UNDER THE SURFACE

Trenchless technology aids storm drain repair beneath Boston airport taxiway

By Peter Goodwin

Situated in the heart of New England, Manchester-Boston Regional Airport is located less than 50 miles north of Boston. It is physically located within two counties, Hillsborough and Rockingham. The airport property encompasses approximately 1,200 acres of land.

Located under a general aviation taxiway, approximately 700 ft of 12- and 15-in. aging concrete storm drains needed rehabilitation.

Airport construction poses various challenges. Storm drains located under an active general aviation taxiway proved to be a unique site constraint. One priority was that the solution have no impact on the environment and the downstream waterway. Storm drains often are extensive networks of underground pipe and structures used to convey storm water away from roadways, residential and commercial areas, and impervious surfaces. Storm drain rehabilitation is challenging for utility owners and operators because they are often located in areas that are not easily accessible.

The Ted Berry Co. was called upon to provide a solution to rehabilitate

Trenchless technology allowed for the rehabilitation of a storm drain beneath an active general aviation taxiway without the need to excavate.

the storm drains below this taxiway. The project team—President Matt Timberlake, Utility Construction Manager Isaiah Bean and Trenchless Services Manager Shawn Ready—evaluated the site and the unique characteristics of the project, including the existing pipe conditions, the long-term structural design of the storm drains, and the challenging logistics associated with working on and near an active airport.

Trenchless Solution

Due to the requirements for long-term structural pipe design and the job site complexities, a fully trenchless solution was the logical solution for this rehabilitation problem.

Because it could be installed through existing manhole structures, cured-in-place pipe (CIPP) was chosen and approved as the best option for this project. CIPP offers a trenchless option, without the need to excavate (open-cut) and it met the conditions of the project site.

The project team chose Reline America's ultraviolet (UV) CIPP Alphaliner due to its ability to be designed with structural properties that could exceed the potential loads associated with the site and minimal disruption to the job site, and to be installed using trenchless technology, which prevented unnecessary impact to the site and its users. Its design characteristics encapsulate the composite materials during delivery, installation and curing, thus reducing the impact to the site and environment.

Preparing for Rehabilitation

The rehabilitation project began in November 2015. New England weather in the fall can range from 60°F and sunny to 20°F and snowing; it was essential that the approach be able to be completed in a short timeframe, limiting both impact to the airport and its users as well as avoiding potential weather delays.

A critical part of the planning process was developing a site plan that maximized the efficiency of the rehabilitation team while limiting disruption to the users. The project team had three main pieces of equipment on site to perform the work. A Vactor combination cleaner was staged to remove debris from the pipe in preparation for lining. The UV CIPP equipment consisted of a blower truck and a UV cure truck. Equipment was set up at the opposite ends of the pipe segment being rehabilitated and was in place for less than one shift to complete the total line segment rehabilitation.

Preparation of the existing pipe

included removal of hardened grout at the pipe joints. A water-driven turbine cutter was utilized and the existing pipe was jetted to remove any foreign materials. This allowed the new CIPP liner to have a smooth and full pipe inside diameter and maximized the hydraulic capacity of the storm drain.

Using the Quality Tracker System, a pre-CCTV inspection was performed to document the condition of the pipe just prior to lining. The Alphaliner was installed using a pull in place method (ASTM F2019). Once the liner was pulled into place from the manhole to the outlet and fully inflated, the UV light train was inserted into the liner. The camera on the light train then was used to inspect and record for quality assurance.

Successful Cure

After the inspection of the liner, the UV lightbulbs on the light train were activated and the liner was cured. The liner composite, which consists of a fiberglass and resin system, is activated and cured utilizing the UV light from the light train. One of the benefits of the UV curing system is that no water or steam is used. When the curing is complete, the line is ready to be put into service, with no makeup or curing water to dispose of and no effect on the downstream waterway.

The liner's composite materials are fully encapsulated in a protective inner and outer barrier, which protects the material from becoming contaminated. The encapsulation prevents contamination from groundwater, the weather or residual material in the pipe during the installation.

Upon completion of the installation and cure, the ends of the pipe were terminated in the existing manhole structures. Rehabilitating the manholes was completed using epoxy applied with a spray-on process.

The entire project was completed in just four days, and 100% of the work was performed through the small 24-in. manhole openings in the airport surface, providing a true no-dig solution.

"The challenges associated with a project like this seem to energize our crew, and it is rewarding to see how a dedicated group of people can employ technology to solve a problem like this and literally leave no trace that we were on site," Timberlake said. "A successful project like this only continues to reinforce the value of trenchless technologies in our society." SWS

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