Splicing Precast Prestressed Concrete Piles

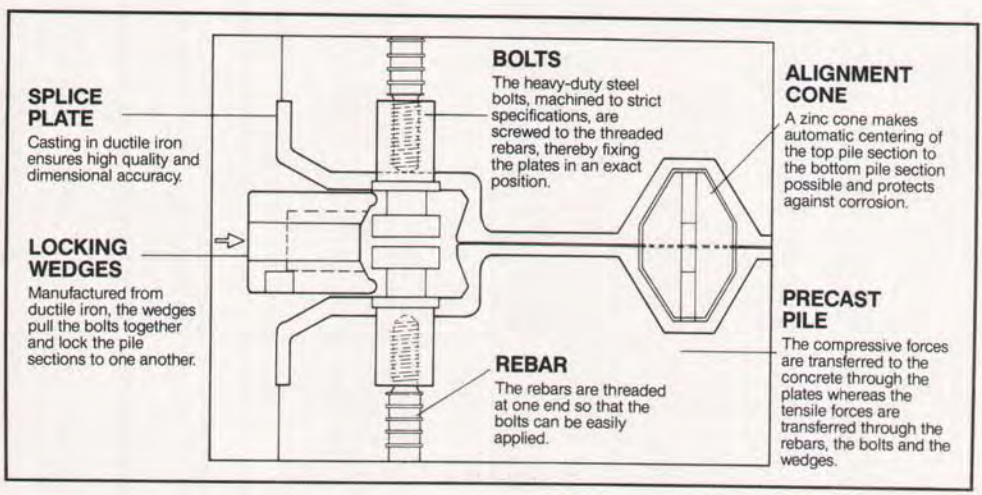
by Roberta L. Lincoln*

The Boston Edison Company in Everett, Massachusetts, was looking for an economical, easy-to-use yet strong splice for precast prestressed concrete piles. The company decided to use a splicing technique that was originally developed in Sweden.

Because there is a 60 ft (18.3 m) maximum length allowed on the highways in Sweden, it was imperative that a reliable splicing technique be developed in that country. Indeed, most concrete piles in Sweden are spliced. Swedish contractors, therefore, prefer to purchase smaller, less costly equipment while investing more money in shorter piles and quality splices. In their opinion, the piles and splices are what is important, and they should be easy to use at the job site.

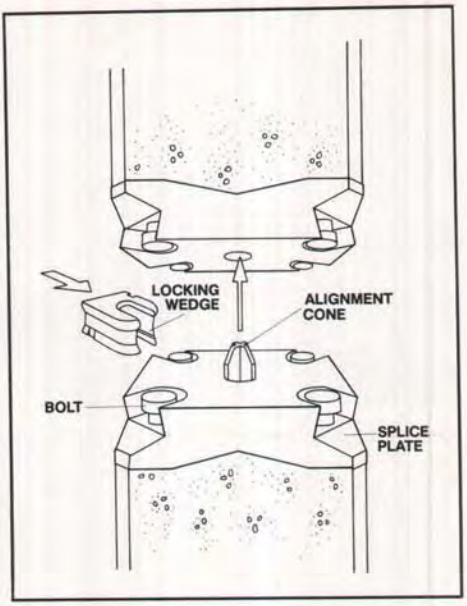
Marketed by the A-Joint Corporation in New Jersey, the Dyn-A-Splice was designed with efficiency, strength and low cost in mind. The splice is made of identical iron plates cast into mating concrete pile ends. A zinc aligning cone is placed in the center and the piles are connected. Four wedges are then driven in over aligning bolt ends and locked in place to complete the splice. The splice can be provided for square concrete piles with a cross section of 12 x 12 in., 14 x 14 in., or 16 x 16 in. (305 x 305 mm, 356 x 356 mm, or 406 x 406 mm).

According to a company representative, more than 40,000 of these splices have already been used successfully in the continental United States, Hawaii and American Samoa. A-Joint is in the process of applying for approval of the splice by the departments of transportation in several states and has already received



*The Image Company, Spencer, Massachusetts.

Aligning two piles prior to splicing.



approval in Louisiana. The technique has been used throughout the world for more than 15 years.

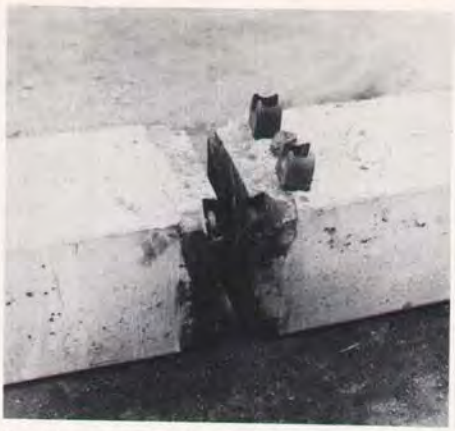
The Boston Edison project required piles as a support base for a wastewater tank farm. Each of the eight fiberglass tanks were 48 ft (14.6 m) in diameter and 40 ft (12.2 m) high, with a 430,000 gallon capacity. The pad for each tank had 32 concrete piles and 175 cubic yards of 4000 psi (28 MPa) concrete.

The tank pads were extended with concrete slabs and 3 ft (0.91 m) high perimeter walls to form a secondary containment vault which could hold the volume of the largest tank plus a 25-year storm event. With flexibility in mind, the pumps, piping and instrumentation control systems were designed to enable the system to operate in either a series or parallel arrangement, and also to allow segregation of waste and/or mixing of separate waste streams. Having a firm foundation provided by the use of concrete piles was an important ingredient in the overall success of this project.

According to Lars Persson, president of A-Joint Corporation, the Dyn-A-Splice is designed to be at least as strong as the pile itself. Tensile forces are transmitted from the reinforcement of one pile to the reinforcement of the other pile. The splice plates transfer only the compression forces.

Lone Star/San-Vel (a subsidiary of Lone Star Industries Inc.) in Littleton, Massachusetts, manufactured the piles and splices for the Boston Edison project. The three basic steps of production which ensured satisfactory results were: (1) Plates were aligned to be perpendicular to the pile (within 1:150 in. in both directions) and oriented to match the draft in the form; (2) The bolt heads were securely tightened onto the rebar dowels and held parallel to the line of the pile and seated properly in the splice plate; and (3) The concrete was well consolidated to eliminate voids within the splice.

This particular job required 130 ft (39.7 m) long piles. The decision was made to use two 65 ft (19.8 m) spliced piles for several reasons: ease of transporting shorter piles, less risk of damage in transporting the piles, and lower freight costs.



Two Dyn-A-Splice piles with alignment cone and wedges.

Inserting wedges to connect the piles.

Thom Cringan, production planner at Lone Star/San-Vel, says that there are no unusual problems in manufacturing the splice. A very real benefit of using the Dyn-A-Splice, he says, is the post-production ease of handling and storing the shorter piles. Another advantage in the storage and handling of the product is that all splice components are identical—there are no male or female parts.

Connecting concrete piles with a Dyn-A-Splice joint takes less than five minutes to complete and does not require any special skills for installation. On the other hand, steel pile connections take approximately 45 minutes to complete because the piles must be welded together at the joints.

Perhaps the greatest benefit of using Dyn-A-Splice is that the joint is clearly visible during installation. This allows the people installing the splice to be sure that the joint has been successfully completed. A welded joint is only as good as the person doing it, and an x-ray would have to be taken to determine if a welded splice has been done properly.

Credits

Owner: Boston Edison Co., Boston, Massachusetts.

Engineer: Charles T. Main Inc., Boston, Massachusetts.

General Contractor: Bond Brothers Inc., Everett, Massachusetts.

Subcontractor: Carter Pile Driving Inc., Natick, Massachusetts.

Manufacturer of Precast Prestressed Concrete: Lone Star/San-Vel, Littleton, Massachusetts.

Manufacturer of Tanks: Ershigs, Bellingham, Washington.

Dyn-A-Splice: A-Joint Corporation, North Brunswick, New Jersey.

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