEET FOR BOLLARD 14	06/11/10	AH	TG	
△	ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL

No.	Revision	Date	By	Checked	Approved
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2					

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**SCOPE OF WORK**

The project includes demolition and work necessary to upgrade the wharf structure at Berths RCH-7 and RCH-8, Pt Potrero Marine Terminal, for berthing and mooring auto carrier vessels and for loading and unloading automobiles from the vessels. The existing wharf structure was constructed in 1940's.

The wharf upgrade work includes:

- Remove and dispose of some existing bollards, all existing fenders, and all temporary bullrails
- Furnish and install new fenders
- Furnish and install new bollards
- Repair damaged wharf deck at the traffic loading area
- Repair and replace damaged piles at the traffic loading area
- Furnish and install sheet piles

The wharf upgrade work is limited to certain locations. Access shall be restricted to wharf areas with unacceptable damage that are not repaired. Seismic upgrades to improve seismic performance is not part of the scope of work.

**PROJECT REFERENCES**

1. Proposed Recommendations for Pt. Potrero Wharf Repair, Port of Richmond, prepared by Liftech Consultants Inc, dated December 11, 2009
2. Inspection Report for Berth RCH-7 and Berth RCH-8 at Point Potrero in the Port of Richmond, California, prepared for Liftech Consultants, by Collins Engineers, Inc., September 10, 2009
3. Above and Underwater Inspection Report of Berth 7, Shipyard No. 3, Port of Richmond, CA, prepared for The Pasha Group, by Han Padron Associates Engineers, Inc., August 2001
4. Drawings for "Fitting-Out Dock", Kaiser Company Inc, Richmond, California, by L. H. Nishkian Consulting Eng'r, dated August, 1942
5. Field Review of the Existing Outfitting Dock, Shipyard No. 3, Richmond, CA, prepared for The Pasha Group, by Jordan[Casper]Woodman[Dobson, May 6, 1985
6. Report of the Allowable Loading Capacity of the Existing Outfitting Dock, Kaiser Engineers, May 1974 (bound as an appendix to reference 5)
7. Berth 6C, 6D and 7 of the Point Potrero Marine Terminal, Condition Survey, Port of Richmond, prepared for Pasha Group, by Vickerman Zachery Miller Engineering Architecture, June 1990
8. Load Testing Observations – Berth 7, Port of Richmond, CA, by Jordan Woodman Dobson, April 7, 2000

**SPECIAL INSPECTION**

Special inspection shall be provided in accordance with the requirements in CBC, Chapter 17, including:

- Concrete construction
- Steel construction
- Epoxy anchor and dowel installation in concrete
- Wharf Deck Piling repair and installation
- Pile and sheet pile installation by geotechnical engineer
- See Inspector Requirements on Sheet S3.4

The Client will retain the Special Inspector for the above inspections. Inspection reports shall be submitted to the Client, the Port, and the Engineer.

**STRUCTURAL OBSERVATION**

Contractor shall notify the engineer of record at least two working days prior to each of the following construction stages so that a registered design professional can perform a visual observation of the structural system for general conformance to the approved construction documents.

- Installation of the steel fender support frame
- Prior to pouring concrete for reinforcing steel and anchor bolt review:
  - Deck Repair
  - Fender Support
  - Bollard Beam
- Deck and Pile Repair

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**GENERAL NOTES**

**GENERAL**

All work shall conform to all applicable codes and ordinances including OSHA and the Port of Richmond requirements

Contractor shall visit the site and verify that all existing conditions, elevations, dimensions, and construction are consistent with these drawings and notify the Client and Engineer of any discrepancies before proceeding with the work.

Contractor is responsible to secure all required permits to perform demolition and repair in the marine environment.

**CONSTRUCTION STAGING AREA**

Contractor shall coordinate with Client and Port for construction staging area. Contractor shall note the following:

1. Construction loading shall be prohibited at the "restricted loading area" shown on drawing S3.1 and S3.2.
2. Construction loading outside the "restricted loading area" shall be limited to 125 psf.
3. If heavy construction equipment, such as erection cranes and heavy wheel loads, are mobilized onto wharf area, contractor shall submit calculations, performed by a licensed engineer, to demonstrate the wharf deck is adequate to support such loading.

**CIVIL**

There may be below deck or underground obstructions, such as utilities, that are not shown on these drawings. If such obstructions are discovered, Contractor shall notify the Client and the Port. Contractor shall stop work in the affected area until notified by the Client.

If hazardous material is found in the work area, the Contractor shall notify the Client and the Port. Contractor shall stop work in the affected area until notified by the Client.

Contractor shall provide dust, erosion, and runoff control measures to the satisfaction of the Port. The control measures shall be reviewed by the Port before starting work.

Contractor shall provide shoring for the under deck work in accordance with OSHA requirements.

**STRUCTURAL CONCRETE**

**Concrete Work**

Concrete work shall conform to ACI 301-05 and ACI 318-08.

**Strength**

Concrete shall have a minimum compressive strength,  $f_c'$ , of 4000 psi in 28 days. Mix design shall be submitted to the Engineer for review at least two weeks prior to pouring concrete.

**Slump**

Concrete slump shall be a minimum of 5". The slump shall be determined in accordance with ASTM C143-08

**Cement Content**

The minimum cement content shall be 564 pounds (6 sacks) per cubic yard. Fly ash may be substituted for no more than 15% of the cement content. The maximum water-cement ratio shall vary with respect to maximum aggregate size as follows:

Maximum Aggregate Size	Maximum W/C Ratio
1-1/2 inch	0.400
1 inch	0.385
¾ inch	0.375

**Construction Joints**

Concrete construction joints, both horizontal and vertical, shall be thoroughly cleaned by wet sandblasting, exposing firmly embedded aggregates. The blasting shall be followed by washing to remove all loose particles. Prior to placing concrete, the surface of the construction joint shall be thoroughly cleaned and wetted. Joints shall be continuously moist cured between concrete placings.

**Concrete Cover and Chamfer**

Concrete cover shall be 3" minimum unless noted otherwise. All chamfer shall be ¾" unless otherwise noted.

**Reinforcing Steel**

Reinforcing steel shall be deformed steel bars conforming to ASTM A 615-08A, Grade 60, unless otherwise shown. Bars shall be continuous around corners and lapped at splices as shown on sheet G3 unless otherwise shown. Submit shop drawings and mill certificates to the Engineer for review prior to fabrication.

**Grout**

**Anchor bolts and dowels**

Epoxy for anchor bolts and dowels into the existing concrete shall be Simpson SET High Strength Epoxy or approved equal. Installation shall be in accordance with the manufacturer's recommendations.

**Bollards and others**

Grout shall be high strength non-shrink grouting, Masterflow 928, suitable for marine environment by BASF Construction Chemicals or an approved equivalent.



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PT. POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

GENERAL NOTES – 1

Project No. Z1800	
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**STRUCTURAL STEEL**

**Workmanship for Steel Structures**

Work shall conform to the requirements of the AISC 360-05 "Specification for Structural Steel Buildings", March 9, 2005, including current supplements and AWS D1.1/D1.1M:2008, "Structural Welding Code - Steel" including Section 6 and provisions applicable to dynamically loaded structures.

Electrodes shall be in accordance with the notes below under Welding.

**Material**

Structural steel shall conform to the following unless otherwise noted:

W-Shapes	ASTM A992-06 or ASTM A572-07 Grade 50
Plate, bar, and sheet pile:	ASTM A572-07 Gr50
Angles & Channels:	ASTM A36-05
Anchor Bolts	ASTM F1554-07A Grade 105 unless otherwise noted
Structural bolts	ASTM A325 Type 1

**Material Substitution**

Contractor may propose substitution of material and shall submit all necessary information to demonstrate that the material is equivalent to the material specified. The Engineer may reject any substitution.

**Fabrication and Erection**

Shop drawings shall be submitted to the Engineer for review prior to fabrication.

**Sheet Piles**

The sheet pile driving procedure shall be submitted to the Engineer for review. A vibrodriver or impact hammer may be used at Contractor's option.

**Galvanizing**

All steel components shall be hot dipped zinc coated to not less than two ounces per square foot. Galvanizing shall comply to ASTM A123-02 for fabricated items and ASTM A153-05 for hardware including the referenced ASTM A143-07 to avoid hydrogen embrittlement. Damaged surfaces shall be repaired using either a zinc-based alloy or a paint containing zinc dust in accordance with ASTM A780-01. The repair shall be in accordance with the manufacturer's recommendations.

**Welding**

**Welders**

Welders and welding operators shall have current AWS certificates for the materials and processes being used. The Contractor shall maintain current files of these certificates and shall provide them to the Port upon request.

**Procedures**

Weld Procedures shall be qualified in accordance with AWS D1.1. The Contractor shall maintain current files of weld procedure specifications and test results. Weld procedures and test results shall be verified by the Contractor prior to making repairs.

**Wraparound Welds**

Unless otherwise noted, all fillet welds which occur on opposite sides of a common plane shall be interrupted at the corner common to both welds. Refer to AWS D1.1 Section 2.8.3.5. See Figure 1.

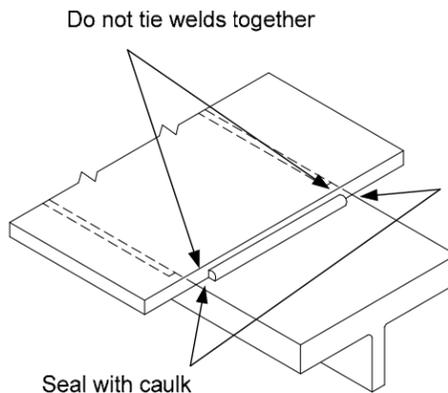


Figure 1

**Seal Welding**

All welded joints shall be seal welded except fillet welds occurring on opposite sides of a common plane as shown in Figure 1. Those joints shall be sealed with caulking.

**Preheat and Interpass Temperatures**

Weld preheat and interpass temperatures shall comply with Table 3.2 of AWS D1.1.

**Electrodes**

Electrodes shall be low hydrogen and shall be in accordance with Table 3.1 of AWS D1.1 except E60xx rods shall not be used. For base metals with yield strengths less than 70 ksi electrodes shall be H16.

**CJP Welds**

Welds shown as CJP shall be made without backup bars unless otherwise noted. Detail drawings shall show the weld details.

**Cracks**

Cracks shall be removed using air carbon arc or grinding. MT inspection method shall be used to determine the extent of the cracks. Unless otherwise noted, the root pass of the repair welds shall be inspected by VT and MT.

**Weld Inspection**

All welds shall be visually inspected (VT). All full penetration welds shall be inspected by VT and UT unless otherwise shown. Additional NDT shall be performed as indicated on the drawings. The Client may perform verification NDT other than visual even though this inspection is not indicated on the drawings. It shall be the Contractor's responsibility to ensure that all welds meet the acceptance requirements of AWS D1.1 section 6, "Inspection." The Contractor shall allow unrestricted access for inspection by the Port.

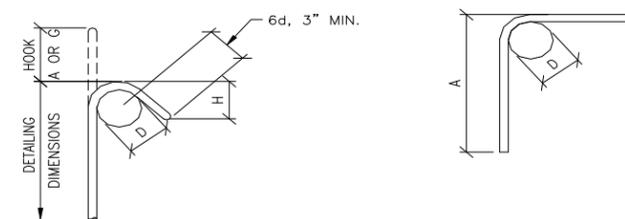
**MEANS, METHODS, AND JOBSITE SAFETY**

At all times, the Contractor shall be solely and completely responsible for means, methods, sequences, and procedures of work, and conditions of the jobsite including safety of persons and property, and for all necessary independent engineering review of these conditions. The Engineer's jobsite review is not intended to include review of the adequacy of the Contractor's safety measures.

**RECORD DRAWINGS**

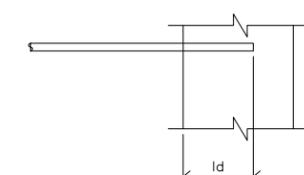
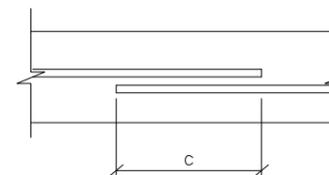
The Contractor shall submit a set of record drawings to the Client after completion of construction. The record drawings shall show deviations to the contract documents.

**TYPICAL REINFORCING DETAILS**



135° Hooks			
Bar Size	D	A or G	H Approx.
#3	1 1/2"	4 1/4"	3"
#4	2"	4 1/2"	3"
#5	2 1/2"	5 1/2"	3 3/4"
#6	4 1/2"	8"	4 1/2"
#7	5 1/4"	9"	5 1/4"
#8	6"	10 1/2"	6"

90° Hooks		
Bar Size	D	A
#3	2 1/4"	6"
#4	3"	8"
#5	3 3/4"	10"
#6	4 1/2"	1'-0"
#7	5 1/4"	1'-2"
#8	6"	1'-4"
#9	9 1/2"	1'-7"
#10	10 3/4"	1'-10"
#11	1'-0"	2'-0"



Bar Size	Typical Lap Splice	
	C	
	Top Reinf.	Bott. Reinf.
#3	1'-7"	1'-4"
#4	2'-1"	1'-7"
#5	2'-7"	2'-0"
#6	3'-2"	2'-5"
#7	4'-7"	3'-6"
#8	5'-3"	4'-0"
#9	5'-10"	4'-6"
#10	6'-6"	5'-0"
#11	7'-2"	5'-6"

Bar Size	Bar Development	
	ld	
	Top Reinf.	Bott. Reinf.
#3	1'-2"	1'-0"
#4	1'-7"	1'-3"
#5	2'-0"	1'-6"
#6	2'-5"	1'-10"
#7	3'-6"	2'-8"
#8	4'-0"	3'-1"
#9	4'-6"	3'-6"
#10	5'-0"	3'-10"
#11	5'-6"	4'-3"

Notes:

1. ACI 318-08 applies unless otherwise noted.
2. Concrete strength f<sub>c</sub> = 4000 psi minimum.
3. Center to center reinf. > 6" and center of bar to concrete surface > 2"
4. Top reinforcement: Horizontal reinforcement so placed that more than 12" of fresh concrete is cast below the development length or splice.
5. Concentric mechanical and weld splices in compliance with ACI 318-08 are acceptable alternatives to lap splices.

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PT. POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

GENERAL NOTES - 1

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**DESIGN CRITERIA**

**CODES**

Design Code: 2007 California Building Code (CBC)

**TECHNICAL REFERENCES**

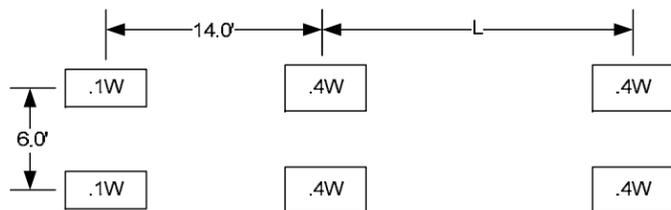
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- American Concrete Institute, Surface Repair Using Form-and-Pump Techniques (ACI RAP-5). Farmington Hills, MI: American Concrete Institute, 2003.
- American Institute of Steel Construction, Inc., Steel Construction Manual, 13<sup>th</sup> Edition (AISC). Chicago, IL: American Institute of Steel Construction, Inc., 2005.
- American Welding Society, AWS D1.1/D1.1M:2008, Structural Welding Code – Steel, 21st Edition (AWS). Miami, FL: American Welding Society, 2008.
- American Association of State Highway and Transportation Officials, Inc., AASHTO LRFD Bridge Design Specifications, 4th Edition (AASHTO). Washington, DC: AASHTO, 2007.
- American Society of Civil Engineers, ASCE/SEI Standard 7-05, Minimum Design Loads for Buildings and Other Structures (ASCE). American Society of Civil Engineers, 2006.
- Working Group 33 of the Maritime Navigation Commission, Guidelines for the Design of Fender Systems: 2002 (PIANC). Brussels, Belgium: International Navigation Association, 2002.
- International Concrete Repair Institute, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (Guideline No. 310.1R-2008). Des Plaines, IL: International Concrete Repair Institute (ICRI), 2008.

**DESIGN LOAD CRITERIA**

**Basic Loads**

- DL Dead Load  
Weight of wharf structure, density of reinforced concrete = 150 pcf
- LL Live Load  
Live Loads include the following individual non-concurrent loads:

- Uniform Live Load on deck = 250 PSF
- AASHTO HS20-44 Truck Wheel Loading, see below



W = 40 kips x 1.25 impact  
L = Spacing between 14' and 30' producing maximum stress

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**BL Berthing Load**

Angle berthing on one fender: The maximum fender reaction = 200 Kips combined with orthogonal friction load. Friction load is based on a coefficient of friction,  $\mu = 0.25$  orthogonal to the fender compression force in either vertical or horizontal direction.

**ML Mooring Load**

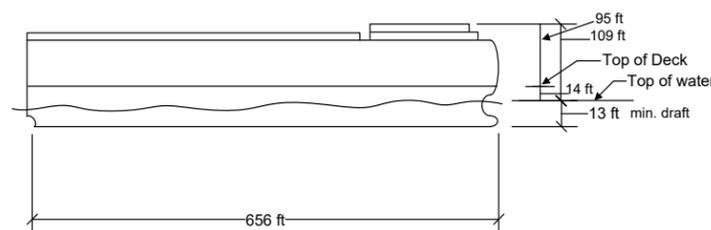
Determined based on 85 mph wind, 3 second gust, exposure "C" in accordance with ASCE/SEI 7-05 on Sunshine Ace Vessel.

Maximum bollard horizontal load = 440 kips in any direction within 180 degrees toward waterside.

Maximum bollard vertical reaction = 300 kips

Breasting lines at each end of the design vessel must be attached to at least three new bollards to resist the design wind force.

Design Wind Area:



**Factored Load Combination**

Basic Loads	Load Combinations		
	OP1	OP2	OP3
DL Dead Load	1.2	1.2	1.2
LL Live Load	1.6	1.6	1.6
BL Berthing Load		1.6	
ML Mooring Load			1.6

**Pile Loading: Unfactored Vertical Load**

New piles are designed to support dead load of structure plus a uniform live load of 500 psf

**Fender System Design Criteria**

Vessel Name	Sunshine Ace
Maximum Displacement	46,000 metric tons
Length Overall (LOA)	199.95 m (656 ft)
Beam Width	32.2 m (105.6 ft)
Maximum Draft	9.82 m (32.2 ft)
Stern Ramp	7 m x 32.34 m (23 ft x 106 ft)
Center Ramp	4.5 m x 16.78 m (14.8 ft x 55 ft)
Maximum Berthing Velocity Normal to wharf	0.15 m/s (0.50 FPS)
Berthing Angle	0 – 10 degrees
Minimum Berthing Energy per fender	425 kN-m (313 ft-k)
Maximum Hull Pressure	200 kN/m <sup>2</sup> (4.2 ksf)
Berthing Point Fore/Aft of Midship	LOA/4



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DESIGN LOAD CRITERIA

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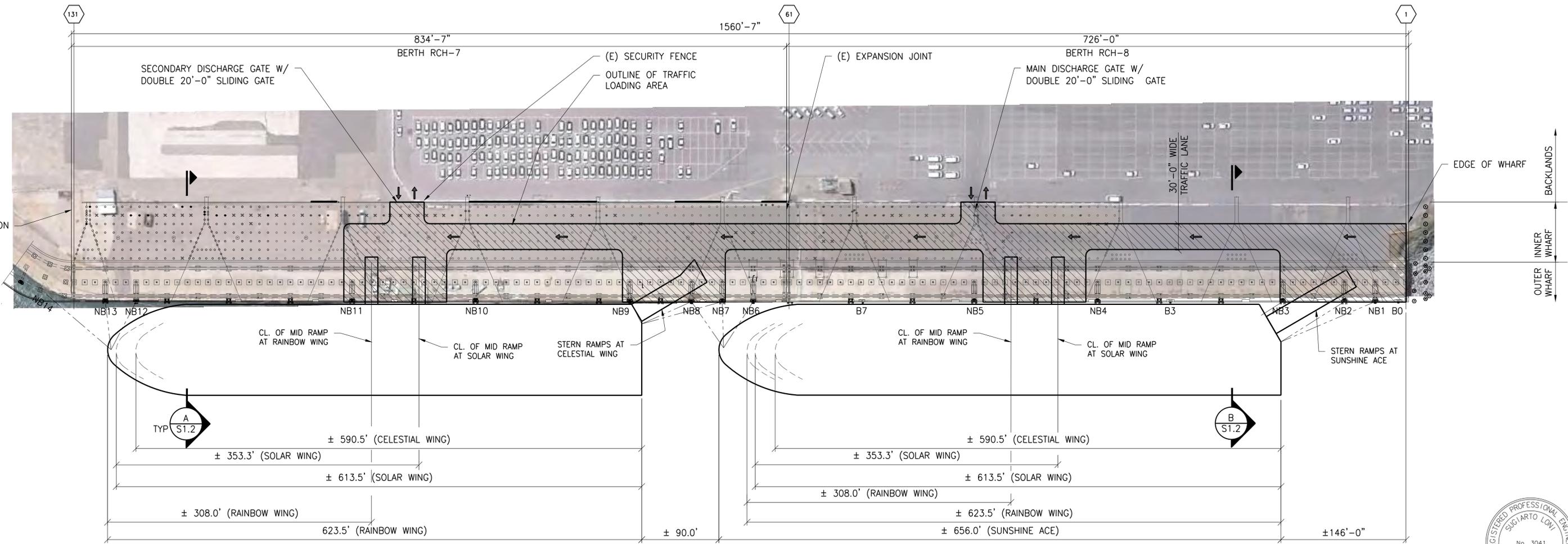
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LEGEND

- BX (E) BOLLARD TO REMAIN
- NBX (N) BOLLARD
- TRAFFIC LOADING AREA

NOTES:

1. VESSEL DATA WERE PROVIDED BY TRANSEVELOPMENT/AWC. VESSEL BERTHING POSITION MAY VARY FROM THE POSITION SHOWN ABOVE AND SHALL BE VERIFIED BY THE TERMINAL OPERATOR.
2. REFER TO SHEETS S2.1-S2.7 FOR EXTENT OF DEMOLITION.
3. REFER TO SHEETS S3.1 AND S3.2 FOR EXTENT OF DECK AND PILE DAMAGE AND EXTENT OF DECK AND PILE REPAIRS.
4. REFER TO SHEETS S4.1-S4.7 FOR BOLLARD, FENDER AND SHEET PILE WALL LOCATIONS.
5. CONTRACTOR SHALL COORDINATE WITH TERMINAL OPERATOR FOR LOCATION OF SLIDING GATES.
6. USE EXISTING BOLLARDS ONLY FOR SPRING LINES. USE NEW BOLLARDS FOR SPRING AND BREASTING LINES.
7. SEE SHEET G4 FOR MOORING LINE REQUIREMENTS.

SITE PLAN  
1" = 60'-0"



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SITE PLAN

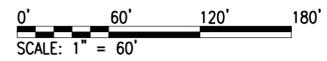
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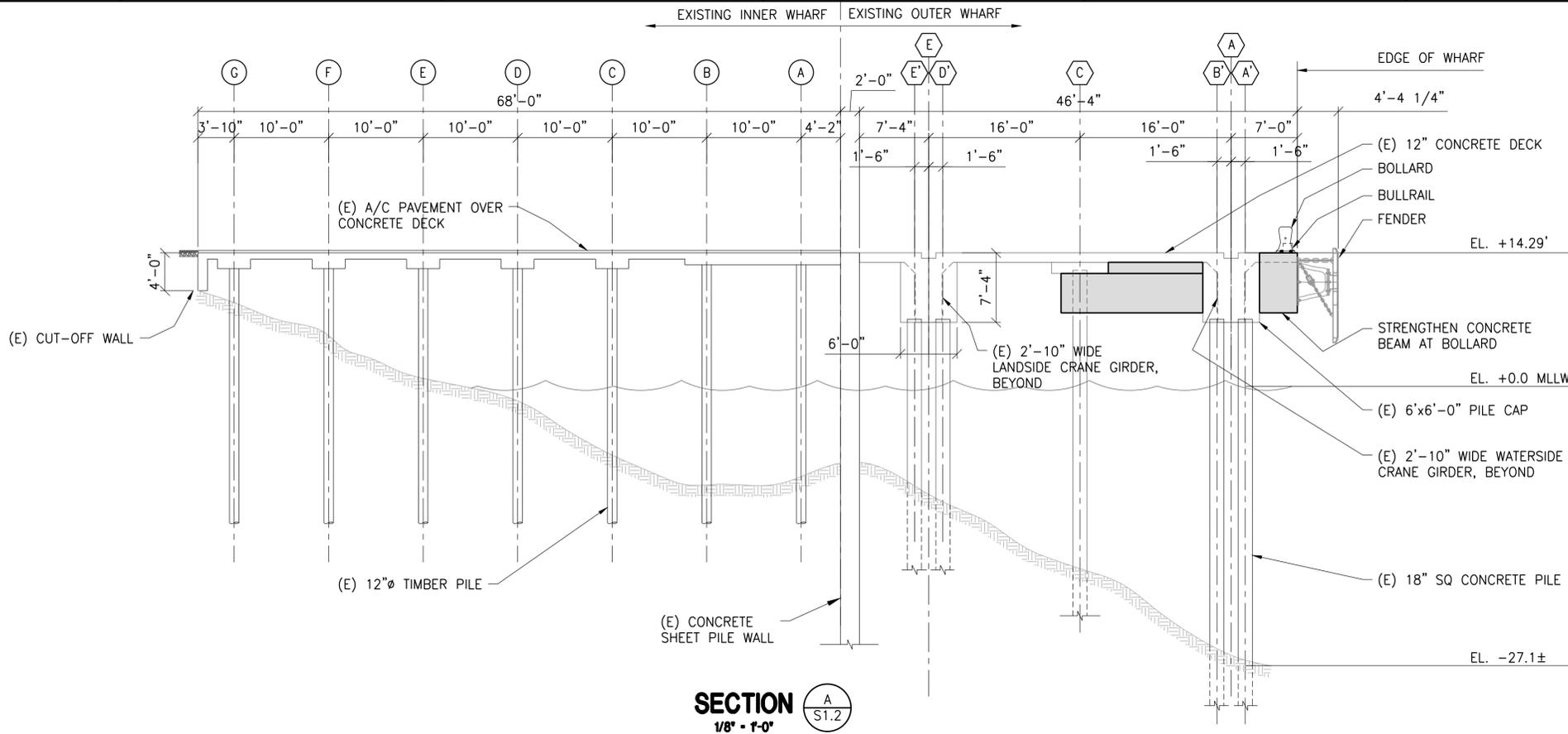
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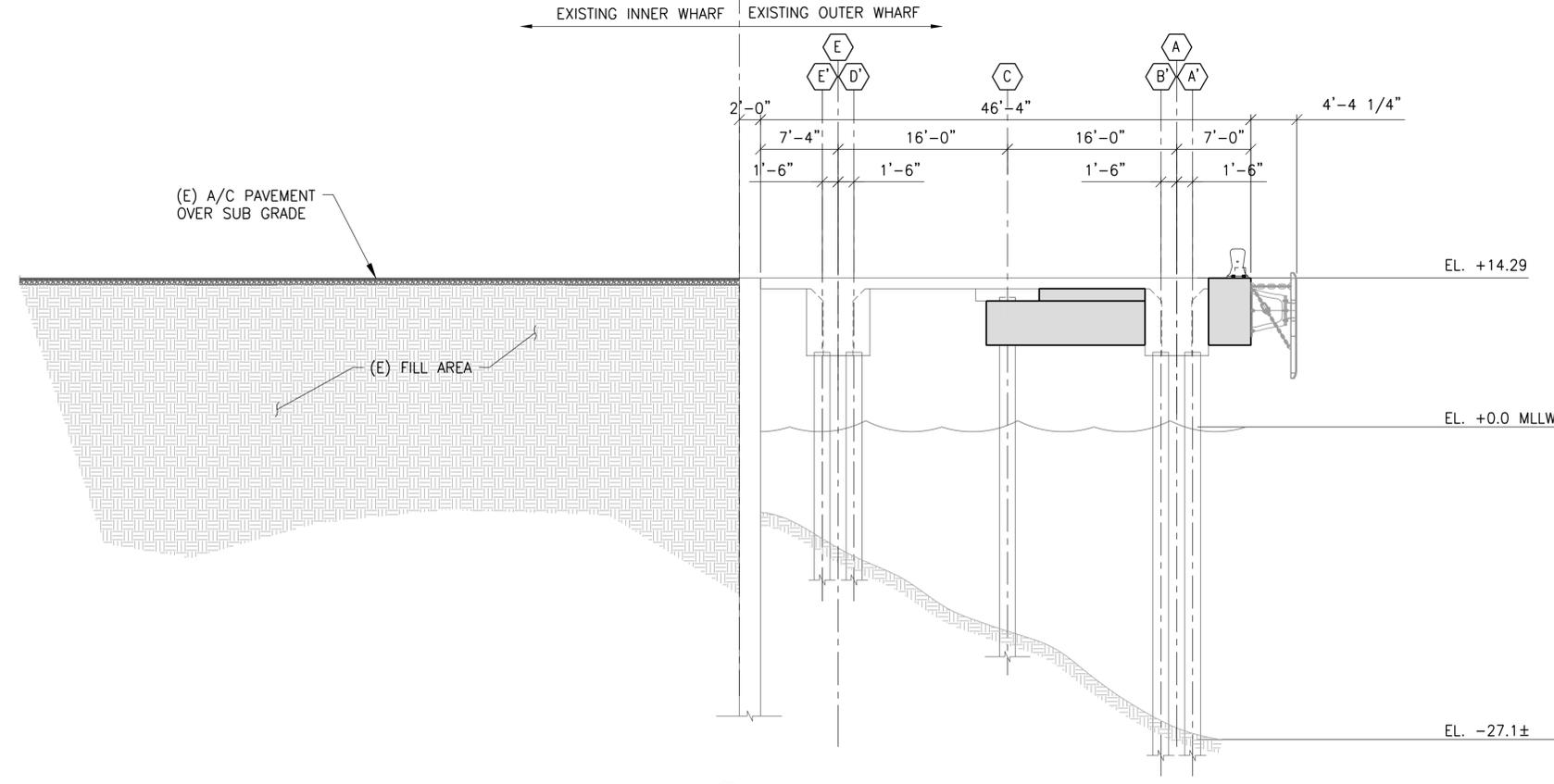


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**SECTION A**  
S1.2  
1/8" - 1'-0"

NOTE:  
AT BOLLARD USE ALTERNATE BOLLARD SUPPORT  
DETAILS SHOWN ON SHEET S4.13 PER PORT'S  
DIRECTIVE.



**SECTION B**  
S1.2  
1/8" - 1'-0"

SEE SECTION A/S1.2 FOR  
INFORMATION NOT SHOWN



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POINT POTRERO WHARF REPAIR  
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TYPICAL WHARF SECTIONS

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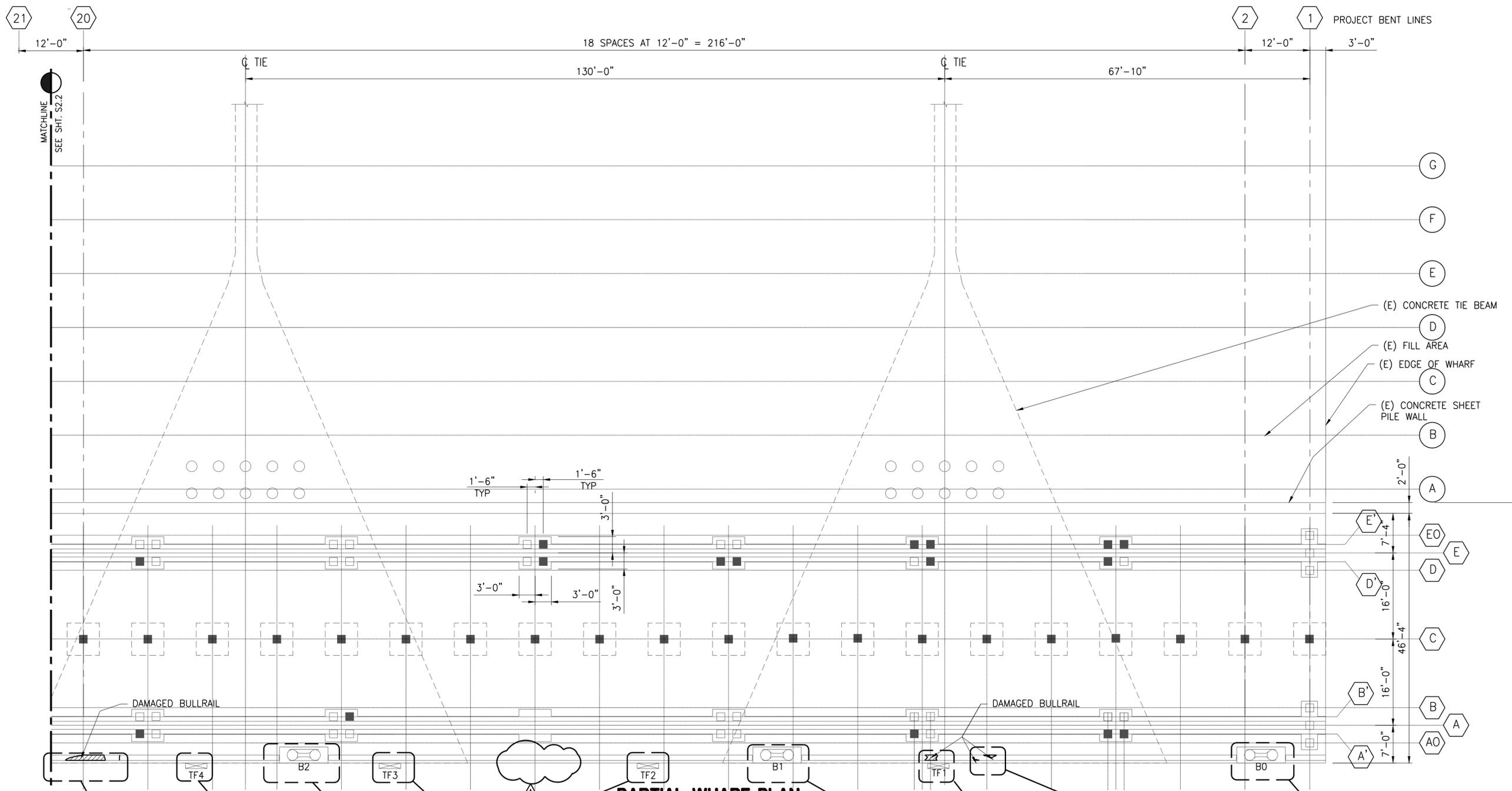
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Approved SL	of
Date 01/25/10	Revision 1

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**PARTIAL WHARF PLAN - DEMOLITION - 1**  
1" = 10'-0"



REPAIR DAMAGED BULLRAIL AS REQUIRED. LENGTH = 14'-0"



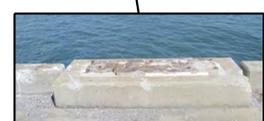
REMOVE AND DISPOSE OF TIRE FENDER



REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF TIRE FENDER



REMOVE AND DISPOSE OF TIRE FENDER



REPAIR DAMAGED BULLRAIL AS REQUIRED. LENGTH = 5'-0"



(E) BOLLARD TO REMAIN

**DEMOLITION NOTES:**

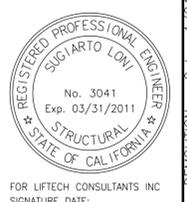
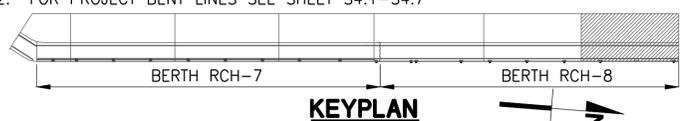
- ALL DEMOLITION WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF RICHMOND CONSTRUCTION DEMOLITION ORDINANCE.
- ADDITIONAL CONCRETE DEMOLITION IS REQUIRED FOR BOLLARD INSTALLATION. SEE DRAWING SHEETS S4.1 - S4.6 FOR BOLLARD LOCATION AND S4.7-S4.10 FOR BOLLARD DETAILS.
- SEE SHT S3.1-S3.2 FOR ADDITIONAL DEMOLITION NOTES FOR CONCRETE DECK REPAIR.
- (E) STEEL FENDER SUPPORTS SHALL BE REMOVED WHEN REMOVING FENDER.

**LEGEND**

- (E) BOLLARD
- (E) TIRE FENDER
- (E) FOAM FILLED FENDER
- (E) TOP DECK SURFACE DAMAGED AREA
- (E) TIMBER PILE
- (E) DAMAGED TIMBER PILE
- (E) MISSING TIMBER PILE
- (E) DAMAGED CONCRETE PILE

**NOTES:**

- CONCRETE PEDESTAL OF REMOVED BOLLARDS CAN REMAIN PROVIDED THAT TOP ELEVATION OF THE PEDESTAL IS APPROXIMATELY THE SAME AS BULLRAIL. IF THE PEDESTAL IS REMOVED, NEW BULLRAIL SHALL BE INSTALLED PER SECTION E/S4.8. IF BOLLARD PEDESTAL IS REMOVED OR SHORTENED, PROVIDE SMOOTH SURFACE TO TOP OF CONCRETE.
- FOR PROJECT BENT LINES SEE SHEET S4.1-S4.7



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POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PARTIAL WHARF PLAN - DEMOLITION - 1

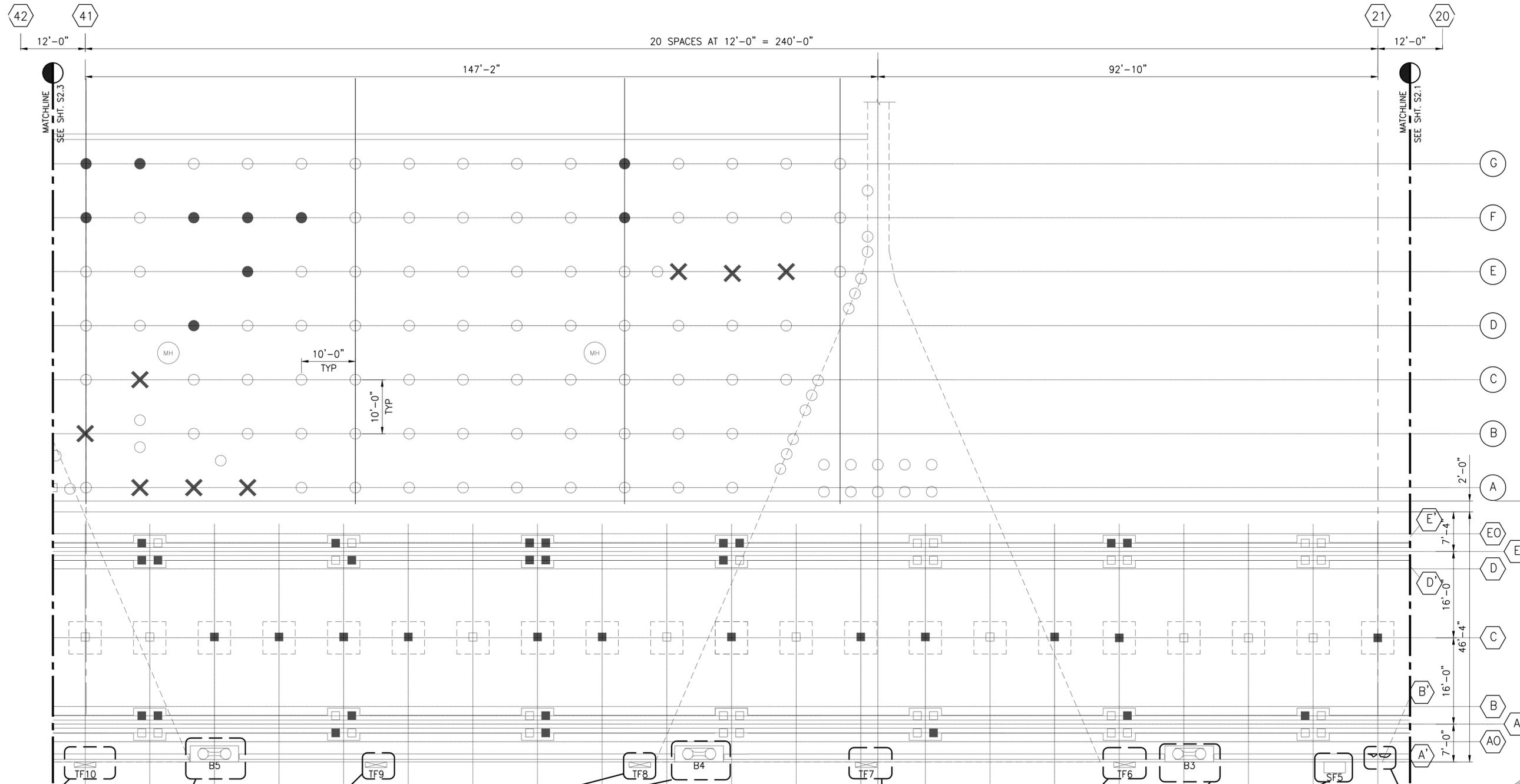
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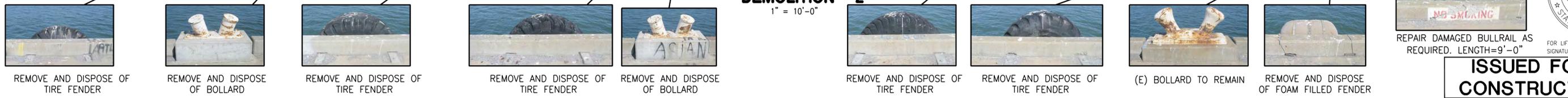
Project No. Z1800  
By AH Checked TG/EGS Sheet No. S2.1  
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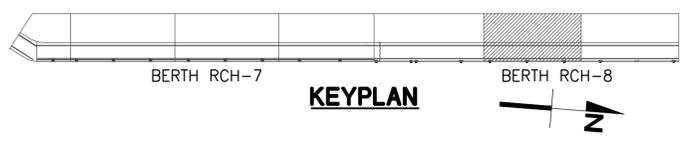
**PARTIAL WHARF PLAN - DEMOLITION - 2**  
1" = 10'-0"



REMOVE AND DISPOSE OF TIRE FENDER    REMOVE AND DISPOSE OF BOLLARD    REMOVE AND DISPOSE OF TIRE FENDER    REMOVE AND DISPOSE OF TIRE FENDER    REMOVE AND DISPOSE OF BOLLARD    REMOVE AND DISPOSE OF TIRE FENDER    REMOVE AND DISPOSE OF TIRE FENDER    (E) BOLLARD TO REMAIN    REMOVE AND DISPOSE OF FOAM FILLED FENDER    REPAIR DAMAGED BULLRAIL AS REQUIRED. LENGTH=9'-0"

- LEGEND**
- (E) BOLLARD
  - (E) TIRE FENDER
  - (E) FOAM FILLED FENDER
  - (E) TIMBER PILE
  - (E) DAMAGED TIMBER PILE
  - (E) MISSING TIMBER PILE
  - (E) DAMAGED CONCRETE PILE
  - (E) TOP DECK SURFACE DAMAGED AREA

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



REPAIR DAMAGED BULLRAIL AS REQUIRED. LENGTH=9'-0"

**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PARTIAL WHARF PLAN - DEMOLITION - 2

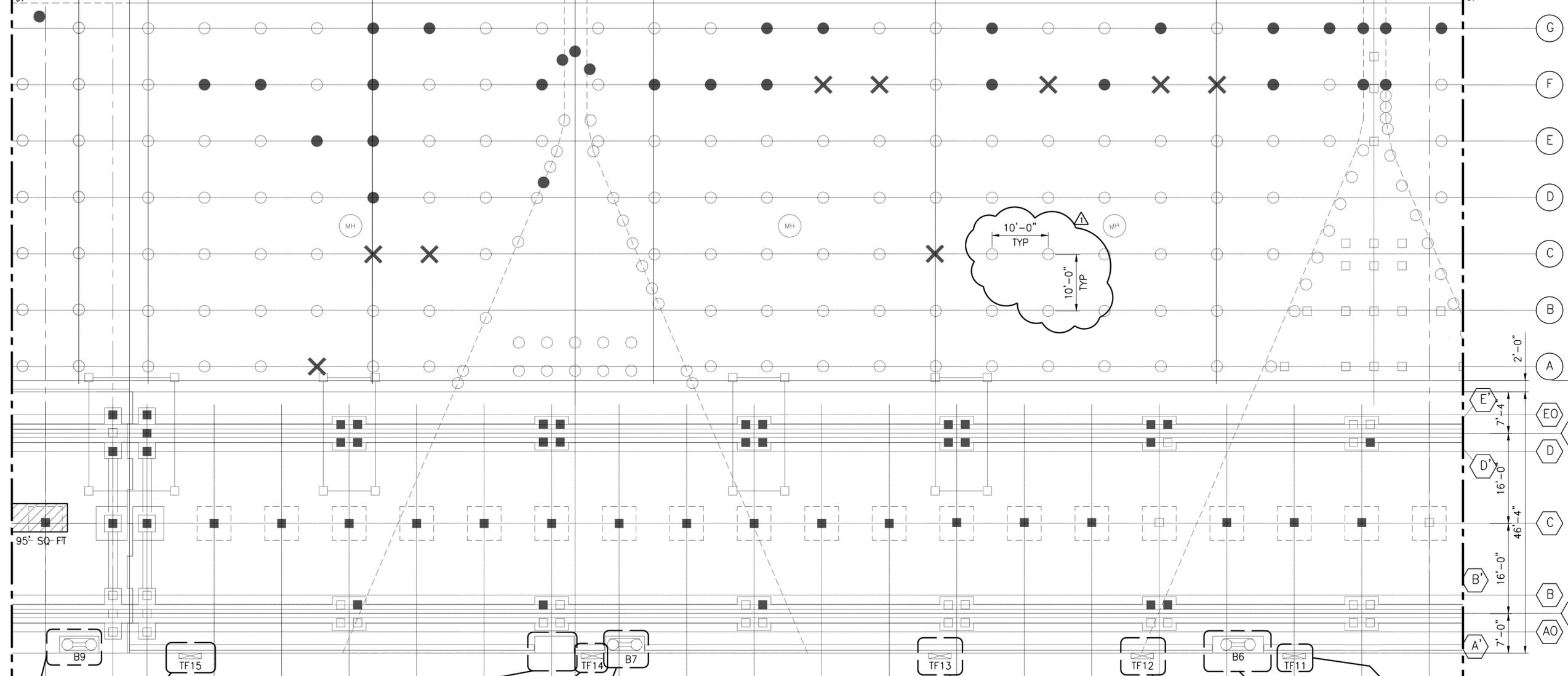
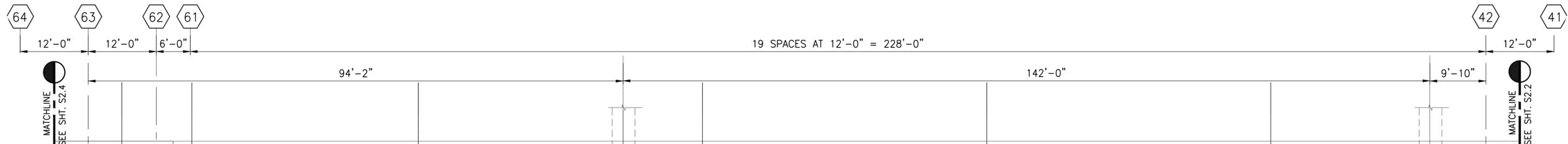
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**PARTIAL WHARF PLAN - DEMOLITION - 3**  
1" = 10'-0"



REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF TIRE FENDER



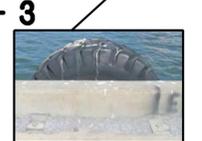
(E) BOLLARD TO REMAIN



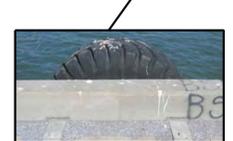
REMOVE AND DISPOSE OF TIRE FENDER



REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF TIRE FENDER



REMOVE AND DISPOSE OF TIRE FENDER



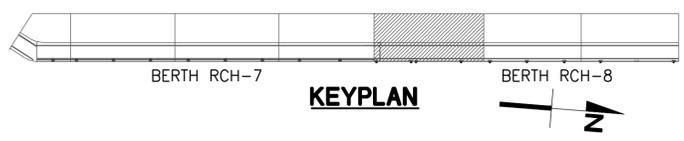
REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF TIRE FENDER

- LEGEND**
- (E) BOLLARD
  - (E) TIRE FENDER
  - (E) FOAM FILLED FENDER
  - (E) TOP DECK SURFACE DAMAGED AREA
  - (E) TIMBER PILE
  - (E) DAMAGED TIMBER PILE
  - (E) MISSING TIMBER PILE
  - (E) DAMAGED CONCRETE PILE

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



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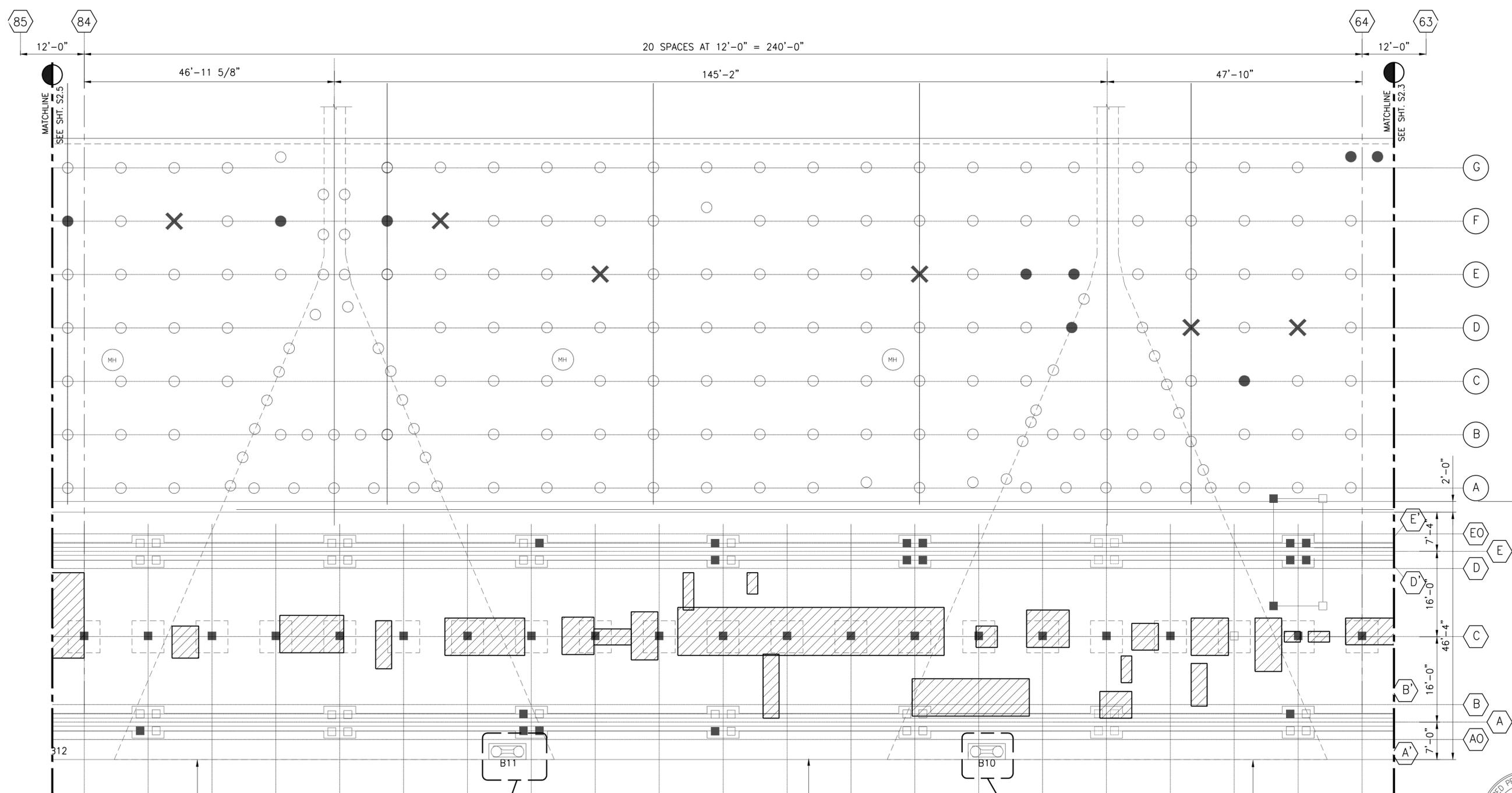


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POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PARTIAL WHARF PLAN - DEMOLITION - 3

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S2.3  
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**PARTIAL WHARF PLAN - DEMOLITION - 4**  
1" = 10'-0"



REMOVE AND DISPOSE OF TEMPORARY RAIL, PRECAST CONCRETE, AND PLASTIC PIPE



REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF TEMPORARY RAIL, PLASTIC PIPE



REMOVE AND DISPOSE OF BOLLARD

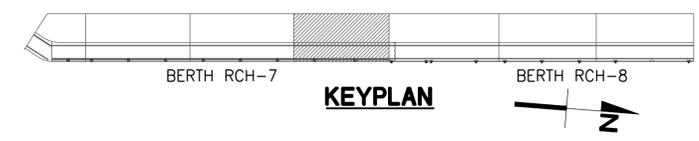


REMOVE AND DISPOSE OF TEMPORARY STEEL RAIL

**LEGEND**

- (E) BOLLARD
- (E) TIRE FENDER
- (E) FOAM FILLED FENDER
- (E) TOP DECK SURFACE DAMAGED AREA
- (E) TIMBER PILE
- (E) DAMAGED TIMBER PILE
- (E) MISSING TIMBER PILE
- (E) DAMAGED CONCRETE PILE

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



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**POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY**  
PARTIAL WHARF PLAN - DEMOLITION - 4

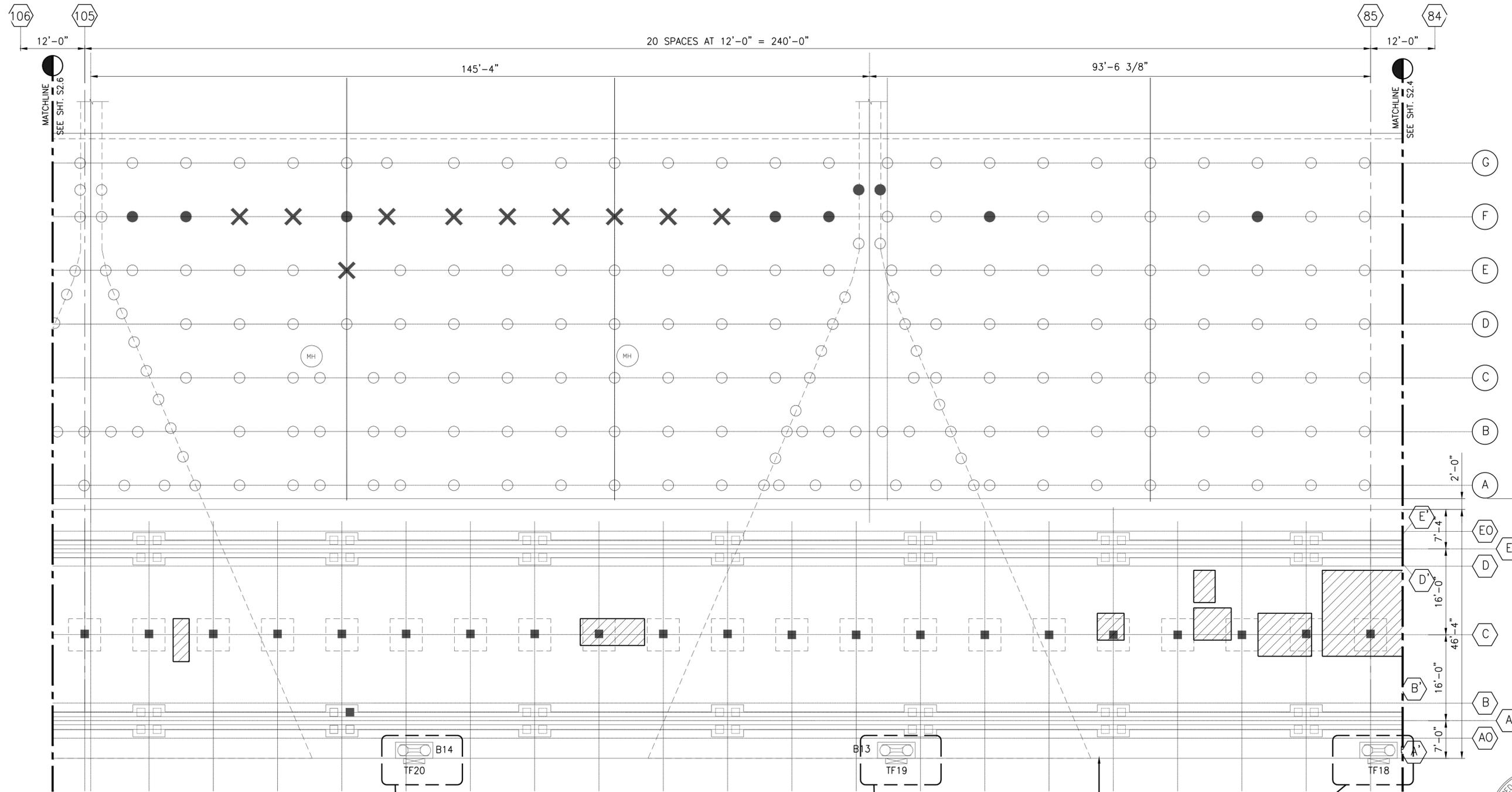
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**PARTIAL WHARF PLAN - DEMOLITION - 5**  
1" = 10'-0"



REMOVE LADDER AND STEEL FRAME



REMOVE AND DISPOSE OF BOLLARD



REMOVE AND DISPOSE OF BOLLARD



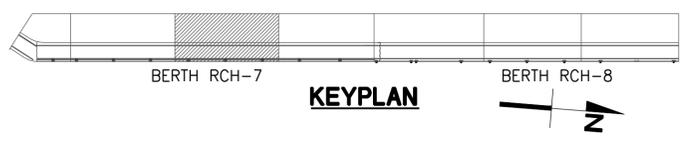
REMOVE AND DISPOSE OF TEMPORARY STEEL RAIL



REMOVE AND DISPOSE OF BOLLARD

- LEGEND**
- (E) BOLLARD
  - (E) TIRE FENDER
  - (E) FOAM FILLED FENDER
  - (E) TOP DECK SURFACE DAMAGED AREA
  - (E) TIMBER PILE
  - (E) DAMAGED TIMBER PILE
  - (E) MISSING TIMBER PILE
  - (E) DAMAGED CONCRETE PILE

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



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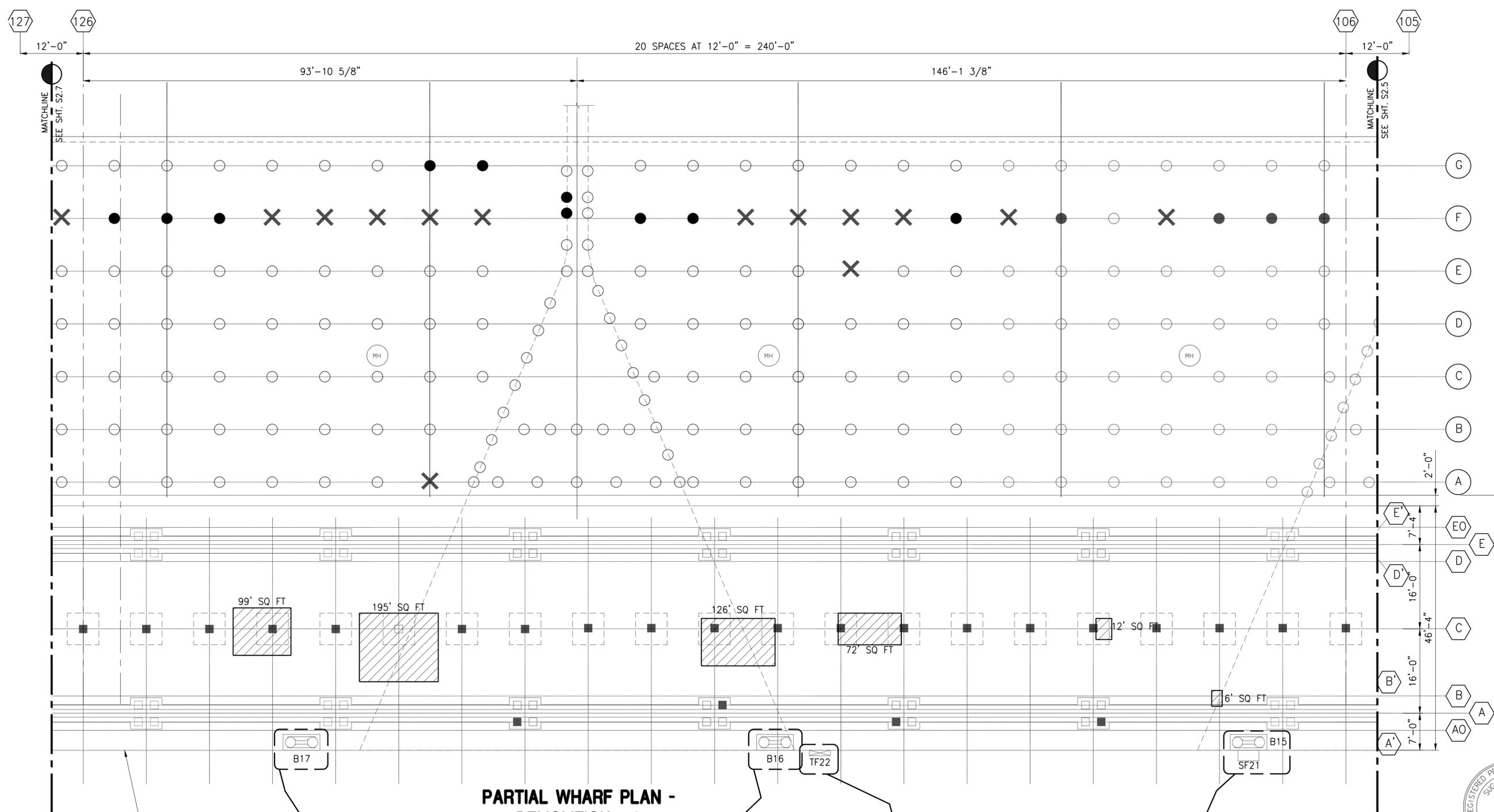
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POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
PARTIAL WHARF PLAN -  
DEMOLITION - 5

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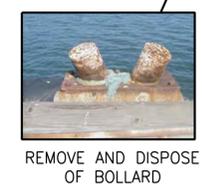
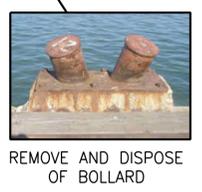
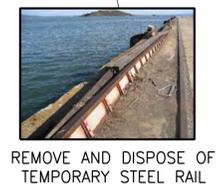
Project No. Z1800  
By AH Checked TG/EGS Sheet No. S2.5  
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Date 01/25/10 Revision 1

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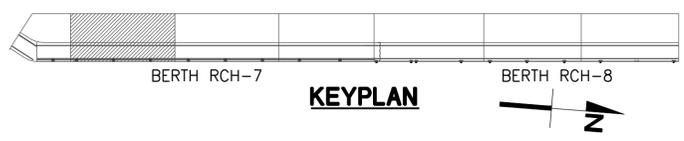


**PARTIAL WHARF PLAN - DEMOLITION - 6**  
1" = 10'-0"



- LEGEND**
- (E) BOLLARD
  - (E) TIRE FENDER
  - (E) FOAM FILLED FENDER
  - (E) TOP DECK SURFACE DAMAGED AREA
  - (E) TIMBER PILE
  - (E) DAMAGED TIMBER PILE
  - (E) MISSING TIMBER PILE
  - (E) DAMAGED CONCRETE PILE

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



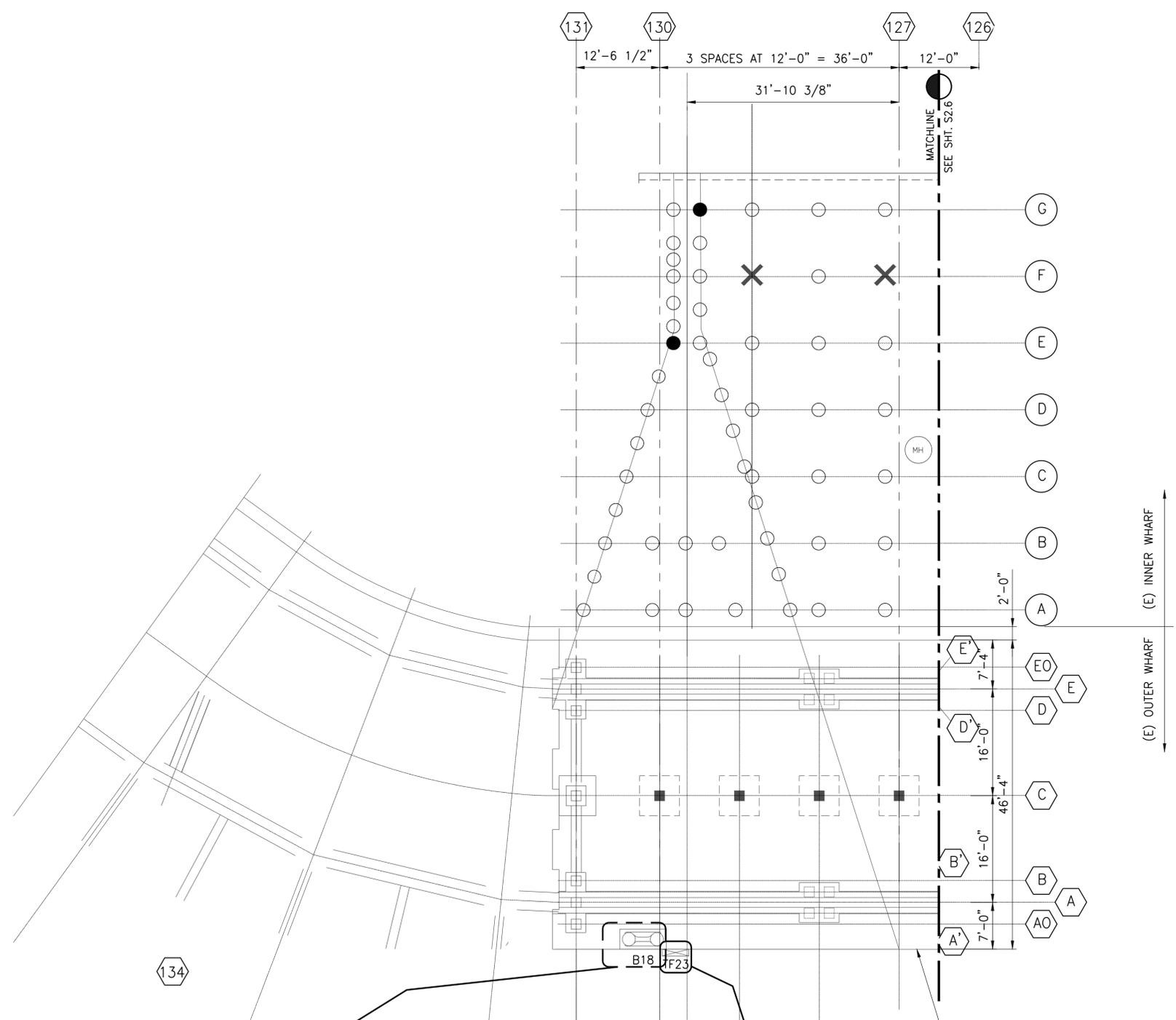
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POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
PARTIAL WHARF PLAN - DEMOLITION - 6

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Approved SL of ---  
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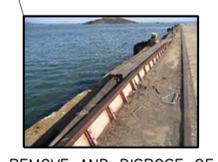
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REMOVE AND DISPOSE OF BOLLARD



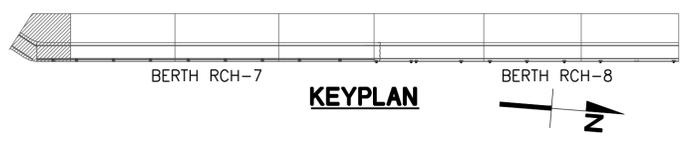
REMOVE AND DISPOSE OF TIRE FENDER



REMOVE AND DISPOSE OF TEMPORARY STEEL RAIL

**PARTIAL WHARF PLAN - DEMOLITION - 7**  
1" = 10'-0"

**NOTE:**  
1. SEE NOTES ON SHEET S2.1.



- LEGEND**
- (E) BOLLARD
  - (E) TIRE FENDER
  - (E) FOAM FILLED FENDER
  - (E) TOP DECK SURFACE DAMAGED AREA
  - (E) TIMBER PILE
  - (E) DAMAGED TIMBER PILE
  - (E) MISSING TIMBER PILE
  - (E) DAMAGED CONCRETE PILE

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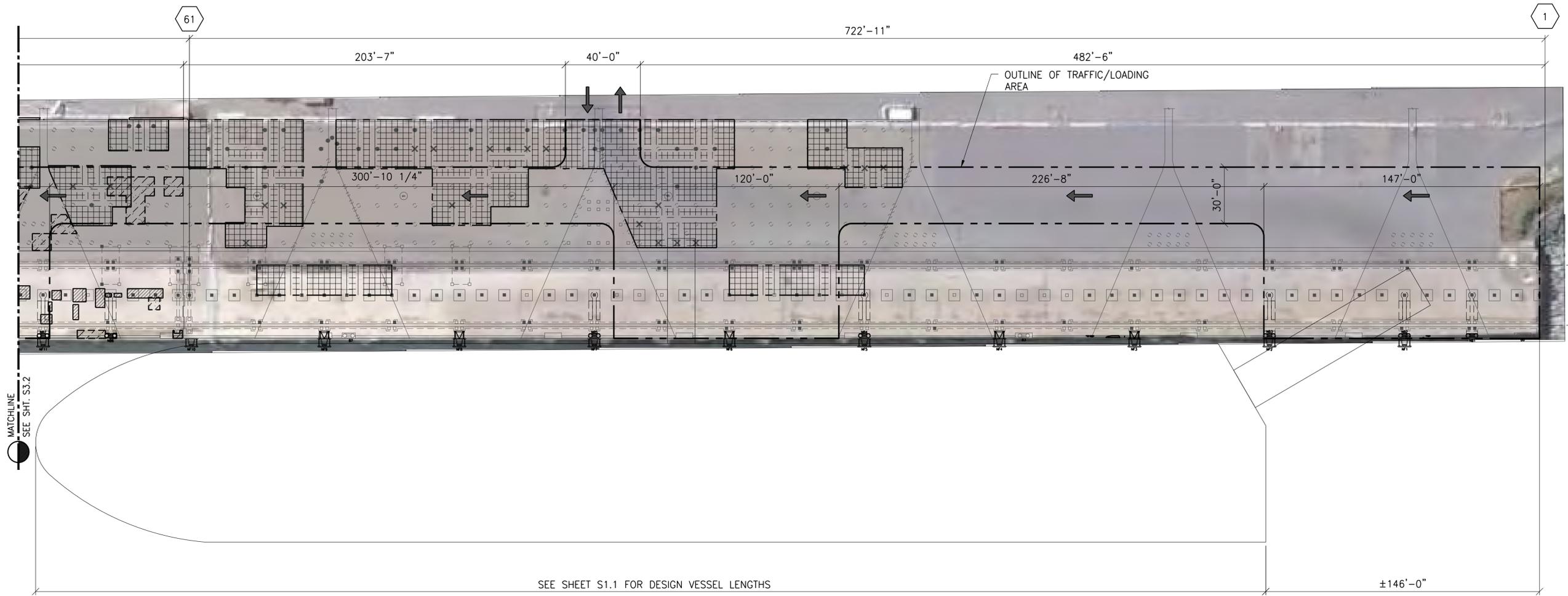
FOR LIFTECH CONSULTANTS INC  
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POINT POTRERO WHARF REPAIR  
PORT OF RICHMOND  
PARTIAL WHARF PLAN -  
DEMOLITION - 7

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**PARTIAL PLAN AT BERTH RCH-8 - DAMAGED DECK AREAS AND PILES**

1" = 30'-0"



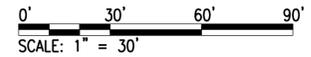
**LEGEND**

- RESTRICTED LOADING AREA
- DAMAGED TOP DECK SURFACE AREA, SEE SECTION A/S3.3 FOR REPAIR.
- DAMAGED BOTTOM DECK SURFACE AREA, SEE SECTION B/S3.3 FOR REPAIR DETAILS.
- MISSING TIMBER PILE SEE SHEET S3.6 AND S3.7 FOR REPAIR DETAILS.
- DAMAGED TIMBER PILE SEE SHEET S3.6 FOR REPAIR DETAILS.
- DAMAGED CONCRETE PILE SEE SHEET S3.5 FOR REPAIR DETAILS.
- LIMIT OF TRAFFIC/LOADING AREA

**NOTES:**

1. THE DAMAGED PILES, THE MISSING PILES, AND THE DAMAGED AREAS FOR BOTTOM DECK SURFACES SHOWN ARE BASED ON THE "INSPECTION REPORT FOR BERTH RCH-7 AND BERTH RCH-8" PREPARED BY COLLINS ENGINEERS, INC. DATED SEPTEMBER 10, 2009 AND "THE ABOVE AND UNDER WATER INSPECTION REPORT OF BERTH 7" PREPARED BY HAN PADRON ASSOCIATES DATED AUGUST 2001.
2. AT THE OUTER WHARF OF BERTH RCH-7, THE REPAIR AREAS FOR TOP DECK SURFACE WERE FIELD MEASURED. ONLY DECK DAMAGE AREAS IDENTIFIED AS "MODERATE" OR "WORSE", IN ACCORDANCE WITH THE CLASSIFICATIONS LISTED IN THE INSPECTION REPORT, ARE SHOWN. REFER TO DRAWING SHEETS S3.1 AND S3.2 AND ENLARGED PLANS, DRAWING SHEETS S2.3, S2.4, S2.5, AND S2.6. THE LOCATION AND SIZE OF THE DAMAGED AREAS ARE APPROXIMATE.
3. AT THE INNER WHARF OF BERTH RCH-7 AND RCH-8, THE TOP DECK SURFACES ARE COVERED WITH ASPHALT. THE TOP DECK SURFACE CONDITION IS ASSUMED ADEQUATE. NO REPAIRS ARE REQUIRED.
4. AT THE OUTER WHARF OF BERTH RCH-8, THE TOP DECK SURFACE CONDITION IS ASSUMED ADEQUATE. NO REPAIRS ARE REQUIRED.
5. AT BERTH RCH-7, THE DAMAGE AREAS FOR BOTTOM DECK SURFACE ARE SHOWN ON SHEET S3.2 AND "DECK INSPECTION PLAN" PREPARED BY COLLINS ENGINEERS, DATED 10/19/09, SHEET 6 THROUGH 9. THE LOCATION AND SIZE OF THE DAMAGED AREAS ARE APPROXIMATE.
6. AT BERTH RCH-8, THE DAMAGED AREAS FOR BOTTOM DECK SURFACE WERE NOT SURVEYED AND ARE ASSUMED IN SIMILAR CONDITION AS BERTH RCH-7. THE CONTRACTOR SHALL FIELD LOCATE THE DAMAGED AREAS FOR THE BOTTOM DECK SURFACE.
7. PHASE 1 REPAIRS: WITHIN THE TRAFFIC LOADING AREA, DAMAGED DECK AREAS, DAMAGED PILES, AND MISSING PILES SHALL BE REPAIRED. OUTSIDE THE TRAFFIC LOADING AREA, PILES AT NEW BOLLARDS AND FENDER SHALL BE REPAIRED. REFER TO DRAWING SHEET S3.3 FOR DECK REPAIR DETAILS AND DRAWING SHEETS S3.4 TO S3.8 FOR PILE REPAIR AND REPLACEMENT SCHEDULE AND DETAILS.
8. PHASE 2 REPAIRS: DAMAGED DECK AREAS, DAMAGED PILES, AND MISSING PILES NOT INCLUDED IN PHASE 1 SHALL BE REPAIRED. UNTIL REPAIRED, THE FOLLOWING SHALL APPLY.  
 AT THE INNER WHARF, UNREPAIRED DAMAGED AREAS SHALL BE FENCED OFF TO PREVENT ACCESS.  
 AT THE OUTER WHARF, OPERATIONS MAY CONTINUE PROVIDED THE DESIGN LOADING IS REDUCED. CONTACT ENGINEER IF REDUCED LOADS ARE DESIRED.
9. PRIOR TO BOTTOM DECK REPAIRS, PERFORM DELAMINATION SURVEY FOR ENTIRE PHASE 1 AND PHASE 2 AREAS. SEE NOTE 3 ON SHEET S3.3.
10. FOR THE WHARF DECK REPAIR SCHEDULE SEE SHEET S3.2.

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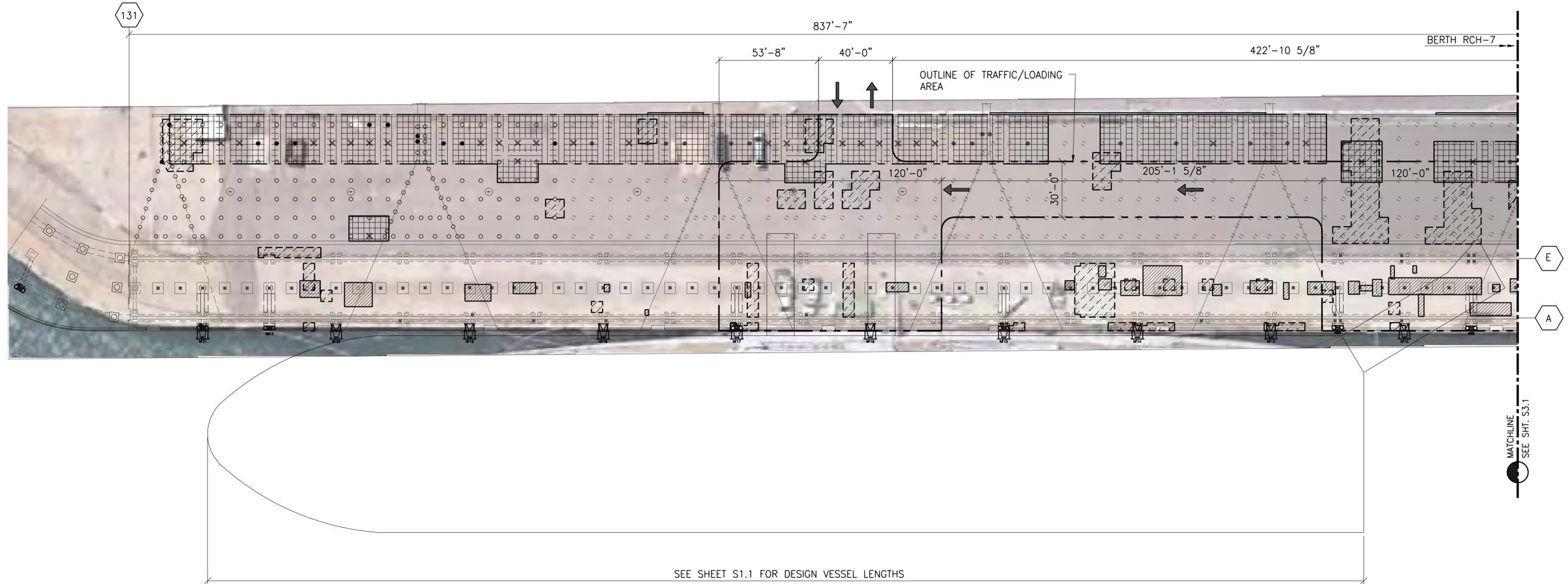
**ISSUED FOR CONSTRUCTION**

**POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND RCH-8 DAMAGED AND REPAIR AREAS**

Project No. Z1800			
By AH	Checked TG/EGS	Sheet No. S3.1	
Approved SL		of	----
Date 01/25/10		Revision	1

I:\Z1800\Uwg\Current\S3.2 RCH-7 DAMAGED AND REPAIR AREAS.dwg 1/24/2012 3:36 PM ALVIN HOFFPAUR

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**PARTIAL PLAN AT BERTH RCH-7 - DAMAGED DECK AREAS AND PILES**

1" = 30'-0"

PHAL 1

SEE SHEET S1.1 FOR DESIGN VESSEL LENGTHS

**LEGEND**

- RESTRICTED LOADING AREA
- DAMAGED TOP DECK SURFACE AREA, SEE SECTION A/S3.3 FOR REPAIR.
- DAMAGED BOTTOM DECK SURFACE AREA, SEE SECTION B/S3.3 FOR REPAIR DETAILS.
- MISSING TIMBER PILE SEE SHEET S3.6 AND S3.7 FOR REPAIR DETAILS.
- DAMAGED TIMBER PILE SEE SHEET S3.6 FOR REPAIR DETAILS.
- DAMAGED CONCRETE PILE SEE SHEET S3.5 FOR REPAIR DETAILS.
- LIMIT OF TRAFFIC/LOADING AREA

**NOTE:**

SEE NOTES ON S3.1

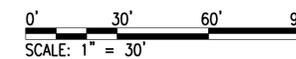
**WHARF DECK REPAIR SCHEDULE**

	PHASE I		PHASE II	
	TOP DECK SURFACE (SQ FT)	BOTTOM DECK SURFACE (SQ FT)	TOP DECK SURFACE (SQ FT)	BOTTOM DECK SURFACE (SQ FT)
BERTH RCH-7				
DECK DAMAGED AREAS	1060	3900	1420	2500
20% CONTINGENCY	212	780	284	500
<b>TOTAL DAMAGED AREAS</b>	<b>1272</b>	<b>4680</b>	<b>1704</b>	<b>3000</b>
BERTH RCH-8				
<b>TOTAL DAMAGED AREAS</b>	<b>NONE</b>	<b>2500 (SEE NOTE 3)</b>	<b>NONE</b>	<b>1600 (SEE NOTE 3)</b>

**NOTES:**

1. PHASE I IS ALL REPAIR WORK WITHIN THE TRAFFIC LOADING AREA
2. PHASE II IS ALL REPAIR WORK OUTSIDE THE TRAFFIC LOADING AREA
3. THE DAMAGED AREA FOR RCH-8 IS ESTIMATED BASED ON THE PERCENT OF THE RCH-7 DECK THAT IS DAMAGED.

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POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
RCH-7 DAMAGED AND  
REPAIR AREAS

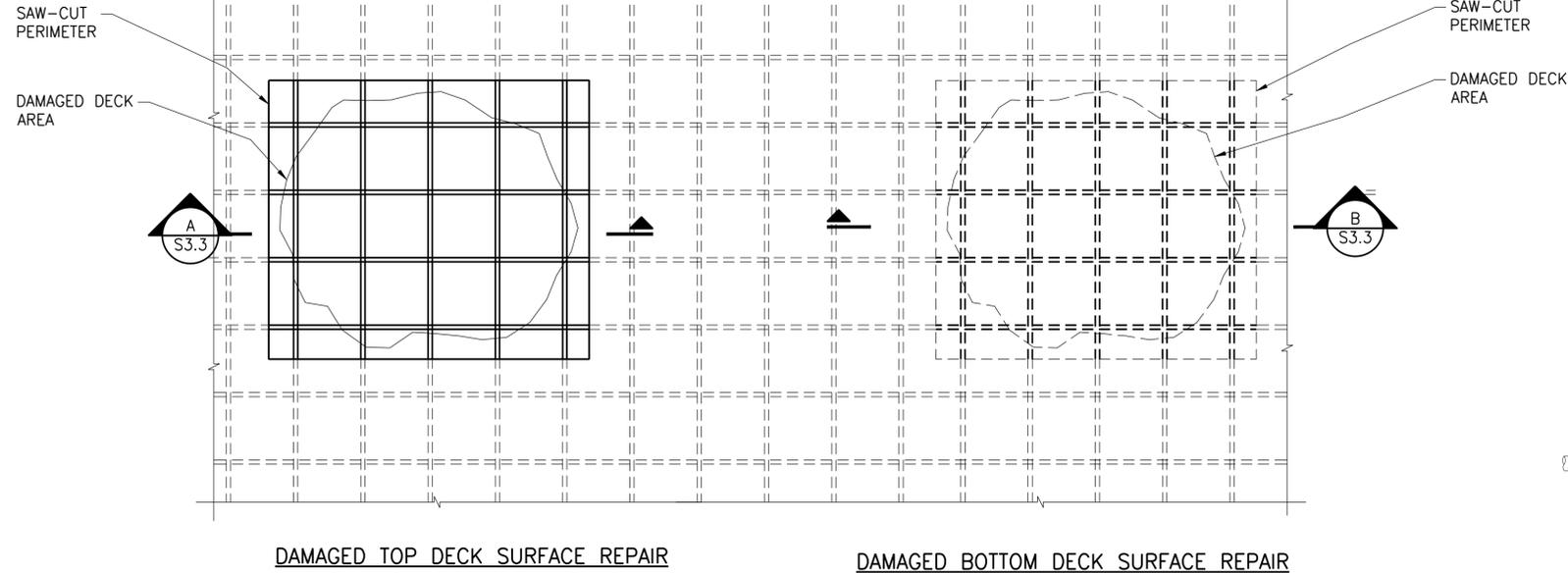
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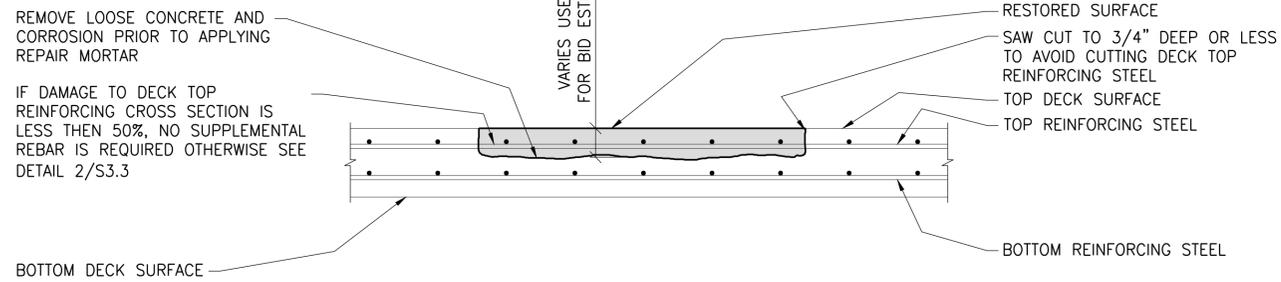
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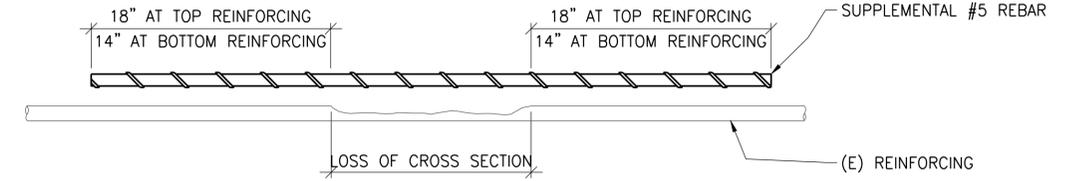
**CONCRETE REMOVAL AND SURFACE PREPARATION**  
3/4" - 1'-0"

1  
S3.3



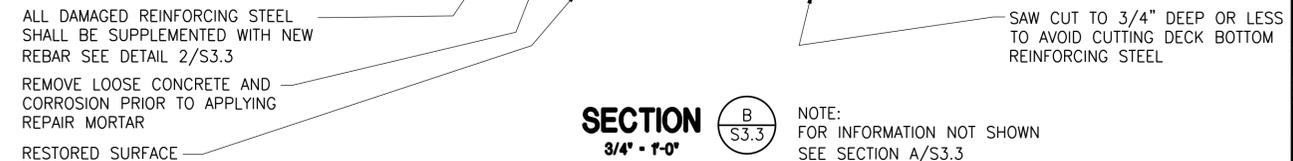
**SECTION**  
3/4" - 1'-0"

A  
S3.3



**SUPPLEMENTAL REBAR DETAIL**  
DO NOT SCALE

2  
S3.3



**SECTION**  
3/4" - 1'-0"

B  
S3.3

NOTE:  
FOR INFORMATION NOT SHOWN  
SEE SECTION A/S3.3

**WHARF DECK REPAIR NOTES:**

- THE PURPOSE OF THE WHARF DECK REPAIR IS TO RESTORE THE WHARF STRUCTURAL STRENGTH TO SUPPORT A DESIGN LIVE LOAD OF 250 PSF AND TO EXTEND THE SERVICE LIFE OF THE STRUCTURE.
- THE DECK REPAIR WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
  - AMERICAN CONCRETE INSTITUTE, CONCRETE REPAIR GUIDE. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2004.
  - AMERICAN CONCRETE INSTITUTE, SURFACE REPAIR USING FORM-AND-PUMP TECHNIQUES. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2003.
  - INTERNATIONAL CONCRETE REPAIR INSTITUTE, GUIDE FOR SURFACE PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION (GUIDELINE NO. 310.1R-2008). DES PLAINES, IL: INTERNATIONAL CONCRETE REPAIR INSTITUTE, 2008..
- AT REPAIR AREAS CONTRACTOR SHALL PERFORM SOUNDING OR OTHER APPROPRIATE NON-DESTRUCTIVE CONCRETE TESTING TO LOCATE AREAS OF DELAMINATION FOR THE TOP AND BOTTOM DECK SURFACES OF INNER AND OUTER WHARVES FOR BERTH RCH-7 AND RCH-8.
- CONTRACTOR SHALL MARK THE PERIMETER OF THE DECK
- REPAIR AREAS TO BE SAW CUT. LAYOUT SHALL BE SQUARE OR RECTANGULAR IN SHAPE. NOTIFY THE ENGINEER FOR REVIEW OF THE PERIMETER TO BE SAW CUT AREA PRIOR TO THE CUTTING.
- SPECIAL INSPECTION IS REQUIRED FOR SURFACE PREPARATION PRIOR TO INSTALLATION OF STRUCTURAL REPAIR CONCRETE.
- THE WHARF DECK REPAIR SYSTEM CONSISTING OF REBAR PROTECTION AND MORTAR SHALL BE COMPATIBLE AND SHALL BE SUPPLIED BY A SINGLE SOURCE SO THAT THE REPAIR SYSTEM PERFORMS AS WARRANTED BY THE PRODUCTS MANUFACTURER
- THE FOLLOWING CONCRETE AND TIMBER PILE REPAIR PRODUCTS ARE ACCEPTABLE:
  - BASF CONSTRUCTION CHEMICAL, LLC**  
EMACO S66 CI, FLOWABLE STRUCTURAL-REPAIR CONCRETE WITH INTEGRAL CORROSION INHIBITOR, FOR TOP DECK SURFACE REPAIR  
EMACO S88 CI, SPRAYABLE FIBER-REINFORCED STRUCTURAL REPAIR MORTAR WITH INTEGRAL CORROSION INHIBITOR FOR BOTTOM DECK SURFACE REPAIR.  
MASTERSEAL CP, ADVANCED CORROSION INHIBITOR TREATMENT FOR STEEL REINFORCED CONCRETE, APPLIED TO REPAIRED AREAS.
  - SIKA CORPORATION**  
SIKA ARMATEC 110 EPOCEM  
SIKAREPAIR 222 FOR TOP SURFACE  
SIKAREPAIR 223 FOR BOTTOM SURFACE
- CONTRACTOR MAY SUBMIT ALTERNATE EQUIVALENT WHARF DECK REPAIR SYSTEM TO THE ENGINEER AND PORT FOR REVIEW AND APPROVAL. THE PRODUCTS INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- SEE NOTES ON SHEET S2.1 AND GENERAL NOTES.



FOR LIFTECH CONSULTANTS INC  
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POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
WHARF DECK REPAIR NOTES  
AND DETAILS

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1/24/2012

LIFTECH CONSULTANTS INC  
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Project No. Z1800  
By AH Checked TG/EGS Sheet No. S3.3  
Approved SL of ---  
Date 01/25/10 Revision 1

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### CONCRETE PILE REPAIR SCHEDULE AT OUTER WHARF

### TIMBER PILE REPAIR SCHEDULE AT INNER WHARF

PHASE I			PHASE II		
ROW NO.	BENT NO.	COMMENTS	ROW NO.	BENT NO.	COMMENTS
<b>BERTH RCH-8</b>			<b>BERTH RCH-8</b>		
		See Partial Wharf Repair Plan, Drawing S4.1 for pile locations			See Partial Wharf Repair Plan, Drawing S4.1 for piles locations
A'	3.9, 4.1		B'	15.9	
A'	7.1		D'	19.1	
A'	19.1		C	15 to 20	
C	1 to 14				
D'	4.1				
E'	3.9, 4.1				
D'	6.9				
E'	6.9, 7.1				
D'	9.9, 10.1				
D', E'	12.9				
		See Partial Wharf Repair Plan, Drawing S4.2 for and pile locations			See Partial Wharf Repair Plan, Drawing S4.2 for pile locations
B'	24.9		B'	22.1	
A'	37.1		A'	27.9	
B'	36.9		C	21, 25	
C	31		C	26, 28	
C	33, 34		C	29	
C	36 to 39		E'	24.9, 25.1	
A', B'	33.9		D'	31.1	
B'	39.9, 40.1		E'	30.9, 31.1	
D', E'	33.9, 34.1				
D'	36.9				
E'	37.1				
D'	39.9, 40.1				
E'	40.1				
		See Partial Wharf Repair Plan, Drawing S4.3 and pile locations			See Partial Wharf Repair Plan, Drawing S4.3 for pile locations
B'	55.1		B'	45.9, 46.1	
C	43		B'	51.9	
			C	57.9	
			C	44, 45	
			C	47 to 61	
			D'	42.9	
			D'	46.1	
			E'	45.9, 46.1	
			D', E'	48.9, 49.1	
			D', E'	51.9, 52.1	
			D', E'	54.9, 55.1	
			D', E'	57.9, 58.1	
			D, E, E0	61	
PHASE I - TOTAL NUMBER OF PILES = 53			PHASE II - TOTAL NUMBER OF PILES = 64		
<b>BERTH RCH-7</b>			<b>BERTH RCH-7</b>		
		See Partial Wharf Repair Plan, Dwg S4.3 & S4.4 for pile location			See Partial Wharf Repair Plan, Dwg S4.3 & S4.4 for pile locations
B'	65.1		A'	83.1	
A'	74.1		D, E	62	
A'	76.0, 77.1		D', E'	64.9, 65.1	
B'	77.1		C	62, 63, 64	
C	65		C	79 to 84	
C	67 TO 78				
D', E'	70.9, 71.1				
D', E'	74.1				
E'	76.9				
		See Partial Wharf Repair Plan, Drawing S4.5 for Pile locations			See Partial Wharf Repair Plan, Drawing S4.5 for pile locations
C	92		C	85 to 91	
B'	100.9		C	93, 94	
C	95 to 105				
		See Partial Wharf Repair Plan, Drawing S4.6 for Pile locations			See Partial Wharf Repair Plan, Drawing S4.6 for pile locations
A'	109.1		A'	119.1	
A'	113.1		C	106 to 120	
B'	115.9		C	122, 123, 124, 126	
C	125				
		See Partial Wharf Repair Plan, Drawing S4.7 for pile locations			See Partial Wharf Repair Plan, Drawing S4.7 for pile locations
C	C128, 134		C	127, 129, 130	
PHASE I - TOTAL NUMBER OF PILES = 44			PHASE II - TOTAL NUMBER OF PILES = 48		
NOTE:					
1. REFER TO DRAWING SHEET S3.5 FOR CONCRETE PILE REPAIR DETAILS					

PHASE I			PHASE II		
ROW NO.	BENT NO.	COMMENTS	ROW NO.	BENT NO.	COMMENTS
<b>BERTH RCH-8</b>			<b>BERTH RCH-8</b>		
		See Partial Wharf Repair Plan Drawing S4.2 for pile locations			See Partial Wharf Repair Plan Drawing S4.2 for pile locations
A	12, 13, 14	Missing Piles	F	5, 11, 12, 13, 15	Damaged piles
B	15	Missing Pile	G	5, 14, 15	Damaged piles
E	2, 3, 4	Missing Piles			
F	15, 15.9, 16.1, 19	Damaged pile			
G	15, 15.9, 16.1, 19	Damaged pile			
		See Partial Wharf Repair Plan, Drawing S4.3 for pile locations			See Partial Wharf Repair Plan Drawing S4.3 for pile locations.
A	36	Missing Piles	AT TIE BACK #4 AT LINE F	16.9, 17.1	Damaged piles
C	25, 34, 35	Missing Piles	F	19	Damaged piles
D	35	Damaged pile	F	20, 21, 23	Missing Piles
E	35, 36	Damaged piles	F	22, 24	Damaged piles
AT TIE BACK #5, BETWEEN D & E	32	Damaged piles	F	26, 27	Missing Piles
			F	28, 29, 30	Damaged piles
			AT TIE BACK #5 BETWEEN F & G	31, 32	Damaged piles
			F	32, 35, 37, 38	Damaged piles
			G	16, 19, 21, 24, 27, 28, 34, 35	Damaged piles
PHASE I - TOTAL NUMBER OF PILES = 16			PHASE II - TOTAL NUMBER OF PILES = 38		
<b>BERTH RCH-7</b>			<b>BERTH RCH-7</b>		
		See Partial Wharf Repair Plan Dwg S4.3 & S4.4 for pile locations.			See Partial Wharf Repair Plan Dwg S4.3 & S4.4 for pile locations
C	44	Damaged pile	F	59	Missing Pile
D	43, 45	Missing Piles	F	60, 61	Damaged piles
AT TIE BACK #6 AT LINE D	48	Damaged pile	F	63	Missing piles
E	47, 48	Damaged piles	F	65	Damaged pile
E	50	Missing pile	G	41, 42	Damaged piles
E	56	Missing Pile			
		See Partial Wharf Repair Plan Drawing S4.5 for pile locations			See Partial Wharf Repair Plan Drawing S4.5 for pile locations
E	85	Damaged pile	F	68, 73, 76, 77	Damaged pile
F	80, 80, 82, 83, 84	Missing Piles	F	78 to 84	Missing Piles
			F	85	Damaged pile
			F	86, 87	Missing Piles
			F	88, 89	Damaged piles
			AT TIE BACK #8 BETWEEN F & G	75.1, 75.3	Damaged piles
		See Partial Wharf Repair Plan Drawing S4.6 for pile locations			See Partial Wharf Repair Plan Drawing S4.6 for pile locations
A	105	Damaged pile	F	90, 91, 92	Damaged Piles
E	99	Missing pile	F	93	Missing pile
			F	95	Damaged Pile
			F	96	Missing Pile
			F	97	Damaged Pile
			F	98, 99, 100, 101	Missing Piles
			F	102, 103	Damaged Piles
			F	104 to 108	Missing Piles
			F	109, 110, 111	Damaged Piles
			F	112	Missing pile
			AT TIE BACK #10 BETWEEN F & G	103, 104	Damaged Pile
			G	104, 105	Damaged piles
NONE					
			F	113, 115	See Partial Wharf Repair Plan Drawing S4.7 for pile locations. Missing Piles
			AT TIE BACK #11 AT LINE G	116	Damaged piles
PHASE I - TOTAL NUMBER OF PILES = 11			PHASE II - TOTAL NUMBER OF PILES = 55		
NOTES					
1. REFER TO DRAWING SHEET S3.6 FOR TIMBER PILE REPAIR DETAILS, SEE DETAIL 2/S3.5					
2. REFER TO DRAWING SHEETS S3.6 TO S3.7 FOR PILE REPLACEMENT DETAILS. CONTRACTOR SHALL USE EITHER DETAIL 3/S3.6 OR 1/S3.7 FOR PILE REPLACEMENT					

### Concrete and Timber Pile Repair Notes

- The purpose of the pile repair is to restore the structural strength of the piles so that they will support a design live load of 250 psf on the wharf deck and to extend the pile service life.
- Contractor shall refer to the following wharf inspection reports for the conditions of pile damage:
  - Inspection Report for Berth RCH-7 and Berth RCH-8 at Point Potrero in the Port of Richmond, California, prepared for Liftech Consultants Inc. by Collins Engineers, Inc., September 10, 2009.
  - Above and Underwater Inspection Report of Berth 7, Shipyard No. 3, Port of Richmond, CA, prepared for The Pasha Group by Han Padron Associates Engineers, Inc., August 2001.
- The pile repair at Berth RCH-7 is limited to the piles with at least "Moderate Damage" in accordance with the Collins inspection report. Piles with less than moderate damage are adequate for supporting the design live load.
- The pile repair at Berth RCH-8 is limited to the piles with at least "Advanced Damage" in accordance with the Han Padron inspection report. Piles with less than advanced damage are adequate for supporting the design live load.
- Missing piles shall be replaced, refer to detail 3/S3.6.
- The pile repair work shall be performed in accordance with the following applicable specifications:
  - American Concrete Institute, Concrete Repair Guide. Farmington Hills, MI: American Concrete Institute, 2004.
  - American Concrete Institute, Surface Repair Using Form-and-Pump Techniques. Farmington Hills, MI: American Concrete Institute, 2003.
  - International Concrete Repair Institute, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (Guideline No. 310.1R-2008). Des Plaines, IL: International Concrete Repair Institute, 2008.
- The contractor shall have at least five years of experience with concrete and timber pile repair projects.
- The pile repair work shall be inspected by a special inspector with a minimum of two years experience with the pile repair work. Refer to the General Notes for additional special inspection report requirements.
- The pile repair will be performed in phases. Phase I consists of repairing the damaged piles in the Traffic Loading area, as shown on Drawings S3.1, and S3.2 and piles at new bollard and fender supports. Phase II consists of repairing the remaining damaged piles. Refer to the Concrete Repair Piles Schedule on this sheet.
- The concrete pile repair concepts are shown on Drawing Sheet S3.5. The timber pile repair concepts are shown on Drawing Sheet S3.6. The contractor may submit alternate repair concepts to the Engineer and the Port for review and approval.
- Contractor shall submit the repair procedures, proposed jacket and grout specifications to the Engineer and the Port for review and approval prior to commencing the repair work. If shoring is required, contractor shall submit shoring design calculations, signed by a licensed engineer, and in conformance with OSHA requirements.
- The concrete and timber pile repair system consisting of protective jacket, grout, and epoxy shall be compatible and shall be supplied by a single source so that the repair system performs as warranted by the products manufacturer.
- The following concrete and timber pile repair products are acceptable:
  - Fox Industries Inc
    - FX-70 Inert Corrosion-Free jacket with minimum 1/8" wall thickness
    - FX-70-6 Hydro-Ester MP Marine Epoxy Grout
    - FX-225 Non-Shrink Non-Metallic Underwater Grout
    - FX-763 Low Modulus Hydro-Ester Trowel Grate Epoxy
  - Sika Corporation
    - Fiberglass Reinforced Plastic (FRP) pile sleeve with minimum 1/8" wall thickness
    - Sika MonoTop 611 and Sikament 100 SC for concrete pile
    - Sikadur 35, Hi-Mod LV LPL or SikaGrout 212 for timber pile
    - Sikadur Injection Gel for sealant
    - SikaRepair 223 for patching

Contractor may submit an equivalent wharf deck repair system to the Engineer and Port for review and approval. The products installation shall be in accordance with manufacturer's recommendations.



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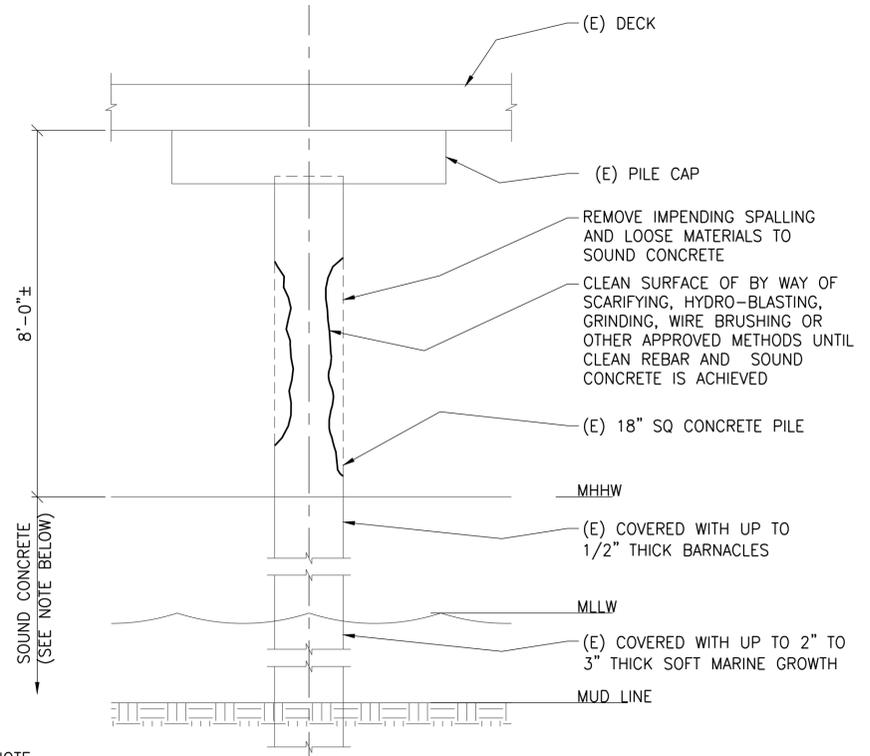
**POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND PILE REPAIR NOTES AND SCHEDULES**

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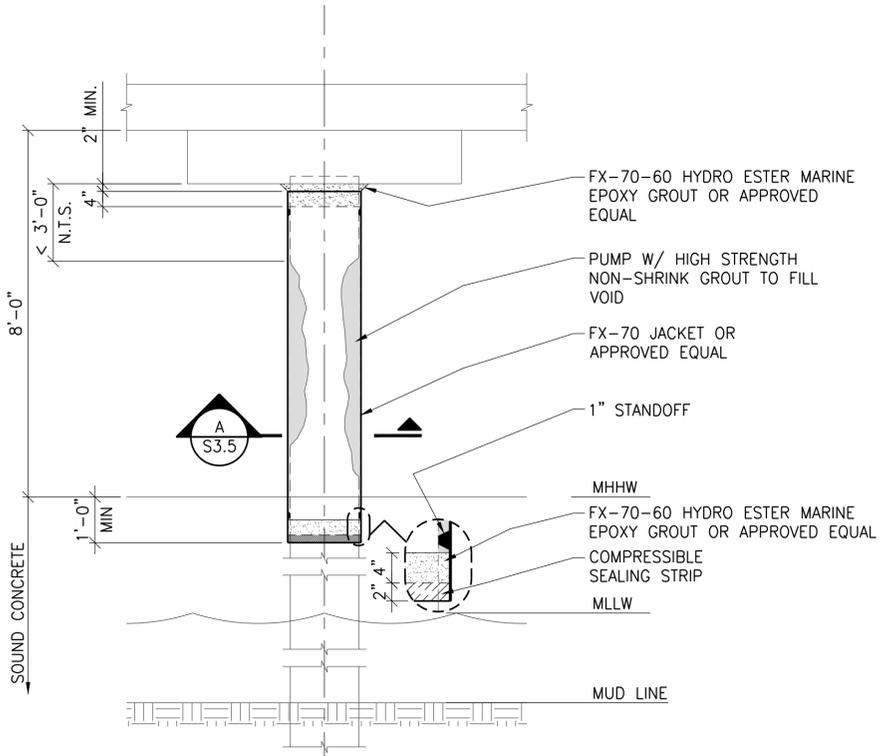
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NOTE:  
IF ADDITIONAL DEFECTS, MODERATE OR WORSE AS DEFINED IN WHARF INSPECTION REPORT, ARE FOUND BELOW MHHW, NOTIFY ENGINEER AND PORT. ADDITIONAL REPAIRS MAY BE REQUIRED.

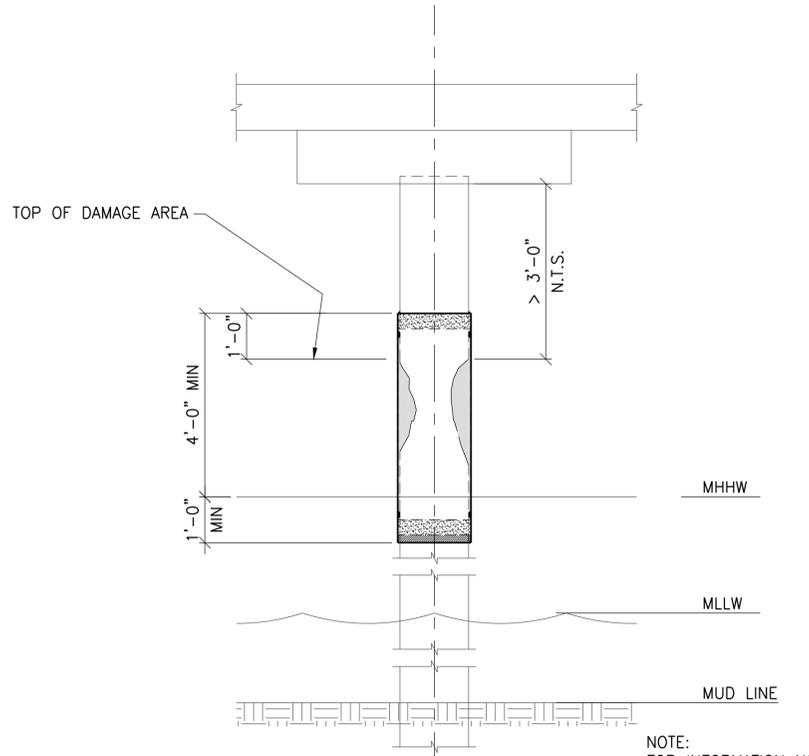
**TYPICAL CONCRETE PILE DAMAGED SURFACE PREPARATION** 1  
S3.5

1/2" - 1'-0"



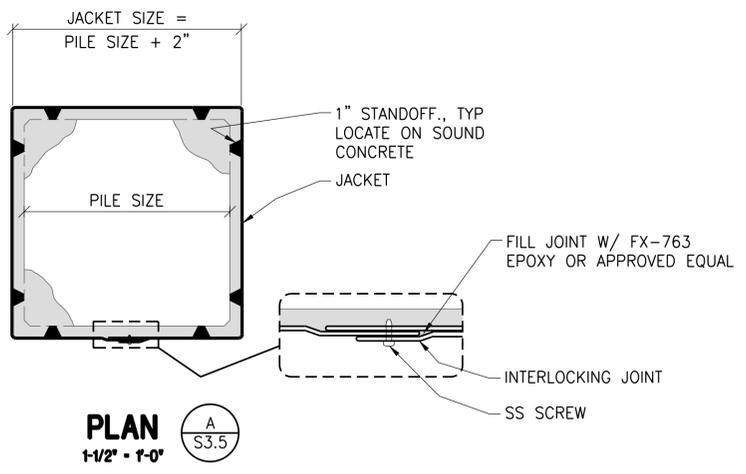
**TYPICAL CONCRETE PILE REPAIR DETAIL - 1** 2  
S3.5

1/2" - 1'-0"



**TYPICAL CONCRETE PILE REPAIR DETAIL - 2** 3  
S3.5

1/2" - 1'-0"



**PLAN** A  
S3.5

1-1/2" - 1'-0"



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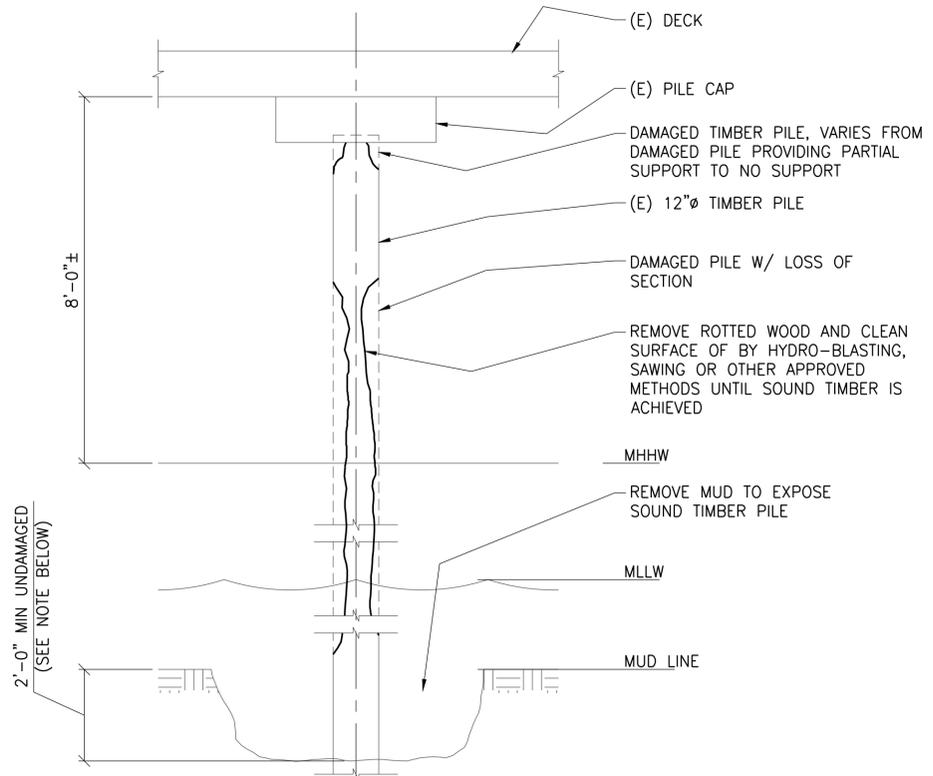
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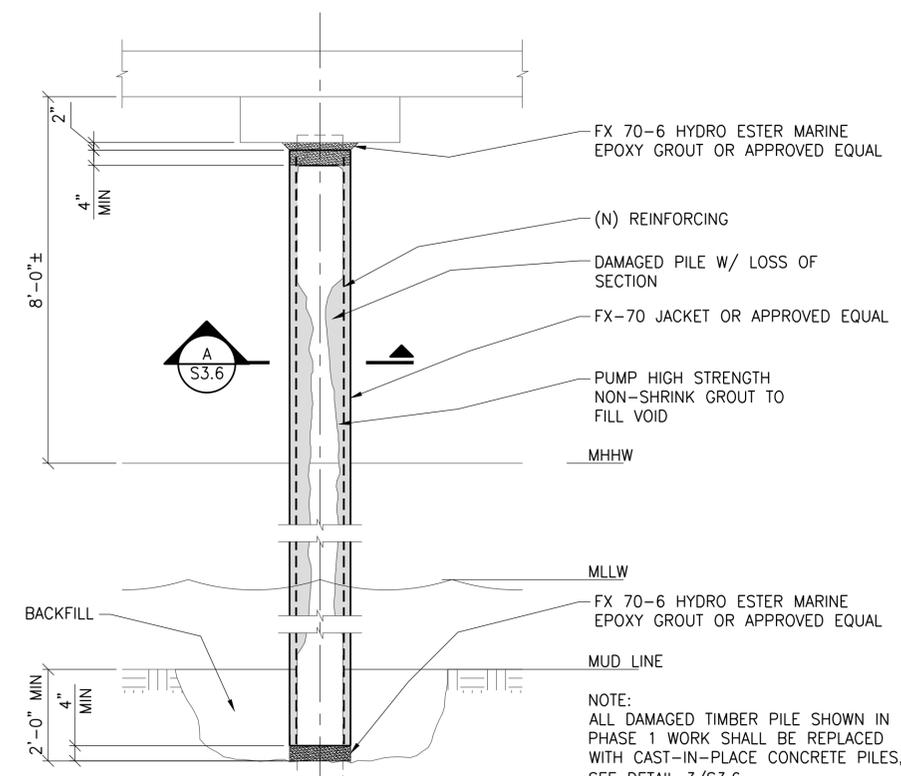
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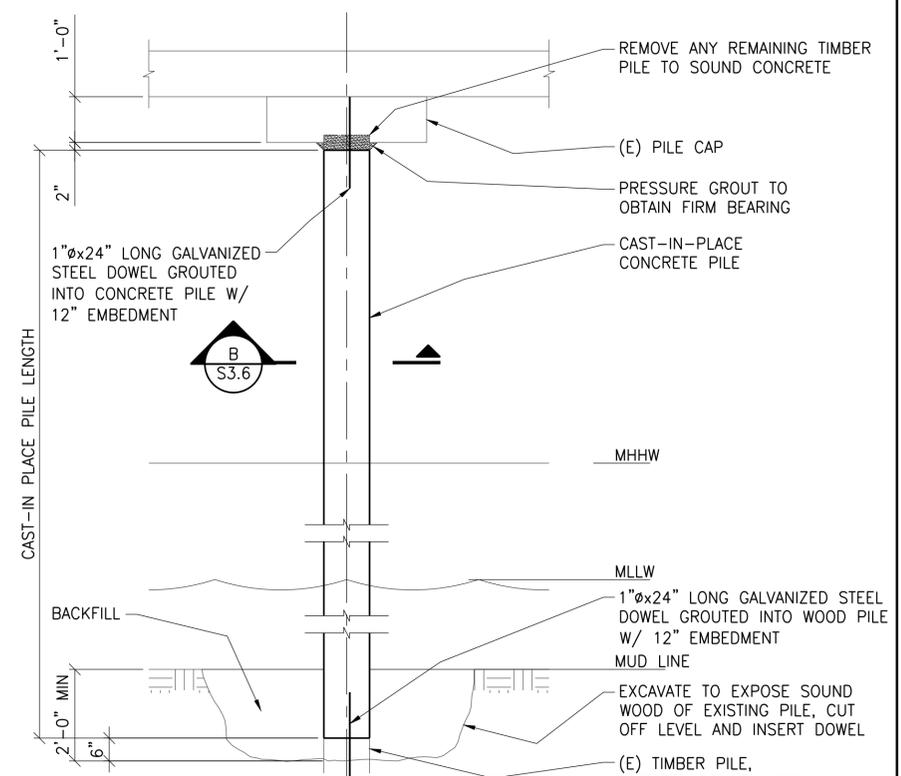


NOTE: CONTRACTOR MAY EXCAVATE MORE THAN 2'-0" TO EXPOSE SOUND TIMBER  
**TYPICAL TIMBER PILE DAMAGED SURFACE PREPARATION**  
 1/2" - 1'-0" 1 / S3.6



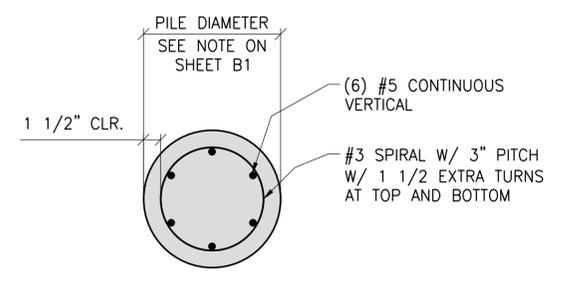
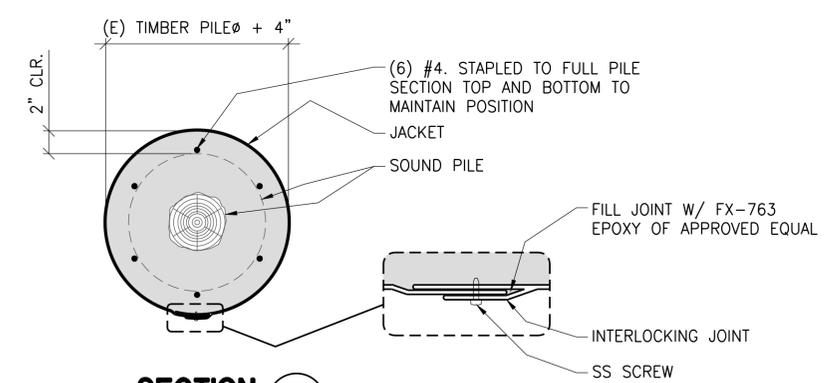
**TYPICAL TIMBER PILE REPAIR DETAIL**  
 1/2" - 1'-0" 2 / S3.6

NOTE:  
 CONTRACTOR HAS THE OPTION TO REPAIR TIMBER PILE OR REPLACE DAMAGED PILE WITH CAST-IN-PLACE CONCRETE PILE PER DETAIL 3/S3.6



**(N) CAST-IN-PLACE PILE TO REPLACE MISSING PILES**  
 1/2" - 1'-0" 3 / S3.6

- NOTES:
- IF CAST-IN-PLACE CONCRETE PILE LENGTH IS 24'-0" OR LESS, USE 12" DIAMETER PILE
  - IF CAST-IN-PLACE CONCRETE PILE LENGTH IS BETWEEN 24'-0" AND 28'-0", USE 14" DIAMETER PILE.



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 SIGNATURE DATE:

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POINT POTRERO WHARF REPAIR  
 FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 TIMBER PILE REPAIR AND  
 REPLACEMENT DETAILS

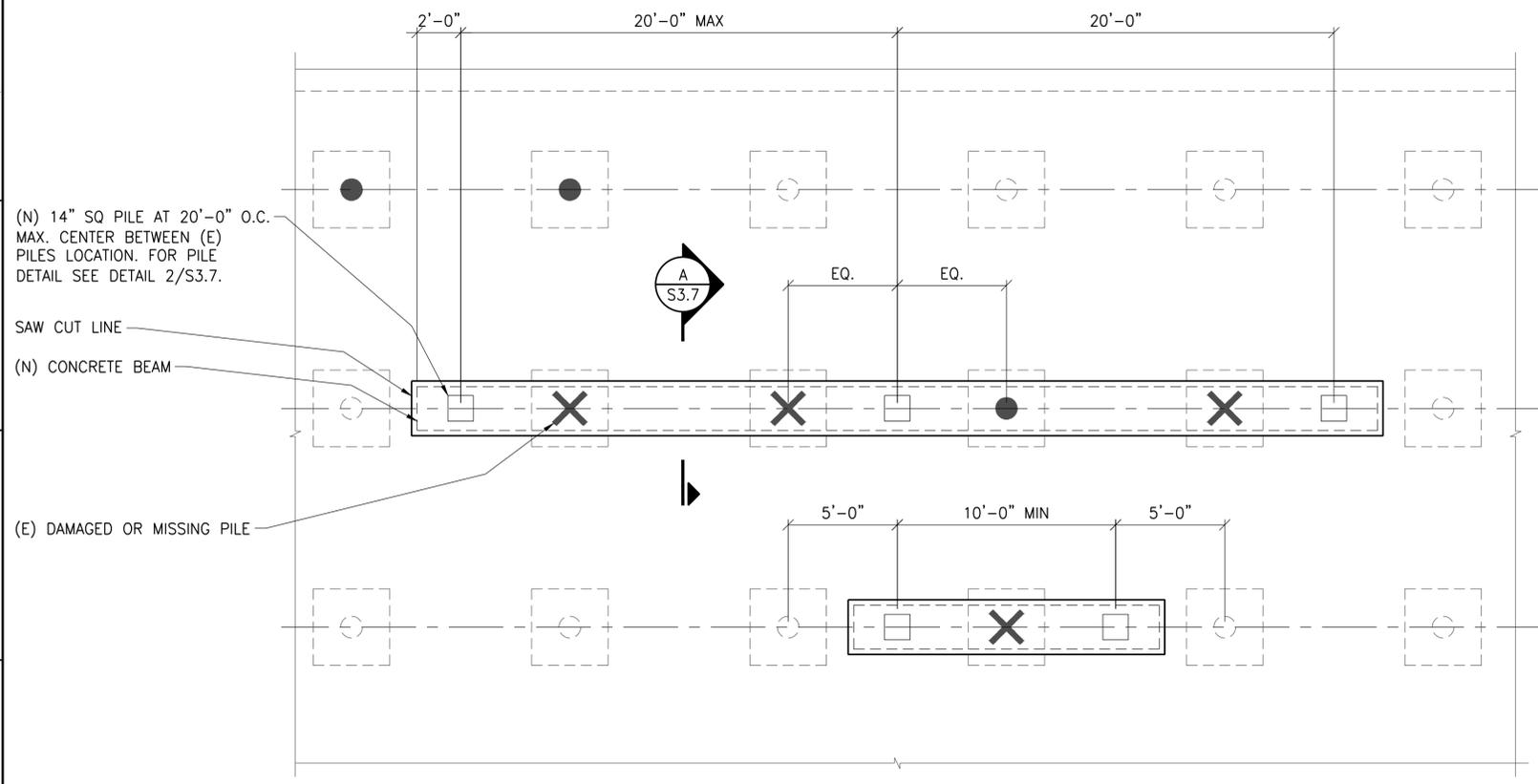
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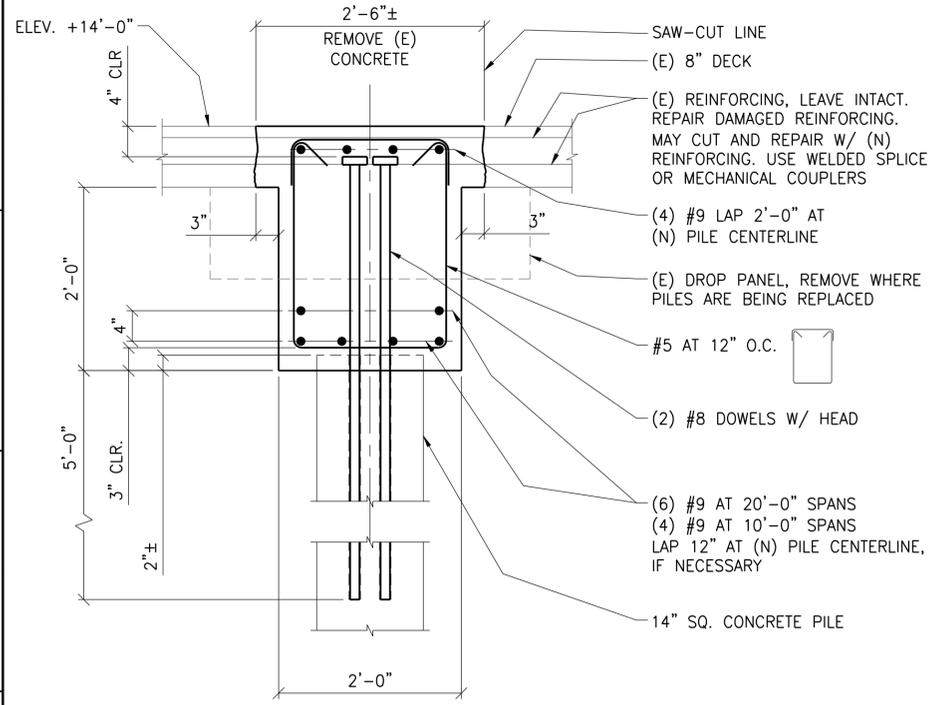
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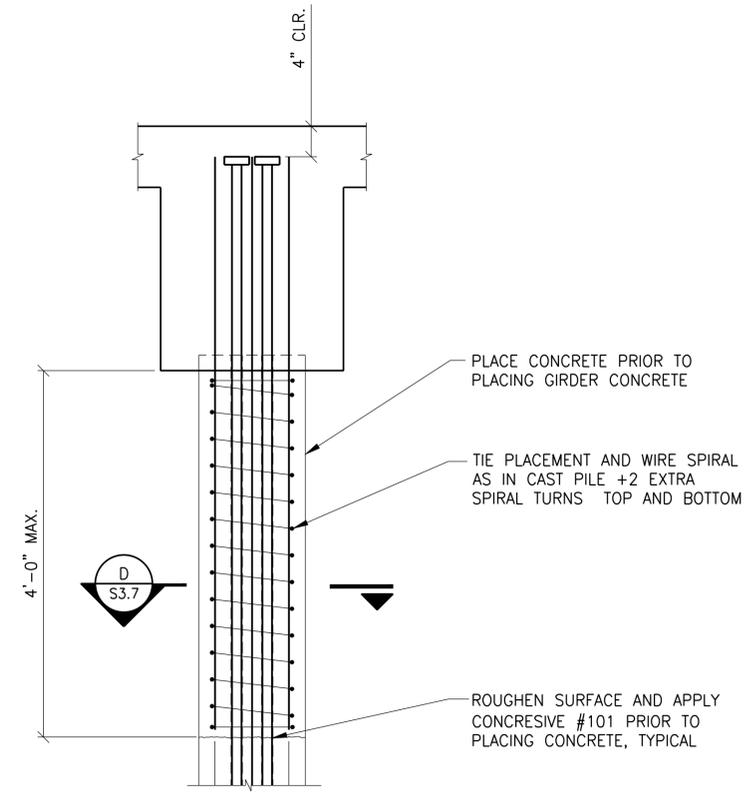
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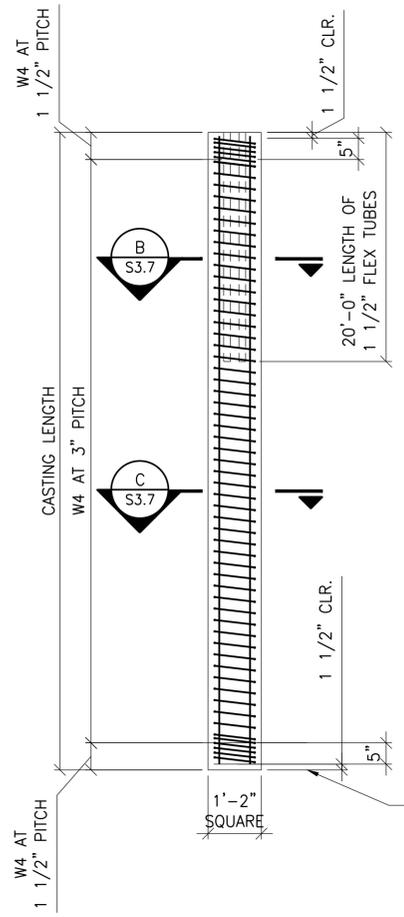
**PLAN AT PILE REPAIR**  
 1/4" - 1'-0"



**SECTION A**  
 1'-1'-0"

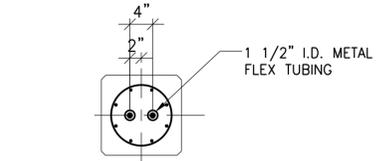


**CAST IN PLACE PILE EXTENSION**  
 1'-1'-0"

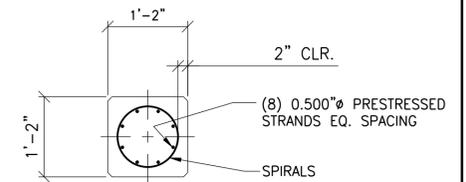


**14" SQ PRESTRESSED CONCRETE PILE DETAIL**  
 DO NOT SCALE

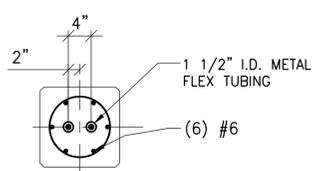
PILE TIP ELEVATION	
BENT LINES AT INNER WHARF	PRODUCTION
1-17	-108
18-31	-101
32-46	-90
47-60	-80
61-75	-75
76-89	-71
90-103	-66
104-115	-64



**SECTION B**  
 3/4" - 1'-0"



**SECTION C**  
 3/4" - 1'-0"



**SECTION D**  
 3/4" - 1'-0"

**PRESTRESSED PILE NOTES:**

- MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE F'C = 6000 PSI AT 28 DAYS AND F'C AT TRANSFER OF STRESS F'C = 4000 PSI.
- MATERIALS
  - CEMENT SHALL BE TYPE II OR MODIFIED TYPE II
  - AGGREGATES SHALL BE PER ASTM C33 3/4" MAX.
  - PRESTRESSED STRANDS SHALL BE ASTM A416 LOW RELAXATION 7-WIRE STRANDS WITH MIN. BREAKING STRENGTH OF 270 KSI.
  - MILD REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
  - SPIRAL BARS SHALL BE ASTM A82 COLD DRAWN WIRE WITH MINIMUM YIELD STRENGTH OF 70 KSI.
  - HEADED REINFORCEMENT SHALL CONFORM TO ASTM A970-08
- MINIMUM CONCRETE COVER OVER SPIRAL SHALL BE 2".
- MAXIMUM JACKING FORCE PER STRAND SHALL BE 28.9 KIPS.
- MINIMUM EFFECTIVE PRESTRESS IN CONCRETE, AFTER LOSSES = 800 PSI.
- PILES SHALL BE DRIVEN TO REFUSAL. THE REQUIRED BLOW COUNT WILL BE DETERMINED BY FUGRO AFTER SUBMISSION OF THE PROPOSED PILE DRIVING HAMMER. THE TIP ELEVATIONS HAVE BEEN SET SO PILES ARE EMBEDDED 3'-0" INTO BED ROCK. PILES MAY HAVE TO BE CUT-OFF OR EXTENDED IF BEDROCK ELEVATIONS VARIES FROM ESTIMATED.
- PILES HAVE BEEN PROPORTIONED FOR A DEAD LOAD PLUS LIVE LOAD ALLOWABLE COMPRESSIVE CAPACITY OF 130 KIPS IN ACCORDANCE WITH THE FOUNDATION RECOMMENDATION BY FUGRO, INC. REFER TO FUGRO'S LETTER REPORT DATED 01/27/10, FUGRO PROJECT NO. 1413.005.
- ELEVATIONS ARE WITH REFERENCE TO MLLW.

NOTE:  
 THIS SHEET IS NOT USED FOR PHASE 1 WORK.

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1/24/2012

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**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
 FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 ALTERNATE TIMBER PILE  
 REPLACEMENT DETAILS

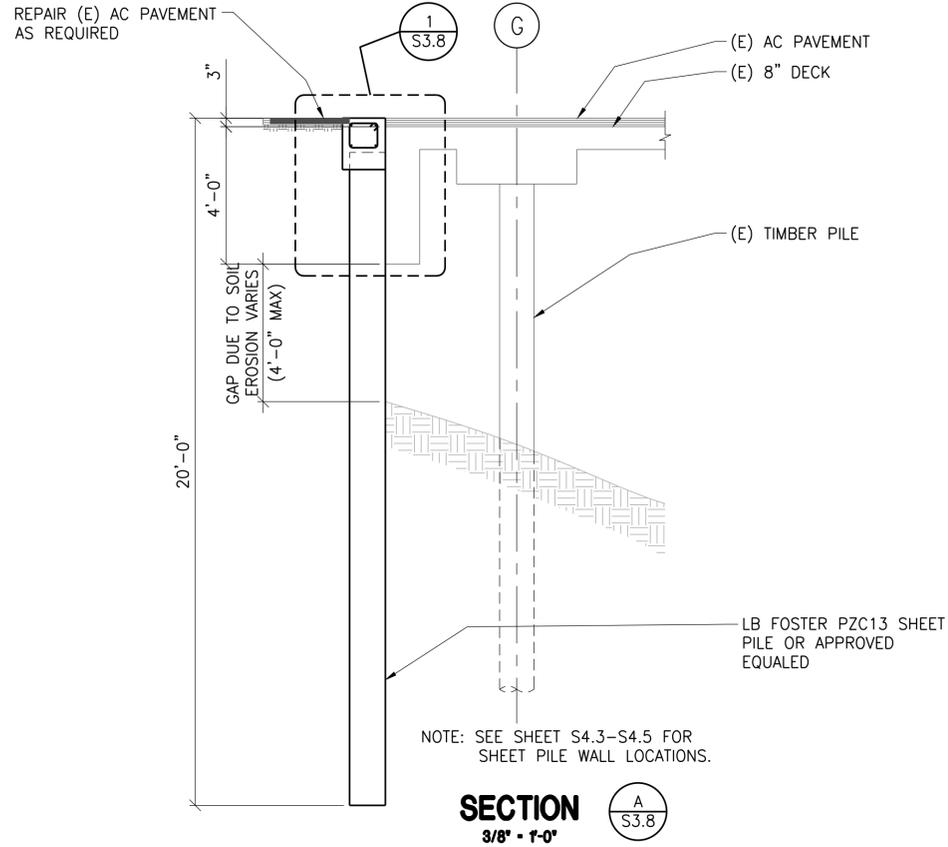
Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S3.7  
 Approved SL of  
 Date 01/25/10 Revision 1



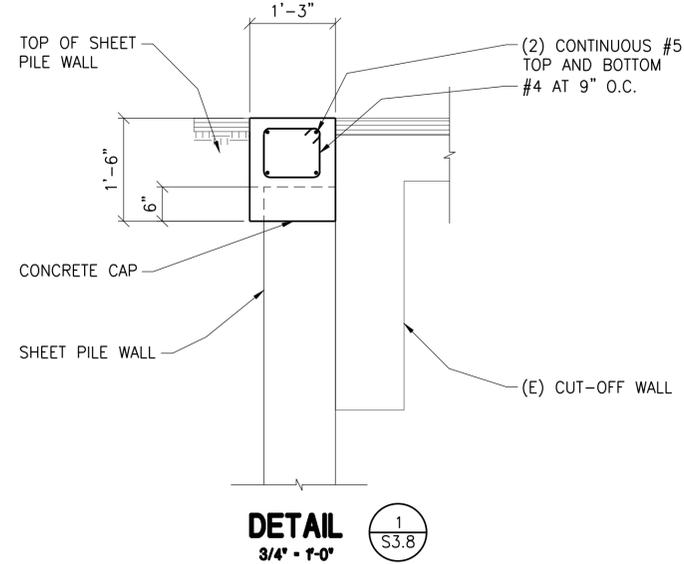
FOR LIFTECH CONSULTANTS INC  
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No. Revision	Date	By	Checked	Approved

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**SECTION**  
3/8' - 1'-0'  
A  
S3.8



**DETAIL**  
3/4' - 1'-0'  
1  
S3.8

XXXX-XXX 1



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POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

SHEET PILE DETAIL

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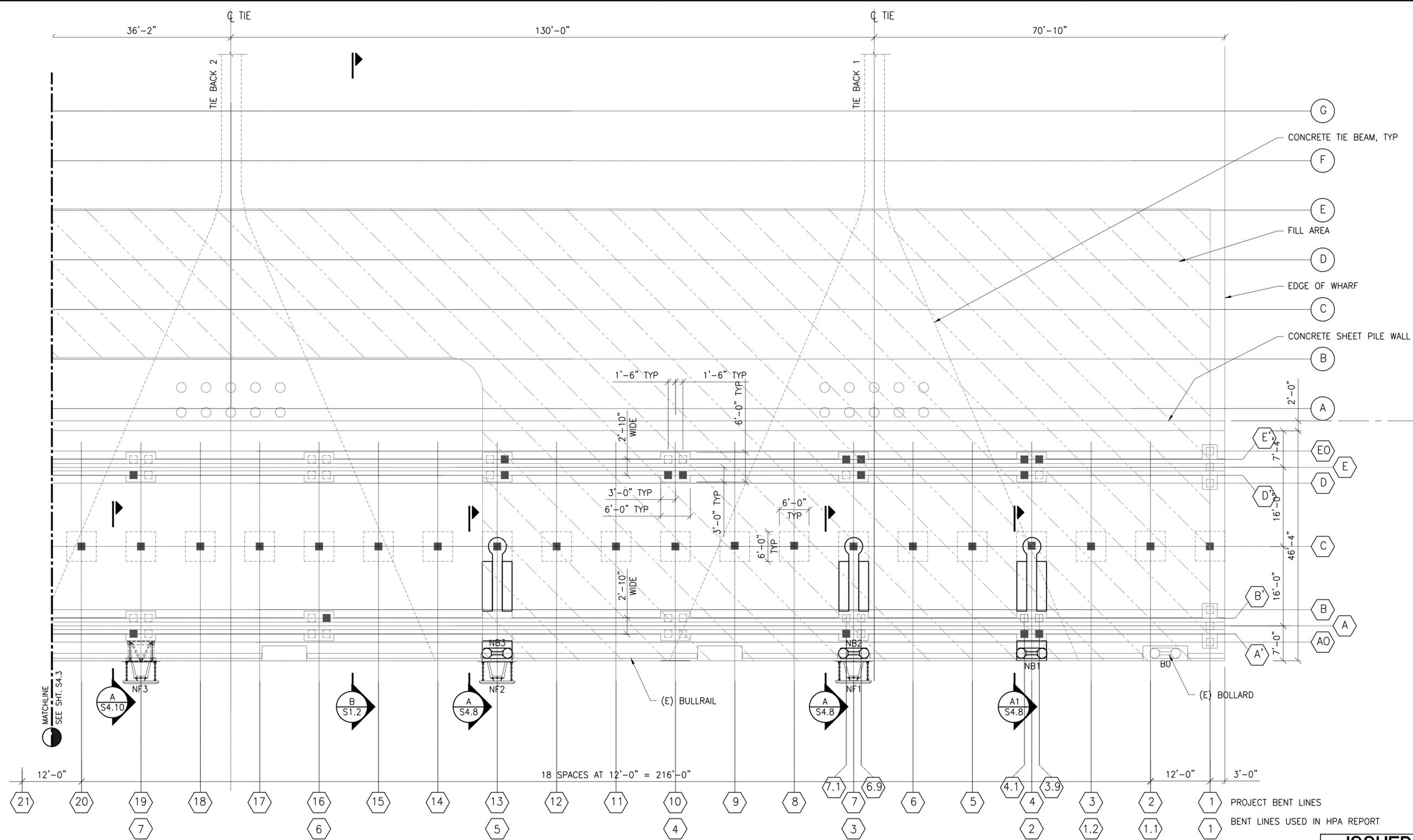
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Project No. Z1800  
By AH Checked TG/EGS Sheet No. S3.8  
Approved SL of ---  
Date 01/25/10 Revision 1

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\\wcc\z1800\z1800\dwg\Current\S3.8 SHEET PILE DETAIL.dwg 1/24/2012 3:55:15 PM ALVIN HOFFFAUR

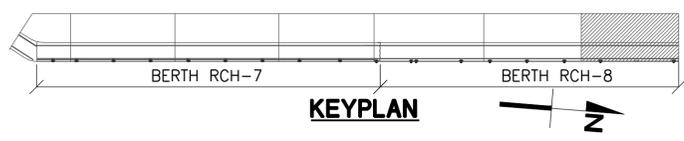
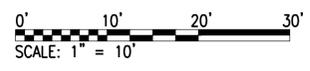
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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 1**  
 1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE
  - MISSING TIMBER PILE
  - CONCRETE PILE
  - DAMAGED CONCRETE PILE
  - TRAFFIC LOADING AREA

- NOTES:**
- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
  - DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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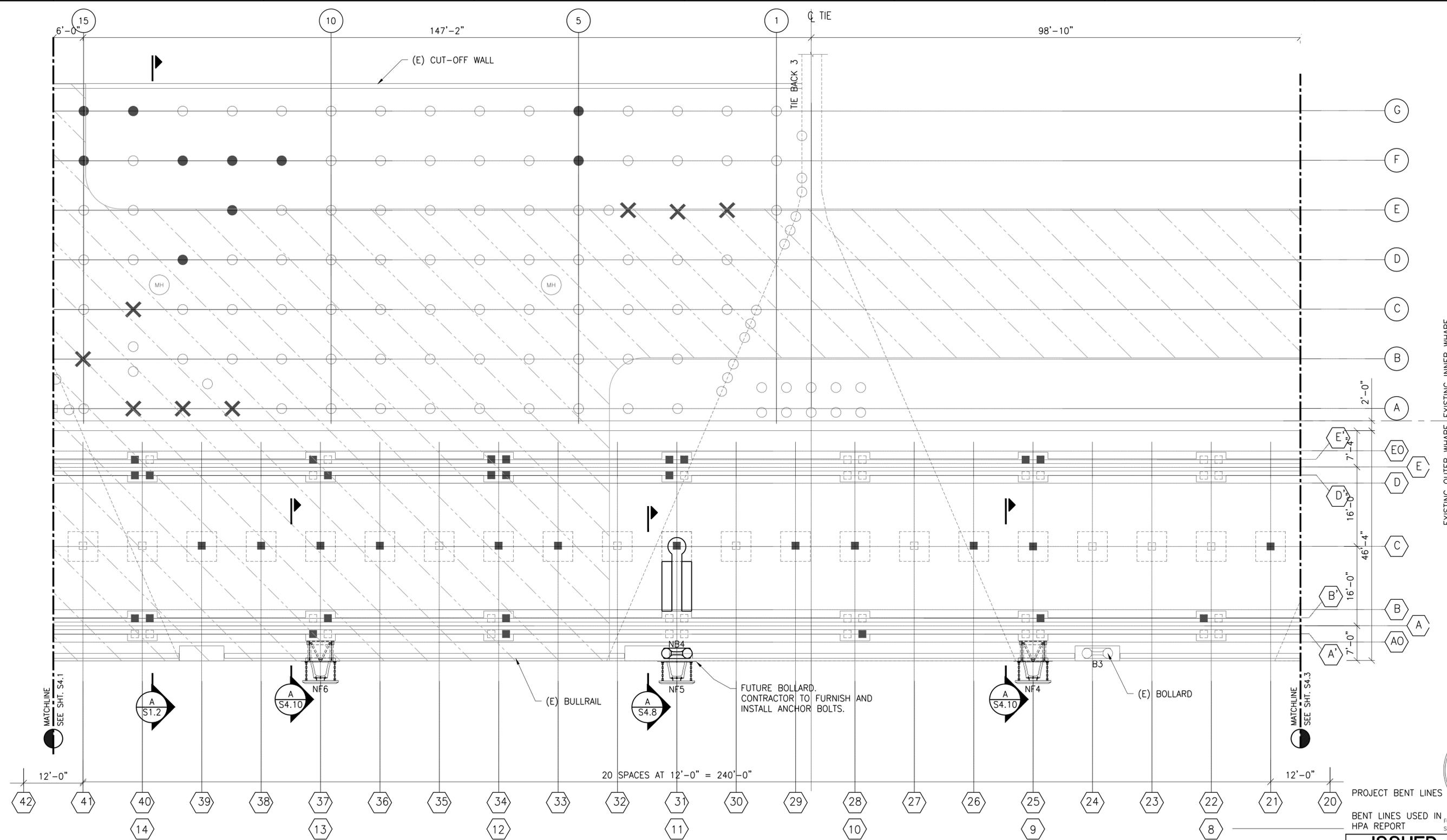
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 1

Project No. Z1800  
 By AH \_\_\_\_\_ Checked TG/EGS Sheet No. S4.1  
 Approved SL \_\_\_\_\_ of \_\_\_\_\_  
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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 2**

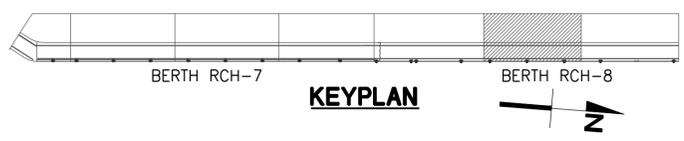
1" = 10'-0"

**LEGEND**

- |                     |                       |
|---------------------|-----------------------|
| (N) BOLLARD         | MISSING TIMBER PILE   |
| (N) FENDER          | CONCRETE PILE         |
| TIMBER PILE         | DAMAGED CONCRETE PILE |
| DAMAGED TIMBER PILE | TRAFFIC LOADING AREA  |

**NOTES:**

- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
- DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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No.	Revision	Date	By	Checked	Approved

PROJECT BENT LINES

BENT LINES USED IN HPA REPORT



**ISSUED FOR CONSTRUCTION**

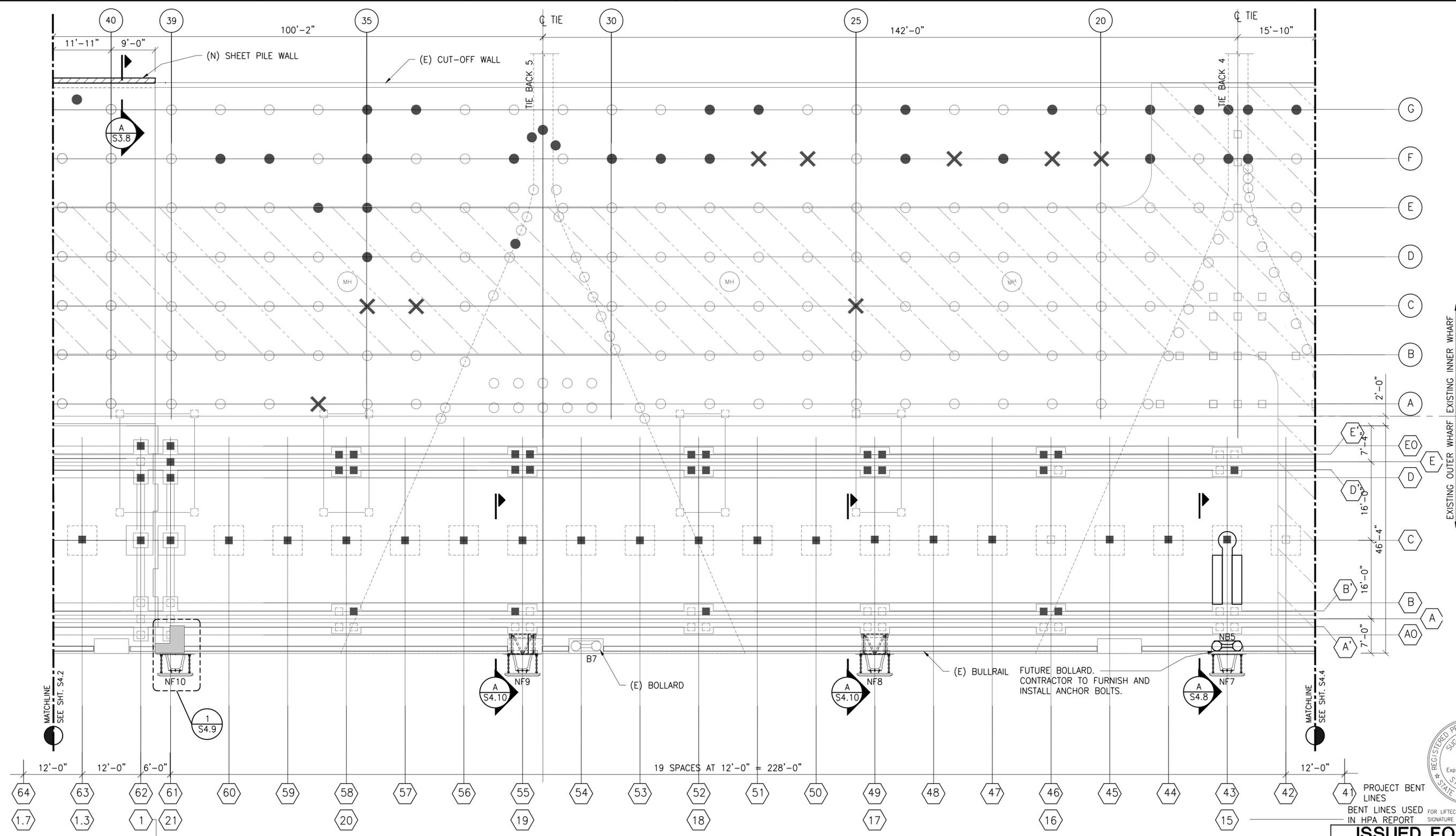
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 2

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.2  
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EXISTING OUTER WHARF EXISTING INNER WHARF

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 3**

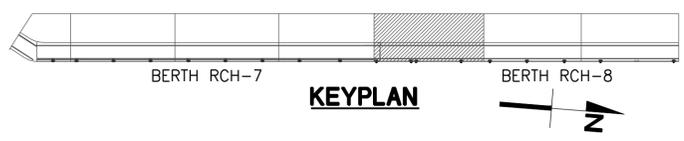
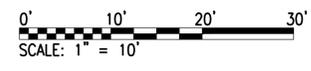
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

**LEGEND**

	(N) BOLLARD		MISSING TIMBER PILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



PROJECT BENT LINES  
 BENT LINES USED FOR LIFTECH CONSULTANTS INC IN HPA REPORT  
 SIGNATURE DATE: \_\_\_\_\_

**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 3

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S4.3  
 Approved SL of \_\_\_\_\_  
 Date 01/25/10 Revision 1

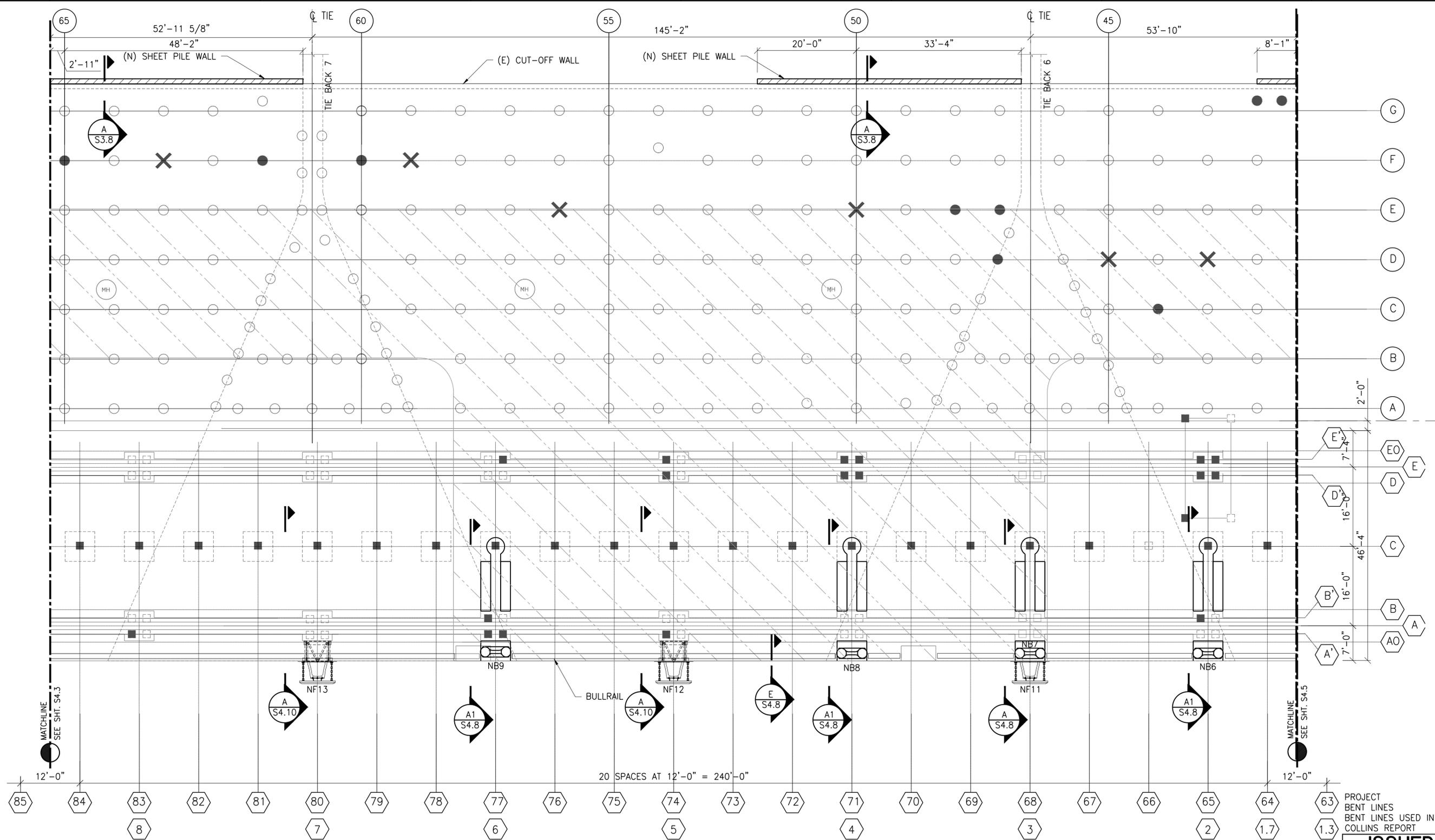
**Liftech**  
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No.	Revision	Date	By	Checked	Approved

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 4**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**

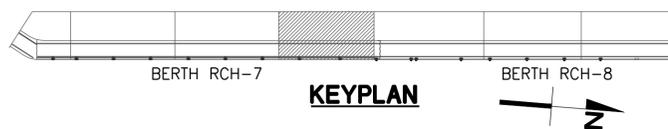
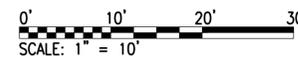
- IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.
- REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

**LEGEND**

- |                     |                       |
|---------------------|-----------------------|
| (N) BOLLARD         | MISSING TIMBER PILE   |
| (N) FENDER          | CONCRETE PILE         |
| TIMBER PILE         | DAMAGED CONCRETE PILE |
| DAMAGED TIMBER PILE | TRAFFIC LOADING AREA  |

**NOTES:**

- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
- DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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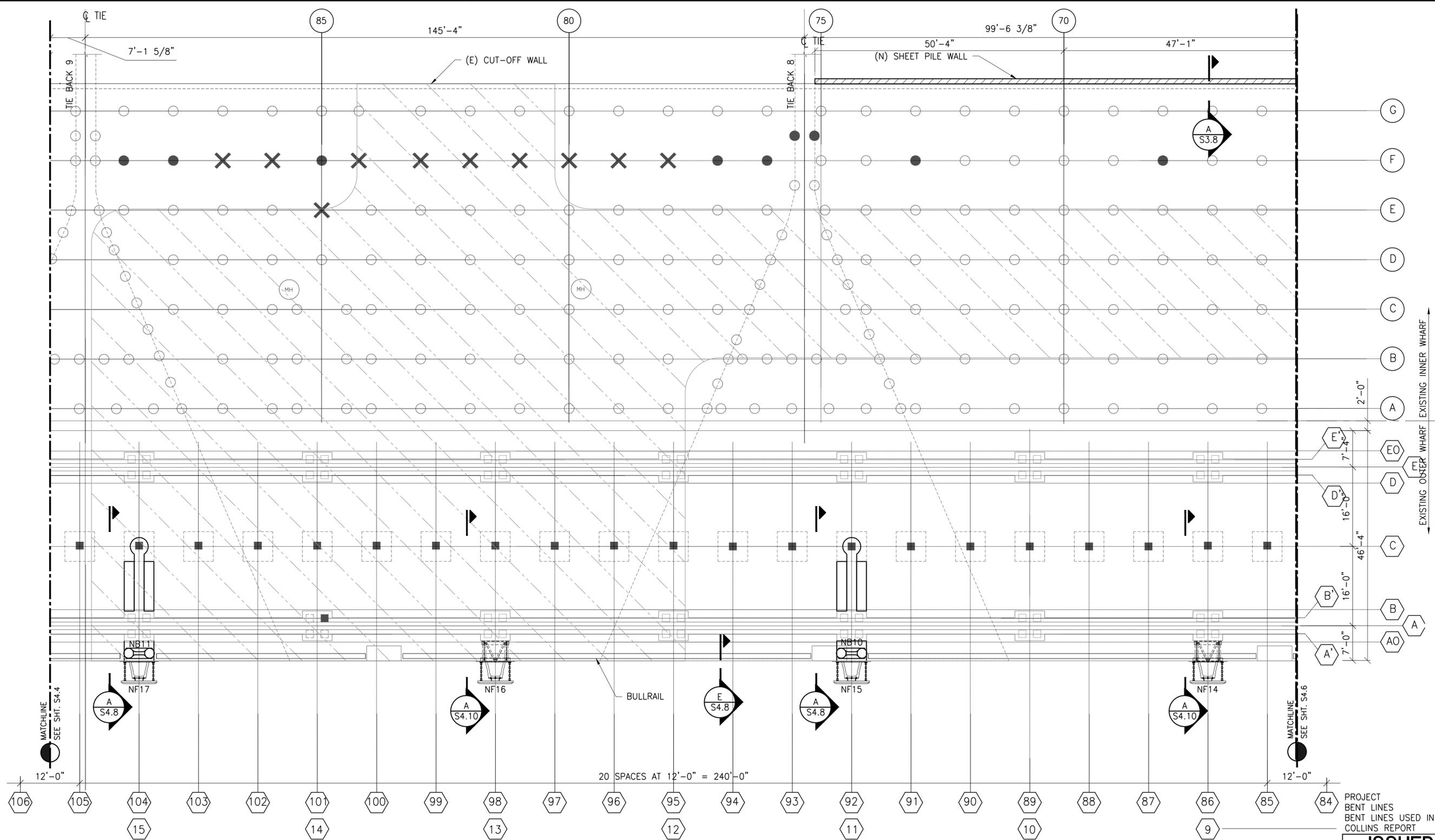
**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 4

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.4  
Approved SL of \_\_\_\_\_  
Date 01/25/10 Revision 1

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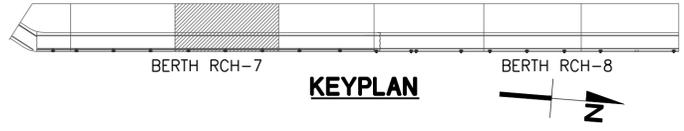


**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 5**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE
  - MISSING TIMBER PILE
  - CONCRETE PILE
  - DAMAGED CONCRETE PILE
  - TRAFFIC LOADING AREA

**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND

**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 5**

Project No. Z1800

By AH Checked TG/EGS Sheet No. S4.5

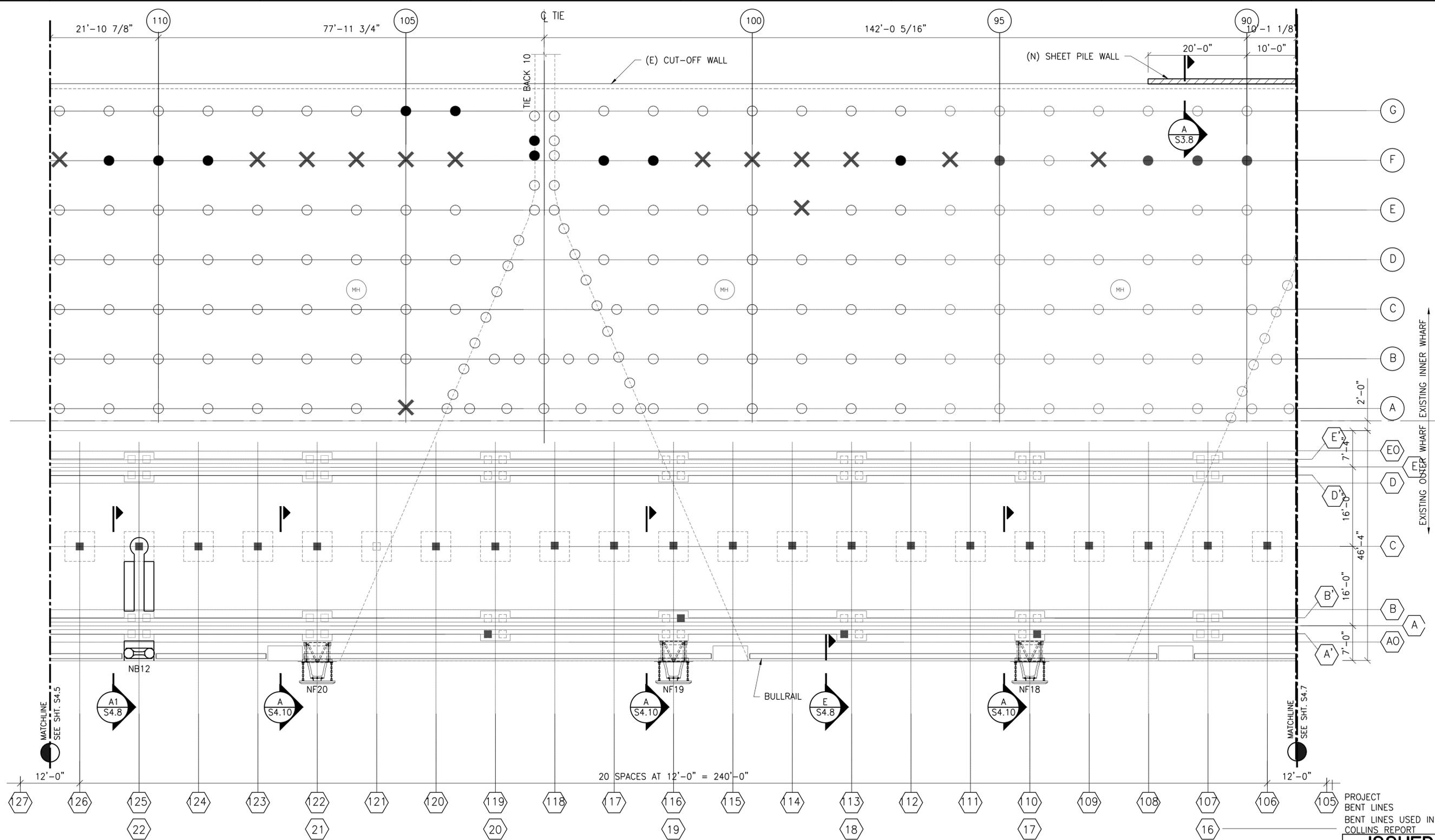
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Date 01/25/10 Revision 1



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No.	Revision	Date	By	Checked	Approved

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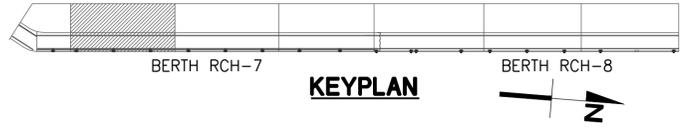
**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 6**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

**LEGEND**

(N) BOLLARD	MISSING TIMBER PILE
(N) FENDER	CONCRETE PILE
TIMBER PILE	DAMAGED CONCRETE PILE
DAMAGED TIMBER PILE	TRAFFIC LOADING AREA

**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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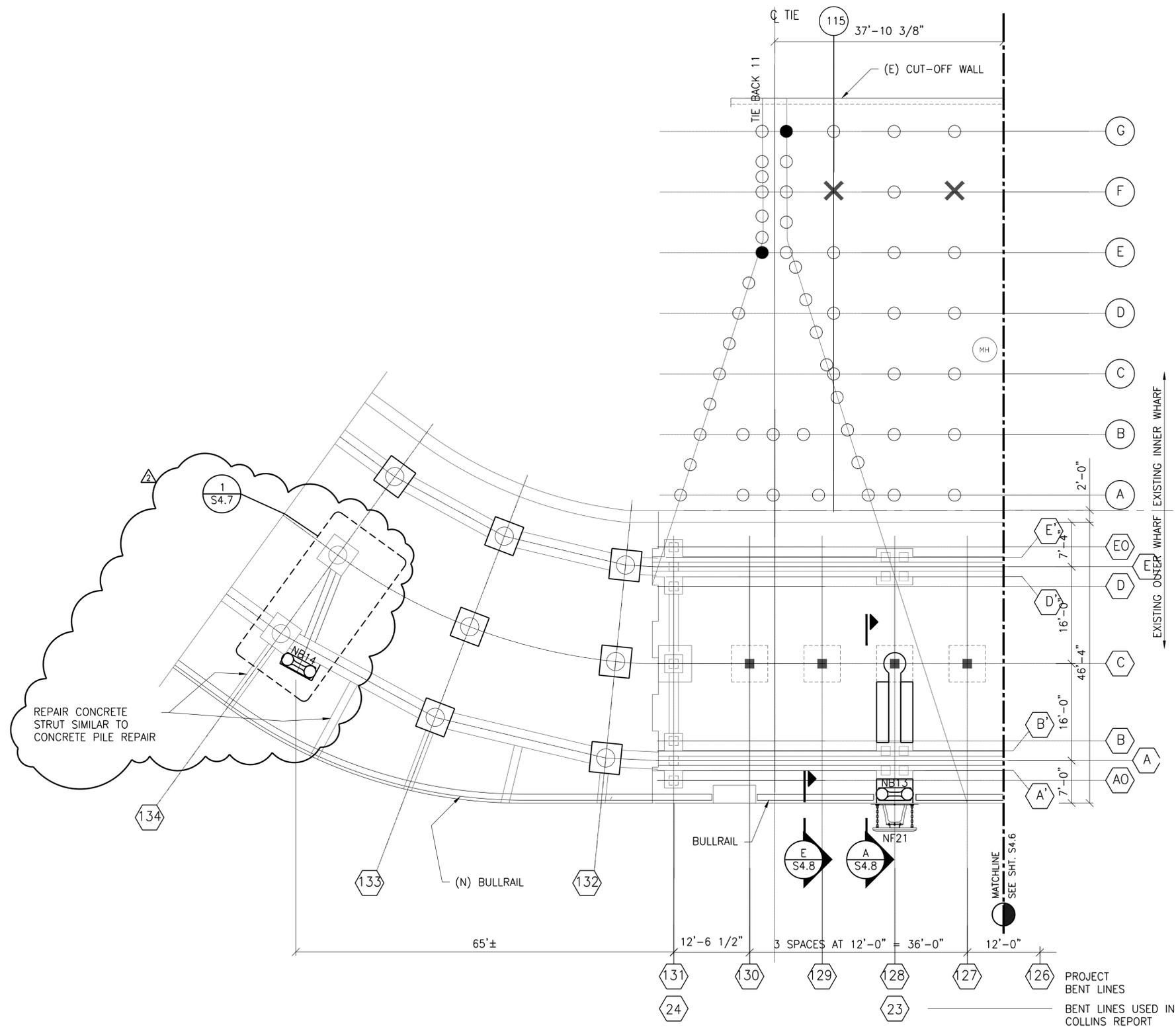
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 6

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.6  
Approved SL of  
Date 01/25/10 Revision 1



I:\Z1800\Draw\Current\54.7 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7.dwg 1/24/2012 3:37 PM ALVIN HOFFHAUER

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 7**

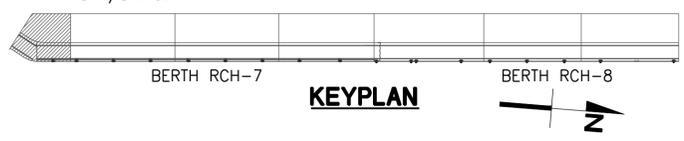
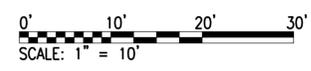
1" = 10'-0"

**LEGEND**

- (N) BOLLARD
- (N) FENDER
- TIMBER PILE
- DAMAGED TIMBER PILE
- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**

- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
- DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



	BOLLARD NO. 14 SUPPORT	06/11/10	LMK/AH	TG	SL
	ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No.	Revision	Date	By	Checked	Approved



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**ISSUED FOR CONSTRUCTION**

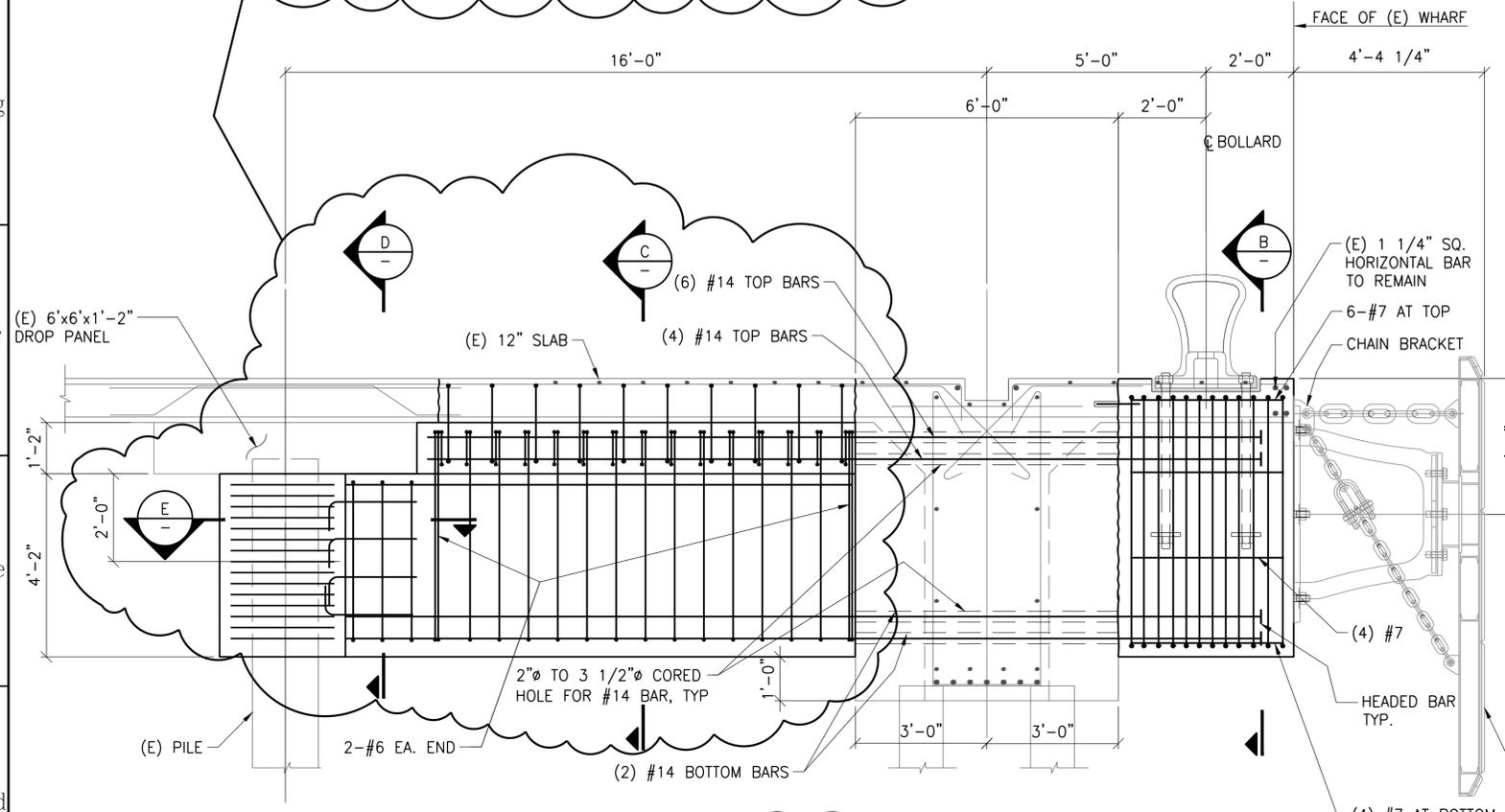
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.7  
Approved SL of ---  
Date 01/25/10 Revision 2

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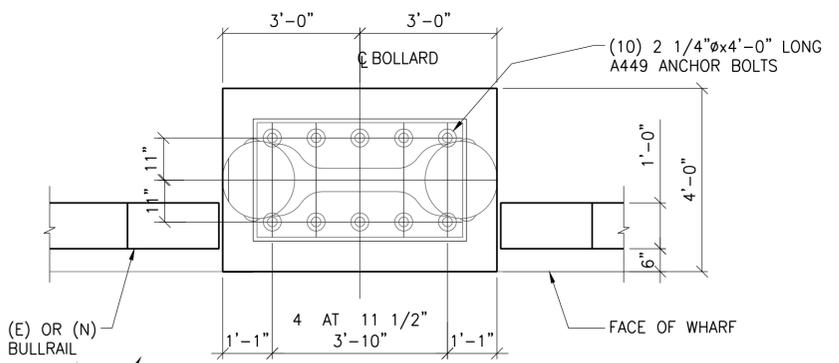
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THIS SECTION OF STRENGTHENED BEAM IS NOT INSTALLED PER PORT'S DIRECTIVE, SEE ALTERNATE DETAILS ON SHEET S4.13.

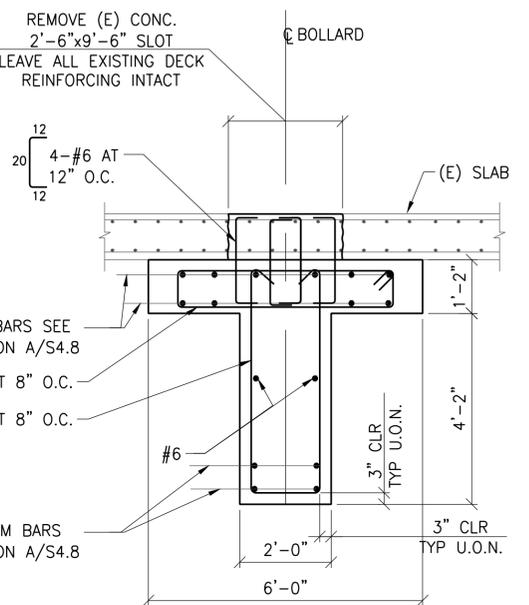


**SECTION A**  
1/2" - 1'-0" S4.8

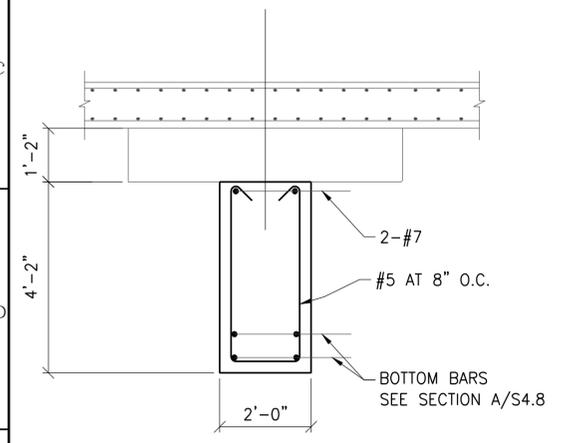
NOTES:  
1. BOLLARD AND ANCHOR BOLTS ARE SUPPLIED BY OTHERS AND INSTALLED BY THE CONTRACTOR. CONTRACTOR TO COORDINATE WITH THE BOLLARD SUPPLIER FOR INSTALLATION PROCEDURES



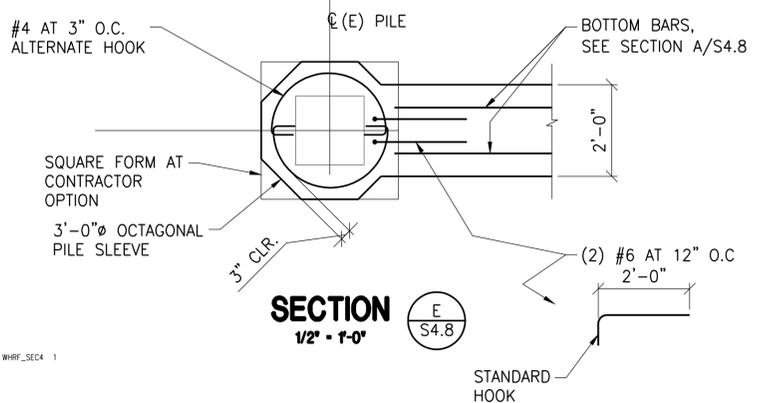
**SECTION B**  
1/2" - 1'-0" S4.8



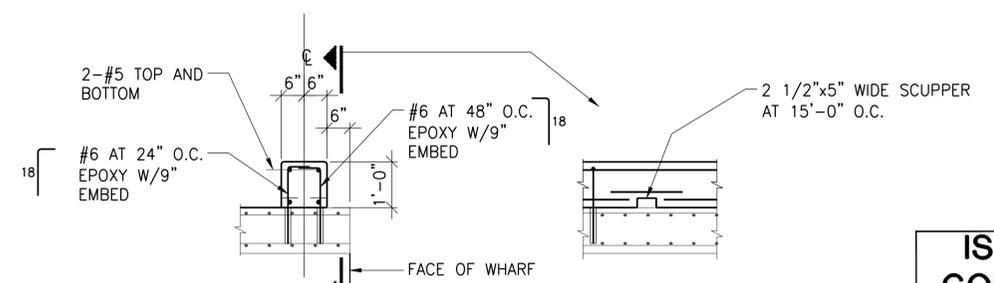
**SECTION C**  
1/2" - 1'-0" S4.8



**SECTION D**  
1/2" - 1'-0" S4.8



**SECTION E**  
1/2" - 1'-0" S4.8



**SECTION E**  
1/2" - 1'-0" S4.8

NOTES:  
1. SECTION A1/S4.8 IS DESIGNED FOR THE MOORING LOADS SHOWN ON SHEET G4.  
2. CONTRACTOR SHALL INCLUDE SECTION A/S4.8 AND A1/S4.8 AS PHASE 1 BASE BID ITEM.



FOR LIFTECH CONSULTANTS INC. SIGNATURE DATE:

**ISSUED FOR CONSTRUCTION**  
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND NEW BOLLARD AND FENDER DETAIL

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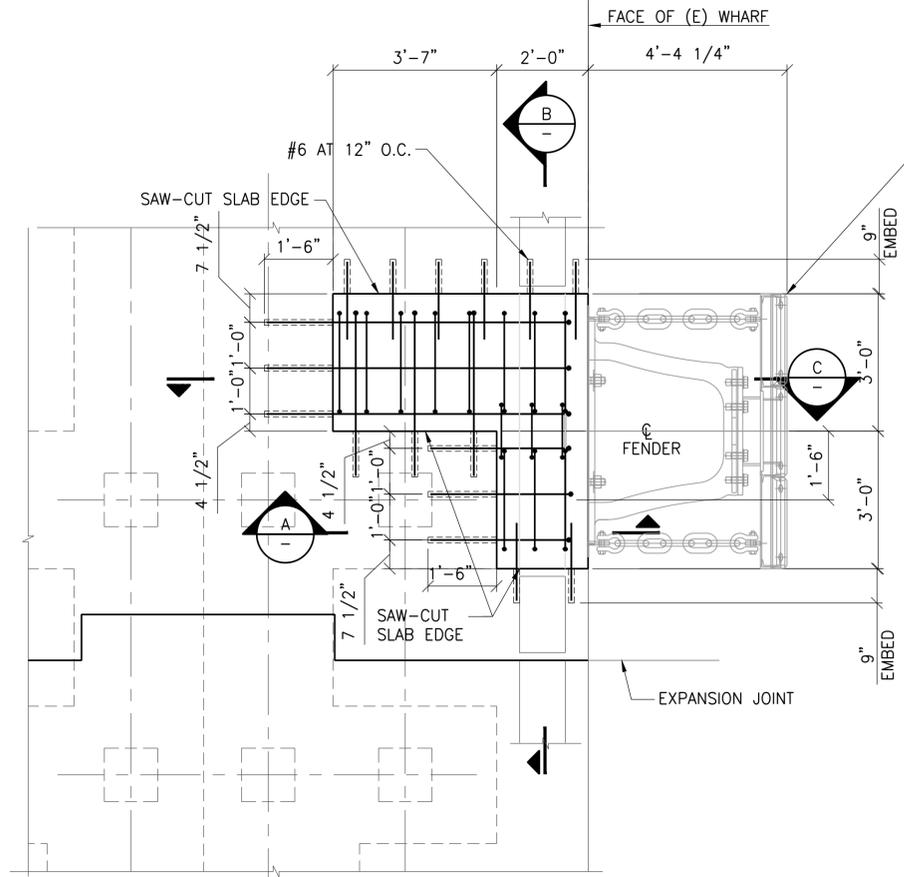
LIFTECH CONSULTANTS INC

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Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.8  
Approved SL of  
Date 01/25/10 Revision 1

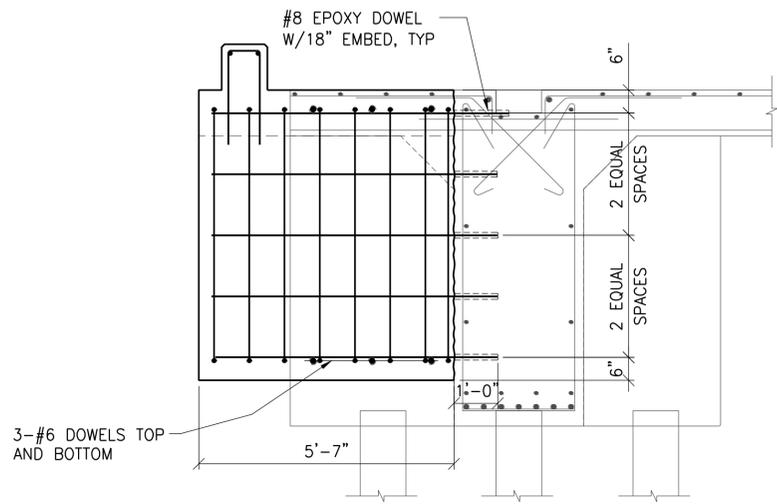
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No. Revision	Date	By	Checked	Approved

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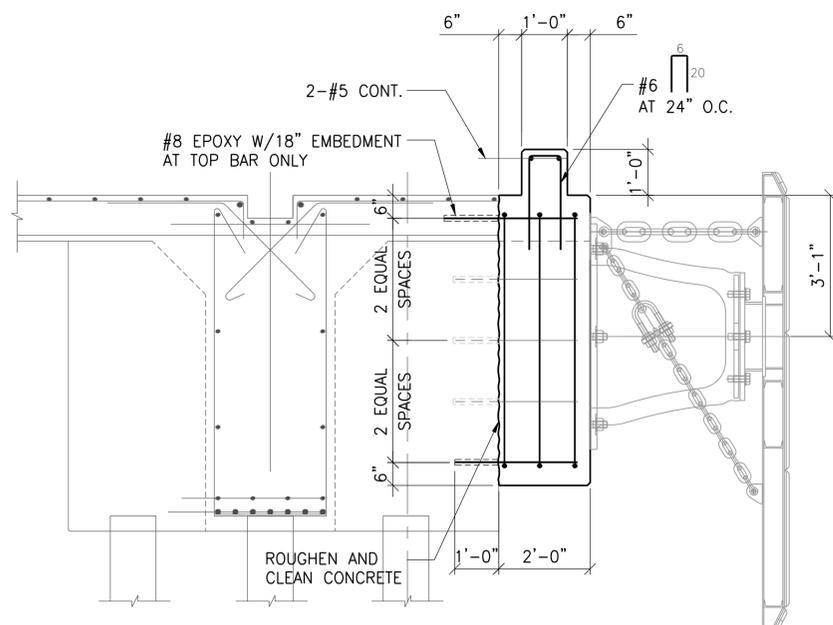


**PLAN 1**  
1/2' - 1'-0' S4.9

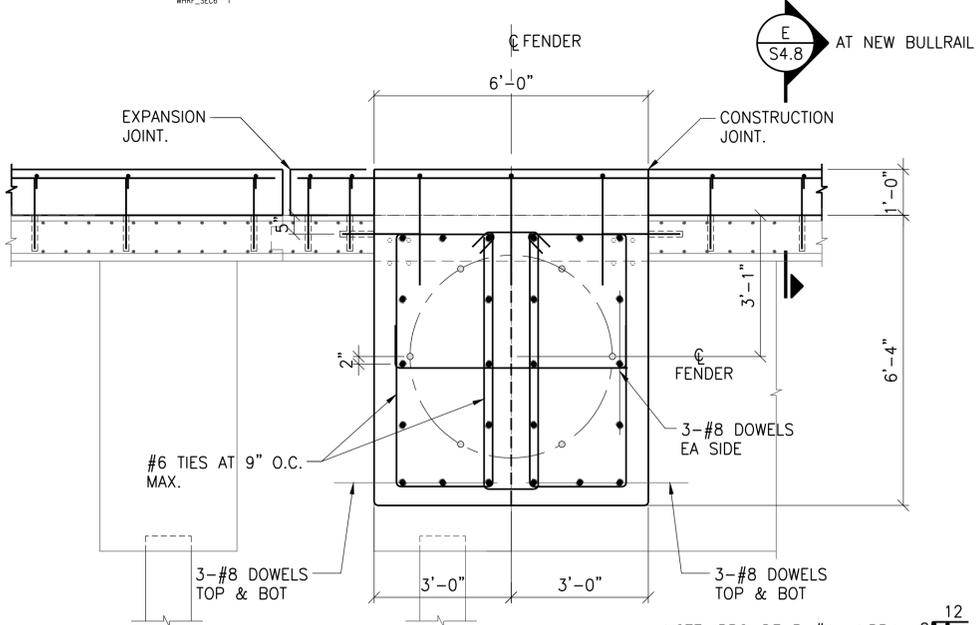
FENDER, FRONTAL FRAME, AND ANCHOR BOLTS ARE SUPPLIED BY OTHERS AND INSTALLED BY THE CONTRACTOR. CONTRACTOR TO COORDINATE WITH FENDER SUPPLIER FOR INSTALLATION PROCEDURES



**SECTION C**  
1/2' - 1'-0' S4.9



**SECTION A**  
1/2' - 1'-0' S4.9



**SECTION B**  
1/2' - 1'-0' S4.9

NOTE: PROVIDE 3-#4 HAIRPIN AT CHAIN BRACKET BOLTS



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FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
NEW FENDER AT  
EXPANSION JOINT

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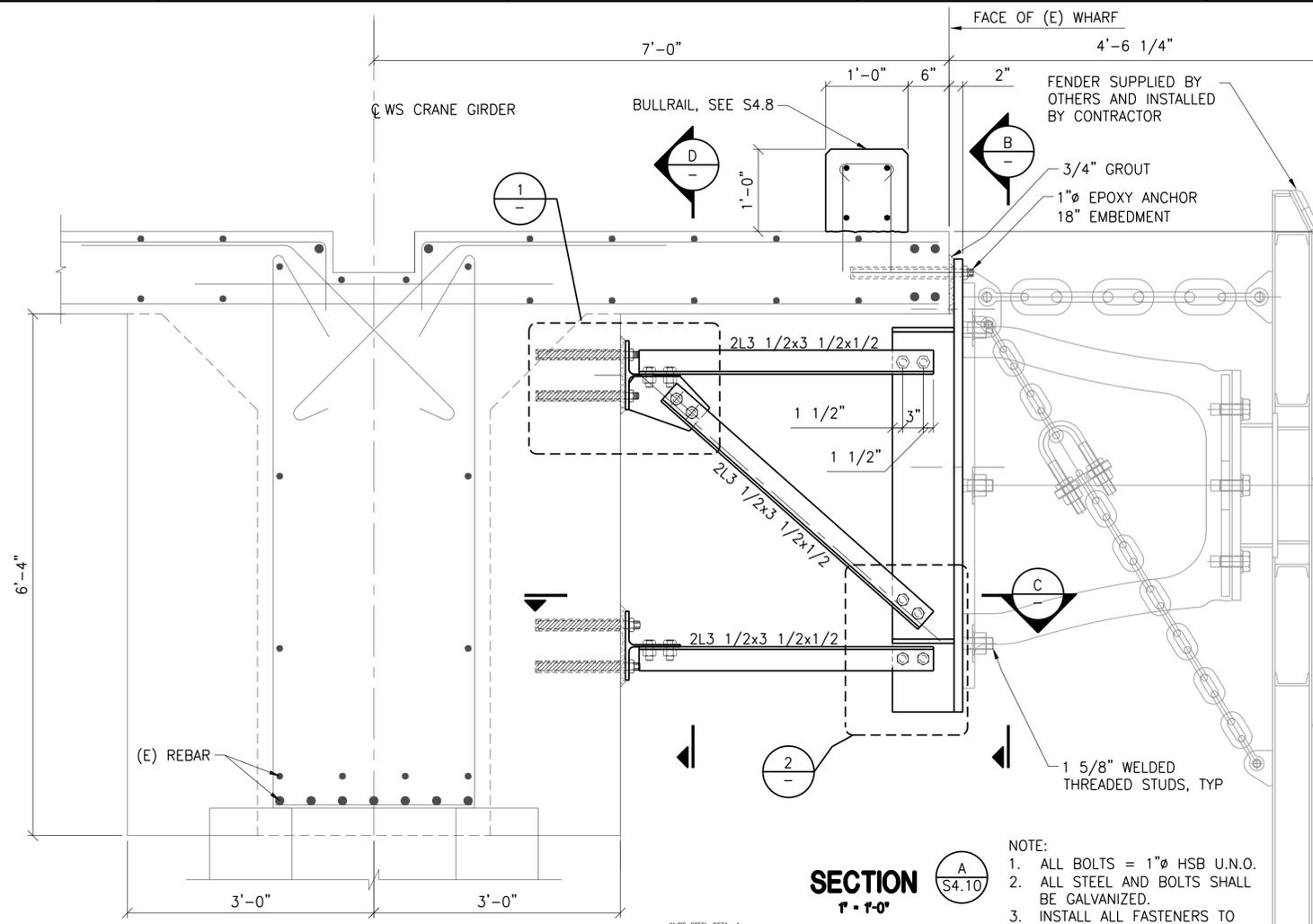
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Date 01/25/10 Revision 1

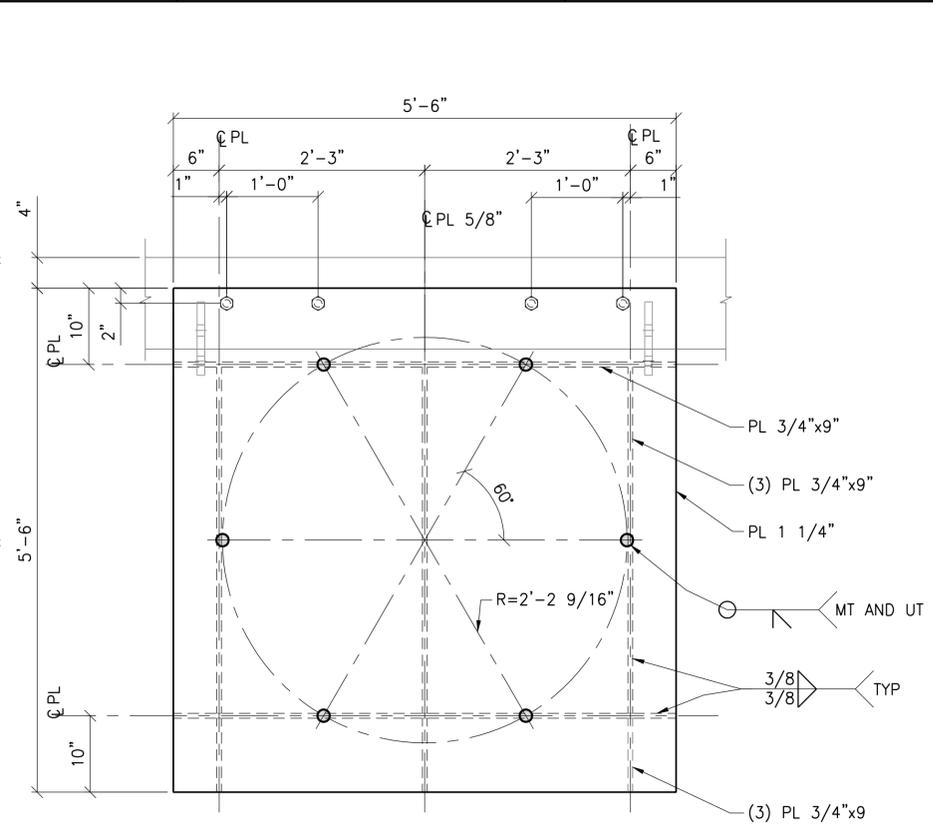
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**SECTION A**  
S4.10  
1'-1'-0"

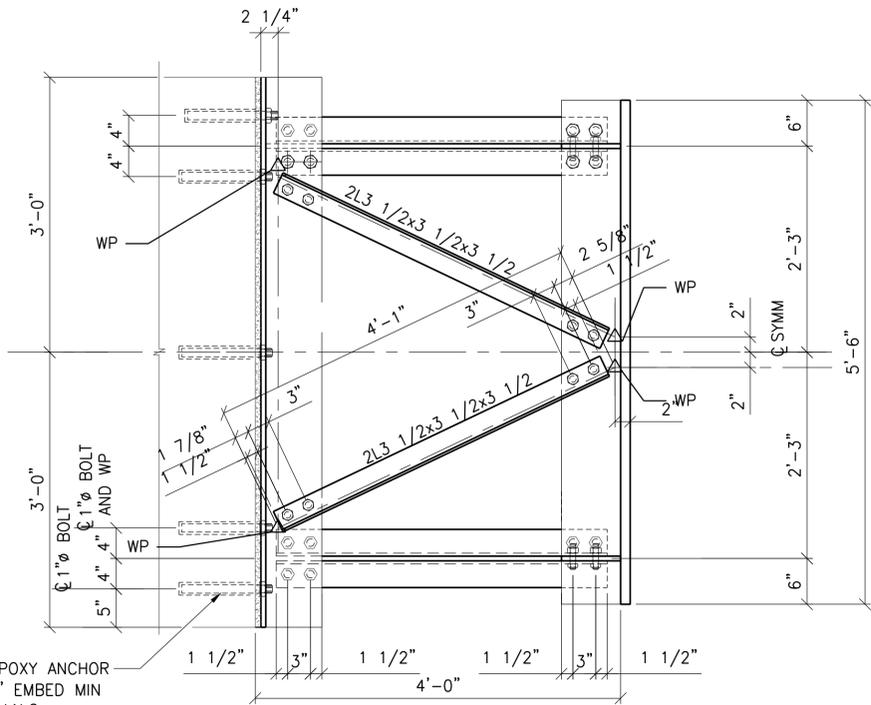
NOTE:  
1. ALL BOLTS = 1" HSB U.N.O.  
2. ALL STEEL AND BOLTS SHALL BE GALVANIZED.  
3. INSTALL ALL FASTENERS TO SLIP CRITICAL CONDITION U.O.N.



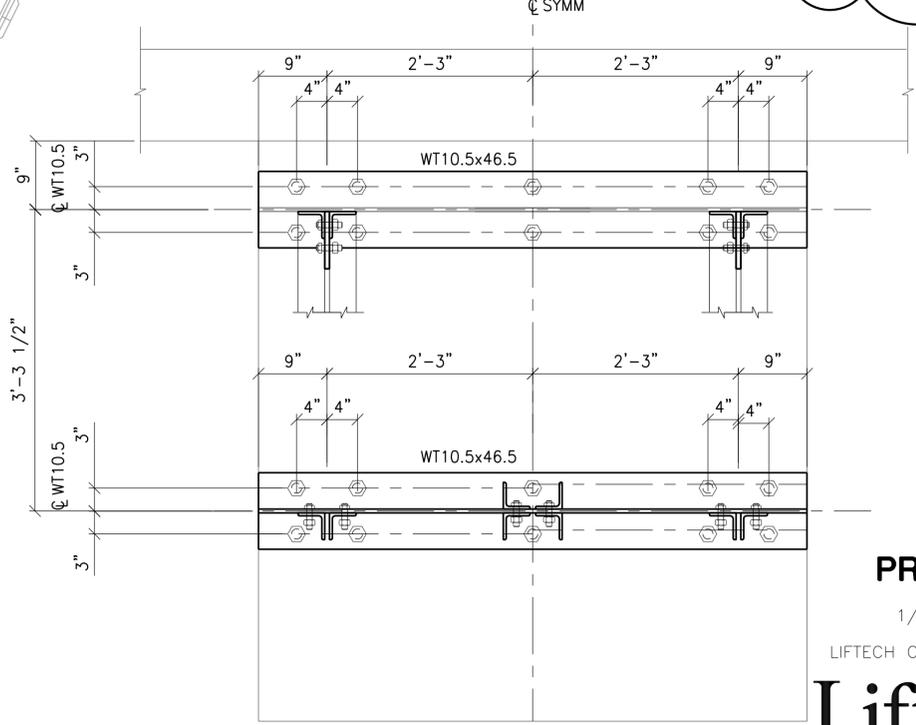
**SECTION B**  
S4.10  
1'-1'-0"

**THIS SHEET IS NOT USED SEE SHEET S4.8, S4.9, S4.12, AND S4.13**

NOTE:  
CONTRACTOR SHALL INCLUDE SECTION A/S4.10 AS PHASE 1 BASE BID ITEM.



**SECTION C**  
S4.10  
1'-1'-0"



**SECTION D**  
S4.10  
1'-1'-0"

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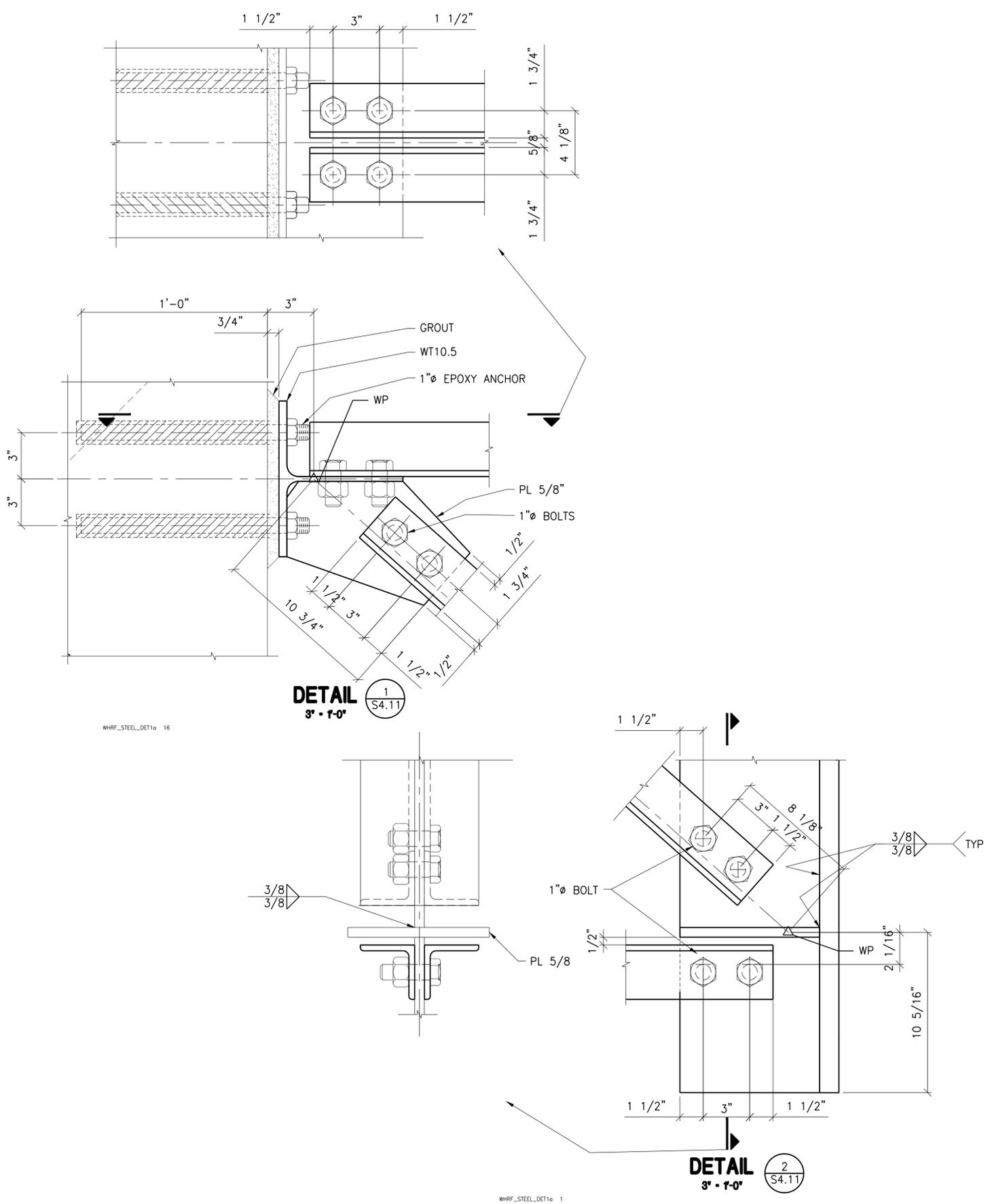
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POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
NEW FENDER WITH  
STEEL SUPPORT - 1

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.10  
Approved SL of  
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**THIS SHEET IS  
NOT USED SEE SHEET  
S4.8, S4.9, S4.12, AND S4.13**



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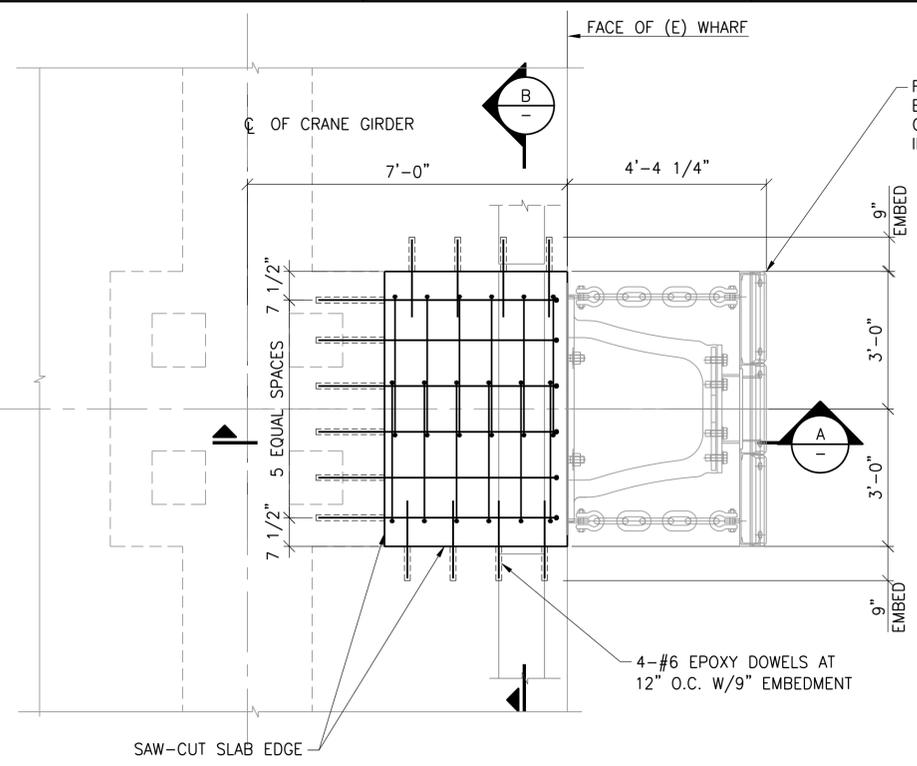
POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
NEW FENDER WITH STEEL  
SUPPORT - 2

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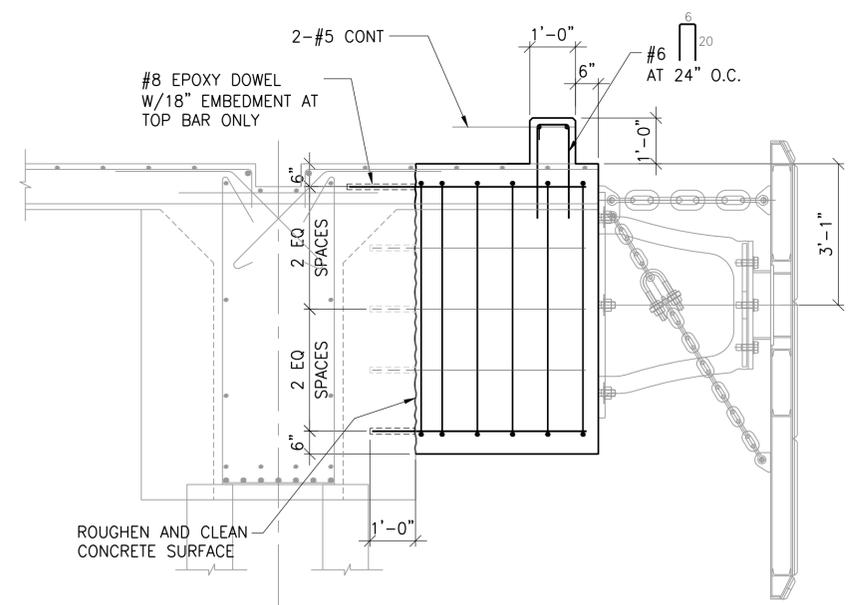
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By AH Checked TG/EGS Sheet No. S4.11  
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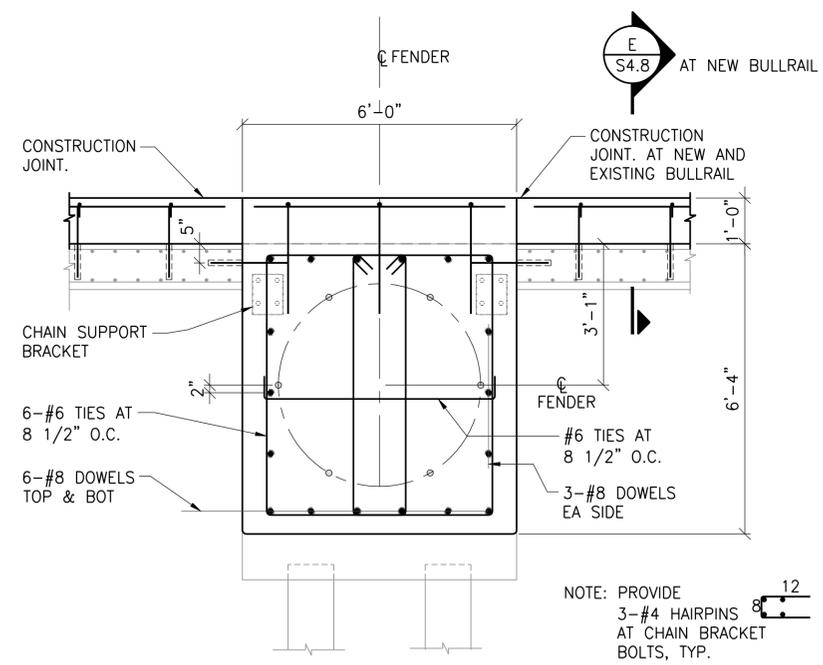
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**PLAN**  
1/2" - 1'-0"  
1  
S4.12



**SECTION A**  
1/2" - 1'-0"  
A  
S4.12



**SECTION B**  
1/2" - 1'-0"  
B  
S4.12

NOTE:  
CONTRACTOR SHALL INCLUDE SECTION A/S4.12  
AS PHASE 1 ALTERNATE BID ITEM.



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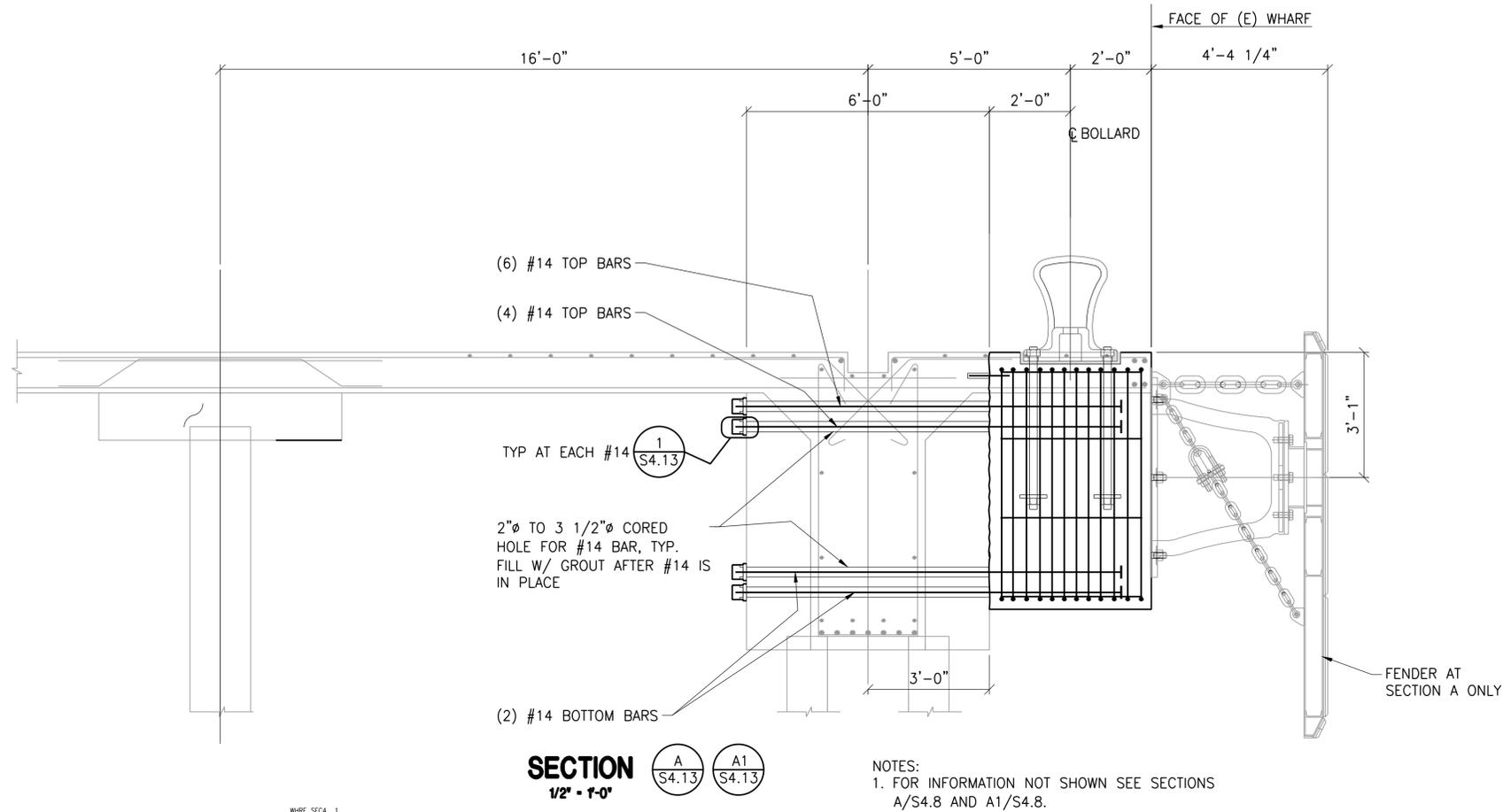
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FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
ALTERNATE FENDER  
SUPPORT DETAIL

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Approved SL of ---  
Date 01/25/10 Revision 1

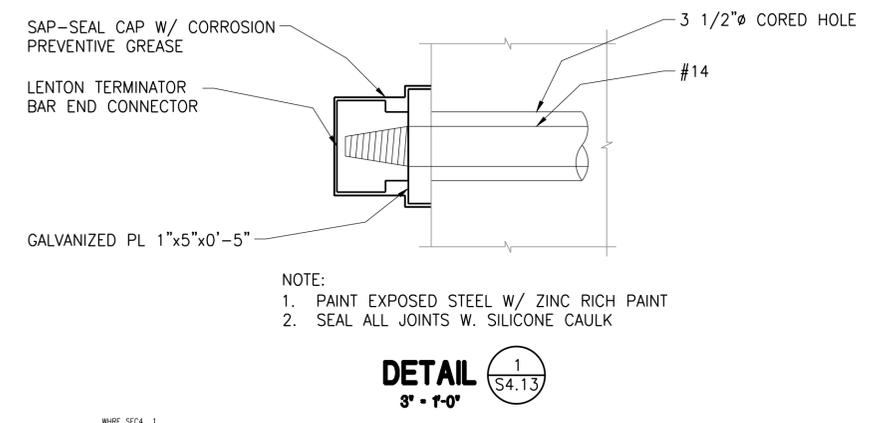
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**SECTION**  
1/2' - 1'-0"  
A/S4.13 A1/S4.13

NOTES:  
1. FOR INFORMATION NOT SHOWN SEE SECTIONS A/S4.8 AND A1/S4.8.



**DETAIL**  
1/S4.13  
3' - 1'-0"

NOTES:  
1. SECTION A/S4.13 IS DESIGNED FOR 1/2 THE MOORING LOAD ON SHEET G4, WHICH REDUCES THE DESIGN WIND FROM 85 MPH TO 60 MPH.  
2. CONTRACTOR SHALL INCLUDE SECTION A/S4.13 AND A1/S4.13 AS PHASE 1 ALTERNATE BID ITEM.



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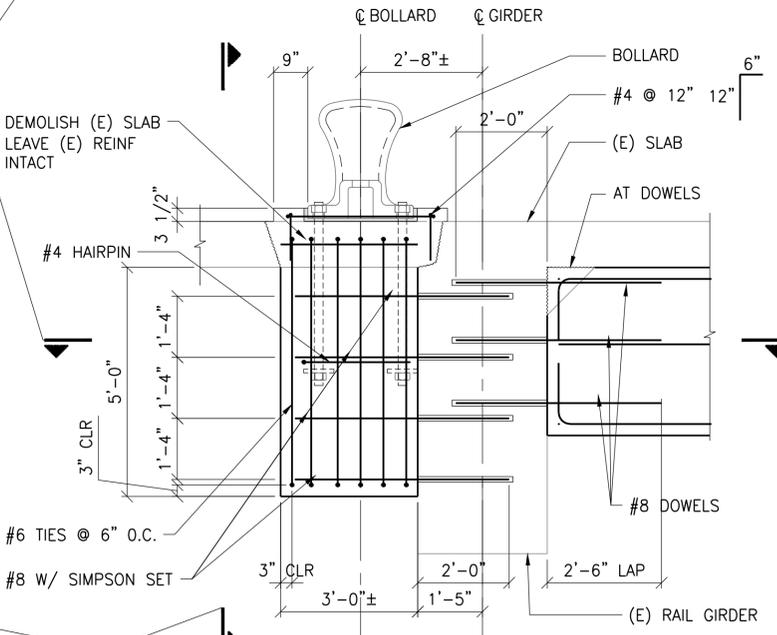
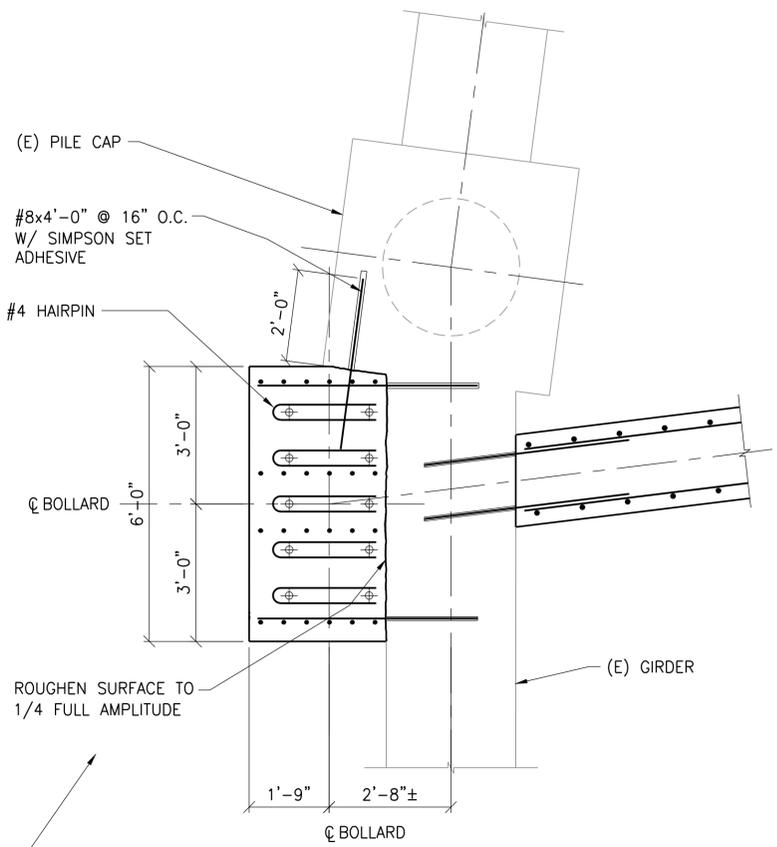
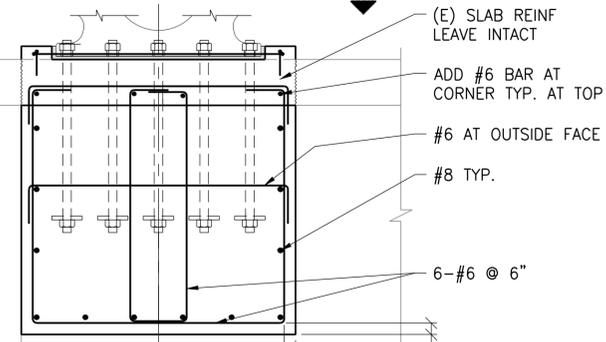
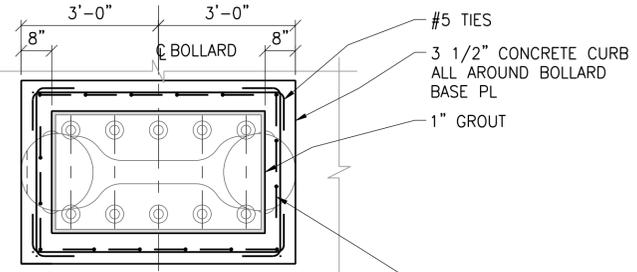
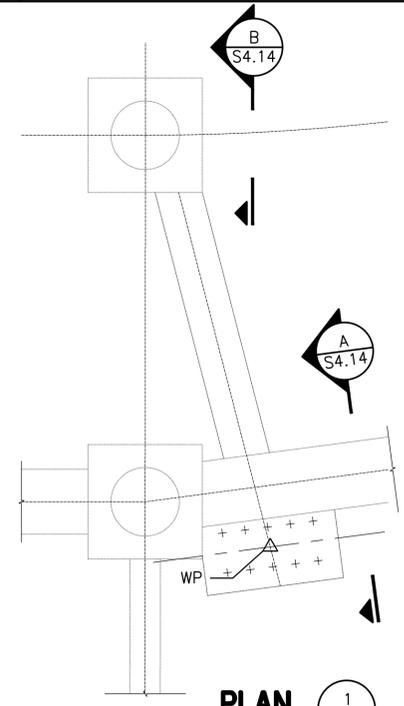
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FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
ALTERNATE BOLLARD  
SUPPORT DETAIL

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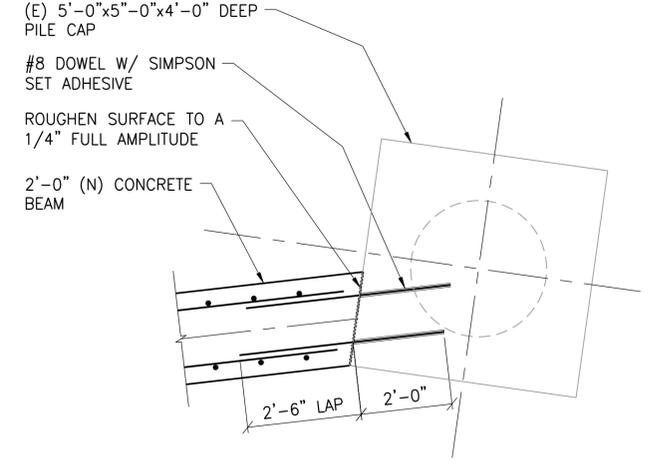
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Date 02/05/2010 Revision 1

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No. Revision	Date	By	Checked	Approved

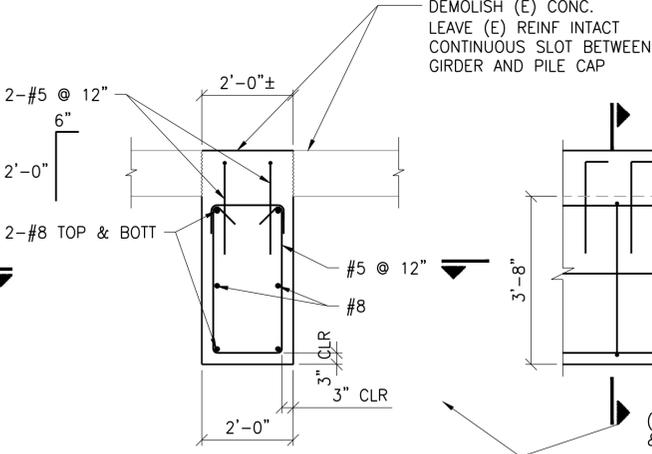
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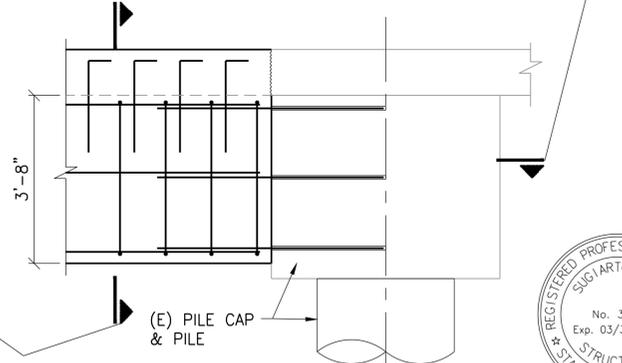
**SECTION A**  
1/2" - 1'-0"  
S4.14



**SECTION B**  
1/2" - 1'-0"  
S4.14



**SECTION C**  
1/2" - 1'-0"  
S4.14



**SECTION D**  
1/2" - 1'-0"  
S4.14



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FOR HONDA AUTOMOTIVE  
FACILITY PORT OF RICHMOND

BOLLARD 14 DETAILS

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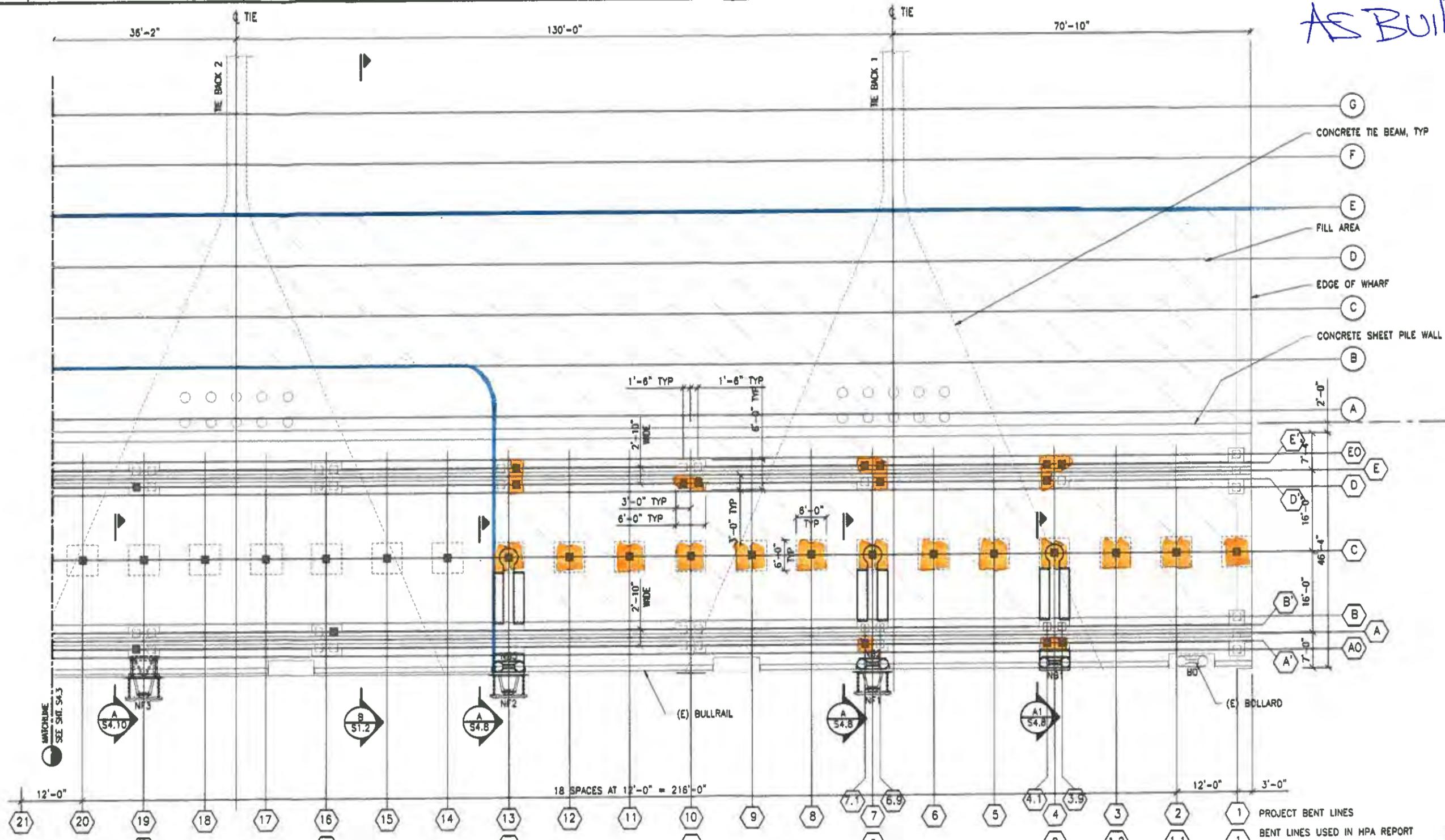
Date 6/11/10 Revision 0

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1					
2					

**APPENDIX B – VORTEX PILE REPAIR AS-BUILT DRAWINGS 2012**

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 1**  
1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA

- NOTES:**
- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
  - DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



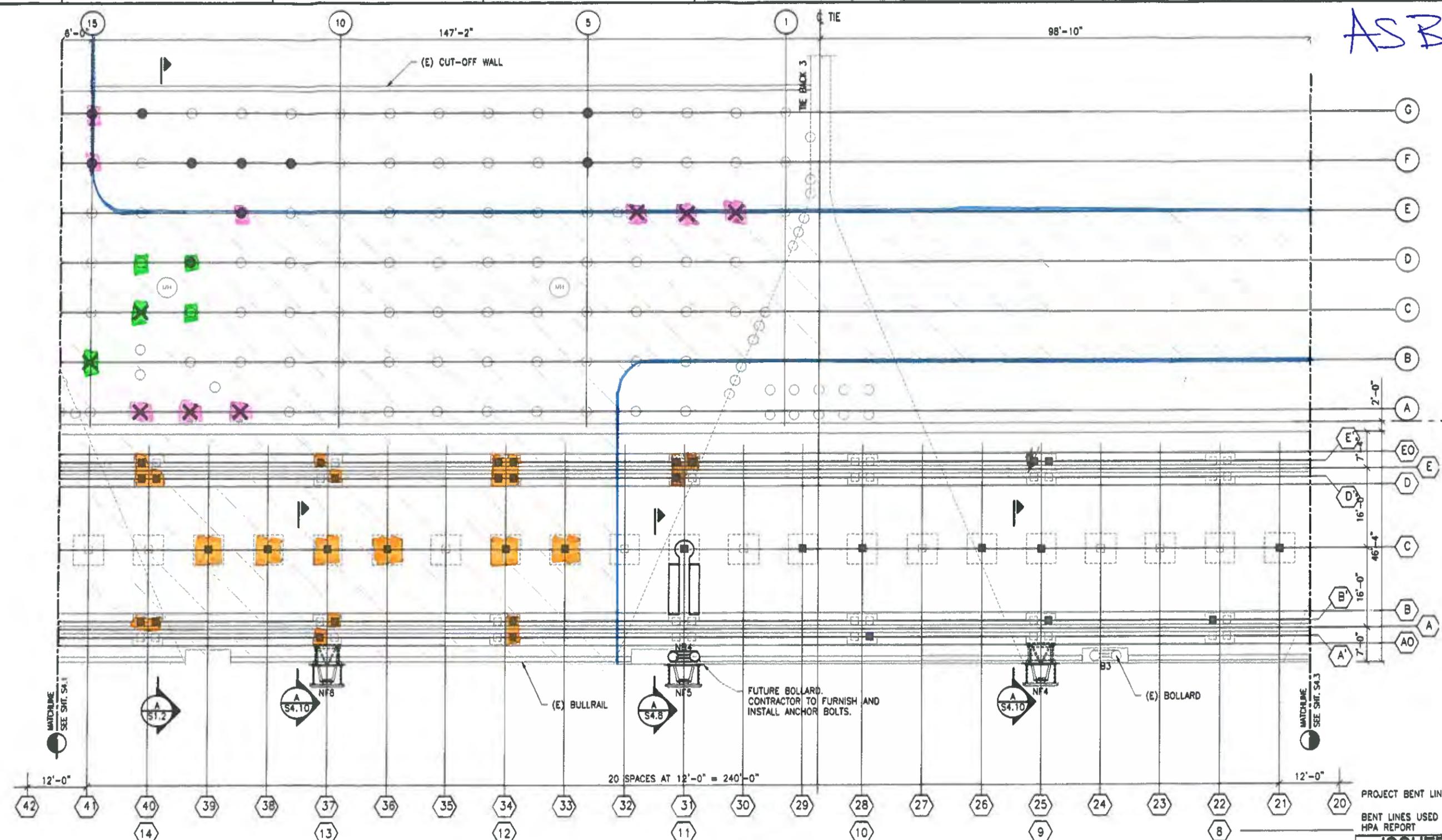
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**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 1**  
Project No. Z1800  
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AS BUILT



**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 2**  
1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA
- UNREPAIRED

- NOTES:**
- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
  - DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 2**

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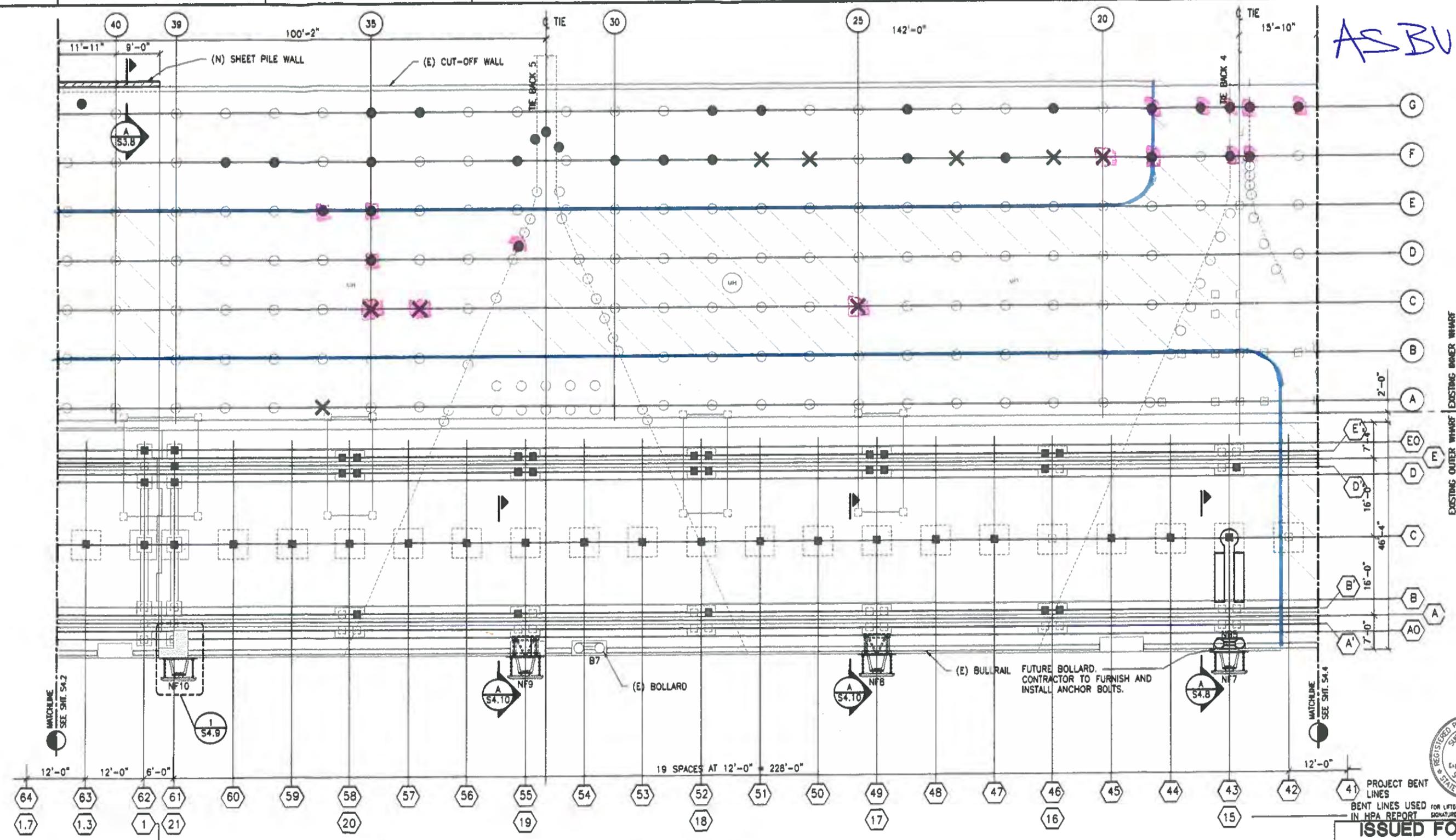
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REGISTERED PROFESSIONAL ENGINEER

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AS BUILT



**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE REPAIRED
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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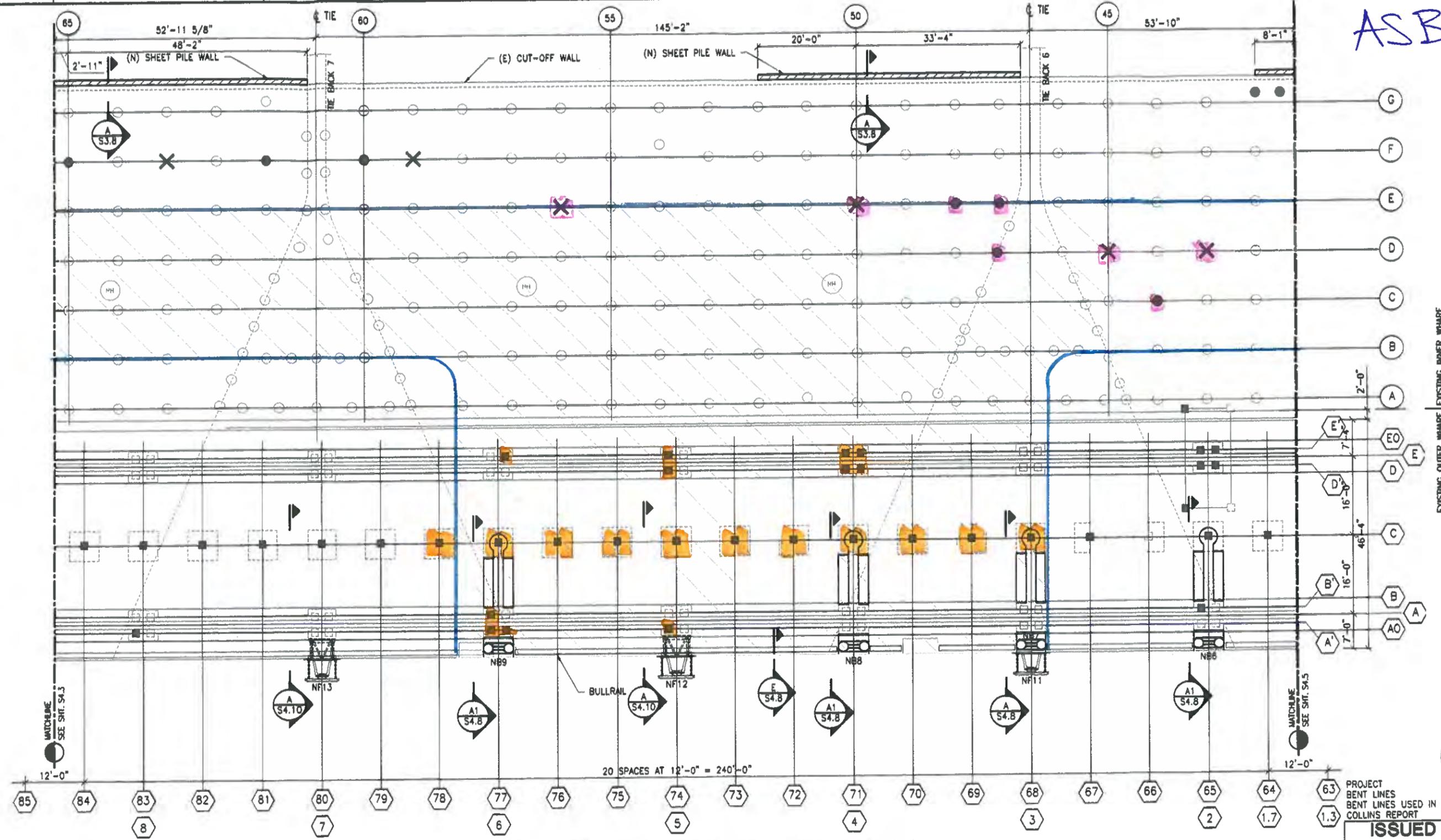
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 PORT OF RICHMOND  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 3**  
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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 4**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE REPAIRED
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA DELINEATED BLUE

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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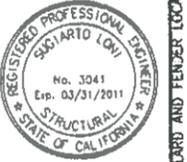
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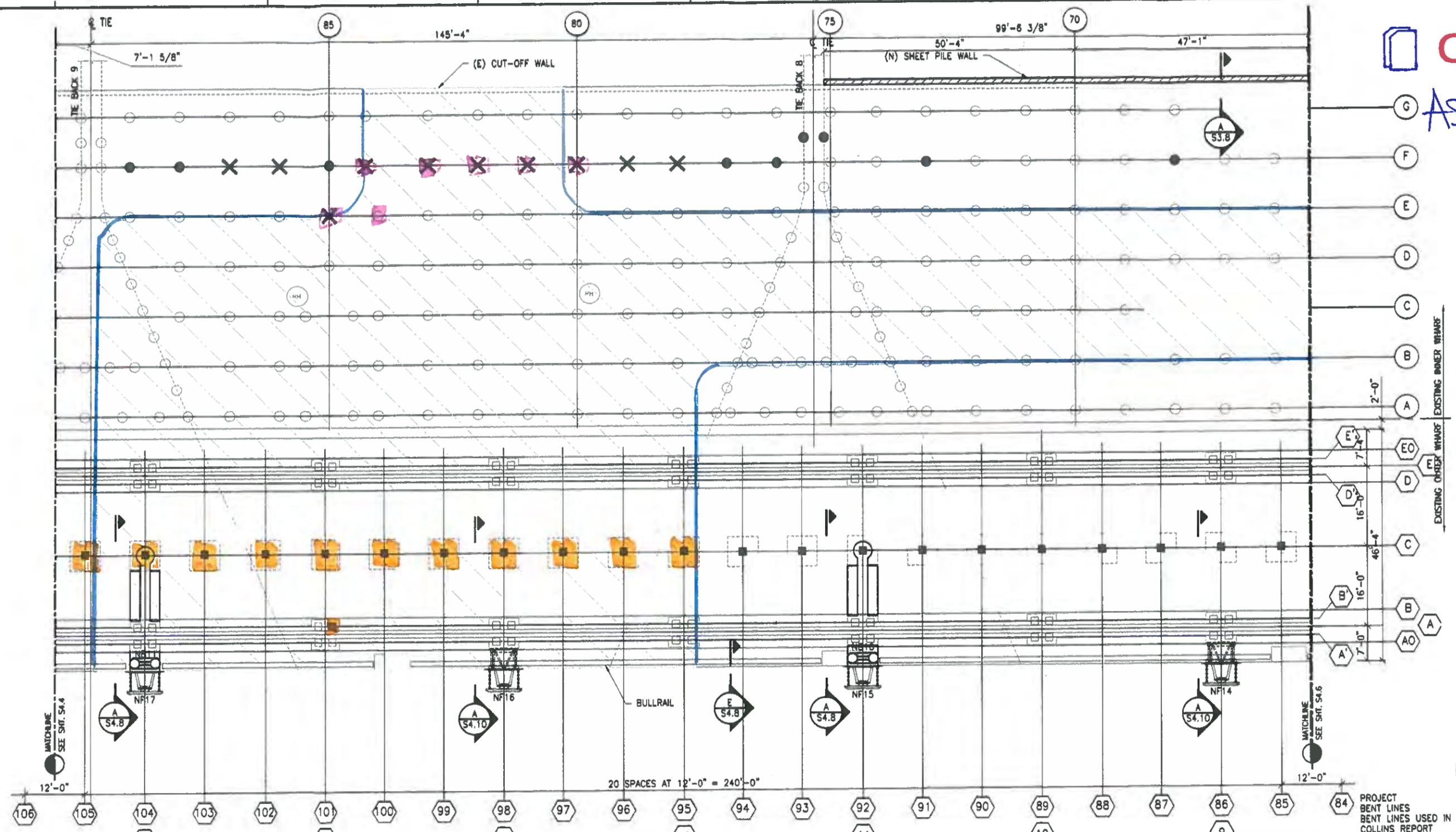
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 4**

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 5**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE **REPAIRED**
- CONCRETE PILE
- DAMAGED CONCRETE PILE **REPAIRED**
- TRAFFIC LOADING AREA **DELINEATED BLUE**

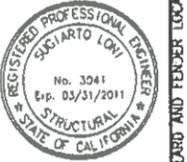
**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 5**  
Project No. Z1800  
By AH Checked TG/EGS Sheet No S4.5  
Approved SL of \_\_\_\_\_  
Date 01/25/10 Revision 1

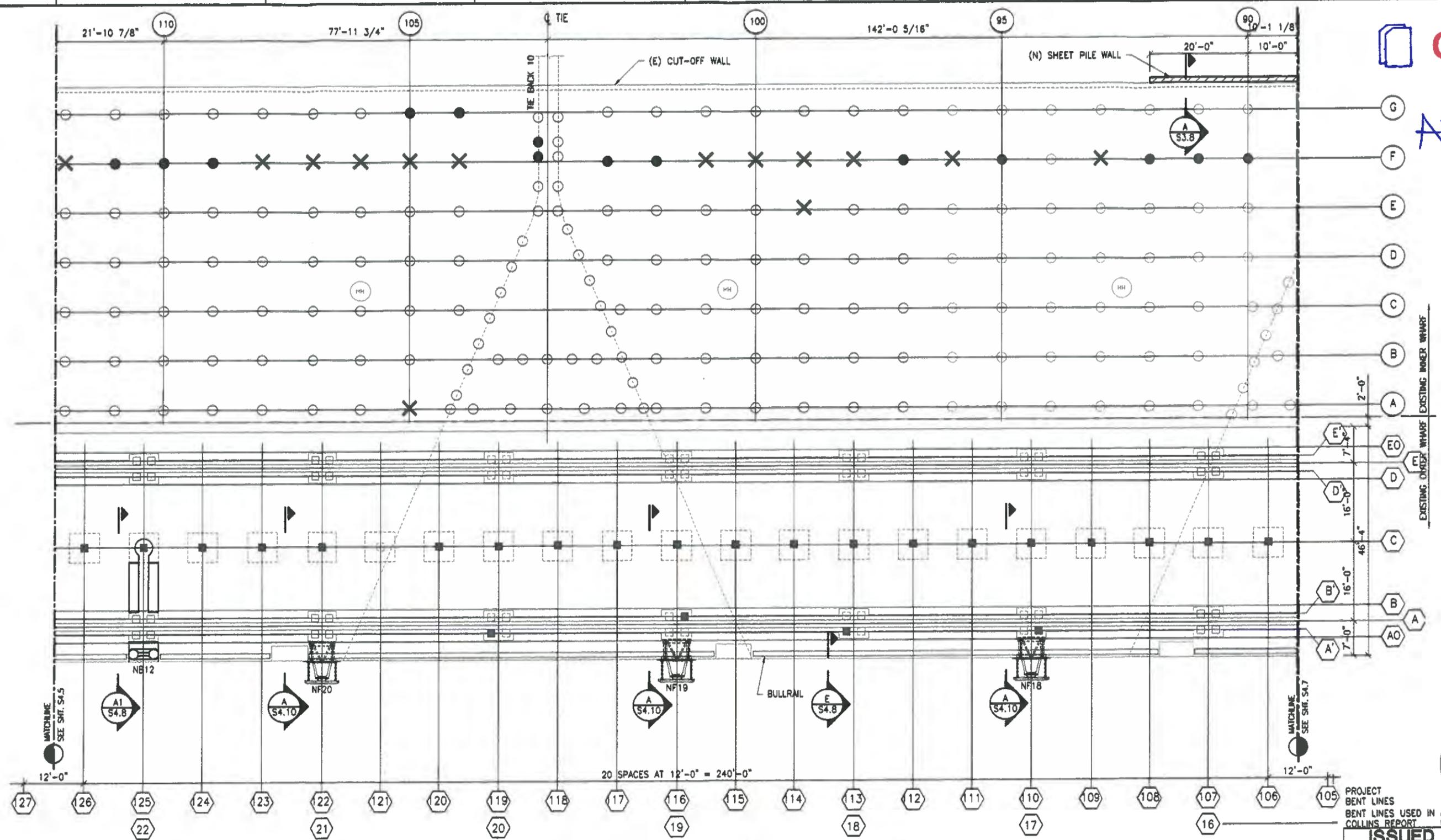


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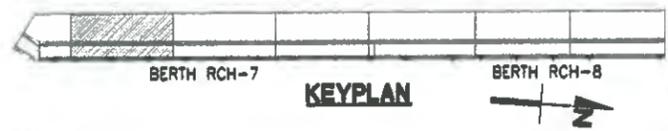
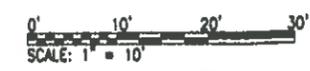


**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 6**  
 1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE
  - MISSING TIMBER PILE
  - CONCRETE PILE
  - DAMAGED CONCRETE PILE
  - TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



**PRINTED**  
 1/24/2012  
 LIFTECH CONSULTANTS INC  
**Liftech**  
 LIFTECH CONSULTANTS INC

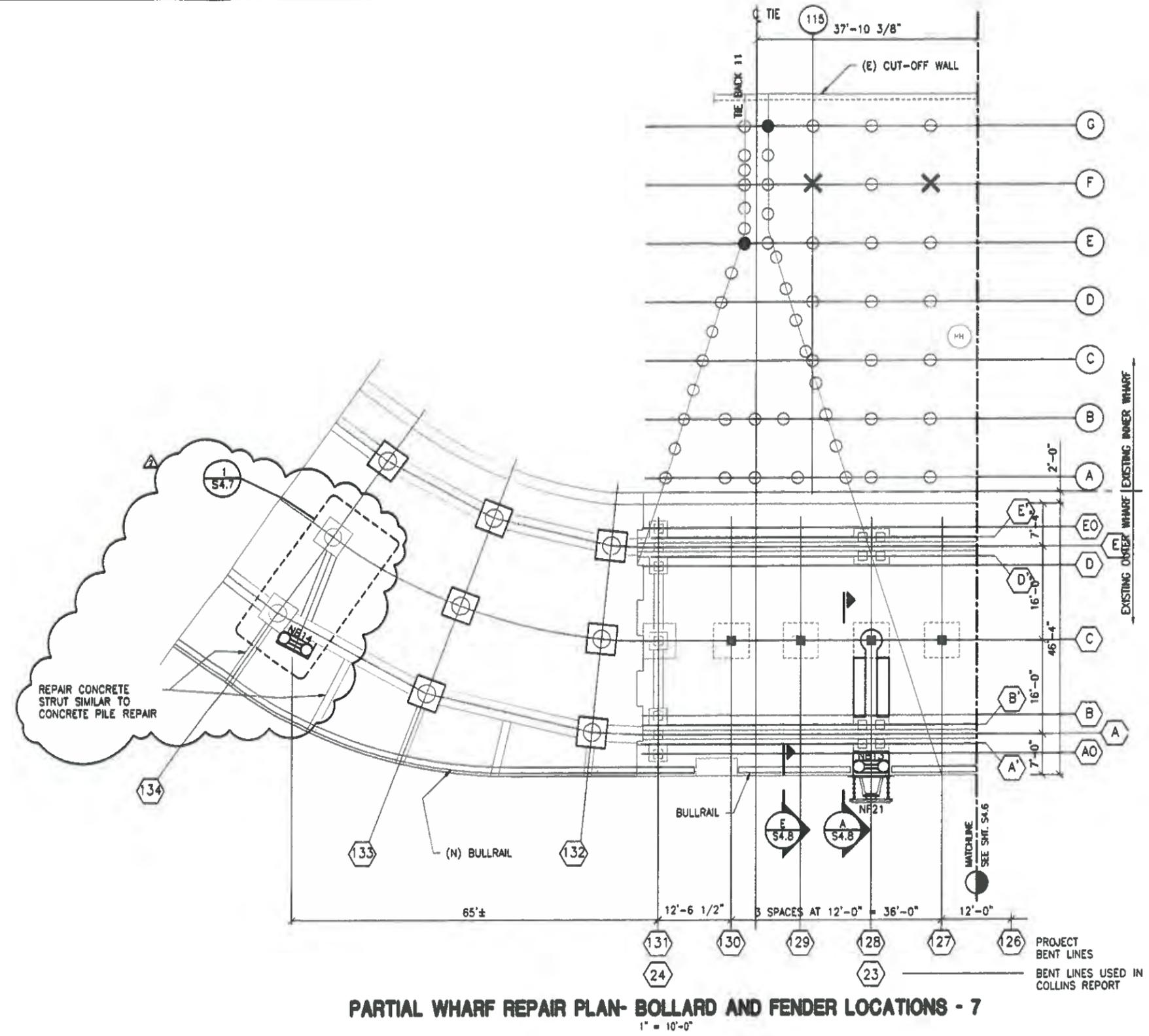
**ISSUED FOR CONSTRUCTION**  
 PROJECT BENT LINES BENT LINES USED IN COLLINS REPORT  
 REGISTERED PROFESSIONAL ENGINEER SANTIARTO LOWE No. 3041 Exp. 03/31/2011 STRUCTURAL STATE OF CALIFORNIA  
**POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND**  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 6**  
 Project No. Z1800  
 By AH Checked TG/EGS Sheet No S4.6  
 Approved SL of  
 Date 01/25/10 Revision 1

	ISSUED FOR CONSTRUCTION	3/18/10	AH	TG	SL
No	Revision	Date	By	Checked	Approved

Copyright © 2012 by Liftech Consultants Inc  
 A California Corporation. All rights reserved.  
 344 - 20th STREET SUITE 360, Oakland, CA 94612, 510 832-5606  
 Original border size 505 x 812 mm.

**COPY**

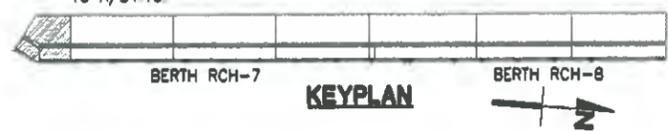
AS-BUILT



**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 7**  
 1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE
  - MISSING TIMBER PILE
  - CONCRETE PILE
  - DAMAGED CONCRETE PILE
  - TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



FOR LIFTECH CONSULTANTS INC  
 SIGNATURE DATE: \_\_\_\_\_

**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND

**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7**

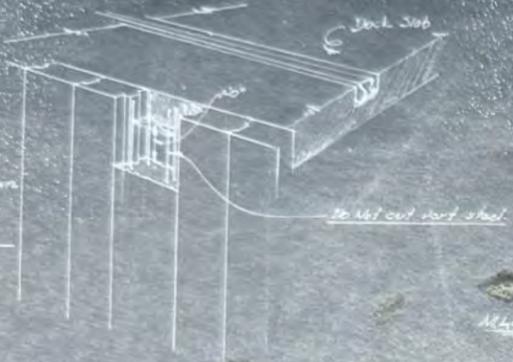
Project No. Z1800  
 By AH \_\_\_\_\_ Checked TG/EGS Sheet No. S4.7  
 Approved SL \_\_\_\_\_ of \_\_\_\_\_  
 Date 01/25/10 Revision 2

**PRINTED**  
 1/24/2012  
 LIFTECH CONSULTANTS INC  
**Liftech**  
 LIFTECH CONSULTANTS INC

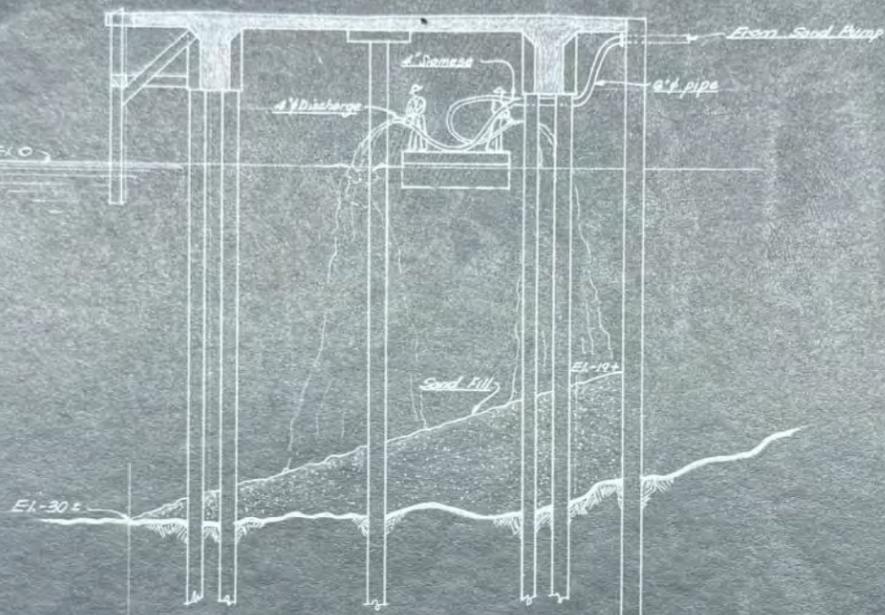
No	Revision	Date	By	Checked	Approved
1	BOLLARD NO. 14 SUPPORT	06/11/10	LMK/AH	TG	SL
2	ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL

**APPENDIX C – BERTHS 5–8 ORIGINAL DRAWINGS**

Notes: If this cut-out is shown, the 2" x 2" hole in the sheet piling must be made as shown. No work of 2" hole is to be made. The bottom of dock at this location when pipe is removed from sheet piling.



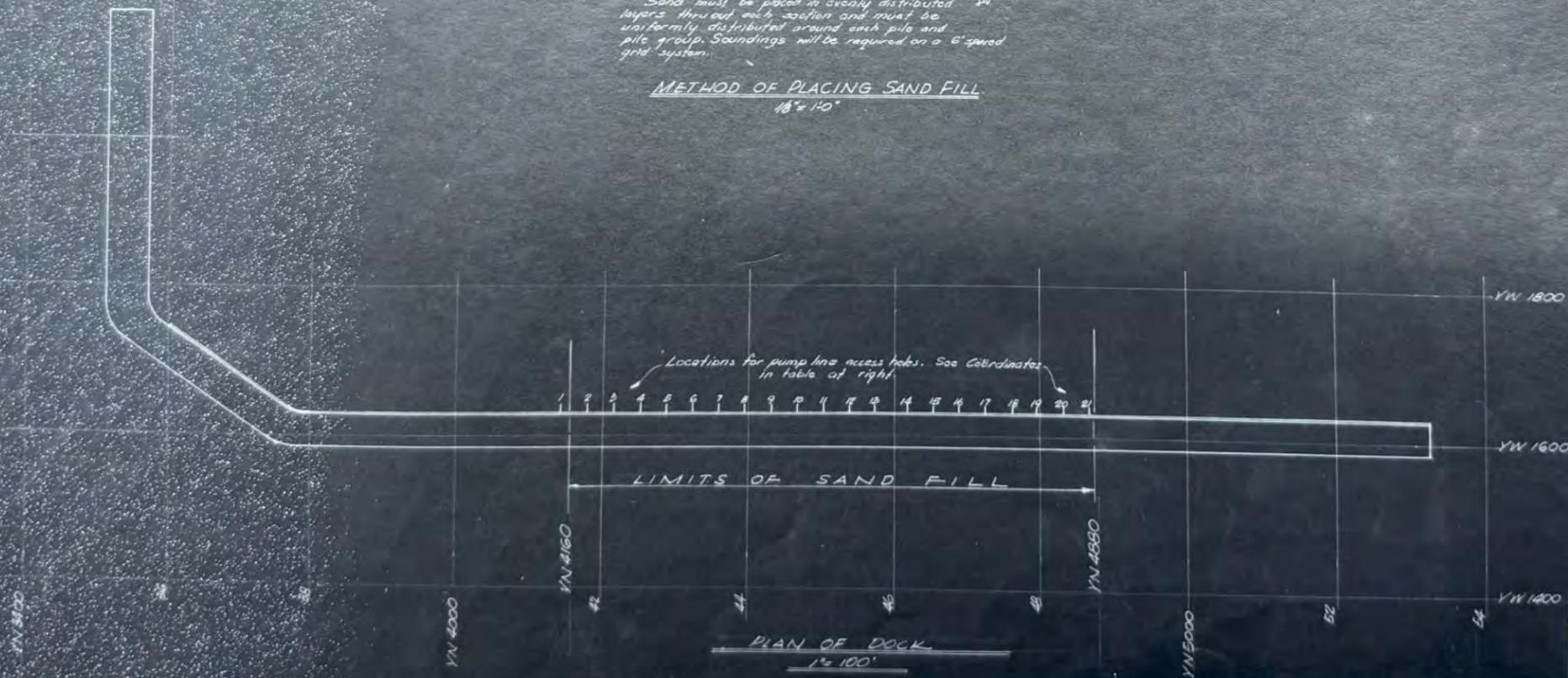
METHOD OF CHIPPING SHEET PILE FOR PUMP PIPE ACCESS HOLE  
ALTERNATE



Note: Sand must be placed in evenly distributed layers thru out each caisson and must be uniformly distributed around each pile and pile group. Soundings will be required on a 6" spaced grid system.

METHOD OF PLACING SAND FILL  
1/8" = 1'-0"

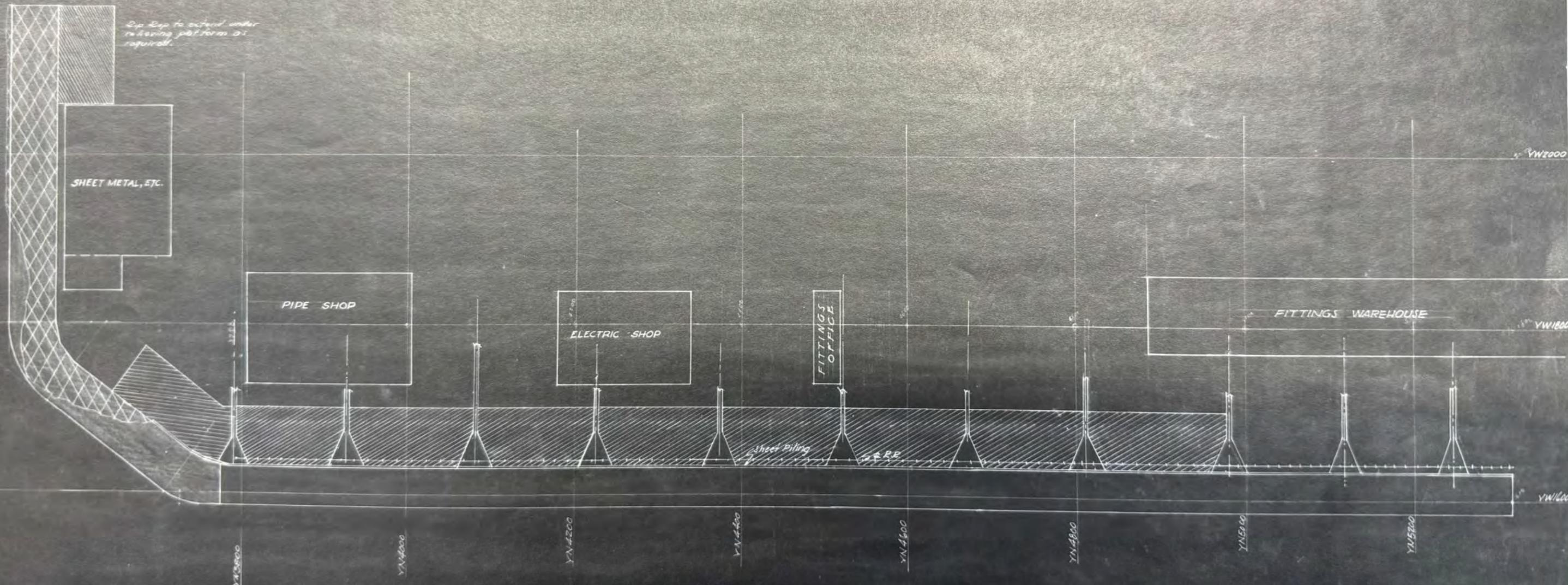
NOTE: In order to provide access for pump line it is suggested that one sheet pile be driven 1' below the bottom of the dock floor slab at the location desired. Should the pile be too tight for further driving the concrete may be chipped out as shown by sketch at extreme left.



Hole No.	NORTH COORDINATE
1	4143
2	4179
3	4215
4	4251
5	4287
6	4323
7	4359
8	4395
9	4431
10	4467
11	4503
12	4539
13	4575
14	4611
15	4647
16	4683
17	4719
18	4755
19	4791
20	4827
21	4863

If necessary to change location to hit 1/2 of pile move north as required.

REVISIONS				KAISER COMPANY, INC. RICHMOND, CALIFORNIA	
NO.	DATE	BY	OK		
				METHOD OF PLACING SAND FILL UNDER RT. DOCK	
	DATE 12-8-42			SUBMITTED	
	SCALE NOTE-DIV.			APPROVED	
	DRAWN BY BAL...			CHECKED BY	

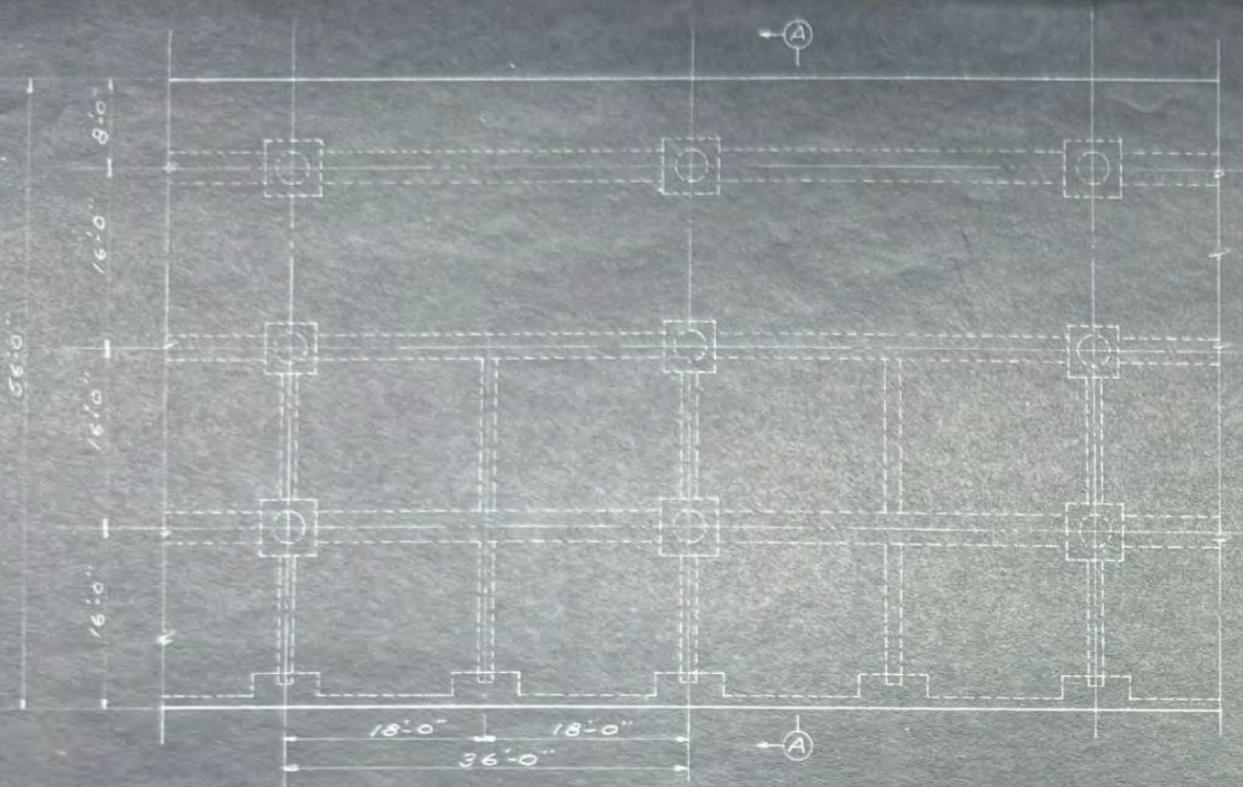


**PLAN OF RELIEVING PLATFORM**

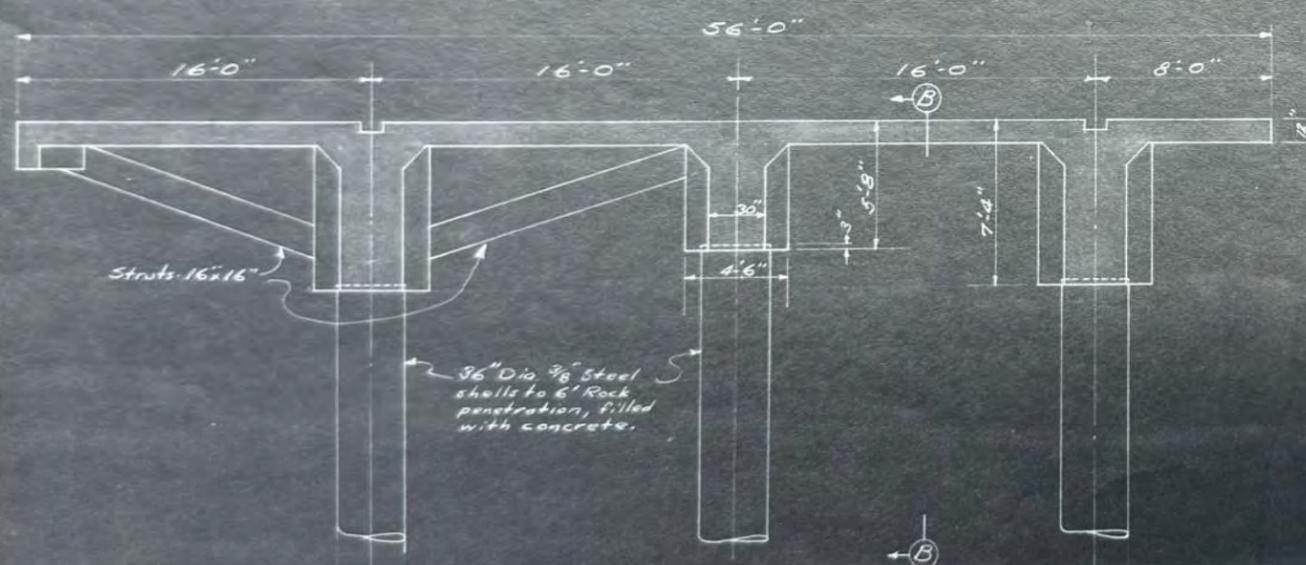
SCALE 1" = 60'-0"

- LEGEND**
- EXISTING STRUCTURE
  - DOCK TO BE BUILT
  - SUPPORTING SLAB
  - RIP RAP

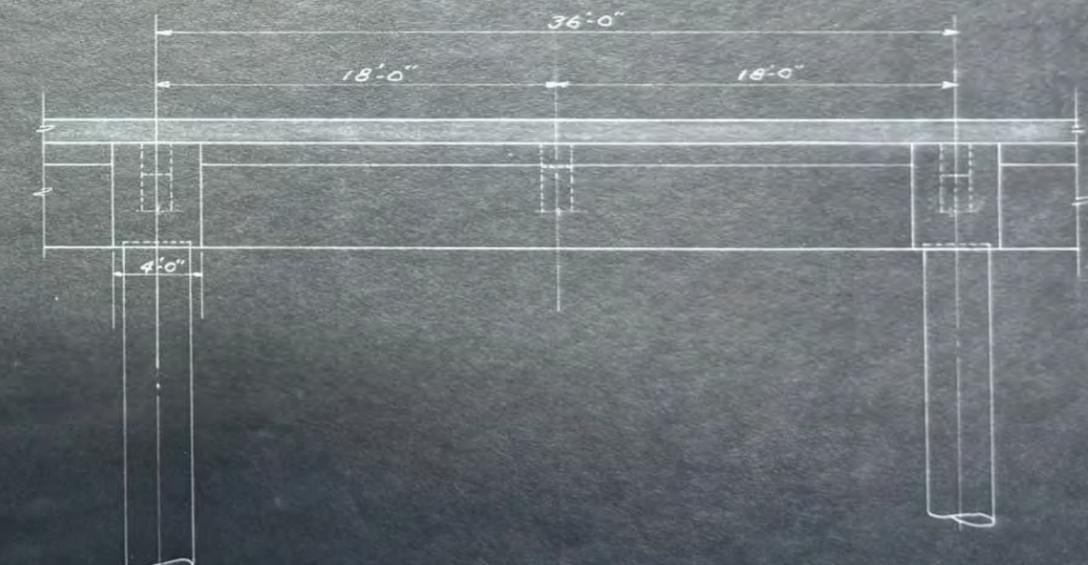
REVISIONS				KAISER COMPANY, INC.	
MK.	DATE	BY	OK	RICHMOND, CALIFORNIA	
				RELIEVING PLATFORM	
				FITTING-OUT DOCK AT	
				RICHMOND YARD NO. 3	
				DATE JAN 25, 1943	SUBMITTED
				SCALE 1" = 60'-0"	APPROVED



PLAN  
scale 1/8" = 1'-0"



SECTION A-A  
1/4" = 1'-0"



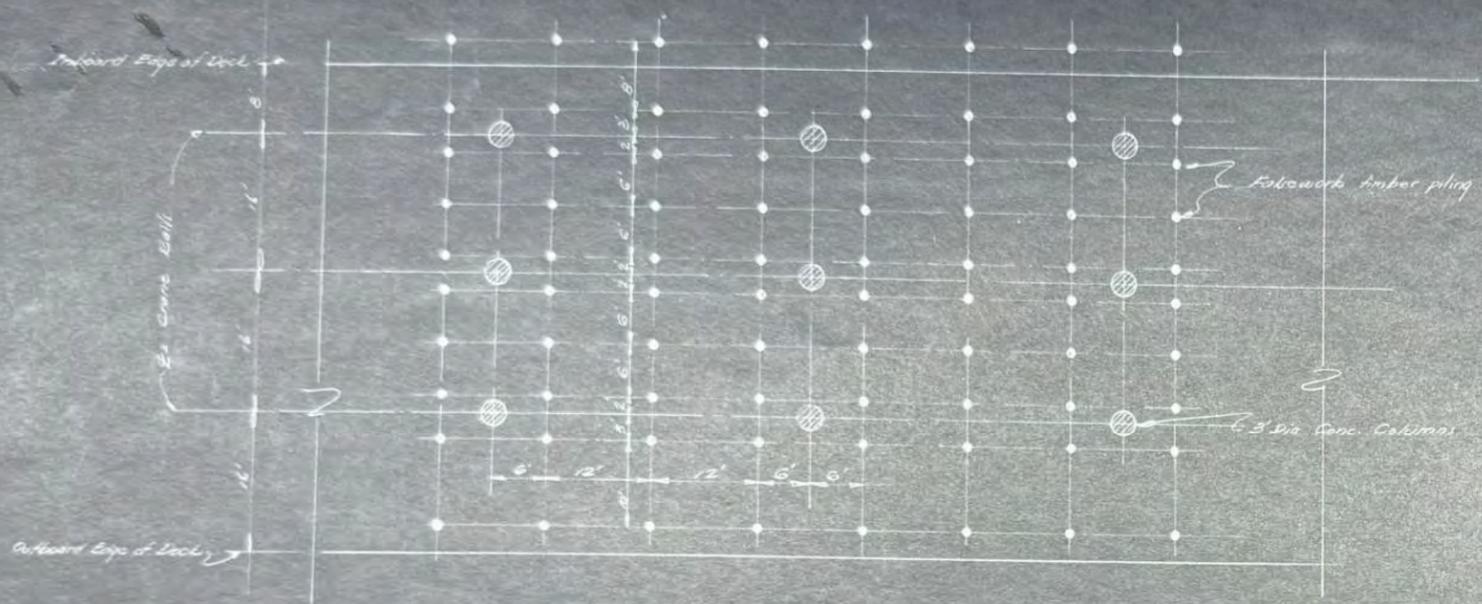
SECTION B-B  
1/4" = 1'-0"

REVISIONS				KAISER COMPANY, INC.	
NO.	DATE	BY	OK	RICHMOND, CALIFORNIA	
				FITTING OUT DOCK	
				SOUTH END	
				CYLINDER SCHEME DETAILS	
	DATE 2-10-43			SUBMITTED	
	SCALE Noted			APPROVED	
	DRAWN BY J. M. C.				

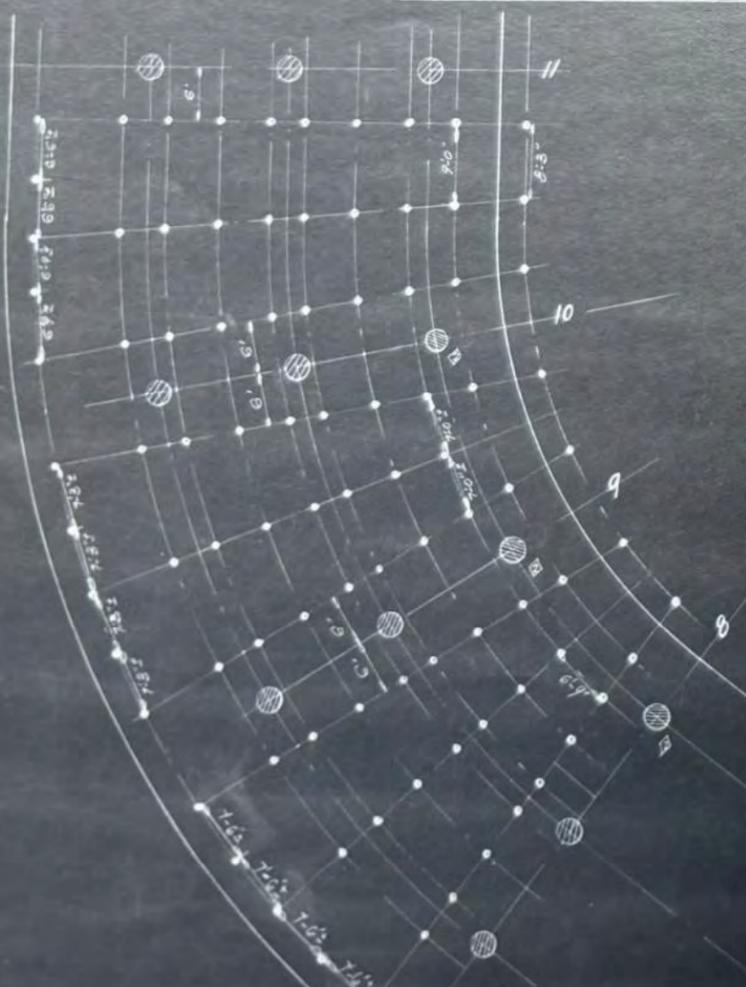


KANE CO INC.  
 F.O. DOCK  
 LAYOUT OF SOUTH CORNER  
 2-17-42

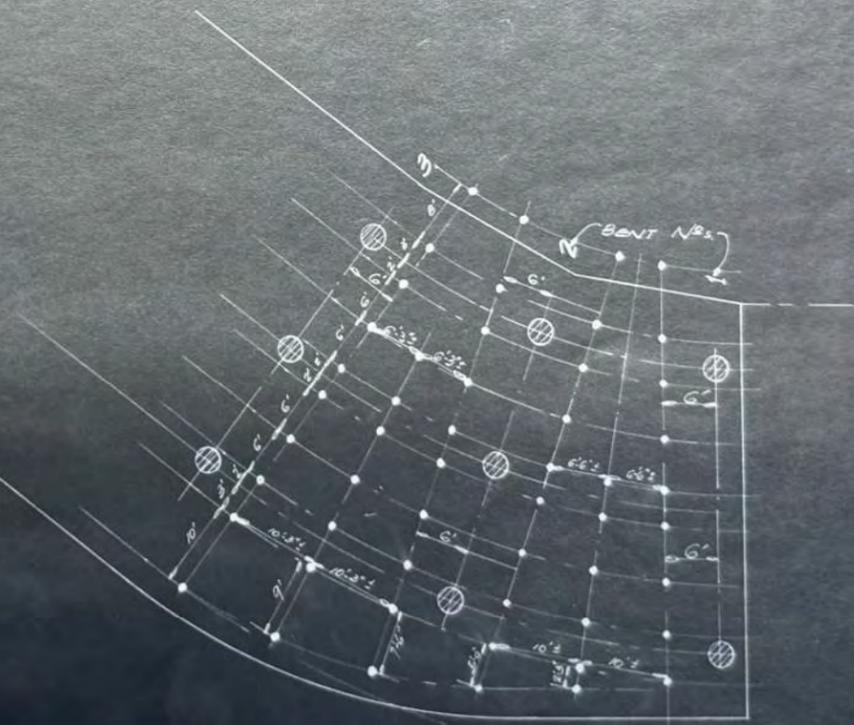
220-1-31



P L A N  
 1" = 10'-0"  
 TYPICAL FOR BENTS 3/6 INC & 10/6 21 INC.



P L A N  
 1" = 10'  
 FOR BENTS SHOWN



P L A N  
 1" = 10'  
 FOR BENTS SHOWN

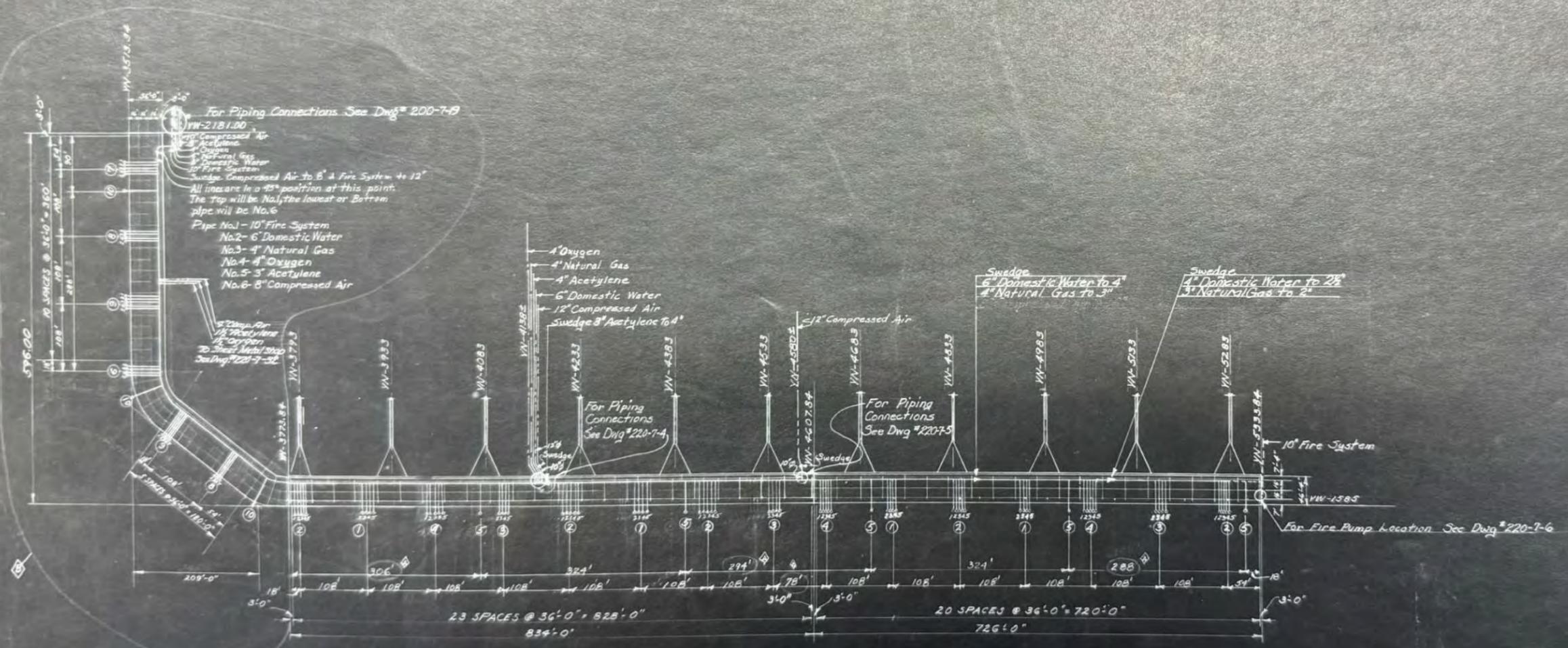
REVISIONS				KAISER COMPANY, INC.	
NO.	DATE	BY	OR	RICHMOND, CALIFORNIA	
1	2-27-42	W.C. R.	W.C. R.	F.O. DOCK	
2	3-5-42	W.C. R.	W.C. R.	PILE LAYOUT & FALSEWORK	
				DATE 2-22-42	SUBMITTED
				SCALE 1/2" = 10'	APPROVED
				DRAWN BY W.C. R.	200-1-33





**LEGEND**

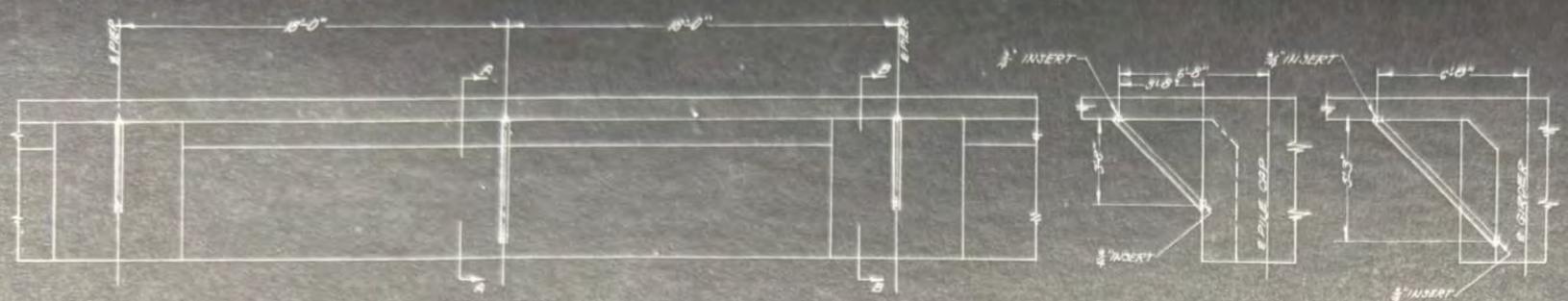
- Acetylene -----
- Oxygen -----
- Natural Gas -----
- Compressed Air -----
- Domestic Water -----
- Fire System -----



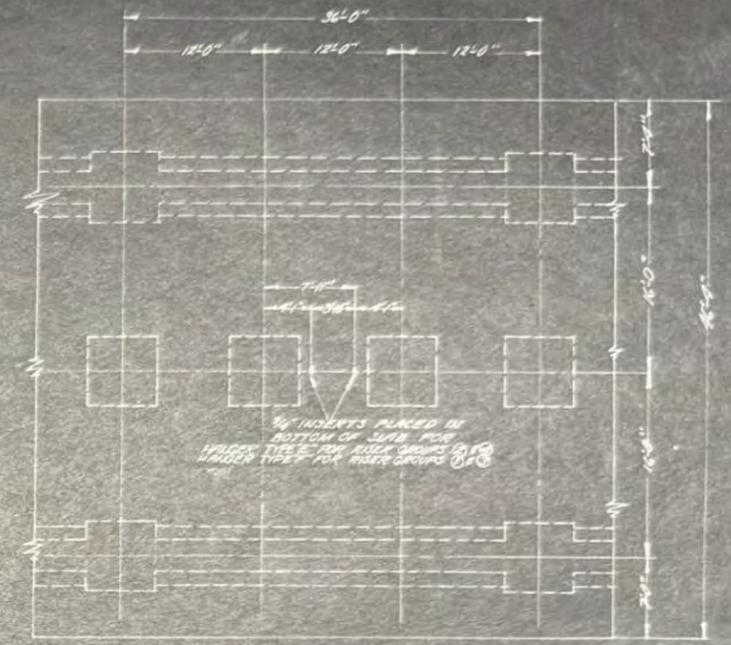
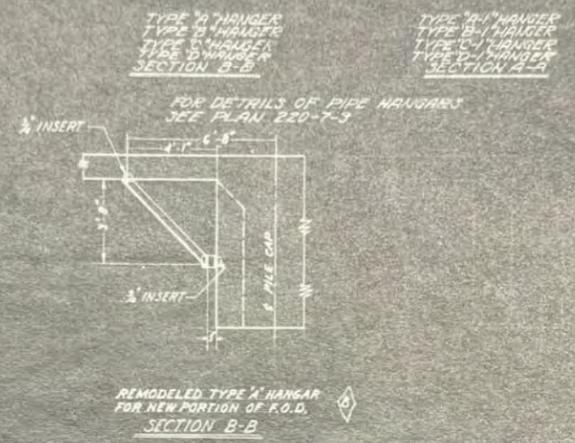
Pipe No	RISERS				
	① W-4083	② W-4283	③ W-4553	④ W-4683	⑤ W-4853
1	2 1/2" Domestic Water	4" Fire System			
2	1" Natural Gas	1" Natural Gas	2" Natural Gas	2" Natural Gas	
3	1" Oxygen	1" Oxygen	1" Oxygen	1" Oxygen	
4	1" Acetylene	1" Acetylene	1" Acetylene	1" Acetylene	
5	2 1/2" Compressed Air				

**NOTE**  
DO NOT SCALE

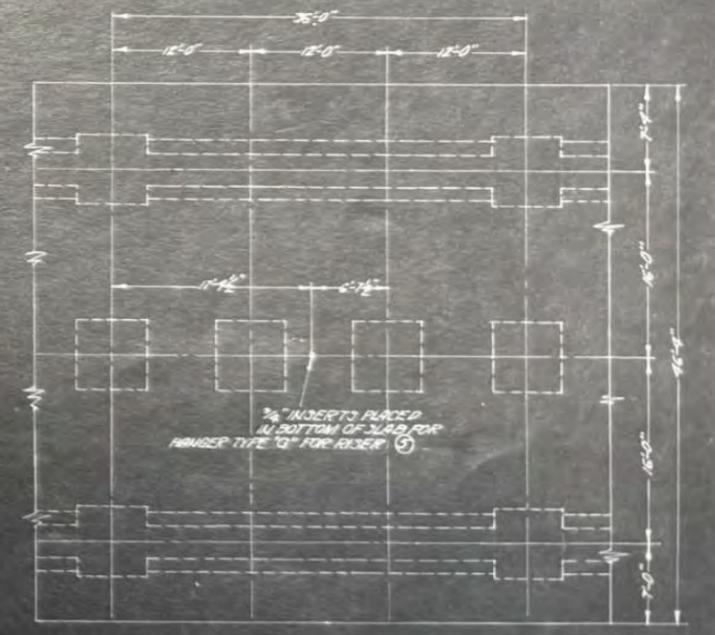
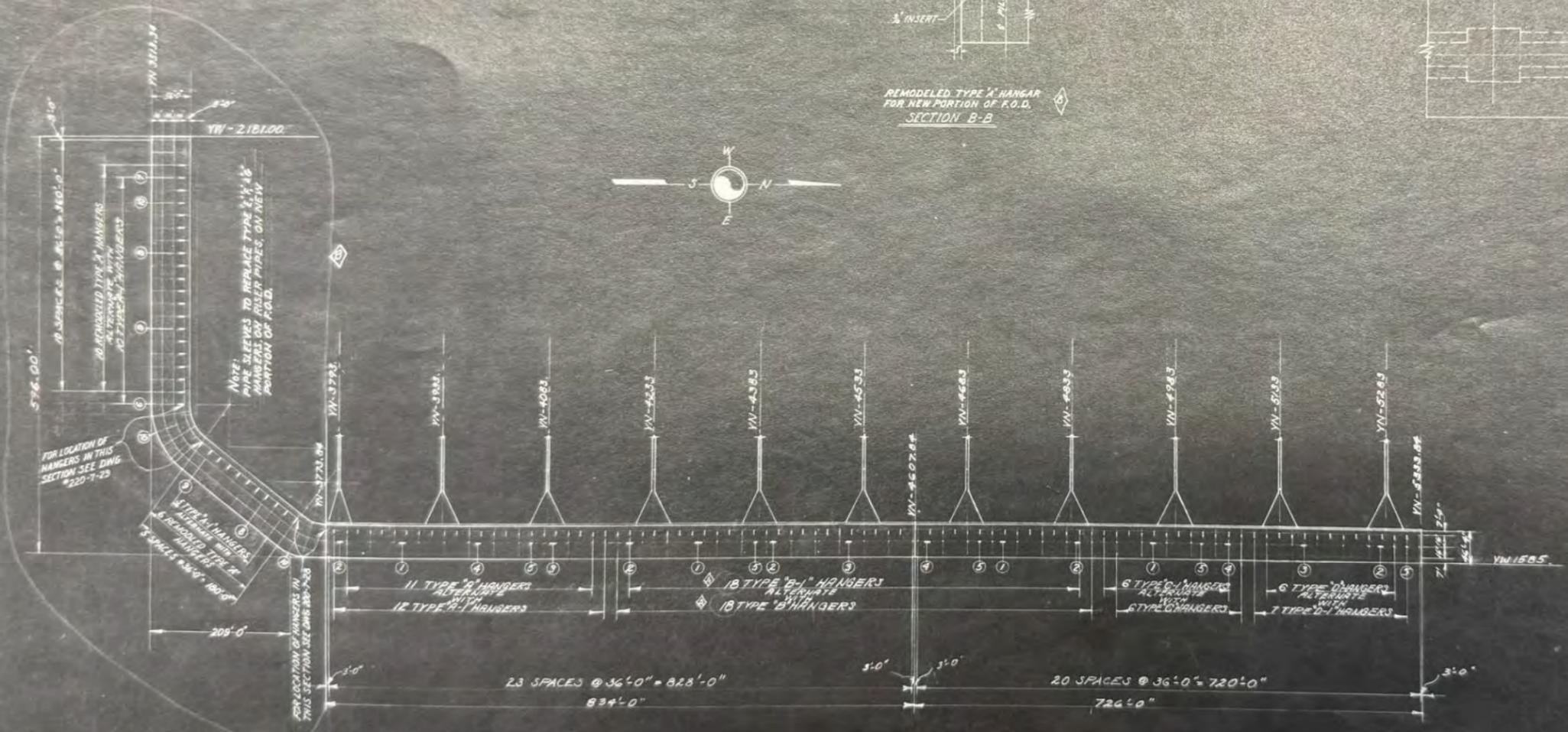
REVISIONS				KAISER COMPANY, INC.	
MK.	DATE	BY	OK	RICHMOND, CALIFORNIA	
A	9/17/42	[Signature]	[Signature]	FITTING OUT DOCK PIPING LAYOUT	
1	3/26-43	[Signature]	[Signature]		
				DATE 9/10/42	SUBMITTED BY [Signature]
				SCALE 1"=100'	APPROVED [Signature]
				DRAWN BY [Signature]	220-7-1



SCALE: 1/4"=1'-0"  
TYPICAL LOCATION OF PIPE HANGERS  
ELEVATION



PLAN



PLAN

FOR DETAILS OF TRANSVERSE PIPE HANGERS SEE PLAN 220-7-13

SCALE: 1"=100'  
FITTING OUT DOCK

NOTE  
DO NOT SCALE

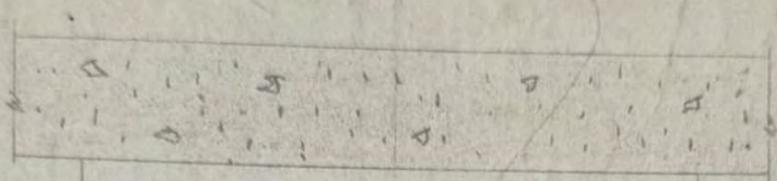
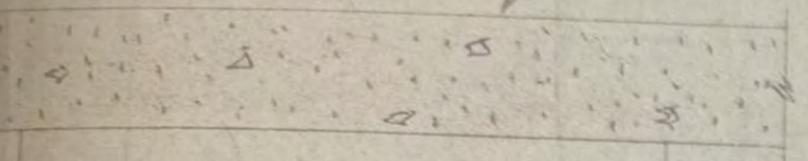
REVISIONS				KAISER COMPANY, INC.	
NO.	DATE	BY	CHK	RICHMOND, CALIFORNIA	
A	9/17/42	W.H.	W.H.	FITTING OUT DOCK.	
B	3/22/43	W.H.	W.H.	LOCATION OF PIPE HANGERS	
				DATE 9-14-42	SUBMITTED
				SCALE AS SHOWN	APPROVED
				DRAWN BY	220-7-2



EXISTING SLAB

Note: Apply a coating of neat cement grout between concrete & plate surface before bolts are tightened.

A



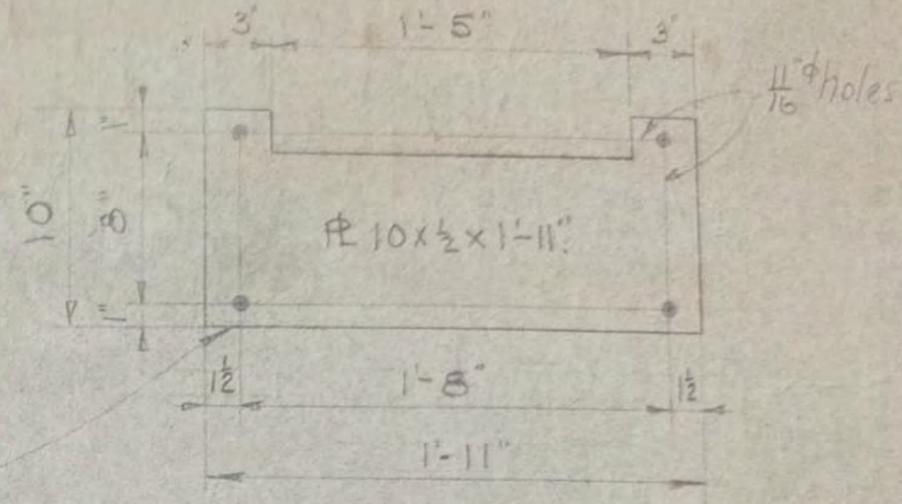
$\frac{5}{8}$ "  $\phi$  Anchors

$\frac{1}{2}$ "  $\phi$  Steel - 1x6x12 wedges  
Steel - 1x6x8  $\phi$

6"x8"x4'-2" pads

Exist. Pile

$\frac{3}{4}$ "  $\phi$  Bolts  
4" S.R.



PLAN  
2 Req. Each Pile  
1 1/2" = 1'-0"

7"  
9"  
9"  
9"  
9"  
9"  
7"

To give  
on S.R.

TYPICAL ELEVATION

1" = 1'-0"

SECTION A-A

REVISIONS			
MK.	DATE	BY	OK

**KAISER COMPANY, INC.**  
RICHMOND, CALIFORNIA

FITTING OUT DOCK  
YARD #3  
SHIM FOR SUBSIDING PILES

DATE 6-2-44  
SCALE shown  
DRAWN BY F.B.C.  
CHECKED BY

SUBMITTED to Bureau  
APPROVED Bernal  
220-414

# COMPARATIVE AREAS AND COSTS

No.	BUILDING	ESTIMATE JANUARY-42			ESTIMATE FEB. 22-42			ESTIMATE APRIL 15-42			AREA CONSTRUCTED	ACTUAL COST	COST per SQ. FT.
		SQ. FT.	EST. COST	COST per SQ. FT.	SQ. FT.	EST. COST	COST per SQ. FT.	SQ. FT.	EST. COST	COST per SQ. FT.			
301	ADMINISTRATION	14,250.	\$101,000.	\$7.09	23,750.	\$168,355.	\$7.09	36,280.	\$220,000.	\$6.06	36,280.	\$225,157.	\$6.21
302	CHECK STATION & GUARD	6,630.	\$12,475.	\$1.88	11,050.	\$20,800.	\$1.88	3,958.	\$20,800.	\$5.26	3,504.	\$62,801.	\$17.92
303	PLATE SHOP	95,325.	\$484,714.	\$5.08	158,875.	\$672,186.	\$4.23	214,640.	\$672,186.	\$3.13	216,400.	\$831,272.	\$3.84.
304	MACHINE SHOP	23,925.	\$164,368.	\$6.87	39,875.	\$273,944.	\$6.87	46,475.	\$284,044.	\$6.11	44,260.	\$283,080.	\$6.40
305	FORGE SHOP	1,575.	\$11,000.	\$6.98	2,625.	\$18,329.	\$6.98	5,000.	\$26,350.	\$5.27	5,000.	\$66,567.	\$13.31
306	PAINT & SHEET MT & RIGGERS LOFT	16,400.	\$26,000.	\$1.58	27,388.	\$43,471.	\$1.59	26,560.	\$43,471.	\$1.64	26,240.	\$109,590.	\$4.18
307	YARD OFFICE	2,375.	\$20,000.	\$8.42	3,958.	\$33,333.	\$8.42	10,414.	\$41,633.	\$4.00	10,414.	\$77,711.	\$7.46
308	MAINTENANCE	NONE	—	—	1,000.	\$6,760.	\$6.76	3,225.	\$12,510.	\$3.88	3,225.	\$22,562.	\$7.00
309	FIRST AID	1,200.	\$10,000.	\$8.33	2,000.	\$16,667.	\$8.33	4,434.	\$30,000.	\$6.77	4,443.	\$41,405.	\$9.32
310	SWITCH HOUSE	400.	\$3,011.	\$7.53	443.	\$3,331.	\$7.52	429.	\$3,331.	\$7.76	432.	\$13,599.	\$31.48
311	ACETYLENE	1,273.	\$9,076.	\$7.13	2,530.	\$18,054.	\$7.13	1,517.	\$18,054.	\$11.90	1,500.	\$37,635.	\$25.09
12 314	PIPE SHOP	5,850.	\$21,000.	\$3.59	9,750.	\$35,040.	\$3.59	27,400.	\$78,000.	\$2.85	28,800.	\$149,875.	\$5.20
14 316	FITTINGS OFFICE	NONE	—	—	1,600.	\$9,600.	\$6.00	3,200.	\$9,600.	\$3.00	AS DESIGNED 4,320.	NOT BUILT	
15 317	COMPRESSOR	1,750.	\$6,000.	\$3.42	3,500.	\$12,000.	\$3.43	5,105.	\$35,550.	\$6.57	5,066.	\$83,358	\$16.45
16 318	MAINTENANCE GARAGE	NONE	—	—	2,200.	\$16,300.	\$7.40	4,985.	\$16,300	\$3.27	4,985.	\$36,887	\$7.40
23 319	CAFETERIA	NONE	—	—	6,276.	\$30,000.	\$4.78	AS DESIGNED 6,276.	\$30,000.	\$4.78	AS DESIGNED 6,276.	NOT BUILT	
24 350	GENERAL WAREHOUSE	112,000.	\$335,464.	\$3.00	146,000.	\$437,464.	\$3.00	146,926.	\$475,697.	\$3.24	146,926.	\$507,081.	\$3.45
25 351	FITTINGS WAREHOUSE	22,800.	\$63,250.	\$2.77	22,800.	\$63,250.	\$2.77	58,320.	\$200,418.	\$3.44	58,320	\$200,554.	\$3.44
	352 BRICK & INSULATION STORAGE										4,000.	\$12,080.	\$3.02
	355-57 WELDING & BURNER SCHOOL		\$62,438.			\$104,063.			\$104,063.		10,078.	\$30,435	\$3.02
	MISC. BUILDINGS										30,774.		

<b>REVISIONS</b>				<b>KAISER COMPANY, INC.</b>	
				RICHMOND, CALIFORNIA	
MK.	DATE	BY	OK	COMPARATIVE AREAS AND COSTS	
				DATE <u>July 18-42</u> SUBMITTED	
				SCALE APPROVED <u>E.T. LARSEN</u>	
				DRAWN BY <u>Cerruti</u>	
				CHECKED BY	

**APPENDIX D – BERTHS 7–8 AND PART OF 6 INNER WHARF DOCUMENTATION  
PHOTOGRAPHS**







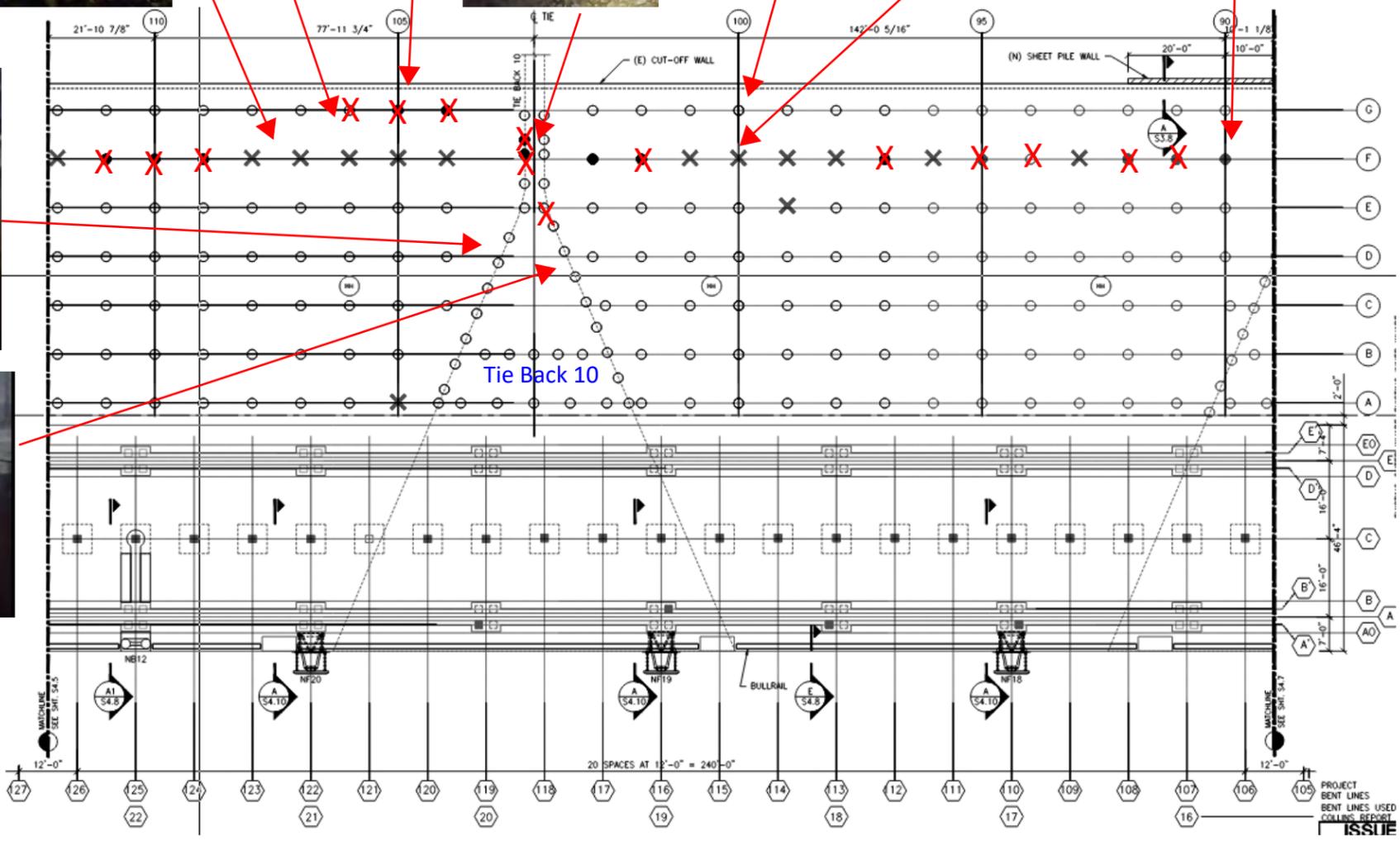
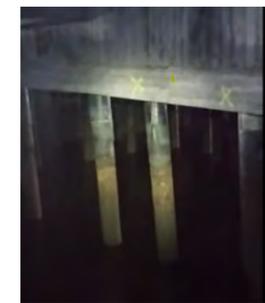
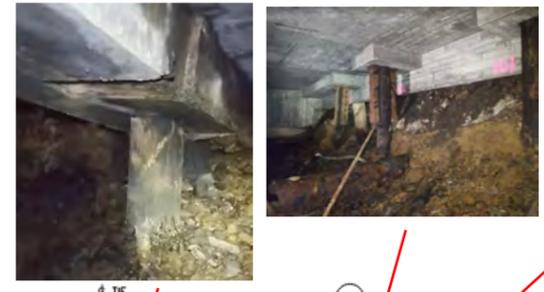






# Port of Richmond - Berths 7 & 8 Inner Wharf

Original border size 525 x 812 mm.  
340134arfr:SPRE:STRE:WHT:ES:RIB: 120007008:Ma:08/06/08:39600297150009332-5606  
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**LEGEND**

	(N) BOLLARD		MISSING TIMBER PILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**PRELIMINARY  
NOT FOR CONSTRUCTION**

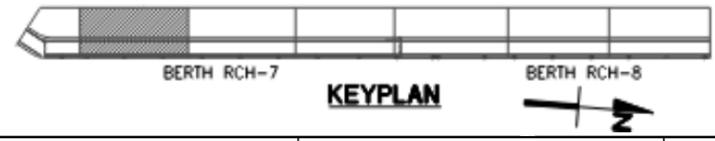
**Liftech**  
LIFTECH CONSULTANTS INC.  
344 20th Street, Suite 360  
Oakland, Ca 94612  
Ph: (510) 832-5606

**PORT OF RICHMOND  
WHARF INSPECTION**

Berths 7 & 8  
Inner Wharf Condition

Project No. 2525  
By TBS Checked SL Sheet No. 7  
Approved SL of 8  
Date 05/12/25 Revision ##

REVISION	##/##/##	XX	XX	XX
No.	Revision	Date	By	Checked Approved



1 2 3 4 5 6 7 8

# Port of Richmond - Berths 6 & 7 Inner Wharf

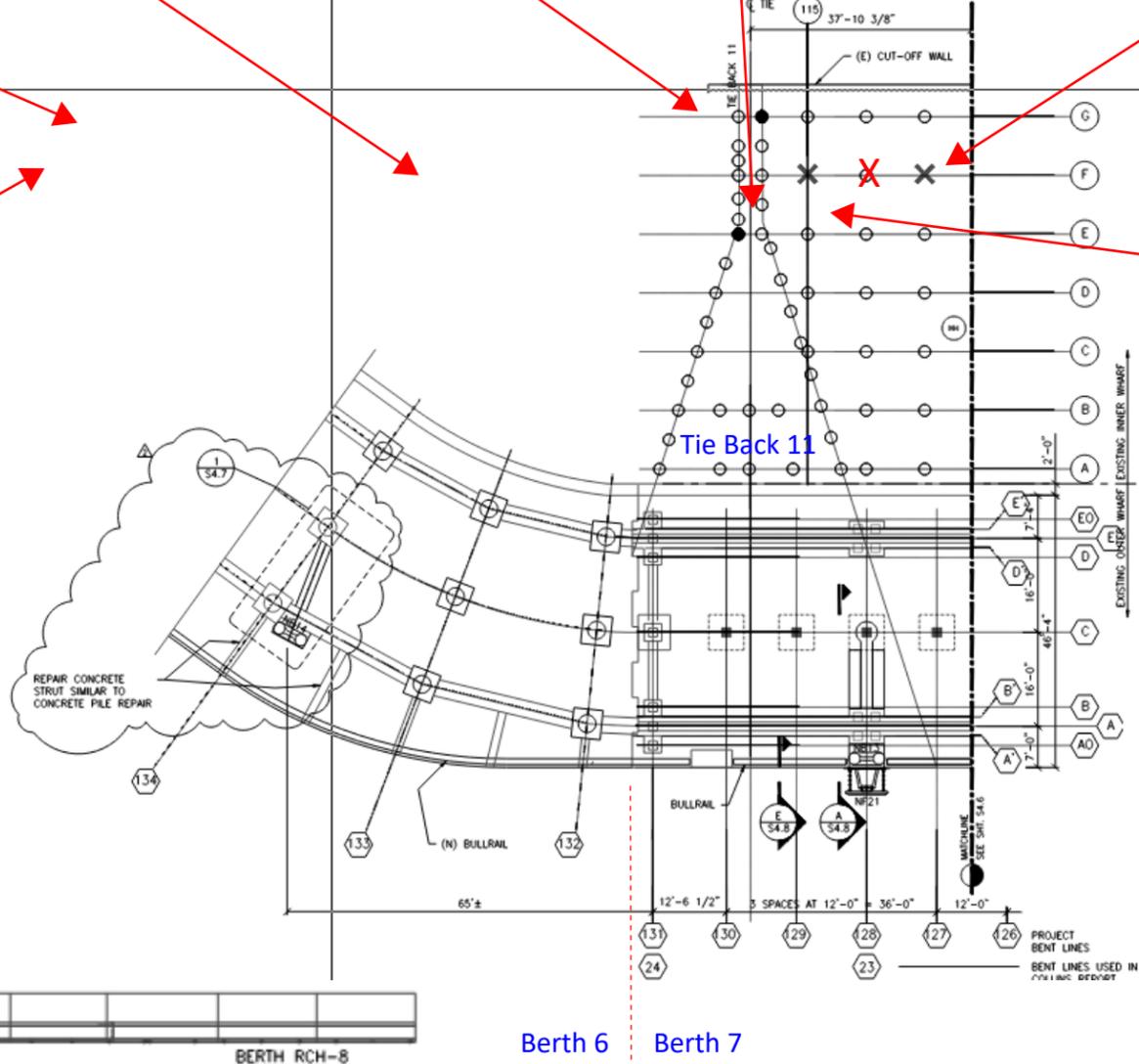
Original border size 525 x 812 mm.  
3401.2441.50RE STRUT ES RB 1.000.000 (A) 08/08/2025 09:00:00 0532-5606  
A California Corporation All rights reserved  
Copyright © 2025 by Liftech Consultants Inc.



Space behind cracked beam



**Note:**  
1. See Appendix G for additional photos of Berths 5-6.



<b>LIFTECH CONSULTANTS INC.</b>	
Job No. 2525	
Project P/Richmond wharf Inspection	
By TBS ChkdSL	Approved SL
Date 05/08/2025	Sheet 8 of 8
Note 1	

	(N) BOLLARD		MISSING TIMBER FILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**PRELIMINARY NOT FOR CONSTRUCTION**

**Liftech**  
LIFTECH CONSULTANTS INC.  
344 20th Street, Suite 360  
Oakland, Ca 94612  
Ph: (510) 832-5606

**PORT OF RICHMOND INNER WHARF CONDITION**

**Berths 6 & 7 Inner Wharf Condition**

Project No.	2525
By	TBS Checked SL Sheet No. 8
Approved	SL of 8
Date	05/12/25 Revision ##

REVISION	##/##/##	XX	XX	XX
No. Revision	Date	By	Checked	Approved

**APPENDIX E – BERTHS 7-8 OUTER WHARF SOFFIT DOCUMENTATION PHOTOGRAPHS**

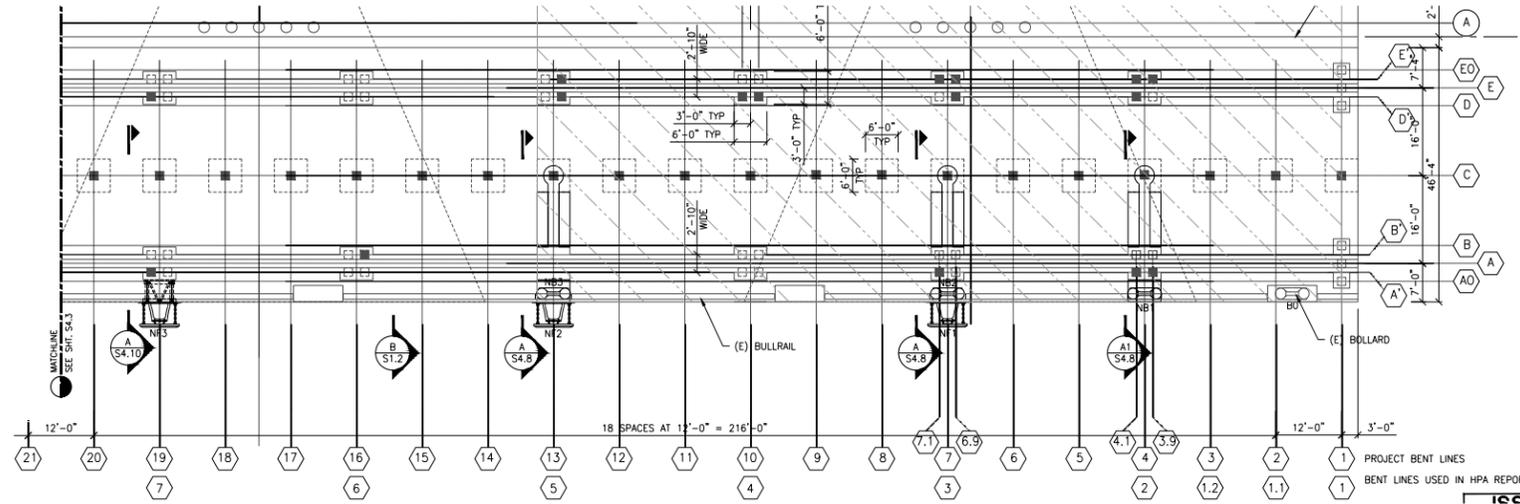
# Port of Richmond - Berths 7 & 8 Soffit Damage Bents 1-42



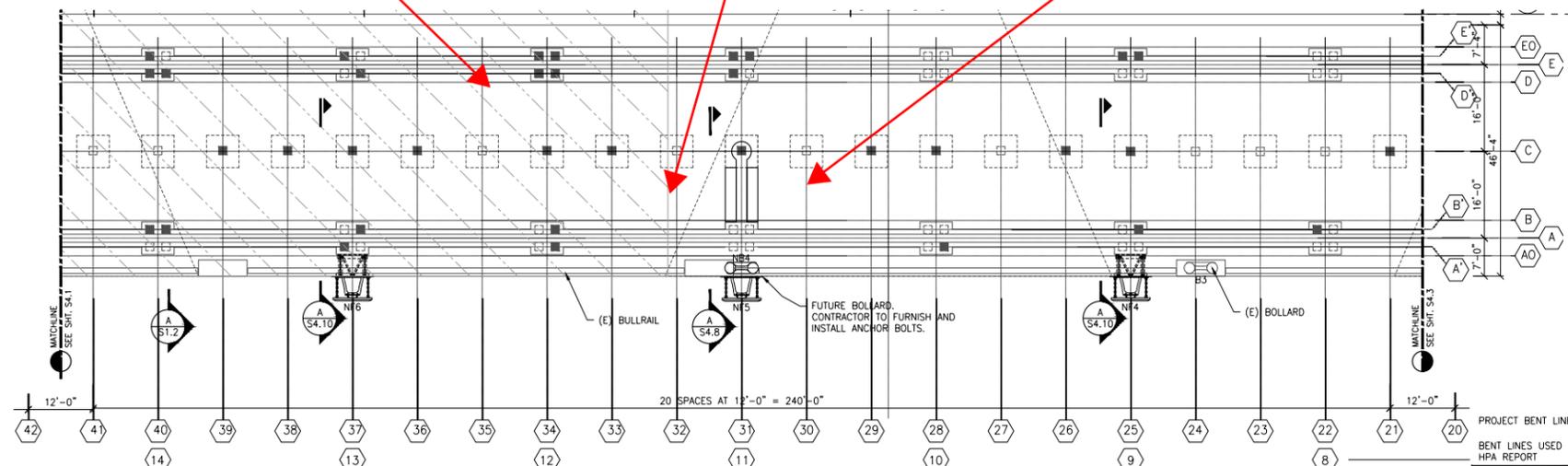
View looking South  
Soffit in good condition



Example of soffit in  
good condition:

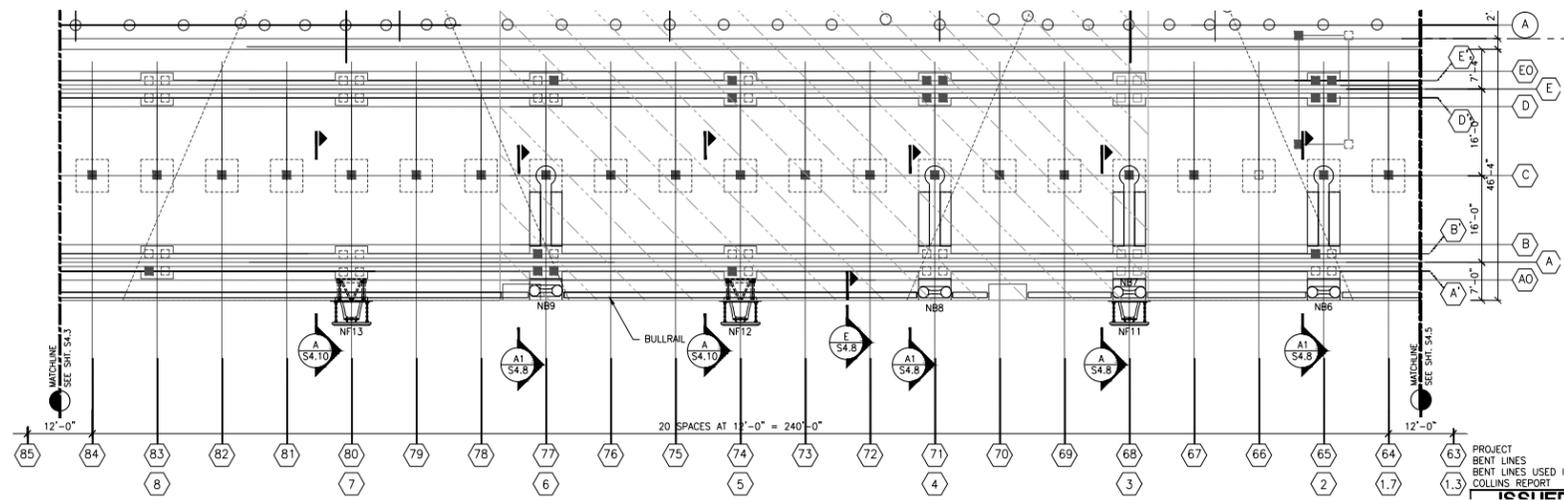
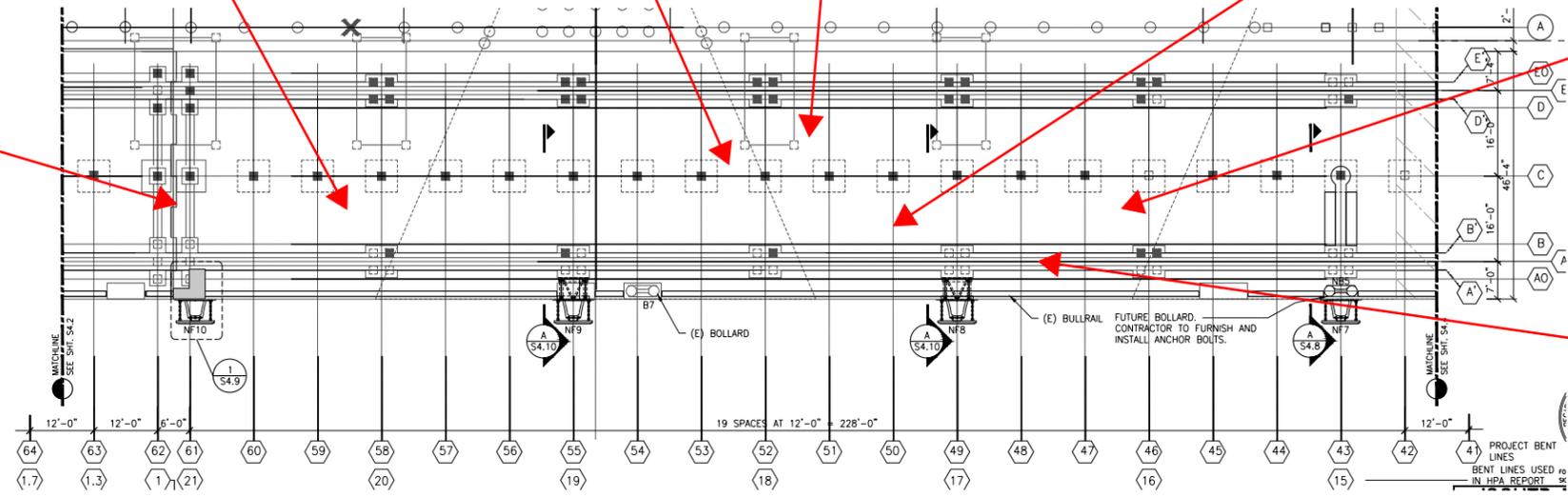
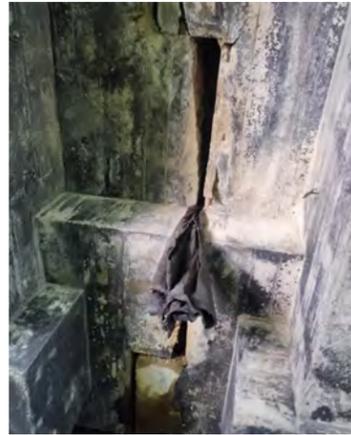


Spalled  
Concrete



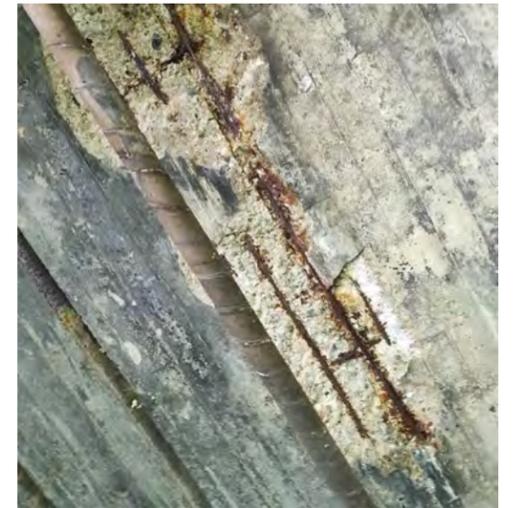
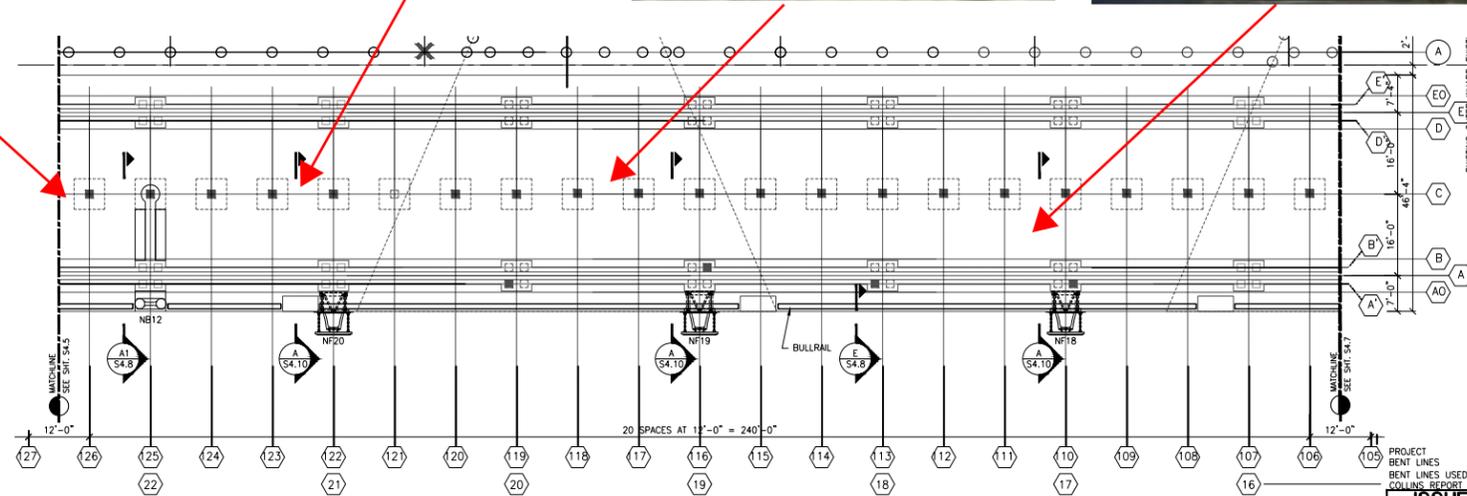
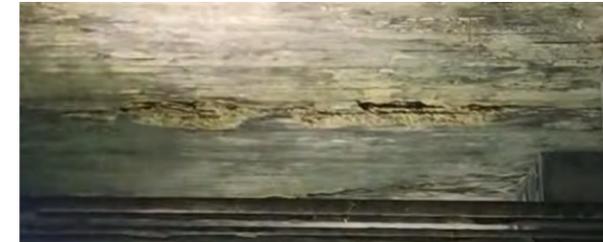
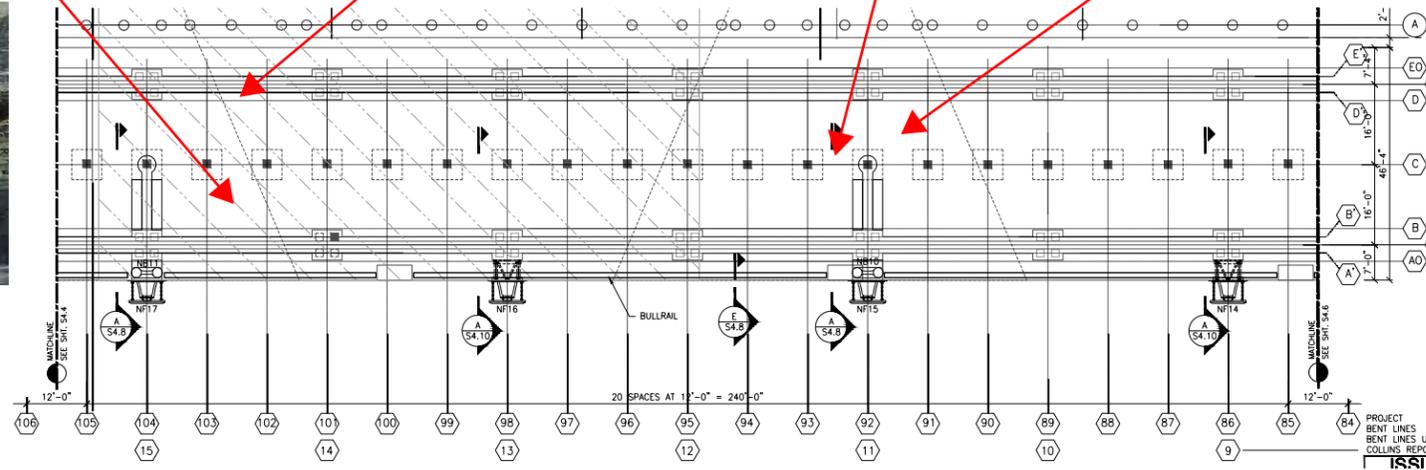
# Port of Richmond - Berths 7 & 8

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# Port of Richmond - Berths 7 & 8

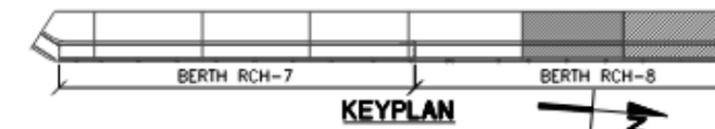




**APPENDIX F – BERTHS 7-8 OUTER WHARF PILE DOCUMENTATION PHOTOGRAPHS**

# Port of Richmond - Berths 7 & 8 Pile Condition Bents 1-41

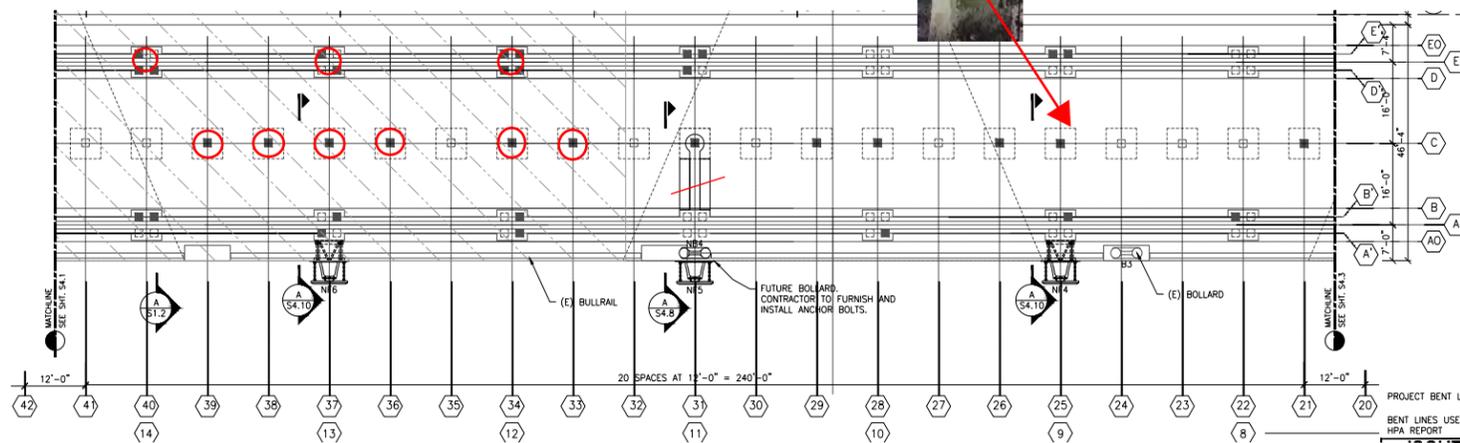
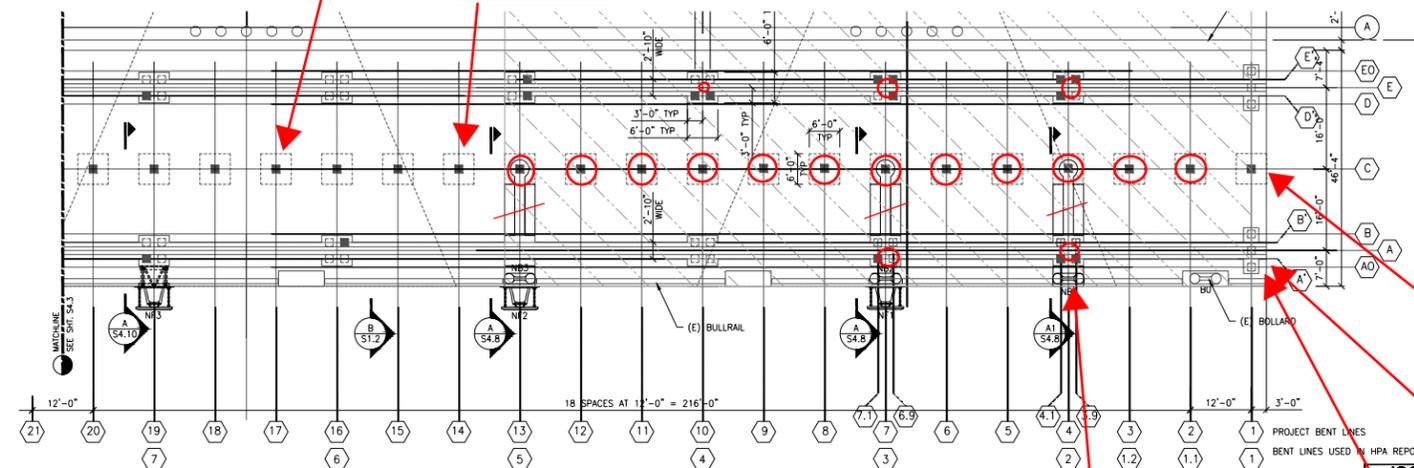
In general  
- Repaired piles in good condition  
- Many damaged piles



Repaired piles

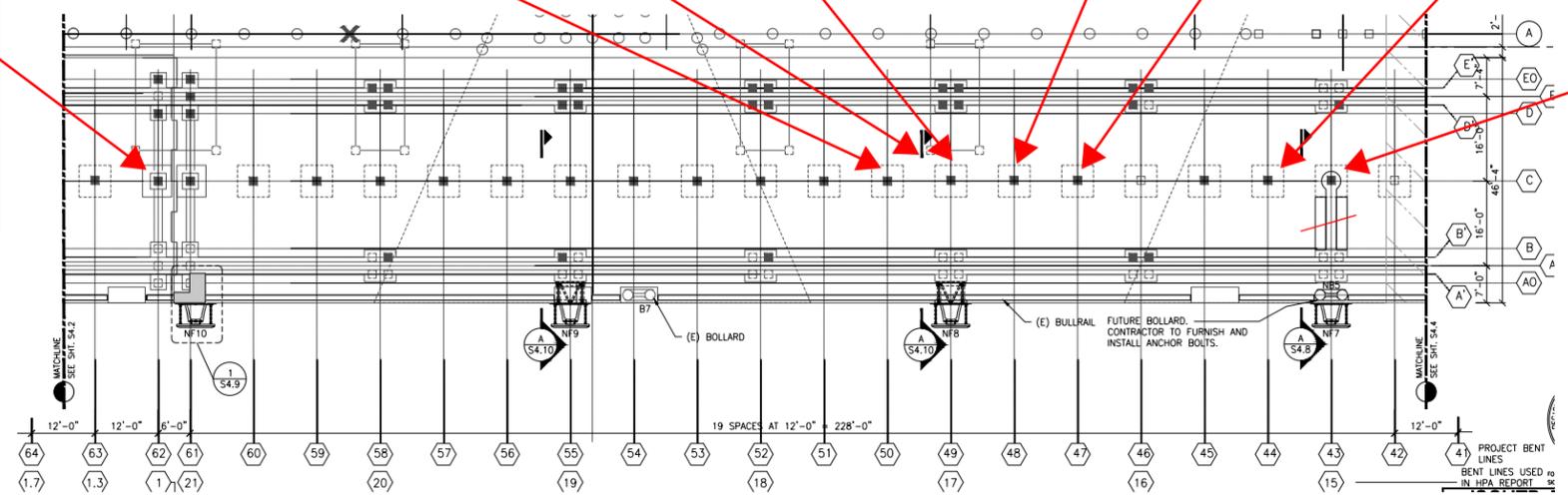
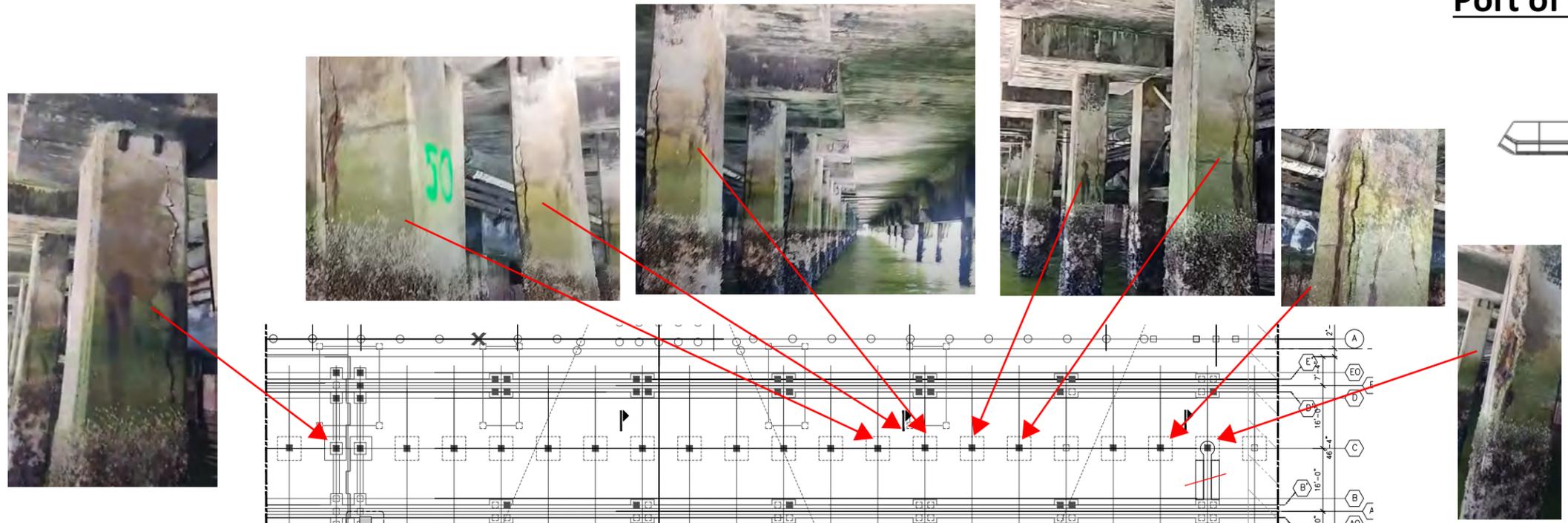


Unrepaired piles

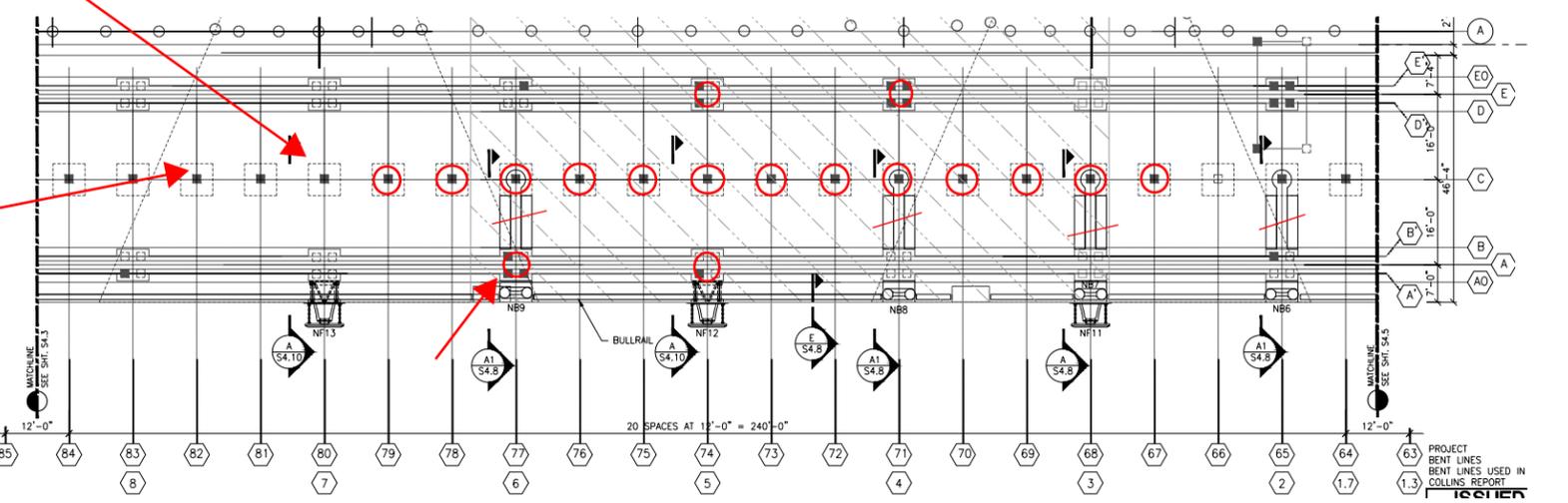


# Port of Richmond - Berths 7 & 8

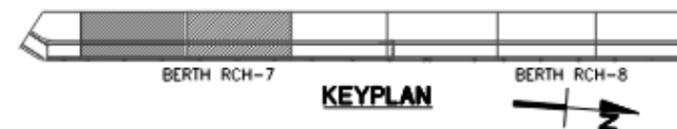
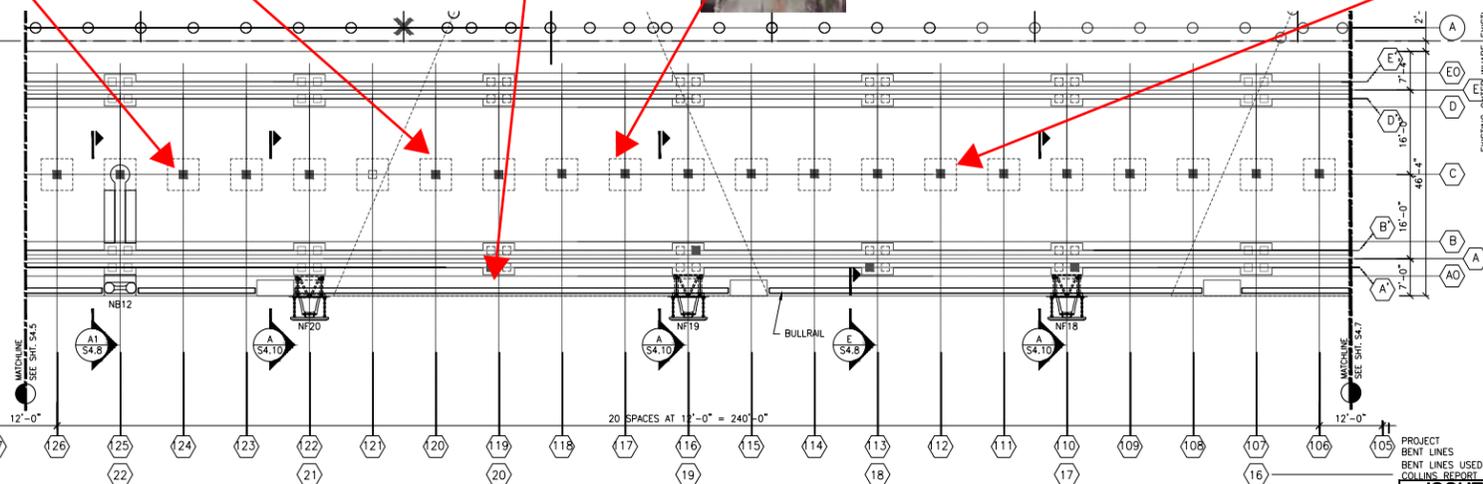
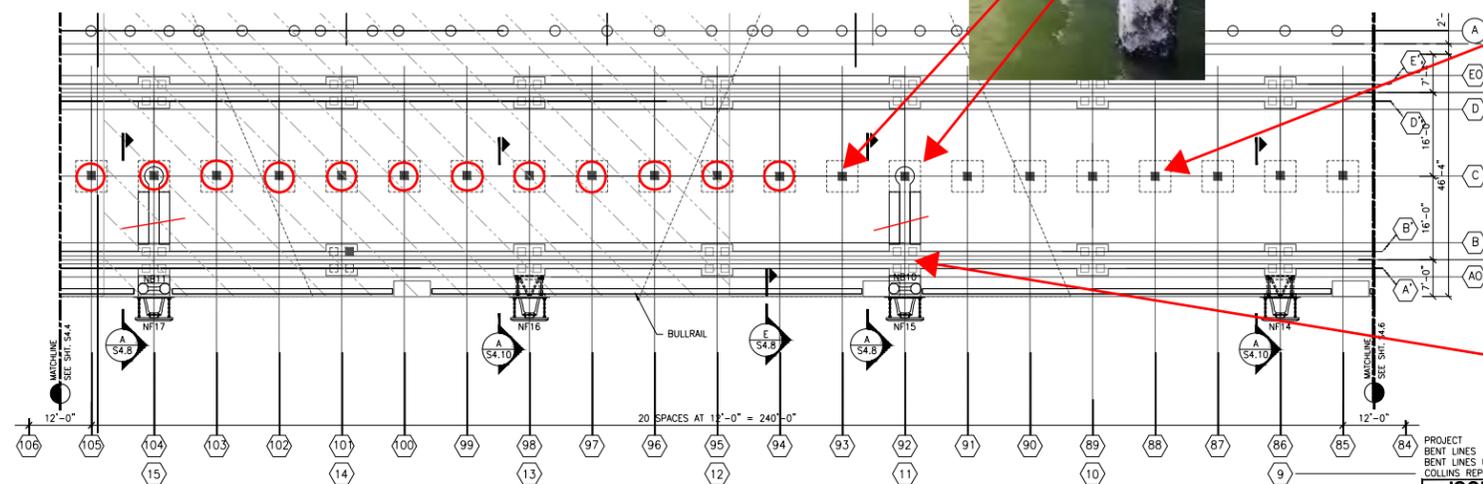
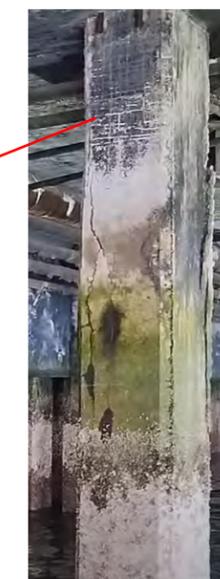
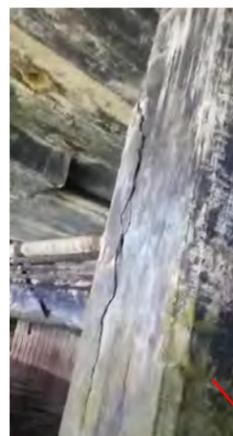
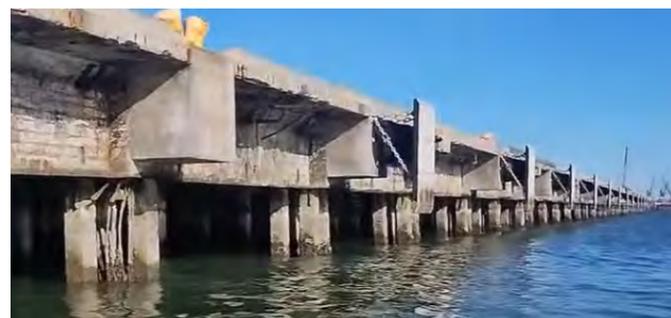
## Pile Condition Bents 42-84



- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA
- Repaired Concrete Pile

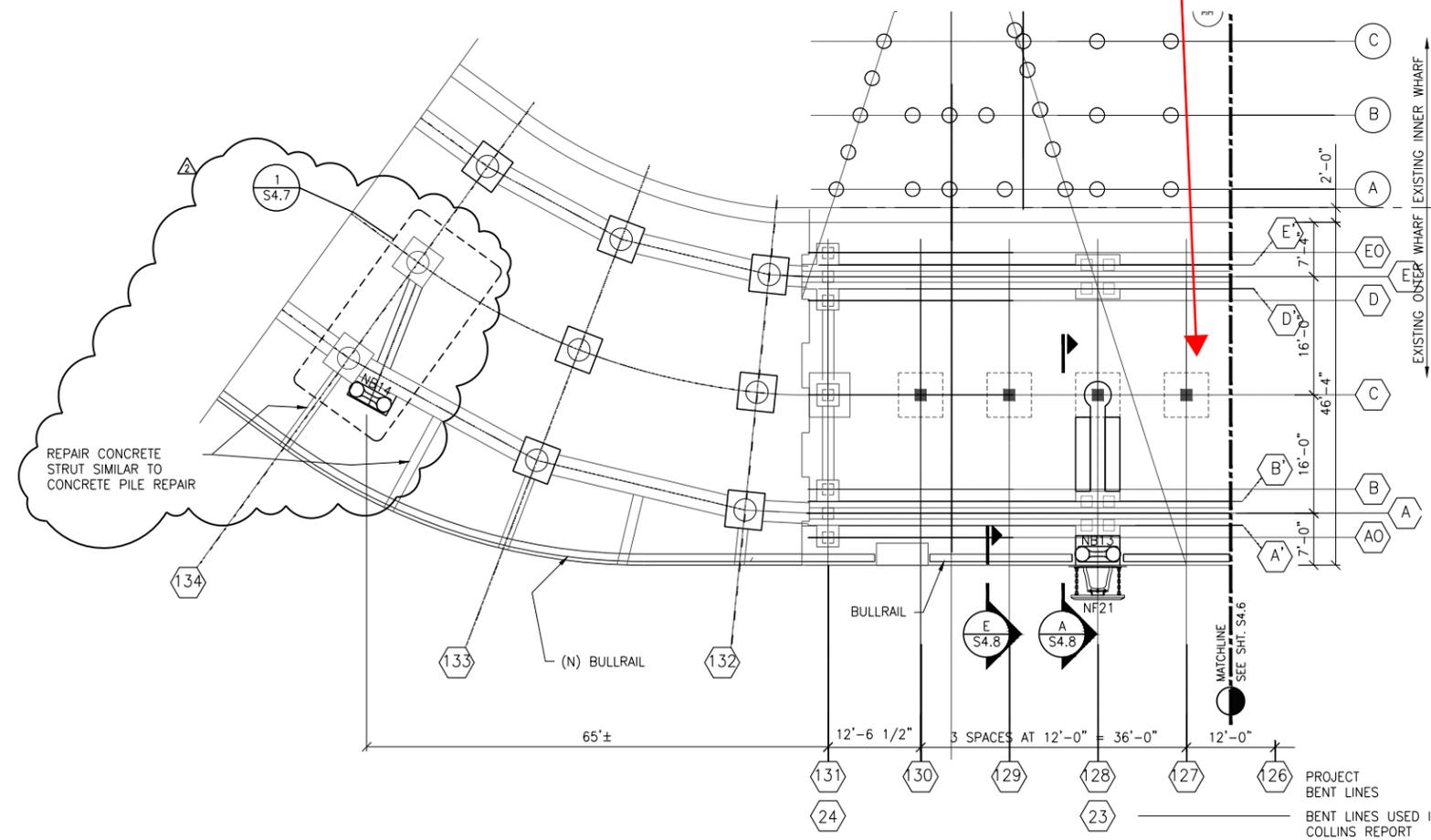


# Port of Richmond - Berths 7 & 8 Pile Condition Bents 85-126



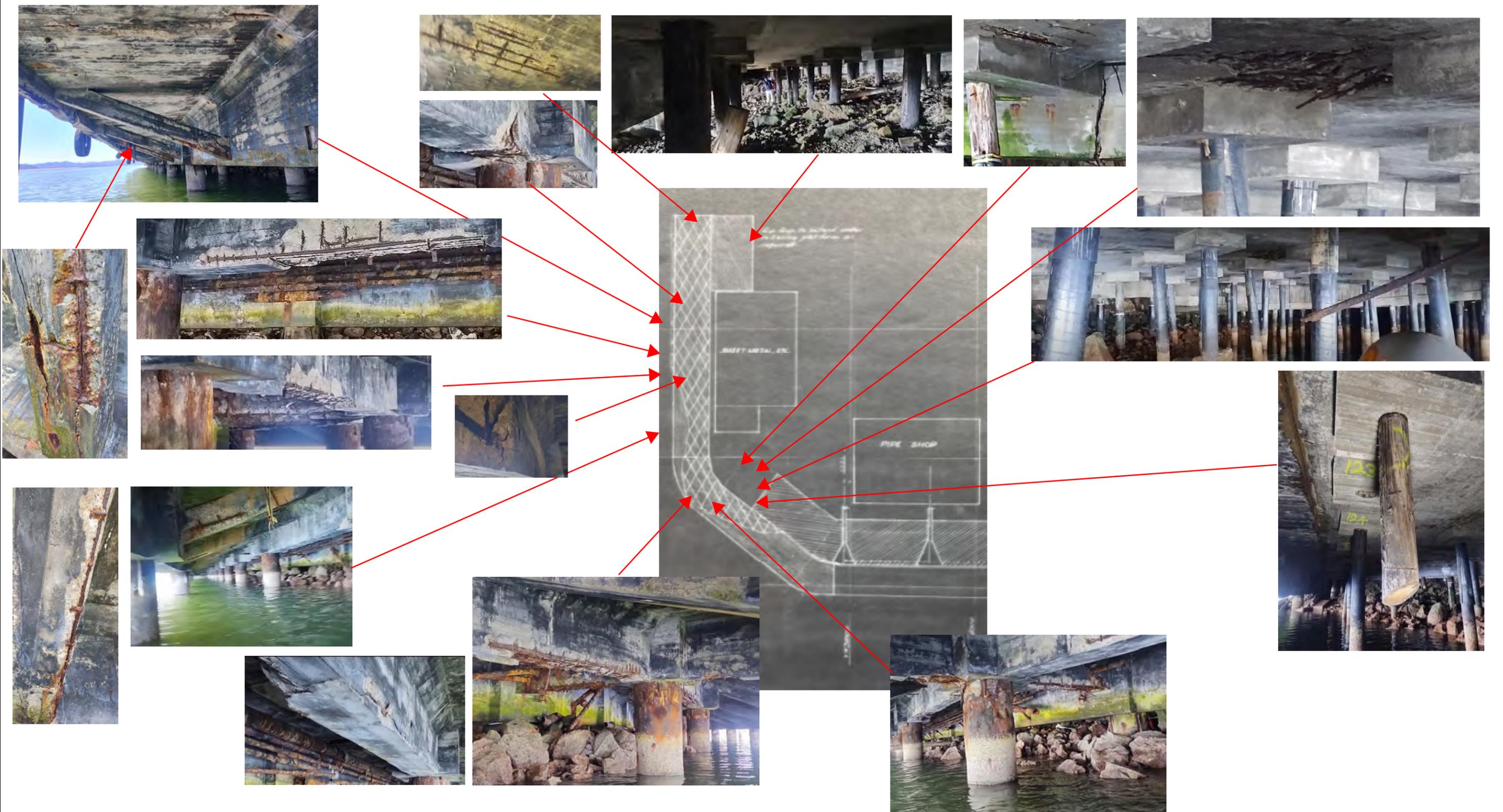
# Port of Richmond - Berths 7 & 8

## Pile Condition Bents 127-131 and Turn



- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**APPENDIX G – BERTHS 5–6 PILE AND SOFFIT DOCUMENTATION PHOTOGRAPHS**



**Port of Richmond - Berths 5 & 6**

**APPENDIX H – ASCE 130 DAMAGE RATING GUIDANCE**

# Waterfront Facilities Inspection and Assessment

Waterfront Facility Inspection Committee

Edited by  
Ronald E. Heffron, P.E.

Sponsored by  
Technical Committee on Ports and Harbors of the  
Coasts, Oceans, Ports, and Rivers Institute of the  
American Society of Civil Engineers

**ASCE** AMERICAN SOCIETY  
OF CIVIL ENGINEERS



COASTS, OCEANS,  
PORTS & RIVERS  
INSTITUTE

Table 2-6. Damage Ratings for Reinforced Concrete Elements

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	
ND	No Defects	<ul style="list-style-type: none"> <li>• Good original hard surface, hard material, sound</li> </ul>	
MN	Minor	<ul style="list-style-type: none"> <li>• Mechanical abrasion or impact spalls up to 1 in. in depth</li> <li>• Occasional corrosion stains or small pop-out corrosion spalls</li> <li>• General cracks up to 1/16 in. in width</li> </ul>	<p>Minor damage not appropriate if</p> <ul style="list-style-type: none"> <li>• Structural damage</li> <li>• Corrosion cracks</li> <li>• Chemical deterioration<sup>c</sup></li> </ul>
MD	Moderate	<ul style="list-style-type: none"> <li>• Structural cracks up to 1/16 in. in width</li> <li>• Corrosion cracks up to 1/4 in. in width</li> <li>• Chemical deterioration: Random cracks up to 1/16 in. in width; "Soft" concrete and/or rounding of corners up to 1 in. deep</li> <li>• Mechanical abrasion or impact spalls greater than 1 in. in depth</li> </ul>	<p>Moderate damage not appropriate if</p> <ul style="list-style-type: none"> <li>• Structural breakage and/or spalls</li> <li>• Exposed reinforcement</li> <li>• Loss of cross section due to chemical deterioration beyond rounding of corner edges</li> </ul>

MJ	Major	<ul style="list-style-type: none"> <li>• Structural cracks 1/16 in. to 1/4 in. in width and partial breakage (through section cracking with structural spalls)</li> <li>• Corrosion cracks wider than 1/4 in. and open or closed corrosion spalls (excluding pop-outs)</li> <li>• Multiple cracks and disintegration of surface layer due to chemical deterioration</li> <li>• Mechanical abrasion or impact spalls exposing the reinforcing</li> </ul>	<p>Major damage not appropriate if</p> <ul style="list-style-type: none"> <li>• Loss of cross section exceeding 30% due to any cause</li> </ul>
SV	Severe	<ul style="list-style-type: none"> <li>• Structural cracks wider than 1/4 in. or complete breakage</li> <li>• Complete loss of concrete cover due to corrosion of reinforcing steel with more than 30% of diameter loss for any main reinforcing bar</li> <li>• Loss of bearing and displacement at connections</li> <li>• Loss of concrete cover (exposed steel) due to chemical deterioration</li> <li>• Loss of more 30% of cross section due to any cause</li> </ul>	

<sup>a</sup>Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup>If not inspected due to inaccessibility or passed by, note as such.

<sup>c</sup>Chemical deterioration: Sulfate attack, alkali-silica reaction, alkali-aggregate reaction, alkali-carbonate reaction ettringite distress, or other chemical/concrete deterioration.

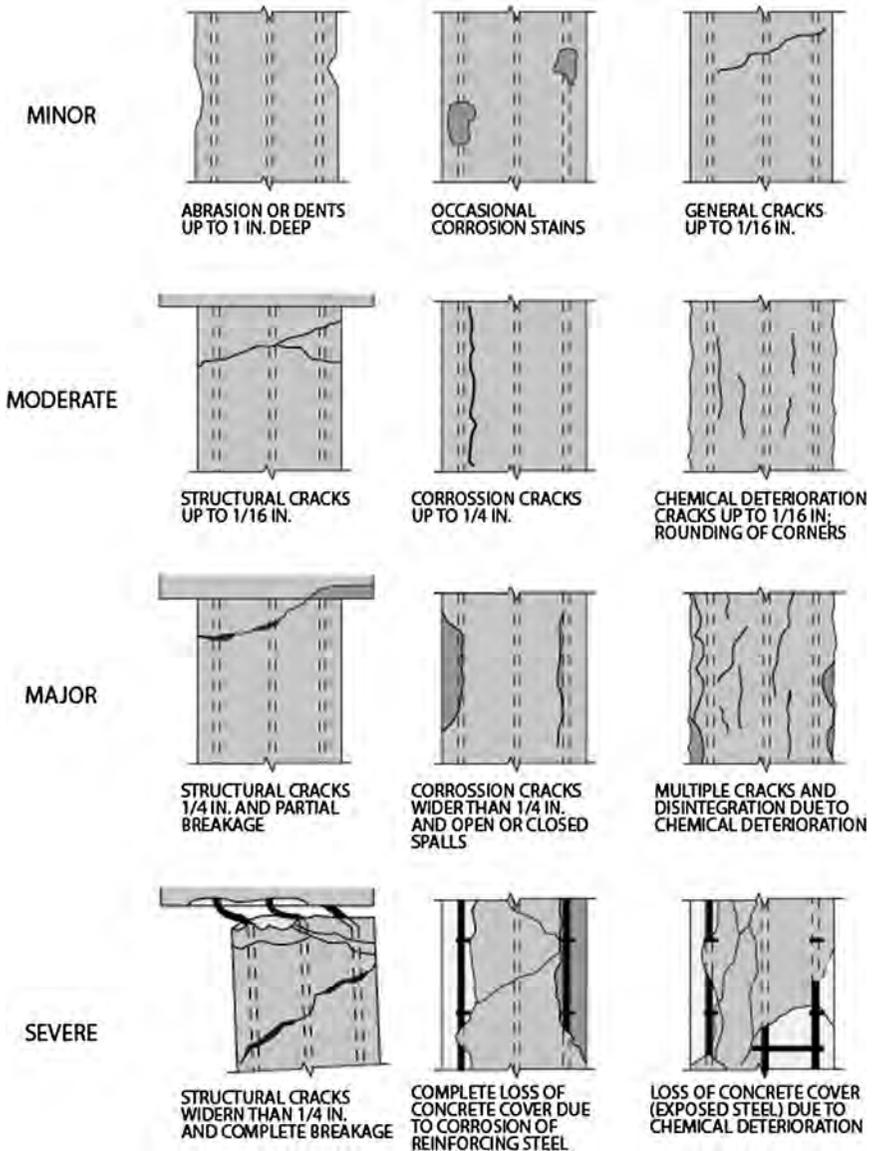


Fig. 2-4. Damage ratings for reinforced concrete elements  
 Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

Table 2-7. Damage Ratings for Prestressed Concrete Elements

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	
ND	No Defects	<ul style="list-style-type: none"> <li>• Good original hard surface, hard material, sound</li> </ul>	
MN	Minor	<ul style="list-style-type: none"> <li>• Minor mechanical or impact spalls up to 0.5 in. deep</li> </ul>	Minor damage not appropriate if <ul style="list-style-type: none"> <li>• Structural damage</li> <li>• Corrosion damage</li> <li>• Chemical deterioration<sup>c</sup></li> <li>• Cracks of any type or size</li> </ul>
MD	Moderate	<ul style="list-style-type: none"> <li>• Structural cracks up to 1/32 in. in width</li> <li>• Chemical deterioration: Random cracks up to 1/32 in. in width</li> </ul>	Moderate damage not appropriate if <ul style="list-style-type: none"> <li>• Structural breakage and/or spalls</li> <li>• Corrosion cracks</li> <li>• Loss of cross section in any form</li> <li>• "Softening" of concrete</li> </ul>

*(Continued)*

Table 2-7. Damage Ratings for Prestressed Concrete Elements (*Continued*)

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
MJ	Major	<ul style="list-style-type: none"> <li>• Structural cracks 1/32 in. to 1/8 in. in width</li> <li>• Any corrosion cracks generated by strands or cables</li> <li>• Chemical deterioration: cracks wider than 1/8 in.</li> <li>• "Softening" of concrete up to 1 in. deep</li> </ul>	Major damage not appropriate if <ul style="list-style-type: none"> <li>• Exposed prestressing steel</li> </ul>
SV	Severe	<ul style="list-style-type: none"> <li>• Structural cracks wider than 1/8 in. and at least partial breakage or loss of bearing</li> <li>• Corrosion spalls over any prestressing steel</li> <li>• Partial spalling and loss of cross section due to chemical deterioration</li> </ul>	

<sup>a</sup>Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup>If not inspected due to inaccessibility or passed by, note as such.

<sup>c</sup>Chemical deterioration: Sulfate attack, alkali-silica reaction, alkali-aggregate reaction, alkali-carbonate reaction ettringite distress, or other chemical/concrete deterioration.

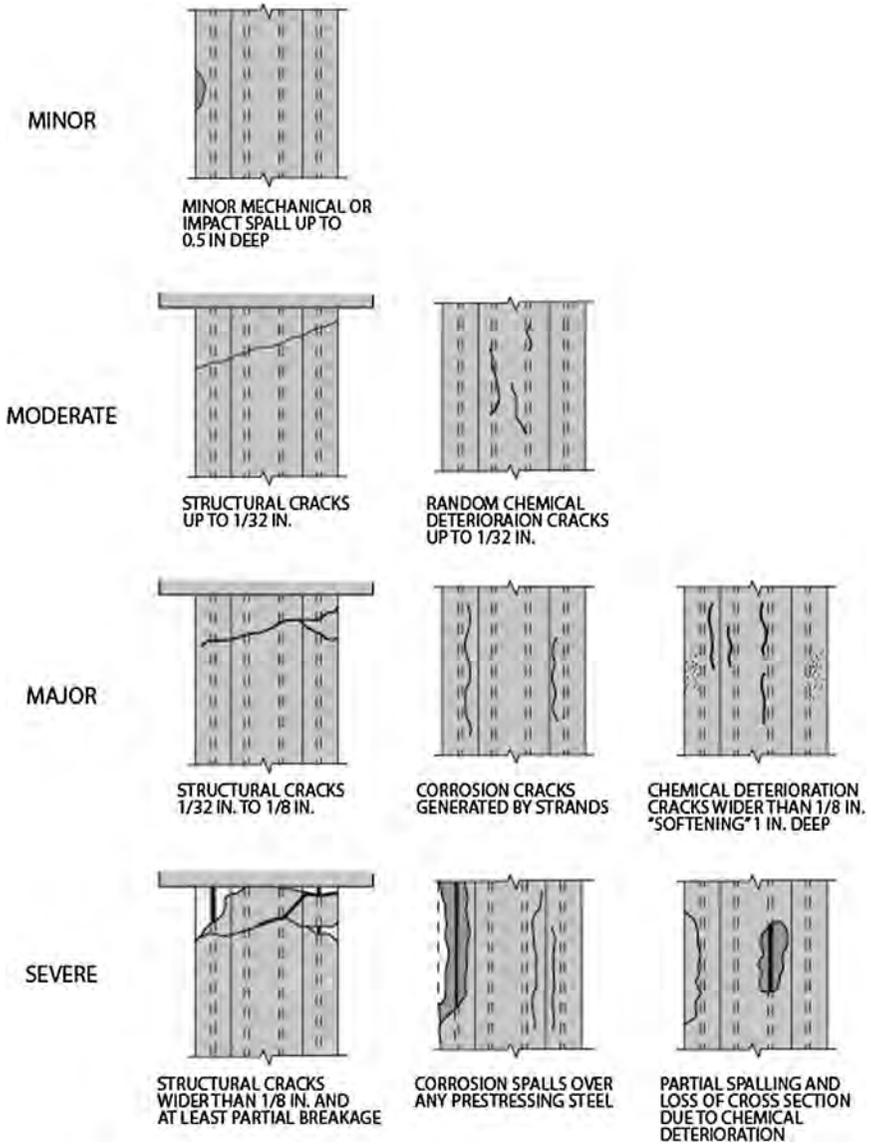


Fig. 2-5. Damage ratings for prestressed concrete elements

Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

Table 2-8. Damage Ratings for Mooring Hardware

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	
ND	No Defects	<ul style="list-style-type: none"> <li>• Material sound, surfaces smooth without indications of corrosion, surface coating in good condition, connections sound</li> <li>• Bolt countersinks grouted or sealed.</li> </ul>	<p>No Defects Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Surface coatings worn or damaged</li> <li>• Visible corrosion on fasteners</li> </ul>
MN	Minor	<ul style="list-style-type: none"> <li>• Fitting has surface corrosion over 10 to 25% of its area.</li> <li>• Minor wear marks or pitting on surface of fitting are less than 1/8-in. deep</li> <li>• Fasteners have minor corrosion with no significant loss of section</li> </ul>	<p>Minor Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Deep pits, gouges, or wear on fitting surfaces</li> <li>• Any noticeable loss of section on fastener threads, if visible</li> </ul>
MD	Moderate	<ul style="list-style-type: none"> <li>• Fitting has moderate surface corrosion with loose scale over less than 50% of its area</li> <li>• Significant surface wear marks or pitting on fitting are up to 1/4-in. deep</li> <li>• Fasteners have corrosion with less than 25% loss of section</li> </ul>	<p>Moderate Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Loose scale on fasteners</li> <li>• Inability to remove fasteners due to heavy corrosion, if accessible</li> </ul>

MJ	Major	<ul style="list-style-type: none"> <li>• Fitting has surface corrosion with loose scale over 50% or more of its surface area and/or less than 25% section loss</li> <li>• Significant surface wear marks or pitting on fitting are 1/4-in. deep or greater</li> <li>• Fasteners have corrosion with loose scale or loss of section greater than 25%</li> </ul>	<p>Major Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Displaced, damaged, or broken fitting components</li> <li>• Loose or missing fasteners</li> </ul>
SV	Severe	<ul style="list-style-type: none"> <li>• Fitting has heavy surface corrosion and loose scale with greater than 25% loss of section at critical areas of the fitting</li> <li>• Structural displacement, deformation, or rotation of the fitting are present; fitting components are broken, cracked, or delaminated</li> <li>• Loose, broken, or missing fasteners</li> </ul>	

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<sup>a</sup> Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup> If not inspected due to inaccessibility or passed by, note as such.

Table 2-9. Damage Ratings for Mooring Foundations

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	No Defects not appropriate if <ul style="list-style-type: none"> <li>• Weathering on timber, steel, or composite elements</li> <li>• Hairline cracks in concrete elements</li> </ul>
ND	No Defects	<ul style="list-style-type: none"> <li>• Good original hard surface, hard material, sound</li> </ul>	
MN	Minor	<ul style="list-style-type: none"> <li>• Timber Foundations: Weathered timber; evidence of fungal decay; minor checks, splits, and gouges up to 1/4-in. wide</li> <li>• Steel Foundations: Weathering of steel coating, light surface corrosion</li> <li>• Concrete Foundations: No significant section loss to load-bearing areas, hairline cracking of the concrete due to corrosion of the mooring hardware</li> <li>• Composites: Weathered surfaces</li> </ul>	Minor Rating not appropriate if <ul style="list-style-type: none"> <li>• Load-bearing areas around mooring hardware not sound</li> <li>• Displacements, loss of bearing, or connections</li> <li>• Fungal decay, insect infestation within or adjacent to the bearing area on timber elements</li> <li>• Corrosion loss exceeding fabrication tolerances (at any location)</li> <li>• Structural damage or corrosion cracking of concrete elements</li> </ul>

MD	Moderate	<ul style="list-style-type: none"> <li>• Timber cracked and checked up to 1/2-in. wide; weathered surfaces; fungal decay under or adjacent to the mooring hardware, with loss of section (max 1 in.)</li> <li>• Corrosion of steel with less than 10 to 25% section loss at any location</li> <li>• Noticeable cracking of concrete, larger than hairline but with no loss of interlock</li> </ul>	<p>Moderate Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Displacements, loss of bearing, or connections</li> <li>• Changes in straight-line configuration or local buckling</li> <li>• Loss of thickness exceeding 30% of nominal at any location for steel elements</li> <li>• Structural breakage, spalls, or corrosion cracks in concrete elements</li> <li>• Chemical deterioration<sup>c</sup> or “softening” of concrete elements</li> </ul>
MJ	Major	<ul style="list-style-type: none"> <li>• Timber cracked and checked greater than 1/2-in. wide; weathered; fungal decay present (max 3 in. depth); up to 25% loss of bearing</li> <li>• Steel corrosion with 25 to 50% section loss at any location</li> <li>• Noticeable cracking of concrete, resulting in loss of interlock</li> <li>• Composite elements cracked or split</li> </ul>	<p>Major Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Breakage or displacement of any element</li> <li>• Exposed steel strands in prestressed concrete elements</li> <li>• Perforations or loss of section exceeding 50% on steel elements</li> </ul>

*(Continued)*

Table 2-9. Damage Ratings for Mooring Foundations (*Continued*)

Damage Rating	Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
SV Severe	<ul style="list-style-type: none"> <li>• Displacement/yielding of any support members</li> <li>• Loss of full bearing of fitting under hardware</li> <li>• Fungal decay of timber members (greater than 3 in. depth)</li> <li>• Significant corrosion of steel members with greater than 50% section loss at any location</li> <li>• Cracking or spalling of concrete base under hardware</li> <li>• Composite broken or damaged</li> </ul>	

<sup>a</sup>Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup>If not inspected due to inaccessibility or passed by, note as such.

<sup>c</sup>Chemical deterioration: Sulfate attack, alkali-silica reaction, alkali-aggregate reaction, alkali-carbonate reaction ettringite distress, or other chemical/concrete deterioration.

MINOR



FITTING HAS CORROSION OVER 10 TO 25 PERCENT OF ITS AREA



MINOR WEAR MARKS OR PITTING ON SURFACE OF FITTING LESS THAN 1/8-INCH DEEP

MODERATE



FITTING HAS MODERATE SURFACE CORROSION WITH LOOSE SCALE OVER LESS THAN 50 PERCENT OF ITS AREA



SIGNIFICANT SURFACE WEAR MARKS OR PITTING ON FITTING UP TO 1/4-INCH DEEP

MAJOR



FITTING HAS SURFACE CORROSION AND LOOSE SCALE OVER 50 PERCENT OR MORE OF ITS SURFACE AREA AND/OR LESS THAN 25 PERCENT SECTION LOSS



SIGNIFICANT SURFACE WEAR MARKS OR PITTING ON FITTING UP TO 1/4-INCH DEEP OR GREATER

SEVERE



FITTING HAS HEAVY SURFACE CORROSION AND LOOSE SCALE WITH GREATER THAN 25 PERCENT LOSS OF SECTION AT CRITICAL AREAS OF THE FITTING



STRUCTURAL DISPLACEMENT, DEFORMATION OR ROTATION OF THE FITTING: BROKEN, CRACKED, OR DELAMINATED FITTING COMPONENTS

Fig. 2-6. Damage ratings for mooring hardware elements  
 Source: Courtesy of Moffatt & Nichol, Inc., reproduced with permission.

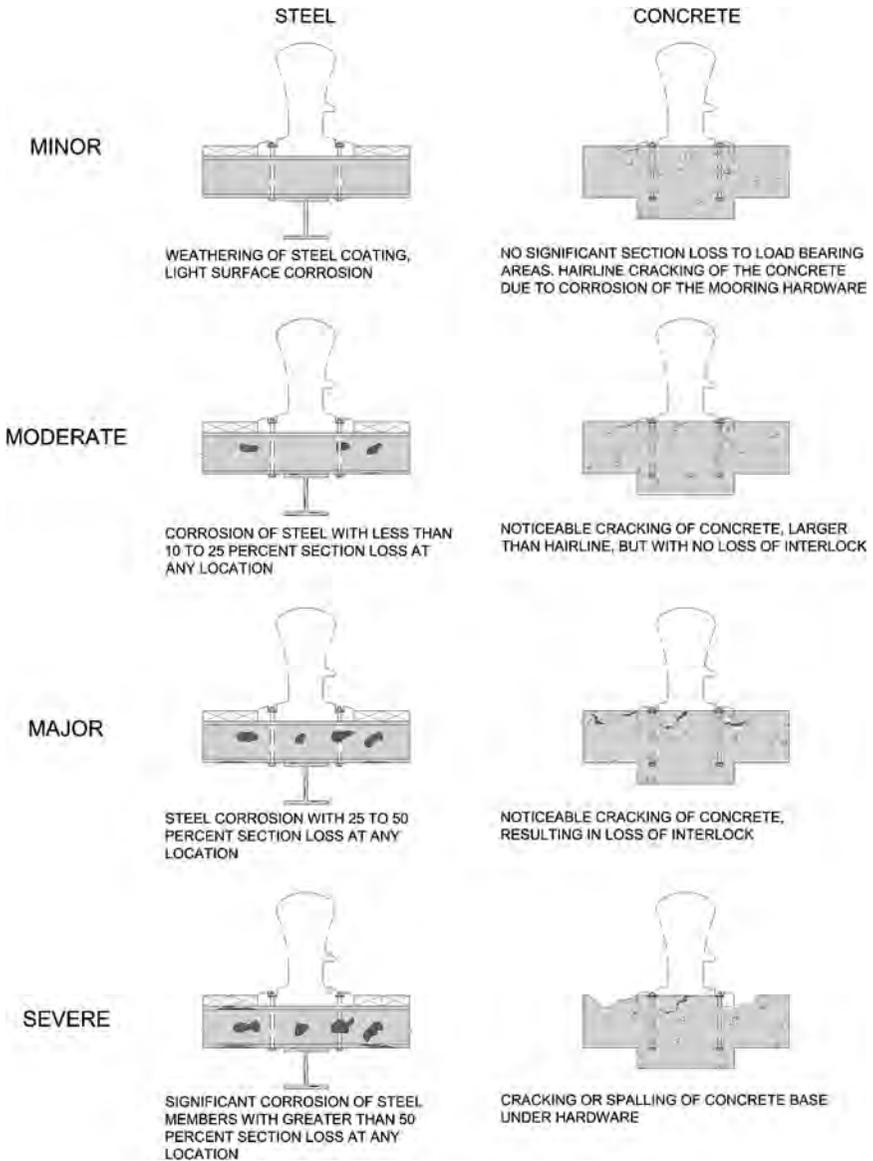


Fig. 2-8. Damage ratings for mooring hardware elements

Source: Courtesy of Moffatt & Nichol, Inc., reproduced with permission.

Table 2-12. Damage Ratings for Rubber Fender Elements

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	
ND	No Defects	<ul style="list-style-type: none"> <li>• Good original surface, sound</li> <li>• Connections intact and tight</li> </ul>	<p>No Defects Rating not appropriate if:</p> <ul style="list-style-type: none"> <li>• Noticeable abrasion or wear of rubber surfaces</li> </ul>
MN	Minor	<ul style="list-style-type: none"> <li>• Small gouges or surface defects present less than 10% of nominal depth</li> <li>• Connection intact, tight with light corrosion (less than 10% section loss at any location)</li> </ul>	<p>Minor Rating not appropriate if:</p> <ul style="list-style-type: none"> <li>• Surface cracking or degradation of rubber components</li> </ul>
MD	Moderate	<ul style="list-style-type: none"> <li>• Gouges, wear, or tears less than 25% of nominal depth</li> <li>• Rubber damaged at the connectors or connection plates</li> <li>• Connections loose, a bolt missing, or corrosion with 10 to 25% section loss at any location</li> </ul>	<p>Moderate Rating not appropriate if:</p> <ul style="list-style-type: none"> <li>• Permanent deformation or misalignment of rubber elements</li> </ul>

MJ	Major	<ul style="list-style-type: none"><li>• Cracks, gouges, or tears between 25 and 50% of nominal depth</li><li>• Rubber torn at the connectors or connection plates</li><li>• Connections loose, two bolts missing, or corrosion with 25 to 50% section loss at any location</li></ul>	Major Rating not appropriate if: <ul style="list-style-type: none"><li>• Rubber element is split or torn through</li></ul>
SV	Severe	<ul style="list-style-type: none"><li>• Cracks, gouges, or tears greater than 50% of nominal depth</li><li>• Rubber torn through at the connectors or connection plates</li><li>• Connections with loose or missing bolts, or corrosion with greater than 50% section loss at any location</li></ul>	

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<sup>a</sup> Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup> If not inspected due to inaccessibility or passed by, note as such.

Table 2-13. Damage Ratings for Fender Panels

Damage Rating		Existing Damage <sup>a</sup>	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	<ul style="list-style-type: none"> <li>• Not inspected, inaccessible, or passed by<sup>b</sup></li> </ul>	
ND	No Defects	<ul style="list-style-type: none"> <li>• Good original surfaces</li> <li>• All connections intact</li> <li>• Backing panel sound</li> <li>• Support chains intact and in good condition</li> </ul>	No Defects Rating not appropriate if <ul style="list-style-type: none"> <li>• Coatings damaged</li> <li>• Visible surface corrosion</li> </ul>
MN	Minor	<ul style="list-style-type: none"> <li>• Small cracks or gouges (less than 10% of nominal)</li> <li>• 90% of panel connections intact</li> <li>• Backing frame with surface corrosion with no significant loss of section</li> <li>• Support chains intact with light surface corrosion</li> </ul>	Minor Rating not appropriate if <ul style="list-style-type: none"> <li>• Panels worn or damaged</li> </ul>
MD	Moderate	<ul style="list-style-type: none"> <li>• Cracks or gouges (less than 25% of nominal)</li> <li>• 75% of panel connections intact</li> <li>• Panels displaced from the backing panel</li> <li>• Backing frame corroded</li> <li>• Support chains intact, with less than 25% section loss</li> </ul>	Moderate Rating not appropriate if <ul style="list-style-type: none"> <li>• Panels displaced or misaligned</li> <li>• Any loose or missing hardware</li> </ul>

MJ	Major	<ul style="list-style-type: none"> <li>• Cracks or gouges (less than 50% of nominal)</li> <li>• 50% of the panel connections intact or multiple panels displaced from the backing panel</li> <li>• Backing frame corroded with loose scale, but panel substantially in place</li> <li>• Support chains heavily corroded with more than 25% section loss</li> </ul>	<p>Major Rating not appropriate if</p> <ul style="list-style-type: none"> <li>• Panel/frame system sagging, misaligned, or with limited bearing</li> </ul>
SV	Severe	<ul style="list-style-type: none"> <li>• Cracks or gouges (greater than 50% of nominal)</li> <li>• Less than 50% of the panel connections intact or multiple panels displaced from the backing panel</li> <li>• Backing frame heavily corroded with loose scale</li> <li>• Sagging/displacement of panel/frame system</li> <li>• Support chains heavily corroded with loose scale and/or missing or broken</li> </ul>	

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<sup>a</sup> Any defect listed is sufficient to identify relevant damage grade.

<sup>b</sup> If not inspected due to inaccessibility or passed by, note as such.

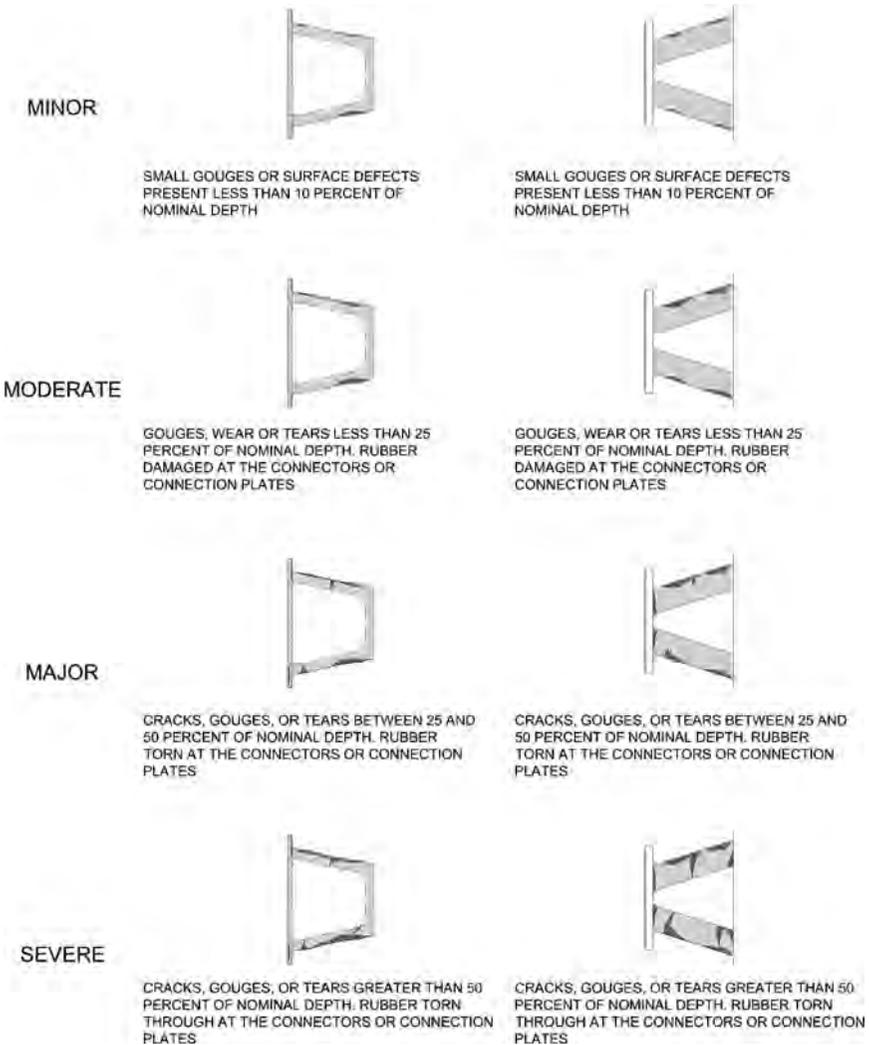


Fig. 2-13. Damage ratings for rubber fender elements

Source: Courtesy of Moffatt & Nichol, Inc., reproduced with permission.

Table 2-14. The ratings are important in establishing the priority of follow-up actions to be taken. This is particularly true when many structures are included in an inspection program, and follow-up activities must be ranked or prioritized due to limited resources.

The rating system used for Post-Event Inspections differs from that used for Routine Inspections because Post-Event Inspection ratings must focus on

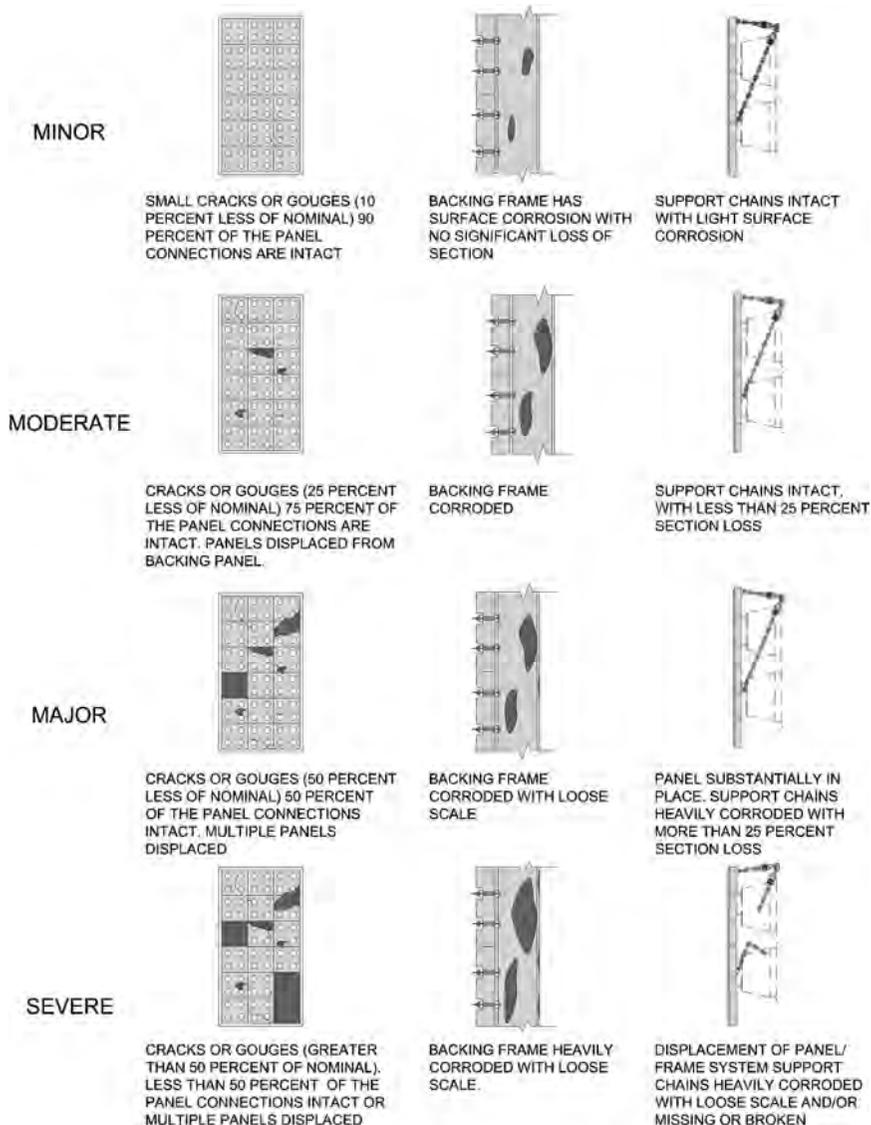


Fig. 2-14. Damage ratings for fender panel elements  
 Source: Courtesy of Moffatt & Nichol, Inc., reproduced with permission.

event-induced damage only, excluding long-term defects such as corrosion deterioration. An alphabetical scale is used for Post-Event Inspections to distinguish from the numerical condition assessment scale used for Routine Inspections, as shown in Table 2-15.

Table 2-14. Condition Assessment Ratings

Rating	Description
6 Good	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs are required.
5 Satisfactory	Limited minor to moderate defects or deterioration observed but no overstressing observed. No repairs are required.
4 Fair	All primary structural elements are sound but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the load-bearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low.
3 Poor	Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the load-bearing capacity of the structure. Repairs may need to be carried out with moderate urgency.
2 Serious	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible, and loading restrictions may be necessary. Repairs may need to be carried out on a high-priority basis with urgency.
1 Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur, and load restrictions should be implemented as necessary. Repairs may need to be carried out on a very high-priority basis with strong urgency.

### 2.6.2 Condition Assessment Ratings

The Condition Assessment Rating should be assigned upon completion of the Routine Inspection and remain associated with the structural unit (as defined in Section 3.1.1) until the structure is rerated following a quantitative engineering evaluation and repairs, or upon completion of the next

Table 2-15. Post-event Damage Ratings

Rating	Description
A	No significant event-induced damage observed; no further action is required
B	Minor to moderate event-induced damage observed, but all primary structural elements are sound. Repairs may be required, but the priority of repairs is low
C	Moderate to major event-induced damage observed that may have significantly affected the load-bearing capacity of primary structural elements. Repairs are necessary on a priority basis
D	Major event-induced damage has resulted in localized or widespread failure of primary structural components. Additional failures are possible or likely to occur. Urgent remedial attention is necessary

scheduled Routine Inspection. The ratings should be assigned against distinct structural units, groups of units, and the overall facility.

A scale of 1 to 6 is used for the rating system, as shown in Table 2-14. A rating of 6 represents a structure in good condition, whereas a rating of 1 represents a structure in critical condition. Other suitable rating systems may be substituted for a particular owner's purpose as appropriate.

Understanding that ratings are used to describe the existing in-place structure relative to its condition when newly built is important. The fact that the structure was designed for loads that are lower than the current standards for design shall have no influence on the ratings.

Equally important is understanding that the correct assignment of ratings requires both experience and an understanding of the structural system. Judgment must be applied in considering

- Scope of damage (total number of defects),
- Severity of damage (type and size of defects),
- Distribution of damage (local vs. general),
- Types of components affected (their structural "sensitivity"),
- Location of defect on component (relative to point of maximum moment/shear), and
- Serviceability.

The qualifications of individuals assigning ratings are important in ensuring that the ratings are assigned consistently and uniformly in accordance with sound engineering principles and the guidelines provided herein. The team leader, with oversight from the project manager, should verify that the assigned ratings are appropriate.

### 2.6.3 Post-Event Damage Ratings

The post-event damage rating should be assigned upon completion of the Post-Event Inspection, preferably prior to leaving the site. The rating should be used to reflect whether additional attention is necessary and, if so, at what priority level. Table 2-15 shows the four post-event damage ratings. A rating of “A” indicates no further action is required, whereas a rating of “D” indicates major structural damage requiring urgent attention.

The following guiding principles should be followed when assigning post-event damage ratings:

- Ratings should reflect only damage that was likely caused by the event. Long-term or preexisting deterioration such as corrosion damage should be ignored unless the structural integrity of the structure is immediately threatened.
- Ratings are used to describe the existing in-place structure as compared with the structure when new. The fact that the structure was designed for loads that are lower than the current standards for design should have no influence on the ratings.
- Assignment of ratings should reflect an overall characterization of the entire structure being rated. Correct assignment of a rating should consider both the severity of the deterioration and the extent to which it is widespread throughout the structure.
- The assignment of rating codes will require judgment. Use of standard rating guidelines is intended to make assignment of these ratings uniform among inspection personnel.

## 2.7 RECOMMENDED ACTION GUIDELINES

Whereas condition assessment and post-event damage ratings describe the urgency with which or *when* follow-up action should be taken, the recommended actions describe *what* specific actions should be taken. Recommended actions are assigned upon completion of each inspection type described in Section 2.1, with the exception that new construction inspections and repair construction inspections are in-process activities that typically require immediate follow-up action in the event of nonconformance.

A description of each recommended action choice is provided in Table 2-16. Typical recommended action options for each inspection type are depicted in Fig. 2-15. Multiple recommended actions may be assigned upon completion of each inspection; however, guidance should be provided to indicate the order in which the recommended actions should be carried out. For example, a structure that has received a Routine Inspection may be assigned recommended actions of an Emergency Inspection (due to broken piles), Repair or Upgrade Design Inspection (due to deteriorated and broken

**APPENDIX I – ENGEO PPMT UNDERDECK GEOTECHNICAL INSPECTION**

Project No.  
**26829.000.001**

April 28, 2025  
Revised July 2, 2025

Mr. Matt Trowbridge  
Moffatt & Nichol  
1300 Clay Street, Suite 350  
Oakland, CA 94612

Subject: Port of Richmond Point Potrero Marine Terminal  
Richmond, California

## UNDERDECK GEOTECHNICAL INSPECTION

Dear Mr. Trowbridge:

We prepared this letter to document our observations during underdeck inspections at the Point Potrero Marine Terminal at the Port of Richmond in Richmond, California. As you know, we joined Liftech Consultants Inc. (Liftech) for an inspection of the conditions below the deck of the existing Marine Terminal. We performed our underdeck inspections both from boat and on foot.

On March 18, we observed the conditions below Berths 5 and 6 during a boat inspection; Power Engineering Construction (Power) provided the boat and pilot and Liftech performed structural inspections. The purpose of our inspection was to observe geotechnical conditions. In particular, we were interested to see the conditions along Berth 5 where collapse of the pavement occurred along the interface of land and the wharf structure, and a portion of Berth 6 where the deck structure has settled.

During our inspection, we observed existing weathered rock outcropping and rock-derived fill covering the surface of the slope below the marginal wharf structures. Portions of the ground along Berth 5 are protected by variably sized riprap revetment. As shown in Exhibit 1, the area of the settled wharf appears to be a result of a crack through the support beam. There is no evidence that any of the piles in this area have plunged, though there are several piles that have been removed and not replaced. A structural fix will be necessary in this area. Likely the replacement of missing piles will be required to perform this repair.

Along much of the wharf, there is a headwall at the interface of the wharf structure and the land. However, in the area of the settled pavement at Berth 5, there is no headwall, and the soil/weathered bedrock appears to be eroding at the top of the slope below the wharf (as shown in Exhibit 2). In this area, we recommend creating a confinement structure at the top of the slope to retain and protect fill from erosion and backfilling the area of lost ground so the pavement can be restored and stabilized.

**EXHIBIT 1: Area of Settled Wharf – Berth 6**



**EXHIBIT 2: Area of Settled Pavement Behind Wharf – Berth 5**



On May 19, 2025, we performed an inspection below the deck of Berths 7 and 8 with Liftech. We performed this inspection between the existing sheet pile wall and the landward slope. We entered the area through manholes in the deck; Power provided assistance with access and site safety monitoring. During our inspection, we again observed stable slope conditions below the wharf and no evidence of pile plunging. Again in areas where pavement settlement was observed at the interface between the land and the wharf, this appeared to be due to erosion of the top of the slope in areas without a headwall; in one area this lack of wall appeared to be due to utility penetration and the eroded soil was likely utility trench backfill. We recommend a similar fix in this area.

If you have any questions or comments regarding this letter, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

  
Jeff Fippin, GE

jf/rhb/cb

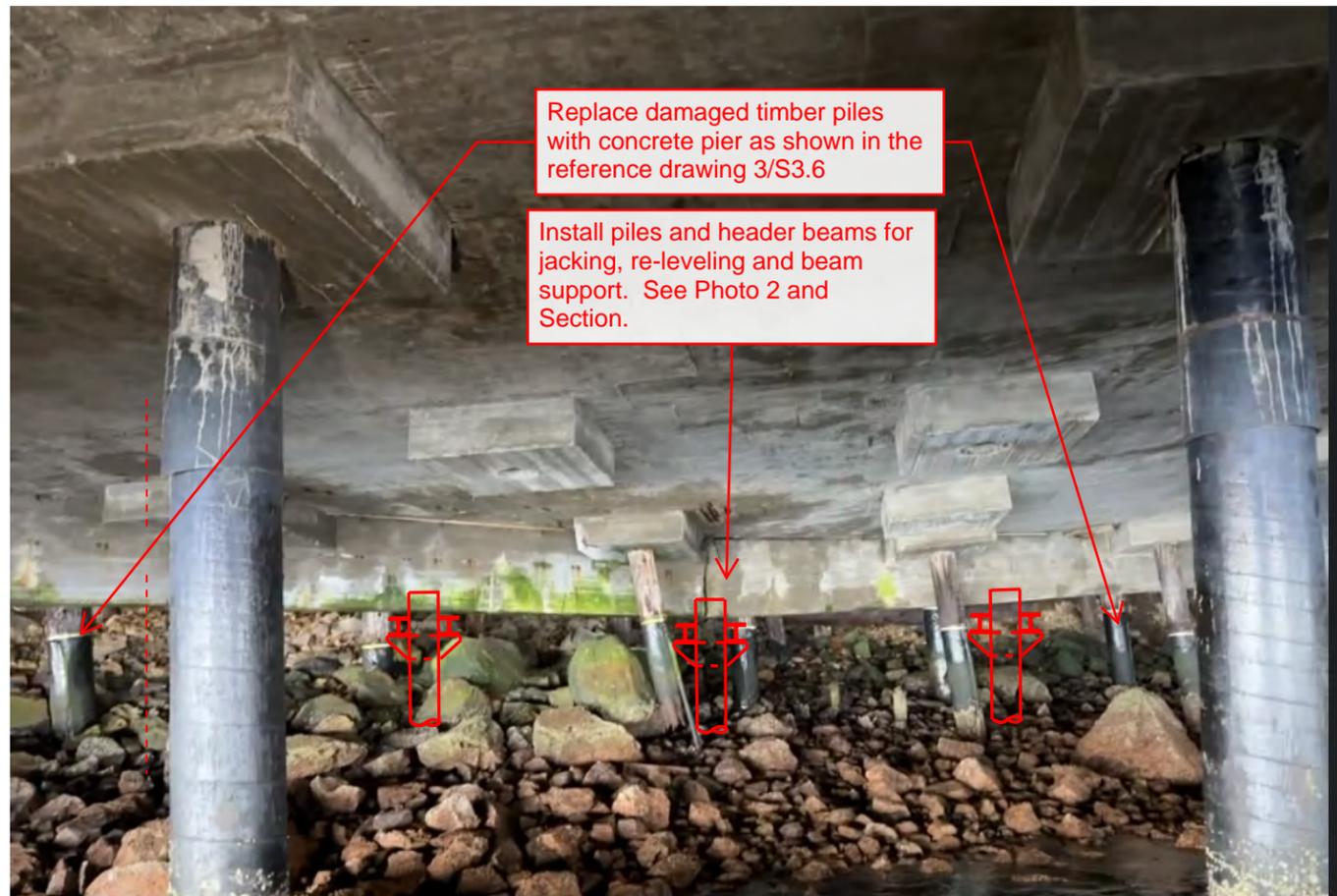


  
Robert H. Boeche, CEG

**APPENDIX J – LIFTECH CONCEPT REPAIR PROJECTS AND BUDGETARY COST ESTIMATES**

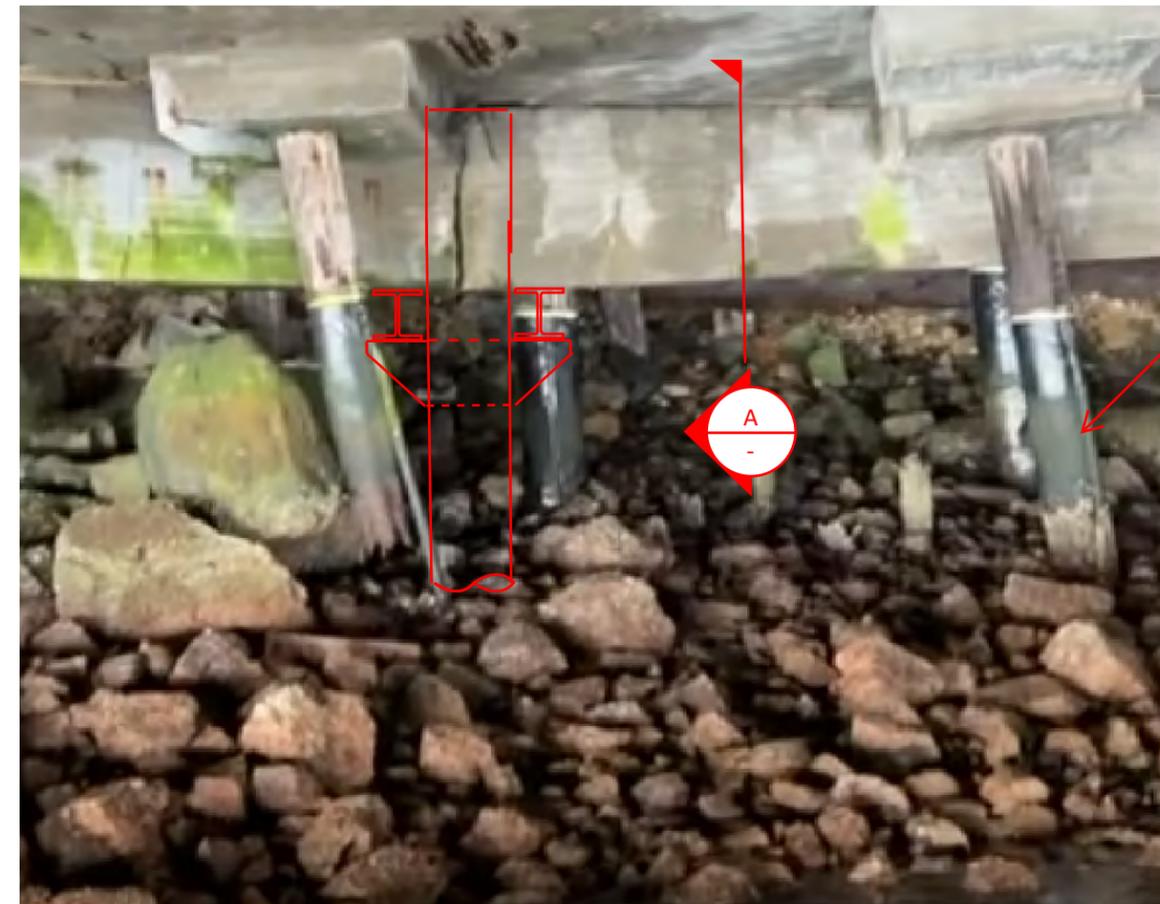
**PROJECT NO. 1: BROKEN CONCRETE BEAM AND DECK DEPRESSION REPAIR AT BERTH 6/7**

## Project No: 1 - Broken Beam Retrofit at Berths 6 & 7 - Alternate 1 & 2



Replace damaged timber piles with concrete pier as shown in the reference drawing 3/S3.6

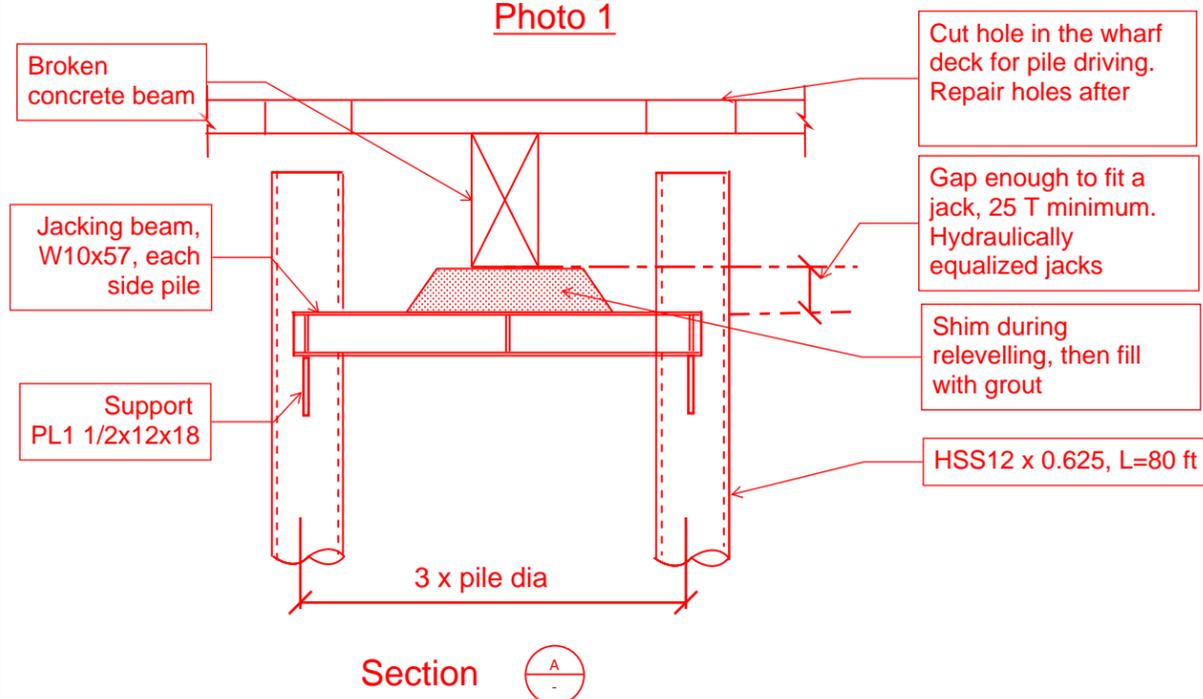
Install piles and header beams for jacking, re-leveling and beam support. See Photo 2 and Section.



Remove and replace

Photo 1

Photo 2



### Scope of Work:

#### Alternate 1 - Retrofit Concept

1. Cut holes at wharf deck for pile installation.
2. Install pile each side of the broken beams (3 locations as shown on Photo 1)
3. Install beam support plates.
4. Install jacking/support beams
5. Jack the beam and slab to level position using shim plates.
6. Remove jacks
7. Add non-shrink grout for permanent beam support.
8. Install concrete pier at missing and damage timber piles, See reference drawings 3/S3.6 (Sht. 5) for details. Assume 10 locations.
9. Repair deck reinforcing at holes and install grout or concrete.

#### Alternate 2: Demo and Rebuild Inner Wharf

1. Demo the section of the slab that effected by the broken beam.
2. Construct a new wharf deck, assume 9000 SF of concrete pile supported wharf deck.

## Project No: 1 - Budgetary Cost Estimates

### Estimated Quantity Take-off for Construction Cost Estimates for Broken Concrete Beam and Deck Depression Repair at Berth 6/7

Item	Description	Quantity	Unit	Total Quantity	Comments
<b>Alternate 1 - Broken Beam Retrofit</b>					
1	Cut holes in the deck	6	EA	6	Refer to scope of work description
2	Furnish and install steel pipe piles and steel support beams	6	EA	6	Refer to scope of work description
3	Furnish and install steel beams and slab jacking	6	EA	6	Refer to scope of work description
4	Furnish and install concrete pier to replace damaged timber or missing piles	10	EA	10	Refer to scope of work description & reference drawing on sheet 5
5	In-fill holes with continuity slab rebars	6	EA	6	Refer to scope of work description
<b>Alternate 2 - Demo and Rebuild Inner Wharf</b>					
1	Demo existing dock	9000	SF	9000	See sheet 4 for demo area
2	Construct a new dock	9000	SF	9000	

### Budgetary Cost for Broken Concrete Beam and Deck Depression Repair at Berth 6/7

Item	Description	Quantity	Unit	ROM Cost	
<b>Alternate 1 - Broken Beam Retrofit</b>					
1	Construction cost estimates based on 2025 labor and material costs	1	EA	\$906,653	Refer to sheet 3 for Power Engineering Construction cost estimates.
2	Soft cost and contingency - 30%	1	EA	\$271,996	Refer to sheet 3 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
Total Budgetary Cost Estimates				\$1,178,649 <b>\$1,200,000</b>	
<b>Alternate 2 - Demo and Rebuild Inner Wharf</b>					
1	Construction cost estimates based on 2025 labor and material costs	1	EA	\$5,040,000	Refer to sheet 3 for Power Engineering Construction cost estimates.
2	Soft cost and contingency - 30%	1	EA	\$1,512,000	Refer to sheet 3 for exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
Total <b>Budgetary Cost Estimates</b>				\$6,552,000 <b>\$6,600,000</b>	

Notes:  
1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

**Project No:1 - Construction Cost  
Estimates and Duration prepared by  
Power Engineering Company**

Project No. 1: Broken Beam Retrofit in Berths 6 & 7 - Alternate 1, Version 1  
Richmond, California

**ROM Budget for Project 1, Broken Beam Retrofit in Berth 6 & 7 - Version 1**

Date: May 13, 2025

Description	Quantity	Units	\$/Unit	Total	Comments	Working Days
<b>Base Scope</b>						
1 Mobilize/Demobilize	1	LS	\$ 135,239	\$ 135,239		7
2 Cut Holes in Deck	6	EA	\$ 2,017	\$ 12,102		1
3 Furnish & Install Steel Pipe Piles and Support Steel Beam Brackets	6	EA	\$ 45,063	\$ 270,378		10
4 Furnish & Install Steel Beams and Slab Jacking	6	EA	\$ 54,142	\$ 324,852		18
5 F&I Fiberglass Jacket (with Rebar) to Encase Existing Timber Pile - assume 10' Jacket + 2' of Embedment	6	EA	\$ 24,893	\$ 149,358		8
6 Infill Pile Driving Access Holes	6	EA	\$ 2,454	\$ 14,724		1
<b>Total Base Scope:</b>				<b>\$ 906,653</b>		<b>45</b>
<b>Bid Alternates</b>						
AA1 Demolish Existing Deck & Piles	9,000	SF	\$ 60	\$ 540,000		12
AA2 Construct New Pipe Supported Concrete Wharf Deck	9,000	SF	\$ 500	\$ 4,500,000		30
<b>Total Bid Alternates:</b>				<b>\$ 5,040,000</b>		<b>42</b>

**Project Assumptions**

- 1 A working day is defined as an 8-hour weekday between the hours of 6 AM - 5 PM.
- 2 The working days do not include fabrication times for materials.
- 3 Only one mobilization is assumed, with continuous work until project completion.
- 4 All pricing is in current dollars.
- 5 No contingency is included in this budget.

**Schedule Milestones**

- 1 We estimate the on-site construction for the base scope will take approximately 10 weeks for a single crew.

**Design Assumption**

- 1 Per Liftech Sketches, May 2025

**Subcontractors**

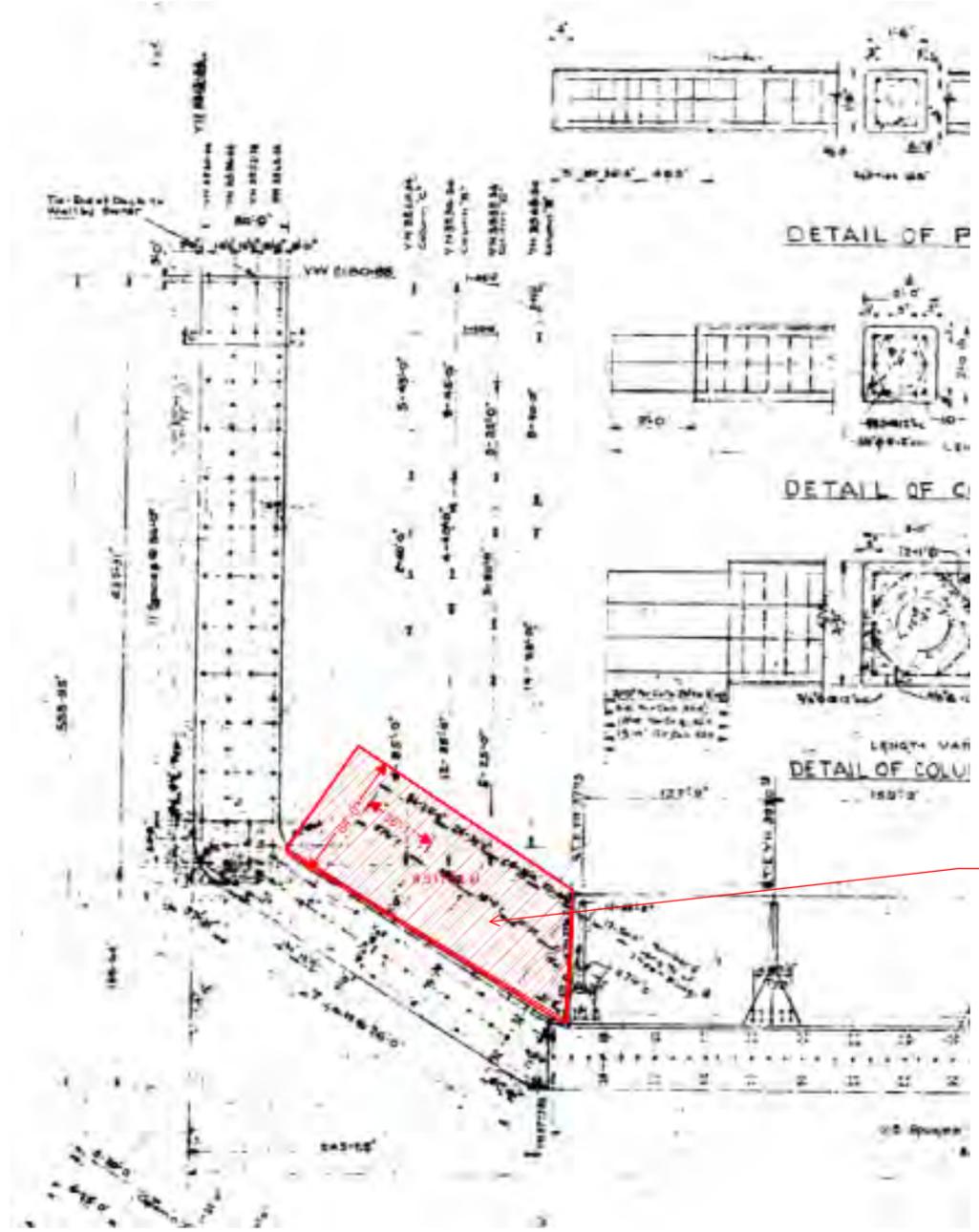
- 1 None assumed.

**Proposal Exclusions**

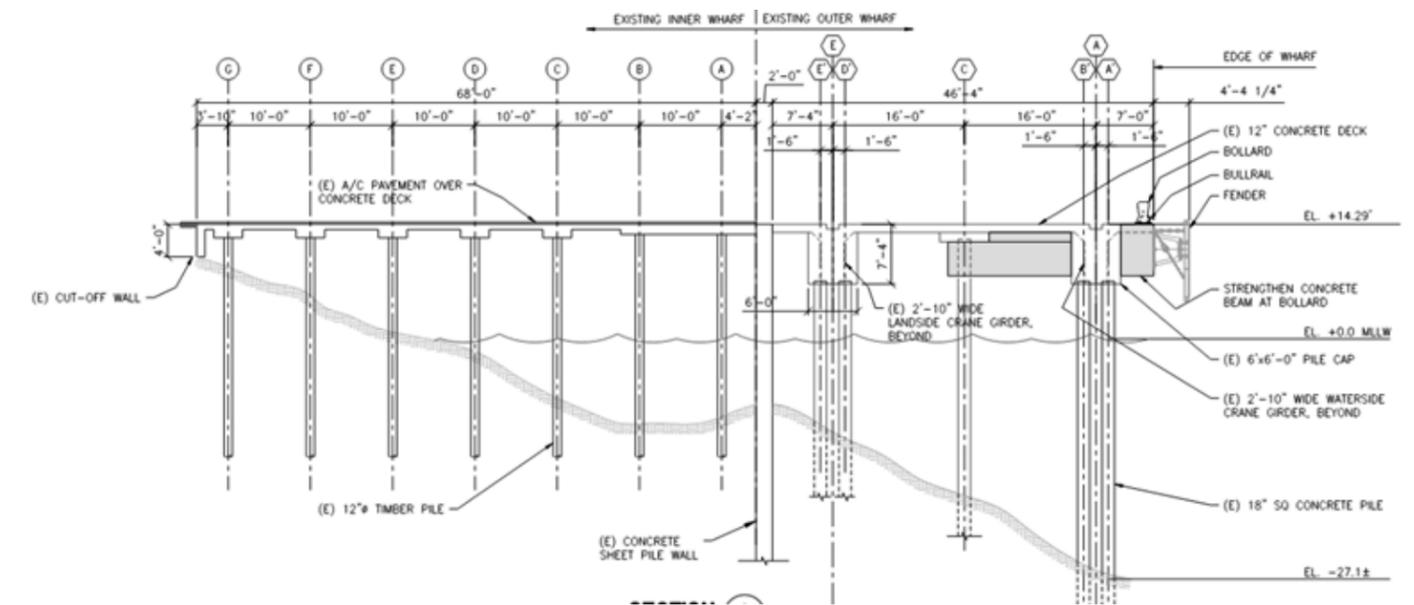
- 1 Payment and Performance Bonds (available at 1.5% of final contract amount)
- 2 Builders Risk Insurance (can be provided on a per-project basis)
- 3 Permits and Permit Fees
- 4 Engineering or Design
- 5 Utility Relocation unless Listed Above
- 6 Site Survey, Lines, Grade
- 7 Hazardous Materials Handling/Abatement/Removal
- 8 Special Inspection or Testing Fees
- 9 Vibration or Damage Monitoring
- 10 Any Repairs to the Existing Structures, Interior or Exterior, either prior to, during, or after Construction
- 11 Temporary Power & Lighting Install and Supply
- 12 Industrial Hygienist or Inspection Services
- 13 Silt Curtain, Bubble Curtain, or other regulatory requirements not normally encountered.

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# Alternate 2 - Demo and Reconstruct wharf Deck at Berth 6



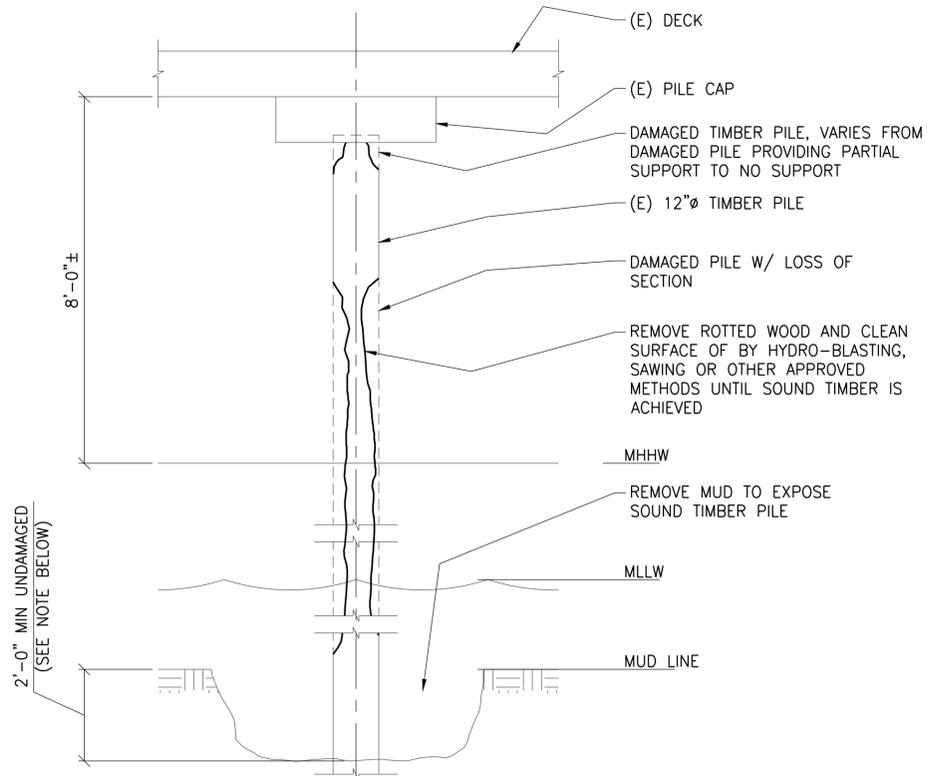
Reconstruct inner wharf with concrete pile supported wharf deck



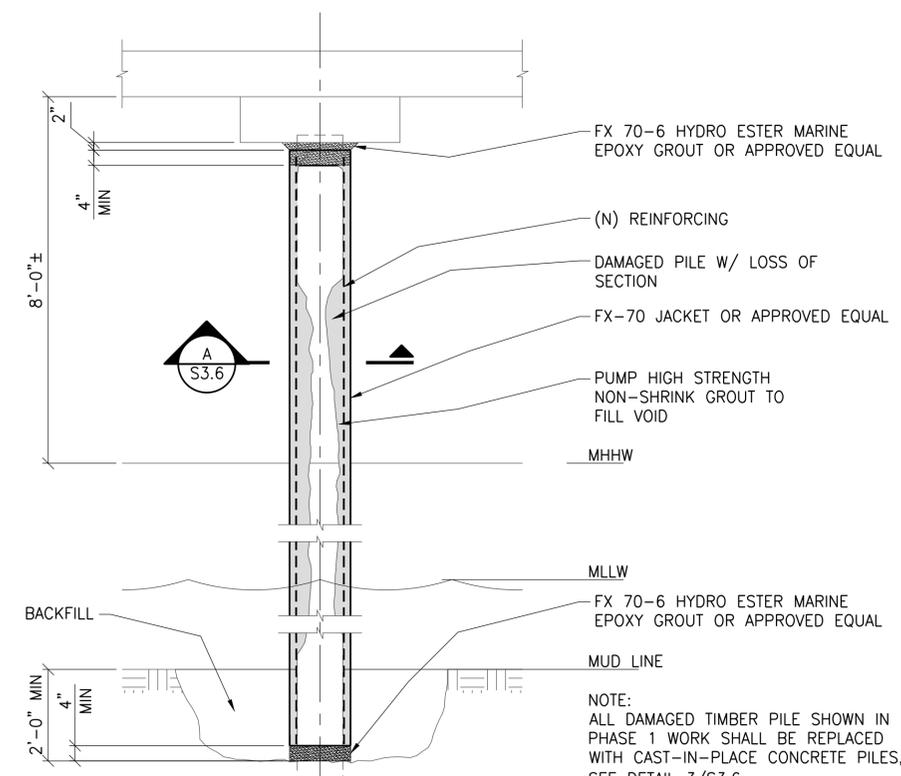
BERTHS 7 AND 8 WHARF CROSS SECTIONS FOR REFERENCE

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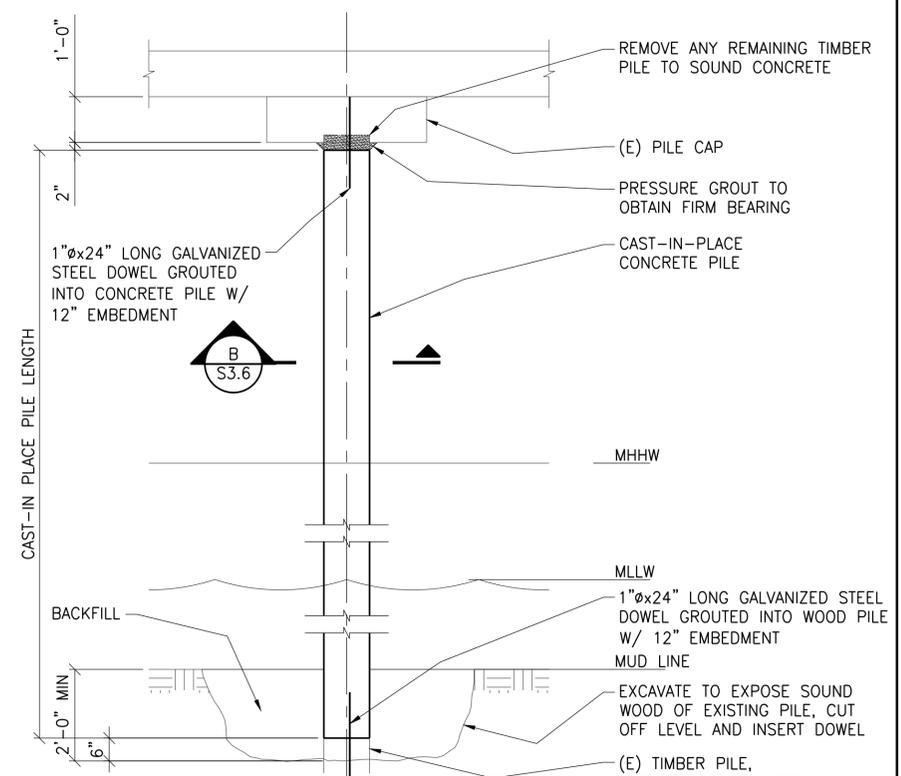
Copyright © 2012 by Liftech Consultants Inc. A California Corporation. All rights reserved. 344 - 20th STREET SUITE 360, Oakland, CA 94612, 510 832-5606 Original border size 525 x 812 mm.



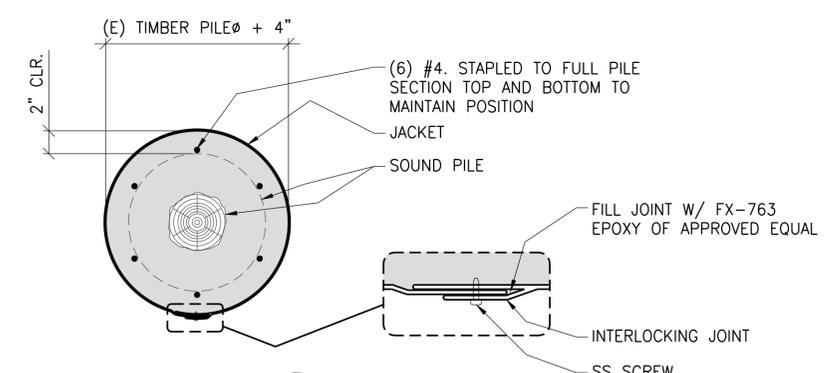
**TYPICAL TIMBER PILE DAMAGED SURFACE PREPARATION**  
 1/2" - 1'-0"  
 NOTE: CONTRACTOR MAY EXCAVATE MORE THAN 2'-0" TO EXPOSE SOUND TIMBER



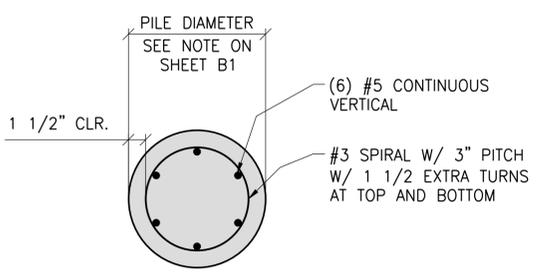
**TYPICAL TIMBER PILE REPAIR DETAIL**  
 1/2" - 1'-0"  
 NOTE: ALL DAMAGED TIMBER PILE SHOWN IN PHASE 1 WORK SHALL BE REPLACED WITH CAST-IN-PLACE CONCRETE PILES. SEE DETAIL 3/S3.6.



**(N) CAST-IN-PLACE PILE TO REPLACE MISSING PILES**  
 1/2" - 1'-0"  
 NOTES:  
 1. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS 24'-0" OR LESS, USE 12" DIAMETER PILE  
 2. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS BETWEEN 24'-0" AND 28'-0", USE 14" DIAMETER PILE.



**SECTION A**  
 1-1/2" - 1'-0"  
 S3.6



**SECTION B**  
 1-1/2" - 1'-0"  
 S3.6

NOTE: CONTRACTOR HAS THE OPTION TO REPAIR TIMBER PILE OR REPLACE DAMAGED PILE WITH CAST-IN-PLACE CONCRETE PILE PER DETAIL 3/S3.6

**REFERENCE DRAWING**



FOR LIFTECH CONSULTANTS INC  
 SIGNATURE DATE:

**ISSUED FOR CONSTRUCTION**  
 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 TIMBER PILE REPAIR AND REPLACEMENT DETAILS

**PRINTED**  
 1/24/2012  
 LIFTECH CONSULTANTS INC  
**Liftech**  
 LIFTECH CONSULTANTS INC

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S3.6  
 Approved SL of ---  
 Date 01/25/10 Revision 1

ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No. Revision	Date	By	Checked	Approved

**PROJECT NO. 2: SHEET PILE WALL INSTALLATION & PAVEMENT SETTLEMENT  
REPAIR**

**Estimated Quantity Take-off for Construction Cost Estimates for Sheet Pile Wall Installation & Pavement Settlement Repair**

Item	Description	Quantity	Unit	Total Quantity	Comments
<b>Berths 7 &amp; 8 - Sheet Pile Wall Installation</b>					
1	Furnish and install sheet pile walls, 228' x 20'	4560.0	SF	4560.0	Refer to reference drawing S4.3 to S4.6 for location and S3.8 for details
2	Furnish and install concrete beams, 1'-3" x 1'-6" x 228'	15.8	CY	15.8	See notes above
3	Excavate and control density fill, 3' x 8' x 228'	202.7	CY	202.7	See drawing sheet S3.8 for extent of density fill
4	Pavement repair, 5' x 288'	1440.0	SF	1440.0	Repair damaged pavement caused by sheet pile wall construction
<b>Berths 5 &amp; 6 - Sheet Pile Wall Installation</b>					
1	Furnish and install sheet pile wall, (375'+120') x 10'	4950.0	SF	4950.0	Refer to sheet 12 for approximate location and reference drawing S3.8 for details
2	Furnish and install concrete beams, 1'-3" X 1'-6" x (375'+120')	34.4	CY	34.4	See notes above
3	Excavate and control density fill, 3'x8' x (375'+120')	440.0	CY	440.0	See drawing sheet S3.8 for extent of density fill
4	Pavement repair, 5' x (375'+120')	2475.0	SF	2475.0	Repair damaged pavement caused by sheet pile wall construction

**Budgetary Cost for Sheet Pile Wall Installation & Pavement Settlement Repair**

Item	Description	Quantity	Unit	Total Quantity	Comments
<b>Berths 7 &amp; 8 - Sheet Pile Wall Installation &amp; Pavement</b>					
1	Construction cost estimates based on 2025 labor and material costs	One	EA	\$884,450	Refer to sheet 2 for Power Engineering Construction cost estimates based on adjusted cost and 50% of mob/demob.
2	Soft cost and contingency - 30%	One	EA	\$265,335	Refer to sheet 2 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
	Subtotal			\$1,149,785	
<b>Berths 5 &amp; 6 - Sheet Pile Wall Installation &amp; Pavement</b>					
1	Construction cost estimates based on 2025 labor and material costs	One	EA	\$1,191,438	Refer to sheet 2 for Power Engineering Construction cost estimates and 50% of mob/demob.
2	Soft cost and contingency - 30%	One	EA	\$357,431	Refer to sheet 2 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
	Subtotal			\$1,548,869	
	Total - Berths 5 to 8			\$2,698,654	
	<b>Budgetary Cost Estimates</b>			<b>\$2,700,000</b>	

Notes:  
 1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

**Project No: 2 - Budgetary Cost Estimates for Sheet Pile Installation and Pavement Settlement Repair**

Scope of Work:

In 2010 project, it was identified segments of Berths 7 and 8 requires soils settlement stabilization to prevent further pavement settlement at the landside edge of the inner wharf. This repair work was not performed in 2010 but required. Refer to reference drawings S4.3 to S4.6 for location and drawing S3.8 for repair details.

On 05/18/2025, a site inspection was performed below deck at Berths 5 & 6, it was noted that the soils/weathered bedrock eroded at the top of the slope causing significant pavement settlement. Refer to ENGEO report (Sheet 2 to 3) for a detail description and recommendation.



Photo 1 - Below Deck, Erosion and Pavement Failure

**Project No: 2 - Construction Cost  
Estimates and Duration prepared by  
Power Engineering Company**

Project 2: Pavement Settlement Repairs at Berths 6, 7, & 8, Version 1  
Richmond, California

**ROM Budget for Pavement Settlement Repairs in Berths 6, 7, & 8, Version 1**

Date: May 14, 2025

Description	Quantity	Units	\$/Unit	Total	Comments	Working Days
<b>Mobilization Allowance</b>						
1 Mobilize/Demobilize	1	LS	\$ 205,596	\$ 205,596		7
						<b>Adjusted cost</b>
<b>Berth 7 &amp; 8: Sheet Pile Wall Installation</b>						
2 Furnish & Install Sheet Pile Walls (228' x 20' Long) - Assume PZC 13 Sheets	4,560	SF	\$ 74	\$ 337,440	<b>\$425,440</b>	6
3 Furnish & Install Concrete Beams (1' 3" x 1' 6" x 228')	16	CY	\$ 6,350	\$ 101,600	<b>\$128,100</b>	7
4 Excavate and Place Control Density Fill (3' x 8' x 228')	203	CY	\$ 720	\$ 146,160	<b>\$164,750</b>	9
5 Pavement Repair (5' x 288') - Assume 10" AC Lift	1,440	SF	\$ 44	\$ 63,360		2
<b>Berth 6: Sheet Pile Wall Installation</b>						
6 Furnish & Install Sheet Pile Wall ((375' + 120') x 10' Long) - Assume PZC 13 Sheets	4,950	SF	\$ 89	\$ 440,550		10
7 Furnish & Install Concrete Beams (1' 3" x 1' 6" x (375' + 120'))	35	CY	\$ 6,354	\$ 222,390		15
8 Excavate and Place Control Density Fill (3' x 8' x (375'+120'))	440	CY	\$ 720	\$ 316,800		19
9 Pavement Repair (5' x 375' + 120')) - Assume 10" AC Lift	2,475	SF	\$ 44	\$ 108,900		4
				<b>Total Base Scope:</b>	<b>\$ 1,942,796</b>	<b>78</b>

Revised length 257 ft

**Project Assumptions**

- 1 A working day is defined as an 8-hour weekday between the hours of 6 AM - 5 PM.
- 2 The working days do not include fabrication times for materials.
- 3 Only one mobilization is assumed, with continuous work until project completion.
- 4 All pricing is in current dollars.
- 5 No contingency is included in this budget.

**Schedule Milestones**

- 1 We estimate the on-site construction for the base scope will take approximately 14 weeks for a single crew.

**Design Assumption**

- 1 Per Liftech Sketches, May 2025

**Subcontractors**

- 1 None assumed.

**Proposal Exclusions**

- 1 Payment and Performance Bonds (available at 1.5% of final contract amount)
- 2 Builders Risk Insurance (can be provided on a per-project basis)
- 3 Permits and Permit Fees
- 4 Engineering or Design
- 5 Utility Relocation unless Listed Above
- 6 Site Survey, Lines, Grade
- 7 Hazardous Materials Handling/Abatement/Removal
- 8 Special Inspection or Testing Fees
- 9 Vibration or Damage Monitoring
- 10 Any Repairs to the Existing Structures, Interior or Exterior, either prior to, during, or after Construction.
- 11 Temporary Power & Lighting Install and Supply
- 12 Industrial Hygienist or Inspection Services
- 13 Silt Curtain, Bubble Curtain, or other regulatory requirements not normally encountered.

Project No.  
**26829.000.001**

April 28, 2025  
Revised July 2, 2025

Mr. Matt Trowbridge  
Moffatt & Nichol  
1300 Clay Street, Suite 350  
Oakland, CA 94612

Subject: Port of Richmond Point Potrero Marine Terminal  
Richmond, California

## UNDERDECK GEOTECHNICAL INSPECTION

Dear Mr. Trowbridge:

We prepared this letter to document our observations during underdeck inspections at the Point Potrero Marine Terminal at the Port of Richmond in Richmond, California. As you know, we joined Liftech Consultants Inc. (Liftech) for an inspection of the conditions below the deck of the existing Marine Terminal. We performed our underdeck inspections both from boat and on foot.

On March 18, we observed the conditions below Berths 5 and 6 during a boat inspection; Power Engineering Construction (Power) provided the boat and pilot and Liftech performed structural inspections. The purpose of our inspection was to observe geotechnical conditions. In particular, we were interested to see the conditions along Berth 5 where collapse of the pavement occurred along the interface of land and the wharf structure, and a portion of Berth 6 where the deck structure has settled.

During our inspection, we observed existing weathered rock outcropping and rock-derived fill covering the surface of the slope below the marginal wharf structures. Portions of the ground along Berth 5 are protected by variably sized riprap revetment. As shown in Exhibit 1, the area of the settled wharf appears to be a result of a crack through the support beam. There is no evidence that any of the piles in this area have plunged, though there are several piles that have been removed and not replaced. A structural fix will be necessary in this area. Likely the replacement of missing piles will be required to perform this repair.

Along much of the wharf, there is a headwall at the interface of the wharf structure and the land. However, in the area of the settled pavement at Berth 5, there is no headwall, and the soil/weathered bedrock appears to be eroding at the top of the slope below the wharf (as shown in Exhibit 2). In this area, we recommend creating a confinement structure at the top of the slope to retain and protect fill from erosion and backfilling the area of lost ground so the pavement can be restored and stabilized.

Sht 3 of 13

**EXHIBIT 1: Area of Settled Wharf – Berth 6**



**EXHIBIT 2: Area of Settled Pavement Behind Wharf – Berth 5**



On May 19, 2025, we performed an inspection below the deck of Berths 7 and 8 with Liftech. We performed this inspection between the existing sheet pile wall and the landward slope. We entered the area through manholes in the deck; Power provided assistance with access and site safety monitoring. During our inspection, we again observed stable slope conditions below the wharf and no evidence of pile plunging. Again in areas where pavement settlement was observed at the interface between the land and the wharf, this appeared to be due to erosion of the top of the slope in areas without a headwall; in one area this lack of wall appeared to be due to utility penetration and the eroded soil was likely utility trench backfill. We recommend a similar fix in this area.

If you have any questions or comments regarding this letter, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

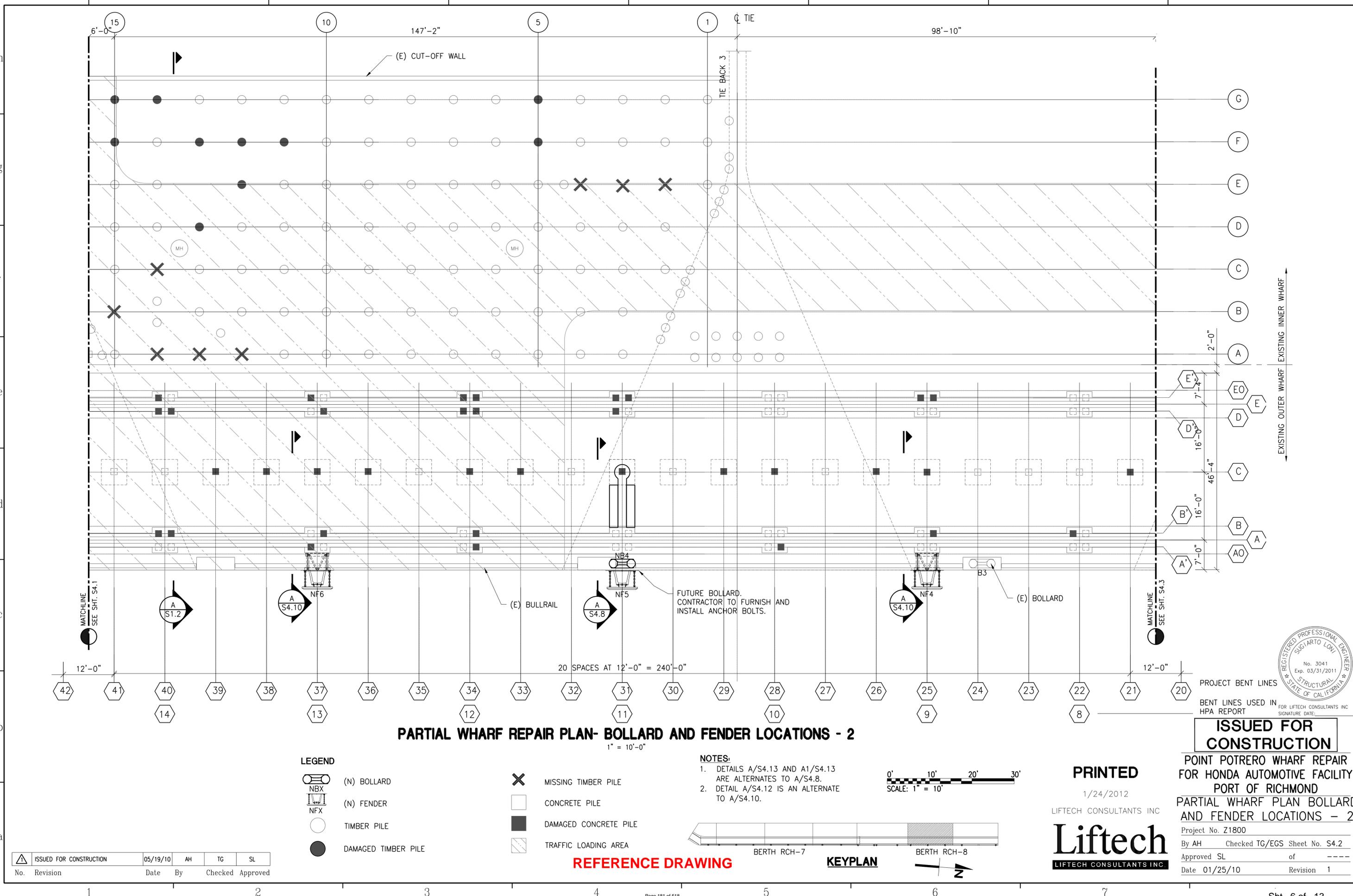
  
Jeff Fippin, GE

jf/rhb/cb



  
Robert H. Boeche, CEG

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 2**

1" = 10'-0"

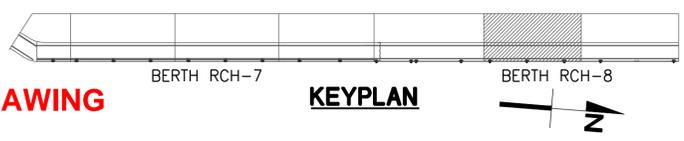
**LEGEND**

- (N) BOLLARD
- (N) FENDER
- TIMBER PILE
- DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**

1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



**REFERENCE DRAWING**

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PROJECT BENT LINES

BENT LINES USED IN HPA REPORT FOR LIFTECH CONSULTANTS INC SIGNATURE DATE:

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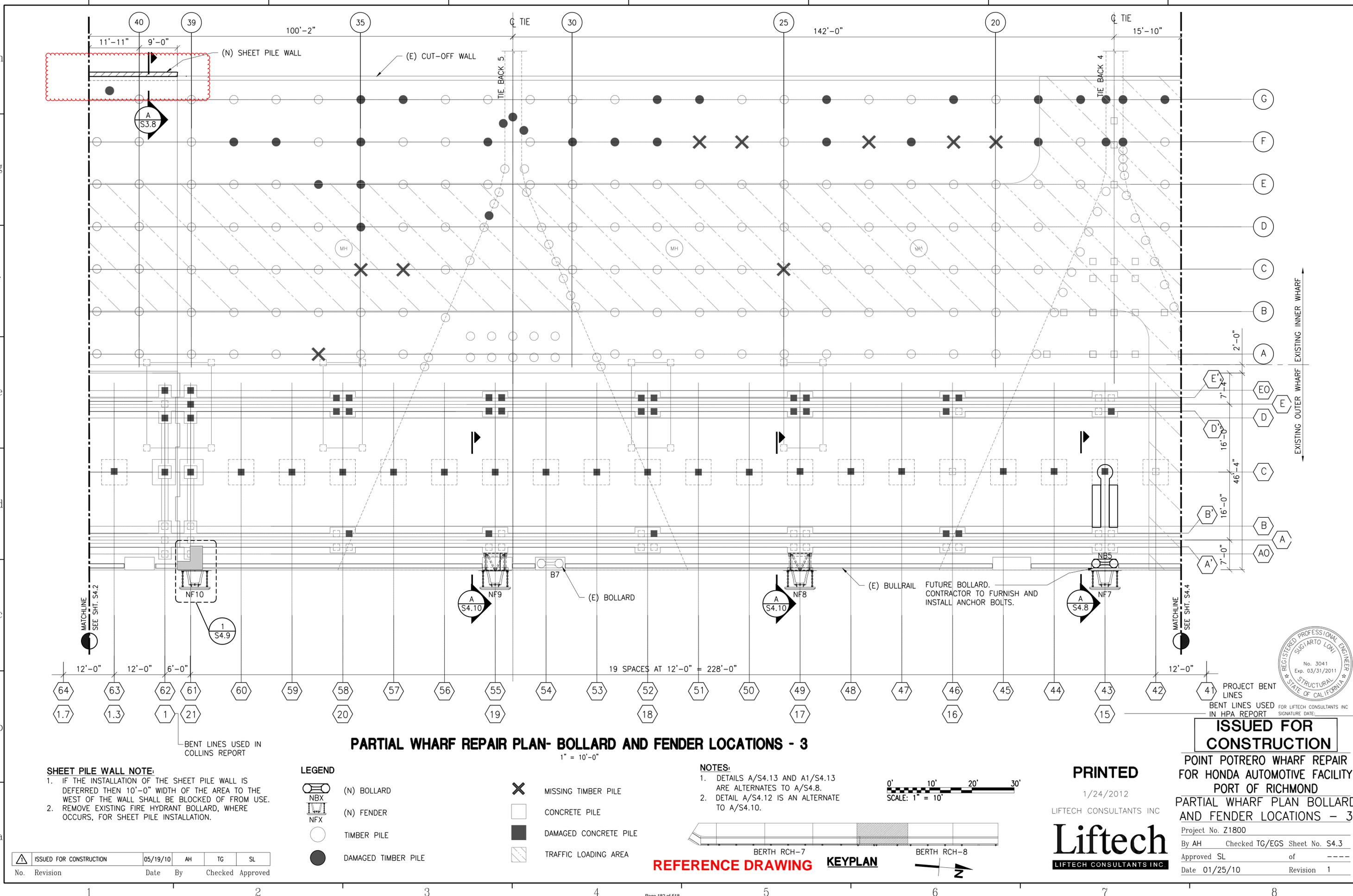
POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND

**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 2**

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S4.2  
 Approved SL of ---  
 Date 01/25/10 Revision 1

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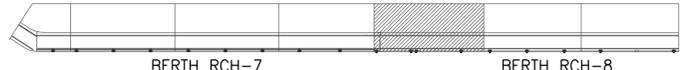
**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 3**

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**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

LEGEND	
	(N) BOLLARD
	(N) FENDER
	TIMBER PILE
	DAMAGED TIMBER PILE
	MISSING TIMBER PILE
	CONCRETE PILE
	DAMAGED CONCRETE PILE
	TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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 PORT OF RICHMOND  
 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 3

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S4.3  
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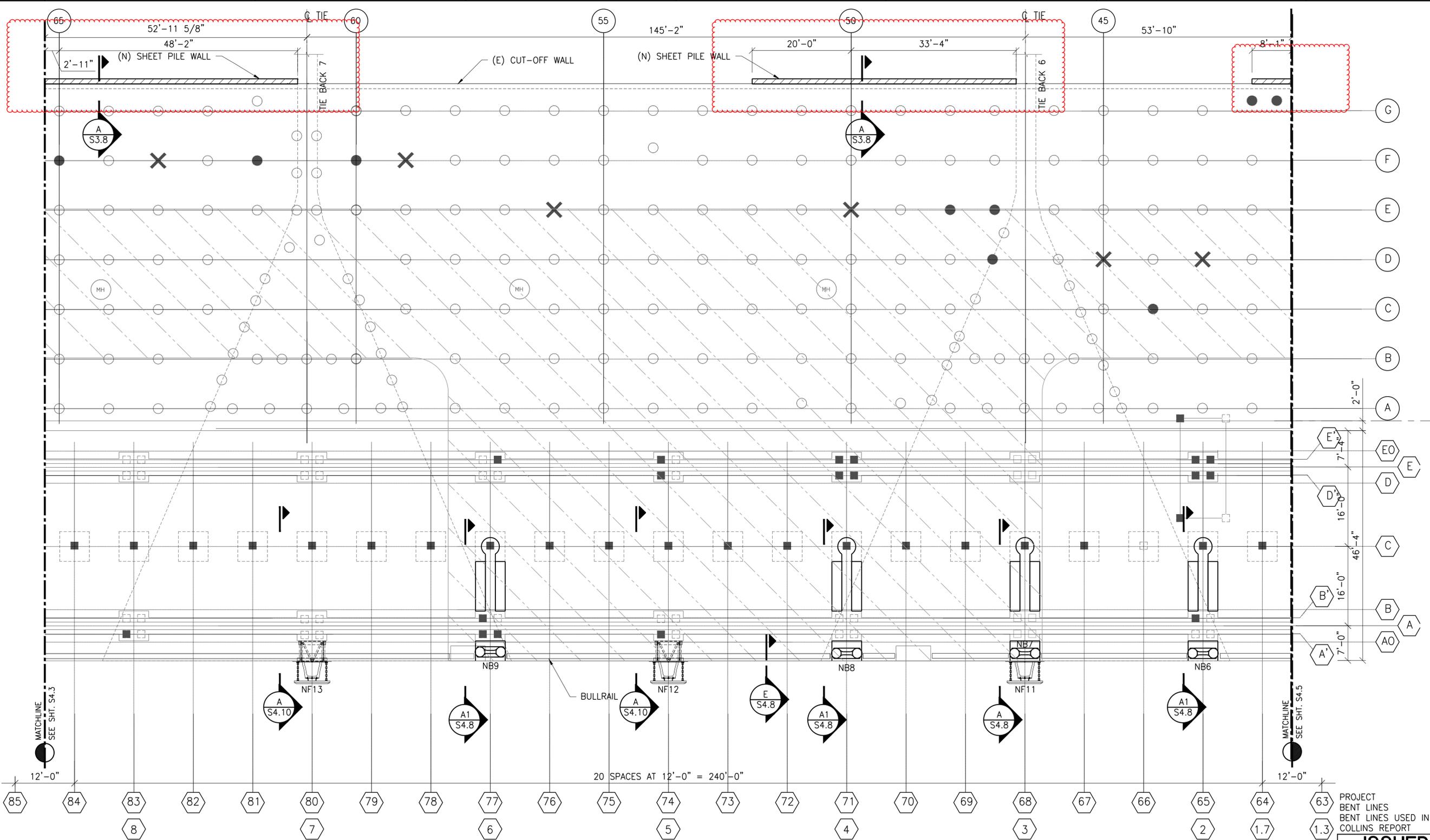
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 LIFTECH CONSULTANTS INC



**REFERENCE DRAWING KEYPLAN**

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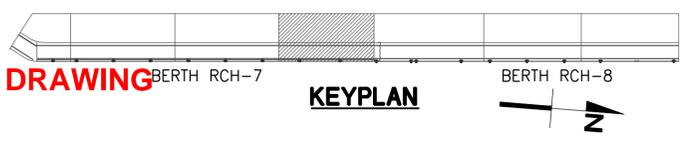
**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 4**  
1" = 10'-0"

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- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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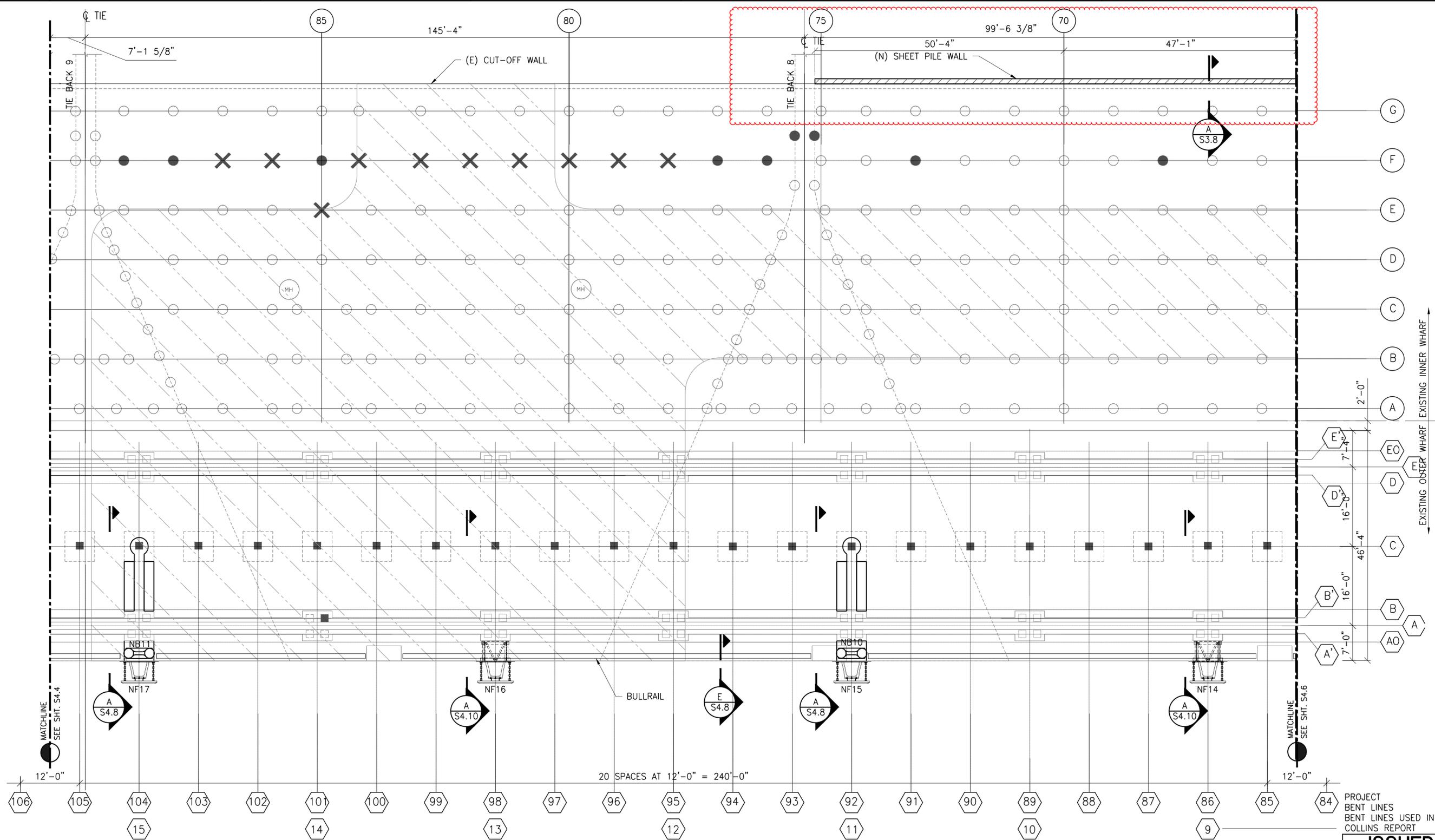
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Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.4  
Approved SL of ---  
Date 01/25/10 Revision 1



EXISTING OUTER WHARF EXISTING INNER WHARF

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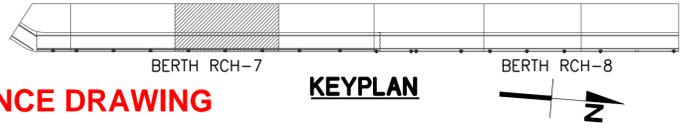
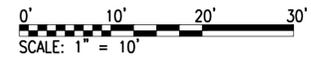
**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 5**  
 1" = 10'-0"

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 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

**LEGEND**

	(N) BOLLARD		MISSING TIMBER PILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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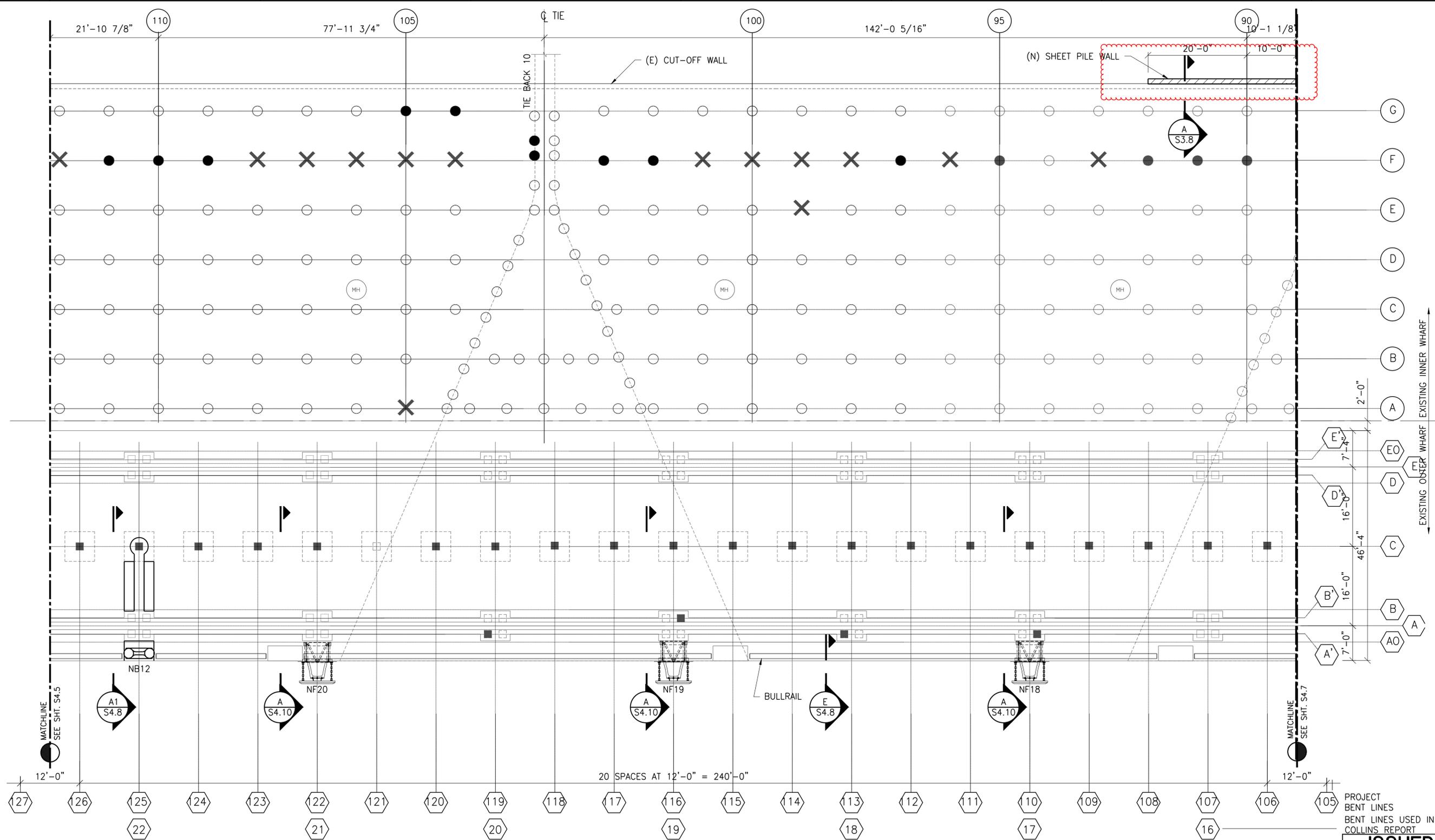
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**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 5**  
 Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S4.5  
 Approved SL of ---  
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I:\Z1800\Draw\Current\54-7 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7.dwg 1/24/2012 3:37 PM ALVIN HOFFFAUR

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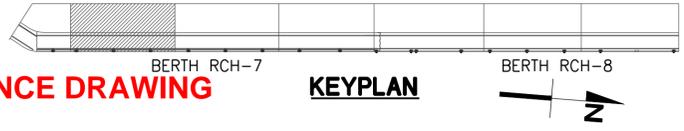
**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 6**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
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**LEGEND**

	(N) BOLLARD		MISSING TIMBER PILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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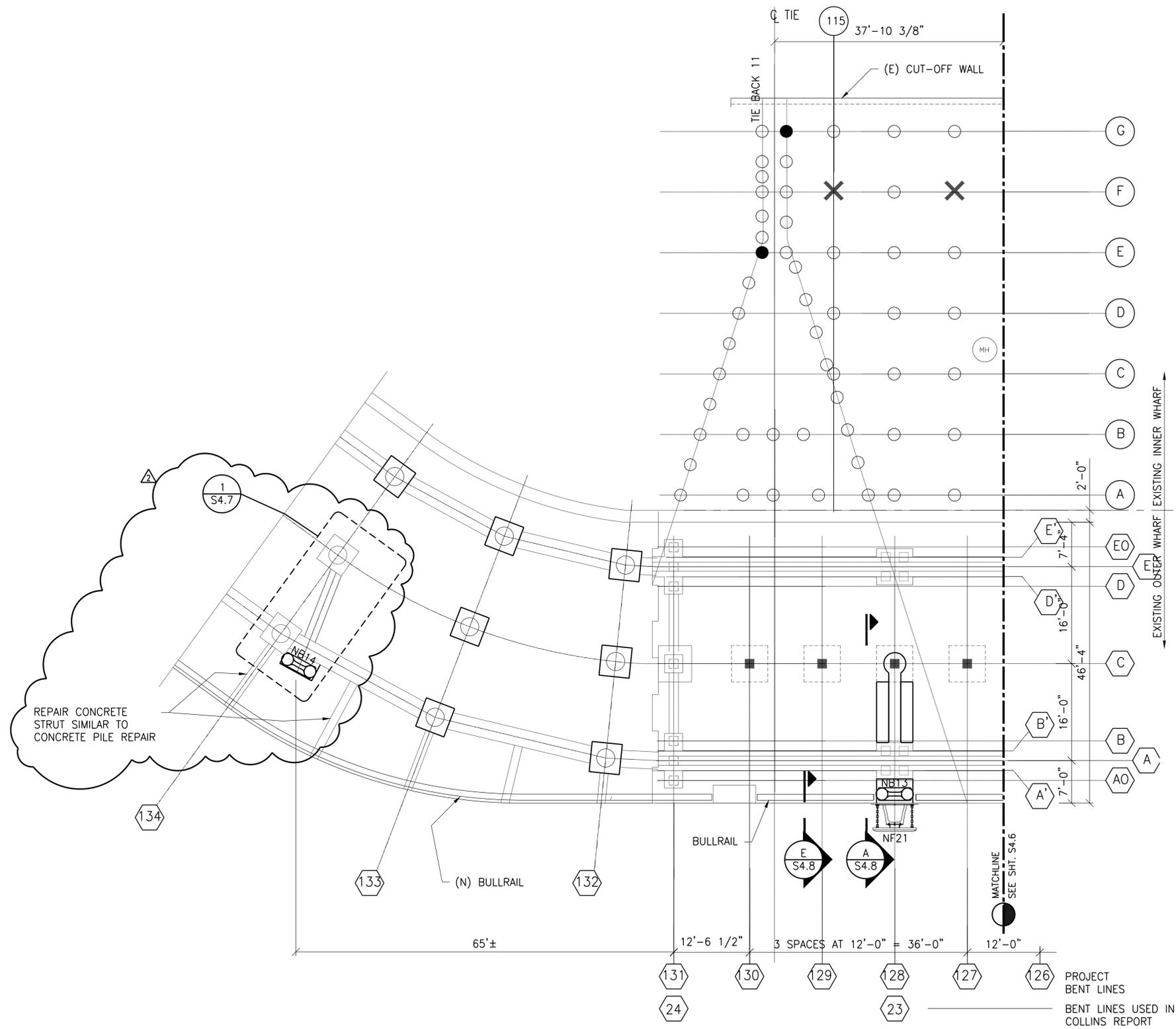
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PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 6  
Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.6  
Approved SL of  
Date 01/25/10 Revision 1

**REGISTERED PROFESSIONAL ENGINEER**  
SUGIARTO LOVI  
No. 3041  
Exp. 03/31/2011  
STRUCTURAL  
STATE OF CALIFORNIA

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 7**

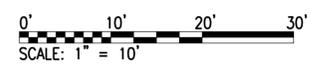
1" = 10'-0"

**LEGEND**

- (N) BOLLARD
- (N) FENDER
- TIMBER PILE
- DAMAGED TIMBER PILE
- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**

1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



	BOLLARD NO. 14 SUPPORT	06/11/10	LMK/AH	TG	SL
	ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No.	Revision	Date	By	Checked	Approved



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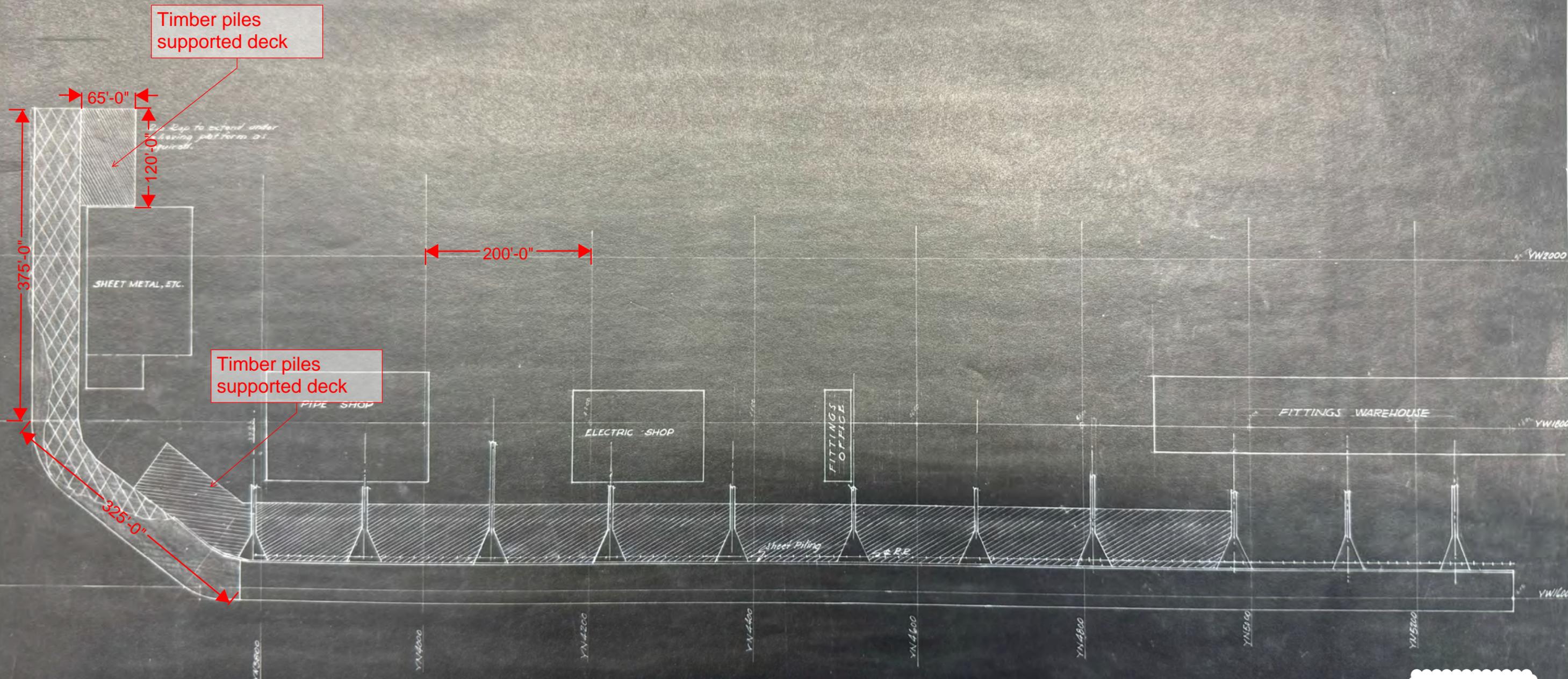
**ISSUED FOR CONSTRUCTION**

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PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S4.7  
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Date 01/25/10 Revision 2

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**Liftech**  
LIFTECH CONSULTANTS INC

**REFERENCE DRAWING KEYPLAN**



PLAN OF RELIEVING PLATFORM

SCALE 1" = 60'-0"

- LEGEND
- EXISTING STRUCTURE
  - ▨ DOCK TO BE BUILT
  - ▤ SUPPORTING SLAB
  - ▩ RIP RAP

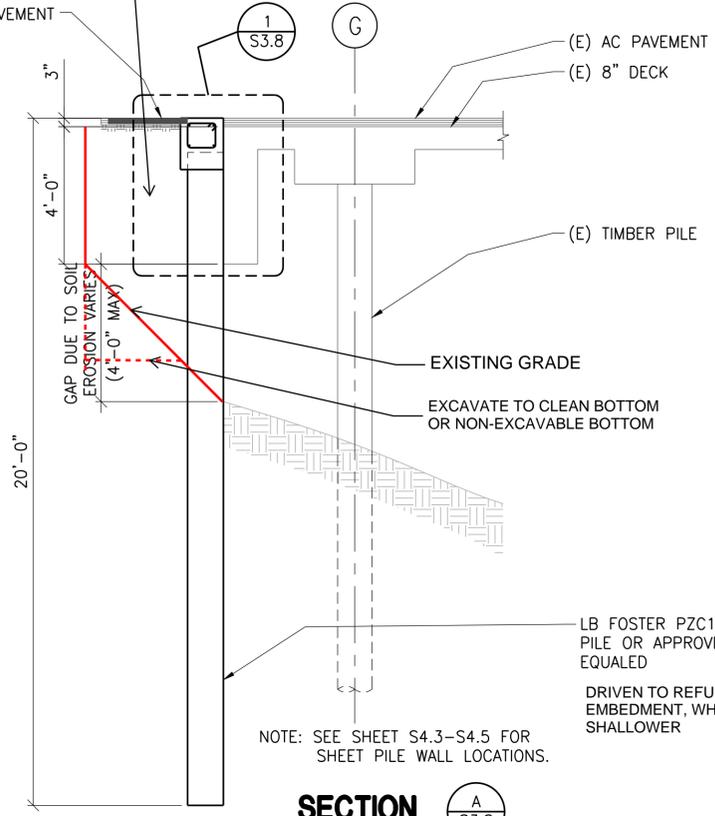
REFERENCE DRAWING

REVISIONS				KAISER COMPANY, INC.	
MK.	DATE	BY	OK	RICHMOND, CALIFORNIA	
				RELIEVING PLATFORM	
				FITTING OUT DOCK AT	
				RICHMOND YARD NO. 3	
				DATE JAN 25, 1943	SUBMITTED
				SCALE 1" = 60'-0"	APPROVED

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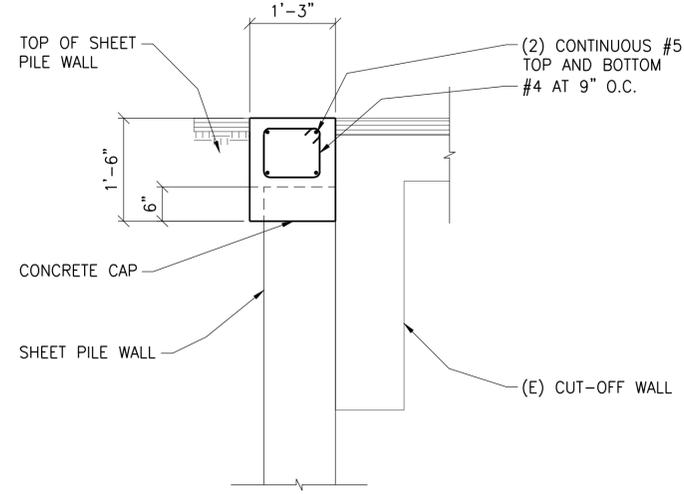
BACKFILL WITH CONTROL DENSITY FILL WITH 28-DAY COMPRESSIBLE STRENGTH OF 100 PSI.

REPAIR (E) AC PAVEMENT AS REQUIRED



**SECTION**  
3/8" - 1'-0"

1  
S3.8



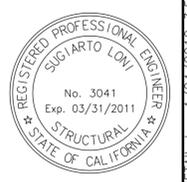
**DETAIL**  
3/4" - 1'-0"

1  
S3.8

NOTE: SEE SHEET S4.3-S4.5 FOR SHEET PILE WALL LOCATIONS.

LB FOSTER PZC13 SHEET PILE OR APPROVED EQUIVALED  
DRIVEN TO REFUSAL OR 5'-0" MINIMUM EMBEDMENT, WHICHEVER IS SHALLOWER

XXXX-XXX 1



FOR LIFTECH CONSULTANTS INC  
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FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

SHEET PILE DETAIL

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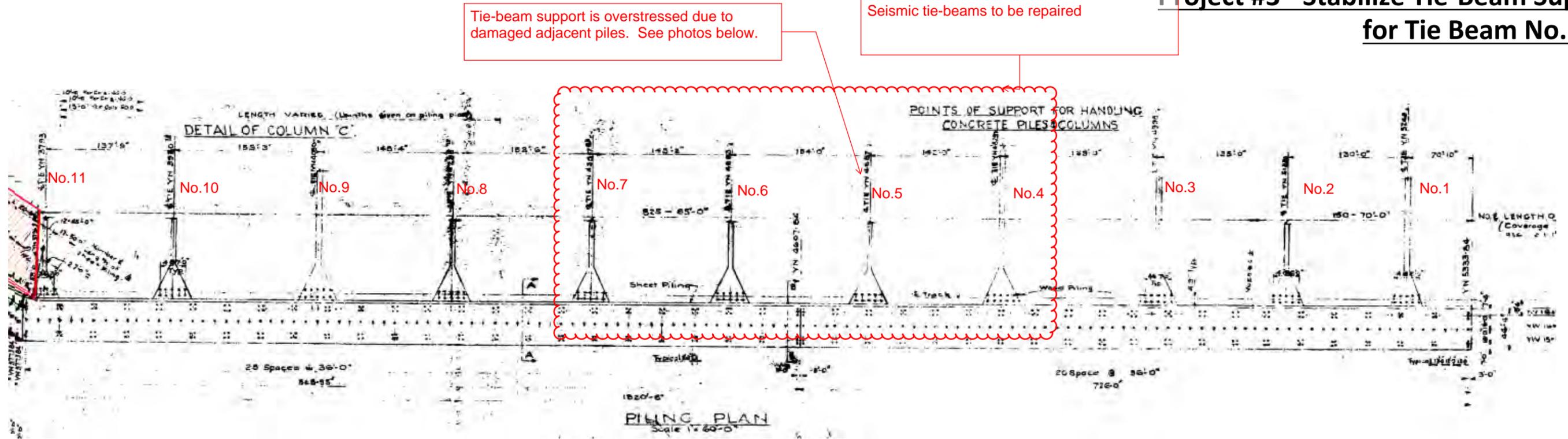
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**PROJECT NO. 3: SEISMIC TIE BEAM SUPPORT STABILIZATION**

# Project #3 - Stabilize Tie-Beam Supports for Tie Beam No. 4 to 7



Missing piles

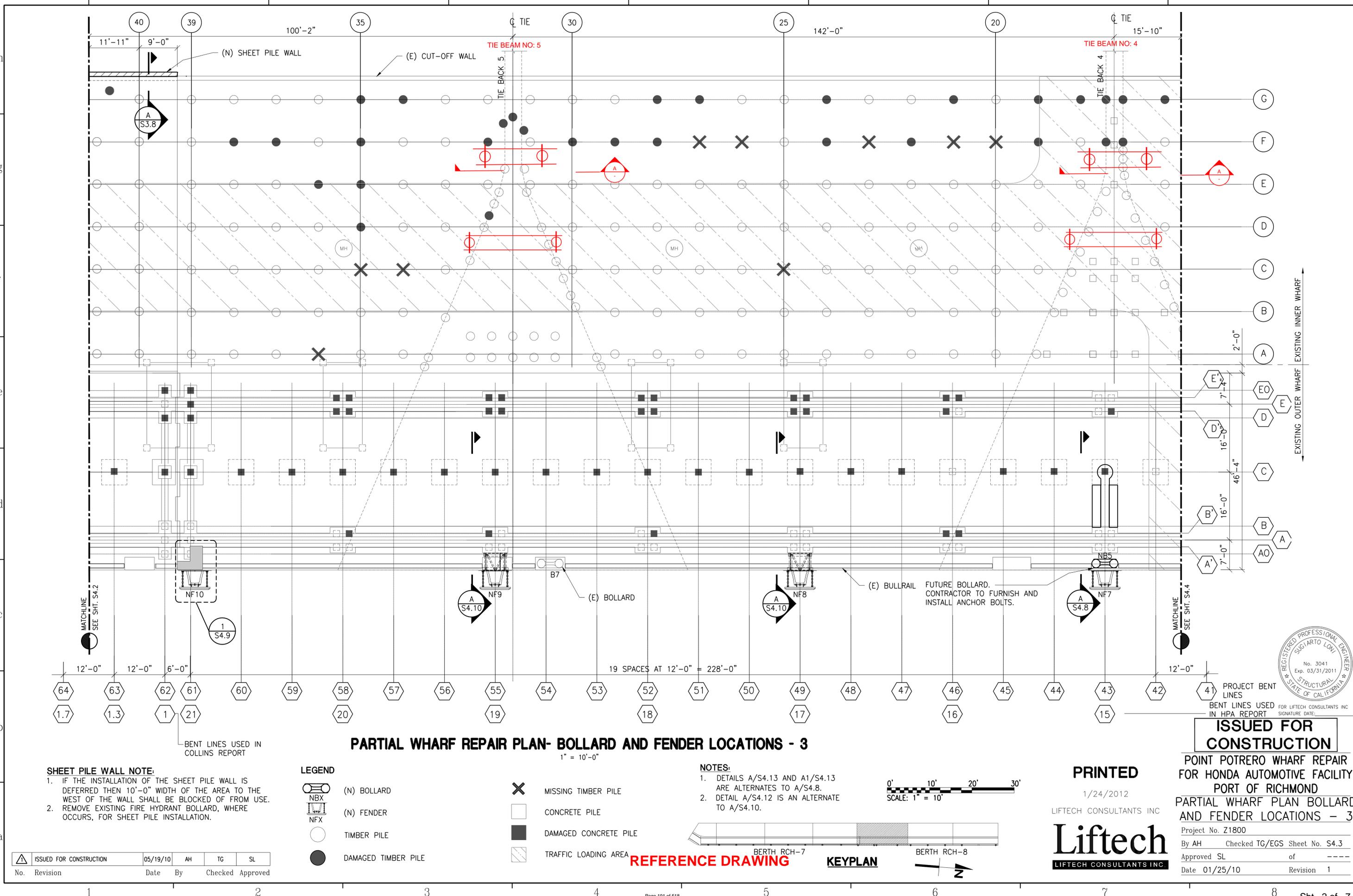


Pile overstressing



Seismic tie projected to pavement surface. Some settlement observed

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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 3**

1" = 10'-0"

**SHEET PILE WALL NOTE:**

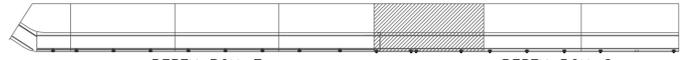
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**LEGEND**

- (N) BOLLARD
- (N) FENDER
- TIMBER PILE
- DAMAGED TIMBER PILE
- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**

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- DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



**REFERENCE DRAWING KEYPLAN**

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PROJECT BENT LINES  
BENT LINES USED FOR LIFTECH CONSULTANTS INC IN HPA REPORT SIGNATURE DATE:

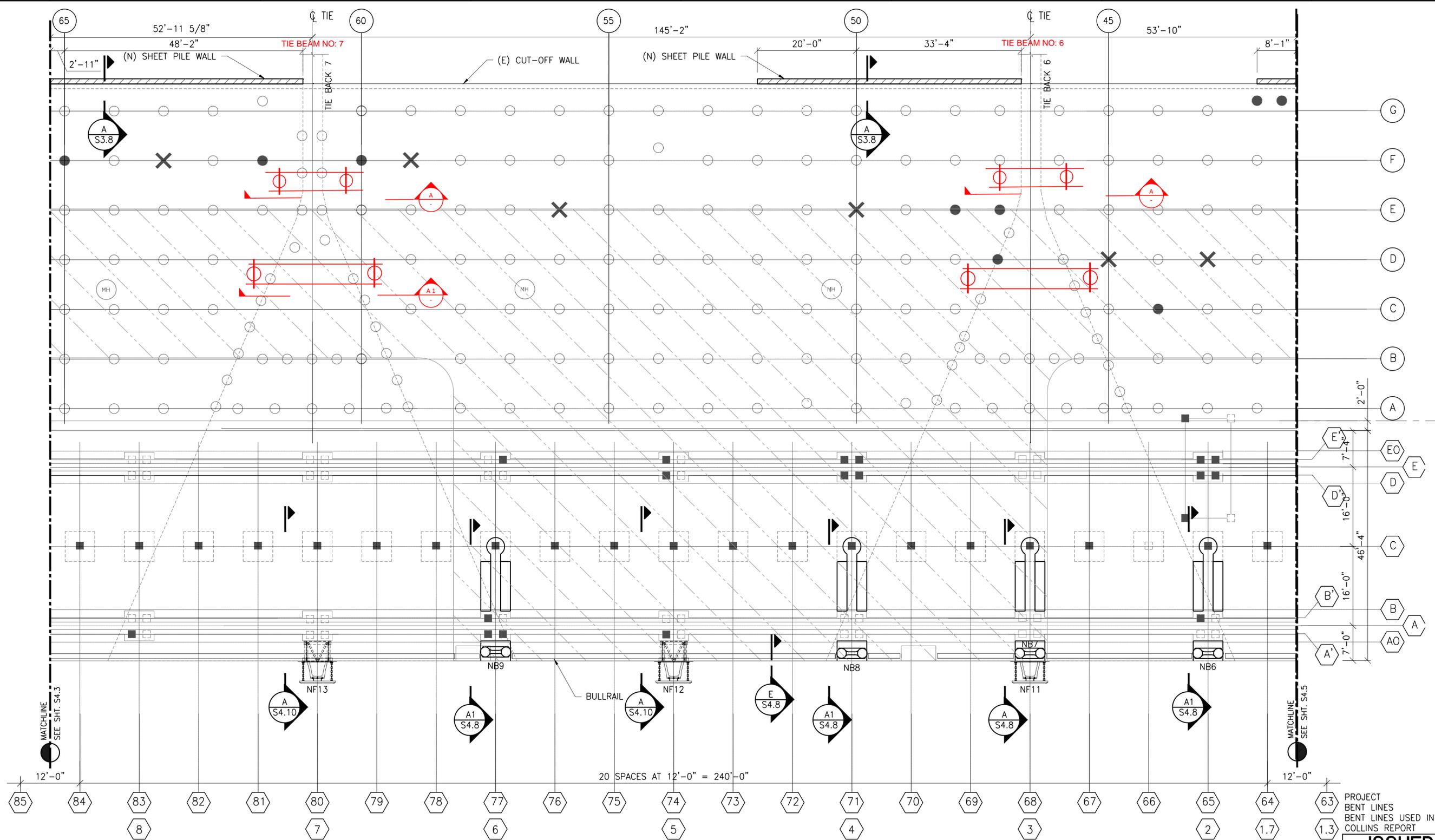
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PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 3

Project No. Z1800  
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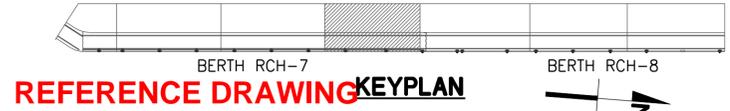
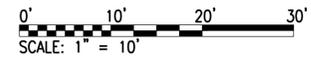


**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 4**  
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- LEGEND**
- (N) BOLLARD
  - (N) FENDER
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PORT OF RICHMOND  
PARTIAL WHARF PLAN BOLLARD  
AND FENDER LOCATIONS - 4

Project No. Z1800

By AH Checked TG/EGS Sheet No. S4.4

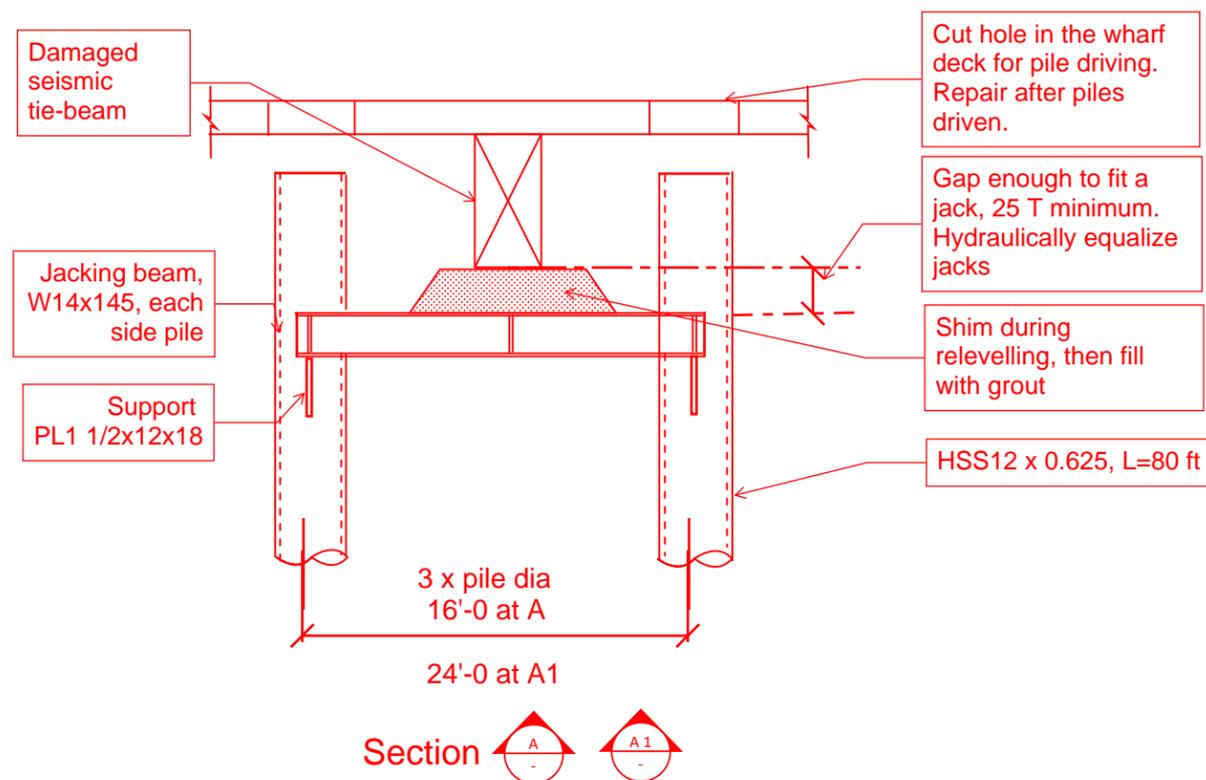
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## Project #3 - Stabilize Tie-Beam Supports for Tie Beam No. 4 to 7



Note:  
The section shown above is not to scale and schematic in nature to convey the repair concepts. Refer to repair concept notes this sheet.

### Scope of Work:

#### Repair concept:

1. Cut holes at wharf deck for pile and beam installation.
2. Install pile each side of the deflected beams (4 locations per tie-beam as shown on plan. Total 4 - seismic tie beams)
3. Install beam support plates
4. Install jacking/support beams
5. Jack the beam and slab to a level position using shim plates.
6. Remove jacks
7. Add non-shrink grout for permanent beam support.
8. Perform corrosion damage repair for the concrete tie-beam.
9. Repair deck reinforcing at holes and install grout or concrete.
10. Repair corrosion damage at seismic tie-beam. Refer to reference drawing S3.3 for similar repair.

**Project #3 - Budgetary Cost Estimates**

**Estimated Quantity Take-off for Construction Cost Estimates for Seismic Tie-beam Support Stabilization**

Item	Description	Quantity	Unit	Total Quantity	Comments
<b>Seismic Tie-beam Support Stabilization</b>					
1	Cut holes in the deck	16	EA	16	Refer to scope of work description
2	Furnish and install steel pipe piles and steel support beams	16	EA	16	Refer to scope of work description
3	Furnish and install steel beams and slab jacking	16	EA	16	Refer to scope of work description
4	In-fill holes with continuity slab rebars	16	EA	16	Refer to scope of work description
5	Repair concrete beams	1200	SF	1200	Assume 300 SF of beam areas have corrosion damage/tie beam.

**Budgetary Cost for Seismic Tie-beam Support Stabilization**

Item	Description	Quantity	Unit	ROM Cost	Comments
<b>Seismic Tie-beam Support Stabilization</b>					
1	Construction cost estimates based on 2025 labor and material costs	One	EA	\$3,565,255	Refer to sheet 6 for Power Engineering Construction cost estimates.
2	Soft cost and contingency - 30%	One	EA	\$1,069,577	Refer to sheet 6 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
<b>Total</b>				<b>\$4,634,832</b>	
<b>Budgetary Cost Estimates</b>				<b>\$4,600,000</b>	

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

**Project No: 3 - Construction Cost  
Estimates and Duration prepared by  
Power Engineering Company**

Project No. 3 - Stabilize Tie-Beam Supports for Tie Beam No. 4 to 7  
Richmond, California

**ROM Budget for Project 3 to Stabilize Tie-Beam Supports for Tie Beam No. 4 to 7**

Date: May 15, 2025

Description	Quantity	Units	\$/Unit	Total	Comments	Working Days
<b>Base Scope</b>						
1 Mobilize/Demobilize	1	LS	\$ 135,239	\$ 135,239		7
2 Cut Holes on the Deck	16	EA	\$ 2,017	\$ 32,272		1
3 Furnish & Install Steel Pipe Piles and Support Steel Beam Brackets	16	EA	\$ 45,063	\$ 721,008		26
4 Furnish & Install Steel Beams and Slab Jacking	16	EA	\$ 54,142	\$ 866,272		48
5 Infill Pile Driving Access Holes	16	EA	\$ 2,454	\$ 39,264		1
6 Repair Concrete Beam - assume 300 SF of Beam Area has Corrosion and Repair Depth = 8"	1,200	SF	\$ 1,476	\$ 1,771,200		56
<b>Total Base Scope:</b>				<b>\$ 3,565,255</b>		<b>140</b>

**Project Assumptions**

- 1 A working day is defined as an 8-hour weekday between the hours of 6 AM - 5 PM.
- 2 The working days do not include fabrication times for materials.
- 3 Only one mobilization is assumed, with continuous work until project completion.
- 4 All pricing is in current dollars.
- 5 No contingency is included in this budget.

**Schedule Milestones**

- 1 We estimate the on-site construction for the base scope will take approximately 26 weeks for a single crew.

**Design Assumption**

- 1 Per Liftech Sketches, May 2025

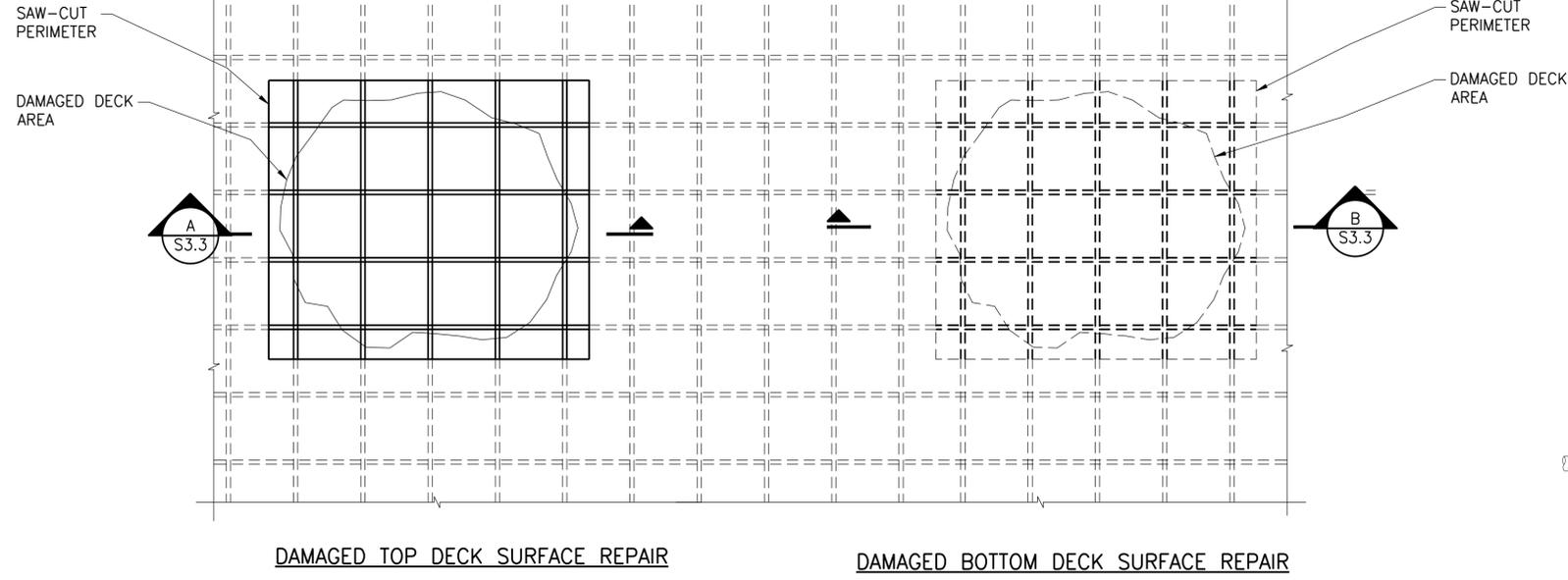
**Subcontractors**

- 1 None assumed.

**Proposal Exclusions**

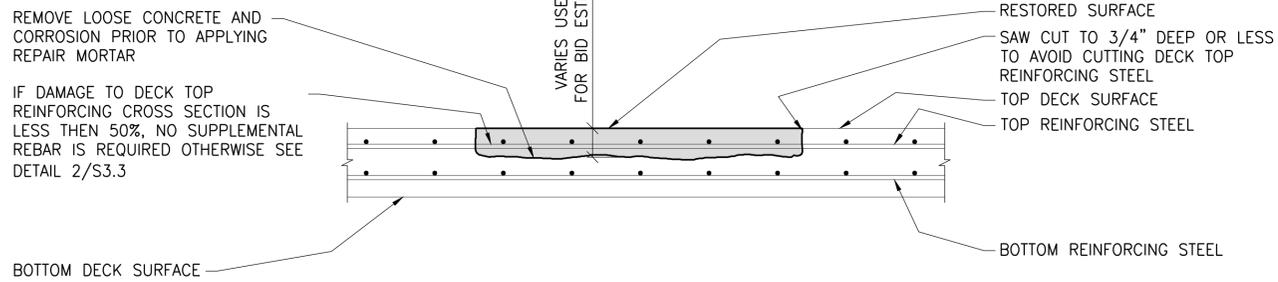
- 1 Payment and Performance Bonds (available at 1.5% of final contract amount)
- 2 Builders Risk Insurance (can be provided on a per-project basis)
- 3 Permits and Permit Fees
- 4 Engineering or Design
- 5 Utility Relocation unless Listed Above
- 6 Site Survey, Lines, Grade
- 7 Hazardous Materials Handling/Abatement/Removal
- 8 Special Inspection or Testing Fees
- 9 Vibration or Damage Monitoring
- 10 Any Repairs to the Existing Structures, Interior or Exterior, either prior to, during, or after Construction
- 11 Temporary Power & Lighting Install and Supply
- 12 Industrial Hygienist or Inspection Services
- 13 Silt Curtain, Bubble Curtain, or other regulatory requirements not normally encountered.

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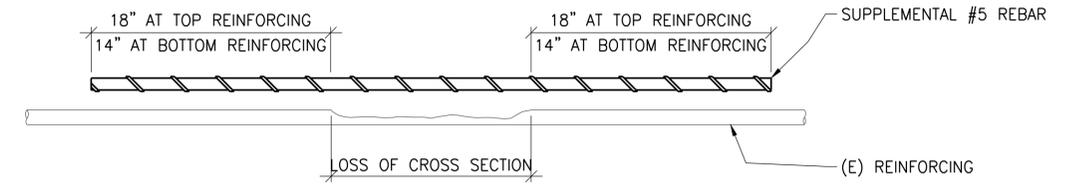
**CONCRETE REMOVAL AND SURFACE PREPARATION**  
3/4" - 1'-0"

1  
S3.3



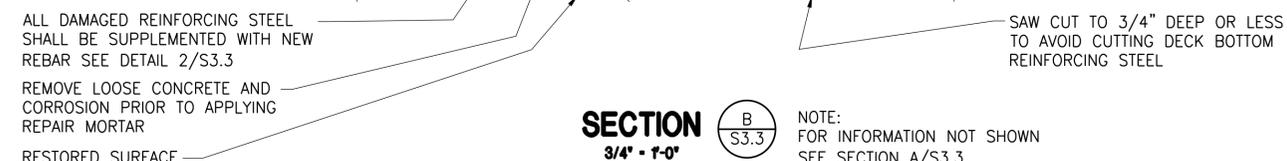
**SECTION**  
3/4" - 1'-0"

A  
S3.3



**SUPPLEMENTAL REBAR DETAIL**  
DO NOT SCALE

2  
S3.3



**SECTION**  
3/4" - 1'-0"

B  
S3.3

**WHARF DECK REPAIR NOTES:**

- THE PURPOSE OF THE WHARF DECK REPAIR IS TO RESTORE THE WHARF STRUCTURAL STRENGTH TO SUPPORT A DESIGN LIVE LOAD OF 250 PSF AND TO EXTEND THE SERVICE LIFE OF THE STRUCTURE.
- THE DECK REPAIR WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
  - AMERICAN CONCRETE INSTITUTE, CONCRETE REPAIR GUIDE. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2004.
  - AMERICAN CONCRETE INSTITUTE, SURFACE REPAIR USING FORM-AND-PUMP TECHNIQUES. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2003.
  - INTERNATIONAL CONCRETE REPAIR INSTITUTE, GUIDE FOR SURFACE PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION (GUIDELINE NO. 310.1R-2008). DES PLAINES, IL: INTERNATIONAL CONCRETE REPAIR INSTITUTE, 2008..
- AT REPAIR AREAS CONTRACTOR SHALL PERFORM SOUNDING OR OTHER APPROPRIATE NON-DESTRUCTIVE CONCRETE TESTING TO LOCATE AREAS OF DELAMINATION FOR THE TOP AND BOTTOM DECK SURFACES OF INNER AND OUTER WHARVES FOR BERTH RCH-7 AND RCH-8.
- CONTRACTOR SHALL MARK THE PERIMETER OF THE DECK
- REPAIR AREAS TO BE SAW CUT. LAYOUT SHALL BE SQUARE OR RECTANGULAR IN SHAPE. NOTIFY THE ENGINEER FOR REVIEW OF THE PERIMETER TO BE SAW CUT AREA PRIOR TO THE CUTTING.
- THE WHARF DECK REPAIR SYSTEM CONSISTING OF REBAR PROTECTION AND MORTAR SHALL BE COMPATIBLE AND SHALL BE SUPPLIED BY A SINGLE SOURCE SO THAT THE REPAIR SYSTEM PERFORMS AS WARRANTED BY THE PRODUCTS MANUFACTURER
- THE FOLLOWING CONCRETE AND TIMBER PILE REPAIR PRODUCTS ARE ACCEPTABLE:
  - BASF CONSTRUCTION CHEMICAL, LLC**  
EMACO S66 CI, FLOWABLE STRUCTURAL-REPAIR CONCRETE WITH INTEGRAL CORROSION INHIBITOR, FOR TOP DECK SURFACE REPAIR
  - EMACO S88 CI, SPRAYABLE FIBER-REINFORCED STRUCTURAL REPAIR MORTAR WITH INTEGRAL CORROSION INHIBITOR FOR BOTTOM DECK SURFACE REPAIR.
  - MASTERSEAL CP, ADVANCED CORROSION INHIBITOR TREATMENT FOR STEEL REINFORCED CONCRETE, APPLIED TO REPAIRED AREAS.
  - SIKA CORPORATION**  
SIKA ARMATEC 110 EPOCEM  
SIKAREPAIR 222 FOR TOP SURFACE  
SIKAREPAIR 223 FOR BOTTOM SURFACE
- CONTRACTOR MAY SUBMIT ALTERNATE EQUIVALENT WHARF DECK REPAIR SYSTEM TO THE ENGINEER AND PORT FOR REVIEW AND APPROVAL. THE PRODUCTS INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- SEE NOTES ON SHEET S2.1 AND GENERAL NOTES.

**REFERENCE DRAWING**



FOR LIFTECH CONSULTANTS INC  
SIGNATURE DATE:

**ISSUED FOR CONSTRUCTION**  
POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
WHARF DECK REPAIR NOTES  
AND DETAILS

**PRINTED**  
1/24/2012

LIFTECH CONSULTANTS INC  
**Liftech**  
LIFTECH CONSULTANTS INC

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S3.3  
Approved SL of ---  
Date 01/25/10 Revision 1

ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No. Revision	Date	By	Checked	Approved

**PROJECT NO. 4: DAMAGED CONCRETE PILES, BEAMS, AND DECK REPAIRS AT BERTHS 7 & 8**

**Project No: 4 - Damaged Concrete Piles,  
Beams, and Deck Repairs  
Berths 7 and 8**

**Estimated Quantity Take-off for Construction Cost Estimates  
for Damaged Concrete Piles, Beams, and Deck Repairs at Berths 7 & 8**

Item	Description	Quantity	Unit	Damaged Factor	Total Quantity	Comments
<b>Outer Wharf Concrete Piles, Beams, and Deck Repairs</b>						
1	Concrete piles	120	EA	1.25	150	Refer to as-built drawings for the quantity of the un-repaired concrete piles. Refer to reference drawing S3.5 for repair details.
2	WS Crane Beam, outer face - 6.3' deep x 1540' long	9,702	SF	0.33	3,202	Refer to reference drawing sheet S3.3 for similar concrete repair details.
3	WS Crane Beam, inner face - 6.3' deep x 1540' long	9,702	SF	0.33	3,202	Same notes above as item 2
4	LS Crane Beam, outer face - 6.3' deep x 1540' long	9,702	SF	0.33	3,202	Same notes above as item 2
5	LS Crane Beam, inner face - 6.3' deep x 1540' long	9,702	SF	0.33	3,202	Same notes above as item 2
6	Underdeck soffit - 46.3' x 1540'	71,302	SF	0.2	14,260	Same notes above as item 2
7	Deck top - 46.3 x 1540'	71,302	SF	0.3	21,391	Same notes above as item 2
<b>Inner Wharf - Concrete Pier and Deck Repairs</b>						
1	Install concrete piers for missing timber piles	26	EA	1.25	33	Refer to as-built drawings for the quantity of the un-repaired missing timber piles. Refer to reference drawing sheet S3.6 for repair details.
2	Repair damaged timber piles	55	EA	1.25	69	Refer to as-built drawings for the quantity of the un-repaired damaged timber piles. Refer to reference drawing S3.6 for repair details.
3	Underdeck soffit - 68' x 1540'	104,720	SF	0.2	20,944	Refer to repair details on reference drawing S3.3.
4	Deck top - 68' x 1540'	104,720	SF	0.3	31,416	Same notes above as item 3.

Scope of Work:

**Outer Wharf**

1. Repair concrete piles identified in 2010 project but not repaired at that time.
2. Repair face beam corrosion damage identified in 2010 project but not repaired at that time.
3. Repair under deck soffit and top deck slab damage in accordance with reference drawing S3.3.

**Inner Wharf**

1. Install concrete piers at the missing timber piles in accordance with detail 3/S3.6 shown in reference drawing S3.6.
2. Repair damage timber piles in accordance with detail 2/S3.6 shown in reference drawing S3.6.
3. Repair damage under deck soffit and top deck in accordance to reference drawing S3.3

**Budgetary Cost for Damaged Concrete Piles, Beams, and Deck Repairs at Berths 7 & 8**

Item	Description	Quantity	Unit	ROM Cost	Comments
<b>Outer and Inner Wharf Concrete Piles, Beams, and Deck Repairs</b>					
1	Construction cost estimates based on 2025 labor and material costs	One	EA	\$99,927,461	Refer to sheet 2 for Power Engineering Construction cost estimates.
2	Soft cost and contingency - 30%	One	EA	\$29,978,238	Refer to sheet 2 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
<b>Total</b>				\$129,905,699	
<b>Budgetary Cost Estimates</b>				<b>\$130,000,000</b>	

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

# Project No: 4 - Construction Cost Estimates and Duration prepared by Power Engineering Company

Project 4: Pile and Soffit Repair in Berth 7 & 8  
Richmond, California

## ROM Budget for Project 4: Pile and Soffit Repair in Berth 7 & 8

Date: May 16, 2025

Description	Quantity	Units	\$/Unit	Total	Comments	Working Days
<b>Mobilization Allowance</b>						
1 Mobilize/Demobilize	1	LS	\$ 560,000	\$ 560,000		24
<b>Outer Wharf</b>						
2 F&I Fiberglass Jacket (with Rebar) to Encase Existing Concrete Pile - assume 10' Jacket + 2' of Embedment	181	EA	\$ 24,500	\$ 4,434,500	Adjusted Price: \$3,675,000	42
3 WS Crane Beam, outer face - 6' 3" deep x 1,540' long: Spall Repair	3,202	SF	\$ 1,476	\$ 4,726,152		27
4 WS Crane Beam, inner face - 6' 3" deep x 1,540' long: Spall Repair	3,202	SF	\$ 1,476	\$ 4,726,152		27
5 LS Crane Beam, outer face - 6' 3" deep x 1,540' long: Spall Repair	3,202	SF	\$ 1,476	\$ 4,726,152		27
6 LS Crane Beam, inner face - 6' 3" deep x 1,540' long: Spall Repair	3,202	SF	\$ 1,476	\$ 4,726,152		26
7 Underdeck Soffit - 46.3' x 1,540': Spall Repair	14,260	SF	\$ 1,337	\$ 19,065,620		107
8 Deck Top - 46.3' x 1,540': Spall Repair	21,391	SF	\$ 515	\$ 11,016,365		122
<b>Inner Wharf</b>						
9 F&I Fiberglass Jacket (with Rebar) to Repair Missing Timber Pile - assume 10' Jacket + 2' of Embedment	61	EA	\$ 24,750	\$ 1,509,750	\$ 816,750	14
10 F&I Fiberglass Jacket (with Rebar) to Encase Existing Timber Pile - assume 10' Jacket + 2' of Embedment	91	EA	\$ 24,750	\$ 2,252,250	\$1,707,750	21
11 Underdeck Soffit - 68' x 1,540': Spall Repair	20,944	SF	\$ 1,337	\$ 28,002,128		157
12 Deck Top - 68' x 1,540': Spall Repair	31,416	SF	\$ 515	\$ 16,179,240		88
<b>Total Base Scope:</b>				<b>\$ 101,924,461</b>	<b>\$99,927,461</b>	<b>682</b>

### Project Assumptions

- 1 A working day is defined as an 8-hour weekday between the hours of 6 AM - 5 PM.
- 2 The working days do not include fabrication times for materials.
- 3 Only one mobilization is assumed, with continuous work until project completion.
- 4 All pricing is in current dollars.
- 5 No contingency is included in this budget.

### Schedule Milestones

- 1 We estimate the on-site construction would take approximately 2.6 years with an average crew of 84 craft workers.

### Design Assumption

- 1 Per Liftech Sketches, May 2025

### Subcontractors

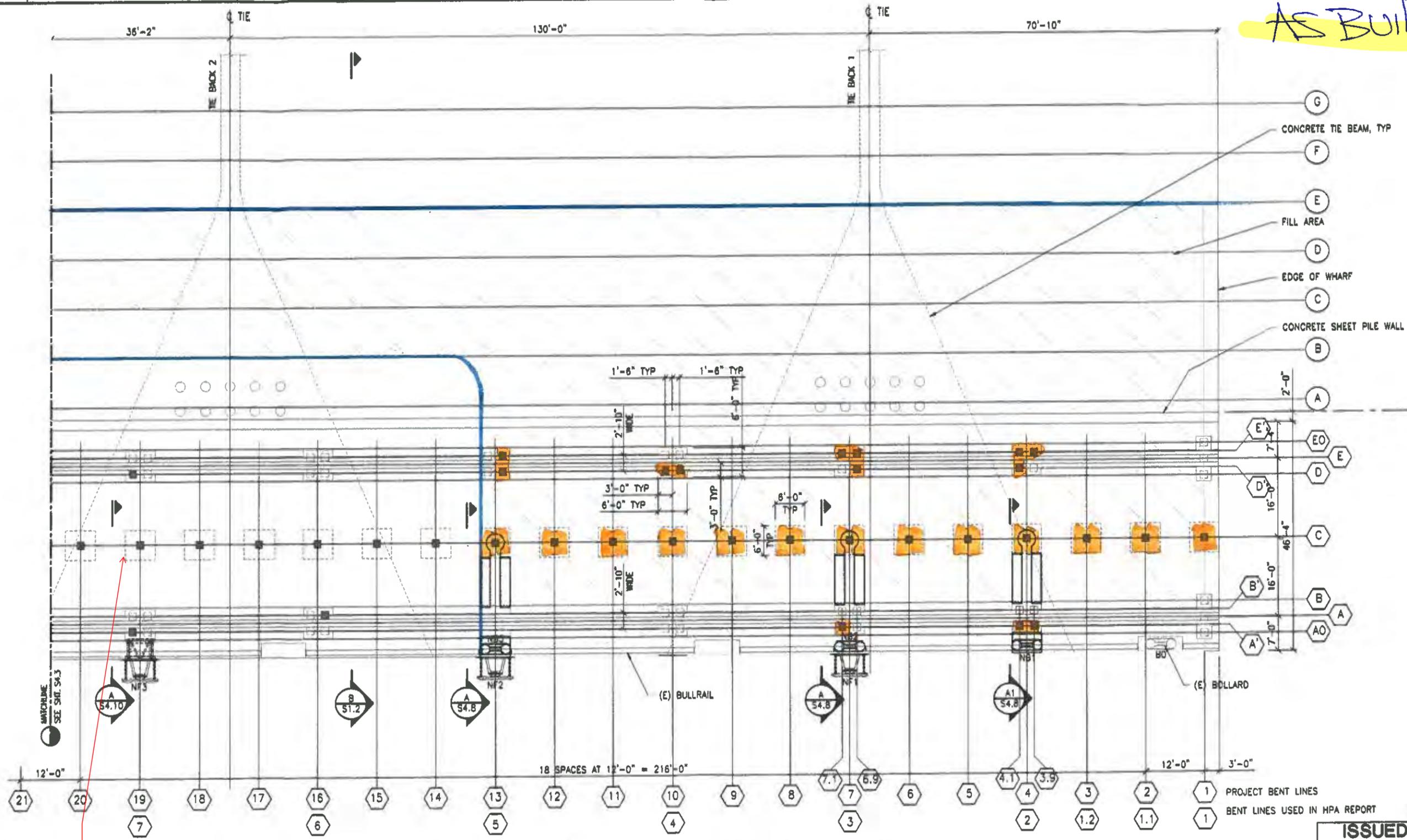
- 1 None assumed.

### Proposal Exclusions

- 1 Payment and Performance Bonds (available at 1.5% of final contract amount)
- 2 Builders Risk Insurance (can be provided on a per-project basis)
- 3 Permits and Permit Fees
- 4 Engineering or Design
- 5 Utility Relocation unless Listed Above
- 6 Site Survey, Lines, Grade
- 7 Hazardous Materials Handling/Abatement/Removal
- 8 Special Inspection or Testing Fees
- 9 Vibration or Damage Monitoring
- 10 Any Repairs to the Existing Structures, Interior or Exterior, either prior to, during, or after Construction
- 11 Temporary Power & Lighting Install and Supply
- 12 Industrial Hygienist or Inspection Services
- 13 Silt Curtain, Bubble Curtain, or other regulatory requirements not normally encountered.

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Damaged concrete piles = 8

### PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 1

1" = 10'-0"

#### LEGEND

- (N) BOLLARD
- (N) FENDER
- TIMBER PILE
- DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA

#### NOTES:

1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND

PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 1

Project No Z1800

By AH Checked TG/EGS Sheet No S4.1

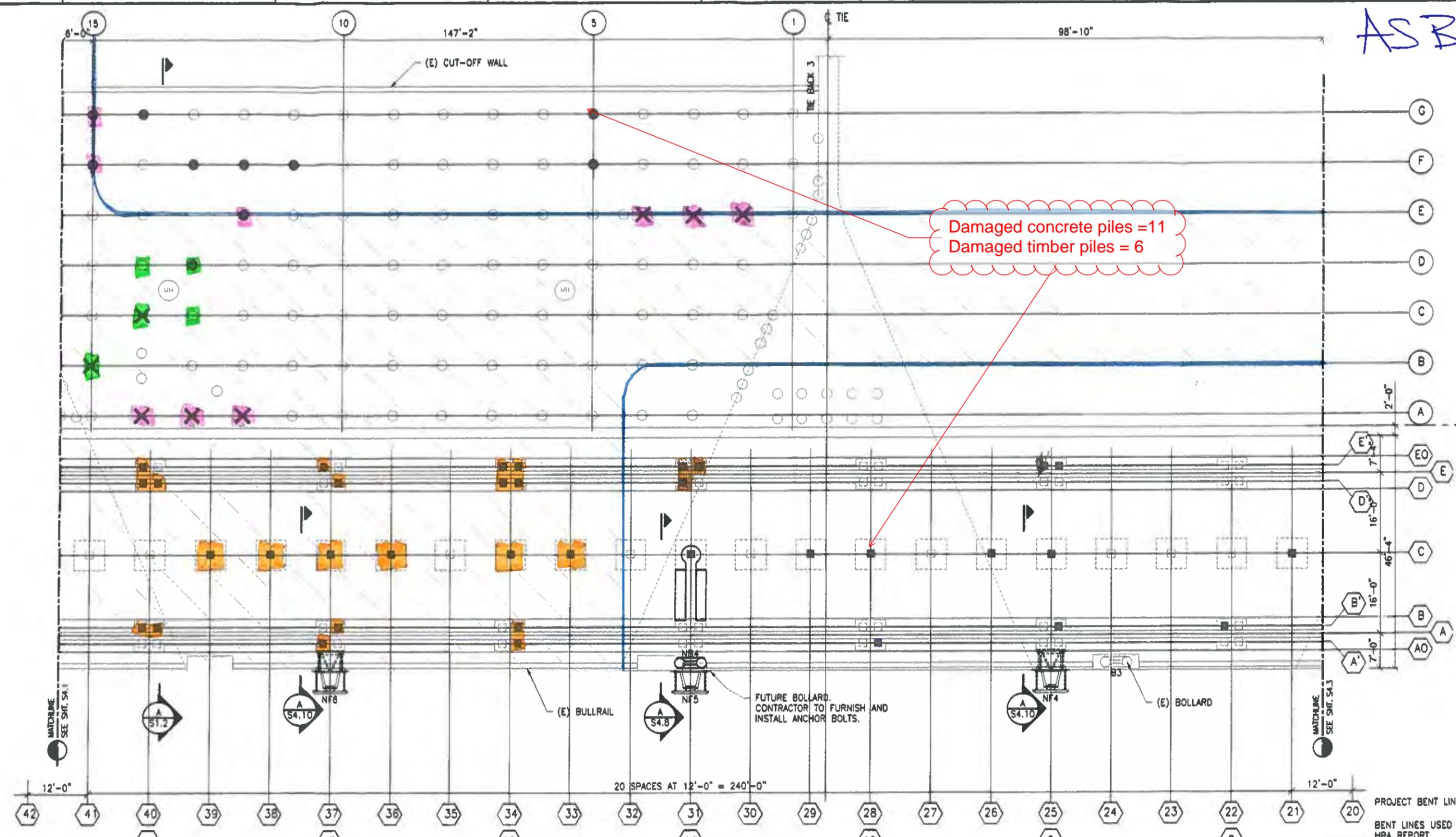
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Damaged concrete piles = 11  
 Damaged timber piles = 6

**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 2**  
 1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA
- UNREPAIRED

- NOTES:**
- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
  - DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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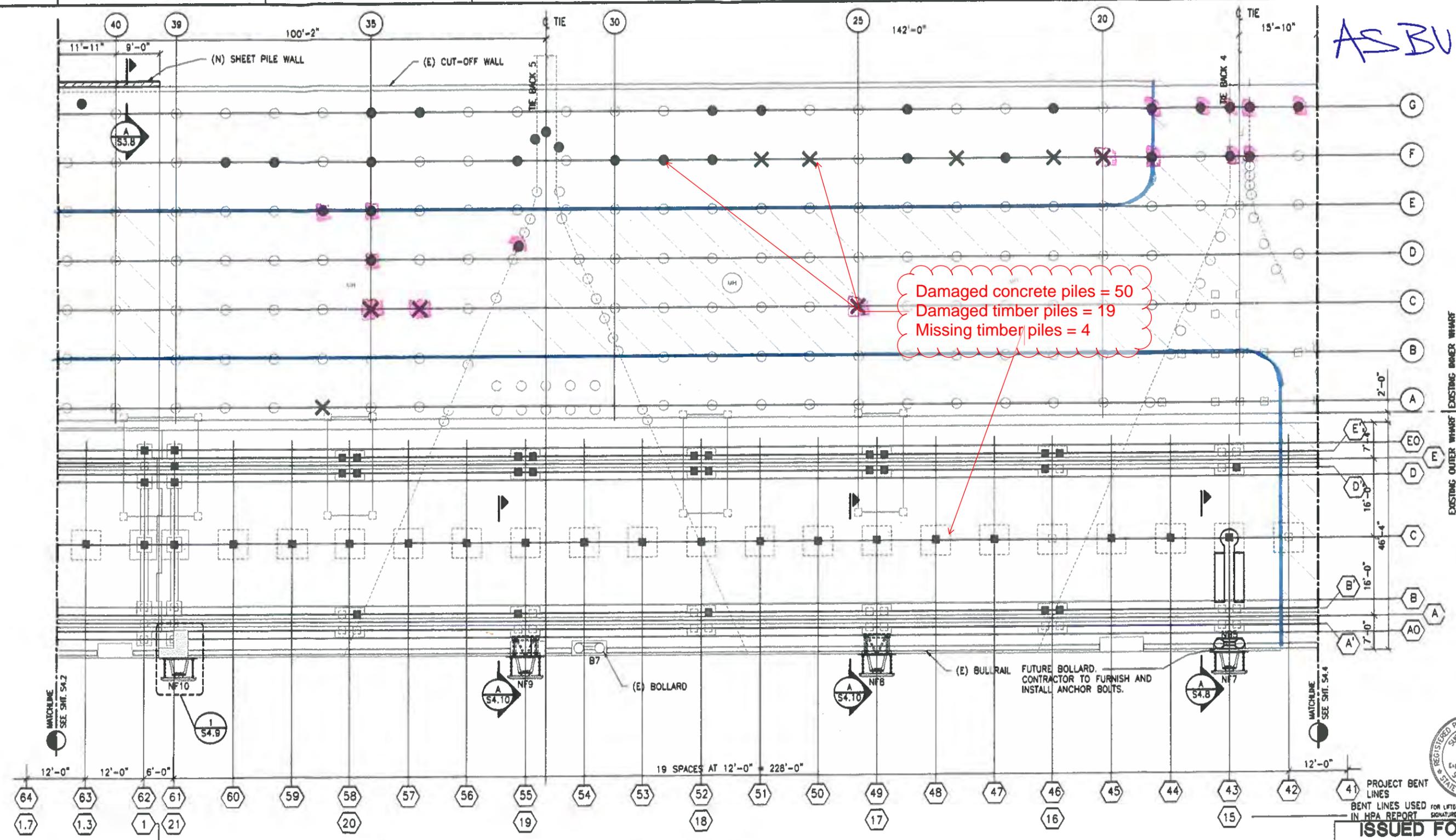
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 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND  
 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 2  
 Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S4.2  
 Approved SL of  
 Date 01/25/10 Revision 1



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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 3**  
 1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

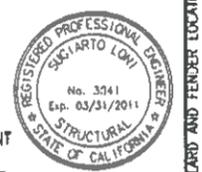
- MISSING TIMBER PILE REPAIRED
- CONCRETE PILE
- DAMAGED CONCRETE PILE
- TRAFFIC LOADING AREA

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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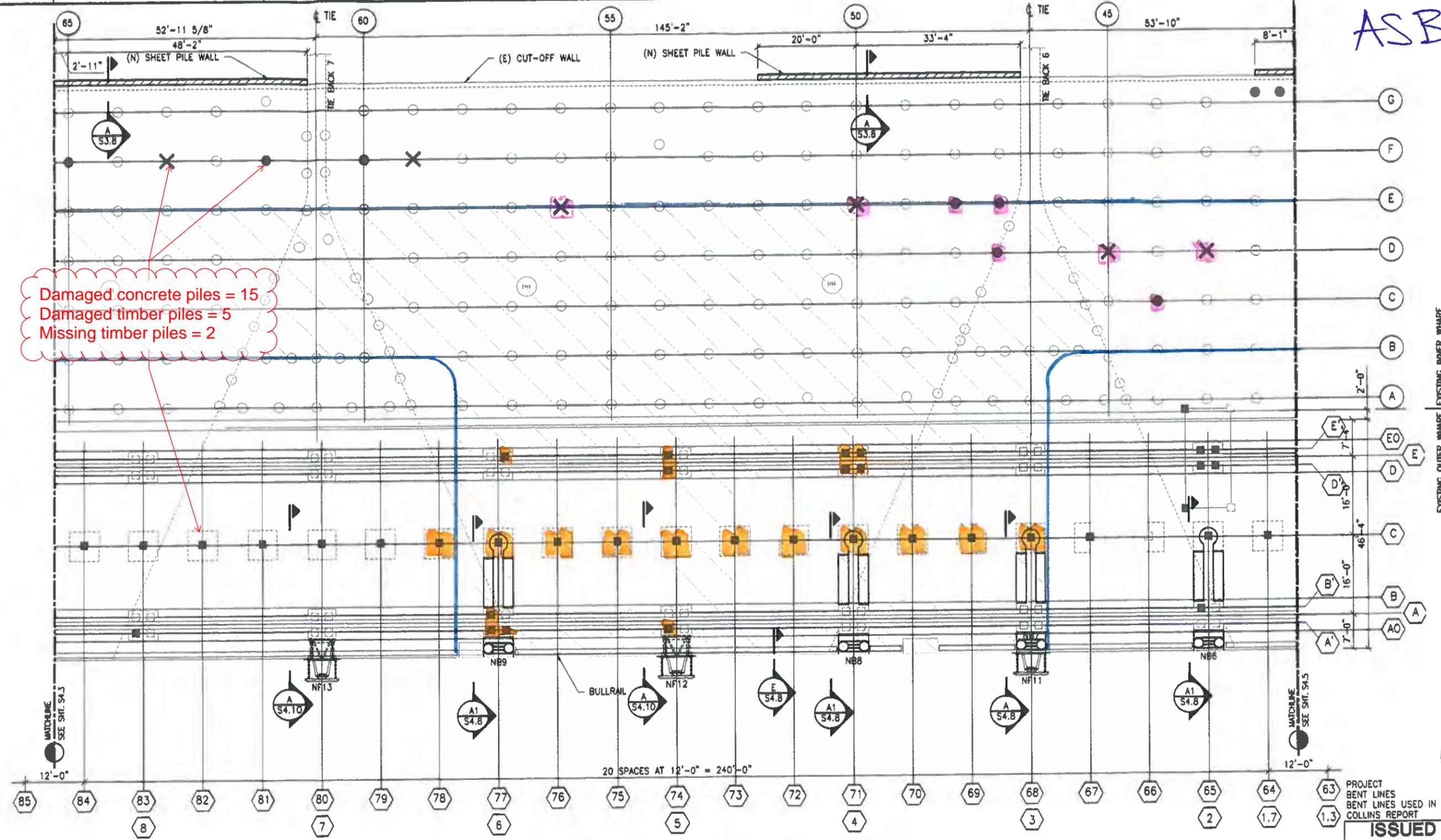
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 PORT OF RICHMOND  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 3**  
 Project No. Z1800  
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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 4**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE REPAIRED
- CONCRETE PILE
- DAMAGED CONCRETE PILE REPAIRED
- TRAFFIC LOADING AREA DELINEATED BLUE

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



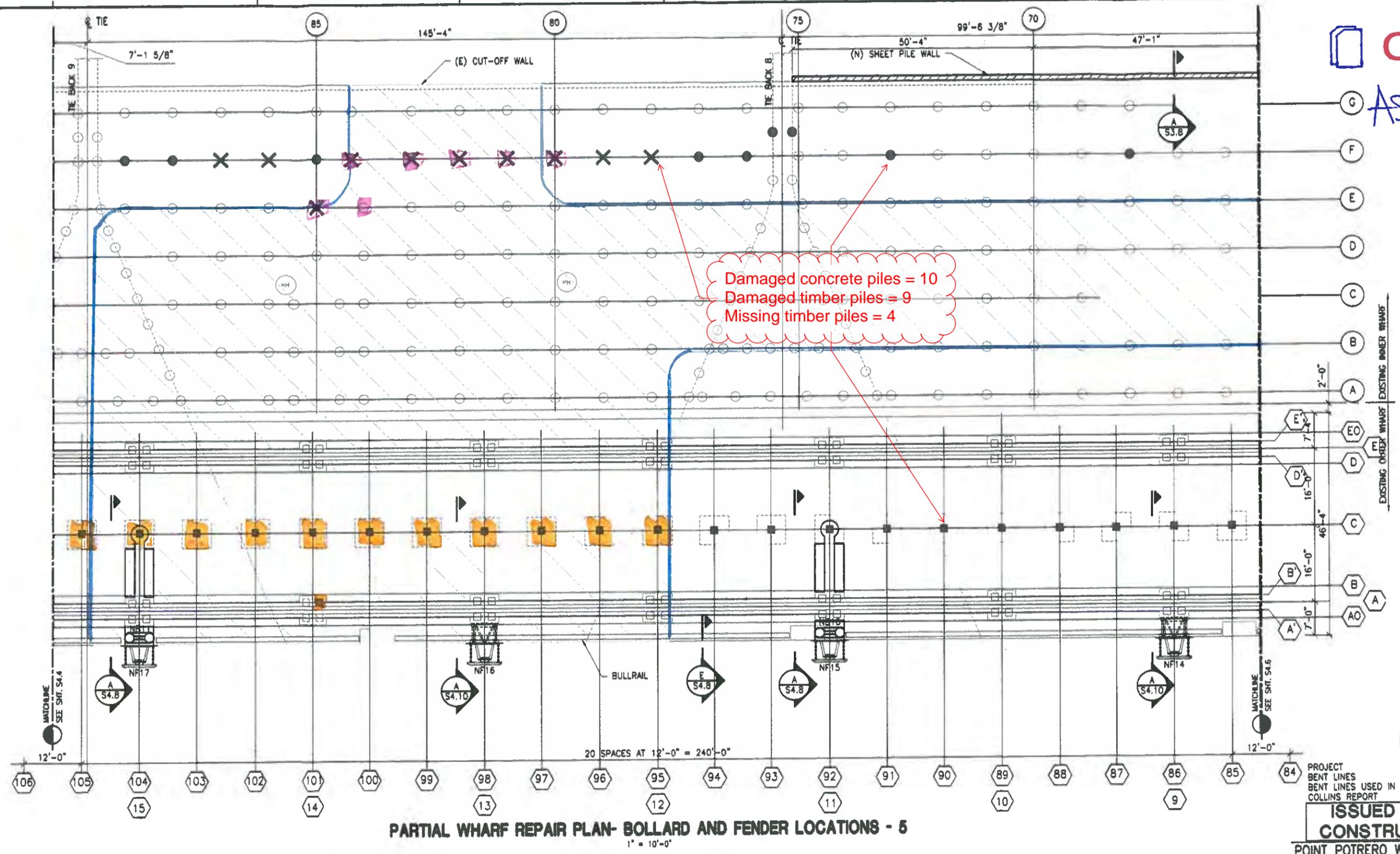
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2				

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**ISSUED FOR CONSTRUCTION**  
 PROJECT BENT LINES BENT LINES USED IN COLLINS REPORT  
 FOR LIFTECH CONSULTANTS INC SIGNATURE DATE:  
 REGISTERED PROFESSIONAL ENGINEER (SICARIO LOPEZ) No. 3041 Exp. 03/31/2011  
 STRUCTURAL ENGINEER STATE OF CALIFORNIA  
**PARTIAL WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND**  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 4**  
 Project No. Z1800  
 By AH Checked TG/EGS Sheet No S4.4  
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**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 5**  
 1" = 10'-0"

**SHEET PILE WALL NOTE:**  
 1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
 2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE

- MISSING TIMBER PILE *REPAIRED*
- CONCRETE PILE
- DAMAGED CONCRETE PILE *REPAIRED*
- TRAFFIC LOADING AREA  
*DELIMITATED BLUE*

**NOTES:**  
 1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
 2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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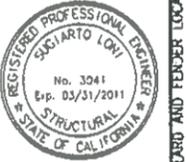
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**ISSUED FOR CONSTRUCTION**  
 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 5

Project No. Z1800  
 By AH Checked TG/EGS Sheet No S4.5  
 Approved SL of  
 Date 01/25/10 Revision 1

**KEYPLAN**

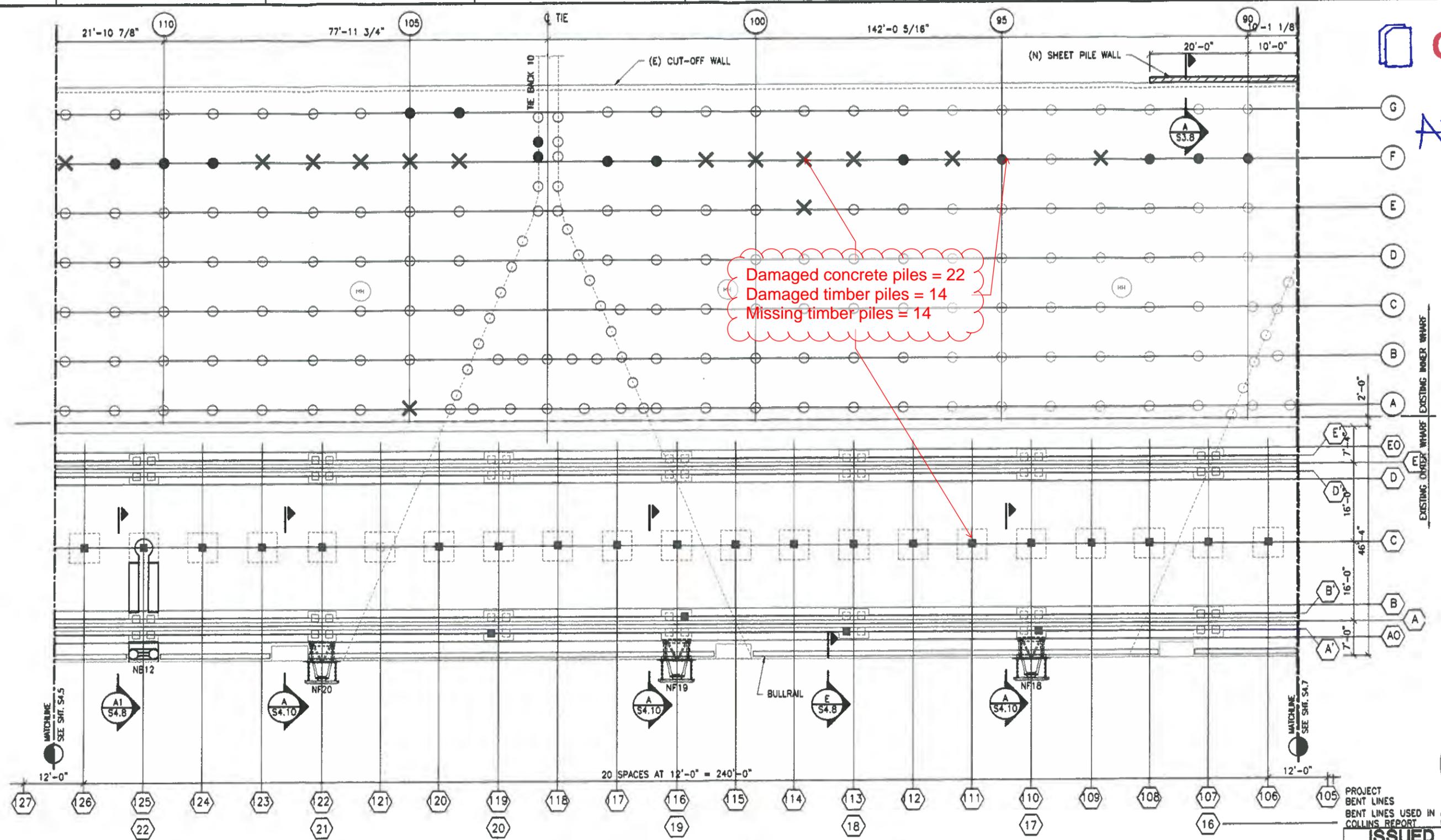
BERTH RCH-7      BERTH RCH-8



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*AS BUILT*



**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 6**  
1" = 10'-0"

**SHEET PILE WALL NOTE:**  
1. IF THE INSTALLATION OF THE SHEET PILE WALL IS DEFERRED THEN 10'-0" WIDTH OF THE AREA TO THE WEST OF THE WALL SHALL BE BLOCKED OFF FROM USE.  
2. REMOVE EXISTING FIRE HYDRANT BOLLARD, WHERE OCCURS, FOR SHEET PILE INSTALLATION.

**LEGEND**

	(N) BOLLARD		MISSING TIMBER PILE
	(N) FENDER		CONCRETE PILE
	TIMBER PILE		DAMAGED CONCRETE PILE
	DAMAGED TIMBER PILE		TRAFFIC LOADING AREA

**NOTES:**  
1. DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.  
2. DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



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**ISSUED FOR CONSTRUCTION**  
PROJECT BENT LINES BENT LINES USED IN COLLINS REPORT  
FOR LIFTECH CONSULTANTS INC  
SIGNATURE DATE:  
**POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND**  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 6**  
Project No. Z1800  
By AH Checked TG/EGS Sheet No S4.6  
Approved SL of  
Date 01/25/10 Revision 1

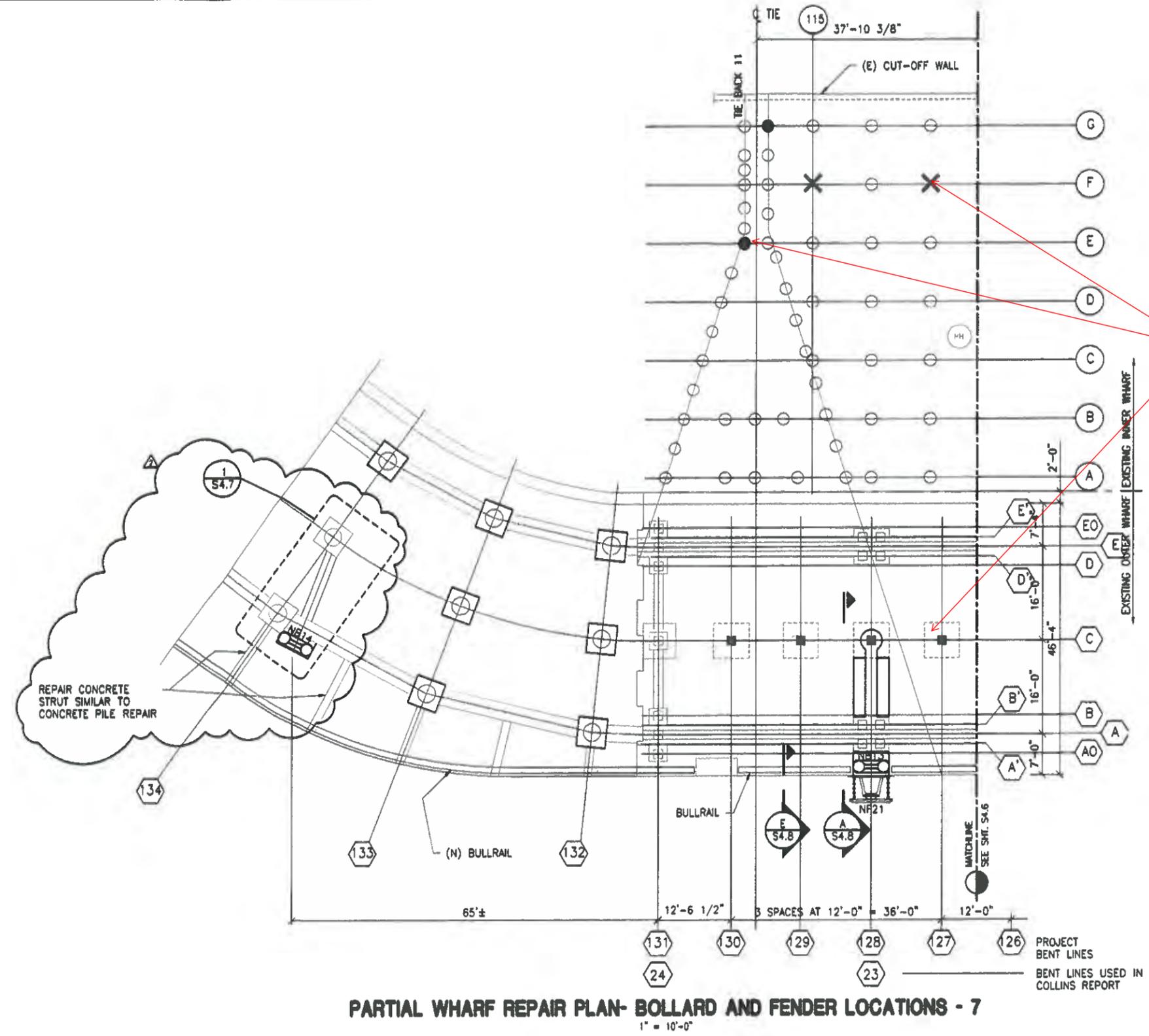


	ISSUED FOR CONSTRUCTION	3/18/10	AH	TG	SL
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AS-BUILT



Damaged concrete piles = 4  
 Damaged timber piles = 2  
 Missing timber piles = 2

Total damaged concrete piles  
 =(8+11+50+15+10+22+4)=120

Total damaged timber piles:  
 =(6+19+5+9+14+2) = 55

Total missing timber piles:  
 =(4+2+4+14+2) = 26

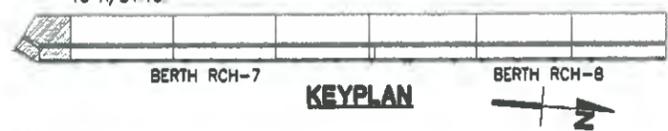


FOR LIFTECH CONSULTANTS INC  
 SIGNATURE DATE: \_\_\_\_\_

**PARTIAL WHARF REPAIR PLAN- BOLLARD AND FENDER LOCATIONS - 7**  
 1" = 10'-0"

- LEGEND**
- (N) BOLLARD
  - (N) FENDER
  - TIMBER PILE
  - DAMAGED TIMBER PILE
  - MISSING TIMBER PILE
  - CONCRETE PILE
  - DAMAGED CONCRETE PILE
  - TRAFFIC LOADING AREA

- NOTES:**
- DETAILS A/S4.13 AND A1/S4.13 ARE ALTERNATES TO A/S4.8.
  - DETAIL A/S4.12 IS AN ALTERNATE TO A/S4.10.



No	Revision	Date	By	Checked	Approved
1	BOLLARD NO. 14 SUPPORT	06/11/10	LMK/AH	TC	SL
2	ISSUED FOR CONSTRUCTION	05/19/10	AH	TC	SL

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 REGISTERED PROFESSIONAL ENGINEERS

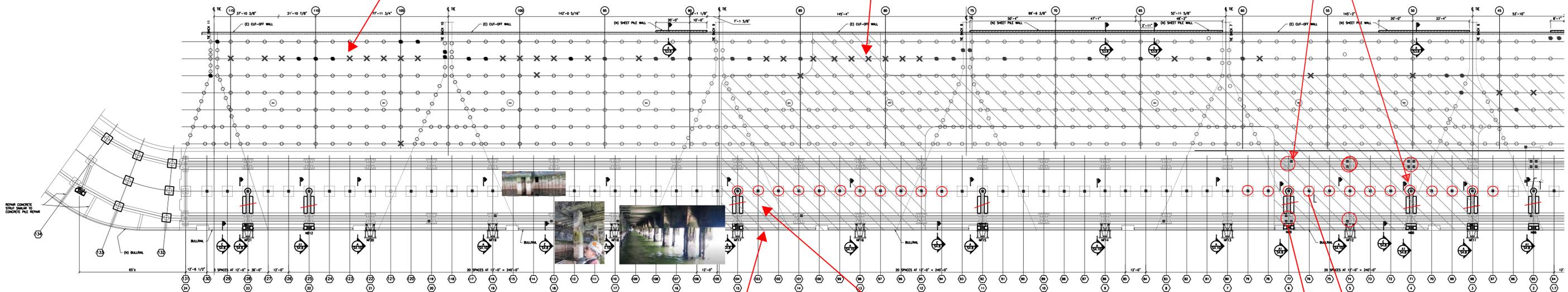
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 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY PORT OF RICHMOND  
**PARTIAL WHARF PLAN BOLLARD AND FENDER LOCATIONS - 7**  
 Project No. Z1800  
 By AH \_\_\_\_\_ Checked TG/EGS Sheet No. S4.7  
 Approved SL \_\_\_\_\_ of \_\_\_\_\_  
 Date 01/25/10 Revision 2

LIFTECH CONSULTANTS INC.	
Job No. 2525	
Project Port of Richmond	
BySL ChkdXXX	Approved XXX
Date 04/24/2025	Sheet XX of XX
Pile and soffit repair quantity	



Nearly entire row of piles missing between tie-backs

Piles circled in red were repaired in 2010 project. Typical.



Delamination and Spalling Concrete near Wharf Face

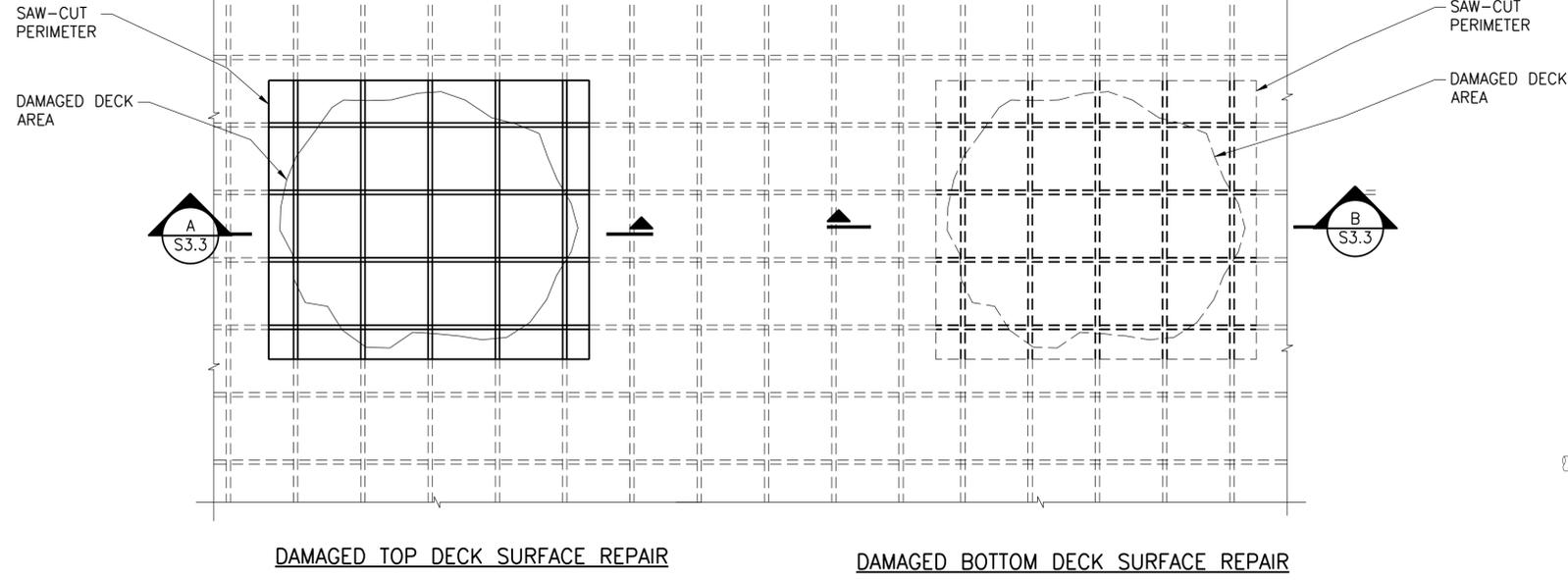


Delamination and Spalling Concrete at Soffit

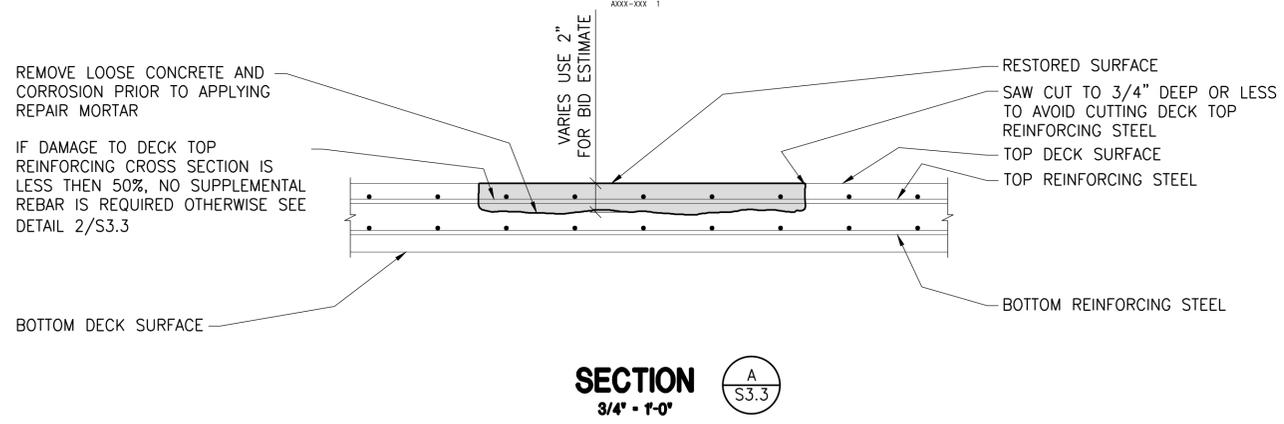




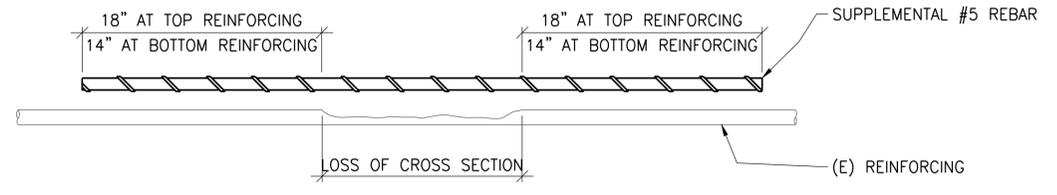
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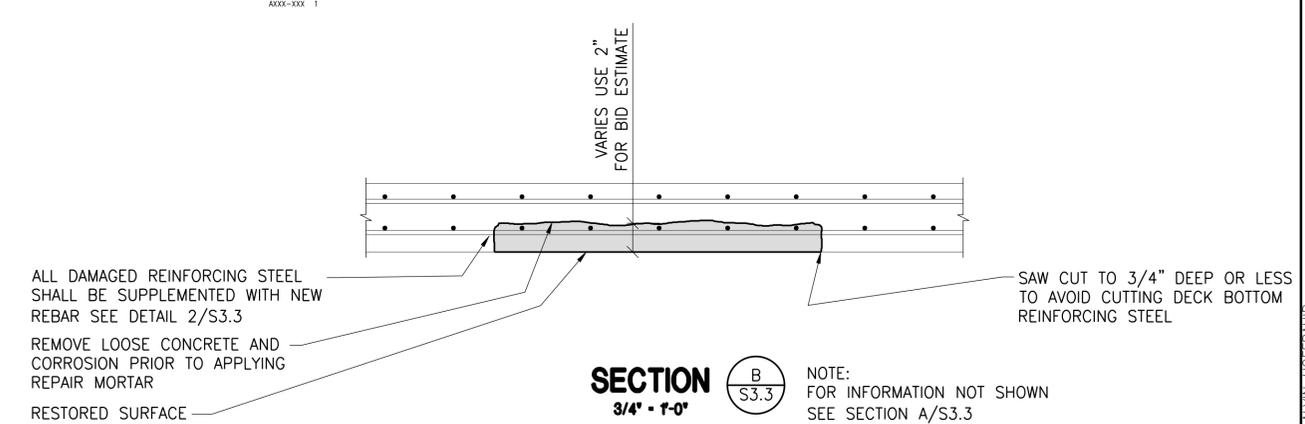
**CONCRETE REMOVAL AND SURFACE PREPARATION**  
3/4" - 1'-0" (1 S3.3)



**SECTION A**  
3/4" - 1'-0" (S3.3)



**SUPPLEMENTAL REBAR DETAIL**  
DO NOT SCALE (2 S3.3)



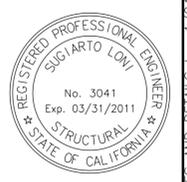
**SECTION B**  
3/4" - 1'-0" (S3.3)

NOTE:  
FOR INFORMATION NOT SHOWN  
SEE SECTION A/S3.3

**WHARF DECK REPAIR NOTES:**

- THE PURPOSE OF THE WHARF DECK REPAIR IS TO RESTORE THE WHARF STRUCTURAL STRENGTH TO SUPPORT A DESIGN LIVE LOAD OF 250 PSF AND TO EXTEND THE SERVICE LIFE OF THE STRUCTURE.
- THE DECK REPAIR WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
  - AMERICAN CONCRETE INSTITUTE, CONCRETE REPAIR GUIDE. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2004.
  - AMERICAN CONCRETE INSTITUTE, SURFACE REPAIR USING FORM-AND-PUMP TECHNIQUES. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2003.
  - INTERNATIONAL CONCRETE REPAIR INSTITUTE, GUIDE FOR SURFACE PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION (GUIDELINE NO. 310.1R-2008). DES PLAINES, IL: INTERNATIONAL CONCRETE REPAIR INSTITUTE, 2008..
- AT REPAIR AREAS CONTRACTOR SHALL PERFORM SOUNDING OR OTHER APPROPRIATE NON-DESTRUCTIVE CONCRETE TESTING TO LOCATE AREAS OF DELAMINATION FOR THE TOP AND BOTTOM DECK SURFACES OF INNER AND OUTER WHARVES FOR BERTH RCH-7 AND RCH-8.
- CONTRACTOR SHALL MARK THE PERIMETER OF THE DECK
- REPAIR AREAS TO BE SAW CUT. LAYOUT SHALL BE SQUARE OR RECTANGULAR IN SHAPE. NOTIFY THE ENGINEER FOR REVIEW OF THE PERIMETER TO BE SAW CUT AREA PRIOR TO THE CUTTING.
- SPECIAL INSPECTION IS REQUIRED FOR SURFACE PREPARATION PRIOR TO INSTALLATION OF STRUCTURAL REPAIR CONCRETE.
- THE WHARF DECK REPAIR SYSTEM CONSISTING OF REBAR PROTECTION AND MORTAR SHALL BE COMPATIBLE AND SHALL BE SUPPLIED BY A SINGLE SOURCE SO THAT THE REPAIR SYSTEM PERFORMS AS WARRANTIED BY THE PRODUCTS MANUFACTURER
- THE FOLLOWING CONCRETE AND TIMBER PILE REPAIR PRODUCTS ARE ACCEPTABLE:
  - BASF CONSTRUCTION CHEMICAL, LLC**  
EMACO S66 CI, FLOWABLE STRUCTURAL-REPAIR CONCRETE WITH INTEGRAL CORROSION INHIBITOR, FOR TOP DECK SURFACE REPAIR  
EMACO S88 CI, SPRAYABLE FIBER-REINFORCED STRUCTURAL REPAIR MORTAR WITH INTEGRAL CORROSION INHIBITOR FOR BOTTOM DECK SURFACE REPAIR.  
MASTERSEAL CP, ADVANCED CORROSION INHIBITOR TREATMENT FOR STEEL REINFORCED CONCRETE, APPLIED TO REPAIRED AREAS.
  - SIKA CORPORATION**  
SIKA ARMATEC 110 EPOCEM  
SIKAREPAIR 222 FOR TOP SURFACE  
SIKAREPAIR 223 FOR BOTTOM SURFACE
- CONTRACTOR MAY SUBMIT ALTERNATE EQUIVALENT WHARF DECK REPAIR SYSTEM TO THE ENGINEER AND PORT FOR REVIEW AND APPROVAL. THE PRODUCTS INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- SEE NOTES ON SHEET S2.1 AND GENERAL NOTES.

**REFERENCE DRAWING**



FOR LIFTECH CONSULTANTS INC  
SIGNATURE DATE:

**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
WHARF DECK REPAIR NOTES  
AND DETAILS

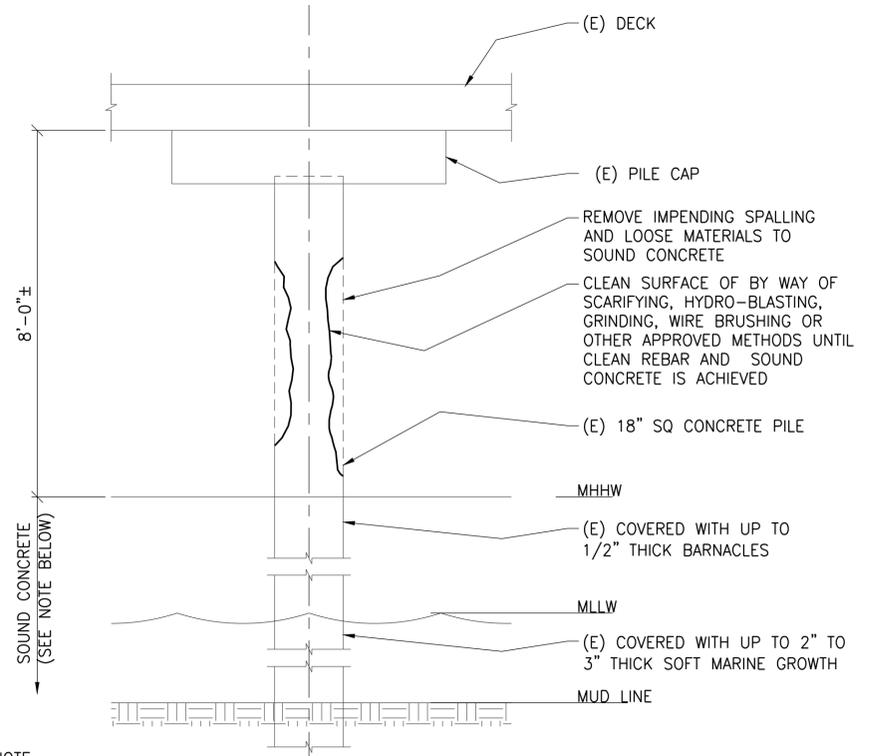
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Approved SL of ---  
Date 01/25/10 Revision 1

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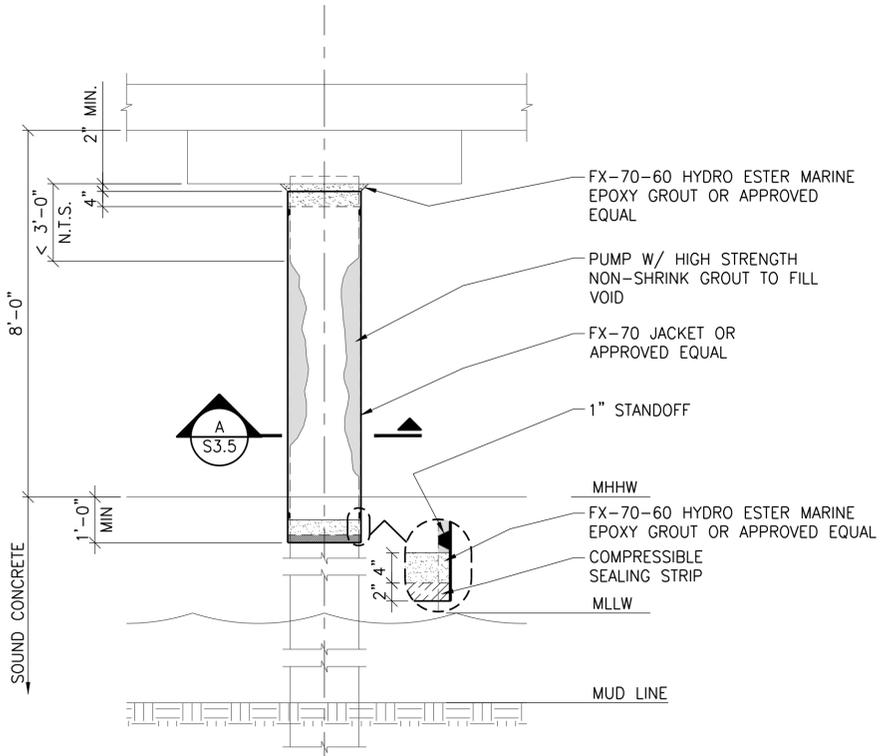
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NOTE:  
IF ADDITIONAL DEFECTS, MODERATE OR WORSE AS DEFINED IN WHARF INSPECTION REPORT, ARE FOUND BELOW MHHW, NOTIFY ENGINEER AND PORT. ADDITIONAL REPAIRS MAY BE REQUIRED.

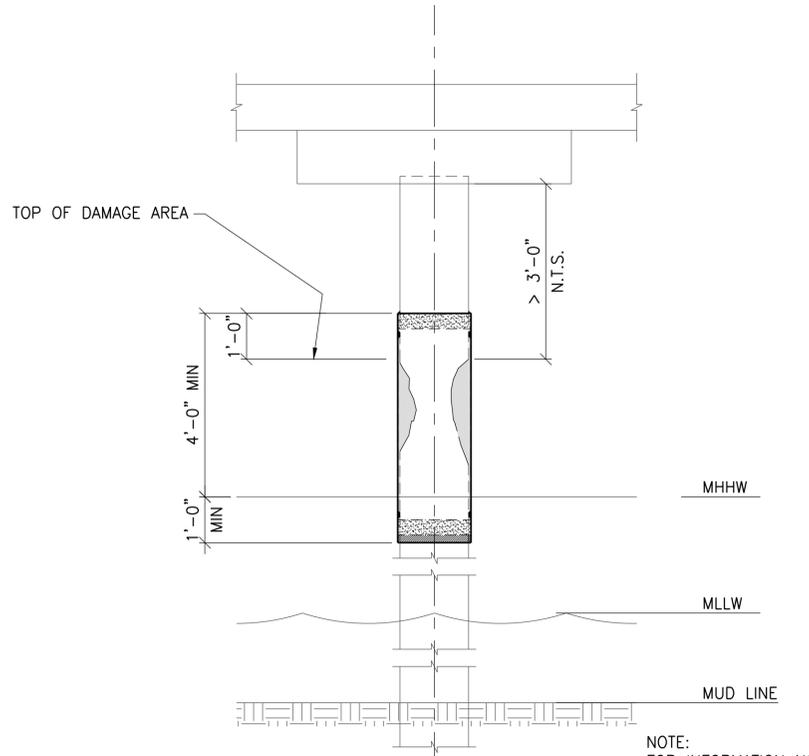
**TYPICAL CONCRETE PILE DAMAGED SURFACE PREPARATION** 1  
S3.5

1/2" - 1'-0"



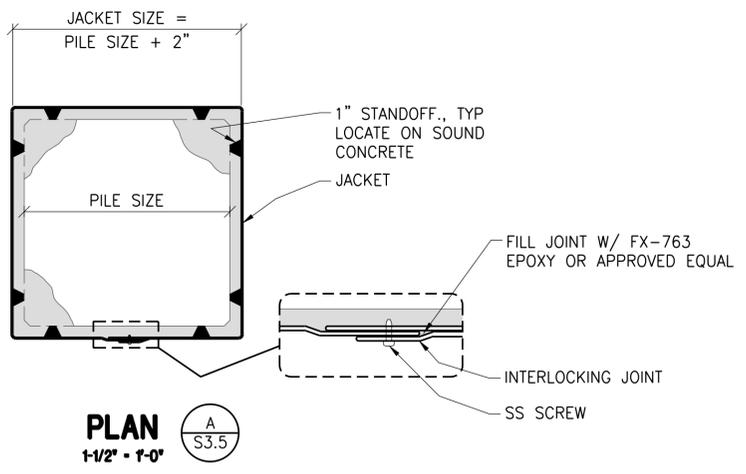
**TYPICAL CONCRETE PILE REPAIR DETAIL - 1** 2  
S3.5

1/2" - 1'-0"



**TYPICAL CONCRETE PILE REPAIR DETAIL - 2** 3  
S3.5

1/2" - 1'-0"



**PLAN** A  
S3.5

1-1/2" - 1'-0"

**REFERENCE DRAWING**



**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

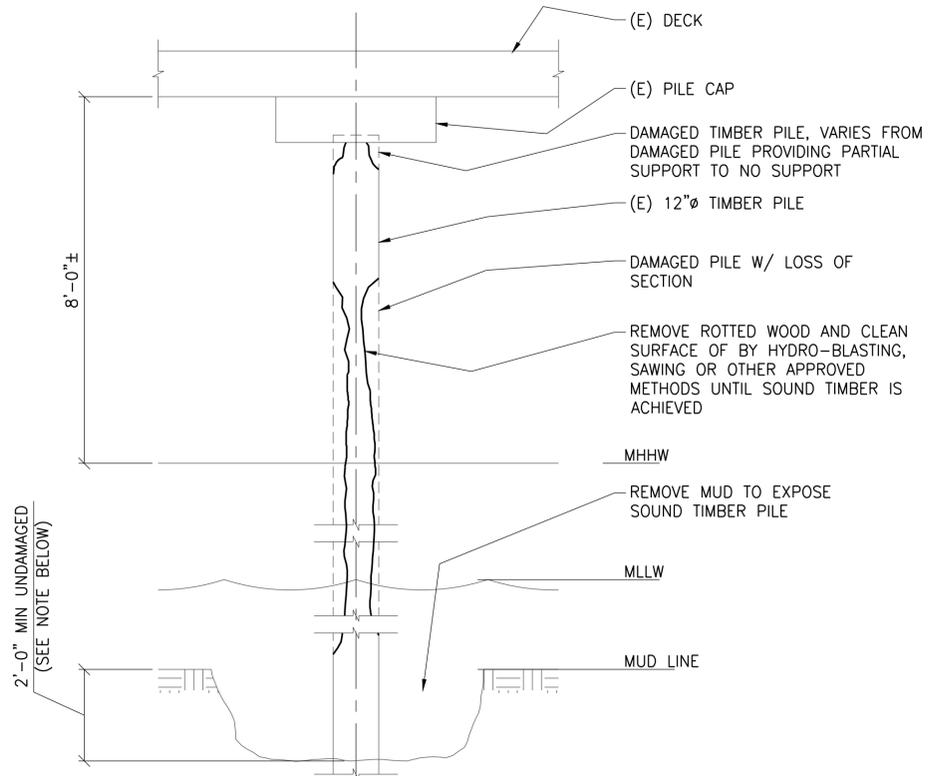
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LIFTECH CONSULTANTS INC CONCRETE PILE REPAIR DETAILS

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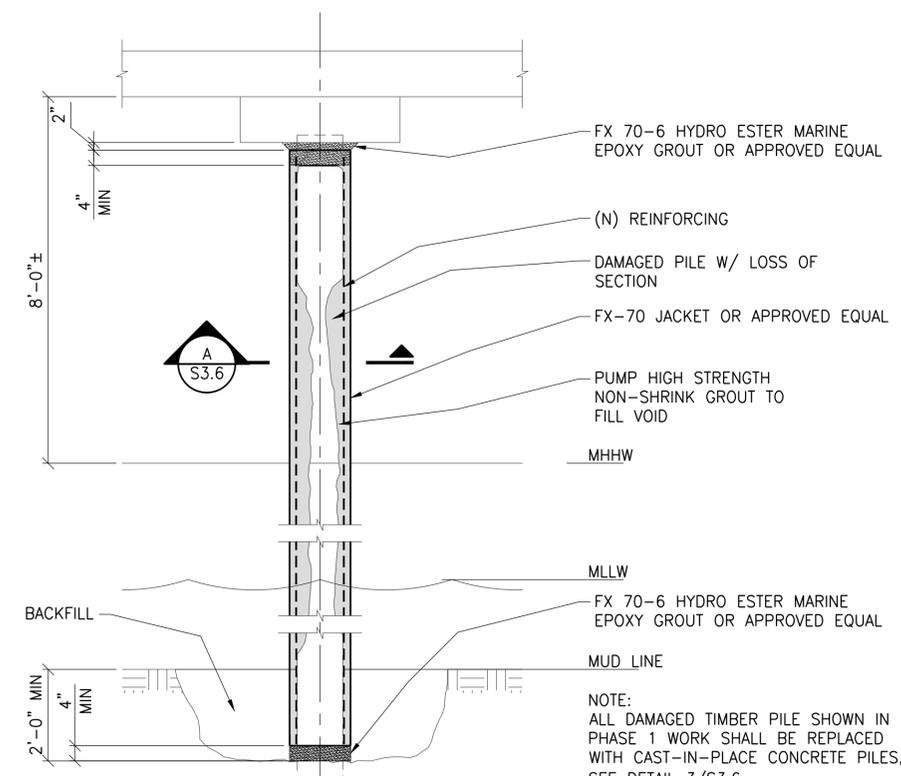
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Date 01/25/10 Revision 1

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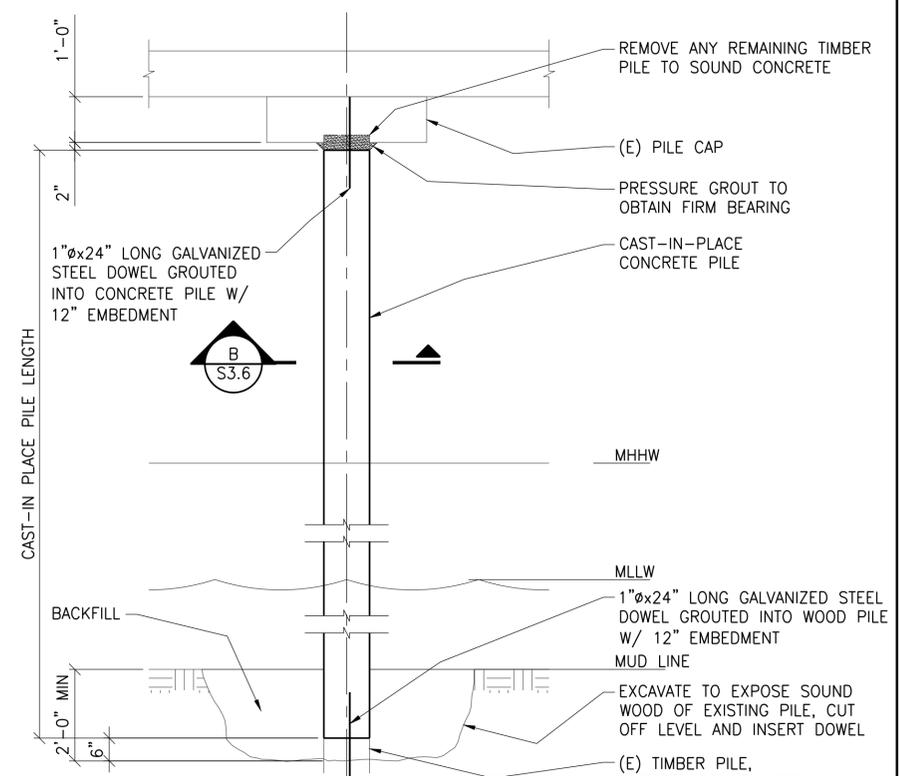
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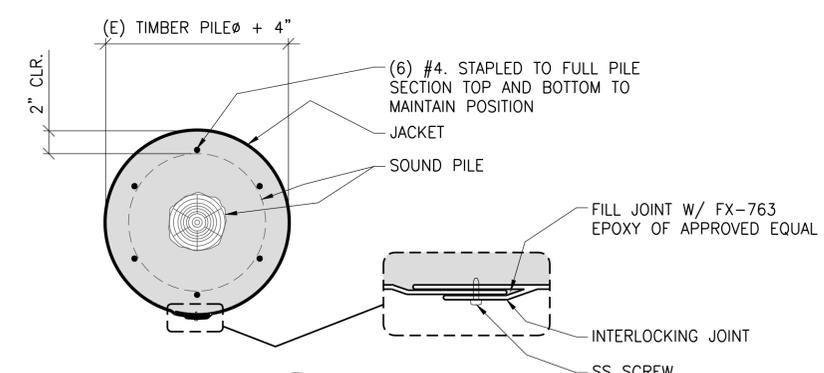
**TYPICAL TIMBER PILE DAMAGED SURFACE PREPARATION**  
 1/2" - 1'-0"  
 NOTE: CONTRACTOR MAY EXCAVATE MORE THAN 2'-0" TO EXPOSE SOUND TIMBER



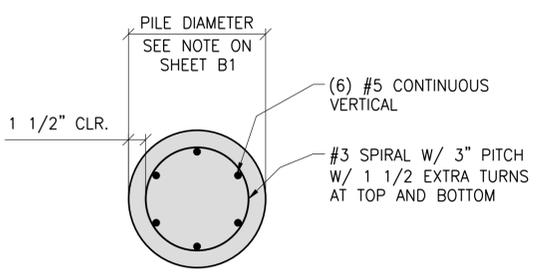
**TYPICAL TIMBER PILE REPAIR DETAIL**  
 1/2" - 1'-0"  
 NOTE: ALL DAMAGED TIMBER PILE SHOWN IN PHASE 1 WORK SHALL BE REPLACED WITH CAST-IN-PLACE CONCRETE PILES. SEE DETAIL 3/S3.6.



**(N) CAST-IN-PLACE PILE TO REPLACE MISSING PILES**  
 1/2" - 1'-0"  
 NOTES:  
 1. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS 24'-0" OR LESS, USE 12" DIAMETER PILE  
 2. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS BETWEEN 24'-0" AND 28'-0", USE 14" DIAMETER PILE.



**SECTION A**  
 1-1/2" - 1'-0"  
 S3.6



**SECTION B**  
 1-1/2" - 1'-0"  
 S3.6

NOTE: CONTRACTOR HAS THE OPTION TO REPAIR TIMBER PILE OR REPLACE DAMAGED PILE WITH CAST-IN-PLACE CONCRETE PILE PER DETAIL 3/S3.6

**REFERENCE DRAWING**



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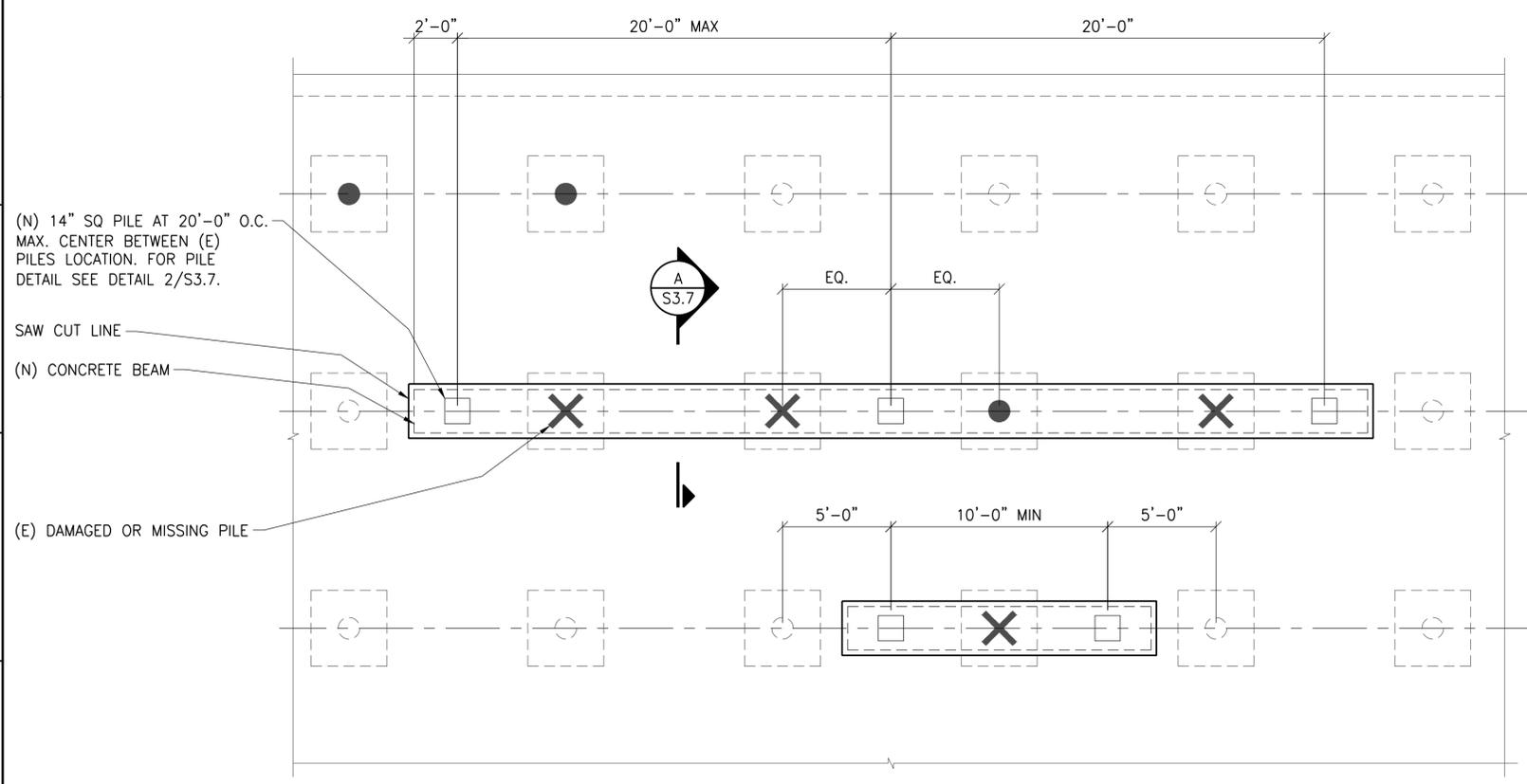
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 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 TIMBER PILE REPAIR AND REPLACEMENT DETAILS

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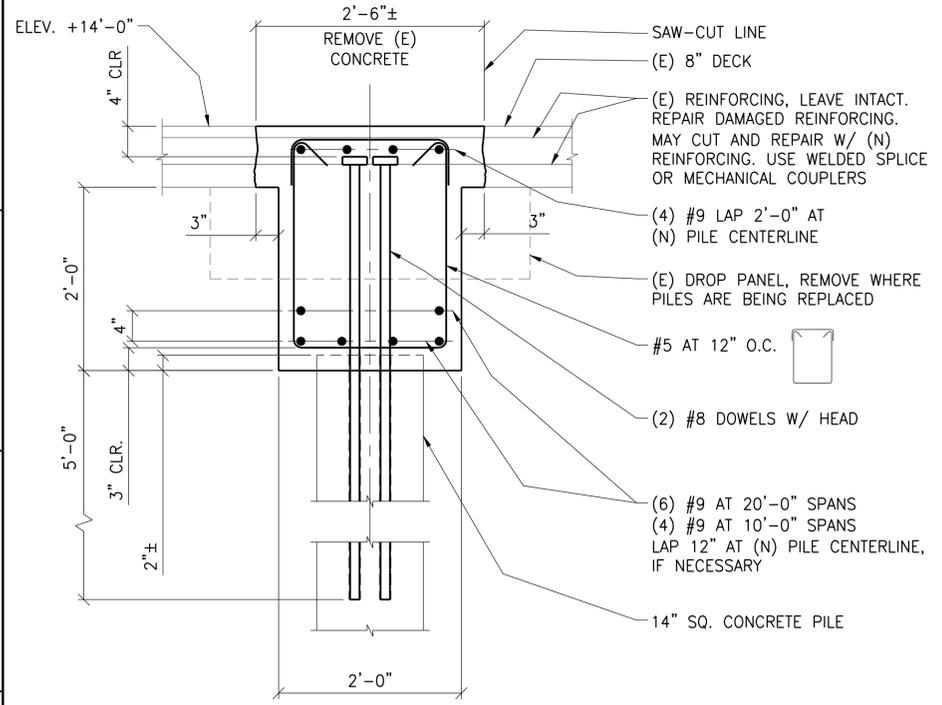
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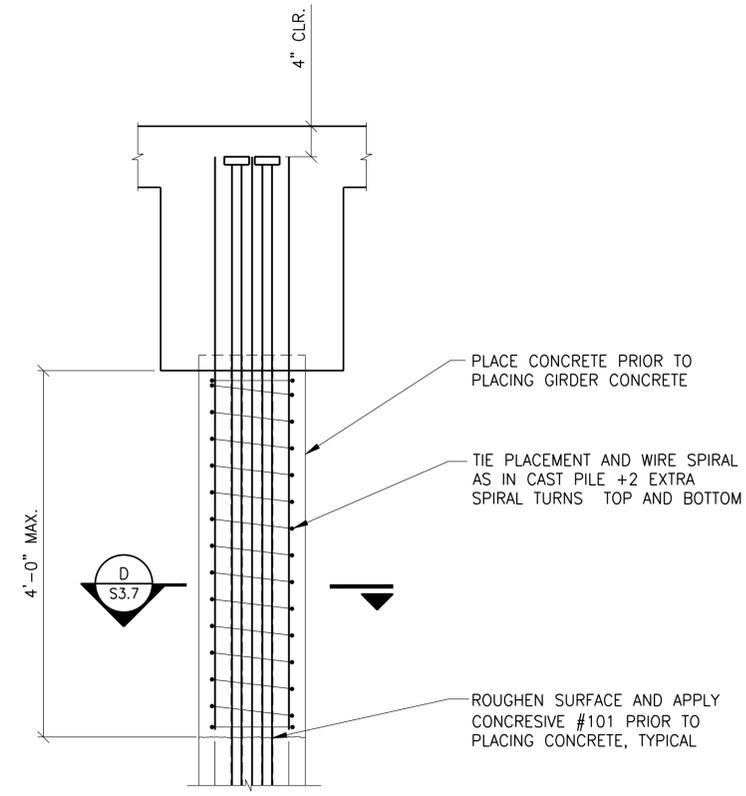
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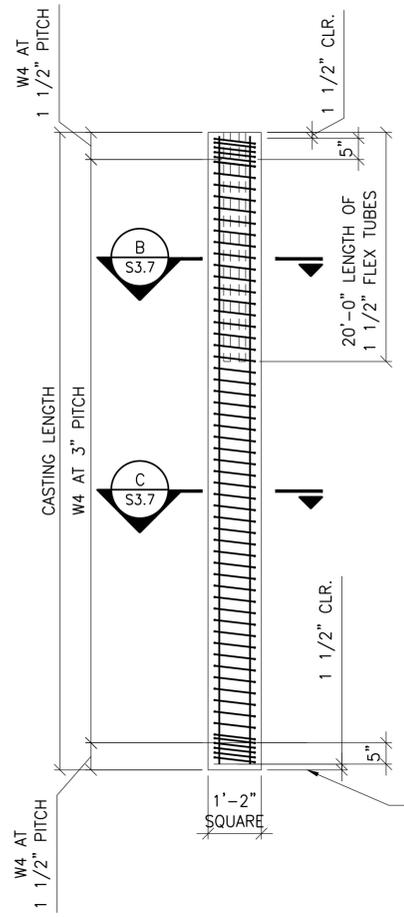
**PLAN AT PILE REPAIR**  
 1/4" - 1'-0"



**SECTION A**  
 1'-1'-0"

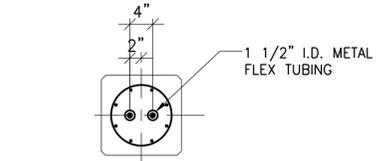


**CAST IN PLACE PILE EXTENSION**  
 1'-1'-0"

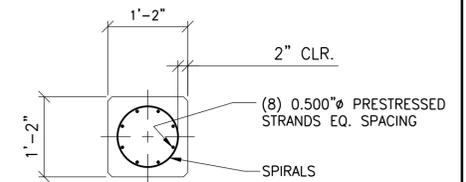


**14" SQ PRESTRESSED CONCRETE PILE DETAIL**  
 DO NOT SCALE

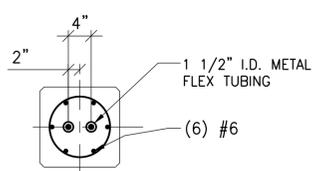
PILE TIP ELEVATION	
BENT LINES AT INNER WHARF	PRODUCTION
1-17	-108
18-31	-101
32-46	-90
47-60	-80
61-75	-75
76-89	-71
90-103	-66
104-115	-64



**SECTION B**  
 3/4" - 1'-0"



**SECTION C**  
 3/4" - 1'-0"



**SECTION D**  
 3/4" - 1'-0"

**PRESTRESSED PILE NOTES:**

- MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE F'C = 6000 PSI AT 28 DAYS AND F'C AT TRANSFER OF STRESS F'C = 4000 PSI.
- MATERIALS
  - CEMENT SHALL BE TYPE II OR MODIFIED TYPE II
  - AGGREGATES SHALL BE PER ASTM C33 3/4" MAX.
  - PRESTRESSED STRANDS SHALL BE ASTM A416 LOW RELAXATION 7-WIRE STRANDS WITH MIN. BREAKING STRENGTH OF 270 KSI.
  - MILD REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
  - SPIRAL BARS SHALL BE ASTM A82 COLD DRAWN WIRE WITH MINIMUM YIELD STRENGTH OF 70 KSI.
  - HEADED REINFORCEMENT SHALL CONFORM TO ASTM A970-08
- MINIMUM CONCRETE COVER OVER SPIRAL SHALL BE 2".
- MAXIMUM JACKING FORCE PER STRAND SHALL BE 28.9 KIPS.
- MINIMUM EFFECTIVE PRESTRESS IN CONCRETE, AFTER LOSSES = 800 PSI.
- PILES SHALL BE DRIVEN TO REFUSAL. THE REQUIRED BLOW COUNT WILL BE DETERMINED BY FUGRO AFTER SUBMISSION OF THE PROPOSED PILE DRIVING HAMMER. THE TIP ELEVATIONS HAVE BEEN SET SO PILES ARE EMBEDDED 3'-0" INTO BED ROCK. PILES MAY HAVE TO BE CUT-OFF OR EXTENDED IF BEDROCK ELEVATIONS VARIES FROM ESTIMATED.
- PILES HAVE BEEN PROPORTIONED FOR A DEAD LOAD PLUS LIVE LOAD ALLOWABLE COMPRESSIVE CAPACITY OF 130 KIPS IN ACCORDANCE WITH THE FOUNDATION RECOMMENDATION BY FUGRO, INC. REFER TO FUGRO'S LETTER REPORT DATED 01/27/10, FUGRO PROJECT NO. 1413.005.
- ELEVATIONS ARE WITH REFERENCE TO MLLW.

NOTE:  
 THIS SHEET IS NOT USED FOR PHASE 1 WORK.

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1/24/2012

LIFTECH CONSULTANTS INC



**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
 FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 ALTERNATE TIMBER PILE  
 REPLACEMENT DETAILS

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S3.7  
 Approved SL of  
 Date 01/25/10 Revision 1



No.	Revision	Date	By	Checked	Approved
1		05/19/10	AH	TG	SL

**PROJECT NO. 5: DAMAGED CONCRETE BEAMS, DECK REPAIRS, AND MISSING  
PILES REPLACEMENT AT BERTHS 5 & 6**

## Project No: 5 - Damaged Concrete Beams, Deck Repairs and Missing Piles Replacement at Berths 5 & 6

### Estimated Quantity Take-off for Construction Cost Estimates for Damaged Concrete Beams, Deck Repairs, and Missing Piles Replacement at Berths 5 & 6

Item	Description	Quantity	Unit	Damaged Factor	Total Quantity	Comments
Outer Wharf - Concrete Beams and Deck Repairs. Replace Missing Piles.						
1	Steel piles	0	EA	1.00	0	Steel pipe piles wrapped with protective cover. Unable to determine the condition and is assumed good.
2	WS Crane Beam, outer face - 6.0' deep x 700' long	4200	SF	33%	1386	Refer to similar repair details on reference drawing sheet S3.3
3	WS Crane Beam, inner face - 6.0' deep x 700' long	4200	SF	33%	1386	Refer to similar repair details on reference drawing sheet S3.3
4	WS Crane Beam, bottom face - 5'-6" x 700	3850	SF	33%	1271	Refer to similar repair details on reference drawing sheet S3.3
5	LS Crane Beam, outer face - 6.0' deep x 700' long	4200	SF	33%	1386	Refer to similar repair details on reference drawing sheet S3.3
6	LS Crane Beam, inner face - 6.0' deep x 700' long	4200	SF	33%	1386	Refer to similar repair details on reference drawing sheet S3.3
7	LS Crane Beam, bottom face - 5'-6 x 700' long	3850	SF	33%	1271	Refer to similar repair details on reference drawing sheet S3.3
8	Repair damaged concrete at underdeck soffit - 56' x 700'	39200	SF	33%	12936	Refer to repair details on reference drawing S3.3
9	Repair damaged concrete at above deck - 56' x 700'	39200	SF	33%	12936	Refer to repair details on reference drawing S3.3
10	Diagonal struts - 16" x 16" x 13'-0 at 18'-0 oc	76	EA	100%	76	Refer to repair details on reference drawing S3.5 Accounted for in Project No. 6
Inner Wharf - Timber Piles Repairs and Replacement and Deck Repairs						
1	Berth 6 - See Project No 1 Berth 5				0	Accounted for in Project No. 1
2	Replace missing or damaged timber piles, assume 10	10	EA	100%	10	Refer to repair details on reference drawing S3.6
3	Repair damaged concrete at underdeck soffit - 65' x 120'	7800	SF	50%	3900	Refer to repair details on reference drawing S3.3
4	Repair damaged concrete at above deck - 65' x 120'	7800	SF	50%	3900	Refer to repair details on reference drawing S3.3

Scope of Work:

Objective: Repair damaged concrete to restore to the original design intent.

1. Repair concrete damage at diagonal struts each side of the waterside rail beam.
2. Repair concrete damage at waterside crane beam.
3. Repair concrete damage at landside crane beam.
4. Replace missing and damaged timber piles with concrete piers at Berth 5 (Note: Berth 6 is accounted for in Project No. 1).
5. Repair damaged concrete at underdeck soffit.
6. Repair damaged concrete at above deck

### Budgetary Cost for Damaged Concrete Beams, Deck Repairs, and Missing Piles Replacement at Berths 5 & 6

Item	Description	Quantity	Unit	ROM Cost	Comments
Outer and Inner Wharf Concrete Beams and Deck Repairs. Piles Replacement					
1	Construction cost estimates based on 2025 labor and material costs	One	EA	\$46,739,868	Refer to sheet 2 for Power Engineering Construction cost estimates.
2	Soft cost and contingency - 30%	One	EA	\$14,021,960	Refer to sheet 2 for assumptions and exclusions. The 30% add is to account for the cost associated with the exclusions and reasonable contingency.
	<b>Total</b>			\$60,761,828	
	<b>Budgetary Cost Estimates</b>			<b>\$61,000,000</b>	

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

# Project No: 5 - Construction Cost Estimates and Duration prepared by Power Engineering Company

Project No. 5: Wharf Repair for Concrete Damage at Berths 5 & 6  
Richmond, California

## ROM Budget for Project 5: Wharf Repair for Concrete Damage at Berths 5 & 6

Date: May 16, 2025

Description	Quantity	Units	\$/Unit	Total	Comments	Working Days
<b>Mobilization Allowance</b>						
1 Mobilize/Demobilize	1	LS	\$ 560,000	\$ 560,000		24
<b>Outer Wharf - Steel Pile Supported Wharf</b>						
2 WS Crane Beam, outer face - 6' 0" Deep & 700' Long	1,386	SF	\$ 1,476	\$ 2,045,736		26
3 WS Crane Beam, inner face - 6' 0" Deep & 700' Long	1,386	SF	\$ 1,476	\$ 2,045,736		26
4 WS Crane Beam, bottom face - 5' 6" Deep & 700' Long	1,271	SF	\$ 1,476	\$ 1,875,996		24
5 LS Crane Beam, outer face - 6' 0" Deep & 700' Long	1,386	SF	\$ 1,476	\$ 2,045,736		26
6 LS Crane Beam, inner face - 6' 0" Deep & 700' Long	1,386	SF	\$ 1,476	\$ 2,045,736		26
7 LS Crane Beam, bottom face - 5' 6" Deep & 700' Long	1,271	SF	\$ 1,476	\$ 1,875,996		24
8 Repair Damaged Concrete Underdeck Soffitt - 56' x 700'	12,936	SF	\$ 1,337	\$ 17,295,432		195
9 Repair Damaged Concrete Above Deck - 56' x 700'	12,936	SF	\$ 515	\$ 6,662,040		74
10 Replace Existing Diagonal Concrete Struts - 16" x 16" x 13' 0" at 18' 0" OC	76	EA	\$ 29,935	\$ 2,275,060		29
<del>11 Remove &amp; Replace 200MT Bollard and Repair Concrete Support</del>	<del>8</del>	<del>EA</del>	<del>\$ 50,225</del>	<del>\$ 401,800</del>		<del>17</del>
<b>Inner Wharf - Timber Pile Supported Wharf</b>						
12 Berth 6: See Project No. 1	1	LS	\$ -	\$ -		-
13 F&I Fiberglass Jacket (with Rebar) to Repair Missing Timber Pile - assume 10' Jacket + 2' of Embedment	10	EA	\$ 24,750	\$ 247,500		14
14 Berth 5: Repair Damaged Concrete at Underdeck Soffit - 65' x 120'	3,900	SF	\$ 1,476	\$ 5,756,400		64
15 Berth 5: Repair Damaged Concrete Above Deck - 65' x 120'	3,900	SF	\$ 515	\$ 2,008,500		23
<b>Total Base Scope:</b>				<b>\$ -47,141,668</b>	<b>(\$46,739,868)</b>	<b>593</b>

Accounted for in  
Project No. 6

### Project Assumptions

- 1 A working day is defined as an 8-hour weekday between the hours of 6 AM - 5 PM.
- 2 The working days do not include fabrication times for materials.
- 3 Only one mobilization is assumed, with continuous work until project completion.
- 4 All pricing is in current dollars.
- 5 No contingency is included in this budget.

### Schedule Milestones

- 1 We estimate the on-site construction would take approximately 2 years with an average crew of 42 craft workers.

### Design Assumption

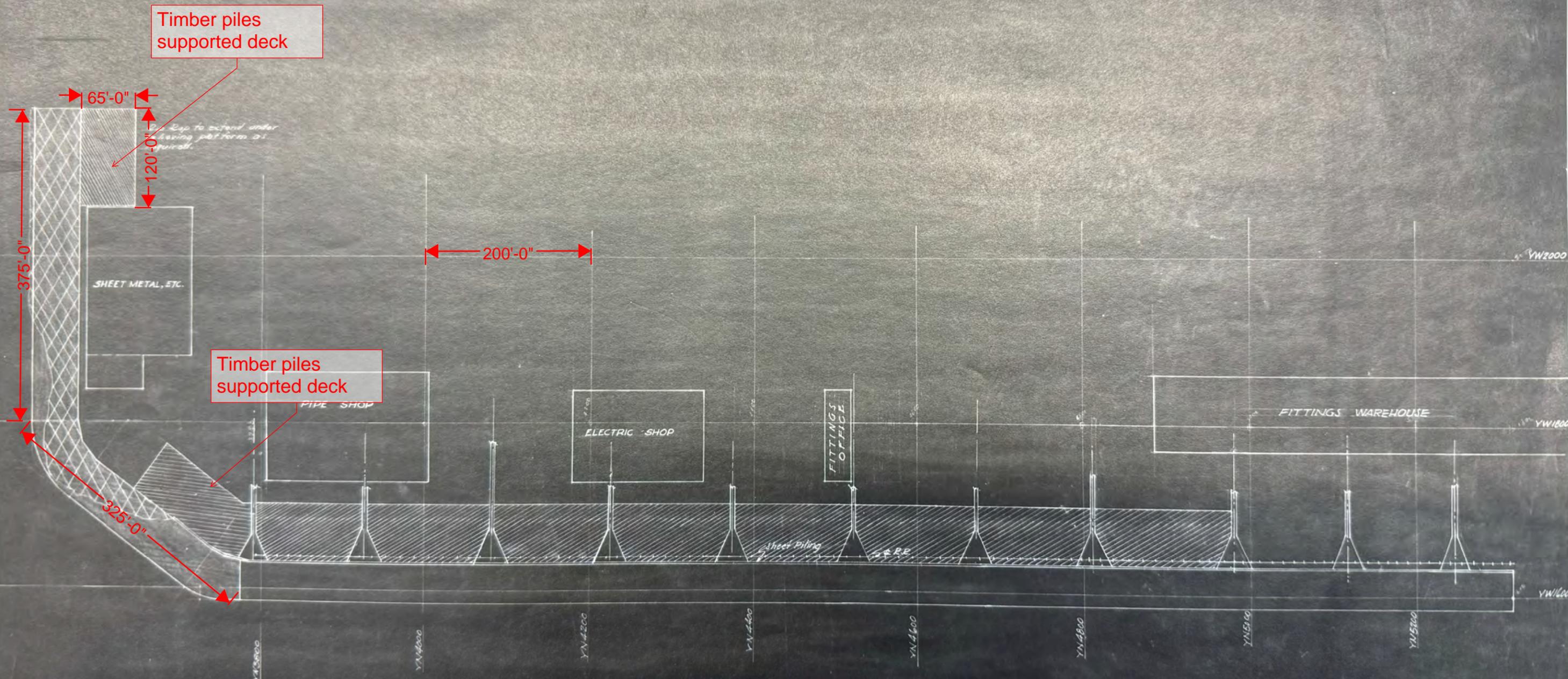
- 1 Per Liftech Sketches, May 2025

### Subcontractors

- 1 None assumed.

### Proposal Exclusions

- 1 Payment and Performance Bonds (available at 1.5% of final contract amount)
- 2 Builders Risk Insurance (can be provided on a per-project basis)
- 3 Permits and Permit Fees
- 4 Engineering or Design
- 5 Utility Relocation unless Listed Above
- 6 Site Survey, Lines, Grade
- 7 Hazardous Materials Handling/Abatement/Removal
- 8 Special Inspection or Testing Fees
- 9 Vibration or Damage Monitoring
- 10 Any Repairs to the Existing Structures, Interior or Exterior, either prior to, during, or after Construction
- 11 Temporary Power & Lighting Install and Supply
- 12 Industrial Hygienist or Inspection Services
- 13 Silt Curtain, Bubble Curtain, or other regulatory requirements not normally encountered.

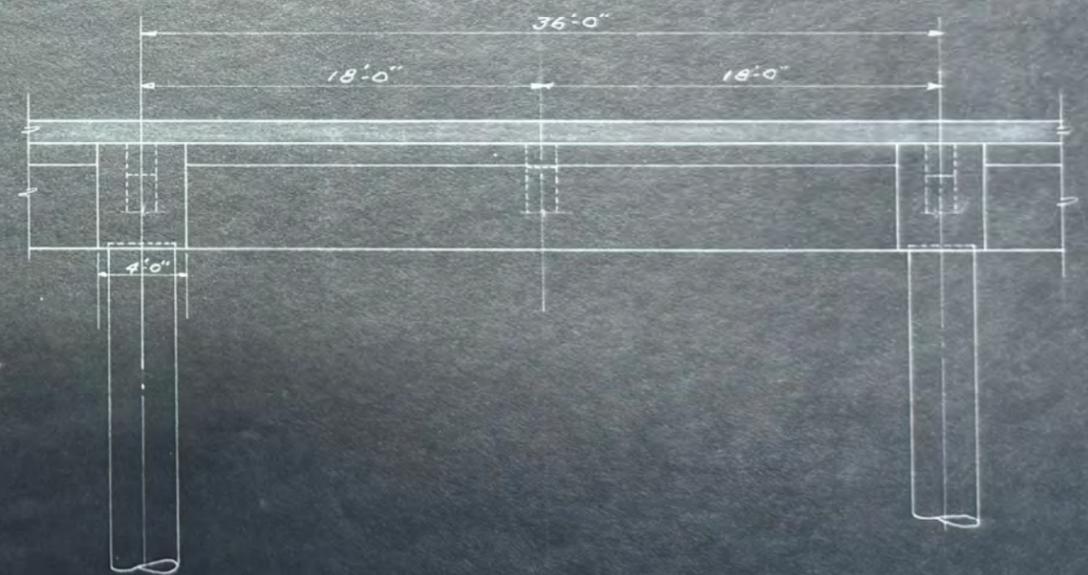
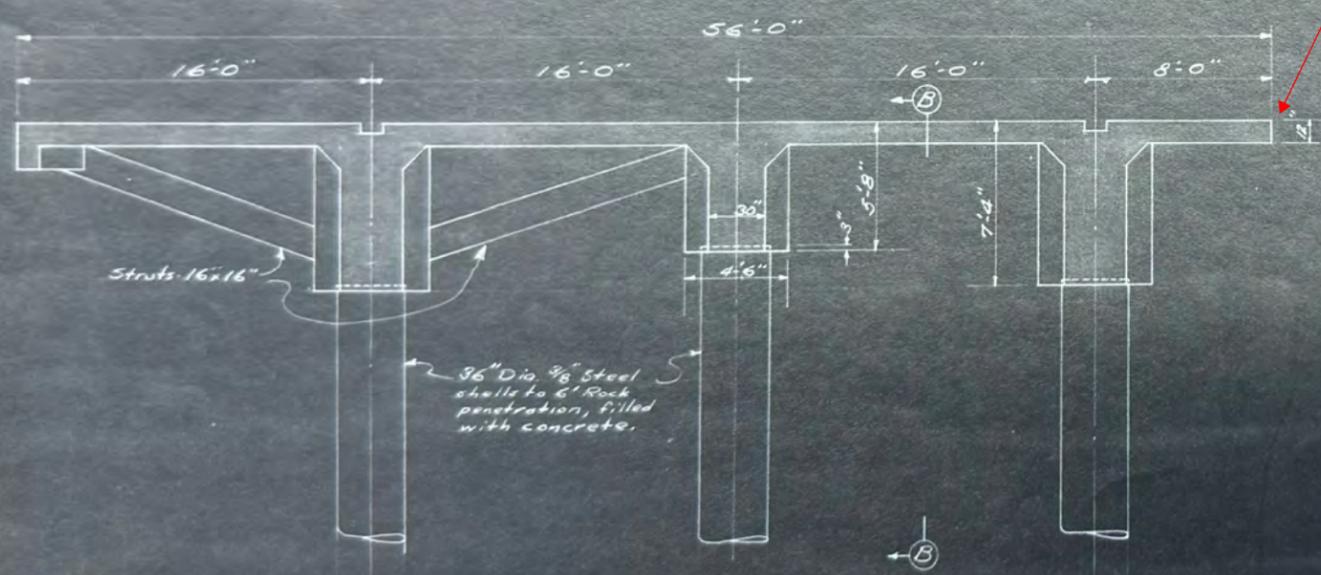
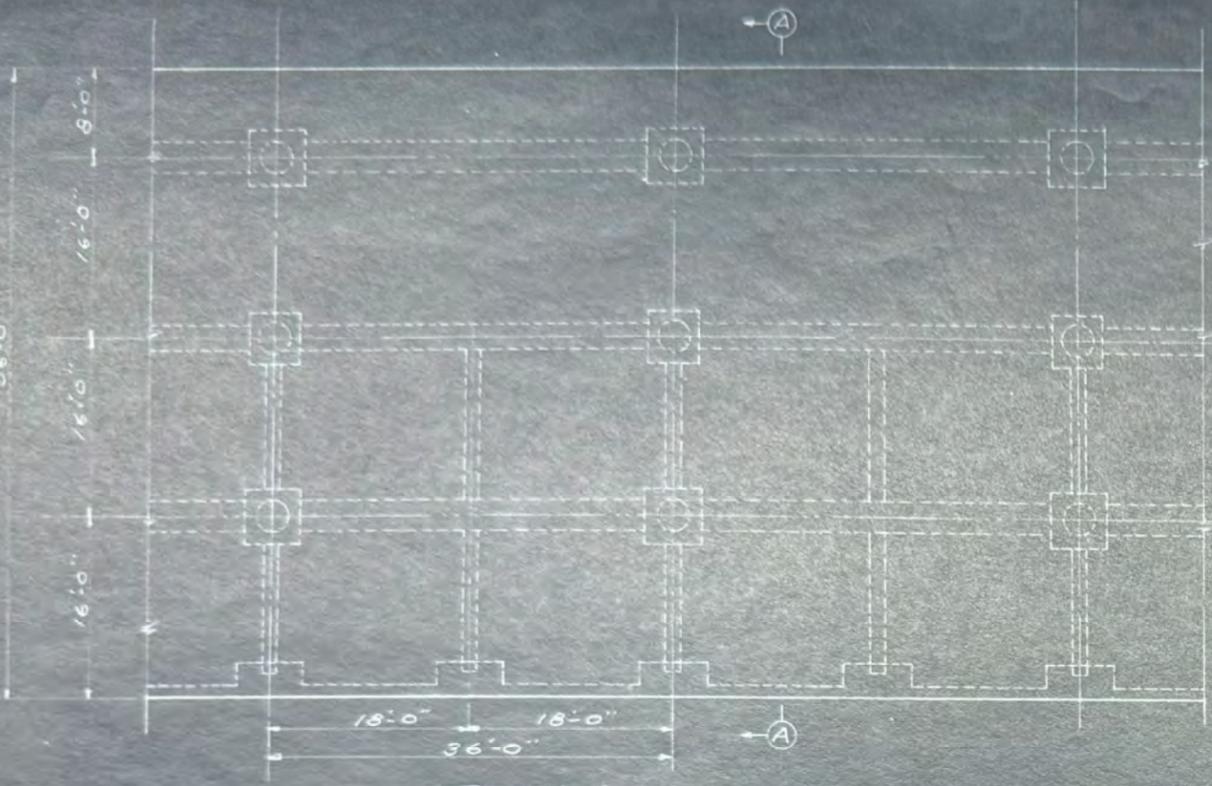


PLAN OF RELIEVING PLATFORM

SCALE 1" = 60'-0"

- LEGEND**
- EXISTING STRUCTURE
  - ▨ DOCK TO BE BUILT
  - ▩ SUPPORTING SLAB
  - ▧ RIP RAP

REVISIONS				KAISER COMPANY, INC.	
MK.	DATE	BY	OK	RICHMOND, CALIFORNIA	
				RELIEVING PLATFORM	
				FITTING OUT DOCK AT	
				RICHMOND YARD NO. 3	
				DATE JAN 25, 1943	SUBMITTED
				SCALE 1" = 60'-0"	APPROVED



Pavement Settlement



Timber piles supported deck

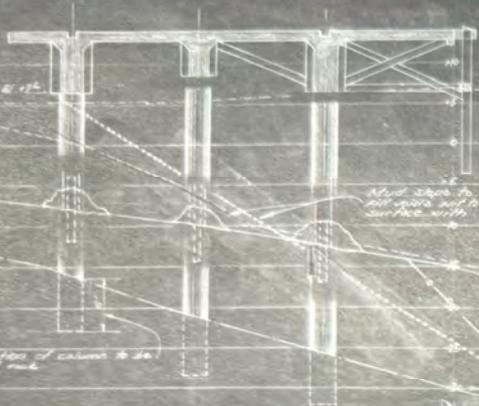
Landside rail

Waterside rail

Concrete Deck Condition

34'-0"  
7'-0"

REVISIONS				KAISER COMPANY, INC.	
MR.	DATE	BY	OK	RICHMOND, CALIFORNIA	
				FITTING OUT DOCK	
				SOUTH END	
				CYLINDER SCHEME DETAILS	
	DATE 2-10-43			SUBMITTED	
	SCALE Noted			APPROVED	
	DRAWN BY J. M. G.				

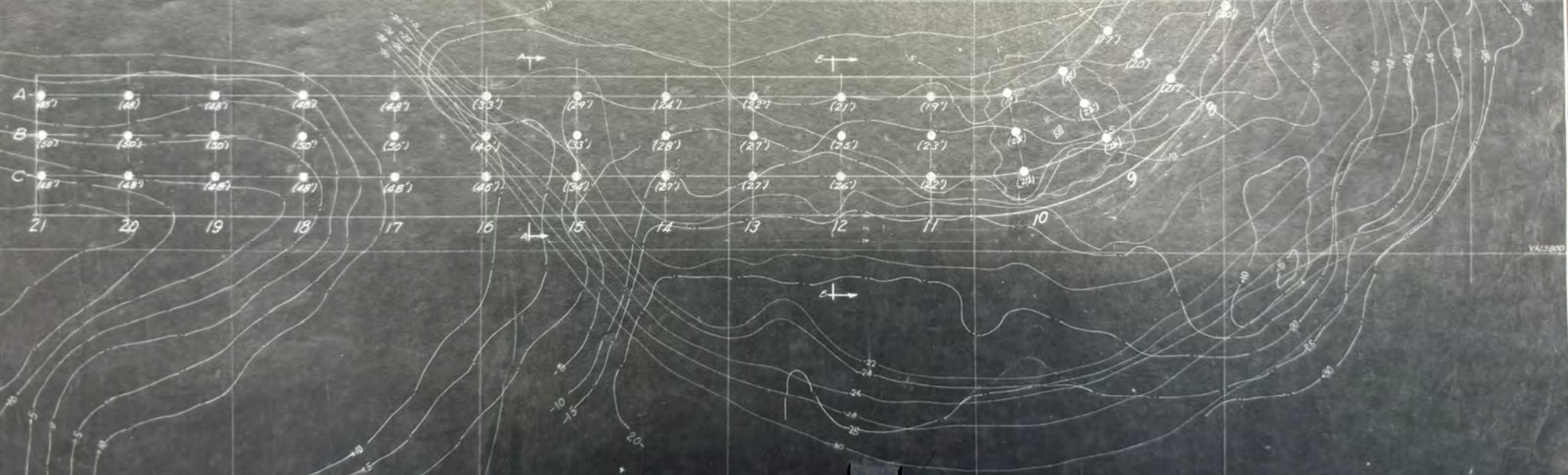


SECTIONS A-A & B-B

Abut slope to be paved with diamond rock, 200' wide and to extend back over 2000 sq ft of surface with a concrete top side of paving (top level to be +7±)

Rock slope to be 1 to 1. Excavation not to be done under present contract. When slope to be 2 to 1, where rock slope is higher to be 4 to 1 than 1 to 1, to intersect with shore and concrete and where as reported here.

Sheet piling to terminate at this point



PLAN  
1" = 20'

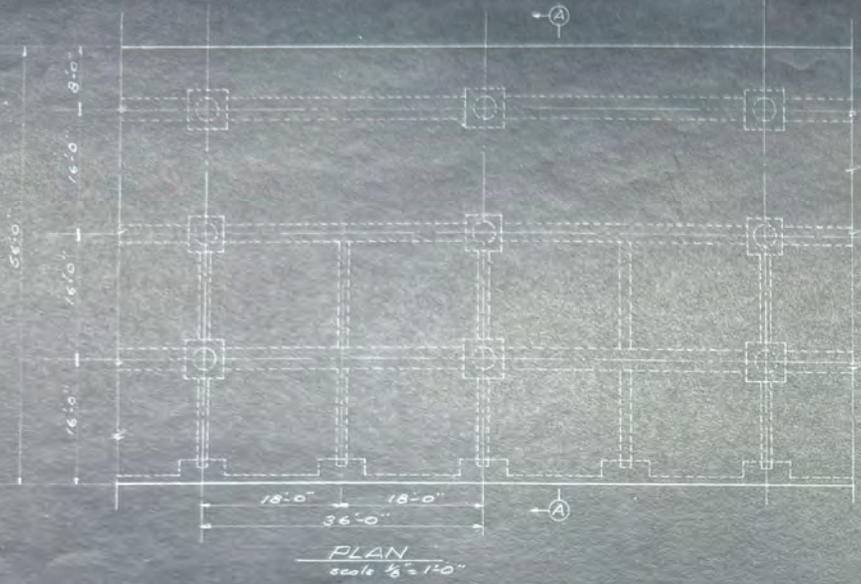
- PILING PREVIOUSLY DRIVEN
- (21') INDICATES 1/2TH OF CYLINDER
- 36" DIAM. CYLINDER
- BENTS NUMBERED, ROWS LETTERED

Sht 5 of 10

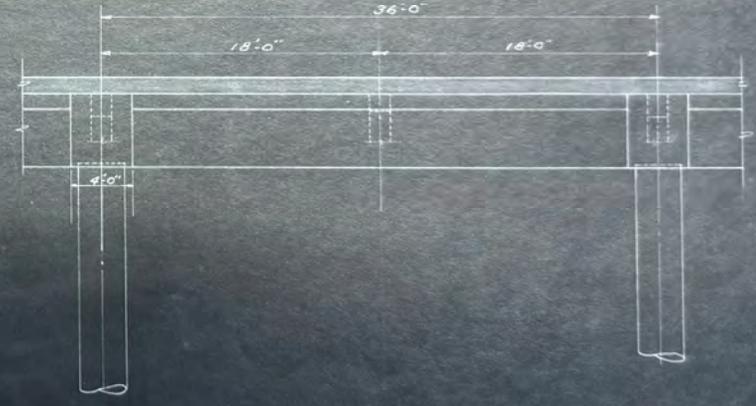
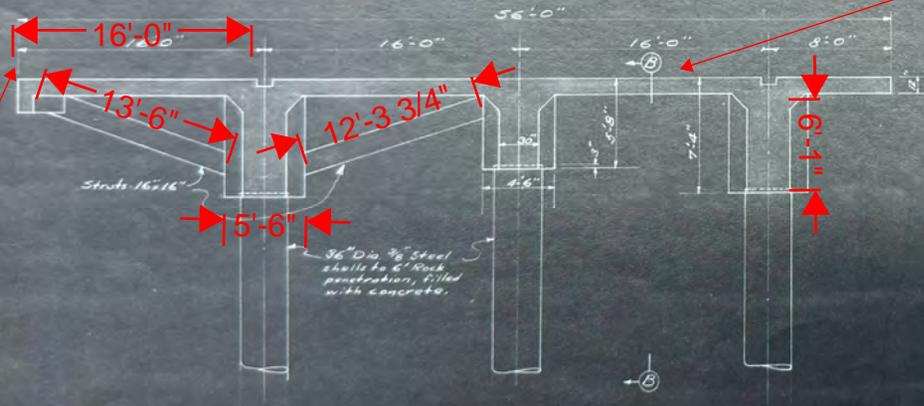
See Drawg 220-134 For Grdgs & Connections

REVISIONS				KAISER COMPANY, INC.	
NO.	DATE	BY	CHK	RICHMOND, CALIFORNIA	
1	2-12-43	Wm. J. P.	WJ	FITTING OUT DOCK	
2	2-13-43	C. Mac	WJ	CYLINDER SCHEME	
3	2-23-43	Wm. J. P.	WJ		

DATE	2-23-43	APPROVED BY	Wm. J. P.
SCALE	As Noted	CHECKED BY	Wm. J. P.
DRAWN BY	Wm. J. P.		
CHECKED BY			



Concrete Deck Condition

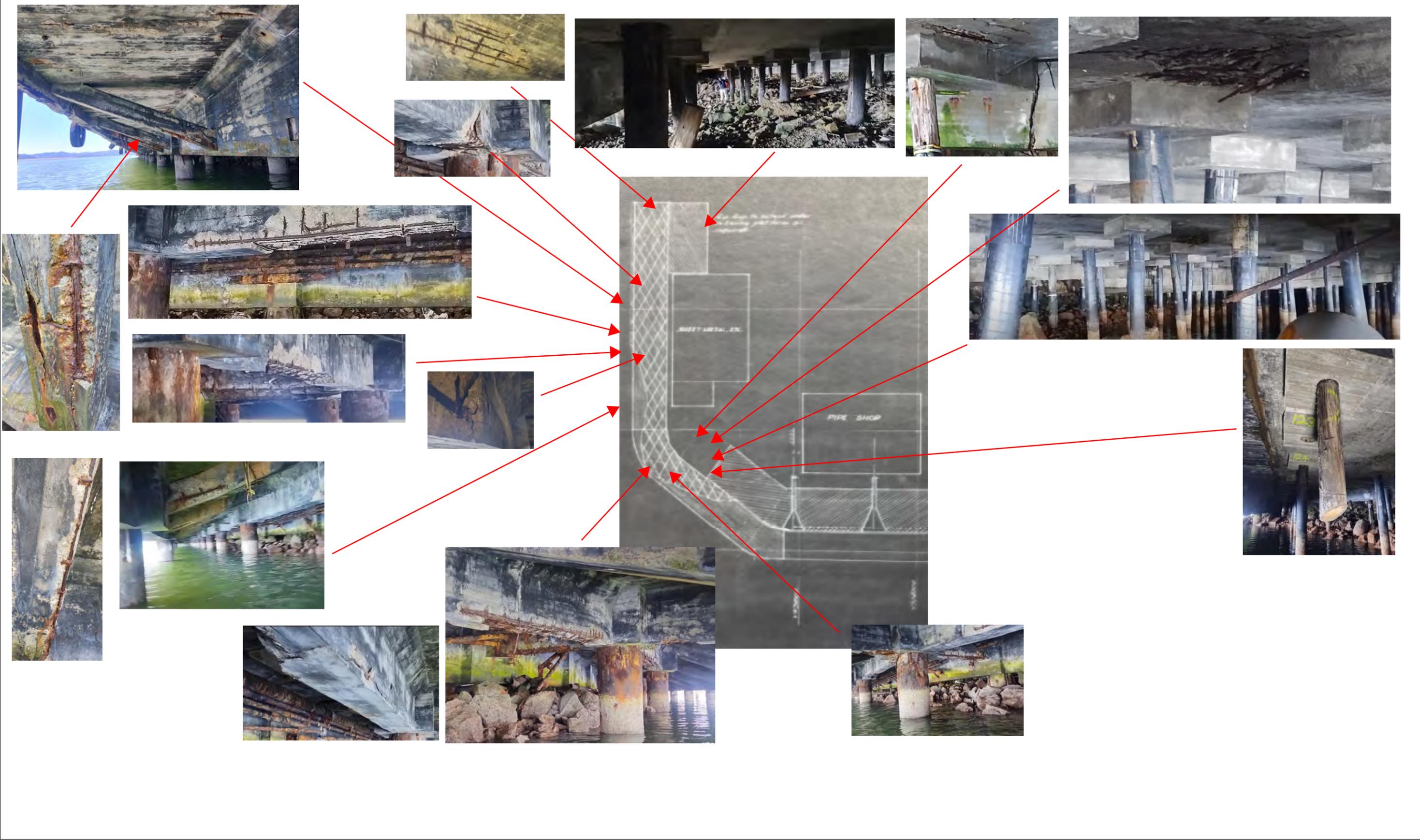


Sht 6 of 10

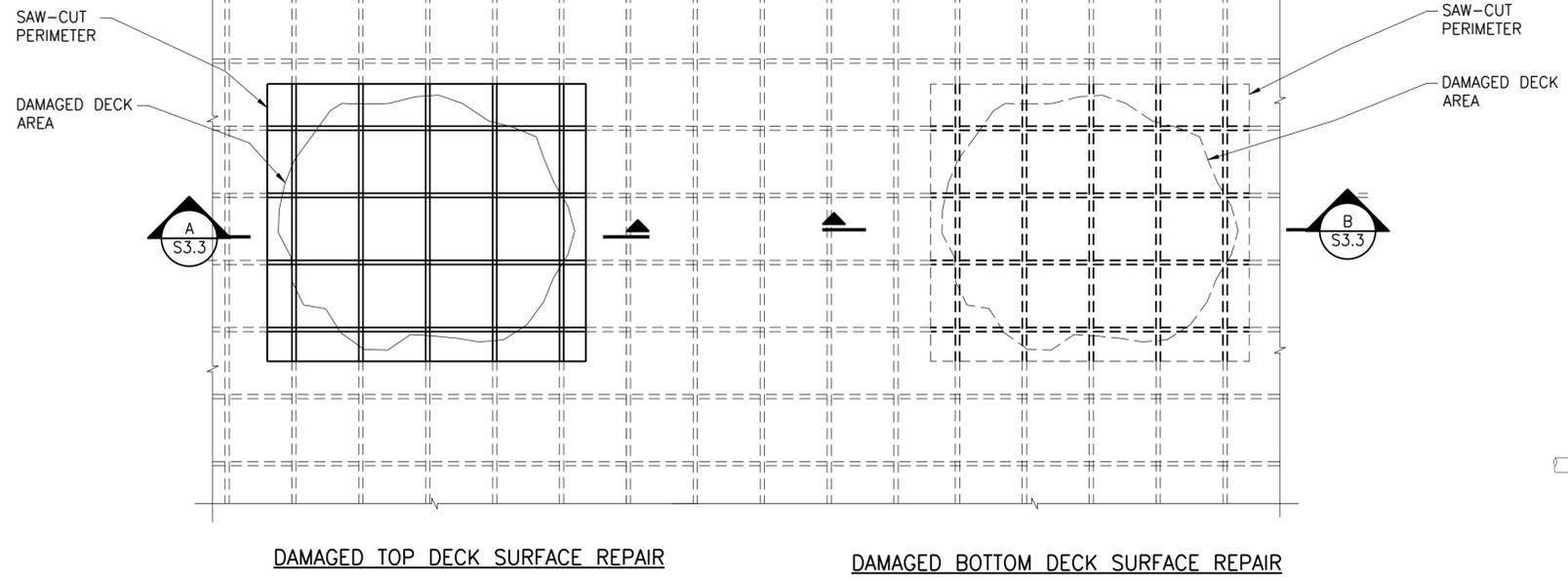
REVISIONS				KAISER COMPANY, INC.	
NO.	DATE	BY	CHK	RICHMOND, CALIFORNIA	
				FITTING OUT DOCK	
				SOUTH END	
				CYLINDER SCHEME DETAILS	
				DATE 2-10-43	DESIGNED
				SCALE 1/4" = 1'-0"	APPROVED
				DRAWN BY E. M. C.	
				CHECKED BY	220-0-20

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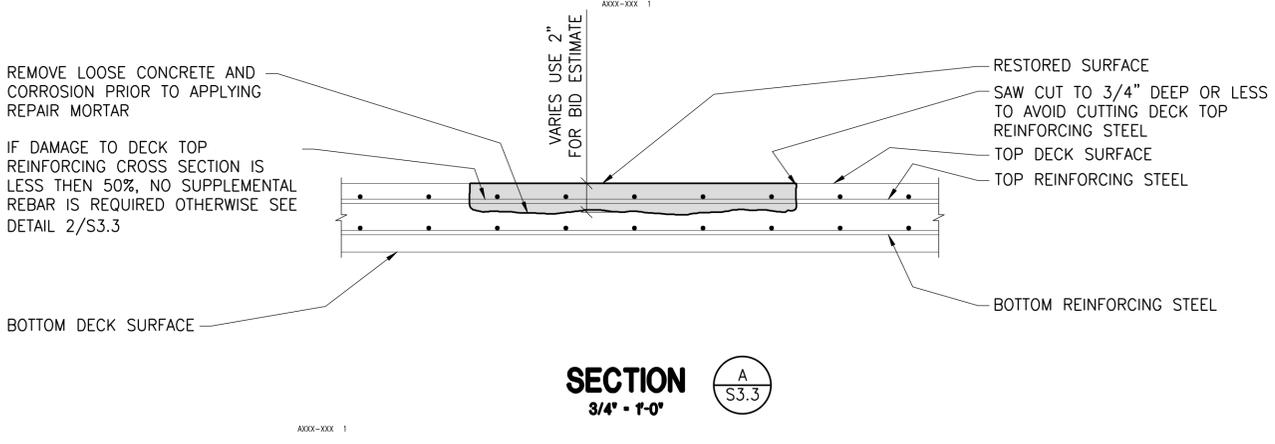
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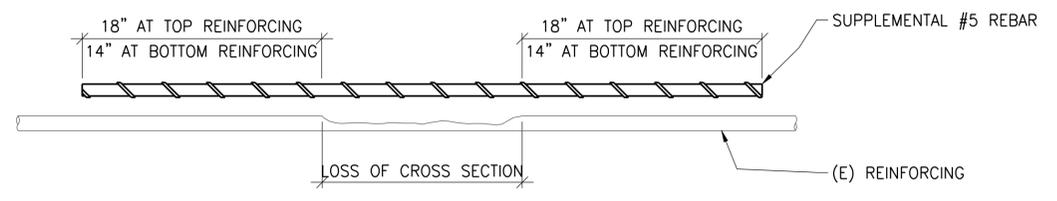
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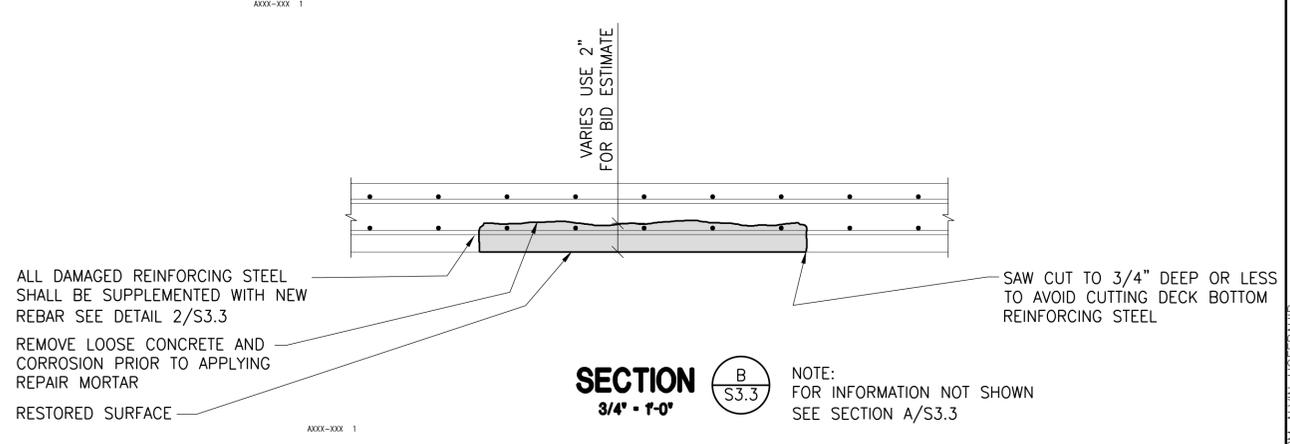
**CONCRETE REMOVAL AND SURFACE PREPARATION**  
3/4" - 1'-0" (1/S3.3)



**SECTION**  
3/4" - 1'-0" (A/S3.3)



**SUPPLEMENTAL REBAR DETAIL**  
DO NOT SCALE (2/S3.3)



**SECTION**  
3/4" - 1'-0" (B/S3.3)

**WHARF DECK REPAIR NOTES:**

- THE PURPOSE OF THE WHARF DECK REPAIR IS TO RESTORE THE WHARF STRUCTURAL STRENGTH TO SUPPORT A DESIGN LIVE LOAD OF 250 PSF AND TO EXTEND THE SERVICE LIFE OF THE STRUCTURE.
- THE DECK REPAIR WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
  - AMERICAN CONCRETE INSTITUTE, CONCRETE REPAIR GUIDE. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2004.
  - AMERICAN CONCRETE INSTITUTE, SURFACE REPAIR USING FORM-AND-PUMP TECHNIQUES. FARMINGTON HILLS, MI: AMERICAN CONCRETE INSTITUTE, 2003.
  - INTERNATIONAL CONCRETE REPAIR INSTITUTE, GUIDE FOR SURFACE PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION (GUIDELINE NO. 310.1R-2008). DES PLAINES, IL: INTERNATIONAL CONCRETE REPAIR INSTITUTE, 2008..
- AT REPAIR AREAS CONTRACTOR SHALL PERFORM SOUNDING OR OTHER APPROPRIATE NON-DESTRUCTIVE CONCRETE TESTING TO LOCATE AREAS OF DELAMINATION FOR THE TOP AND BOTTOM DECK SURFACES OF INNER AND OUTER WHARVES FOR BERTH RCH-7 AND RCH-8.
- CONTRACTOR SHALL MARK THE PERIMETER OF THE DECK REPAIR AREAS TO BE SAW CUT. LAYOUT SHALL BE SQUARE OR RECTANGULAR IN SHAPE. NOTIFY THE ENGINEER FOR REVIEW OF THE PERIMETER TO BE SAW CUT AREA PRIOR TO THE CUTTING.
- SPECIAL INSPECTION IS REQUIRED FOR SURFACE PREPARATION PRIOR TO INSTALLATION OF STRUCTURAL REPAIR CONCRETE.
- THE WHARF DECK REPAIR SYSTEM CONSISTING OF REBAR PROTECTION AND MORTAR SHALL BE COMPATIBLE AND SHALL BE SUPPLIED BY A SINGLE SOURCE SO THAT THE REPAIR SYSTEM PERFORMS AS WARRANTED BY THE PRODUCTS MANUFACTURER
- THE FOLLOWING CONCRETE AND TIMBER PILE REPAIR PRODUCTS ARE ACCEPTABLE:
  - BASE CONSTRUCTION CHEMICAL, LLC**  
EMACO S66 CI, FLOWABLE STRUCTURAL-REPAIR CONCRETE WITH INTEGRAL CORROSION INHIBITOR, FOR TOP DECK SURFACE REPAIR  
EMACO S88 CI, SPRAYABLE FIBER-REINFORCED STRUCTURAL REPAIR MORTAR WITH INTEGRAL CORROSION INHIBITOR FOR BOTTOM DECK SURFACE REPAIR.  
MASTERSEAL CP, ADVANCED CORROSION INHIBITOR TREATMENT FOR STEEL REINFORCED CONCRETE, APPLIED TO REPAIRED AREAS.
  - SIKA CORPORATION**  
SIKA ARMATEC 110 EPOCEM  
SIKAREPAIR 222 FOR TOP SURFACE  
SIKAREPAIR 223 FOR BOTTOM SURFACE
- CONTRACTOR MAY SUBMIT ALTERNATE EQUIVALENT WHARF DECK REPAIR SYSTEM TO THE ENGINEER AND PORT FOR REVIEW AND APPROVAL. THE PRODUCTS INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- SEE NOTES ON SHEET S2.1 AND GENERAL NOTES.

**REFERENCE DRAWING**



**ISSUED FOR CONSTRUCTION**  
POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND  
WHARF DECK REPAIR NOTES  
AND DETAILS

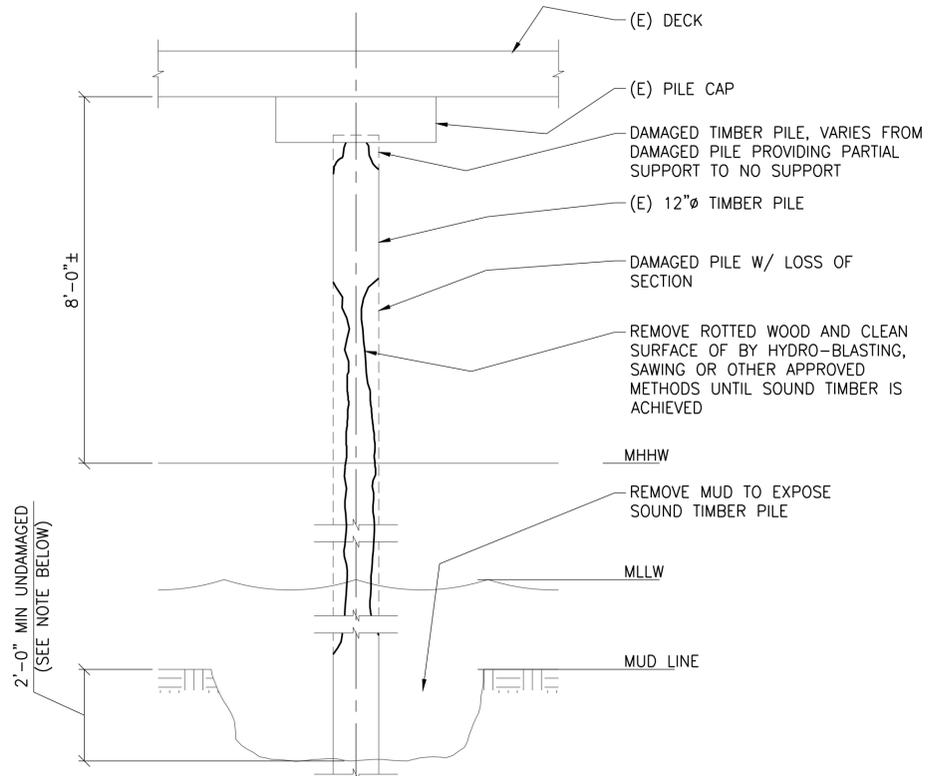
**PRINTED**  
1/24/2012  
LIFTECH CONSULTANTS INC  
**Liftech**  
LIFTECH CONSULTANTS INC

Project No. Z1800  
By AH Checked TG/EGS Sheet No. S3.3  
Approved SL of ---  
Date 01/25/10 Revision 1

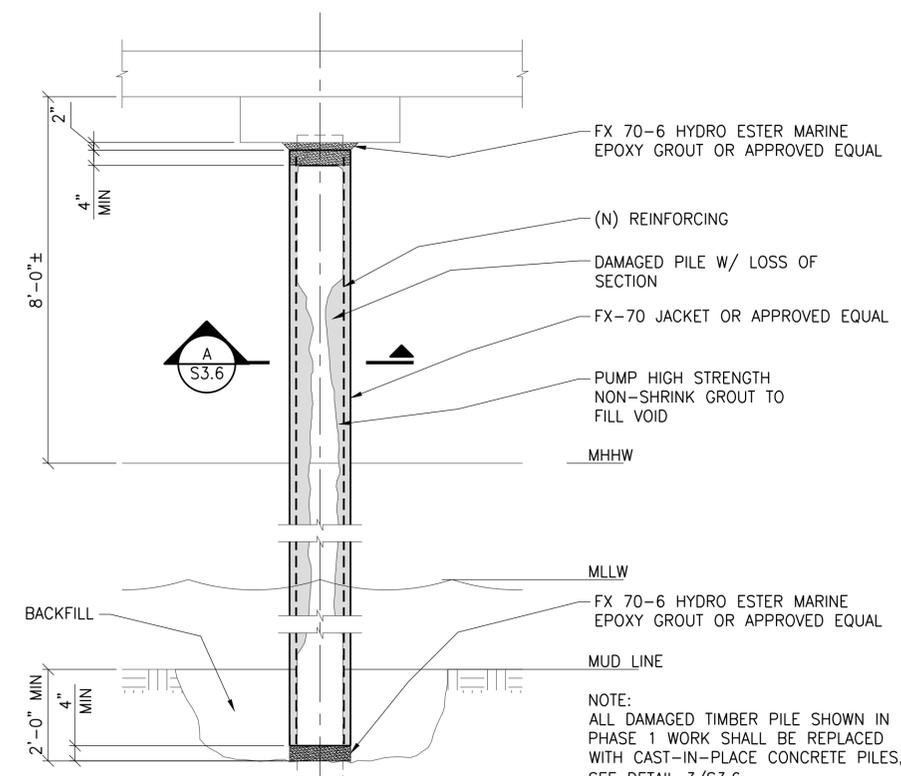
ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No. Revision	Date	By	Checked	Approved



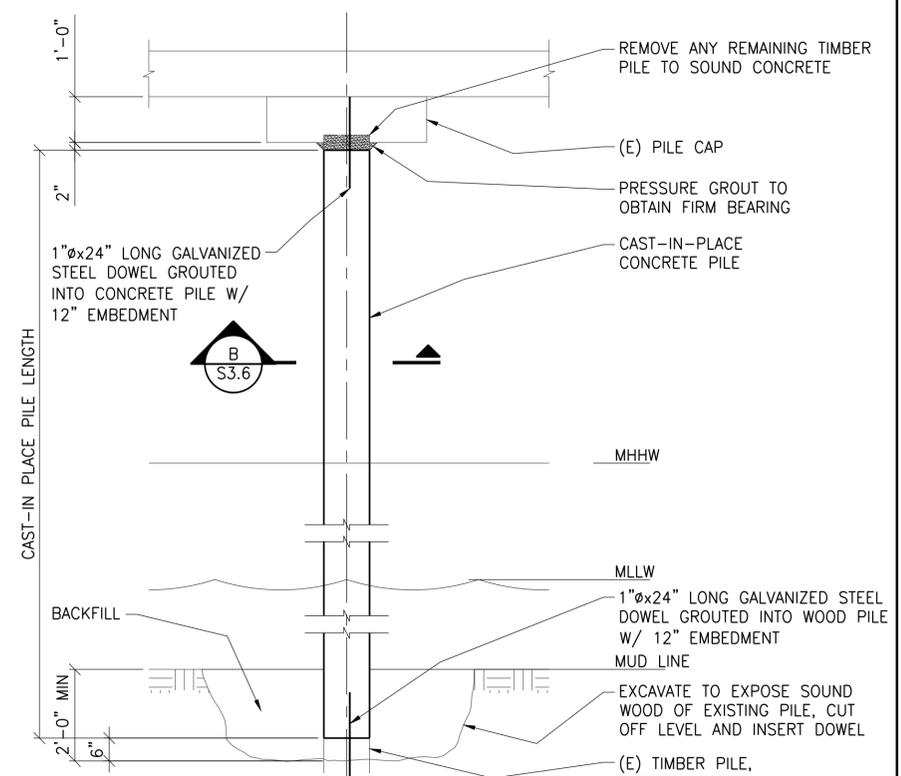
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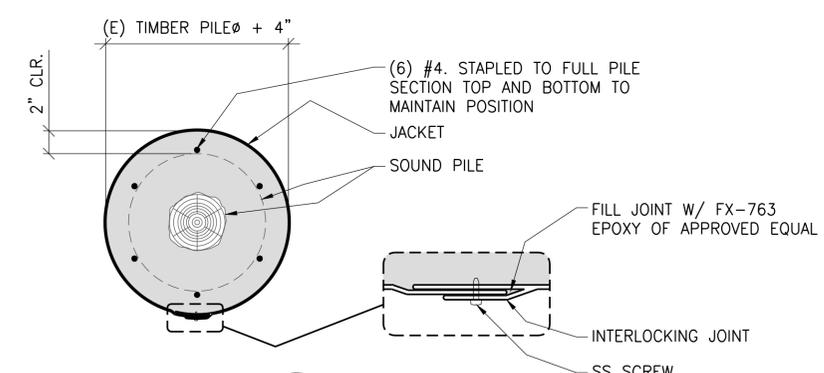
**TYPICAL TIMBER PILE DAMAGED SURFACE PREPARATION**  
 1/2" - 1'-0"  
 NOTE: CONTRACTOR MAY EXCAVATE MORE THAN 2'-0" TO EXPOSE SOUND TIMBER



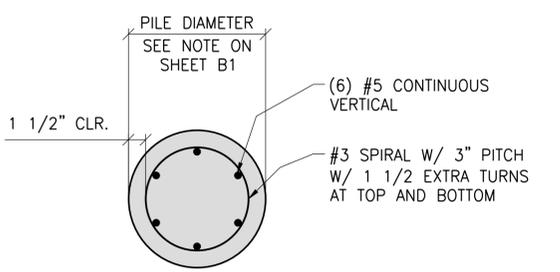
**TYPICAL TIMBER PILE REPAIR DETAIL**  
 1/2" - 1'-0"  
 NOTE: ALL DAMAGED TIMBER PILE SHOWN IN PHASE 1 WORK SHALL BE REPLACED WITH CAST-IN-PLACE CONCRETE PILES. SEE DETAIL 3/S3.6.



**(N) CAST-IN-PLACE PILE TO REPLACE MISSING PILES**  
 1/2" - 1'-0"  
 NOTES:  
 1. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS 24'-0" OR LESS, USE 12" DIAMETER PILE  
 2. IF CAST-IN-PLACE CONCRETE PILE LENGTH IS BETWEEN 24'-0" AND 28'-0", USE 14" DIAMETER PILE.



**SECTION A**  
 1-1/2" - 1'-0"  
 S3.6



**SECTION B**  
 1-1/2" - 1'-0"  
 S3.6

NOTE: CONTRACTOR HAS THE OPTION TO REPAIR TIMBER PILE OR REPLACE DAMAGED PILE WITH CAST-IN-PLACE CONCRETE PILE PER DETAIL 3/S3.6

**REFERENCE DRAWING**



FOR LIFTECH CONSULTANTS INC  
 SIGNATURE DATE:

**ISSUED FOR CONSTRUCTION**  
 POINT POTRERO WHARF REPAIR FOR HONDA AUTOMOTIVE FACILITY  
 PORT OF RICHMOND  
 TIMBER PILE REPAIR AND REPLACEMENT DETAILS

**PRINTED**  
 1/24/2012  
 LIFTECH CONSULTANTS INC  
**Liftech**  
 LIFTECH CONSULTANTS INC

Project No. Z1800  
 By AH Checked TG/EGS Sheet No. S3.6  
 Approved SL of ---  
 Date 01/25/10 Revision 1

ISSUED FOR CONSTRUCTION	05/19/10	AH	TG	SL
No. Revision	Date	By	Checked	Approved

**PROJECT NO. 6: DISCRETE FENDER AND BOLLARD UPGRADES AT BERTHS 5 & 6**

# Project No: 6 - Bollards and Fenders Upgrades at Berths 5 & 6



### Scope of Work:

Objective: To install discrete fenders and bollards to serve various size of barges and tug boats

1. Demo existing bollards and fenders
2. Install three discrete fenders at Berth 5. Refer to reference drawing S2.02 on sheet 5
3. Install two discrete fenders at Berth 6
4. Install five bollards at Berth 5 with strengthened beams, equally spaced. Refer to reference drawing S5.01 on sheet 6
5. Install four bollards at Berth 6 with strengthened beams, equally spaced.



Photos Showing Current Fender and Bollard Conditions at Berths 5 & 6

**Project No: 6 - Budgetary Cost Estimate**

**Estimated Quantity Take-off for Construction Cost Estimates for Discrete Fender and Bollard Upgrades at Berths 5 & 6**

Item	Description	Quantity	Unit	Total Quantity	Comments
<b>Discrete Fender and Bollard Upgrades at Berths 5 &amp; 6</b>					
1	Site preparation	One	EA	One	Refer to scope of work description
2	Furnish and install five discrete fenders	5	EA	5	Refer to sheet 4 for approximate fender locations and reference drawings S2.02 on sheet 5
3	Furnish and install nine bollards	9	EA	9	Refer to reference drawing S5.01 on sheet 6 for bollard
4	Misc concrete repair including bull rails	One	EA	One	

**Budgetary Cost for Discrete Fender and Bollard Upgrades at Berths 5 & 6**

Item	Description	Quantity	Unit	ROM Cost	Comments
<b>Discrete Fender and Bollard Upgrades at Berths 5 &amp; 6</b>					
1	Construction cost estimates based on 2023 contractor bid price for reference project at Port of Oakland	One	EA	\$4,122,133	Refer to bid prices for Port of Oakland B10 project, which has similar scope of work. See sheet 3.
2	Soft cost and contingency - 30%	One	EA	\$1,236,640	The 30% add is to account for the cost associated with escalation and reasonable contingency.
Total				\$5,358,773	
Budgetary Cost Estimates				<b>\$5,400,000</b>	

Notes:

1. The budgetary cost is based on 2025 labor and material costs and does not include escalation for work performed in the future years and tariff impact.

REPLACEMENT OF BERTH 10 FENDERS AND BOLLARDS  
OAKLAND, CALIFORNIA

**REFERENCE BID PRICE**

19 December 2023

				BIDDERS									
				Contractor #1		Contractor #2		Contractor #3		Contractor #4		Contractor #5	
ITEM	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL								
1.	Mobilization and Demobilization	Lump Sum			\$213,000.00		\$400,000.00		\$500,000.00		\$230,000.00		\$360,000.00
2.	Perform all General Condition Work Other than Work Separately Provided for under Other Bid	Lump Sum			\$770,000.00		\$325,000.00		\$500,000.00		\$92,000.00		\$60,000.00
3.	Site Preparation	Lump Sum			\$132,000.00		\$500,000.00		\$240,000.00		\$233,000.00		\$460,000.00
4.	Scanning for Rebar and Underground Utilities	Lump Sum			\$16,000.00		\$75,000.00		\$250,000.00		\$24,000.00		\$12,500.00
5.	Demolish and Repair Concrete at Bollard	231	Linear Feet	\$2,200.00	\$508,200.00	\$3,000.00	\$693,000.00	\$2,500.00	\$577,500.00	\$2,550.00	\$589,050.00	\$3,100.00	\$716,100.00
6.	Demolish and Repair Concrete at Fender	120	Linear Feet	\$1,850.00	\$222,000.00	\$2,500.00	\$300,000.00	\$2,500.00	\$300,000.00	\$2,000.00	\$240,000.00	\$3,200.00	\$384,000.00
7.	Furnish Fenders	6	Each	\$19,500.00	\$117,000.00	\$20,000.00	\$120,000.00	\$35,000.00	\$210,000.00	\$34,000.00	\$204,000.00	\$29,000.00	\$174,000.00
8.	Furnish Fender Pile Support System	5	Each	\$286,200.00	\$1,431,000.00	\$125,000.00	\$625,000.00	\$300,000.00	\$1,500,000.00	\$200,000.00	\$1,000,000.00	\$275,000.00	\$1,375,000.00
9.	Install Fenders	5	Each	\$20,300.00	\$101,500.00	\$12,000.00	\$60,000.00	\$30,000.00	\$150,000.00	\$35,000.00	\$175,000.00	\$10,000.00	\$50,000.00
10.	Install Bollards	11	Each	\$20,900.00	\$229,900.00	\$10,000.00	\$110,000.00	\$20,000.00	\$220,000.00	\$9,000.00	\$99,000.00	\$12,000.00	\$132,000.00
11.	Furnish and Install Steel Spreader Beams	22	Each	\$11,000.00	\$242,000.00	\$7,000.00	\$154,000.00	\$15,000.00	\$330,000.00	\$11,000.00	\$242,000.00	\$6,000.00	\$132,000.00
12.	Furnish and Install Misc. Metals	Lump Sum			\$28,200.00		\$500,000.00		\$10,000.00		\$20,000.00		\$38,000.00
13.	Allowance for Repairs to Concrete Wharf Structure	Allowance			\$200,000.00		\$200,000.00		\$200,000.00		\$200,000.00		\$200,000.00
	<b>TOTAL BID PRICE:</b>				\$4,210,800.00		\$4,062,000.00		\$4,987,500.00		\$3,348,050.00		\$4,093,600.00
	<b>BID BOND AMOUNT:</b>				10%		10%		10%		10%		10%

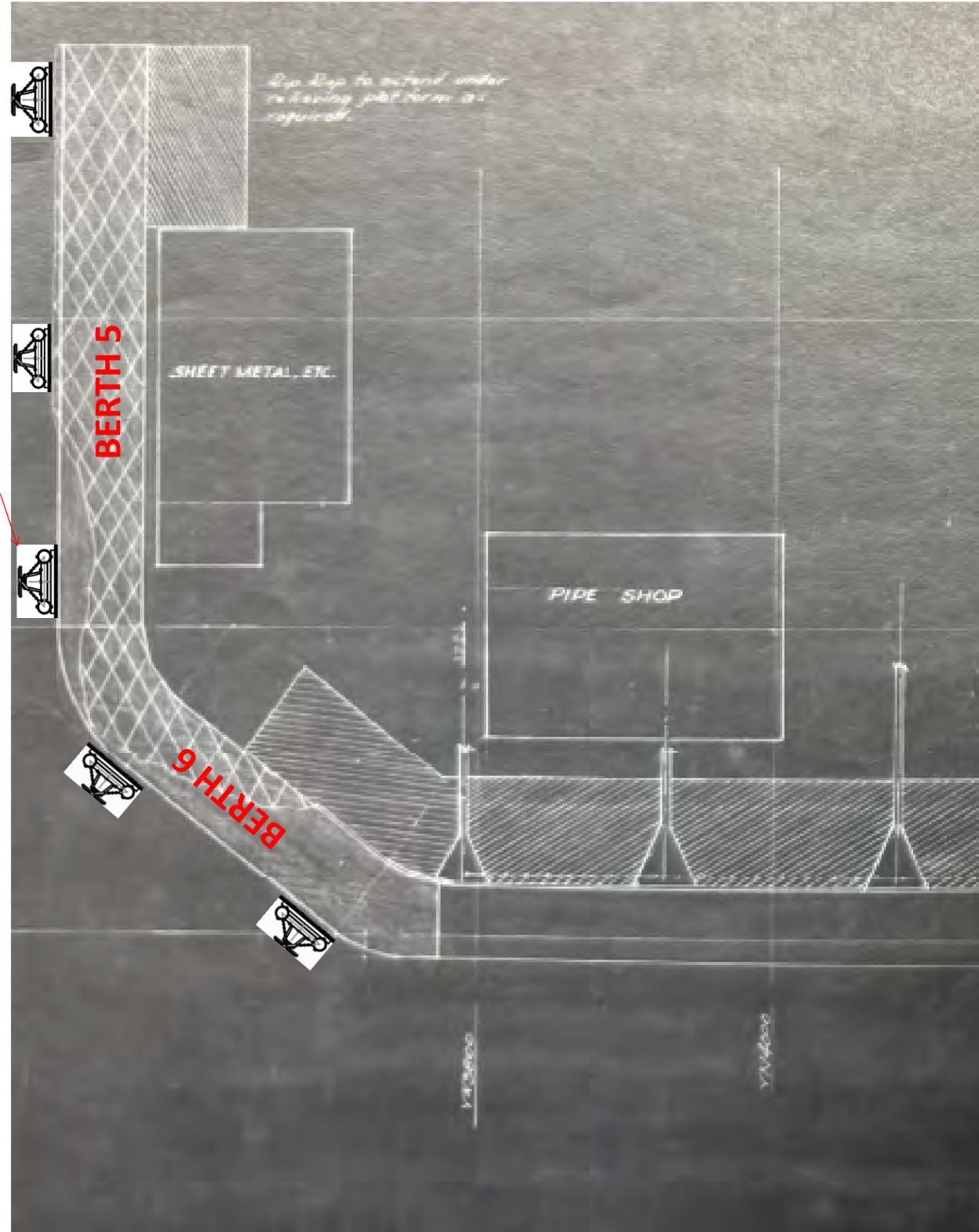
\* Bidder's calculations were corrected per the provisions of Document 00200, Instructions to Bidders, page 00200-11, subparagraph 24.c.

**Liftech Note:**  
**Excluding High and Low, Average bid:\$4,122,133.**

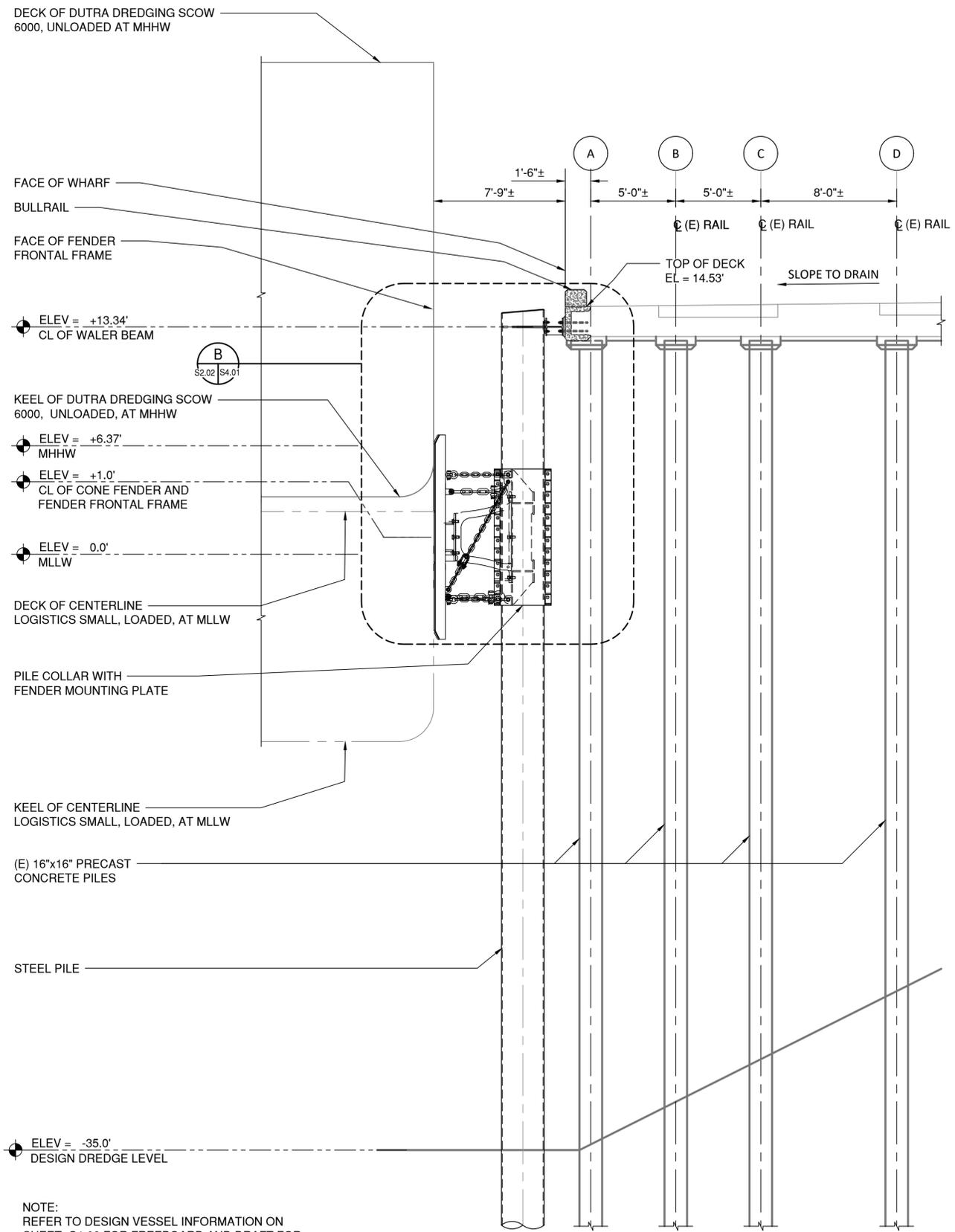
**Project No: 6 - Bollards and Fenders  
Upgrades at Berths 5 & 6**

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Proposed Fender Location



NOTE:  
REFER TO DESIGN VESSEL INFORMATION ON  
SHEET G1.02 FOR FREEBOARD AND DRAFT FOR  
OTHER VESSELS

**BERTH 10 SECTION**  
S2.01 S2.02 1/4" = 1'-0"

**REFERENCE DRAWING**



FOR LIFTECH CONSULTANTS INC  
SIGNATURE DATE: 11/02/23

CAUTION: THIS PLAN MAY BE REDUCED

0 1 2 ORIGINAL SCALE

PROJECT #M23002

REFERENCES:

NO.	REVISIONS	DATE	REVD	APPD

PLANS  
AS-BUILT PLANS  
FIELD BOOKS

CAUTION:  
CHECK TRACING FOR LATEST REVISIONS

NO.	REVISIONS	DATE	REVD	APPD

DRAWN ALVIN HOFFPAUIR  
DESIGNED DI LIU C84419  
CHECKED SUGI LONI S3041



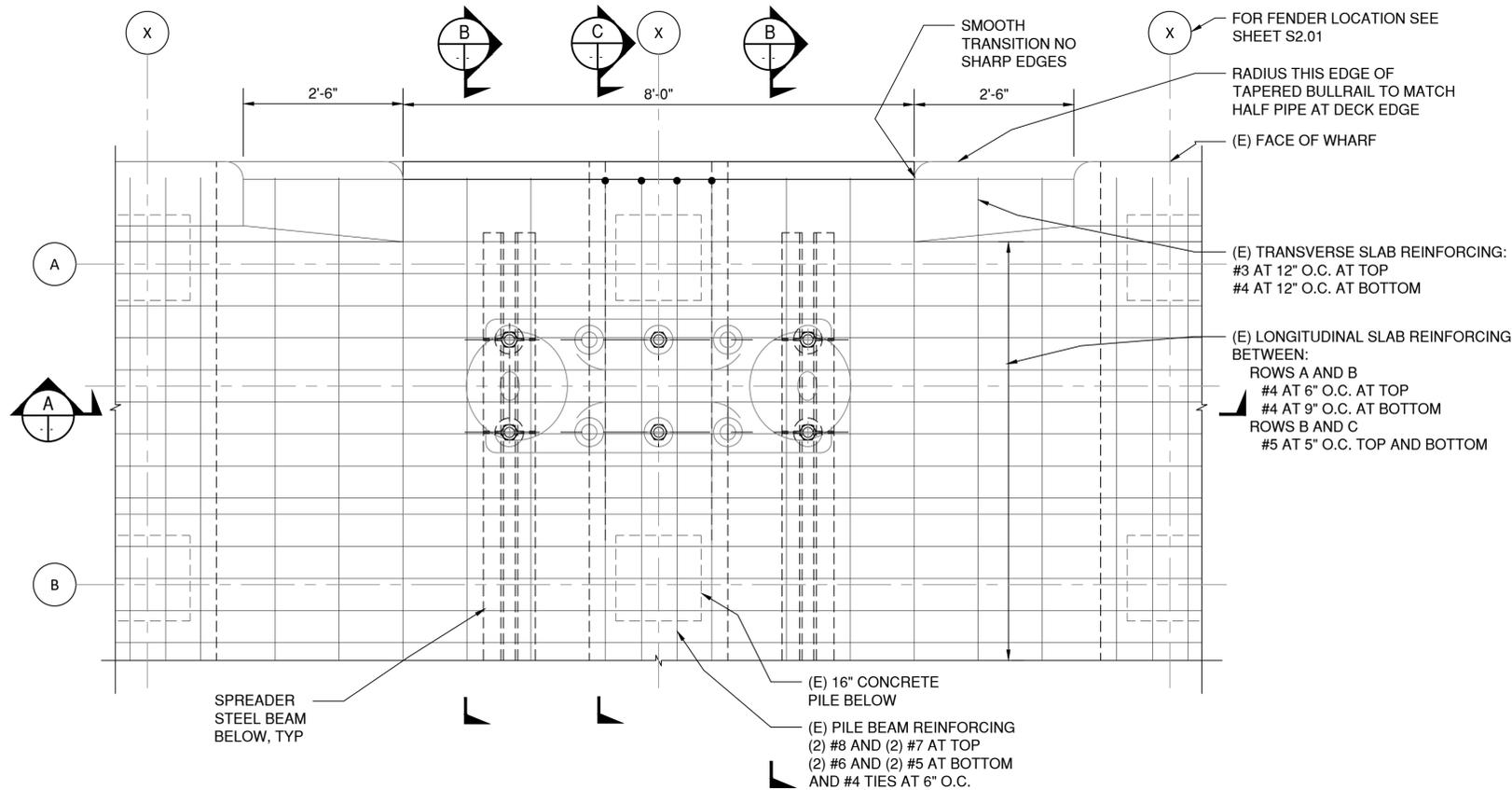
**PORT OF OAKLAND**  
530 WATER ST. OAKLAND, CALIFORNIA

**Liftech**  
LIFTECH CONSULTANTS INC  
344 20th Street, Suite 360  
Oakland, Ca 94612  
Ph: (510) 832-5606  
Job # - 2424

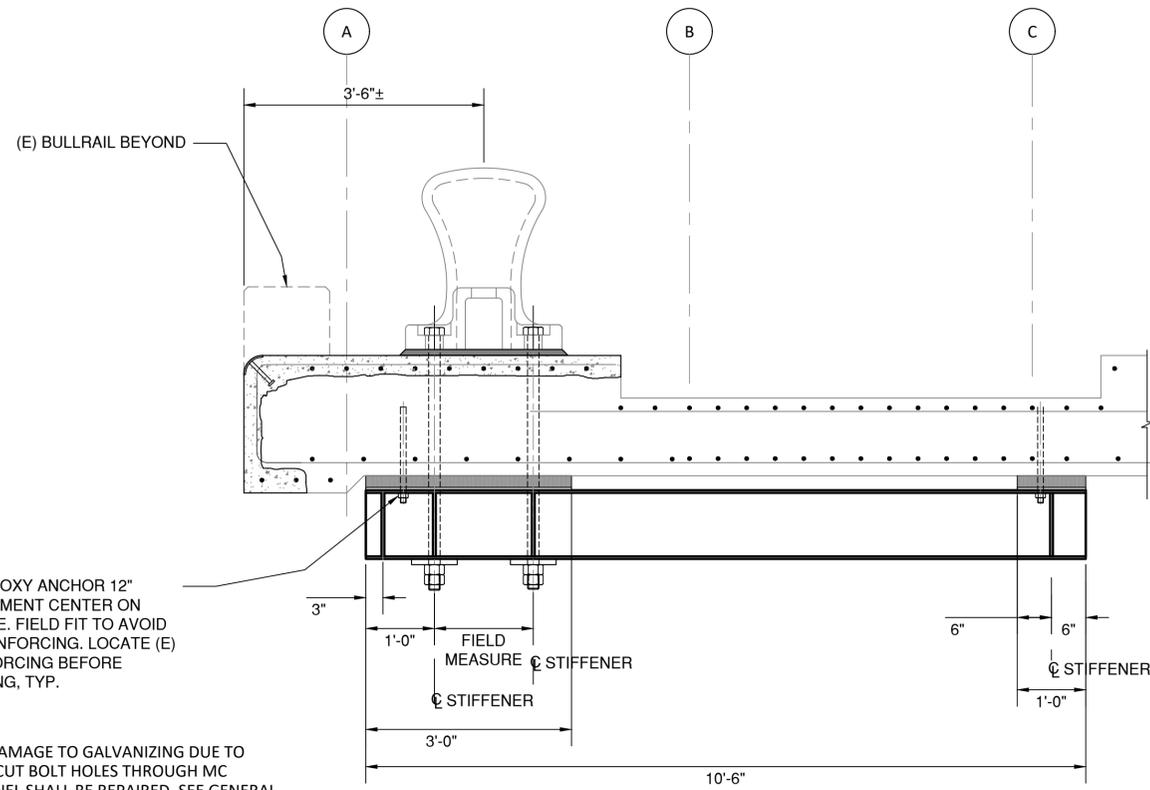
OUTER HARBOR CHANNEL	DATE: 11/02/23
<b>REPLACEMENT OF BERTH 10 FENDERS AND BOLLARDS</b>	SCALE: AS SHOWN
FENDER AND WHARF SECTION	SHEET: 11 OF 19 SHEETS
S2.02	AA-4353

Sht 5 of 6

PRINT DATE: 11/2/2023 3:01:15 PM \\MODEL2424\2424\DWG\PRODUCTION\STRUCTURAL\LIFTECH\S2.02\_FENDER AND WHARF SECTION.DWG PRINTED BY ALVIN HOFFPAUIR



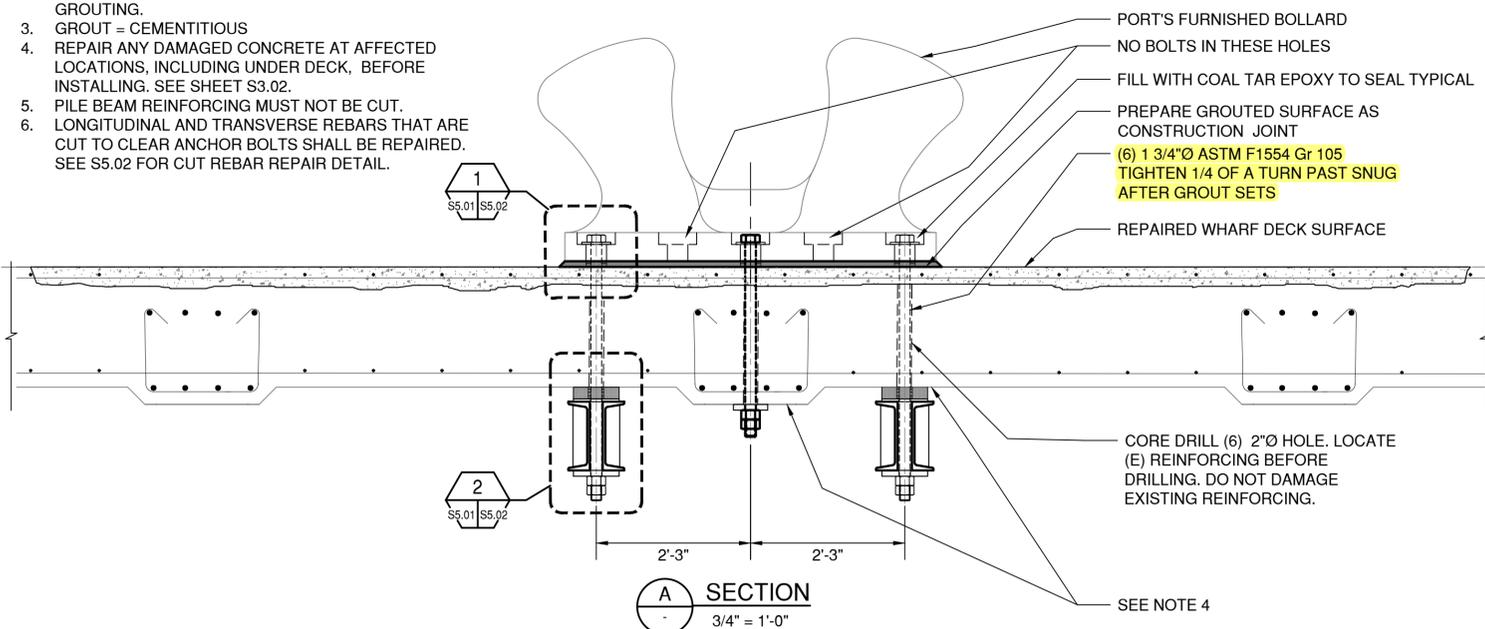
1 BERTH 10 WITH PORT FURNISHED BOLLARD - TYPICAL PLAN  
S2.01 S5.01 3/4" = 1'-0"



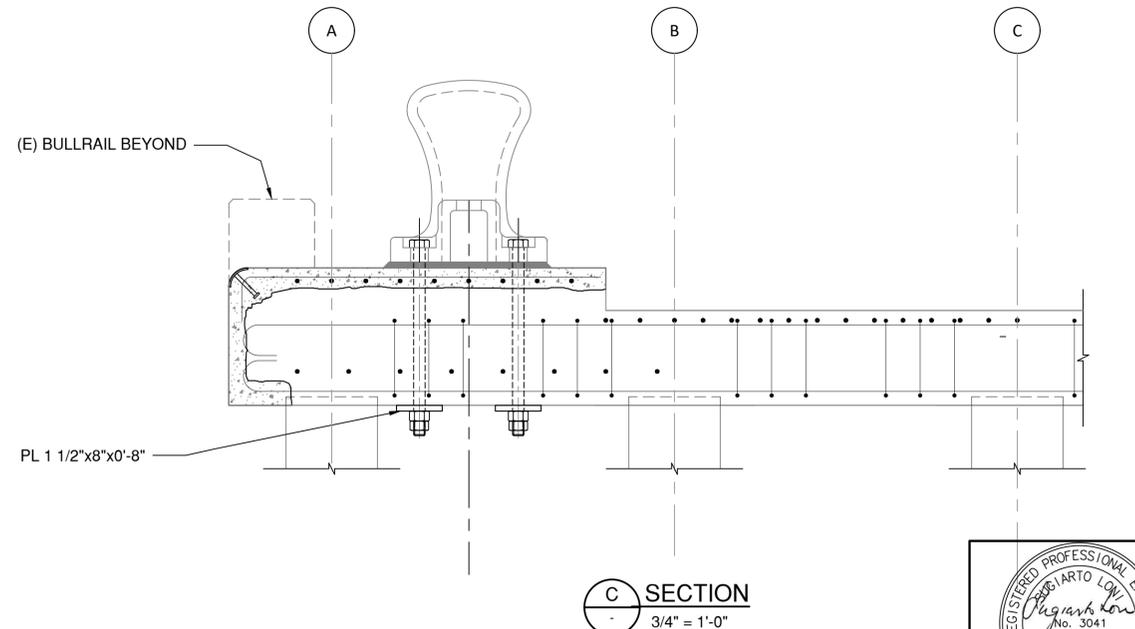
B SECTION  
3/4" = 1'-0"

NOTES:

1. PREPARE ALL GROUTED SURFACES AS CONSTRUCTION JOINT.
2. FOLLOW MANUFACTURERS' REQUIREMENTS FOR GROUTING.
3. GROUT = CEMENTITIOUS
4. REPAIR ANY DAMAGED CONCRETE AT AFFECTED LOCATIONS, INCLUDING UNDER DECK, BEFORE INSTALLING. SEE SHEET S3.02.
5. PILE BEAM REINFORCING MUST NOT BE CUT.
6. LONGITUDINAL AND TRANSVERSE REBARS THAT ARE CUT TO CLEAR ANCHOR BOLTS SHALL BE REPAIRED. SEE S5.02 FOR CUT REBAR REPAIR DETAIL.



A SECTION  
3/4" = 1'-0"



C SECTION  
3/4" = 1'-0"

REFERENCE DRAWING

PRINT DATE: 11/2/2023 3:01:44 PM \\MODE\2424\2424\DWG\PRODUCTION\STRUCTURAL\LIFTECH\S5.01 BOLLARD DETAILS - 1.DWG PRINTED BY ALVIN HOFFPAUIR

PROJECT #M23002

REFERENCES:

NO.	REVISIONS	DATE	REVD	APPD

CAUTION: CHECK TRACING FOR LATEST REVISIONS

DRAWN	ALVIN HOFFPAUIR
DESIGNED	DI LIU C84419
CHECKED	SUGI LONI S3041
	REG. ENGINEER NO.
	REG. ENGINEER NO.



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Job # - 2424

OUTER HARBOR CHANNEL	DATE: 11/02/23
REPLACEMENT OF BERTH 10 FENDERS AND BOLLARDS	SCALE: AS SHOWN
BOLLARD DETAILS - 1	SHEET: 17 OF 19 SHEETS

REGISTERED PROFESSIONAL ENGINEER  
SUGI LONI  
No. 3041  
Exp. 03/31/2025  
STRUCTURAL  
STATE OF CALIFORNIA

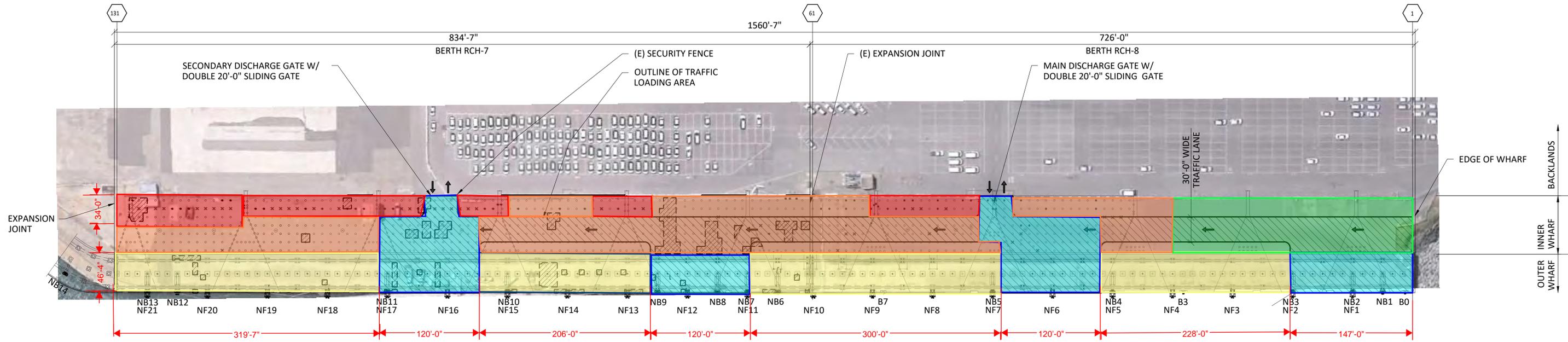
FOR LIFTECH CONSULTANTS INC  
SIGNATURE DATE: 11/02/23

S5.01 AA-4353

**APPENDIX K – WHARF DECK ALLOWABLE LIVE LOAD**

# APPENDIX K - WHARF DECK ALLOWABLE LIVE LOAD

Original border size 525 x 812 mm.  
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## WHARF PLAN

### WHARF LEGEND

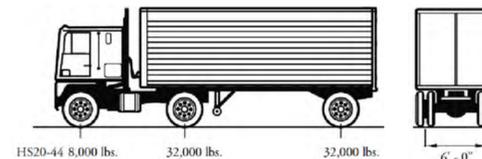
- BX (E) BOLLARD TO REMAIN
- NBX (N) BOLLARD
- TRAFFIC LOADING AREA
- NFX (N) FENDER

### WHARF ALLOWABLE LIVE LOADING LEGEND

- NO LOAD ALLOWED  
SEE NOTE 1
- ALLOWABLE LIVE LOAD = 50 PSF  
VEHICLES:  
TRAFFIC = GVWR < 10,000 POUNDS  
PARKED = NOT ALLOWED  
SEE NOTE 2
- ALLOWABLE LIVE LOAD = 230 PSF  
VEHICLES:  
TRAFFIC = HS20-44  
PARKED = GVWR < 10,000 POUNDS  
SEE NOTE 3
- ALLOWABLE LIVE LOAD = 390 PSF AT OUTER WHARF  
ALLOWABLE LIVE LOAD = 200 PSF AT INNER WHARF  
H20-44 WHEEL LOAD  
SEE NOTE 4
- ALLOWABLE LIVE LOAD = 600 PSF  
H20-44 WHEEL LOAD  
SEE NOTE 5

### NOTES:

1. DUE TO A SIGNIFICANT NUMBER OF DAMAGED AND MISSING PILES, NO LOAD IS ALLOWED UNTIL DAMAGED AND MISSING PILES ARE REPAIRED/REPLACED.
2. THIS AREA IS RECOMMENDED FOR AUTOMOBILE TRAFFIC LOADING ONLY DUE TO SPORADIC PILE DAMAGE AND MISSING PILES. LARGER LOADS MAY BE JUSTIFIED WITH FURTHER EVALUATION, E.G., LOCALIZED AREAS WHERE THERE ARE NO MISSING OR DAMAGED PILES.
3. THIS ALLOWABLE LOAD IS LIMITED TO OUTER WHARF ONLY AND ASSUMES THE UNREPAIRED CONCRETE PILES CAN SUSTAIN A DESIGN LIVE LOAD OF 250 PSF. THE 230 PSF LIVE LOAD IS TO ACCOUNT FOR THE WEIGHT OF 2" ASPHALT OVERLAY. LARGER LOADS MAY BE JUSTIFIED WITH FURTHER EVALUATION, E.G., LOCALIZED AREAS WHERE THERE ARE NO MISSING OR DAMAGED PILES, CRANE BEAMS SINCE THE BEAMS ARE SUPPORTED BY A GROUP OF PILES.
4. THE CONCRETE AND TIMBER PILES IN THESE AREAS WERE REPAIRED IN THE 2010 REPAIRS. ALLOWABLE LIVE LOADS ARE BASED ON THE STRENGTH OF THE WHARF DECK.
5. PAVEMENT OVER FILL. THE ALLOWABLE LIVE LOAD OF 600 PSF IS BASED ON THE ORIGINAL WHARF LIVE LOAD. ALLOWABLE LIVE LOADING PROBABLY LARGER.
6. LARGER LOADS MIGHT BE JUSTIFIED WITH FURTHER EVALUATION.
7. EXTENT OF AREAS SHOWN ARE APPROXIMATE BUT ADEQUATE FOR LOAD LIMITS.
8. VEHICLE SPACING FOR TRAFFIC > 15 FT, PARKED > 4 FT AND 3 FT AT SIDES.
9. THE LOADING ZONE CAN BE APPROXIMATELY IDENTIFIED BY BOLLARD OR FENDER NUMBERING IN THE LOGITUDINAL DIRECTION AND BY DIMENSIONS SHOWN IN THE WHARF CROSS SECTION SHOWN ON THE FOLLOWING SHEET.



DETAIL HS 20-44

### REFERENCE NOTES:

1. REFER TO APPENDIX D, E, AND F FOR PHOTOS DOCUMENTATION OF THE PILES, BEAMS, AND SOFFIT CONDITIONS



No.	Revision	Date	By	Checked	Approved

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**PORT OF RICHMOND  
POINT POTRERO MARINE TERMINAL  
WHARF CONDITION ASSESSMENT  
APPENDIX K  
WHARF DECK ALLOWABLE LIVE LOAD**

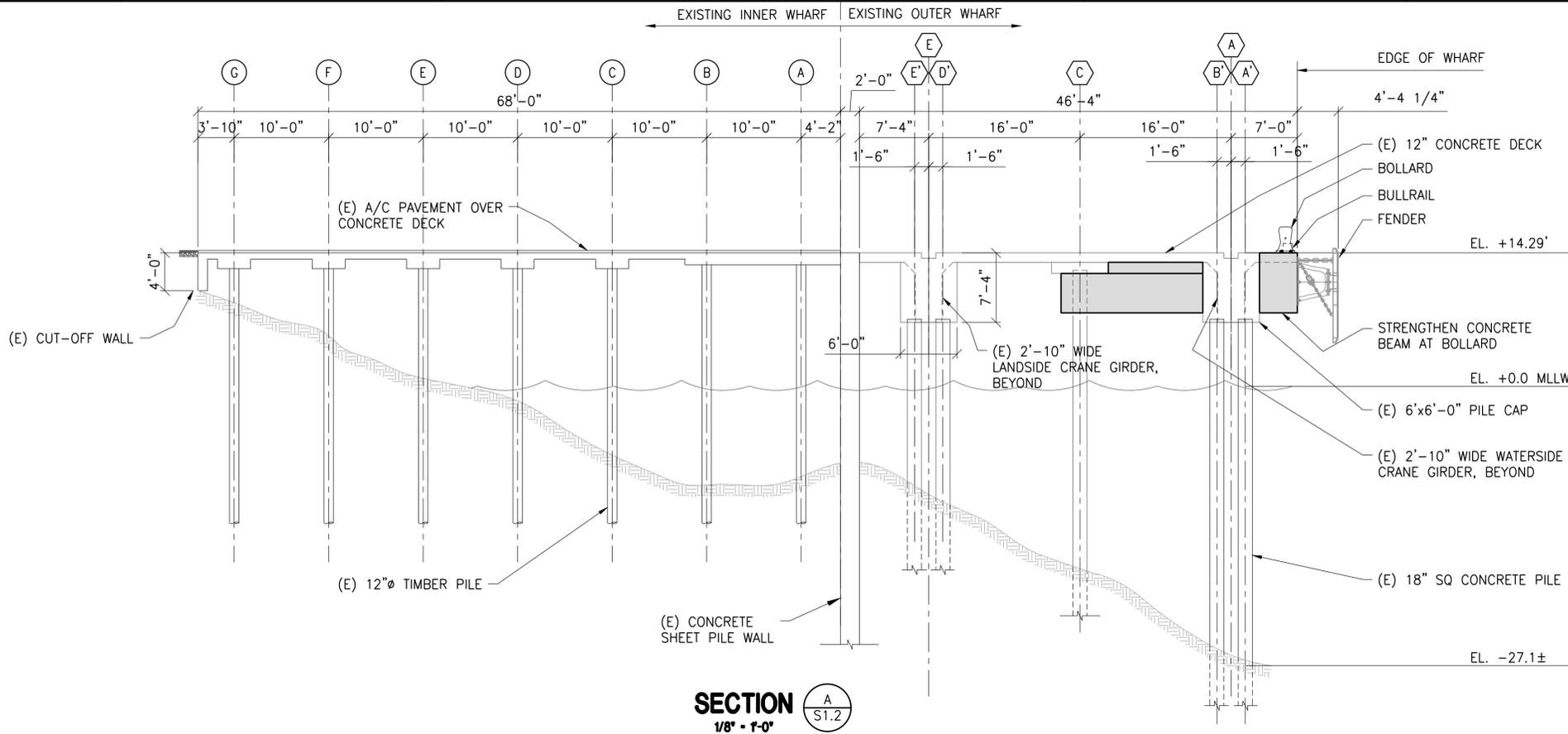
Project No. 2525

By SL/ALH Checked EGS Sheet No. K1

Approved EGS of 1

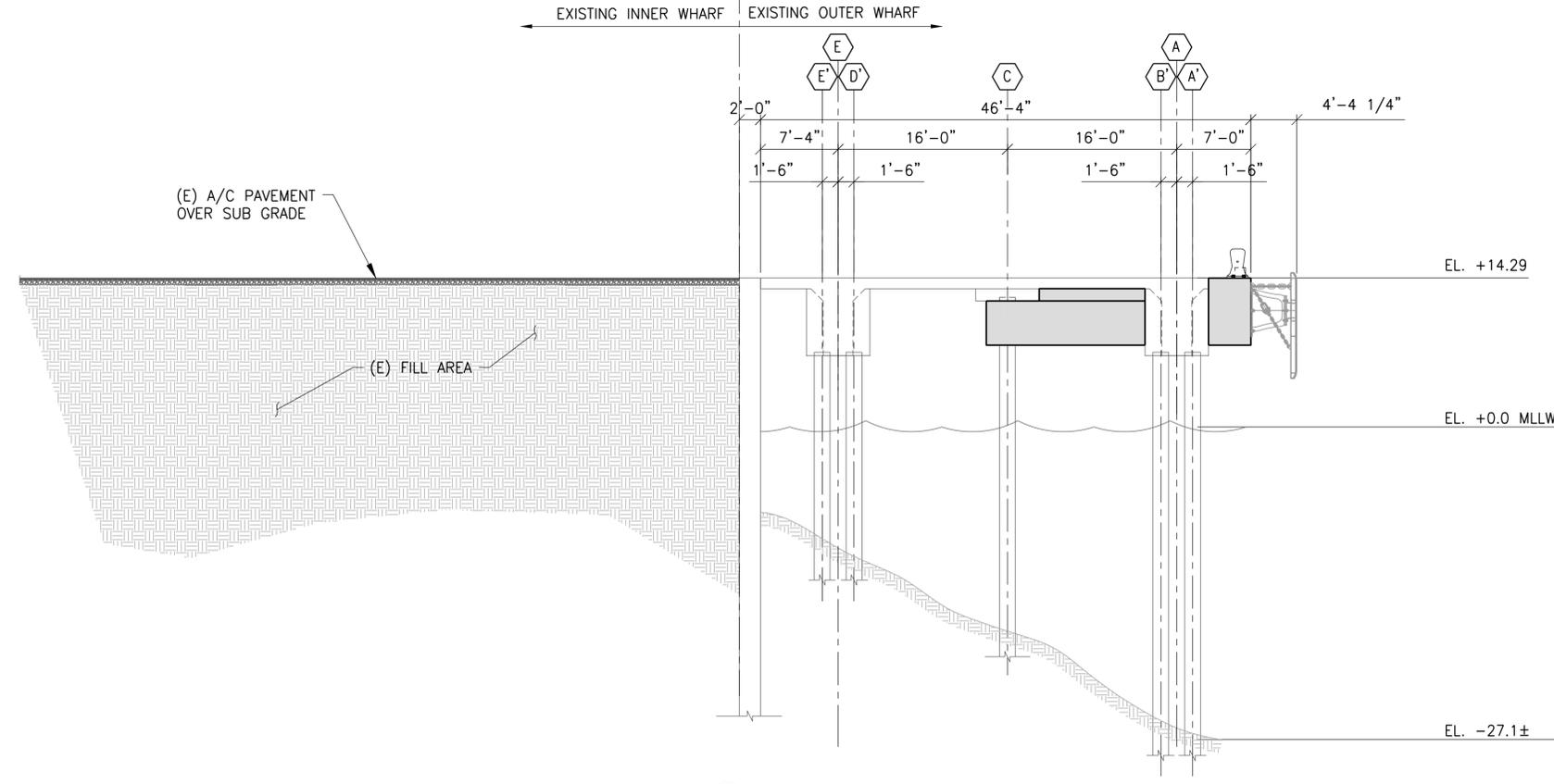
Date 7/25/25 Revision 0

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**SECTION A**  
S1.2  
1/8" - 1'-0"

NOTE:  
AT BOLLARD USE ALTERNATE BOLLARD SUPPORT  
DETAILS SHOWN ON SHEET S4.13 PER PORT'S  
DIRECTIVE.



**SECTION B**  
S1.2  
1/8" - 1'-0"

SEE SECTION A/S1.2 FOR  
INFORMATION NOT SHOWN



**ISSUED FOR CONSTRUCTION**

POINT POTRERO WHARF REPAIR  
FOR HONDA AUTOMOTIVE FACILITY  
PORT OF RICHMOND

TYPICAL WHARF SECTIONS

PRINTED

1/24/2012

LIFTECH CONSULTANTS INC



Project No. Z1800	
By AH	Checked TG/EGS Sheet No. S1.2
Approved SL	of
Date 01/25/10	Revision 1

ISSUED FOR CONSTRUCTION	5/19/10	AH	TG	SL
No. Revision	Date	By	Checked	Approved