PARE PROJECT NO. 08216.00

INSPECTION REPORT
STEAMSHIP PIER
NEW BEDFORD WATERFRONT
FACILTIES INSPECTIONS
NEW BEDFORD, MASSACHUSETTS

MARCH 2009

PARE CORPORATION

EXECUTIVE SUMMARY

Steamship Pier is comprised of three principal components: a timber boardwalk, the original pier structure, and the pier extension. The pier currently provides berthage for commercial fishing vessels.

Pare Corporation of Foxboro, Massachusetts, conducted the topside inspection of the site on November 14, 2008. The underwater inspection was conducted on November 14, 2008 by Childs Engineering Corporation of Medfield, Massachusetts. In general, Steamship Pier was found to be in **Fair to Good** condition. Concerns and deficiencies at the site include deteriorated concrete pile jackets, loss of exposed timber pile section, missing and loose pile cross bracing, deteriorated concrete deck, corroded low water connection hardware, and damage to the fender piles, wale, and chocks.

High priority repairs include the encasement of deteriorated piles, reconnection of cross bracing, replacement of broken or excessively damaged fender components, and patching of the concrete deck. The opinion of probable cost for this work is in the order of $579,600.

Lower priority repairs include the addition of a cathodic protection system, which will increase the remaining useful life of the facility. The opinion of probable cost for this work is in the order of $105,360.

It is recommended that the facility be inspected at 3 to 5 year intervals to monitor deterioration of the facility components.

TABLE OF CONTENTS

APPENDICES:

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 Steamship 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 wharf 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

Steamship Pier is an approximate 675 foot long pier located within Bristol County in the City of New Bedford, Massachusetts. It is bordered by State Pier to its north and Coal Pocket Pier to the south. Steamship Pier is approximately 1.5 miles south of Route 195 along the New Bedford waterfront on Buzzard's Bay, south of State Pier and north of Coal Pocket Pier as shown in Figure 1 – Locus Plan.

2.2 - Facility Description

Steamship Pier was originally constructed in 1838. Currently listed on the National Register of Historic Places, it was formerly used as a ferry terminal for passengers looking to travel between New Bedford, Martha's Vineyard, Nantucket, Boston, New York City, and New London, CT. Steamship Pier is now primarily used for the berthing of commercial fishing vessels. It is comprised of three structures; an original pier, a pier extension constructed in 1986, and a timber boardwalk between Steamship pier and State Pier. The original structure was a 291-foot long timber pile supported pier, with timber stringers and decking. In 1977, reconstruction of the

original structure included encasing the original timber piles in reinforced concrete, construction of concrete stringers, and installation of a concrete deck. In 1986 the pier was extended 384 feet with a concrete deck supported by steel piles. The timber wharf is supported by timber piles and measures approximately 30 feet by 150 feet.

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

A visual inspection of the above water structures at Steamship Pier was performed by PARE Corporation on November 14 and 20, 2008. The topside inspections included a visual inspection of the timber Steamship Pier boardwalk, the original pier structure, the pier extension, and all fender systems at the pier. The inspection of the underside included a visual inspection of the piles and pile caps above the waterline as well as the underside of the deck along the Steamship Pier boardwalk, original pier structure, and pier extension. Photographs taken to document conditions observed during the inspections are available in Appendix A – Photographs. The underwater inspection of Steamship Pier was performed by Childs Engineering Corporation of Medfield, Massachusetts on November 14, 2008 in compliance with the ASCE *Underwater Investigations: Standard Practice Manual (2001).*

For reference purposes, a baseline was established along the waterside face of the timber wharf and concrete pier during the inspection. Station 0+00 was located at the northeast corner of the timber wharf and extended to station 15+72 at the southwestern corner of the pier. Observations were made in relation to their location along the baseline as appropriate and as noted herein. A numbering system created during the underwater pile inspection is shown on Figure 2 – Site Plan. The numbering for the original pier structure begins with Bent No. 1 at the intersection with the Steamship Extension and finishes with Bent No. 36 at the final inshore pile bent. The Steamship Extension numbering begins with Bent No. 1 at the intersection with the original structure and continues to Bent No. 17 at the most outshore pile bent.

3.2 Original Structure

The original structure measures approximately 291 feet long by 61 feet wide. Thirty-six pile bents contain between 8 and 10 piles each, with a total of 343 piles as shown in Figure 2 – Existing Pile Plan. The original piles are timber with a minimum 2-foot embedment into a reinforced concrete section. The timber piles have been jacketed with reinforced concrete to increase capacity and protect the timber, which is understood to have been reduced by rot and marine borer. An 18-inch by 15-inch reinforced concrete pile cap supports 10-inch thick concrete deck slabs. A 20-inch high by 16-inch wide concrete curb is provided along the perimeter of the pier. Cleats are bolted to the top of the timber fender system wale at approximate 25 foot intervals over the length of the pier.

The original pier structure and pier extension are protected with a timber fender system comprised of 10-inch diameter piles spaced 8-feet on center, 8-inch by 8-inch timber chocks at the tops of the piles, and two 2-inch by 12-inch timber caps. An 8-inch by 12-inch timber upper wale runs continuous between the chocks and the concrete curb. An 8-inch by 8-inch timber lower wale runs continuous, bolted to the piles at Mean Sea Level.

3.2.1 Original Pier - Topside

The concrete deck of the original structure was observed to be in overall fair condition, with observed deficiencies consisting of stress cracks, deteriorating concrete, and exposed steel reinforcement. Typically along the length of the original structure, both transverse and longitudinal cracks were observed in the concrete deck as shown in Photo 3 in Appendix A - Photographs. Longitudinal cracks were spaced 4 feet on center, with transverse cracks were spaced approximately 24 to 25 feet on center, corresponding to the precast plank deck joints. The sealer in the expansion joints is typically loose or missing, with soil and gravel now filling the joints.

3.2.2 Original Pier - Underwater

The original section of Steamship Pier was reconstructed circa 1977 to include a precast concrete deck and reinforced concrete jackets around the existing timber piles. The supporting piles of the original section were observed to be in generally fair to poor condition. A number of the concrete jackets are disintegrating. (According to available drawings, these jackets form the connection between the timber pile and the concrete pile caps, and the concrete jackets actually form a concrete column above the top of the timber pile and below the concrete cap). Several of the jackets (ten) have completely broken down and only have the steel reinforcing cage remaining leaving the timber pile exposed. Other jackets have concrete section loss which exposes the rebar, both above and below the waterline. Some of the timber piles are exposed from one to four feet beneath the concrete jacket, and exhibit evidence of marine borer attack. Several piles have reduced pile diameters in this area, with the majority of the piles observed to display solid timber. Appendix A – Photographs indicates typical conditions encountered.

3.3 Pier Extension

The pier extension has added an additional 384-feet to the end of the original structure. The extension is approximately 38-feet wide for 288 feet. It then widens to approximately 63.5-feet wide for the remaining 96 feet. Seventeen pile bents are spaced 24-feet on center with 99 vertical piles and 32 batter piles. The piles are 16-inch diameter pipe piles filled with concrete. The pile caps are 32-inches wide by 30-inches deep and support 12-inch thick concrete deck slabs with a concrete curb that matches the curb on the original structure.

3.3.1 Pier Extension - Topside

Along the pier extension, the concrete deck was observed to be in generally fair to poor condition with several surface cracks observed. Several locations along the deck surface have spalled exposing the steel reinforcement, with significant spalling typically observed surrounding the expansion joints. Asphalt patching used during previous repairs was observed, typically with additional spalling of the concrete surrounding the patchwork as shown in Photos 9 and 10 in Appendix A. Spalling was observed at the edge of the deck from Station 6+56 to 6+62, Station 7+10, and Station 7+38. Specific locations of large spalls and other damage are listed in Appendix F – Field Notes.

The Steamship Pier extension was constructed around 1986 with precast concrete deck panels, concrete pile caps, and steel pipe piles filled with concrete. The extension is in overall good condition. The steel piles have significant coating remaining. There has been no significant loss of steel section. The underside of the concrete deck was observed to be in generally good condition. The concrete caps were observed to be in generally satisfactory condition, with typical areas of spalling and efflorescence noted along the caps.

3.3.2 Pier Extension - Underwater

The underwater inspection of the Pier Extension piles indicated that the steel piles are in generally good condition with no significant loss of steel section. Ultrasonic thickness (UT) and cathodic potential (CP) reading were taken along the steel pipe piles and steel sheet pile bulkhead. Readings were taken at the mudline, mean low water, and approximately halfway between the two. The following tables illustrate the results.

Table 3.2 – Steel Pipe Piles Underwater Readings

STATION	ELEVATION	UT *Q1*	UT *Q2*	UT *Q3*	UT *Q4*	CP
BENT 13 PILE 1	Mud	0.360	0.330	0.330	0.335	0.490
	Mid	0.370	0.370	0.365	0.365	0.488
	MLW	0.395	0.365	0.375	0.370	.175-.430
BENT 11 PILE 1	Mud	0.320	0.325	0.330	0.330	0.507
	Mid	0.370	0.390	0.360	0.370	0.502
	MLW	0.370	0.370	0.370	0.360	0.516
BENT 13.5 PILE1	Mud	0.305	0.320	0.340	0.325	0.458
	Mid	0.370	0.355	0.360	0.365	0.448
	MLW	0.370	0.370	0.365	0.365	0.449
BENT 16 PILE 1	Mud	0.320	0.330	0.325	0.320	0.446
	Mid	0.370	0.360	0.350	0.360	0.445
	MLW	0.370	0.370	0.370	0.370	0.454
BENT 9 PILE 1	Mud	0.325	0.330	0.315	0.330	0.511
	Mid	0.350	0.370	0.360	0.370	0.510
	MLW	0.335	0.380	0.345	0.365	0.500
BENT 7	Mud	0.345	0.345	0.360	0.365	0.508

PILE 7	Mid	0.370	0.375	0.375	0.380	0.508
	MLW	0.365	0.365	0.370	0.380	0.510
BENT 5 PILE 1	Mud	0.335	0.340	0.345	0.330	0.513
	Mid	0.365	0.385	0.380	0.375	0.514
	MLW	0.380	0.390	0.370	0.380	0.565
BENT 3 PILE 1	Mud	0.350	0.345	0.345	0.345	0.352
	Mid	0.365	0.365	0.365	0.365	0.324
	MLW	0.360	0.360	0.360	0.365	0.351
BENT 1 PILE 1	Mud	0.310	0.310	0.300	0.315	0.340
	Mid	0.380	0.375	0.380	0.380	0.349
	MLW	0.375	0.375	0.375	0.375	0.300

3.4 Timber Boardwalk

The timber boardwalk component of the structure runs parallel to the shoreline between State Pier and Steamship Pier. The wharf is supported by 12-inch diameter timber piles, 12-inch by 12-inch timber pile caps, and 4-inch by 8-inch timber stringers. The landside end of the pile caps is supported by a 16-inch by 4.5-inch by 0.75-inch double channel steel wale mounted to the face of a steel sheetpile bulkhead. The steel sheet bulkhead is retained by two inch diameter tie backs at approximate 10 foot intervals. The deck is comprised of 1-inch by 6-inch timber boards with a 12-inch by 12-inch timber curb along the waterside edge.

3.4.1 Boardwalk - Topside

The timber pile supported wharf extends from Station 0+00 to Station 1+54. The timber decking was observed to be in overall good to fair condition. Mildew growth was typical along the topside of the deck with some splintering and warping of the boards noted during the inspection. The pile caps extended approximately 12 inches beyond the waterside face of the wharf, with many of the ends damaged due to rot and possible impact from vessels. The timber curb was observed to be in fair condition, with rotting of the timber observed near Station 0+75, minor wear along the length, and a displaced section from Station 1+24 to Station 1+54. Four cleats were observed bolted to the top of the curb, however, two of them were damaged with bent bolts and broken timber at Station 0+94 and Station 1+09. A steel ladder that allowed access to a small floating dock was noted at Station 0+78. The ladder was observed to be in good to fair condition but was missing the connecting bolts and was held in place on the face of the wharf with a galvanized chain.

Beneath the timber wharf, the shoreline is retained by a steel sheetpile bulkhead. The bulkhead was observed to be in overall fair condition, with corroded steel and loss of the steel coating. A double channel steel wale runs along the face of the bulkhead and supports the timber pile caps at their landside end. The steel wale was observed to be in poor condition, with significant corrosion and 100% section loss observed in several locations.

3.4.2 Boardwalk - Underwater

The Steamship Boardwalk is supported timber pile bents comprised of 3 evenly spaced timber piles. Atop the piles is a timber cap that is supported at the inshore edge by the steel bulkhead wale. The timber piles are in generally good condition, with a few out-shore piles exhibiting section loss due to abrasion from floating docks which are tied alongside. The out-shore end of the pile caps are typically rotted and split starting between pile 2 and pile 3 to the end which is cantilevered 1 to 2 feet beyond pile 3. The timber bracing is in good condition; however the lower connection hardware has typically 50% loss of the steel on the lower connections.

The steel sheet pile bulkhead is in fair condition. There is typically a ¼ inch of corrosion byproduct build up, pitting of the steel up to 1/8 inch deep and ½ inch wide, and low potential readings around 0.3 volts indicating a high corrosion potential. The steel sheet pile section located at station 0+00 has very thin steel readings at the mudline with less than a ¼ inch of steel thickness found in this area. It was noted that the sheet pile sections at this location are a different steel section than the remaining bulkhead section. The wall has an external wale with 2" diameter tierods spaced at 10ft intervals. The wale also supports a 12x12 timber pile cap which is the inshore support of the timber pier. There is an outfall in the steel sheet pile bulkhead located between bents 10 and 11 of the steamship boardwalk. The bulkhead runs out along the outfall in this location and is supported by steel struts 6 feet on center. The steel struts are in good condition. The bulkhead that flanks the outfall acts as the pier support for bents 10 and 11. The 12x12 timber cap is set along the top of the sheeting and supports the stringers between these bents.

Table 3.3 – Steel Sheet Pile Underwater Readings

STATION	ELEVATION	UT *Inner Flange*	UT *Web*	UT *Outer Flange*	CP
0+00	Mud	0.305	0.245	0.225	0.304
	Mid	n/a	n/a	n/a	no reading
	MLW	0.325	0.335	0.330	0.303
0+68	Mud	0.520	0.375	0.500	no reading
	Mid	0.515	0.365	0.505	no reading
	MLW	0.515	0.370	0.510	no reading

STATION	ELEVATION	UT *Inner Flange*	UT *Web*	UT *Outer Flange*	CP
0+00 Bulkhead Corner 6' of Water	Mud	0.305	0.245	0.225	0.304
	Mid	n/a	n/a	n/a	
	MLW	0.325	0.335	0.330	0.303
Bent 4 0+68	Mud	0.520	0.375	0.500	
	Mid	0.515	0.365	0.505	

	MLW	0.515	0.370	
Bent 18	Mud	0.415	0.280	0.319
1+82	Mid	0.420	0.205	0.306
	MLW	0.520	0.355	

3.5 Fender System and Appurtenances

The fender system was observed to be in overall fair to poor condition. The 10-inch diameter fender piles were observed to be in good to fair condition, with several areas in poor condition. The timber chocks, upper wale, and fender cap were observed to be in overall fair to poor condition. Typical deficiencies consist of wearing of the pile faces and several missing and broken piles. Many of the timber chocks and several sections of the timber fender cap were broken or missing. Fire damage was observed on the fender cap at Station 4+94, creating a 12-inch diameter hole in the cap. Another fire has caused significant damage to the fender cap, upper wale, and chocks at Station 8+28. Typical fender system damage is shown in Photo 5 in Appendix A - Photographs. On the top of the upper wale, 24-inch long cleats were observed spaced 24 feet on center. It was noted during the inspection that numerous cleats were loose, with either bent connection bolts or damaged timber. Specific locations of broken and/or missing piles and chocks observed during the topside inspection are listed in the table below.

Table 3.1 – Fender Deficiencies

Location	Station	Deficiency	Description
Topside	2+31 - 2+39	Timber Chock	Damaged / Broken
Topside	2+87 - 2+95	Timber Chock	Missing
Topside	3+03 - 3+11	Timber Chock	Missing
Topside	3+49	Timber Chock	Significantly worn
Topside	3+68	Timber Fender Pile	Missing
Topside	3+68	Timber Chock	Broken
Topside	4+17 - 4+25	Timber Chock	Missing
Topside	4+94	Timber Fender Pile	Fire damage to top of pile
Topside	5+18 - 5+26	Timber Chock	Missing
Topside	6+22 - 6+30	Timber Chock	Missing
Topside	6+54	Timber Fender Pile	Significantly worn
Topside	8+03	Timber Chock	Broken
Topside	8+06	Timber Fender Pile	Broken
Topside	8+24	Timber Chock	Missing
Topside	8+28	Timber Chock	Fire damage
Topside	8+36	Timber Chock	Missing
Topside	8+41 - 8+49	Timber Chock	Missing
Topside	8+81	Timber Fender Pile	(3) Significantly worn
Topside	9+76	Timber Fender Pile	Broken at MLW
Topside	9+76	Timber Chock	Missing
Topside	9+96	Timber Chock	Missing
Topside	10+60	Timber Fender Pile	Significantly worn
Topside	10+60 - 10+68	Timber Chock	Missing
Topside	11+41	Timber Chock	Missing
Topside	11+45	Timber Chock	Missing
Topside	12+41	Timber Chock	Significantly worn

Topside	12+98	Timber Chock	Missing
Topside	13+10	Timber Chock	Broken
Topside	13+87	Timber Chock	Broken / Significantly worn

Below water, the timber fender system is in fair condition. There are a number of broken fender piles and other broken timber members. Most of the piles show evidence of section loss due to abrasion. The timber members are solid below water with no observed punkiness.

The concrete curb houses a utility raceway that provides electricity to electrical outlets along the curb face and light posts mounted on top of the curb. Access boxes were typically located approximately 4 to 6 feet from each outlet and light post. From Station 5+42 to Station 5+58, spalling was observed on the face and on the top of the curb with no exposed reinforcement noted.

Galvanized steel ladders and life rings were observed along the original structure and pier extension. The ladders are mounted within the fender system and provide access to and from the deck and the water below. Overall the ladders were observed to be in fair to poor condition. Many of the ladders have been damaged during impact with vessels causing damage to the rungs and buckling of members. All of the ladders are corroded below mean high water rendering them useless during times of low water. The life rings were observed mounted to the face of the concrete curb, providing access to emergency life-saving devices.

A list of specific locations of all fenders, ladders, cleats, light posts, electrical outlets, and life rings as well as any other deficiencies observed during the topside inspection is provided in Appendix E: Field Notes.

SECTION 4 – STRUCTURAL CONDITION ASSESSMENT

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 structure conditions were based on visual and tactile observations only, and were limited to accessible and visible portions of the structures.

4.2 Original Pier

The Original Pier component of the Steamship Pier was observed to be in generally fair condition, with observed deficiencies as described below:

- Cracking of the concrete deck is symmetrical with the precast concrete deck panels, and is typical of this type of construction. Lateral loads causing deflection of the pier

structure induce movement in the precast slabs, causing cracking of the concrete deck overlay.

- The concrete caps are in fair condition, with localized areas of repair required.
- The concrete encasements (jackets) on the timber piles were observed to have areas of deficiencies as indicated on Figure 2 – Existing Site Plan. The loss of concrete section exposing reinforcing steel above the waterline must be repaired or replaced, as this area comprises a structural column and is required for the support of the pier. The loss of concrete cover on the underwater sections of the concrete encasements is not as critical, as this area of concrete serves primarily as a protection to the timber.
- Loss of timber pile section was observed in areas where the concrete encasements do not extend to the mudline. While this can be a potentially serious situation, the observed remaining pile diameters were generally good, with few exceptions, and solid timber was observed.
- Missing or disconnected pile bracing.

Given the age and existing condition of the pier, the original section of the Steamship Pier could be considered as nearing the end of its useful life. If neglected, the deterioration of the concrete encasements will result in a reduced load carrying capacity of the pier, requiring the eventual reconstruction of this component of the pier. However, with remedial work and continued monitoring, the remaining life of the structure can be extended.

Recommended remedial measures include the replacement of deteriorated concrete pile encasements, extension of concrete jackets to the mudline where pile diameters have been significantly reduced, and repair of limited cracking and spalling of the reinforced concrete pile caps. It is also recommended that the piles be inspected at regular intervals of approximately 3 years, to monitor further deterioration of the concrete encasements and deterioration of the unprotected areas of the timber piles.

4.3 Pier Extension

The steel pile supported Pier Extension was constructed in 1986 and is in generally good condition. The concrete deck was observed to have localized areas of spalling adjacent to the expansion joints which need to be addressed. The concrete pile caps were observed to have localized areas of spalling. The steel pipe piles were observed to be in generally good condition, with ultrasonic thickness readings on the steel pipe piles indicating very little section loss to date. Higher rates of corrosion were observed near the mudline. The installation of cathodic protection along the piles will reduce the rate of steel corrosion and therefore increase the life span of the structure.

Recommendations for this component of the structure include the repair of spalling and exposed reinforcing steel of the concrete deck and pile caps, and the installation of a cathodic protection system for the steel piles.

4.4 Timber Boardwalk

The existing timber boardwalk was observed to be in generally fair condition, with several areas of rehabilitation required. The timber piles were observed to be in generally good condition, with little evidence of marine borer. The existing lower bolts on the pile bracing are corroded and replacement is warranted. The timber pile caps are deteriorated above the outer row of piles, and need to be reinforced or replaced. The steel wale ledger beam along the inshore face of the sheeting is corroded and needs to be reinforced or replaced. The steel sheet piling is corroded and has a slight loss of steel section. Cathodic protection of the steel sheet piling is recommended to extend its useful life.

4.5 Fendering and Appurtenances

The existing fender system is in fair condition, with replacement of broken fender piles and wales and chocks required to adequately protect the structure and vessels. Similarly, the existing ladders should be repaired and replaced. The existing cleats have rotated in many instances and should be replaced with more substantial hardware fastened to the concrete.

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. Existing structure conditions and assessments were based on visual and tactile observations only, and were limited to accessible and visible portions of the 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 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 actual construction costs may be somewhat less or considerably more than indicated, due to fluctuations in the market and the actual repair implemented.

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 Original Structure Piles

This item consists of the encasement of the severely deteriorated piles supporting the original structure of Steamship Pier. Providing "fish plates" or concrete jackets as means of repair is the most viable option at this site. Similar repairs to the piles beneath the pier were completed in the past.

The proposed work will require excavation to uncover the section of good pile below the mudline, and will include the encasement of the piles with reinforced concrete within fiberglass forms. The opinion of probable construction cost for this work is approximately $278,000.

Alternatively, the replacement of the entire original structure with concrete filled pipe piles similar to the pier extension has an associated opinion of probable construction cost of approximately $3,250,000.

B. Reattach Cross Bracing

This item consists of the removal and replacement of low water connection hardware for the cross bracing. Loose cross bracing beneath the original structure and timber boardwalk needs to be reattached. The opinion of probable construction cost for this work is approximately $30,000.

C. Fender Repairs

This item consists of the removal of broken fendering members and replacement with new timber. This includes removal of old hardware, disposal of materials, and the furnishing and installation of new hardware and timber members. The opinion of probable construction cost for this work is approximately $150,000.

D. Concrete Deck Repairs

This item consists of repairs to the deteriorated concrete deck along the pier extension. The proposed work will include patching spalled areas and installation of joint filler. The opinion of probable construction cost for this work is approximately $25,000.

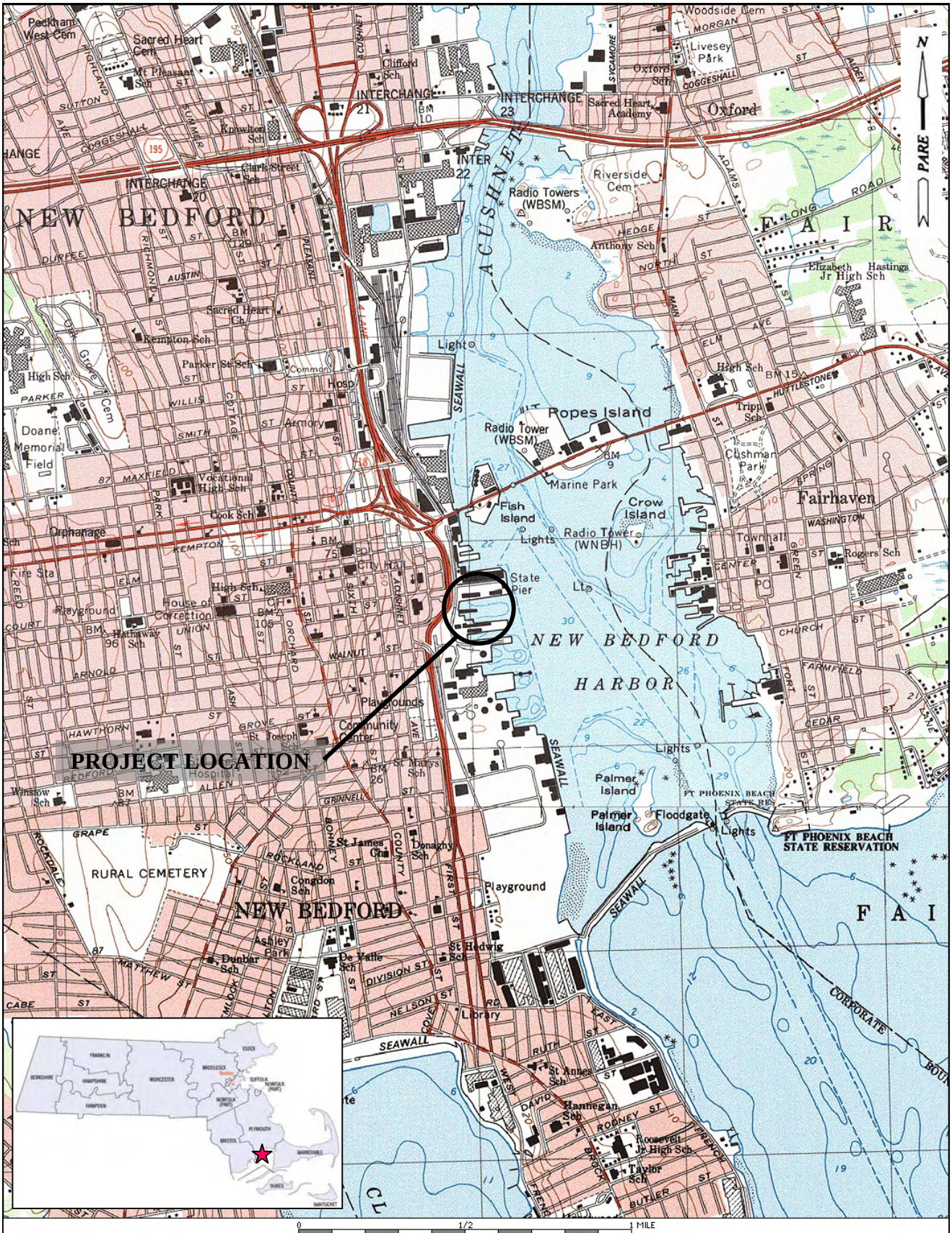
5.3 – Lower Priority

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. Installation of Cathodic Protection

This item consists of the installation of cathodic protection along the steel sheetpile bulkhead beneath the timber boardwalk and on the steel pipe piles beneath the pier extension. Sacrificial zinc or aluminum anodes minimize corrosion of the steel sheet piling and components, as well as the steel pipe piles, and will extend the useful life of the structures. The opinion of probable construction cost for this work is approximately $105,360.

Figures
Steamship Pier
New Bedford, Massachusetts



PARE CORPORATION

STEAMSHIP PIER

NEW BEDFORD, MASSACHUSETTS

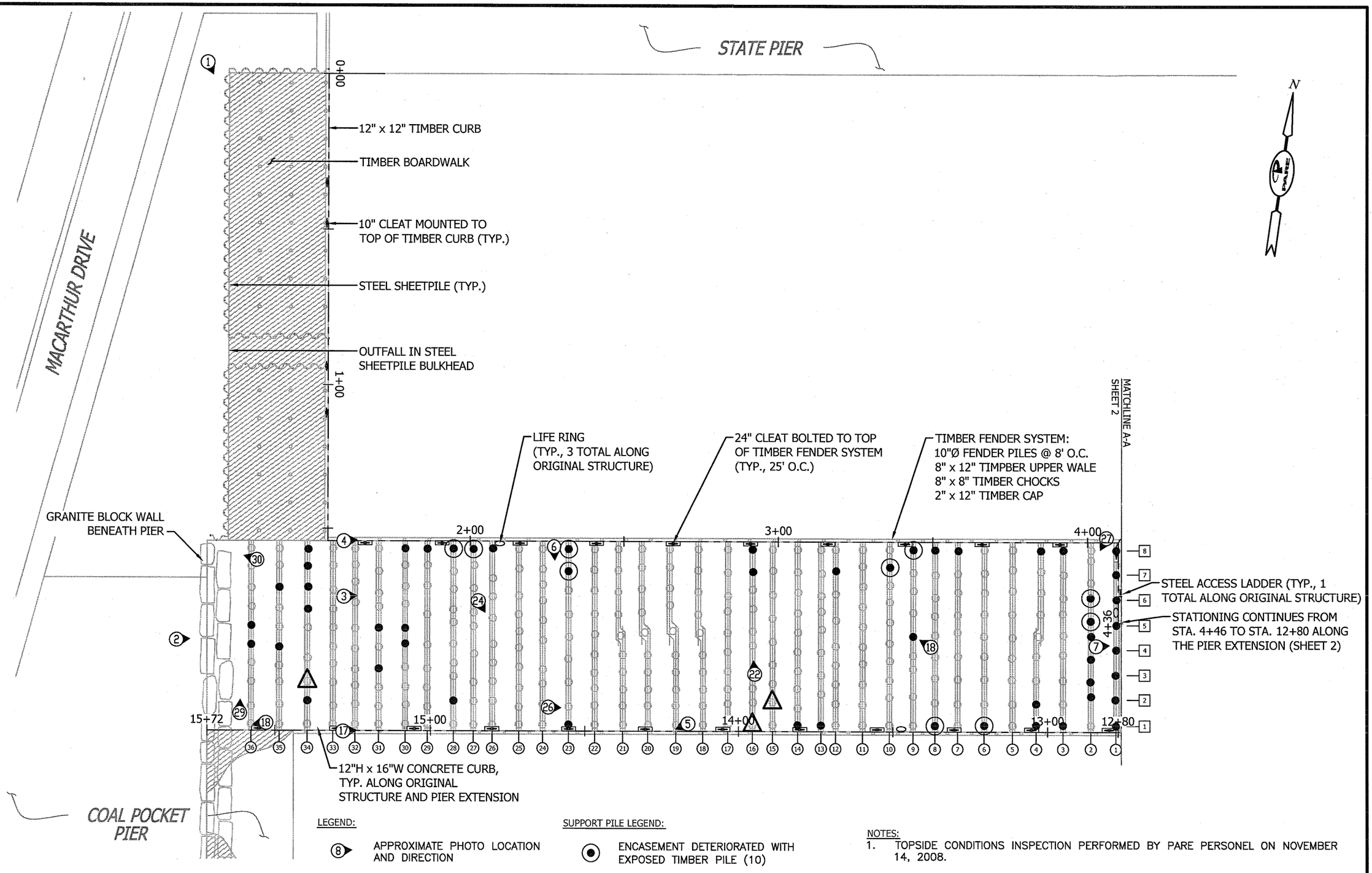
NEW BEDFORD HARBOR DEVELOPMENT COMMISSION

NEW BEDFORD WATERFRONT FACILITY INSPECTIONS

NOVEMBER 2008

FIGURE 1

LOCUS PLAN



LEGEND:

- APPROXIMATE PHOTO LOCATION AND DIRECTION
- BENT NUMBER
- PILE NUMBER
- 10+00 BASELINE/STATION
- CLEAT
- LADDER

SUPPORT PILE LEGEND:

- ENCASEMENT DETERIORATED WITH EXPOSED TIMBER PILE (10)
- ENCASEMENT DETERIORATED IN TIDAL ZONE (41)
- MUDLINE EXPOSED WITH LESS THAN 6" OF TIMBER PILE SECTION REMAINING (3)

NOTES:

1. TOPSIDE CONDITIONS INSPECTION PERFORMED BY PARE PERSONEL ON NOVEMBER 14, 2008.
2. UNDERWATER CONDITION INSPECTION PERFORMED BY CHILDS ENGINEERING CORP. ON NOVEMBER 14, 2008.
3. SITE PLAN BASED UPON DRAWINGS ENTITLED "STRUCTURAL DETAILS – CONSTRUCTION OF STEAMSHIP PIER AND COALPOCKET PIER" BY TIBBETTS ENGINEERING CORP. DATED JUNE, 1977, "STRUCTURAL DETAILS – EXTENSION OF STEAMSHIP PIER" BY TIBBETTS ENGINEERING CORP. DATED MARCH 1986, AND CONDITIONS OBSERVED DURING THE INSPECTION.

HALF SIZED

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SCALE ADJUSTMENT GUIDE
0" 2"
BAR IS TWO INCHES ON ORIGINAL DRAWING.

NEW BEDFORD WATERFRONT FACILITIES INSPECTIONS

STEAMSHIP PIER

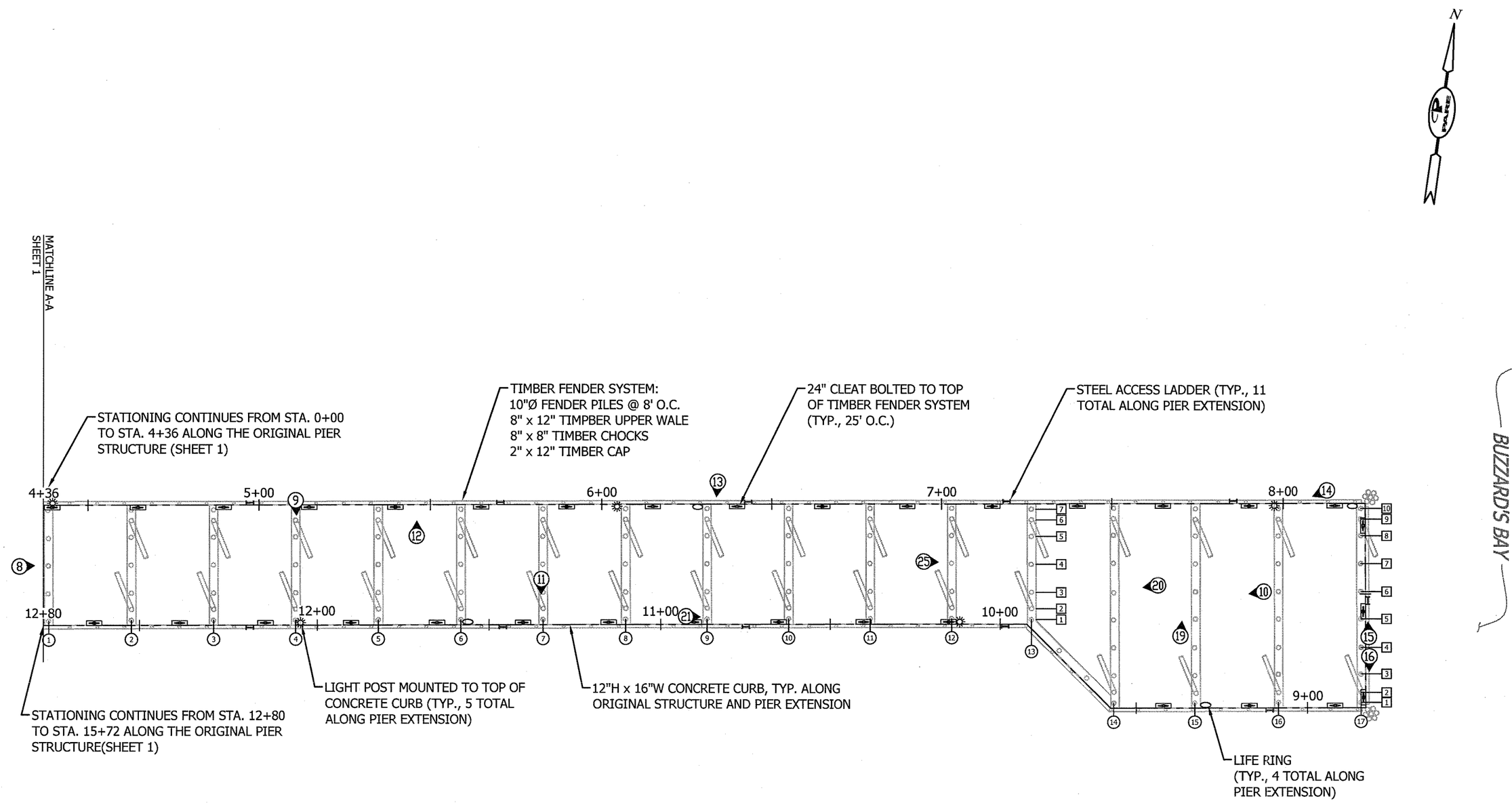
NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
NEW BEDFORD, MASSACHUSETTS

REVISIONS:

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 ORIGINAL PIER

FIGURE NO.: 2
SHEET NO. 1 OF 2



LEGEND:

- (8)▶ APPROXIMATE PHOTO LOCATION AND DIRECTION
- (10) BENT NUMBER
- [1] PILE NUMBER
- 10+00 BASELINE/STATION
- CLEAT
- LADDER

NOTES:

1. CONDITIONS INSPECTION PERFORMED BY PARE PERSONEL ON NOVEMBER 14, 2008.
2. UNDERWATER CONDITION INSPECTION PERFORMED BY CHILDS ENGINEERING CORP. ON NOVEMBER 14, 2008.
3. SITE PLAN BASED UPON DRAWINGS ENTITLED "STRUCTURAL DETAILS – CONSTRUCTION OF STEAMSHIP PIER AND COALPOCKET PIER" BY TIBBETTS ENGINEERING CORP. DATED JUNE, 1977, "STRUCTURAL DETAILS – EXTENSION OF STEAMSHIP PIER" BY TIBBETTS ENGINEERING CORP. DATED MARCH 1986, AND CONDITIONS OBSERVED DURING THE INSPECTION.

HALF SIZED

PARE
PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
10 LINCOLN ROAD, SUITE 103
FOXBORO, MA 02035
508-543-1755

SCALE ADJUSTMENT GUIDE
0" 2"
BAR IS TWO INCHES ON ORIGINAL DRAWING.

NEW BEDFORD WATERFRONT FACILITIES INSPECTIONS

STEAMSHIP PIER

NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
NEW BEDFORD, MASSACHUSETTS

REVISIONS:

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
PIER EXTENSION

FIGURE NO.: 3

SHEET NO. 2 OF 2

Appendix A
Photographs
Steamship Pier
New Bedford, Massachusetts

Photo No. 1: Timber wharf from Station 0+00 to Station 1+54.

Photo No. 2: Overview of the Steamship Pier.

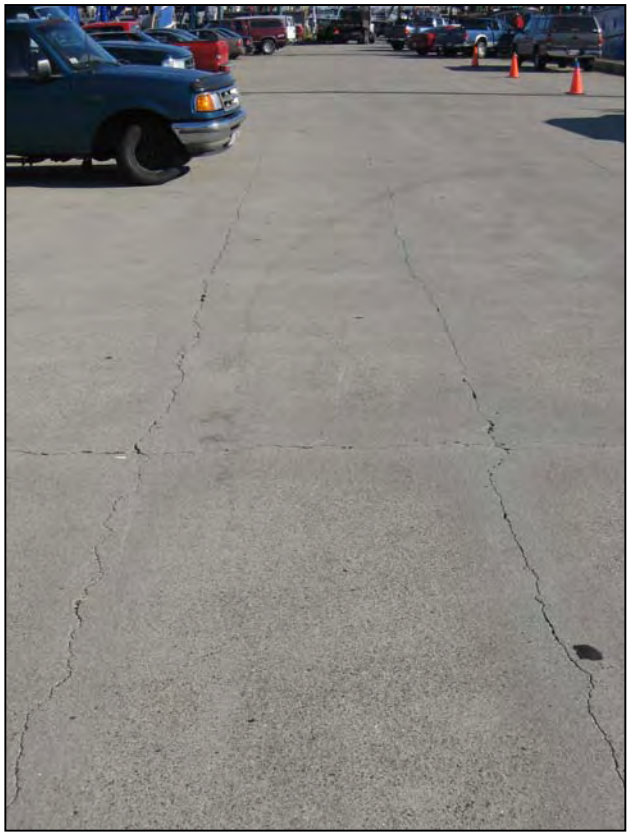


Photo No. 3: Typical longitudinal and transverse cracking observed along the deck of the original structure.

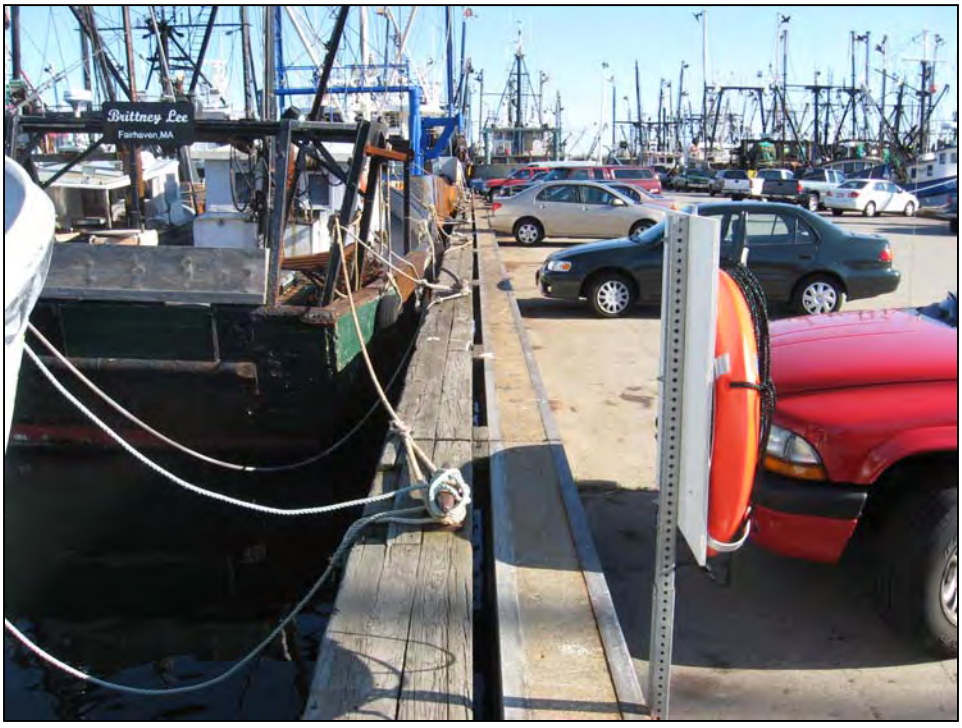


Photo No. 4: Overview of the concrete curb and fender system on the north face of the pier.

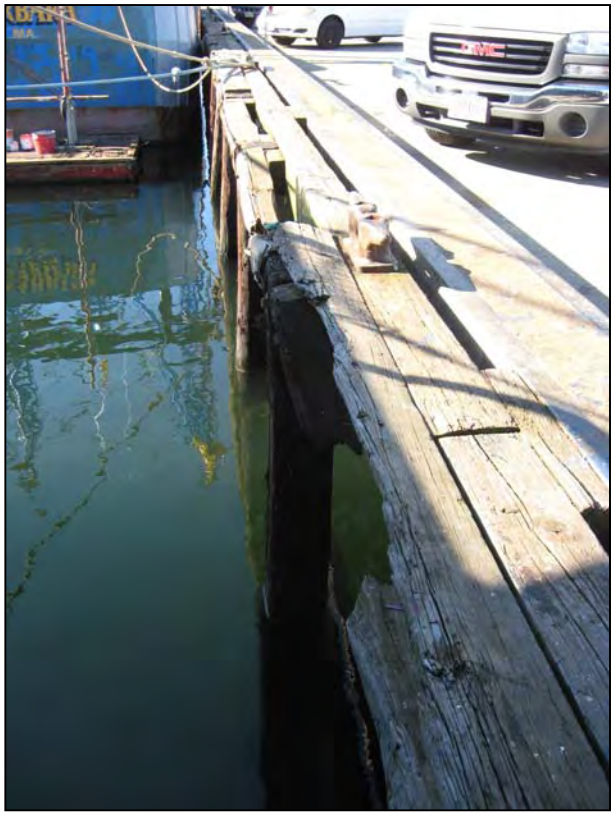


Photo No. 5: Typical fender section with broken chock and damaged or missing cap board.

Photo No. 6: Typcial expansion joint in the deck of the original structure. Note missing joint sealer.

Photo No. 7: Loose joint filler at intersection of original structure and pier extension.

Photo No. 8: Overview of the pier extension.

Photo No. 9: Typical expansion joint in the deck of the pier extension. Note spalling of concrete and asphalt patch.

Photo No. 10: Four way intersection of expansion joints at the head of the pier extension.

Photo No. 11: Spalling of the concrete deck with exposed reinforcement observed in several locations.

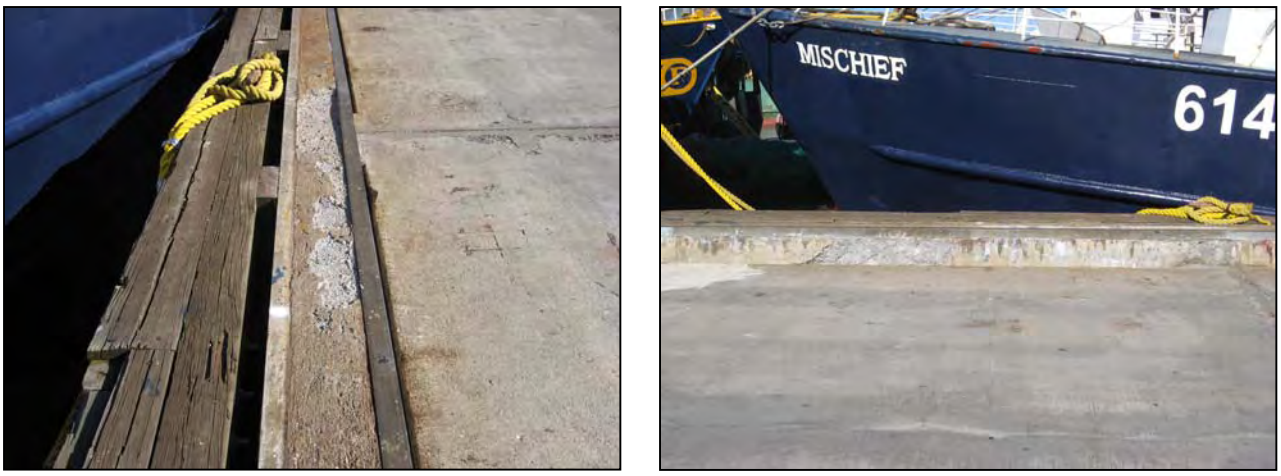


Photo No. 12: Spalling of concrete on top and face of curb.

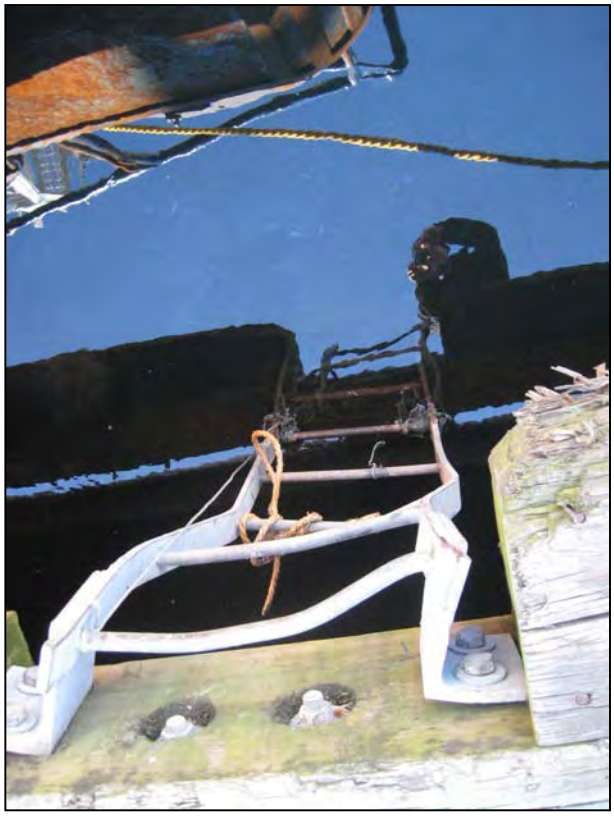


Photo No. 13: Typical buckled ladder.

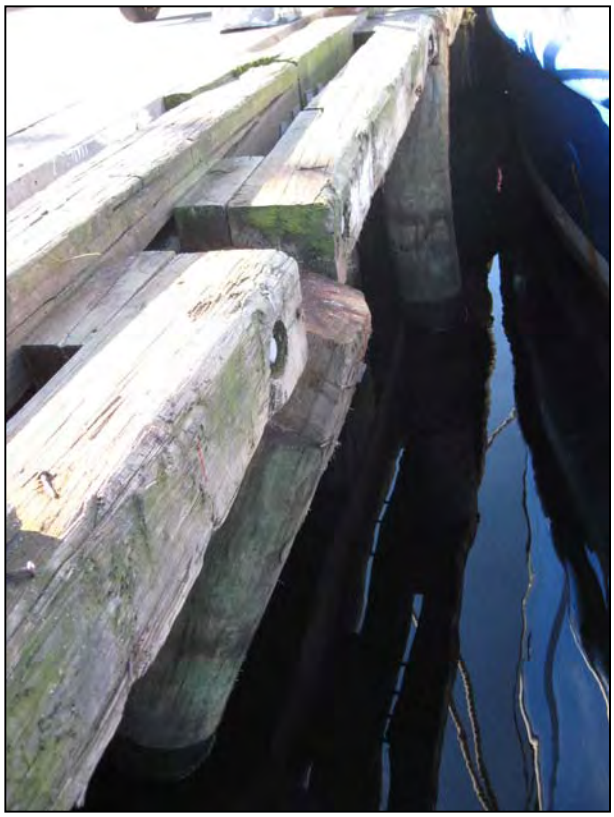


Photo No. 14: Broken fender pile at Station 8+06.

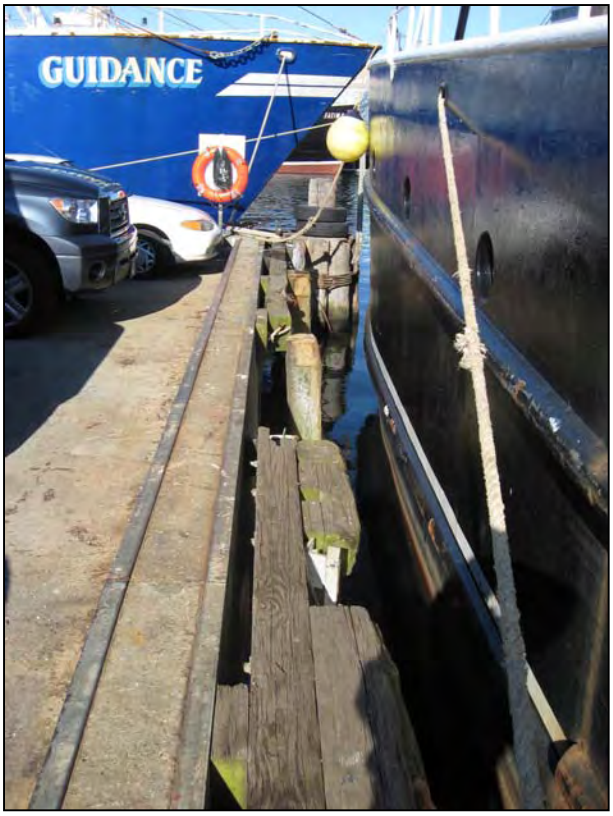


Photo No. 15: Damaged fender system from station 8+20 to Station 8+65.

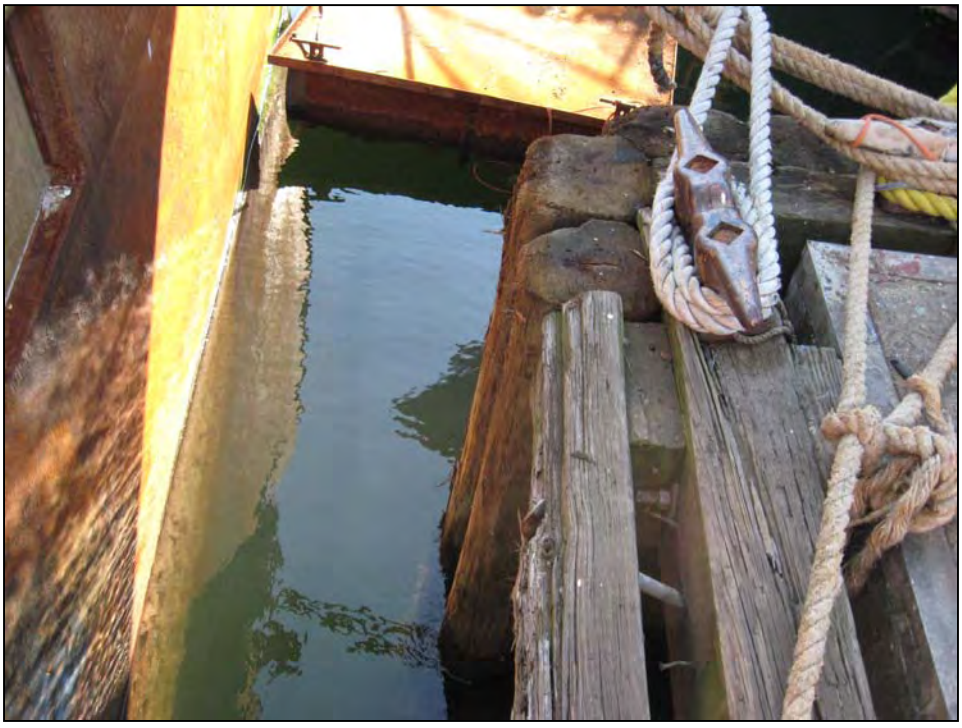


Photo No. 16: Worn fender piles and loose cleat at Station 8+80.

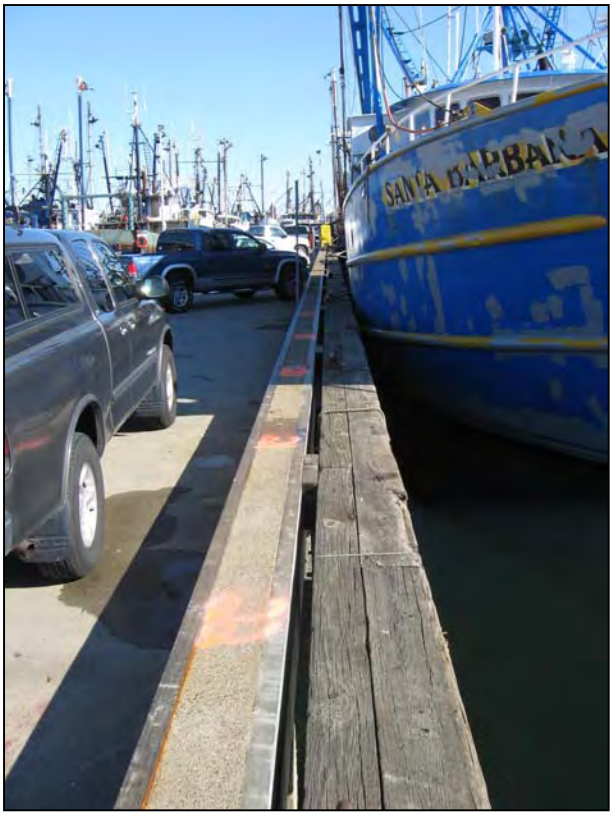


Photo No. 17: Overview of the curb and fender system on the south face of the pier.

Photo No. 18: Patch in the southwest corner of the concrete deck.

Photo No. 19: Typical overview of the deck slabs, concrete pile caps, and piles below the pier extension.

Photo No. 20: Typical spalling of the pile cap beneath the pier extension. Note presence of efflorescence.

Photo No. 21: Significant spalling of the concrete pile cap along the waterside edge beneath the original pier structure. Note exposed reinforcement.

Photo No. 22: Typical spalling of the underside of the pile cap beneath the original pier structure.

Photo No. 23: Spalled areas on the concrete pile cap with rust staining from exposed steel reinforcement.

Photo No. 24: Cracking at the top of the concrete pile beneath the original pier structure.

Photo No. 25: Typical top of pile at the intersection of the concrete pile cap beneath the pier extension.

Photo No. 26: Missing concrete jacket with exposed steel reinforcement cage and timber pile. (Photo by Childs Engineering Corp.)

Photo No. 27: Missing concrete jacket with exposed steel reinforcement cage and timber pile.

Photo No. 28: Missing concrete jacket with exposed steel reinforcement cage in the tidal zone.

Photo No. 29: Overview of the granite block wall along the shoreline beneath the original structure looking north.

Photo No. 30: Overview of the void at the corner of the granite block wall and the steel sheetpile bulkhead under the timber boardwalk.

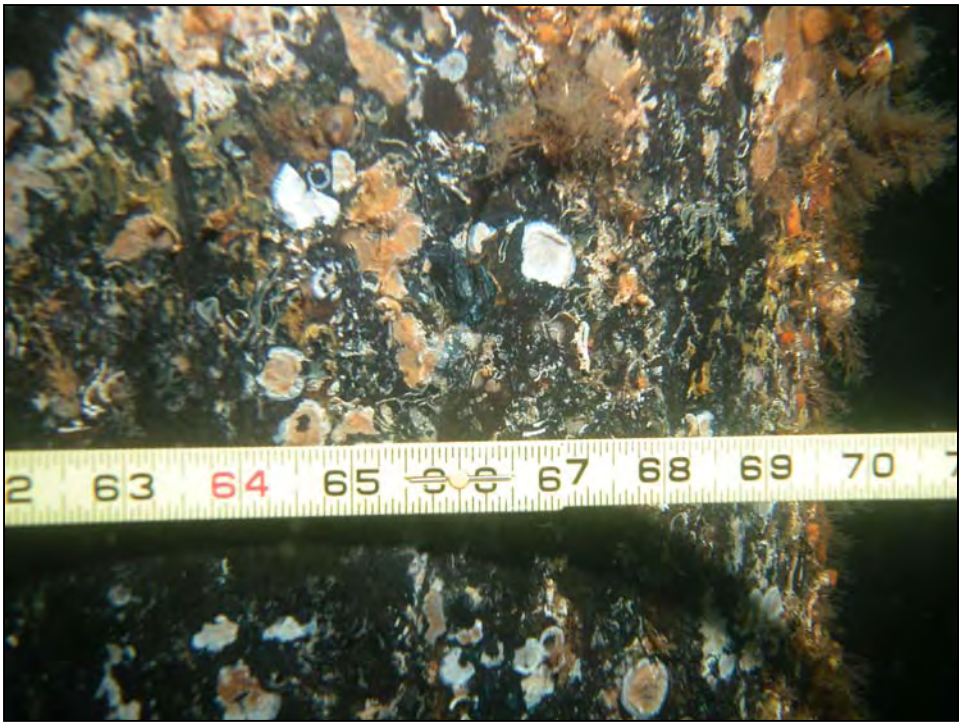


Photo No. 31: Typical marine growth below water. (Photo by Childs Engineering Corp.)

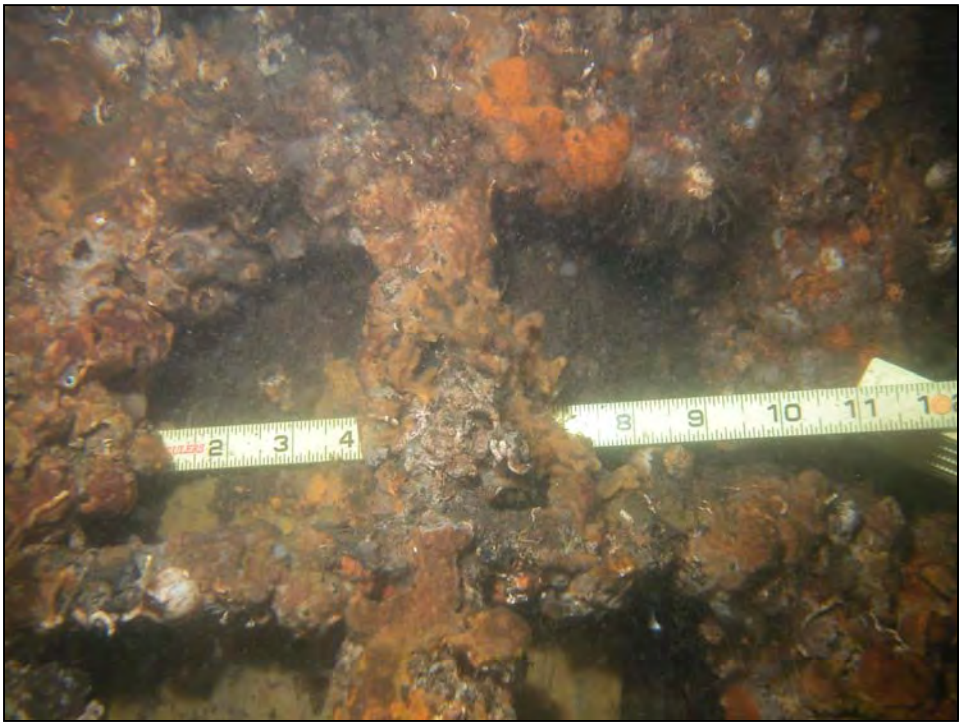


Photo No. 32: Underwater photo of exposed reinforcement. (Photo by Childs Engineering Corp.)

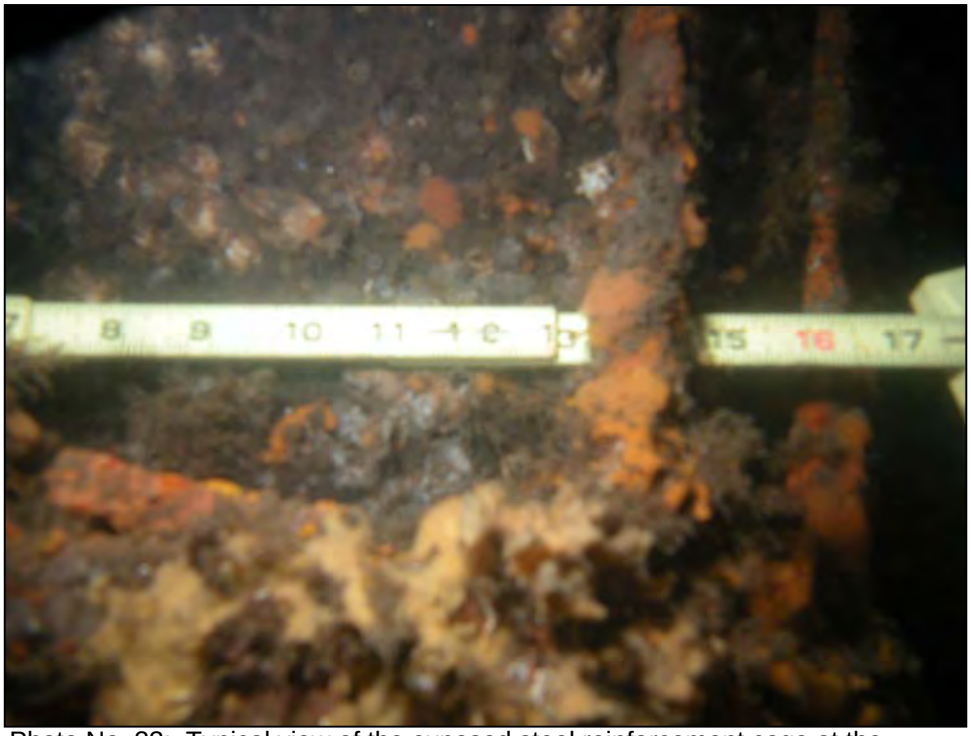


Photo No. 33: Typical view of the exposed steel reinforcement cage at the location of the missing concrete pile jacket. (Photo by Childs Engineering Corp.)

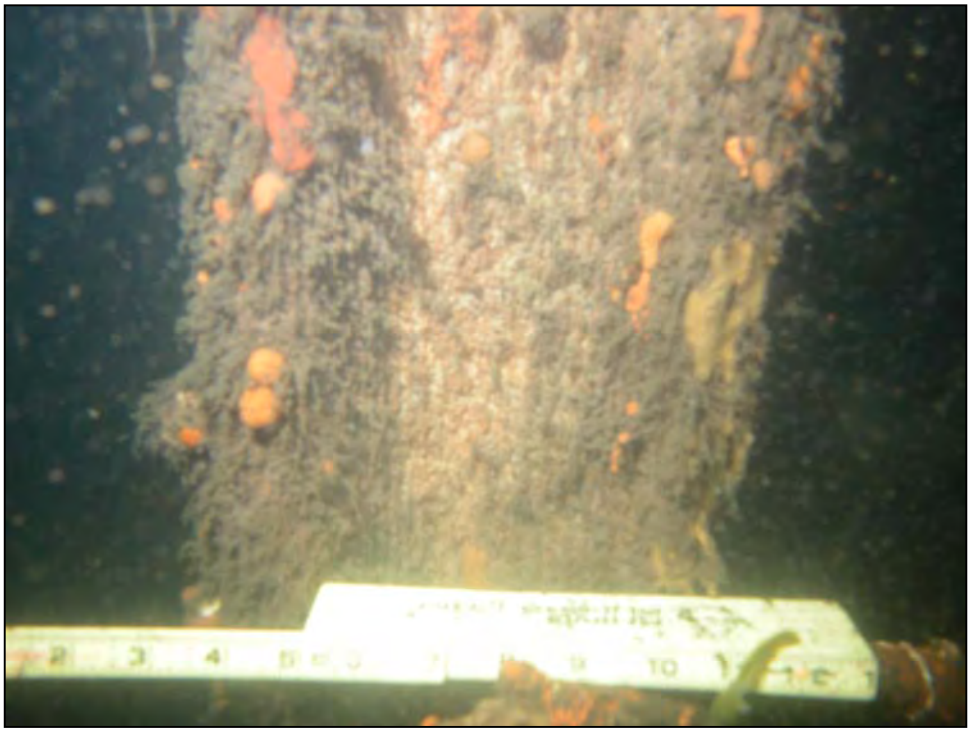


Photo No. 34: Underwater photo of marine growth on the pile. (Photo by Childs Engineering Corp.)

Appendix B
Key Personnel
Steamship 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:

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

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

STEAMSHIP PIER

OPINION OF PROBABLE CONSTRUCTION COST

February, 2009

PIER REHABILITATION						
		QTY	UNIT	UNIT PRICE		TOTAL
High Priority Repairs						
1.	Mobilization/Demobilization	1	LS	$ 10,000.00	$	10,000.00
2.	Demolition and Removal	1	LS	$ 8,000.00	$	8,000.00
3.	Pile Encasement	104	EACH	$ 2,500.00	$	260,000.00
4.	Reattachment of Cross Bracing	1	LS	$ 30,000.00	$	30,000.00
5.	Fender System Repairs	1	LS	$ 150,000.00	$	150,000.00
6.	Concrete Deck Repairs	1	LS	$ 25,000.00	$	25,000.00
				Subtotal	$	483,000.00
				Contingency 20%	$	96,600.00
				Total Alt.1	**$**	**579,600.00**
Low Priority Repairs						
1.	Mobilization/Demobilization	1	LS	$ 10,000.00	$	10,000.00
2.	Demolition and Removal	1	LS	$ 4,000.00	$	4,000.00
3.	Install Cathodic Protection	6,150	LB	$ 12.00	$	73,800.00
				Subtotal	$	87,800.00
				Contingency 20%	$	17,560.00
				Total Alt.2	**$**	**105,360.00**

Appendix D
References
Steamship 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. *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).*

3. *Construction Drawings "Extension of Steamship Pier", Tibbetts Engineering Corp., March 1986.*

Appendix E
Field Notes
Steamship Pier
New Bedford, Massachusetts

New Bedford Waterfront Facilities Inspections

Nov. 14, 08 — 55° F — Showers/Overcast

Steamship Pier

STA 0+00 - Corner Timber Deck

STA 0+00 - 0+12 - Steel 6' High Security Fence

STA 0+00 - 0+08 - 5' Deck Extension

STA 0+11.5 - Pile Bent

* Bents spaced 9' O.C. (typ.)

* Pile Caps extend 12" waterside of deck face

STA 0+35 - 10" Cleat

STA 0+38.5 - End of pile cap destroyed

STA 0+42 - 40" wide sign

STA 0+48 - Cleat

STA 0+70 - Power Box on Deck Face

- PVC Raceway from STA 0+00 - 0+70

STA 0+78 - Steel Ladder - 16.5" clear

- Good condition * attached w/ chain - needs rebolting

STA 0+84 - 40" wide sign

STA 0+94 - Cleat (Bolts bent

* 12" X12" Timber Curb Good - Fair (minor wear & rot)

Water Depths to the top of Deck

11'	@	STA 0+25
11'	@	STA 0+50
11'	@	STA 0+75
13.5'	@	STA 1+00
17'	@	STA 1+25
18'	@	STA 1+50
16.5'	@	STA 1+75
16.5'	@	STA 2+00
17.5'	@	STA 2+25
19'	@	STA 2+50
19'	@	STA 2+75
17'	@	STA 3+00
17'	@	STA 3+25
16.5'	@	STA 3+75
21.5'	@	STA 4+00
21.5'	@	STA 4+25
24'	@	STA 5+00
26'	@	STA 5+50
26'	@	STA 6+25
24.5'	@	STA 6+50
23'	@	STA 7+25

(3)

STA 1+08.5 - CLEAT (LOOSE - BROKEN TIMBER)

STA 1+14 - 40" WIDE SIGN

STA 1+17, 1+26, 1+44 - END OF PILE CAP DAMAGED

STA 1+24 - 1+54 - TIMBER CURB DAMAGED AND DISPLACED (ROTATED)

STA 1+54 - CORNER OF TIMBER DECK

* 1" X6" TIMBER DECKING IN FAIR CONDITION - MILDEW GROWTH, SOME SPLINTERING AND WARPING, SOLID - NO LOOSE BOARDS/BOUNCE

→ FENDER SYSTEM ALONG PILE SUPPORTED PIER:
- 10" TIMBER PILES 8' O.C.
- 8" X8" TIMBER CHOCKS W/ 12"L X4" X8" SPACERS
- 2" X12" CAP
- 8" X12" SPACER (CONTINUOUS)

→ 12"H x 16"W CONCRETE CURB
- 3" X3" L ON CORNERS

STA 1+55 - ELECTRICAL RACEWAY ON TOP OF CURB - RUNS UNDER WATER AND ALONG LANDSIDE FACE OF CURB

(4)

WATER DEPTHS TO TOP OF DECK

24' @	STA 8+00
24 @	STA 8+25
23	8+50
22	9+00
22.5	9+50
22.5	10+00
24	10+50
24.5	11+00
23.5	11+50
24	12+00
21	12+50
17	13+00
17	13+50
16	14+00
14.5	14+50
12	15+00
13	15+40

STA 1+66 - CLEAT (24" BOLTED TO SPACER)
STA 1+74 - RUBBER ATTACHED TO PILE
STA 1+87.5 - UTILITY BOX IN CURB - WIRES EXPOSED
STA 1+90 - CLEAT / UTILITY ACCESS BOX ON CURB (10" X 10"
STA 2+06 - RUBBER ATTACHED TO PILE
STA 2+09 - LIFE RING
STA 2+14 - CLEAT / LOOSE RUBBER
STA 2+18.25 - EXPANSION JOINT
STA 2+31 - LOOSE RUBBER
STA 2+31 - 2+39 - DAMAGED CHOCK
STA 2+39 - CLEAT / RUBBER ATTACHED
STA 2+47 - RUBBER ATTACHED
STA 2+60.25 - ELECTRIC BOX IN CURB - WIRES EXPOSED
STA 2+62.25 - UTILITY ACCESS BOX ON CURB
STA 2+63 - CLEAT
STA 2+79 - RUBBER ATTACHED / END OF BROKEN TIMBER CAP
STA 2+87 - CLEAT

STA 2+87 – 2+95 – BROKEN/MISSING CHOCK

STA 3+03 – 3+11 – BROKEN/MISSING CHOCK

STA 3+11 – CLEAT (DAMAGED TIMBER @ BOLTS) RUBBER

STA 3+16 – EXPANSION JOINT / END OF MISSING TIMBER CAP

STA 3+20 – RUBBER ATTACHED

STA 3+33.25 – ELECT. OUTLET ON CURB FACE

STA 3+35 – 10"X10" UTILITY ACCESS ON TOP OF CURB

STA 3+36 – CLEAT

STA 3+37 – CORNER DAMAGED / MISSING TIMBER CAP

STA 3+49 – CHOCK WORN (FAIR TO POOR

STA 3+60 – CLEAT

STA 3+68 – MISSING FENDER PILE

→ SPACE IN CHOCKS / BOLT IN PLACE

→ BROKEN CHOCKS BOTH SIDES

STA 3+84 – CLEAT

STA 4+00 – PILE

INSPECTION NOTES

CONCRETE DECK

- LONGITUDINAL CRACKS ± 48" O.C. (TYP., MAIN PIER)
- TRANSVERSE CRACKS ± 25' O.C. (TYP., MAIN PIER)
- (2) EXPANSION JOINTS ALONG MAIN PIER – FILLER IN POOR CONDITION (DRY, SOME MISSING, LOOSE) SOIL & GRASS GROWTH IN JOINT (TYP)
- EXPANSION JOINTS 25' O.C. (TYP., PIER EXTENSION)
- JOINT FILLER MISSING, DRY, LOOSE JOINTS FILLED W/ GRAVEL/SOIL/ASPHALT (TYP)
- STA 4+36 – 4+61 – LONG. CRACK

STA 4+08 - CLEAT
STA 4+10 - CORNER OF WALL
STA 4+12 - CLEAT
* CAP MISSING FROM CORNER TO CURB
@ STA 4+36
STA 4+17-4+25 - BROKEN / MISSING CHOCK
STA 4+20 - LADDER ATTACHED TO CHOCK HANGING W/ 1 BOLT
STA 4+32 - LIFE RING
STA 4+36 - CORNER OF CURB
STA 4+38 - CLEAT / LIGHT POLE
STA 4+44.5 - 10"Ø UTILITY ACCESS IN TOP OF CURB
STA 4+54 - 4+62 - MISSING CAP
STA 4+62 - CLEAT
STA 4+86.5 - CLEAT
STA 4+94 - FIRE ON UNDER PIER
BURNED HOLE IN CAP / SIGNIFICANT PILE LOSS @ TOP OF FENDER PILE
STA 4+98.5 - LADDER

- STA 4+45 - 24" x 10" SPALL @ CL OF PIER
- STA 4+61 - EXPANSION JOINT / 48" WIDE ASPHALT PATCH (FORMER SPALL W/ EXPOSED REINF)
- STA 4+86 - EXPANSION JOINT / 36" WIDE ASPHALT PATCH (FORMER SPALL W/ EXPOSED REINF.) SPALL EXTENDING ±6" BEYOND PATCH IN SEVERAL LOCATIONS
- STA 4+86 - 5+11 - (4) LONGITUDINAL CRACKS W/ EXPOSED REINF
- STA 5+11 - EXPANSION JOINT W/ ASPHALT PATCH
- STA 5+36 - EXPANSION JOINT W/ ASPHALT PATCH

STA 5+34 - [illegible]
[illegible] 5+58 - SPALLED
CONCRETE ON [illegible]
[illegible] BUCKLED)
[illegible] CHECK & CAP
[illegible] 5+82 - [illegible]
STA 5+98 - [illegible]
[illegible] 10' [illegible]
STA 6+05.75 - [illegible]
[illegible] CAP END
STA 6+22 - [illegible] CHECK/CAP
[illegible] - EXPANSION JOINT
STA 6+31 - LIFE RING/CLEAT
STA 6+42 - LADDER (POOR BUCKLED)
[illegible] - [illegible] / PILE WORN
[illegible] THAN OTHERS (FAIR)
- [illegible] CAP START
STA [illegible] - [illegible] CAP END
- TIRE ON FACE

- STA 5+50 - 5+58 - 54" WIDE
ASPHALT PATCH ± 10' RIGHT OF C.L.

- STA 5+42 - 5+58 - SPALLING OF
CURB FACE (NO EXPOSED REINF.)

- STA 5+58 - EXPANSION JOINT W/
ASPHALT PATCH FROM CL TO
RIGHT CURB / SPALLING ± 4" WIDE
LEFT OF CL

- STA 5+83 - EXPANSION JOINT W/
MINIMAL ASPHALT PATCHING
16" Ø SPALL W/ EXPOSED REINF
± 10' LEFT OF C.L.

- STA 5+73 - 16" X 24" SPALL W/
EXPOSED REINF. ± 8' RIGHT OF CL

- STA 5+83 - 16" Ø SPALL W/ ASPHALT
PATCH AND EXPOSED REINF

STA 6+78 - CLEAT / TIRE ON FACE
STA 6+85 - LOCAL WOODREC ON
8" X12" CONTINUOUS SPACER
STA 7+02 - CLEAT / TIRE ON FACE
STA 7+14 - LADDER (POOR - BUCKLED)
STA 7+26 - CLEAT
STA 7+26 - 7+34 - LOOSE CAP BOARD
STA 7+50 - CLEAT / MISSING CAP
STA 7+74 - CLEAT / MISSING CAP
STA 7+86 - LADDER (POOR - BUCKLED)
STA 7+92 - 10' ϕ UTILITY BOX ON CAP /
MISSING CAP
STA 7+98 - LIGHT POLE
- CLEAT
- MISSING CAP
STA 8+03 - BROKEN CHOCK
STA 8+06 - BROKEN PILE
STA 8+21 - LIFE RING
STA 8+23 - CORNER OF PIER
- 7 TIMBER PILE CLUSTER
STA 8+24 - CLEAT / BROKEN CHOCK (MISSING)
STA 8+28 - APPARENT FIRE ON CAP/
SPACER / CHOCK

- STA 6+08 - EXPANSION JOINT W/
MINIMAL ASPHALT PATCHING

- STA 6+30 - EXPANSION JOINT W/
RUBBER FILLER INTACT

- STA 6+22 - 16" X4" SPALL W/
NO EXPOSED REINF

- STA 6+55 - EXPANSION JOINT W/
MINIMAL ASPHALT PATCHING. SOME
SPALLING 2"-4" WIDE, NO EXPOSED REINF

- STA 6+76 - 12" ϕ SPALL W/ EXPOSED REINF

- STA 6+78 - EXPANSION JOINT W/
SOME ASPHALT PATCHING / SOME
MINOR SPALLS (± 3" ϕ) W/ NO
EXPOSED REINF

- STA 7+03 - EXPANSION JOINT W/
ASPHALT PATCHING / SPALLING

STA 8+36 - MISSING CHOCK / BROKEN 8X12 SPACER

STA 8+41 - 8+49 - MISSING CHOCKS AND SPACERS AND 8X12 SPACER

STA 8+53 - LADDER (POOR - BUCKLED)

STA 8+60 - CORNER - MISSING CAP

STA 8+65 - CLEAT (WOOD DAMAGE AT BOLTS) TIRE ON FRONT

STA 8+81 - CORNER OF PIER
- CLEAT (BOTH FACES)
- CORNER FENDER PILES IN POOR CONDITION (WORN)

STA 9+09 - CLEAT / ANCHOR BOLTS & WIRES FOR LIGHT POLE

STA 9+13 - 10"Ø UTILITY ACCESS COVER

STA 9+19 - LADDER (POOR - BUCKLED)

STA 9+31 - CLEAT / LIFE RING

STA 9+54 - CLEAT

STA 9+56 - CORNER OF PIER

STA 9+76 - FENDER PILE BROKEN NEAR MHW @ LOW WALE
- CHOCKS MISSING TO CORNER
- DISPLACED 8X12 SPACER

- STA 7+28 - EXPANSION JOINT W/ SOME ASPHALT PATCHING / SEVERAL SPALLS UP TO 24" X 4" W X 2" D

- STA 7+50 - EXPANSION JOINT W/ ASPHALT PATCHING WATERSIDE OF JOINT / CRACKING AND SPALLING LANDSIDE OF JOINT
  → (2) 12"Ø SPALLS W/ NO EXPOSED REINF ± 10' FROM RIGHT CURB

* LONGITUDINAL EXPANSION JOINT FROM STA 7+50 TO 7+98
  - ASPHALT PATH LEFT & RIGHT OF LONG. EX. JOINT W/ SPALLING AROUND PATCH

- STA 7+74 - EXPANSION JOINT W/ ASPHALT PATCHING / 12"Ø SPALL W/ NO EXPOSED REINF ± 18' FROM LEFT CURB / 48" X 36" SPALL W/ NO EXPOSED REINF. RIGHT OF LONG. EX. JOINT

STA 9+87 - CLEAT
STA 9+89 - CORNER OF PILE
STA 9+96 - BROKEN CHOCK
STA 10+00 - LADDER (POOR BUCKLED)
STA 10+12 - LIGHT POST / CLEAT
STA 10+18 - UTILITY ACCESS 10"Ø / DAMAGED CAP
STA 10+36 - CLEAT / LOOSE CAP
STA 10+41 - MISSING CAP TO 11+00
STA 10+60 - CLEAT / WORN PILE / MISSING CHOCKS TO 10+68
STA 10+72 - LADDER (FAIR TO POOR - BUCKLED)
STA 10+82 - CLEAT
STA 10+84 - EXPANSION JOINT
STA 11+09 - CLEAT
STA 11+14 - 10"Ø UTILITY ACCESS BOX / MISSING CAP
STA 11+33 - CLEAT / CL LOOSE CAP
STA 11+38 - MISSING CAP
STA 11+41 - MISSING CHOCK
STA 11+45 - LADDER (POOR - BUCKLED) - MISSING CHOCK
STA 11+54 - MISSING CAP

- STA 7+98 - EXPANSION JOINT W/ ASPHALT PATCHING / SPALLS EXTENDING BEYOND PATCH LIMITS 3"-6" TYP

- STA 8+53 - LONGITUDINAL CRACK EXTENDING LANDSIDE TO STA 7+96 @ EXPANSION JOINT

- STA 7+86 - 12" WIDE SPALL @ LEFT EDGE OF DECK W/ EXPOSED REINF

- STA 7+38 - SPALLING @ LEFT EDGE OF DECK

- STA 7+10 - 8" SPALL @ LEFT EOD

- STA 6+56 - 6+61 - SPALLING @ LEFT EOD & FACE OF DECK W/ EXPOSED REINF

STA 11+55 - LIFE RING
STA 11+57 - CLEAT
STA 11+65 - 8X12 SPACER BROKEN AT FENDER PILE LOCATION
STA 11+73 - 8X12 SPACER BROKEN AT FENDER PILE LOCATION
STA 11+81 - CLEAT
STA 11+87 - CRACKED / LOOSE CAP
STA 12+05 - LIGHT POLE / CLEAT
STA 12+11 - 10" ϕ UTILITY ACCESS BOX
STA 12+17 - LADDER (POOR - BUCKLED)
STA 12+23 - DAMAGED CAP
STA 12+29 - CLEAT
STA 12+41 - WORN CHOCK
STA 12+46 - CL LOOSE CAP
STA 12+53 - CLEAT
STA 12+58 - LOOSE CAP BOARDS (INTERSECTION)
STA 12+66 - MISSING CAP
STA 12+71 - 10" ϕ UTILITY BOX
STA 12+77 - CLEAT
STA 12+80 - EXPANSION JOINT
* OLD / NEW PIER INTERSECTION

UNDER DECK INSPECTION

- 16X45X3/4 DOUBLE CHANNEL WALE - POOR CONDITION SUPPORTING PILECAPS.

- PILECAPS - CREOSOTE - GOOD CONDITION
- STRINGERS - CAP SPLICED CREOSOTE - GOOD CONDITION

STA 12+82 - 10" X 10" UTILITY ACCESS BOX - CLEAT

STA 12+98 - MISSING CHOCKS

STA 13+06 - CLEAT

STA 13+10 - BROKEN CHOCK / MISSING CAP

STA 13+30 - CLEAT

STA 13+47 - LIFE RING

STA 13+54 - CLEAT

STA 13+54.5 - 10" X 10" UTILITY ACCESS BOX

STA 13+56 - ELECTRICAL OUTLET ON CURB

STA 13+75 - EXPANSION JOINT

STA 13+78 - CLEAT / MINOR ROT ON CAP

STA 13+87 - CHOCK DAMAGED / WORN

STA 14+02 - CLEAT

STA 14+26 - CLEAT / 10" X 10" UTILITY ACCESS BOX

STA 14+50 - CLEAT

STA 14+71 - EXPANSION JOINT

STA 14+74 - CLEAT

STA 14+87 - MINOR WOOD ROT ON 8 X 12 SPACER

(23)

STA 14+98 - CLEAT
STA 14+99 - 10" X10" UTILITY ACCESS BOX
STA 15+01 - ELEC BOX ON CURB
STA 15+22 - CLEAT/RUBBER ON FENDER
STA 15+40.5 - CNR TIMBER DECK/
END FENDER SYSTEM
STA 15+71.5 - ENDOF CONC. CURB

DRAWINGS TO CHILDS

✓ * STEAMSHIP EXISTING PILE PLAN
✓ * STEAMSHIP EXTENSION FENDERING
✓ * LEONARDS & HOMERS
✓ * MARINA LAYOUT PLAN
✓ * MARINA PIER SECTIONS
✓ * SECTION/ ELEVATION

CHILDS ENGINEERING CORPORATION

PRE-DIVE MEETING & EQUIPMENT SAFETY CHECKLIST

Pre-Dive Meeting

CEC Project # : New Bedford Date : 11/14/08

Supervisor : RFG Crew : RBW, PDi, RFG, NS, RY

Dive Mode: [x] SSA [ ] SCUBA [ ] Wading

Dive Plan Prepared: [ ] YES [ ] NO

Objective of Dive:

Thermal Protection: [ ] Wet Suit [x] Dry Suit Water Temperature 40's–50's / 50 °f

Team Assignments

				Diver Repet Group
Supervisor	RFG	Diver 1	PDi	2500
Tender	RY	Diver 2	BW	2800
Tender	NS	Standby Diver		

[x] Assessment of Team Members [x] Physically Fit [ ] Ready to Dive

[x] Emergency Procedures [x] Emergency Diver Bailout Bottle 2800 psi

[ ] Emergency Action Plan [ ] Emergency Diver ______

[ ] Emergency Numbers Available

[ ] Cell Phone/2-Way Radio Operational

Hazards Review

Water Current	Maximum Depth	
[x] <1 Knot	[ ] <10'	[ ] 40' to 50'
[ ] 1 to 2 Knots	[ ] 10' to 20'	[ ] 50' to 60'
[ ] 2 to 3 Knots	[x] 20' to 30'	[ ] 60' to 70'
[ ] >3 Knots	[ ] 30' to 40'	[ ]

[x] Loss of Air [ ] Weather

[ ] Visibility ____ ft [ ] Loss of Communication

[ ] Entrapment/Entanglement [ ] Underwater Debris

[ ] Break Away from Moored Station

[ ] Ships at Berth

[ ] Suctions [ ] Props [ ] Rudder

[ ] Sonar [ ] Underway

[ ] Tagout Notes:

[ ] Other:

Dive Team Attendees (Sign and Date)

1 RFG [signature] Date 11/14/08

2 [signature] Date 11/14/08

3 [signature] Date 11/14/08

4 [signature] Date 11/14/08

5 [signature] Date 11/14/08

6 ______ Date

Pre-Dive Equipment Checklist

Surface Supplied Air (SSA):

[x] Fuel [x] Compressor Oil [x] Belts

Dive Compressor: [x] Unloader [x] Filters [x] Engine Oil [x] Connections

[ ] Manifold Pressure ______ Psi [ ] Volume Tank

Repairs or Corrections Made:

Reserve Air Supply:

[ ] HP Tank ______ PSI [x] Diver 1 Pony Tank 2500 PSI [ ] Tanks Secure

[ ] HP Tank Regulated to ______ PSI [ ] Diver 2 Pony Tank 2500 PSI

[ ] Standby Diver Pony Tank ______ PSI

Umbilical's, Whips and Pressure Gauges:

[x] Connections Tight [x] Main Valves Open [x] Check for Manifold Leaks [x] Check For Cuts in Umbilical's

[x] Blow Out Hoses [x] Bleed H2O Out Of Volume Tank [ ] Non Return Valve

Repairs or Corrections Made:

Dive Helmets :

[x] AGA Mask [x] Nose Pad [x] Swivel Connection [x] Bailout Block

Repairs or Corrections Made:

SCUBA:

Diver 1		Diver 2		Sand-by Diver		
Main Tank	PSI	Main Tank	PSI	Main Tank	PSI	[ ] Pressure Gauge
Reserve Tank	PSI	Reserve Tank	PSI	Reserve Tank	PSI	[ ] Depth Gauge
Standby Main Tank	PSI	Standby Reserve Tank	PSI	Standby Reserve Tank	PSI	[ ] SCUBA Masks
Primary Regulators	[ ]	Primary Regulators	[ ]	Primary Regulators	[ ]	[ ] Weight Belts
Backup Regulators	[ ]	Backup Regulators	[ ]	Backup Regulators	[ ]	[ ] BCD
						[ ] AGA Mask

Communications:

Diver Communication:

[ ] Batteries Charged / Changed

COMM SYSTEMS CHECK

[ ] Surface Station [ ] Test Diver 1 [ ] Test Diver 2

Repairs or Corrections Made:

General: [x] Dive Logs [ ] Navy Dive Tables [ ] Navy Repetitive Dive Classifications [x] Dive Knife

[x] Dive Flags Out [x] Ladder / Entry and Exist Points Secured [ ] Dive Notes [ ] Fire Extinguishers Charged

Repairs or Corrections Made:

Dive Supervisor :

Signature ______ Date ______

CHILDS ENGINEERING CORPORATION

PRE-DIVE MEETING & EQUIPMENT

Pre-Dive Meeting

CEC Project # : 0101 (Hammers Wharf) Date : 11/19/08

Supervisor : PDT Crew : PDT, RFG, NBS, RPY

Dive Mode: ☒ SSA ☐ SCUBA ☐ Wading

Dive Plan Prepared: ☐ YES ☐ NO

Objective of Dive:

Thermal Protection:

☐ Wet Suit ☒ Dry Suit Water Temperature 50± °f

Team Assignments		Diver Repet Group @ Start
Supervisor PDT	Diver 1	
Tender NBS	Diver 2	
Tender RPY	Standby Diver RPY	

☒ Assessment of Team Members ☒ Physically Fit ☒ Ready to Dive

☒ Emergency Procedures ☒ Emergency Diver Bailout Bottle 2400 psi

☒ Emergency Action Plan ☒ Emergency Diver 2100

☒ Emergency Numbers Available 911

☒ Cell Phone/2-Way Radio Operational

Hazards Review

Water Current	Maximum Depth		
☒ <1 Knot	☐ <10'	☐ 40' to 50'	
☐ 1 to 2 Knots	☐ 10' to 20'	☐ 50' to 60'	
☐ 2 to 3 Knots	☐ 20' to 30'	☐ 60' to 70'	
☐ >3 Knots	☐ 30' to 40'	☐	

☒ Loss of Air ☒ Weather

☒ Visibility 8 ft ☒ Loss of Communication

☐ Entrapment/Entanglement ☒ Underwater Debris

☐ Break Away from Moored Station

☒ Ships at Berth

☐ Suctions ☒ Props ☐ Rudder

☐ Sonar ☐ Underway

☐ Tagout Notes:

☐ Other:

Dive Team Attendees (Sign and Date)

1 _____ 11/18/08 Date

2 _____ 11/18/08 Date

3 _____ 11/18/08 Date

4 _____ Date

5 _____ Date

6 _____ Date

Pre-Dive Equipment Checklist

Surface Supplied Air (SSA) **Dive Compressor:**

☒ Fuel ☒ Compressor Oil ☒ Belts ☒ Unloader ☒ Filters ☒ Engine Oil ☒ Connections

☒ Manifold Pressure 120 Psi ☒ Volume Tank

Repairs or Corrections Made: N/A

Reserve Air Supply:

☐ HP Tank _____ PSI ☐ Diver 1 Pony Tank _____ PSI ☐ Tanks Secure

☐ HP Tank Regulated to _____ PSI ☐ Diver 2 Pony Tank _____ PSI

☐ Standby Diver Pony Tank _____ PSI

Umbilical's, Whips and Pressure Gauges:

☒ Connections Tight ☒ Main Valves Open ☒ Check for Manifold Leaks ☒ Check For Cuts in Umbilical's

☒ Blow Out Hoses ☒ Bleed H2O Out Of Volume Tank ☒ Non Return Valve

Repairs or Corrections Made:

Dive Helmets:

☒ AGA Mask ☒ Nose Pad ☒ Swivel Connection ☒ Bailout Block

Repairs or Corrections Made:

SCUBA:

Diver 1		Diver 2		Sand-by Diver		
Main Tank	PSI	Main Tank	PSI	Main Tank	PSI	☐ Pressure Gauge
Reserve Tank	PSI	Reserve Tank	PSI	Reserve Tank	PSI	☐ Depth Gauge
Standby Main Tank	PSI	Standby Reserve Tank	PSI	Standby Reserve Tank	PSI	☐ SCUBA Masks
Primary Regulators	☐	Primary Regulators	☐	Primary Regulators	☐	☐ Weight Belts
Backup Regulators	☐	Backup Regulators	☐	Backup Regulators	☐	☐ BCD
						☐ AGA Mask

Communications:

Diver Communication:

☒ Batteries Charged / Changed

COMM SYSTEMS CHECK

☒ Surface Station ☒ Test Diver 1 ☐ Test Diver 2

Repairs or Corrections Made:

General: ☒ Dive Logs ☒ Navy Dive Tables ☒ Navy Repetitive Dive Classifications ☒ Dive Knife

☒ Dive Flags Out ☒ Ladder / Entry and Exist Points Secured ☒ Dive Notes ☒ Fire Extinguishers Charged

Repairs or Corrections Made:

Dive Supervisor : _____ Signature 11/19/08 Date

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JOB Divers: BW & PDI 10:10 Divers in
SHEET NO. ______ OF 12:30 Divers out
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

Steamship Pier — New Extension

Outshore ↑ — Q1, 2, 3, 4 — pile — Inshore

South Side P1 →

Fender Pile Good

Bent 13 - Pile 1 — Surface Rust, 60% coating remaining, pitting 1/8"

MLW		Potential Reading	MID		Potential Reading	MUD		Potential Reading
.395	Q1	.430 V	.370	Q1	.488 V / .500 V	.360	Q1	.490
.365	Q2	.175	.370	Q2		.330	Q2	
.375	Q3		.365	Q3		.330	Q3	
.370	Q4		.385	Q4		.335	Q4	

Mid - Steel good, smooth, 90% coated. Mud - pitting 1/16"

Bent 12 - Fender piles good, sound, w/o MB.

Bent 11 Pile 1

MLW		Potential	MID		Potential	MUD		Potential
.370	Q1	.516 V	.370	Q1	.502	.320	Q1	.507
.370	Q2		.390	Q2		.325	Q2	
.370	Q3		.360	Q3		.330	Q3	
.360	Q4		.370	Q4		.330	Q4	

Typical Conditions: Top 3' 60% coating lost
Mid 100% coating remaining
Mud 100% coating lost - small 1/16" pits

Bent 13. Grout patch - 3" deep - Failed repair
→ Outshore side 3sf max depth 3" no rebar exposed
Between P6 - P7 on cap

Bent 14. L2 @ P9 - Top - Steel 60% coating intact 1/8" pitting @ all quads
Mid 80% coating intact - 1/16" pitting
Mud 80% intact 1/16" pitting

P7 1' North. 4sf spall on concrete cap

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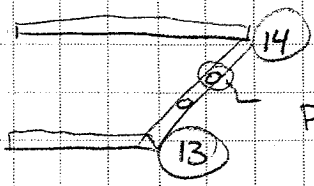
JOB Steamship Pier Extension
SHEET NO. ____ OF ____
CALCULATED BY RFG DATE 11/14/03
CHECKED BY ____ DATE ____
SCALE ____

Bent Between (P1)

13 & 14 Outshore Pile



	MLW	MID	MUD
Q1	.370	.370	.305
Q2	.370	.355	.320
Q3	.365	.360	.340
Q4	.365	.368	.325
Potential	.449	.448	.458

P6 - P4 - Spall 3" Deep Top & ~~Outside~~ Face of Pilecap
Batter Pile 2 - 3 - Spall 4 SF

Fender Pile @ Bent 14 is Broken @ Low water Whale - LW Whale is Broken Between B14 & 15

BENT 16

16"ϕ Steel Pipe Piles

(P1)

	MLW	MID	MUD
Q1	.370	.370	.320
Q2	.370	.360	.330
Q3	.370	.350	.325
Q4	.370	.360	.320
Potential	.454	.445 V	.446

Bent 15 - Corner crack / spall 3SF 3" Deep outshore ON Pilecap @ Pile 5

Pilecap 1' towards 6 From 7 4SF of spall 3" Deep outshore face of cap

Between 9 & 10 - spall 3" Deep 5 SF ON CAP

Piles typical condition 80% coating loss small pitting 1/16"

Fender Pile Between BENT 15 & 16 Split Above Low Water Whale / Whale cracked in location

1

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JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

Fender
Pile Between 16 & 17 Broken & Whole @ Lw Broken & Pushed In - 2 Piles up From Bent 16 towards Pier

Bent 16 Pile 3 L2 @ MUD 1/16" Pitting COATING 40% Remains

Bent 17 Fender Piles Ok - Abrasion on Corners typical Conditions for Piles

Bent 10 L2 - P4 Surface Rust, small Pits
Coating 40% Intact.

Mid 80% - 90% Intact - Q 2 1/2" Wide 1/2" Deep P7
Bottom 40% Coating Remains UTS - 8-10'

★ General Note - Concrete Underdeck Typically Looks Pretty Good

P7 - Top 3-feet Coating is Blistering off

Bent 10 — Fender Pile on North Side 1/4 of Diam. Abraded off by Boats

Bent 9 Fender Piles Between 9 & 10 Both Broken @ Pilecap MHW Mark

Pile 1 Open Corrosion Spall
Top outshore side of Pilecap
5" Deep - 5sf

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JOB _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 9 (P1)

MLW	MID	MUD
.335 Q1	.350 Q1	.325 Q1
.380 Q2	.370 Q2	.330 Q2
.345 Q3	.360 Q3	.315 Q3
.365 Q4	.370 Q4	.330 Q4
Potential	Potential	Potential
.500	.510	.511

70% coating intact mid pile

1/8" pits over surface
coating 20% remains

Photo 476 Last one used

Bent 13 - Pile 1 Photos #488 - Last Photo #

Bent 8 L2-P5 good 85-90% intact coating | Steel @ mud 1/16" pits 20-40% intact coating

Bent 9 - Pile 7 Pile cap spall open corrosion spall
Rebar corroded & concrete spall
Top to bottom of cap 10 SF
1½ ft deep @ max up to ½" deep
Edges
3 bars showing

Bent 7

Bent 6 - Piles look wonderful

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JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

Bent 7 P.7

MLW		MID		MUD	
.365	Q	.370	Q1	.345	Q1
.365	Q2	.375	Q2	.345	Q2
.370	Q3	.375	Q3	.360	Q3
.380	Q4	.380	Q4	.365	Q4
Potential .510		Potential .508		Potential .508	

MLW: Steel Smooth, 60% intact coating
MID: 50% intact, Corrosion 1/8" wide 1/8" deep pitts
MUD: 50-40% intact, 1/16" pits All Quads

Bent 5 P1

MLW		MID		MUD	
.380	Q1	.365	Q1	.335	Q1
.390	Q2	.385	Q2	.340	Q2
.370	Q3	.380	Q3	.345	Q3
.380	Q4	.375	Q4	.330	Q4

MLW: 85%-90% intact
MUD: Smooth steel coating 40% intact

Bent 4 RJW — Potential .565 | Potential .514 | Potential .513

⇨ LII on P4

Bent 4-6 Piles good & typical condition

From bottom MUD 8' coating gone
1/4" Black corrosion byproduct

50% of coating from cap to MHW
100% coating remains @ MID

PHOTOS

#477 - Bent 13 Pile #1 top cleaning
↓
#480 Bent 13 Pile 1 Top Clea

481–483 — MID cleaning B13 P1

484 — MUD thru 488 mudline

#489-491 Attempt to get Pile cap spall (impact?)

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JOB: Move station — RSW
SHEET NO.: Divers in 2:30 OF PDI
CALCULATED BY: out @ 4:10 DATE
CHECKED BY DATE
SCALE

New extension

Bent 3

MLW		MID		MUD	
.360	Q1	.365	Q1	.350	Q1
.360	Q2	.365	Q2	.345	Q2
.360	Q3	.365	Q3	.345	Q3
.365	Q4	.365	Q4	.345	Q4
Potential .351		Potential .324		Potential .352	

Coating 90% intact Steel smooth
Steel mud 1/16" pits 40% intact coating

Piles ok Fenders ok

Bent 2 LH P3 -
Coating MLW & MID 80% coating 1/16" pits C
MUD 40% coating
Fender pile Between 2 & 1 Broken 4ft Above lower whale
Closer to 1

Bent 1

MLW		MID		MUD	
.375	Q1	.380	Q1	.310	Q1
.375	Q2	.375	Q2	.310	Q2
.375	Q3	.390	Q3	.300	Q3
.375	Q4	.380	Q4	.315	Q4
Potential .300		Potential .349		Potential .340	
Coating 80% intact		80% intact		30-40% intact	
Steel smooth		Steel smooth		1/16" pits	

5 Piles no Batters

JOB Steamship O?D

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SHEET NO. ______ OF ______

CALCULATED BY ______ DATE ______

CHECKED BY ______ DATE ______

SCALE ______

Bent 1 - Bracing P1-5 intact

- Hoop steel Exposed & Vert steel exposed to mud
Jacket goes down to 1' Above Mudline
Timber 10" Ø

Pile 2 - 4' Band @ MLW Rebar exposed

P3 - 4' Band centered @ X Brace 5' Down from cap Exposed Rebar

P4 ↗ Same

P5 4' Band exposed Hoop steel Center @ MLW
No Bracing

P6 Bracing NOT Attached - 4' Band
Rebar

P7 4' Band Rebar Exposed

P8 6' Band Rebar Exposed

P9 ok

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JOB Steamship OD
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

B2

Pile 7 }
Pile 6 } 5' Band no concrete left

Pile 7 Photos – 10 –

Pile 5 & 4 Disintegration Aggregate Exposed 1/2" Deep
Jacket to mud

Pile 3 – HW to LW – Rebar Exposed 2" Deep

Pile 2 3' Band @ LW ~~Rebar~~ Exposed 2" Deep

B3

P1 – 1/2" Loss concrete MLW

P9 – ~~Be~~ Loss section of Jacket 2" Deep
Fender Pile outshore – MB – 4" Ø mud up 4'
→ Photos – 3 Pics

B4

P9 – Rebar exposed Photos –

P3 – Bracing not Attached.

P2 – 1" Loss 4' length –

P1 – exposed Rebar 1" Loss to 2" Tidal zone

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JOB Stoughton OD

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

B7 P10 Bottom 3 ft Diagonal rotted 3"
P4 & P5 Bracing Detached -
P1 & 10 Timber Exposed Below Jacket

B6 P1 & P9 Timber Exposed
P10 - 10" ø
Fender Pile missing
9 piles total Piles 9, 8, 7, & 1 Exposed @ Bottom
12"
9 - 10" ø
Concrete Jacket @ 1 Pretty much gone
3'-8' Below Cap Rebar left

B5 - OK

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JOB Old Portion
SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE Old Portion State Pier

Old Portion of Steamship Pier

Bent 8

Pile 1 - Concrete Jacket
2' of timber exposed 14" Diameter MB Evidence on outside of Pile
Timber is solid

Concrete caps look good
Concrete Planks about 4' wide

Pile 2 1' of timber exposed 8" Ø 1" Deep MB grooves

Pile 3 Jacket to Mud

Pile 4 Bracing is Disconnected

Pile 9 Concrete Jacket 4' Deep Spall 6' length through tidal zone
exposed Rebar

Bent 9 Pile 9 - Concrete Jacket Disintegrated gone to mud
timber Pile exposed - 12" Hard

Pile 5 - Jacket 8" Loss around Perimeter Exposed Rebar

Pile 1 2' exposed timber 9" Ø MB Evidence

Fender system Looks Good

Bent 10 P8 timber Pile exposed 12" Ø mid tide to mud
7' Exposed
↳ 10 total piles
P6 } Bracing Detached
P5 }

Bent 11 10 piles

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JOB OLD Position of Pier Structure
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 12 2" Loss Around Permitter of Jacket Starts 2' Below Cap
Pile 8 Runs to Mudline

Bent 13 - 9 Piles Total P1 - 4' Below Cap to mud 1" of Loss

Bent 14 Bent to Bent 6' apart 13-14

Bent 13-15- Low water Whole Broken North Side

Bent 15 Typical 12" ø Piles

Bent 16: P1 - 6" ø Pile 1' Exposed Below Jacket
P2 - 6" ø Pile timber
P9 - Jacket Loss 2" Around Permitt
P10 - Jacket 5" Loss From Cap to Bottom Exposed Rebar

B17 Pile 1 8" ø 1' exposed timber

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JOB New Bedford
SHEET NO. 1 OF
CALCULATED BY RGF DATE 11/17/08
CHECKED BY DATE
SCALE

Steamship Pier OLD

arrive on site 0730
set-up, station bulkheads
PPE, RJW Divers in @ 950

POF Bent 29 Pile 1 South Side Quad 3
cracking top down 3' CCS → OCS
Quad 2
Top 2' 2 vert cr Cran Cap
1/8" wide

Pile cap in good condition
Pile 3 Quad 2 vert cr 3 1/2 x 1/8" w/ Rust stains
Pile 1 - 1' of timber exposed Piles 2 x 3 past concrete
Pile cap 1's of Pile 4 1 # sp w/ Rust Stain 1" deep
Pile 4 Quad 1 & 2 vert cr. 2' x 1/8" mult cracks
top down 2'
1' south of Pile 6 - Pile cap OCS bottom & outshore face 3 # x 2" deep
w/ RB exposed
Pile 8 Quad 2-3 CCS 3 # w/ Rust stains
Pile 9 MLW down 4' - exposed agg, concrete soft 1-2 1/2" deep
Quad 2 mult cr. CCS 3 # w/ Rust stains @ top
of pile 1' long

CHILDS ENGINEERING CORPORATION
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JOB Steamship QID
SHEET NO. 2 OF
CALCULATED BY RGF DATE 11/27/08
CHECKED BY DATE
SCALE

RJW

Bent 28 Pile 1 top 2' of jacket 5/8" cr, all around

Pile 1 & 2 1' of timber exposed
12" ϕ Pile 1
10" ϕ Pile 2

Pile 2 jacket sp 3" deep all around
start 4' below cap to ML RB exposed

Pile 10 - 4' of exposed timber 14" ϕ - pile hard & good
sp 4" deep w/ RB from 4' below
to bottom of jacket 2' timber exposed
Quad 2-3

Bent has no bracing

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JOB Steamship SLD 2
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 27 RJW

Pile 9 4' of timber exposed 14" ϕ good condition

No braces on bent

CHILDS ENGINEERING CORPORATION
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JOB Steamship pier OLD
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

Bent 30 PDI

Pile 10 bottom 6' RB exposed Quad 2, 3, 4
Quad 4 Vert Cr. 3'1/2 × 1/8" top down 3'

bent 27 10 piles not 9

Bob pile 1 bottom 1' of pile exposed 10" diameter
marine bore damage

top 2' has 1/8" cracks around perimeter

bent 26 pile 1 identical to bent 27 pile 1

PDI bent 30 pile 7 qu. 1 @ top 1/8" crack 3' long
Bent 30
qu. 4/1 same crack

Bent 30
PDI pile 6 bottom 3' has hoop steel exposed all qu.

pile 5 q. 1 whole quad. CCS 3 sq. Ft. 2" deep

Bent 26
Bob bent 26 pile 10 conc. jacket loss of 4" around perimeter
Starting 5' down from cap going 3'

bottom 2' of pile exposed

no bracing

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JOB Steamship OLD
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 3C

Pile 3 1' North OSC 1" deep w/ CG 1# on bottom of pile cap

Pile 1-8 Core packet sent into ML

Pile 1 Quad 1 vert cr @ cap down 3' 1/8" wide

Quad 2 2 vert cr @ cap down 3' 1/8" wide
Under side of cap 1# CCS w/ Rust stains
6" south of pile

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SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

Bent 25 RJW - No bracing
Pile 10 - 2' of timber pile exposed 14"ϕ good cond.

Pile 1 - timber exposed 1' MB damage 12"ϕ remaining timber good

~~Bent 24~~

Bent 24 - bent has bracing
Pile 1 1' exposed timber 12"ϕ good

No bracing on bents from PDI

Pile 9 - timber pile exposed 1½ 14"ϕ good

Pile 10 - 5' timber pile exposed 14"ϕ good cond.

Bent 23 - bracing on bent
Piles 8, 9 same as 9 & 10 on Bent 24

Pile 2 timber pile exposed 1' w/ MB 10"ϕ
Pile 1 " " " 3' w/ MB 12"ϕ
Conc jacket 3" sp to bottom start 3' below cap w/ RB exposed

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JOB Steamship OID
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 31 POI No bracing

Pile 2 - Hang on Quad 1 Map cracking 4# w rust @ top of pile

Pile 4 Quad 1 CCS 3# top of pile 2" deep

1' south of Pile 5 OCS 1# × ½" deep bottom of cap

Pile 6 Quad 4 3' below cap 6' ½ ~~spalled~~ spalled agg w/ RB exposed

Pile 7 + 8, 9 sp all Quad 1" deep exposed agg
bottom 3' of jacket

No timber pile exposed

Pile 10 - timber pile exposed 4' MB ⅛" deep max
12" ϕ good cond.

Bent 32 POI

Pile 10 Timber exposed 4' 14" ϕ good
Pile 9 " " 2' 14" ϕ MB w/ ¼" loss
Pile 8 bottom 4' of conc jack sp 2½" deep w/ RB all quad.
Pile 6 Quad 2, 3 & 4 bottom 4½ RB exposed 2" loss of conc.
Pile 5-6 underside of cap 1# sp × ½" deep OCS

Pile 5 Quad 1, 2, 4 sp loss 1" deep bottom 3'
Pile 4 all Quad sp 1" deep bottom 3'
Pile 2 conc jacket bottom 3' sp 1" deep all quad.
1' timber pile exposed
Pile 1 ~~Bottom~~ 1' of timber exposed 12" ϕ ¼" deep MB

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JOB Steamship Old
SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

Bent 22 RJW - bracing present

Pile 1 3' timber exposed 13"ϕ MB · 1" trenches - good

Pile 9 3' " " >14"ϕ good cond.
Pile 10 4' " "

Bent 21 Pile 10 4' timber exposed 12"ϕ MB minor
Has bracing 9 2' " " 14"ϕ good
No cap jog

Pile 1 18" timber pile exposed 9"ϕ MB 2" loss

Bent 20 RJW - bracing present on pile 1-2 connected, not connected on piles 3,4,5
Pile 1 - 18' timber exposed 7"ϕ hy MB
Pile 8 - 12" timber exposed 12"ϕ good
9 3' " " 14"ϕ good
10 4' " " 13"ϕ good

Bent 19
Pile 10 4' timber pile exposed 13"ϕ good cond
Pile 9 2' " " 13"ϕ good cond,
Bent 18-20 low wale on fender missing
Pile 8 6" pile exposed 12"ϕ good cond
Pile 2 6" " " 8"ϕ Hvy MB 4" loss
Pile 1 2' " " 14"ϕ light MB

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SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

Bent 33 POI

Pile 2 Quad 3,4,1 exposed RB Sp 2-2½" deep
bottom 4' of pocket
2 vert cr. x 2' lg x ⅛" on Quad 3 @ top down

Pile 6 Sp bottom 3' all quad 1" deep
Pile 7 bottom ~~4~~ 6' Sp RB exposed 2" deep all quad.
Quad 2, 2-vert cr. from cap down 2' ⅛" W w/ Rust stains

Pile 10 Sp on pocket 1½" deep w/ RB starts 4' below cap
5' long all quad

* U/W ~~Photo~~ - exposed timber 4' MB 1½-2' deep pocket
# 6" ϕ

Bents 33 + 34 ~~South~~ North side conduit into water, broken
w/ cable exposed - at wharf structure

Photo 80-89 Pile 10 Bent 33 - marine bore

Pile 10 Bent 34 bottom 4' of pile exposed
3' below cap exp aggregate 1" - 3" deep
5' long section

Pile 9 bottom 2' of pile exposed - 12" ϕ

Pile 8 qu. 3,4,1 exposed bar - conc. loss 1" deep
starts 4' below cap, 5' long

Pile 7+6 exp. agg. loss all quad. Typ. 1" deep
4' vertical section

Pile 4 bottom 1' of pile exp.
marine b. 1" deep, pile 10" ϕ

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JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

Bent 1@ RJW
Pile 1 & 9 1' timber exposed 12" ϕ good
Pile 10 4' timber exposed mud MB 14" ϕ good

5 piles 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

COAL POCKET BOARDWALK

Bent 2 has 3 piles

Bent 5 pile 3 low water crossbrace connection bad, 3' at base 80% deteriorated

Bent 6 pile 3 low water crossbrace same ↑ as bent 5

Stone seawall seaps 6" to 1' voids behind >3' irregular stone set
laid in wall 6' below top @ Sta 3+40
1'H x 3'W x 7' deep

- 4'x4'x2'h in seawall @ corner Sta 3+87

timber fender piles - hvy MB x 8" ϕ remains @ M2
all piles along face

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JOB Steamship Pier ONS
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CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 34 PD1

Pile 2 ex. agg. Typ. 1" deep loss Section 3' long

Pile 3 heavy MB 3/4" deep 1' on Lotton pile exposed
effective area about 6"

Pile 1 bottom 2' of pile exposed
light MB 1/4" - 1/8"
effective diam 12"

Bent 35

Pile cap - right abut pile 2
vert. crack 2' long 1/8" wide

Bent

Drystack granite seawall inshore of Bent 36
about 4 courses high
about 7' inshore of Bent 36

Bent 35

Pile 5 CCS Q 2/3 1" deep 3 sq. Feet w/ rust stains
4' below cap exposed bar typ. loss 1" running 4'

6 top of pile cap crushing
crack running down 3' in Q 3 1/8" wide distance 4'
all rebar exposed typ loss of concrete 3-3 1/2"

all of quad 3 turning into CCS

Bent 36

Pile 516 expose RB 4' below pile cap 3' long
typ. loss 2-2 1/2"

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JOB _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Bent 34 PDI

Pile 5 @ 1 CC S 2 sq. Ft. 1" deep

Between Piles 4-7 each section between piles all 3 Faces
cracks 1/16" w/ leaching

Steamship OID

Bent 35

Pile 8 exposed RB 1' From top of pile going 5'
typ. loss 4" deep

Steel bulkhead at N side of pier - runs perpendicular to pier w/ walk supporting pier

3 piles running ⊥ to bulkhead
1st pile 12' from bulkhead cap sits on walk

Steamship Boardwalk

Bent 17

Sta. 182.7 - D meter

Mudline outside F .420"
web ~~480~~ .280" .319 pat. reading
inside F .415"

Typ. steel uncoated pits starting 1/8" deep max 1/4" wide

Midway outside F 285 at top 525 at Fl
web 205 .306 pat. reading 355 web
inside F 420 .520 inside Fl
steel smooth, 80% coating intact

Typ. steel 1/4" black byproduct pits 1/4" deep 1/2" wide

Exterior walk - w/ 2" ϕ tie rod w/ ± 10' spacing Sta 1+82
2 tie rod

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SHEET NO. OF
CALCULATED BY DATE
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SCALE STEAMSHIP BOARDWALK

1st timber piles at face of bulkhead 10' Bent 18
timber pile cap sits on bulkhead wale
~~outshore~~ 3' of pile cap bent 2 is cracked, rotted, pile back 1' from end

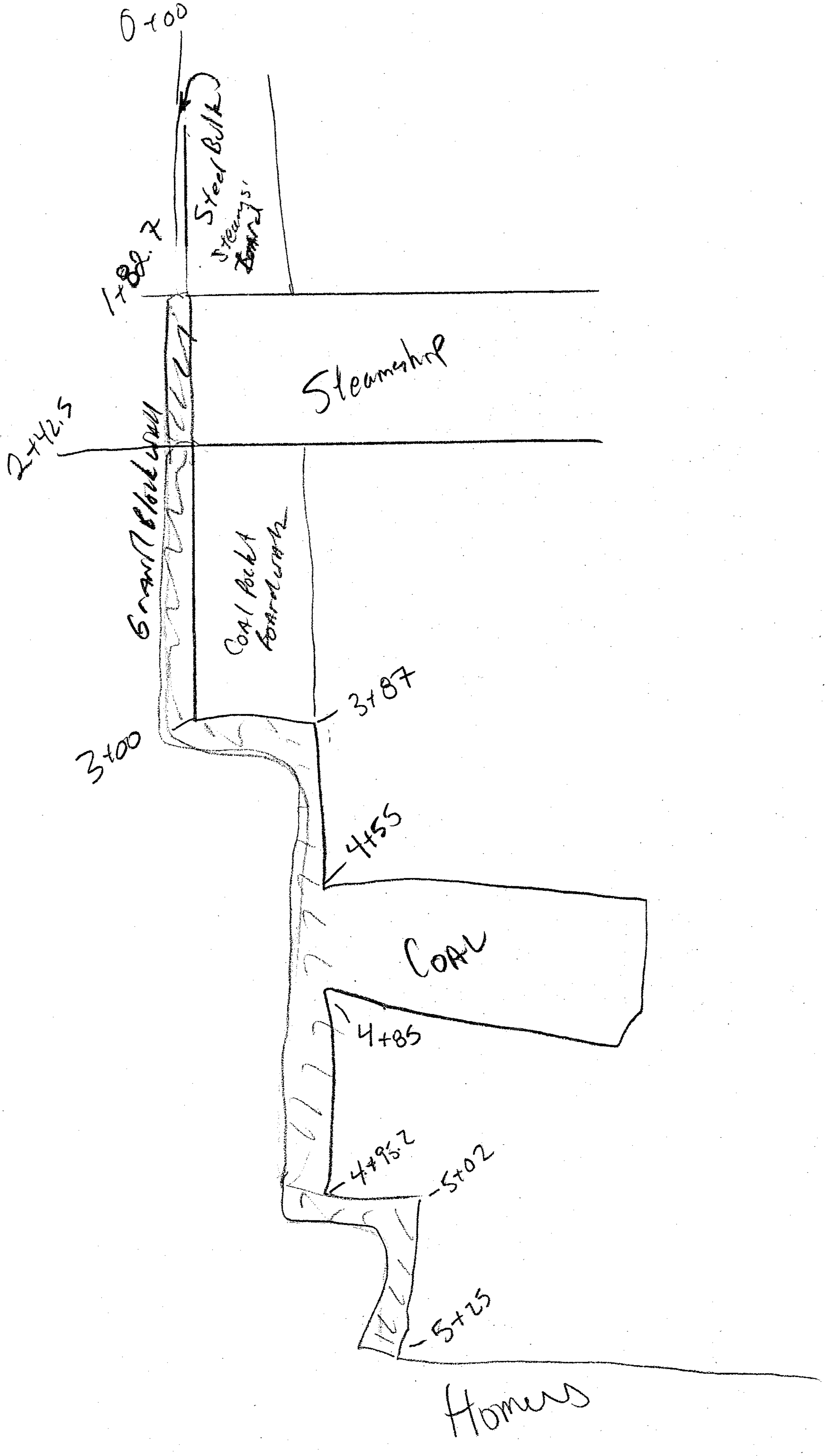
12, 14, 15
Bent ~~4, 5~~ Same as Bent 2 on pile cap condition

low water bolts X bracing piles 2-3 & 1-2 & long. X bracing along pile 1, bent to bent
bolts @ low water 50% corroded

BENT 15
D meter @ ~~Bent 4~~ Sta 0+68

out fl	.520"	} at ML	steel 50% coated smooth - good
web	.375		
inside fl	.500		
out fl	515	} @ Mid	steel smooth 1-pit ⅛" deep x ¼" coating 50% intact
web	365		
inside fl	505		
out fl	.515"	} @ top	80% intact coating small pitting 2" ϕ holes sheet - similar to earlier steel bulkhead fill visible
web	.370"		
inside fl	.510"		

Timber piles & bracing typ in good condition
low bolts



0+00
Steel Bulk
Steamers' Board
1+88.7
Steamship
2+42.5
Granit Block wall
Coal Pocket Boardwalk
3+00
3+87
4+55
Coal
4+85
4+95.2
5+02
5+25
Homers

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SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

BENT 12

After ~~bent 7~~ 12"x12" on top of sheet pile supporting stringers

~~Bent 7~~ pile cap rotted + split outshore 4' of 12"x12" on sheet pile

D-meter @ bulkhead corner Sta 0+00 6' of water

out fl .305"
web .245"
inside fl .225" *

} ML ← 1/4" corrosion by-product, coating missing

.304 pot. reading — different sheet section, old steel - coating 30% intact at top

out fl .325
web .335
inside fl .330

} top .303 pot. reading

OUTFALL STRUTS are 6' O.C.

Struts @ 6' o.c.
Over

Outfall @ bent 10 - 11 * BENT # OK FROM HERE ON ↓ *

Pile cap Bent 9 - outshore 2' rotted + split
diag bracing not connected @ pile 3, bracing 2-3

Pile cap sits on bulkhead wall on inshore end

Bent 8 Pile 3 - abraded 30% from pile cap down 5'
↑ outshore pile from floating dock

Bents 10-9, 9-8 & 8-7 no outshore diag bracing on outshore pile

Bent 7 diag. bracing from outshore to mid pile - missing
Pile 3 light MB @ ML 14"ø
[illegible]

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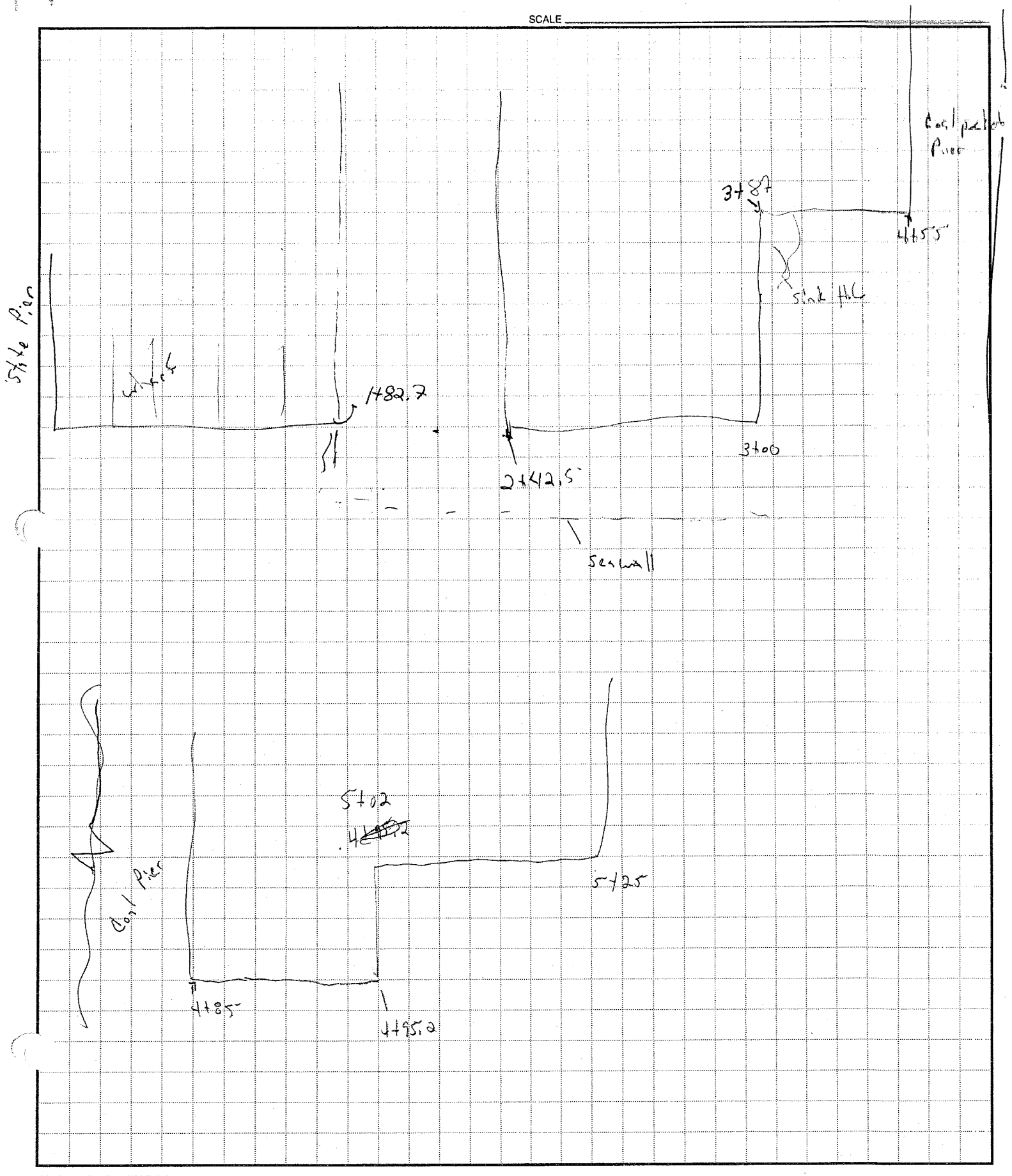

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JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
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Bent 6 - pile cap rotted & crushed outshore 4'
not supported by pile

bracing bolts 50% corroded at low connections

Bent 4 pile cap rotted 4' outshore end, 25% section remains

X-Bracing from Bents 5 to 4 & 4 to 3 ~~8~~ 1 piece missing on each

Bent 3 outshore 4' of pile cap rotted, 25% remaining
Pile 3 driven at an angle

Bent 2 Pile cap outshore 12" rotted - extends beyond wharf face

Bent 1 same as Bent 2

Divers out 13/5