



Won't Crack Under Pressure

Cutter Keeps Cool to Help Remove Damaged Concrete Slab

When a damaged concrete slab needed to be removed from the basin of a 600 foot-long, 250-foot-wide graving dock in Corpus Christi, Texas, one CSDA member had to bring in a fleet of cutting equipment to complete the job.

The concrete slab measured up to 39 inches thick in some areas, but hydrostatic pressure in the ground below the slab had caused it to crack and break. The upward movement of the ground had pushed broken concrete sections up from the slab and created hazards for the keels of docking ships and the positioning of support blocks. Vessels are floated into graving docks and positioned on blocks before the dock is drained of all water so crews can perform maintenance or repairs on the vessel in a dry environment. The displacement of the earth beneath the basin floor had also caused damage to parts of the dock's drainage and pump systems, rendering them unusable until the slab could be removed and repairs made.

The broken and cracked areas of the slab were to be demolished, removed and replaced. As part of this project, CSDA member Concrete Cutting & Breaking Co. was contracted to use sawing and drilling techniques and create sections of concrete that would be manageable for the general contractor—CCC Group, Inc. of Corpus Christi—to remove by crane. The speed, low vibration and precision associated with diamond tools was the best way for the damaged slab to be removed while keeping undamaged areas intact.

"This portion of the demolition and removal work was extremely time sensitive, with just 14 weeks allocated between June and September 2012 to cut and remove the concrete," said Ed Gushwa, project manager for Concrete Cutting & Breaking's southeast region. "The graving dock owners, Gulf Marine Fabricators (GMF) of Ingleside, Texas, wanted to retain some portions of the basin so as not to affect the critical path of work scheduled for the assembly of superstructure components." Part of the graving dock was being used to fabricate and assemble the lower portion of an offshore deep-water oil rig, and this project was not to be interrupted.

In addition to the short time period, the cutting contractor had to consider other parts of the graving dock that could not afford to be damaged further. The use of diamond wire and blades reduced the risk of personnel being struck by flying debris and also reduced the possibility of more breakages in the basin's existing drainage and pump systems. Both systems were to be repaired and reconnected to the functional parts of the graving dock's pit de-watering system when the job was completed.

The type of aggregate used for the basin slab also presented a challenge. Operators would have to cut through extremely hard concrete with a hardness of 9 on the Mohs scale, which included quartz, chert and flint. The basin had a top mat with #8 rebar at 5 inches on center in each direction, while the bottom mat had #10 rebar at 5 inches on center in each direction with 6-foot-long lap splicing.

Concrete Cutting & Breaking devised a plan with CCC Group to cut the concrete into uniform square sections so that the slab pieces could be removed by 360 class excavators. The pieces would then be transported to the sides of the graving dock pit, where rigging would be installed to lift the pieces out by cranes positioned at the edge of the dock walls, 40 feet above the basin floor. Slab thickness differed at



Tools and equipment were lowered to the dock basin by crane.



The damaged graving dock measured 600 feet long and 250 feet wide.

certain parts of the floor. Some areas were between 24 and 27 inches thick, while others were 36 to 39 inches thick. Operators would use both slab and wire sawing techniques to cut the slab as appropriate. Where the slab was thickest, diamond wire was fed under the slab to holes previously core drilled by the contractor. Wire saws were then used to cut the slab into sections for removal.

Concrete Cutting & Breaking began mobilizing its fleet for the job. Operators, tools and equipment, trucks and support services from the company's Delray Beach, Orlando and Jacksonville branches in Florida, its Buffalo,

New York location and its West and Central Michigan branches gathered in Corpus Christi to begin work.



Wire saw units from several locations across the U.S. were brought to the dock.



Access to the graving dock basin slab, 40 feet below grade, was achieved via certified scaffolding. All equipment and repair parts were lowered to the basin slab by crane. Slab saw operators began by making 22 longitudinal cuts 210 feet long and 20 transverse cuts measuring 250 feet each. This totaled 8,400 linear feet at depths ranging from 24 to 27 inches. The contractor had seven slab saws running on the job, with three operators working each shift. The three-man teams cut approximately 120 linear feet per shift.



Wire saws were used to cut 10-foot square sections that were 36 to 39 inches thick.

With the more shallow of the two slab areas cut, the contractor then set up to create longitudinal and transverse structural cuts 36 to 39 inches deep in another part of the basin. There were 22 cuts made, totaling 4,620 linear feet. An increase in slab depth meant cutting speeds were slower, especially as operators had to cut through tough aggregate with a Mohs hardness rating of 9. All slab sawing work was done in 38 days.

To set up pulley runs for the wire saw, the contractor had to first core drill access holes through the basin slab. Operators made 80 holes in total, measuring 8 inches in diameter through the 36- to 39-inch-thick sections of the slab, so that wire could be fed through for the pull cuts. The wire sawing team ran five 120-horsepower tractor rig saws engineered by the contractor. Each 20-foot-long cut through the slab took six hours

to complete. The process was then repeated for the rest of the specified slab area, with each piece being excavated from the slab and removed from the basin by crane.

In addition to the 9,000 linear feet of slab sawing through the basin slab, Concrete Cutting & Breaking wire sawed 14,395 square feet of concrete. Because the depth of the slab varied between 36 and 39 inches, the volume of concrete cut with the wire saw could not be accurately calculated, but was approximately 44,700 cubic feet.

While the cutting work progressed, the cutting team found access to the graving dock basin from the staging area to be a challenge. The team had

to walk down 50 feet of scaffolding stairs to get to the work area and everything needed for the job had to be lowered, lifted or removed by crane, which was sometimes a time-consuming process when there was only a limited number of cranes available. The work environment offered little shade or breeze for operators, who worked through the heat of summer in Texas to get the job done.

Another challenge was the effect of the hydrostatic pressure below the slab during cutting. This pressure had caused some areas of the slab to break and was still built-up below others. These areas were under tremendous vertical and lateral pressure, and operators found that during the cutting process, portions of the slab would release and rise while



Cut sections were lifted from the slab by excavators and moved to the dock wall for removal by crane.



Operators cut approximately 44,700 cubic feet of concrete.



Concrete Cutting & Breaking operators with some of the cut slab sections.

others would fall. This led to “slamming” of blades and wire, which when placed under that amount of pressure, caused instantaneous and irreversible failure of these tools. However, the contractor was prepared and well stocked with spares.

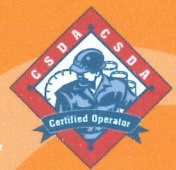
Obviously a job of this scale required a lot of equipment. In addition to the five wire saws and four slab saws manufactured by the contractor, the team used three 120-horsepower slab saws from Diamond Products, four 1,500-gallon water tanker trailers and pump systems, seven service trucks and vans, various diamond blades from Diamond Products, Diamond Tools Technology and Husqvarna ranging from 26 to 96 inches in diameter and diamond wire from Diamond Tools Technology, Husqvarna and Diamond Products.

The project was completed September 28, 2012, as scheduled. The general contractor was then able to enter the site and begin repairing the damaged parts of the dock’s drainage and water pump systems, before replacing the cut sections of concrete.

Concrete Cutting & Breaking would like to thank its employees and the general contractor, along with Randy Wendel of Diamond Core, Mike Hogan of Diamond Products, Clay Morphis of Husqvarna and Mark Turner of Diamond Tools Technology for their patience, perseverance and support during the work. This combined effort led to another successful job for the contractor.

COMPANY PROFILE

Concrete Cutting & Breaking Co. is based in Grand Rapids, Michigan, and has been a member of CSDA for 27 years. The company has nine locations across the states of Florida, Indiana, Michigan, New York and Ohio. The company has 60 operators and 65 trucks and offers the concrete cutting services of core drilling, slab sawing, hand sawing, wall sawing, wire sawing, grinding, selective demolition and removal. The contractor is a CSDA Certified Operator company.



RESOURCES

General Contractor:

CCC Group, Inc.

Sawing and Drilling Contractor:

Concrete Cutting & Breaking Co.
Orlando, Florida

Phone: 407-257-0274

Email: edgushwa@yahoo.com

Website: www.concut.com

Methods Used: Slab Sawing, Wire Sawing, Core Drilling

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