655 Montgomery Street, Suite 1010
San Francisco, California 94111
United States
ghd.com

Your ref: CSO GH-09
Our ref: 12641156

June 18, 2024

Matthew Bell, SE
Port of San Francisco
Pier 1, The Embarcadero
San Francisco, CA 94111
Email: matthew.n.bell@sfport.com

RE: CSO GH-09 - DD2 Assessment and Evaluation

Dear Mr. Bell

The GHD-Structus JV (JV) was engaged by the Port of San Francisco to evaluate the current condition of the Floating Dry Dock #2 (DD2) located at the at Pier 68 (former Shipyard) in San Francisco. The Port of San Francisco (Port) staff had noted that DD2 had taken on large amounts of water during recent storms (March 30, 2024) resulting in significant listing to the east. The Port had requested the JV's specialized services subconsultant – Heger Dry Dock, Inc. (HDD) to perform a high-level visual assessment of DD2 and provide recommendations as necessary to stabilize the structure.

Mike Naylor, PE, from HDD led the visual assessment of DD2 on May 6, 2024. The JV team – Mike Naylor and Satish Chilka, met with Port's staff – Patrick Forrester and Jeffrey Carter to gather more insights into the current operations and maintenance procedure for DD2.

As part of the assessment, the JV team reviewed the deck area, interiors of each ballast tanks through the access door, and visited the DD2 operations room to note condition of the Tank Level and Draft Level indication systems. There are forty (40) ballast tanks in DD2, with individual pump operated independently. The individual pumps for various ballast tanks were run for a few minutes to note functionality. After the assessment from the DD2 deck, the JV team accompanied by Patrick Forrester observed the exterior hull of DD2 from a work boat provided by SF Boat Support.

The boat allowed access to the severely corroded sections of the hull along the water line and access the mooring grippers from the three concrete dolphins on the west side of DD2. In general, DD2 was found to be in poor condition. The hull plating on the east side of DD2 was more extensively repaired in recent times (prior to the closure of the Shipyard). Hence, the east side of the structure is in relatively better condition than the west side. As DD2 is kept in light draft condition, the area of the hull in the splash zone i.e., around 6-ft to 10-ft above the baseline of the structure is exposed to accelerated corrosion. The worst condition was observed on the north-east corner of DD2 near Tank 40. Based on the extent and location of the corrosion related damage, and inoperability of the dewatering pump, Tank 40 is noted to be the most susceptible to uncontrolled flooding.

The steel stair tower adjacent to DD2 was not included in the current scope of work. Although the stair tower is not being used by Port staff, it is connected to DD2 and suffered damage at the top connection due to the listing event. The tower endangers the shore power supply feed to DD2 and should be assessed for safety and

stability in the near term. The safety ladders on the concrete dolphins to access the mooring dolphins were damaged in an unrelated event in the past.

HDD has provided several recommendations that can improve the condition of DD2 and mitigate against the risk of uncontrollable flooding. A few notable recommendations are listed below:

– Install Draft Level Indication system to monitor drafts at the four (4) corners of DD2 that will help monitor the drafts remotely and send alerts to notify of deviations from acceptable parameters.
– Install doubler plates on the hull to patch the holes and tears in the steel plating. A comprehensive thickness measurement survey will be required to evaluate the viability of welding new steel to existing structure and determining the extent of repairs.
– Repair existing pumps or secure temporary dewatering pumps for the tanks where pumps are inoperable.

The detailed findings of the field visit and recommendations are included in the report provided as Attachment 1. The JV team received review notes from the Port on the draft report (issued May 20, 2024). Accordingly, Exhibit A-001 of the attachment identifies the locations of inoperable tank dewatering pumps and where leaks were detected in the flood valve. The other review notes were consistent with the findings and recommendations of HDD and do not require further edits to the report.

Please accept this report as the final version of the deliverable for CSO GH-09. The JV team will be on standby to assist the Port will any additional tasks related to DD2.

Regards

Satish Chilka 2024.06.18 15:38:27-07'00'

Satish Chilka, PE
Project Manager

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GHD Principal

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Copy to: Peter Yu, SE, Structus Inc. Principal
Mike Naylor, PE (Heger Dry Dock, Inc.)

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Phone 508.429.1800
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www.hegerdrydock.com

June 14th, 2024

Attention: Matthew Bell, Senior Structural Engineer, Port of San Francisco
Satish Chilka, Technical Director, GHD

Subject: Visual Assessment Inspection of DD#2

Attachments: (1) Resume of Surveyor
(2) General Arrangement
(3) Photographs

1. Executive Summary

HEGER DRY DOCK, Inc. (HDD) was tasked by GHD to conduct a visual external inspection of DD#2, owned and operated by the Port of San Francisco at Pier 68, following a listing incident that occurred on March 30th, 2024 which resulted in a significant East side (PORT) list.

The inspection consisted of visually inspecting the outboard shell (internally from inner wing shell access doors and externally from a boat), witnessing the operation of dock pumps, and talking with dock operators. The following are notable findings:

1. The "splash zone" or "wind/water strake" is defined as the shell area from the waterline (at normal operational freeboard) to about 4-ft up. Typically, this area of a steel floating dry dock is the most susceptible to accelerated corrosion.
    a. Historically, the dock has been maintained at an operating draft of about 18-ft (approximately 2-ft freeboard to the pontoon deck) lending to accelerated corrosion occurring near the pontoon deck level.
    b. For the last ~6-yrs, the dock has been kept in a light draft condition (at approximately 6-ft draft) lending to accelerated corrosion on the shell areas 6-10 feet above the pontoon bottom level.

2. On the West side (STBD), the side shell is generally wasted and holed through from 2-ft below to 10-ft above the pontoon deck level (i.e. the historic splash zone). A significant number of corrosion holes were noted in nearly every ballast tank in this zone.

3. Prior to stoppage of its use as a ship repair facility (circa 2016), it appears the dock's East side (PORT) was more extensively repaired relative to the West side (STBD) and therefore less holes were observed to be present near the pontoon deck level.

4. Presently, there is accelerated corrosion occurring in the current splash zone which is approximately 6-ft to 10-ft above baseline. Externally the paint in this area appears completely failed with rust scale developing. The East side (PORT) appears to be in worse condition than the West side (STBD).

5. On the East side (PORT), the side shell is generally wasted and tearing along the welded connection of scantlings to the plating, most notably directly below the discharge piping and at the FWD and AFT ends of the dock. The location of these tears is extremely close to the light draft waterline of the dock with some tears being located only 1-2 feet from the current waterline. Refer to Attachment 2 for a plan map of noteworthy tears near the waterline.

6. The worst tear is located at the North-East corner of the dock in way of Tank 40. The side shell of the dock is corroded through in an area that is about 8-ft tall and 30-ft long; the bottom of the tear is only about 1-2 feet above the waterline.

7. Some of the dock's pumps do not operate and dock operators are currently unable to remove water from these tanks if there is an influx of water. Inoperable pumps were observed in Tanks 32, 33, 35, and 40. The pump for Tank 24 was operable but was generating a loud 'knocking' noise indicating a mechanical issue. The discharge piping for Tank 31 is holed through and thus ineffective in pumping water out of the tank.

8. Given the large extent of corrosion holes in the side of Tank 40 in close proximity to the light waterline and the inoperability of the dewatering pump, this tank is extremely susceptible to uncontrollable flooding.

9. The dock's Tank Level Indication (TLI) system, which is utilized for monitoring water levels in all 40 ballast tanks, is not functional. This condition makes it challenging for dock operators to monitor ballast levels on a day-to-day basis and identify tanks which may be taking on water. To monitors tank levels, operators have to view into each tank from open access doors to visually judge ballast levels; this process can take 30-45 minutes to check all tank levels.

10. The dock's Draft Level Indication (DLI) system, which is typically utilized for monitoring draft levels at 6 points (the dock's four corners and amidships, port and starboard) is not functional. This condition makes it challenging for dock operators to monitor the dock's drafts on a day-to-day basis and readily identify if any flooding issues, which would reduce dock draft, are occurring.

11. There are a number of holes in the pontoon deck, most notably in the FWD Port area of the dock where a crack appears to be developing ~40-ft off centerline from FR 0-14. Holes in the deck allows for rain water to fill the tanks underneath.

12. A number of flood valves, which are constantly submerged, were observed to be leaking at a slow rate causing a constant influx of water into the associated ballast tanks. Leaky flood valves were found in Tanks 4, 16, 17, and 27.

13. In general, all valve actuation reach rods appear to be corroded. The flood valves have not been cycled in a long period of time and the reach rod bearing supports are likely seized up. Dock operators reportedly attempted to cycle the #16 flood valve recently which resulted in breaking the reach rod and leaving the flood valve cracked open.

14. The external Impressed Current Corrosion Protection (ICCP) system has been reportedly turned off. This makes the submerged portions of the dock prone to corrosion. Protective coatings (if any remain) are the only defense against corrosion; the coating condition of submerged hull areas was not investigated as part of the inspection.

15. Dock operators reported that the dock used to have two redundant shore power electrical feeds, one port and one starboard. Both sources were capable of operating dock de-ballasting equipment. The port side feed is no longer functional. The starboard feed is functional but it was reported that the crossover bus-ties are in a deteriorated condition and it may not be possible to operate all dock pumps for an extended period of time, if required to do so.

16. The dock is equipped with onboard diesel generator reportedly capable of running 3-4 dock pumps at a time if there is a loss of shore power. The generator was not operated as part of the survey but dock crew reported that the generator is functional; however, available diesel fuel and thereby run-time may be limited.

17. Although pier side elements were not in HEGER's inspection scope, dock operators reported the following damages from the recent listing incident:

    a. Cracking of the southernmost concrete dolphin in way of the mooring gripper anchorage.

    b. Damage to the stair tower access in the South-West corner of the dry dock potentially endangering the shore power supply feed to the dry dock.

2. Inspection Scope

HDD's task objectives, following the request by GHD to conduct a visual external inspection of DD#2, were as following:

1. Conduct a high-level visual survey of the external and accessible internal areas of DD#2 to ascertain the current material condition and identify structural deficiencies.

2. Determine recommendations for repairs or other implementations for improving the dock's condition to reduce the risk of the uncontrollable flooding of the dock in its current moored location.

As part of the survey, the following activities were accomplished:

- General inspection of the visually accessible internal wing areas of each ballast tank as viewed from the pontoon deck level through an open inner wing shell access door.
- Visual inspection of the topside of the pontoon deck level as surveyed by walking the deck.
- Visual inspection of the external portions of the outer shells as surveyed from a boat.
- Briefly running each tank's dewatering pump while visually confirming operation via the inner wing shell access door.

The following were excluded from HDD's survey scope:

- Comprehensive Ultrasonic Thickness (UT) measurements of the dock's shell plating or other structural elements.
- Survey of submerged portions of the dry dock hull
- Internal inspection of the dock's ballast tanks, other than the areas easily viewed from access hatches.
- Operation of other mechanical and electrical systems

The findings of this limited survey are summarized within this memorandum.

3. Survey Results – Pontoon Deck Areas

The pontoon deck plating and lower portions of the inner wing shell were visually inspected externally. The findings are as follows:

- Generally, the plating in the transverse center of the dock was in satisfactory condition with many areas previously repaired by installing doubler plates over the original deck plating.
- The driving lanes, defined as the area from the inner wing shell and inboard 20-ft on either side of the dock, visually was in more corroded condition than the center plating. Through the dock this area has medium to heavy pitting and rust scale.
- Multiple holes were noted in way of the starboard side driving lane at FR 64-67 & FR 17
- On the port side, multiple holes were noted in the forward driving lane areas (Tank 2, 4, and 6) with a tear appearing to be propagating 30-ft off dock centerline from FR 0-14.
- The inner wing shell connection to the pontoon deck plating is wasted and holed through on the portside at FR 54.
- There is an 18" diameter hole in the portside driving lane at FR 64. Multiple holes also noted in the portside driving lane from FR 72 to 74.

NOTE: A complete visual inspection of the pontoon deck could not be conducted due to keel blocks and immovable large other equipment (such as replacement plate panels) being scattered throughout deck areas.

4. Survey Results – Visual of Internal Ballast Tank Areas from Access Door

The internal portions of the outboard shell, from the pontoon bottom to the safety deck level, was visual inspected from the pontoon deck level via access hatch/door opening in the inner wing shell. Material condition notes are provided below on a tank-by-tank basis.

In addition to accomplishing a visual inspection of the dock's structural conditions, each dewatering pump was mechanically bump tested to verify operability and function.

Tank #	Observations
1	Pump is operational, some water in tank, water is suspected to be coming from holes in Frame 0 transverse end BHD which has multiple temporary cofferdams installed.
3	Pump is operational, some water in the tank, side shell is holed though from pontoon deck level and up 6' including around the discharge valve penetration
5	Pump appears to be operation, tank is dry, no holes noted in side shell

7	Pump is operational, scaffolding is obstruction visual inspection form access door, outboard side shell is completely holed through at 6' and 20' above pontoon deck level
9	Pump is operational, some water in the tank, outboard side shell has been recently renewed, no holes
11	Pump appears to be operational, tank is dry, lots of holes along the pontoon deck level of outboard shell
13	Pump appears to be operational; tanks is dry, outboard wing shell has significant corrosion with plating completely holed through at FR 25-26 and 27-28 especially in upper portion, moderate number of holes around discharge penetration.
15	Pump appears to be operational, tank is dry, 2 holes in side shell plating in close proximity to discharge pipe penetration, moderate number of holes 4' to 6' above pontoon deck level
17	Pump is operational, flood valve has a minor leak by, lots of holes 6' below to 6' above pontoon deck level and around discharge valve
19	Pump appears to be operational; tank is dry, moderate number of holes in shell from pontoon deck level and up 10'
21	Pump appears to be operational, tank is dry, no holes at pontoon deck level, moderate number of holes 15' above pontoon deck level
23	Scaffolding obstructing visual inspection from access door, pump appears to be operational, tank is dry, lots of holes along pontoon deck level, around discharge piping penetration, and in upper portion of shell
25	Pump is operational, moderate holes along pontoon deck level, lots of holes at 15' above pontoon deck and above
27	Flood valves has a minor leak by, pump is operational, lots of holes at pontoon deck level and above
29	Pump appears to operate, tank is dry, the side shell in way of the discharge piping penetration has lots of corrosion holes, lots of holes along the pontoon deck level and above
31	Pump is operational but discharging piping is disconnected from side shell resulting in the pump discharging water back into tank, scaffolding obstructs visual inspection from door, moderate number of holes above and below pontoon deck level
33	Pump not operational, water noted in tank, scaffolding obstructs internal visual inspection from door, side shell is renewed along pontoon deck level
35	Pump not operational, one hole at 4' below pontoon deck level, lot of outboard shell holes at 15' above pontoon deck level
37	Pump operates, moderate number of holes at the pontoon deck level
39	New plate repairs at pontoon deck level, pump operates, small holes 4' above baseline (submerged) at FR 79-80 causing an influx of water
2	Pump is operational, scaffolding obstructions visual inspection from access door, pontoon side shell plating is tearing along scantling welds approximately 4' to 8' below pontoon deck level at FR 0-2
4	Pump is operational, some pin holes in the outboard shell plating at the pontoon deck level, large tear in the side shell below the discharge piping, small leak in the flood valve
6	Pump is operational, tank dry, no holes in the side shell
8	Pump is operational, tank is dry, large tear in the outboard shell plating approximately 8' below the pontoon deck level at FR 13-14, the shell is renewed at the pontoon deck level
10	Pump is operational, some water in the tank, large tear in the outboard shell plating approximately 10' below the pontoon deck level at FR 18-19, side shell is renewed at pontoon deck level
12	Pump is operational, tank is dry, side shell is renewed at pontoon deck level, large tears in outboard shell plating along the scantling welds located approximately 8' to 10' below the pontoon deck level at FR 22-24
14	Pump is operational, tank is dry, some scaffolding in the tank obstructing a full visual inspection from access door, large tear in outboard shell plating along scantling welded connection about 8' to 10' below the pontoon deck level at FR 25-27

16	Some water in the tank from flood valve that is stuck slightly open, flood valve reach rod is broken, large hole in the shell plating approximately 6' to 8' below the pontoon deck level at FR 30, moderate number of holes in the shell plating at 9' to 10' above pontoon deck level
18	Pump is operational, tank is dry, there is a large tear in the side shell plating just below the discharge penetration, the plating at FR 32 is starting to develop a vertical tear, there are side shell holes scatter throughout the tank from pontoon deck level up to the safety deck level
20	Pump is operational, tank is dry, large tear in the outboard side shell plating approximately 10' to 12' below the pontoon deck level along the scantling welds at FR 39-40, the is a tear developing in the same location at FR 38-39
22	Pump is operational, some water in the tank, localized holes scattered throughout the side shell from the pontoon deck level up to safety deck level
24	Pump is operational but making a loud knocking noise when running, tank is dry, side shell holes and tears developing along the pontoon deck level and up 10'
26	Pump is operational, tank is dry, holes developing along the pontoon deck level and in the upper portion of the wing just below the safety deck
28	Pump is operational, tank is dry, side shell is renewed at pontoon deck level and above, no holes noted in outboard shell, the inboard wing shell is wasted through at the pontoon deck connection at FR 54
30	Some water in the tank, pump is operational, side shell tearing below the discharge valve approximately 6' to 12' below the pontoon deck level, scattered holes throughout the tank from pontoon deck level up to safety deck
32	Pump is not operational, tank is dry, side shell repaired from 10' above pontoon deck level and up, only one hole in the side shell noted at about 6' above pontoon deck level
34	Pump is operational, some water in the tank, lots of holes in the side shell at 8' to 15' above pontoon deck level, holes developing in way of discharge penetration
36	Pump is operational, tank is dry, lots of holes in the side shell at 15' above pontoon deck level and up
38	Pump is operational, tank is dry, some pin holes in the side shell plating along the pontoon deck level
40	Pump does not work, some water in the tank, the side shell is completed wasted with large tears along stiffeners approximately 4' to 12' below the pontoon deck level from FR 77-80

5. Survey Results – Visual of External Shell from Boat

The external portions of the outboard shell were visually inspected from a boat.

In general, the external survey of the dock confirmed the corroded and holed through conditions identified in the visual inspection from inner wing shell access doors. In the enclosed photographs (Attachment 3), an external view of an outboard shell deficiency (plating hole or tear) was generally coupled with the associated internal view taken in the same location. The location is notable tears near the waterline are overlain on the dock's general arrangement in Attachment 2.

From the external view, it is apparent that the outboard shell protective coating is completely failed from the pontoon deck level and down with rust film covering the pontoon shell surface. From the light draft waterline and up ~3-ft, the plating has accelerated rusting with scale developing. There is moderate marine growth on the submerged portions of the shell. These conditions are shown in FIGURE 1 below.

FIGURE 1 - TYPICAL CONDITION OF OUTBOARD SHELL (EAST/PORT)

Along the East (PORT) side of the dock, the side shell corrosion is generally more accelerated relative to the West (STBD) side. This is evident with the number of side shell tears noted through the course of the survey. On this side of the dock, most tanks have a side shell tear, 1-5 feet above the light draft waterline and these tears are primarily developing directly below the discharge valve, as shown in the Figure 1.

On the West (STBD) side, the condition is similar, but there are not quite as many tears developed yet. On the West side, there appears to be tears developing in way of Tank 29 and 31. These tears were only evident from the external inspection as daylight was not yet visible from tank internals. On this side of the dock, there is more corrosion and holes along the pontoon deck and up ~10-ft.

In addition to surveying the external shell, HDD climbed upon the mooring dolphins to get a closer look at the material condition of mooring grippers. Generally, the mooring spud brackets which attach to the side shell of the dock appear to be corroding and the gripper jaws have surface rust; however, there were no obvious signs of damages from the listing event of March 30th, 2024.

FIGURE 2 - TYPICAL CONDITION OF A MOORING POINT

NOTE: Visual inspection of the North and South end bulkheads of the dock was limited as boat could not completely access due to pier arrangement and outrigger aprons.

6. Conclusion and Recommendations

DD#2, overall, was found to be in poor condition with the side shell of the dock extremely corroded with extensive holed through or torn plating along the length of the dock. Along the East (PORT) side of the dock, these side shell holes are large, numerous, and extremely close the dock's light draft waterline.

In the dock's current condition, even a minor increase in dock's light/current draft will result in a condition that will increasingly submerge large holed through areas of the dock's hull ultimately leading to the uncontrollable flooding of most (if not all) ballast tanks, thus causing an unacceptably large listing and/or trimming condition and potentially sinking the dock.

Furthermore, dock operators have to routinely combat minor leakage into tanks to maintain the dock's current draft as some tanks were noted to have compromised flood valves, discharge piping or holes in the submerged portions of the hull. In some tanks, dewatering pumps have failed and operators are unable to pump these tanks out if flooding does occur.

The lack of protective coatings on the outboard shell and exposure of this area to salt water spray is accelerating the rate of hull deterioration. From external visual inspections, it appears new tears are in the process of developing on the both sides of the dock near the waterline. If immediate action is not taken, tears will continue to develop and enlarge in areas near the waterline and only further increase the risk of water influx into the associated tanks.

To improve the dock's condition and mitigate some risk of uncontrollable flooding, HDD recommends the following course of action generally listed by priority:

1. Install a Draft Level Indication (DLI) system to monitor drafts at least at the 4 corners of the dock. The system should be set up in a way that allows operators to continuously monitor the drafts remotely and send alerts if measurements deviate from acceptable parameters.
    - *A "JOWA Metritape" system, with sensors mounted within external standpipes, is one possible option.*

2. Install engineered doubler plates along the side shell in way of all areas that were observed to have holed-through or torn plating. Doubler plates have to be designed with perimeter and slot welds to sufficiently attach the plating to relatively intact side shell structure of the dock and develop a new watertight boundary. A comprehensive UT survey will help determine if the existing shell plating thickness is sufficient to weld to; however, additional pre-construction surveys may be required to design doubler plate repairs on a case-by-case basis.

3. In tanks which have inoperable dewatering pumps, repair pump. If pump is not easily repairable, install temporary dewatering pumps such that the tanks can be dewatered if needed.

4. Install cofferdams over the leaky flood valves (minimum) or all flood valves. As the reach rods associated with flood valves are likely seized, installing cofferdams around all flood valves may be the only way to prevent water influx.

5. Patch holes in pontoon deck to prevent influx of water into tanks during rain events.

6. Conduct a comprehensive UT survey of the outboard shell's plating to determine the current thickness. HDD recommends taking measurements at 1', 3' and 5' above the light draft waterline every 10 to 20-ft along the dock's length, port and starboard.

7. Conduct an underwater hull survey of the dock's submerged areas and UTs to determine structural condition of the submerged areas. Identify any leakage that may be occurring from holes in submerged portions.

8. Remove scaffolding from tanks to allow complete visual inspection of side shell from inner wing shell hatch.

9. Damages were reported by dock operators on pier side structures including the South-West stair access tower and the South-West concrete mooring dolphin. Damages to these structures, and the potential risk it imposes on the facility, should be investigated by others qualified to evaluate such elements.

Please contact us if you have any questions or comments regarding this memorandum,

HEGER DRY DOCK

Attachment 1 – Resume of Surveyor

Mike Naylor, PE
Principal Engineer & Co-Owner

HEGER DRY DOCK, INC
77 West Main St, Suite #9
Hopkinton, MA
mike@hegerdrydock.com
Office: 508.429.1800

Dry Dock Engineer- ***Heger Dry Dock, Inc., Hopkinton MA*** **June 2012-Present**

Primary responsibilities as Dry Dock Engineer are in support of Heger's maritime clientele, both Naval and commercial, in the various aspects of design, analysis, and inspection of dry dock facilities.

Design responsibilities include:

- Strength analysis of dry dock structural elements subjected to vessel loads, design head pressures, hurricane wind forces, local block loads, etc.
- Hydrostatic analysis of floating dry docks including the determination of lift capabilities and stability during docking evolutions of design vessels.
- Hull structure design and analysis in accordance to American Bureau of Shipping (ABS) Standards or other applicable classification societies.
- Expert forensic engineering investigation into dry dock or dry dock related incidents.
- Finite Element Analysis (FEA) using SIEMENS FEMAP with NASTRAN solver.
- Draft and develop design drawings in accordance with the Nation CAD Standard to accurately reflect the structural and architectural design of dry dock elements.

Major Design Projects:

- Design of 80,000 LT capacity steel floating dry dock for VIGOR – Portland, OR
- Design of 55,000 LT capacity steel floating dry dock for BAE – San Diego, CA
- Design of 9,000 LT capacity steel floating dry dock for AUSTAL – San Diego, CA
- Design of customized mooring systems at floating dry dock facilities in Maine, Alabama, Washington, Portland, Connecticut, Virginia, etc.
- Design and construction support of various replacement caisson gates including NASSCO San Diego, Portsmouth Naval Shipyard and Norfolk Naval Shipyard.
- Expert witness for VIGOR Seattle in litigation with Western Towboat Co. regarding sinking of YFD-70 in 2016.

Field/Inspection responsibilities include:

- On-site condition assessment surveys of floating dry docks in accordance with US Naval and commercial standards in order to verify compliance prior to issuing dry dock certifications.
- Analysis in order to ascertain or verify a safe maximum lifting capacity for certification based on the material assessment of the floating dry dock.

Major Field/Inspection Projects:

- Inspection of over 30 dry docks facilities at BAE Norfolk, BAE Jacksonville, BAE Mobile, BAE San Diego, BAE San Francisco, Vigor Portland, Vigor Seattle, Bath Iron Works, Electric Boat, NASSCO San Diego, Lyon's Shipyard, Colonna's Shipyard, SENESCO, AUSTAL USA, etc. Inspections conducted in accordance with USCG or NAVSEA MIL-STD requirements.
- Engineering assessment and on-site support to rebuild 4,000 LT capacity marine railway dry dock for MIL-STD 1625(D) certification at BAE – Jacksonville, FL

EDUCATION

Northeastern University– ***Structural Engineering M.S.*** **August 2013-May 2017**
University of New Hampshire – ***Civil Engineering B.S.*** **August 2008-May 2012**

REGISTRATION

Profession Engineer – Massachusetts, Alaska, Alabama, California, Louisiana, Oregon, Washington

Attachment 2 – General Arrangement

ATTACHMENT 1

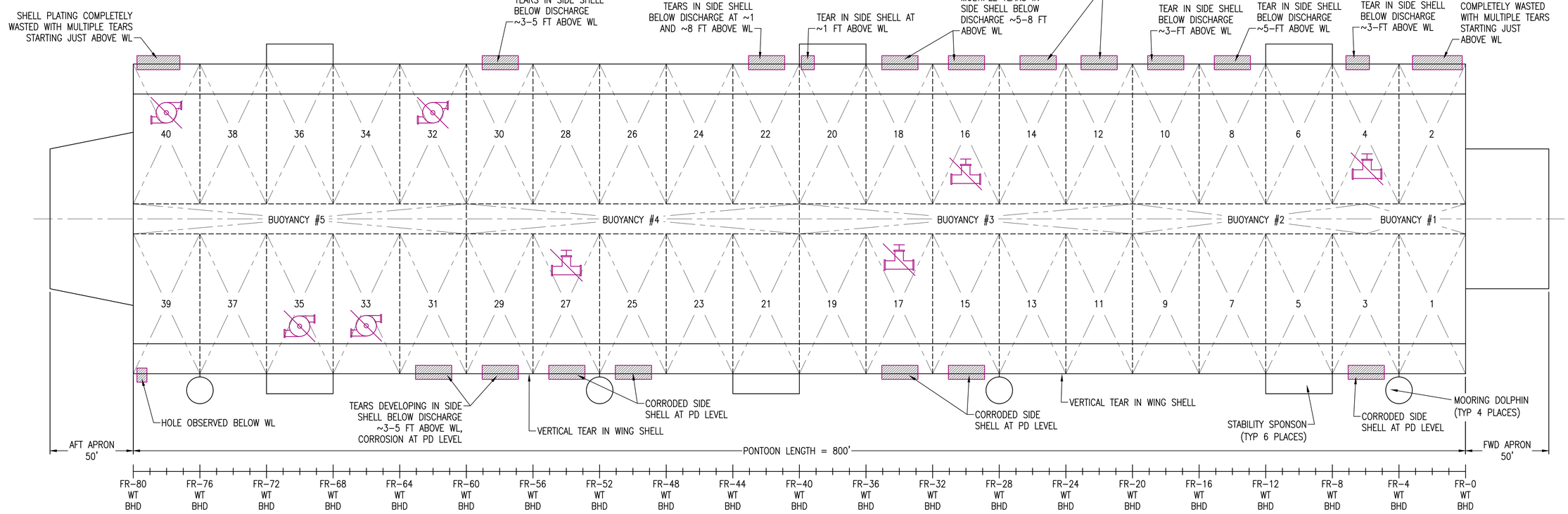
KEY OF SYMBOLS

INOPERABLE TANK DEWATERING PUMP

LEAK IN FLOOD VALVE

NOTABLE TEAR OR HOLES IN DOCK HULL PLATING

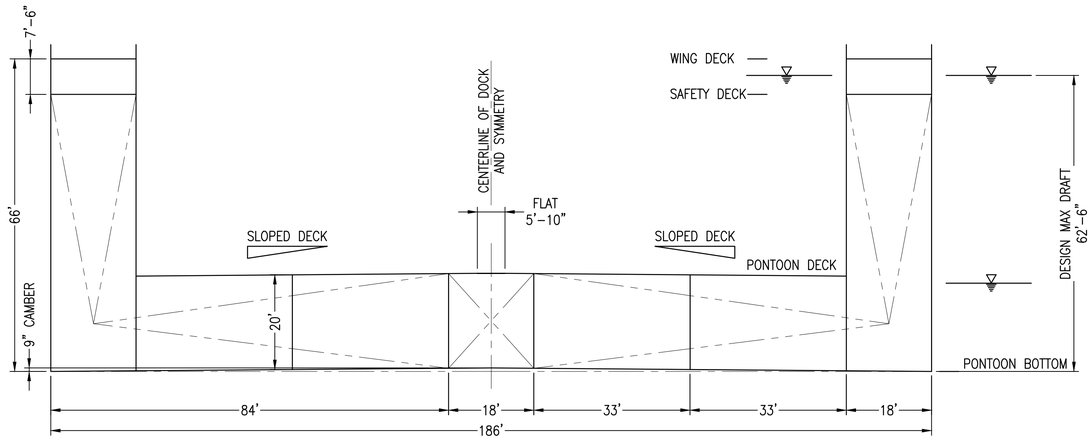
FWD



PLAN VIEW

SCALE 1/32" = 1'– 0"

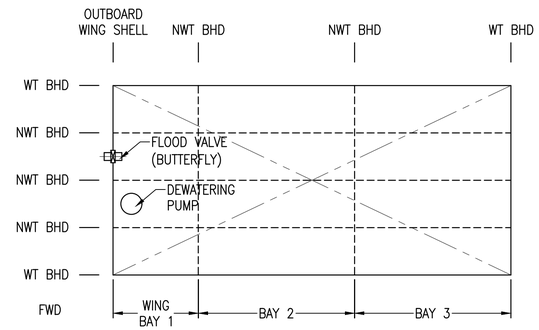
B1



MIDSHIP SECTION

SCALE 1/16" = 1'– 0"

A1



PLAN - TYPICAL BALLAST TANK CONFIGURATION

SCALE 1/16" = 1'– 0"

A4

NO	DESCRIPTION	DATE	APPR

HEGER DRY DOCK, INC.
hegerdrydock.com

SEAL

DES	–	DRW MDN	CHK JJB
CHIEF ENG.		–	
DATE:		MAY 8, 2024	

THESE DESIGNS AND SPECIFICATIONS ARE, NOW AND SO REMAIN THE PROPERTY OF HEGER DRY DOCK, INC. USE OF THESE DESIGNS WITHOUT OUR EXPRESS WRITTEN PERMISSION IS PROHIBITED

CLIENT NAME AND ADDRESS:

PROJECT TITLE: PORT OF SAN FRANCISCO
SAN FRANCISCO, CALIFORNIA
EXTERNAL VISUAL INSPECTION OF DD#2 (2024)

DRAWING TITLE: GENERAL ARRANGEMENT

SCALE:	AS NOTED
PROJECT NO.:	4555–D
CONSTR. CONTR. NO.	
SHEET	1 OF 1

A-001

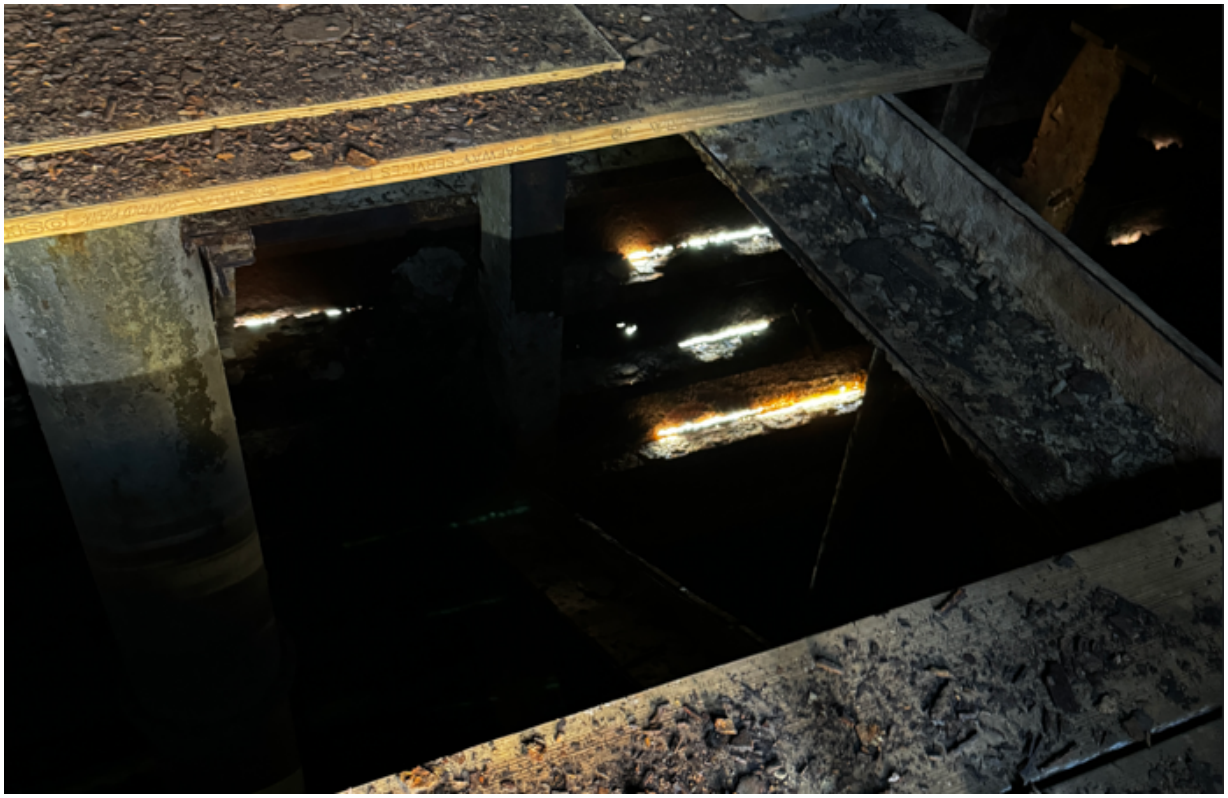
Attachment 3 – Photographs

List of Photographs

Photograph 1 - Outboard Shell tears just above waterline in NE corner of dock (Tank 40)

Photograph 2 - View of Tank 40 shell tears internally (FR 77-80)

Photograph 3 - Outboard Shell tears at SE corner of dock (Tank 2)



Photograph 4 View of Tank 2 shell tears internally (FR 0-2)

Photograph 5 - Corrosion around Tank 4 discharge penetration with side shell tear below

Photograph 6 - Internal view of Tank 4 side shell tear

Photograph 7 - Side shell tears at Tank 8

Photograph 8 - Internal view of side shell tear at Tank 8

Photograph 9 - External view of side shell tear below Tank 10 discharge

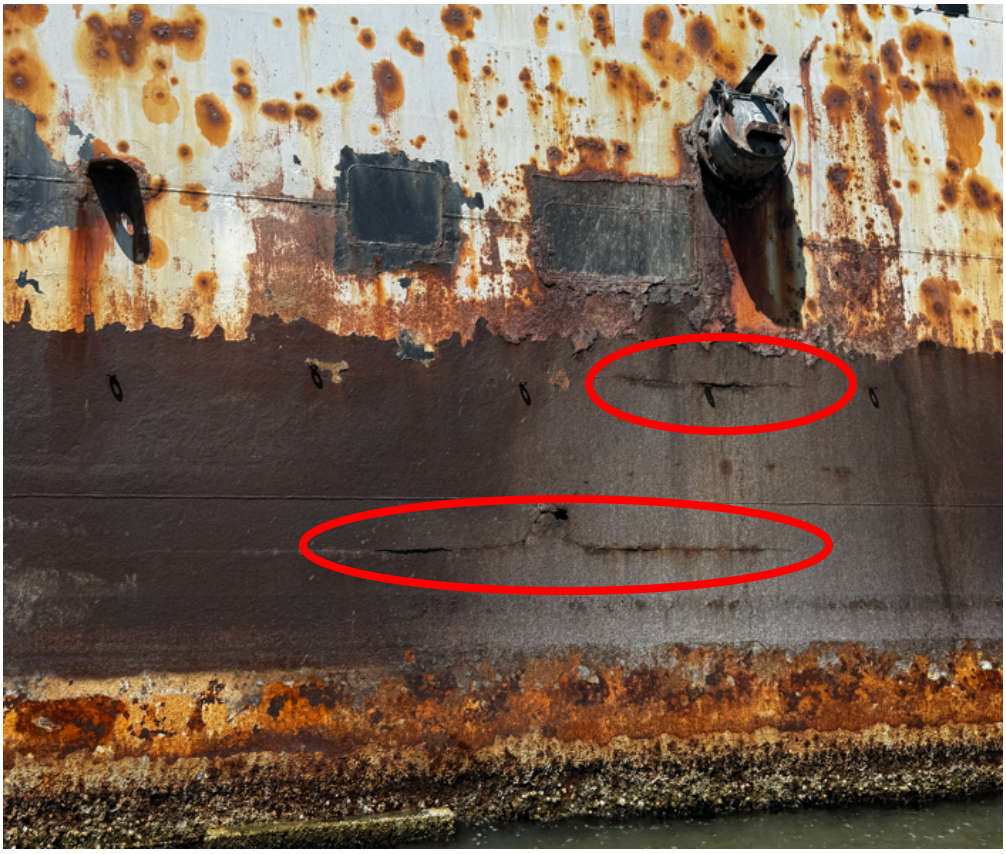
Photograph 10 - internal view of Tank 10 side shell tear

Photograph 11 - External view of Tank 12 side shell tear below discharge

Photograph 12 - Internal view of Tank 12 side shell tear

Photograph 13 - External view of Tank 14 side shell tear

Photograph 14 - Internal view of Tank 14 side shell tear



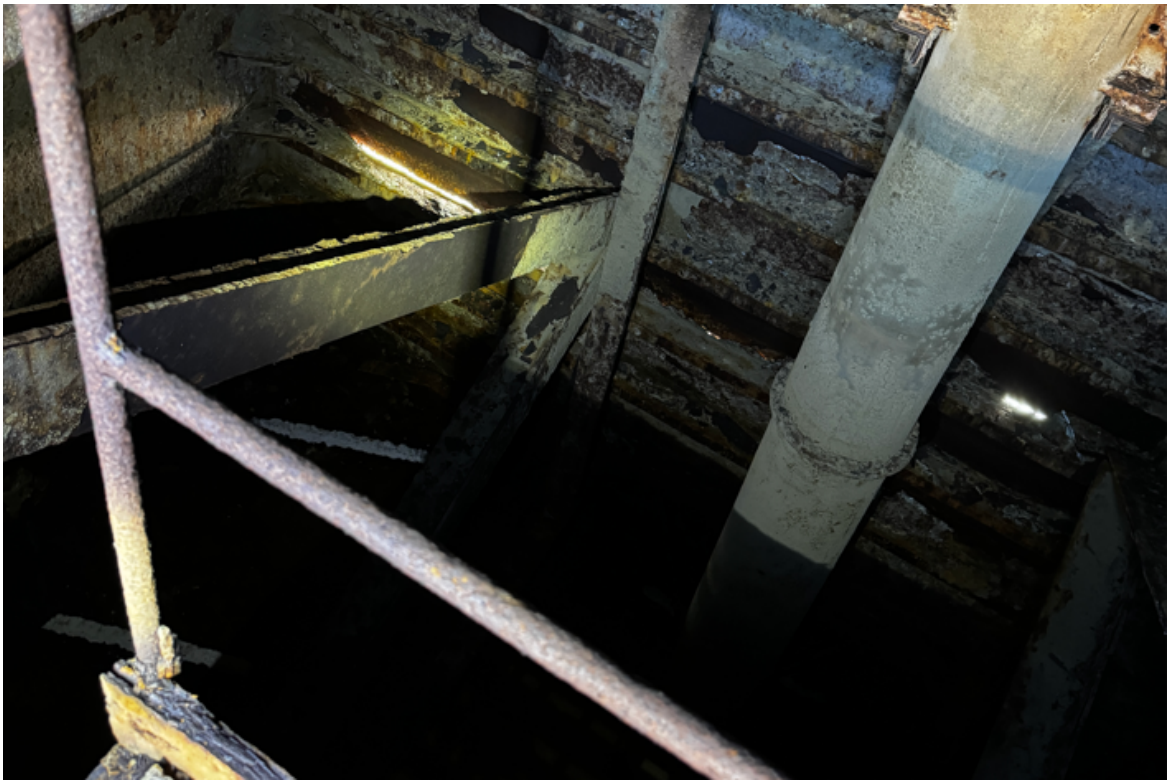
Photograph 15 - External View of Tank 16 side shell tear

Photograph 16 - Internal View of Tank 16 side shell tear

Photograph 17 - External view of Tank 18 side shell tear

Photograph 18 - Internal view of Tank 18 side shell tear

Photograph 19 - External view of Tank 22 side shell tears



Photograph 20 - Internal view of Tank 20 side shell tears

Photograph 21 - Corroded and holed through wing shell at Tank 22

Photograph 22 – External view of side shell tears at Tank 30

Photograph 23 - Internal View of side shell tears at Tank 30

Photograph 24 - Holed through side shell plating at Tank 11

Photograph 25 - External view of corroded wing shell plating in way of Tank 13 and 15

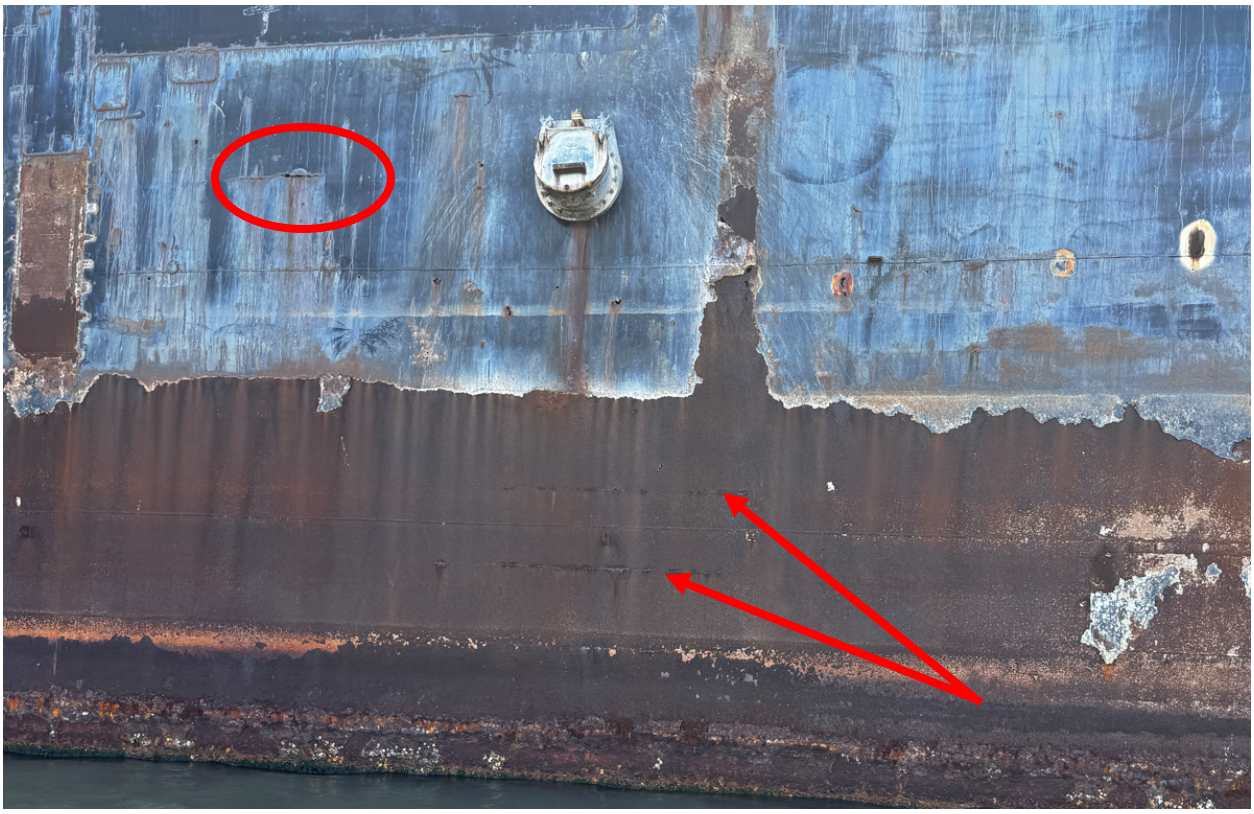
Photograph 26 - Vertical tear of wing shell at FR 26 (Tank 13)

Photograph 27 - External view of through side shell plating in way of Tank 17 discharge

Photograph 28 – Internal view of through side shell plating in way of Tank 17 discharge

Photograph 29 - Internal view of pontoon deck level holes at Tank 23

Photograph 30 - Holed through wing shell at Tank 25



Photograph 31 - External view of side shell tears at Tank 29

Photograph 32 - Internal view of side shell tears at Tank 29

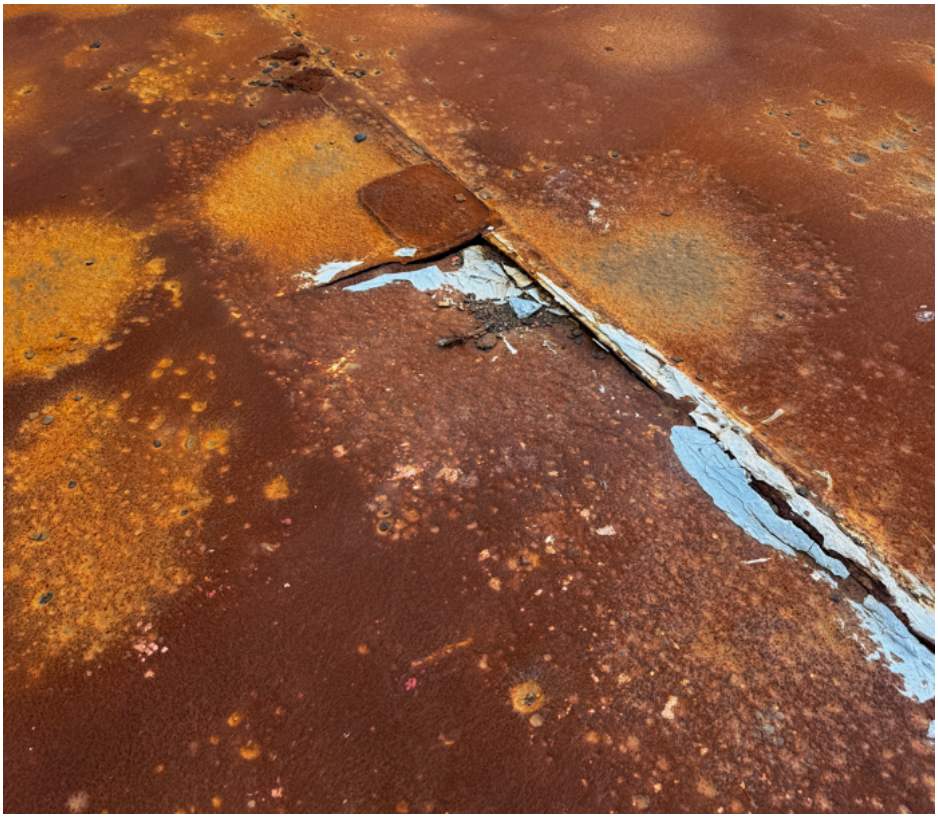
Photograph 33 - External view of vertical wing shell tear at Tank 29

Photograph 34 - Internal view of vertical wing shell tear at Tank 29

Photograph 35 - External view of side shell tears at Tank 31

Photograph 36 - Pump 31 discharge pipe is wasted resulting in refilling tank

Photograph 37 - Typical condition of pontoon deck in way of holed through areas



Photograph 38 - Pontoon Deck crack, 30-ft off centerline, PORT FWD