sanitation

Javier D. Lojan Acting Commissioner

Anthony Bianco
Assistant Chief
SWM Operations
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125 Worth Street
Room 731
New York, NY 10013

May 16, 2025

Denise Grattan, Div. of Environmental Permits
NYS Dept. of Environmental Conservation, Region 2
47-40 21st Street
Long Island City, NY 11101

Re: NYSDEC Permit 2-6106-00002/00022 Ren 4 (Permit)
Southwest Brooklyn Marine Transfer Station (MTS)
New York City Department of Sanitation (DSNY)
2024 Bulkhead Inspection Report

Via Email

Dear Ms. Grattan:

On behalf of DSNY, this letter provides the 2024 Southwest Brooklyn MTS Bulkhead Inspection Report in compliance with Solid Waste Management Condition 24 of the above-referenced Permit. The Inspection Report includes the King Pile, North, and East Bulkhead Fender Systems. As required, the Report will be posted on the DSNY website within 7 days.

Please contact me with any questions.

Sincerely,

Anthony Bianco

Enclosure (1): 2024 Southwest Brooklyn MTS Bulkhead Inspection Report

c: J. McDonnell, J. Capo, J. Rossiello, K. Grunin, DSNY
P. Sierzenga, NYSDEC
J. Kaplan, A. Barna, Waste Management of New York, LLC

ROUTINE INSPECTION

OF

SOUTHWEST BROOKLYN MARINE TRANSFER STATION – FENDER SYSTEM

Located At

400 BAY 41ST STREET, BROOKLYN, NY 11214

For:

WASTE MANAGEMENT OF NY, LLC
650 S. Front Street
Elizabeth, NJ – 07202

By:

BOWMAN CONSULTING GROUP
1224 Baltimore Pike, Suite205
Chadds Ford, PA - 19317

APRIL 11 2025

BOWMAN PROJECT: 270164

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I. FACILITY DESCRIPTION

Southwest Brooklyn Marine Transfer Station (SWBMTS or Facility) is located approximately 2.5 Miles South of Verrazzano Narrows Bridge along the eastern shore of Gravesend Bay in Brooklyn, New York. The coordinates of this Facility are 40°35'20.10" N and 73°59'54" W. See Figures 1 and 2 for the Facility Location Map and Aerial View, respectively.

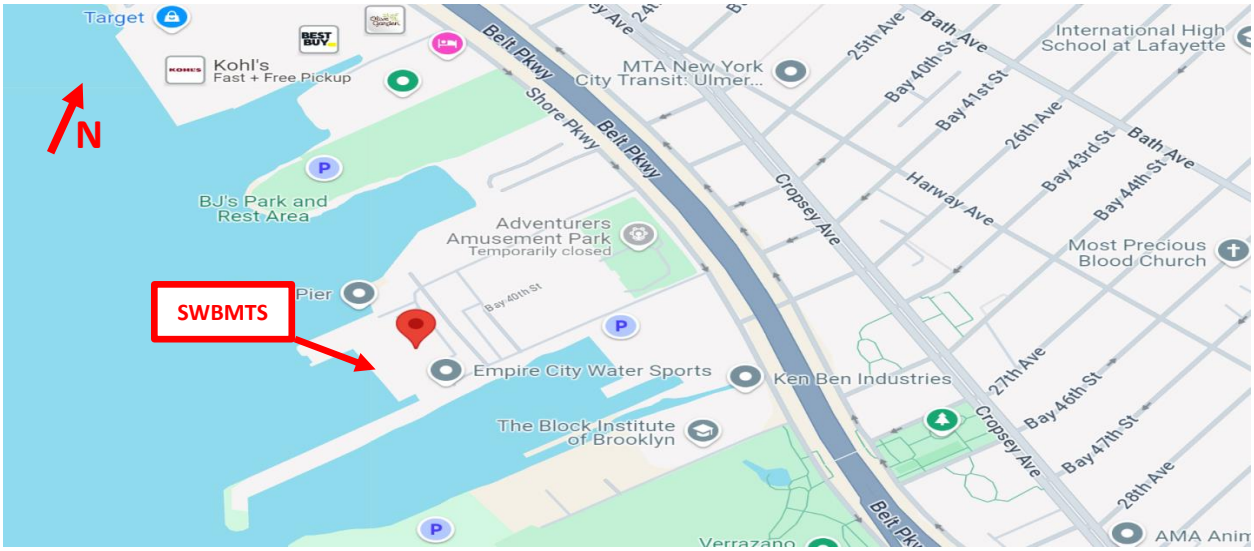


Figure 1: Location Map (via Google Maps).

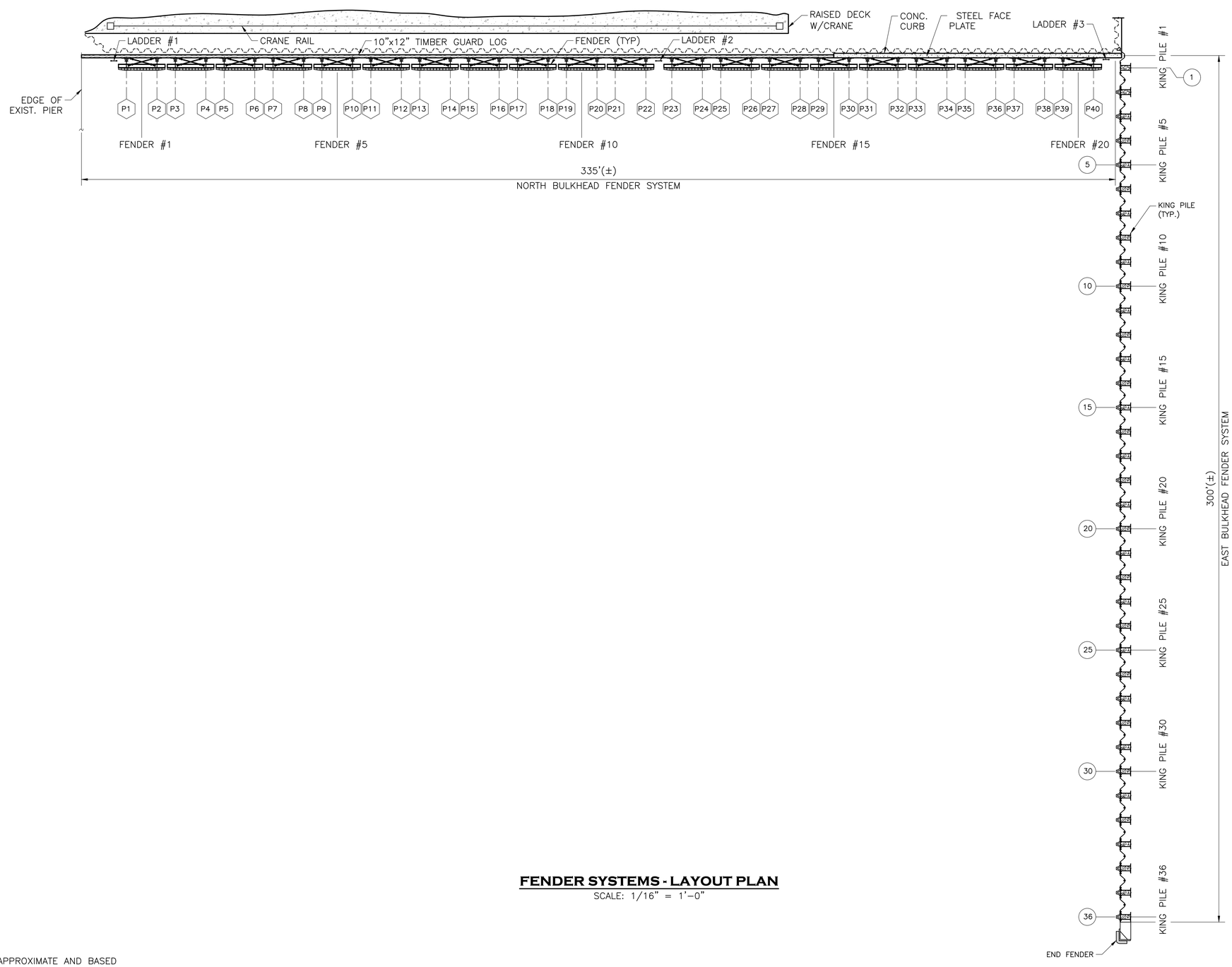
Figure 2: Aerial View & Layout of SWBMTS (Courtesy Google Earth).

The Facility is equipped with a marginal wharf to service barges. The marginal wharf is approximately 335 linear feet in length and spans in the East-West direction. The wharf is constructed as a steel sheet pile bulkhead with a concrete deck/cap. According to historical drawings, the top of concrete deck elevation is at approx. +10'-10" MLW (Local Mean Low Water). The concrete extends down approximately 12'-6" along the outshore face of sheet piles to form the visible face of bulkhead. Mooring hardware including bollards, cleats, winches, capstans, fairleads, and roller chocks exist along the outshore edge of wharf to moor barges.

A fender system exists along the outshore face of wharf/bulkhead to allow safe barge berthing operations. This fender system is referred to as the "**North Bulkhead Fender System**". The North Bulkhead Fender System consists of twenty (20) individual fenders. In this report, the West most fender of North Fender System has been designated as "Fender #1" and the East most fender has been designated as "Fender #20". Each Fender consists of two coat tar epoxy (CTE) coated HP12 fender piles. A cross braced fender panel frame consisting of three (3) levels (Top, Middle, and Bottom) of CTE coated W14 Wales and fifteen (15) vertical 10x12 timbers are bolted to the outer face of fender piles. A vertically oriented, 300 mm x 1000 mm rubber arch fender is bolted to the inner flange of each fender pile using eight (8) galvanized bolts. The inner flanges of each arch fender are bolted to a CTE coated mounting plate using four (4) galvanized bolts. The mounting plate is anchored to the concrete face of bulkhead using six (6) galvanized threaded rods.

Another bulkhead exists along the East edge of property, starting at the South-East corner of the marginal wharf, extending approximately 300 ft into the water, towards South. This bulkhead is constructed using an HZ wall system and consists of thirty-six (36) CTE coated double PSP900 king piles with a pair of CTE coated PZC26 sheet piles between each double king pile. The cut off elevation of sheet piles varies but is below MLW. The gap between the two king piles of each double king pile is filled with concrete. No engineered mooring hardware exists along this bulkhead. Two (2) vertically oriented 400 mm arch fenders are mounted on the West face of each double king pile using eight (8) galvanized bolts. The East bulkhead also acts as a fender system and is generally referred to as the "**East Bulkhead Fender System**". Each double king pile of the East Bulkhead, along with their rubber fenders is referred to as the "King Pile Fender" in this report. The North most King Pile Fender has been designated as "King Pile Fender #1" and the South most King Pile Fender has been designated as "King Pile Fender #36".

The field observed construction details of existing North Bulkhead Fender System, wharf along the North Bulkhead Fender System, and East Bulkhead Fender System were slightly different from those shown in historical drawings provided to the Inspection Team. The construction details observed in field are shown in sketches SK-2 and SK-3 of this report. The general layout and designations of Fender Systems at SWBMTS are shown in Sketch SK-1 of this report.



LEGEND:

- (PXX) FENDER PILE #
- (XX) KING PILE #

NOTES:

1. SHOWN ELEMENTS ARE APPROXIMATE AND BASED ON HISTORICAL DRAWINGS AND/OR OUR FIELD OBSERVATIONS. DO NOT SCALE THIS DRAWING.

FENDER SYSTEMS - LAYOUT PLAN

SCALE: 1/16" = 1'-0"

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WASTE MANAGEMENT

CLIENT NAME: WASTE MANAGEMENT OF NEW YORK, LLC
CLIENT LOCATION: 650 S. FRONT STREET ELIZABETH, NJ 07202
PROJECT LOCATION: 400 BAY 41ST STREET BROOKLYN, NY 11214

ROUTINE INSPECTION - SWBMTS FENDER SYSTEMS

SWBMTS FENDER SYSTEMS - LAYOUT PLAN

SHEET: 1 OF 3 | DRAWING NO.: SK-1

REV.	REVISION DESCRIPTION	BY	CHKD	DATE
B	REVISED FOR CLIENT COMMENTS	RIZ	AN	4-2-2025
A	ISSUED FOR INFORMATION	RIZ	AN	12-16-2024

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FILE NO: N/A
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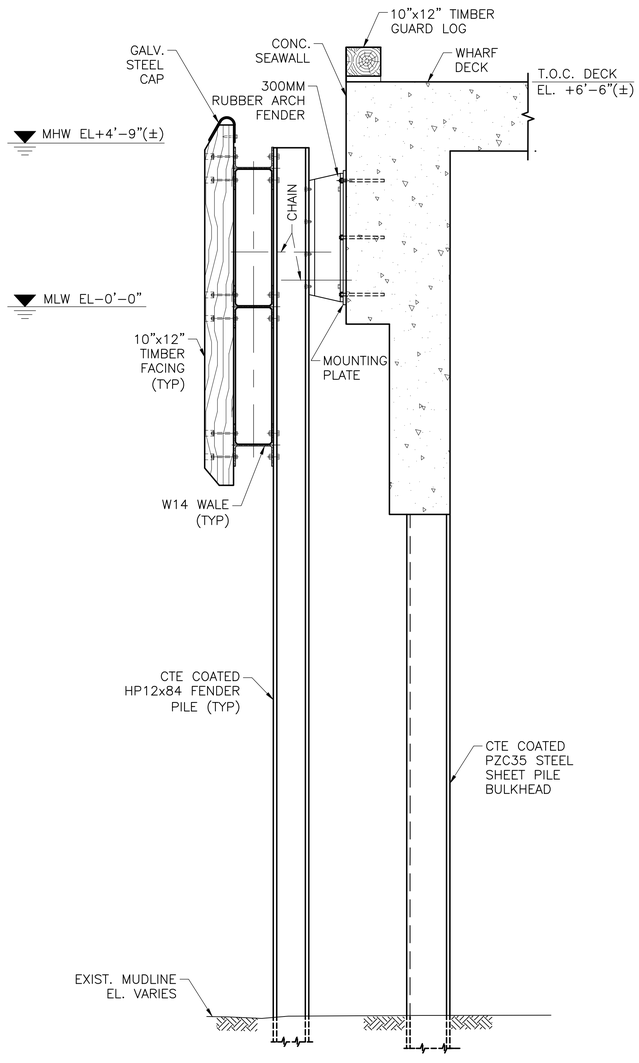
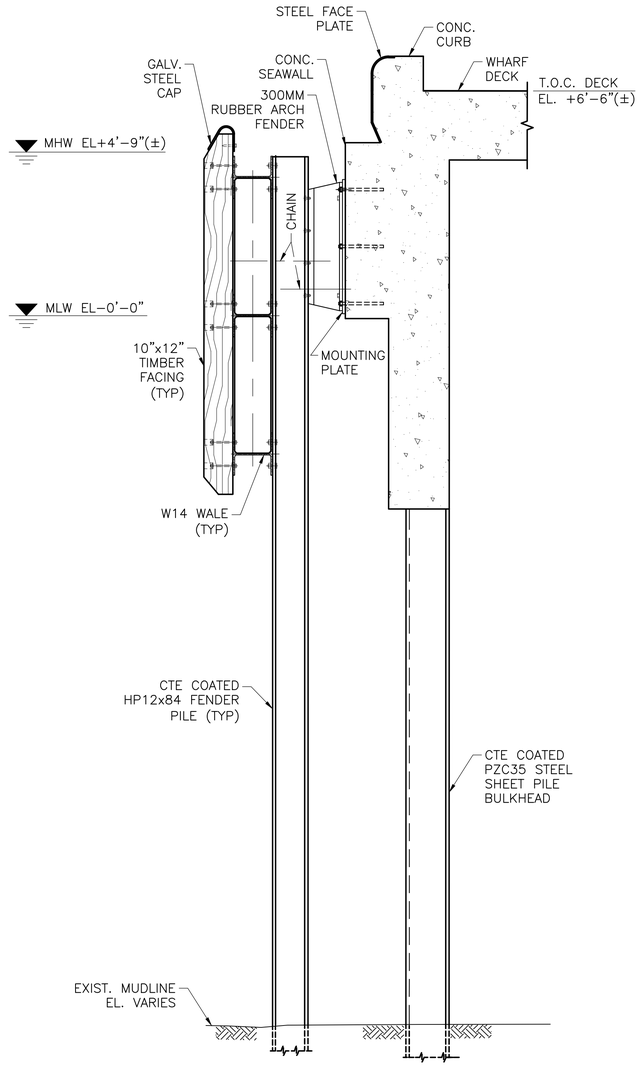
DATE DRAWN: 12-16-2024 | REVISION: B



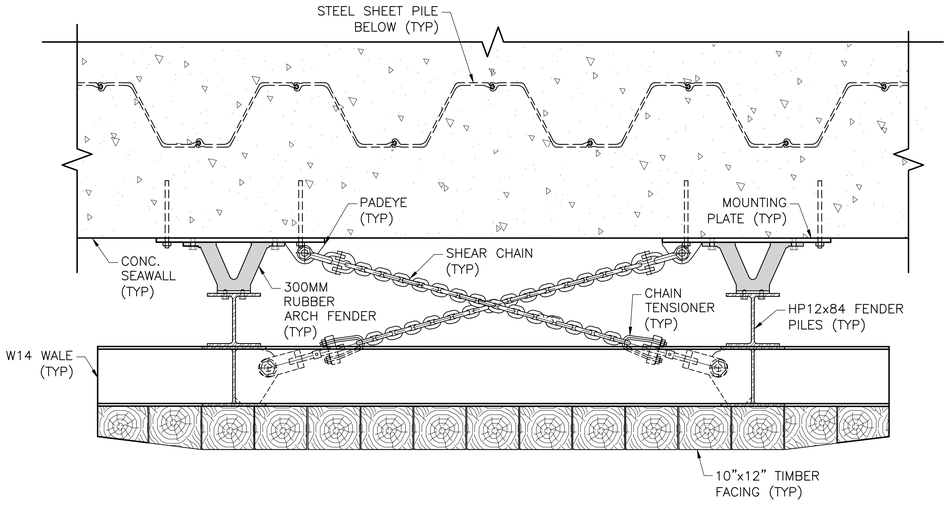
NORTH BULKHEAD FENDER - SECTION @ FENDER # 1 - 15

SCALE: 1/2" = 1'-0"



NORTH BULKHEAD FENDER - SECTION @ FENDER # 15 - 20

SCALE: 1/2" = 1'-0"



TYPICAL NORTH BULKHEAD FENDER - PLAN

SCALE: 3/4" = 1'-0"

NOTES:

1. SHOWN ELEMENTS ARE BASED ON HISTORICAL DRAWINGS AND/OR OUR FIELD OBSERVATIONS.

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ROUTINE INSPECTION - SWBMTS FENDER SYSTEMS

NORTH FENDER PLAN & SECTIONS

SHEET: 2 OF 3 DRAWING NO.: SK-2

REV.	REVISION DESCRIPTION	BY	CHKD	DATE
B	REVISED FOR CLIENT COMMENTS	RIZ	AN	4-2-2025
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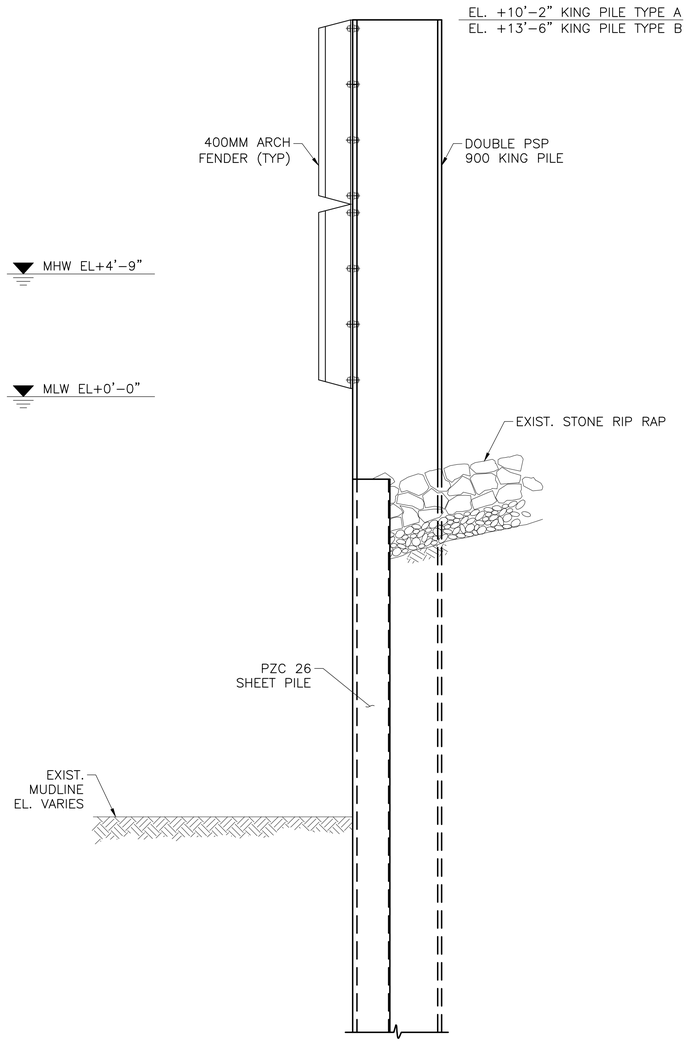
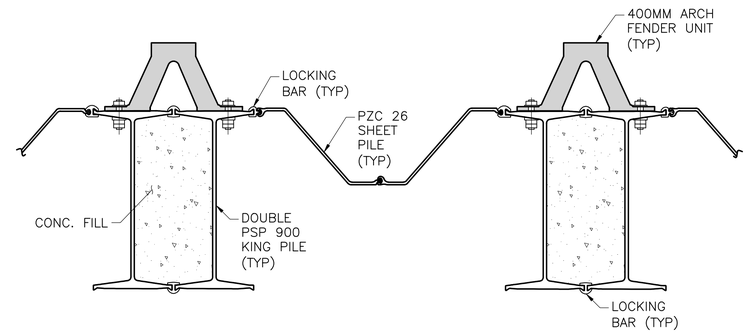


EAST BULKHEAD FENDER KING PILE # 1 THRU 36 - ELEVATION

SCALE: 3/8" = 1'-0"
(LOOKING NORTH)



EAST BULKHEAD FENDER KING PILE # 1 THRU 36 - PLAN

SCALE: 3/4" = 1'-0"

NOTES:

1. SHOWN ELEMENTS ARE BASED ON HISTORICAL DRAWINGS AND/OR OUR FIELD OBSERVATIONS.

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ROUTINE INSPECTION - SWBMTS FENDER SYSTEMS
EAST BULKHEAD FENDER SYSTEM - PLAN & SECTION
SHEET: 3 OF 3 DRAWING NO.: SK-3

REV.	REVISION DESCRIPTION	BY	CHKD	DATE
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II. SCOPE OF WORK & LIMITATIONS

General Scope of Work:

Waste Management of New York, LLC (WM) retained Kraken Diving Services, LLC (Kraken) to perform a Routine Inspection of their Southwest Brooklyn Marine Transfer Station (SWBMTS) fender systems and bulkhead. The scope of Routine Inspection included performing an above and below water visual and tactile inspection of fender systems to review their current condition; evaluate the inspection findings; assign condition assessment rating; and recommend required maintenance repairs for each structure, based on visual observations during the inspection. Limited areas of bulkhead were inspected for gross deterioration and damage. Bowman Consulting Group, Ltd. (Bowman) was retained by Kraken to oversee the field inspection; evaluate the inspection findings; and provide recommendations for the maintenance repairs to the existing fender systems.

Routine Inspections are performed on a routine, cyclical basis, and therefore represent a proactive rather than reactive approach to maintenance. The primary purpose of a Routine Inspection is to assess the general overall condition of a waterfront structure, assign a condition assessment rating to the overall waterfront structure and recommend course of action for current and future maintenance work.

The Routine Inspection is performed in accordance with the general recommendations of ASCE Waterfront Facilities Inspection and Assessment Manual, Engineering Practice No. 130 (ASCE Manual). The ASCE Manual recommends performing three levels of inspection during a Routine Inspection. Level I Inspection involving a swim by visual and tactile inspection of all underwater structural components of a marine structure, without the removal of marine growth, is recommended in the ASCE Manual for Routine Inspections. Level II Inspection involving the removal of marine growth prior to performing visual inspection is recommended on 10% of randomly selected sample of underwater structure. Level III Inspection is recommended on approximately 5% sample of the underwater components. Level III inspection of steel structures involves Non-Destructive Testing (NDT) of underwater structural components after cleaning the inspection area of marine growth and corrosion.

Site Specific Inspection Approach & Details

Kraken coordinated the field inspection days with WM. Kraken and Bowman (Inspection Team) conducted the underwater and topside inspections of SWBMTS fender systems and limited areas of the bulkhead on November 16th, 17th, and 18th, 2024. Inspected structures and piles were generally named and labeled prior to initiating the inspection.

The underwater inspection was performed using an OSHA compliant diving crew consisting of a diving captain, a diver, a standby diver, and a tender. Bowman's Marine Engineer was on site to oversee the inspection. The dive crew was equipped with a landside inspection station, surface supplied air, two-way audio equipment, video monitor and camera. The diver had an underwater camera & light attached to his helmet to allow the inspector to observe what the diver observed under water.

Underwater inspection included the visual and tactile inspection of fender piles and other underwater structural elements like limited areas of steel sheet pile bulkhead and concrete seawall. While the inspection focused on the fender systems of the SWBMTS facility, the existing bulkhead and seawall were also visually inspected at limited locations. The extent of deterioration, corrosion, section loss, signs of distress in structural members and their connections, were reviewed and recorded during the underwater inspection. Level I, II and III inspections were performed on randomly selected fender piles and sheet piles. Level III Inspection was performed using an Ultrasonic Thickness Measurement (UTM) Gauge to measure the remaining steel thickness at the submerged portion of piles and sheet piles to evaluate the rate of corrosion.

The diver was instructed to observe and report the observed loss of coating, extent and type of corrosion, delamination of steel, necking and knife edging of piles, evidence of section loss, holes, buckling, and visual plumbness of piles and sheet piles. Randomly selected piles were cleaned of marine growth and inspected to Level III using a UTM gauge, in addition to the visual inspection. Remaining steel thicknesses were recorded at the outer flange, inner flange, and the web of piles and sheet piles. Thickness readings were recorded below the concrete seawall and near mudline. Erosion of mudline was also reviewed. The diver observed and reported the condition of accessible bolts connecting various members of fender systems.

Topside inspection included the visual inspection of visible portions of fender piles, wales, rubber fenders, connecting bolts, and shear chains. Existing mooring hardware, concrete deck, and safety ladders were also visually inspected. Still photographs of above water deficiencies were taken and selected photographs are included in Appendix – C of the report.

Limitations:

Routine Inspections are performed to determine the general overall condition of waterfront structures like the North and East Bulkhead Fender Systems and other structures. It should be noted that the entire underwater portion of a waterfront structure is not inspected during Routine Inspections. Visual and tactile inspection of portions of randomly selected structural members of waterfront structures like the North and East Bulkhead Fender Systems are inspected in detail during Routine Inspections. A Routine Inspection assumes that the condition of inspected sample of structural members represents the general condition of waterfront structure. During our inspection, all fender piles, rubber fenders, and connecting bolts were visually inspected. Limited portions of concrete seawall and sheet piles below the concrete seawall and at mudline were also visually inspected.

It should be noted that only the accessible, visible, and apparent damage and deterioration at the inspected portion of waterfront structures like the North and East Bulkhead Fender Systems can be observed and recorded during underwater Routine Inspections. Additional damage and/or deterioration may exist at portions of the structure which are not visible, accessible and at portions that are not inspected. Therefore, a Routine Inspection only provides a general overview of the underwater condition of the inspected structure and overall waterfront facility. Also, underwater inspection represents the condition of the inspected structure on the day(s) of the inspection. The condition of waterfront structures may change with time and due to other events.

The structural assessment and evaluation under the scope of Routine Inspections is based on the field observed damage/deterioration of existing waterfront structures and their structural components. Performing structural analysis or calculations to evaluate the structural adequacy/capacity of existing waterfront structures or individual structural components constituting the waterfront structures, in their current or original condition, is not included under the scope of Routine Inspections. A detailed structural analysis under

a separate contract must be undertaken if determining the structural adequacy/capacity of existing waterfront structures in their current, as new, or repaired condition is desired.

The recommendations provided in this report are general recommendations. These recommendations are not based on structural analysis/design and do not consider the calculated current structural capacity versus demands of existing structures and their individual structural members. These recommendations also do not delve into the site-specific limitations, which are considered during a preliminary or detailed structural design. As a minimum, a preliminary design must be performed to investigate the feasibility and economical ways to accomplish the required repairs prior to developing a budget for the repairs. A preliminary design is also necessary to develop a reliable Opinion of Probable Costs (OPC) of repairs, specific to the project.

Regulatory permitting, final structural analysis, final design, and detailing are necessary prior to proceeding with the construction of repairs recommended in this report.

III. INSPECTION FINDINGS

This section of Report summarizes the findings of our Routine Inspection of SWBMTS Fender Systems. While the inspection focused on fender systems, existing bulkhead was also inspected at limited locations. General inspection findings of bulkhead inspection are also presented in this section.

A. North Bulkhead Fender System Findings:

North Bulkhead Fender System consists of twenty (20) Fenders. Each Fender consists of two coal tar epoxy (CTE) coated HP12 fender piles. A cross braced fender panel frame consisting of three (3) levels (Top, Middle, and Bottom) of CTE coated W14 Wales and fifteen (15) vertical 10x12 timbers is bolted to the outer fah Fe of fender piles. The outer face of a vertically oriented, 300 mm x 1000 mm rubber arch fender is bolted to the inner flange of each fender pile. The inner flanges of each arch fender are bolted to a CTE coated mounting plate anchored into the concrete seawall.

During field inspection, the East most fender was marked as Fender #1 while the West most fender was marked as Fender #20. However, to match historical drawings and earlier inspection report provided to the Inspection Team, this Report designates the West most fender of North Bulkhead Fender System as Fender #1 and the East most fender as Fender #20. See Appendix C for Photographs showing the current condition of North Bulkhead Fender System.

Typical Conditions:

Unless noted otherwise in Tables 1 thru 20, the structural elements forming the fenders of North Bulkhead Fender System were found to be in the following “Typical Conditions” during our visual inspection.

Rubber Fenders – Two (2) 300 x 1000 mm rubber arch fenders exist at each Fender. The outer face of each rubber fender is connected to the inner flange of a fender pile using eight (8) galvanized bolts. The inner flanges of rubber fender are attached to a steel mounting plate using four (4) galvanized bolts. Typical rubber fender is generally intact with no cuts and tears. However, the rubber fender has partially or fully separated from the mounting plate with a gap between the rubber fender and the mounting plate for their

full or partial height. One or more bolt holes of rubber fender are worn and enlarged with the bolt head already pulled out of the bolt hole due to separation of fender or in the process of pulling out of the bolt hole due to tensile stresses in the rubber fender.

Bolts connecting the rubber fender to fender pile typically exhibit Major coating loss and surface corrosion, but no significant section loss. Bolts and washers connecting rubber fender to the mounting plate typically exhibit Minor to Moderate coating loss and surface corrosion with Minor section loss or damage. Bottom bolts and washers exhibit greater coating loss and corrosion. One or more washer of bolts connecting rubber fender to the mounting plate is typically loose or missing. Head of one or more bolt to the mounting plate has pulled out or is pulling out of the rubber fender bolt hole at a typical rubber fender. See Photos 1 and 2 for Typical Condition of rubber fender and their connecting bolts.

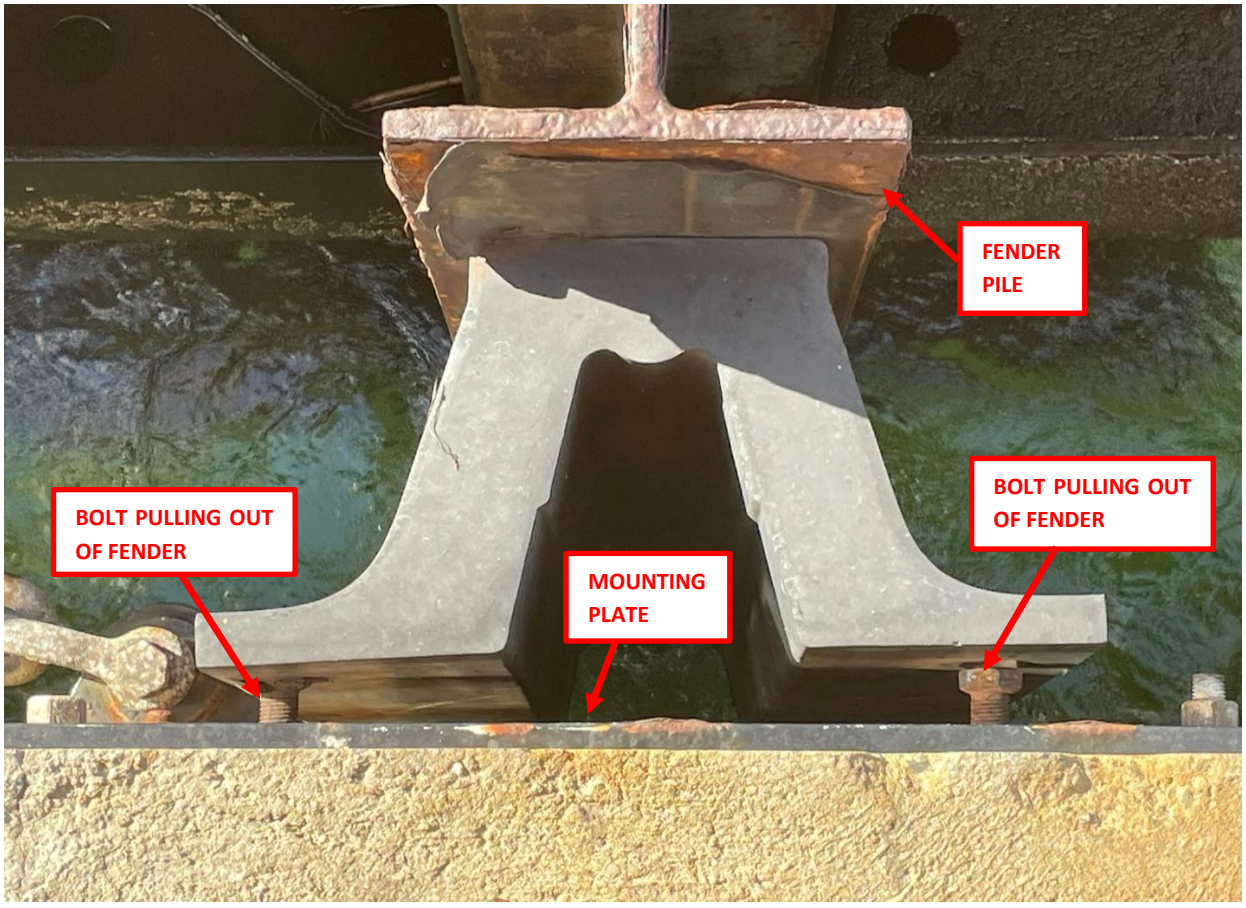

Photo 1: Rubber fender separated from mounting plate w/ top 2 bolts pulling out of fender.

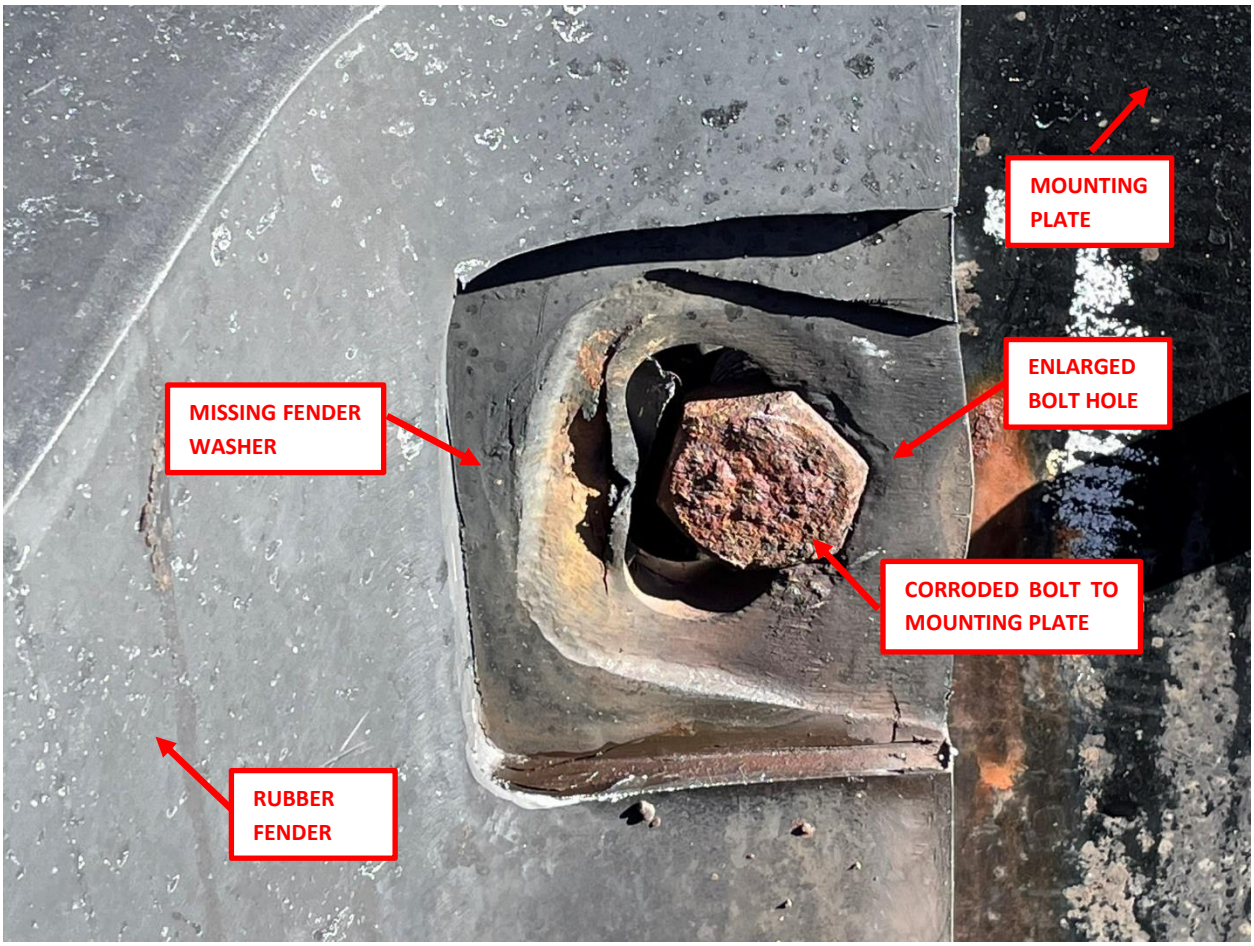

Photo 2: Rubber fender bolt connecting fender to mounting plate.

Fender Piles – Two (2) coal tar epoxy coated HP12 fender piles support each Fender. Top 18 to 24 inches of a typical fender pile exhibits Moderate coating loss and surface corrosion. Coating has peeled off in this area of piles. Coating loss and surface corrosion extends further down to the mid-wale of fender panel along the flanges of fender piles. See Photos 3 & 4 for the Typical Condition of fender piles. Coating is intact below water with heavy, soft marine growth. No visible section loss, no significant knife edging (thinning) of pile flanges or necking (reduction in width) of flanges was observed in fender piles under water.

Photo 3: Fender pile with coating loss & corrosion at top approx. 18". Corrosion of flange edges continues further down.

Photo 4: Coating of fender pile below water is intact. Flange edges are square with no necking or knife edging.

Mounting Plates – Each rubber arch fender is mounted on a coal tar epoxy coated steel mounting plate, which is anchored to the concrete seawall of the marginal wharf using six (6) galvanized threaded rods arranged in 3 rows. Mounting plate has experienced Minor (5% to 15%) coating loss and surface corrosion with no significant section loss. Mounting plates are in place and not rotated or separated from seawall.

Top and mid threaded rods anchoring the mounting plate to concrete seawall are intact with Minor to Moderate coating loss and surface corrosion. Bottom threaded rods typically exhibit Major coating loss and surface corrosion. Nuts of threaded rods are generally tight. See Photos 5 & 10 for Typical Condition of mounting plate.

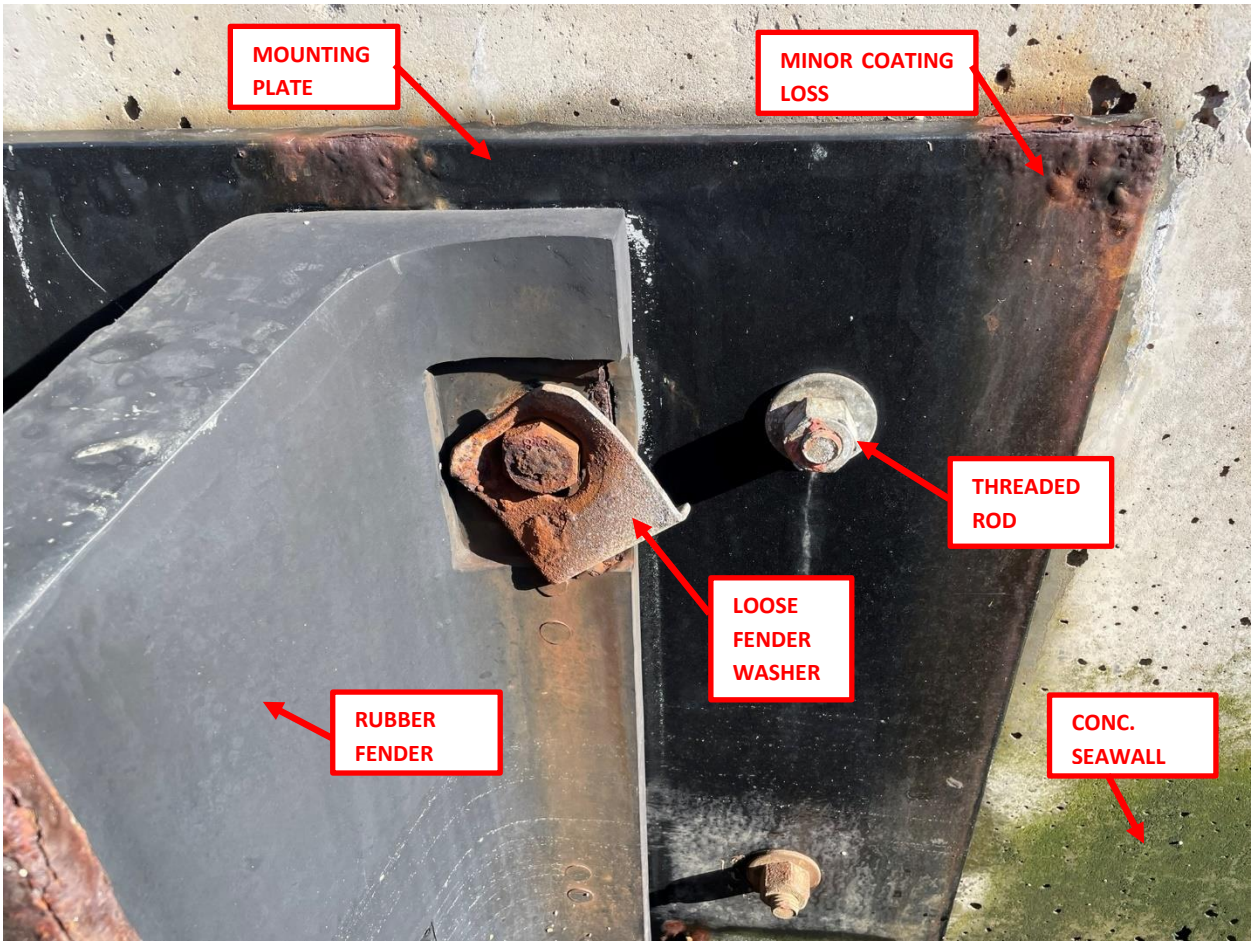

Photo 5: Typical Condition of mounting plate

Frame Wales – Three (3) (top mid, and low) coal tar epoxy coated W14 Wales connect the two fender piles of each Fender and support the fender timbers. Top wale exhibits

Minor (10% to 15%) coating loss and surface corrosion but no significant section loss. Coal tar epoxy coated steel pipe cross bracing exists between the two fender piles of each fender system. Top 3 to 4 inches of pipes exhibit coating loss and surface corrosion but no significant section loss. Welds at the ends of bracing members are intact.

Four (4) galvanized bolts connect each wale to each fender pile. Bolts connecting top wale to fender piles exhibit Minor to Moderate coating loss and surface corrosion, but no significant section loss. Bolts connecting the mid and lower wale exhibit greater coating loss and corrosion, but no significant section loss. One or more bolt is loose. See Photos 6 & 7 for Typical Condition of Wales.

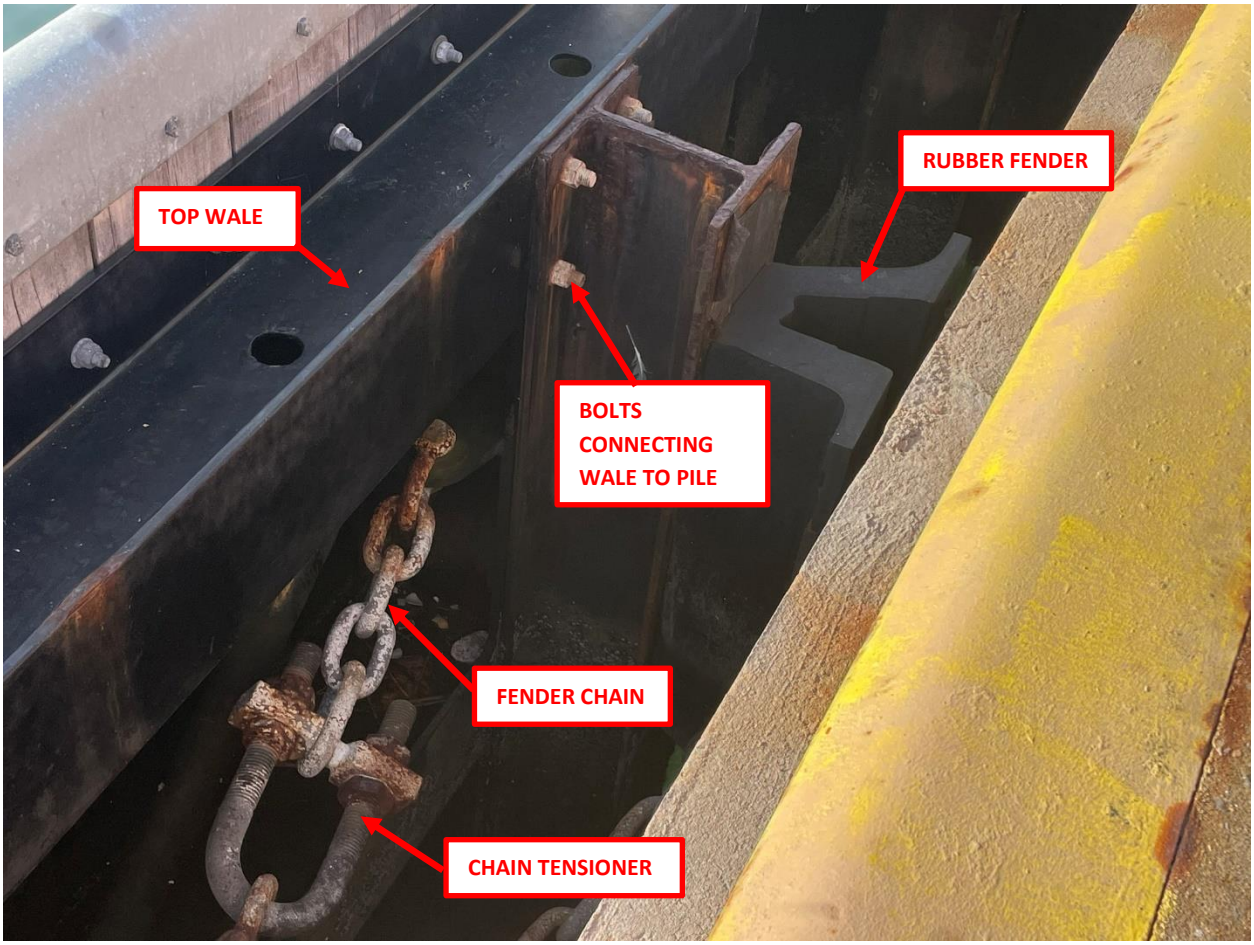

Photo 6: Typical Condition of Wale. Also note Typical Condition of top fender chain.

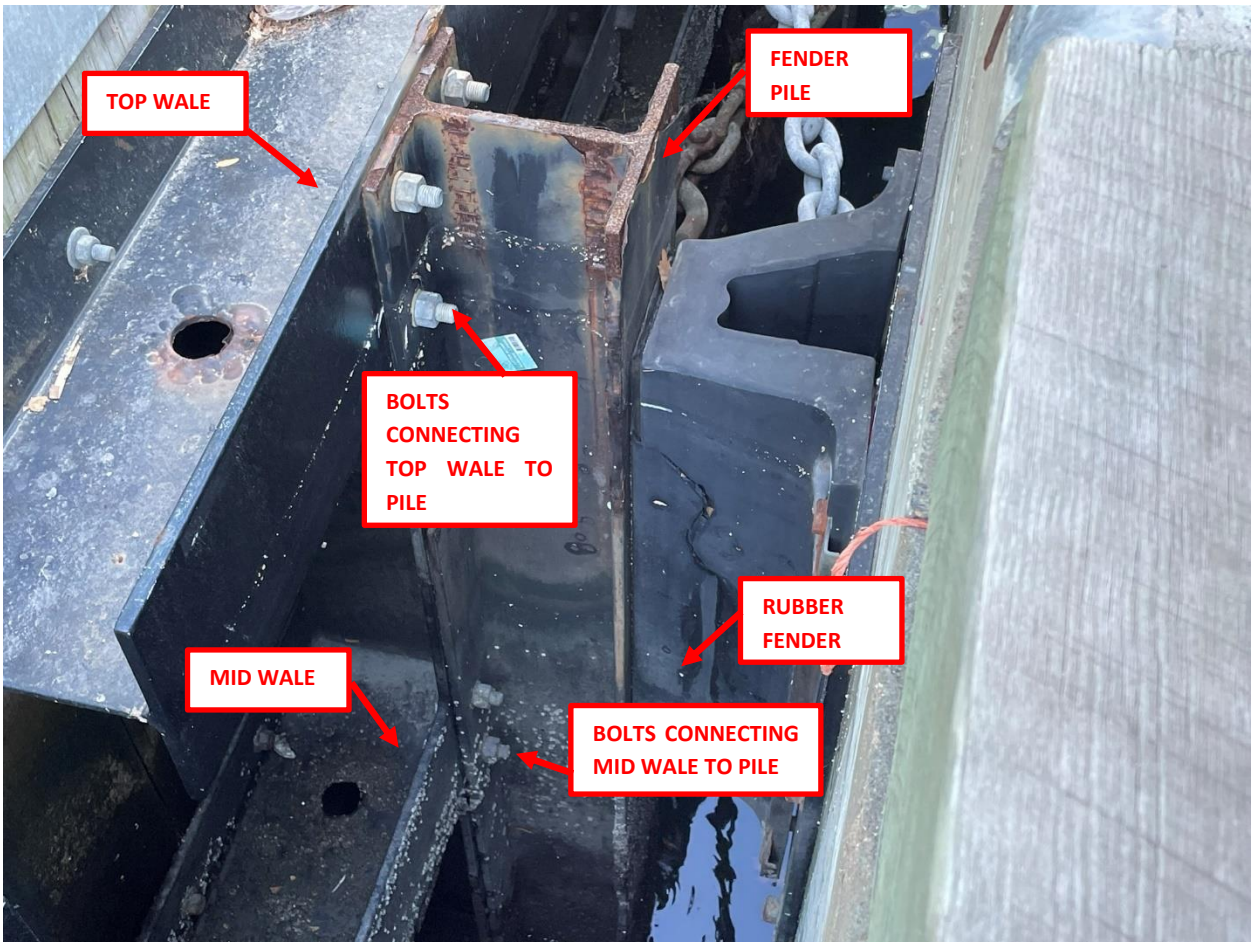

Photo 7: Typical Wale Construction

Fender Chain Assemblies – Two galvanized shear chains exist at each Fender. Each chain is equipped with galvanized shackles and a chain tensioner. Lower fender chain and hardware exhibit Moderate to Major (50% to 90%) coating loss and surface corrosion. The top fender chain and hardware exhibit Minor to Moderate (10% to 25%) coating loss and surface corrosion. All hardware including padeyes, shackles, and chain tensioner are intact. Lower chain is sagging while the upper chain is generally tight. Welds of padeyes are intact with Minor coating loss and surface corrosion. See Photos 6 & 8 for Typical Condition of fender chains.

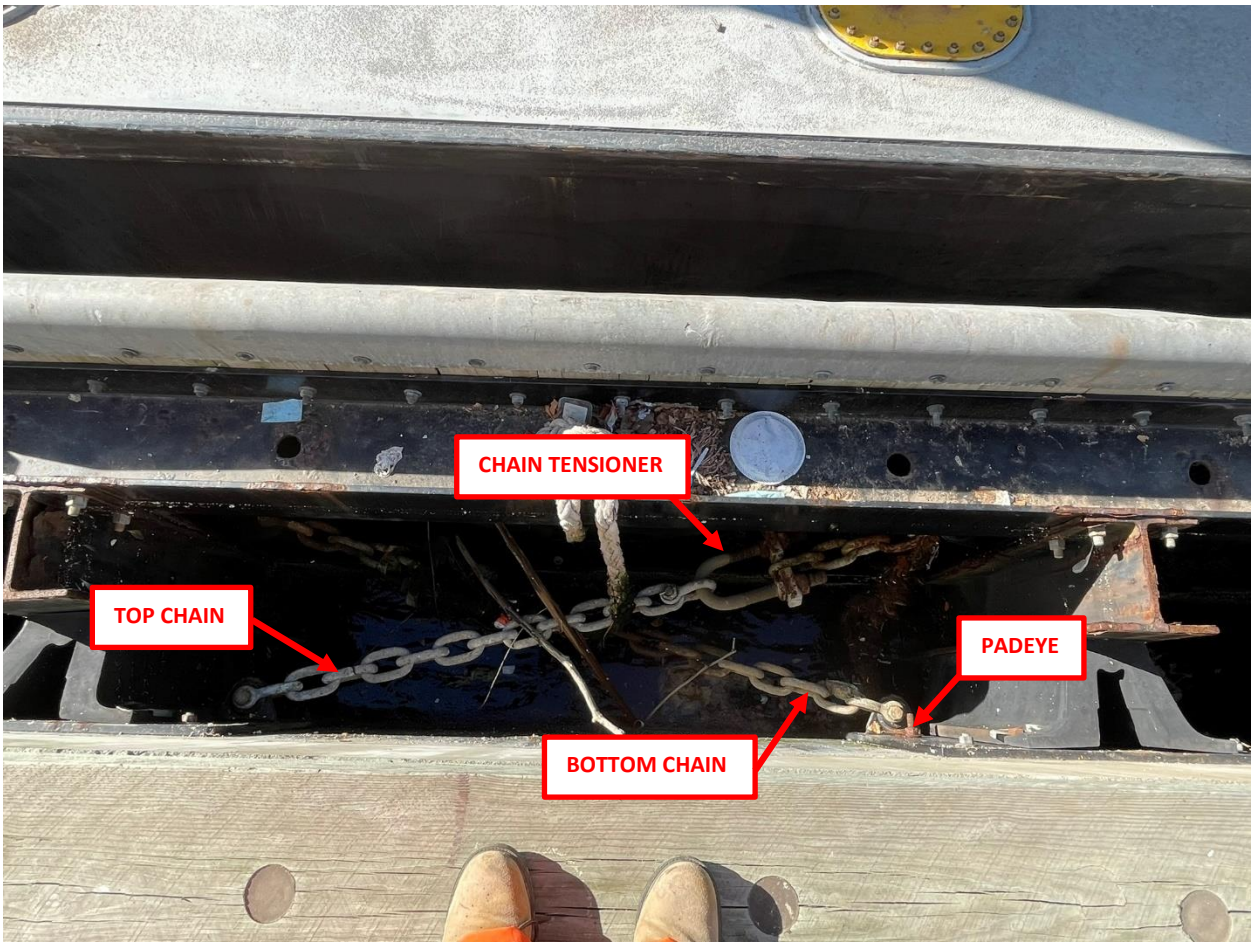

Photo 8: Typical Condition of top & bottom fender chains. Lower chain is typically sagging.

Timber Fender Panels – Fifteen (15) - 10x12 timbers are mounted on the outshore face of Wales to form the timber fender panel. Timbers of the panel are intact and not missing, broken, or split. Timbers exhibit checks, some gouging, and normal abrasion due to vessel contact. Two (2) galvanized bolts connect each timber to each wale. Bolts exhibit Minor to Moderate surface corrosion and coating loss but no significant section loss. One or more bolt is loose.

A galvanized rolled steel cap exists on top of fender timbers at each fender panel. The coating of cap is intact with no corrosion. The cap is in place but one or more of the fifteen (15) bolts connecting the cap to timbers are loose. See Photo 9 for Typical Condition of fender timbers and cap.

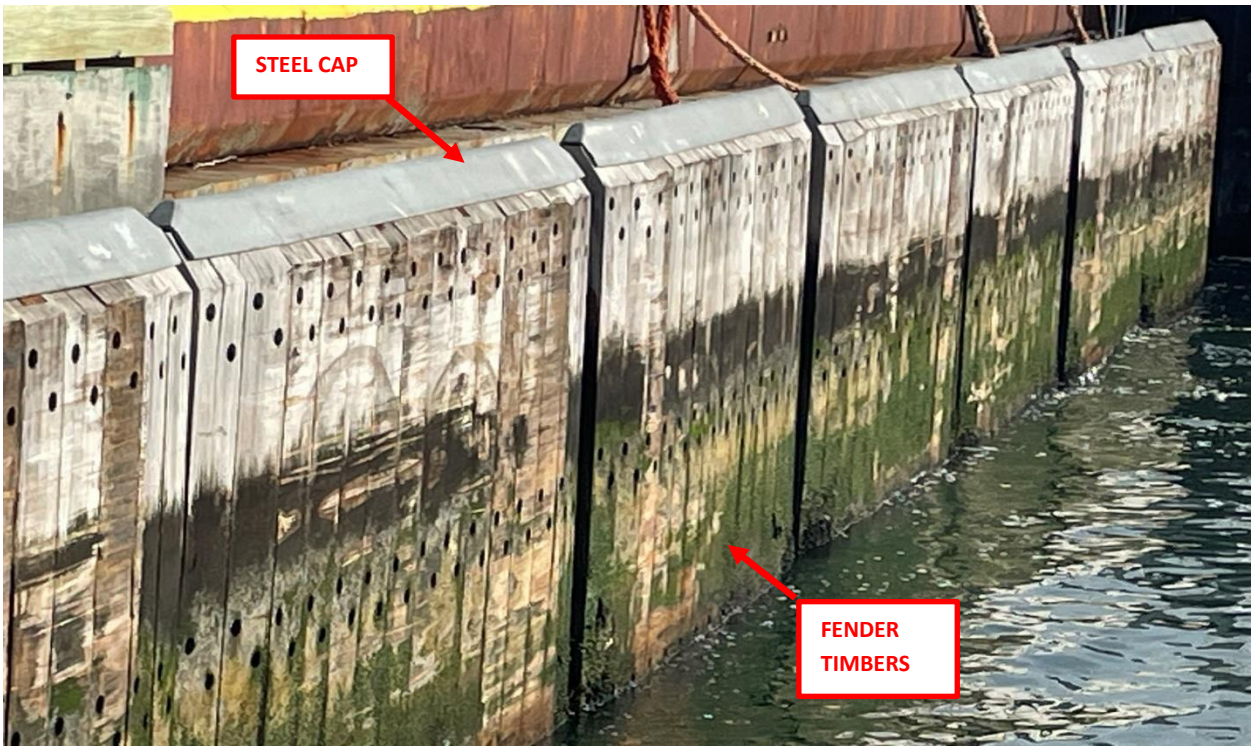

Photo 9: Typical Condition of fender timbers

Concrete Seawall – Below water, the concrete seawall exhibits erosion and minor spalling along the bottom outer edge and face. Seawall concrete also has hairline cracks, which extend down to the bottom of seawall. Interface with steel sheet pile is tight.

Above water, the concrete seawall exhibits minor spalling along the top outer edge. Seawall also exhibits hairline cracks, which extend down along the outer face of seawall. Random, up to 3” diameter and up to 2” deep voids exist in seawall.

18” wide x 12” tall concrete curb exists along the outer edge of seawall behind Fender #s 15 thru 20. A curved steel plate forms the top outer edge of curbs. The plate extends down approximately 30” to form the outer top face of seawall. The plate exhibits surface corrosion. The top surface of concrete curb exhibits delamination and spalling of concrete along steel plate. Rust stains are also visible on curb.

10x12 timber guard logs exist along the outer edge of seawall behind Fender #s 1 thru 15. Guard log timbers are checked with no section loss and are intact. See Photos 10 thru 13 for typical condition of concrete seawall and curb.

Photo 10: Typical Condition of concrete seawall above water

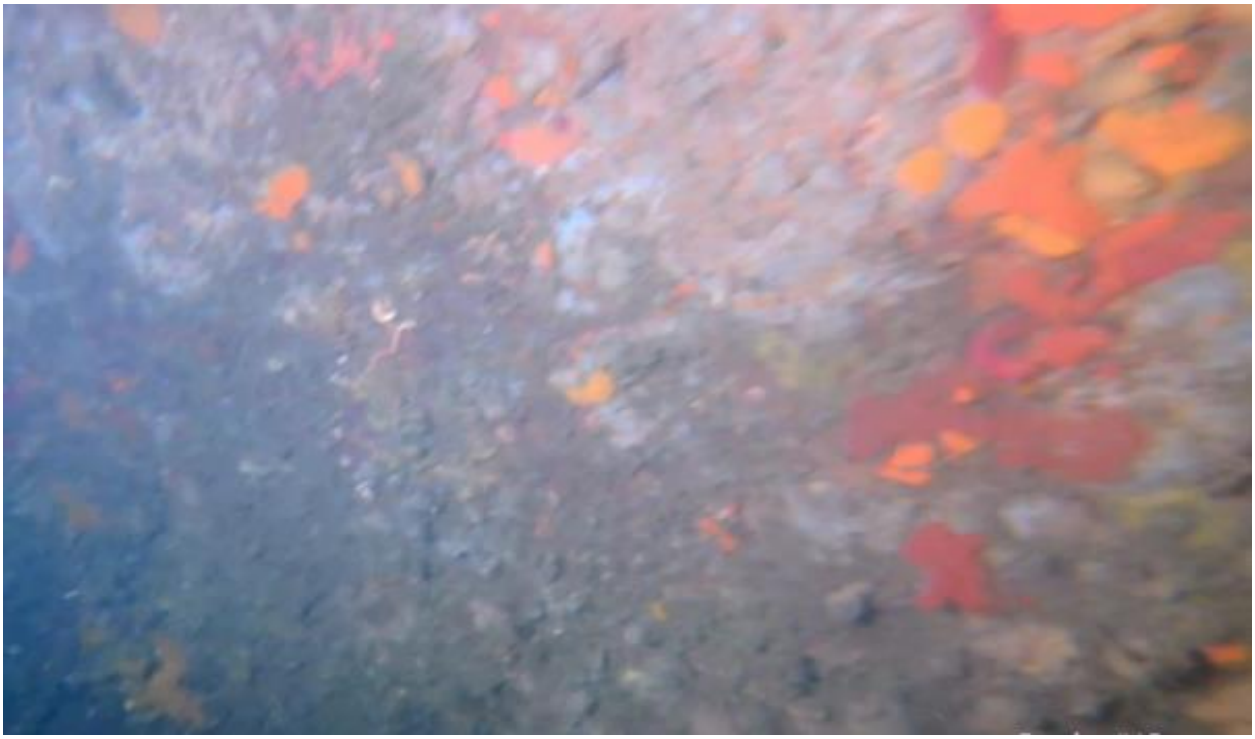

Photo 11: Typical Condition of concrete seawall below water

Photo 12: Typical Condition of concrete curb behind Fender #s 15 thru 20

Photo 13: Spalling of concrete curb behind Fender # 15. Also note Typical condition of timber guard log

Sheet Pile Bulkhead – Coal tar epoxy coated steel sheet pile bulkhead exists below the concrete seawall, inboard of the North Bulkhead Fender Systems. Sheet piles are not visible above water. Sheet piles are generally plumb with no visible lean or bulging. Minor (5%) coating loss with surface corrosion and up to 1" thick, soft marine growth was observed on sheet piles. Corrosion blisters and pitting corrosion were not observed in sheet piles. Inspected sheet pile interlocks were found to be intact with no tenting. See Photo 14 for typical underwater condition of steel sheet piles.

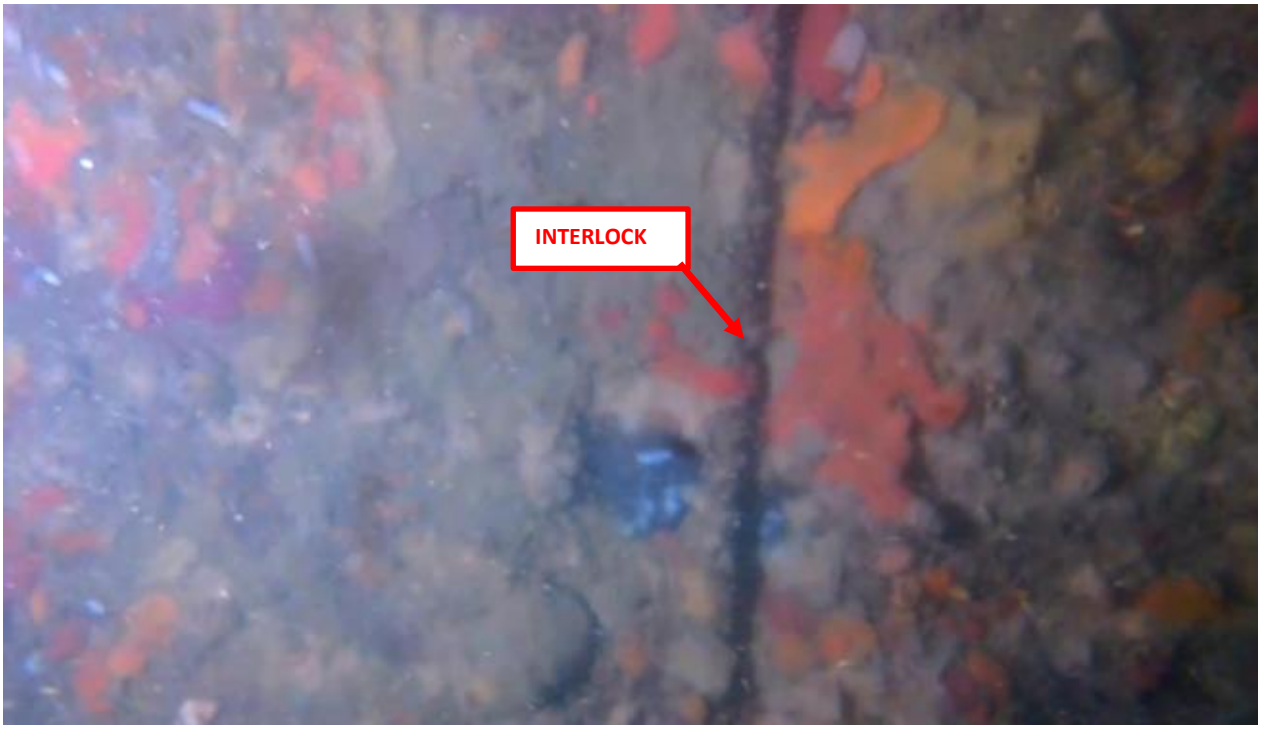

Photo 14: Typical condition of steel sheet piles below water

Mooring Hardware – Mooring hardware in the form of cleats, bollards, winches, roller chocks, and sheaves exist along the outer edge of concrete seawall. The hardware is painted yellow and mounted on concrete pedestals. Concrete pedestals are intact with no significant cracks and spalling but have rust stains, indicating that the mooring hardware was significantly corroded prior to paint application. Mooring hardware is intact with some of them exhibiting Minor to Moderate (up to 50%) corrosion. Corrosion seems to have been painted over which did not allow visual inspection of mooring hardware steel. The connecting hardware of mooring hardware was not visible for inspection. See Photos 15 & 16 for typical condition of mooring hardware.

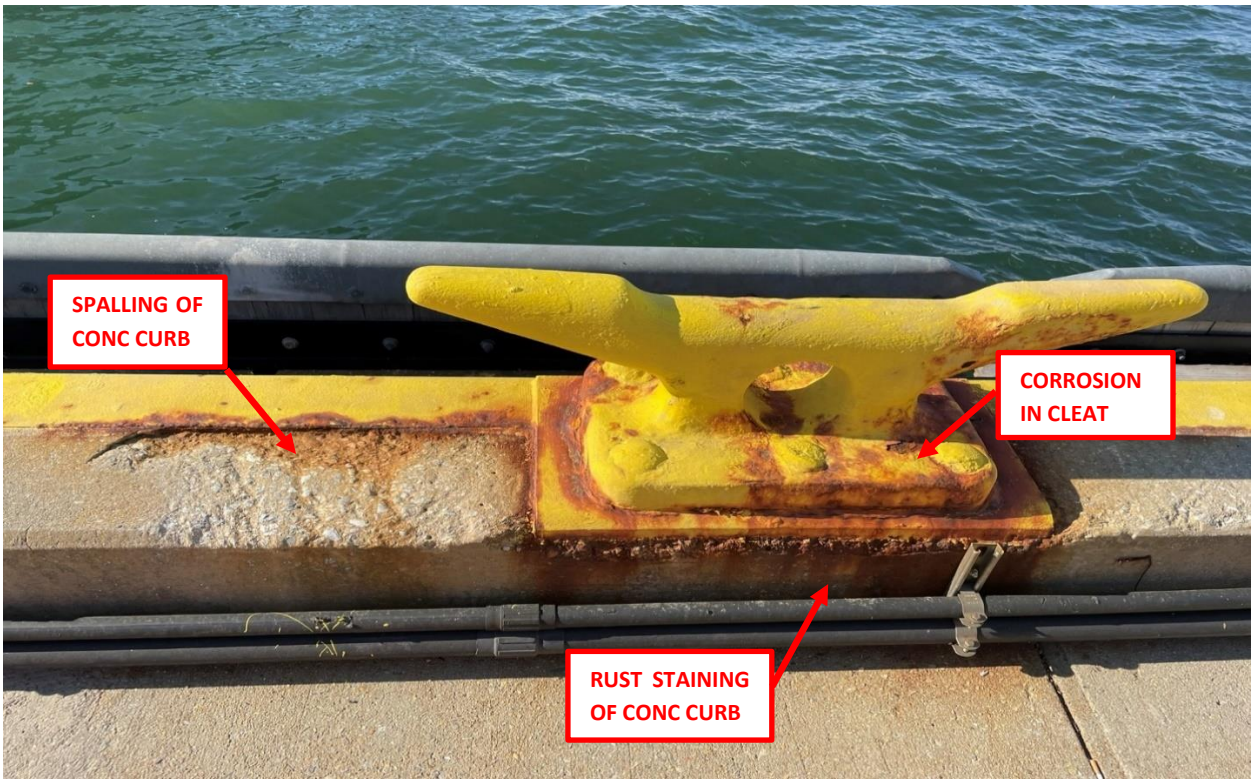

Photo 15: Typical condition of mooring cleat. Also note spalling of conc curb

Photo 16: Typical condition of roller chocks. Note gouging of horizontal roller at the location of mooring line

B. East Bulkhead Fender System Findings:

East Bulkhead Fender System of SWBMTS consists of thirty-six (36) King Pile Fenders. Each fender consists of two (2) – coal tar epoxy (CTE) coated PSP900 king piles inter-connected using locking bars. Gap between the web of two king piles is filled with concrete. According to historical drawings, a pair of CTE coated PZC26 sheet pile exists between each fender. The elevation of the top of sheet piles varies but is generally below the local Mean Low Water (MLW), however, the interlock between the king piles and sheet piles extends above water. The bottom of sheet piles penetrates the mudline and is not visible. Two (2) arch rubber fenders are mounted on the West face of each fender. The two rubber fenders are mounted vertically, in line. Two types (Type A and B) of King Pile Fenders exist. Type A fenders consist of two (2) – 400x2000 mm arch rubber fenders. Type B fenders consist of two (2) – 400x2500 mm arch rubber fenders and are taller as compared to Type – A fenders. Each rubber fender is connected to the king piles using eight (8) galvanized bolts.

In this Report, the North most fender has been designated as King Pile Fender #1 while the South most fender has been designated as King Pile Fender #36. King Pile Fender #s 2, 4, and 6 are Type B fenders. All other fenders are Type A. See Appendix C for Photographs showing the current condition of East Bulkhead Fender System.

At the South end of East Bulkhead Fender System, an End Fender exists abutting the King Pile Fender #36. The End Fender consists of an approx. 7’-0” long x 4’-10” wide concrete block. The concrete cap extends below mudline. The Southwest corner of this fender is protected by four (4) corner arch rubber fenders mounted on timbers using galvanized bolts.

Typical Conditions

Unless noted otherwise in Tables 21 thru 56, the structural elements forming the East Bulkhead Fender System were found to be in the following “Typical Conditions” during our visual inspection.

King Piles - Typically, the king piles are plumb with no impact damage. Below the approximate elevation of +8’-6” MLW, the king piles exhibit coating loss and surface corrosion along flange edges. The area of coating loss and corrosion extends into the

face of flanges and web below the approx. elevation of +6'-0" MLW. The interlocks have moderate coating loss and surface corrosion above water. Below MLW, all components are covered with heavy marine growth. The king piles have approximately 20% coating loss, with no visible section loss. The interlocks between the king piles and between the king piles and sheet piles are tight and not separating. No noticeable scouring was observed at the bottom of king piles.

Photo 17: Typical condition of King Pile.

Steel Sheet Pile – Coal tar epoxy coated steel sheet piles between king piles are not visible above water. Typical sheet pile is generally plumb with no bulge or lean. Up to 1" thick, soft marine growth exists with negligible coating loss and corrosion. Sheet pile penetrates mudline and the interlocks are intact with no tenting.

Top Rubber Arch Fender – A Typical top rubber Arch fender is intact with no significant damage to the rubber. The bottom of top rubber fender has abrasion marks. The galvanized bolts connecting rubber fender to the king piles have negligible coating loss and are intact. Bolts are tight unless noted otherwise in Tables 21 thru 56.

Bottom Rubber Arch Fender – Top of a Typical bottom rubber Arch fender has abrasion marks but no significant damage to the rubber. Galvanized bolts in the top two (2) rows, connecting the rubber fender to the king piles, have negligible to minor coating loss and are intact. Bolts in the bottom two rows of lower Arch fender exhibit Minor to Moderate coating loss and surface corrosion, but no significant section loss. All bolts are tight unless noted otherwise in Tables 21 thru 56. Below MLW, the lower fender is covered in marine growth up to the second bolt from the bottom.

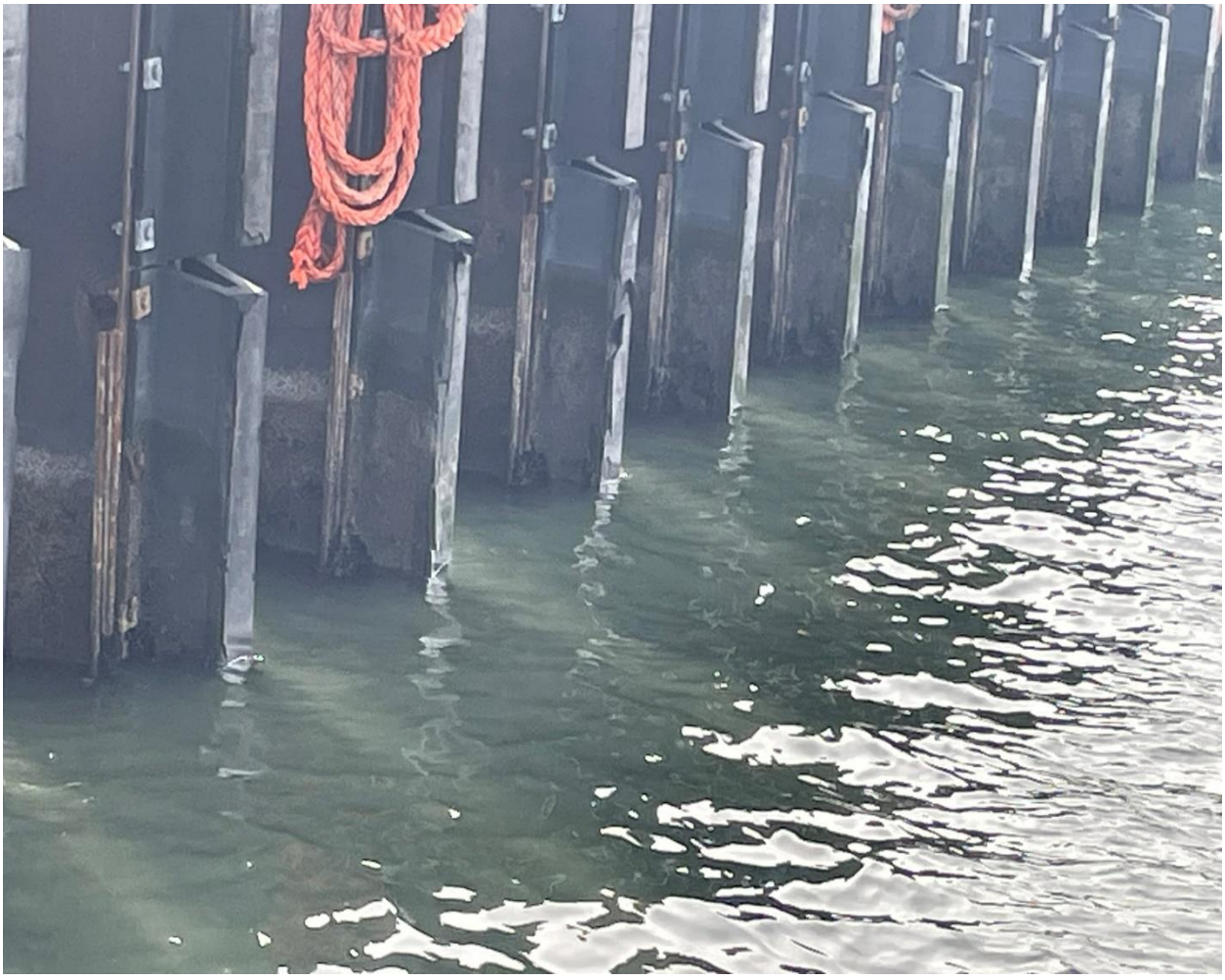

Photo 18: Typical condition of top and bottom arch rubber fenders.

Corner Rubber Arch Fenders – The concrete cap, corner arch fenders, and timbers of the End Fender are in “as new” condition. The bolts and washers of the lowest and the 2nd from bottom rubber fenders exhibit Moderate coating loss and surface corrosion but no section loss.

Photo 19: Condition of End Fender.

TABLE - 1: Fender #1 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P2)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P1)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.5" to 0.75" gap.
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate			X	
East Top	Typical			Bolt & washer loose and corroded.
East Bottom	Typical			Bolt & washer loose and corroded
West Top	Typical			Bolt & washer loose and corroded
West Bottom	Typical			Bolt & washer loose and corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender				Fender is tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate			X	
East Top	Typical			Bolt & washer corroded
East Bottom	Typical			Bolt & washer corroded
West Top	Typical			Bolt & washer corroded
West Bottom	Typical			Bolt & washer corroded
Fender Chain Assembly				
Chains	Typical	X		Minor to moderate corrosion.
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		In place
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small holes and hairline cracks.
Below Waterline	Typical			Heavy marine growth. 24" outfall pipe below West fender
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at mudline

TABLE - 2: Fender #2 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P4)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P3)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.5" gap.
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.5" to 1.5" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. 1 link of lower chain has a crack
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		5 bolts are missing. 10 bolts are loose.
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small holes and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 3: Fender #3 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P6)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P5)		X		Typical but pile web is buckled. Pile flange is distorted & rotated.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender				Fender is tight
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer corroded
East Bottom	Typical		X	Bolt & washer corroded
West Top	Typical		X	Bolt & washer corroded
West Bottom	Typical		X	Bolt & washer corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender			X	Fender loose w/0.125" to 0.5" gap. Stretched & damaged
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose. Bolt pulling thru fender.
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom	Typical		X	Bolt & washer corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Missing and sitting on top wale.
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small holes and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 3A - CORROSION EVALUATION @ FENDER #3		
Item	**Current Thickness (Inch)**	**Corrosion Evaluation**
East Pile (P6) - Midwater		2.58% section loss (Minor).
Outer Flange	0.675	
Web	0.665	
Inner Flange	0.662	
East Pile (P6) - Mudline		2.68% section loss (Minor)
Outer Flange	0.663	
Web	0.669	
Inner Flange	0.668	
Sheetpile - Below Conc. Seawall		0% section loss (None)
Outer Flange	0.698	
Web	0.671	
Inner Flange	0.653	
Sheetpile - Mudline		0% section loss (None)
Outer Flange	0.627	
Web	0.672	
Inner Flange	0.668	

NOTES:

1. Existing piles are HP12x84 (Per historical drawings)
2. Section Properties of New HP12X84

   Flange thickness = 0.685"

   Web thickness = 0.685"
3. Existing sheet piles are PZ35 (Per historical drawings)
4. Section Properties of New PZ35 Sheet Pile:

   Flange thickness = 0.600"

   Web thickness = 0.500"

TABLE - 4: Fender #4 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P8)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P7)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.5" gap at the bottom
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.5" gap at the bottom
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap		X		Top of cap rotated inshore. 6 bolts missing. 9 bolts loose
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks
Below Waterline		X		49"Lx14"Dx7"T spall at bottom edge of seawall
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 5: Fender #5 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P10)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P9)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.125" gap along East edge
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.125" to 0.5" gap.
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer loose. Bolt pulling thru fender.
West Bottom	Typical		X	Bolt & washer loose and corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at mudline

TABLE - 6: Fender #6 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P12)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P11)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender				Fender is tight
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt corroded
East Bottom	Typical		X	Bolt corroded
West Top	Typical		X	Bolt corroded
West Bottom	Typical		X	Bolt corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.5" to 1" gap
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt corroded
East Bottom	Typical		X	Bolt & washer loose and corroded. Bolt pulling thru fender
West Top	Typical		X	Bolt corroded
West Bottom	Typical		X	Bolt & washer loose and corroded. Bolt pulling thru fender
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 7: Fender #7 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P14)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P13)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender				Fender is tight
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer corroded
East Bottom	Typical		X	Bolt & washer loose. Bolt corroded
West Top	Typical		X	Bolt & washer loose. Bolt corroded
West Bottom	Typical		X	Bolt & washer loose. Bolt corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.25" gap
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Loose bolt & washer.
East Bottom	Typical		X	Loose bolt & washer.
West Top	Typical		X	Bolt corroded
West Bottom			X	Bolt & washer missing
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Upper chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Top of cap is rotated towards land. Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 8: Fender #8 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P16)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P15)		X		Typical, but w/slight buckling of web
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender			X	Damaged fender. Tear in N & S face.
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer corroded
West Bottom	Typical		X	Bolt & washer corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender				Fender is tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt corroded
East Bottom	Typical		X	Bolt corroded
West Top	Typical		X	Bolt corroded
West Bottom	Typical		X	Bolt corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale		X		Minor coating loss & corrosion. Missing bolts
Bottom Wale	Typical	X		Heavy marine growth.Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 9: Fender #9 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P18)		X		Typical but pile web is buckled & inner flange is rotated.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P17)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender			X	Loose fender w/gap along East edge. Fender stretched & distorted
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Missing washer. Bolt corroded
West Bottom	Typical		X	Missing washer. Bolt pulling thru
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/ 0.75" gap at top on West side. Bottom tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer corroded
East Bottom	Typical		X	Bolt & washer corroded
West Top			X	Missing bolt & washer.
West Bottom	Typical		X	Bolt & washer corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain is loose
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale		X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth.Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small holes and hairline cracks
Below Waterline		X		55"Lx10"Hx7"D spall at bottom w/exposed rebar
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at mudline

TABLE - 10: Fender #10 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P20)		X		Typical but pile web is buckled & inner flange is rotated.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P19)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender			X	Fender is stretched & distorted.
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Loose washer. Bolt pulling thru fender
East Bottom	Typical		X	Loose washer. Bolt pulling thru fender
West Top	Typical		X	Coating loss & corrosion of bolt
West Bottom	Typical		X	Coating loss & corrosion of bolt & washer
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Fender loose w/0.75" gap at bottom on East side
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Loose washer. Bolt pulling thru fender
East Bottom	Typical		X	Loose washer. Bolt pulling thru fender
West Top			X	Coating loss & corrosion of bolt
West Bottom	Typical		X	Coating loss & corrosion of bolt & washer
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale		X		Minor coating loss & corrosion. Missing bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline		X		Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 11: Fender #11 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P22)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P21)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender			X	Torn, damaged, & displaced up
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top			X	Missing bolt & washer
East Bottom			X	Missing bolt & washer
West Top			X	Missing bolt & washer
West Bottom	Typical		X	Coating loss & corrosion of bolt & washer
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/ 0.75" gap at bottom on East side
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom			X	Missing bolt & washer
West Top			X	Missing bolt & washer
West Bottom	Typical		X	Corrosion of bolt & washer
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale		X		Minor coating loss & corrosion. Missing bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical	X		Deteriorated at bolt holes. Bolts project beyond timber face.
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline		X		12"Lx6"Dx6"T section missing at bottom. Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 12: Fender #12 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P24)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P23)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.5" to 2" gap. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom			X	Missing bolt & washer
West Top	Typical		X	Bolt & washer loose. Bolt corroded
West Bottom			X	Missing bolt & washer
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.5" to 2" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded. Washer cracked
East Bottom			X	Missing bolt & washer
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom			X	Missing bolt & washer
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Both chains sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale		X		Minor coating loss & corrosion. Missing bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

Bowman

TABLE - 12A - CORROSION EVALUATION @ FENDER #12		
Item	**Current Thickness (Inch)**	**Corrosion Evaluation**
East Pile (P24) - Midwater		2.29% section loss (Minor).
Outer Flange	0.669	
Web	0.672	
Inner Flange	0.667	
East Pile (P24) - Mudline		3.89% section loss (Minor)
Outer Flange	0.665	
Web	0.641	
Inner Flange	0.669	
Sheetpile - Below Conc. Seawall		0% section loss (None)
Outer Flange	0.597	
Web	0.675	
Inner Flange	0.671	
Sheetpile - Mudline		0% section loss (None)
Outer Flange	0.663	
Web	0.668	
Inner Flange	0.664	

NOTES:

1. Existing piles are HP12x84 (Per historical drawings)
2. Section Properties of New HP12X84

   Flange thickness = 0.685"

   Web thickness = 0.685"
3. Existing sheet piles are PZ35 (Per historical drawings)
4. Section Properties of New PZ35 Sheet Pile:

   Flange thickness = 0.600"

   Web thickness = 0.500"

TABLE - 13: Fender #13 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P26)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P25)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/0.5" to 1" gap. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Washer loose. Bolt pulling thru fender
East Bottom	Typical		X	Washer missing. Bolt pulling thru fender.
West Top	Typical		X	Washer loose. Bolt pulling thru fender
West Bottom	Typical		X	Washer missing. Bolt pulling thru fender.
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender				Fender is tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Coating loss & corrosion of bolt & washer
East Bottom	Typical		X	Loose washer. Coating loss & corrosion of bolt & washer
West Top	Typical		X	Coating loss & corrosion of bolt & washer
West Bottom	Typical		X	Loose washer. Coating loss & corrosion of bolt & washer
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Light marine growth. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 14: Fender #14 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P28)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P27)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/1" to 1.5" gap. Bolts pulling thru damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Washer loose. Bolt pulling thru fender
East Bottom	Typical		X	Washer missing. Bolt pulling thru fender.
West Top	Typical		X	Washer missing. Bolt pulling thru fender.
West Bottom	Typical		X	Washer missing. Bolt pulling thru fender.
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender				Fender loose on top w/0.25" gap. Bottom tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose. Bolt corroded
East Bottom	Typical		X	Bolt & washer corroded
West Top	Typical		X	Bolt & washer loose. Bolt corroded
West Bottom	Typical		X	Bolt & washer corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 15: Fender #15 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P30)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P29)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/2" to 3" gap. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Washer loose. Bolt pulling thru fender.
East Bottom	Typical		X	Washer loose. Bolt pulling thru fender.
West Top	Typical		X	Washer missing. Bolt pulling thru fender.
West Bottom	Typical		X	Washer missing. Bolt pulling thru fender.
West Fender Mounting Plate	Typical	X		Repair minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/0.5" to 1.5" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Washer cracked. Bolt pulling thru fender
East Bottom	Typical		X	Bolt & washer loose and corroded
West Top	Typical		X	Bolt & washer loose and corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Typical but 1" deep x 12" tall spall in seawall. Hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 16: Fender #16 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P32)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P31)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/2" to 3" gap along West edge. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose & corroded
East Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/2" to 3" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Missing washer. Bolt pulling thru fender
East Bottom			X	Missing bolt & washer.
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom			X	Missing bolt & washer.
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion. 1 nut of chain tensioner missing.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth.Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 17: Fender #17 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P34)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P33)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/2" to 3" gap. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Missing washer. Bolt pulling thru fender
East Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/2" to 3" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Missing washer. Bolt pulling thru fender
East Bottom			X	Missing bolt & washer.
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom			X	Missing bolt & washer.
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Typical but 1" deep x 10" x 24"spall at top. Hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 18: Fender #18 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P36)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P35)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Fender loose at top w/0.5" gap. Bottom tight
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt & washer corroded
West Top	Typical		X	Missing washer. Bolt corroded
West Bottom	Typical		X	Bolt & washer loose and corroded
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & moderate corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/2" gap at top. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Missing washer. Bolt pulling thru fender
East Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom	Typical		X	Missing washer. Bolt pulling thru fender
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 19: Fender #19 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P38)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P37)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Fender loose at top w/0.75" gap. Bottom tight
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer w/heavy corrosion. Bolt pulling thru fender
East Bottom	Typical		X	Bolt w/heavy corrosion
West Top	Typical		X	Bolt w/heavy corrosion pulling thru fender
West Bottom	Typical		X	Bolt w/heavy corrosion
West Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
West Rubber Fender	Typical	X		Loose fender w/2.5" gap. Damaged bolt holes
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Missing washer. Bolt pulling thru fender
East Bottom	Typical		X	Missing washer. Bolt pulling thru fender
West Top	Typical		X	Missing washer. Bolt pulling thru fender
West Bottom	Typical		X	Missing washer. Bolt pulling thru fender
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging
Padeyes	Typical	X		Minor coating loss & corrosion
Shackles & Tensioners	Typical			Minor to moderate corrosion.
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth. Loose bolts
Cross Bracing Members	Typical	X		Minor coating loss & corrosion at top
Timber Fender Panel				
Cap	Typical	X		Loose Bolts
Face Timbers	Typical			Minor checking
Concrete Seawall				
Above Waterline	Typical	X		Small voids and hairline cracks.
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at Mudline

TABLE - 20: Fender #20 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
East Fender Pile (P40)		X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
West Fender Pile (P39)	Typical	X		Coating loss & corrosion at top 5 ft.
Scouring at Mudline	No			
Marine Growth	Heavy			
East Fender Mounting Plate	Typical	X		Minor coating loss & corrosion
Anchors to Seawall	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
East Rubber Fender	Typical	X		Loose fender w/up to 1.5" gap. Damaged bolt holes
Bolts to East Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer loose and corroded
East Bottom	Typical		X	Bolt corroded. Missing washer
West Top	Typical		X	Bolt corroded. Missing washer
West Bottom	Typical		X	Bolt corroded. Missing washer
West Fender Mounting Plate	Typical	X		Coating loss & some corrosion of threaded rods, nuts & washers
Anchors to Seawall	Typical	X		Loose fender w/0.5" to 1.5" gap. Damaged bolt holes
West Rubber Fender	Typical	X		Fender loose on East side w/0.5" gap at top. Bottom tight
Bolts to West Fender Pile	Typical		X	Coating loss w/heavy corrosion
Bolts to Mounting Plate				
East Top	Typical		X	Bolt & washer corroded. Bolt pulling thru fender
East Bottom	Typical		X	Coating loss & corrosion of bolt & washer
West Top	Typical		X	Missing washer. Bolt pulling thru
West Bottom	Typical		X	Coating loss & corrosion of bolt & washer
Fender Chain Assembly				
Chains	Typical	X		Moderate corrosion. Lower chain sagging. Tighten lower chain
Padeyes	Typical	X		Touch up coating loss
Shackles & Tensioners	Typical			Minor to moderate corrosion
Frame Wales				
Top Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Middle Wale	Typical	X		Minor coating loss & corrosion. Loose bolts
Bottom Wale	Typical	X		Heavy marine growth.Loose bolts
Cross Bracing Members	Typical	X		Touch up coating loss
Timber Fender Panel				
Cap	Typical	X		Loose bolts
Face Timbers	Typical			
Concrete Seawall				
Above Waterline	Typical	X		Small holes and hairline cracks. Seal holes & cracks
Below Waterline	Typical			Heavy marine growth.
Sheetpile Bulkhead	Typical			Heavy marine growth. No scouring at base

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TABLE - 20A - CORROSION EVALUATION @ FENDER #20		
Item	**Current Thickness (Inch)**	**Corrosion Evaluation**
East Pile (P40) - Midwater		0% section loss (None).
Outer Flange	0.791	
Web	0.783	
Inner Flange	0.765	
East Pile (P40) - Mudline		1.31% section loss (Minor)
Outer Flange	0.656	
Web	0.677	
Inner Flange	0.695	
Sheetpile - Below Conc. Seawall		0% section loss (None)
Outer Flange	0.645	
Web	0.645	
Inner Flange	0.637	
Sheetpile - Mudline		0% section loss (None)
Outer Flange	0.674	
Web	0.676	
Inner Flange	0.660	

NOTES:

1. Existing piles are HP12x84 (Per historical drawings)
2. Section Properties of New HP12X84

   Flange thickness = 0.685"

   Web thickness = 0.685"
3. Existing sheet piles are PZ35 (Per historical drawings)
4. Section Properties of New PZ35 Sheet Pile:

   Flange thickness = 0.600"

   Web thickness = 0.500"

TABLE - 21: King Pile Fender #1 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			Bottom two rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 22: King Pile Fender #2 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Minor abrasion of outer face. Minor damage at bottom on North side
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Abrasion of outer face
Fender Bolts	Typical			Bottom two rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 23: King Pile #3 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			Bottom two rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 24: King Pile Fender #4 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Minor abrasion & damage at the bottom of fender
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Minor abrasion & damage at top of fender
Fender Bolts	Typical			Bottom two rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 25: King Pile Fender #5 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Minor abrasion at bottom North corner of fender
Fender Bolts	Typical			Washer of bottom South bolt is deteriorated
Bottom Fender				
Rubber Fender	Typical			Minor abrasion at top North corner of fender
Fender Bolts	Typical	X		2nd bolt from top on S side is loose. Bottom 2 rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 26: King Pile Fender #6 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			Impact damage to flange
Top Fender				
Rubber Fender	Typical			Outer face is separating
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender			X	Fender is split and torn
Fender Bolts	Typical	X		2nd bolt from bott. on S side is loose. Bott. 2 rows of bolts are corroded.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 27: King Pile Fender #7 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			Impact damage to flange
Top Fender				
Rubber Fender	Typical			Abrasion along North side of fender. Missing material at bottom 2"
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Top 2"Tx6"Lx1/4"D mat'l missing. Damage extends 12" down along N edge
Fender Bolts	Typical	X		Bolts in bottom 3 rows are loose. All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 28: King Pile Fender #8 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Top 5" of outer face damaged on N side. 3 ft. Lg. crack extends below water
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 29: King Pile Fender #9 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Horiz. Cut in North face at mid height
Fender Bolts	Typical		X	Top North bolt is missing
Bottom Fender				
Rubber Fender			X	Top 30" of outer face is damaged & peeling off.
Fender Bolts	Typical	X		2nd bolt from bott. on N side is loose. All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 30: King Pile Fender #10 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Botton 5" fender is damaged along North edge
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Approx. 12" of fender is damaged & separating along N edge near top.
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 31: King Pile Fender #11 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			6" tall cut in fender along North edge near fender face
Fender Bolts	Typical			
Bottom Fender			X	Top 30" of outer face is damaged & peeling off.
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 32: King Pile Fender #12 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Minor abrasion of fender
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				Approx. 12" of fender is damaged & separating along N edge near top.
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 33: King Pile Fender #13 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			South corner at bottom is damaged
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Top 5"x1/4" material missing at outer face. N edge gouged & washer area cracked.
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 34: King Pile Fender #14 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Top edge is separating along outer face. 5"x5"x1/4" material missing
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 35: King Pile Fender #15 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 36: King Pile Fender #16 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	Missing nut at both bottom bolts. All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 37: King Pile Fender #17 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Top edge of fender is separating along outer face
Fender Bolts	Typical		X	Missing nut at 2nd bolt from bott. on South side. Typical corrosion of bolts.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 38: King Pile Fender #18 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Approx. 5"x5"x 1/4" deep fender material missing at bottom.
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				Top edge of outer face separating w/ 3"x3"x1/4" mterial missing on S side
Fender Bolts	Typical			All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 39: King Pile Fender #19 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surfacecorrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 40: King Pile Fender #20 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	Missing nut at bott. 2 bolts on N side. Typical corrosion of bolts.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 41: King Pile Fender #21 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				Top outer edge of fender is separating
Fender Bolts	Typical			Missing nut at 2nd bolt from top on N side. Typical corrosion of bolts.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 42: King Pile Fender #22 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Approx. 5" tall x 1/4" deep fender material missing at bottom.
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Outer face of fender is peeling along top edge
Fender Bolts	Typical		X	Missing nut at 2nd bolt from top on N side. Typical corrosion of bolts.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 43: King Pile Fender #23 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	Missing nut at 2nd bolt from top on N side. Typical corrosion of bolts.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 44: King Pile Fender #24 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Fender torn between 2 bottom bolts and at bottom washer on South side
Fender Bolts	Typical			Missing washer at bottom bolt on S side
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical			All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 45: King Pile Fender #25 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Minor damage to top South corner of fender
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 46: King Pile Fender #26 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			Minor abrasion of fender face
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 47: King Pile Fender #27 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Approx. 1"x1/2"x1/2" fender material missing at bottom
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 48: King Pile Fender #28 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			Approx. 6"x6" damage/cut on outer face of fender
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 49: King Pile Fender #29 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 50: King Pile Fender #30 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	2nd bolt from bottom on S side is missing
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical		X	Nut missing at 2nd bolt from top on S side. Bolts in Typical condition
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 51: King Pile Fender #31 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corrosion
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 52: King Pile Fender #32 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	2nd nut from bott on N side & bott. nut on S side missing. Bott. nut loose on N side
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	Top & 2nd from top nut missing on S side. 2nd from top nut missing on N side
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 53: King Pile Fender #33 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical		X	Both bottom row bolts missing nut.
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical		X	Both 2nd row bolts from top missing nuts
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 54: King Pile Fender #34 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 55: King Pile Fender #35 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 56: King Pile Fender #36 - Inspection Findings				
Item	**Condition**	**Repair**	**Renew**	**Remarks**
King Piles				
North Pile	Typical			
South Pile	Typical			
Top Fender				
Rubber Fender	Typical			
Fender Bolts	Typical			
Bottom Fender				
Rubber Fender				
Fender Bolts	Typical			All bolts have surface corrosion.
Steel Sheet Pile (SSP)				
North SSP	Typical			
South SSP	Typical			

TABLE - 57 - CORROSION EVALUATION @ KING PILE FENDER 2		
Item	**Current Thickness**	**Corrosion Evaluation**
North King Pile - Below Lower Fender		0% section loss (None).
Outer Flange	0.672	
North King Pile - Mudline		1.5% section loss on average (Minor)
Outer Flange	0.663	
Sheetpile - Below Lower Fender		0% section loss (None)
Flange	0.665	
Web	0.665	
Sheetpile - Mudline		0% section loss (None)
Flange	0.672	

NOTES:

1. Existing King Piles PSP 900 (Per historical drawings)
2. Section Properties of New PSP 900 King Pile

Flange thickness = 0.551" min; 0.673" Avg.

Web thickness = 0.551"

3. Existing sheet piles are PZC26 (Per historical drawings)
4. Section Properties of New PZC26 Sheet Pile:

Flange thickness = 0.600"

Web thickness = 0.525"

TABLE - 58 - CORROSION EVALUATION @ KING PILE FENDER 22		
Item	**Current Thickness (Inch)**	**Corrosion Evaluation**
North King Pile - Along Lower Fender		0% section loss (None).
Outer Flange	0.729	
North King Pile - Below Lower Fender		0% section loss (None)
Outer Flange	0.682	
Sheetpile - Below Lower Fender		12.8% section loss (Minor)
Flange	0.508	
Web	0.484	

NOTES:

1. Existing King Piles PSP 900 (Per historical drawings)
2. Section Properties of New PSP 900 King Pile

Flange thickness = 0.551" min; 0.673" Avg.

Web thickness = 0.551"

3. Existing sheet piles are PZC26 (Per historical drawings)
4. Section Properties of New PZC26 Sheet Pile:

Flange thickness = 0.600"

Web thickness = 0.525"

TABLE - 59 - CORROSION EVALUATION @ KING PILE FENDER 31		
Item	**Current Thickness**	**Corrosion Evaluation**
North King Pile - Along Lower Fender		2.8% section loss on average (Minor).
Outer Flange	0.654	
North King Pile - Below Lower Fender		2.1% section loss on average (Minor)
Outer Flange	0.659	
Sheetpile - Below Lower Fender		10.4% section loss (Minor)
Flange	0.506	
Web	0.566	

NOTES:

1. Existing King Piles PSP 900 (Per historical drawings)
2. Section Properties of New PSP 900 King Pile

Flange thickness = 0.551" min; 0.673" Avg.

Web thickness = 0.551"

3. Existing sheet piles are PZC26 (Per historical drawings)
4. Section Properties of New PZC26 Sheet Pile:

Flange thickness = 0.600"

Web thickness = 0.525"

IV. EVALUATION

A. North Bulkhead Fender System

Rubber Fenders – A total of forty (40) rubber arch fenders exist at the North Bulkhead Fender System. Five (5) existing rubber fenders (at Piles P5, P16, P18, P20, and P22) are severely damaged (torn, stretched, distorted) requiring removal and renewal. Twenty-eight (28) additional rubber fenders (at Piles P2, P3, P4, P7, P8, P9, P10, P11, P13, P17, P21, P23, P24, P26 thru P40) are also damaged and separated from their mounting plates; however, they can likely be repaired. **Therefore, of the existing 40 rubber arch fenders, a total of thirty-three (33) or 82.5% rubber fenders are damaged.** The observed damage to rubber fenders may be due to the outward deflection/rotation of fender panels during eccentric barge impacts on fender panels. Rubber fenders are attached to mounting plates using four (4) bolts and not six (6), as indicated in historical drawings. Missing and loosening of existing bolts and washers connecting rubber fenders to mounting plates may also be due to the outward deflection/rotation of fender panels. Installation of a mechanism to minimize this deflection/rotation in fender panels may prevent damage to rubber fenders and their connections.

Fender Piles – Forty (40) fender piles support the North Bulkhead Fender System. Fender piles are generally in serviceable condition with coating loss and corrosion in top approx. 5 ft. **Four (4) (P5, P18, P15, and P20) of the existing 40 (or 10%) fender piles exhibit buckling of web and rotation of inner flange in top approx. 5 ft.** This observed damage in fender piles may also be due to eccentric impact from barges on fender panels. Installation of a mechanism to minimize this deflection/rotation in fender panels may prevent damage to rubber fenders and their connections. Our evaluation of corrosion in fender piles indicates that **only 1.62% and 2.63% of pile steel section has been lost at midwater depth and at mudline, respectively, due to corrosion. This section loss is classified as Minor in accordance with ASCE Manual.** See Table A below and Tables 3A, 12A, and 20A in the "Inspection Findings" Section of this Report.

Table A: North Bulkhead Fender System Piles - Corrosion Evaluation.

	Percent Section Loss*			
Pile	**P6**	**P24**	**P40**	**Average**
Mid Water	2.58%	2.29%	0%	**1.62%**
Mudline	2.68%	3.89%	1.31%	**2.63%**

- See Tables 3A, 12A, and 20A in "Inspection Findings" Section for Details.

Mounting Plates – Mounting plates are in serviceable condition. Threaded rods anchoring mounting plate to the concrete wall exhibit varying degree of coating loss and surface corrosion. Significant section loss was generally not observed. Recoating with marine coating may prolong their life.

Frame Wales – Existing Wales are W14 steel beams and not W12, as shown in historical drawings. Wales are in serviceable condition. Cleaning and re-coating areas with coating loss and corrosion will prolong their life. Several bolts connecting Wales to fender piles are loose. The loosening of bolts may be due to repeat impact loads from barges. Installing lock nuts/washers may alleviate the loosening of bolts in future.

Fender Chain Assemblies – Most lower fender chains were found to be sagging. The slack in fender chains may allow greater deflection in Fenders, resulting in damage to rubber fenders and piles.

Timber Fender Panels – Timbers of fender panels are in serviceable condition. Few timbers exhibit deep checks and may split in future, requiring removal and renewal. Several bolts connecting timber to Wale were found to be loose. At one location, bolt was found to project beyond the face of timber panel. Projecting bolt may cause damage to barge hull. Steel cap of Fender #3, 4, and 7 is dislodged or displaced. Bolt connecting cap to timbers are missing or loose at several fenders. Repeat barge impacts may have caused these damages.

Concrete Seawall – Concrete seawall is generally in serviceable condition with spalling of concrete at isolated locations above and below water. At two (2) locations (near Fender #4 and #9) exposed rebar was observed in the spalled area below water. Spalling reduces concrete cover on reinforcing steel allowing accelerated corrosion of rebar. Corrosion of rebar results in deterioration and further spalling of concrete, resulting in reduction in structural capacity of concrete member. Spalling of concrete should be repaired to prolong the life of structure. Minor hairline cracks and voids also exist in the face of seawall and should also be repaired to prevent water intrusion resulting in corrosion of rebar and spalling of concrete.

Steel Sheet Pile Bulkhead – Sheet piles were found to be plumb with no noticeable lean, bulge, or tenting. Interlocks between sheet piles are intact, indicating no overstressing. If

the existing sheet piles are those specified in historical drawings, our evaluation of corrosion in sheet piles indicates that no section loss due to corrosion has occurred in sheet piles. See Table B below and Tables 3A, 12A, and 20A in the "Inspection Findings" Section of this Report.

Table B: Steel Sheet Pile Bulkhead - Corrosion Evaluation.

	Percent Section Loss*			
Fender #	**#3**	**#12**	**#20**	**Average**
Below Seawall	0%	0%	0%	**0%**
Mudline	0%	0%	0%	**0%**

- See Tables 3A, 12A, and 20A in "Inspection Findings" Section for Details.

Mooring Hardware – Visible portions of mooring hardware units (cleats, bollards, roller chocks, sheaves, winches, etc.) are intact with no signs of overstress in the form of damage, lean, or pulling out of anchor rods. However, mooring hardware appeared to be coated in paint recently and rust was visible below the paint, indicating significant corrosion in mooring hardware prior to the application of paint. Concrete around several mooring hardware was also stained in rust. Anchor rods of mooring hardware could not be inspected due to inaccessibility. A closer inspection of mooring hardware is required.

Based on our findings and evaluations, **the North Bulkhead Fender System of SWBMTS is rated to be in "POOR" condition** in accordance with the ASCE Manual.

The **"POOR"** Condition in the ASCE Manual is defined as: "Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the loadbearing capacity of the structure. Repairs may need to be carried out with moderate urgency."

B. East Bulkhead Fender System:

King Piles - Visually, existing king piles appear plumb with no visible lean, indicating they are performing satisfactorily. While coating loss was observed in the tidal and splash zones, our evaluation of corrosion in king piles indicates that negligible section loss has

occurred in king piles below water and near mudline due to corrosion. See Table C below and Tables 57, 58, and 59 in the "Inspection Findings" Section of this Report.

Table C: East Bulkhead Fender System King Piles - Corrosion Evaluation.

	Percent Section Loss*			
King Pile	**2 North**	**22 North**	**31 North**	**Average**
Along Low Fender	-	0%	2.8%	**1.4%**
Below Low Fender	0%	0%	2.1%	**0.7%**
Mudline	1.5%	-	-	**1.5%**

- See Tables 57, 58, and 59 in "Inspection Findings" Section for Details.

Steel Sheet Piles – Sheet piles below waterline were found to be plumb with no lean or bulge. Interlocks between sheet piles and between sheet piles and king piles are intact, indicating no overstressing. If the existing sheet piles are those specified in historical drawings, our evaluation of corrosion in sheet piles indicates that Minor section loss due to corrosion has occurred below fenders in sheet piles. No corrosion has occurred near mudline. See Table D below and Tables 57, 58, and 59 in the "Inspection Findings" Section of this Report.

Table D: East Bulkhead Fender System Sheet Piles - Corrosion Evaluation.

	Percent Section Loss*			
King Pile near SSP	**2**	**22**	**31**	**Average**
Below Low Fender	0%	12.8%	10.4%	**7.7%**
Mudline	0%	-	-	**0%**

- See Tables 57, 58, and 59 in "Inspection Findings" Section for Details.

Rubber Arch Fenders - Seventy-two (72) rubber arch fenders exist at the thirty-six King Pile Fenders of East Bulkhead Fender System. Each rubber fender is attached to king piles using eight (8) bolts and not ten (10), as shown in historical drawings. Twenty-seven (27) (or 37.5%) of the existing 72 fenders were found to be damaged during our inspection. It was observed during our presence on site that barge maneuvering operations at East Berth may be causing damage to the rubber fenders. Modifying the existing fender system may alleviate the observed damage to rubber fenders.

Based on our findings and evaluations, **the East Bulkhead Fender System of SWBMTS is rated to be in "POOR" condition** in accordance with the ASCE Manual.

The **"POOR"** Condition in the ASCE Manual is defined as: "Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the loadbearing capacity of the structure. Repairs may need to be carried out with moderate urgency."

V. RECOMMENDATIONS

Below are our recommendations regarding the repairs to SWBMTS North and East Bulkhead Fender Systems.

A. North Bulkhead Fender System:

Maintenance Repair Recommendations

Rubber Fenders

- Remove and renew in-kind, five (5) damaged rubber fenders at fender piles P5, P16, P18, P20, and P22 at Fender #s 3, 8, 9, 10, and 11, respectively.
- Design and install new fabricated galvanized plate washers on twenty-eight (28) rubber fenders (at Piles P2, P3, P4, P7, P8, P9, P10, P11, P13, P17, P21, P23, P24, P26 thru P40) with damaged bolt holes or washers.
- Renew all 4 bolts connecting each rubber fender to mounting plate. Tighten new bolts.

Fender Piles

- Clean and recoat approx. top 5 ft. of all existing fender piles.
- Repair four (4) damaged/rotated fender piles P5, P15, 18, and P20 at Fender #s 3, 8, 9 and 10, respectively.

Mounting Plates

- Clean and recoat mounting plate.
- Clean & recoat exposed portions of corroded threaded rods, nuts, and washers connecting mounting plate to the concrete seawall with suitable marine coating.
- Renew threaded rods, nuts, and washers with greater than 15% section loss.

Frame Wales

- Clean and recoat damaged coating of top and mid Wales.
- Install lock washer/nut on all bolts connecting Wale to fender piles.
- Tighten all loose bolts connecting top, mid, and bottom Wales to fender piles.

Fender Chain Assemblies

- Reinstall one (1) missing nut of chain tensioner of Fender #16.
- Tighten lower chains of all fenders and few loose upper chains.
- Weld the crack in one chain link at Fender #2.

Timber Fender Panels

- Install lock washer/nut on all bolts connecting timbers to top, mid, and bottom Wales.
- Tighten all loose bolts connecting timbers to top, mid, and bottom Wales.
- Reinstall displaced steel caps at Fender #s 3, 4, and 7.
- Renew five (5) missing cap bolts at Fender #2 and six (6) missing cap bolts at Fender #4.
- Remove and reinstall projecting bolt at Fender #11.
- Tighten loose cap bolts at all Fenders.

Concrete Seawall

- Repairs spall damage below water at Fender #4, 9, and 11.
- Repair spalling in above water seawall and concrete curb.
- Repair hairline cracks in the top and outshore face of seawall.
- Fill voids in seawall.

Mooring Hardware

- Remove existing paint, remove rust and have a registered Engineer perform visual inspection of corroded mooring hardware and their anchor rods. Temporary removal of mooring hardware maybe required for inspection, if determined by the Engineer.
- If mooring hardware and their anchor rods are in serviceable condition and do not exhibit section loss, clean and recoat mooring hardware. Renew anchor rods and mooring hardware if section loss is observed.

Additional Recommendations

1. Consider evaluation, design, and installation of engineered tension chains or an alternate engineered mechanism at each Fender to minimize outboard deflection/rotation of fender panels which may be causing the separation of rubber fenders from the mounting plates and damage to the rubber arch fenders. Damage

to fender piles may also be mitigated by the installation of tension chains. Disconnecting the outer face of rubber fenders from fender piles should also be evaluated to minimize these damages.

2. During the November 16 to18, 2024 inspection, fasteners (nuts and bolts) present on Fender #s 9 through 20 were visually inspected. The fasteners present at Fender #s 9 through 20 were originally inspected during the December 2-3, 2023, inspection by others and were observed to require tightening in several locations. Loose fasteners were observed at the wood fender panels as well as the steel cap along the top edge of the wood fender panels. Approximately, 30% of the accessible fasteners were observed to be loose to some degree at the time of 2023 and 2024 inspections. These fasteners were checked and tightened by Kraken Diving Service during the 2024 inspection. Fenders 1 through 8 were not accessible at the time of 2024 inspection for checking and tightening of bolts due to the presence of a barge in this area. These bolts should be checked and tightened during the next field work event.

B. East Bulkhead Fender System:

Maintenance Repair Recommendations

1. Remove and renew in-kind, the three (3) severely damaged bottom arch rubber fenders at King Pile Fender #s 6, 9, and 11.
2. Renew missing bolts connecting the top rubber fender to king pile at King Pile Fender #s 9 and 32.
3. Renew sixteen (16) missing nuts at King Pile Fender #s 16, 17, 20, 21, 22, 23, 30, 32, and 33.
4. Install missing washer at the top rubber fender of King Pile Fender #24.
5. Tighten all loose bolts connecting rubber fender to king piles.
6. Clean and install marine coating to repair damaged king pile coating in tidal and splash zones.

Additional Recommendations

1. In addition to the three (3) severely damaged rubber fenders recommended to be renewed above, twenty-four (24) other rubber fenders are damaged. Renewal of these fenders has not been recommended in this Report since the damage may have not reduced the energy absorption capacity of these fenders significantly.

However, it is expected that damage to these rubber fenders will become worse in future, requiring removal and renewal.

2. Consider evaluation, design, and installation of a continuous horizontal Wale system at the East Bulkhead Fender System to minimize damage to rubber fenders.

APPENDIX – A

ASCE WATERFRONT FACILITIES DAMAGE RATING SYSTEM

Table 2-5. Damage Ratings for Steel Elements

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	• Not inspected, inaccessible, or passed by[b]	
ND	No Defects	• Protective coating or wrap intact • Light surface rust • No apparent loss of material	
MN	Minor	• Protective coating or wrap damaged and loss of thickness up to 15% of nominal at any location • Less than 50% of perimeter or circumference affected by corrosion at any elevation or cross section • Loss of thickness up to 15% of nominal at any location	Minor damage not appropriate if • Changes in straight line configuration or local buckling • Corrosion loss exceeding fabrication tolerances (at any location)
MD	Moderate	• Protective coating or wrap damaged and loss of thickness 15 to 30% of nominal at any location • More than 50% of perimeter or circumference affected by corrosion at any elevation or cross section • Loss of thickness 15 to 30% of nominal at any location	Moderate damage not appropriate if • Changes in straight line configuration or local buckling • Loss of thickness exceeding 30% of nominal at any location

(Continued)

Table 2-5. Damage Ratings for Steel Elements *(Continued)*

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
MJ	Major	• Protective coating or wrap damaged and loss of nominal thickness 30 to 50% at any location • Partial loss of flange edges or visible reduction of wall thickness on pipe piles • Loss of nominal thickness 30 to 50% at any location	Major damage not appropriate if • Changes in straight line configuration or local buckling • Perforations or loss of wall thickness exceeding 50% of nominal
SV	Severe	• Protective coating or wrap damaged and loss of wall thickness exceeding 50% of nominal at any location • Structural bends or buckling, breakage and displacement at supports, loose or lost connections • Loss of wall thickness exceeding 50% of nominal at any location	

[a] Any defect listed is sufficient to identify relevant damage grade.
[b] If not inspected due to inaccessibility or passed by, note as such.

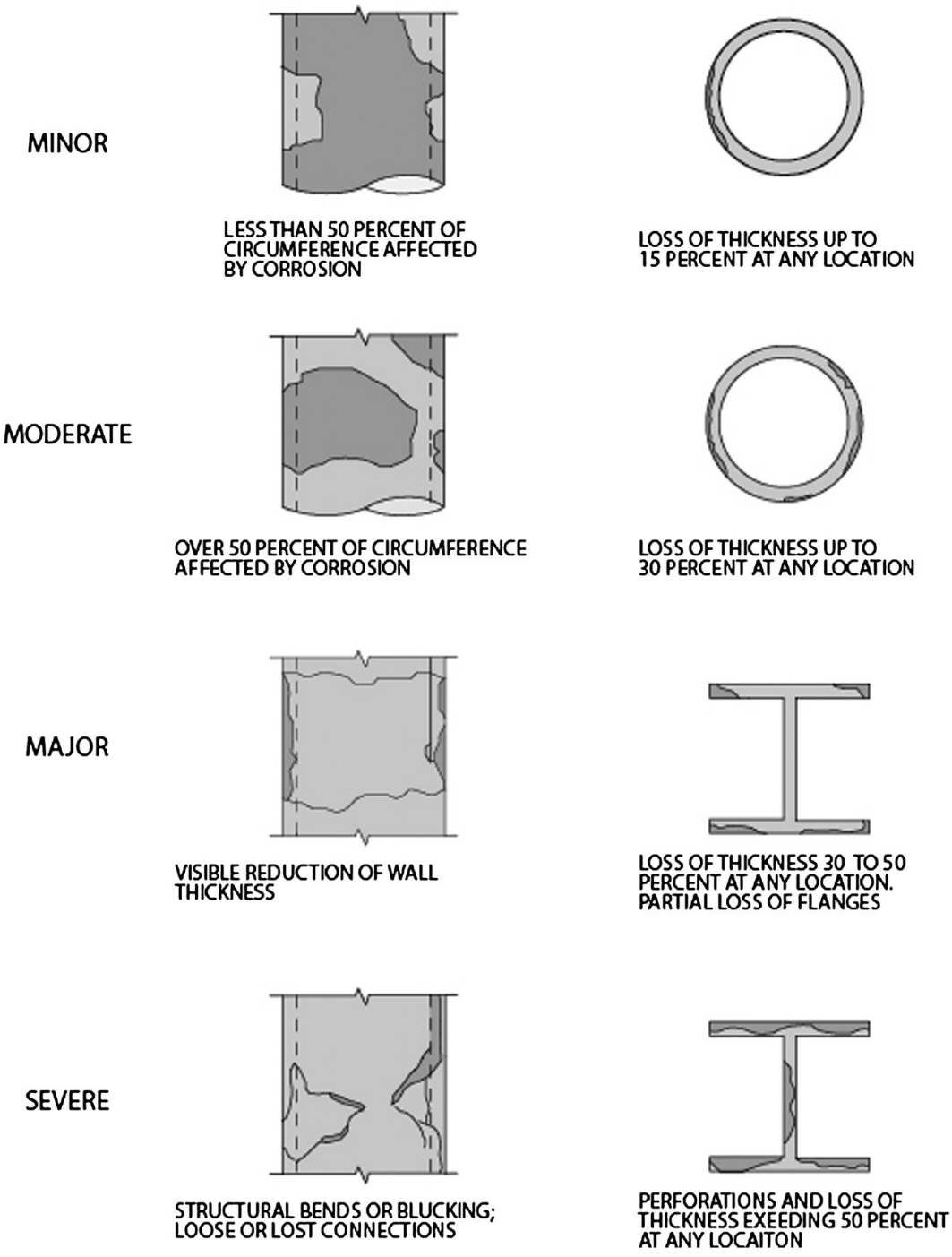

Fig. 2-3. Damage ratings for steel elements
Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

APPENDIX – A

ASCE WATERFRONT FACILITIES CONDITION ASSESSMENT RATING SYSTEM

Table 2-14. Condition Assessment Ratings

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

2.6.2 Condition Assessment Ratings

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

APPENDIX – C

PHOTOGRAPHS

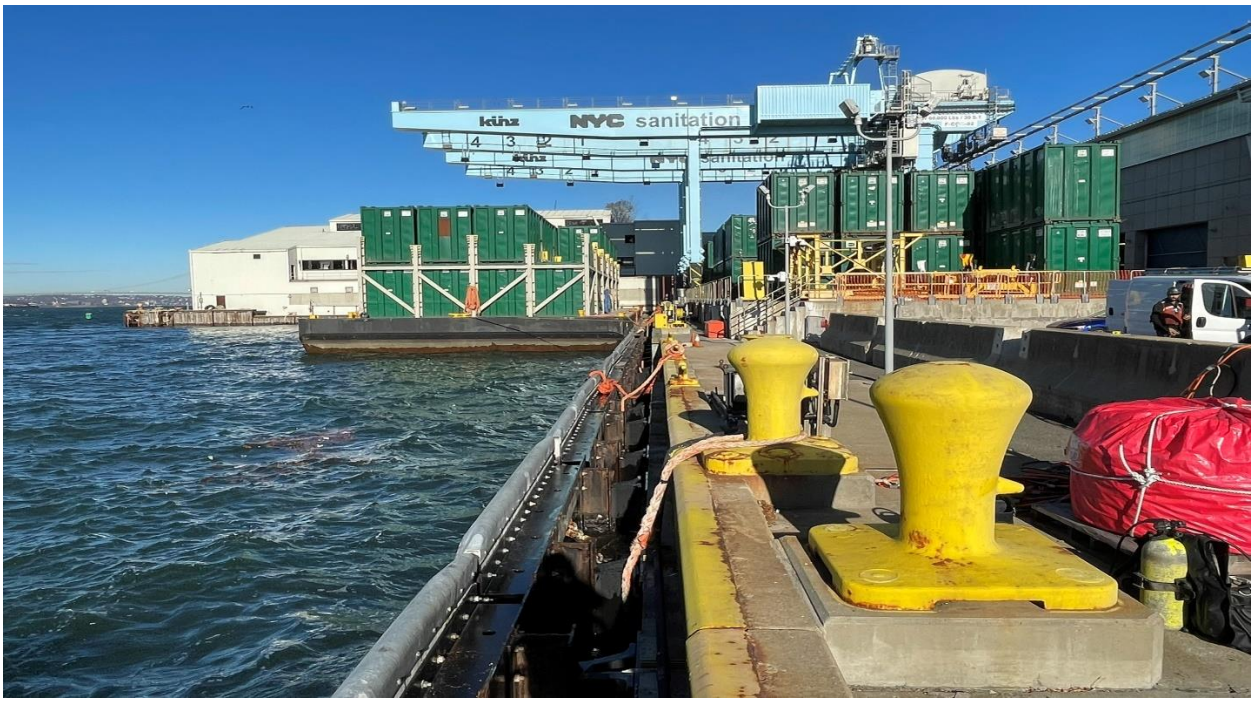

Photo 1: View of North Fender System (Looking West)

Photo 2: West flange of a rubber fender separated from mounting plate. Note the pulled-out bolt and crack in seawall.

Photo 3: Rubber fender of Pile 34 at Fender #17 completely separated from mounting plate. Also note crack in seawall.

Photo 4: Rubber fender separated from mounting plate with bolts pulled out.

Photo 5: Pile P18 of Fender #9 is buckled with rubber fender stretched and distorted.

Photo 6: Inner flange of Pile P18 of Fender #9 is rotated and damaged at top approx. 5 ft.

Photo 7: Rubber fender at Pile P16 of Fender #8 is cut/torn on its East and West faces.

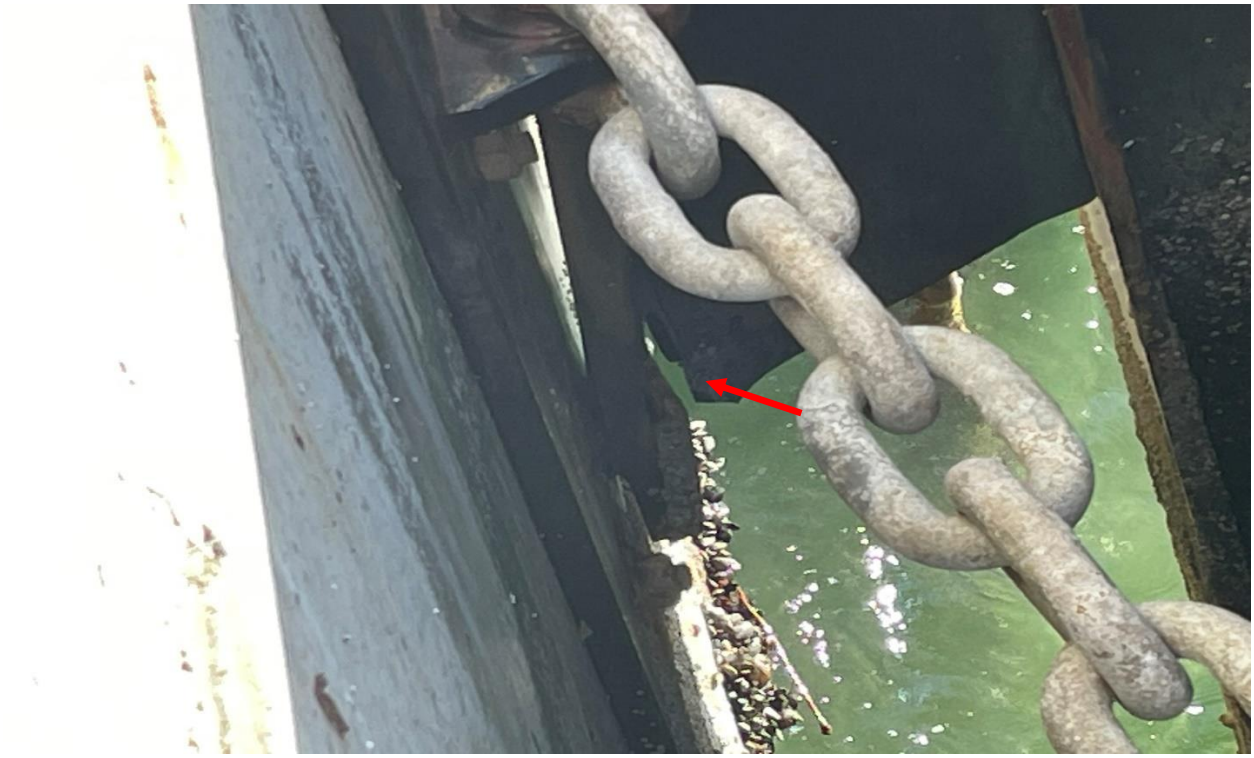

Photo 8: Rubber fender at Pile P22 of Fender #11 torn at bottom separated.

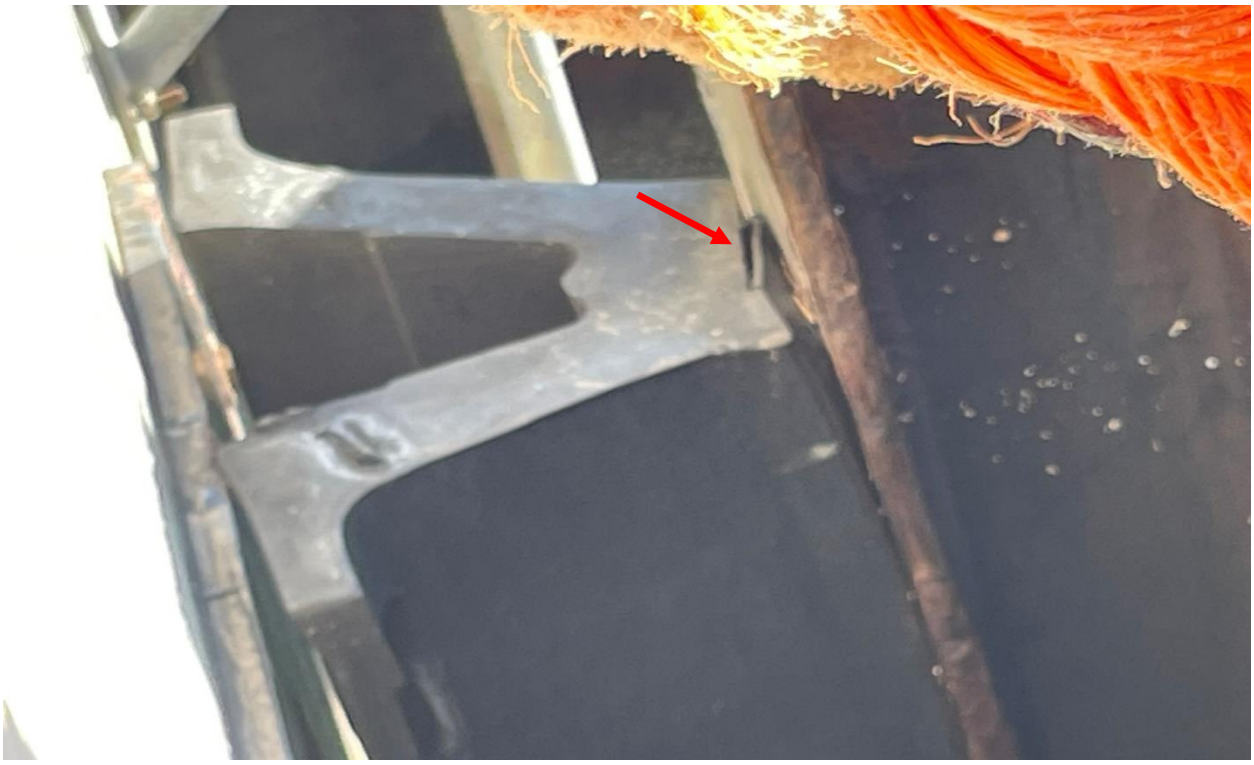

Photo 9: Rubber fender at Pile P22 of Fender #11 is separated with damage to its' front face at interface with fender pile.

Photo 10: Rubber fender at Pile P22 of Fender #11 is lifted up above the mounting plate.

Photo 11: Rubber fender bolt hole damaged due to pulling out of bolt connecting fender to mounting plate.

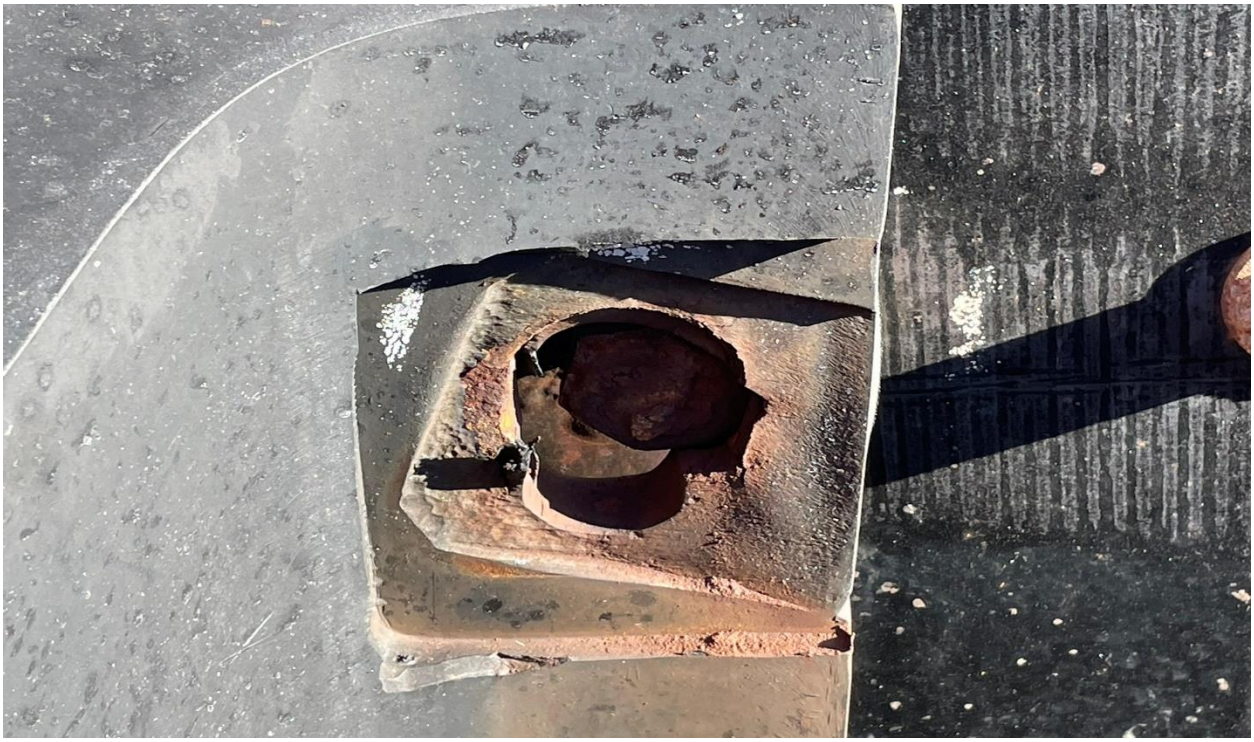

Photo 12: Rubber fender bolt hole damaged due to pulling out of bolt connecting fender to mounting plate.

Photo 13: Bolts connecting rubber fender to mounting plate & threaded rods connecting mounting plate to seawall are corroded at Pile P40.

Photo 14: Corroded bolts of top wale connection to fender pile at Pile P40.

Photo 15: Steel cap of Fender #3 is dislodged and sitting in web of top wale.

Photo 16: Steel cap of Fender #4 is displaced and rotated.

Photo 17: Spalling of concrete seawall behind Fender #15.

Photo 18: Typical hairline crack at fenders.

Photo 19: Typical cracks in the concrete deck of dock.

Photo 20: Corrosion of sheave. Note rust stain in concrete pedestal below.

Photo 21: Corrosion of mooring cleat. Note rust stain at the base of cleat.

Photo 22: Corrosion of mooring cleat. Note rust stain at the base of cleat.

Photo 23: Corrosion of mooring bollard. Note rust stain at the base of bollard and concrete pedestal.

Photo 24: View of East Fender System (Looking North).

Photo 25: View of East Fender System (Looking South).

Photo 26: Damage to the lower fenders of King Pile Fender #s 6, 7, 8, and 9.

Photo 27: Loose bottom bolts of top rubber fender of King Pile Fender #32.

Photo 28: Missing bolt of top rubber fender of King Pile Fender #30.

Photo 29: Damaged and torn lower rubber fender of King Pile Fender #6.

Photo 30: Damaged and cracked lower rubber fender of King Pile Fender #8.

Photo 31: Damaged and peeled lower rubber fender of King Pile Fender #9.

Photo 32: Cut in the North face of upper rubber fender of King Pile Fender #9. Also note the missing bolt at top.

Photo 33: Damaged and peeled front face of lower rubber fender of King Pile Fender #11.

Photo 34: Damaged upper and lower rubber fenders of King Pile Fender #18.