sanitation

Kathryn Garcia
Commissioner

Sarah Dolinar
Director, SWM Environmental Compliance/Contracts

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BY EMAIL and PRIORITY MAIL May 21, 2019

Mr. Kenneth B. Brezner, Regional Material Management Engineer
New York State Department of Environmental Conservation, Region 2
47-40 21st Street
Long Island City, NY 11101-5407

RE: NYC Department of Sanitation
Southwest Brooklyn Marine Transfer Station (MTS)
NYSDEC ID No.: 2-6106-00002/00022: 2018 Bulkhead Inspection Report (Permit)

Dear Mr. Brezner:

In compliance with the above-referenced Permit, the New York City Department of Sanitation (DSNY) hereby provides a copy of the Southwest Brooklyn Marine Transfer Station Routine Inspection, dated March 2019, which reflects the results of an underwater MTS bulkhead inspection undertaken in November/December 2018 (2018 Bulkhead Inspection Report). A copy of the 2018 Bulkhead Inspection Report will appear on the DSNY website.

Deficiencies noted in the installation of the new bulkhead fender system will be corrected after notification to NYSDEC about the scope and timing of the corrections.

Please contact me if you have any questions or comments.

Sincerely,

Sarah Dolinar

Enclosure (1): 2018 Bulkhead Inspection Report
Cc: J. Atkinson, J. Capo, A. Bianco, M. Petkanas, V. Arnold, M. Barrett, H. Kallman, DSNY
J. Cuervo, E. De la Cruz, DDC
M. Pokorny, URS/LiRo
J. O'Connell, S. Watts, NYSDEC Region 2

WATERFRONT FACILITIES
MAINTENANCE MANAGEMENT SYSTEM

SOUTHWEST BROOKLYN MARINE TRANSFER STATION (MTS) BROOKLYN, NEW YORK

ROUTINE INSPECTION

MARCH 2019

NYCEDC
New York City Economic Development Corporation

NEW YORK CITY DEPARTMENT OF SANITATION

MASER CONSULTING P.A.

NEW YORK CITY
ECONOMIC DEVELOPMENT CORPORATION

WATERFRONT FACILITIES
MAINTENANCE MANAGEMENT SYSTEM

SOUTHWEST BROOKLYN
MARINE TRANSFER STATION (MTS)
BROOKLYN, NEW YORK

ROUTINE INSPECTION

MARCH 2019

Submitted by:

Maser Consulting, P.A.
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701

1 INTRODUCTION

This report summarizes the findings of the Routine Inspection performed by Maser Consulting at the Southwest Brooklyn Marine Transfer Station (SW Brooklyn MTS) facility located in Brooklyn, New York. The inspection was performed at the request of the New York City Economic Development Corporation (NYCEDC) in accordance with the standards of the Waterfront Facilities Maintenance Management System (WFMMS).

1.1 PURPOSE

The primary purpose of the Routine Inspection is to assess and document the general condition of the structures at the facility, assign a Condition Assessment Rating to the systems and components observed, provide recommended actions to maintain and/or rehabilitate the facility, and the associated cost.

Routine level inspections are performed on a regularly-scheduled basis to represent a proactive, rather than reactive, approach to maintenance. If significant damage or deterioration is observed on a structure, an analysis of the effects of such findings on the overall structure is typically performed. Should an evaluation of the actual or anticipated loading be needed, an engineering evaluation per the NYCEDC guidelines can be undertaken.

1.2 METHODOLOGY

The above and underwater investigations of the facility were conducted from November 5, 2018 through December 19, 2018. The topside inspection was carried out by Maser Consulting engineers and was limited to the areas that were accessible by land. Maser Consulting engineers completed the topside inspection at a relatively low tide. The inspection included visual inspections of upland structures and waterfront structures that could be safely accessed during the inspection.

Maser contracted Marine Infrastructure Engineering Solutions, P.C. (MIES) to preform dive inspections at areas that were offshore and only accessible by boat. For the underwater portion of the inspection, MIES utilized a three-man dive crew. The team consisted of one Professional Engineer-Diver and two Technician Divers/Tenders. Dive operations were staged from a 28-foot vessel containing all necessary dive equipment. A

300-foot umbilical was used to provide the diver surface supplied air and hot water, and to maintain constant two-way radio communication.

Per the NYCEDC WFMMS Inspection Guidelines Manual, this Routine Inspection consisted of Level I general examination of all structural components and Level II detailed inspection of 10 percent of the components. Level I inspection is considered an overview, detecting obvious structural defects based on visual and tactile observation. The purpose of the Level II inspection is to detect and identify damaged or deteriorated structural elements in greater detail. Level II involves closely documenting surface conditions. A Level III highly detailed inspection is required on 5 percent of the components, seeking to detect subsurface deficiencies.

The underwater portion of the Routine Inspection generally included Level I (swim-by) inspection effort for 100 percent of the underwater elements, as well as a Level II effort for 10 percent of the underwater elements. In addition, a small percentage of the elements (approximately 5 percent) received a Level III effort of inspection to detect any hidden damage or subsurface deficiencies.

As some of the structural systems within this facility are composed of steel, Level III testing was performed during the investigation. Tests consisted of Ultrasonic Thickness Measurements (UTMs) and Cathodic Protection (CP) readings, where applicable. These measurements seek to ascertain the remaining thickness of steel components and their innate level of protection against corrosion.

1.3 CONDITION ASSESSMENT CRITERIA

The inspected condition and assessment criteria use a six point standardized approach provided in the NYCEDC WFMMS Inspection Guidelines Manual, Section 3.3 Condition Assessment Ratings. This standardized approach can be recreated during all facilities inspections and allows for a simplified comparison between facilities and future inspections of the same site.

The Condition Assessment can be interpreted as the “health” of the overall structure or portions of a facility. The Condition Assessment of the facility is determined by the findings during the Routine Inspection. A variety of factors including severity, quantity and frequency impact the overall Condition Assessment rating. These ratings are required in order to categorize the results of the inspection and to provide a basis for

comparison of new deficiencies in future inspections or other facilities.

The Condition Assessment ratings for the inspected structures are as follows:

6 "Good" No problems or only minor problems noted. Structural elements may show some very minor deterioration, but no overstressing observed. No rehabilitation is required.

5 "Satisfactory" Minor to moderate defects and deterioration observed, but no overstressing observed. No rehabilitation is required.

4 "Fair" All primary structural elements are sound; but minor to moderate defects and deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the load bearing capacity of the structure. Rehabilitation is recommended, but the priority of the recommended rehabilitation is low.

3 "Poor" Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the load carrying capacity of the structure. Rehabilitation may be carried out with moderate urgency.

2 "Serious" Advanced deterioration, overstressing, or breakage may have significantly affected the load bearing capacity of primary structural elements. Local failures are possible and loading restrictions may be necessary. Rehabilitation 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 elements. More widespread failures are possible or likely to occur and load restrictions should be implemented as necessary. Rehabilitation may need to be carried out on a high priority basis with strong urgency.

1.4 DAMAGE GRADE ASSESSMENT

Damage Grade refers to the defect type based upon the observed defect during the inspection. The typical deficiencies encountered during an inspection are the defect ratings, and are: Severe, Advanced, Moderate and Minor. The defect rating is dependent only on the deficiency type from observations relating to the defect. The observed defect

is independent of the component as a whole. General assessments are valuable by comparing the rating criteria with the losses in effective sections for the different components.

1.4.1 Concrete

Deterioration of concrete can occur as a result of exposure to the elements or unusual loading conditions in the environment. Several factors can affect the integrity of the concrete and lead to deterioration and failure, such as, construction defects, temperature, chemical reactions, and impact damage. Concrete deterioration generally occurs from concrete degradation, corrosion of the reinforcing steel, overstress, or a combination of such. The general assessment for concrete defects is based on the assessment scale below:

Minor Mechanical abrasion or impact dents up to 1 in.; general cracks up to 1/16 in.; occasional corrosion stains or small pop-out corrosion spalls.

Moderate Structural cracks up to 1/16 in. wide; corrosion cracks up to 1/4 in. wide; chemical deterioration: random cracks up to 1/16 in. wide; "Soft" concrete and rounding of corners up to 1 in. deep.

Advanced Structural cracks between 1/16 in. to 1/4 in. wide and partial breakages (structural spalls); Corrosion cracks wider than 1/4 in. and open spalls (excluding pop-outs); multiple cracking and disintegration of surface layer due to chemical deterioration.

Severe Structural cracks wider than 1/4 in. or complete breakage. Loss of bearing and displacement at connections; complete loss of concrete cover due to corrosion of reinforcing steel with over 30 percent of diameter loss for any main reinforcing bar; loss of concrete cover (exposed steel) due to chemical deterioration; loss of concrete cover (exposed steel) due to chemical deterioration; loss of over 30 percent of cross section due to any cause described above.

1.4.2 Steel

Deterioration of steel components can occur from corrosion, fatigue, overload or impact damage. Often multiples of these agents occur simultaneously. Corrosion is the thinning of metal due to a reaction between the non-coated material and its environment when the metal oxidizes. Corrosion is most common around the splash and tidal zones

but can also be found in other areas of a structure. Pitting is localized corrosion that causes deep circular patterns in the steel to form and is caused by chemical variations in the steel or imperfections in the steel. The general assessment for steel defects is based on the assessment scale below:

Minor Protective coating partially or no longer is intact; less than 50% of the perimeter is affected by corrosion at any elevation; loss of thickness up to 15% of nominal thickness at any location.

Moderate Over 50% of perimeter or circumference affected by corrosion at any elevation; loss of nominal thickness 15-30%.

Advanced Partial loss of flange edges or visible reduction of wall thickness on pipe piles; loss of nominal thickness 30-50%.

Severe Structural bends or buckling; breakage and displacement at supports; loose or lost connections; perforations or loss of wall thickness exceeding 50% of nominal thickness at any location.

1.4.3 Timber

Deterioration of timber components can occur as a result of bio-deterioration, mechanical deterioration, overload or impact damage. The main cause of bio-deterioration is shell rot and heart rot. Shell rot causes the timber to soften through a fungus that starts from the interior and extends outwards. Heart rot is also a fungus that eats away at the interior of the timber pile which causes loss of overall structural integrity. Other causes of deterioration in timber are checking, delamination, chafing, overloading, cracking, abrasion, and corrosion of connection hardware. Delamination occurs when outer layers of the timber begin to peel away from the pile causing a loss of cross section of the timber and is caused by drying and shrinking. Chafing occurs when the water surrounding the timber and the timber pile freezes and then thaws causing shrinkage to occur. The general assessment for individual timber defects is based on the assessment scale below:

Minor Cracking, splits and gouges less than ½" wide.

Moderate Cracking, splits and gouges wider than ½"; diameter loss up to 15%; cross section area loss up to 25%; corroded hardware; any evidence of infestation by marine insects.

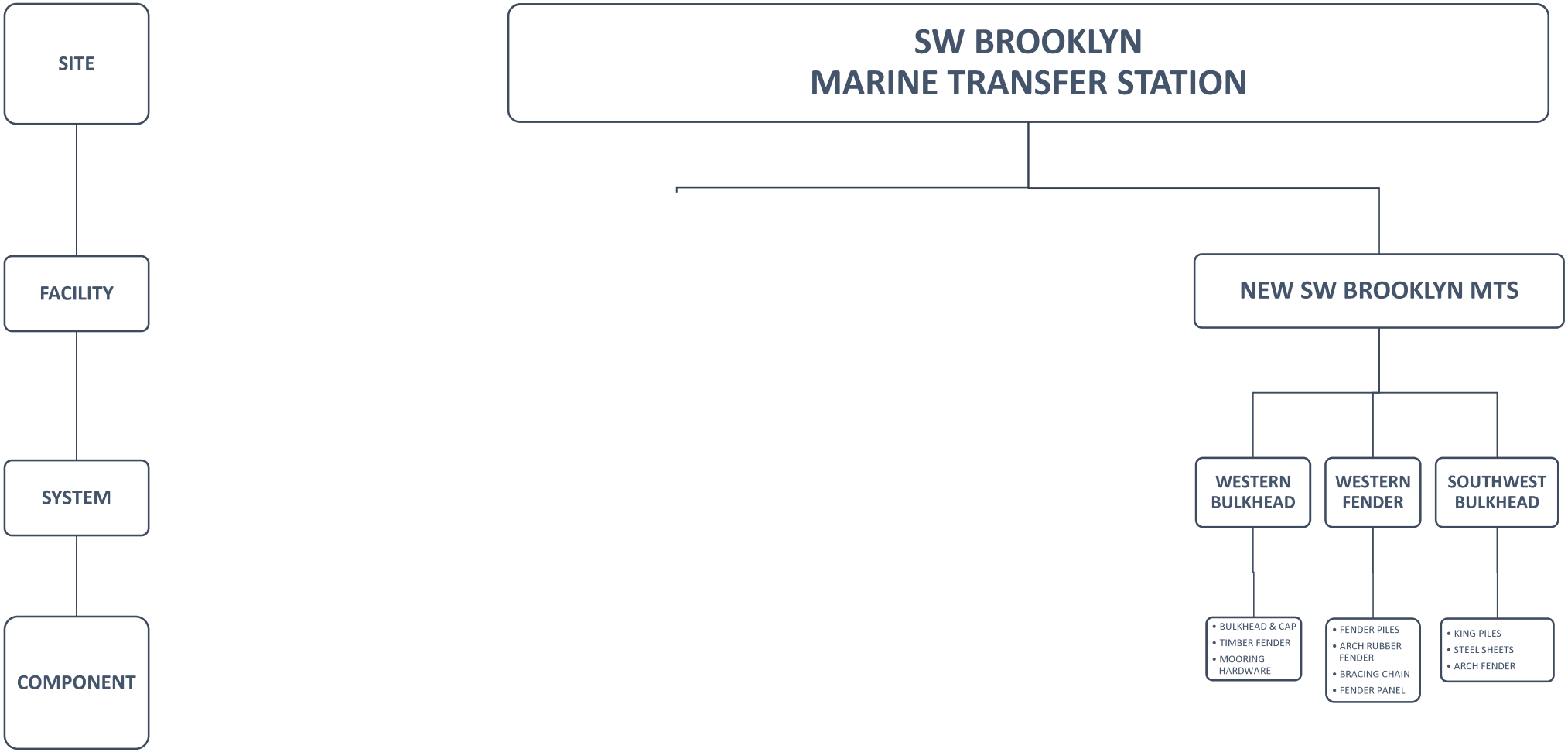
Advanced Cracking and splits through full depth of the cross section; diameter loss

15-30%; cross section loss 25-50%; heavily corroded hardware; delamination up to 1/8”; displacements and misalignments at connections.

Severe Diameter loss more than 30%; cross section area loss more than 50%; loss of connections or fully non-bearing connections; partial or complete breakage.

1.5 RECOMMENDED ACTIONS

All recommended actions are categorized into three categories: Emergency/Immediate, Priority or Routine. Immediate level responses require prompt response due to unsafe conditions of the structure. Some of these recommendations could be to restrict access to or around the unsafe portion of the structure, adding additional reinforcement in specified areas, or calling for more in-depth structural analysis of the element to determine a more detailed view of what is occurring in the structure. Priority level responses are required in order to keep the structure in a safe and operational function and should be performed within one to three years. Routine level responses are tasks that should be regularly taken as a basic maintenance project or as part of another project. These responses should be performed every three to five years to prevent greater deterioration.



FACILITY STRUCTURE
BREAKDOWN
FIG. 2-4

New SW Brooklyn MTS

Overall, the New SW Brooklyn MTS in **Satisfactory** condition.

The Western Bulkhead was assessed to be in **satisfactory** condition due to the recent rehabilitation of the west face of the bulkhead. Based on the current condition (with the recent rehabilitation) of the critical structures and components that support this system, the overall structural capacity of the Western Bulkhead appear to be consistent with the design intent of the rehabilitation. As a result, no load restrictions or structural repairs are recommended at this time. A follow-up inspection should be scheduled for this system within 5 years.

The new Western Fender was assessed to be in **fair** condition due to the Advanced and Severe defects that are mostly attributed to poor and incomplete installation of the Fender Systems. In addition, some of the connections providing critical support to the Fender System do not match the drawings due to changes in the bolt configuration (from 6 bolts to 4 bolts). Thus, the structural capacity of the Fender Rack does not meet the design intent. As a result, Maser recommends taking cautionary measures during berthing operations to reduce impact on the Fender System until the installation is complete; replacing all missing connection hardware and verifying that all connections at the Western Fenders are complete and properly installed with properly tightened connections and the correct hardware. If the installation defects are corrected in accordance with design drawings, the overall conditions rating is likely to improve from fair to good. A follow-up inspection should be scheduled for the structure after installation repairs/corrections are complete and in 5 years.

The Southwest Bulkhead was assessed to be in **good** condition as no specific structural defects were observed during the cursory inspection. There is no indication that the structural capacity of the Southwest Bulkhead has diminished from the initial design. As a result, no load restrictions or structural repairs are recommended at this time. A follow-up inspection should be scheduled for this system within 5 years.

The table below shows a summary of the facility condition, with order of magnitude costs for all recommendations.

Facility	Condition Assessment Rating	Cost of Recommended Action (2019 Dollars)			
		Immediate	Priority	Routine	Total
New SW Brooklyn MTS:	**Satisfactory**				
Western Bulkhead	Satisfactory	$0	$0	$0	$0
Western Fender	Fair	$0	$0	$0	$0
Western Bulkhead	Good	$0	$0	$0	$0
Subtotal for New SW Brooklyn MTS		**$0**	**$0**	**$0**	**$0**

The table above provides a summary, with order of magnitude costs, that may be associated with the recommended actions. Appendix C, included in this report, provides backup data for the cost estimates, with a detailed breakdown for each recommendation. Recommended actions which are assumed to align with general facility operations and maintenance or incomplete construction/warrantee items are excluded.

1.5 RECOMMENDED ACTIONS

All recommended actions are categorized into three categories: Emergency/Immediate, Priority or Routine. Immediate level responses require prompt response due to unsafe conditions of the structure. Some of these recommendations could be to restrict access to or around the unsafe portion of the structure, adding additional reinforcement in specified areas, or calling for more in-depth structural analysis of the element to determine a more detailed view of what is occurring in the structure. Priority level responses are required in order to keep the structure in a safe and operational function and should be performed within one to three years. Routine level responses are tasks that should be regularly taken as a basic maintenance project or as part of another project. These responses should be performed every three to five years to prevent greater deterioration.

Photo 2-1. Old SW Brooklyn MTS (Looking Northeast)

Photo 2-2. New SW Brooklyn MTS (Looking East)

Photo 2-7. New SW Brooklyn MTS (Looking East)

Photo 2-8. Western Bulkhead and Fender at New SW Brooklyn MTS

Photo 2-9. Western Bulkhead and Fender at New SW Brooklyn MTS

Photo 2-10. Southwest Bulkhead and Fender at New SW Brooklyn MTS

3.9 WESTERN BULKHEAD

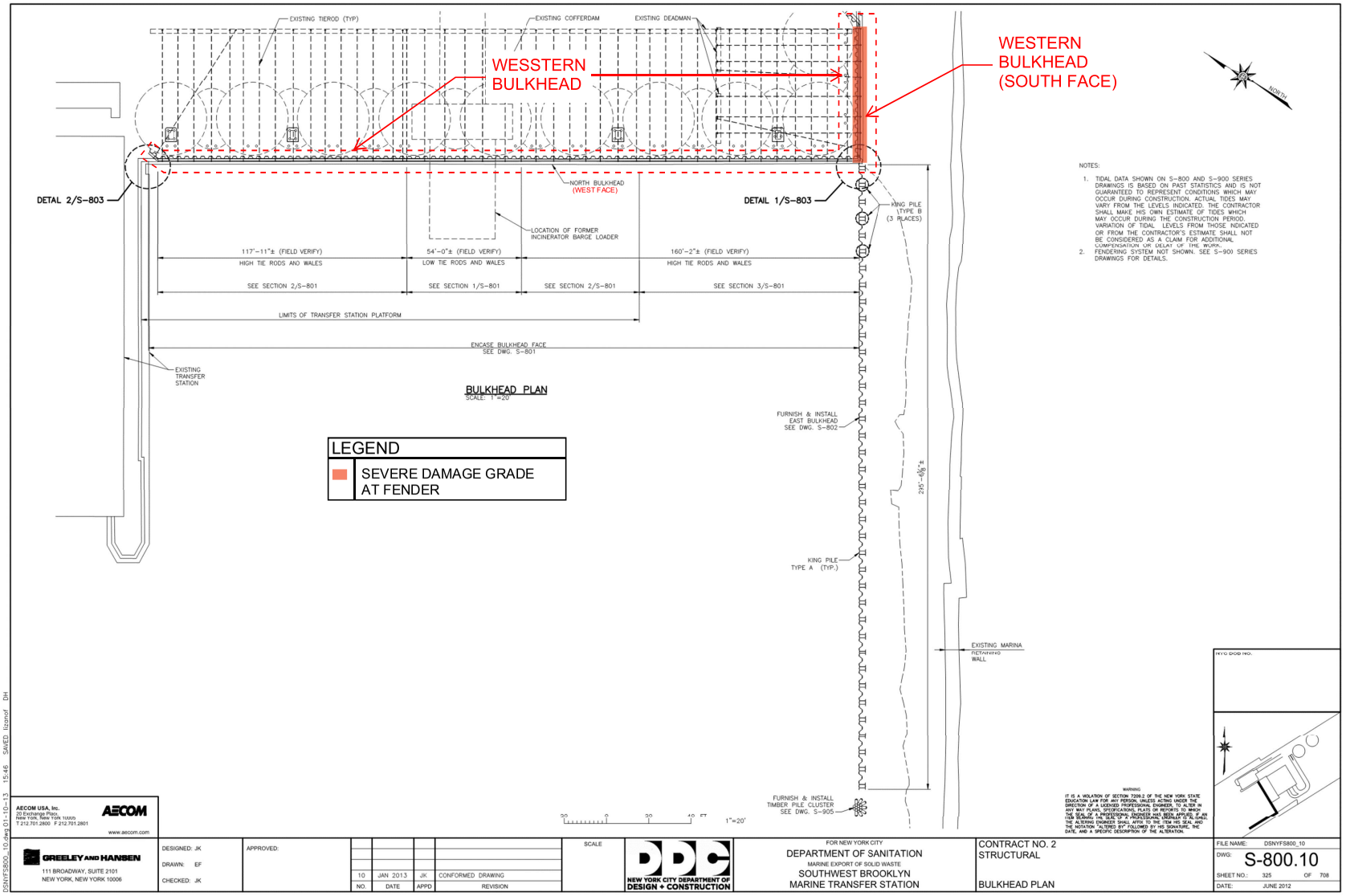
3.9.1 Description of Structure

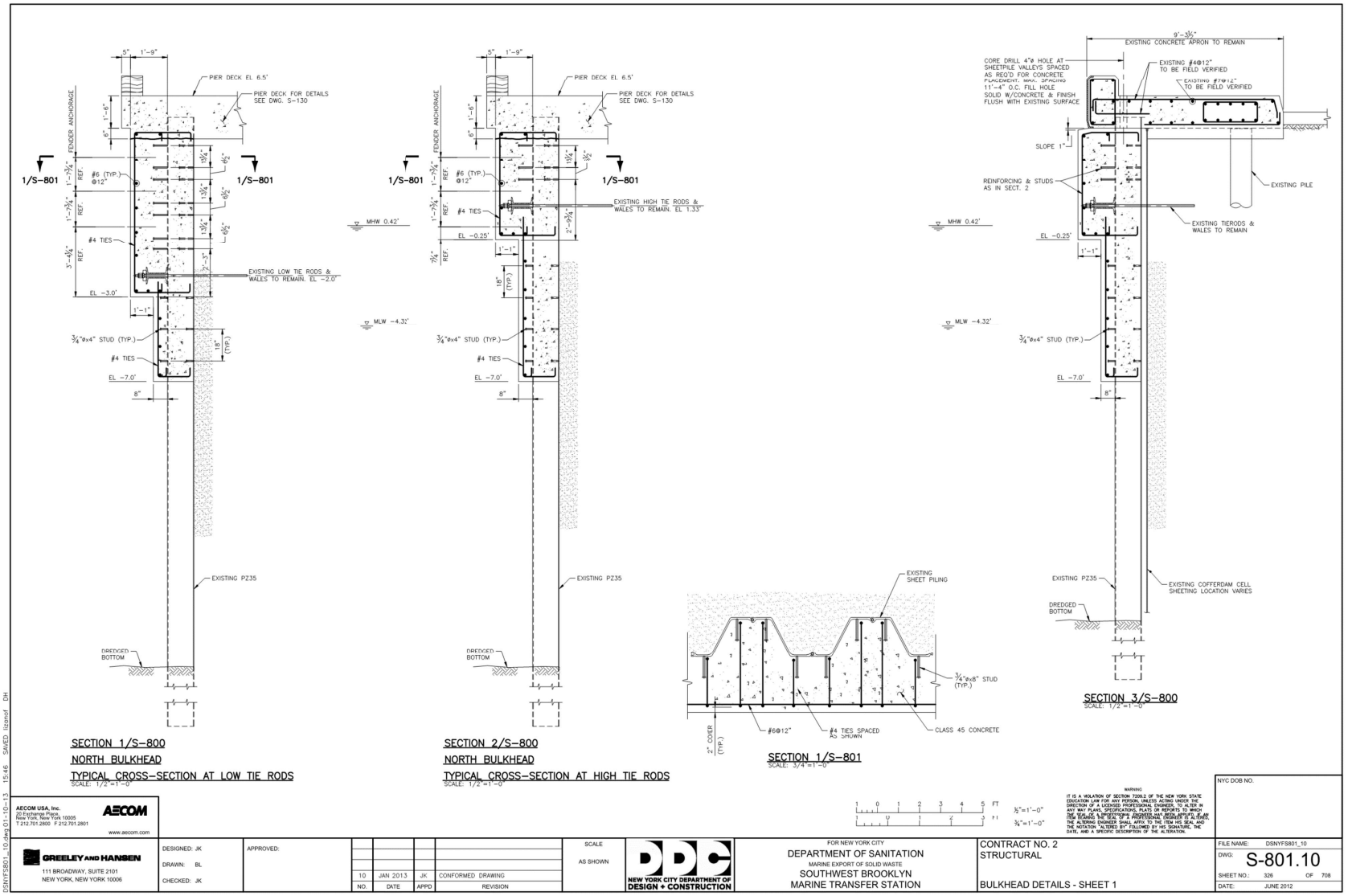
The Western Bulkhead is an L-Shaped bulkhead structure along the western and southern sides of the New Southwest Brooklyn MTS. The bulkhead starts at the southeastern corner of the Old SW Brooklyn MTS, adjacent to the South Pier and the Cellular Bulkhead, and runs along the shoreline in the North-South direction (West Face) approximately 333 linear feet. The southern leg of the L-shaped bulkhead (South Face) runs along the East-West direction, approximately 117 linear feet from the southern corner of the bulkhead towards the upland areas; with approximately 70 linear feet exposed and the remaining buried.

Based on the previous inspection report prepared by CH2M Hill in 2016 and the Conformed Drawings by Greeley and Hanson, dated June 2012, the Western Bulkhead has been rehabilitated. The rehabilitation of the Western Bulkhead extends from the northern corner of the Western Bulkhead and terminates a few feet east of the south eastern corner (West Face). The rehabilitation observed includes the construction of a concrete encasement that encapsulates the upper sections of the pre-existing steel bulkhead, extending from the top of the bulkhead (El. 6.5') to an elevation approximately 3 feet below the Mean Low Water (El. -7.0'). The concrete encasement at the top of the bulkhead essentially acts as part of the concrete cap and/or deck in some sections. Due to the elevation of the pre-existing tie rods (El. 1.3'), the recently added concrete encasement at the face of the bulkhead now encloses the tie rods and steel wale that were previously exposed and assessed to be in fair condition.

At the South Face of the Western Bulkhead, it appears there was no change to the bulkhead structure as the tie rods and steel wales remain exposed and the structure appears to match the original construction. Based on field measurements of the Z-shaped profile, the Western Bulkhead sheets (West Face and South Face) generally match the dimensions of a PZ35 steel sheet pile.

See Figure 3-18 through Figure 3-20 below for drawings of the Western Bulkhead and its components; this includes the Plan and Section views. In addition, Photo 3-108 through Photo 3-114 below the figures show general views of the structure and its current conditions.


WESSTERN BULKHEAD
WESTERN BULKHEAD (SOUTH FACE)
EXISTING TIEROD (TYP)
EXISTING COFFERDAM
EXISTING DEADMAN
DETAIL 2/S-803
DETAIL 1/S-803
NORTH BULKHEAD (WEST FACE)
LOCATION OF FORMER INCINERATOR BARGE LOADER
KING PILE TYPE B (3 PLACES)
117'-11"± (FIELD VERIFY)
HIGH TIE RODS AND WALES
54'-0"± (FIELD VERIFY)
LOW TIE RODS AND WALES
160'-2"± (FIELD VERIFY)
HIGH TIE RODS AND WALES
SEE SECTION 2/S-801
SEE SECTION 1/S-801
SEE SECTION 2/S-801
SEE SECTION 3/S-801
LIMITS OF TRANSFER STATION PLATFORM
ENCASE BULKHEAD FACE SEE DWG. S-801
EXISTING TRANSFER STATION
BULKHEAD PLAN
SCALE: 1"=20'
FURNISH & INSTALL EAST BULKHEAD SEE DWG. S-802
295'-6"±
KING PILE TYPE A (TYP.)
EXISTING MARINA RETAINING WALL
FURNISH & INSTALL TIMBER PILE CLUSTER SEE DWG. S-905
LEGEND
SEVERE DAMAGE GRADE AT FENDER
NOTES:
1. TIDAL DATA SHOWN ON S-800 AND S-900 SERIES DRAWINGS IS BASED ON PAST STATISTICS AND IS NOT GUARANTEED TO REPRESENT CONDITIONS WHICH MAY OCCUR DURING CONSTRUCTION. ACTUAL TIDES MAY VARY FROM THE LEVELS INDICATED. THE CONTRACTOR SHALL MAKE HIS OWN ESTIMATE OF TIDES WHICH MAY OCCUR DURING THE CONSTRUCTION PERIOD. VARIATION OF TIDAL LEVELS FROM THOSE INDICATED OR FROM THE CONTRACTOR'S ESTIMATE SHALL NOT BE CONSIDERED AS A CLAIM FOR ADDITIONAL COMPENSATION OR DELAY OF THE WORK.
2. FENDERING SYSTEM NOT SHOWN. SEE S-900 SERIES DRAWINGS FOR DETAILS.
AECOM USA, Inc.
20 Exchange Place,
New York, New York 10005
T 212.701.2800 F 212.701.2801
www.aecom.com
GREELEY AND HANSEN
111 BROADWAY, SUITE 2101
NEW YORK, NEW YORK 10006
DESIGNED: JK
DRAWN: EF
CHECKED: JK
APPROVED:
10 JAN 2013 JK CONFORMED DRAWING
NO. DATE APPD REVISION
SCALE
NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION
FOR NEW YORK CITY
DEPARTMENT OF SANITATION
MARINE EXPORT OF SOLID WASTE
SOUTHWEST BROOKLYN
MARINE TRANSFER STATION
CONTRACT NO. 2
STRUCTURAL
BULKHEAD PLAN
FILE NAME: DSNYFS800_10
DWG: S-800.10
SHEET NO.: 325 OF 708
DATE: JUNE 2012
DSNYFS800_10.dwg 01-10-13 15:46 SAVED lizonof DH



SECTION 1/S-800
NORTH BULKHEAD
TYPICAL CROSS-SECTION AT LOW TIE RODS
SCALE: 1/2"=1'-0"

SECTION 2/S-800
NORTH BULKHEAD
TYPICAL CROSS-SECTION AT HIGH TIE RODS
SCALE: 1/2"=1'-0"

SECTION 1/S-801
SCALE: 3/4"=1'-0"

SECTION 3/S-800
SCALE: 1/2"=1'-0"

1 0 1 2 3 4 5 FT
½"=1'-0"
¾"=1'-0"

WARNING
IT IS A VIOLATION OF SECTION 7209.2 OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER IN ANY WAY ANY ITEM BEARING THE SEAL OF A PROFESSIONAL ENGINEER. THE SEAL OF A PROFESSIONAL ENGINEER IS AN IMPRINT OF AN ITEM BEARING THE SEAL OF A PROFESSIONAL ENGINEER IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE, THE DATE, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NYC DOB NO.

AECOM USA, Inc.
20 Exchange Place,
New York, New York 10005
T 212.701.2800 F 212.701.2801
www.aecom.com

GREELEY AND HANSEN
111 BROADWAY, SUITE 2101
NEW YORK, NEW YORK 10006

DESIGNED: JK
DRAWN: BL
CHECKED: JK
APPROVED:

NO.	DATE	APPD	REVISION
10	JAN 2013	JK	CONFORMED DRAWING

SCALE: AS SHOWN

NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

FOR NEW YORK CITY
DEPARTMENT OF SANITATION
MARINE EXPORT OF SOLID WASTE
SOUTHWEST BROOKLYN
MARINE TRANSFER STATION

CONTRACT NO. 2
STRUCTURAL

BULKHEAD DETAILS - SHEET 1

FILE NAME: DSNYFS801_10
DWG: S-801.10
SHEET NO.: 326 OF 708
DATE: JUNE 2012

DSNYFS801_10.dwg 01-10-13 15:46 SAVED lopsof DH

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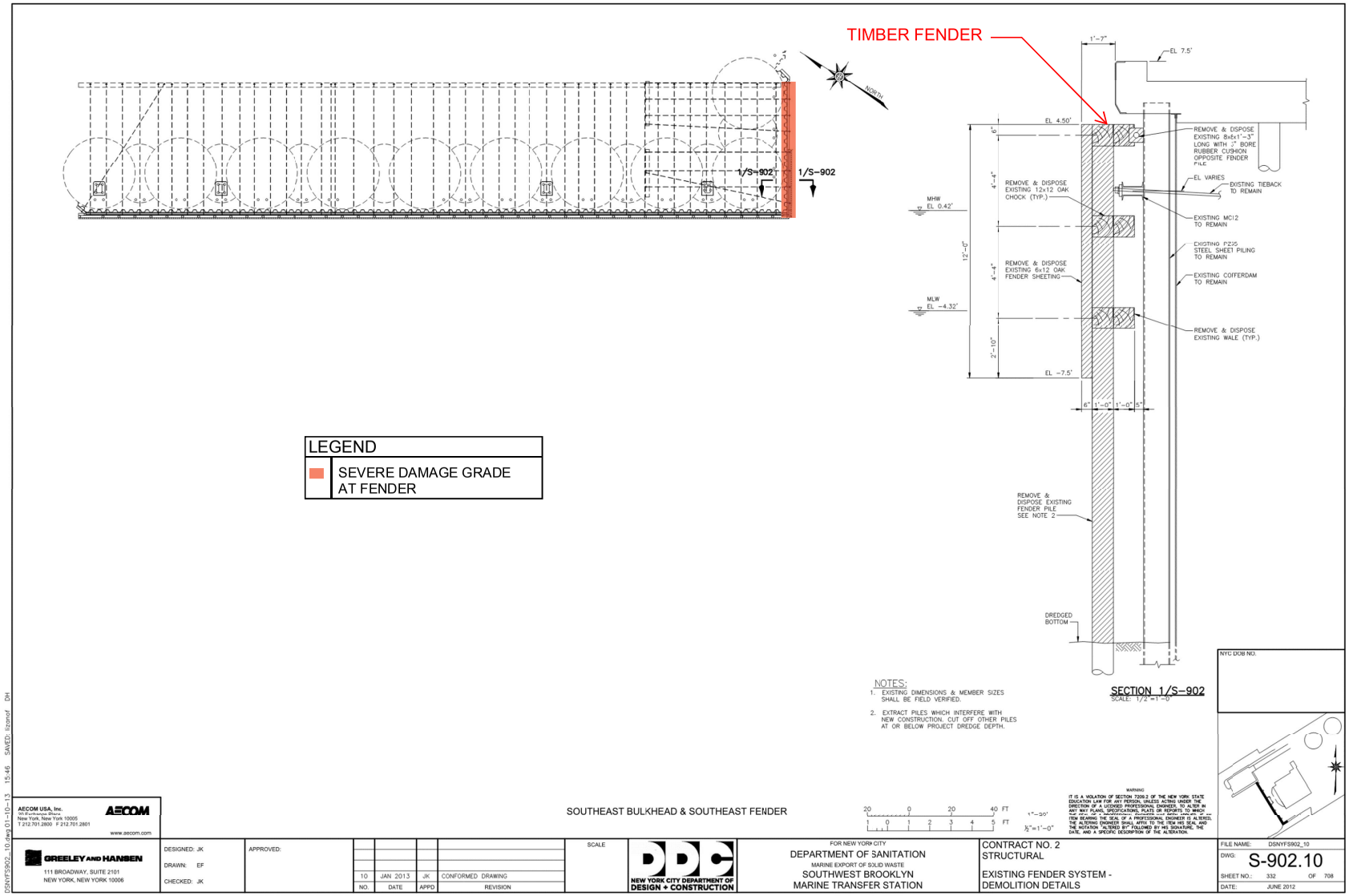
WESTERN BULKHEAD SECTION (WEST FACE)

NEW YORK CITY
ECONOMIC DEVELOPMENT CORPORATION
NEW SOUTHWEST BROOKLYN MTS
BROOKLYN, NEW YORK

FIG. 3 - 19



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WESTERN BULKHEAD SECTION (SOUTH FACE)

NEW YORK CITY
ECONOMIC DEVELOPMENT CORPORATION
NEW SOUTHWEST BROOKLYN MTS
BROOKLYN, NEW YORK

FIG. 3 - 20

3.9.2 Observed Conditions

Overall, the Western Bulkhead is generally in **Satisfactory** condition. For the purpose of this Routine Inspection, the condition and ratings of the Western Bulkhead system components are discussed below:

(A) BULKHEAD AND CAP

The Bulkhead and Cap structures (West Face and South Face) are generally in **Satisfactory** condition, as summarized in Table 3-33.

Table 3-33. Bulkhead and Cap Bulkhead Rating Summary

COMPONENT	NO DEFECT	MINOR	MODERATE	ADVANCED	SEVERE	TOTAL
BULKHEAD AND CAP	0' (0.00%)	333' (82.63%)	70' (17.37%)	0' (0.00%)	0' (0.00%)	403' (100.00%)

The Bulkhead and Cap ratings for the West Face (333 Linear Feet) of the Western Bulkhead are based on the general conditions observed at the concrete encasement and the exposed steel sections below the concrete encasement, while the Bulkhead and Cap ratings for the accessible portions of the South Face (70 Linear Feet) of the Western Bulkhead are based on the general conditions observed at the concrete cap, steel sheet pile, and the steel wales and tie rods. Minor and moderate deteriorations were typically observed in the Western Face of the Western Bulkhead. Advanced and severe deteriorations were observed in localized areas of the South Face of the Western Bulkhead.

Minor deterioration typically observed in the West Face of the Western Bulkhead were mostly observed in the concrete encasements at the steel sheet piles. Minor deterioration observed in the concrete encasements generally includes: general and random cracks up to 1/16"; occasional corrosion stains or small pop-out corrosion spalls; and structural cracks up to 1/16" wide.

Moderate deteriorations typically observed in the South Face of the Western Bulkhead were observed throughout the steel sheet piles, steel wale and tie rods; while advanced and severe deteriorations were observed in localized areas of the bulkhead. The moderate deteriorations typically observed in the exposed steel

components generally include: protective coating loss (over 50% of surface); moderate surface corrosion; moderate section loss in the steel, estimated to be less than 30% nominal section loss.

Advanced deteriorations observed were noted in the concrete cap and limited to a large spall observed in one location, at the base of the concrete cap (approximately 14" high and 20" wide).

Severe deteriorations observed in localized areas generally include perforations or loss of wall thickness exceeding 50% of nominal thickness (hole in steel sheet).

Ultrasonic Thickness Measurements (UTM) were taken at several locations of the sheet pile including the splash zone, top of the pile, mid pile elevation and at the mudline, to determine the remaining thickness of some of the steel. Of the four (4) locations sampled, the UTM generally recorded section losses that ranged from 1% section loss (minimum) up to 7% (maximum)at the steel sheets.

See Photo 3-108 through Photo 3-114 for documented images of the existing conditions. Additional documentation of the observed conditions are included in the attached field notes, see Appendix E for details.

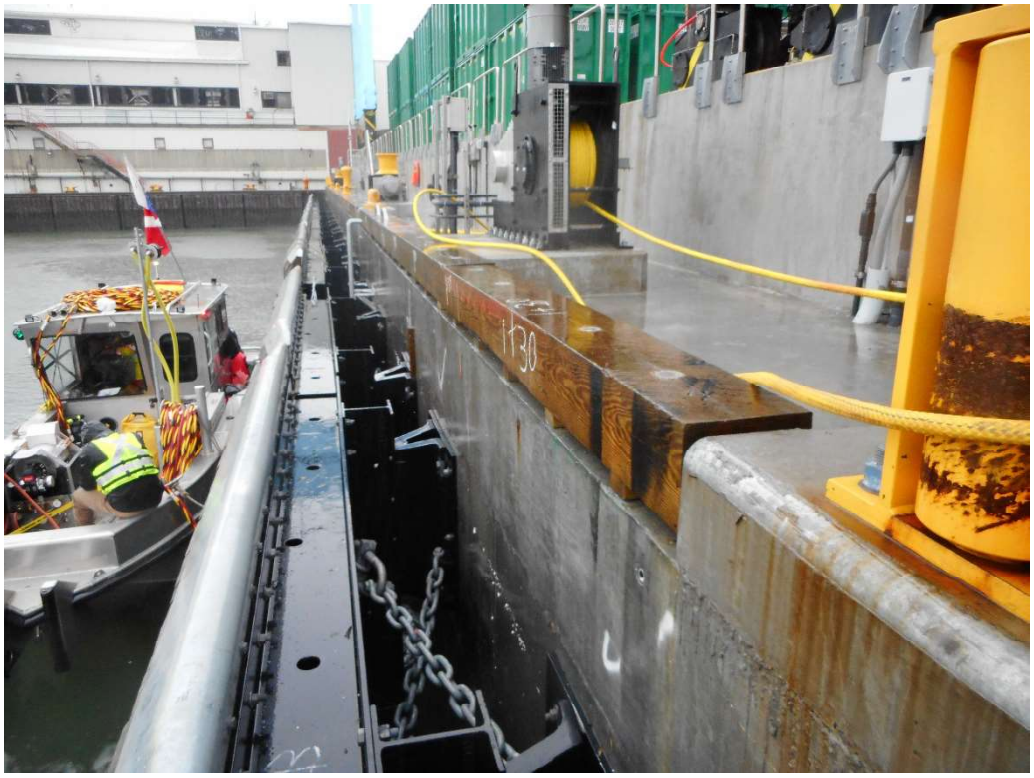

Photo 3-108. West Face of Western Bulkhead

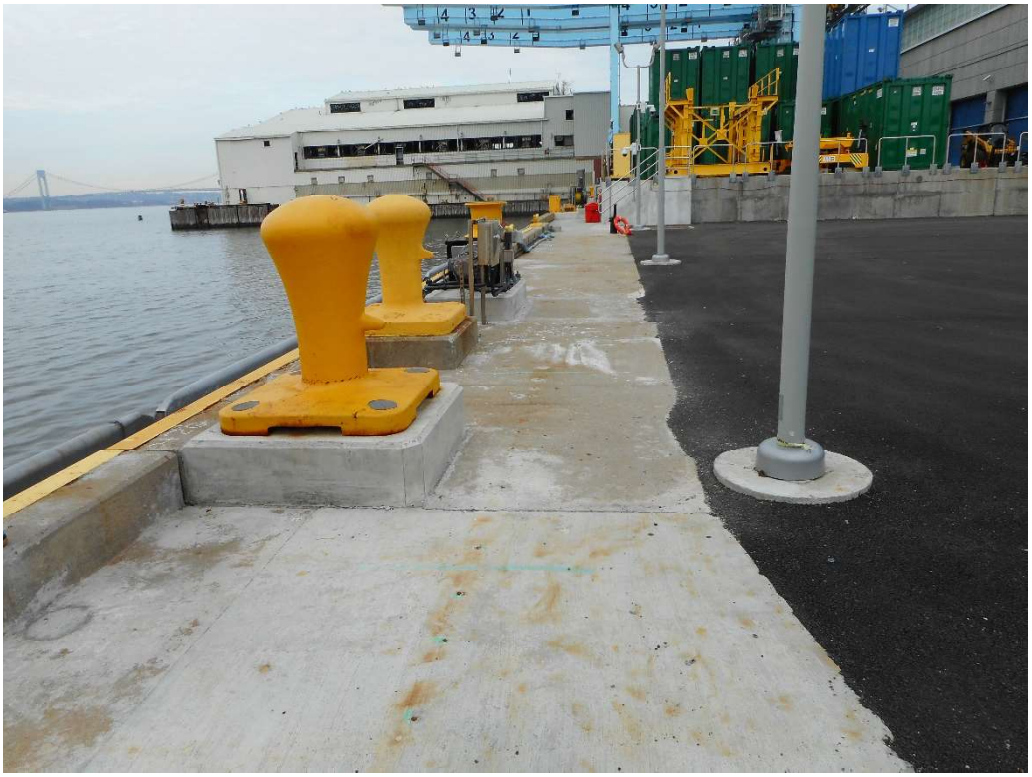

Photo 3-109. Pile Cap and Concrete Deck at Western Bulkhead (West Face)

Photo 3-110. South Face of Western Bulkhead

Photo 3-111. Pile Cap and Concrete Deck at Western Bulkhead (South Face)