

BRUCE HAMMER SUCCESS STORY IN USA
Model SGH-2015 Pile Hammer (Max. Energy 30 ton.m)

PROJECT SPOTLIGHT ←



Chincoteague Channel Bridges

The Bruce SGH-2015 completed the pile driving of Chincoteague Channel Bridges at Va, USA

By Bayshore Concrete Products at Pile Driving Association Magazine January, 2009

Chincoteague is a small town on the Eastern Shore of Virginia with roughly 4,000 residents. It hosts more than one million tourists each year and is famous for its annual Pony Swim and Auction.

The Black Narrows and the Chincoteague Channel Bridges on Virginia Route 175 provide the only access to Chincoteague Island. These steel bridges, built in 1939 and 1940, have become costly to maintain and repair, and are narrower than current standards for safety and ease of traffic flow.

The citizens of Chincoteague knew that a new bridge was needed and they lobbied the Virginia Department of Transportation (VDOT) and the Commonwealth Transportation Boards (CTB) for funds to replace the bridges. Environmental concerns, sustainability and the timeline were the major factors in the determination to use pre-cast concrete for this project. The performance and sustainability of pre-cast pre-stressed concrete, combined with the economical advantages and design flexibility, make it the preferred construction material for today's bridge designers. In addition, *pre-cast pre-stressed concrete construction reduces installation time by eliminating expensive and time-intensive field formwork.*

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During the design phase of the bridge, the designers focused on both 24-inch square piles and 36-inch cylinder piles. The 36-inch centrifugal-spun cylinder piles were chosen for their superior engineering properties. The centrifugal-spun cylinder piles minimize the battering of the piles, and the quantity of piles required is less. These benefits are realized without increasing the overall weight of the pile.

In January 2007, *American Bridge Company* in Richmond, Va. was awarded the contract to build a new bridge with work beginning in March 2007. Bayshore Concrete Products Corporation in Cape Charles, Va. was chosen to provide the pre-cast, pre-stressed concrete components for the new bridge. Bayshore's stringent manufacturing and inspection processes permit a degree of quality control that is almost impossible to attain in the field. Bayshore Concrete Products, a PCI-certified company, is only 50 miles from Chincoteague and has many employees with local connections to the island, which makes it a very special project for the Bayshore Concrete Team. The new bridge will be three-quarters of a mile (4,035 feet) with a 729-foot connector bridge linking the bridge to Marsh Island. It is expected to be complete in November 2009.

The two-lane, 43-foot four-inch wide bridge will also include a Bascule Bridge to replace the existing swing bridge. The vertical clearance at the Lewis Creek Channel span will be 15'8" that will allow larger vessels to pass underneath and minimize the number of bridge openings. Each pile is 36 inches in diameter ranging from 80 to 104 feet in length with a 6-1/2" wall thickness and 12 tendons each and Bruce supplied its most suitable pile hammer model SGH-2015 (Max. energy 30 ton.m / 216,990 lbs-ft). The concrete compressive strength is 7,000 psi at 28 days and 4,000 psi at time of post tensioning.

The concrete contains 2 gallons of calcium nitrite corrosion inhibitor per cubic yard and 40% replacement slag. With this high-performance concrete mix, the bridge owner is anticipating the structural life of the bridge to be 100 years or more.

Cylinder piles are made in 16-foot long sections. The sections are centrifugally cast from zero slump concrete. Holes are provided in the wall of the cylinder pile section for post tensioning cables that will ultimately be used to stress the sections together to make a one piece pile. Piles are available in three outside diameters: 36 inch, 54 inch and 66 inch. The centrifugal casting process produces a dense, low permeability concrete that is ideally suited to the marine environment.

Once sections are cast and cured to the 4,000 psi they are stressed together (assembled) to make the required pile lengths. Epoxy paint is applied in the splash zone for protection against chloride ion intrusions.

All of the products for the Chincoteague Bridge were shipped to the construction site by barge. Construction began in March 2007, with driving the test piles. *To date, approximately 274 pre-cast, pre-stressed cylinder piles have been driven into place using a barge-mounted Bruce 2015 hydraulic hammer which has a RAM weight of 44,092 pounds and maximum potential energy of 216,990 ft lbs And powered by Bruce Power Pack PQ-500.*



Bruce PQ-500



Bruce SGH-2015

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Fifty-four piles were driven below the mud line for the bascule footing. Piles were driven inside a cofferdam and are typically driven in pier bents within a template frame. Bents ranged from three to five piles each. American Bridge expects to complete the project on time in November 2009.

Challenges faced in constructing the bridge included the location which is in an environmentally sensitive area. Due to shallow water, a total of six temporary work bridges are needed for equipment access. In addition, crews had to work around the schedule of the Colonial-Nesting water bird that chooses to mate and nest in the waters surrounding Chincoteague Island. Both pile driving operation and use of artificial light were restricted for a five-month period each year while the birds mated and nested. American Bridge was prepared for the environmental concerns and scheduled work away from the marshes during the nesting season. Additionally, two way traffic was required to be maintained during the summer months because of the influx of tourists to Chincoteague and Assateague Island beyond.

Bruce SGH-3013 (Max energy 39 ton.m / 282,087 lbs-ft) was also supplied for pile driving 60 inch concrete cylinder pile for Hathaway Bridge in year 2000 and made successful completion of project.

Bruce piling equipments are provided hydraulic pile hammers in the world market from energy range 2.4 ton.m (17,359 lbs-ft ~ 645,906 lbs-ft) to 89.3 ton.m and the modes can be supplied for any pile size, shape and materials upon request.