Liftech
LIFTECH CONSULTANTS INC.

SITE VISIT REPORT
MCNEARS BEACH FISHING PIER
UNDERDECK AND UNDERWATER DAMAGE REVIEW

FOR COUNTY OF MARIN

VISIT DATE: APRIL 14, 2023

Prepared by Liftech Consultants Inc.
Preparation Date: April 20, 2023

Project No. 2421

Quality Assurance Review
for Liftech Consultants Inc.

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BACKGROUND

In March 2023, an unknown vessel was blown from the north into the McNears Beach Fishing Pier. The vessel collided into the north side of the pier causeway near the intersection with the pier head. For additional information, refer to Liftech's site visit report dated March 28, 2023.

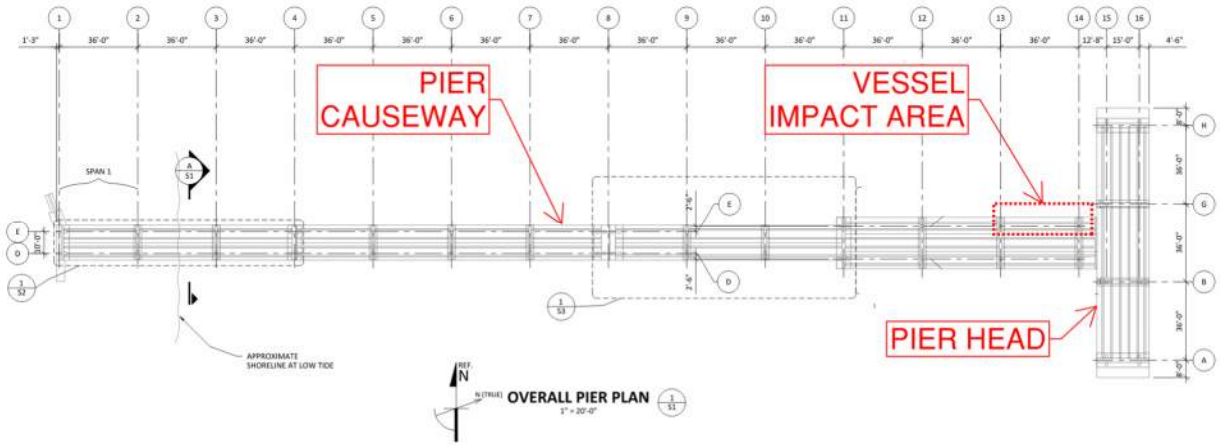


Figure 1: Overall pier plan with terms and impact area

The County of Marin (County) retained Liftech Consultants Inc. (Liftech) to provide structural engineering related to evaluating the damage and designing temporary shoring. The County intends to install the temporary shoring as soon as practical and perform a permanent repair by soliciting bids after the design for the permanent repair work is completed

SITE VISIT SCOPE

Liftech's initial observations in March 2023 were limited to above the pier deck.

On April 14, Liftech structural engineer Derrick Lind visited the site to observe the condition of the existing pier structure from under the pier deck. Liftech retained Underwater Resources Inc. (URI) to provide underwater inspection of the existing piles in the vicinity of the vessel impact area and a boat for underwater access. Access was limited due to strong currents, the high tide, and concern about going under the compromised causeway.

URI performed an underwater inspection of the piles identified in Figure 2. The inspection consists of a close visual and tactile examination of the pile condition. Marine growth was not removed as part of the inspection. The focus of the underwater inspection was identification and measurement of damaged areas of the existing concrete piles.

Similarly, the intent of the underdeck observation work was to identify and quantify visually observable damage caused by the vessel impact to the underdeck, above water portion of the pier structure.

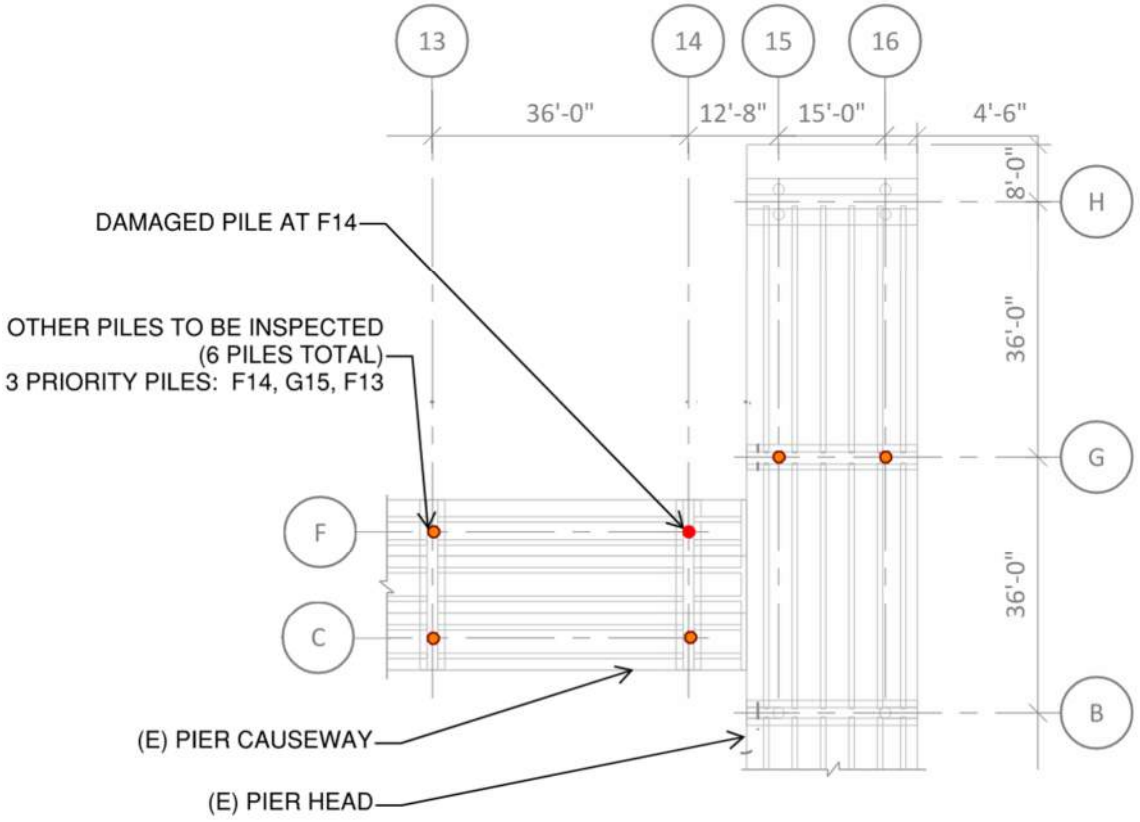


Figure 2: Inspected piles

OBSERVATIONS

We observed the following:

Underdeck Observations

1. Although not confirmed with measurements, the north end of the causeway appears to be approximately 3" lower than the adjacent pier head.
2. The pier head structure does not appear to be damaged, other than localized damage to the railing and expansion joint. See Photograph 1 for damaged railing posts.
3. Pile F14 – The top of Pile F14 is severely damaged. See Photographs 7–11.
4. Span 13-14 – The bottom of the outboard tee on the north face of Span 13-14 has minor abrasion that does not impact the strength of the structure, but reduced cover may result in accelerated corrosion.
5. Pile Cap Beam 14 – No damage observed.
6. No damage observed at double tees at cantilever end and north face of causeway when viewed from outside of pier. See Photographs 15–16.
7. Pile Cap Beam 13 – The west and east faces of Pile Cap 13 have cracks.
8. Pile Cap Beam 12 – The east face of Pile Cap 12 shows some minor evidence of corrosion.
9. Toe plates at the expansion joint are displaced and possibly deformed. See Photographs 17–18.
10. Public access on the pier causeway was blocked off at Bent 11.

Observations 7 and 8 do not affect the strength of the pier and are not likely to have been caused by the vessel impact.

Underwater Observations

11. Pile F14
    a. Severe damage at the pile-cap connection.
    b. Diver reported chipping on the north and west faces of the pile down to approximately 4'±6" below the bottom of the pile cap.
    c. Remnants of the vessel (e.g., ¼" round steel bar and fiberglass w/steel mesh) remain at the west and north faces of the pile. Some components wrap around the pile. Diver was not able to inspect pile at this area due to unsafe conditions.
12. Pile C14 – Diver reported cracking around the perimeter of the top of Pile C14. Due to access restrictions, details about this crack could not be obtained. It is possible that this damage was caused by lateral movement of the causeway during impact.
13. Pile G15 – One area with minor abrasion that removed marine growth, but no damage to concrete.
14. Piles G16, F13, C13 – No observable damage or marine growth removal.
15. Water depth at time of data collection = 17'± and tide was approximately +5' MLLW (nearly high tide).

RECOMMENDATIONS

We recommend the following actions:

Temporary Shoring Actions

1. Install temporary shoring to support the northwest end of the causeway deck near Bent 14.
2. Remove remnants of vessel around Pile F14 and confirm that no further pile damage was observed.

Post-Shoring Actions

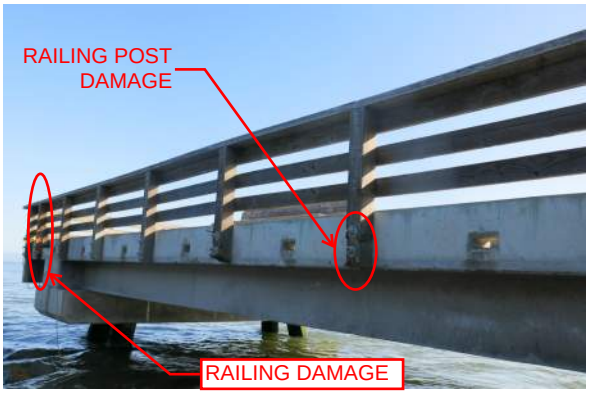
3. Design and implement repairs to restore the pier structure.

APPENDICES

Appendix A – Liftech Photographs from Underdeck Observations

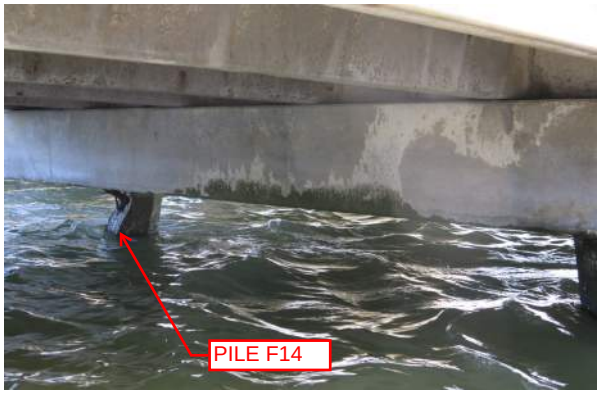
Appendix B – Underwater Pile Inspection by URI

APPENDIX A - UNDERDECK PHOTOGRAPHS



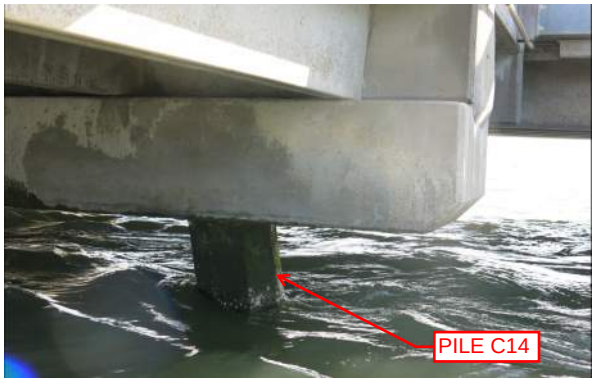
Photograph 1: Railing damage on pier head

Photograph 2: West end of causeway (north side)

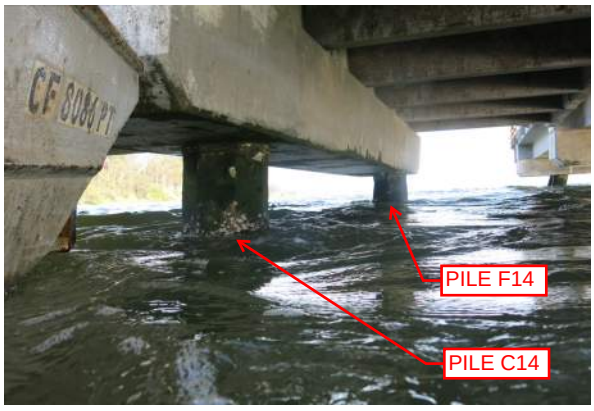


Photograph 3: Pile Cap 14 west face

Photograph 4: Abrasion at tee bottom at Span 13-14



Photograph 5: Pile Cap 14 west face



Photograph 6: Pile Cap 14 east face

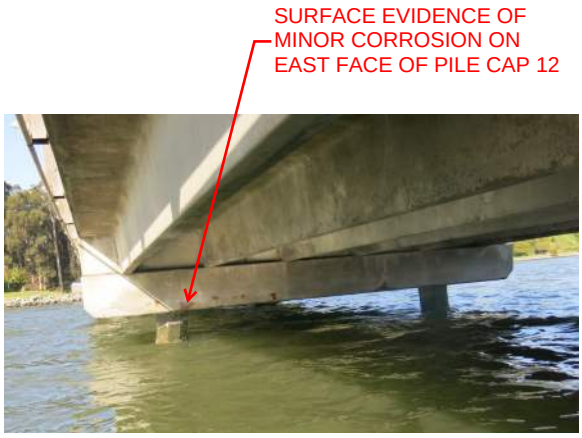
Photograph 7: Pile F14

Photograph 8: Pile F14

Photograph 9: Pile F14

Photograph 10: Pile F14

Photograph 11: Pile F14



Photograph 12: Pile Cap 12 east face

Photograph 13: Pile Cap 13 west face

Photograph 14: Pile Cap 13 east face

Photograph 15: East end of causeway (at exp. jt.)

Photograph 16: Span 13-14 south face

Photograph 17: Expansion joint - north side

Photograph 18: Expansion joint - south side

Photograph 19: Expansion joint - south side - detail

APPENDIX B - UNDERWATER PILE INSPECTION REPORT BY URI

UNDERWATER RESOURCES INC

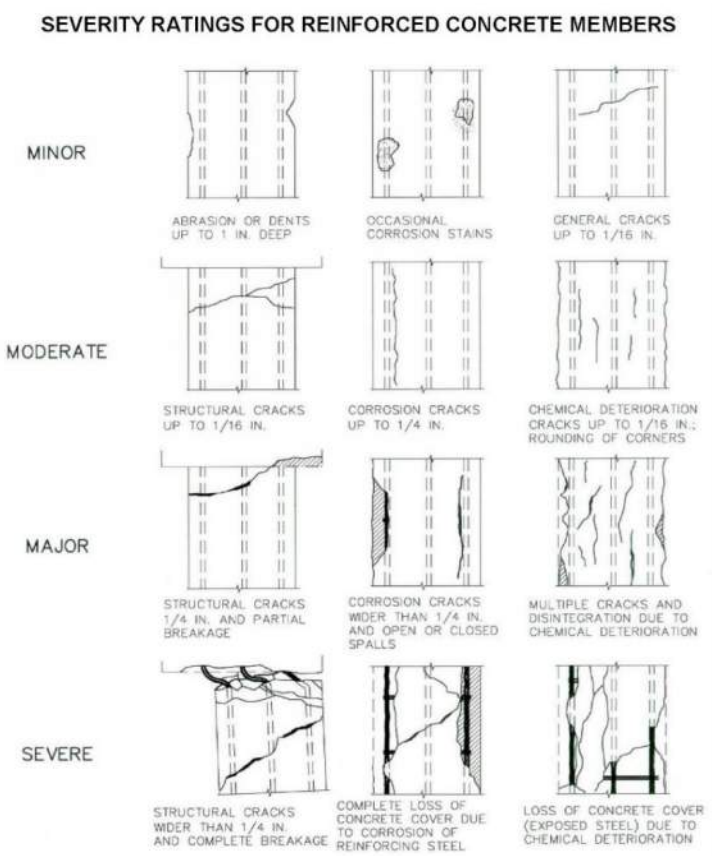
April 18, 2023

Liftech Consultants
344 Thomas L Berkley Way
Oakland, CA 94612
Attn: Derrick Lind

Subject: McNear's Pier Diver Pile Inspection Report

BACKGROUND

Underwater Resources Inc. (URI) was contracted by Liftech Consultants to conduct a level one dive inspection of select concrete pile supporting the McNear's Fishing Pier in San Rafael, CA. At the direction of the Liftech Derrick Lind, P.E. the diver inspected pile C13, C14, F14, F13, G15, and G16 from immediately above the water line to the mudline.



The inspection was performed on Friday April 14th, 2023, during a brief slack tide period from 0745 hours to 0835 hours. URI utilized a three-person dive team comprised of a supervisor, diver, and tender who conducted the UW inspection from our 27-foot utility vessel. A closeup above water inspection of the pile connection details along the underside of the deck was also facilitated by utilizing an additional 19-foot steel work skiff and 4th crew member as boat operator. The URI field inspection was attended by Mr. Lind in a separate URI vessel operated by a fourth URI crew member. The inspection was performed at the direction of Mr. Lind.

Slack tide was estimated to be at 0912 hours using Point San Pedro as a reference. This was inaccurate as the dive became unmanageable around 0830 hours.

FINDINGS

Based on the MOTEMS criteria above, pile F14 had severe damage while all other pile inspected had minor to no damage. There was a large amount of vessel debris abutted against pile F14 including wire mesh and fiberglass sections as well as many steel rods. Additional debris was found at the base of pile C13 although no damage was found on that pile. More detailed information on the dive can be found in the attached video and photo log. Video of the inspection can be viewed and downloaded here. For questions, please contact: Chris Levesque, Operations. Manger, 510-957-5097, chris@urdiving.com

Video Log

07:45:24	Diver encounters vessel debris on F14 at 10 feet below water surface on north face.
07:50:00	It unsafe to swim beneath the vessel debris since it is leaning against the pile.
07:51:15	Diver encountering steel rods all around pile.
07:52:03	Diver descending west side of pile F14.
07:52:30	Video malfunction.
07:53:40	Video resumed.
07:54:05	A 2-foot square section of 1-inch depth on the west face of F14 is sheared off 4 feet below the surface. Exposed aggregate is showing as a result.
07:54:50	At 10 feet of depth diver cannot proceed down the west face of F14 due to metal debris.
07:55:30	Diver notes that metal rod debris wraps around entire pile.
07:56:35	Topside confirms top of vessel debris at 13-feet below surface.
07:58:02	Diver at surface.
07:58:02	Diver inspecting pile G15 on the west face.
08:00:20	Evidence of light impact to pile. Barnacles have been removed but no concrete damage.
08:00:45	Diver on bottom of pile G15.
08:01:50	Diver ascending pile G15 inspecting the north face.
08:02:47	Diver at surface.
08:04:21	Diver at pile G16. Descending east side.
08:05:30	Diver on bottom of G16 east side. No damage and no debris on the bottom.
08:0615	Diver ascending north face of G16.
08:07:20	Diver at surface. No damage to north face of G16.
08:07:25	Diver descending west side of G16. No damage.
08:08:18	Diver ascending south side of G16. No damage.
08:09:10	Diver at surface.
08:11:25	Diver at pile F13.
08:12:25	Diver descending north face of F13. No damage and no debris.
08:13:30	Diver ascending west face of F13. No damage.
08:13:54	Diver directed to return to bottom and measure mud depth. Diver can reach arm into bottom mud up to their elbow before meeting resistance (soft mud).
08:15:48	Diver at surface.
08:16:23	Diver descending east face of pile F13. No damage on pile and no debris on bottom.
08:17:15	Diver ascending south face of pile F13.
08:17:56	Diver at surface heading to C13.
08:18:18	Diver descending the north face of C13. No damage on pile and no debris on bottom.
08:19:15	Diver ascending west face of C13. No damage.
08:20:00	Diver at surface. Descending the east face of C13. No damage.
08:20:54	Diver ascending south face of C13. No damage.
08:21:39	Diver at surface on C13. Heading to C14.
08:22:17	Diver at surface on C14. Diver notes moderate cracking around the top of the pile.
08:22:55	Diver descending west face of C14. No damage to pile. Vessel debris on bottom.
08:25:00	Topside measures depth of top of debris at 13 feet below the water surface.
08:25:25	Diver notes that vessel debris is abutted to pile C13, but notes no damage to pile.
08:26:55	Diver at top of C13 and descending east face. No damage to pile. Diver notes east side and north side of pile are clear of damage.
08:29:41	Diver at surface on pile C13. Heading back to F14 for elevation readings.
08:32:30	Diver at vessel debris on F14. Topside confirms top of debris at 13 feet of water depth.
08:34:35	Diver measures damage at top of F14 to be 4 feet in height.

Photo 1 – F14 – North Face – Top of pile showing severe damage

Photo 2 – F14 – North Face – 10 feet below surface – Vessel debris abutted to pile

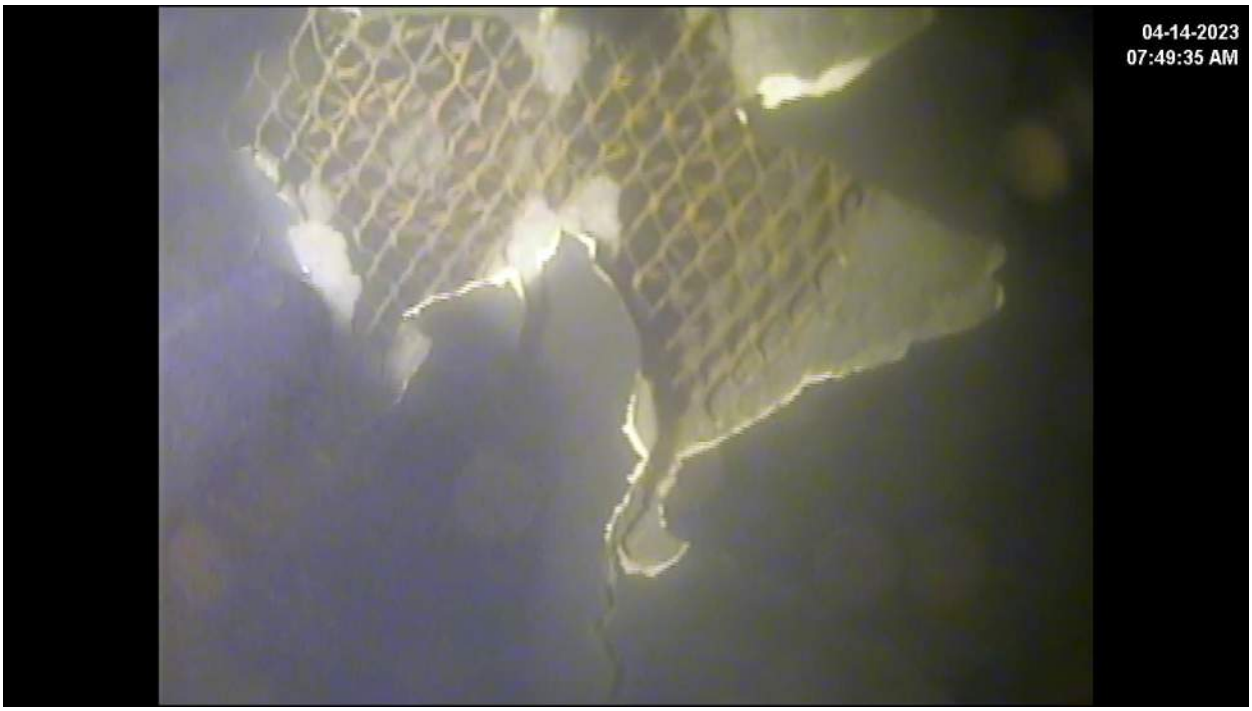


Photo 3 – F14 – North Face – 10 feet below surface – Vessel debris abutted to pile

Photo 4 – F14 – West Face – 2ft square section is sheared off 4 feet below the surface.

Photo 5 – G15 – West Face – Inconsequential impact damage to marine growth on pile

Photo 6 – C14 – Diver notes moderate cracking around the top of the pile.

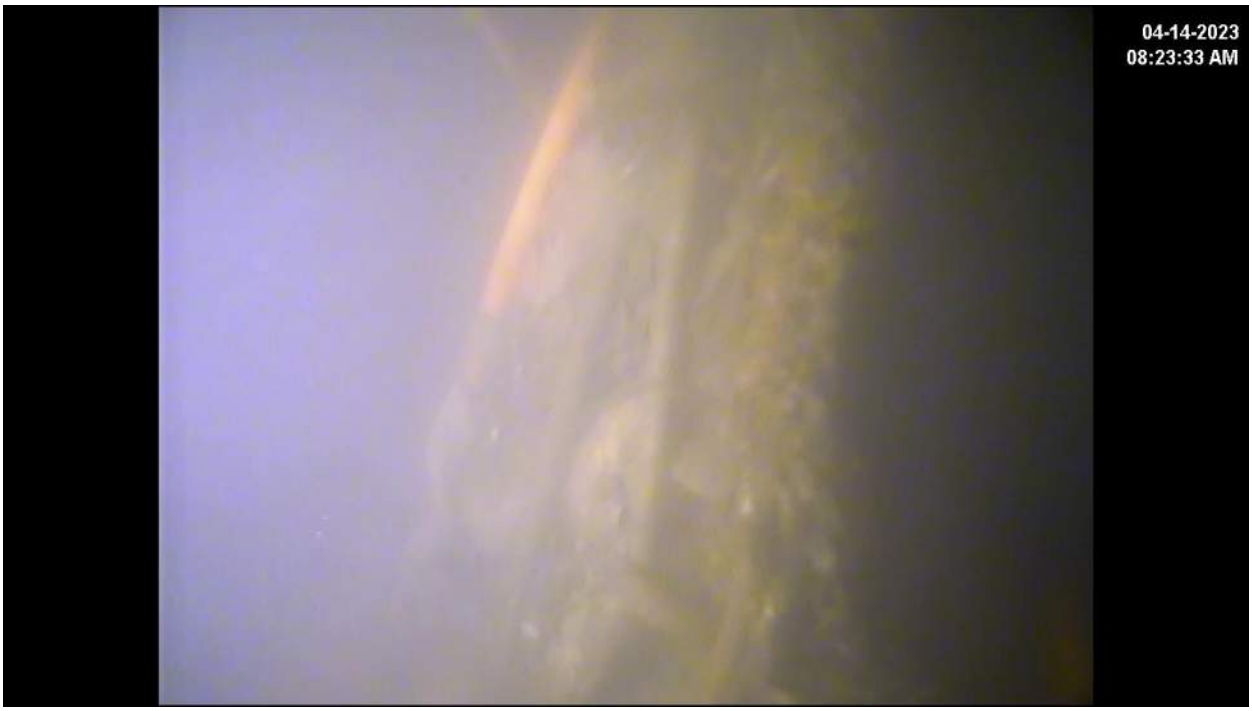


Photo 7 – C14 – West Face – Vessel debris on bottom

Photo 8 – F14 – North Face – Top of pile showing severe damage