The Value of Routine Preventative Measures

Situated in central Washington's Kittitas Valley, the 330 miles of canals and laterals of the Kittitas Reclamation District (KRD) service 60,000 acres of irrigated land. KRD diverts water from the Yakima River into its Main Canal by a diversion dam near the town of Easton. The Main Canal then carries the water parallel to the river at 1,200 cubic feet per second to a point where it divides into the North and South Branch Canals, with each branch providing water to irrigated lands of the Kittitas Valley.

This past spring, the Kittitas Valley experienced severe thunderstorms and torrential rainfall. On the night of July 17, 2012, a lightning storm is believed to have caused a glitch in the electrically controlled

Void in the canal bank and intact lining.

KRD crew finishing repair behind the canal lining.

Damage to the canal bank on KRD's Main Canal.

gate that feeds the South Branch Canal. The gate fully closed, putting additional water in the Main Canal, which was already at maximum flow, and causing a significant overflow of the concrete-lined canal.

As soon as the South Branch gate closed, the water level rose above the concrete panels lining the canal at a point upstream of the gate and started flowing over the canal bank. While the water did not wash out the adjacent canal bank roadway, it did flow into the rocky fill of the canal embankment. Soil was washed out from between the rocks, allowing the concrete canal lining to settle at least 1 foot into the void. Parts of the canal lining were unsupported while water was flowing at abnormally high levels in the canal.

Led by District Manager Ken Hasbrouck, KRD staff and crew took quick action to assess the situation and create a plan of action. KRD requested that CH2M HILL engineer Dick Haapala visit the damaged area the following morning. He observed the void in the embankment and several concrete lining panels suspended in midair next to the void. Even though the canal lining had moved, it was intact and holding water in the canal.

In the spring of this year, as part of routine canal maintenance, KRD continued with an accelerated joint sealing program. At the recommendation of Mr. Haapala several years ago, KRD hired a company to spray Aqualastic—an elastomeric polymer material—on the joints and cracks up for repair at that time. Notably, the damaged area just happened to be on this year's maintenance schedule. Although only the joints were sealed, not the entire panel surface, the protection was sufficient to prevent water from rushing out of the canal.

In the past, KRD had only utilized asphalt-like materials for its sealing projects. Those materials, however, often lacked the flexibility and elasticity to address the considerable movement in the lining joints. By this spring, KRD had been using Aqualastic for several years.

After assessing the damage, Mr. Haapala determined that the lining was stable as long as it was not disturbed and a proper amount of support could be added behind it. KRD carefully placed a controlled density fill (CDF) consisting of a very low-strength concrete in the void in the canal bank to provide support underneath the lining. CDF is usually composed of sand, a little cement, and additives to make it flow in and around rock voids or pipes. In the end, the lining had settled more than a foot, lower than what it should be to provide a normal amount of freeboard. To raise the canal side back up after the CDF had set, KRD formed and poured a concrete curb on the top edge of the lining.

The fix ended up being relatively simple. So too was the lesson. Preventative maintenance—here in the form of sealing joints with flexible, rubbery material—can save thousands of hours of work and cost down the road. Had those joints not been sealed, there would have been considerably more flow through the canal lining, washing it and the steep hillside below out into the Yakima River. In this case, routine maintenance directly prevented, in the words of Mr. Haapala, "a catastrophic failure."