BRIERLEY ASSOCIATES
Creating Space Underground

IN DEPTH
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Missouri River Wastewater Treatment Plant Improvements – Chlorine Contact Basin, Omaha, NE

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Beginning in 2012, as part of the Omaha Long Term Control Plan to reduce untreated discharges into the Missouri River, a three phase program was implemented at the Missouri River Water Resource Recovery Facility (MRWRRF) to increase treatment capacity for wet weather flows. These improvements, when combined with other projects that are being built to deliver additional wet weather flow to the plant, will result in a significant reduction in bacterial loading to the Missouri River.

Aerial photo of MRWRRF during installation of the CCB diaphragm wall.

Construction for the third phase of improvements will disinfect flow in excess of the biological treatment capacity of the plant. This will be accomplished by a new Chlorine Contact Basin (CCB). The CCB is approximately 280-ft long by 80-ft wide and 30-ft deep and located within the Missouri River floodplain. To construct the below grade basin structure, a concrete diaphragm wall was designed to serve as the temporary support of excavation and as a permanent structural component of the exterior basin wall. The diaphragm wall was constructed using a hydraulic clamshell under bentonite slurry and extended approximately 80-ft deep and toed into the bedrock to provide global stability. The overburden soils generally consist of soft clay overlaying a confined sand aquifer above bedrock. Several excavation challenges were posed by the soft clay including: basal stability, potentially large ground deformations if not properly mitigated, and base heave due to the underlying pressurized aquifer.

Brierley Associates was retained by the general contractor, Omaha based Hawkins Construction Company, and specialty shoring subcontractor, Nicholson Construction Company, to serve as engineer-of-record for the diaphragm wall, value engineering and temporary internal bracing design.

To improve constructability of the diaphragm wall, Brierley worked with Hawkins and Nicholson to:

- Decrease the widths of the primary and secondary diaphragm wall panels which improved trench stability, reduced dimensions of the reinforcing cages and the required service crane size to lift the cages into place.
- Redesign the diaphragm wall using a higher grade reinforcing steel to reduce rebar congestion, improve concrete consolidation and reduce overall weight of reinforcing cages.

Additionally the team worked together to redesign the temporary internal brace system to incorporate a discontinuous waler, thus reducing the number of required struts. This redesign also allowed shortening of the internal bracing anchorage embedment depth to minimize potential conflicts with reinforcement and the tremie pipe used during concrete placement.

The collaborative efforts of Hawkins, Nicholson and Brierley benefited the project through value engineering of the diaphragm wall, improving its overall constructability, and the seamless coordination of the internal temporary bracing design with the excavation and casting sequences of the permanent basin structure. Through this team effort, the project is on schedule to be completed mid-summer 2019.

Excavation of CCB after installation of first level of internal bracing.