

EROSION AT LOCKS ENTRANCE, ISSUES WITH BIVALVE MOLLUSCS PERFORATING EXPOSED WOOD PILES SUPPORTING LOCKS APPROACH WALL



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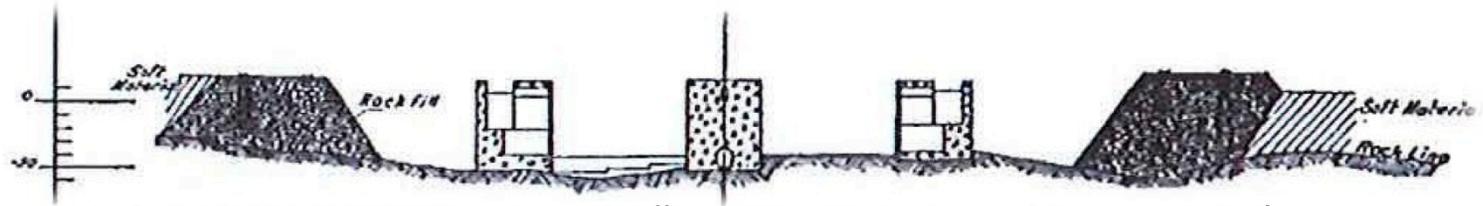


- **BACKGROUND**
- **PROBLEMS FOUND**
- **INSPECTIONS AND STUDIES**
- **PLANS**



GATUN LOCKS NORTH ENTRANCE



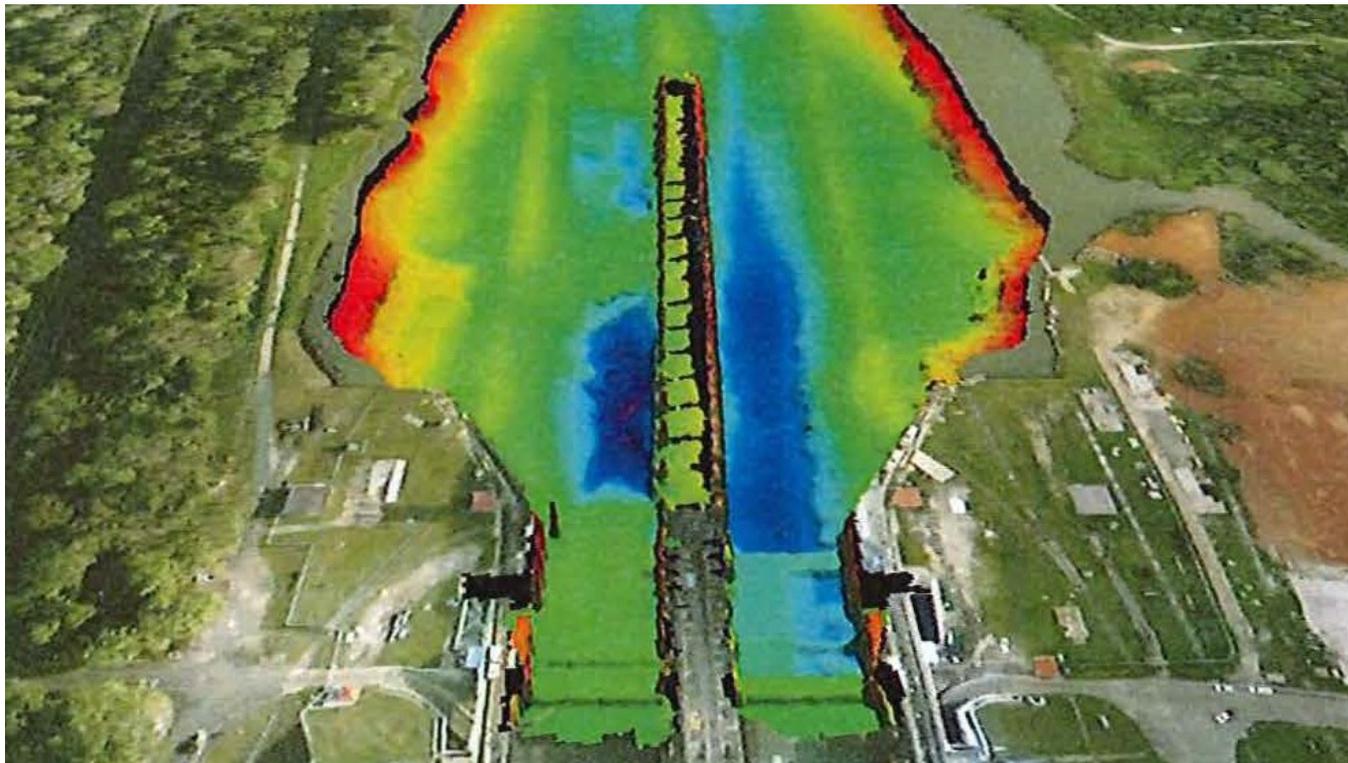






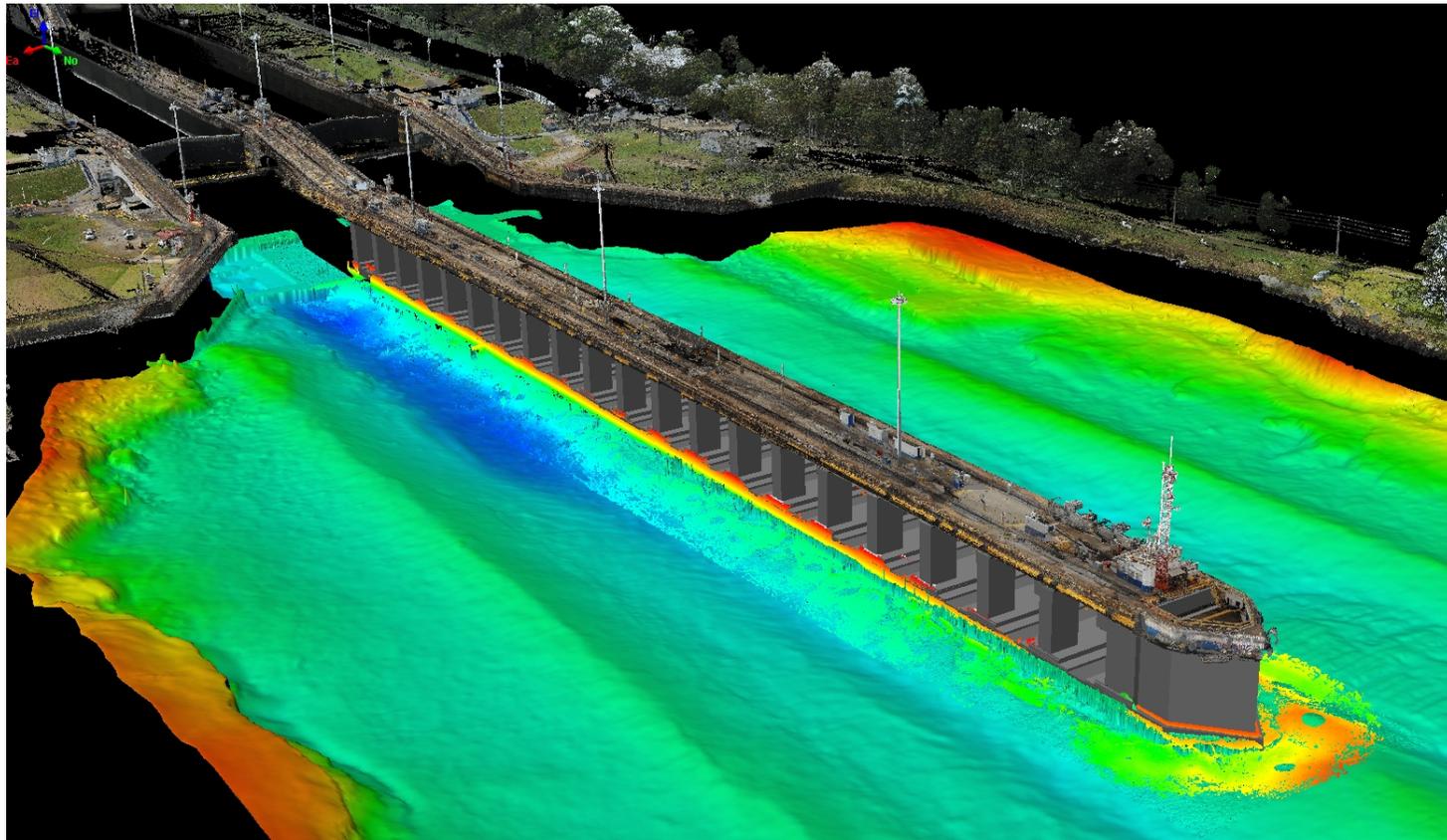


EROSION AT SEAFLOOR, GATUN LOCKS NORTH ENTRANCE



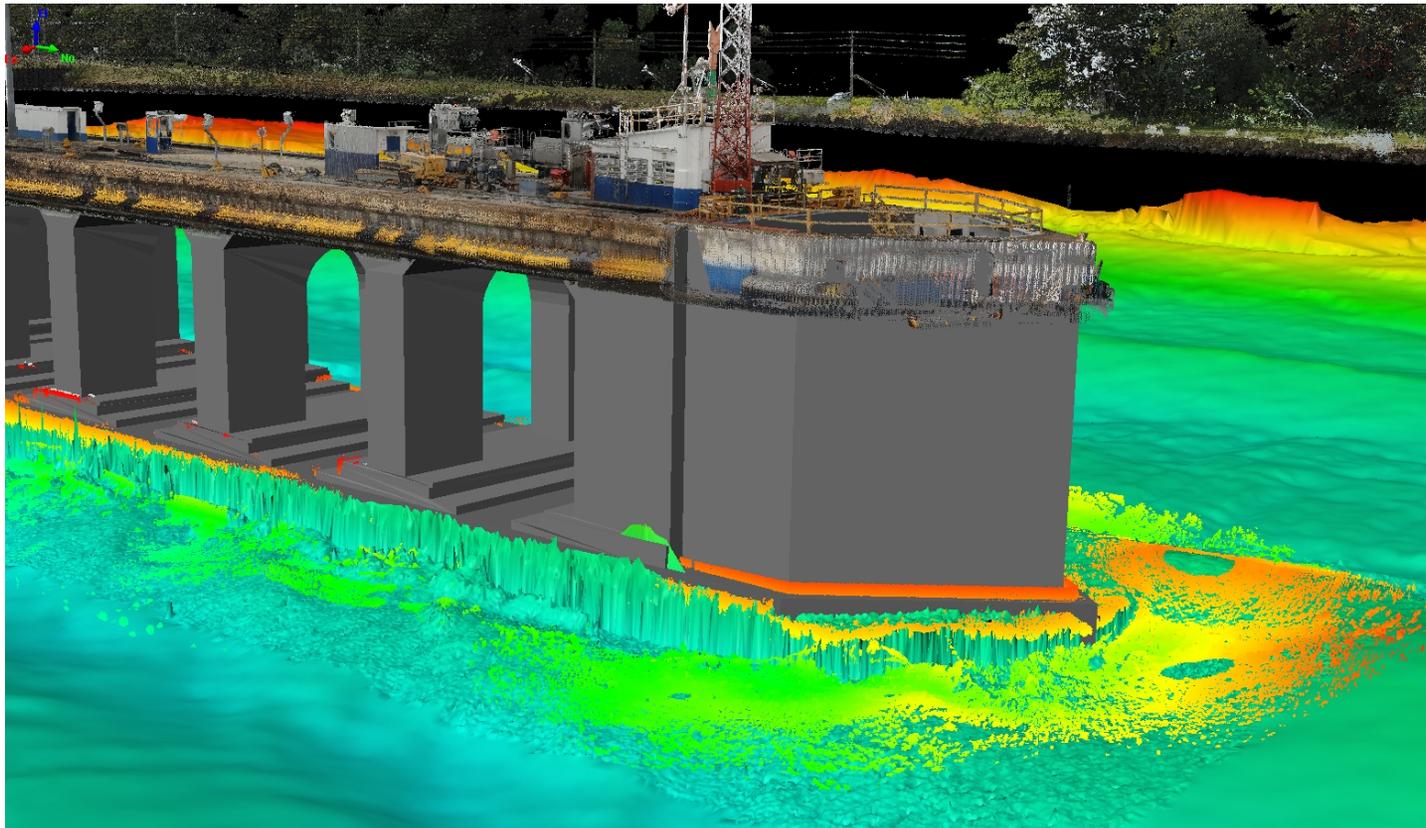


BLUEVIEW SONAR INSPECTIONS



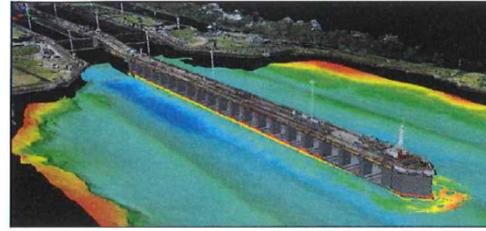


BLUEVIEW SONAR INSPECTIONS

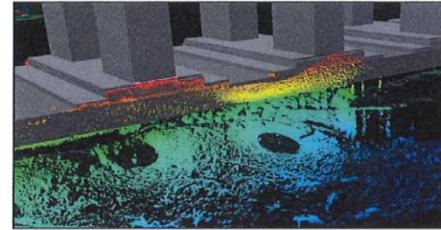
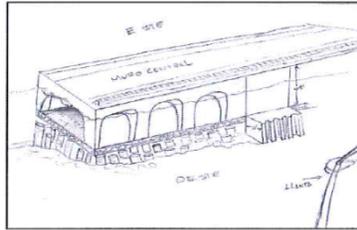




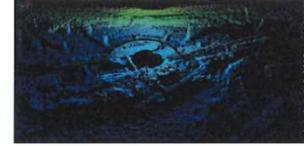
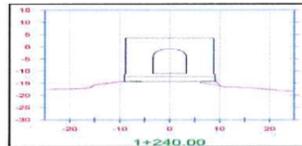
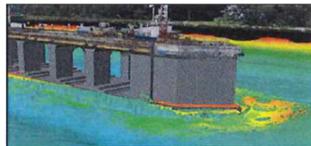
With the assistance of ACP divers and the ACP dive vessel, Arc was successful in sonar scanning the entire perimeter of the guidwall by placing the Blueview scanner on the seafloor at approximately 75 locations.



The three dimensional 3D model (above right) is a combination of 2013 ACP multibeam swath data, 2014 Blueview sonar scan data and Riegl terrestrial laser scanner surveys all georeference horizontally to NAD27 and vertically to Panamanian Precise Level Datum (PLD).



The above ACP artist's rendition of the support pile and guidwall illustrates the function of the support piles. The center photograph illustrates the condition of the 100 year old support piles. The combination of ACP bathymetry, Arc Blueview and laser scan data illustrates the bottom of the guidwall slab, the seafloor, debris on the seafloor and sheet piling at the southwest end of the guidwall.

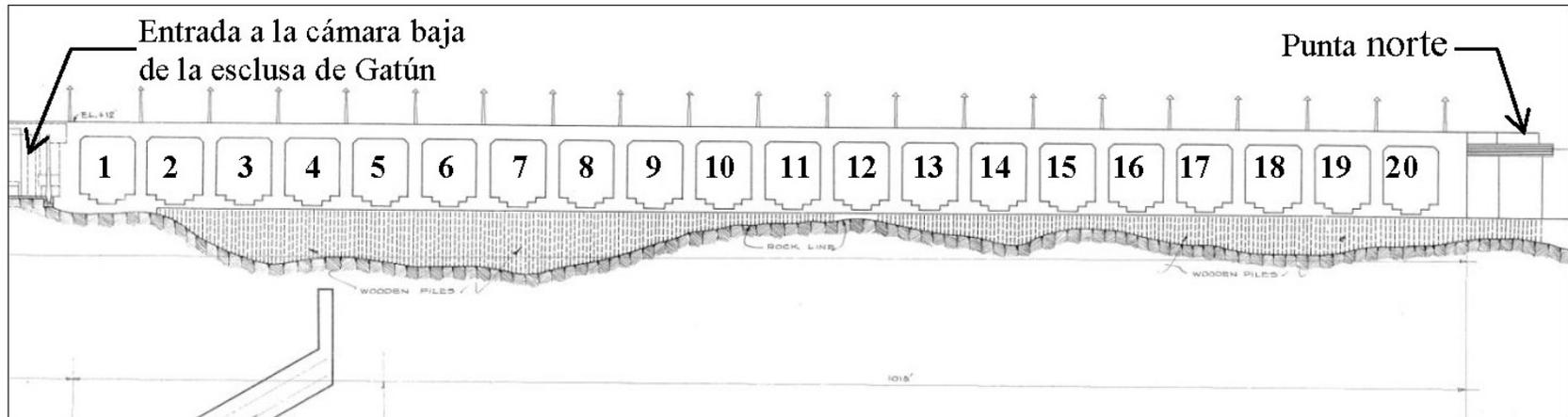


The purpose of this survey was to locate and quantify void areas around and under the perimeter of the north guidwall. In addition to identifying the void areas Arc is providing visual sonar images of the seafloor, broken and deteriorated piling and where possible the bottom surface of the guidwall slab. As built drawings of the 100 year old structure were not available. Therefore, in order to accurately survey and map the project, Arc laser scanned the guidwall utilizing horizontal and vertical control ARC-1 North 1025727.636 East 618491.173 Elevation 4.024 PLD and ARC-2 North 1025642.932 East 618454.829 Elevation 4.399 PLD furnished by ACP surveyors. By laser scanning the guidwall Arc is able to provide georeferenced models and maps suitable for use on other ACP projects.



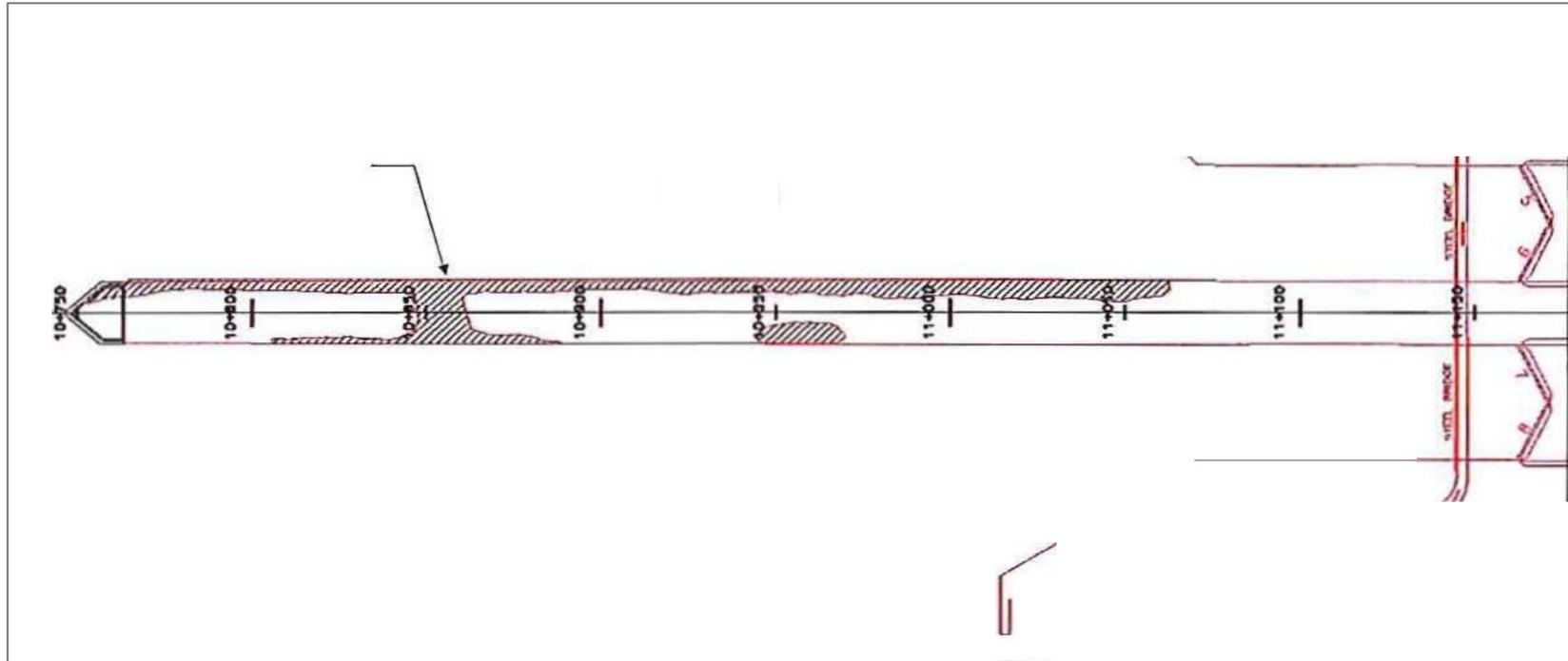


PROFILE VIEW





VIEW SHOWING DAMAGED WOODEN SUPPORT PILES



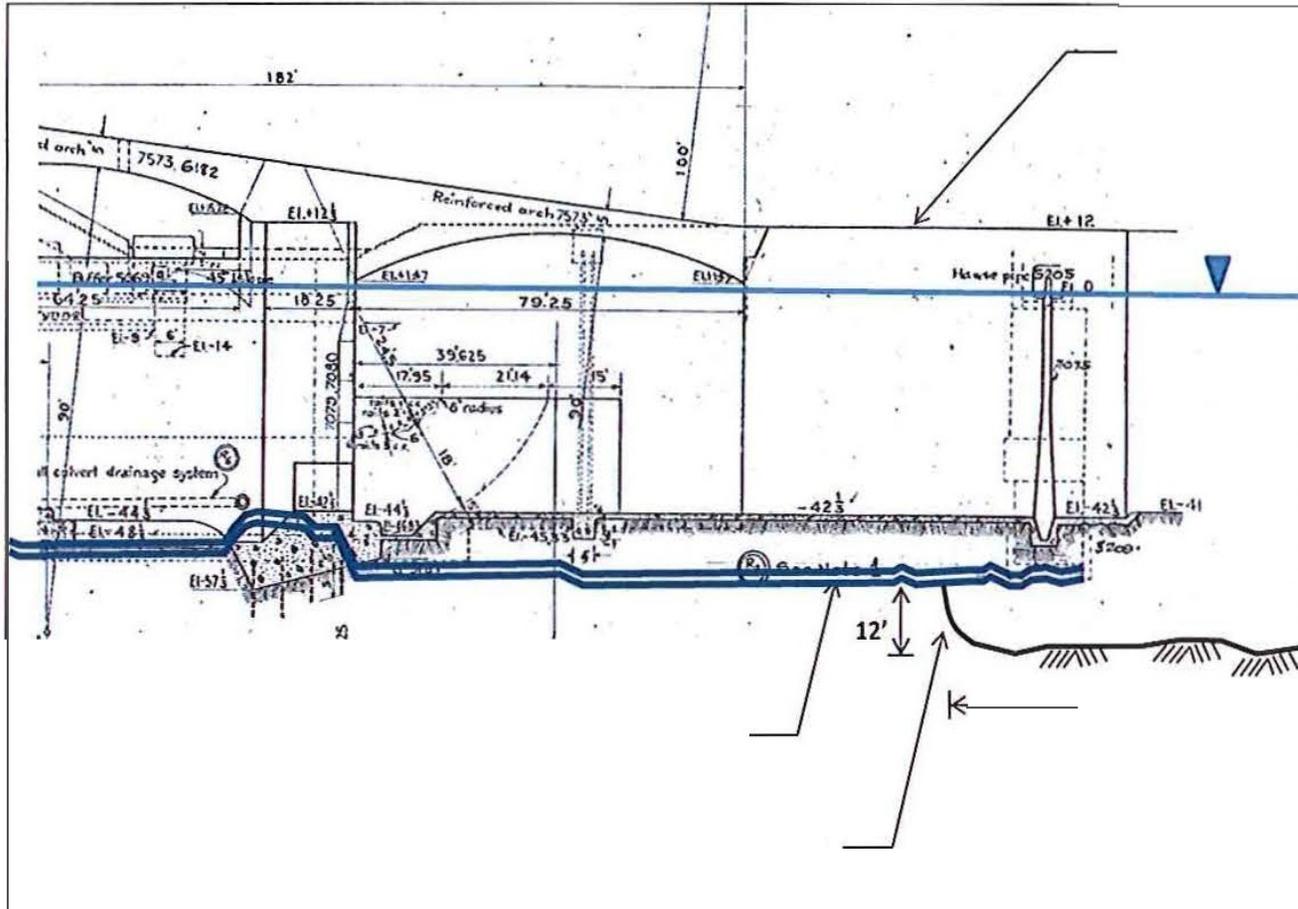


WOOD PILES RETRIEVED BY LOCKS DIVERS



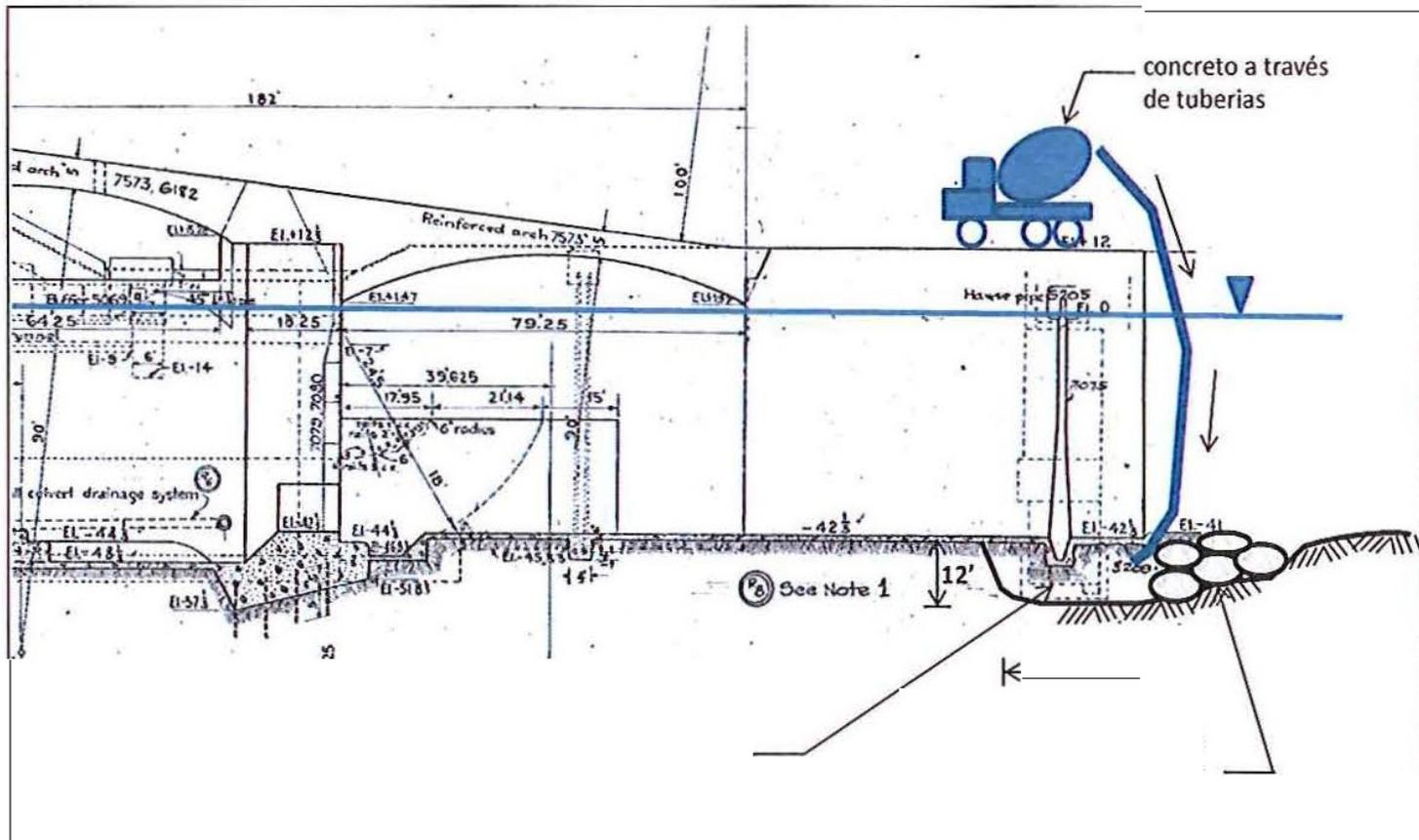


EROSION UNDER CONCRETE SLAB





PROPOSED REPAIR PROCEDURE FOR EROSION UNDER CONCRETE SLAB





PLANS

- 1. Short Term**
 - a. Geotechnical Studies**
 - b. Repair erosion under concrete slab at northeast entrance**
- 2. Medium Term**
 - a. Assess the condition of the wooden support piles**
 - b. Monitor settlements of north approach wall**
 - c. Continue survey of erosion at north entrance, bathymetry**
- 3. Long Term**
 - a. Structural analysis of concrete wall**
 - b. Underwater repairs to approach wall**

THANKS!



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