



*Modified outlet on Keller Creek*

## Automated outlets mitigate flood risk in RWMWD

With the 2013 release of Atlas 14, Volume 8 (National Oceanic and Atmospheric Administration [NOAA] precipitation estimates), the Ramsey-Washington Metro Watershed District (RWMWD) updated its hydrologic and hydraulic model to calculate 100-year water surface elevations throughout the district. The model identified numerous flood-prone structures—several of them within the Phalen Chain of Lakes subwatershed. Mitigating this flood risk, without purchasing flood-prone homes, required some out-of-the box thinking.

### Restricted capacity

Adding to the problem of increased rainfall depths was the fact that the Beltline Stormwater Interceptor, the outlet for the Phalen Chain of Lakes, was at capacity during a 100-year event. The Beltline is part of the District's stormwater infrastructure, conveying runoff from the entire Phalen Chain of Lakes and Beaver Lake to the Mississippi River. During flood events, the Beltline restricts flow to the river. After modifications in 2001 and extensive repair work in 2018, there was no additional capacity for an increase in peak flow rate into the Beltline to lower upstream flood levels.

"We couldn't increase the peak flow rate through the Beltline," said Barr engineer Brandon Barnes. "The question was, is there a way to create storage?" As it turns out, the answer was yes: real-time mechanical operation of Lake Phalen and Keller Creek channel outlets. These outlets control water levels on the Phalen Chain of Lakes.

The concept was that flow could be passed through the outlets to the Beltline prior to a large rain event (when the pipe was not at full capacity), creating additional storage in the Chain. The general operation of the structures includes

(1) lowering the outlets as water levels increase so more water will be conveyed to the Beltline and (2) raising the outlets to their existing levels when the Beltline is near its capacity.

Modifications to automate the Keller Creek and Lake Phalen outlets occurred in the winter of 2020–2021. At Keller Creek, a fixed-crest weir was removed and replaced by one that staff could lower based on water levels. At Lake Phalen, two pipes were installed into the side of the two existing outlets, each with a manhole and adjustable gate. The system has been fully functional since August, but there has not been enough rainfall to trigger operation.

### Ease of operation

The outlets are set up so that authorized RWMWD staff can operate them from a secure computer in the office or by using a cell phone app from anywhere. In the event of a power loss the outlets can be operated on-site (including manual operation). Each weir and outlet can be moved individually, and the interface allows staff to see the gates moving in real time. The system alarms if gates do not move or water levels get too high. "It gives them flexibility," said Barnes, "and it frees up a lot of storage volume in the Phalen Chain."

In addition to designing the system, Barr provided RWMWD with an operations plan. According to Barnes, adjustments depend on upstream water levels, the time of year, and rainfall forecasted by the National Weather Service. These 48-hour forecasts are updated hourly.

For more information on the automated system, contact Brandon Barnes ([bbarnes@barr.com](mailto:bbarnes@barr.com), 952-832-2737).