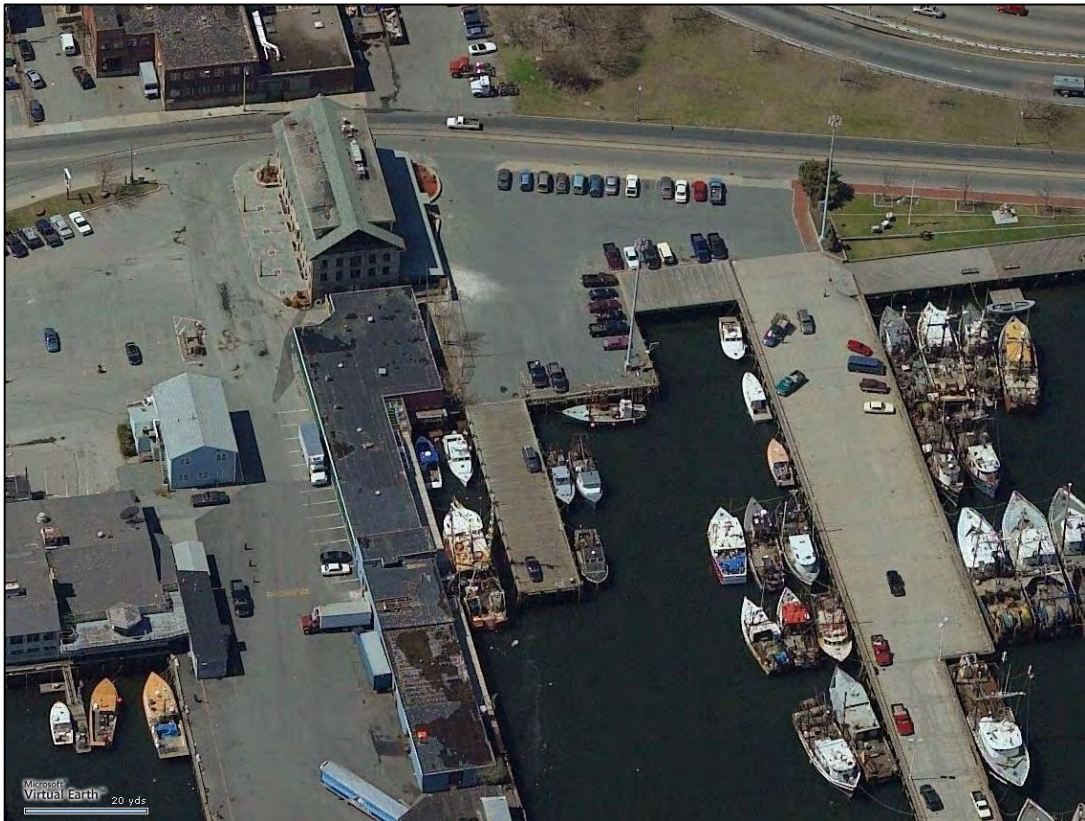


PARE PROJECT NO. 08216.00

**INSPECTION REPORT
COAL POCKET PIER
NEW BEDFORD WATERFRONT
FACILITIES INSPECTIONS
NEW BEDFORD, MASSACHUSETTS**



MARCH 2009

EXECUTIVE SUMMARY

Coal Pocket Pier is comprised of three principal components: a granite stone bulkhead, a timber boardwalk, and a timber pier. The timber pier provides operational berthage for several smaller fishing vessels. The posted load capacity of the pier is for ½ ton trucks only.

Pare Corporation and Childs Engineering Corporation conducted the inspection of the site on November 17, 2008. In general, Coal Pocket Pier was found to be in **Poor** condition. Major concerns include deterioration of timber piles beneath the pier, voids in the granite stone bulkhead, subsidence behind the wall, and corroded low water hardware.

The timber piles supporting the timber pier are severely deteriorated due to marine borer activity, and are in urgent need of rehabilitation. It is recommended that additional piles (sister piles) be installed adjacent to approximately 56 percent of the existing deteriorated timber piles in order to adequately support the pier. Preservative wrapping of the remaining timber piles is also recommended. The opinion of probable construction cost for this rehabilitation is in the order of \$326,000. Alternatively, the replacement of the entire pier would cost approximately \$926,000. It is recommended that the reduced allowable loading of the timber pier continue to be posted until repairs can be implemented.

The existing granite stone bulkhead is in poor condition, with voids in the stone face and subsidence or loss of material behind the wall. Rehabilitation of the existing wall is recommended, with an associated opinion of probable cost of \$385,000. Alternatively, reconstruction of the wall is anticipated to cost in the order of \$640,000 to \$730,000.

The existing timber boardwalk is in generally fair to good condition, with only minor hardware replacement and pile wrapping required. The opinion of probable cost for this work is in the order of \$88,000.



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- Appendix B: Key Personnel
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- Appendix D: References
- Appendix E: Field Notes



SECTION 1 INTRODUCTION

1.1 – Background and Objectives

The New Bedford Harbor Development Commission (HDC) has retained Pare Corporation (PARE) and Childs Engineering Corporation (CEC) to perform an above and below water inspection, and to develop a report of existing conditions for the Coal Pocket Pier in New Bedford, Massachusetts. Inspections were performed in accordance with the ASCE Manuals and Reports on Engineering Practice No. 101 – Underwater Investigations: Standard Practice Manual. The major objectives of the inspection report are to provide the HDC with an assessment of existing conditions at the facility, and to substantiate requests for funding for the maintenance and repair of the facility.

1.2 – Scope of Work

The scope of this investigation is to provide an inspection and evaluation of the present condition of the pier and appurtenant structures, and to provide information that will assist in both prioritizing repair needs and planning/conducting maintenance and operation.

The investigation is divided into three parts: 1) provide a description of the facility, including review of available reports, investigations, and data previously submitted to the owner pertaining to the pier and appurtenant structures; 2) perform a visual inspection of the site above and below water; 3) prepare and submit a final report presenting the evaluation of the structure, including recommendations for remedial actions and associated costs.

SECTION 2 DESCRIPTION OF SITE

2.1 - Site Location

The Coal Pocket Pier is located south of Steamship Pier and north of Homer’s Wharf along the New Bedford waterfront on Buzzard’s Bay as shown in Figure 1 – Locus Plan.

To access the site from Interstate I-195, take exit 15 for Route 18. Follow Route 18 South for approximately 1.2 miles. Turn left onto Union Street, followed by an immediate right onto MacArthur Drive. Coal Pocket Pier is accessed via a parking lot approximately 0.1 miles on the left.

2.2 - Facility Description

The Coal Pocket Pier is comprised of three structures: a 30-foot wide by 60-foot long timber pile supported boardwalk; a 280-foot long granite stone and concrete bulkhead wall; and a 30-foot wide by 130-foot long timber pile supported pier. Coal Pocket Pier was originally constructed in the 1850s primarily for receiving casks of whale oil, when it was known as the Lumber Wharf or the School Street Wharf. In the late 1800s, the pier was used by a utility company for the



loading and unloading of coal. Before being shipped out, the coal was stored in large containers, also known as pockets, which is how the pier received its present name. Coal Pocket Pier is presently used for berthing fishing and lobster boats, servicing vessels typically 40 feet long or less.

Existing drawings pertaining to the facility were located in the HDC Office. Prior inspection reports have not been located at the time of this writing.

SECTION 3 EXISTING CONDITIONS

3.1 - General

The topside and underwater inspections of the Coal Pocket Pier were performed on November 17, 2008. For reference purposes, a baseline was established along the top of the bulkhead during the topside inspection as indicated on Figure 2 – Existing Site Plan. Station 0+00 was located at the northwest corner of the timber wharf and extended to station 2+80 at the southern end of the bulkhead at its intersection with Homer’s Wharf. The timber pier layout is referenced by pile bent number, with Bent No.1 closest to shore, as indicated on the Site Plan. Observations during the topside and underwater inspections were made in relation to their location along the baseline and pier bent as appropriate, and as noted herein.

3.2 Granite Block Seawall

3.2.1 Existing Configuration

The granite stone seawall component of the Coal Pocket Pier consists of a dry lain granite stone bulkhead, measuring approximately 280 feet long, with solid fill supporting a bituminous deck and parking area. The stone bulkhead extends from the Steamship Pier and continues south to the Coal Pocket pier, as indicated on the Site Plan. The exposed height of the wall varies from 9 feet to 16 feet, measured from the top of the wall to the mudline.

A timber fender system is provided in front of the seawall for approximately 120 linear feet of the bulkhead. The fender system is comprised of 12 inch diameter timber pile fenders protecting 50 linear feet of wall, and 10 inch and 12 inch diameter timber pile fenders with 12 inch by 12 inch timber wale protecting 70 linear feet of the bulkhead. A 40 foot long section of the stone and concrete bulkhead adjacent to Homer’s Wharf has 3 steel pile guides attached to the wall face, however only 1 timber fender remains.

The condition of the 61 linear feet of stone bulkhead beneath Steamship Pier will not be discussed as part of this report and will be included in the inspection report for Steamship Pier.

3.2.2 Observed Conditions - Topside



The portion of the granite block seawall that was observed during the topside inspection was in overall fair to poor condition. During the topside inspection, the wall was observed to have large spaces between stones, possibly the loss of chinking stones. From Station 0+90 to Station 1+40, a timber cap sits atop the stone bulkhead. The cap was observed to be in fair condition with rot developing in areas. From Station 1+40 to Station 2+80, approximately the top 3-feet of the stone bulkhead has been replaced with a concrete cutoff wall that was built on top of the stone bulkhead. At Station 1+75, the concrete cutoff wall was observed to be displaced approximately 4 inches (Photo 17, 18). This condition may have occurred due to movement of the stones below. The stone and concrete bulkhead from Station 2+10 to 2+80 was observed in overall fair condition with no observed voids or areas of subsidence. Three steel pile guides were bolted to the face of the concrete cutoff wall from Station 2+50 to 2+80 with only 1 timber pile remaining. Subsidence areas were observed along the length of the wall as discussed in Section 3.5 and as indicated on Figure 2 - Existing Site Plan.

3.2.3 Observed Conditions - Underwater

The underwater portion of the stone bulkhead was observed to be in overall poor condition. The bulkhead is set with irregular stones, with many gaps and voids observed throughout the wall. The voids typically extend back into the wall greater than 3 feet. There are 2 locations in which there are large voids near the bottom of the wall. At Station 0+97 located 6 feet below the top of the wall, a void was observed and measures approximately 1' high by 3' wide by 7' deep. At the corner of the bulkhead at Station 1+44 there is a 2' high by 4' wide by 4' deep void (Photo 16). The loss of fill material was not observed during the underwater inspection, however this void is likely the cause of subsidence along the bituminous deck above. At the bottom of the stone bulkhead at Station 2+20 beneath the timber pier, a void was observed measuring approximately 2' high by 4' wide by 4' deep (Photo 19). A small depression with asphalt patching was observed along the bituminous deck at this location and should be monitored.

Timber fender piles were observed along the face of the granite block seawall, and may serve the purpose of retaining the stone wall. The piles were noted to be in overall fair condition, with evidence of marine borer attack. Piles were observed to have reduced diameters from 12 inches to approximately 8 inches.

3.3 Timber Boardwalk

3.3.1 Configuration

In front of the stone bulkhead, and adjacent to the Steamship Pier, is a 30-foot wide by 60-foot long timber pile supported boardwalk. The timber boardwalk is comprised of 4-inch by 10-inch timber stringers, 12-inch by 12-inch pile caps, and 12-inch diameter timber piles spaced 9 feet on center, with a concrete cap wall supporting the landside edge of the



boardwalk above the stone bulkhead. The boardwalk is provided with 3-inch by 8-inch timber decking and a 10-inch by 10-inch timber curb.

3.3.2 Observed Conditions - Topside

The Coal Pocket boardwalk extends parallel to the shoreline from Station 0+00 at its intersection with Steamship Pier to Station 0+60 at the corner of the bulkhead wall. The topside of the timber wharf was observed to be in overall good to fair condition. The 3-inch by 8-inch timber decking was observed to be in fair condition with no loose boards, however mildew growth and some splintering was observed. The 10-inch by 10-inch timber curb was observed in good condition. The concrete cap wall along the inboard edge of the wharf was observed to be in good condition with no major cracks or areas of spalling noted. There is no fender system on the face of the wharf.

3.3.3 Observed Conditions - Underwater

The underwater portion of the Coal Pocket Boardwalk was observed to be in overall good condition. The boardwalk has 3 structural piles per bent with all of the structural piles observed to be in good condition. The timber cross bracing was observed to be solid, however the low water connection hardware was observed to be severely corroded.

3.4 Timber Pier

3.4.1 Configuration

The Coal Pocket timber pier is a 30-foot wide by 130-foot long timber pile supported pier, as indicated on the Site Plan. The pier is perpendicular to the face of the stone bulkhead, and runs parallel to Homer's Wharf.

The timber pier is comprised of fourteen bents of 14-inch diameter timber piles, with the piles configured as indicated on the site plan. The timber piles are provided with 3-inch by 8-inch timber cross bracing. The 12-inch by 12-inch timber pile caps support and 6-inch by 10-inch timber stringers spaced approximately 22-inches on center. The decking is comprised of 3-inch by 8-inch timber boards, with an 8 ¼-inch by 8 ¼-inch timber curb lining the edge of the pier. The pier is protected with a timber pile fender system with 12 inch diameter fender piles spaced 10' on center, with 8-inch by 8-inch timber chocks. In lieu of cleats, vessels tie off to the existing fender piles. Water depths vary along the pier to an approximate water depth of 9 feet at the head of the pier at low tide.

3.4.2 Observed Conditions - Topside

The topside of the timber pile supported pier was observed to be in overall satisfactory condition. The timber decking was observed to be in good to fair condition with no loose boards, minor splintering of some boards, and a small area of fire damage. The timber curb was in good condition with no observed deficiencies. The timber fender system along the



timber pier was in overall good to fair condition. Typical deficiencies included wear on the pile face, broken chocks, and damage to the tops of several piles. Fire damage and rot was also observed on a number of piles and chocks. The pile caps and stringer along the underside of the timber pier were observed in good condition with no rot or damage observed. The timber piles were observed to be in good condition above the waterline.

3.4.3 Observed Conditions - Underwater

The Coal Pocket Pier was observed to be in generally poor condition and has a significantly reduced load carrying capacity. The pier foundation consists of 14 timber pile bents, with 12 piles per bent. There is severe marine borer damage to most of the piles at the mudline. A significant number of piles were observed with a remaining diameter of 6-inches or less with a number of those piles observed to have diameters of 3-inches or less. One of the piles was observed to have 100% section loss approximately 3' above the mudline. The piles with 50% or greater section loss are indicated on Figure 2 – Existing Site Plan. There were also several repairs observed where the tops of the piles have been posted. Section 4.4 of this report discusses further the structural condition of the pier.

The table below presents a list of the timber piles supporting the Coal Pocket Pier that were observed to have a section loss of 50% or greater. The pile in Bent 13 with 100% section loss is highlighted.

Table 3.1 – Support Pile Remaining Pile Diameters (< 50% remaining)

<i>Bent No.</i>	<i>Pile No.</i>	<i>Deficiency Description</i>
1	5	6" Diameter
2	5	4" Diameter
3	1	6" Diameter / Top 2' posted
5	5	6" Diameter
5	7	6" Diameter
5	8	8" Diameter
5	9	4" Diameter
5	10	6" Diameter / Top 2' posted
5	11	4" Diameter
5	12	7" Diameter / Top 2' posted
6	2	2" Diameter
6	4	6" Diameter
6	10	7" Diameter
6	11	7" Diameter
6	12	6" Diameter
7	1	6" Diameter
7	2	5" Diameter
7	3	6" Diameter
7	4	6" Diameter
7	5	6" Diameter
7	10	4" Diameter
7	11	7" Diameter



Coal Pocket Pier

7	12	2" Diameter
8	5	6" Diameter
8	6	7" Diameter
8	7	6" Diameter
8	9	2" Diameter
8	10	4" Diameter
8	11	6" Diameter
8	12	6" Diameter
9	1	6" Diameter
9	2	7" Diameter
9	3	3" Diameter
9	6	3" Diameter
9	7	6" Diameter / Heavy marine borer activity at mudline to 4' above mudline
9	8	5" Diameter
9	9	Less than 2" Diameter
9	10	4" Diameter / Heavy marine borer activity at mudline to 4' above mudline
9	11	4" Diameter / Heavy marine borer activity at mudline to 4' above mudline
9	12	7" Diameter
10	2	6" Diameter / Heavy marine borer activity at mudline to 4' above mudline
10	5	3" Diameter / Heavy marine borer activity at mudline
10	8	4" Diameter
10	9	4" Diameter
10	10	4" Diameter
10	11	4" Diameter
11	1	4" Diameter
11	2	6" Diameter
11	3	4" Diameter
11	5	2" Diameter
11	6	6" Diameter
11	7	6" Diameter
11	8	6" Diameter
11	9	6" Diameter / Top 2' posted
11	10	6" Diameter
11	11	4" Diameter
11	12	4" Diameter
12	1	6" Diameter
12	3	4" Diameter
12	4	4" Diameter
12	5	5" Diameter
12	6	3" Diameter
12	8	6" Diameter
12	9	4" Diameter
12	10	4" Diameter
12	11	2" Diameter / Cut off 7' above mudline
12	12	4" Diameter
13	2	4" Diameter
13	3	6" Diameter
13	4	4" Diameter



13	8	0" Diameter (100% section loss 3' above mudline)
13	9	6" Diameter
13	10	7" Diameter
13	11	2" Diameter
13	12	7" Diameter / Top 2' posted

3.5 Bituminous Pavement

The bituminous pavement was observed to be in generally poor condition. A number of large cracks have developed in the surface. Areas of subsidence behind the stone seawall were typical, with several large areas as indicated on the Site Plan. Near Station 1+00 to 1+25, several smaller areas of subsidence were observed in the bituminous deck behind the wall (Photo 13, 14). There is a void in the stone bulkhead near this location, and is likely the cause of this subsidence. A 7-foot wide area of subsidence was observed along the bituminous deck at the corner of the bulkhead at Station 1+40. A piece of plywood was placed over the hole (Photo 15). A large void was also observed in the stone bulkhead at this location. An area of subsidence measuring 3 feet in diameter was observed approximately 5 feet behind the edge of the wall at Station 1+75, indicating significant loss of fill material (Photo 17). The concrete and stone bulkhead at this location was observed to be displaced by several inches.

3.6 Appurtenances

Several timber ladders are located along the timber pier providing access to and from the deck to the water below. Overall the ladders were observed to be in poor condition, with a number of the ladders broken due to impact from docked vessels. All of the ladders are deteriorated below mean high water, limiting their use.

4.0 – Structural Condition Assessment

4.1 General

Based on the observations obtained from the site inspections, the following provides our assessment of the various structures and components. Existing structural condition determinations were based on visual and tactile observations only, and were limited to accessible and visible portions of the structures.

4.2 Granite Block Seawall

The existing granite block seawall was observed to be in generally poor condition, with large voids observed in the wall, and associated subsidence of the retained fill behind the wall. Without remedial action, the wall will continue to deteriorate, with continued loss of material through the wall.



Potential remedial measures include repair of the existing wall by patching the voids which involves excavation and installation of a geotextile fabric behind the wall to reduce the loss of fines through the wall; or full rehabilitation of the existing wall by reconstruction in-kind; or by the installation of a steel sheet pile bulkhead in front of the wall.

4.3 Timber Boardwalk

The existing timber boardwalk was observed to be in generally good condition, with no major deficiencies observed. It is estimated that the remaining useful life of this structure is in the order of 15 to 20 years.

Potential remedial work for the boardwalk includes the replacement of the low water level bracing bolts and hardware, and wrapping of the piles for protection against marine borer activity.

4.4 Timber Pier

Based upon the visual inspections, the timber support piles of the Coal Pocket Pier are in generally poor condition. The significant section loss of the timber support piles beneath the pier due to rot and marine borer attack has reduced the pier load capacity to approximately 30% of its original capacity. The timber above the waterline is considered to be in fair condition. The pier is at or near the end of its useful life, and major rehabilitation or replacement is warranted. The posted reduced allowable loading of the timber pier should be continued until repairs can be carried out.

Rehabilitation of the existing deteriorated timber piles can be accomplished by driving new “sister” piles adjacent to the deteriorated piles. Alternatively, reinforcement can be accomplished by reinforcing the deteriorated pile section with concrete encasements, or “Fish Plating” the piles with steel or timber; reinforcement via these means are not recommended to due to high costs. Existing timber piles with more than 6 inches in sound diameter remaining should be wrapped to prevent further deterioration and section loss due to marine borer.

SECTION 5 RECOMMENDATIONS AND OPINION OF PROBABLE COST

5.1 – Recommendations - General

Based on conditions observed during the inspections, and the corresponding assessments of the existing structures, the following recommendations are provided for the repair and rehabilitation of these structures.

Opinions of probable cost were generated based upon current industry unit prices for similar work. Breakdowns of cost are provided in the Appendix. The cost opinions provided are for construction only and do not include allowances for engineering, permitting, or construction administration. A 20 percent contingency has been included with these costs. The opinions



shown herein are based on a limited investigation and are provided for general information only. This should not be considered an engineer's estimate, as final design has not been performed, and actual construction costs may be somewhat less or considerably more than indicated, due to fluctuations in the market.

5.2 – High Priority

The following items are considered to have a High Priority, as they affect the usability and safety of the structure:

A. Rehabilitate the Coal Pocket Pier Support Piles

This item consists of the removal and replacement, or sistering, of the severely deteriorated timber piles supporting the Coal Pocket Timber Pier. Providing “fish plates” or concrete jackets as means of repair has been ruled out at this location, as the location of the deterioration is at the mudline, and would require costly labor intensive work below the mudline.

The proposed work will consist of the removal of the timber decking, removal and replacement of approximately 75 timber piles, and refastening of the timber bracing and decking. In addition, the remaining 60 timber piles, with at least 6 inches of pile diameter remaining, should be wrapped along the underwater component to arrest further marine borer damage.

The opinion of probable construction cost for this work is approximately \$330,000.

Alternatively, the replacement of the entire Coal Pocket Timber Pier has an associated opinion of probable construction cost of approximately \$930,000.

B. Rehabilitate Stone Bulkhead

This item consists of the rehabilitation of the existing stone wall from Station 90 to Station 2+80. Rehabilitation will include the excavation behind the wall, repairing of voids in the stone, and placement of a geotextile against the back of the wall prior to backfilling and replacement of the pavement. Rehabilitation will also include necessary repairs to the existing timber fender pile system in front of the wall.

The opinion of probable construction cost for this work is approximately \$390,000.

Alternatively, the replacement of the entire bulkhead has an associated opinion of probable construction cost of approximately \$640,000 to \$730,000.



5.3 – Lower Priority

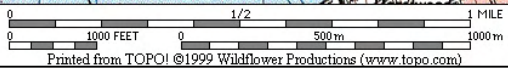
The following items are considered to have a Lower Priority, as they presently do not affect the usability and safety of the structure, but will need to be addressed in approximately 5 to 10 years.

A. Rehabilitate Low Water Timber Bracing Hardware

This item consists of the removal and replacement of the existing corroded bracing hardware, or bolts, fastening the bracing to the timber piles supporting the Coal Pocket Pier and Boardwalk.

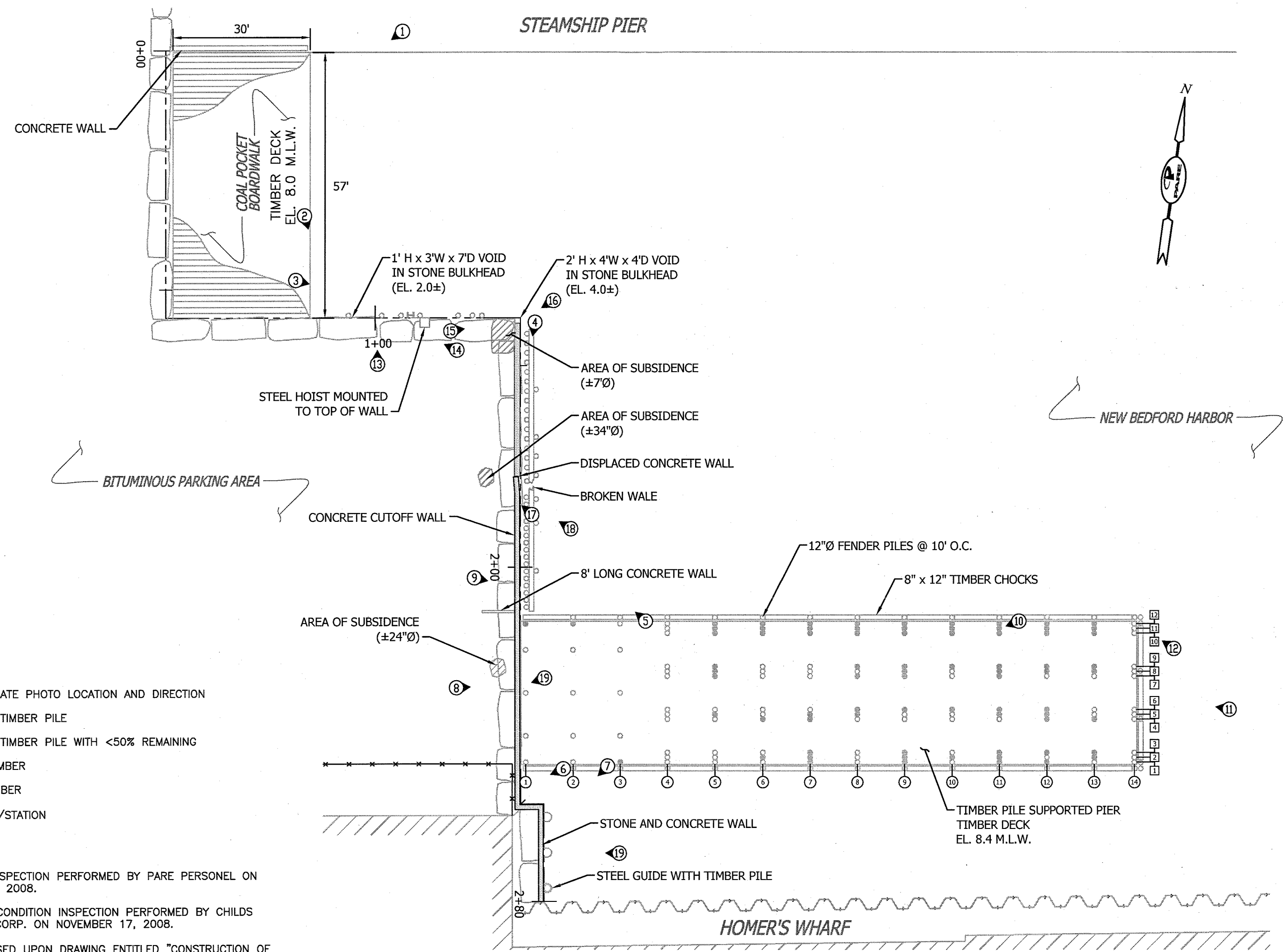


Figures
Coal Pocket Pier
New Bedford, Massachusetts



COAL POCKET PIER
NEW BEDFORD, MASSACHUSETTS
 NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
 NEW BEDFORD WATERFRONT FACILITY INSPECTIONS
 NOVEMBER 2008

FIGURE 1
LOCUS PLAN



- LEGEND:**
- ⑧ APPROXIMATE PHOTO LOCATION AND DIRECTION
 - EXISTING TIMBER PILE
 - EXISTING TIMBER PILE WITH <50% REMAINING
 - ⑩ BENT NUMBER
 - ① PILE NUMBER
 - 2+00 BASELINE/STATION

- NOTES:**
1. CONDITIONS INSPECTION PERFORMED BY PARE PERSONEL ON NOVEMBER 17, 2008.
 2. UNDERWATER CONDITION INSPECTION PERFORMED BY CHILDS ENGINEERING CORP. ON NOVEMBER 17, 2008.
 3. SITE PLAN BASED UPON DRAWING ENTITLED "CONSTRUCTION OF STEAMSHIP PIER AND COAL POCKET PIER-EXISTING CONDITIONS PLAN" BY TIBBETTS ENGINEERING CORP. DATED NOV. 1977, AND CONDITIONS OBSERVED DURING THE INSPECTION.

EXISTING SITE PLAN
 SCALE: 1"=10'

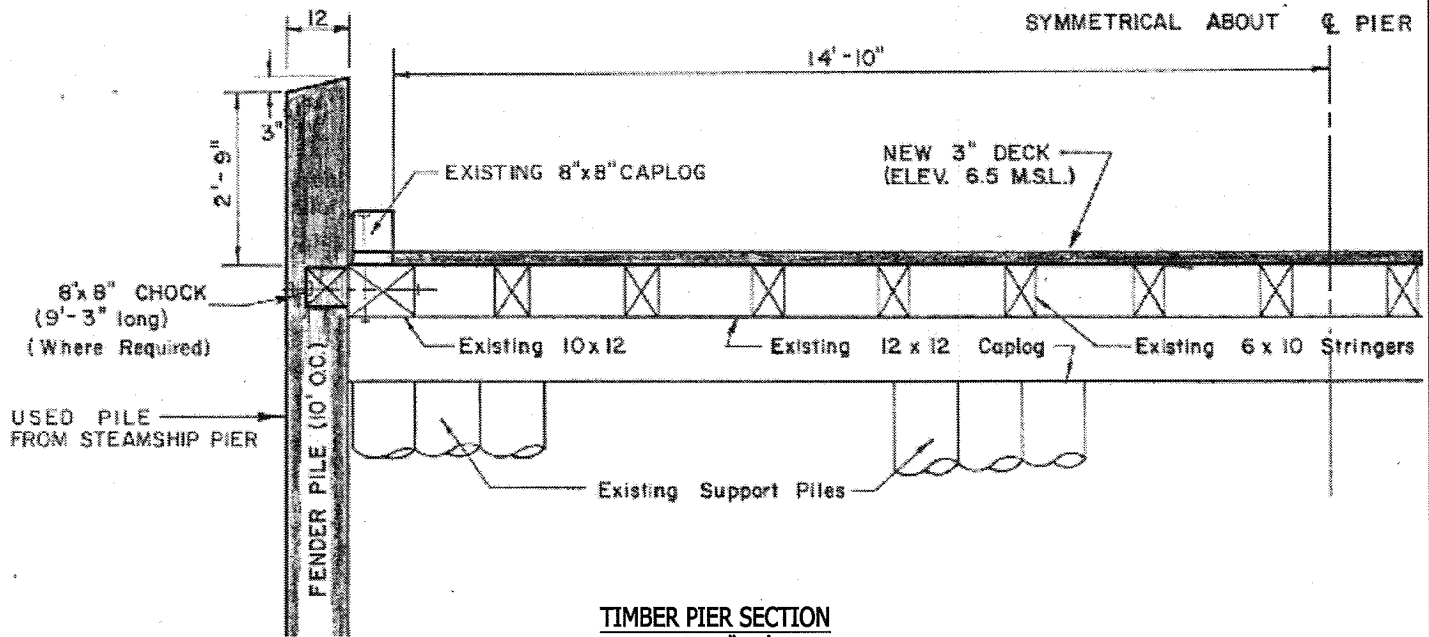
HALF SIZED

REVISIONS:

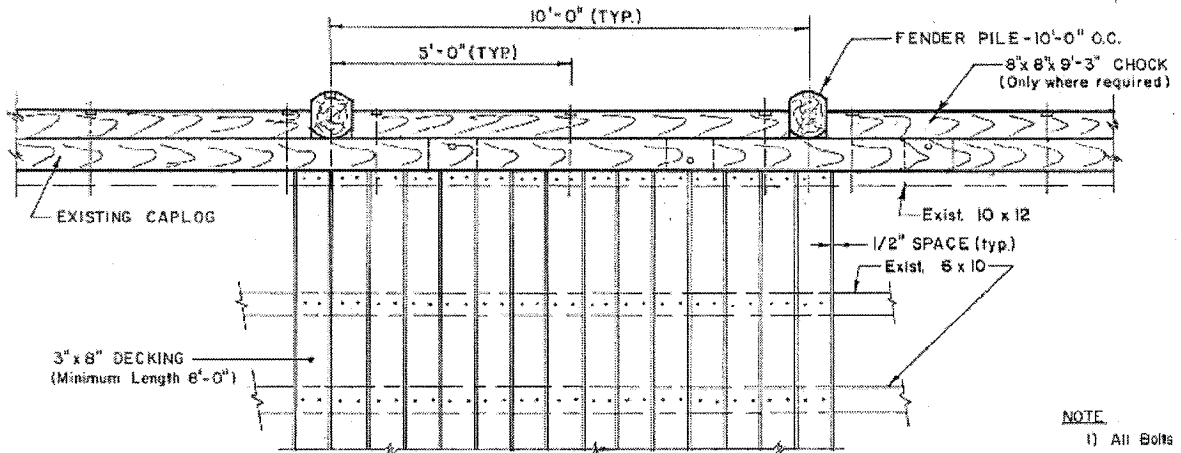
NO.	DESCRIPTION

PROJECT NO.: 08216.00
 DATE: NOVEMBER 2008
 SCALE: AS NOTED
 DESIGNED BY: -
 CHECKED BY: -
 DRAWN BY: RMM
 APPROVED BY: KWH
 DRAWING TITLE:

EXISTING SITE PLAN
 FIGURE NO.:
 SHEET NO. 2 OF 1

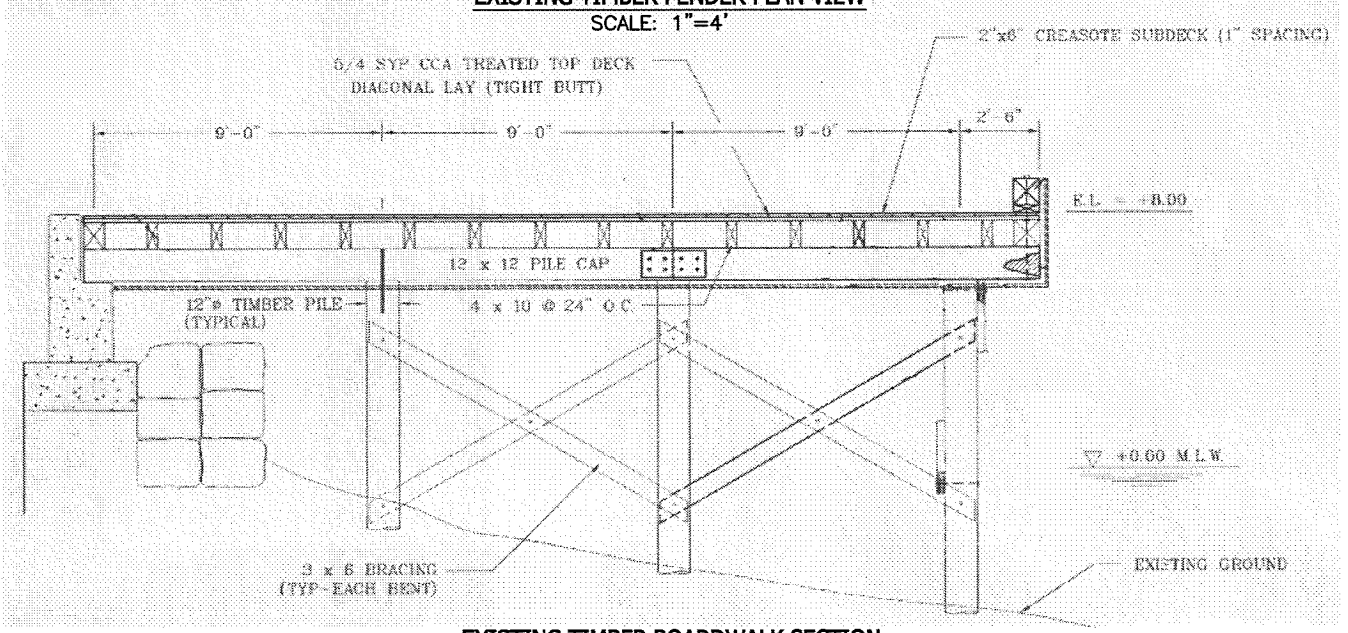


TIMBER PIER SECTION
SCALE: 1"=3'



EXISTING TIMBER FENDER PLAN VIEW
SCALE: 1"=4'

NOTE
1) All Bolts /
2) Corners of



EXISTING TIMBER BOARDWALK SECTION
SCALE: 1"=6'



**NEW BEDFORD WATERFRONT
FACILITIES INSPECTIONS
COAL POCKET PIER**
NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
NEW BEDFORD, MASSACHUSETTS

**EXISTING PLAN
AND SECTIONS**

DRAWN BY:
RMM
CHECKED BY:
KWH
APPROVED BY:
KWH

DATE:
NOVEMBER 2008
PROJECT NO.:
08216.00
SCALE:
AS NOTED

FIGURE NO.:
3
SHEET NO.:
1 OF 1

Appendix A
Photographs
Coal Pocket Pier
New Bedford, Massachusetts



Photo No. 1: Overview of the Coal Pocket Boardwalk.



Photo No. 2: Typical stone bulkhead near Station 0+90.





Photo No. 3: Timber fender piles with docked vessel along the stone bulkhead from Station 0+86 to Station 1+33.



Photo No. 4: Timber fender system with docked vessel along the stone bulkhead from Station 1+33 to Station 2+10.



Photo No. 5: Timber fender system with docked vessel along the stone bulkhead from Station 1+70 to Station 2+10.



Photo No. 6: Stone bulkhead and concrete fill from Station 2+40 to Station 2+50.





Photo No. 7: Stone bulkhead and concrete fill from Station 2+50 to Station 2+80.



Photo No. 8: Overview of the 30' wide timber pile supported pier.



Photo No. 9: Overview of the fender system with docked vessel along the timber pier.

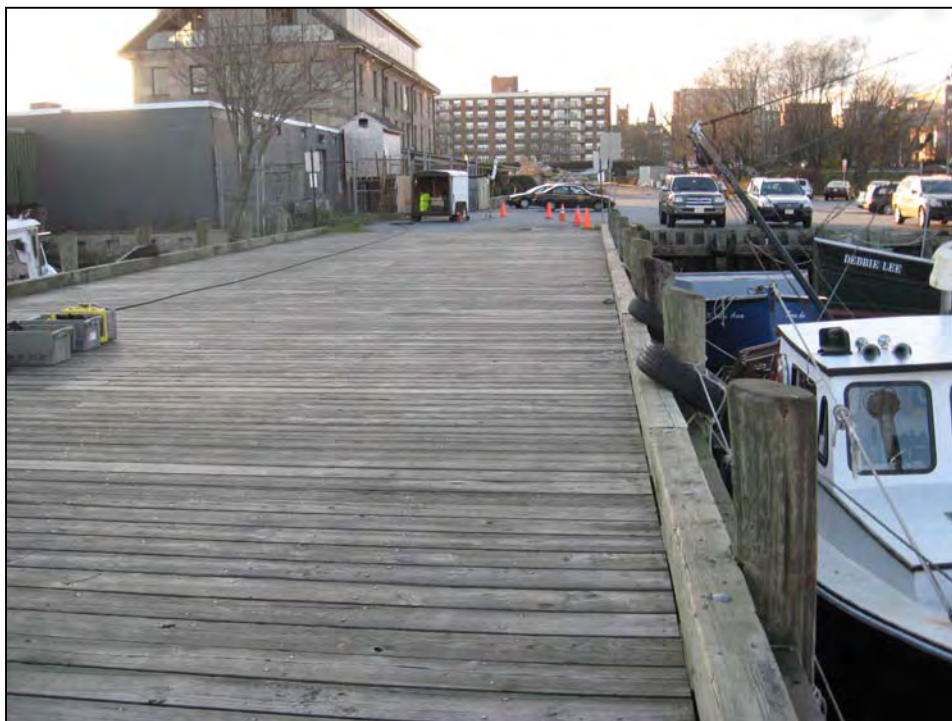


Photo No. 10: Overview of the timber decking along the pier.



Photo No. 11: Overview of the end of the timber pier and timber fender system.



Photo No. 12: Typical wearing of the fender face at the end of the timber pier.



Photo No. 13: Area of subsidence behind the bulkhead wall. Note: Void observed in stone bulkhead in underwater inspection report.



Photo No. 14: Areas of subsidence behind the bulkhead near Station 1+25.



Photo No. 15: Plywood sheet covering 7' wide area of subsidence at Station 1+40.

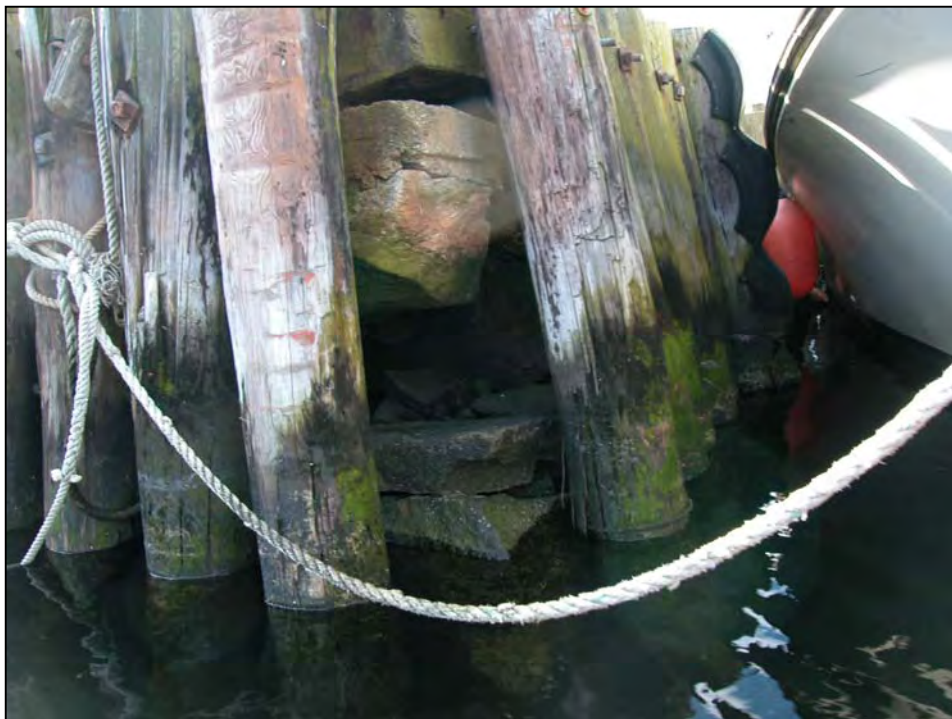


Photo No. 16: Large void with missing stone in bulkhead wall at Station 1+40.



Photo No. 17: Area of subsidence (34" diameter) at Station 1+76. Note the displacement of the concrete wall.



Photo No. 18: Displacement of the concrete wall with exposed reinforcement at Station 1+75.



Photo No. 19: Void observed in the stone bulkhead at Station 2+20 beneath the timber pier



Photo No. 20: Typical underwater view of the timber pile section loss beneath the timber pier. (Photo by Childs Engineering Corp.)



Photo No. 21: Typical underwater view of the timber pile section loss beneath the timber pier. (Photo by Childs Engineering Corp.)

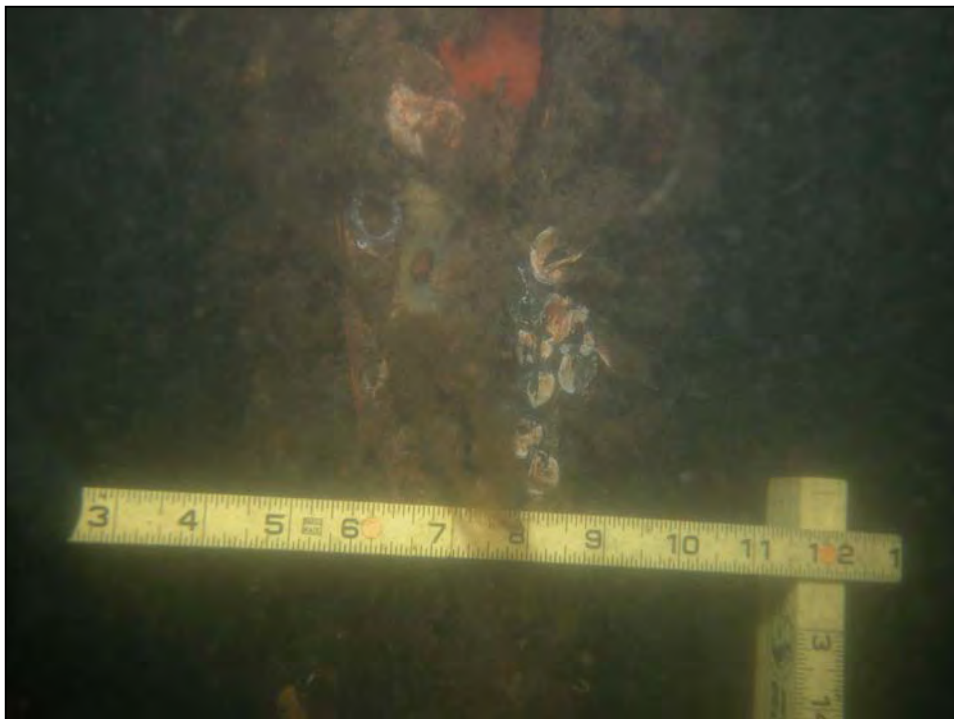


Photo No. 22: Typical underwater view of the timber pile section loss beneath the timber pier. (Photo by Childs Engineering Corp.)



Appendix B
Key Personnel
Coal Pocket Pier
New Bedford, Massachusetts

KEY PERSONNEL

The following personnel were involved with this project including but not limited to the topside and underwater inspections and the preparation of this report:

<i>Name</i>	<i>Employer</i>	<i>Responsibilities</i>
<i>Karl Hammond, P.E.</i>	<i>PARE Corporation</i>	<i>Project Manager, Lead Engineer</i>
<i>Ernest O. Rabideau, Jr., P.E.</i>	<i>PARE Corporation</i>	<i>Project Reviewer</i>
<i>Matt Bellisle, P.E.</i>	<i>PARE Corporation</i>	<i>Principal in Charge</i>
<i>Craig Sams, P.E.</i>	<i>Childs Engineering Corporation</i>	<i>Principal in Charge</i>
<i>Robert Garrity, P.E.</i>	<i>Childs Engineering Corporation</i>	<i>Project Engineer for Underwater Inspections</i>
<i>Kevin Champagne, P.E.</i>	<i>PARE Corporation</i>	<i>Support Engineer</i>
<i>Richard Fitzgerald, P.E.</i>	<i>Childs Engineering Corporation</i>	<i>Underwater Inspection Team</i>
<i>Charlie Marshall Roberts</i>	<i>Childs Engineering Corporation</i>	<i>Underwater Inspection Team</i>
<i>Robert Welch</i>	<i>Childs Engineering Corporation</i>	<i>Underwater Inspection Team</i>
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<i>Ryan McCoy</i>	<i>PARE Corporation</i>	<i>Topside Inspection</i>
<i>Briscoe B. Lang</i>	<i>PARE Corporation</i>	<i>Permitting Services</i>



Appendix C
Backup Data for Cost Estimates
Coal Pocket Pier
New Bedford, Massachusetts

COAL POCKET PIER
OPINION OF PROBABLE CONSTRUCTION COST
February, 2009

TIMBER PIER REHABILITATION				
	QTY	UNIT	UNIT PRICE	TOTAL

Alternate 1 - Drive Sister Piles

1. Mobilization/Demobilization	1	LS	\$ 25,000.00	\$ 25,000.00
2. Demolition and Removal	1	LS	\$ 25,000.00	\$ 25,000.00
3. Install Timber Piles	75	EACH	\$ 1,800.00	\$ 135,000.00
4. Wrap Timber Piles	60	EACH	\$ 1,200.00	\$ 72,000.00
5. Miscellaneous Timber	1	LS	\$ 15,000.00	\$ 15,000.00

	Subtotal	\$	272,000.00
	Contingency 20%	\$	54,400.00
	Total Alt.1	\$	326,400.00

Alternate 2 - Replace Pier

1. Mobilization/Demobilization	1	LS	\$ 30,000.00	\$ 30,000.00
2. Demolition and Removal	1	LS	\$ 40,000.00	\$ 40,000.00
3. Install Timber Pier	3,900	SF	\$ 180.00	\$ 702,000.00

	Subtotal	\$	772,000.00
	Contingency 20%	\$	154,400.00
	Total Alt.2	\$	926,400.00



COAL POCKET PIER
OPINION OF PROBABLE CONSTRUCTION COST
February, 2009

REHABILITATE GRANITE STONE BULKHEAD				
	QTY	UNIT	UNIT PRICE	TOTAL

Alternate 1 - Rehabilitate Existing Wall

1. Mobilization/Demobilization	1	LS	\$ 20,000.00	\$ 20,000.00
2. Demolition and Removal	1	LS	\$ 20,000.00	\$ 20,000.00
3. Repair Granite/Concrete Wall	190	LF	\$ 900.00	\$ 171,000.00
4. Replace Pavement	500	SY	\$ 30.00	\$ 15,000.00
5. Replace Timber Fender	190	FT	\$ 500.00	\$ 95,000.00
Subtotal				\$ 321,000.00
Contingency 20%				\$ 64,200.00
TOTAL Alt.1				\$ 385,200.00

Alternate 2 - Replace Existing Wall

1. Mobilization/Demobilization	1	LS	\$ 20,000.00	\$ 20,000.00
2. Demolition and Removal	1	LS	\$ 20,000.00	\$ 20,000.00
3. Reconstruct Granite Wall	190	LF	\$ 2,000.00	\$ 380,000.00
4. Replace Pavement	500	SY	\$ 30.00	\$ 15,000.00
5. Replace Timber Fender	190	FT	\$ 500.00	\$ 95,000.00
Subtotal				\$ 530,000.00
Contingency 20%				\$ 106,000.00
TOTAL Alt.2				\$ 636,000.00

Alternate 2a - Install SSP

1. Mobilization/Demobilization	1	LS	\$ 20,000.00	\$ 20,000.00
2. Demolition and Removal	1	LS	\$ 20,000.00	\$ 20,000.00
3. Install SSP Wall	190	LF	\$ 2,600.00	\$ 494,000.00
4. Replace Pavement	500	SY	\$ 30.00	\$ 15,000.00
5. Replace Timber Fender	190	FT	\$ 300.00	\$ 57,000.00
Subtotal				\$ 606,000.00
Contingency 20%				\$ 121,200.00
TOTAL Alt.2a				\$ 727,200.00



COAL POCKET PIER
OPINION OF PROBABLE CONSTRUCTION COST
February, 2009

REHABILITATE TIMBER BOARDWALK				
	QTY	UNIT	UNIT PRICE	TOTAL

Alternate 1 - Replace Bracing Hardware

1. Mobilization/Demobilization	1	LS	\$ 5,000.00	\$ 5,000.00
2. Demolition and Removal	1	LS	\$ 5,000.00	\$ 5,000.00
3. Replace Bolts	1	LS	\$ 12,000.00	\$ 12,000.00
Subtotal				\$ 22,000.00
Contingency 20%				\$ 4,400.00
TOTAL Alt.1				\$ 26,400.00

Alternate 2 - Wrap Timber Piles

1. Mobilization/Demobilization	1	LS	\$ 10,000.00	\$ 10,000.00
2. Excavate at Mudline	1	LS	\$ 20,000.00	\$ 20,000.00
3. Wrap Timber Piles	18	EA	\$ 1,200.00	\$ 21,600.00
Subtotal				\$ 51,600.00
Contingency 20%				\$ 10,320.00
TOTAL Alt.2				\$ 61,920.00



Appendix D
References
Coal Pocket Pier
New Bedford, Massachusetts

REFERENCES

The following references were utilized during the preparation of this report and the development of the recommendations presented herein:

1. *“About the Port – Key Locations”*, New Bedford Harbor Development Commission, <http://www.newbedford-ma.gov/PortofNewBedford/AboutPort/KeyLocations.html>
2. *“Maritime History of Massachusetts – Merrill’s Wharf Historic District”*, National Park Service, <http://www.nps.gov/history/NR/travel/maritime/mer.htm>.
3. *Construction Drawings “Proposed Repairs and Improvements to Wharves and Piers in New Bedford and Fairhaven, MA”*, Tibbetts Engineering Corp., January 23, 1998 (Revised March 20, 1998).
4. *Construction Drawings “Construction of Steamship Pier and Coalpocket Pier”*, Tibbetts Engineering Corp., June 1977 (Revised November 1977).



Appendix E
Field Notes
Coal Pocket Pier
New Bedford, Massachusetts

①

NEW BEDFORD WATERFRONT

FACILITIES INSPECTION

NOV 17, 08

50°F

SUNNY

COAL POCKET PIER

280 LF OF STONE BULKHEAD w/
133 LF OF TIMBER PILE SUPPORTED
PIER, 30 FT WIDE @ STA 2+10 - 2+40

BULK HEAD

STA 0+00 - 0+56.5 - 30' WIDE TIMBER

DECK

* 3" X 10" TIMBER DECKING IN FAIR CONDITION
- MILDew GROWTH, SOME SPUNTING,

NO LOOSE BOARDS

* NO FENDER SYSTEM ON DECK FACE

* 10" X 10" TIMBER CURBS w/ 3" X 10" BLOCKS
@ 54" O.C.

STA 0+00 - 0+56.5 - 12" WIDE CONCRETE CAP

STA 0+56.5 - 0+90 - 24" WIDE CONCRETE CAP

STA 0+90.5 - 12" FENDER PILE (TIMBER)

②

WATER DEPTING TO TOP OF DECK				
→ 13	⊙	0 00		
→ 11.5	⊙	0+25		
→ 10.5	⊙	0+50		
→ 12.5	⊙	1+00		
→ 16	⊙	CORNER		
→ 14.5	⊙	1+50		
→ 12.0	⊙	2+10		
→ 9'	⊙	2+55		
→ 10'	⊙	2+80		
→ 13	⊙	PIER LEFT 25		
→ 14	⊙	PIER LEFT 50		
→ 14.5	⊙	PIER LEFT 75		
→ 15	⊙	PIER LEFT 100		
→ 19	⊙	PIER LEFT CNR		
→ 17	⊙	PIER CENTER END		
→ 17.5	⊙	PIER RIGHT CNR		
→ 14	⊙	PIER RIGHT 100		
→ 13	⊙	PIER RIGHT 75		
→ 11	⊙	PIER RIGHT 50		
→ 9.5	⊙	PIER RIGHT 25		
→ 7.5	⊙	PIER RIGHT 0		

STA 1+08, 1+12, 1+16 - 12" ϕ

TIMBER FENDER PILES

RUBBER ON 1+08 & 1+12

STA 1+14.5 - TIMBER LADDER

15" CLEAR - GOOD CONDITION

STA 1+16 - STEEL PLATE w/

MANUAL HOIST CRANE

STA 1+24 - 12" ϕ FENDER PILE

STA 1+27, 1+29 - 12" ϕ FENDER PILE

STA 1+32.5 - CORNER @ STA 1+40

(7) 12" ϕ TIMBER FENDER PILES

STA 1+40 - CORNER OF WALL

STA 1+40 - 1+45 - (4) 12" ϕ TIMBER

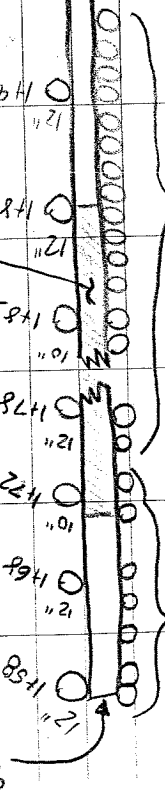
FENDER PILES (F-P \rightarrow ROT)

STA 1+48 - 1+56 - (6) 12" ϕ TIMBER

FENDER PILES (F-P \rightarrow ROT)

* STA 1+58 - 2+10 - TIMBER FENDER

12" X 12" CREGG SITE SYSTEM SKETCH: 12" X 12" TIMBER



(7) 12" ϕ TIMBER PILES

(16) 10" ϕ TIMBER PILES

INSPECTION NOTES

10" X 10" END CAP

12" X 12" PILE CAPS

4" X 10" STEINERS @ 24" O.C.

10" ϕ PILES 9' O.C. E-W

3" X 6" CROSS BEAMS

- CONCRETE BULKHEAD w/ STONE PROTECTION

- 3/8" ϕ OUTFALL PIPE 10' FROM CORNER

- 48" DEEP VOID @ CORNER

PIER - 12" X 12" PILE CAPS

6" X 10" STEINERS @ 22" O.C.

3" X 9" CROSS BEAMS

STA 0190 - 1440 - 12" x 12"

TIMBER CAP

STA 1140 - 2140 - 12" W CONC CAP

STA 1177.5 - CONCRETE WALL

DISPLACED ± 4" / 24" L AREA
OF MISSING CONCRETE w/ EXPOSED
REINFORCEMENT

STA 2123, 2130, 2133 - CONCRETE

PATCH ON TOP OF WALL

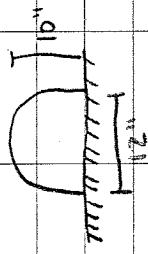
STA 2140 - 2150 - CONCRETE FILL

ON TOP OF STONE BULKHEAD

STA 2150 - 2180 - 18" W CONCRETE

WALL ON TOP OF STONE BULKHEAD

STA 2181.5 - STEEL FENDER PILE GUIDE



STA 2167.5 - STEEL FENDER PILE GUIDE

STA 2175.5 - STEEL FENDER PILE GUIDE
w/ 12" Ø TIMBER PILE (ROTTED)

STA 2180 - CORNER OF BULKHEAD

DECK INSPECTION NOTES

STA 0161 - CB 8' FROM EDW
(DEPRESSION AROUND CB)

STA 0195 - 16" Ø SINKHOLE 4' FROM
EDW FILED w/ VEGETATION

STA 1100 - 12" Ø SINKHOLE 4" Ø SINKHOLE
± 2' FROM EDW

STA 1120 - 1135 - SERIES OF
DEPRESSIONS / SINKHOLES BEHIND

TIMBER CAP → (2) 16" Ø

SINKHOLES 3' BEHIND EDW

FILED w/ VEGETATION

STA 1135 - 1140 - 7' W SINKHOLE

COVERED w/ PLYWOOD

STA 1152 - LIGHT POST 12'

FROM EDW (3' x 3' BASE)

STA 1170 - 34" Ø SINKHOLE

5' FROM EDW

* @ LOCATION OF WALL DISPLACEMENT

STA 2108 - 9" THICK x 20' LONG

CONCRETE RETURN WALL

TIMBER PIER

- * 30' WIDE, 3x8" TIMBER DECKING
8 1/4" x 8 1/4" TIMBER JOISTS w/ 3" x 8"
BLOCKS @ 546" O.C.
- * 8" x 8" TIMBER CHOCKS w/ 12" φ
FENDER PILES @ 10' O.C.

STA 0+12 - FENDER PILE (L & R)
FIRE DAMAGE TO TOP OF
LEFT PILE

STA 0+23 - TIMBER LADDER (LEFT)
ATTACHED TO CHOCK (FAIR TO
POOR - TWISTED, MINOR ROT)

STA 0+13 - DAMAGE TO RIGHT CHOCK
STA 0+14 - FIRE DAMAGE TO TOP
OF LEFT PILE (TIRE ATTACHED)

STA 0+52 - MINOR WENT OF RIGHT PILE
STA 0+62 - TIMBER LADDER ATTACHED
TO LEFT CHOCK (FAIR TO POOR -
ROTTED BELOW 3RD RUNG)

STA 0+72 - ROT & DAMAGE @ TOP OF
LEFT PILE

STA 2+30 - 12" W x 5' L DEPRESSION
IN ASPHALT

STA 1+12 - DAMAGE TO TOP OF LEFT PILE

STA 1+13 - TIMBER LADDER ATTACHED TO LEFT CHOCK (GOOD CONDITION - 4" X 4" TIMBER W/ S.S. RUNGS)

STA 1+16 - FIRE DAMAGE ON TOP OF LEFT CHOCK

STA 1+22 - FIRE DAMAGE ON TOP OF LEFT PILE

STA 1+33 - ENDS OF TIMBER PILE

→ (3) 12" Ø TIMBER PILE CLUSTER @ EACH CORNER

→ 12" Ø TIMBER PILE 5' RIGHT OF CL

→ 12" Ø TIMBER PILE 4' LEFT OF CL

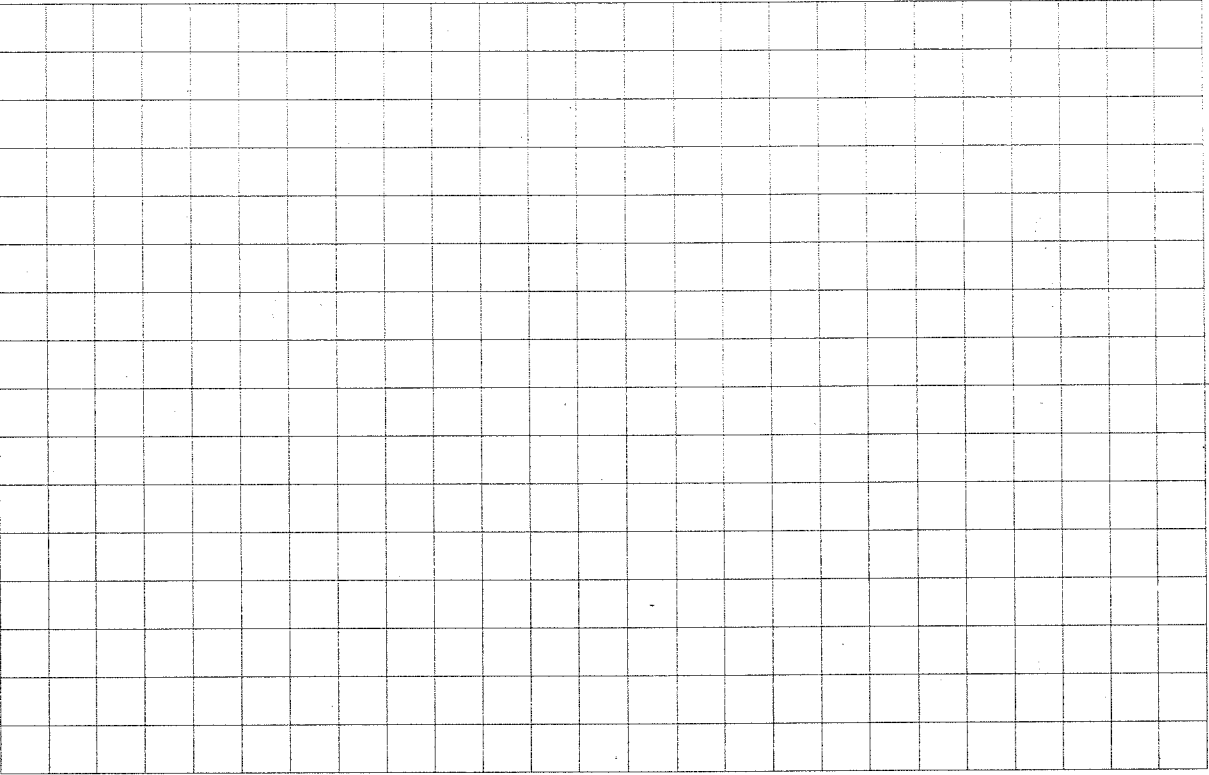
→ 12" Ø TIMBER PILE 12' LEFT OF CL

→ FAIR TO POOR - WORN

→ TIMBER CHOCKS ALONG FRONT FACE FAIR TO POOR (WORN)

→ LIFE RING IN LEFT CORNER

* TIMBER DECKING GOOD TO FAIR - NO LOOSE BOARDS, SOME SPLITTING AND FIRE DAMAGE





CHILDS ENGINEERING CORPORATION

Waterfront and Structural Engineering

BOX 333, MEDFIELD, MA 02052

JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

Bent 10 RTW

Pile 1 x 9 ✓ timbers exposed 12" φ good
Pile 10 4' timbers exposed minor MB 14" φ good

5 pile total 10' diam
everything looks new

Piles 2 + 4 notched 4" deep for bracing

seawall at back of pier conc. to mudline
each cap
last pile 5' away from seawall

STEAMSHIP
PIER DID



Bent 2 has 3 piles

Bent 5 pile 3 ^{cap water} cross brace connection bad, 3' at base 80% deteriorated

Bent 6 pile 3 low water cross brace same ↑ as bent 5

COAL Pocket
BOARDWALK



Stone seawall gaps 6" to 1' voids behind > 3' irregular stone set
Void in wall 6' below top @ Sta 3+40
1'4" x 3' w x 7' deep

- 4' x 4' x 2' h in seawall @ corner Sta 3+87

timber fender piles - long MB x 8" φ remaining @ MR
all piles along face



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JOB Coal Pocket Pier

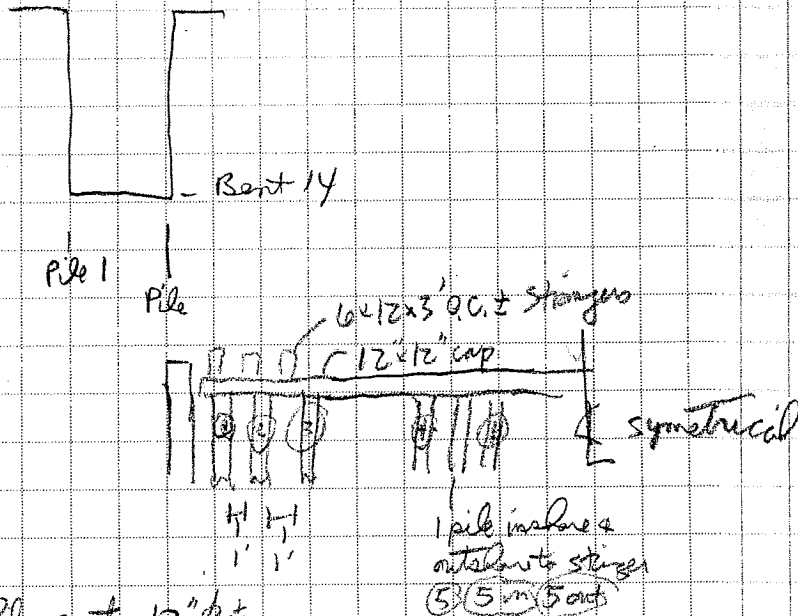
SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

Divers in 1430
RTW
Coal Pocket Pier



Bent 13 Pile 1 2' lg Pile post 12" φ ±
Hvy MB @ ML hollow only 2" shell left bottom 3'

Pile 2 - Hvy MB 6" φ remains up 3'

Pile 3 MB 8" φ remains up 3'

Pile 4 top 2' posted

Piles 4, 6, 7 + 5 out 5 in MB w 1"-2" loss @ ML
5 Hvy MB 3" φ @ ML

Pile 7 - 8" φ 40% loss MB @ ML

8, 9, 4" φ Hvy MB bottom 3'

8 in, out - 10" φ 2" loss due to MB

10, 11, 4" φ @ ML w/ MB

12 12" @ ML w/ MB

Fender piles good cond.



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JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

Bent 9

all 12 7" ϕ MB

11, 10, 4" ϕ MB @ ML

Fender Pile OK

Rib 9 < 2" ϕ

8 5"

8 in out 9"

pile 7 - 6" ϕ Hvy MB @ ML

6 - 3"

5 - 8" 5 out - 5" 5 in - 7"

4 - 9"

1 - 6" 3 - 3"

2 - 7"

Fender Pile good

transverse bracing, no long bracing

Hvy MB
@ ML up 3-4' typ

3 w Photos # 95, 94, 93

Bent 8 Fender - OK

Piles 1-10' 2-8' 3-8' Hvy MB @ ML up 3'

4-12" 5-6" 6-7"

5 in - 8" 5 out - 3" ϕ

7-8" ϕ 8-9" 9" = 2" ϕ

8 in - 8" 8 out - 11" - cut off 5' off ML

10-4" 11-6" 12-6" Fender 6"

typ - pile OK above MB damage

Bent 7 12 - 2" ϕ 11 - 7" ϕ 10 - 4" ϕ Fender good

7 - 8 - 9, 8 in 8 out all \pm 6" ϕ

5 in 5 out - 10" ϕ

6 - 8" ϕ 4 5 - 6" ϕ

1 - 6" ϕ 2 - 5" ϕ 3 - 6" ϕ Fender Pile - good



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JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

Bent 6

Pile 1-10" 2-2"φ 3-9"φ Fender-good

4-6" 5-8" 6-10"

5 in-10" 5 out-12" all have MB

pile 7-10" 8-10"φ 9-10"

8 in-12" 8 out-10"φ

10-7"φ 11-7"φ 12-6"φ Fender-good

Bent 5

Fender-7 12-7" 11-4" 10-6" low water brace @ 11-12 bolts gone

piles 12 & 10 posted top 2'

7-6"φ 8-8"φ 9-4"φ

8 in & 8 out both 14"φ

6-12"φ 5-6"φ 4-8"φ

5 in & 5 out 10"φ

1-9"φ 2-10"φ 3-8"φ Fender good

Bent 4

Pile 1-8"φ 2-8"φ 3-12"φ

Pile 1 top 2' posted

4-10"φ 5-12"φ 6-12"φ no 5 in or 5 out piles

7-10"φ 8-12"φ 9-10"φ no 8 in or out

10-9"φ 11-9"φ 12-14"φ Fender good 14"φ

Bent 3 5 vertical piles & 2 fender piles

Fender-good 5-8"φ 4-14"φ light MB Top posted 2'

Pile 3-10"φ Posted top 2'

low water bolts - gone all bracing

Pile 2-10" Pile 1-6" Posted

long bracing from bents 2-3

top 2'



Coal Pocket Pier

Bent 2

Pile 1-10"φ 2-12"φ Fender-good

3-10"φ 4-12"φ 5-4"φ Fender 12"φ w/ 2" deep MS trench @ ML

Bent 1

no fender - Pile 5-6"φ

pile 2, 3, 4 ~ 8"φ Pile 1-10"φ

#99, 98, 97, 96 U/W PHOTOS

Bent 11

#101, 100 U/W PHOTOS

Pile 1-4"φ 2-6"φ 3-4"φ Fender-good

Pile 4-8"φ 5-2"φ 10-6"φ

5 in-10"φ 5 out-5"φ

pile 7-6"φ 8-6"φ 9-6"φ Pile 9 posted top 2'

8 in-8"φ 8 out-8"φ

10-6"φ 11-4"φ 12-4"φ Fender-4"φ

Bent 12

Fender-6"φ Pile 12-4" 11-2"φ 10-4"φ

↳ cut off 7' above ML

9-4"φ 8-6"φ 7-8"φ

out 8-4"φ 8 in-10"φ

6-3"φ 5-5"φ 4-4"φ

5 in-4"φ 5 out-10"φ

Pile 3-4"φ 2-8"φ 1-6"φ Fender good 12"φ



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JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

Bent 13

1-10"φ 2-4"φ 3-6"φ Fender good

4-4"φ 5-10"φ 6-10"φ

5 in - 8"φ 3 out - 8"φ

pile 7 - 8"φ 8 - 0" 9 - 6"φ

↑ 3' 4" sub out of mud

pile 8 out - 10"φ 5 in - 4"φ

pile 10 - 7"φ 11 - 2"φ 12 - 7"φ Fender - good

↑ top 2' posted

Bent 14

pile 12 - 10"φ 11 - 10" 10 - 10" 3 pile corner cluster - 12"φ good cond
fender pile @ pile 10 - 8"φ

pile 7 - 9"φ 8 - 9"φ 9 - 9"φ

↑ 2 1" d x 1" w x 2' 1/2 ms tendon bottom 2'

fender pile @ pile 7 - good cond

6 - 8"φ 5 - 10"φ 4 - 10"φ fender in front of pile 4 - 8"φ good cond

Pile 1 - 10"φ 2 - 10"φ 3 - 10"φ

↑ split top down 6' - 1/2" wide

Drives out @ 16/15