

Bank On It

Earthen dam rehabilitation with geotextile fabric prevents water loss



The McLeod Dam in Ontario, Canada, is a hydropower facility that powers the equivalent of 400 homes.



As the hydropower facility was being constructed, a leak in the dam embankment was discovered.

The McLeod Dam is one of six dams owned and operated by Quinte Conservation on the Moira River in Belleville, Ontario, Canada. Originally built in 1979 for ice control and flood protection, hydropower turbines were added in 2008. Today, the run-of-river hydro facility powers the equivalent of 400 homes in local communities.

During construction of the hydropower facility, Quinte Conservation discovered leakage through the dam embankment. Over the years, the PVC liner along the floodwall continued to decay. This damage allowed water permeation through the liner, which contributed to a loss of water flow through the hydropower turbines and a higher-than-normal water table in the surrounding area.

The Challenge

As a result of the damaged liner, the protection originally provided by the floodwall for a major traffic artery and

surrounding buildings no longer was guaranteed. Water also had begun seeping through the liner in the head pond and had even made it into the basement of one business.

Quinte Conservation needed to find a way to repair the earthen embankment and restore the level of protection that the floodwall provided for both public and private property around the reservoir and dam. Because the floodwall was under the municipal road, removal or repair of the PVC liner was not feasible.

The Solution

In 2012, Quinte Conservation engineers decided to dewater the reservoir and install a seamless spray-on polyurea liner over geotextile fabric to create a watertight membrane. The new liner needed to extend much farther upstream and to the intake that the original liner had in order to fully resolve the seepage issues.

First, the water level within the reservoir was lowered. A lining contractor removed all organic growth along the wall, and groomed and compacted the soil of the embankment to create a smooth surface.

Next, a concrete curb was installed at the base of the embankment to connect the turbine inlet at the dam to the upper end of the reservoir. A continuous keyway, or attachment point, was cut into the curb to the edge of the concrete dam. Along the top of the reservoir embankment, a trench keyway was installed to hold the upper edge of the liner in place.

For this application, Quinte Conservation chose to use a geotextile fabric sprayed with Rhino Extreme 11-55, a spray-applied polyurea by Rhino Linings Corp. It can be sprayed even in outdoor application sites where water, humidity and extreme temperatures exist. Because it is elastomeric, it can be applied to surfaces that are subject to vibration,



Engineers dewatered the reservoir and installed a seamless spray-on polyurea liner over geotextile fabric to create a watertight membrane.

expansion, contraction, movement, flexing, abrasion and impact. The fast-set lining has ideal hardness and elongation properties, high tensile strength, and tear and abrasion resistance.

The sheets of geotextile were rolled out, seamed and attached at the top and bottom of the embankment. Then the fabric was sprayed with Rhino Extreme 11-55 at a thickness of 80 to 100 mils. Gravel and riprap were layered over the

polyurea-coated geotextile to protect it from ultraviolet degradation and preserve the look of a natural riverbed.

The Results

The \$700,000 project rehabilitated 1,030 ft of the embankment and was completed in four weeks. The water level was raised gradually to return it to normal, and the reservoir was put back into operation. Two years after the project,

Quinte Conservation engineers noted the liner and fabric have held up.

"It is performing to expectations and was an excellent way to remediate our embankment," said Bryon Keene, Quinte Conservation's water resources manager. "The old liner had failed, and although this option was more expensive, we felt it was more durable and would withstand the harsh environment. We placed riprap directly over the surface of the liner with heavy machinery and it easily withstood the placement."

The result is expected to be a long-lasting solution that will keep the water contained. With routine maintenance, Quinte Conservation expects to get at least 40 years of service life from the Rhino Linings polyurea. **SWS**

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