

BARGE MOUNTED CRITICAL LIFT PLAN AND BARGE RETROFIT

In a challenging and technically diverse project, ESi and our partner Oceanus provided engineering and marine survey support for crane barge operations. The work ensured that the critical lift plan and equipment were safe and in compliance with the applicable codes and standards.

SITUATION

ESi was originally engaged to develop a critical lift plan for a lift off of an inland waterway barge. However, over the course of the work, ESi took on additional responsibilities that included calculating the barge stability, verifying the allowable deck pressures, vessel inspection, providing retrofit drawings, and (with ESi's partner Oceanus Maritime Service, LLC) inspecting the barge retrofits for compliance with ESi's plan.

The crane barge was set to work at a wellsite in a well intervention operation. The primary responsibility of the barge was to lift the intervention equipment onto the wellhead and there were also two additional deck barges to carry supplies for the work. The lift was identified as "critical" requiring an engineered plan, in part, because the crawler crane was mounted on a barge. ESi provided the engineer of record for the critical lift plan.

The crawler tracks of the crane bear onto timbers which then transmit load to the barge deck. When the crane is balanced, the load spreads evenly over the entire footprint of the track but there are normal service conditions where the load is not balanced and can concentrate at the edges of the tracks.

Another issue requiring ESi's attention was the stability of the support barges. Deck barges carry heavy loads at or above their main deck which can impair the barge stability. If the draft and reserve buoyancy is not carefully considered, a barge can become unstable and capsize.

Practices: Naval Architecture
Structural Engineering

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Services Utilized

- Naval Architecture
- Structural
- Lifting Appliances
- Marine Survey
- Retrofit

About ESi

For over 30 years, ESi has leveraged its multidisciplinary team of engineers, scientists, and professional technical staff to investigate many major accidents and disasters. Our technical expertise, hands-on experience and state-of-the-art facilities, combined with diagnostic, analytical and physical testing capabilities create an ideal environment for quickly identifying and interpreting the facts of a case.

Contact ESi

For more information visit our website or call us toll free at 866.596.3994

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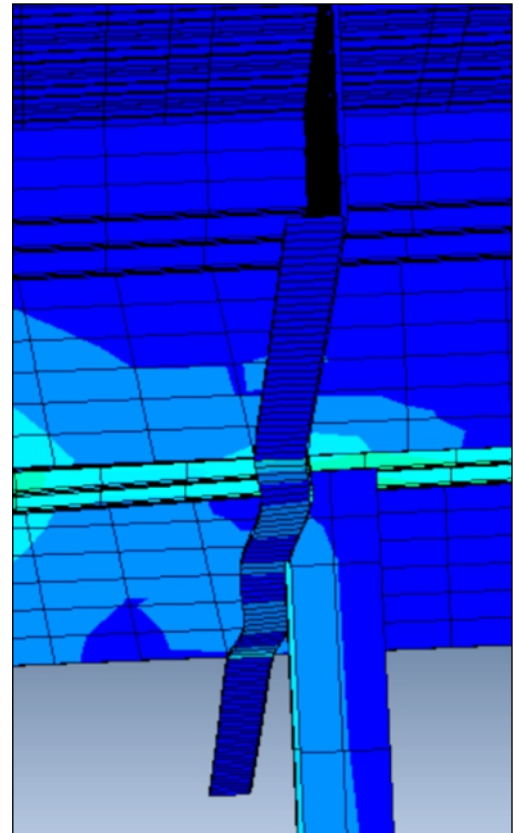
SOLUTION

For the critical lift plan, ESi developed a plan template based, in part, on the requirements of the US Army Corps of Engineers (USACE) Safety and Health Requirement Manual (EM 385-1-1) and also the American Society of Mechanical Engineers (ASME) B30 Standard for lifting devices. The plan included reviewing the proposed rigging, load, and site plan and comparing these details to the requirements of the lift to the manufacturer's load chart. ESi also completed independent verification calculations.

In review of the allowable deck loads on the crane barge, ESi performed hand calculations as well as finite element analysis (FEA). ESi also inspected the barge itself and, in the course of the inspection, found cracks and deformations which matched ESi's FEA and necessitated a retrofit.

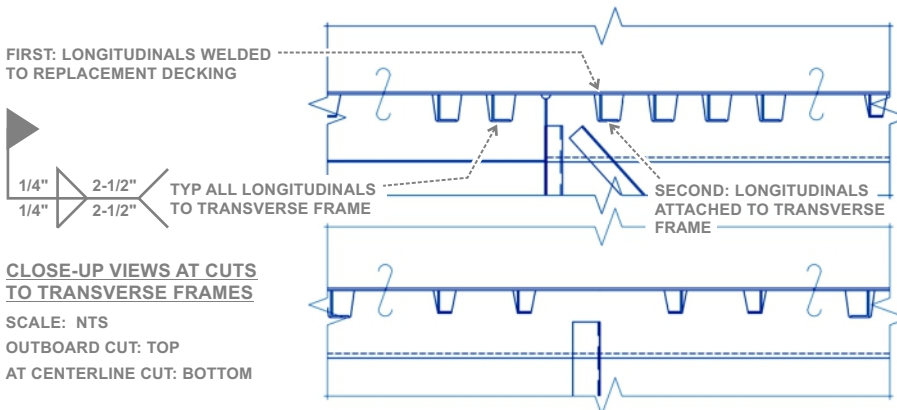
The retrofit primarily consisted of increasing the size of the existing deck stiffeners and transverse frames while also replacing damaged deck plating. ESi provided the design drawings and Oceanus verified the shipyard's work with an industry standard quality check.

The last scope of work involved verifying the stability of the two support barges (not the crane barge that required the retrofit). With the details of the deck loading, ESi developed the vessel hydrostatics, using small angle motions and wall-sided vessel/waterplane interaction assumptions, and compared the intact stability to the applicable criteria. The operations were approved provided the weather and loading envelopes were maintained.



RESULTS

ESi supported the work from start to finish providing technical depth and quality work products. The lift plan was reviewed by the operator's lift and safety warrant holders and was sealed by ESi's Professional Engineer. With ESi's partner Oceanus, ESi was able to provide the engineering and marine surveying support, including sealed engineering drawings, necessary to keep the equipment operating in compliance with the applicable codes and standards. The critical lift was successfully completed.



WHY ESi. ESi consultants are experts in the complete range of engineering disciplines. All of the technical expertise needed to tackle multi-disciplinary problems is found under one roof. In this case, ESi naval architects and structural engineers collaborated both internally and with our marine surveyor partner Oceanus on a wide range of technical issues to support safe and satisfactory equipment and operations.



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