

# TRANSMISSION & DISTRIBUTION WORLD

## ATC Replaces Poles in Wetland Area

Wisconsin crews use specialized mats to access rights-of-way in marsh during a transmission line replacement project.

By **Stan Tessmer**, *American Transmission Co.*

**A**merican Transmission Co. owns a 20-mile segment of a 345-kV transmission line in central Wisconsin. Over time, the aging poles became severely weakened as a result of leaning, cracking and woodpecker-inflicted damage.

As part of a maintenance project, the company opted to replace all 112 of the K-frame structures with steel H-frame poles. About 70% of these structures, however, are located in wetland areas, which presented many challenges to the field crews. In particular, a contiguous 1.6-mile wetland area called Bear Creek Marsh was of critical concern.

This stretch of wetlands, which is located about 10 miles west of Stevens Point, Wisconsin, can only be accessed through private property.

Because of the depth of the highly organic soils in this area, the utility was not able to use its conventional timber mats that it would normally employ in this situation. In a typical wetland area, the crews would use 4-ft-wide by 18-ft-long oak timber mats. Depending on the severity of the wetlands, they would stack the 8-inch-deep mats up to three or four layers deep, sinking down into the wet soil.

Given the deep and soggy soil conditions in the Bear Creek area, however, the crews would have had to stack the mats at least 10 deep to build a temporary road strong enough to support the heavy



ATC needed access across 5,400 ft of extreme, protected wetlands near Stevens Point, Wisconsin. Traditional wood-mat methods were unable to remedy the problem without adverse environmental impacts and uncontrollable/unpredictable cost. New South's wetlands access experts designed an access road that was built to float on the vegetative layer of the existing marsh. The access road was designed to support 190,000 lbs/36,000-lb axle weight, providing higher weight limits than local paved roads. (Article photos courtesy of New South Equipment Mats.)



An excavator is used to lay road deck surface on top of floating foundation mats. Environmental protection required that equipment could not be taken into any part of the wetland. The supports and bridge were laid one segment at a time. Then equipment was driven on that new bridge section to work on the next bridge segment.

employees were looking for viable alternatives to cross this section of the wetlands, so they asked New South for their assistance to come up with a solution.

During the walk-through, the New South employees spent three hours walking just one mile through the marsh area. In fact, Drew St. John, New South's president, described the surface area as "like quicksand." Project designer Jon Fiutak proposed a different kind of mat that would work well in this situation. Called the emtek mat, this mat

equipment. Because of the length of the wetland area to be covered, the field crews would have had to install about 20,000 mats, which would have been cost prohibitive. ATC has a large inventory of mats and used about 17,000 mats elsewhere in this project to access the right-of-way.

In addition, using the traditional timber mats could have had a significant negative impact on the wetland. This area is home to both endangered turtle and lizard species, so the crews had to take care that they were not disrupting their habitat. In fact, the Wisconsin Department of Natural Resources only allowed the utility to work on the project from Oct. 15 through March 15 in order to protect the animals.

Another challenge was that the Bear Creek Marsh doesn't freeze, even in the most frigid temperatures. This particular stretch of marsh has a high level of organic matter. Due to the constant decay and the depth of the plant material, there is enough heat generated that even in the bitter winters, the area doesn't freeze. In other portions of the line, the field crews can simply drive over the frozen ground without putting down the timber mats. In the case of the Bear Creek Marsh, however, they had to come up with a different plan of action.

### Taking a New Approach

Instead of opting to use the conventional timber mats, ATC, along with Kenny Construction Co., worked with New South Equipment Mats to come up with another solution. During a visit to look at two temporary bridge locations, New South employees also were asked to look at the Bear Creek Marsh area. The ATC em-

is the only mat that has engineered certified load ratings. The company can take a utility's design criteria, analyze the wetlands and then determine what needs to be built to support that particular load factor.

The utility opted to go with an engineered floating mat system design called an "air bridge." This was only the second project to use this stacking technique and the first in which the mats float on the vegetative layer. The other job in which the crews used the emtek mats was a smaller project in Texas.

The transmission line cuts directly through the middle of the marsh, and the utility has a 150-ft right-of-way. To access the wetlands, the utility needed to be



The Bear Creek Marsh wetlands access solution incorporated RFID-GPS technology in each mat to ensure no non-native materials were left on the site after construction completion. The completed temporary access road is used year-round; a special eco-friendly snow-removal product keeps the surface ice-free, even during tough Wisconsin winters.



ATC contractor crews are pouring concrete into a recently excavated foundation cavity. Steel reinforcement bars and anchor bolts were positioned in the hole for embedment in the concrete. About 3,500 cubic yards of concrete was used throughout the project.



After erecting the two individual weathering steel poles, ATC contractor crews are in the process of lifting the crossarm in place. When complete the crossarm will support the electrical conductors. The average weight of each fully assembled steel H-frame structure is about 14,000 lbs.

able to place up to 190,000 lbs of weight on to the mats. The workers needed to install new drilled-pier concrete foundations, take down the old structures, erect the new structures and transfer the conductors in order to complete the transmission line relocation project. This job required heavy machinery to get the job done.

Because of the characteristics of the wetlands, the utility would otherwise require layer upon layer of the submerged timber mats. With the emtek mats, however, when the mats were fully loaded with equipment, the downward depression into the surface was only several inches rather than sinking below the surface.

Instead of purchasing the mats, the utility hired New South to provide their mats and install them at the designated location. Using cranes and loaders, the crews had to set out the mats one at a time so no piece of construction equipment was ever on the wetland. The project took them three weeks to build 1 mile of access using 197 tractor trailer loads of material.

Most of the mats are 40 ft long and weigh 6,000 lbs each. Overall, ATC used about 9.5 million lbs of mats on the project or about 3,000 total mats.

The support mats were placed perpendicular to the main road decking, so the crew members were able to disperse the weight of the machinery over a large area. The road deck mats rest on the 8-inch-thick foundation mat, which allows the mat road to float on the vegetative marsh layer, rather than to sink.

### Heavy Machinery

During the project, the workers needed to get their

heavy machinery and equipment into the wetland area while minimizing harm to the environment. A 16-ft temporary mat road traverses the 1.6 miles of wetlands. To access each pole for construction, ATC built working platforms around each of the structure locations. The crew worked off of platforms and rebuilt the line along the same right-of-way as the existing line. ATC needed a 190,000-lb load-bearing capability for the mats to accommodate the heavy drilling rigs, cranes and associated equipment.

After surveying and identifying the new structure locations, the crews drilled holes in the ground for foundations, typically around 6 ft in diameter. The holes were then filled with reinforced concrete and anchor bolt assemblies were used to attach the steel poles. Not only did ATC need to overcome the challenges of the wetland access, but at several structure locations, they also encountered shallow hard granite bedrock. The crews used dynamite to blast the foundation location and assist the drilling.

In other areas, the engineers were able to redesign the foundations in advance to avoid the bedrock. Where feasible, the workers installed large steel casings. Essentially, these were steel culverts that were stood on end at the structure location and vibrated (using a 40,000-lb hammer) to drive the steel casings into the ground. Crews could then drill out the casings and fill with concrete.

### Protecting the Land

While laying down the material, New South used a technique in which no materials penetrated into the

wetlands. Because the mats exert little downward pressure (about 3.5 psi), they cause minimal impact to the environment. The wetland area should experience a very short recovery period and revert exactly to the way it was before.

Because of the design of the mats, they do not impede the water flow. The floating road moves up and down as the water level rises and falls. The mats are designed to work with the wetland rather than to impact it in a negative way.

This is especially important because ATC is tasked with retrieving all the materials that it uses in the wetlands. If the company had used the traditional timber mats, it would have been extremely difficult to get everything out. Had the crews stacked seven to 10 layers of mats into the muck and the marsh, it would have been a huge challenge to retrieve them at the end of the project. With the floating bridge design, however, everything that goes in will eventually come out.

To make sure that this happens, New South equipped each one of its mats with a radio-frequency tag and a designated GPS location. Once they lay down the mats, they scan them into a computer program and take an inventory of every mat and its location. When they pick

up the mats this spring, they will rescan them and place them in the storage area. That way, they can account for every mat.

ATC is now renting the mats on a monthly basis, and at the end of the month, New South will begin picking them up. With this solution, ATC estimates savings of about \$2 million as compared to the cost of timber matting and immeasurable protection of the Bear Creek Marsh area. The team expects to get the job done with minimal impacts and expects to leave the wetlands as much as possible as they found them. **TDW**

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**Companies mentioned in this article:**

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