

## SWC 2010 Construction Projects Summary

The 2010 construction season for the Water Commission's construction crew was another busy one, with flood fighting and spring inspections in early spring, and several projects thereafter. However, wet conditions in the spring and early summer months delayed the start of repair projects, and swollen rivers prevented some inspections until mid summer.

The construction crew also constructed, modified, and repaired stream gauges and water quality collection sites throughout the state in cooperation with the U.S. Geological Survey. The Water Commission was also involved in several other repair and modification projects that did not directly involve the construction crew.

The construction crew includes Project Manager Darron Nichols, and Operators Dan Bahm and Duane Foote.

The following is a summary of the projects the construction crew worked on during the 2010 construction season.

### Flood Fighting

Once again, the construction crew and other Water Commission staff spent the end of March at Cottonwood Creek Dam/Lake LaMoure in LaMoure County, working in cooperation with local, state, and federal agencies to stabilize the emergency

spillway to prevent a dam breach during the spring runoff. Repairs to the spillway, which are covered in more detail below, should be completed in the fall of 2010.

### Blacktail Dam, Williams Co.

Blacktail Dam is a recreational use earthen dam located on Blacktail Creek in Williams County, northwest of Williston. At normal pool, the reservoir holds 2,668 acre-feet of water, and is a significant hazard dam due to its proximity to Williston.

The Williams County Water Resource District requested cost-share, construction, and technical assistance to replace the control valve on the low level system. The nearly 20-year-old valve was not being used due to concerns it may not close

again if opened, thus taking away the means to manage the water quality of the reservoir. The Water Commission construction crew replaced the valve with a new 12-inch gate valve capable of being operated from the catwalk above the inlet structure, or from a boat alongside the structure.

The North Dakota Game and Fish Department owns the dam and participated as a cost-share partner in the project.

### Braddock Dam, Emmons Co.

Braddock Dam is a recreational use earthen dam, located southwest of the town of Braddock. It is owned by Emmons County, and the Emmons County Water Resource District requested Water Commission assistance with repair options, including cost-sharing and construction services. The North Dakota Game and Fish Department also participated as a cost-share partner.

The 2009 spring runoff caused significant damage and erosion of the sheet pile stilling basin structure and surrounding soils downstream from the principal spillway (see photo). The erosion removed an estimated 600 cubic yards of material, including the riprap along the downstream

face of the structure. It appears that the flow may have completely overtopped the structure - starting the erosion around the ends of the structure. The scour removed the supporting soils from in front of the six-foot wings, causing the left side to fail.

The main concrete spillway of the dam also had some areas where the concrete had cracked and spalled, leaving holes in the face of the spillway. This damage was unrelated to the 2009 and 2010 runoff events, but was more than likely due to deterioration over time.

The construction crew repaired the erosion by placing and compacting new clay borrow, replaced some of the existing sheet pile sections, and added some new lengths to extend the structure farther up the banks of the stream. Additional riprap was also placed around the structure, and repairs were made to the deteriorated/missing concrete with concrete repair mortar.

### Doll/Zeitlow Dam, Morton Co.

Doll Dam is a medium hazard earth embankment livestock dam that also carries Morton County Highway 140, northwest of New Salem. Doll Dam, originally called Zeitlow Dam,

is a WPA dam built in the 1930s.

On April 21, Morton County Engineer, Mile Aubola, notified the Water Commission of a breach at Doll Dam. The breach may have been the result of connecting rodent tunnels within the embankment. A small hole was draining water into the downstream ditch about 60 feet from the spillway pipe. This hole was running at approximately 31 gallons per minute.

The Morton County Water Resource District requested Water Commission assistance to repair the embankment. The Water Commission construction crew repaired the embankment by excavating and recompacting the soil material to close off the hole.

### Fort Ransom Dam, Ransom Co.

Fort Ransom Dam is a low hazard concrete low head dam on the Sheyenne River within the city limits of Fort Ransom. It was originally built in 1881, and reconstructed in 1954. At normal pool level, it holds 92 acre-feet of water, and is currently used for recreational purposes.

During 2009 and 2010 inspections, Water Commission personnel

observed erosion around the right abutment. The erosion appeared to be the result of water overtopping the dam during the last two spring runoffs. The erosion consisted of both loss of riprap and head cutting of the earth fill around the end of the abutment.

The Ransom County Water Resource District requested construction and technical assistance from the Water Commission, in addition to cost-sharing to repair the erosion. The Water Commission construction crew repaired the embankment by excavating and recompacting the existing material, adding new material as necessary, and placing new riprap over the fill.

### Olson/Tongue River WS Dam T7-1, Pembina Co.

Olson Dam is a high hazard, earth embankment flood control dam on a tributary of the Tongue River, southwest of Cavalier. It was built in 1957, and at maximum pool holds 1,077 acre-feet of water.

During the summer of 2010, the outlet structure intake became plugged with debris, preventing it from passing floodwater as intended. The Water Commission construction



The damaged sheet pile stilling basin and erosion at Braddock Dam.

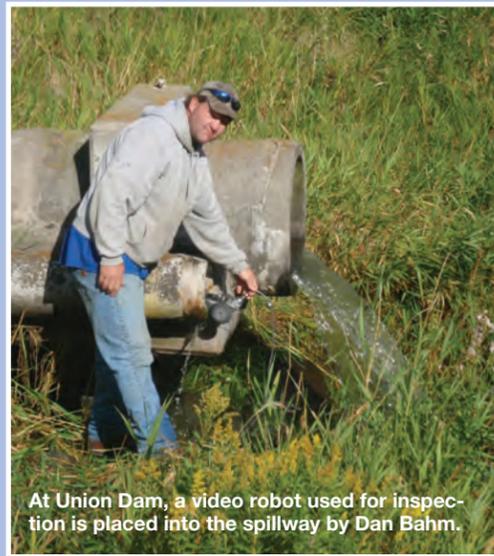


Placing rock riprap at Fort Ransom Dam.



Floodwater impounded behind Olson Dam as a result of the intake becoming plugged with debris.

The downstream section of the new corrugated metal pipe spillway at Sarnia Dam.



At Union Dam, a video robot used for inspection is placed into the spillway by Dan Bahm.



Erosion of the emergency spillway at Absaraka Dam.



Armoring the spillway of Cottonwood Creek Dam. Inset: the cable-tied concrete block mats used to armor the spillway.



Veit Construction working on the new reinforced wing walls of the stilling basin at Sweetbriar Creek Dam.

crew worked with members of the water resource district and the USDA-NRCS to clear the debris from the trash rack. Initial attempts at clearing it with hooks and rakes were ineffective. Finally, compressed air was used to blow the debris loose.

#### Sarnia Dam, Nelson Co.

Sarnia Dam is a low hazard, earth embankment flood control dam located on a tributary of the Middle Branch Forest River, north of the city of Michigan. It was originally built in 1936 and reconstructed in 1981. At maximum pool it holds 1,610 acre-feet of water.

During 2009 and 2010 inspections, Water Commission personnel observed erosion around the inlet of the principal spillway structure. The principal spillway conduit is a 42-inch diameter by 102-foot long corrugated metal pipe with a flared end section at the upstream end. The

erosion appeared to be the result of soil entering the conduit through a rusted-out hole in the bottom of the flared-end section. The erosion progressed outwards, ultimately to the surface of the embankment. It then progressed up the slope of the embankment along each side of the spillway conduit.

The construction crew repaired the embankment by excavating and recompacting material where erosion occurred, and replaced the flared-end section.

#### Union Dam, Walsh and Cavalier Counties

Union Dam is a medium hazard, earth embankment flood control dam northwest of Grafton that was built in 1970. At maximum pool it holds 2,467 acre-feet of water. The Walsh and Cavalier Water Resource Districts jointly own the dam.

During previous inspections, a

sinkhole over the outlet end of the principal spillway conduit was observed. The size of the sinkhole continued to increase over time. Video inspection of the pipe from July 2008 showed separation at two joints, where embankment material was entering the pipe and causing the sinkhole.

The Walsh County Water Resource District requested Water Commission cost-sharing and construction assistance to repair the conduit and the sinkhole. The construction crew repaired the conduit by exposing the conduit, installing sheet pile anchors along each side of the conduit to prevent further separation of the joints, and then filled the joint with a concrete repair mortar. The joint was then covered with geo-textile fabric before backfilling to prevent soil material from entering the conduit in the future if the joint opens again.

#### USGS Gauging Stations, Statewide

The construction crew constructed, modified, and repaired several U.S. Geological Survey gauging stations/collection sites throughout North Dakota. The work involved installation of orifice lines and staff gauges, removal of gauge houses, installation of gauge houses, and repairs to sheet pile control sections.

*The Water Commission was also involved in other repair projects in 2010, by providing technical assistance and funding through our cost-share program, in addition to regulatory review and permitting.*

#### Absaraka Dam, Cass Co. Cottonwood Cr. Dam, LaMoure Co.

Both of these projects suffered severe erosion in their emergency spillways during the 2009 and 2010 spring runoff events. The emergency spillways at these projects are grass-lined channels that experienced high flows for long periods of time, resulting in erosion and head cutting of their channel bottoms. The emergency spillways at Absaraka and Cottonwood Creek Dams were repaired during 2009 and then subsequently severely eroded again in 2010. Following the second round of damage, it was decided that rather than simply repairing the spillways to their pre-damage conditions, they would be reconstructed by armoring with cable-tied concrete block mats to prevent them from being damaged again.

The USDA-NRCS provided engineering and 75 percent cost-share for construction at Absaraka and Cottonwood Creek. The Water Com-

mission and local entities picked up the remaining costs of the Absaraka project. With Cottonwood Creek Dam, the Commission, local entities, and the North Dakota Game and Fish Department all served as non-federal cost-share contributors. Both the Absaraka and Cottonwood Creek projects were completed in 2010.

#### Clausen Springs Dam, Barnes Co.

Clausen Springs Dam was not repaired after 2009 spring runoff damage, pending a decision on whether or not it should have a structural spillway in lieu of an earthen spillway. It was ultimately decided to repair the spillway with an armored earthen spillway similar to Absaraka and Cottonwood Creek Dams. Clausen Springs is planned as a two-phase project, with Phase 1 being completed late this year and Phase 2 being completed in 2011. Project costs are being shared between local entities, Game and Fish, and the Water Commission.

#### Sweetbriar Creek Dam, Morton Co.

Sweetbriar Creek Dam is a high hazard, earth embankment recreational use dam on Sweetbriar Creek

west of Mandan. The dam was built in the 1960s as part of the construction of I-94, and serves to carry the Interstate across Sweetbriar Creek. At normal pool the reservoir holds 3,640 acre-feet of water.

Since its first inspection as part of Phase I of the U.S. Army Corps of Engineers dam inspection program, there have been concerns about uncontrolled seepage around the spillway structure and the potential for internal erosion piping of the embankment material. This summer's project was designed to address these concerns. The project involved the construction of a filter collar around the spillway structure, along with the installation of toe drains and filters along the toe of the dam. Also, the stilling basin's reinforced concrete wing walls were reconstructed due to extensive cracking, and the access ladder that had become dilapidated was replaced with a new design that incorporates fall protection.

The project was of such magnitude that it was constructed through the use of an outside contractor. Veit Construction of Rogers, Minnesota was awarded the contract in May, and completion is expected by the end of the year.



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