

**FINAL ENGINEER'S REPORT
FOR THE IMPROVEMENT OF
POLK COUNTY DITCH NO. 175
AND
WATERSHED DITCH NO. 5 OUTLET**

August 6, 2018

Prepared for the:
**Middle-Snake-Tamarac Rivers Watershed District
453 North McKinley Street (PO Box 154)
Warren, MN 56762**

**I hereby certify that this plan, specification, or report
was prepared by me or under my direct supervision
and that I am a duly Registered Engineer under the
laws of the State of Minnesota.**


**Nicholas P. Pribula Minnesota Reg. No. 48397
Date: August 6, 2018**

TO THE:

**MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT
453 North McKinley Street, Box 154
Warren, MN 56762**

LOCATION

The subject of this project and the report to follow is the improvement of 3 miles of Polk County Ditch No. 175. The subject improvement project begins at the west inverts of the culverts at Minnesota Highway No. 220 and then proceeds west 3 miles to approximately 150 feet west of the proposed culvert at Polk County Highway No. 22 where proposed grade meets existing grade of Watershed Ditch No. 5.

SCOPE OF PRELIMINARY SURVEY AND REPORT

As requested by the Middle-Snake-Tamarac Rivers Watershed District, Pribula Engineering, PLLC has conducted the necessary horizontal and vertical survey work to prepare the attached plan and profile sheets for the proposed project. Channel plan and profile sheets for the proposed improvement project are attached to this report (see Appendix E). Channel cross sections at 400 foot intervals are also attached. Calculations were made to determine discharges and flow return periods for both the existing and the proposed ditch along the proposed project alignment. A total cost estimated to complete the project is also included in this report (see Appendix B).

It should be noted that all work for this engineering report was done in substantial accordance with the very specific project description that was included on the submitted petition (see Appendix F) for this proposed improvement project.

DRAIN HISTORY

Polk County Ditch No. 175 system was established in 1967 by petition to the Polk County Board of Commissioners which acted as the drainage authority for the drain from 1967 to 1996 (See Appendix A for vicinity map). Polk County Ditch No. 175 system begins as a dual channel drain in the southeast corner of Section 3 / northeast corner of Section 10 in Northland Township. It then flows west 4.5 miles to a location at which the two channels combine to one channel located on the south side of township road. From that location the drain continues to flow west 1.5 miles where it meets and combines with Watershed Ditch No. 5 on the west side of Polk

Over the years since the original drain construction in 1967 the drain has been minimally repaired and maintained numerous times by the watershed district. Generally the watershed district has replaced culverts and coordinated only spot cleaning as the system has been at or undercut below legal grade due to erosion. In an effort to contain flow in the channel, adjacent land owners have constructed berms along the system with material from the back-slope of the drain causing the drain bottom to be lower and wider than the plan cross section. In some locations along the channel alignment replacement culverts have been installed to match the undercut bottom grade. Recent survey data has confirmed this to be true.

A vicinity map (Appendix A), a drainage area map per USGS StreamStats delineation website (Appendix C) and a map delineating the original 1967 benefited area of the drain (Appendix D) are attached to this report.

Prior to receiving a petition, the Middle-Snake-Tamarac Rivers Watershed District held two public meetings in Tabor, Minnesota to discuss what needed to be done to make the Polk County Ditch No. 175 system a better drain system for all landowners within the drainage district. Various alternatives were presented during those meetings. See appendix G for a copy of the alternatives presented during these meetings. The landowner opinions were varied but the common consensus was that the water coming from the east stalls at Minnesota Trunk Highway No. 220. It slows to a standstill and floods adjacent land for a mile east and a mile west of Highway No. 220. The flooding of these lands have been frequent and during the summer growing season. The existing drain has cause significant damage to all lands in Sections 5, 6, 7 and 8, Northland Township. Observed performance of the existing drain has verified that this consensus is accurate.

After the Tabor meetings and after much consideration, a petition was prepared to improve the drain only in Sections 6 and 7 Northland Township and in Sections 1, 10, 11 and 12 Esther Township. The scope of improvement was well defined in the petition and generally followed one of the alternatives presented at the public meetings in Tabor. Landowners upstream and along the proposed channel improvement area carried the petition to others and requested their support for the project. The wide spread support of the petition would indicate that most land owners in the entire assessment area of County Ditch No. 175 system feel that the project is needed and that it will benefit the property they own.

EXISTING CONDITIONS

Polk County Ditch No. 175 system should generally receive run off water from lands within one mile to the south and one-half mile north of its channel alignment. Watershed Ditch No. 5 located one mile south of proposed project intercepts run off from the area south of Watershed Ditch No. 5. The southern reaches of Judicial Ditch No. 75 located one mile to north of subject project should collect runoff from lands approximately one-half mile north of subject project. Water frequently overflows from the Judicial Ditch No. 75 system along the north side of Sections 4 and 5 Northland Township. When this overflow occurs the overflow water flows southerly into the County Ditch No. 175 system causing severe flooding in the County Ditch No. 175 drainage basin. This is a known problem that has not been addressed by the watershed district.

The improved drain system will utilize its existing outlet which is a shared outlet with Watershed Ditch No. 5. The shared Watershed Ditch No. 5 / County Drain No. 175 outlet flows into the Red River of the North approximately 2 miles west of County Drain No. 175's confluence with Watershed Ditch No. 5 at Polk County Highway No. 22. No total additional flow will be generated by the construction of this improvement project. The drainage area of the proposed project is 10.1 square miles. This is the same area that is presently being drained by the existing Polk County Ditch No. 175 channel/s.

To various degrees, there have been upstream improvements to the channel by adjacent land owners. Channel undercutting and over cleaning have improved the channel upstream to the east of Highway 220 beyond the original ditch construction. A survey conducted in June of 2017 shows this to be true.

PROJECT NECESSITY

Storm water frequently floods fields adjacent to the subject drain in Sections 5, 6, 7, and 8 of Northland Township and less frequently Sections 1, 2, 11 and 12 of Higdem Township. Due to the deficiency of the existing system in the proposed improvement area, storm water does also pond throughout the entire drainage basin of County Ditch No. 175. The recurrence interval of the existing system is approximately 1.5 years. The performance of the system agrees with Ronald Adrian's assessment of the drain previously discussed under the drain history section of this report. In the Red River Valley this is generally considered to be unacceptable. Presently a 10 year recurrence interval is the standard for which all new farmland legal drains are designed and built. Landowners throughout the

drainage area of County Ditch No. 175 have signed the petition requesting what they feel would be a more adequate outlet for the entire drainage system. The legal outlet for the subject drain (County Ditch No. 175) is a shared outlet with Watershed District Ditch No. 5. The proposed improvement will improve 3 miles of County Drain No. 175 up to and including approximately 150 feet of the shared Watershed Ditch No. 5 channel where the proposed new improved drain grade meets the existing grade of shared Watershed Ditch No. 5 / County Ditch No. 175 channel shortly after crossing Polk County Highway No. 22. The proposed drainage improvement will bring the outlet for the drain up to a more generally acceptable 5 to 8 year design. The improved outlet will be utilized by all lands in the County Ditch No. 175 drainage area. To different degrees the proposed improvement will reduce ponding throughout the entire drainage basin of County Ditch No. 175.

Based on the original plans of the drain, the capacity of the drain was never balanced. A balanced drain means that all lands along a drain will receive the same degree of service without flooding other properties. As stated, the original drain was constructed with an inadequate outlet due to compromises made at the time of original construction. The existing drain overflows in Sections 5, 6, 7 and 8 of Northland Township. Farther to the east water ponds in fields as flow comes to a standstill at Minnesota Trunk Highway No. 220. Observed drain performance has shown this to be true and has causing land owners throughout the entire existing alignment to sign a petition that would produce a more functional drain for all concerned. By improving the drain from Highway No. 220 and going west to Polk County Highway No. 22, the proposed project will provide better access to drainage to all properties that drain into ditch.

PROJECT IMPROVEMENT AREA

This section is included for the informational benefit of the project petitioners and viewers. This report conforms to the wishes of the petitioners.

The extent of the proposed Improvement to Polk County Ditch No. 175 and Watershed Ditch No. 5 Outlet was specifically stated in the submitted petition (see Appendix F). The Polk County Ditch No. 175 drain improvement will be located along original alignment, as stated in the petition. The existing channel will be improved, along the south side of the north line of Sections 11 and 12, Twp. 153 N., R. 50 W. (Esther Township), and along the south side of the north line of Section 7, Twp. 153 N., R 49 W. (Northland Township). The existing channel will be improved along the north side of the south line of the East Half of Section 1, Twp. 153 N., R. 50

W. (Esther Township) and along the north side of the south line of Section 6, Twp. 153 N., R. 49 W. (Northland Township). The shared Watershed Ditch No. 5/County Ditch No. 175 channel will be improved from the northeast corner of Section 10, Esther Township to a point approximately 150 feet westerly of said northeast corner. The bottom of shared outlet channel in this section of channel will be lowered from 0.0 feet to 0.5 feet. The construction will end where a continuation of the 0.04 % daylight out in the existing outlet.

During construction of the drain improvement, sufficient topsoil will be removed/conserved from the channel alignment so that 6 inches of black topsoil can be replaced on the surface of the slope easement and the 16.5 foot wide buffer strip when excavation is completed. No black dirt will be replaced on the channel bottom and side slopes which will be seeded to grass. Experience has shown grass can be well established in the channel without seeding into black dirt.

103E.015 Subd. 1 Environmental, land use, and multipurpose water management criteria

(1) private and public benefits and costs of the proposed drainage project;

The private benefits of this improvement project will be a reduction of the persistent flooding of farmland adjacent to the drain. Annual flooding has had an extremely detrimental effect on the farm productivity of land located throughout the entire drainage basin. It should be noted that the proposed improvement project will provide a higher level of flood protection that is similar to that provided on all new agricultural drains in the Red River Valley. An 8 to 10 year design is normal, acceptable and the standard for all farm drains in the watershed.

The public benefits of this improvement project are that it will provide drainage along the adjacent township roadway. By increasing the productivity of the land in the drainage area the improvement project will cause land sale prices to rise and thereby provide the county, township and school districts with a higher tax base. The proposed improvement project will provide a grade which will reduce the duration of standing water adjacent to roads by improving drainage from the contributing drainage area.

The estimated total project costs for the proposed drain construction described in this report can be found in the detailed breakdown of the improvement project costs is included as Exhibit B to this report.

In addition to economic costs, there are other non-quantifiable factors to be considered. These include impacts on the environment, social costs, and cultural costs. As part of this improvement project Polk County Highway No. 22 will be open cut to install a new culvert. This will require traffic to be rerouted for a short period of time. It is expected that this closure would last one to two weeks. Because the land use of the project area is predominately agricultural, there will be some adverse impact to the area. These adverse impacts will include inconveniences caused by construction operations, removal of some lands from agricultural production, and other miscellaneous impacts. The existing permanent right-of-way of the existing drain will be adequate to contain the proposed improvement. Approximately 25 acres of additional existing agricultural land will be required for spoil bank right-of-way along proposed drain. This spoil bank right-of-way is required for the placement and leveling of topsoil and spoil and other construction activities. The land required for spoil bank right-of-way will be lost for agriculturally for one or two production seasons. After completion of the project construction, the spoil bank right-of-way can be used for agricultural purposes again.

There are no known cultural or archeological sites along the alignment of proposed drain improvement. A majority of the land area along the alignment has been previously disturbed by field drain and roadway construction. Therefore, there are no anticipated impacts on cultural or archaeological resources.

(2) alternative measures, including measures in applicable state-approved and locally adopted water management plans;

Minnesota Statutes 103E.015 Subdivision 1. (2) requires the consideration of alternative measures to address the drainage problem being addressed by the project. Alternative measures identified in state and locally adopted water management plans would include changing land use by creating wetlands, enrolling the effected land in a permanent easement program through the state of Minnesota (Reinvest in Minnesota), or the federal government (ie. Conservation Reserve Program, Wetland Reserve Easement, etc.), or flood storage easement through the watershed. All of these alternative measures involve landowner participation on a voluntary basis and would be pursued in a voluntary basis and would meet the goals of Subd. 1. (2)(i-

v). It is unlikely that these alternative measures would be pursued on a voluntary basis. Lands within the project drainage area are classified as prime land that is presently being utilized for high value agricultural crop production.

(3) the present and anticipated land use within the drainage project or system, including compatibility of the project with local land use plans;

Presently the entire area in the drainage area is utilized for high value agricultural crop production. Only the productivity of the land will be changed.

All land is now and will continue to be used for high value agricultural small grain and row crop production for the foreseeable future.

(4) current and potential flooding characteristics of the property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year events, including the adequacy of the outlet for the drainage project;

The flooding characteristics of the improvement project are discussed earlier in this report. These specific flooding, drainage, and erosion problems, which lead to the petition for this project are all surface water related. Due to very flat slopes, surface runoff pools on farmland throughout the drainage area of the drainage system. Essentially all of the agricultural land within the project drainage system is directly impacted by drainage and flooding problems. Annual spring flooding impacts agriculture adversely by delaying the start of spring planting and shortening of the growing season. This results in reduced crop yields. More damaging are heavy summer rainfall events that can cause substantial financial losses to crop producers. The rate of flood water development and magnitude can be much greater than that which occurs in the springtime. These damages are greater because the excess rainfall comes usually early on in the growing season when the crops are most vulnerable to standing in sustained water. Replanting can take place but the potential of the crop is greatly reduced due the soil compaction and shortened growing season. As stated earlier in report, presently the existing township roadway ditch channel is inadequate at discharges that are less than a 2-year event. The proposed improvement will substantially decrease crop flood damage due to the duration of standing water in depressed areas. The proposed channel is designed for a 5 to 8-year discharge capacity. Higher discharge events will cause water to pond for a period of time in adjacent fields. When the

propose drain is flowing at and above design capacity there will be limited or no outflow and water can be expected to collect in adjacent fields. At higher return events the proposed project will have no substantial change downstream. The highest flood levels (10, 25 and 50-year events and higher) in the project area are driven by backup and breakout flows from the Red River of the North. The outlet of County Drain No. 175 is a shared outlet with Watershed Ditch No. 5 and is adequate for subject improvement due to its grade and depth from Polk County Highway No. 22 to Red River.

(5) the effects of the proposed drainage project on wetlands;

There are no wetlands that would be affected by the proposed improvement project. A review of the National Wetland Inventory (NWI) indicates no wetlands within the project construction area.

(6) the effects of the proposed drainage project on water quality;

The occurrence of an extreme runoff condition during project construction could cause an increased sediment load into the downstream channel system. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the project. When the project is complete and well vegetated, the sediment load from the project will be lower than before construction. Farming practices have the greatest effect on the quality of both surface and ground water in the project area. The improved channel area is designed for reduction of erosion and sediment production. Techniques have been incorporated into the project design including piped inlets, berms and grass buffer strips, some of which do not currently exist. The channel will have insignificant effect on the quantity of other water pollutants entering downstream watercourses.

(7) the effects of the proposed drainage project on fish and wildlife resources;

The proposed ditch improvement project does not contemplate any major excavation in any existing natural watercourse or lake, and as a result will have insignificant effects on fish resources. Water flows in the ditch channel are intermittent and occur only after heavy rains or spring snow melt. All disturbed areas are to be seeded to grass as part of the project. This grass will provide a small amount of cover to wildlife native to the area and will have a positive effect on wildlife resources. There is no destruction of prairie wildlife as part of this project.

(8) the effects of the proposed drainage project on shallow groundwater availability, distribution, and use:

The flat topography does not allow for the opportunity to store or retain water in a concentrated area in the vicinity of the improvement project area. The heavy clay soil in the project area retains moisture extremely well. For this reason irrigation is not considered viable in crop production without installing drain tile.

The heavy clay subsoil in the project area usually retains ground water table at a depth of 4 to 8 feet below the surface. The quality of this water is not usually considered suitable for good drinking water. Quantity is limited by the tight heavy soils in the area of influence of the aquifer. The ground water in the project area is very saline and is not suitable for domestic use. Potable water for residents in the area is being provided by the Marshall and Polk Rural Water System.

(9) The overall environmental impact of all the above criteria:

The project engineer and project sponsors for this project envision that the overall impact of the project will contain no long-term adverse effects on the environment. While construction operations have an inherent adverse effect on the environment, these effects are temporary in comparison to the long-term benefits anticipated from the project operation. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the project. When the project is complete and well vegetated, the sediment load from the project will be lower than before construction.

PROJECT RIGHT-OF-WAY REQUIREMENTS

All required government section and quarter section corners were located or recovered during the ditch cross section survey that was needed to prepare this report. The plan and profile sheets show the correct location of all property corners found or set. Based on this accurate section line survey and existing right-of-way records provided by the watershed district, even though the proposed drain improvement cross section will be wider no additional permanent right-of-way will be needed to construct the project along with the required 16.5 foot wide grass buffer strip on the field side of the improved channel. A slope easement will be required beyond the permanent right-of-way to provide an area adjacent to the improved channel where the spoil material from constructing the new channel can be placed.

Depending on the time of the year that construction takes place land lost to crop production will be 1 to 2 years on the slope easements. The required land required for temporary slope easements are shown on the table below:

LOCATION	SLOPE EASEMENT
NE ¼, Sec. 10, Esther Twp.	-0- Feet
NW ¼, Sec. 11, Esther Twp.	150 Feet
NE ¼, Sec. 11, Esther Twp.	100 Feet
NW ¼, Sec. 12, Esther Twp.	75 Feet
NE ¼, Sec. 12, Esther Twp.	60 Feet
NE ¼, Sec. 1, Esther Twp.	60 Feet
All Sec. 6, Northland Twp.	-0- Feet
All Sec. 7, Northland Twp.	-0- Feet

PROJECT DESIGN DESCRIPTION

FLOW

Discharge flow was calculated based on the drainage area upstream from each location and calculated utilizing $Q = 27 \times A^{5/6}$. Based on ditch and natural channel gage readings and observations of ditch systems in the Red River Valley, this formula is believed to model an approximate 8 year design for local conditions better than any other method. The watershed has considered this design standard is acceptable for new ditch projects in the watershed district.

Based on presentations at two previously discussed public meetings held in Tabor (see appendix G) the MRSRWD chose a preferred alternative and has placed two (2) restrictions on the amount of improvement that can be made with this project. The restrictions are:

1. The channel grade is to be limited to a maximum of 0.04 % grade.
2. The existing mainline culverts are to remain substantially the same size as the existing in-place culverts.

The proposed improved channel side-slopes are dictated by roadway and mowing safety concerns. The only design variable left to the engineer was channel bottom width.

CHANNEL CROSS SECTIONS

The filed petition requires an explicit design. The petitioners intended a design including a channel with side slopes that could be more readily mowed and maintained.

The board of Managers of the Middle River-Snake River-Tamarac River Watershed District mandated a 0.04% ditch bottom slope from the west end invert of the existing culverts through Minnesota Trunk Highway 220 (Elevation 811.72, 1929 Datum) and proceeding westerly through Polk County Ditch No. 175 and Watershed Ditch No. 5 to a point approximately 150 westerly of the northeast corner of Section 10, Esther Township where the grade meets the existing legal grade of Watershed Ditch No. 5.

The improved ditch bottom width in Section 11, Esther Township will be 14 feet. All other improved channel will have a 10 foot bottom width.

The improved channel through Sections 1, 11 and 12, Esther Township will have a 4:1 in-slope and a 3:1 Back-slope.

The improved channel in Sections 6 and 7, Northland Township will have a 3:1 in-slope and a 3:1 back-slope.

Where practical, the adjacent berm (spoil) will be placed to be lower than the adjacent roadway. There will be areas where there will be a vast amount of material and it is not reasonable or practical to limit the elevation to be below the roadway. Although berm settlement is expected to some extent in these locations, engineered spillways with elevations lower than adjacent roadway will be constructed at intervals through the spoil bank to allow the flooding of adjacent fields during events that have flows beyond the design flow of the ditch. Due to the existing and proposed culverts configuration being sufficiently large enough it will be impossible for the roadway to be topped due to runoff water coming from areas upstream, however, roadways will be breached as before due to overland flow from the east and back flow from Red River. The only possibility of water passing through the engineered spillways is during larger 50 and 100 year flood events. The proposed improvement project is not intended to prevent flooding during large basin wide flood events and water will continue to pond on the land as it does now.

The height and location of all berm (spoil) banks will be shown on the project cross-section sheets. These berm (spoil) banks are designed to

provide freeboard protection beyond the channel design capacity and to limit erosion from field drainage into ditch system. The channel will reach design capacity when the water surface profile reaches an elevation that would flood the adjacent farm land.

CONTROL STRUCTURES

FIELD DRAIN INLETS

18 inch corrugated steel pipe field inlet culverts will be installed through the adjacent spoil in Sections 6 and 7 in Northland Township and in Sections 1, 11 and 12 of Esther Township. The inlet culverts will be installed at locations as requested by the adjacent land owners. Land owners will be contacted to decide the number of inlet culverts that will be installed. Where practical an effort will be made to limit field inlets to 5 per mile plus 24" culverts in all township roadway ditches at the mile lines.

EXISTING ROADWAY DITCHES THAT INLET INTO THE PROPOSED DRAIN

Existing culverts will be utilized and extended in necessary or 24" diameter corrugated metal pipe culverts will be installed in all of the existing township, county and state roadway ditches that enter the proposed drain from the north and south of the drain. The culverts will be trapped on the outlet end of each culvert so water cannot back out of the drain into other roadway ditches. Existing culverts will be utilized if possible.

MAINLINE ROADWAY CROSSING CULVERTS

Polk County Highway No. 22

As shown on the attached plan sheets the existing culvert through Polk County Highway No. 22 is a 154" x 94" reinforced concrete arch pipe. This culvert at an elevation that is too high to ever run full at the design flow. Presently it never flows more than 2 feet deep unless water is flowing backwards from the Red River. The Polk County Engineer, Richard Sanders concurs that the culvert should be replaced with a 14'x6' concrete box culvert. This new culvert is the same effective size as the existing culvert but has better hydraulic characteristics at the design flow. Polk County Highway recommends this 14' x 6' culvert be installed as it is hydraulically more suited for this location and will allow for better compaction of road subgrade. The Polk County Highway Department Highway Engineer has agreed to allow the paved roadway to be open cut so the culvert can be replaced. If the project is proceeding, the Polk County Highway Department will provide the engineering plans to install the new culvert.

These plans will be included in the final plans and specifications for the project bid package. The Polk County Highway Department will not participate in the cost of installing the new culvert to the proper line and grade, however they will allow the existing 154" x 94" culvert to be salvaged and reused 1.5 miles to the east at the dual channel convergence location without any cost to the project. Per Richard Sanders there are monies available for relocation/reuse of bridges of which the 154" x 94" culvert is classified as. Currently the Polk County Highway Department is seeking cost sharing for relocating the existing 154" x 94" culvert on this projects behalf.

Township Roadway Culvert NE Corner Section 11, Esther Township

The existing 139" x 89" steel multi-plate culvert at this location is in excellent condition and will be reutilized, lowered and extended in place. Ends shall have step bevels torch cut into ends.

Twp. Diagonal Crossover Culvert at North ¼ corner of Sec. 12, Esther Twp.

The existing 87" x 63" diagonal CMP crossover culvert located at the north ¼ corner of Section 12, Esther Township will be salvaged and replaced with the salvaged and relocated 94 foot long 154" x 94" RCPA that is to be removed from under Polk County Highway No. 22. This culvert is in excellent condition and it is a real value to the project. It is slightly larger than the existing 87"x 63" CMP crossover culvert. The bottom portion of this culvert will be countersunk and restricted to have the same effective size as the existing culvert at this location. Per Richard Sanders there are monies available for relocation/reuse of bridges of which the 154" x 94" culvert is classified as. Currently the Polk County Highway Department is seeking cost sharing for relocating the existing 154" x 94" culvert on this projects behalf. The salvaged CMP will be combined with a section of salvaged pipe of the same size at a driveway located in the Southwest Quarter of Section 6, Northland Township. The salvaged is in good condition and can be reused.

Township Roadway Culvert NE Corner Section 12, Esther Township

The two existing 87" x 63" CMP culvert located at the northeast corner of Section 12, Esther Township will be removed and replaced with longer new CMP of the same size as the existing culverts. See attached plan and profile sheets for culvert sizes and lengths. The existing culverts in this location have bottoms that a rusted out and heaved up.

Private Driveway Culvert in Section 6, Northland Township

The existing 87" x 63" CMP culvert located at the private driveway in Section 6, Northland Township will be salvaged and lengthened with a portion of salvaged crossover culvert.

Field Approach west of the N. ¼ Cor. Section 6, Northland Township

The existing 72" round CMP will remain in-place as it is to the proper new line and grade.

PERMIT REQUIREMENTS

Permits that may be required to construct this project are:

Army Corps of Engineers, Section 404 Permit.
NPDES, SWPPP Permit

ESTIMATED ASSESSMENTS AND BENEFITS

The viewers assigned by the MSTR Watershed Board to the improvement project will determine project assessment area and amount benefited to each area. The total project costs will be assessed over these areas as determined by the viewers.

PROJECT SUMMARY

This improvement project as presented will provide a more adequate efficient outlet for all properties draining into Polk County Ditch No. 175. The project will provide both improved access to drainage and more adequate protection for all properties that are located east of Polk County Highway No. 22 that are presently in the assessed district for Ditch No. 175.

- The original project was constructed to a plan that has caused it to flood certain lands adjacent to the drain. The flooding has occurred almost annually in the summertime.
- The design limitations set by the managers of the Middle-Snake-Tamarac Rivers Watershed District will determine the adequacy and performance of the drain if it is constructed.

- The proposed project would provide a more adequate outlet for Polk County Ditch No. 175. A more adequate outlet would benefit all lands in the ditches present assessment district.
- In the 2016 growing season the monetary loss due to crop drown out was greater than the cost of this project. Not all but a large portion of that loss may have been eliminated if this improvement project were in place at that time.
- The estimated project cost is \$834,162.00. The costs to replace/relocate large downstream culverts are a large portion of the total construction costs. These large rusted culverts are 50 years old and need to be replaced soon. These culverts will have to be replaced with or without the proposed project going forward.
- This project has been awarded FY 2018 CWF Competitive Grant Program monies in the amount of \$144,000 for the construction of field side water inlets and erosion control berm.
- Per Richard Sanders (Polk County Highway Engineer) this project may be eligible for monies related to the relocation/reuse of bridge (97" x 154" RCAP at Polk County Hwy 22) 1.5 miles to the east. Currently the Polk County Highway Department is seeking cost sharing for relocating the existing 154" x 94" culvert on this projects behalf.

PROJECT RECOMENDATIONS

In the opinion of the Project Engineer, the proposed improvement project outlined herein provides the information and data necessary to disclose the practicability, necessity and feasibility of the proposed project.