Flying Right

X52 KIRKWOOD TO TRIENDA 138KV ISLAND SPAN FIX

Every construction job starts long before the mobilization of equipment, field personnel and materials. It starts with the end vision and a few experienced minds working on the way to get there. The resources that every construction veteran takes to work each day start to fill in the gaps and solve the puzzle of the project. Things not left to chance, but things not illustrated in the specs either. These are the things in every job dependent on talent, experience and knowledge.

In Calendonia Wisconsin, American Transmission Co. required installation of replacement transmission structures across the Wisconsin River via Pine Island and adjacent islands. Described in the engineer's report as "generally vacant", the area's ground surface is "typically grass covered with dense trees". There is no access to the islands, and the report further describes the topography as "varied".
A span of 1750 feet would be covered by installation of two 160 foot H-Frame Steel structures and five light duty structures stepping down to accommodate the river crossing.

The larger structures would each require two 45 1/4" diameter steel caissons, driven to depth of 36 feet. The smaller structures would each be set on two caissons varying from 16-1/4" - 20" in diameter, driven into the ground to depths of 20 to 25 feet.

A familiar construction problem must have immediately occurred to the personnel involved in the project in the early planning phases: How to access?

ATC's environmental policy which includes a section, "Impact Reduction". It reads, "Reduce environmental impacts of construction, operation and maintenance through the use of innovative practices, cost-effective technologies, and, where appropriate, environmental mitigation and enhancement." Per ATC's commitment, they dismissed construction bridge access as too impactful, not to mention costly. Perhaps winter conditions could improve access by providing frozen terrain and lower water levels. Unfortunately the winter of 2012 did not comply.

So how to access?

"Helicopter."

As is most often the case in construction challenges, phones rang, e-mails flew, and the people tasked with making it work called on experience and contacts to find out, "Who done it, how'd they do it and how'd it go?" After several meetings with Erickson Air-Crane, Portland, Ore., ATC's project team and Henkels & McCoy decided a viable solution would be helicopter construction.

When the call came in from Henkels and McCoy, American Piledriving Equipment had a few air crane jobs under its belt. Says American Piledriving Equipment Midwest Branch Manager Ed Corbett, "We had worked with several contractors on jobs where the only way in was a flying vibro (Vibratory pile driver/extractor). APE had developed what we call a "Helitemplate", or skid, to hold and place the power unit while the vibratory pile driver is retrieved. The legs are on rams that are hydraulically powered to adjust for varying ground conditions often found in low access areas. A gantry attached to the top of the power unit provides a sleeve, or gate, for the caisson, operated with hydraulics to adjust placement, with manual adjustments for fine tuning."

> Screaming / hand signals were your only means of communication between the crew once the air crane was in position.

Selected for installation of the steel caissons in the mostly sandy soils found in the boring logs was an American Piledriving Equipment's J&M 28-35. Mobilization was scheduled for the end of January.

"Damned good planning," says Paul Ives, Henkels & McCoy's project manager, "Once you mobilize that bird in, you want to get to work, you want to keep it at work until the job is done."

Henkels and McCoy marked the timber mats so the ground crew could line up the components as the set-up flew in. Next the helitemplate mounted power unit was dropped into place, lined up so the template would place the caisson, to be refined to acceptable tolerance by the hydraulic gantry. The caissons would be lifted into place and the air crane would fly off to retrieve the J&M 28-35 vibratory pile driver from the laydown site across the river. The Vibro would suspend from the helicopter on specially designed sling to prevent spin, and then lowered and attached to ears pre-mounted on the caisson. The vibro caissons were driven to variable depths with approximately six to seven feet of reveal protruding from natural ground line. These were driven to within approx. 18" of the top of the helitemplate, while supported by the air crane above. Then the ship would detach to allow the J&M 28-35 to free drive the remaining required depth. Alignment and proper spacing of the caissons were critical and numerous fine tuning adjustments for plumb and cant had to be in continuous monitor as driving initiated.

A capability called "Power-Beyond" facilitated use of all the hydraulics via a single power unit and eliminating the need for an auxiliary power unit. The Power Beyond option, available on all J&M power packs, uses the clamp manifold to additionally power an auxiliary hydraulic circuit containing its own hydraulic control valve bank while maintaining the use of the clamp circuit. Says American Piledriving Equipment Engineer Scott Gray, "The APE Helitemplate set-up needed to use the legs to get the template level as well as position the gantry. We did not want to bring in an additional power unit so the Power-Beyond allowed the Vibro, the clamp manifold, the hydraulics of

the template, and the self-leveling feet of the skid to power from one circuit."

On the ground, the crew worked under the unfamiliar phenomenon of "rotor wash" and the pressure of one fleeting week for the air crane mobilization. January in Wisconsin was a little kinder than usual in 2012, but cold conditions nonetheless. Wind speed exceeded 70 mph stabilized. This was a crew that had never worked with the likes of a heli-installation. Henkels and McCoy's Chris Forsythe, Construction Manager, Scott Mueller, Transmission Line Superintendent, and Jim Jacobi, ATC Construction Coordinator, were the only three with previous experience. They had tried to explain the magnitude of the wash to the crews, but it was only to be experienced first-hand to get a real understanding. On the first flight as the ship emerged in the distance with the power pack in suspension, the crews were overwhelmed with anticipation and pure awe at the enormous size of such a machine hovering directly above them. The initial wall of wash was overwhelming to them; their talent mixed with adrenaline took control. After setting the first alignment of the power unit under the ship, 40 plus year old men looked like teenagers that had just stepped off a wet n' wild roller coaster ride.

There were several safety matters that had to be addressed. There were adverse conditions with recent snowfall (crew wore certified ski goggle to protect the eyes), potential risks of flying debris (crew wore certified ski helmets for head protection), slick mats from the icing regarding footing (Crew wore ice cleat overshoes), extreme wind chills created by the wash (proper clothing layering, face masks, gloves), and extreme noise levels (crews utilized aviation style ear phone in conjunction with ear plugs to deter the extreme noise). Screaming and hand signals were the only means of communication between the crew once the air crane was in position

Talent, experience and knowledge accommodates for new circumstances. Such was the case with work under a 16,500 pound payload helicopter. From contractor to equipment supplier, air crane operator to the crew in the cold mud and rotor wash, the challenges of delivery, coordination, installation were met with quality work.

"We were impressed," says the job General Foreman Scott Mueller. "The APE setup worked like we expected it to."

A total of 16 caissons were installed using the Ericson air crane and APE helitemplate method. For the accessible installations, drilling equipment was used. All told, 16 caissons were installed for the seven transmission structures.

With the foundations in place, the two pole H-structure configuration were erected via a bolted flange type assembly. Erickson provided three lifts for installation of each. One lift each for the legs, and then the top H sections consistent with the remaining pole tops and the cross arm, were all flown out pre-assembled. These units were mated and bolted at the site by the ground crew working from aerial cranes. The smaller five structures were flown in single lifts.

"I'd like to thank the project team, Henkels & McCoy, helicopter crews and the airboat captain for their hard work," said ATC Project Manager Doug Berton. "The project went in service two weeks early thanks to them."