memo

651 Hale Avenue North Oakdale, Minnesota 55128 telephone: 651.770.8448 facsimile: 651.770.2552 www.eorinc.com

Date | 6-7-2010

To | Chisago Lakes LID Board of Managers

cc | Jerry Spetzman

From | Dan Fabian & Greg Graske

Regarding | 5/21/2010 Channel and Outlet Structure Inspection

---

On May 21st, 2010 an inspection of the Chisago Lakes Outlet Channels and Structures was conducted. Chisago County staff Jerry Spetzman, Mary Christopherson and Monica Kinny along with EOR engineers Dan Fabian and Greg Graske performed the field inspection. Also, along for the inspection was John Erdmann from the MPCA. John was one of the original project engineers that designed the system and was able to provide first hand knowledge and background regarding the channel system. The following summarizes the inspection, actions performed, and any future actions recommend. Actions in red are recommended for action in the near future, actions in orange are action that require future follow or monitoring up but are not urgent, and actions in green are minor maintenance items that were completed in field prior to this report.

Channel from Chisago Lake to Wallmark Lake

The entire length of the channel from Chisago Lake to Wallmark Lake was walked. Erosion was noted in the channel near the connection with Chisago Lake. This was being caused by head cutting of the channel that is a result of a combination of factors including stormwater flows towards Chisago Lake and the lake level being down several feet. Some rock has been placed in the channel in an attempt to stop this erosion. Additional strategic placement of rock may be warranted for better protection of this channel. Also near the connection with Chisago Lake a downed tree is obstructing the channel and should be removed.

Photos: left-exposed/eroding bank caused by head cut, right-deadfall in channel

Just downstream of these areas is a large box culvert that flows under Stinson Avenue and Highway 8. At the down stream end of this pipe some of the large rock placed for erosion control purposes is currently sitting above the invert of the pipe. This may be obstructing some of the flows from upstream. The

landowner at the upstream end of the box culvert is concerned about water levels and stormwater flowing towards Chisago Lake that he feels should be flowing out towards Wallmark Lake. Removal of this rock and further investigation of drainage in this area is warranted.

North of North Avenue it was noted that several large branches had been placed across the channel to provide a crossing for a path from the nearby tot lot. It is our understanding that at one-time there was a small foot-bridge at this location. The branches were removed from the channel as has been done on previous inspections. Because this appears to be an ongoing problem the LID may want to consider a more long term solution. One option that could be considered is placement of a small foot-bridge at this location to allow for crossing the channel without placing obstructions in the channel.


Photos: left-rock placed above pipe invert, right-branches placed in channel

Recommended Action:

- Remove fallen tree from channel near Chisago Lake channel connection.
- Rearrange rip rap at box culvert outlet such that it is not obstructing upstream flows.

Suggested Follow Up:

- Survey of channel upstream and downstream of box culvert to determine if there is positive grade and determine if there are obstructions causing flow toward Chisago Lake instead of out to Wallmark Lake as observed by landowner. Compare survey against project as-built plans.
- Have Engineer develop sketch plans to address erosion of channel into Chisago Lake, develop preliminary cost estimate and bring back to Board for consideration.
- Board should discuss pros and cons of placing a bridge at the make shift crossing site currently being used to cross the channel. If Board feels a small foot-bridge is appropriate then staff should be directed to work with park (tot lot) owner on bridge design, installation and maintenance. We suggest LID consider providing cost share funding with park owner being responsible for installation and on-going maintenance.

Minor Maintenance Items Completed:

- Removed branches placed in channel
- Lopped off small trees growing on overflow weir control structure

Channel from Wallmark Lake to County Road 19

The crossing at County Road 19 was visited. A small amount of stagnant water was noted in the small grass channel. Flow was not observed. No maintenance issues were noted.

Suggested Follow Up:

- Next quarterly inspection walk the entire channel and investigate the connection at the Wallmark Lake outlet.

Channel from Chisago Lake to Green Lake

The entire length of the channel from Chisago Lake to Green Lake was walked. Between Chisago Lake and County Road 83 a small sediment hump was observed and was likely the beginning of a beaver dam. At the time of the visit this sediment hump was only holding back a couple inches of water. This hump was breached during the site visit.

Photos: left sediment hump before breach, right sediment hump after breach

About midway between County Road 83 and the outlet structure going into Green Lake a large beaver dam was observed this dam was holding back approximately 2 feet of water.


Photos: left-large beaver dam, right erosion near channel bank

Further down the channel significant erosion was noted up on the bank of the channel. The erosion appeared to be caused by runoff from the adjacent farm field concentrating at the location of erosion. Although it did not appear that the sediment is making it all the way down to the channel bottom, it is recommended that this area be stabilized before this starts to occur. Strategic placement of rock and plantings could be used to stop the erosion

Recommended Action:

- Remove large Beaver Dam. Remove beaver prior to removal of beaver dam. Engineer to get contact information for beaver trapper.

Suggested Follow Up:

- Engineer to visit erosion site to take measurements, develop sketch plans, preliminary cost estimate and bring back to Board for consideration.
- Recheck small sediment hump during future inspections to determine additional Beaver activity and need for removal.

Outlet Structure from Chisago Lake Outlet Channel into Green Lake

The outlet structure connecting the channel from Chisago Lake to Green Lake was visited. Branches were noted that appeared to be placed inside the weir structure by a beaver. Jerry Spetzman performed some minor maintenance items that are noted below subsequent to the inspection.


Photos: left-Branches inside of control structure, right-Testing operation of gates

Recommended Action:

- Remove branches from overflow weir.

Suggested Follow Up:

- Periodically exercise the gates to maintain them in working order.
- Purchase or have another tool made for operating the control gates (currently there is only one tool between the two control structures). Engineer to obtain and review original project specifications for gate model, recommended maintenance practices and check on availability of a portable motorized tool for operating gates.
- Monitor site for continued beaver activity and need for beaver control.
- Replace faded undertow warning sign.

Minor Maintenance Items Completed:

- Cleaned out the mouse nests in the crank boxes.
- Greased three grease fittings in each of the crank boxes.
- Hammered in all high nails.
- Oiled all locks.
- Replaced broken hasp lock

Outlet Structure and Pipe between Lake Ellen and Swamp Lake

The outlet structure on Lake Ellen was visited. Debris was currently in the process of being removed from around the Lake Ellen structure. It was clear from the site visit that a beaver had decided to make the structure his home. A beaver was observed inside of the structure. The outlet gate was partially open when the site was visited. No water was flowing over the sheet pile weir. The gate was closed during the site visit. The emergency management plan calls for the gate to be open when the lake level is 891.5. The plan also says that the gate may remain closed when lake levels are below 891.0. Lake Ellen was at elevation 889.4 on 5/26/2010 per monitoring report. Continue to monitor lake levels and open gates when water levels start to increase. Jerry Spetzman performed some minor maintenance items that are noted below subsequent to the inspection.

Photos: left-Outlet control structure, right- Beaver inside of outlet structure

Leaving the outlet structure is a long pipe that discharges to Swamp Lake. About a third of the way downstream is a manhole with an inlet structure that is located in the middle of the farm field. There is some concern that sediment from this farm field may be entering the pipe. It is recommended that a sediment control device or structure modifications be located above or around this structure to limit sediment into pipe. The down stream end of the pipe is partially submerged and the water at the outlet was cloudy. It was unclear what was causing the murkiness in the water. Televising the pipe has been proposed and it is recommended that this occur when possible. It may be possible to sand bag the end of

the pipe and dewater in order to get the camera inside of the pipe. Maintenance at the downstream end of Swamp Lake (see Swamp Lake of report) may also help with lowering water levels.



Photos: left-Beehive Inlet above Lake Ellen outlet pipe, right- Outlet pipe into Swamp Lake

Recommended Action:

- Proceed with televising pipe.
- Engineer to obtain and review plans and make recommendation for dewatering pipe prior to televising, if maintenance at Swamp Lake outlet does not sufficiently lower water levels.
- Remove beaver at Ellen Lake weir.

Suggested Follow Up:

- Monitor Beaver Activity going forward and determine need for additional beaver control if beaver debris build-up continues to be a major problem at this location.
- Determine whether the gate should remain in the closed position until water levels start to rise on the lakes again. Engineer to review operation plan and make recommendation.
- Periodically exercise the gates to maintain them in working order.
- Purchase or have another tool made for operating the control gates (currently there is only one tool between the two control structures). Engineer to obtain tool cost information and also explore availability of powered tool for operating gates.
- Engineer will explore sediment control options and costs at pipe inlet in farm field and provide recommendation to Board.

Minor Maintenance Items Completed:

- Cleaned out the mouse nests in the crank boxes.
- Greased three grease fittings in each of the crank boxes.
- Hammered in all high nails.
- Oiled all locks.

Swamp Lake Outlet

The Swamp Lake outlet pipes under County Road 80 were visited. This location has 7 pipes under the road to convey flow. Water was flowing at the time of the inspection. The pipes were partially filled with water due to rock and debris just downstream of the culverts that appeared to be obstructing some of the flow causing tailwater on the pipes. The water drop across the obstruction was estimated at about half a foot.


Photos: Outlet End of pipes leaving Swamp Lake

Recommended Action:

- Minor clean-out at outlet end of pipes and reconfigure rip rap.

Ivy wood Outlet Structure

The culvert crossing under Ivywood Trail was visited. The previous inspection report indicated that the stop logs had been removed and were sitting adjacent to the structure. The stop logs have subsequently been replaced. This culvert crossing only serves as an equalizer under the road as the outlet channel to the west was never finished.

No Action Needed.

Bloomquist Creek Crossings @ County Road 19 and Ivywood Trail

The Bloomquist Creek Crossing at Ivywood Trail was visited. Water was flowing through the stream and no maintenance issues were noted. The Bloomquist Creek Crossing at County Road 19 was also visited and water was flowing at this location also. The upstream end of the pipe was completely submerged, while the downsteam end only had a couple inches of water actively flowing through it. It was unclear why the upstream end of this culvert was submerged and further investigation is warranted.



Photos: Left-Bloomquist Creek Crossing @ Ivywood, Center-Upstream end of Bloomquist creek crossing @ CR 19, Right-Downstream end of crossing @ CR 19

Suggested Follow Up:

- Engineer to obtain plans for County Road 19 crossing to determine original design.
- Engineer to make recommendations for further action depending on the outcome of the design plan review.