May 4, 2017

Board of Managers
Buffalo-Red River Watershed District
PO Box 341
Barnesville, MN 56514

Subject: 220th Street Ditch Investigation
HEI Project No. 1915_018

Dear Managers:
We have taken a detailed preliminary look at one alternative to provide improved drainage along 220th Street in Sections 31 and 32 of Mitchell Township, Wilkin County. This area will be referred to as the Target Area for the rest of this letter. Per the request of local landowners, we’ve taken a more in depth look at Alternative 1 which would take water due west and outlet into Whiskey Creek approximately 700ft upstream of the confluence of Whiskey Creek with the Red River of the North. We’ve also taken a cursory look at two alternative outlets for the 220th Street drainage (Alternatives 2 and 3). See the attached map for the alignment alternatives.

INTRODUCTION
In March of 2017, local landowners came to the Board of the Buffalo-Red River Watershed District with a request to provide improved drainage to the Target Area. Poor drainage, inadequate ditch sizes, and separation from the field elevation have resulted in flooded fields and crop loss on a frequent basis in the Target Area and upstream watershed. To alleviate the flooding concerns, the landowners requested that the capacity of the ditch located along 220th Street be increased. At the March 27, 2017 Board meeting, the BRRWD Board authorized this study.

The existing ditch located in Sections 31 and 32 of Mitchell Township, flows from east to west on the north side of 220th Street. At approximately 0.76 miles west of CSAH 3, the ditch crosses 220th Street to the south into Section 6 of Nordick Township, Wilkin County. The existing 220th Street crossing consists of two lines of 88"x54" RCPA culverts. From there, a channel flows to the southeast and crosses County Road 24 into Section 7 of Nordick Township. The existing crossing at County Road 24 is a 14'x7' reinforced concrete box culvert. The channel then continues another 0.71 miles to the south before outletting into a tributary of Whiskey Creek.

Landowners have more recently requested that the proposed ditch be extended another 2 miles to the east in Sections 33 and 34 of Mitchell Township along the north side of 220th Street. The primary reasons of concern brought forth by the landowners are poor drainage and inadequate
ditch and culvert sizes. Based on the 2008 IWI LiDAR, all of Sections 33, 34, and 35 of Mitchell Township and approximately half of Section 2 of Nordick Township use the ditch to convey flows into the Target Area.

MnDOT will be working on a project on Hwy 75 in the area scheduled for 2018 and have suggested that construction of a ditch during that time would be ideal.

There are also several utilities located along 220th Street. Lake Region Electric Coop has an underground phase 3 cable located on the south side of 220th Street in Section 6 of Nordick Township. Lake Region Electric Coop also has an above ground power line on the south side of 220th Street in Section 3 of McCauleyville Township, Wilkin County. Ottertail Power has above ground power lines on the south side of 220th Street in Section 1 of McCauleyville. Depending on the alternative, utilities along 220th Street may need to be relocated.

Alternative 1

The first alternative is to increase the ditch capacity on the north side of 220th Street in Sections 31 and 32 of Mitchell Township, then utilize the existing two lines of 88"x54" RCPA culverts through 220th Street to the south. From there, a new ditch would be constructed along the south side of the road to the west until outletting into the outlet of Whiskey Creek. The ditch geometry assumed consists of a 10' bottom width with 4 horizontal to 1 vertical side slopes. The ditch profile would vary from a 0.06% to a 0.10% slope. See the attached plan and profile for Alternative 1.

Larger culverts would be installed at several road crossing locations and one railroad crossing. CSAH 3 would need two lines of 73"x45" RCPA culverts. A single line of 73"x45" RCPA culvert is proposed to be installed this summer. Hwy 75, BNSF Railway, 150th Ave, and 160th Ave would all need a 14"x4' RCB culvert. On the west end of Alternative 1, a series of 12 rock drop structures or other grade control methods would be necessary to convey flows across the roughly 24 feet in elevation difference from the proposed ditch profile down to Whiskey Creek. This transition would occur in the last 800 feet of the ditch and will protect against potential headcutting. The entire Alternative 1 ditch as proposed has a drainage coefficient of 0.67 in./day. The opinion of probable cost for Alternative 1 is between $1,200,000 to $1,400,000.

Pros

- Improves drainage from the Target Area
- Reduces the area contributed to portions of Whiskey Creek upstream of Kent, MN

Cons

- Most expensive of the alternatives
- Will need to relocate utilities
- Little additional watershed enters the ditch west of Section 6 of Nordick Township
- Will need to install culverts through Hwy 75 and BNSF Railway
  - Detours
  - Additional project coordination required
Alternative 2

The second alternative to consider follows the same alignment as Alternative 1 until approximately 0.44 miles west of the section line between Sections 1 and 2 of McCauleyville Township. At this location, the ditch would turn to the south-southeast and follow an existing channel to an existing 10'x4' RCB culvert crossing through County Road 24. From there the channel continues another 600 feet to the southeast before outletting into Whiskey Creek. The ditch geometry assumed consists of a 10' bottom width with 4 horizontal to 1 vertical side slopes. The ditch profile would vary from a 0.06% to 0.12% slope.

Larger culverts would be installed at several road crossing locations. CSAH 3 would need two lines of 73"x45" RCPA culverts. 150th Ave and 160th Ave would need a 14"x4' RCB culvert. County Road 24 would likely need an additional culvert to convey higher flows. Further analysis would be required to determine an adequate size should this alternative be chosen moving forward. On the southeast end of Alternative 2, a series of rock drop structures or other grade control methods would be necessary to convey flows across approximately 8 feet in elevation difference from County Road 24 to Whiskey Creek. This transition would occur in the last 600 feet of the ditch and will protect against potential headcutting. No opinion of probable cost for this alternative has been determined at this time.

Pros
- Improves drainage from the Target Area
- Avoids Hwy 75 and BNSF construction

Cons
- Will need to relocate utilities
Alternative 3

The third alternative is to increase the ditch capacity on the north side of 220th Street in Sections 31 and 32 of Mitchell Township and then follow the existing drainage path through Sections 6 and 7 of Nordick Township before outletting into a Tributary of Whiskey Creek. The ditch geometry assumed consists of a 10' bottom width with 4 horizontal to 1 vertical side slopes. The ditch profile would vary from a 0.06% to 0.08% slope.

Larger culverts would need to be installed at CSAH 3. They would consist of two lines of 73"x45" RCPA culverts. On the south end of Alternative 3, a series of rock drop structures or other grade control methods might be necessary to convey flows at the outlet to the Tributary of Whiskey Creek. Further analysis would be required if this alternative is chosen moving forward. No detailed opinion of probable cost for this alternative has been determined at this time.

Pros
- Improves drainage from the Target Area
- Least expensive of the alternatives
- Minimal utility relocating necessary
- Avoids Hwy 75 and BNSF construction

Cons
- Potential wetland mitigation needed

If you have any questions or comments, feel free to give me a call at (701) 499-2079.

Sincerely,

HOUSTON ENGINEERING, INC.

Ted Rud, PE
TDR:tr

Enclosures
H:\Fargo\BJ\1900\1915\00_1915_01\(c)\1915-018 220th St Ditch220th Street Ditch Investigation Letter to Board of Managers 5-4-2017.doc