



PROJECT OVERVIEW

The city of Auburn, NY, currently operates several small hydroelectric facilities that use the water from the Owasco River, just north of the Finger Lakes. One of these includes the Mill Street Dam Hydropower Facility. The systems consist of a dam that diverts water during high flow times through a penstock to a small turbine and then back into the river. The original penstock was made from welded in place steel nearly 100 years ago. Over time, roads and other structures had been built above the pipe and the steel structure had begun to corrode. The city of Auburn approached Precision Trenchless, LLC of Schenectady, NY, looking for a long-term solution to create a new structural penstock within the current structure.

SOLUTION

The existing penstock is approximately 165 linear feet in length with a 10 percent incline to funnel water down to the turbine. At the entrance to the penstock, a flume measuring 12.5 feet wide and nearly 12 feet tall as the starting point of the repair. After the initial 10 linear feet, the pipe necked down to a structure that was approximately 10.5 feet in diameter. There were several load conditions that the pipe was subjected to due to significantly varying fill heights and live loads across the length of the pipe. In addition, approximately 80 feet into the structure, the pipe appeared to have been damaged by a significant impact during a previous construction.

Precision proposed and centrifugally cast geopolymer lining using GeoTree's GeoSpray geopolymer mortar as the rehabilitation solution. An engineering analysis was completed and the professional engineer decided that a liner thickness of between 2 and 2.75 inches depending upon the load conditions and diameter would be required.

PROJECT DETAILS

Location: Auburn, NY

Application: Penstock Rehabilitation

Client: City of Auburn

Installation: September 2016

Installer: Precision Trenchless, LLC



Completed penstock rehabilitation.



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RESULTS

The penstock pipe was pressure washed, cleaned and standard hydraulic cement was used to plug holes and stop several areas of active infiltration including fill soil voids prior to the application of the GeoSpray mortar. The 165 linear feet of the pipe were repaired by completing four passes over five days. Each pass was approximately 0.5" to 0.75," but the actual thickness could be varied during the pass by changing the sled retrieval speed. The sled retrieval speed allows for a thickness build of different amounts at different locations along the pipe based on the engineering requirements. The city had struggled with solutions that would be viable based on the geometry and size of the pipe and was glad to find a cost-effective solution that could be done within its time frame. The city of Auburn is looking for additional projects for the GeoSpray geopolymer mortar based on its positive experience.



Lining after four complete passes.



Welded steel pipe cleaned and prepared for geopolymer lining.



Application of geopolymer lining.



Close up of liner application.

