



Nashville Airport Authority begins largest closed loop 'lake plate geothermal project' in North America

WL PLastics HDPE pipe cools terminal facilities and eliminates critical 'leakage potential' under runways

The project

The Nashville Airport Authority (NAA) conducted a ground breaking ceremony on October 21, 2015 for the largest closed loop "lake plate geothermal project" in North America and questionably the world to cool the Nashville terminal facilities. Although the ceremony was considered "ground breaking" the project is well underway and is to be fully operational by April of 2016.



The NAA is considered a leader in aviation sustainability which operates utilizing environmental, economic, conservation and social responsibilities. The geothermal project vision from Christine Vitt (Head of Strategic Planning and Sustainability, NAA) started in 2008-9 which included a comprehensive energy study conducted on all NAA facilities. It was decided to utilize the water filled, 43 acre Hoover Quarry which averages 150 feet in depth (max 400ft and min 75ft) which over-flowed in the floods of 2010. It is also fed by natural springs keeping the 1.5 billion gallons of water at an average temperature of 50F. Which was ideal for geothermal cooling. This project is not only innovative but truly exemplifies creativity and engineering ingenuity. Juli Mosley mentioned, "With sustainability being the core values of the NAA the utilization of natural resources and innovative products this project keeps us in step with the millennium."

The specifications

With the help from business partners Energy Systems Group, Blakley Construction Services, Garver, and Smith Seckman Reid the concept to utilize the water filled quarry to cool the Nashville Airport Terminal was developed. Utilizing a Design/Build/Construct method developed by Blakey Construction Services the system will recirculate 30 million gallons of water per year in a closed loop system. This involved running 12,000 feet of 20" PE 4710 high density polyethylene (HDPE) pipe for supply and return lines to the terminal and back to the quarry. Installed by Horizontal Directional Drilling (HDD) and some trenching under roadways, runways, and landscapes across the International Airport facility.

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"The project is running very smoothly and is ahead or meeting all required NAA timelines and requirements," says Michael Thomas owner of Blakley Construction. Approximately 2000 feet of 6" HDPE supply and return lines from the HDPE fabricated value boxes (or in this case, cylinders) to the stainless steel plate heat exchangers submerged 75 feet in the quarry water. In addition, to the geothermal project there is an additional irrigation system being installed at the same time which utilizes approximately 6-8000 feet of 4" HDPE pipe for non-potable water irrigation for all terminal landscapes. All pipe was supplied by WL Plastics and utilizes the PE4710 material classification. The fabricated value boxes and manifolds were designed and built by Plastic Fusion Fabricators and are made from HDPE to resist corrosion and create a leak free, water tight environment for the values controlling flow to the submerged plate exchangers in the quarry. Van Dobbs says, "This project is amazing, being involved with innovative people and working together to accomplish something that has never been done before truly gives you a sense of accomplishment."

The benefits

First, eliminating the "leakage potential" by utilizing HDPE and fusion joints under runways was a critical benefit. "We cannot have any water issues under runways, and HDPE is the only product for the job," says Bob Abbott the Lead Engineer for the NAA.

The geothermal system will circulate 30 million gallons of water and will create saving benefits of 6000Kw peak use/day or 1.3 million Kw hours per year equating to \$430,000 minimum in electricity savings per year. Circulating untreated water from the quarry the HDPE system will not tuberculate or support biological growth in the system. Therefore, operating systems will not be affected for the life expectancy of the system. Also with PE4710 HDPE materials the slow crack growth (SCG), pressure class, long-term surge resistance, toughness while maintaining flexibility, and overall performance requirements are enhanced which equate to a life expectancy of these pipes greater than 100 years. The use of HDD installations also helped to preserve existing landscapes at the airport and did not affect roadways going to and from the airport terminal. Installation also required construction under two major runways. A 90-day maximum closure time was allocated by the NAA. Due to the use of HDD

the construction is expected to complete well ahead of schedule providing access to the runways sooner than expected. This geothermal project will not only benefit the NAA, but will allow future generations to learn and understand how creative thinking and proper project planning can impact sustainability to better our world in a positive way.



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