The Background

Quincy Columbia Basin Irrigation District (QCBID) is one of three irrigation districts operating the Columbia Basin Project, which brings water resources to the Columbia Basin. In 1902, Congress passed the Reclamation Act which authorized the construction of irrigation storage and delivery systems. This included projects for the Columbia Basin region. The Columbia Basin Project was set in motion by President Roosevelt with the construction of the Grand Coulee Dam, which began in 1933. A railroad was built to move materials and workers to the building site. Congress then authorized the Columbia Basin Irrigation Project in 1943 and the first water deliveries started in 1948.

The Project
Extending the Longevity of Critical Irrigation Canals and Reducing Costly Seepage

Today, because of canal expansions and additional pumping plants, the number of irrigated acres is over 680,000 in the Columbia Basin. In addition, the Columbia Basin Project provides power for millions of homes, controls flooding in the lower Columbia region, creates habitat for endangered species, and provides areas of recreation. With water being such a vital component of life in the Columbia Basin, the QCBID has taken it upon themselves to provide longer lasting sustainable canals which will minimize the loss of this precious water and deliver it to the farmlands that need it. In 2009, QCBID entered into a coordinated water conservation plan with the East and South Columbia Basin Irrigation Districts and the Washington State Department of Ecology to conserve water and alleviate canal capacity.
The Challenge & IPG’s Solution

When the project first began, QCBID was using a costly geomembrane, which was composed of a thin liner with a heavyweight non-woven glued to each side. QCBID approached Intertape Polymer Group’s (IPG®) ECP Division for a more cost effective and stronger solution. The solution was ArmorPad™ 3NWLD.

IPG manufactures a wide range of woven reinforced geomembranes. ArmorPad 3NWLD is composed of a 5-layer system which is thermally bonded to provide some of the highest shear strength amongst liners on the market. It begins with strong, reinforcing scrim. Both sides of the scrim are bonded with im permeable coatings creating a strong geomembrane / liner that is both durable and flexible. ArmorPad then has a unique non-woven bonded to both outside surfaces, providing higher puncture resistance and extended durability.

In the case of this project for QCBID, the non-woven also acts as a bonding surface for the concrete which is applied directly onto the geomembrane composite.

Repairing the QCBID canals is a tricky operation as work must be completed in a short time frame. The water is shut off in mid-October and the water needs to be turned back on in early spring. The time frame for the work to be completed is reduced further, because the winter snow and rain season make it difficult to schedule access to the site and install concrete. This was a major factor QCBID wanted to overcome and IPG delivered with their fabricated liner which is made to the exact dimensions of the canal, thus reducing the amount of time consuming field seams by more than 90%. The liner was also made easy to install with a hot melt adhesive to bond the large panels together. This was a huge advantage for Halme Construction who won this phase of the project, since they were able to complete the installation themselves and did not have to schedule another installer for the liner.

“Having a single piece of liner which covered the width of the canal saved us time and money.”

-Halme Construction-Spokane, WA

The Installation

Repair of the canal began in November, 2016 with the reshaping of the canal. Once the canal was reshaped the ArmorPad 3NWLD was installed. The liner was delivered to the site in rolls which were just over 40 feet wide and 300 feet long. The rolls were made to fit into the canal easily, with enough slack left for burying it in the anchor trench. First the contractor placed one side into an anchor trench on the edge of the canal and rolled the entire 300 feet of ArmorPad 3NWLD out. Once the liner was placed into the anchor trench a small amount of soil was backfilled into the first anchor trench to hold the liner in place and protect it from wind.

Installers then pulled the other side across the bottom of the canal and placed it in the adjacent anchor trench. The ArmorPad 3NWLD composite is flexible enough to fit around most corners, however on some of the corners which were closer to 90-degrees, the contractor left enough slack material to make a cut and fold it over. The panels of liner were overlapped approximately 1 foot and each overlap was shingled downstream. The direction of
overlap is commonly overlooked when placing liners in canals and is one of the easiest mistakes to overcome! Halme construction had no issues with installing the liner in this manner. The next step was to connect each seam of the large panels together. A hot melt adhesive applicator was utilized. Each seam was completed with more than the recommended adhesive because of the ease at which the adhesive was applied. The hot melt adhesive unit heats the adhesive and pumps it through a nozzle, delivering three beads. The contractor would make 2-3 passes using this applicator for a strong, long lasting seam. Quality control was done on several of the seams and yielded higher peel and shear strength than most welded seams.

The final step to extending the life of these canals was to apply 4" of concrete over the top of the ArmorPad 3NWLD. The durability of the ArmorPad with the special combination of non-woven and liner for this project allowed the contractor to install the concrete directly into the canal without damaging the liner. The non-woven also provides an excellent bonding surface for the concrete. Halme Construction developed a unique concrete application technique for the exact dimensions of the QCBID canal network. They built a concrete buggy which allowed them to install the concrete quicker than doing it manually. The concrete trucks could pull up to the buggy and dump their concrete. As the concrete was fed down into the canal the buggy was moved along with a single track hoe. The entire operation was completed ahead of schedule and is now helping to save water throughout the Columbia Basin.

So far, the QCBID has installed more than six miles of rehabilitated canals with an estimated water savings of more than 1,257,786,517 gallons - the equivalent of 1,904 Olympic swimming pools.

For more information on this project, and the benefits that IPG ArmorPad can provide for your site, you can visit IPG’s website at www.itape.com or speak with one of your local IPG representatives.

References: QCBID - Quincy Columbia Basin Irrigation District
Halme Construction - Spokane, WA
Western Ag. Tolleson, AZ