HEGER DRY DOCK, INC
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17-11L

January 19, 2017

Attention:
Justin Gleaton, Dockmaster (JGleaton@pugliamarine.com)

Re: Docking of Tandem Barges on Eureka

References:
(1) HEGER - Structural and Operational Inspection Report for EUREKA, Jan 2015
(2) INTERNATIONAL INSPECTION – UT/VT Survey Report for EUREKA, May 2015
(3) DRS MARINE – Ultrasonic Thickness Inspection Report for EUREKA, December 2016

Enclosures:
(1) Pontoon Deck UT data
(2) Pontoon Deck Stiffener Fracture Map
(3) Pontoon Deck Stiffener Repair Plan

Gentlemen:

HEGER DRY DOCK, INC. has been asked to review the feasibility of tandem docking barges MANSON VALHALLA and MANSON 75 on the Eureka floating dry at PUGLIA's San Francisco Shipyard based on the current condition of the dock's pontoon deck structure.

Material condition inspections recently performed in 2015 and 2017 by HEGER have identified that the EUREKA dry dock has a deteriorating pontoon deck structure. Upon HEGER's request, two nondestructive surveys were conducted on the dock. See Reference (2) and (3) for more information.

There are two major concerns with the deteriorating pontoon deck structure. They are described as follow:

1. The pontoon deck plate is experiencing significant diminution in material thickness. The pontoon deck plate is typically a floating dry dock's most susceptible region to metal loss as the pontoon deck experiences the highest amount of wear due to work performed on the docked vessels, vehicular traffic and high exposure to weathering effects such as rain and sun. These factors ultimately cause accelerated paint failure and corrosion of the deck plating. The diminution of the pontoon deck is of particular concern as it acts as one of the critical structural components in supporting a ship load during a lifting operation on a floating dry dock. The diminution of plating on a longitudinally strengthened pontoon deck, such as EUREKA's, exponentially decreases the compressive buckling strength of deck. The 6' by 6' Ultrasonic Thickness (UT) survey grid preformed in May 2015 by INTERNATIONAL INSPECTION showed a significant number of readings (nearly half of all readings) with corrosion in the range of 25% - 50% on the original 7/16-inch pontoon deck plating. The corroded plate in its current condition drastically reduces the transverse strength of the dock.

2. The pontoon deck's longitudinal stiffeners are the serrated channel type, commonly used in the AFDM Harris docks constructed in the World War II era. HEGER regularly inspects a number of the AFDM type docks and is familiar with design flaws

associated with the serrated channel type stiffener. The serrated channel design optimized the steel material to strength ratio but introduced high stress concentration zones at the corners of the serrated notches and the connection of the stiffener to the pontoon deck plating. As a result, the design is susceptible to failures in way of the stress concentrations typically taking the form of localized deck corrosion or fractures in the channel web. The fatigue failures are commonly prominent on the pontoon deck stiffeners that not only have to resist hydrostatic head pressures, but are also exposed to cyclical vehicular traffic. The serrated channel failures drastically reduce the strength of the stiffener; if not repaired promptly, adjacent stiffeners become more susceptible to failure due to an increased local strength demand. In HEGER's 2105 inspection, it was noted the pontoon deck's serrated channels were beginning to fracture. In response, an in-depth visual survey mapping out the extent of the deck stiffener fractures was performed in May 2015 by INTERNATIONAL INSPECTION. A pontoon deck repair plan was prescribed by HEGER in November of 2015. In HEGER's 2017 dock inspection, it was observed that no repairs were made to the fractured stiffeners and the failures had become more widespread bringing uncertainly to the dock's ability to resist head pressure and vehicular traffic loads.

Given the pontoon deck concerns stated above, the dock is in an inadequate condition to be rated with the dock's original design capacities of a maximum keel line load of 27 long tons per foot and an internal/external water differential (head pressure) of 20 feet. The anticipated loads applied in the dry docking of barges MANSON VALHALLA and MANSON 75, however, will be considerably less than the design capacities. HEGER's study will analyze the dock's ability to support the tandem docking with considerations given to:

- Transverse bending strength of dock with reduced strength in pontoon deck due to corrosion reported in Reference (2). Loading conditions will be based on blocking arrangements and vessel docking conditions supplied by Justin Gleaton, Dockmaster.
- Local strength of pontoon deck in its current condition based on corrosion and fractures reported in Reference (2). Loading conditions will be based on expected hydrostatic head pressure applied during the tandem docking.

Vessel Condition and Blocking Arrangement

MANSON 75 (spud barge) parameters and estimated docking condition:

Length	196.0 ft
Width	60.0 ft
Draft FWD	5.0 ft
Draft AFT	5.0 ft
Displacement (estimated)	1,600 LT
Max LT/ft (estimated)	8.5 LT/ft

MANSON VALHALLA (crane barge) parameters and estimated docking condition:

Length	256.5 ft
Width	78.0 ft
Draft FWD	5.0 ft
Draft AFT	5.5 ft
Displacement (estimated)	2,900 LT
Max LT/ft (estimated)	12 LT/ft

Both barges are flat bottom vessels. The blocking arrangements are such that there will be a transverse line of blocks spaced every 16' to 24' longitudinally over the entire length of the vessel to coincide with the dry dock structural frames spaced every 8' on the EUREKA. The transverse line of blocks consist of four(4) blocks located approximately 9' and 23' off dock centerline. Given the flat bottom shape of the barges, the maximum estimated load per foot will be evenly distributed across the width of the blocking to each of the four block lines. The max load per foot is estimated to be 3 long tons per foot along each of the four blocking lines.

Transverse Bending Strength

Loading condition assumptions:

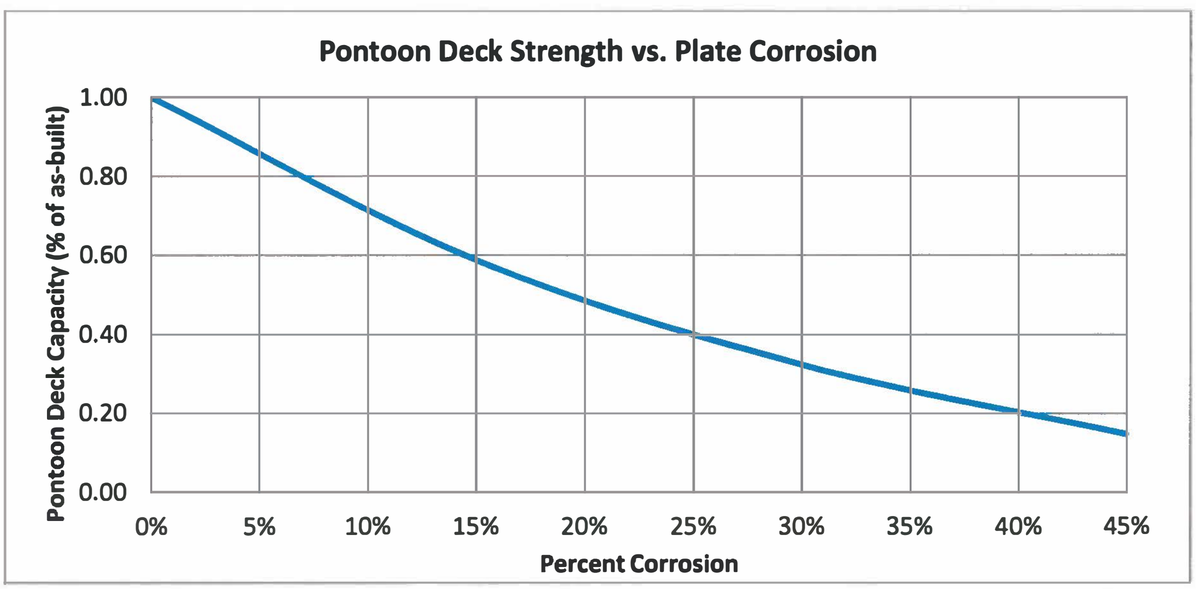
- Phase 5 condition, dock at 15.64 ft draft
- Internal water level = 10 ft above dock keel
- 7.0 kip/ft load applied at 9' and 23' off dock centerline
- Pontoon Deck thickness = 0.219in (45% corroded) – See Reference (2)
- Transverse Frames and WT BHD structure 25% corroded (conservative estimate – no data)
- Pontoon Bottom thickness = 0.306in (30% corroded) See Reference (3)

The result of the transverse bending analysis show that the combine compressive stress applied to the pontoon deck is approximately 1,000 psi.

The compressive stress permitted in the EUREKA's pontoon deck's longitudinally stiffened panels was calculated in accordance with NAVSEA Design Data Sheet DDS 100-4 published in 1982. The results are as follows:

- Longitudinally stiffened panel – 96" x 24-5/8" x 7/16" (No Corrosion) = 9,360 psi
- Longitudinally stiffened panel – 96" x 24-5/8" x 0.216" (45% Corroded) = 2,520 psi

Given the coupled effects of a 45% material thickness reduction and a 75% allowable compressive stress reduction, the pontoon deck's net reduction in structural capacity is about 85% or 15% of the deck's original capacity. This reduction in pontoon deck strength drastically decreases the overall transverse bending strength of the dock.



The transverse bending analysis of the barge docking, however, shows the maximum applied stress of 1,000 psi is less than the calculated compressive strength of 2,520 psi rendering it acceptable. Note that this calculation assumes the dock is ballasted correctly and is only applicable to the specifically addressed docking presented in this letter.

Hydrostatic Head Pressure

Loading condition assumptions:

- Maximum external/internal water level differential = 10 ft
- Maximum dock draft = 30 ft
  - Applied head pressure to buoyancy chamber deck = 14 ft
  - Applied head pressure to buoyancy chamber bottom = 30 ft

Plating

The hydrostatic capacity of the pontoon deck plate was calculated in accordance with ABS Rules for Building and Classing Steel Floating Dry Docks published in 2009.

Given an applied head pressure of 10 ft and a stiffener spacing of 24.625-inches in the ballast tanks, the minimum required pontoon deck plating thickness is 0.24-inches (45% corroded). The dock is currently in marginal condition to meet this requirement with isolated UT readings slightly exceeding the requirement in ballast tanks 2, 5A, 5, 6A, 6, 7, 8, 9, 10, and 11. It is recommended additional UTs be taken in proximity to corroded reading to identify extent of corrosion. Additionally, the 24.625-inch stiffeners spacing assumption is only applicable if no more than one(1) fracture type occurs in adjacent stiffeners supporting the plate panel. Received survey reports (verified in HEGER's 2017 inspection) have identified zones in the dock where two(2) fracture types occur in the same stiffener between supporting frames; this is an UNSATISFACTORY condition to resist the head pressures required of the tandem barge docking addressed in this letter.

Given an applied head pressure of 14 ft and a stiffener spacing of 15.875-inches in the buoyancy chamber, the minimum required pontoon deck plating thickness is 0.21-inches (53% corroded). The dock is currently in marginal condition to meet this requirement with isolated UT readings slightly exceeding the requirement in void tanks 21 and 22. A doubler plate has been installed in these areas providing additional temporary strength.

Given an applied head pressure of 30 ft and a stiffener spacing of 15.875-inches in the buoyancy chamber, the minimum required pontoon bottom plating thickness is 0.26-inches (41% corroded). The dock is currently in satisfactory condition to meet this requirement.

Stiffeners

The hydrostatic capacity of the pontoon deck stiffeners was also calculated in accordance with ABS Rules for Building and Classing Steel Floating Dry Docks published in 2009. The effective section modulus for the channel stiffener was calculated assuming 45% pontoon deck corrosion, an effective plating width of 50t, and 25% corrosion of the web and flange. Calculations resulted in a minimum elastic section modulus of 8.1 in^3 for the section.

Given the 96" unsupported pontoon deck stiffener span (fixed-fixed boundary condition assumed at supporting transverse frame) and typical 24-5/8" tributary width, the hydrostatic head pressure capacity of the section is 21.05 feet.

The EUREKA's pontoon deck stiffeners, however, have a widespread condition of fractures to the channel stiffeners in way of the serrated notches. A fracture in the serrated channel creates a discontinuity in the flow of bending stresses and changes the boundary condition of the stiffener beam from a fixed-fixed condition to two independent cantilevered beams overhanging from the supporting transverse frame. These cantilevered beams are significantly weaker and are assumed to take no load. As a result of the failure, the hydrostatic load is redistributed to adjacent stiffeners, increasing the tributary width of the intact stiffeners and putting more structural demand on the member. If every other pontoon deck stiffener was assumed to be fractured and ineffective, the tributary width of the intact stiffener would double to 41-1/4". This assumption would result in a hydrostatic capacity of 10.53 ft for the intact stiffener therefore representing the limiting condition for the tandem docking.

The latest 2017 HEGER inspection of the EUREKA pontoon deck found that the typical condition was for multiple adjacent pontoon deck stiffeners to be fracture. This is an UNSATISFACTORY condition to resist the head pressures required of the tandem barge docking addressed in this letter.

Short Term Repair Plan

The following conditions render the EUREKA floating dry dock UNSATISFACTORY for support of the tandem docking of barges MANSON VALHALLA and MANSON 75:

- Fracture of any kind in two(2) adjacent pontoon deck stiffeners
- More than one(1) fracture of any kind in a single pontoon deck stiffener between transverse frames.

There are four(4) different types of stiffener fractures occurring on the pontoon deck stiffeners. An acceptable short term pontoon deck stiffener repair plan for each fracture type is attached in Enclosure (3). Pontoon deck stiffeners should be repaired in accordance with the repair plan to eliminate the unsatisfactory conditions stated above. If staging is erected in a tank to repair deck stiffeners, it is recommended all stiffeners in the vicinity be repaired.

The following conditions render the EUREKA floating dry dock MARGINAL for support of the tandem docking of barges MANSON VALHALLA and MANSON 75:

- Pontoon deck UT measurements in ballast tank compartments are nearing the 45% corrosion limit required to resist the 10 feet of expected head pressure. Isolated UT readings slightly exceeding the 45% requirement were identified in ballast tanks 2, 5A, 5, 6A, 6, 7, 8, 9, 10, and 11. It is recommended additional UTs be taken in proximity to the corroded readings to identify extent of corrosion.
- Pontoon deck UT measurements in buoyancy chamber compartments are nearing the 53% corrosion limit required to resist the 14 feet of expected head pressure for the dock's 30 ft draft. Isolated UT readings slightly exceeding the 53% requirement were identified in buoyancy chamber compartments 21 and 22. A doubler plate has been installed in these areas providing additional temporary strength.

The pontoon deck thicknesses must be closely monitored during the repairs of all UNSATISFACTORY conditions identified. Additional corrosion and loss of material thickness may warrant areas of pontoon deck UNSATISFACTORY.

Once all UNSATISFACTORY conditions are repaired, HEGER will require the certifying engineer to perform an onsite visual inspection to verify repairs prior to the approval of the tandem barge docking. If repairs are made with adherence to the prescribed repair plan to the satisfaction of the HEGER engineer, the dock's condition may warrant commercial certification with specific operational restrictions. Even after pontoon deck stiffener repairs are complete the dock will have limited transverse strength and hydrostatic head pressure capacities.

NOTEWELL: The pontoon deck stiffener repair solutions prescribed in this section are short term in nature only. As such the condition of the dock after completed repairs may only warrant a year to year certification with a required engineering review prior to each docking to allow for operation while long term repairs are completed.

NOTEWELL: Vehicles may not travel over any area of the pontoon deck that has been identified to have fractured stiffeners without a temporary 1" thick driving lane plate laid down on the pontoon deck. Even after the temporary repairs have been made to the fractured pontoon deck stiffeners, the corroded plate may be unsatisfactory to support vehicular wheel loads without the 1" driving lane plate.

Long Term Pontoon Deck Repair Plan

Due to the dock's extensively corroded pontoon deck plating and widespread fractures developing in the pontoon deck's longitudinal serrated channel stiffeners, the only viable long term solution for the dock is a complete pontoon deck replacement. The installation of doubler plates will not be an acceptable solution.

HEGER recommends fabricating 1/2" insert panels with 7" x 4" x 3/8" angles spaced to match the dock's existing stiffener spacing. The angles shall be welded to the plate with continuous, double sided 5/16" watertight fillet welds. The existing pontoon deck plating and serrated channels will have to be cut out and scrapped to allow for the installation of the new insert panels. The dock's stiffener pass thru details and brackets may have to be slightly altered to accommodate the new dimensions of the angle stiffeners. All insert panels should be painted prior to installation. Once the panel seems are welded together, the seam should be stripe coated and painted as well. Additionally the stiffeners will need to be welded to the internal structure and painted once welded.

The pontoon deck replacement should be carried out on a tank by tank schedule. The repair priority, based on the received deck UT report, is the 18'of deck to either side of dock centerline from dock frames 15-54. This repair should be made within a 2-year time frame. Special priority consideration should also be given to the high traffic zones of the dry dock.

Once a tank's pontoon deck replacement has been completed, the tank may be again be certified at its design capacity and permitted safe for vehicle traffic pending the repair verification of the certifying engineer.

Note that this long term repair plan pertains to the pontoon deck structure only. Additional consideration should be given to the long term outlook off other dock structure such as but not limited to pontoon bottom structure (belt UTs showing areas of 15%-30% corrosion), wing shell (belt UTs appear satisfactory), and transverse framing structure (no available data).

If you have any questions or comments regarding this review please feel free to contact us.

Sincerely,
HEGER DRY DOCK, Inc.

Michael Naylor
Dry Dock Engineer

ENCLOSURE 1
Pontoon Deck UT Data

NORTH

BHD V

0.16 (63%)	0.41 (6%)	0.30 (31%)	0.28 (36%)		0.26 (41%)	0.27 (38%)	0.30 (31%)	0.27 (38%)
0.31 (29%)	0.34 (22%)	0.36 (18%)	0.38 (13%)		0.24 (45%)	0.28 (36%)	0.27 (38%)	0.38 (13%)
0.18 (59%)	0.43 (2%)	0.45 (0%)	0.34 (22%)	RUDDER	0.38 (13%)	0.36 (18%)	0.37 (15%)	0.26 (41%)
0.23 (47%)	0.29 (34%)	0.38 (13%)	0.36 (18%)		0.41 (6%)	0.32 (27%)	0.29 (34%)	0.20 (54%)
0.29 (34%)	0.28 (36%)	0.37 (15%)	0.22 (50%)		0.34 (22%)	0.29 (34%)	0.34 (22%)	0.37 (15%)

BHD 59

0.43 (2%)	0.27 (38%)	0.21 (52%)	0.45 (0%)		0.35 (20%)	0.38 (13%)	0.34 (22%)	0.28 (36%)
0.40 (9%)	0.42 (4%)	0.44 (0%)	0.40 (9%)		0.36 (18%)	0.29 (34%)	0.24 (45%)	0.32 (27%)
0.40 (9%)	0.37 (15%)	0.33 (25%)	0.30 (31%)	PIT	0.33 (25%)	0.36 (18%)	0.27 (38%)	0.37 (15%)
0.32 (27%)	0.32 (27%)	0.40 (9%)	0.28 (36%)		0.40 (9%)	0.27 (38%)	0.24 (45%)	0.30 (31%)
0.31 (29%)	0.40 (9%)	0.36 (18%)	0.40 (9%)		0.31 (29%)	0.33 (25%)	0.31 (29%)	0.43 (2%)

BHD 54

0.30 (31%)	0.21 (52%)	0.41 (6%)	0.23 (47%)	0.31 (29%)	0.21 (52%)	0.37 (15%)	0.35 (20%)	0.35 (20%)	0.38 (13%)	0.22 (50%)	0.33 (25%)	0.32 (27%)	0.24 (45%)	0.23 (47%)
0.28 (36%)	0.29 (34%)	0.31 (29%)	0.27 (38%)	0.35 (20%)	0.33 (25%)	0.34 (22%)	0.32 (27%)	0.29 (34%)	0.32 (27%)	0.31 (29%)	0.46 (0%)	0.40 (9%)	0.36 (18%)	0.28 (36%)
0.35 (20%)	0.40 (9%)	0.31 (29%)	0.38 (13%)	0.25 (43%)	0.24 (45%)	0.47 (0%)	0.42 (4%)	0.40 (9%)	0.32 (27%)	0.34 (22%)	0.31 (29%)	0.30 (31%)	0.37 (15%)	0.20 (54%)
0.30 (31%)	0.28 (36%)	0.35 (20%)	0.46 (0%)	0.37 (15%)	0.36 (18%)	0.31 (29%)	0.35 (20%)	0.33 (25%)	0.21 (52%)	0.24 (45%)	0.42 (4%)	0.42 (4%)	0.34 (22%)	0.40 (9%)
0.17 (61%)	0.34 (22%)	0.34 (22%)	0.27 (38%)	0.24 (45%)	0.33 (25%)	0.29 (34%)	0.27 (38%)	0.49 (0%)	0.49 (0%)	0.23 (47%)	0.36 (18%)	0.40 (9%)	0.39 (11%)	0.17 (61%)
0.29 (34%)	0.37 (15%)	0.34 (22%)	0.42 (4%)	0.28 (36%)	0.26 (41%)	0.40 (9%)	0.31 (29%)	0.26 (41%)	0.25 (43%)	0.32 (27%)	0.40 (9%)	0.38 (13%)	0.39 (11%)	0.24 (45%)
0.29 (34%)	0.45 (0%)	0.25 (43%)	0.30 (31%)	0.20 (54%)	0.40 (9%)	0.32 (27%)	0.40 (9%)	0.27 (38%)	0.30 (31%)	0.26 (41%)	0.38 (13%)	0.44 (0%)	0.40 (9%)	0.21 (52%)
0.29 (34%)	0.36 (18%)	0.21 (52%)	0.33 (25%)	0.32 (27%)	0.39 (11%)	0.30 (31%)	0.30 (31%)	0.27 (38%)	0.23 (47%)	0.41 (6%)	0.31 (29%)	0.32 (27%)	0.35 (20%)	0.20 (54%)
0.40 (9%)	0.40 (9%)	0.37 (15%)	0.40 (9%)	0.33 (25%)	0.32 (27%)	0.33 (25%)	0.41 (6%)	0.33 (25%)	0.32 (27%)	0.34 (22%)	0.28 (36%)	0.30 (31%)	0.36 (18%)	0.20 (54%)
0.33 (25%)	0.25 (43%)	0.46 (0%)	0.44 (0%)	0.34 (22%)	0.24 (45%)	0.28 (36%)	0.41 (6%)	0.31 (29%)	0.35 (20%)	0.30 (31%)	0.29 (34%)	0.43 (2%)	0.38 (13%)	0.26 (41%)
0.40 (9%)	0.33 (25%)	0.22 (50%)	0.43 (2%)	0.40 (9%)	0.20 (54%)	0.27 (38%)	0.39 (11%)	0.31 (29%)	0.28 (36%)	0.35 (20%)	0.33 (25%)	0.41 (6%)	0.24 (45%)	0.21 (52%)
0.32 (27%)	0.28 (36%)	0.37 (15%)	0.29 (34%)	0.24 (45%)	0.39 (11%)	0.28 (36%)	0.40 (9%)	0.34 (22%)	0.24 (45%)	0.35 (20%)	0.21 (52%)	0.36 (18%)	0.27 (38%)	0.24 (45%)

BHD 42

0.48 (0%)	0.36 (18%)	0.39 (11%)	0.38 (13%)	0.49 (0%)	0.34 (22%)	0.26 (41%)	0.32 (27%)	0.29 (34%)	0.34 (22%)	0.43 (2%)	0.33 (25%)	0.33 (25%)	0.44 (0%)	0.45 (0%)
0.49 (0%)	0.29 (34%)	0.37 (15%)	0.32 (27%)	0.34 (22%)	0.31 (29%)	0.21 (52%)	0.27 (38%)	0.28 (36%)	0.30 (31%)	0.35 (20%)	0.30 (31%)	0.35 (20%)	0.34 (22%)	0.25 (43%)
0.44 (0%)	0.29 (34%)	0.34 (22%)	0.35 (20%)	0.25 (43%)	0.31 (29%)	0.22 (50%)	0.24 (45%)	0.19 (57%)	0.26 (41%)	0.36 (18%)	0.38 (13%)	0.40 (9%)	0.37 (15%)	0.36 (18%)
0.50 (0%)	0.44 (0%)	0.31 (29%)	0.50 (0%)	0.24 (45%)	0.22 (50%)	0.27 (38%)	0.24 (45%)	0.26 (41%)	0.21 (52%)	0.35 (20%)	0.40 (9%)	0.37 (15%)	0.41 (6%)	0.36 (18%)
0.43 (2%)	0.39 (11%)	0.29 (34%)	0.30 (31%)	0.32 (27%)	0.41 (6%)	0.19 (57%)	0.26 (41%)	0.24 (45%)	0.24 (45%)	0.28 (36%)	0.41 (6%)	0.39 (11%)	0.34 (22%)	0.28 (36%)
0.40 (9%)	0.41 (6%)	0.41 (6%)	0.44 (0%)	0.40 (9%)	0.41 (6%)	0.20 (54%)	0.27 (38%)	0.15 (66%)	0.29 (34%)	0.31 (29%)	0.47 (0%)	0.49 (0%)	0.49 (0%)	0.30 (31%)
0.48 (0%)	0.37 (15%)	0.48 (0%)	0.37 (15%)	0.40 (9%)	0.40 (9%)	0.28 (36%)	0.29 (34%)	0.28 (36%)	0.25 (43%)	0.45 (0%)	0.42 (4%)	0.44 (0%)	0.40 (9%)	0.35 (20%)
0.47 (0%)	0.48 (0%)	0.32 (27%)	0.45 (0%)	0.38 (13%)	0.48 (0%)	0.28 (36%)	0.27 (38%)	0.23 (47%)	0.35 (20%)	0.29 (34%)	0.38 (13%)	0.22 (50%)	0.48 (0%)	0.20 (54%)
0.30 (31%)	0.30 (31%)	0.37 (15%)	0.36 (18%)	0.34 (22%)	0.26 (41%)	0.30 (31%)	0.27 (38%)	0.18 (59%)	0.33 (25%)	0.40 (9%)	0.32 (27%)	0.26 (41%)	0.34 (22%)	0.24 (45%)
0.40 (9%)	0.45 (0%)	0.42 (4%)	0.28 (36%)	0.47 (0%)	0.20 (54%)	0.34 (22%)	0.32 (27%)	0.36 (18%)	0.23 (47%)	0.36 (18%)	0.29 (34%)	0.20 (54%)	0.28 (36%)	0.38 (13%)
0.41 (6%)	0.41 (6%)	0.31 (29%)	0.25 (43%)	0.40 (9%)	0.34 (22%)	0.21 (52%)	0.27 (38%)	0.23 (47%)	0.46 (0%)	0.44 (0%)	0.31 (29%)	0.36 (18%)	0.35 (20%)	0.19 (57%)

BHD 31

NOTE:
DRY DOCK DECK .4375"PLT.
RED = EXCESSIVE WASTAGE 25% OR GREATER.
[pink box] = READINGS TAKEN IWO DOUBLER FROM UNDERSIDE OF DECK.

VESSEL: EUREKA DRY DOCK		DESCRIPTION: MAIN DECK PLATING - NORTH SECTION PLAN VIEW	
DRAWN BY: M. SMITH	JOB # A1268	DWG # MnDk 1 v1.1	DATE: MAY 2015

NORTH

BHD 31															
	0.18 (59%)	0.35 (20%)	0.37 (15%)	0.32 (27%)	0.44 (0%)	0.49 (0%)	0.22 (50%)	0.32 (27%)	0.25 (43%)	0.39 (11%)	0.50 (0%)	0.40 (9%)	0.28 (36%)	0.30 (31%)	0.10 (77%)
	0.42 (4%)	0.42 (4%)	0.39 (11%)	0.33 (25%)	0.33 (25%)	0.31 (29%)	0.26 (41%)	0.26 (41%)	0.25 (43%)	0.34 (22%)	0.41 (6%)	0.27 (38%)	0.29 (34%)	0.34 (22%)	0.26 (41%)
	0.40 (9%)	0.36 (18%)	0.32 (27%)	0.34 (22%)	0.41 (6%)	0.32 (27%)	0.29 (34%)	0.28 (36%)	0.22 (50%)	0.42 (4%)	0.43 (2%)	0.41 (6%)	0.46 (0%)	0.26 (41%)	0.24 (45%)
	0.23 (47%)	0.28 (36%)	0.29 (34%)	0.35 (20%)	0.50 (0%)	0.24 (45%)	0.22 (50%)	0.34 (22%)	0.29 (34%)	0.43 (2%)	0.40 (9%)	0.37 (15%)	0.37 (15%)	0.25 (43%)	0.21 (52%)
	0.24 (45%)	0.46 (0%)	0.26 (41%)	0.48 (0%)	0.48 (0%)	0.36 (18%)	0.21 (52%)	0.27 (38%)	0.28 (36%)	0.44 (0%)	0.35 (20%)	0.42 (4%)	0.46 (0%)	0.39 (11%)	0.24 (45%)
	0.26 (41%)	0.34 (22%)	0.43 (2%)	0.38 (13%)	0.30 (31%)	0.29 (34%)	0.25 (43%)	0.34 (22%)	0.23 (47%)	0.40 (9%)	0.40 (9%)	0.41 (6%)	0.44 (0%)	0.32 (27%)	0.24 (45%)
	0.28 (36%)	0.36 (18%)	0.43 (2%)	0.28 (36%)	0.40 (9%)	0.25 (43%)	0.23 (47%)	0.29 (34%)	0.32 (27%)	0.38 (13%)	0.45 (0%)	0.39 (11%)	0.36 (18%)	0.42 (4%)	0.24 (45%)
	0.29 (34%)	0.36 (18%)	0.40 (9%)	0.33 (25%)	0.38 (13%)	0.32 (27%)	0.28 (36%)	0.27 (38%)	0.22 (50%)	0.40 (9%)	0.37 (15%)	0.42 (4%)	0.38 (13%)	0.50 (0%)	0.25 (43%)
	0.35 (20%)	0.36 (18%)	0.47 (0%)	0.28 (36%)	0.37 (15%)	0.23 (47%)	0.29 (34%)	0.28 (36%)	0.26 (41%)	0.43 (2%)	0.35 (20%)	0.48 (0%)	0.41 (6%)	0.29 (34%)	0.25 (43%)
	0.45 (0%)	0.29 (34%)	0.35 (20%)	0.41 (6%)	0.42 (4%)	0.30 (31%)	0.20 (54%)	0.30 (31%)	0.28 (36%)	0.44 (0%)	0.46 (0%)	0.40 (9%)	0.34 (22%)	0.32 (27%)	0.11 (75%)
	0.33 (25%)	0.30 (31%)	0.42 (4%)	0.37 (15%)	0.40 (9%)	0.34 (22%)	0.27 (38%)	0.31 (29%)	0.29 (34%)	0.39 (11%)	0.42 (4%)	0.40 (9%)	0.38 (13%)	0.29 (34%)	0.35 (20%)
BHD 20															
	0.35 (20%)	0.39 (11%)	0.49 (0%)	0.42 (4%)	0.47 (0%)	0.44 (0%)	0.32 (27%)	0.33 (25%)	0.31 (29%)	0.40 (9%)	0.41 (6%)	0.48 (0%)	0.37 (15%)	0.38 (13%)	0.31 (29%)
	0.28 (36%)	0.33 (25%)	0.34 (22%)	0.50 (0%)	0.30 (31%)	0.33 (25%)	0.27 (38%)	0.22 (50%)	0.46 (0%)	0.19 (57%)	0.34 (22%)	0.47 (0%)	0.25 (43%)	0.31 (29%)	0.22 (50%)
	0.32 (27%)	0.30 (31%)	0.30 (31%)	0.24 (45%)	0.34 (22%)	0.33 (25%)	0.20 (54%)	0.27 (38%)	0.46 (0%)	0.36 (18%)	0.42 (4%)	0.39 (11%)	0.38 (13%)	0.34 (22%)	0.42 (4%)
	0.50 (0%)	0.36 (18%)	0.30 (31%)	0.32 (27%)	0.31 (29%)	0.25 (43%)	0.20 (54%)	0.32 (27%)	0.34 (22%)	0.33 (25%)	0.46 (0%)	0.45 (0%)	0.36 (18%)	0.39 (11%)	0.43 (2%)
	0.49 (0%)	0.43 (2%)	0.32 (27%)	0.34 (22%)	0.29 (34%)	0.41 (6%)	0.20 (54%)	0.38 (13%)	0.49 (0%)	0.34 (22%)	0.50 (0%)	0.44 (0%)	0.46 (0%)	0.39 (11%)	0.35 (20%)
	0.34 (22%)	0.28 (36%)	0.35 (20%)	0.38 (13%)	0.29 (34%)	0.33 (25%)		RUDDER		0.34 (22%)	0.47 (0%)	0.48 (0%)	0.47 (0%)	0.30 (31%)	0.32 (27%)
	0.50 (0%)	0.28 (36%)	0.50 (0%)	0.32 (27%)	0.48 (0%)	0.32 (27%)				0.43 (2%)	0.45 (0%)	0.48 (0%)	0.46 (0%)	0.39 (11%)	0.26 (41%)
	0.48 (0%)	0.38 (13%)	0.45 (0%)	0.37 (15%)	0.46 (0%)	0.43 (2%)				0.37 (15%)	0.45 (0%)	0.48 (0%)	0.46 (0%)	0.46 (0%)	0.30 (31%)
	0.50 (0%)	0.48 (0%)	0.46 (0%)	0.43 (2%)	0.47 (0%)	0.36 (18%)				0.30 (31%)	0.35 (20%)	0.48 (0%)	0.41 (6%)	0.46 (0%)	0.17 (61%)
	0.47 (0%)	0.51 (0%)	0.50 (0%)	0.46 (0%)	0.50 (0%)	0.34 (22%)				0.51 (0%)	0.50 (0%)	0.51 (0%)	0.27 (38%)	0.28 (36%)	0.25 (43%)
	0.37 (15%)	0.37 (15%)	0.47 (0%)	0.39 (11%)	0.48 (0%)	0.30 (31%)		PIT		0.39 (11%)	0.25 (43%)	0.35 (20%)	0.35 (20%)	0.28 (36%)	0.29 (34%)
	0.45 (0%)	0.38 (13%)	0.38 (13%)	0.48 (0%)	0.41 (6%)	0.32 (27%)				0.43 (2%)	0.38 (13%)	0.40 (9%)	0.50 (0%)	0.40 (9%)	0.33 (25%)
BHD 8															
	0.36 (18%)	0.41 (6%)	0.40 (9%)	0.42 (4%)	0.40 (9%)	0.32 (27%)	0.32 (27%)	0.39 (11%)	0.36 (18%)	0.39 (11%)	0.38 (13%)	0.40 (9%)	0.41 (6%)	0.35 (20%)	0.29 (34%)
	0.34 (22%)	0.40 (9%)	0.38 (13%)	0.35 (20%)	0.39 (11%)	0.43 (2%)	0.39 (11%)	0.34 (22%)	0.42 (4%)	0.37 (15%)	0.38 (13%)	0.41 (6%)	0.38 (13%)	0.38 (13%)	0.31 (29%)
	0.33 (25%)	0.37 (15%)	0.29 (34%)	0.38 (13%)	0.39 (11%)	0.40 (9%)	0.26 (41%)	0.32 (27%)	0.35 (20%)	0.35 (20%)	0.38 (13%)	0.41 (6%)	0.38 (13%)	0.41 (6%)	0.47 (0%)
	0.36 (18%)	0.36 (18%)	0.39 (11%)	0.40 (9%)	0.37 (15%)	0.39 (11%)	0.30 (31%)	0.40 (9%)	0.29 (34%)	0.34 (22%)	0.30 (31%)	0.39 (11%)	0.38 (13%)	0.30 (31%)	0.28 (36%)
	0.44 (0%)	0.34 (22%)	0.29 (34%)	0.42 (4%)	0.31 (29%)	0.37 (15%)	0.31 (29%)	0.33 (25%)	0.34 (22%)	0.31 (29%)	0.28 (36%)	0.37 (15%)	0.40 (9%)	0.32 (27%)	0.36 (18%)
BHD 3															
	0.30 (31%)	0.31 (29%)	0.46 (0%)	0.33 (25%)	0.41 (6%)	0.42 (4%)	0.22 (50%)	0.39 (11%)	0.32 (27%)	0.31 (29%)	0.29 (34%)	0.32 (27%)	0.41 (6%)	0.35 (20%)	0.29 (34%)
	0.34 (22%)	0.40 (9%)	0.31 (29%)	0.37 (15%)	0.38 (13%)	0.41 (6%)	0.31 (29%)	0.28 (36%)	0.39 (11%)	0.33 (25%)	0.30 (31%)	0.41 (6%)	0.43 (2%)	0.36 (18%)	0.37 (15%)
	0.43 (2%)	0.40 (9%)	0.41 (6%)	0.32 (27%)	0.34 (22%)	0.40 (9%)	0.36 (18%)	0.32 (27%)	0.27 (38%)	0.27 (38%)	0.30 (31%)	0.41 (6%)	0.43 (2%)	0.42 (4%)	0.40 (9%)
	0.42 (4%)	0.41 (6%)	0.39 (11%)	0.36 (18%)	0.33 (25%)	0.39 (11%)	0.37 (15%)	0.31 (29%)	0.50 (0%)	0.28 (36%)	0.30 (31%)	0.32 (27%)	0.42 (4%)	0.24 (45%)	0.25 (43%)
	0.43 (2%)	0.43 (2%)	0.43 (2%)	0.42 (4%)	0.50 (0%)	0.48 (0%)	0.50 (0%)	0.50 (0%)	0.50 (0%)	0.29 (34%)	0.32 (27%)	0.39 (11%)	0.37 (15%)	0.29 (34%)	0.27 (38%)
BHD A															

NOTE:
DRY DOCK DECK .4375"PLT.
RED = EXCESSIVE WASTAGE 25% OR GREATER.
= READINGS TAKEN IWO DOUBLER FROM UNDERSIDE OF DECK.

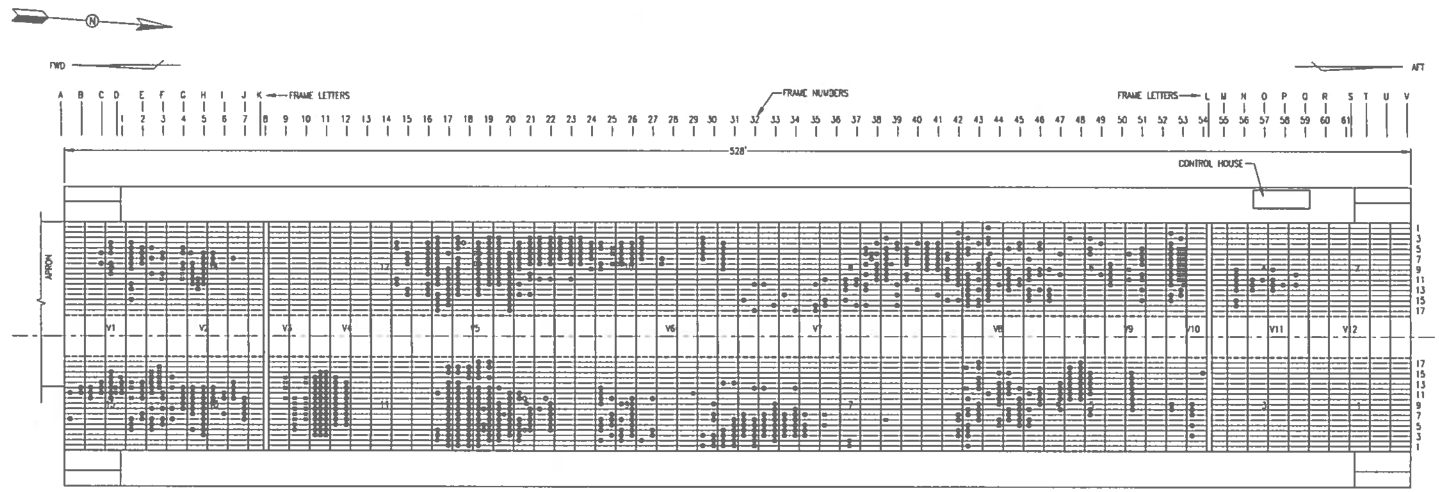
VESSEL: EUREKA DRY DOCK

DESCRIPTION: MAIN DECK PLATING - SOUTH SECTION PLAN VIEW

DRAWN BY: M. SMITH | JOB # A1268 | DWG # MnDk 2 | v1.1 | DATE: APRIL 2015

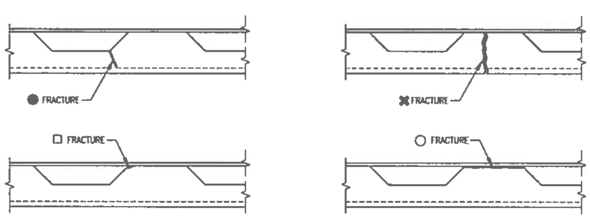
ENCLOSURE 2

Pontoon Deck Stiffener Fracture Map



PLAN VIEW OF EUREKA
SCALE: 1" = 20'-0"

(C1)



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

(A1)

1 1/2" = 1'-0"   0   1   1 1/2 FT

NOTES:

1.) DRAWING REFLECTS FACTURES IDENTIFIED IN INTERNATION INSPECTIONS UT/VT SURVEY CONDUCTED IN MAY 2015
2.) REFER TO HEGER'S 3896-D SKETCHES FOR AN ACCEPTABLE TEMPORARY REPAIR PLAN

1" = 20'-0"   0   20   40 FT

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
531 CONCORD STREET
HOLLISTON, MA 01746
(508) 429-1800

WALEED SAYED
1/09/2017

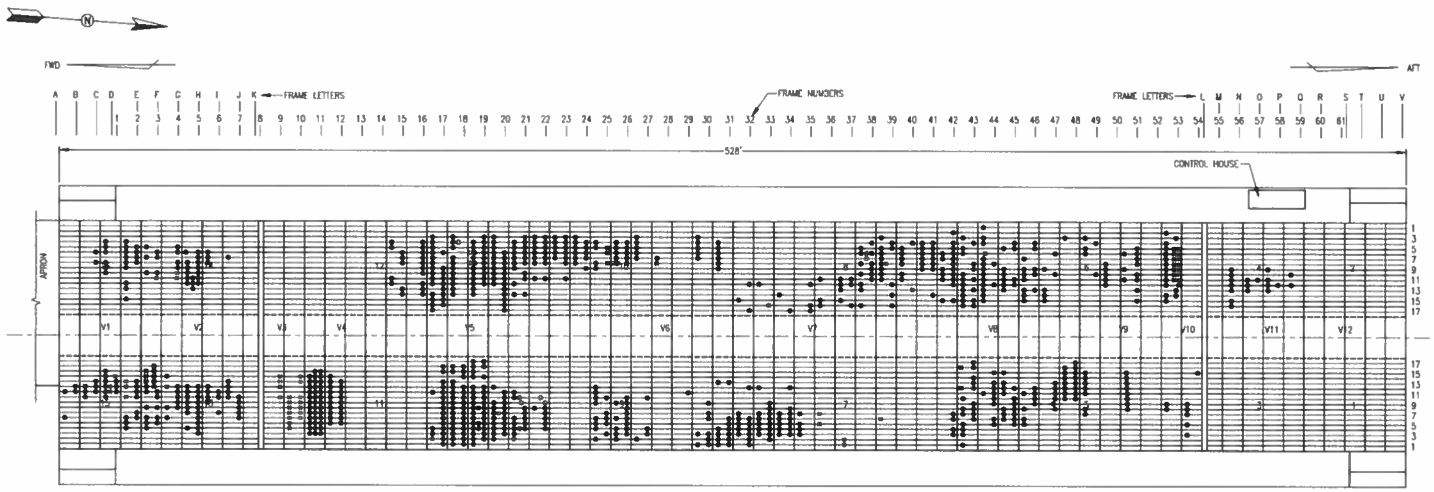
PUGLIA MARINE
SAN FRANCISCO, CA.
2017 COMMERCIAL INSPECTION OF EUREKA FDD (EX AFDM 14)
PONTOON DECK STIFFENER FRACTURE MAP

AS NOTED
3878-8

A-011

ENCLOSURE 3

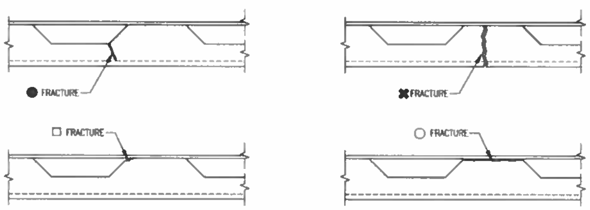
Pontoon Deck Stiffener Repair Plan



PLAN VIEW OF EUREKA

SCALE: 1" = 20'-0"

(C1)



SYMBOLS KEY

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

(A1)

1 1/2" = 1'-0" 0 1 1 1/2 FT

NOTES:

1.) DRAWING REFLECTS FACTURES IDENTIFIED IN INTERNATION INSPECTIONS UT/VT SURVEY CONDUCTED IN MAY 2015
2.) REFER TO HEGER'S 3996-D SKETCHES FOR AN ACCEPTABLE TEMPORARY REPAIR PLAN

1" = 20'-0" 0 20 40 FT

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
531 CONCORD STREET
HOLLISTON, MA 01746
(508) 429-1800

WALEED SAYED
1/09/2017

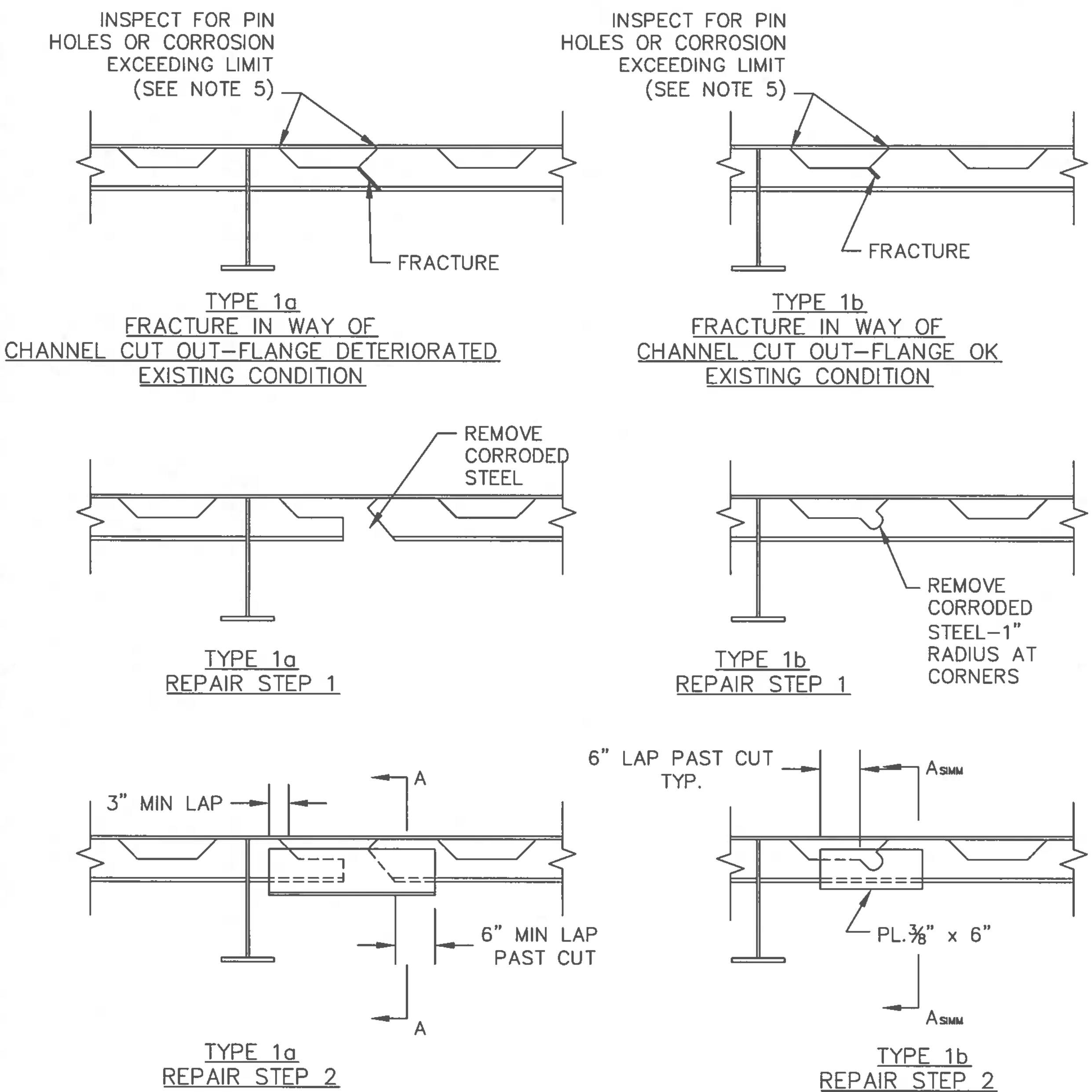
PUGLIA MARINE
SAN FRANCISCO, CA.
2017 COMMERCIAL INSPECTION OF EUREKA FDD (EX AFDM 14)
PONTOON DECK STIFFENER FRACTURE MAP

SCALE: AS NOTED
PROJECT NO.: 3879-0

A-011

ENCLOSURE 3

Pontoon Deck Stiffener Repair Plan



REVISIONS			
REV	ZONE	DESCRIPTION	DATE:

NOTES:

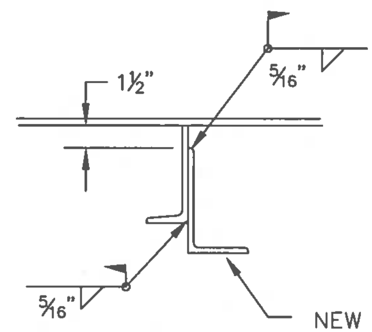
1.) REMOVE CORRODED STEEL BACK TO GOOD METAL – STEEL WITH LESS THAN 15% CORROSION

2.) REMOVE SCALE & PAINT IN REPAIRED AREA

3.) REPAINT REPAIRED AREA

4.) CRACK MAY BE BUTT WELDED IF SURROUNDING STEEL HAS LESS THAN 15% THICKNESS LOSS

5.) IF DECK PLATING HAS PIN HOLES OR CORROSION EXCEEDING LIMIT SEE SHEET SK 5–5 FOR ALTERNATIVE REPAIR METHOD



SECTION A–A

No. REQ.	PART No.	DESCRIPTION	REMARKS
		LIST OF MATERIALS	

PUGLIA MARINE
SAN FRANCISCO, CA

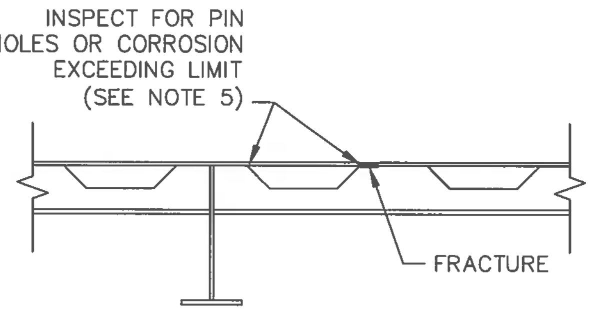
REPAIRS TO
EUREKA DRY DOCK

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
13 WATER STREET
HOLLISTON, MA 01746
(508) 429-1800

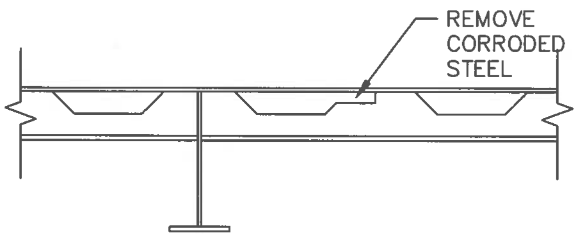
DECK STIFFENER
REPAIRS
TYPE 1

PROJECT No. 3996–D	DATE 1/19/2017	
CHECKED BY	SCALE AS NOTED	DRAWING UNITS INCH
SUPERVISOR W. SAYED	CAD FILE NAME 3996–D SK 1–5	SHEET SIZE D–22 x 34
DRAWN BY M. NAYLOR	16	6

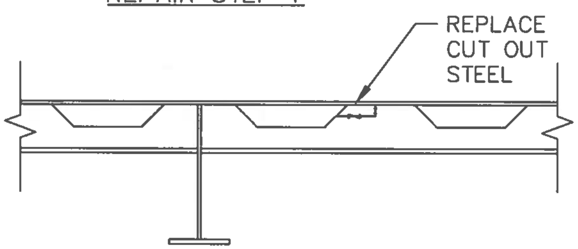
DRAWING No. 3996–D–SK1 SHEET 1 OF 5 REV. A



TYPE 2
FRACTURE IN WAY OF
WRAP WELD
EXISTING CONDITION



TYPE 2
FRACTURE IN WAY OF
WRAP WELD
REPAIR STEP 1



TYPE 2
FRACTURE IN WAY OF
WRAP WELD
REPAIR STEP 2

NOTES:

1.) REMOVE CORRODED STEEL BACK TO GOOD METAL – STEEL WITH LESS THAN 15% CORROSION

2.) REMOVE SCALE & PAINT IN REPAIRED AREA

3.) REPAINT REPAIRED AREA

4.) CRACK MAY BE BUTT WELDED IF SURROUNDING STEEL HAS LESS THAN 15% THICKNESS LOSS

5.) IF DECK PLATING HAS PIN HOLES OR CORROSION EXCEEDING LIMIT SEE SHEET SK 5–5 FOR ALTERNATIVE REPAIR METHOD

REVISIONS			
REV	ZONE	DESCRIPTION	DATE

No. REQ.	PART No.	DESCRIPTION	REMARKS

LIST OF MATERIALS

PUGLIA MARINE
SAN FRANCISCO, CA

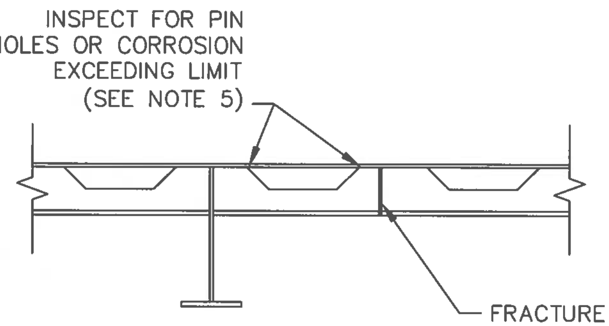
REPAIRS TO
EUREKA DRY DOCK

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
13 WATER STREET
HOLLISTON, MA 01746
(508) 429-1800

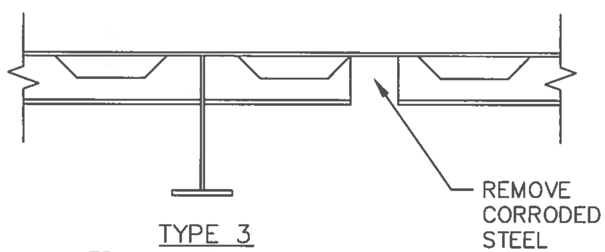
DECK STIFFENER
REPAIRS
TYPE 2

PROJECT No. 3996-D	DATE 1/19/2017	
CHECKED BY	SCALE AS NOTED	DRAWING UNITS INCH
SUPERVISOR W. SAYED	CAD FILE NAME 3996-D SK 1-5	SHEET SIZE D-22 x 34
DRAWN BY M. NAYLOR	DIMSCALE 16	LTSCALE 6

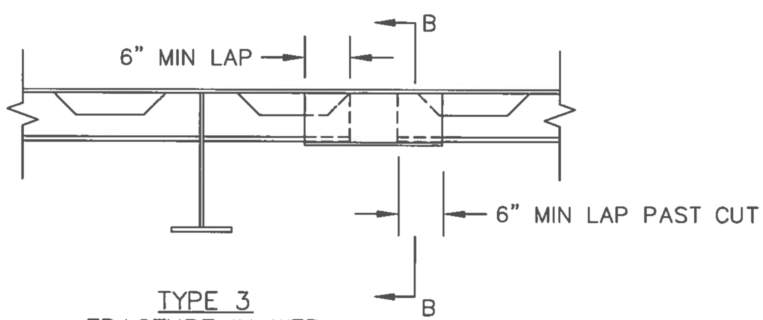
DRAWING No. 3996-D-SK2 | SHEET 2 OF 5 | REV. A



TYPE 3
FRACTURE IN WEB
AND FLANGE
EXISTING CONDITION



TYPE 3
FRACTURE IN WEB
AND FLANGE
REPAIR STEP 1



TYPE 3
FRACTURE IN WEB
AND FLANGE
REPAIR STEP 2

NOTES:

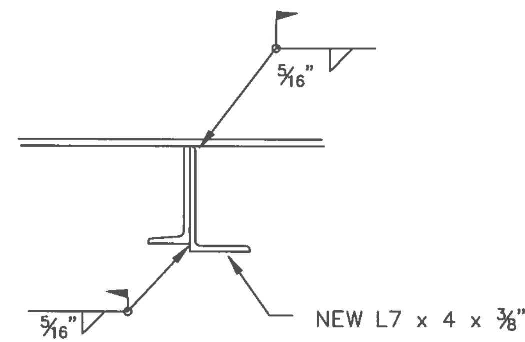
1.) REMOVE CORRODED STEEL BACK TO GOOD METAL – STEEL WITH LESS THAN 15% CORROSION

2.) REMOVE SCALE & PAINT IN REPAIRED AREA

3.) REPAINT REPAIRED AREA

4.) CRACK MAY BE BUTT WELDED IF SURROUNDING STEEL HAS LESS THAN 15% THICKNESS LOSS

5.) IF DECK PLATING HAS PIN HOLES OR CORROSION EXCEEDING LIMIT SEE SHEET SK 5–5 FOR ALTERNATIVE REPAIR METHOD



SECTION B–B

REV	ZONE	REVISIONS DESCRIPTION	DATE

No. REQ.	PART No.	DESCRIPTION	REMARKS
		LIST OF MATERIALS	

CLIENT: PUGLIA MARINE, SAN FRANCISCO, CA

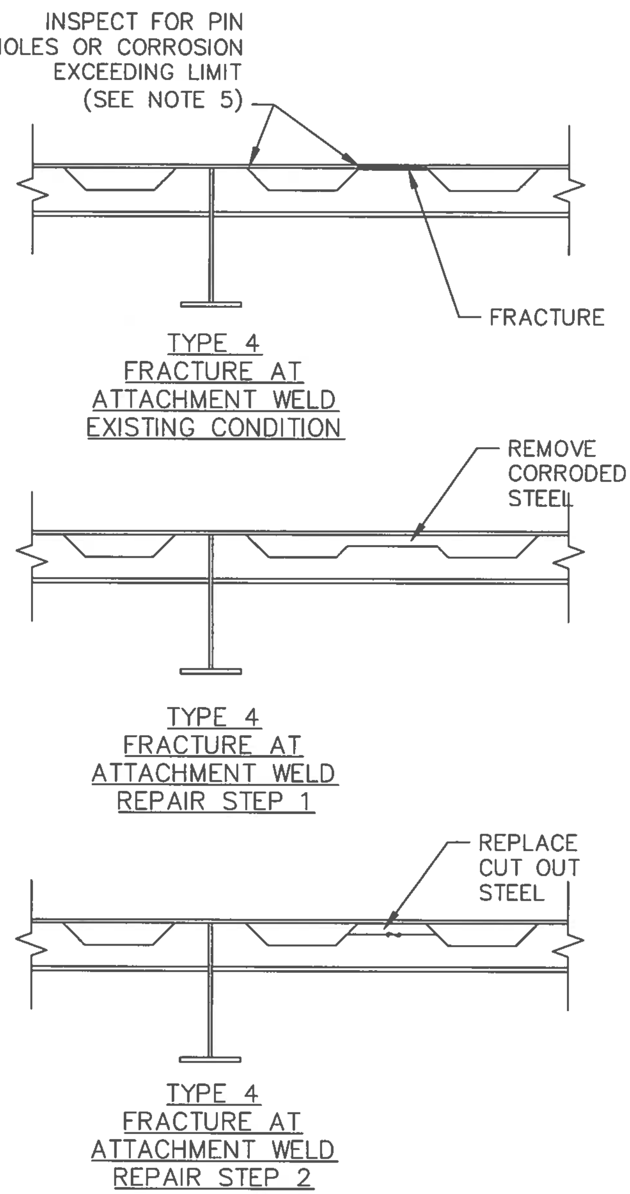
PROJECT: REPAIRS TO EUREKA DRY DOCK

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
13 WATER STREET
HOLLISTON, MA 01746
(508) 429-1800

TITLE: DECK STIFFENER REPAIRS TYPE 3

PROJECT No. 3996–D	DATE 1/19/2017	
CHECKED BY	SCALE AS NOTED	DRAWING UNITS INCH
SUPERVISOR W. SAYED	CAD FILE NAME 3996–D SK 1–5	SHEET SIZE D–22 x 34
DRAWN BY M. NAYLOR	16	6

DRAWING No. 3996–D–SK3 SHEET 3 OF 5 ISSUE A



NOTES:

1.) REMOVE CORRODED STEEL BACK TO GOOD METAL – STEEL WITH LESS THAN 15% CORROSION

2.) REMOVE SCALE & PAINT IN REPAIRED AREA

3.) REPAINT REPAIRED AREA

4.) CRACK MAY BE BUTT WELDED IF SURROUNDING STEEL HAS LESS THAN 15% THICKNESS LOSS

5.) IF DECK PLATING HAS PIN HOLES OR CORROSION EXCEEDING LIMIT SEE SHEET SK 5–5 FOR ALTERNATIVE REPAIR METHOD

REVISIONS			
REV	ZONE	DESCRIPTION	DATE

No. REQ.	PART No.	DESCRIPTION	REMARKS
		LIST OF MATERIALS	

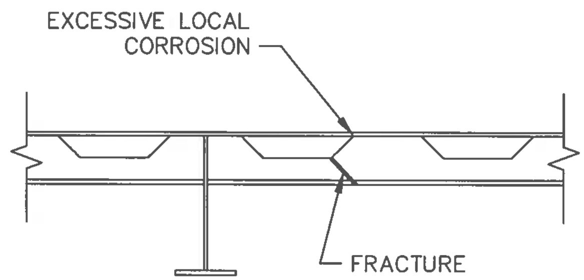
PUGLIA MARINE
SAN FRANCISCO, CA

PROJECT: REPAIRS TO EUREKA DRY DOCK

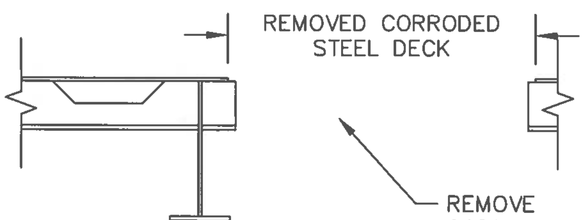
HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
13 WATER STREET
HOLLISTON, MA 01746
(508) 429-1800

TITLE: DECK STIFFENER REPAIRS TYPE 4

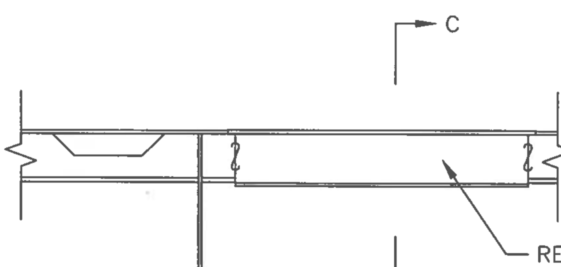
PROJECT No. 3996-D	DATE 1/19/2017		
CHECKED BY	SCALE AS NOTED	DRAWING UNITS INCH	
SUPERVISOR W. SAYED	CAD FILE NAME 3996-D SK 1-5	SHEET SIZE D-22 x 34	
DRAWN BY M. NAYLOR	16	6	
DRAWING No. 3996-D-SK4	SHEET 4	OF 5	REV A



ALTERNATIVE REPAIR METHOD



REPAIR STEP 1



REPAIR STEP 2

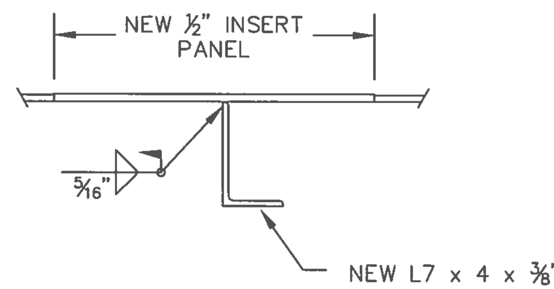
NOTES:

1.) REMOVE CORRODED STIFFENER STEEL BACK TO GOOD METAL – STEEL WITH LESS THAN 15% CORROSION

2.) REMOVE CORRODED STEEL DECK BACK TO ACCEPTABLE LIMITS – STEEL WITH LESS THAN 30% CORROSION RECOMMENDED

2.) REMOVE SCALE & PAINT IN REPAIRED AREA

4.) REPAINT REPAIRED AREA



SECTION C–C

REVISIONS			
REV	ZONE	DESCRIPTION	DATE

No. REQ.	PART No.	DESCRIPTION	REMARKS
		LIST OF MATERIALS	

PUGLIA MARINE
SAN FRANCISCO, CA

REPAIRS TO EUREKA DRY DOCK

HEGER DRY DOCK, Inc.
DRY DOCK ENGINEERS
13 WATER STREET
HOLLISTON, MA 01746
(508) 429-1800

DECK STIFFENER REPAIRS
ALTERNATIVE REPAIR METHOD

PROJECT No. 3996-D	DATE 1/19/2017	
CHECKED BY	SCALE AS NOTED	DRAWING UNITS INCH
SUPERVISOR W. SAYED	CAD FILE NAME 3996-D SK 1-5	SHEET SIZE D-22 x 34
DRAWN BY M. NAYLOR	16	6

DRAWING No. 3996-D-SK5 SHEET 5 OF 5 REV A