

2018 State Water Commission Construction Season

The SWC construction crew worked on several projects in various areas throughout the state in 2018.

DEVILS LAKE WEST END OUTLET STANDPIPE MODIFICATION, BENSON COUNTY



SWC construction crew members cutting additional holes in the center core of a standpipe.

The Devils Lake West End Outlet, owned by the North Dakota State Water Commission (SWC), discharges a maximum of 250 cubic feet per second of water from Devils Lake through a system of canals and pipes to an outfall structure along the Sheyenne River, fourteen miles away. The project consists of two pump stations. Each pump station has a standpipe that maintains a constant pressure on the pumped portions of the system. In past operating seasons, the standpipes would develop foam that would build up to the point it blew out of the vents at the tops of the tanks.

In 2017, work was done to try to reduce or eliminate the foam buildup. This work consisted of cutting holes in the center core of each standpipe to change the turbulence at each operating water level. This initial effort was mostly successful in reducing the foam build up. However, it was found that additional holes were needed in the Round Lake standpipe at the maximum water level elevation. In February 2018, the SWC construction crew, along with the outlet operations staff, erected scaffolding and cut additional holes at the max water level. The standpipe operated without any foam issues throughout the 2018 pumping season.

The Devils Lake West End Outlet, owned by the North Dakota State Water Commission (SWC), discharges a maximum of 250 cubic feet per second of water from Devils

DEVILS LAKE EAST END OUTLET OUTFALL REPAIR, NELSON COUNTY



The East End Outlet was temporarily shut down for twenty days to conduct repairs.

The Devils Lake East End Outlet, owned by the ND State Water Commission, discharges a maximum of 350 cubic feet per second of water from Devils Lake through an 8-foot diameter concrete pipe to an outfall structure in the Tolna Coulee five miles away. The outfall structure consists of a reinforced concrete spillway structure, an area of articulated concrete block for energy dissipation, and a sheet pile wall as the final stage.

Over the previous several pumping seasons, the impact of the discharge spilling onto the concrete block displaced the block, and the soil at the base of the outfall structure began to erode away. In 2018, repairs were required at two separate areas of the outfall structure to prevent undermining of the structure.

The first repair took place prior to the start of the 2018 pumping season and consisted of driving piling along the toe of the reinforced concrete spillway structure and filling the space behind the piling and under the structure with a flowable concrete fill to replace the eroded soil and prevent future erosion.

The second repair took place in August and was required after a separate area of erosion formed at the sheet pile wall which was placed during original construction in 2012. For this repair, the outlet was shut down for twenty days, the area was excavated, and a separation in a seam of the sheet pile wall was observed. This separation of the seam was likely caused by a large rock encountered during initial construction and resulted in a seepage path which eventually led to the damaging erosion. For this repair, both sides of the wall were excavated, a secondary wall was driven, and the hole was filled with concrete to prevent future erosion. The wall was then backfilled with rock to provide additional energy dissipation. With these repairs completed, the East End Outlet was able to provide reliable operation for the remainder of 2018 and is prepared to serve the region into the future.

SCHLENKER DAM, LAMOURE COUNTY



These repairs will ensure beneficial use for recreation.

Schlenker Dam is a small recreational fishing reservoir located in LaMoure County ten miles east of Gackle. The dam is an earth embankment dam constructed in 1970.

The principal outlet consists of a 48-inch corrugated metal pipe (CMP) riser and 30-inch CMP conduit. The outlet also includes a valve to release water from the bottom of the lake to improve water quality.

The CMP riser developed leaks leading to loss of water from the reservoir. The joint at the riser to conduit connection had ruptured, allowing water and soil to leak through the opening - resulting in a sinkhole around the riser. The valve for the low-level outlet was also heavily rusted. In 2017, the LaMoure County Water Resource District requested cost-share, along with technical and construction support from the Water Commission to repair the principal spillway.

The repairs began in June 2018, with the construction of an earthen coffer dam. This was followed by excavation of the riser. Forms were then placed around the existing CMP riser to create a reinforced concrete drop structure, using the CMP as the inside form. New fittings for the low-level outlet were cast into the new concrete and a new valve and operator stem were installed in the riser. The structure was then backfilled and the cofferdam was removed. The borrow site was reclaimed and seeded. With these repairs, Schlenker Dam will continue to provide a place for anglers to enjoy the North Dakota outdoors for years to come.

The principal outlet

to Hwy 200A. The dam is owned by the state, with responsibility for the dam functions falling under the North Dakota Game and Fish Department.

The dam has two low-level drawdown systems, used primarily for water quality improvement in the reservoirs, one in each embankment. The low-level drawdown systems consisted of 12-inch ductile iron pipe (DIP) conduits with gate valves at the downstream end. Outlet works with valves at the downstream end, referred to as "downstream control" were once popular in dam construction because they are easier to construct and cost less than upstream control systems. However, downstream control presents a risk of dam failure if the pipe full of water near the downstream toe of the dam starts to leak. A possibility made more likely by the fact the conduit is made of iron. That is what happened at the west embankment of Daub Dam in the spring of 2018. Fortunately, it was found quickly by Game and Fish staff before significant damage to the embankment occurred. The west reservoir was quickly drained to prevent further damage to the embankment and loss of this important transportation corridor.

The Game and Fish Department requested cost-share along with technical and construction support from the Water Commission to mitigate the risk of the downstream control on both embankments, and to install a new low-level outlet on the west reservoir for water quality.

DAUB DAM, MERCER COUNTY



A sink hole discovered on April 10, 2018.

Daub Dam forms the embankment of ND Highway 200A and creates two small recreational fishing reservoirs divided by a narrow isthmus. The reservoirs may be better known as East and West Arroda Lakes and

are 11 miles west of Washburn. The dam is two earth embankments built in 1971 as part of improvements



Concrete truck pumping concrete grout for the project.

The State Water Commission construction crew filled the existing low-level conduits with a cement grout to seal them and eliminate the risk caused by the high-pressure water near the toe of the dam. In the spring of 2019, the plan is to install a new outlet conduit with control on the upstream side of the dam into the west embankment's principal spillway.

US GEOLOGIC SURVEY

Throughout 2018, the State Water Commission also continued to cooperate and coordinate with the US Geological Survey (USGS) on the maintenance and improvement of the USGS's stream gaging sites across the state.