CONTRACTOR REPORT
CR-NAVFAC EXWC-CIOFP-DRAFT
Volume II of III - Bulkheads

WATERFRONT FACILITIES INSPECTIONS AND ASSESSMENTS AT NORFOLK NAVAL STATION NORFOLK, VIRGINIA

On Site: Jan-29-2013

Prepared By:

Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

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On Site Date: Jan-29-2013

Prepared for:

NAVFAC EXWC
Washington Navy Yard
720 Kennon Street, SE
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Funding Provided By: Commander, Navy Installations Command (CNIC)
Contract Number: N62583-12-D-0749
Delivery Order Number: 9

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Norfolk Naval Station
Norfolk, Virginia

Section 1 - Executive Summary

Contract: N62583-12-D-0749
Contractor: Marine Solutions, Inc.

225 Industry Parkway
Nicholasville, KY 40356

Inspection Date: 01/29/2013
Funding Provided By:
Commander, Navy Installations Command (CNIC)

Executive Summary:

An inspection of the waterfront facilities at the Naval Station Norfolk located in Norfolk, Virginia was performed by Marine Solutions, Inc. (MSI) from January 29 to December 19, 2013. The inspection was conducted in accordance with the requirements of Delivery Order No. 0009 of Contract No. N62583-12-D-0749 issued by the Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC).

A total of 75 facilities were inspected and reported upon in three separate volumes. This volume (Volume II) includes the bulkhead facilities located along the western shore of the Naval Station. The following provides a brief description of the general condition of each facility and the repairs recommended. The accompanying Executive Summary Table provides a summary of the facility ratings, recommended repairs and estimated repair costs.

The CEP191 Bulkhead is in Serious Condition overall with a Condition Index rating (CI) of 32 and an Operation Capability (OC) rating of C3. The current condition ratings have been lowered in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and OC rating of C2. The bulkhead is constructed of steel sheet piles that have significant section loss due to corrosion. There are three large sinkholes in the asphalt deck affecting more than one third of the length of the bulkhead. It is recommended that the sinkholes be repaired and at the southernmost sinkhole, it is recommended that a steel sheet pile return wall be installed to stop further fill loss. Until repairs are made, the areas surrounding the sinkholes should be cordoned off to restrict access. To protect the steel sheet piles from further corrosion, it is recommended that a cathodic protection system be installed. It is recommended that one missing cleat be replaced and one remaining cleat be cleaned and repainted. It is also recommended that fender wale members be replaced at two locations and a missing timber chock be replaced at one location.

The CEP111 Bulkhead is in Satisfactory Condition overall with a Condition Index (CI) rating of 71 and an Operational Capability (OC) rating of C2. The current condition ratings have been raised in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and an OC rating of C2. The previous inspection report identified a large spall in the sheet piles, subsidence in the deck behind the bulkhead, and a large spall in the pile cap near the west end of the facility. The previous report also noted a cleat with severe corrosion. Since the previous inspection performed in 2007, the western 103 linear ft of the bulkhead has been replaced with a new steel sheet pile bulkhead and the concrete pile cap and asphalt deck in that area has been replaced. Presently there are no significant areas of subsidence behind the bulkhead. Additionally, the one severely corroded cleat has been replaced. It is recommended that spalls be repaired at three locations and gaps be repaired at two locations at the concrete sheet piles. It is recommended that one spall, one area of erosion and one crack be repaired on the concrete sheet pile cap. Two missing fender piles and two fender piles with section loss due to decay should be replaced. Two timber fender piles with missing hardware and one detached fender pile cluster should be secured. It is recommended that the damaged or missing timber chocks or wales be replaced at a total of six locations. The cleats should be cleaned, inspected for integrity and repainted. One missing utility

cover plate should be replaced and one loose cover plates should be securely fastened. Three electrical junction boxes should be cleaned and repainted. The fuel loading facility, if still in use, should be cleaned, inspected for integrity and serviced.

The CEP102 Bulkhead and Platform are in Satisfactory Condition overall with a Condition Index (CI) rating of 80 and an Operational Capability (OC) rating of C1. The current condition ratings have been raised in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and an OC rating of C2. The previous report identified spalls and gaps in the bulkhead, concentrated near the southern end of the facility, which allowed loss of upland fill material and resulted in subsidence of the deck behind the bulkhead in those areas. Since the previous inspection, an outboard steel sheet pile wall has been constructed along the southern 214 linear ft and the areas of subsidence have been repaired. Additionally, the fender system which was found to be in Serious Condition during the previous inspection has been replaced. Various repairs are recommended to address minor deficiencies and limit further damage and deterioration. It is recommended that one concrete pile beneath the bulkhead platform be repaired to restore bearing support at the pile location. It is recommended that various spalls and areas of impact damage on the sheet pile cap, outboard platform pile cap and light poles be repaired and a subsided portion of sidewalk be repaired. It is also recommended that comprehensive repairs be made to the guard railing along the bulkhead and platform and that the mooring hardware be cleaned and painted.

The CEP176 Bulkhead is in Satisfactory Condition overall with a Condition Index (CI) rating of 80 and an Operational Capability (OC) rating of C1. The current condition ratings have been raised in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and an OC rating of C2. The previous inspection report identified subsidence in the deck and sinkholes behind the bulkhead concentrated at the west end of the facility. Since 2007 the western 125 linear ft of deck has been replaced with a new asphalt deck and there are presently no sinkholes or areas of subsidence. It is recommended that six spalls and four gaps in the concrete sheet piles be repaired, 11 missing extruded rubber fenders be replaced, five partially detached fenders be secured, and 21 cleats be cleaned and repainted. It is also recommended that the insulation be removed from the steam riser and the riser be cleaned and inspected if placed in service.

Patriot Point is in Poor Condition overall with a Condition Index (CI) rating of 40 and Operation Capability (OC) rating of C3. The current condition ratings are unchanged from the previous inspection conducted in 2007. Eroded shoreline areas should be monitored for encroachment into an adjacent parking lot. It is recommended that the steel sheet pile bulkhead be replaced with a new bulkhead and the backfill upland of the bulkhead be restored. Concrete block slope protection should be replaced with an engineered rock revetment.

The CEP175 Bulkhead is in Fair Condition with a Condition Index (CI) rating of 61 and an Operational Capability (OC) rating of C2. The current condition ratings are unchanged from ratings recommended by the previous inspection conducted in 2007. It is recommended that gaps identified between bulkhead concrete sheet piles be covered to limit the potential for backfill loss and separations in the bulkhead cap be sealed to repair shallow sinkholes occurring along the bulkhead. It is recommended that various spalls and cracks on the sheet pile cap and curb also be repaired. The fender system should be reconstructed and expanded as needed to meet operational requirements and the existing cleats should be replaced with new rated fittings.

The CEP169A 5T Breakwater is in Satisfactory Condition overall with a Condition Index rating (CI) of 77 and an Operational Capability rating (OC) of C1. The facility was built in 2008 and has no previous inspection data. It is recommended that three open spalls and six cracks on the concrete battered piles be repaired. One open mechanical spall and one diagonal crack on the north end of the longitudinal pile cap should also be repaired.

The CEP197 Bulkhead and Relieving Platform II is in Satisfactory Condition overall with a Condition Index (CI) rating of 73 and an Operational Capability (OC) rating of C2. The bulkhead and platform were considered separate facilities in the previous inspection report in 2007, in which the bulkhead was rated to be in Satisfactory Condition overall with a Condition Index rating (CI) of 75 and an Operation Capability (OC) rating of C2, and the platform was rated to be in Good Condition with a CI rating of 90 and an OC rating of C1. Since the previous inspection, continued deterioration of the primary fender system has resulted in a recommendation that vessel mooring and berthing be restricted to prevent damage to the structure and moored vessels. It is recommended that the fender system be replaced with a system designed to better accommodate the conditions, equipment and vessels typically moored at the platform. It is recommended that two holes in the fiber reinforced polymer sheet piles be repaired to limit further loss of fill and 11 open spalls on the pile caps, curbs, and mooring foundations be repaired.

The CEP159 Bulkhead is in Fair Condition overall with a Condition Index rating (CI) of 55 and an Operation Capability (OC) rating of C3. The current condition ratings have been lowered in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and OC rating of C2, due to uncompleted repairs and continued deterioration of the elements. It is recommended that pedestrian access be prohibited from within 10 ft of three areas of sidewalk along the bulkhead at which voids beneath the sidewalk are present. It is recommended that comprehensive repairs to the steel sheet pile bulkhead segment be performed to address the voids beneath the sidewalk and restore the backfill containment and lateral support. Repairs are also recommended for 15 open corrosion and mechanical spalls located on the curb and nine missing or detached fenders.

CEP165B Floating Docks and Platform I is in Good Condition overall with a Condition Index rating (CI) of 85 and an Operational Capability rating (OC) of C1. The overall condition of the facility is similar to that of the last inspection; however, due to incompletely repairs and deterioration, the rating has been lowered from the previous inspection in which the facility was rated in Good Condition overall with a CI of 90 and OC of C1. It is recommended that one open mechanical spall on the topside of the deck be repaired and that the detached gangway be reconnected at that location. It is also recommended that three open mechanical spalls on the floating docks, three damaged timber wales, two missing molded fenders and three damaged rubber pads on the guide pile assemblies should be replaced or repaired. Four damaged conduits and 21 broken hangers should be replaced and two power distribution stations and a damaged section of fire protection insulation should be repaired.

The CEP169 Breakwater and Boatramp is in Satisfactory Condition overall with a Condition Index (CI) rating of 75 and an Operational Capability (OC) rating of C3. The current condition ratings have been lowered in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Satisfactory Condition with a CI rating of 75 and an OC rating of C2. Since the previous inspection, continued deterioration of the primary fender system has resulted in a recommendation that vessel mooring and berthing is restricted to prevent damage to the structure and moored vessels. It is recommended that the open corrosion and mechanical spalls on the sheet piles, pile caps, and mooring foundations be repaired. The gaps in the joints of the concrete sheet piles should also be repaired. The missing, broken, and detached fender piles, wales, molded fenders, and fender pile guide assemblies should be repaired or replaced to restore the berthing capacity of the facility. The cleats should be cleaned, inspected for integrity, and repainted.

The Z308 Bulkhead and Platform is in Satisfactory Condition overall with a Condition Index (CI) rating of 80 and an Operational Capability (OC) rating of C3. The current condition ratings have changed in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Fair Condition with a CI rating of 60 and an OC rating of C2. Since the previous inspection, construction has been completed on the northern 500 linear ft of the facility and repairs to the deck were executed in the process. However, continued damage to the primary fender system has resulted in a recommendation that vessel mooring be

restricted to limit damage to the structure and moored vessels. It is recommended that open corrosion spalls and open mechanical spalls on the piles, pile caps, curb, and mooring foundations be repaired. Gaps in the concrete sheet piles should also be repaired to limit future fill retention problems. Missing, broken, and detached fender piles, wales, molded fenders, and fender pile guide assemblies should be repaired or replaced to restore the mooring along the bulkhead platform. The cleats should also be cleaned, inspected for integrity, and repainted.

The W306 Bulkhead is in Satisfactory Condition with a Condition Index rating (CI) of 82 and an Operation Capability (OC) rating of C1. The current condition ratings have been raised in comparison with the ratings recommended by the previous inspection conducted in 2007 in which the facility was rated to be in Fair Condition with a CI rating of 60 and an OC rating of C3. Since the previous inspection, repairs have been made to address the deterioration of the steel sheet pile bulkhead. Repairs include the installation of new steel sheet piles and concrete caps outboard of the existing bulkhead.

It is recommended that three spalls, one area of concrete erosion, and one diagonal crack on the pile caps be repaired. It is also recommended that the top of 22 concrete fender piles be grouted and the painted steel mooring cleats and fire hydrants should be cleaned and repainted.

The W111 Tug Basin Wave Break is in Good Condition overall with a Condition Index rating (CI) of 90 and an Operational Capability rating (OC) of C1. The current condition ratings are unchanged from ratings recommended by the previous inspection conducted in 2007. There are no recommended repairs for this facility.

The W305 Bulkhead is in Good Condition with a Condition Index rating (CI) of 85 and an Operation Capability (OC) rating of C1. The current condition ratings have been raised in comparison with the ratings recommended by the previous inspection conducted in 2007 in which the facility was rated to be in Poor Condition with a CI rating of 45 and an OC rating of C2. The previous inspection identified severely corroded sheet pile bulkhead sections and multiple sinkholes in the asphalt deck. Additionally, the previous inspection of the bulkhead was limited to Sta. 0+00 to Sta. 7+34, due to construction activity north of Sta. 7+34 (Pier 11). Since the previous inspection, repairs have been made to address the deterioration of the steel sheet pile bulkhead and the sinkholes in the deck, and construction north of Pier 11 has been completed. It is recommended that open spalls and cracks on the concrete sheet piles and pile cap be repaired. Gaps in the concrete sheet piles at fourteen locations should be covered to limit potential for backfill loss. Missing grout caps should be replaced at three fender piles and one split extruded fender should be replaced. It is recommended that the displaced fire hydrant guard post be replaced and an additional guard post be placed at the fire hydrant.

Q84 Pier 11 Relieving Platform is in Good Condition overall with a Condition Index rating (CI) of 84 and an Operational Capability rating (OC) of C1. The facility was built in 2008 and has no previous inspection data. Various repairs are recommended to address defects on the structural and mooring and components of the platform. It is recommended that eight spalls and one vertical crack on the piles and fender piles be repaired. It is also recommended that eight detached fender frames be secured to the platform and six fender frame components and two extruded fenders be replaced.

The Q8 Bulkhead in Fair Condition with a Condition Index rating (CI) of 66 and an Operation Capability (OC) rating of C2. The current condition ratings have been lowered in comparison with the ratings recommended by the previous inspection conducted in 2007, in which the facility was rated to be in Satisfactory Condition with a CI rating of 75 and an OC rating of C2. It is recommended that six sinkholes in the asphalt deck upland of the bulkhead be excavated and repaired. Until such time that repairs can be made, the areas should be cordoned off to restrict vehicular and pedestrian access. Various other repairs are recommended to address various deficiencies and maintain the bulkhead. Repair of erosion, spalls and cracks on the bulkhead pile caps, sheet piles, curbs and fender piles are recommended. Repairs are recommended to

replace damaged sections of timber fender system as well as to reattach two concrete fender piles and make other minor repairs. Other recommended repairs include repainting of mooring hardware and replacement of select foundations and replacement of safety ladders.

The Q9 Bulkhead in Satisfactory Condition with a Condition Index rating (CI) of 72 and an Operation Capability (OC) rating of C2. The current condition ratings have been lowered in comparison with the ratings recommended by the previous inspection conducted in 2007. It is recommended that open mechanical spalls on the concrete sheet piles be repaired at four locations. It is also recommended that two spalls and 15 cracks on the pile cap be repaired.

The Q5 breakwater in Satisfactory Condition with a Condition Index rating (CI) of 75 and an Operation Capability (OC) rating of C1. The current condition ratings are unchanged from the ratings recommended by the previous inspection conducted in 2007. It is recommended that the riprap be replaced for a total of 305 lin ft where the top of the breakwater is depressed. It is recommended that two mooring dolphins and 24 mooring bollards be clean, inspected and repainted. Also, one damaged safety ladder should be replaced.

Section 2 - Introduction

This report was prepared as part of the Waterfront Facilities Inspection Program administered by the Ocean Construction Division of the Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC): CIOFP4 Ocean Facilities.

This program provides inspection, structural analysis, repair recommendations, and estimates of repair costs for waterfront facilities. All of these services, including this report, were provided by Marine Solutions, Inc., under the responsible charge of Sean Chapman, P.E., in accordance with Delivery Order No. 9 of Contract No. N62583-12-D-0749. Funding was provided by Commander, Navy Installations Command (CNIC).

Delivery Order No. 9 consisted of furnishing the engineering services necessary to perform an above water and underwater inspection and to assess the general condition of the structural components supporting the waterfront facilities at Norfolk Naval Station Norfolk, Virginia.

As part of the Navy's Facility Condition Assessment Program (FCAP), the Navy is retaining Engineering Management System (EMS) software to assess the general condition of the facilities and individual structural components. The EMS software is designed to generate Condition Index (CI) ratings based on computer analysis of inspection data. The software has not been officially deployed. Therefore, the condition of each waterfront facility is presented as an overall Engineering Assessment Rating, with a corresponding Engineering Management System CI rating derived in accordance with Table 2.1-1.

Inspection results have been tabulated in the specified format and are presented in Appendix B - Structural Data. This format is in accordance with the UniFormat-II classification structure of Waterfront Construction (designated by an "H") with granularity to include Level 4 and Level 5. The Appendix includes Defect Recording Nomenclature, an Asset Summary Sheet, an Asset Inventory, and Structural Data Sheets for each facility, where the conditions of the facility components are presented.

The repair recommendations contained herein are preliminary and are to be used for general costing purposes. The actual design of repair, and any subsequent design inspections, must be left to the discretion of the Engineer of Record.

Table 2.1-1
Engineering Assessment Rating To Equivalent Engineering Management System (EMS) Condition Index (CI) Rating

Assessment Rating	Equivalent CI Rating	Description
"Good"	84-100	No problems or only minor problems noted. Structural elements may show some very minor deterioration, but no significant reduction in structural capacity.
"Satisfactory"	67-83	Minor to moderate defects and deterioration observed, but no significant reduction in structural capacity.
"Fair"	54-66	All primary structural elements are sound; but minor to moderate defects and deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the structural capacity.
"Poor"	37-53	Advanced deterioration or overstressing observed on widespread portions of the structure. Some reduction in structural capacity.
"Serious"	26-36	Advanced deterioration, overstressing or breakage may have significantly affected the load bearing capacity of primary structural components. Local failures are possible.
"Critical"	0-25	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur.

An exit briefing was conducted on December 17, 2013 at 1300. The attendees of the exit brief are listed in Table 2.1-2. At this meeting, the inspection team summarized the findings, discussed operational restrictions, safety concerns, and possible repair recommendations.

Table 2.1-2
Exit Brief Attendees

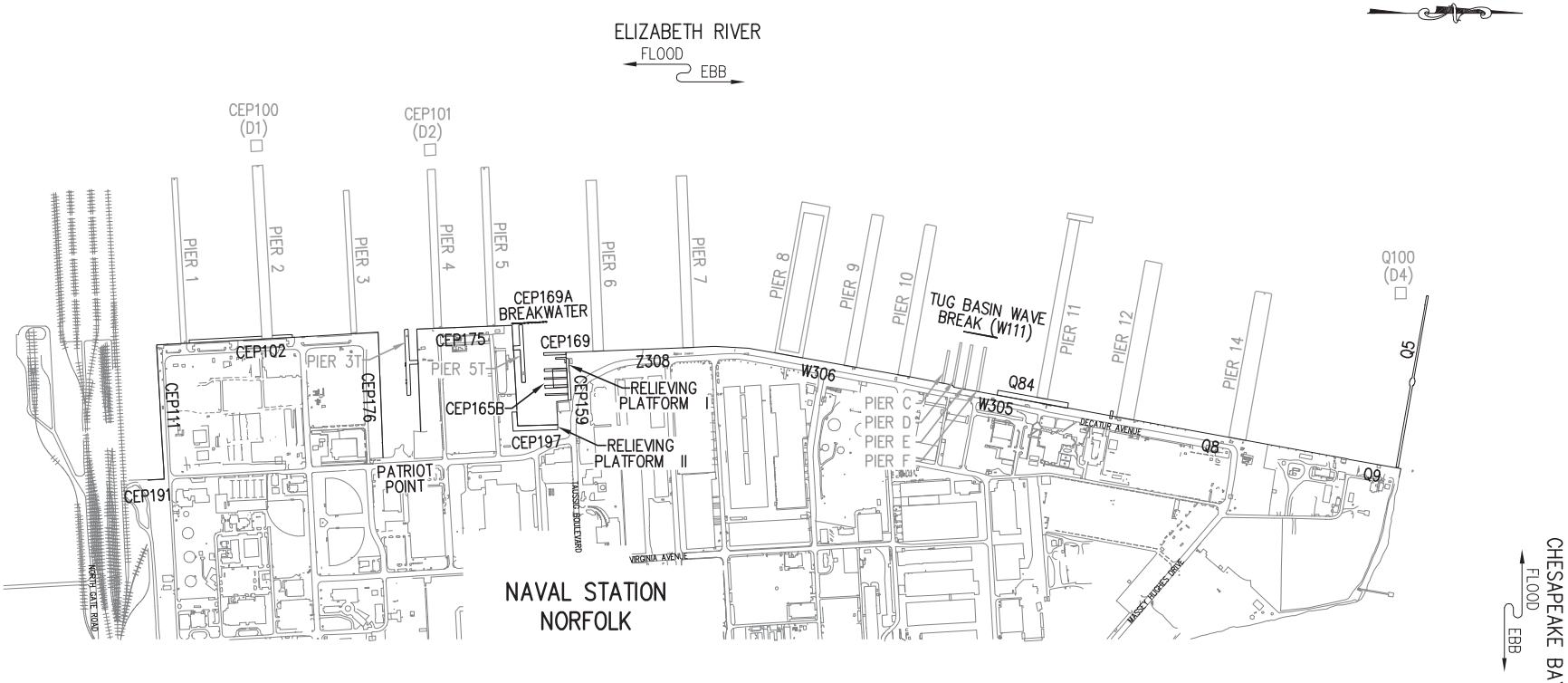
Name	Organization	Phone Number	E-Mail Address
LT Lavell Walson	NAVFAC PWD	757-341-0801	lavell.walson@navy.mil
Bob Butters	NAVFAC MIDLANT PWD	757-341-0512	robert.butters@navy.mil
Eddy Theisz	NAVFAC MIDLANT PWD	757-341-0645	eddy.theisz@navy.mil
Dennis Pickeral	NAVFAC MIDLANT PWD	757-341-0541	dennis.pickeral@navy.mil
Christine Rutkowski	NAVFAC MIDLANT PWD	757-341-0154	christine.rutkowski@navy.mil
Shawn Lindmark	NAVFAC EXWC	202-433-5480	shawn.lindmark@navy.mil
LT Nick Brown	NAVFAC EXWC	202-433-5083	nicholas.c.brown1@navy.mil
Amy Wilkins	MSI	859-576-6634	awilkins@MSImarinesolutions.com

Name	Organization	Phone Number	E-Mail Address
Sean Chapman	MSI	859-608-1716	schapman@MSImarinesolutions.com
Adam Davis	MSI	859-608-8983	adavis@MSImarinesolutions.com
Jeremy Pope	MSI	908-319-9498	jpope@MSImarinesolutions.com
Ryan Bell	Collins	561-714-4284	ryan.bell@collinsengr.com

VICINITY MAP
NOT TO SCALE

LOCATION MAP
NOT TO SCALE

MSI MARINE SOLUTIONS, INC. ENGINEERING & COMMERCIAL DIVING SERVICES	NAVFAC Naval Facilities Engineering Command	NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER WASHINGTON, D.C.
GRAPHIC SCALE **NOT TO SCALE**	DATE: APRIL 2014 CONTRACT NUMBER N62583-12-D-0749 Delivery Order No. 0009	NAVAL STATION NORFOLK — NORFOLK, VA **NAVAL STATION NORFOLK** **WEST SHORE BULKHEADS** **VICINITY AND LOCATION MAP**
		FIG. NO. **2-1**



WEST SHORE BULKHEADS SITE PLAN

SCALE: 1" = 1000'

MSI MARINE SOLUTIONS, INC. ENGINEERING & COMMERCIAL DIVING SERVICES GRAPHIC SCALE 1000 500 0 1000 FT. SCALE: 1" = 1000'	NAVFAC Naval Facilities Engineering Command DATE: APRIL 2014 CONTRACT NUMBER N62583-12-D-0749 Delivery Order No. 0009	NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER WASHINGTON, D.C. NAVAL STATION NORFOLK — NORFOLK, VA **NAVAL STATION NORFOLK** **WEST SHORE BULKHEADS** **SITE PLAN** FIG. NO. **2-2**

Section 3 - Facilities Inspected

The scope of work outlined in this delivery order provided for the inspection and assessment of the waterfront facilities located within Norfolk Naval Station. The official name, NFA number and year built and/or modified for each facility inspected is listed below.

Table 3.0-1
Facilities Inspected

Facility	iNFADS Number	Year Built / Modified
3.1 - CEP191 Bulkhead	NFA100001162742	1978 / 2008
3.2 - CEP111 Bulkhead	NFA100001161271	1943 / 2004
3.3 - CEP102 Bulkhead	NFA100001161244	1943 / 2004
3.4 - CEP176 Bulkhead	NFA100001162519	1943
3.5 - Patriot Point	NFA200001081008	UNK
3.6 - CEP175 Bulkhead	NFA100001162500	1979 / N/A
3.7 - CEP169A 5T Breakwater	NFA200000722318	1983 / 2005
3.8 - CEP197 Bulkhead	NFA100001163297	1983 / 2005
3.9 - CEP159 Bulkhead	NFA100001163493	1973 / 2005
3.10 - CEP165B Floating Docks	NFA200000464524	2005 / N/A
3.11 - CEP169 Breakwater	NFA200000466292	2005 / N/A
3.12 - Z308 Bulkhead	NFA100001161663	2005 / 2007
3.13 - W306 Bulkhead	NFA100001161654	1961 / 1979/2009
3.14 - W111 Wave Break	NFA200000657969	UNK / N/A
3.15 - W305 Bulkhead	NFA100001161645	1961 / 1971
3.16 - Q84 Relieving Platform	NFA200000658361	2008 / N/A
3.17 - Q8 Bulkhead	NFA100001161262	1961 / N/A
3.18 - Q9 Bulkhead	NFA100001166640	1923 / N/A
3.19 - Q5 Breakwater	NFA100001161119	1957 / 2002

Norfolk Naval Station
Norfolk, Virginia

Section 3.5 - Patriot Point

Contract: N62583-12-D-0749 Inspection Date: 02/03/2013

Contractor: Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

Facility: Patriot Point **iNFADS:** NFA200001081008 **PRN:** Unknown

Location: 36.939208, -76.32578 [redacted]

**Repair cost includes Design Allowances, Contractor Overhead & Profit, and Inflation Allowances. See Appendix C - Cost Estimate for detailed analysis.*

Condition Index (CI)	**40**	**Max Water Current**	<1kn
Engineering Assessment Rating	Poor	**Water Clarity**	<10ft
Operational Rating	C3	**Tide Variation**	3ft
5 Year Projected CI	40	**Max Water Depth**	5ft
10 Year Projected CI	31	**Seasonal Water Temp**	52°F
Year(s) Previously Inspected	2007	**Seasonal Ambient Temp**	55°F

Facility Usage Description:
Patriot Point is primarily comprised of a placed stone revetment along the shoreline. The area is used as a recreational park and a portion supports the shoreline along a parking lot. At the northern limit of Patriot Point there is 270 linear ft of steel sheet pile bulkhead. At the northwest corner of Patriot Point there is a revetment comprised of placed concrete blocks. There is no berthing or mooring at the facility.

Summary of Repair Recommendations:
It is recommended that the steel sheet pile bulkhead be replaced with a new bulkhead and the backfill upland of the bulkhead be restored. The concrete block slope protection should be replaced with an engineered rock revetment.

Impact To Mission If Repairs Not Provided:
If the sheet pile bulkhead and concrete block revetment are not replaced, further erosion of upland fill is likely to occur. The eroded shoreline is in close proximity to the asphalt parking area upland of the steel sheet pile bulkhead and could undermine the asphalt deck, resulting in restrictions for portions of the parking area.

Operational Restrictions:
Eroded shoreline areas should be monitored for encroachment into an adjacent parking lot until repairs are made.

Additional Facility Photos

Photo 3.5-1: Overview of Patriot Point from shore, looking northeast.

Photo 3.5-2: Overview of Patriot Point from CEP176 Bulkhead, looking east.

H1010 - Substructure [redacted] **CI: 40**

H101001 - Pile Foundations [redacted] **CI: 10**

UFII Component	H10100102	Sheet Piles Asset Type(s): SP
Findings	The steel sheet piles are in Critical Condition. There is 270 linear ft of steel sheet piles comprising a bulkhead north of Patriot Point. The bulkhead is constructed of 18 in. wide, U-shaped steel sheet piles with a nominal thickness of 1/2 in. The steel sheet piles are severely corroded with numerous holes resulting in sinkholes in the backfill behind the bulkhead. The top of the steel sheet piles are broken off approximately 2 ft above mean high water (MHW) at the western 150 linear ft of the bulkhead. The upland fill within this area is typically eroded for a distance of up to 8 ft upland of the bulkhead.	
Recommendations	It is recommended that the steel sheet pile bulkhead be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.5-3: Overview of the steel sheet pile bulkhead from the Patriot Point stone revetment, looking northwest.

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.5-4: View of U-shaped sheet piles comprising the bulkhead.

Photo Type: Defect UFII/Asset Type: H10100102_SP

Photo 3.5-5: Typical view of the top of steel sheet piles broken off at western 150 linear ft of bulkhead and a resulting wash-out of the shoreline.

H1010 - Substructure [redacted] **CI: 40**

H101005 - Revetments [redacted] **CI: 60**

UFII Component	H101005	Revetments Asset Type(s): REV1 & REV2
Findings	The revetments are in Fair Condition overall. There is approximately 78,400 cu yd of stone revetment and 2,700 cu yd of concrete block slope revetment at Patriot Point. The stone revetment extends from the south end of Patriot Point to the steel sheet pile bulkhead and is comprised of placed 24 in. diameter and smaller stone. The revetment slope is roughly 3:1 and appears stable. At the northeast corner of Patriot Point there is a precast concrete box culvert extending from the revetment slope. A grout bag wall, 70 ft long by 5 ft high, is located above the box culvert. No defects were noted on the stone revetment. At the northwest corner of Patriot Point, from the west end of the steel sheet pile bulkhead to the CEP175 bulkhead, 3 ft by 3 ft by 4 ft concrete blocks have been placed to provide shoreline protection. The concrete block revetment does not adequately protect the shoreline and several blocks appear to be displaced. The slope behind the concrete block revetment is severely eroded.	
Recommendations	It is recommended that the concrete block slope protection be replaced with an engineered rock revetment.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101005_REV1

Photo 3.5-6: View of the stone revetment looking north.

Photo Type: Typical UFII/Asset Type: H101005_REV1

Photo 3.5-7: View of the stone revetment, box culvert, and grout bag wall, looking east.

Photo Type: Typical UFII/Asset Type: H101005_REV2

Photo 3.5-8: Typical view of the concrete blocks comprising the revetment at the northwest corner of Patriot Point.

Photo Type: Defect UFII/Asset Type: H101005_REV2

Photo 3.5-9: View of the eroded slope at the concrete block revetment.

H1010 - Substructure [redacted] **CI: 40**

H101010 - Other Substructure Components **CI: 10**

UFII Component	H101010	Other Substructure Components Asset Type(s): BKF
Findings	The other substructure component is in Critical Condition. The other substructure component is approximately 5,400 sq ft of backfill behind the steel sheet pile bulkhead. Due to severe corrosion and holes in the steel sheet pile bulkhead, there are two large wash-outs in the backfill. The wash-outs are located at Sta. 0+45 and Sta. 0+80 and are 15 ft long, 6 ft wide and 4.5 ft deep and 8.5 ft long, 8.5 ft wide and 3.5 ft deep, respectively. The northern edge of the wash-outs are in close proximity to the upland paved parking area, with the edge of the wash-out at Sta. 0+45 within 7 ft of the parking area, and the edge of the wash-out at Sta. 0+80 within 3 ft of the parking area.	
Recommendations	It is recommended that the wash-outs in the backfill be repaired after the steel sheet pile bulkhead is replaced. The eroded areas should be monitored periodically and following significant storm events for encroachment into the parking lot.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101010_BKF

Photo 3.5-10: Overview of backfill behind the steel sheet pile bulkhead.

Photo Type: Defect UFII/Asset Type: H101010_BKF

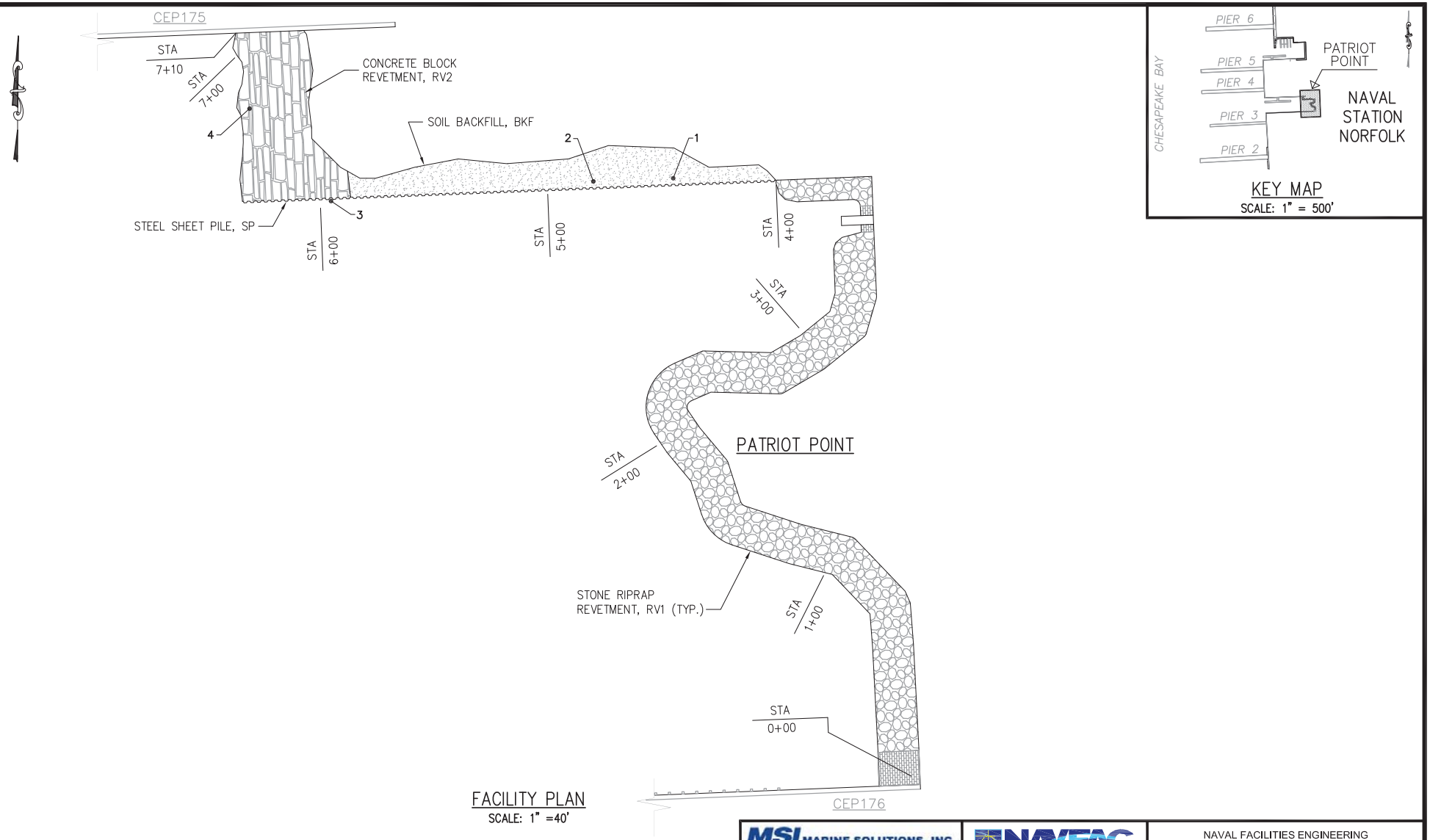
Photo 3.5-11: View of a wash-out behind the steel sheet pile bulkhead at Sta. 0+45.

Photo Type: Defect UFII/Asset Type: H101010_BKF

Photo 3.5-12: View of a wash-out behind the steel sheet pile bulkhead at Sta. 0+80.

Photo Type: Defect UFII/Asset Type: H101010_BKF

Photo 3.5-13: Edge of wash-out at Sta. 0+80 located 3 ft from the asphalt parking area.



FACILITY PLAN
SCALE: 1" =40'

KEY MAP
SCALE: 1" = 500'

LEGEND

STA 1+00 — DIMENSIONAL STATION DESIGNATION IN LINEAR FEET

2 — DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

NAVFAC Naval Facilities Engineering Command

DATE: DECEMBER 2013

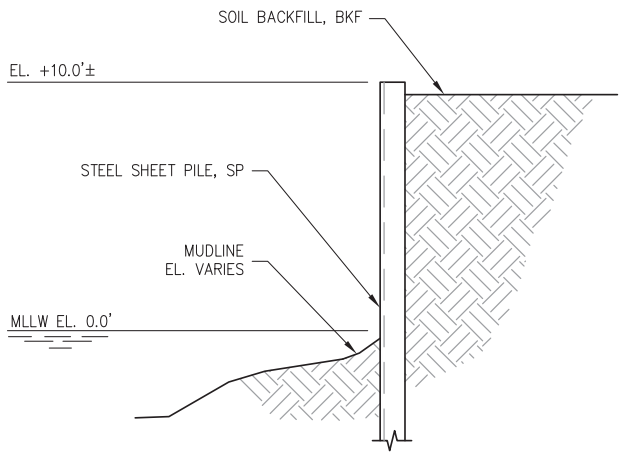
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

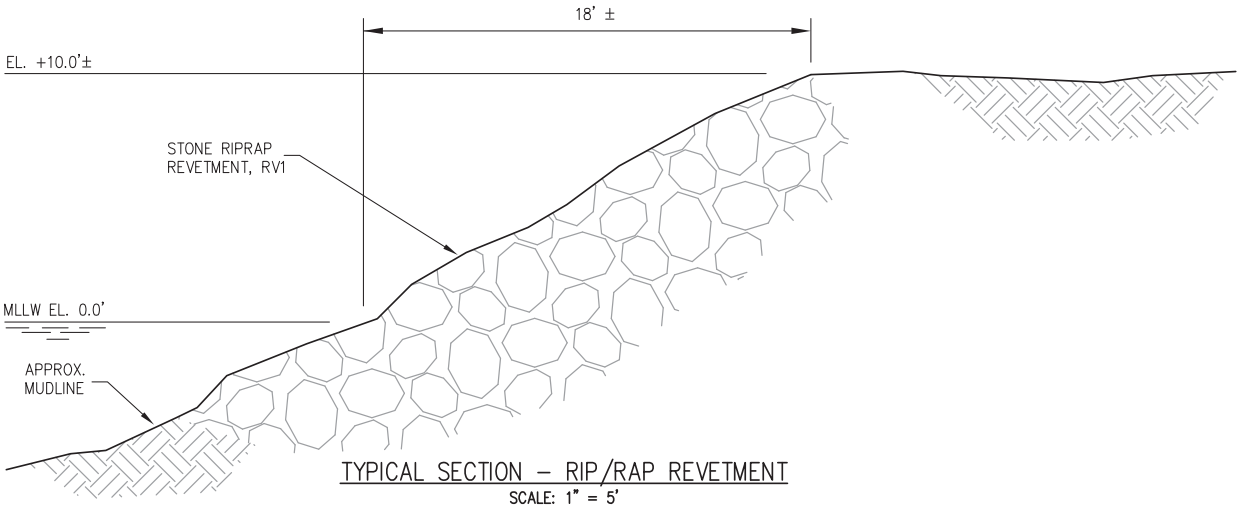
PATRIOT POINT FACILITY PLAN

FIG. NO. 3.5-1



TYPICAL SECTION – NORTH SHORE

SCALE: 1" = 5'



TYPICAL SECTION – RIP/RAP REVETMENT

SCALE: 1" = 5'

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
5 2.5 0 5 FT.
SCALE: 1" = 5'

NAVFAC Naval Facilities Engineering Command

DATE: DECEMBER 2013

CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING
AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

NAVAL STATION NORFOLK NORFOLK, VIRGINIA

PATRIOT POINT
TYPICAL SECTIONS

FIG. NO.
3.5-2

Norfolk Naval Station
Norfolk, Virginia

Section 3.6 - CEP175 Bulkhead

Contract: N62583-12-D-0749 Inspection Date: 03/04/2013

Contractor: Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

Facility: CEP175 Bulkhead **iNFADS:** NFA100001162500 **PRN:** 200993

Location: 36.940689, -76.329415

Estimated Repair Cost*: [redacted]

**Repair cost includes Design Allowances, Contractor Overhead & Profit, and Inflation Allowances. See Appendix C - Cost Estimate for detailed analysis.*

Condition Index (CI)	**61**	**Max Water Current**	<1kn
Engineering Assessment Rating	Fair	**Water Clarity**	<10ft
Operational Rating	C2	**Tide Variation**	3ft
5 Year Projected CI	61	**Max Water Depth**	33ft
10 Year Projected CI	54	**Seasonal Water Temp**	51°F
Year(s) Previously Inspected	2007	**Seasonal Ambient Temp**	43°F

Facility Usage Description:
CEP175 Bulkhead was constructed in 1978 of 2,497 linear ft of concrete sheet piles with a reinforced concrete pile cap. The bulkhead retains the shoreline along piers 3T, 4, 5 and 5T supporting parking lots, driveways, and access to the piers. Lateral support for the bulkhead is provided by steel tie-rods anchored to a timber pile supported concrete cap buried within the upland fill. The tie-back system was not visible for inspection. The majority of the upland area is comprised of an asphalt deck with the exception of the areas adjacent to Pier 3T, Pier 4 and Pier 5 where the deck is a reinforced concrete on-grade deck. Limited mooring hardware and fender systems are present to provide mooring along select segments of the bulkhead.

Summary of Repair Recommendations:
It is recommended that gaps identified between bulkhead concrete sheet piles be covered to limit the potential for backfill loss and separations in the bulkhead cap be sealed to repair shallow sinkholes occurring along the bulkhead. It is recommended that various spalls and cracks on the sheet pile cap and curb also be repaired. The fender system should be reconstructed and expanded as needed to meet operational requirements and the existing cleats should be replaced with new rated fittings.

Impact To Mission If Repairs Not Provided:
If repairs are not made to the gaps in the bulkhead and sinkholes in the deck, new sinkholes may develop and further loss of fill could increase the size of the existing sinkholes. If repairs are not made to the fender system and mooring hardware, berthing and mooring at the facility may be further limited.

Operational Restrictions:
Mooring of vessels, barges and marine equipment should be restricted until repairs to the fender system are made.

Additional Facility Photos

Photo 3.6-1: Overview of CEP175 Platform from shore, Sta. 6+50, looking east.

Photo 3.6-2: Overview of CEP102 Bulkhead from shore, Sta. 19+60, looking east.

Photo 3.6-3: Overview of CEP175 Bulkhead from the water, Sta. 0+75, looking west.

Photo 3.6-4: Overview of CEP175 Bulkhead and from the water, Sta. 6+40, looking west.

Photo 3.6-5: Overview of CEP175 Bulkhead from the water, Sta. 9+05, looking north.

Photo 3.6-6: Overview of CEP175 Bulkhead from the water, Sta. 11+30, looking north.

Photo 3.6-7: Overview of CEP175 Platform from the water, Sta. 19+10, looking east.

H1010 - Substructure [redacted] **CI: 65**

H101001 - Pile Foundations [redacted] **CI: 60**

UFII Component	H10100102	Sheet Piles Asset Type(s): SP
Findings	The sheet piles are in Fair Condition. The bulkhead is constructed of 2,497 lin ft of precast concrete sheet piles. There are 10 locations where gaps exist between the sheet piles. The gaps range in width from 2 in. to 10 in. and vary in height from 4 ft. to 26 ft. Horizontal probes of 12 in. were noted at all of the gaps. At Sta. 15+02, the diver was able to probe up to 6 ft. horizontally into the gap, indicating a void in the backfill behind the sheet pile bulkhead. Presently, there is not a sinkhole in the deck in the vicinity of the Sta. 15+02. All of the gaps appear to be wide enough that a potential for loss of fill from the behind the bulkhead exists. The sheet piles generally have minor mechanical spalls and minor scaling. One open mechanical spall was noted on the sheet piles at Sta. 13+90. The spall is located 17 ft below the top of the sheet piles and is 3 ft tall by 4 in. wide and 8 in deep. The is one area of poorly consolidate concrete 1 ft below the top of the sheet piles at Sta. 24+97, that is 12 in. tall, 18 in. wide and 24 in. deep. The channel bottom depths along the sheet piles ranged from 5 ft to 32 ft below MLLW with a free-standing height of the bulkhead ranging from 15 ft to 42 ft. Facility records do not indicate the embedment elevation of the sheet piles.	
Recommendations	It is recommended that 10 gaps between the concrete sheet piles be covered to limit the potential for loss of backfill. It is also recommended that one open mechanical spall and one area of poorly consolidated concrete be repaired. The embedment depths and anchorage of the sheet piles should be evaluated if dredging along the bulkhead to depths greater than current is considered.	

H1010 - Substructure [redacted] **CI: 65**

H101002 - Pile Caps [redacted] **CI: 75**

UFII Component	H101002	Pile Caps Asset Type(s): PC
Findings	The pile cap is in Satisfactory Condition. The reinforced concrete sheet pile cap is 24 in. wide by 9 ft-8 in. tall and spans the sheet piles along the length of the bulkhead for a distance of 2,497 linear ft. The top of the sheet pile cap generally has minor scaling up to 1/8 in. deep, and isolated vertical and horizontal cracks from hairline up to 1/16 in. wide. There are three open corrosion spalls on the sheet pile cap. The spalls vary in size from 4.5 sq ft up to 27.5 sq ft and the depth of spalls range from 2 in. to 12 in. Reinforcing steel is exposed at each of the three spalls.	
Recommendations	It is recommended that three open corrosion spalls at the concrete sheet pile cap be repaired. The isolated cracking on the pile cap does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101002_PC

Photo 3.6-8: Typical view of the reinforced concrete sheet pile cap.

Photo Type: Defect UFII/Asset Type: H101002_PC

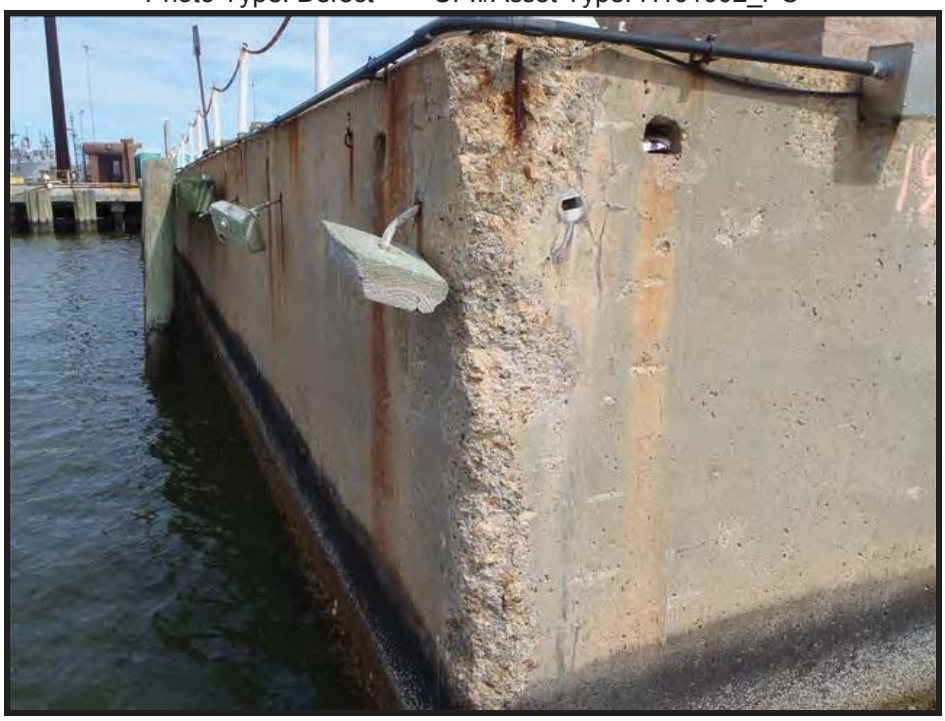


Photo 3.6-9: View of the open mechanical spall on the sheet pile cap, Sta. 9+09.

Photo Type: Defect UFII/Asset Type: H101002_PC

Photo 3.6-10: View of the open mechanical spall on the sheet pile cap at joint, Sta. 13+50.

H1020 - Superstructure **CI: 90**

H102003 - Utility Enclosures **CI: 90**

UFII Component	H10200303	Other Utility Enclosure Components Asset Type(s): UTC, MH1, MH2, MH3, MH4, MH5, & MH6
Findings	The utility enclosures are in Good Condition overall. The inspected utility enclosures at the bulkhead consist of a utility trench cover located a Sta. 6+00 in the concrete deck adjacent to Pier 3T and eight manholes. The utility trench cover in the concrete deck is a reinforced concrete cover with steel grates that is 9 ft-6 in. long by 3 ft-2 in. wide. There were no defects noted in the utility trench cover. There are two 24 in. diameter oily waste manhole covers, two 24 in. telephone manhole covers, one 39 in. diameter sanitary sewer manhole, one 24 in. diameter sanitary sewer manhole cover, one 24 in. diameter electrical manhole cover and one 24 in. unidentified manhole cover at the bulkhead. The manhole covers are located from Sta. 5+87 to Sta. 6+34. The manhole covers and exposed portions of the manhole rings generally have minor surface corrosion but are otherwise free of defects.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10200303_UTC

Photo 3.6-11: Typical view of the utility trench cover, Sta. 6+00.

Photo Type: Typical UFII/Asset Type: H10200303_MH1

Photo 3.6-12: Typical view of a 24 in. diameter oily waste manhole cover, Sta. 5+89.

Photo Type: Typical UFII/Asset Type: H10200303_MH2

Photo 3.6-13: Typical view of the 39 in. diameter sanitary sewer manhole cover, Sta. 5+77.

Photo Type: Typical UFII/Asset Type: H10200303_MH3

Photo 3.6-14: Typical view of a 24 in. diameter telephone manhole cover, Sta. 5+85.

Photo Type: Typical UFII/Asset Type: H10200303_MH4

Photo 3.6-15: Typical view of the 24 in. unidentified manhole cover, Sta. 5+90.

Photo Type: Typical UFII/Asset Type: H10200303_MH5

Photo 3.6-16: Typical view of the 24 in. electric manhole cover, Sta. 6+24.

Photo Type: Typical UFII/Asset Type: H10200303_MH6

Photo 3.6-17: Typical view of the 24 in. sanitary sewer manhole cover, Sta. 6+34.

H1030 - Deck Components [redacted] **CI: 63**

H103002 - On-Grade Deck [redacted] **CI: 75**

UFII Component	H103002	On-Grade Deck Asset Type(s): OGD1 & OGD2
Findings	The on-grade decks are in Satisfactory Condition overall. There is 2,930 sq ft of reinforced concrete on-grade deck and 77,645 sq ft of asphalt on-grade deck upland of Bulkhead CEP175. The approach slabs to Piers 3T, Pier 4 and Pier 5 consist of reinforced concrete on-grade decks of unknown thickness. The concrete on-grade decks extend the width of each pier. At Pier 3T the deck is 50 ft wide, and at Pier 4 and Pier 5 the decks are each roughly 10 ft. wide. There were no defects noted at the concrete on-grade decks. With the exception of the area directly adjacent to Pier 3T, Pier 4 and Pier 5, the area upland of the bulkhead consists of an asphalt on-grade deck. The asphalt deck typically has widespread map-pattern cracking up to 1/4 in. wide with isolated cracks up to 1/2 in. wide. There are isolated areas of subsidence in the asphalt deck up to 1 in. deep. Three sinkholes were found in the asphalt deck adjacent to the bulkhead at Sta. 1+85, Sta. 7+45, and Sta. 11+25. The sinkholes range in size from 4 sq ft to 16 sq ft and are from 12 in. to 24 in. deep and appear to be caused by separated and un-sealed joints in the concrete pile cap.	
Recommendations	It is recommended that three sinkholes in the asphalt deck be repaired.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103002_OGD1

Photo 3.6-18: Typical view of reinforced concrete on-grade deck.

Photo Type: Typical UFII/Asset Type: H103002_OGD2

Photo 3.6-19: Typical view of asphalt on-grade deck.

Photo Type: Typical UFII/Asset Type: H103002_OGD2

Photo 3.6-20: Typical view of map pattern cracking in asphalt on-grade deck.

Photo Type: Defect UFII/Asset Type: H103002_OGD2

Photo 3.6-21: Typical view of 16 sq ft by 24 in. deep sinkhole, Sta. 1+85.

Photo Type: Defect UFII/Asset Type: H103002_OGD2

Photo 3.6-22: Typical view of 6 sq ft by 12 in. deep sinkhole, Sta. 7+45.

H1030 - Deck Components [redacted] **CI: 63**

H103004 - Curbs & Bullrails [redacted] **CI: 60**

UFII Component	H103004	Curbs & Bullrails Asset Type(s): CB
Findings	The curbs are in Fair Condition. There is a total of 2,294 linear ft of curb at the bulkhead. The curb consists of a 12 in. wide by 12 in. high reinforced concrete curb that is integral with the concrete sheet pile cap. The curb extends the length of the bulkhead with the exception of where Pier 3T, Pier 4, Pier 5 and Pier 5T abut the bulkhead. There are 6 in. wide by 4 in. high scuppers cast into the curb spaced roughly 9 ft apart. The curb typically has hairline to 1/8 in. wide transverse cracks and minor mechanical spalls up to 1 in. deep. There are 33 open corrosion spalls, 12 open mechanical spalls and one closed corrosion spall noted on the curb. The spalls range in size from 0.5 sq ft to 53 sq ft and are up to 12 in. deep. The total length of curb affected by spalls is 208 linear ft. At all of the open corrosion spalls there is exposed reinforcing steel. There are nine horizontal cracks along the top of the curb from 5 ft to 115 ft in length and from 1/4 in. to 1 in. wide. There are four transverse cracks on the top of the curb from 2 ft to 5 ft in length, and from 3/16 in. to 1/2 in. wide.	
Recommendations	It is recommended that the open corrosion, mechanical and closed corrosion spalls be repaired at 46 locations. It is also recommended that the nine horizontal cracks and four transverse cracks be repaired.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103004_CB

Photo 3.6-23: Typical view of the reinforced concrete curb.

Photo Type: Typical UFII/Asset Type: H103004_CB

Photo 3.6-24: Typical view of scupper in curb.

Photo Type: Defect UFII/Asset Type: H103004_CB

Photo 3.6-25: Overview of damage on the concrete curb, Sta. 16+90 to 17+43.

Photo Type: Defect UFII/Asset Type: H103004_CB

Photo 3.6-26: View of severe damage on the concrete curb, Sta. 17+40.

Photo Type: Defect UFII/Asset Type: H103004_CB

Photo 3.6-27: View of a spall at concrete curb, Sta. 13+27, 6 sq ft by 8 in. deep.

Photo Type: Defect UFII/Asset Type: H103004_CB

Photo 3.6-28: View of horizontal cracking in top of curb at Sta. 12+80.

Photo Type: Defect UFII/Asset Type: H103004_CB

Photo 3.6-29: View of transverse crack at a joint in the curb at Sta.9+87.

H1030 - Deck Components [redacted] **CI: 63**

H103005 - Mooring Foundations **CI: 75**

UFII Component	H103005	Mooring Foundations Asset Type(s): MFD
Findings	The mooring foundations are in Satisfactory Condition. There are 11 cleats along the bulkhead founded on reinforced concrete foundations between Sta. 19+65 and Sta. 24+67. The cleat foundations are 32 in. long, 28 in. wide and 12 in. high. The mooring foundations have isolated hairline cracks and minor open mechanical spalls up to 1.5 in. deep.	
Recommendations	No repairs are recommended at this time. The open hairline cracks and open mechanical spalls do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103005_MFD

Photo 3.6-30: General view of typical cleat mooring foundation.

H1030 - Deck Components [redacted] **CI: 63**

H103009 - Guard Posts and Railings [redacted] **CI: 30**

UFII Component	H103009	Guard Posts and Railings Asset Type(s): GPT
Findings	The guard posts and railings are in Serious Condition. There is a total of 1,418 linear ft of guard posts and railings at the bulkhead. The guard posts and railings are continuous along the edge of the bulkhead from Sta. 9+05 to 24+97, with the exception of where Pier 4, Pier 5 and Pier 5T abut the bulkhead. The guard posts and railings consist of 3 ft tall, 3 in. diameter, painted steel posts spaced 10 ft on center along the edge of the bulkhead. The rail consists of a single continuous chain strung between the top of each post. The majority of the guard posts and rails are missing or broken from Sta. 16+00 to Sta. 24+97. The posts that are remaining within this area are loose and are no longer functioning as designed. The guard posts and rails from Sta. 9+05 to Sta. 16+00 generally have isolated areas of coating loss and moderate surface corrosion. Two guard posts within this area are detached, one guard post is loose, and one guard post is bent due to impact damage.	
Recommendations	It is recommended that guard posts and rails be replaced from Sta. 16+00 to Sta. 24+97. Two detached and one loose post should be properly secured and one bent post should be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103009_GPT

Photo 3.6-31: Typical view of guard post and chain rail.

Photo Type: Defect UFII/Asset Type: H103009_GPT

Photo 3.6-32: View of the bent guard post, Sta. 12+40.

Photo Type: Defect UFII/Asset Type: H103009_GPT

Photo 3.6-33: View of a detached guard post, Sta. 14+65.

H1040 - Mooring & Berthing Systems [redacted] **CI: 35**

H104001 - Primary Fender System [redacted] **CI: 30**

UFII Component	H10400101	Fender Piles Asset Type(s): FP
Findings	The fender piles are in Serious Condition. There are a total of 63 timber fender piles currently present at the bulkhead. The timber fender piles are 12 in. diameter, and creosote or green treated. There are several locations along the west and north face of the bulkhead where the fender system is completely missing, totaling 618 linear ft, equating to approximately 62 missing fender piles. There is presently no fender system along the south face of the bulkhead. In the areas where the fender system remains in place, there are five missing and 20 broken fender piles. The fender piles that remain have isolated areas of minor abrasion damage.	
Recommendations	It is recommended that the entire fender system be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400101_FP

Photo 3.6-34: Typical view of 12 in. diameter, CCA treated timber fender piles.

Photo Type: Defect UFII/Asset Type: H10400101_FP

Photo 3.6-35: View of broken timber fender piles, Sta. 20+60.

Photo Type: Defect UFII/Asset Type: H10400101_FP

Photo 3.6-36: View of broken timber fender piles, Sta. 23+00.

H1040 - Mooring & Berthing Systems [redacted] **CI: 35**

H104001 - Primary Fender System [redacted] **CI: 30**

UFII Component	H10400102	Fender Framing Asset Type(s): FCH & FWL
Findings	The fender framing is in Serious Condition. The fender framing consists of continuous 12 in. wide by 12 in. high timber wales, and 12 in. wide by 12 in. high fender chocks between the fender piles attached to the fender wale. The fender framing components are creosote or green treated timbers. There are several areas along the west and north face of the bulkhead where the fender system is completely missing, totaling 618 linear ft. Outside of the areas where the fender system is completely missing the fender wale is missing at four additional locations totaling 70 linear ft. The timber wale is broken at three locations and is detached at one location. The timber chock is missing at six additional locations totaling 85 linear ft. The timber chocks are detached at three locations and has abrasion damage up to 2 in deep at one location.	
Recommendations	It is recommended that the fender system be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400102_FCH

Photo 3.6-37: Typical view of a 12 in. by 12 in. treated timber fender chocks.

Photo Type: Defect UFII/Asset Type: H10400102_FCH

Photo 3.6-38: View of a detached timber fender chock, Sta. 9+75.

Photo Type: Defect UFII/Asset Type: H10400102_FCH

Photo 3.6-39: View of a detached timber fender chock and wale, Sta. 10+50.

Photo Type: Typical UFII/Asset Type: H10400102_FWL

Photo 3.6-40: Typical view of a 12 in. by 12 in. treated timber fender wale.

Photo Type: Defect UFII/Asset Type: H10400102_FWL

Photo 3.6-41: View of missing timber fender chocks and wales, Sta. 9+15.

Photo Type: Defect UFII/Asset Type: H10400102_FWL

Photo 3.6-42: View of missing timber fender chocks and wales, Sta. 11+25 to Sta. 15+20.

H1040 - Mooring & Berthing Systems [redacted] **CI: 35**

H104005 - Mooring Hardware [redacted] **CI: 45**

UFII Component	H10400503	Cleats Asset Type(s): MF
Findings	The cleats are in Poor Condition. Berthing at the bulkhead and platform is supported by 11 cleats. The cleats are 24 in. long, painted steel fittings with a design capacity of 7 tons. The cleats are located along the north side of the bulkhead from Sta. 19+65 to Sta. 24+67. The cleats generally have moderate to heavy corrosion and isolated areas of heavy rust scale up to 1/4 in. thick. In the areas of heavier corrosion, minor loss of section of the fitting is evident. Four cleats are loose due to deteriorated or loose hardware. The rated conditions of each mooring fitting in accordance with UFC 4-150-8, Inspection of Mooring Hardware, are also presented within a table at the end of this report section. Please note that "Design Capacity" indicates the estimated original intended nominal allowable capacity of the fitting and the "Rating Capacity" indicates the estimated current nominal allowable capacity of the fitting based only on visual observations.	
Recommendations	It is recommended that the cleats be replaced with new, rated fittings selected and installed to meet operational requirements.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400503_MF

Photo 3.6-43: View of a 24 in. long painted steel cleat.

H5020 - Electrical Utilities	[redacted]	**CI: 60**
H502001 - Electrical Power Distribution	[redacted]	**CI: 75**

UFII Component	H50200104	Receptacles Asset Type(s): REC
Findings	The receptacles are in Satisfactory Condition. There are two electrical receptacles at the bulkhead. The receptacles are mounted to a 1/4 in. thick galvanized steel plate located at Sta. 21+48 at the edge of the bulkhead. The mounting panel is supported by two 1.5 in. diameter steel pipes anchored to the inboard face of the concrete curb. The mounting panel and panel support mounting hardware has minor surface corrosion. There were no defects noted at the receptacles.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200104_REC

Photo 3.6-44: Typical view of the electrical receptacles at Sta. 21+48.

H5020 - Electrical Utilities [redacted] **CI: 60**

H502002 - Telecommunications [redacted] **CI: 45**

UFII Component	H50200204	Cable Television Asset Type(s): CTV
Findings	The cable television panel is in Good Condition. There is one cable television panel at the bulkhead. The cable television panel is a 4 ft tall, 16 in. long and 16 in. wide plastic enclosure located at Sta. 15+99 along the edge of the bulkhead. There were no defects noted at the cable television panel.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200204_CTV

Photo 3.6-45: Typical view of the cable television panel at Sta. 15+99.

H5020 - Electrical Utilities [redacted] **CI: 60**

H502001 - Electrical Power Distribution [redacted] **CI: 75**

UFII Component	H50200105	Other Electrical Power Distribution Components Asset Type(s): PNL
Findings	The electrical enclosure is in Fair Condition. There is one electrical enclosure at the bulkhead. The electrical enclosure is a painted steel enclosure that is 70 in tall, 32 in. long and 16 in wide located at the edge of the bulkhead at Sta. 11+60. The enclosure has widespread paint loss and moderate surface corrosion at the base of the enclosure.	
Recommendations	It is recommended that the electrical enclosure be cleaned and painted.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200105_PNL

Photo 3.6-46: General view of the electrical enclosure at Sta. 11+60 with widespread paint loss and moderate corrosion.

H5020 - Electrical Utilities	Repair Cost $3,068	**CI: 60**

H502002 - Telecommunications	Repair Cost $2,237	**CI: 45**

UFII Component	H502002	Telecommunications Asset Type(s): COM
Findings	The communication enclosure is in Poor Condition. There is one communication enclosure at the bulkhead. The communication enclosure is a painted steel enclosure that is 14 in. tall, 16 in. long and 12 in. wide. The enclosure is mounted to the outboard face of the curb at Sta. 21+22 with two steel vertical supports. The enclosure has widespread paint loss and corrosion with visible section loss. At isolated locations the section loss is up to 100 percent.	
Recommendations	It is recommended that the communication enclosure be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H502002_COM

Photo 3.6-47: General view of the communications enclosure at Sta. 21+22 with wide spread paint loss and corrosion.

H5030 - Fire Protection and Suppression **CI: 75**

H503002 - Fire Alarm **CI: 75**

UFII Component	H503002	Fire Alarm Asset Type(s): FA
Findings	The fire alarms are in Satisfactory Condition. There are two fire alarms located at Sta. 5+90 and Sta. 11+25 along the edge of the bulkhead. The fire alarm at Sta. 11+25 is protected by two painted steel, concrete filled guard posts that are 3.5 ft tall and 6 in. in diameter. The fire alarms have isolated areas of paint loss but are otherwise free of defects and appear functional.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H503002_FA

Photo 3.6-48: Typical view of a fire alarm, Sta. 5+90.

Photo Type: Typical UFII/Asset Type: H503002_FA

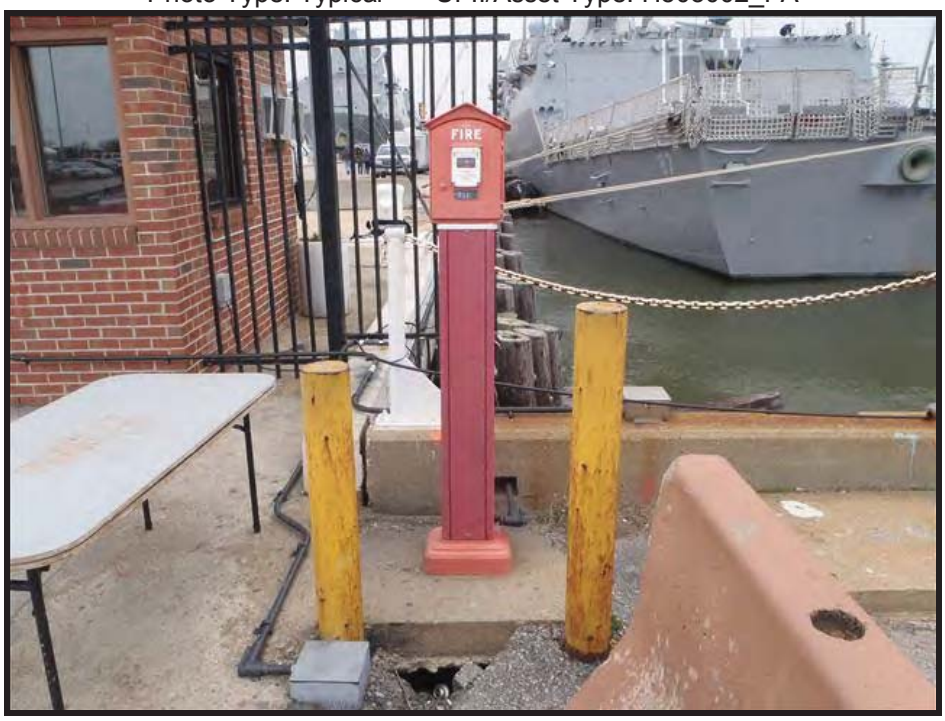


Photo 3.6-49: Typical view of the fire alarm and two guard posts, Sta. 11+25.

Mooring Hardware Condition

	**Asset Type:** MF **Fitting ID:** C1 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** 7 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2
	**Asset Type:** MF **Fitting ID:** C2 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 3
	**Asset Type:** MF **Fitting ID:** C3 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 3

	**Asset Type:** MF **Fitting ID:** C4 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 3

	**Asset Type:** MF **Fitting ID:** C5 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 2

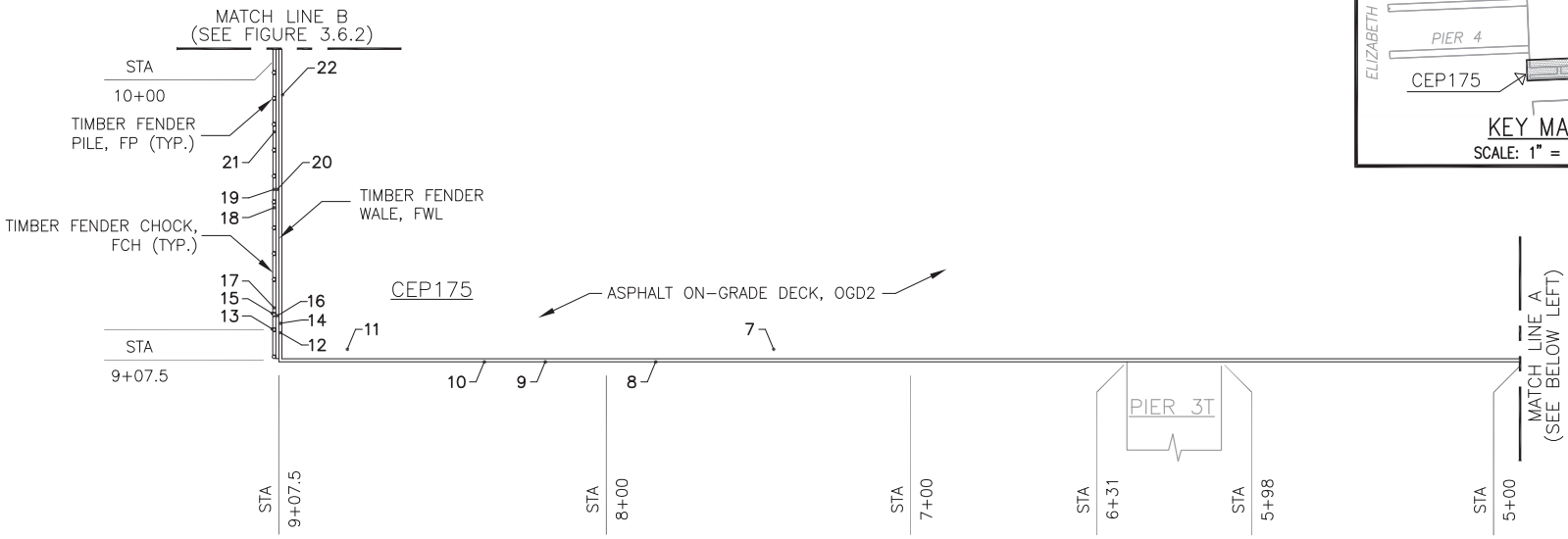
	**Asset Type:** MF **Fitting ID:** C6 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 3

	**Asset Type:** MF **Fitting ID:** C7 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** 7 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

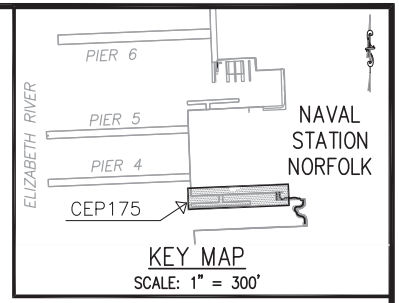
	**Asset Type:** MF **Fitting ID:** C8 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** 7 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2
	**Asset Type:** MF **Fitting ID:** C9 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** 7 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2
	**Asset Type:** MF **Fitting ID:** C10 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 2
	**Asset Type:** MF **Fitting ID:** C11 **Type:** 24 in. Cleat **Design Capacity:** 7 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: 2

Mooring Condition Rating Key:

1	(Green)	Good Condition
2	(Blue)	Minor Deterioration
3	(Yellow)	Moderate Deterioration
4	(Red)	Severe Deterioration



FACILITY PLAN
SCALE: 1" = 40'



KEY MAP
SCALE: 1" = 300'

LEGEND

STA 1+00	DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
2	DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B-STRUCTURAL DATA TABLE FOR MORE INFORMATION)
C1 (1/2/3)	MOORING FITTING ID. NUMBER AND CONDITION RATING (FITTING/BASE/HARDWARE)

ASSET(S) NOT SHOWN

UTL	– UTILITY TRENCH COVER
MH1–3	– MANHOLES
OGD1	– ON-GRADE DECK
GPT	– GUARDPOST
FA	– FIRE ALARM

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

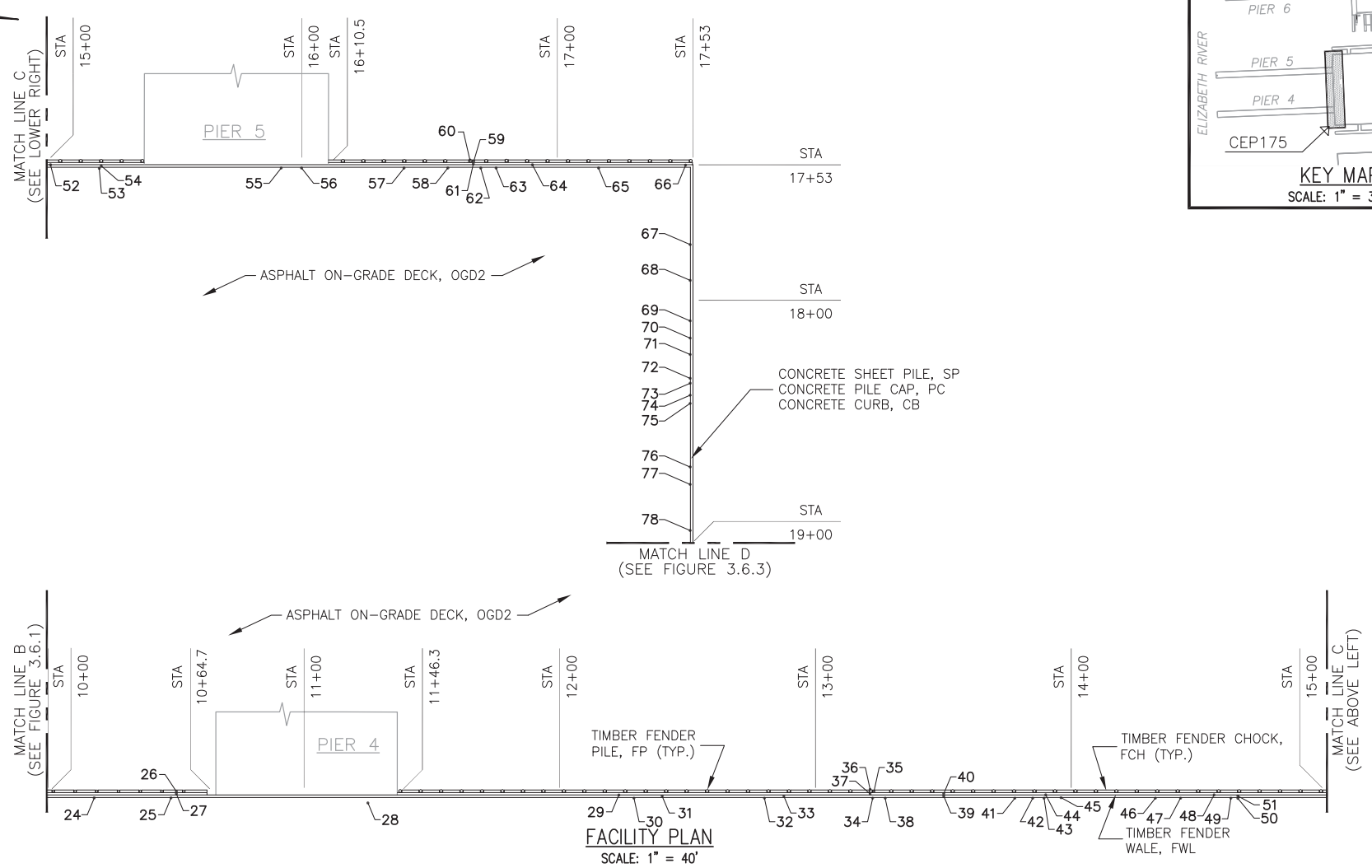
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND
AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

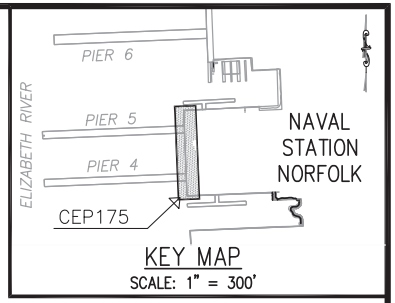
NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

CEP175 BULKHEAD
FACILITY PLAN

FIG. NO. 3.6-1



FACILITY PLAN
SCALE: 1" = 40'



KEY MAP
SCALE: 1" = 300'

LEGEND

STA 1+00	DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
2	DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)
C1 (1/2/3)	MOORING FITTING ID. NUMBER AND CONDITION RATING (FITTING/BASE/HARDWARE)

ASSET(S) NOT SHOWN

OGD1– ON-GRADE DECK
GPT – GUARD POST
CTV – CABLE TELEVISION PANEL
PNL – ELECTRICAL PANEL
FA – FIRE ALARM

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

NAVFAC
Naval Facilities Engineering Command

DATE: APRIL 2014

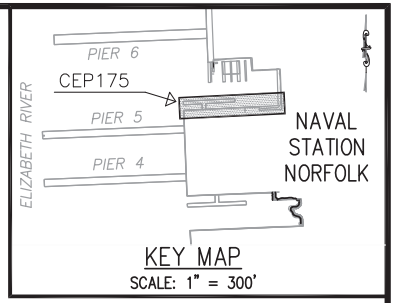
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND
AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

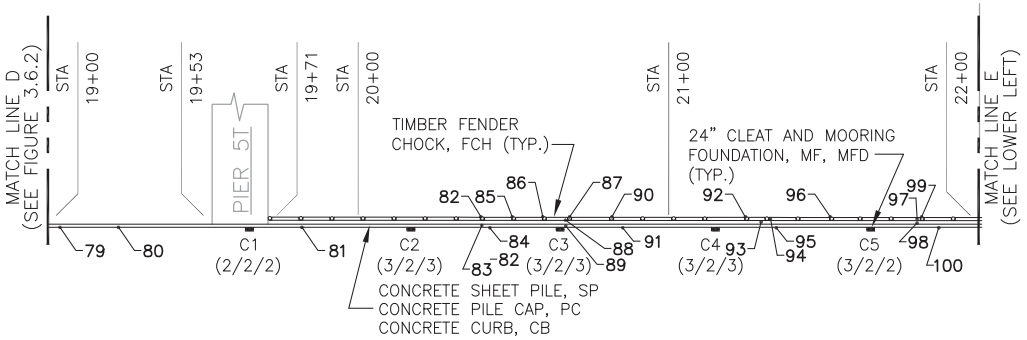
NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

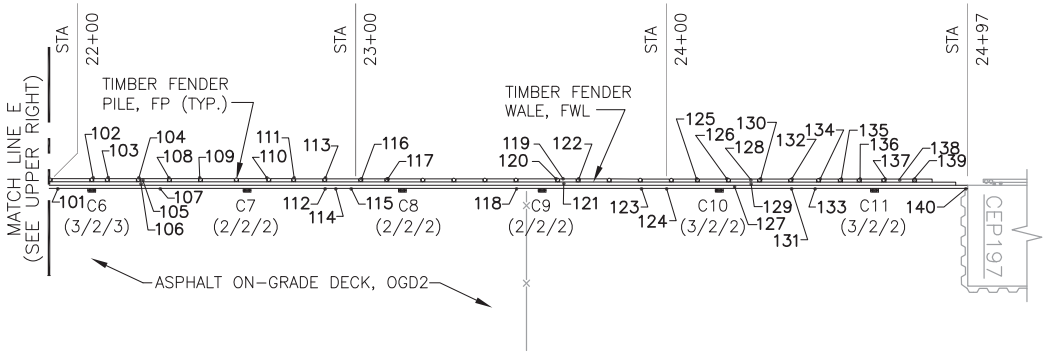
CEP175 BULKHEAD
FACILITY PLAN

FIG. NO.
3.6-2



KEY MAP
SCALE: 1" = 300'





FACILITY PLAN
SCALE: 1" = 40'

LEGEND

STA 1+00	DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
2	DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B-STRUCTURAL DATA TABLE FOR MORE INFORMATION)
C1 (1/2/3)	MOORING FITTING ID. NUMBER AND CONDITION RATING (FITTING/BASE/HARDWARE)

ASSET(S) NOT SHOWN

OGD1 – ON-GRADE DECK
GPT – GUARD POST
REC – RECEPTACLE
COM – COMMUNICATIONS PANEL

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

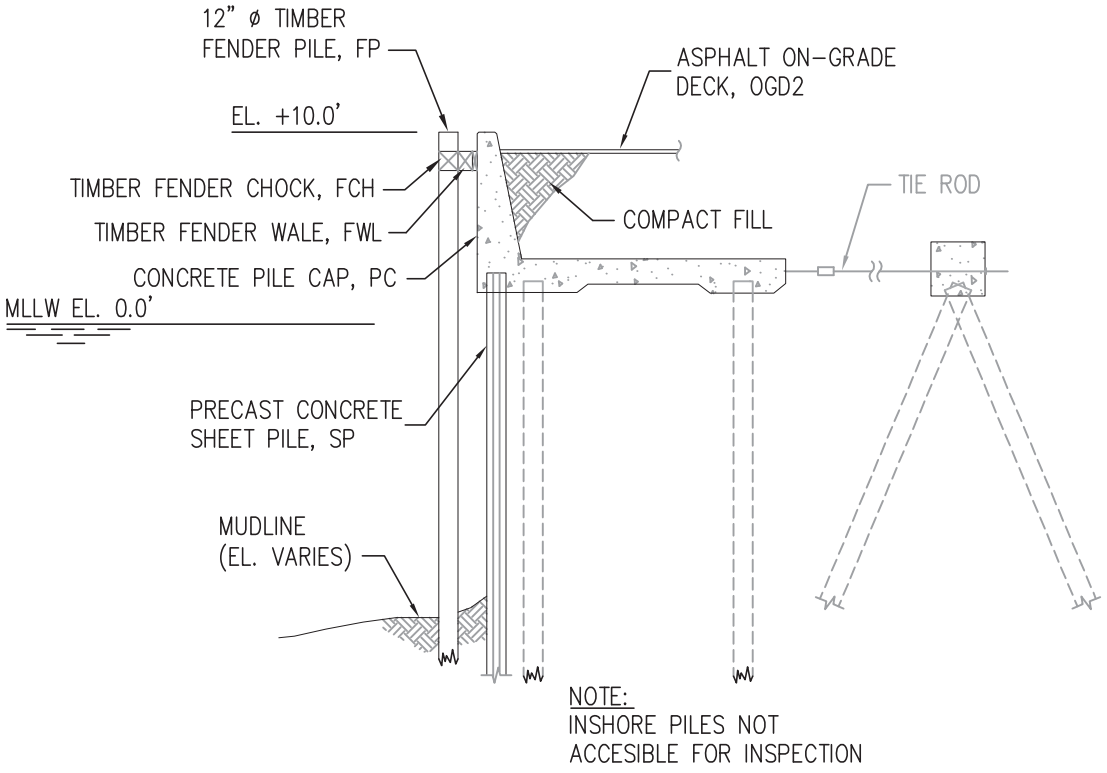
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

CEP175 BULKHEAD FACILITY PLAN

FIG. NO. 3.6-3



TYPICAL SECTION

SCALE: 1" =10'

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

NAVFAC Naval Facilities Engineering Command

NAVAL FACILITIES ENGINEERING
AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

GRAPHIC SCALE
10 5 0 10 FT.
SCALE: 1" = 10'

DATE: APRIL 2014

CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL STATION NORFOLK NORFOLK, VIRGINIA

CEP175 BULKHEAD
TYPICAL SECTION

FIG. NO.
3.6-4

Norfolk Naval Station
Norfolk, Virginia

Section 3.7 - CEP169A 5T Breakwater

Contract: N62583-12-D-0749 Inspection Date: 11/22/2013

Contractor: Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

Facility: CEP169A 5T Breakwater **iNFADS:** NFA200000722318 **PRN:** 200972

Location: 36.942382, -76.329615

Estimated Repair Cost: [redacted]

**Repair cost includes Design Allowances, Contractor Overhead & Profit, and Inflation Allowances. See Appendix C - Cost Estimate for detailed analysis.*

Condition Index (CI)	**77**	**Max Water Current**	<1kn
Engineering Assessment Rating	Satisfactory	**Water Clarity**	<10ft
Operational Rating	C1	**Tide Variation**	3ft
5 Year Projected CI	77	**Max Water Depth**	46ft
10 Year Projected CI	77	**Seasonal Water Temp**	53°F
Year(s) Previously Inspected		**Seasonal Ambient Temp**	53°F

Facility Usage Description:
CEP169A 5T Breakwater was constructed in 2008 and is used to protect the small craft basin from wave and wake action. The breakwater is comprised of reinforced concrete sheet piles and steel H-piles laterally supported by concrete battered piles.

Summary of Repair Recommendations:
It is recommended that three open spalls and six cracks on the concrete battered piles be repaired. One open mechanical spall and one diagonal crack on the north end of the longitudinal pile cap should also be repaired.

Impact To Mission If Repairs Not Provided:
Continued deterioration of the concrete battered piles and pile cap is likely if repairs are not made.

Operational Restrictions:
There are no existing or recommended operational restrictions for CEP169A 5T Basin Outer Breakwater at this time.

Additional Facility Photos

Photo 3.7-1: Overview of CEP169A 5T Breakwater, looking northeast.

Photo 3.7-2: Overview of CEP169A 5T Breakwater, looking west.

H1010 - Substructure [redacted] **CI: 75**

H101001 - Pile Foundations [redacted] **CI: 75**

UFII Component	H10100101	Piles Asset Type(s): P & PB
Findings	The piles are in Satisfactory Condition. A total of 96 piles support the breakwater. There are 76 steel H-piles anchored between the concrete sheet piles for the full length of the breakwater connected by 1 in. diameter anchor rods. Isolated steel H-piles on the west side of the breakwater exhibit minor coating loss and rust scale above the water surface typically less than 1/16 in. thick. The steel H-pile at the north end of the breakwater has been impacted and the flanges are bent up to 2 in. near the top of the pile. There are 20 battered 24 in. square concrete piles providing lateral support for the breakwater. The concrete battered piles exhibit three open mechanical spalls up to 0.25 sq ft in area and six horizontal and vertical cracks up to 1/8 in. wide, typically within 1 ft of the pile cap.	
Recommendations	It is recommended that three open spalls and six cracks on the concrete battered piles be repaired. The impacted steel H-pile is securely anchored to the concrete sheet piles and providing sufficient support, therefore no repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100101_P

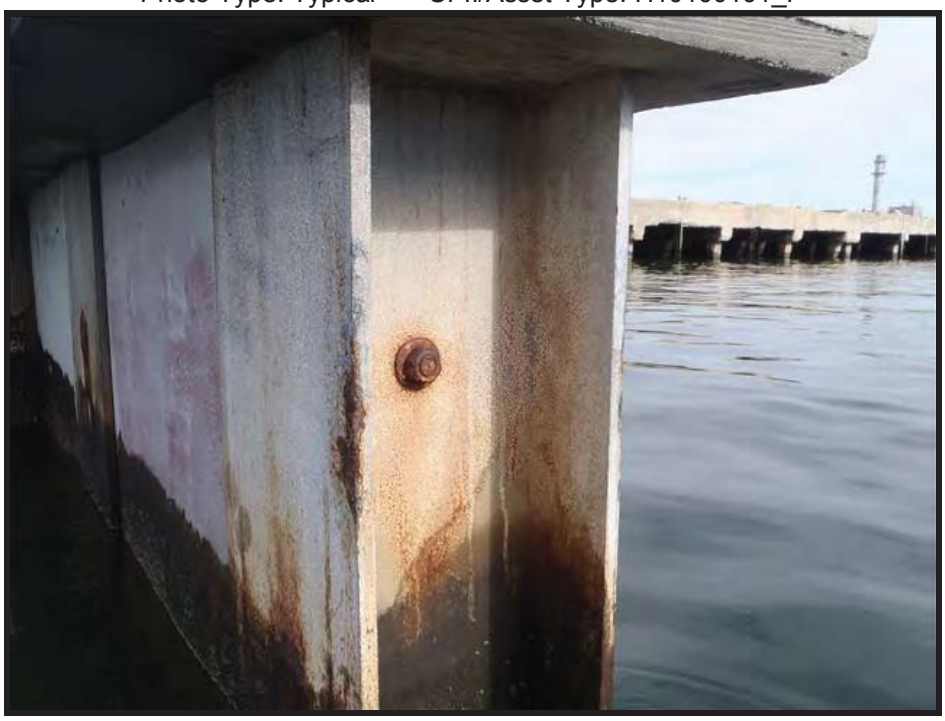


Photo 3.7-3: View of a steel H-pile.

Photo Type: Defect UFII/Asset Type: H10100101_P

Photo 3.7-4: View of a steel H-pile on the west side of the breakwater with coating loss and rust scale.

Photo Type: Defect UFII/Asset Type: H10100101_P

Photo 3.7-5: View of the impacted steel H-pile at the north end of the breakwater.

Photo Type: Typical UFII/Asset Type: H10100101_PB

Photo 3.7-6: View of a concrete battered pile.

Photo Type: Defect UFII/Asset Type: H10100101_PB

Photo 3.7-7: View of an open mechanical spall at the top of a concrete battered pile.

Photo Type: Defect UFII/Asset Type: H10100101_PB

Photo 3.7-8: View of a horizontal crack at the top of a concrete battered pile.

H1010 - Substructure [redacted] **CI: 75**

H101001 - Pile Foundations [redacted] **CI: 75**

UFII Component	H10100102	Sheet Piles Asset Type(s): SP
Findings	The sheet piles are in Satisfactory Condition. There are 75 reinforced concrete sheet piles anchored between the steel H-piles that are 4 ft wide and 1 ft deep. Gaps between the concrete sheet piles and steel H-piles are present at two locations below the water surface. The gaps are typically from the mudline to 10 ft above the mudline and are up to 3 in. wide.	
Recommendations	No repairs are recommended at this time. The gaps between the concrete sheet piles are likely an as-constructed condition and the sheet piles otherwise appear supported and secure.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.7-9: View of reinforced concrete sheet piles.

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.7-10: Typical condition of reinforced concrete sheet piles.

Photo Type: Defect UFII/Asset Type: H10100102_SP

Photo 3.7-11: View of a 3 in. gap between a concrete sheet pile and steel H-pile.

H1010 - Substructure [redacted] **CI: 75**

H101002 - Pile Caps [redacted] **CI: 75**

UFII Component	H101002	Pile Caps Asset Type(s): PC1 & PC2
Findings	The pile caps are in Satisfactory Condition. The sheet piles support a 315 linear ft longitudinal reinforced concrete pile cap that is 3 ft 6 in. wide and 3 ft tall. A 5 ft long concrete pile cap is also located at each battered pile location. The pile caps typically exhibit isolated hairline cracking and light scaling up to 1/4 in. deep. There is impact damage present at the north end of the longitudinal pile cap. The damage consists of a large open mechanical spall 4.3 sq ft in area and 7 in. deep with one exposed reinforcing bar and one 3/8 in. wide diagonal crack.	
Recommendations	It is recommended that one open mechanical spall and one diagonal crack on the longitudinal pile cap be repaired.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101002_PC1

Photo 3.7-12: Overview of the longitudinal concrete pile cap.

Photo Type: Typical UFII/Asset Type: H101002_PC1

Photo 3.7-13: Typical condition of the longitudinal concrete pile cap.

Photo Type: Defect UFII/Asset Type: H101002_PC1

Photo 3.7-14: View of an open mechanical spall on the north end of the longitudinal pile cap.

Photo Type: Defect UFII/Asset Type: H101002_PC1

Photo 3.7-15: View of a 3/8 in. wide diagonal crack on the north end of the longitudinal pile cap.

Photo Type: Typical UFII/Asset Type: H101002_PC2

Photo 3.7-16: View of a pile cap located above a battered pile.

H1020 - Superstructure **CI: 90**

H102004 - Other Superstructure Components **CI: 90**

UFII Component	H102004	Other Superstructure Components Asset Type(s): WSW
Findings	The other superstructure components are in Good Condition. There is 309 linear ft of a reinforced concrete wave screen wall cast on top of the longitudinal pile cap that is 1 ft wide and 3 ft tall. The wave screen wall exhibits hairline vertical cracking typically located every 4 ft. No other defects are noted on the wave screen wall.	
Recommendations	No repairs are recommended at this time. The hairline vertical cracking on the wave screen wall does not require repairs at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H102004_WSW

Photo 3.7-17: View of the longitudinal wave screen wall.

Photo Type: Defect UFII/Asset Type: H102004_WSW

Photo 3.7-18: View of typical hairline cracking on the wave screen wall.

H5020 - Electrical Utilities **CI: 90**

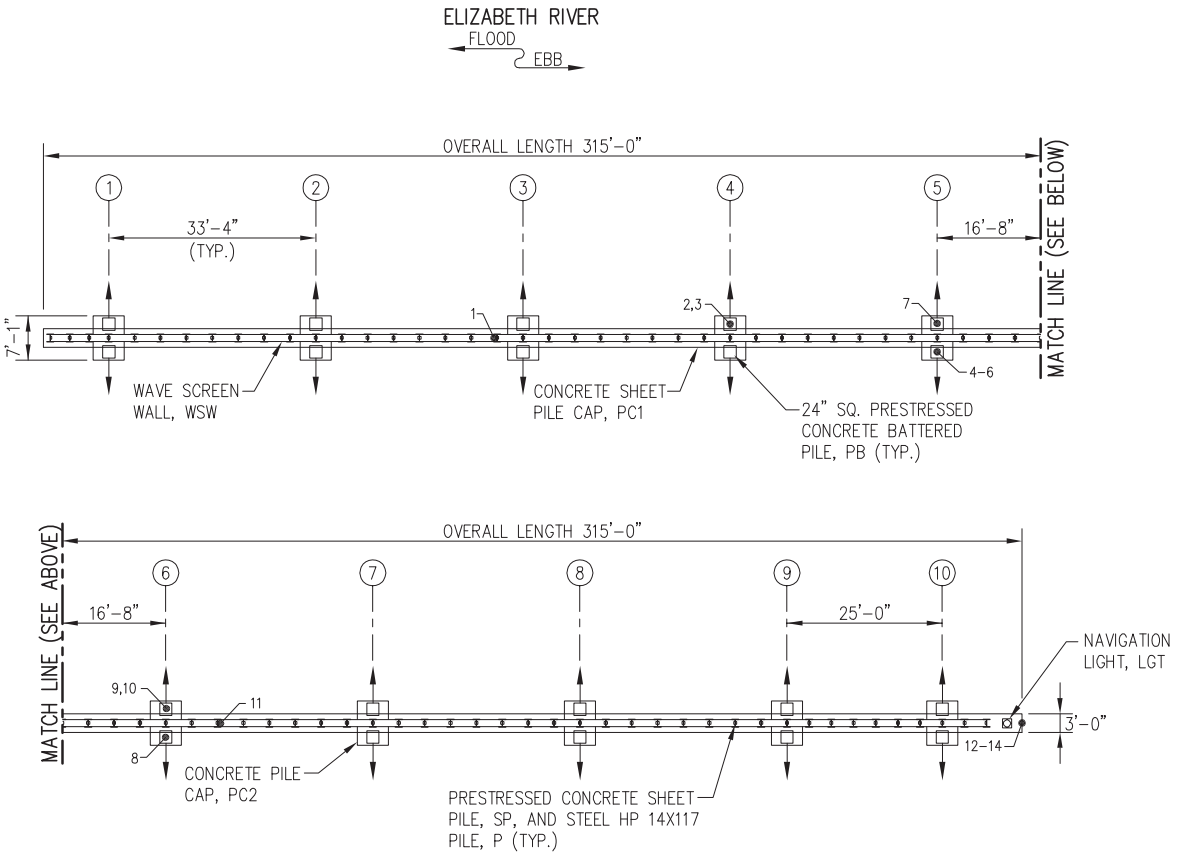
H502003 - Lighting **CI: 90**

UFII Component	H502003	Lighting Asset Type(s): LGT
Findings	The lighting is in Good Condition. There is one navigation light located on the north end of the breakwater. The galvanized steel light pole is 12 in. diameter and is secured to the topside of the sheet pile cap with 3/4 in. diameter anchor bolts. No defects are noted on the navigation light.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

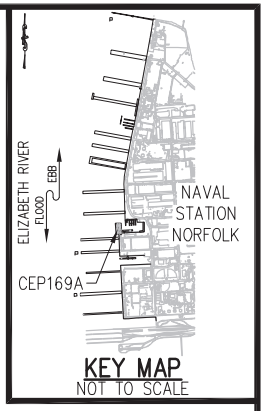
Photo Type: Typical UFII/Asset Type: H502003_LGT

Photo 3.7-19: View of the navigation light.



FACILITY PLAN

SCALE: 1" = 20'



KEY MAP
NOT TO SCALE

LEGEND

(2) PILE BENT DESIGNATION

2 DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
20 10 0 20 FT.
SCALE: 1" = 20'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

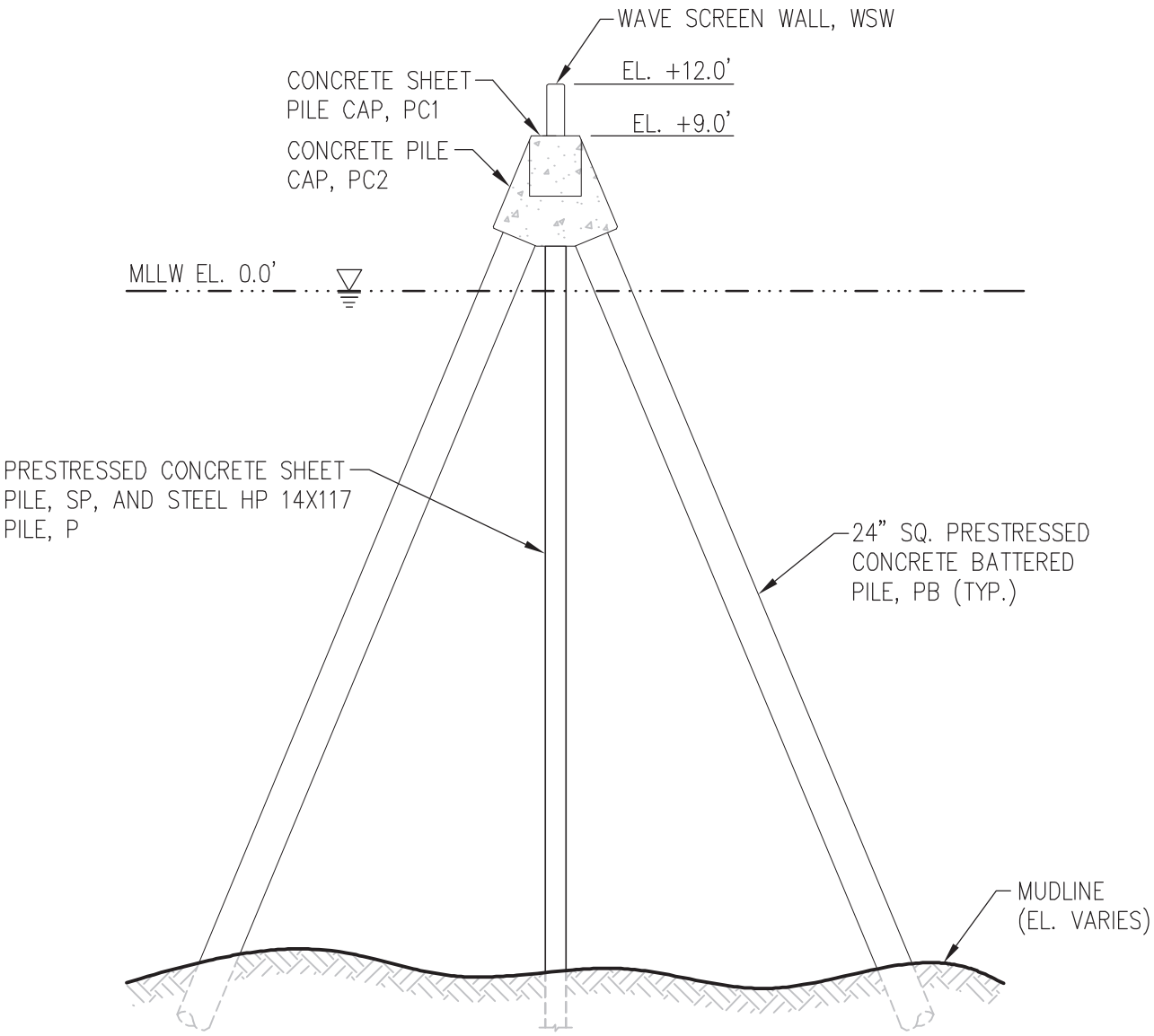
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

NAVAL STATION NORFOLK NORFOLK, VA

CEP169A 5T BASIN OUTER BREAKWATER FACILITY PLAN

FIG. NO. 3.7-1



TYPICAL SECTION

SCALE: 1" = 10'

MSI MARINE SOLUTIONS, INC. ENGINEERING & COMMERCIAL DIVING SERVICES	NAVFAC Naval Facilities Engineering Command	NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER WASHINGTON, D.C.
GRAPHIC SCALE 10 5 0 10 FT. SCALE: 1" = 10'	DATE: APRIL 2014 CONTRACT NUMBER N62583-12-D-0749 Delivery Order No. 0009	NAVAL STATION NORFOLK NORFOLK, VA **CEP169A 5T BASIN OUTER BREAKWATER TYPICAL SECTION**
		FIG. NO. **3.7-2**

Norfolk Naval Station
Norfolk, Virginia

Section 3.11 - CEP169 Breakwater

Contract: N62583-12-D-0749 Inspection Date: 02/20/2013

Contractor: Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

Facility: CEP169 Breakwater **iNFADS:** NFA200000466292 **PRN:** 200969

Location: 36.943339, -76.328696

[redacted]

**Repair cost includes Design Allowances, Contractor Overhead & Profit, and Inflation Allowances. See Appendix C - Cost Estimate for detailed analysis.*

Condition Index (CI)	**75**	**Max Water Current**	<1kn
Engineering Assessment Rating	Satisfactory	**Water Clarity**	<10ft
Operational Rating	C3	**Tide Variation**	3ft
5 Year Projected CI	75	**Max Water Depth**	31ft
10 Year Projected CI	70	**Seasonal Water Temp**	53°F
Year(s) Previously Inspected	2007	**Seasonal Ambient Temp**	53°F

Facility Usage Description:
CEP169 Breakwater and Boatramp underwent reconstruction in 2005 and is used to berth barges, small vessels, and other marine equipment. The breakwater and boat ramp are comprised of reinforced concrete and fiber reinforced polymer sheet piles, pre-cast reinforced concrete bearing piles, and longitudinal concrete pile caps. A fender system comprised of HDPE fender piles and galvanized steel fender wales supports berthing at the facility.

Summary of Repair Recommendations:
It is recommended that the open corrosion and mechanical spalls on the sheet piles, pile caps, and mooring foundations be repaired. The gaps in the joints of the concrete sheet piles should also be repaired. The missing, broken, and detached fender piles, wales, molded fenders, and fender pile guide assemblies should be repaired or replaced to restore the berthing capacity of the facility. The cleats should be cleaned, inspected for integrity, and repainted.

Impact To Mission If Repairs Not Provided:
The concrete elements will continue to deteriorate until repairs are executed. Vessel mooring presents an increased risk of structural damage from vessel impacts and will continue to be restricted until fender system repairs are completed.

Operational Restrictions:
Due to the condition of the fender system, vessel mooring and berthing should be restricted to prevent damage to the structure and moored vessels.

Additional Facility Photos

Photo 3.11-1: Overview of CEP169 Breakwater from basin, looking north.

Photo 3.11-2: Overview of CEP169 Breakwater from basin, looking northwest.

Photo 3.11-3: Overview of CEP169 Breakwater near Sta. 0+00, looking south.

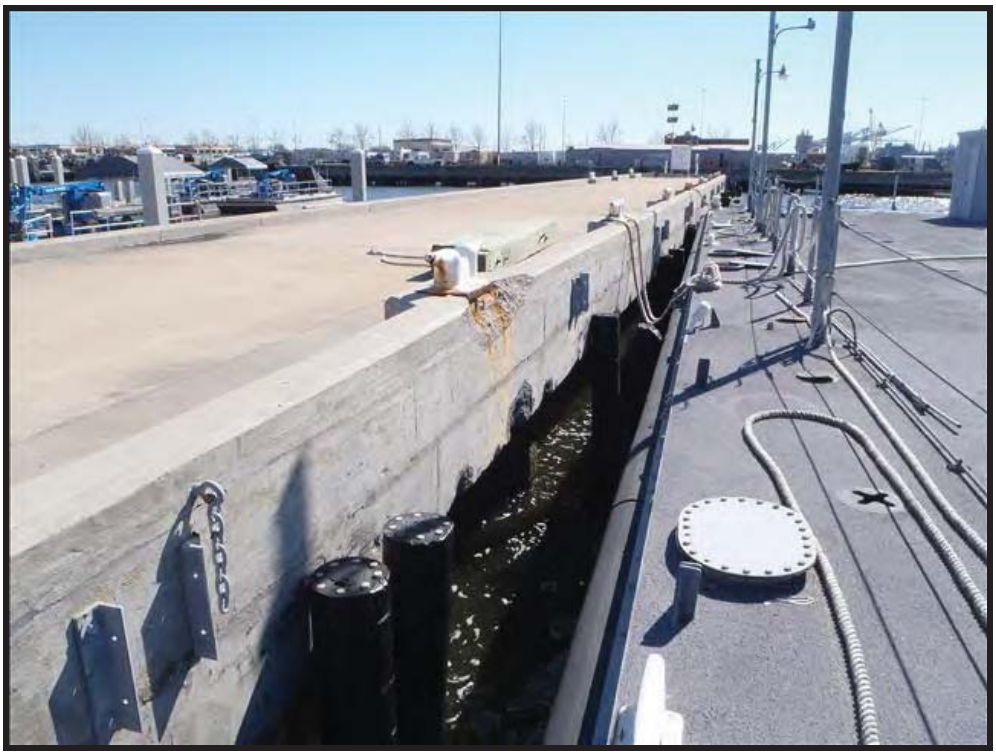


Photo 3.11-4: Overview of CEP169 Breakwater near Sta. 0+00, looking southeast.

H1010 - Substructure [redacted] **CI: 83**

H101001 - Pile Foundations [redacted] **CI: 90**

UFII Component	H10100101	Piles Asset Type(s): P & PB
Findings	The piles are in Good Condition. A total of 29 piles support the breakwater. There are 13 vertical and 16 battered, 18 in. square pre-cast reinforced concrete piles. The piles generally have white epoxy coating for their entire exposed length and exhibit only minor scaling, abrasion, and isolated areas of missing coating.	
Recommendations	There are no repairs recommended on the piles at this time. The minor scaling, abrasion, and isolated areas of missing epoxy coating do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100101_P

Photo 3.11-5: View of a vertical 18 in. square concrete pile supporting the breakwater.

Photo Type: Typical UFII/Asset Type: H10100101_P

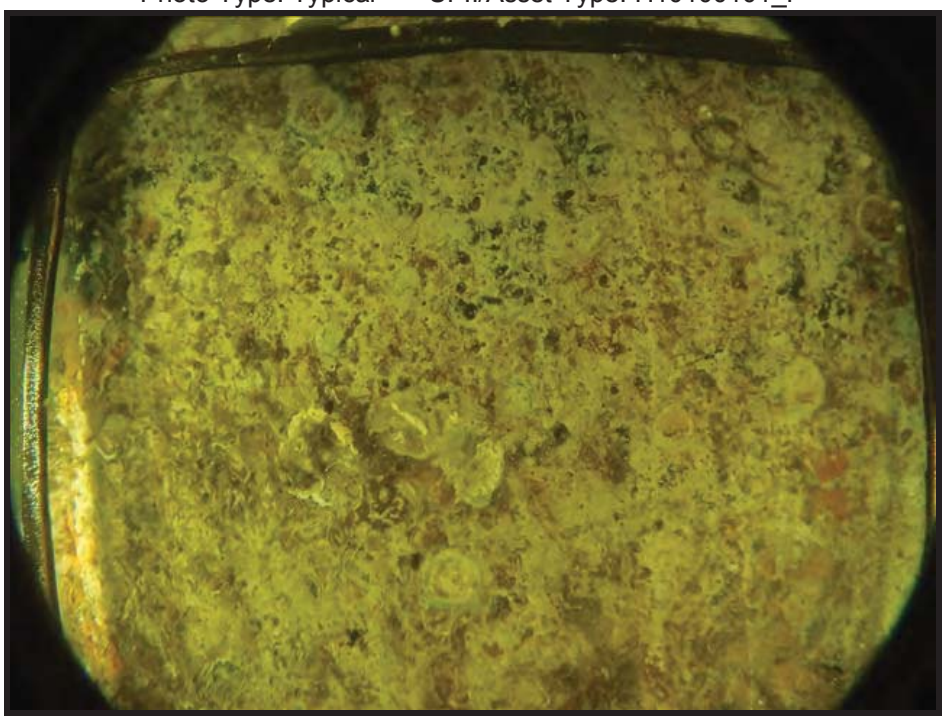


Photo 3.11-6: Typical condition of a vertical concrete pile below water.

Photo Type: Typical UFII/Asset Type: H10100101_PB

Photo 3.11-7: View of a battered 18 in. square concrete pile supporting the breakwater.

Photo Type: Typical UFII/Asset Type: H10100101_PB

Photo 3.11-8: View of a battered concrete pile with light abrasion and coating loss.

H1010 - Substructure [redacted] **CI: 83**

H101001 - Pile Foundations [redacted] **CI: 90**

UFII Component	H10100102	Sheet Piles Asset Type(s): SP1 & SP2
Findings	The sheet piles are in Satisfactory Condition overall. There is 304 linear ft of sheet piles supporting CEP169 Breakwater and the boat ramp. The breakwater is constructed of 198 linear ft of tongue and groove jointed reinforced concrete sheet piles that are 4 ft long and 16 in. deep. There is a white epoxy coating applied to the sheet piles and concrete rubble riprap is typically located at the mudline along the sheeting. The concrete sheet piles are in satisfactory condition with isolated mechanical spalling, light abrasion, and coating loss. Two joints on the east side of the concrete sheet piles exhibit mechanical spalls up to 1 sq ft in area and two gaps are observed in the joints up to 3.5 in. wide. The perimeter of the boat ramp on the east and south sides is constructed of 106 linear ft of fiber reinforced polymer sheet piles that are 1 ft 6 in. long and 8 in. deep. The fiber reinforced polymer sheet piles are in good condition with no defects noted.	
Recommendations	It is recommended that two open mechanical spalls and gaps located at the concrete sheet pile joints be repaired to limit further deterioration.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100102_SP1

Photo 3.11-9: View of reinforced concrete sheet piles.

Photo Type: Defect UFII/Asset Type: H10100102_SP1

Photo 3.11-10: Open mechanical spall located at a concrete sheet pile joint.

H1010 - Substructure [redacted] **CI: 83**

H101002 - Pile Caps [redacted] **CI: 75**

UFII Component	H101002	Pile Caps Asset Type(s): PC1 & PC2
Findings	The pile caps are in Satisfactory Condition overall. The breakwater is constructed of two longitudinal pile caps that span the sheet piles and the bearing piles. The inboard row of battered piles and the concrete sheet piles support a 198 linear ft reinforced concrete pile cap that is 48 in. tall and varies in width from 45 in. to 62 in. The pile cap is in satisfactory condition with isolated areas of mechanical spalling and minor impact damage along the east face of the cap. Defects were noted on the pile cap in two locations, including two mechanical spalls up to 10 ft in length and 2 in. in depth. The outboard row of vertical piles supports a 198 linear ft reinforced concrete pile cap that is 54 in. wide and 24 in. tall. The pile cap is in satisfactory condition with minor impact damage and mechanical spalling near the bottom of the outboard face up to 2 in. in depth. Defects are noted on the pile cap in four locations, including open concrete spalls affecting a total area of 31 sq ft. Reinforcing bars are exposed at one of these locations.	
Recommendations	It is recommended that six open concrete spalls on the pile caps be repaired.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101002_PC1

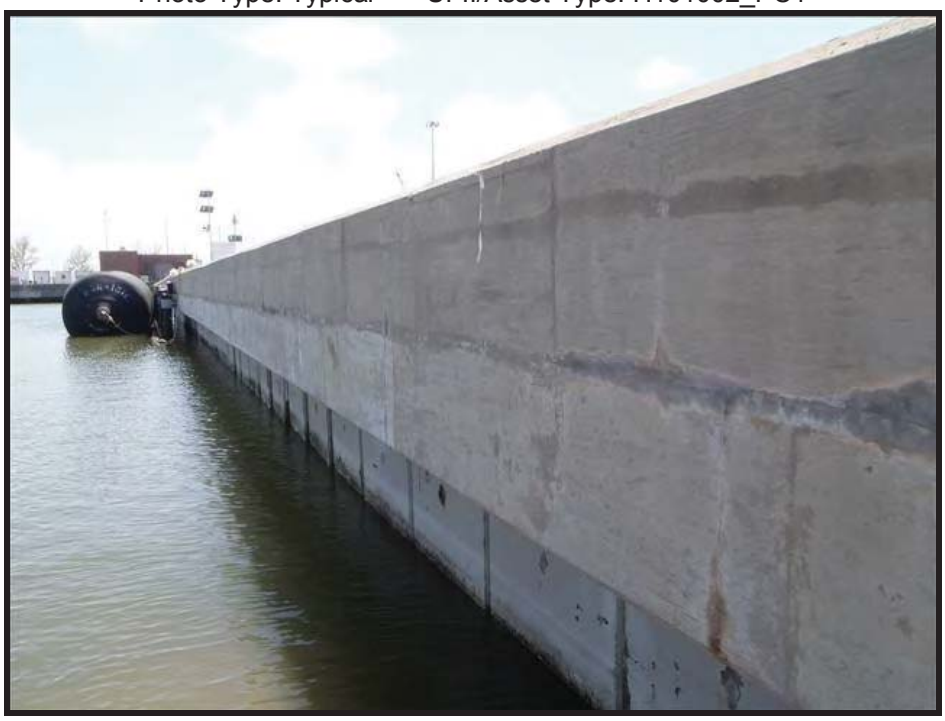


Photo 3.11-11: Overview of the pile cap supported by the inboard row of piles and the concrete sheet piles.

Photo Type: Typical UFII/Asset Type: H101002_PC1

Photo 3.11-12: Typical configuration of the inboard pile cap at battered pile locations.

Photo Type: Defect UFII/Asset Type: H101002_PC1

Photo 3.11-13: View of an open mechanical spall located on the east face of the pile cap.

Photo Type: Typical UFII/Asset Type: H101002_PC2

Photo 3.11-14: Overview of the pile cap supported by the outboard row of piles.

Photo Type: Defect UFII/Asset Type: H101002_PC2

Photo 3.11-15: View of a 4 in. deep open mechanical spall located on the outboard face of the pile cap.

Photo Type: Defect UFII/Asset Type: H101002_PC2

Photo 3.11-16: View of an open corrosion spall located on the outboard face of the pile cap with four exposed reinforcing bars.

H1010 - Substructure [redacted] **CI: 83**

H101003 - Quays **CI: 75**

UFII Component	H10100303	Tie Rods Asset Type(s): TR
Findings	The tie rods are in Satisfactory Condition. There are a total of 13 stainless steel tie rods supporting the breakwater that are 1 in. in diameter and approximately 23 ft in length. The tie rods provide lateral support to the structure by anchoring the concrete sheet piles to the fiber reinforced polymer sheet piles surrounding the boat ramp. The visible tie rod nuts exhibit minor corrosion but are typically intact. One tie rod is not securely anchored resulting in a 4 in. gap between the tie rod nut and the concrete sheet pile.	
Recommendations	There are no repairs recommended at this time.	

Supporting Photos

Photo Type: Defect UFII/Asset Type: H10100303_TR

Photo 3.11-17: Underwater view of the unsecured tie rod.

H1010 - Substructure [redacted] **CI: 83**

H101007 - Boat Ramps **CI: 75**

UFII Component	H101007	Boat Ramps Asset Type(s): RMP
Findings	The boat ramp is in Satisfactory Condition. There is 1,785 sq ft of a cast in place concrete boat ramp adjacent to CEP169 Breakwater. The perimeter of the boat ramp on the east and south sides is formed by fiber reinforced polymer sheet piles. The boat ramp exhibits light scaling throughout, with longitudinal cracking up to 1/4 in. wide typically starting 15 ft south of the top of the ramp and extending to below the water surface.	
Recommendations	There are no repairs recommended to the boat ramp at this time. The light scaling and longitudinal cracking present on the boat ramp does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101007_RMP

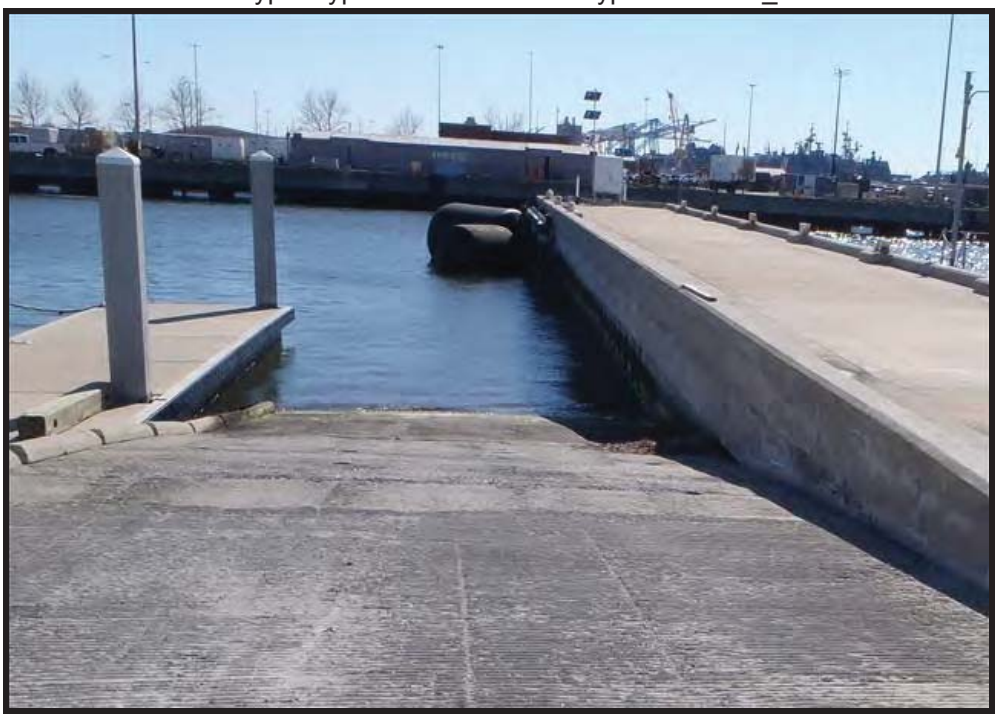


Photo 3.11-18: Overview of the concrete boat ramp adjacent to CEP169 Breakwater.

Photo Type: Typical UFII/Asset Type: H101007_RMP

Photo 3.11-19: View of the boat ramp adjacent to the breakwater.

H1030 - Deck Components [redacted] **CI: 69**

H103001 - Deck **CI: 90**

UFII Component	H103001	Deck Asset Type(s): DA & DU
Findings	The deck is in Good Condition. The breakwater consists of 3,697 sq ft of reinforced concrete deck that is 16 in. in thickness. The topside of the deck exhibits isolated minor hairline cracking and light weathering, but is otherwise free of defects. There are no defects noted on the underside of the deck.	
Recommendations	There are no repairs recommended on the deck at this time. The minor hairline cracking and light weathering of the topside of the deck do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103001_DA

Photo 3.11-20: View of the topside of the deck.

Photo Type: Typical UFII/Asset Type: H103001_DU

Photo 3.11-21: View of the underside of the deck.

H1030 - Deck Components **Repair Cost $1,968** **CI: 69**

H103004 - Curbs & Bullrails **CI: 90**

UFII Component	H103004	Curbs & Bullrails Asset Type(s): CB
Findings	The curbs and bullrails are in Good Condition. There is 425 linear ft of a reinforced concrete curb that is 12 in. wide and 10 in. deep bordering CEP169 Breakwater. The concrete curb exhibits isolated hairline cracking and light abrasion marks but is otherwise free of defects.	
Recommendations	No repairs are recommended at this time. The isolated hairline cracking and light abrasion marks present on the concrete curb do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103004_CB

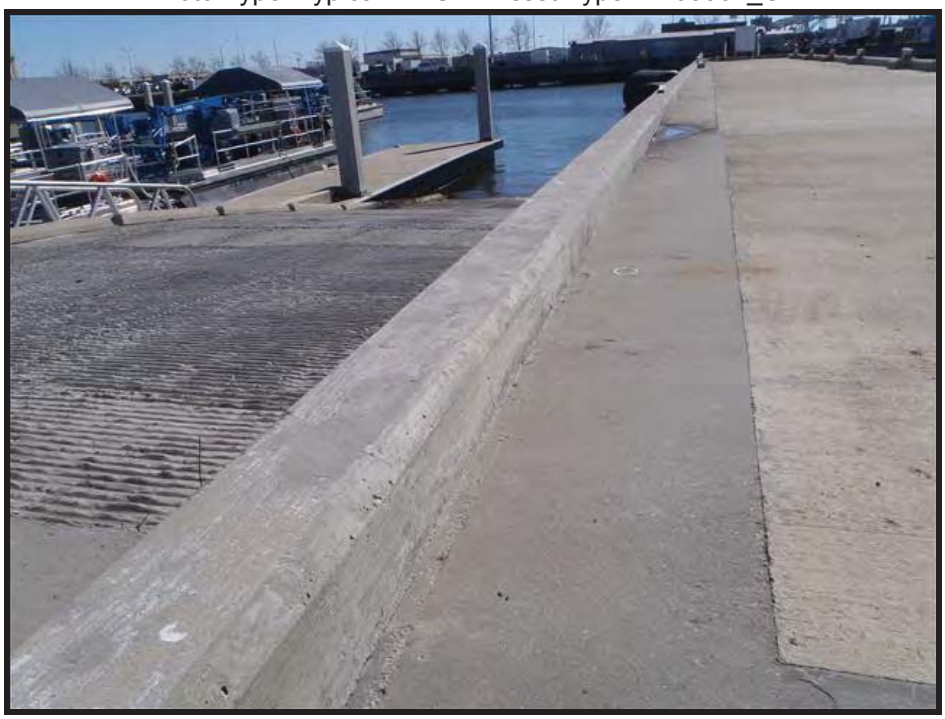


Photo 3.11-22: View of the reinforced concrete curb.

H1030 - Deck Components [redacted] **CI: 69**

H103005 - Mooring Foundations [redacted] **CI: 75**

UFII Component	H103005	Mooring Foundations Asset Type(s): MFD
Findings	The mooring foundations are in Satisfactory Condition. There are 11 mooring foundations that are 5 ft 6 in. long, 26 in. wide, and 10 in. deep located on the breakwater. A 42 in. cleat is attached to each foundation. The foundations are in satisfactory condition with isolated hairline cracking emanating from the inset steel fitting. One mooring foundation has an open mechanical spall present on the outboard face that affects approximately 7 sq ft and is up to 5 in. deep.	
Recommendations	It is recommended that one mechanical spall on a mooring foundation be repaired. The isolated hairline cracking located on the mooring foundations does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103005_MFD

Photo 3.11-23: View of a 42 in. cleat mooring foundation.

Photo Type: Defect UFII/Asset Type: H103005_MFD

Photo 3.11-24: Open mechanical spall on the outboard side of a mooring foundation.

H1030 - Deck Components [redacted] **CI: 69**

H103008 - Expansion Joints **CI: 90**

UFII Component	H103008	Expansion Joints Asset Type(s): EJ
Findings	The expansion joint is in Good Condition. There is one expansion joint located at the north end of the breakwater. The 18 ft 8 in. joint is oriented perpendicular to the length of the breakwater. The expansion joint is 8 in. wide overall and is constructed of galvanized steel angles and a 3 in. wide rubber gasket. There are no defects present on the expansion joint.	
Recommendations	There are no repairs recommended on the expansion joint at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103008_EJ

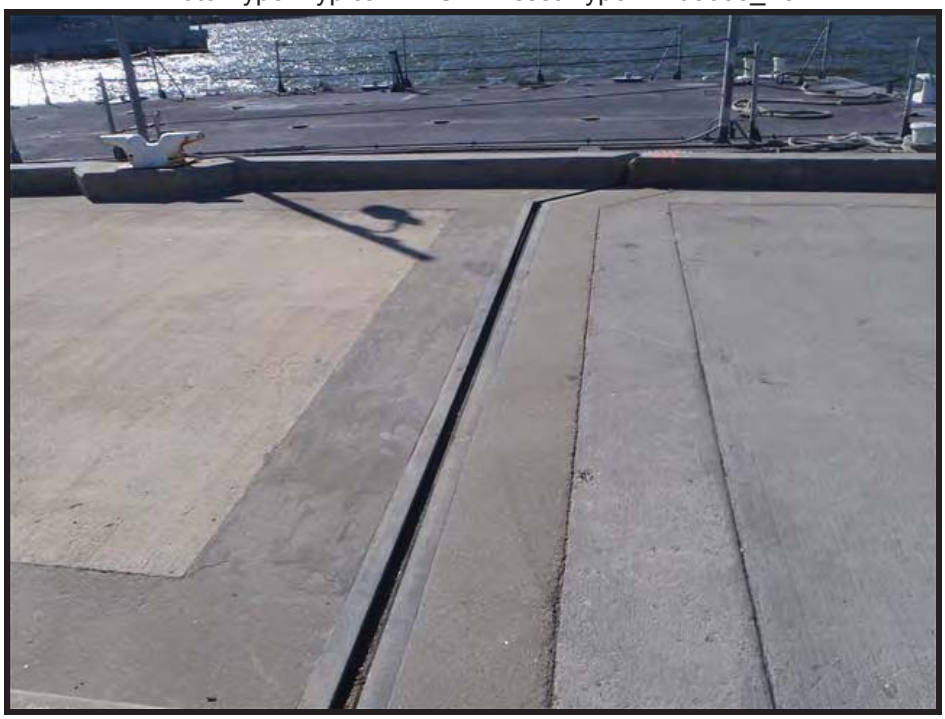


Photo 3.11-25: View of the expansion joint located at the north end of the breakwater.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104001 - Primary Fender System [redacted] **CI: 15**

UFII Component	H10400101	Fender Piles Asset Type(s): FPC
Findings	The fender piles are in Serious Condition. A total of 12 fender pile clusters consisting of fiberglass reinforced, high density polyethylene (HDPE) fender piles support berthing at the breakwater. The HDPE fender piles are installed in clusters of two and are 13 in. in diameter with 12 fiberglass vertical reinforcing bars. The fender piles are secured to the platform using galvanized steel pile guide supports. Ten fender pile clusters have broken or are no longer secured to the breakwater due to missing fender pile guide supports.	
Recommendations	It is recommended that the fender system be replaced with components designed to accommodate the conditions and equipment moored at the bulkhead. Reuse of the existing fender piles may be possible.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400101_FPC

Photo 3.11-26: View of a fiberglass reinforced HDPE fender pile cluster.

Photo Type: Defect UFII/Asset Type: H10400101_FPC

Photo 3.11-27: View of a detached and broken fender pile cluster.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104001 - Primary Fender System [redacted] **CI: 15**

UFII Component	H10400102	Fender Framing Asset Type(s): FWL & FF1
Findings	The fender framing is in Critical Condition overall. The fender framing consists of fender wales and fender pile guide assemblies. There is 228 linear feet of galvanized steel fender wales that are 22 ft 10 in. long, 12 in. tall, and 12 in. deep. A 1-1/2 in. thick HDPE pad is attached to the outboard face of each fender wale and the wales are secured to the breakwater using galvanized steel chains and molded compression members. The galvanized steel fender wale is in critical condition and is missing for 198 linear ft. There are 12 fender pile guide assemblies located on the breakwater. The galvanized steel guide assemblies are 3 ft-7 in. long, 21 in. wide, and 10 in. deep overall and each assembly secures two fender piles to the breakwater. The guide assemblies are in critical condition with 10 missing guide assemblies located on the breakwater, resulting in detached fender piles.	
Recommendations	It is recommended that the fender system be replaced with components designed to accommodate the conditions and equipment moored at the bulkhead. Reuse of the existing fender piles may be possible.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400102_FWL

Photo 3.11-28: View of a typical galvanized steel fender wale.

Photo Type: Defect UFII/Asset Type: H10400102_FWL

Photo 3.11-29: Overview of missing fender wales on the west side of the breakwater.

Photo Type: Typical UFII/Asset Type: H10400102_FF1

Photo 3.11-30: View of a galvanized steel fender pile guide assembly.

Photo Type: Defect UFII/Asset Type: H10400102_FF1

Photo 3.11-31: View of detached piles as the result of a missing pile guide assembly.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104001 - Primary Fender System [redacted] **CI: 15**

UFII Component	H10400104	Molded Fenders Asset Type(s): MFND1
Findings	The molded fenders are in Critical Condition. There are 20 rubber molded compression fenders located on the breakwater that are 1 ft long, 13 in. wide, and 16 in. tall. The molded compression fenders assist in securing the fender wales to the breakwater using galvanized steel hardware. The rubber molded compression fenders are missing at 16 locations causing the fender wale to no longer function as intended.	
Recommendations	It is recommended that the fender system be replaced with components designed to accommodate the conditions and equipment moored at the bulkhead. Reuse of the existing fender piles may be possible.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400104_MFND1

Photo 3.11-32: View of a rubber molded compression fender.

Photo Type: Defect UFII/Asset Type: H10400104_MFND1

Photo 3.11-33: View of a typical missing molded fender.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104003 - Corner Fender System **CI: 90**

UFII Component	H10400301	Fender Piles Asset Type(s): FP
Findings	The corner fender piles are in Good Condition. A total of eight fiberglass reinforced, high density polyethylene (HDPE) corner fender piles protect the southeast and southwest corners of the breakwater. The HDPE corner fender piles are 13 in. in diameter with eight fiberglass vertical reinforcing bars. The corner fender piles are secured to the breakwater using a 1 in. thick galvanized steel frame. There are no defects present on the corner fender piles.	
Recommendations	No repairs are recommended on the corner fender piles at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400301_FP

Photo 3.11-34: View of a HDPE corner fender pile showing fiberglass reinforcement.

Photo Type: Typical UFII/Asset Type: H10400301_FP

Photo 3.11-35: Overview of the corner fender piles located on the southeast corner of the breakwater.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104003 - Corner Fender System **CI: 90**

UFII Component	H10400302	Fender Framing Asset Type(s): FF2
Findings	The corner fender framing is in Good Condition. There are two galvanized steel fender frames located at the southwest and southeast corners of the facility to secure the corner fender piles to the breakwater. The corner fender framing is constructed of 1 in. thick galvanized steel. A 1-1/2 in. thick HDPE pad is attached to the outboard face of each fender frame and the frames are secured to the breakwater using molded compression members. There are no defects present on the corner fender framing.	
Recommendations	There are no repairs recommended for the corner fender framing at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400302_FF2

Photo 3.11-36: View of the corner fender framing.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104003 - Corner Fender System **CI: 90**

UFII Component	H10400304	Molded Fenders Asset Type(s): MFND2
Findings	The corner molded fenders are in Good Condition. There are eight rubber molded compression fenders located on the southeast and southwest corners of the breakwater that are 1 ft long, 13 in. wide, and 16 in. tall. The molded compression fenders assist in securing the corner fender framing to the breakwater using 1 in. diameter galvanized steel hardware. There are no defects present on the corner molded fenders.	
Recommendations	No repairs are recommended on the corner molded fenders at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400304_MFND2

Photo 3.11-37: View of a corner molded compression fender.

H1040 - Mooring & Berthing Systems [redacted] **CI: 48**

H104005 - Mooring Hardware [redacted] **CI: 75**

UFII Component	H10400503	Cleats Asset Type(s): MF
Findings	The cleats are in Satisfactory Condition. There are a total of 11 cleats located on the CEP169 Breakwater. The 42 in. cleats, with a rated capacity of 20 tons, are constructed of painted steel and filled with concrete. Fittings are secured to the mooring foundations using six anchor bolts and bolt recesses are generally filled and painted over. The cleats typically exhibit coating loss up to 25 percent with widespread rust staining and minor corrosion. One cleat has heavy corrosion with visible section loss on the west side of the fitting. The rated conditions of each mooring fitting in accordance with UFC 4-150-8, Inspection of Mooring Hardware, are also presented within a table at the end of this report section. Please note that "Design Capacity" indicates the estimated original intended nominal allowable capacity of the fitting and the "Rating Capacity" indicates the estimated current nominal allowable capacity of the fitting based only on visual observations.	
Recommendations	It is recommended that one cleat fitting be replaced and the remaining 10 cleats be cleaned, inspected for structural integrity, and repainted.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400503_MF

Photo 3.11-38: View of a typical 42 in. cleat.

Photo Type: Defect UFII/Asset Type: H10400503_MF

Photo 3.11-39: View of heavy corrosion and visible section loss on a 42 in. cleat.

H1050 - Appurtenances [redacted] **CI: 45**

H105005 - Safety Ladders [redacted] **CI: 45**

UFII Component	H105005	Safety Ladders Asset Type(s): LAD
Findings	The safety ladders are in Poor Condition. There is one galvanized steel safety ladder located near the southwest corner of CEP169 Breakwater. The ladder is secured to the breakwater using 3/4 in. galvanized steel anchor bolts. The ladder is bent and distorted due to impact damage.	
Recommendations	It is recommended that the damaged safety ladder be replaced.	

Supporting Photos

Photo Type: Defect UFII/Asset Type: H105005_LAD

Photo 3.11-40: View of the galvanized steel ladder located on the breakwater with impact damage.

H5020 - Electrical Utilities **CI: 81**

H502003 - Lighting **CI: 75**

UFII Component	H502003	Lighting Asset Type(s): LGT
Findings	The lighting is in Satisfactory Condition. There is one small galvanized steel marking light located on the outboard end of the breakwater that is 1-1/4 in. in diameter. The light is attached to an 8 in. square steel base that is secured to the concrete curb using 1/2 in. galvanized steel bolts. There is minor surface rust located on the steel base but the light appears to be securely attached to the pier. It is unknown if the light is functional.	
Recommendations	There are no repairs recommended on the lighting at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H502003_LGT

Photo 3.11-41: View of the marking light located at the outboard end of the breakwater.

H5020 - Electrical Utilities **CI: 81**

H502006 - Other Electrical Utilities **CI: 90**

UFII Component	H502006	Other Electrical Utilities Asset Type(s): WLGS
Findings	The other electrical utilities are in Good Condition and include a water level gauge station. The stainless steel gauge station is 2 ft 6 in. long, 4 ft wide, and 5 ft tall and is sitting on a 2 ft tall steel frame constructed of 3 in. by 3 in. angles. Two water level sensors associated with the station are mounted to the outboard end of the breakwater. PVC conduit ranging in size from 1 in. to 2 in. in diameter attaches the gauge station to the sensors. There are no defects present on the water level gauge station and the station appears to be functional.	
Recommendations	No repairs are recommended to the water level gauge station at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H502006_WLGS

Photo 3.11-42: View of the water level gauge station.

Mooring Hardware Condition

	**Asset Type:** MF **Fitting ID:** C1W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 2 Base: 4 Connection: UNK Element Inaccessible
	**Asset Type:** MF **Fitting ID:** C2W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible
	**Asset Type:** MF **Fitting ID:** C3W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C4W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** Reduced tons	**Condition:** Fitting: 3 Base: 2 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C5W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C6W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C6E **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C7W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

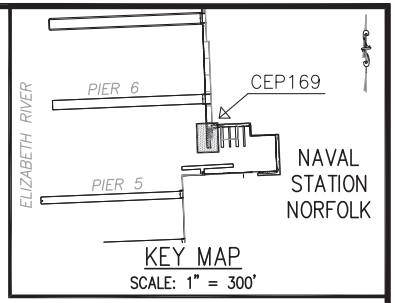
	**Asset Type:** MF **Fitting ID:** C7E **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

	**Asset Type:** MF **Fitting ID:** C8W **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

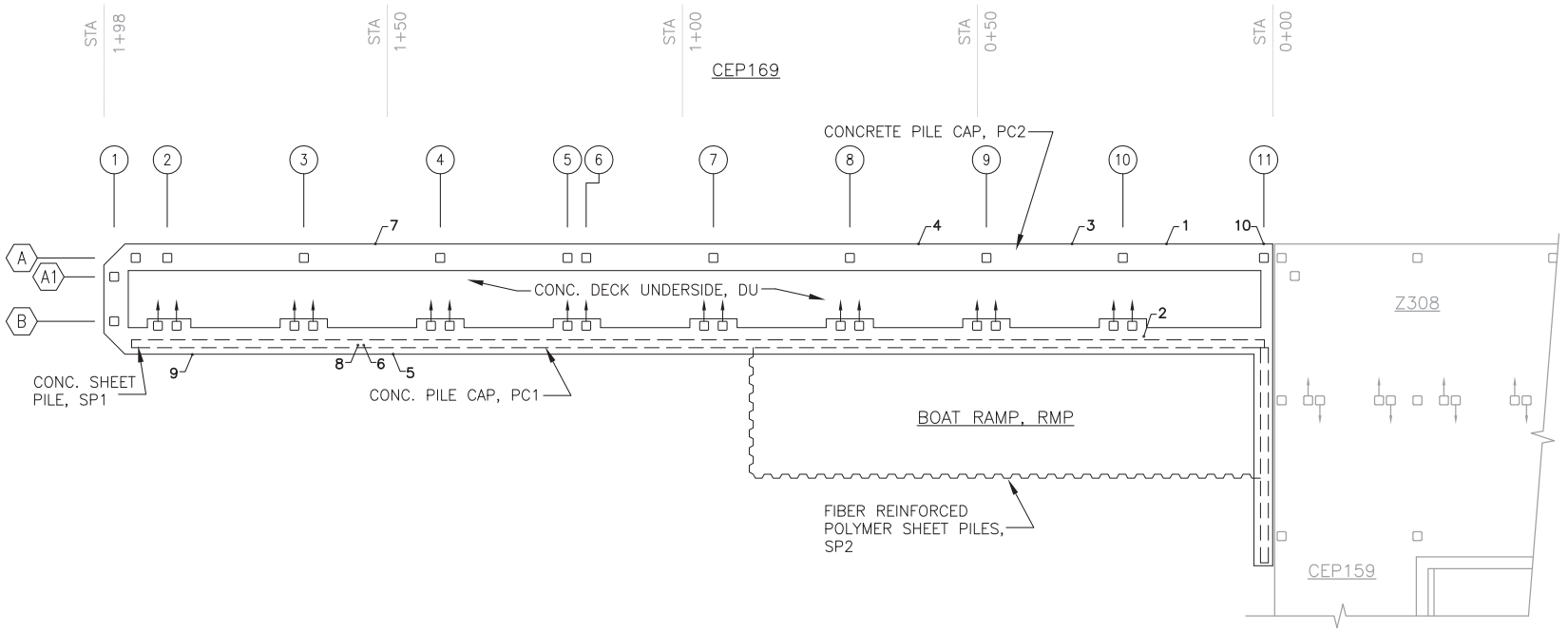
	**Asset Type:** MF **Fitting ID:** C8E **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: UNK Element Inaccessible

Mooring Condition Rating Key:

1	(Green)	Good Condition	3	(Yellow)	Moderate Deterioration
2	(Blue)	Minor Deterioration	4	(Red)	Severe Deterioration



KEY MAP
SCALE: 1" = 300'



UNDERDECK PLAN
SCALE: 1" = 20'

LEGEND

- (2) PILE BENT DESIGNATION
- (A) PILE ROW DESIGNATION
- STA 1+00 DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
- □ 18" CONCRETE PILE, P
- □→ 18" CONCRETE BATTERED PILE, PB
- 2 DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)

ASSET(S) NOT SHOWN

TR – TIE ROD

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
20 10 0 20 FT.
SCALE: 1" = 20'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

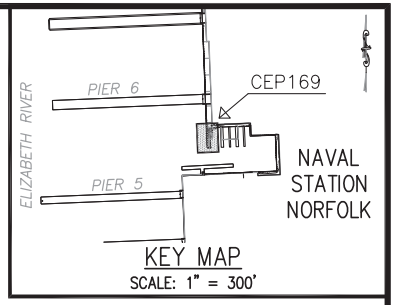
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

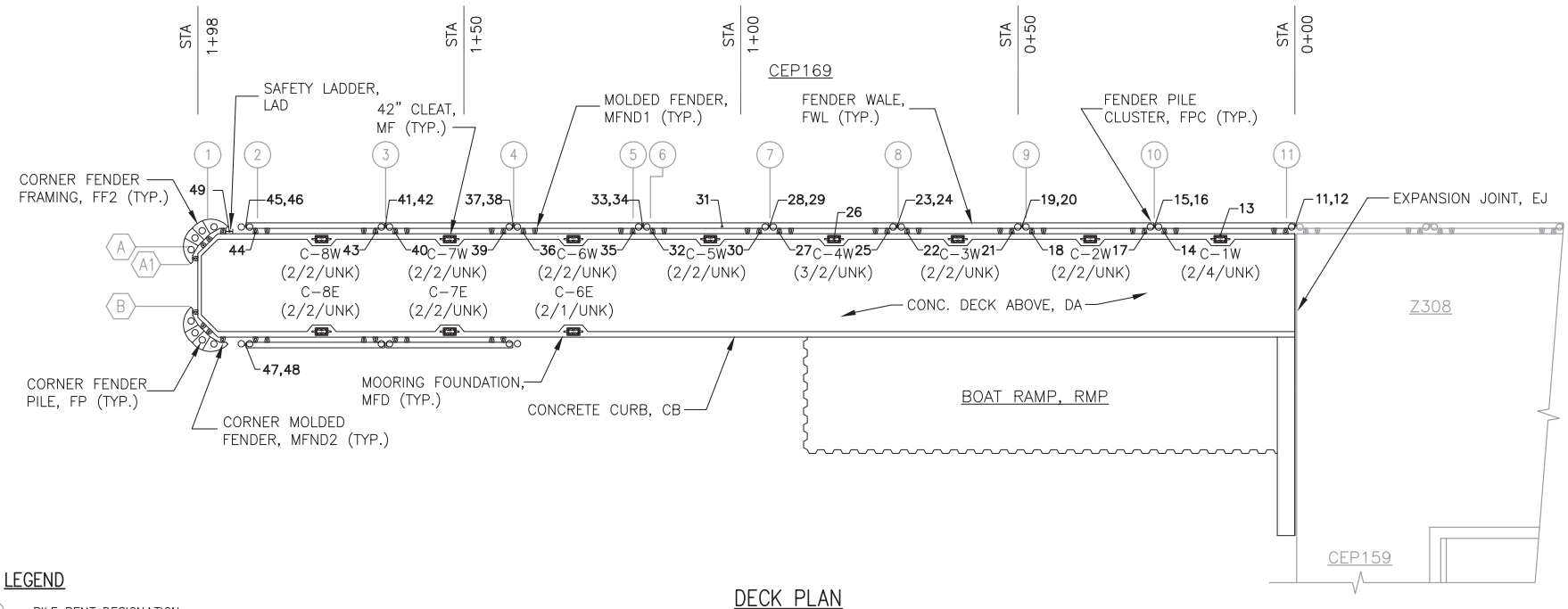
NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

CEP169 BREAKWATER UNDERDECK PLAN

FIG. NO. 3.11-1



KEY MAP
SCALE: 1" = 300'



DECK PLAN
SCALE: 1" = 20'

LEGEND

- (2) PILE BENT DESIGNATION
- (A) PILE ROW DESIGNATION
- STA / 1+00 — DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
- 2 — DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B-STRUCTURAL DATA TABLE FOR MORE INFORMATION)
- C-1W (2/2/2) — MOORING FITTING ID. NUMBER AND CONDITION RATING (FITTING/BASE/HARDWARE)

ASSET(S) NOT SHOWN

FF1 – PILE GUIDE ASSEMBLY
LGT – LIGHT
WLGS – WATER LEVEL GAUGE STATION

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
20 10 0 20 FT.
SCALE: 1" = 20'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

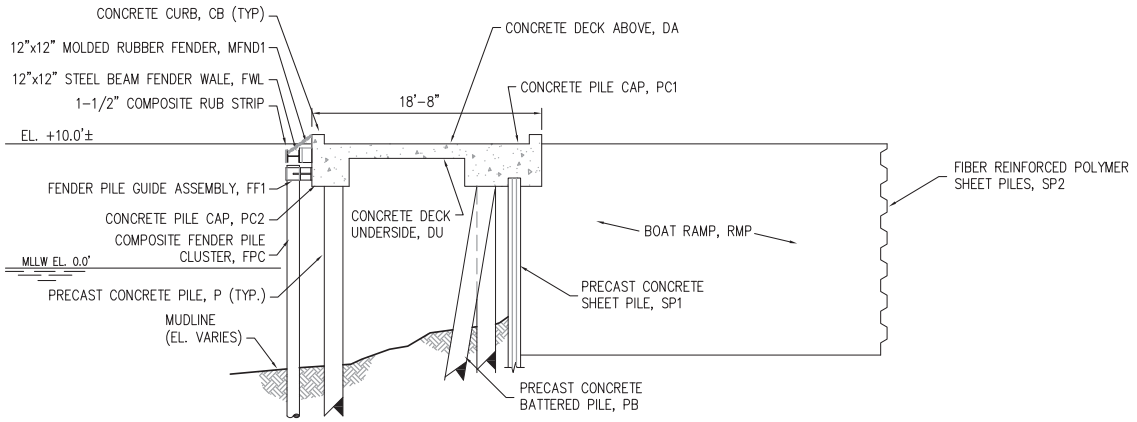
CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND AND EXPEDITIONARY WARFARE CENTER WASHINGTON, D.C.

NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

CEP169 BREAKWATER DECK PLAN

FIG. NO. 3.11-2



TYPICAL SECTION

SCALE: 1 = 10'

MSI MARINE SOLUTIONS, INC.
ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
10 5 0 10 FT.
SCALE: 1" = 10'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL FACILITIES ENGINEERING COMMAND
AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

NAVAL STATION NORFOLK NORFOLK, VIRGINIA

CEP169 BREAKWATER
TYPICAL SECTION

FIG. NO.
3.11-3

Norfolk Naval Station
Norfolk, Virginia

Section 3.12 - Z308 Bulkhead

Contract: N62583-12-D-0749 Inspection Date: 04/16/2013

Contractor: Marine Solutions, Inc.
225 Industry Parkway,
Nicholasville, KY 40356

Facility: Z308 Bulkhead **iNFADS:** NFA100001161663 **PRN:** 200802

Location: 36.945225, -76.328835

[redacted]

**Repair cost includes Design Allowances, Contractor Overhead & Profit, and Inflation Allowances. See Appendix C - Cost Estimate for detailed analysis.*

Condition Index (CI)	**80**	**Max Water Current**	<1kn
Engineering Assessment Rating	Satisfactory	**Water Clarity**	<10ft
Operational Rating	C3	**Tide Variation**	3ft
5 Year Projected CI	76	**Max Water Depth**	26ft
10 Year Projected CI	71	**Seasonal Water Temp**	52°F
Year(s) Previously Inspected	2007	**Seasonal Ambient Temp**	63°F

Facility Usage Description:
The Z308 Bulkhead and Platform was originally constructed in 2005 and underwent reconstruction in 2007. The facility is used to berth barges and other marine equipment. The bulkhead and platform are comprised of reinforced concrete sheet piles, pre-cast reinforced concrete bearing piles, and longitudinal concrete pile caps. A fender system comprised of HDPE fender piles and galvanized steel fender wales supports berthing at the facility where the bulkhead is covered by a relieving platform.

Summary of Repair Recommendations:
It is recommended that open corrosion spalls and open mechanical spalls on the piles, pile caps, curb, and mooring foundations be repaired. Gaps in the concrete sheet piles should also be repaired to limit future fill retention problems. Missing, broken, and detached fender piles, wales, molded fenders, and fender pile guide assemblies should be repaired or replaced to restore the mooring along the bulkhead platform. The cleats should also be cleaned, inspected for integrity, and repainted.

Impact To Mission If Repairs Not Provided:
The concrete elements will continue to deteriorate until repairs are executed. Mooring along the bulkhead presents an increased risk of structural damage and will continue to be restricted until fender system repairs are completed.

Operational Restrictions:

Vessel and equipment mooring should be limited at the platform until repairs are made to the damaged fender system.

Additional Facility Photos

Photo 3.12-1: Overview of Z308 Bulkhead and Platform near Sta. 3+00, looking north.

Photo 3.12-2: Overview of Z308 Bulkhead and Platform near Sta. 11+00, looking north.

Photo 3.12-3: Overview of Z308 Bulkhead and Platform from basin near Sta. 10+00, looking south

Photo 3.12-4: Overview of Z308 Bulkhead near Sta. 13+00, looking north.

Photo 3.12-5: Topside view of Z308 Bulkhead and Platform near Sta. 1+00, looking north.

Photo 3.12-6: View beneath the platform deck near Sta. 9+75, looking south.

H1010 - Substructure [redacted] **CI: 85**

H101001 - Pile Foundations [redacted] **CI: 90**

UFII Component	H10100101	Piles Asset Type(s): P & PB
Findings	The piles are in Good Condition. A total of 374 piles support the platform and bulkhead. There are 175 vertical and 199 battered, 18 in. square pre-cast reinforced concrete piles. The piles generally have a black epoxy coating on their entire exposed length and exhibit minor scaling, abrasion, isolated areas of missing coating and there is an open mechanical spall located at the top of a vertical pile that is up to 2-1/2 in. deep. No other defects or damage was observed.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100101_P

Photo 3.12-7: View of a vertical 18 in. square concrete pile supporting the platform.

Photo Type: Typical UFII/Asset Type: H10100101_P

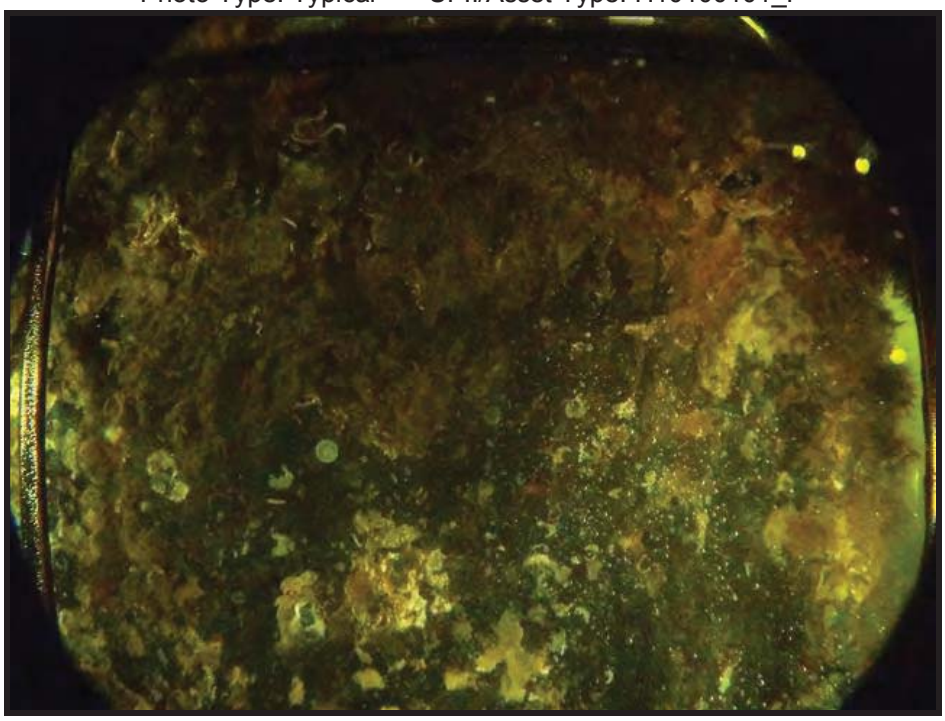


Photo 3.12-8: Typical condition of a concrete pile below water.

Photo Type: Typical UFII/Asset Type: H10100101_P

Photo 3.12-9: View of the concrete piles supporting the bulkhead.

Photo Type: Defect UFII/Asset Type: H10100101_P

Photo 3.12-10: View of an open mechanical spall at the top of a concrete bearing pile.

Photo Type: Typical UFII/Asset Type: H10100101_PB

Photo 3.12-11: View of a battered 18 in. square concrete pile supporting the platform.

H1010 - Substructure [redacted] **CI: 85**

H101001 - Pile Foundations [redacted] **CI: 90**

UFII Component	H10100102	Sheet Piles Asset Type(s): SP
Findings	The sheet piles are in Good Condition. The bulkhead is constructed of 1,605 linear ft of tongue and groove jointed reinforced concrete sheet piles that are 4 ft long and 16 in. deep. Concrete rubble riprap is typically located at the mudline along the sheet piles. Gaps in the concrete sheet pile joints are present at 19 locations. The gaps are up to 5 in. wide. The channel bottom depths along the sheet piles is generally less than 10 ft below MLLW and ranged from 17 ft to 24 ft below MLLW along the outboard edge of the platform. Therefore, sufficient sheet pile embedment is likely.	
Recommendations	It is recommended that 19 gaps in the concrete sheet pile joints be covered to limit future fill retention issues. The embedment depths of the sheet piles should be evaluated if dredging within 50 ft the bulkhead to depths of greater than 25 ft below MLLW is considered.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.12-12: View of the reinforced concrete sheet piles.

Photo Type: Typical UFII/Asset Type: H10100102_SP

Photo 3.12-13: View of an outfall pipe in the reinforced concrete sheet piles.

Photo Type: Defect UFII/Asset Type: H10100102_SP

Photo 3.12-14: View of joint backing material penetrating through a gap in the concrete sheet piles.

H1010 - Substructure [redacted] **CI: 85**

H101002 - Pile Caps [redacted] **CI: 75**

UFII Component	H101002	Pile Caps Asset Type(s): PC1, PC2, PC3, & PC4
Findings	The pile caps are in Satisfactory Condition overall. The bulkhead is constructed of four pile caps that span the sheet piles and the bearing piles supporting the platform. The outboard row of platform piles supports a 1,300 linear ft reinforced concrete pile cap that is 44 in. wide and 24 in. tall. The outboard platform pile cap is in satisfactory condition with isolated hairline vertical cracking and minor impact damage near the bottom of the outboard face. There are a total of nine open concrete spalls on the outboard pile cap of the platform. The total area affected by the open spalls is approximately 93 sq ft. The middle row of platform piles supports an 842 linear ft reinforced concrete pile cap that is 58 in. wide and 24 in. tall. This pile cap extends from Sta. 0+00 to Sta. 8+42. The pile cap is in good condition with no defects noted. There is 1,605 linear ft of a reinforced concrete pile cap is that is 43 in. wide and 24 in. tall, supported by the inboard row of bearing piles for the entire length of the facility. There are three open mechanical spalls located on the pile cap near the north end of the facility where the relieving platform is no longer present. The spalls are up to 10 sq ft in area and 4 in. deep. The sheet piles support a 1,605 linear ft reinforced concrete pile cap that is 30 in. wide and 24 in. tall. The pile cap is in good condition with no defects noted.	
Recommendations	It is recommended that 12 open concrete spalls on the pile caps be repaired. The hairline cracking and minor impact damage noted on the outboard pile cap do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H101002_PC1

Photo 3.12-15: Overview of the pile cap supported by the outboard platform piles.

Photo Type: Defect UFII/Asset Type: H101002_PC1

Photo 3.12-16: View of a 6 in. deep open spall located on the outboard face of the pile cap.

Photo Type: Typical UFII/Asset Type: H101002_PC2

Photo 3.12-17: View of the pile cap supported by the middle row of platform piles, typical from Sta. 0+00 to Sta. 8+42.

Photo Type: Typical UFII/Asset Type: H101002_PC3

Photo 3.12-18: View of a pile cap and pile cap extension typical from Sta. 8+42 to Sta. 16+05.

Photo Type: Typical UFII/Asset Type: H101002_PC3

Photo 3.12-19: View of the pile cap supported by the inboard row of platform piles.

Photo Type: Typical UFII/Asset Type: H101002_PC4

Photo 3.12-20: View of the reinforced concrete pile cap above the concrete sheet piles.

H1030 - Deck Components [redacted] **CI: 81**

H103001 - Deck **CI: 90**

UFII Component	H103001	Deck Asset Type(s): DA & DU
Findings	The deck is in Good Condition. The relieving platform consists of 54,467 sq ft of reinforced concrete deck with asphalt pavement present in isolated sections. The topside of the deck exhibits isolated minor hairline transverse and longitudinal cracking. Only two defects were noted on the topside of the deck, including an open mechanical spall affecting a total area of 1.33 sq ft and a 5 in. deep pot hole in the asphalt affecting a total area of 1.5 sq ft. There are no defects noted on the underside of the platform deck.	
Recommendations	No repairs are recommended at this time. The minor spall and cracking present on the topside of the deck does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103001_DA

Photo 3.12-21: View of the topside of the deck.

Photo Type: Defect UFII/Asset Type: H103001_DA

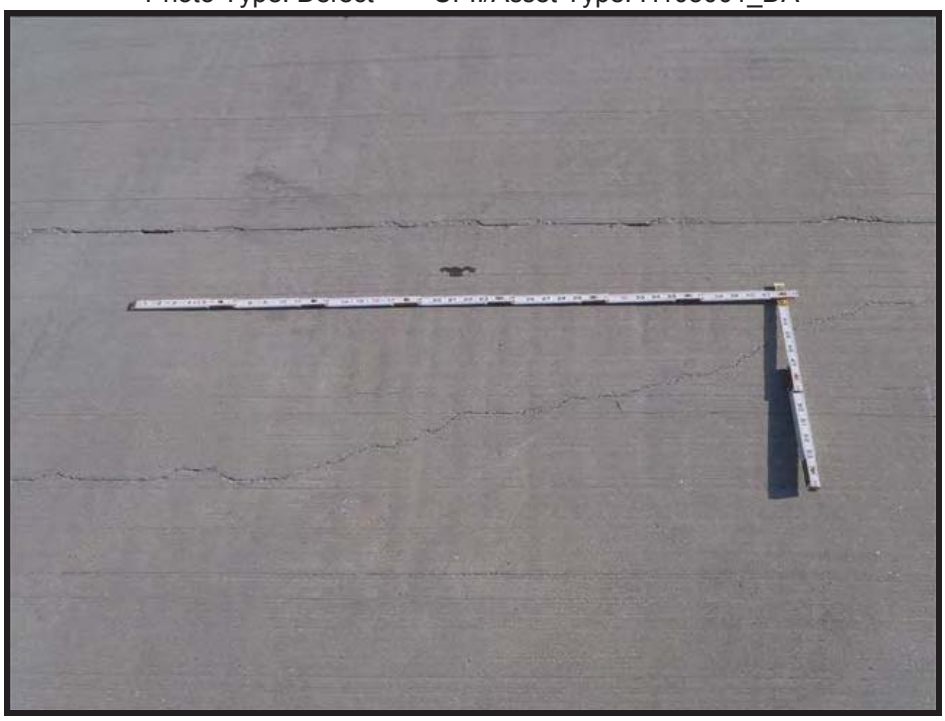


Photo 3.12-22: Typical hairline crack located on the topside of the deck.

Photo Type: Defect UFII/Asset Type: H103001_DA

Photo 3.12-23: Open mechanical spall located on the topside of the deck at an expansion joint.

Photo Type: Defect UFII/Asset Type: H103001_DA

Photo 3.12-24: Pothole located in the asphalt near Pier 7.

Photo Type: Typical UFII/Asset Type: H103001_DU

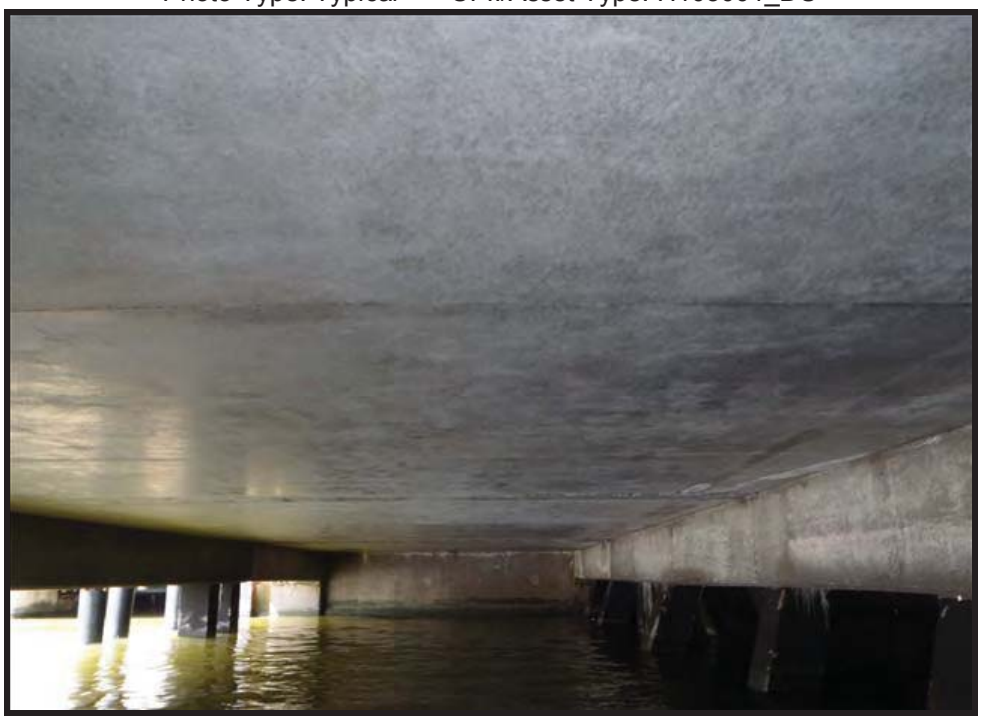


Photo 3.12-25: View of the underside of the platform deck.

H1030 - Deck Components [redacted] **CI: 81**

H103004 - Curbs & Bullrails **CI: 75**

UFII Component	H103004	Curbs & Bullrails Asset Type(s): CB1 & CB2
Findings	The curbs and bullrails are in Satisfactory Condition overall. There is 1,399 linear ft of a reinforced concrete curb that is 12 in. wide and 10 in. deep extending along the outboard edge of the bulkhead and platform. The concrete curb is in satisfactory condition with isolated hairline cracking and shallow abrasion marks. One concrete spall is present on the curb as a result of impact damage. The spall, which has six exposed reinforcing bars, is approximately 13 sq ft in area and 10 in. deep. There is approximately 21 linear ft of high density polyethylene curbs that are 9-1/2 in. wide and 9-1/2 in. deep. The HDPE curbs are secured to the concrete platform using galvanized steel brackets. The HDPE curbs are in good condition with no defects noted.	
Recommendations	No repairs are recommended at this time. The isolated hairline cracking and light abrasion marks present on the concrete curb do not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103004_CB1

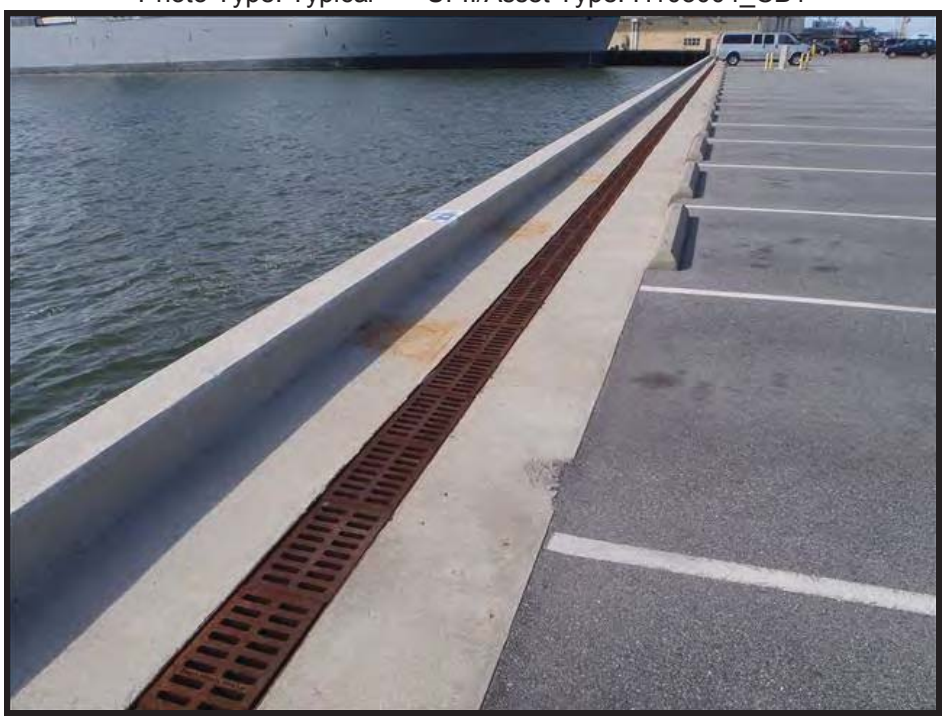


Photo 3.12-26: View of the reinforced concrete curb.

Photo Type: Defect UFII/Asset Type: H103004_CB1

Photo 3.12-27: Spall located on the curb as a result of impact damage with six exposed reinforcing bars.

Photo Type: Typical UFII/Asset Type: H103004_CB2

Photo 3.12-28: View of a HDPE curb section.

H1030 - Deck Components [redacted] **CI: 81**

H103005 - Mooring Foundations [redacted] **CI: 75**

UFII Component	H103005	Mooring Foundations Asset Type(s): MFD1 & MFD2
Findings	The mooring foundations are in Satisfactory Condition overall. There are six mooring foundations that are 7 ft 10 in. long, 52 in. wide, and 10 in. deep located on the platform and bulkhead. A 42 in. bollard is attached to each foundation. The foundations are in satisfactory condition with isolated hairline cracking emanating from the inset steel fitting. Impact damage is present on two mooring foundations, consisting of concrete spalls up to 3 in. in depth. There are 19 mooring foundations that are 5 ft long, 23 in. wide, and 10 in. deep located on the platform and bulkhead. A 42 in. cleat is attached to each foundation. The foundations are in satisfactory condition with isolated hairline cracking emanating from the inset steel fitting.	
Recommendations	It is recommended that two impact spalls be repaired. The isolated hairline cracking located on the mooring foundations does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103005_MFD1

Photo 3.12-29: View of a 42 in. bollard mooring foundation.

Photo Type: Defect UFII/Asset Type: H103005_MFD1

Photo 3.12-30: Impact damage on the outboard side of a mooring foundation.

Photo Type: Typical UFII/Asset Type: H103005_MFD2

Photo 3.12-31: View of a 42 in. cleat mooring foundation.

H1030 - Deck Components [redacted] **CI: 81**

H103008 - Expansion Joints [redacted] **CI: 75**

UFII Component	H103008	Expansion Joints Asset Type(s): EJ1 & EJ2
Findings	The expansion joints are in Satisfactory Condition. There are eight expansion joints located on the platform. The joints are oriented perpendicular to the length of the platform and vary in length from 26 ft to 49 ft. The expansion joints are 8 in. wide overall and are constructed of galvanized steel angles and rubber gaskets. The expansion joint located at Sta. 10+05 has 5 ft 6 in. of the rubber gasket membrane missing.	
Recommendations	It is recommended that the missing rubber gasket membrane at one expansion joint be repaired.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103008_EJ1

Photo 3.12-32: View of a 26 ft long expansion joint located on the platform.

Photo Type: Defect UFII/Asset Type: H103008_EJ1

Photo 3.12-33: View of the missing rubber gasket membrane located at Sta. 10+05.

Photo Type: Typical UFII/Asset Type: H103008_EJ2

Photo 3.12-34: Below deck view of a 49 ft long expansion joint located on the platform.

H1030 - Deck Components [redacted] **CI: 81**

H103009 - Guard Posts and Railings [redacted] **CI: 75**

UFII Component	H103009	Guard Posts and Railings Asset Type(s): GPT1 & GPT2
Findings	The guard posts and railings are in Satisfactory Condition overall. There are six painted steel concrete filled 4-1/2 in. OD guard posts located on the bulkhead that are 2 ft 10 in. tall. The guard posts are installed to protect a telecommunications cabinet and two transformers located along the bulkhead. The guard posts are in satisfactory condition with isolated paint loss. One guard post protecting a transformer is broken and detached from its foundation. There are also eight painted steel concrete filled 5 in. OD guard posts located on the bulkhead that are 3 ft 10 in. tall. These guard posts protect a power limit switch and a fire hydrant. The 5 in. OD guard posts are in satisfactory condition with up to 20 percent paint loss and minor corrosion in paint loss areas.	
Recommendations	It is recommended that one broken guard post be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103009_GPT1

Photo 3.12-35: View of 4-1/2 in. OD painted steel guard posts protecting a communications cabinet.

Photo Type: Defect UFII/Asset Type: H103009_GPT1

Photo 3.12-36: View of a broken and detached guard post no longer protecting a transformer.

Photo Type: Typical UFII/Asset Type: H103009_GPT2

Photo 3.12-37: View of 5 in. OD painted steel guard posts protecting a power limit switch.

H1030 - Deck Components	[redacted]	**CI: 81**
H103011 - Other Deck Components	[redacted]	**CI: 90**

UFII Component	H103011	Other Deck Components Asset Type(s): DRN
Findings	The other deck components are in Good Condition. The other deck components include a deck drain covered by steel grating, located at the joint between the platform and the bulkhead for a distance of 1,605 linear ft. The steel grating is comprised of individual grates that are 1 ft 6 in. long and 10 in. wide. There are three missing deck drain grates located near Sta. 8+40.	
Recommendations	It is recommended that three deck drain grates be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H103011_DRN

Photo 3.12-38: View of the deck drain located at the joint between the platform and the bulkhead.

Photo Type: Defect UFII/Asset Type: H103011_DRN

Photo 3.12-39: View of loose and missing deck drain covers at Sta. 8+40.

H1040 - Mooring & Berthing Systems	[redacted]	**CI: 55**
H104001 - Primary Fender System	[redacted]	**CI: 45**

UFII Component	H10400101	Fender Piles Asset Type(s): FPC
Findings	The fender piles are in Fair Condition. A total of 55 fender pile clusters, each consisting of two fiberglass reinforced high density polyethylene (HDPE) fender piles, support berthing at the platform. The HDPE fender piles are installed in clusters of two piles that are 13 in. in diameter with 12 vertical, fiberglass reinforcing bars. The fender piles are secured to the platform using galvanized steel pile guide supports. Defects are present on 23 fender pile clusters which include three missing fender pile clusters and 20 detached fender pile clusters as a result of missing pile guide supports.	
Recommendations	It is recommended that six fender piles be replaced and 40 fender piles be reattached to the platform.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400101_FPC

Photo 3.12-40: View of a fiberglass reinforced HDPE fender pile cluster.

Photo Type: Defect UFII/Asset Type: H10400101_FPC

Photo 3.12-41: View of a typical detached fender pile cluster along the platform as a result of missing pile guide supports.

H1040 - Mooring & Berthing Systems [redacted] **CI: 55**

H104001 - Primary Fender System [redacted] **CI: 45**

UFII Component	H10400102	Fender Framing Asset Type(s): FWL & FF
Findings	The fender framing is in Poor Condition overall. There is 1,117 linear feet of galvanized steel wide flange beam fender wales. A 1-1/2 in. thick HDPE pad is attached to the outboard face of each fender wale and the wales are secured to the platform using galvanized steel chains and molded rubber compression members. The galvanized steel fender wale is missing for 320 linear ft, detached for 116 linear ft, has loose connections at 23 locations, and exhibits impact damage resulting in a crack between the web and flange in one location. There are 55 fender pile guide assemblies located on the platform. The galvanized steel guide assemblies are 3 ft 7 in. long, 21 in. wide, and 10 in. deep overall and each assembly secures two fender piles to the platform. There are 20 missing guide assemblies located on the platform, resulting in detached fender piles.	
Recommendations	It is recommended that 436 linear ft of the fender wale be replaced, that the fender wale be secured to the platform in 23 locations, and that one area of impact damage be repaired. It is also recommended that 20 fender pile guide assemblies be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400102_FWL

Photo 3.12-42: View of a typical galvanized steel fender wale.

Photo Type: Typical UFII/Asset Type: H10400102_FWL

Photo 3.12-43: View of a section of missing fender wales.

Photo Type: Typical UFII/Asset Type: H10400102_FWL

Photo 3.12-44: View of a typical detached fender wale.

Photo Type: Defect UFII/Asset Type: H10400102_FWL

Photo 3.12-45: View of a typical loose fender wale.

Photo Type: Defect UFII/Asset Type: H10400102_FWL

Photo 3.12-46: View of impact damage located on a fender wale at Sta. 12+75.

Photo Type: Typical UFII/Asset Type: H10400102_FF

Photo 3.12-47: View of a galvanized steel fender pile guide assembly.

Photo Type: Defect UFII/Asset Type: H10400102_FF

Photo 3.12-48: View of detached piles as the result of a missing pile guide assembly.

H1040 - Mooring & Berthing Systems	[redacted]	**CI: 55**
H104001 - Primary Fender System	[redacted]	**CI: 45**

UFII Component	H10400104	Molded Fenders Asset Type(s): MFND
Findings	The molded fenders are in Poor Condition. There are 96 molded rubber compression fenders located on the bulkhead that are 1 ft long, 13 in. wide, and 16 in. tall. The molded compression fenders assist in securing the fender wales to the bulkhead using galvanized steel hardware. The molded rubber compression fenders are missing or broken in 33 locations causing the fender wale to no longer function as intended.	
Recommendations	It is recommended that 33 molded rubber compression fenders be replaced.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400104_MFND

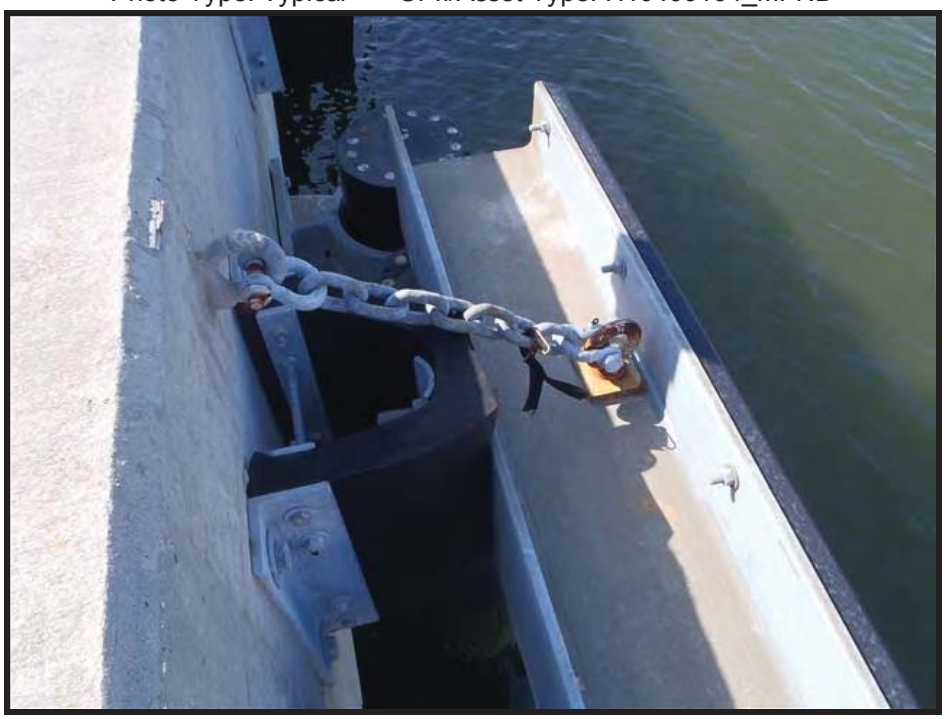


Photo 3.12-49: View of a molded rubber compression fender.

Photo Type: Typical UFII/Asset Type: H10400104_MFND

Photo 3.12-50: View of a typical broken and non-functioning rubber fender.

Photo Type: Defect UFII/Asset Type: H10400104_MFND

Photo 3.12-51: View of a typical missing rubber fender.

H1040 - Mooring & Berthing Systems [redacted] **CI: 55**

H104005 - Mooring Hardware [redacted] **CI: 75**

UFII Component	H10400501	Bollards Asset Type(s): MF1
Findings	The bollards are in Good Condition. There are a total of six bollards located on Z308 Bulkhead and Platform. The 42 in. single ear bollards, with a rated capacity of 35 tons, are constructed of painted steel and filled with concrete. The fittings have a 38 in. square base that is secured to the mooring foundations using four anchor bolts. The bollards typically exhibit minor coating loss on up to 5 percent of the bollard surface with isolated rust staining and light abrasion present. One bollard exhibits coating loss up to 25 percent and corrosion evident in the form of pitting approximately 1/4 deep. The bolt recesses are generally filled and painted over and free of evidence of corrosion. The rated conditions of each mooring fitting in accordance with UFC 4-150-8, Inspection of Mooring Hardware, are also presented within a table at the end of this report section. Please note that "Design Capacity" indicates the estimated original intended nominal allowable capacity of the fitting and the "Rating Capacity" indicates the estimated current nominal allowable capacity of the fitting based only on visual observations.	
Recommendations	No repairs are recommended at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400501_MF1

Photo 3.12-52: View of a typical 42 in. tall bollard on the platform.

Photo Type: Typical UFII/Asset Type: H10400501_MF1

Photo 3.12-53: View of a 42 in. bollard with up to 25 percent coating loss and minor corrosion.

H1040 - Mooring & Berthing Systems [redacted] **CI: 55**

H104005 - Mooring Hardware [redacted] **CI: 75**

UFII Component	H10400503	Cleats Asset Type(s): MF2
Findings	The cleats are in Satisfactory Condition. There are a total of 19 cleats located on Z308 Bulkhead and Platform. The 42 in. cleats, with a rated capacity of 20 tons, are constructed of painted steel and filled with concrete. The fittings have a 2 ft 2 in. long by 11 in. wide base that is secured to the mooring foundations using six anchor bolts. The bolt recesses are generally filled and painted over. The cleats typically exhibit minor coating loss on up to 5 percent of the cleat surface with isolated rust staining and light abrasion present. Five cleats exhibit coating loss up to 35 percent with minor corrosion visible in coating loss areas. The rated conditions of each mooring fitting in accordance with UFC 4-150-8, Inspection of Mooring Hardware, are also presented within a table at the end of this report section. Please note that "Design Capacity" indicates the estimated original intended nominal allowable capacity of the fitting and the "Rating Capacity" indicates the estimated current nominal allowable capacity of the fitting based only on visual observations.	
Recommendations	It is recommended that five cleats be cleaned and repainted.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H10400503_MF2

Photo 3.12-54: View of a typical 42 in. cleat.

Photo Type: Typical UFII/Asset Type: H10400503_MF2

Photo 3.12-55: View of a 42 in. cleat with up to 35 percent coating loss and minor corrosion.

H5020 - Electrical Utilities **CI: 90**

H502001 - Electrical Power Distribution **CI: 90**

UFII Component	H50200101	Transformers Asset Type(s): TFR
Findings	The transformers are in Good Condition. There are two transformers located along the bulkhead that are 5 ft 8 in. long, 3 ft 8 in. wide, and 5 ft tall. The transformers are located on a reinforced concrete pad that is 19 ft long, 20 ft wide, and 9 in. tall and also supports two circuit breakers. There is an electrical meter associated with each transformer. There are no defects present on the transformers.	
Recommendations	There are no repairs recommended on the transformers at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200101_TFR

Photo 3.12-56: View of a transformer.

H5020 - Electrical Utilities **CI: 90**

H502001 - Electrical Power Distribution **CI: 90**

UFII Component	H50200102	Shore Power Circuit Breaker Asset Type(s): CBK
Findings	The shore power circuit breakers are in Good Condition. There are two circuit breakers located along the bulkhead that are 2 ft 9 in. long, 11 in. wide, and vary in height. The circuit breakers are located on a reinforced concrete pad that is 19 ft long, 20 ft wide, and 9 in. tall and also supports two transformers. The circuit breakers are secured to the concrete pad with 4 in. galvanized steel angles. There are five 3 in. diameter and one 4 in. diameter galvanized steel conduits entering the bottom of each breaker box. The circuit breakers exhibit minor corrosion along the edges of the breaker boxes.	
Recommendations	There are no repairs recommended on the circuit breakers at this time. The minor corrosion along the edges of the breaker boxes does not warrant repair at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200102_CBK

Photo 3.12-57: View of a circuit breaker.

H5020 - Electrical Utilities **CI: 90**

H502001 - Electrical Power Distribution **CI: 90**

UFII Component	H50200105	Other Electrical Power Distribution Components Asset Type(s): LS
Findings	The other electrical power distribution components are in Good Condition and include one electrical limit switch that is 9 ft 6 in. long, 5 ft 6 in. wide, and 37 in. tall. The limit switch is located on a reinforced concrete pad that is 11 ft long, 6 ft 9 in. wide, and 8 in. tall. There are no defects noted on the limit switch.	
Recommendations	There are no repairs recommended for the limit switch at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50200105_LS

Photo 3.12-58: View of a limit switch.

H5020 - Electrical Utilities **CI: 90**

H502002 - Telecommunications **CI: 90**

UFII Component	H502002	Telecommunications Asset Type(s): COM
Findings	The telecommunications are in Good Condition and include one painted galvanized steel communications cabinet labeled “Repeater Cabinet W77-1.” The communications cabinet is 2 ft 9 in. long, 1 ft wide, and 4 ft tall. The cabinet is located on a reinforced concrete pad that is 4 ft long by 4 ft wide and is protected by four guard posts. There are no defects noted on the communications cabinet.	
Recommendations	There are no repairs recommended for the communications cabinet at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H502002_COM

Photo 3.12-59: View of a communications cabinet.

H5030 - Fire Protection and Suppression **CI: 90**

H503001 - Fire Protection Water Distribution System **CI: 90**

UFII Component	H50300104	Hydrants Asset Type(s): HYD
Findings	The hydrants are in Satisfactory Condition. There is one fire protection hydrant located along the bulkhead. The hydrant is labeled for 200 PSI and has two 3 in. and one 5 in. threaded connections. The hydrant exhibits minor coating loss with minor corrosion present.	
Recommendations	There are no repairs recommended for the hydrant at this time.	

Supporting Photos

Photo Type: Typical UFII/Asset Type: H50300104_HYD

Photo 3.12-60: View of a fire protection hydrant.

Mooring Hardware Condition

	**Asset Type:** MF2 **Fitting ID:** C1 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C2 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF1 **Fitting ID:** B1 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C3 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C4 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C5 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C6 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF1 **Fitting ID:** B2 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C7 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C8 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C9 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

	**Asset Type:** MF1 **Fitting ID:** B3 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C10 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C11 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

	**Asset Type:** MF1 **Fitting ID:** B4 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C12 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C13 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C14 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF1 **Fitting ID:** B5 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 2 Connection: 2

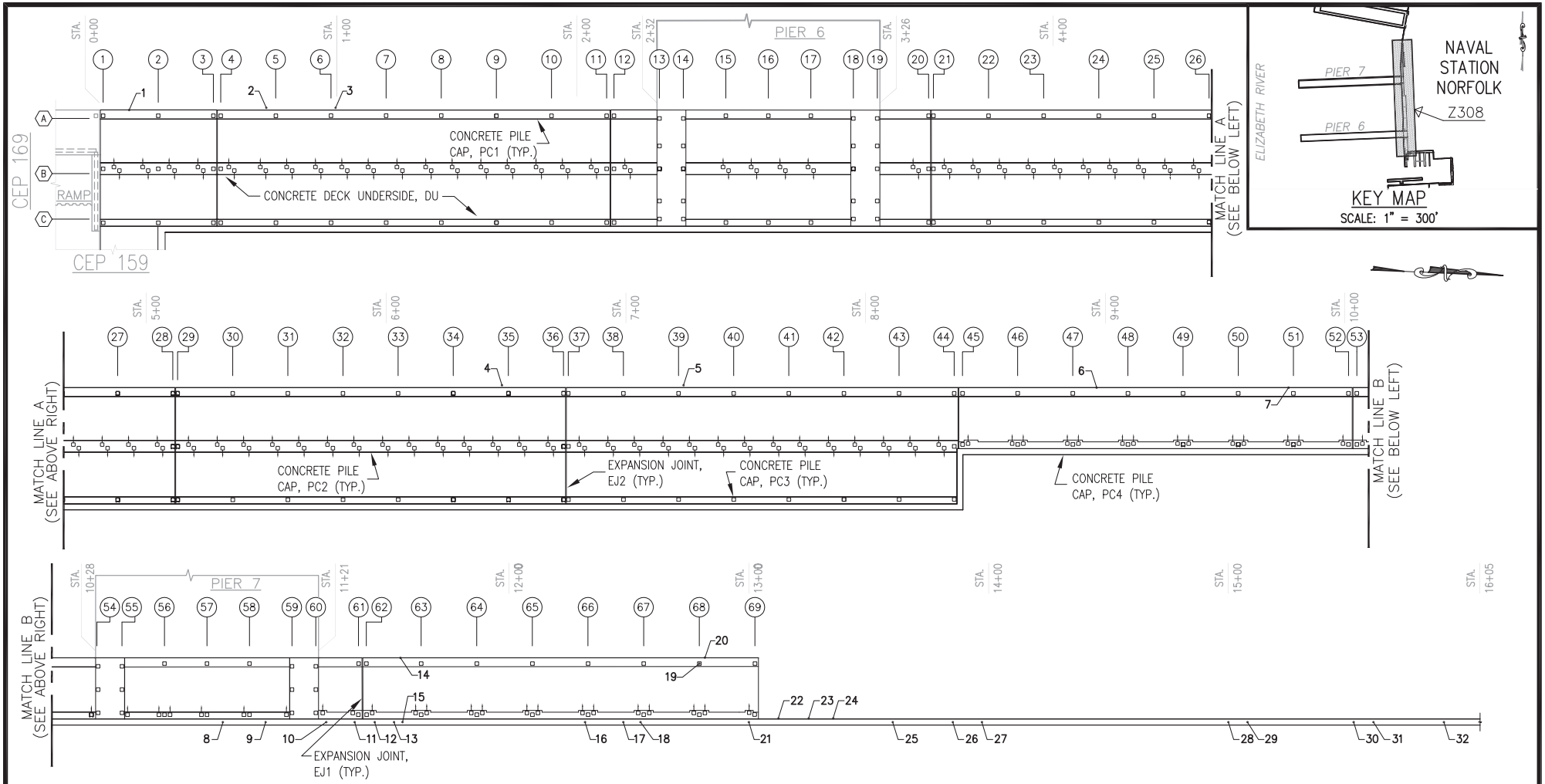
	**Asset Type:** MF2 **Fitting ID:** C15 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C16 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 1 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C17 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2
	**Asset Type:** MF2 **Fitting ID:** C18 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF1 **Fitting ID:** B6 **Type:** Bollard **Design Capacity:** 35 tons **Rating Capacity:** 35 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

	**Asset Type:** MF2 **Fitting ID:** C19 **Type:** 42 in. Cleat **Design Capacity:** 20 tons **Rating Capacity:** 20 tons	**Condition:** Fitting: 2 Base: 1 Connection: 2

Mooring Condition Rating Key:

1	(Green)	Good Condition	3	(Yellow)	Moderate Deterioration
2	(Blue)	Minor Deterioration	4	(Red)	Severe Deterioration



LEGEND

- (2) PILE BENT DESIGNATION
- (A) PILE ROW DESIGNATION
- STA. 1+00 DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
- ▫ 18" CONCRETE PILE, P
- ▫– 18" CONCRETE BATTERED PILE, PB
- 2 DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)

ASSET(S) NOT SHOWN

SP – SHEET PILE

UNDERDECK PLAN

SCALE: 1" = 40'

MSI MARINE SOLUTIONS, INC.
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NAVFAC Naval Facilities Engineering Command

NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER
WASHINGTON, D.C.

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

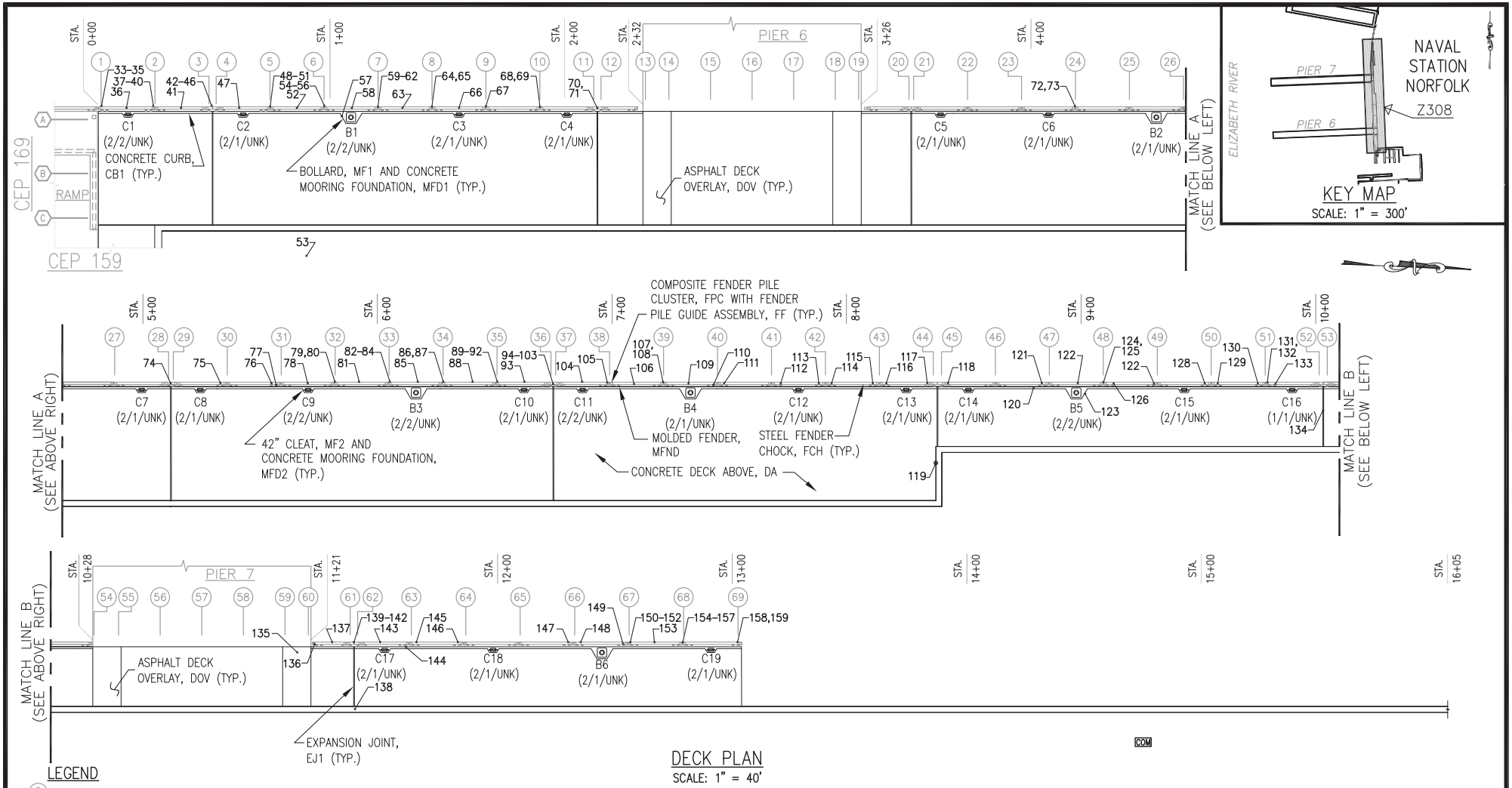
DATE: APRIL2014

CONTRACT NUMBER
N62583-12-D-0749
Delivery Order No. 0009

NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

Z308 BULKHEAD AND PLATFORM UNDERDECK PLAN

FIG. NO. 3.12-1



DECK PLAN
SCALE: 1" = 40'

KEY MAP
SCALE: 1" = 300'

LEGEND

- (2) PILE BENT DESIGNATION
- (A) PILE ROW DESIGNATION
- STA. 1+00 — DIMENSIONAL STATION DESIGNATION IN LINEAR FEET
- 2 — DEFECT LOCATION AND IDENTIFICATION NUMBER (SEE APPENDIX B–STRUCTURAL DATA TABLE FOR MORE INFORMATION)
- C10 (1/2/3) — MOORING FITTING ID. NUMBER AND CONDITION RATING (FITTING/BASE/HARDWARE)
- COM — TELECOMMUNICATIONS CABINET, COM

ASSET(S) NOT SHOWN

CB2 – COMPOSITE CURB
GBT1–2 – GUARD POST
DRN – DECK DRAIN
TFR – TRANSFORMER
CBK – CIRCUIT BREAKER
LS – LIMIT SWITCH
HYD – HYDRANT

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ENGINEERING & COMMERCIAL DIVING SERVICES

GRAPHIC SCALE
40 20 0 40 FT.
SCALE: 1" = 40'

NAVFAC Naval Facilities Engineering Command

DATE: APRIL 2014

CONTRACT NUMBER
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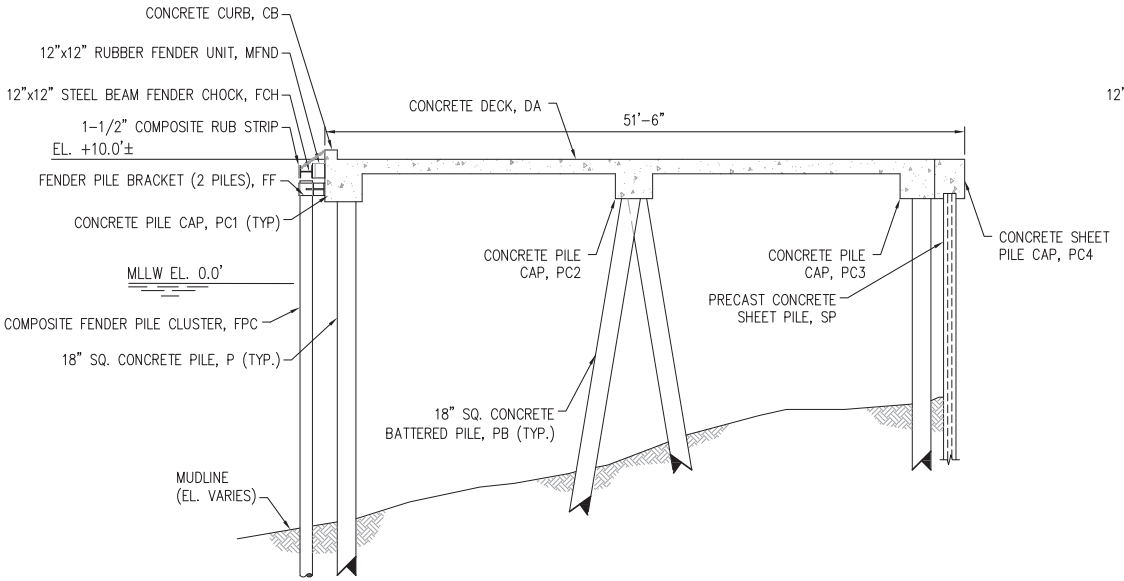
NAVAL STATION NORFOLK — NORFOLK, VIRGINIA

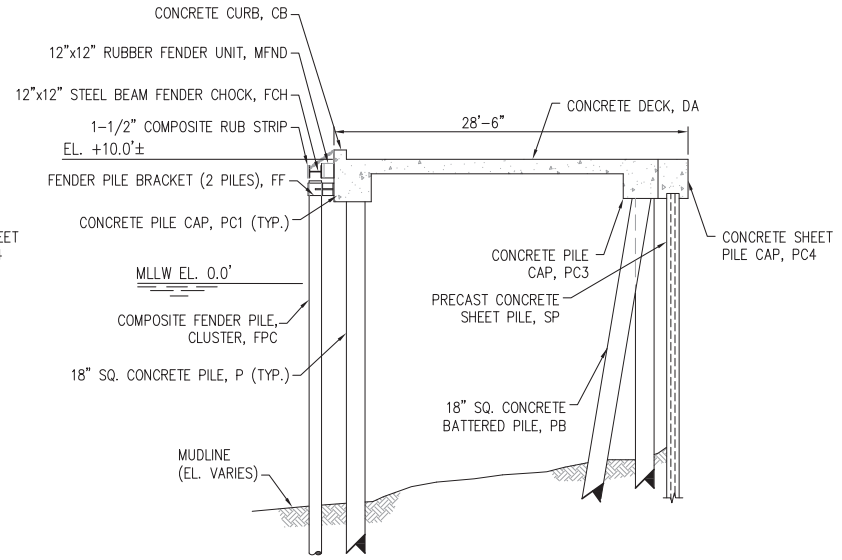
Z308 BULKHEAD AND PLATFORM DECK PLAN

FIG. NO. 3.12-2



TYPICAL SECTION – BENTS 1 TO 44

SCALE: 1" = 10'



TYPICAL SECTION – BENTS 45 TO 69

SCALE: 1" = 10'

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GRAPHIC SCALE
10 5 0 10 FT.
SCALE: 1" = 10'

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DATE: APRIL 2014

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NAVAL STATION NORFOLK NORFOLK, VIRGINIA

Z308 BULKHEAD AND PLATFORM
TYPICAL SECTIONS

FIG. NO.
3.12-3