Swampland Bogs Down Airport Expansion

More than three miles of HDPE pipe from Advanced Drainage Systems was used to provide a solution to a high water table at the Grand Forks International Airport.

The term "floating airport" usually conjures up an image of an aircraft carrier. But it would have also applied to the new runway area at Grand Forks International Airport in North Dakota until the storm water drainage system was installed to combat the area's low water table. Runway 9R/27L, a $6.5 million project south of the existing runways and the main terminal, opened in August 2009.

Building the new 3,300 foot-long, east-west runway first required that the swamp-like acreage around it had to be reconstructed for proper drainage. The drainage system used corrugated high-

density polyethylene (HDPE) pipe with a pre-drilled perforation pattern that allows groundwater to enter the system and be carried away. More than 3.5 miles of pipe were required.

"We knew immediately after the pipe was put in that it was a success," explained Ryan Jones of Ulteig Engineers, Inc. "The proof was that none of our equipment was getting stuck in the mud. It was typical for trucks, tractors and even our workers to get stuck several times a day. Once the pipe was in place we never had that problem again."

In designing the drainage system, Ulteig Engineers, Inc. (Fargo, ND), laid out the design using 18-inch to 60-inch diameter MEGA GREEN™ pipe from Advanced Drainage Systems, Inc. (ADS), with the largest diameter being the collector pipe, being fed by the smaller diameter laterals. More than a mile of 60-inch diameter pipe was installed with the laterals connected in a herringbone pattern.

"We put the pipe in down relatively deep," according to Jones. "It was buried at various depths, with cover of 4-5 feet. We have extremely fine silty clay soil so we used a layer of pea stone to cover the top of the pipe, and backfilled with the soil we dug up."

caption

This corrugated HDPE pipe is made with a minimum 40 percent recycled content and is available with either a soil-tight or water-tight joint in diameters from 12 to 60-inches for gravity-flow drainage systems. Typical uses include land drainage,

captions

retention/detention systems and waterways.

"It was important that the drainage pipe could withstand the top load pressure," Jones said, "because there would be a cover of some four to five feet, and it would also be subjected to the weight of heavy mowing tractors." The pipe provides both strength and optimum hydraulic capacity with Manning's "n" rating of 0.012. Its structural strength will support H-25 live loads. It meets ASTM F2648 standard specifications.

The inherent problem was that the field was swampland that would not support any type of load including a mowing tractor much less an airport runway or the infield services such as landing lights. The alternative was to move the airport or find a way to reclaim the land and turn the swampland into usable acreage without the expense or possible negative environmental impact of a landfill.

"The land around Grand Forks is extremely flat," Jones explained. "And the infield is actually below the rest of the grade. It became a natural pond, really a bog that didn't have any structural stability. This had to be corrected, and we did it by using the HDPE pipe."

At the start of construction, the land itself was the problem. "Bulldozers were getting stuck two to three times a day," Jones stated. "When we put in the pipe, we put in the concrete manhole structures and before we grouted the pipe in place in those structures, there was flowing water. This was because of the water in the soil.

Not rain. Just because of the high water table. And so far it's been working beautifully."

To promote drainage along the new runway and taxiways, ADS AdvanEDGE® product was used. More than 21,000 linear feet of the engineered panel-type HDPE pipe rapidly collects and removes water coming off the pavement, and also feeds into the larger collection system.

The first phase of the runway construction started in the fall of '07. Phase II in Summer of 08, and Phase III completed during the fourth quarter of 2009.

The Grand Forks International Airport was opened on its current site in 1964. Expansion of the terminal and the addition of runways is to accommodate its growth. On a single day in June 2009 the airport had 2014 operations (each take-off and landing is counted as an operation), which set a new summer record and also tagged it as the nation's 22nd busiest airport. Most traffic is for passengers attending the University of North Dakota and for FedEx® cargo. During the school year, it's typical for there to be 2,240 operations in a day.

In addition to the new runway a new $21.9 million terminal is being built. Groundbreaking occurred on July 2, 2009. The terminal is being built to conform to Leadership in Energy and Environmental Design standards (LEED®). It will use geothermal for the heating and cooling of the building.

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While a new drainage system is not part of the new terminal site, the pipe also fits the airport's goal of being as green as possible. Because it uses recycled material, it was also seen as an environmentally sound choice. To qualify for the U.S. Green Building Council rating system, projects must be registered and utilize sustainable products that help the project obtain LEED credits such as the ADS MEGA GREEN line. LEED® certification is recognized nationwide as proof that a building is environmentally responsible, profitable, and a healthy place to live and work. LEED certified buildings qualify for tax rebates, zoning allowances and other incentives in hundreds of cities. **L&W**

by Steve Cooper

Project location:
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Long: -97.176111

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