



# Detailed Survey Report

Roseau County Ditch 16 Improvement

*Roseau County, MN*

April 21, 2020





**DETAILED SURVEY REPORT  
FOR  
ROSEAU COUNTY DITCH 16 IMPROVEMENT  
AS ORDERED BY  
ROSEAU RIVER WATERSHED DISTRICT**

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

A handwritten signature in black ink, reading "Jacob Rand Huwe", written over a horizontal line.

Jacob Rand Huwe, P.E.  
License Number 56657

April 21, 2020

Date

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Thief River Falls, MN 56701

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## **Appendices**

**Appendix A: Petition for Improvement of County Ditch No. 16**

**Appendix B: Whitney Lake Subwatershed Project Fact Sheet**

**Appendix C: Report Maps**

**Appendix D: Technical Memorandum for Reestablishment of Ditch Records**

**Appendix E: Draft Viewer's Report**

# Executive Summary

The Roseau River Watershed District (RRWD) administers and maintains Roseau County Ditch Number 16 (CD 16). A petition to the RRWD Board of Managers was filed by landowners to “improve CD 16 in order to make the ditch have a capacity to hold and carry a 3.3” rain occurring in a 24-hour period.” (See Appendix A for the complete petition) A 3.3” rain in a 24-hour period is approximately a 10-year, 24-hour hydrologic event. HDR was appointed to provide a detailed survey of the CD 16 system. The recommended alternative which will meet every design goal is Alternative 2 as described below. Two alternatives are presented in this report, both of which satisfy the petition by increasing the capacity of the ditch to carry a 3.3 inch rain in a 24-hour period.

## 1. Alternative 1 – Minimum Cost Alternative - \$0.83 million

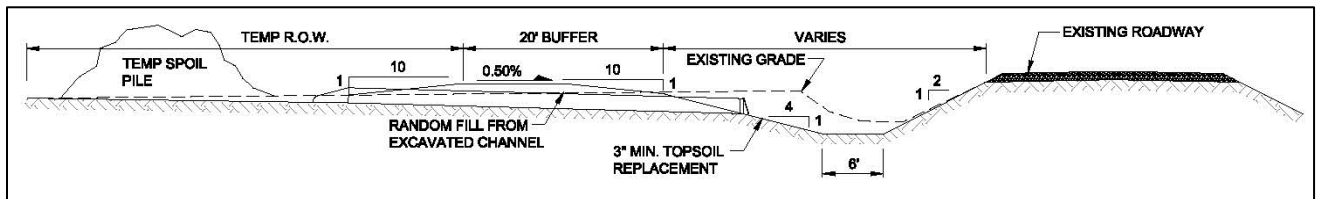
This alternative was identified as the lowest cost option to improve the ditch to the desired capacity. It minimizes earthwork by keeping the existing road slopes in place and constructing a 6-foot wide ditch bottom. This alternative also minimizes costs by retaining the existing culvert crossings and adding small culverts where necessary.

## 2. Alternative 2 – Maximum Design Alternative - \$1.68 million

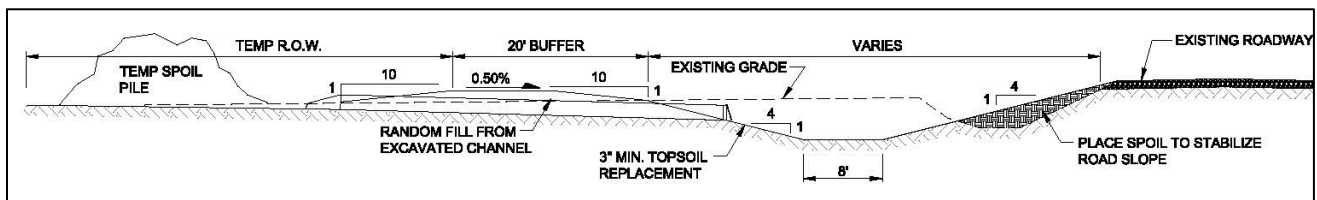
This alternative would meet the design goals as well as provide all new culvert crossings and gentler side slopes which could be easily maintained. This alternative also provides the desired capacity at nearly 100% below field elevations adjacent to the ditch. The ditch bottom is 8 feet wide with 4:1 (horizontal:vertical) side slopes.

These alternatives have been discussed with the affected landowners and regulatory agencies, and the Draft Viewer’s Report has been completed based on Alternative 2. The calculated benefits of this alternative exceed the costs, and further cost savings will be incorporated in the final design of this Project. These cost savings will include eliminating and combining field access crossings along CD 16.

**Figure 1. Alternative 1 Typical Cross Section**



**Figure 2. Alternative 2 Typical Cross Section**



# Introduction

The RRWD has received a 'Petition for Improvement of Drainage System' (Appendix A) according to the Minnesota Statutes 103E.215. This detailed survey report for the improvement of CD 16 complies with Minnesota Statutes 103E.245. CD 16 is located in Dieter and Ross Townships in Roseau County, and has a drainage area of approximately 11.6 square miles. The project location is shown in Figure 3 and the updated drainage area is shown in Figure 4. Enlarged maps are also included in Appendix C. CD 16 outlets into the Roseau River in Section 26 and 27 of Dieter Township. The CD 16 system includes a main ditch which lies to the east of 310<sup>th</sup> Ave, Lateral 1 which lies to the east of Minnesota Trunk Highway 89, and a connecting ditch which lies to the south of 340<sup>th</sup> St. The proposed improvement will consist of work in three ditches as described here:

- 1) COUNTY DITCH 16 – MAIN DITCH: Commencing at a point 1500 feet south of the apparent section corner common to sections 15-16, 21-22, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 21-22, 15-16, 9-10, 3-4; thence continuing north and 25 feet east of the apparent section line between sections 33-34, 27-28, Township 163 N. Range 41 W. (Dieter Township), to the Roseau River.
- 2) COUNTY DITCH 16 – LATERAL 1: Commencing at a point 1800 feet south of the apparent section corner common to sections 14-15, 10-11, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 14-15, 10-11, 2-3; thence continuing north and 25 feet east of the apparent section line between sections 34-35, Township 163 N. Range 41 W. (Dieter Township) for 4536 feet; thence continuing in a northeasterly direction at a bearing of 18 degrees, 14 minutes east of north for 1210 feet to a point in section 26, Dieter Township; thence continuing to the north to the Roseau River.
- 3) COUNTY DITCH 16 – BRANCH 1: Commencing 25 feet south of the southeast corner section 34, Township 163 N. Range 41 W; thence west between sections 3 and 34, Townships 162 and 163 N. Range 41 W. to COUNTY DITCH 16 – MAIN DITCH.

Improving CD 16 is a preferred alternative of the ongoing Whitney Lake Project (Appendix B). A Project Work Team was created to explore alternatives that could reduce flood risk to local landowners and enhance environmental conditions within the subwatershed. The Project Work Team consists of local landowners, RRWD, and several local, state, and federal agencies, including the Minnesota Pollution Control Agency (MPCA), Minnesota Department of Natural Resources (MNDNR), Board of Water & Soil Resources (BWSR), and United States Army Corps of Engineers (USACE). The Project Work Team developed 11 alternatives that fit into four strategies: retention, diversion, protection, and drainage. The Whitney Lake subwatershed has a well-documented history of economic losses due to agricultural and roadway flood damages. One of the unique problems with this subwatershed is in the pattern of flooding. With a relatively steep ridge in the southeastern portion of the subwatershed, the runoff moves quickly into the problem areas. During a 2-year 24-hour rainfall event (2.26"), the Roseau River water surface also rises and backflows into the Whitney Lake Subwatershed drainage systems.

These flows commonly reach as far as two miles south of the Roseau River. The subwatershed runoff can't flow north to the Roseau River, therefore water moves west towards the Whitney Ditch (SD 20). It is common for roads to be overtopped by water coming from the east and flooding multiple sections along the way.

The ditch improvement alone will help protect agricultural lands up to a 10-year rainfall event. According to Technical Paper #11 (FDR Work Group, May 2004),<sup>1</sup> this system can be designed to equitably inundate adjacent agricultural lands above a 10-year event, therefore peak flows at the outlet of the system from less frequent floods will be the same or lower than the existing peak flows.

## Design Goals/Criteria

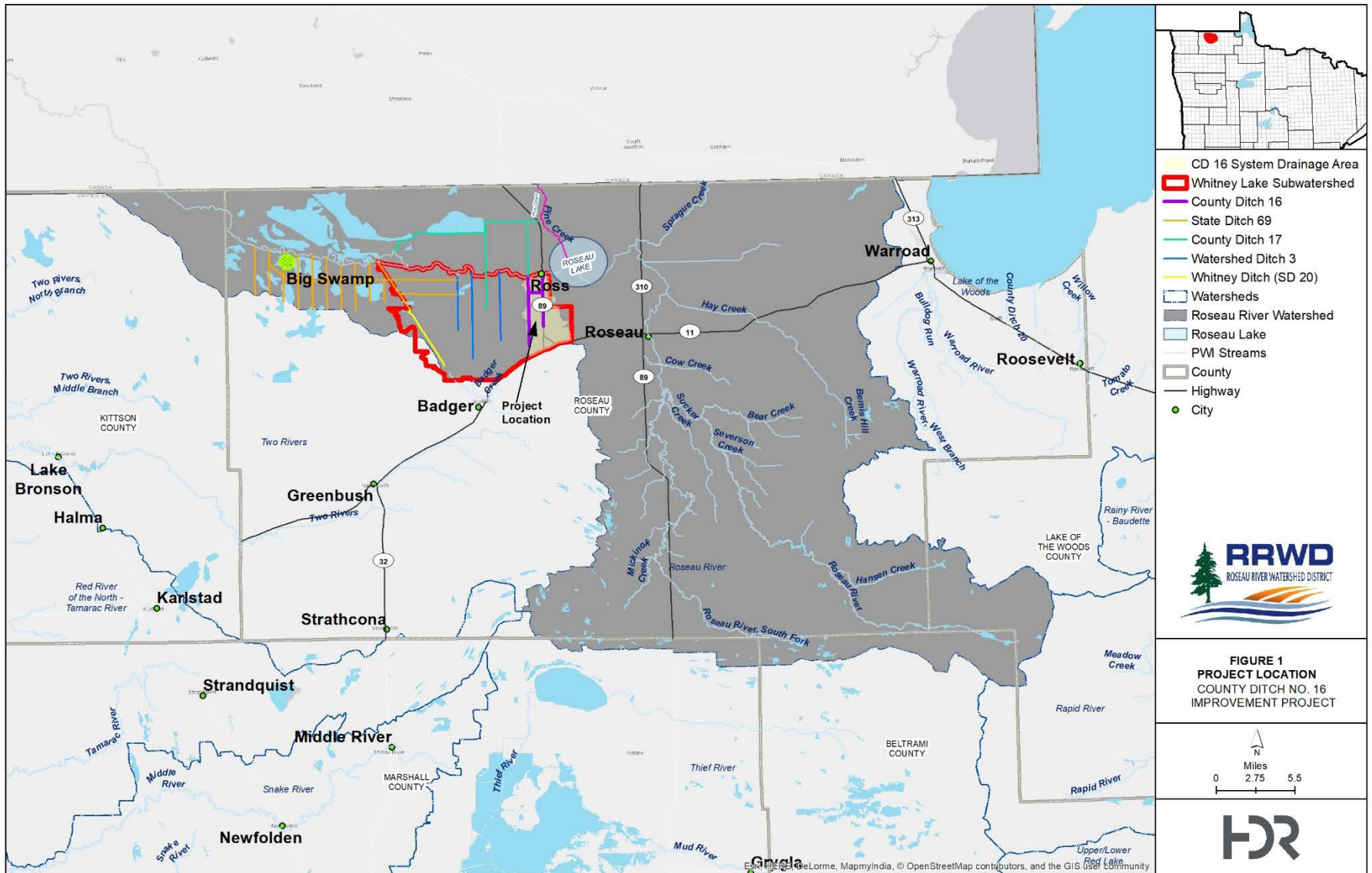
The goal of this improvement is to increase the hydraulic capacity of CD 16 and reduce the frequency of flooding along the system without increasing downstream flooding. The primary design considerations are project function, cost, and impacts to the environment. Improvements must restore and enhance the proper functioning of the ditch. Project costs must be acceptable to provide a feasible project. Impacts to the environment, such as draining of wetlands, must be avoided, minimized, or mitigated. The Red River of the North Basin Technical and Scientific Advisory Committee provided their Briefing Paper #3 in September 2014. This document provides guidance for designing an adequate and equitable ditch that balances channel and culvert capacity in a way that also mitigates downstream effects for larger events (such as 50-year and 100-year floods). The design follows this guidance whenever possible. Specific design goals/criteria include:

- channel capacity for a 10-year, 24-hour event,
- head loss at culverts of 0.5 feet (preferred) for a 10-year event,
- water surface elevations below the adjacent natural ground (or protected by berm),
- flows above a 10-year, 24-hour event will access the floodplain at road crossings via lower berm elevations.

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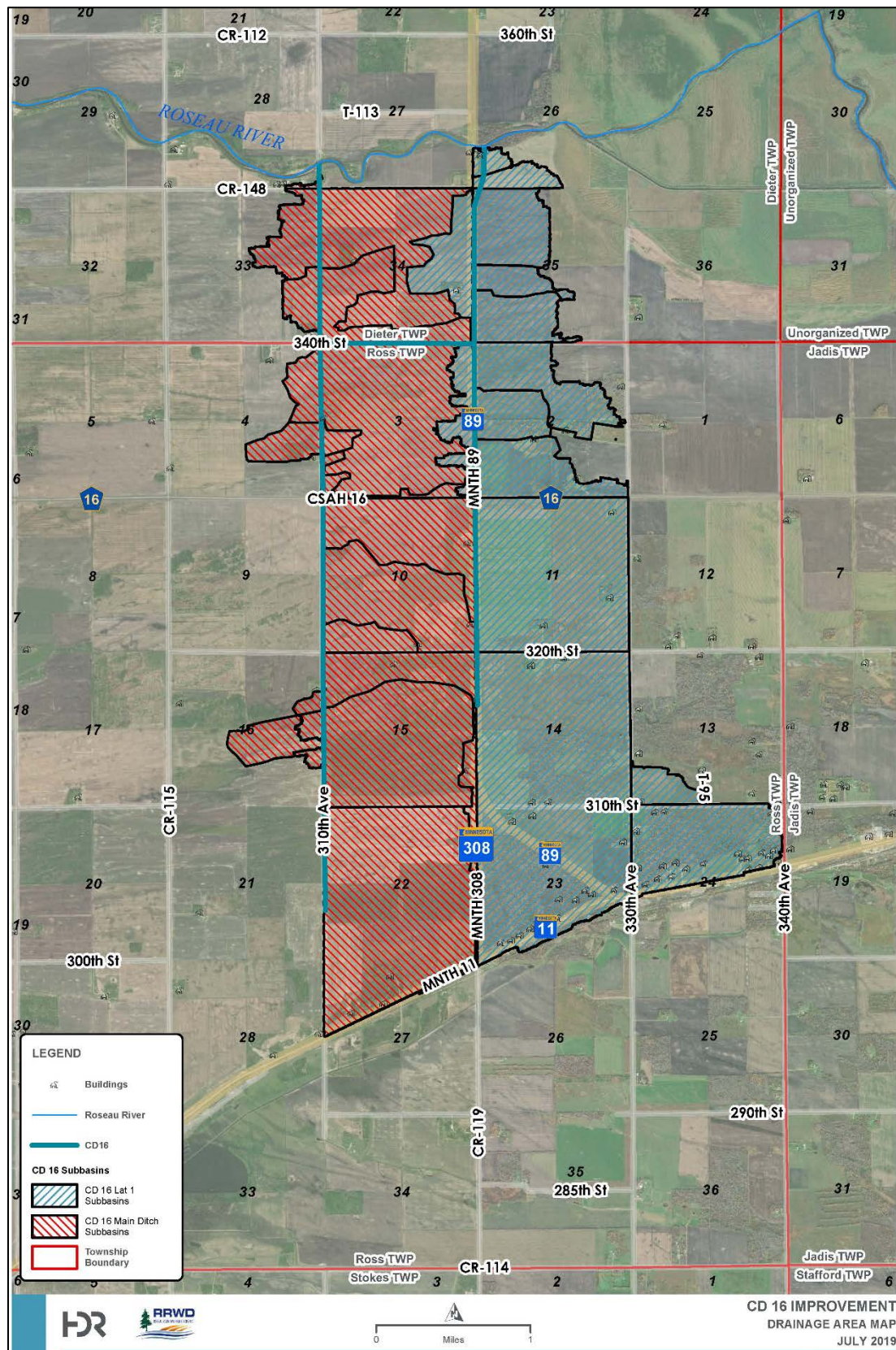
<sup>1</sup> FDR Work Group. (May 2004). *Technical Paper No. 11*. Fargo, ND: Red River Basin Flood Damage Reduction Work Group. Retrieved April 14, 2020, from <https://www.rrwmb.org/TSAC/TP11.pdf>

Figure 3. Project Location – CD 16





### Figure 4. CD 16 Drainage Area



# Project Investigation

The authority to administer and manage CD 16 was turned over to the RRWD from the Roseau County Ditch Authority. The RRWD has records from the year 1913 that have been digitized from the original documents, as well as other historical maps and documents. The section below includes details of the survey of CD 16, hydrologic and hydraulic modeling results, and related design issues. Investigation of the survey data revealed that the CD 16 system does not have a uniform channel geometry or ditch grade. Drainage can be improved by widening the channel bottom, flattening the side slopes, lowering the channel bottom profile, and addressing culvert deficiencies.

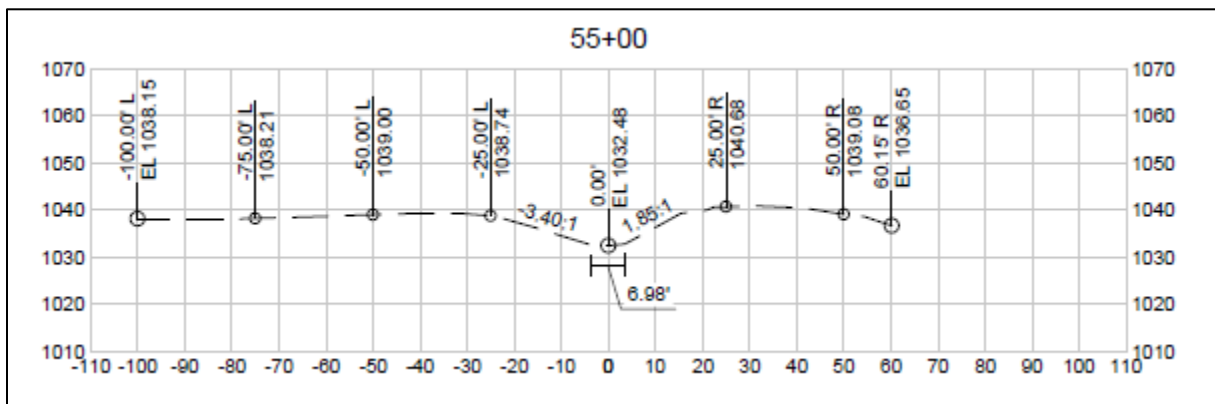
## Ditch Records

A review of the available ditch records for the CD 16 system has been completed by RRWD and HDR. The ditch was established in 1913 by petition. The subsequent improvements of CD 16 are missing in the records, and therefore the RRWD reestablished the CD 16 alignment and right-of-way under Minnesota Statutes 103E.101, Subdivision 4a. Reestablishing records. See Appendix D for the complete investigation results and reestablished ditch records.

## Surveys

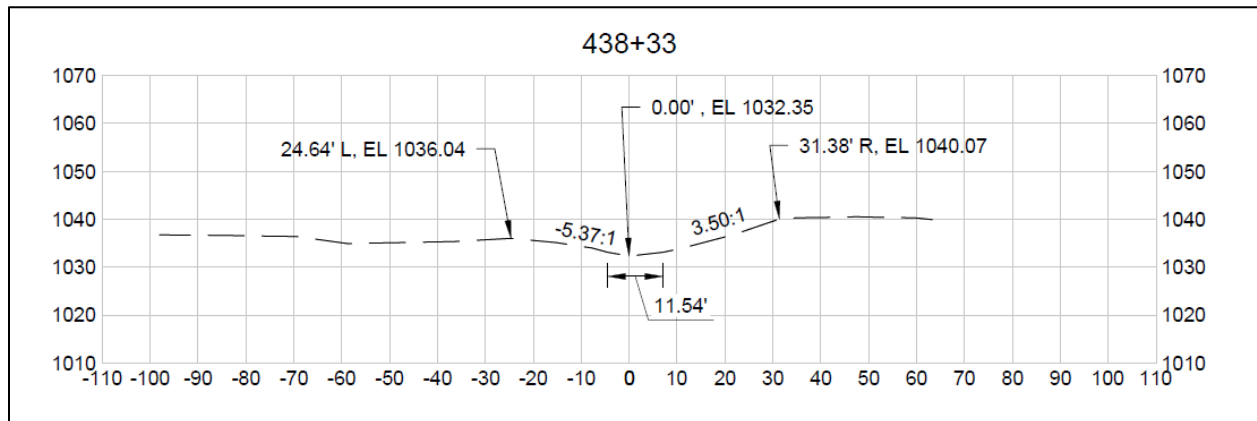
The surveys were completed by HDR. Survey was performed using real time kinetic processing on the Minnesota Continuously Operating Reference Station Network. All elevations in this report are referenced to the North American Vertical Datum of 1988. Cross sections were taken at regular intervals along the entire CD 16 system, and all culverts and crossings were surveyed. The main channel of CD 16 typically has a steep (2:1) roadside slope, bottom width between 5 and 8 feet, and a depth of 3 to 6 feet. A representative cross section at station 55+00 is shown below. CD 16 Lateral 1 typically has gentle side slopes (3:1 or greater), bottom width between 9 and 16 feet, and a depth of 1 to 4 feet. A representative cross section at station 438+33 is shown in Figure 6.

Figure 5. Station 55+00 Surveyed Cross Section





**Figure 6. Station 438+33 Surveyed Cross Section**



## Alignment & Stationing

Figure 8 shows the general alignment of the proposed ditch improvements as well as the stationing. Project stationing was set so that station 0+00 is located at the confluence of the Roseau River and CD 16 – Main Ditch. Station 400+00 is located at the confluence of the Roseau River and CD 16 – Lateral 1. Branch 1 starting at station 300+00 is located at the corner of 340<sup>th</sup> Street and 310<sup>th</sup> Avenue and extends east to Minnesota Trunk Highway 89.

## Soils

Based on the soils investigation, lean clay likely extends to the bottom of the proposed ditches and the soils are relatively competent in strength and stiffness. There should be no concerns of potential slope instability or excessive sloughing. A trapezoidal ditch with 3:1 (horizontal:vertical) side slopes or greater is recommended for maximum stability. The outlet of CD 16 from station 0+00 to 8+71 (Figure 7) is experiencing head cutting and bank failures, due to the steep ditch profile and side slopes. The outlet of CD 16 Lateral 1 also experienced similar erosion, but the RRWD has completed a bank stabilization project in that location. In the next section, the proposed design is discussed which proposes to stabilize the soils along this channel.

**Figure 7. CD 16 Main Ditch Outlet to Roseau River**

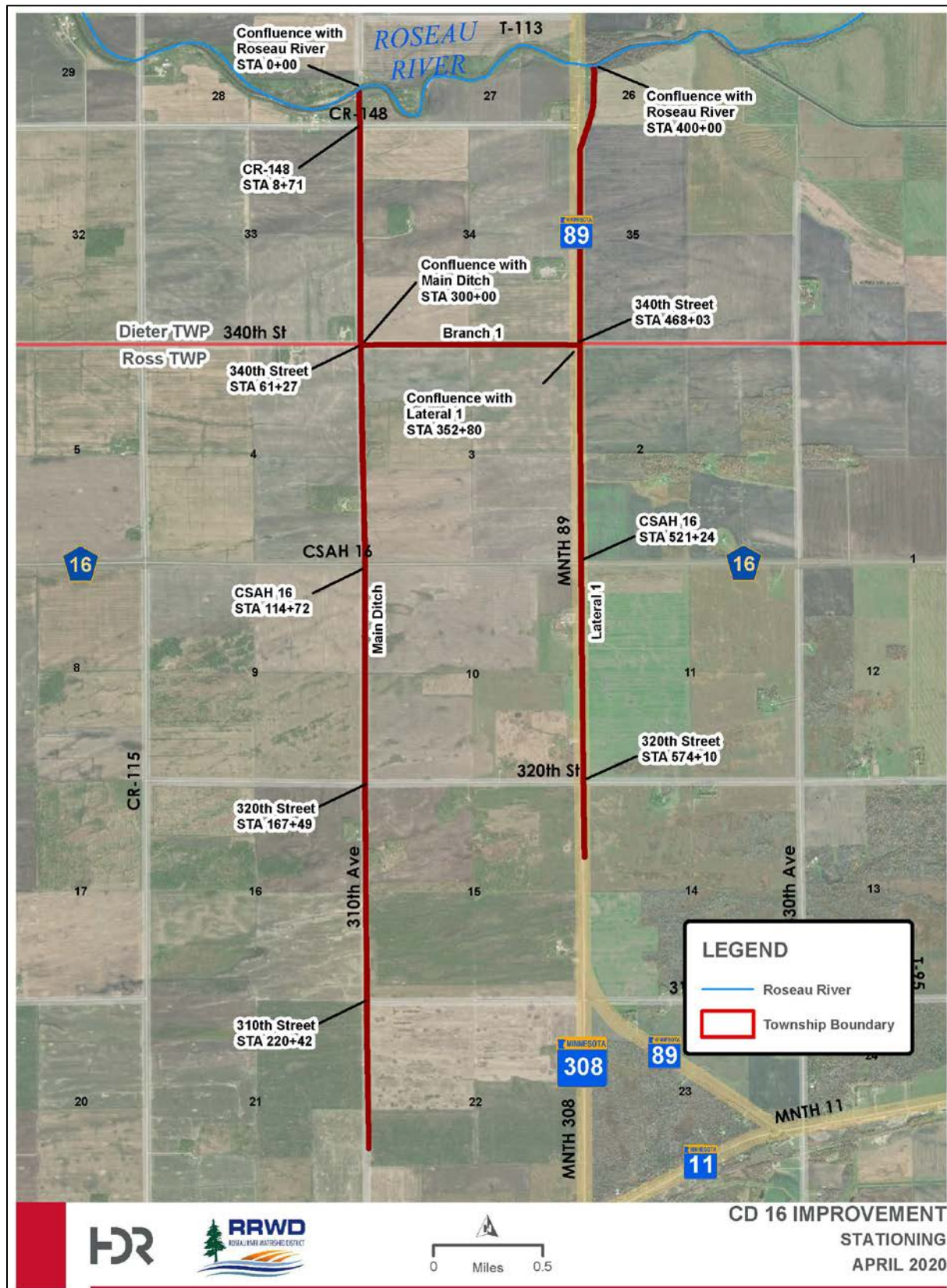


The CD 16 system is located within the glacial lake plain of Lake Agassiz. Lake Agassiz was created during the most recent glaciation 2 million years ago during the retreat of the Des Moines lobe, and the existing topography slopes slightly north at an approximate 0.1%. Three of the four beach ridges from Lake Agassiz are present in Roseau County. Over time, the ridges filled with peat deposits resting on till, although in some areas there are thin layers of sand or gravel in between the peat and the till. Roseau County was originally peatland, hardwood forest to the east, and tall grass prairie to the west. In the twentieth century, as agriculture was on the rise, ditching systems were created to reduce the inundation of fields due to the characteristic poorly drained soils of the area.

Figure 9 is a general soils map for CD 16 (obtained from the USDA NRCS web soil survey), and Figure 10 also shows the area with unified soil classifications at the surface. Soil I84A, described as a Percy Loam, 0 to 1 percent slopes, very cobbly, dominate the central project area. Soil I127A, described as Percy Loam, 0 to 1 percent slopes, is located in the north of the project area. Soil I741A, described as Boash clay loam, dense till, 0 to 2 percent slopes, is located intermittently in the northern project area, while soil I117A described as Skagen Loam, 0 to 3 percent slopes, very cobbly, is located intermittently in the southern project area. The Boash Clay Loam and Percy Loam occur on the characteristic flat lake plains/lake swale geography of this county and are generally considered Prime Farmland if drained. The texture is clayey to loamy. The major uses of these soils are cropland, hay, and pasture. The land is also frequently ponded.

Two soil borings were completed along CD 16 Lateral 1 (BH-12 and BH-13). The results of soils investigations at these two locations indicate that the soil in this area is underlain by a layer of topsoil/fill varying from 0.7 to 4.0 feet and a soft to stiff lean clay to the maximum depths explored (31 and 46 feet). This data compares similarly to the soil survey data discussed above. Groundwater was not encountered during the borehole investigations. It should be noted that groundwater levels will fluctuate seasonally and in response to climatic conditions.

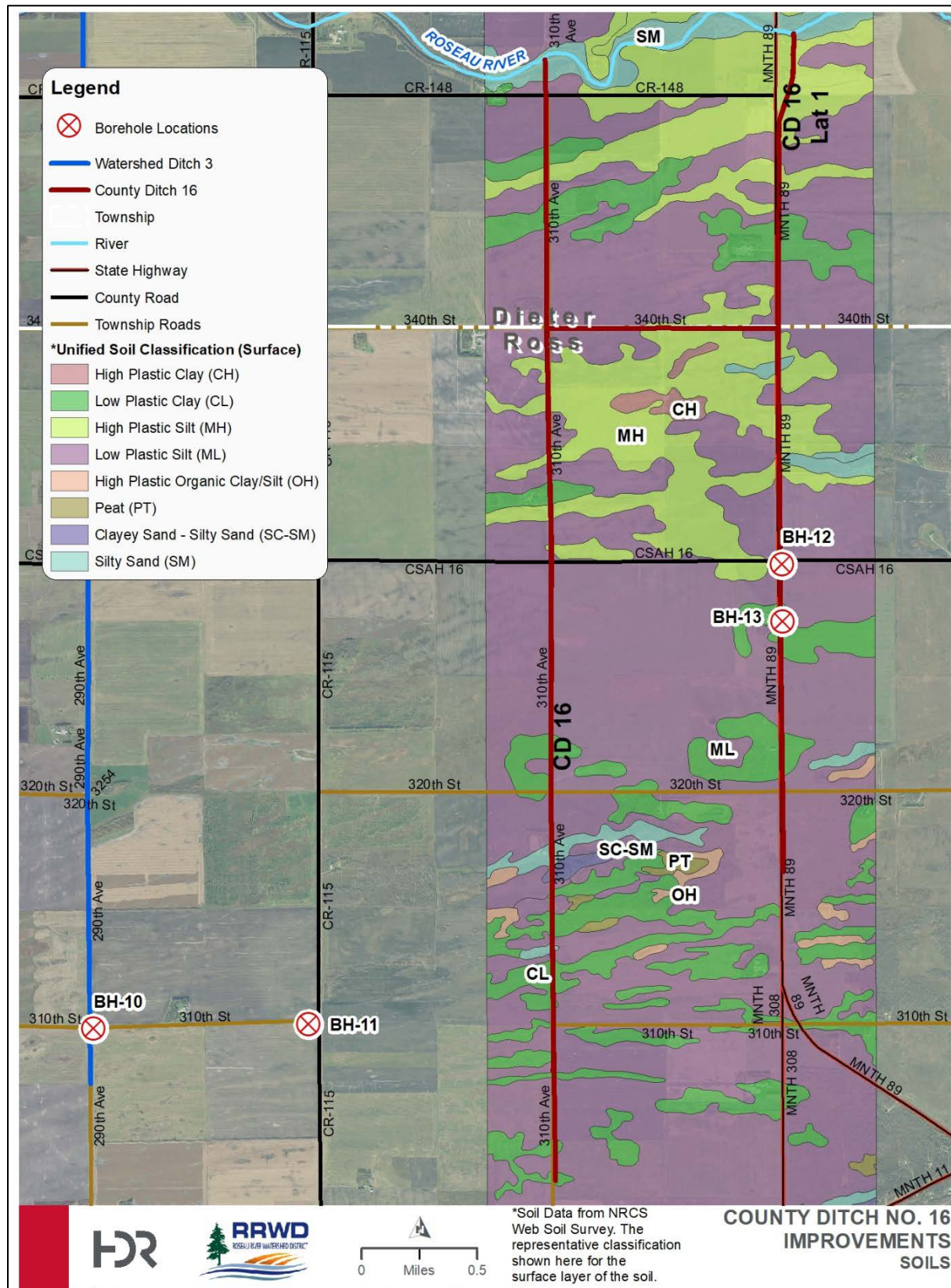
Figure 8. CD 16 Alignment and Stationing





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### Figure 10. CD 16 Soils - Unified Soil Classification





## Hydrology

Several HEC-HMS models (and associated datasets) have been developed by the USACE<sup>2</sup> for the Red River Basin. The models have been used in the Roseau River watershed for assessments of the effectiveness of various flood mitigation projects. The Roseau River watershed HEC-HMS model was used as the basis for modeling improvements to CD 16. Modifications were incorporated for modeling at a smaller watershed scale. Modifications included dividing subbasins into smaller drainage areas (Figure 11), updating times of concentration to match adjusted basin sizes, and methodology changes described in the following sections.

### Rainfall Depths

The CD 16 drainage area has a mean depth of 3.39 inches for a 10-year, 24-hour summer rainfall event. The Minnesota NRCS field office has published National Engineering Handbook (NEH) supplement MN650.290<sup>3</sup>, which specifies the use of Atlas 14 Volume 8 rainfall data as a replacement to the previous National Weather Service Technical Paper Number 40 (TP 40). Atlas 14 rainfall data (3.39") was used for the modeled scenarios even though the CD 16 petition for improvement and TP 40 specified a depth of 3.3 inches.

### Rainfall Distributions

National Engineering Handbook supplement MN650.290 specifies that the Midwest-Southeast (MSE) Distribution 3 is to be applied for hyetographs of 24-hours or less. As indicated in Merkel and Moody (2015)<sup>4</sup>, the MSE distributions are regionalized nested hyetographs developed from the Atlas 14 data. The recommended MSE 3 is more intense than the previously used SCS Type II distribution. See Figure 11 for flow input locations and Table 1 for calculated design flow rates.

**Table 1. Design Flow Rates for CD 16**

| Station | Location | Drainage Area (Sq. Mi.) | 10-Year, 24-Hour Design Flow (CFS) |
|---------|----------|-------------------------|------------------------------------|
| 8+71    | CR 148   | 5.6                     | 177                                |
| 61+27   | 340th St | 4.5                     | 145                                |
| 114+72  | CSAH 16  | 3.5                     | 111                                |
| 167+49  | 320th St | 2.5                     | 80                                 |

<sup>2</sup> <http://www.rrbdin.org/resources/hydrologymodels>

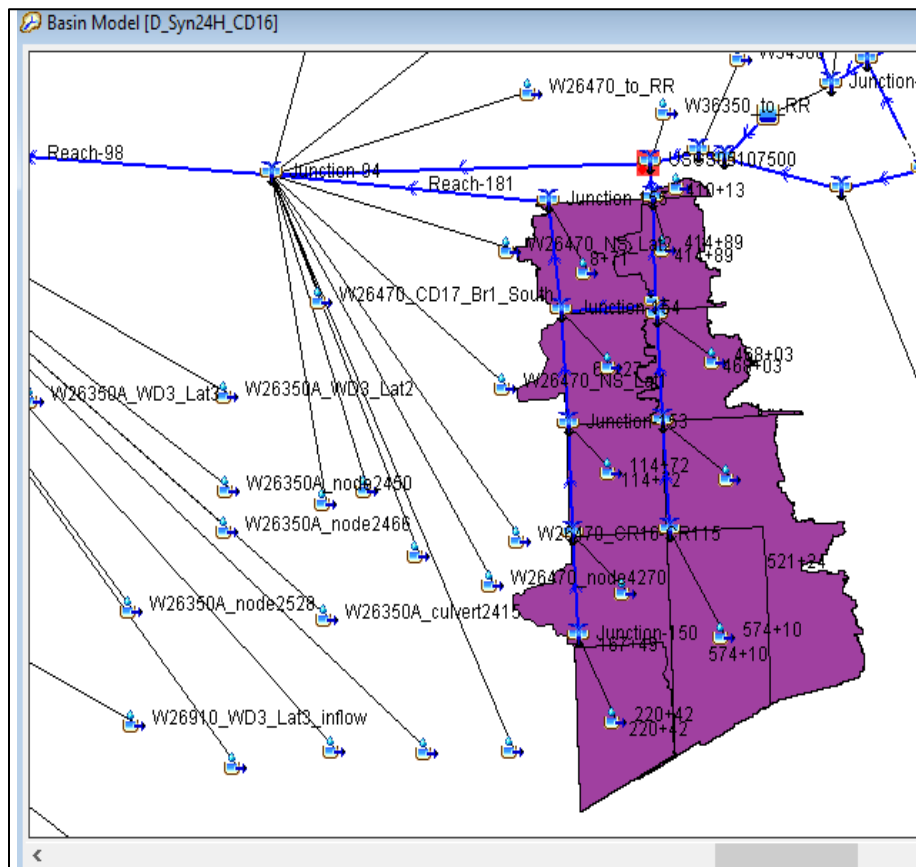
<sup>3</sup> [http://www.nrcs.usda.gov/wps/PA\\_NRCSCconsumption/download?cid=stelprdb1270686&ext=pdf](http://www.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=stelprdb1270686&ext=pdf)

<sup>4</sup> [http://www.wcc.nrcs.usda.gov/feetpref/wntsc/H&H/rainDist/NOAA\\_Atlas\\_14\\_MW\\_SE\\_rainfall\\_%20state\\_county\\_documentation\\_2015.pdf](http://www.wcc.nrcs.usda.gov/feetpref/wntsc/H&H/rainDist/NOAA_Atlas_14_MW_SE_rainfall_%20state_county_documentation_2015.pdf)



| Station | Location | Drainage Area (Sq. Mi.) | 10-Year, 24-Hour Design Flow (CFS) |
|---------|----------|-------------------------|------------------------------------|
| 220+42  | 310th St | 1.2                     | 40                                 |
| 414+89  | CR 148   | 5.9                     | 148                                |
| 468+03  | 340th St | 5.2                     | 124                                |
| 521+24  | CSAH 16  | 4.3                     | 93                                 |
| 574+10  | 320th St | 1.8                     | 40                                 |

### Figure 11. Hydrologic Model



## Hydraulics

Hydraulic analysis of CD 16 was performed to determine existing and proposed capacities. Channel capacities were analyzed for each section between culverts. Results are provided in Table 2. The existing capacities and proposed capacities were compared with the 10-year, 24-hour flows. The analysis shows that where the ditch can be deepened or have berm added, the capacity will meet the design goal. In all cases, the 8' bottom with a 2' berm would meet the desired capacity. A steady-state model was developed in HEC-RAS 5.0.7 to determine the water surface profiles for each alternative (Figure 12). Alternative 1 resulted in a decrease in the maximum water surface profile between 0.5 feet to 1 foot. Alternative 2 resulted in a decrease between 1 to 2 feet. The ditch profile was also adjusted to provide consistent grade and add capacity in the shallow sections of CD 16 (Figure 13). A 1-2' berm alongside the ditch will help to increase ditch capacity during high-flow events, and is a beneficial use of excavated spoil. Locations and elevations of these berms can be determined during final engineering, and a lower spillway section will be added upstream of the culvert crossings to allow higher flow events to be temporarily stored upstream of roadway crossings.



Table 2. Hydraulic Analysis Results for CD 16

| Station | Existing Slope (%) | Proposed Slope (%) | Existing Bottom Width (FT) | Depth to Full (FT) | Peak Inflows (CFS) | Capacity (CFS) |           |                     |                     |                     |
|---------|--------------------|--------------------|----------------------------|--------------------|--------------------|----------------|-----------|---------------------|---------------------|---------------------|
|         |                    |                    |                            |                    | 10-YR              | Existing       | 6' Bottom | 6' Bottom & 1' Berm | 8' Bottom & 1' Berm | 8' Bottom & 2' Berm |
| 7+00    | 0.3                | 0.3                | 5.5                        | 9.0                | 177                | 1,306          | 1,560     | 1,797               | 1,982               | 2,253               |
| 33+00   | 0.03               | 0.04               | 7.2                        | 6.0                | 145                | 216            | 200       | 285                 | 318                 | 431                 |
| 55+00   | 0.03               | 0.04               | 7                          | 6.0                | 145                | 224            | 211       | 302                 | 335                 | 456                 |
| 82+00   | 0.1                | 0.04               | 8.4                        | 3.5                | 111                | 180            | 157       | 283                 | 312                 | 496                 |
| 95+00   | 0.09               | 0.1                | 4.7                        | 3.0                | 111                | 46             | 84        | 158                 | 181                 | 295                 |
| 113+00  | 0.09               | 0.12               | 7.1                        | 2.9                | 111                | 98             | 91        | 177                 | 199                 | 333                 |
| 162+00  | 0.12               | 0.12               | 7.9                        | 4.3                | 80                 | 227            | 199       | 318                 | 360                 | 528                 |
| 217+00  | 0.12               | 0.14               | 7                          | 1.5                | 40                 | 25             | 24        | 68                  | 81                  | 164                 |
| 246+00  | 0.19               | 0.14               | 6.6                        | 1.0                | 40                 | 18             | 17        | 52                  | 62                  | 145                 |
| 319+00  | 0.02               | 0.02               | 5.7                        | 1                  | 23                 | 5.3            | 5.6       | 25                  | 64                  | 71                  |
| 339+32  | -0.01              | 0.02               | 9.56                       | 1.22               | 23                 | 8              | 5.8       | 27                  | 63                  | 71                  |
| 413+00  | 0.37               | 0.37               | 4                          | 4                  | 148                | 384            | 428       | 726                 | 1,128               | 1,217               |
| 438+00  | 0.09               | 0.09               | 11.5                       | 3.7                | 148                | 227            | 173       | 303                 | 481                 | 521                 |
| 464+00  | 0.05               | 0.04               | 17.1                       | 2.5                | 124                | 94             | 50        | 105                 | 186                 | 207                 |
| 499+00  | 0.11               | 0.12               | 13.1                       | 1                  | 124                | 26             | 17        | 48                  | 116                 | 132                 |
| 519+00  | 0.09               | 0.12               | 15.9                       | 1.2                | 93                 | 36             | 19        | 52                  | 117                 | 133                 |
| 571+00  | 0.21               | 0.2                | 9.2                        | 3.4                | 40                 | 272            | 229       | 367                 | 592                 | 649                 |

Orange Shading = Reach does not meet design goals

Figure 12. Hydraulic Model Results – CD 16

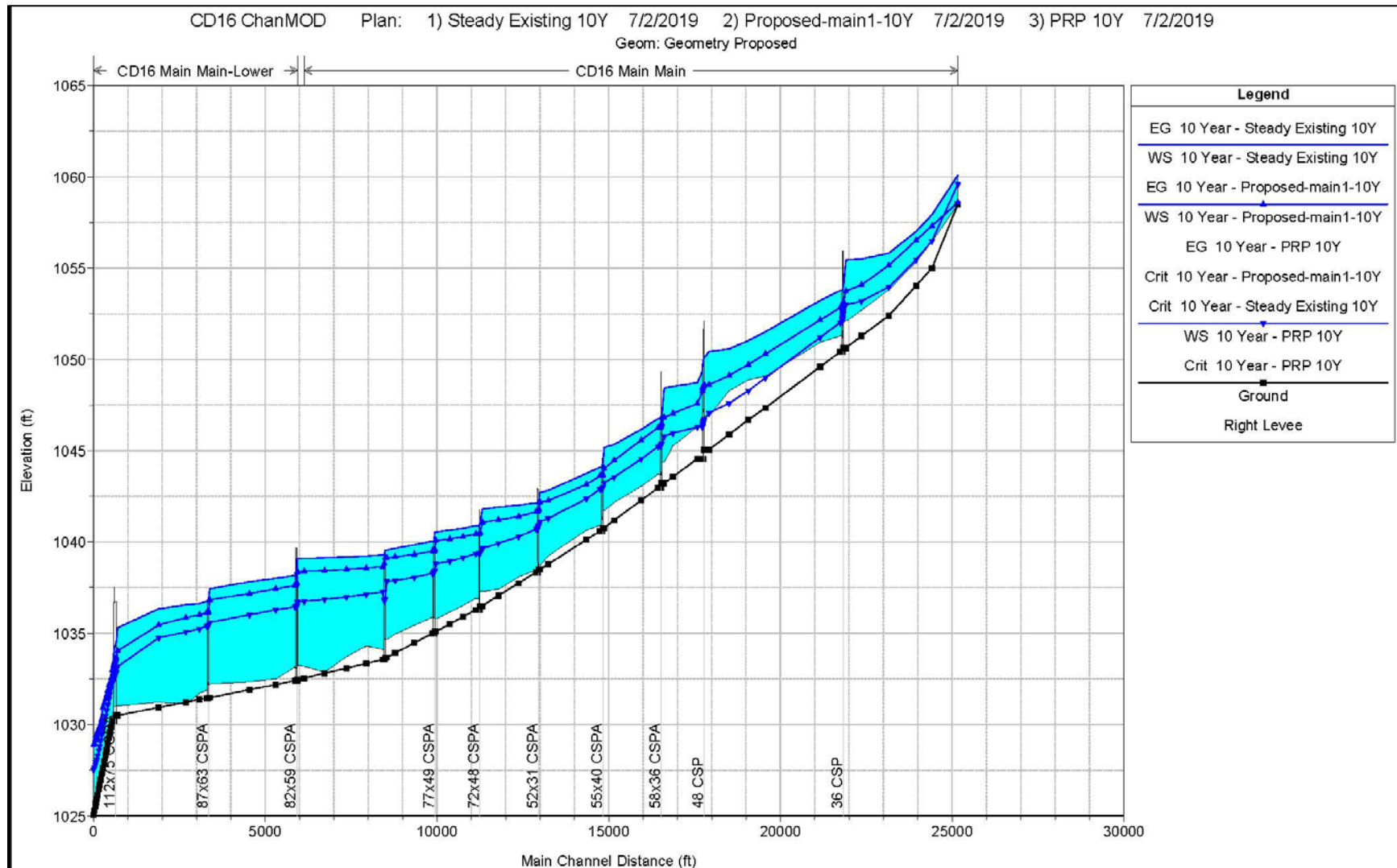
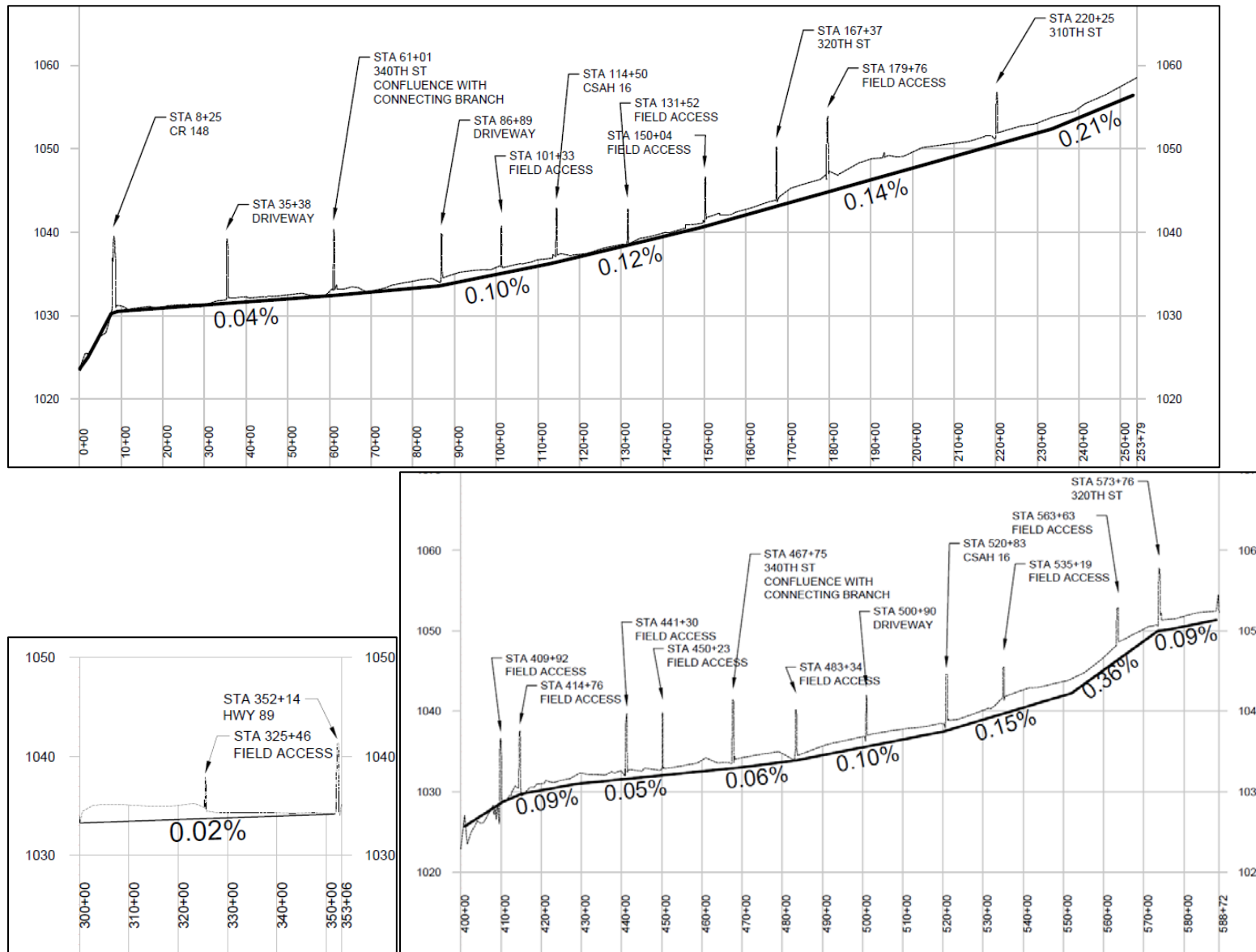




Figure 13. Existing and Proposed Ditch Profiles

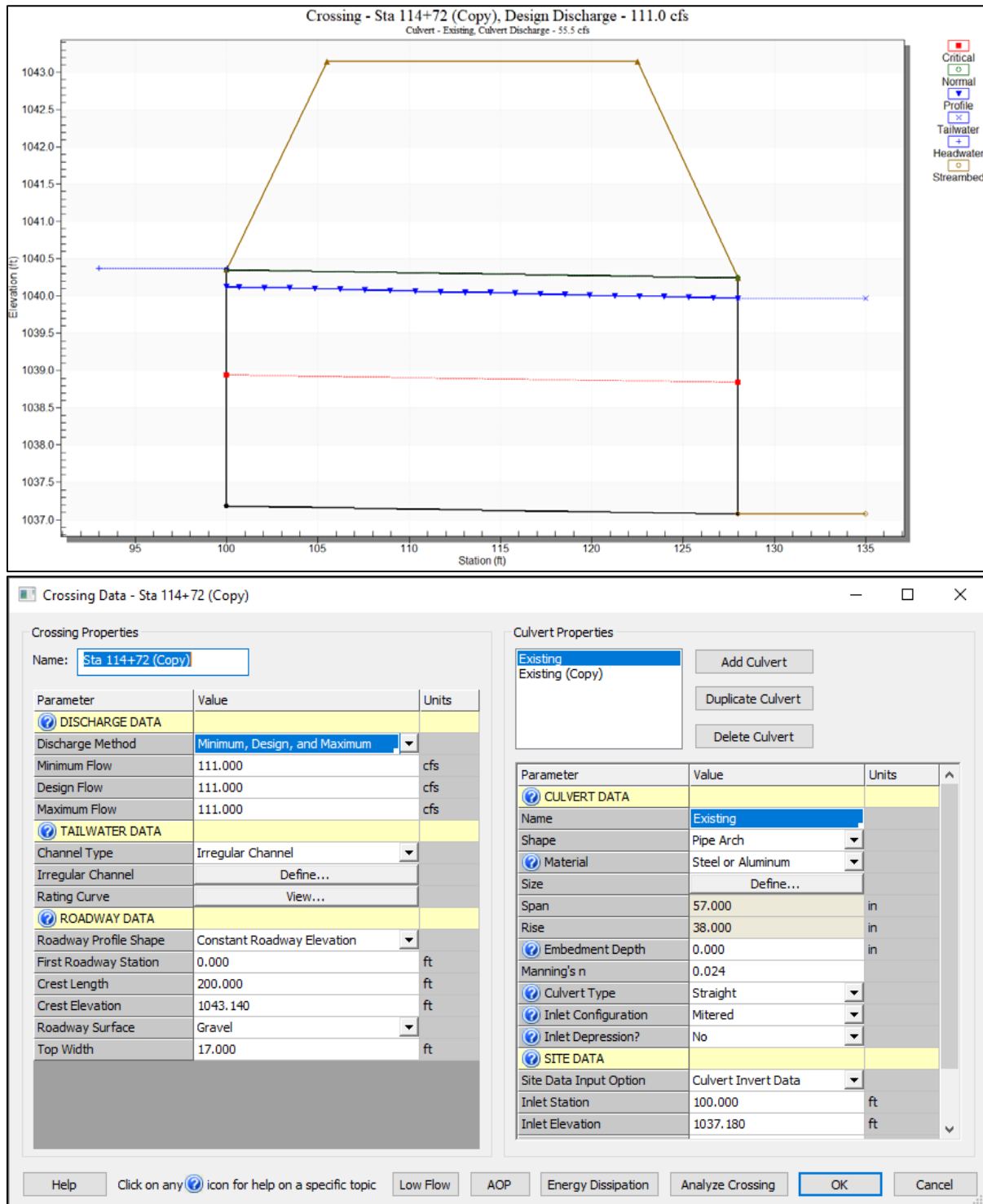


## Structures/Culvert Analysis

Culvert hydraulics were analyzed using the U.S. Federal Highway Administration's HY-8 program which calculates culvert capacities based upon the slope, size, material, inlet condition, and water surface elevation at the inlet (Figure 14). Results for each crossing are provided in Table 3. Only one crossing met all the design goals mentioned above for capacity, freeboard, and head loss. Alternative 1 retains the existing culverts, and adds smaller culverts alongside the existing ones. This allows a jack-and-bore type of installation where the road can be kept open during construction, as opposed to an open cut installation that closes the road until it can be rebuilt. The proposed culverts would be placed on the new ditch grade to allow complete drainage of the upstream ditch. Alternative 2 assumes full replacement of each culvert in the channel of CD 16 except under CSAH 16, which will be jack-and-bored to maintain traffic. The advantages of this alternative would be an extended lifespan of the structure compared to existing, and each culvert would be placed at the proposed ditch grade.

There are up to 5 field access crossings with culverts that may be moved or combined. This will result in cost savings if all affected landowners agree to the change and their access is maintained or replaced in another location. A more detailed investigation of these options coupled with channel characteristics such as berm elevation will be completed during final engineering.

Figure 14. HY-8 Program Figures





**Table 3. Culvert Analysis Results for CD 16**

| Station | 10-YR Peak Flow (CFS) | Existing Culvert Description | Max. Capacity (CFS) | Freeboard (FT) | Head Loss (FT) | Length (FT) | Slope (FT/FT) | Proposed Addition (Alt. 1) | Proposed Replacement (Alt. 2) |
|---------|-----------------------|------------------------------|---------------------|----------------|----------------|-------------|---------------|----------------------------|-------------------------------|
| 8+71    | 177                   | 112"x75" CSPA                | 404                 | 3.53           | 2.19           | 88          | -0.0001       | 66" CSP                    | 103"x71" CSPA (2)             |
| 35+61   | 177                   | 87"x63" CSPA                 | 171                 | -0.04          | 1.08           | 30          | 0.0070        | 24" CSP                    | 103"x71" CSPA (2)             |
| 61+27   | 145                   | 82"x59" CSPA                 | 174                 | 0.88           | 1.13           | 38          | 0.0024        | 24" CSP                    | 57"x38" CSPA (2)              |
| 87+11   | 145                   | 85"x54" CSPA                 | 114                 | -0.13          | 0.58           | 29          | 0.0017        | 18" CSP                    | 57"x38" CSPA (2)              |
| 101+47  | 145                   | 77"x49" CSPA                 | 94                  | -0.19          | 0.34           | 28          | 0.0029        | 24" CSP                    | 57"x38" CSPA (2)              |
| 114+72  | 111                   | 72"x48" CSPA                 | 130                 | 0.62           | 1.53           | 40          | 0.0050        | 30" CSP                    | 57"x38" CSPA (2)              |
| 131+82  | 111                   | 52"x31" CSPA                 | 40                  | -0.32          | 0.01           | 39          | -0.0036       | 24" CSP                    | 54" CSP (2)                   |
| 150+45  | 111                   | 55"x40" CSPA                 | 90                  | -1.95          | 2.07           | 36          | 0.0089        | 54" CSP                    | 54" CSP (2)                   |
| 167+49  | 80                    | 58"x36" CSPA                 | 101                 | 1.98           | 1.46           | 33          | -0.0097       | 42" CSP                    | 49"x33" CSPA (2)              |
| 179+88  | 80                    | 48" CSP                      | 103                 | 1.01           | 3.46           | 53          | -0.0091       | 66" CSP                    | 48" CSP (2)                   |
| 220+42  | 40                    | 36" CSP                      | 51                  | 0.99           | 1.97           | 37          | 0.0189        | 36" CSP                    | 36" CSP (2)                   |
| 325+39  | 23                    | 18" CSP                      | 7                   | -0.1           | 0.36           | 33          | 0.0097        | 36" CSP                    | 36" CSP                       |
| 352+01  | 23                    | 48" RCP                      | 109                 | 4.17           | 0.35           | 58          | 0.0010        | N/A                        | N/A                           |
| 410+14  | 148                   | 117"x79" CSPA                | 321                 | 2.42           | 3.87           | 46          | 0.0063        | 36" CSP                    | 103"x71" CSPA (2)             |
| 414+90  | 148                   | 117"x79" CSPA                | 357                 | 2.86           | 0.97           | 45          | 0.0031        | N/A                        | 103"x71" CSPA (2)             |
| 441+45  | 148                   | 117"x79" CSPA                | 325                 | 1.9            | 0.57           | 49          | 0.0018        | 36" CSP                    | 103"x71" CSPA (2)             |
| 450+45  | 148                   | 117"x79" CSPA                | 196                 | 0.68           | 0.67           | 49          | 0.0024        | 36" CSP                    | 103"x71" CSPA (2)             |
| 468+03  | 124                   | 117"x79" CSPA                | 378                 | 2.97           | 0.46           | 55          | -0.0018       | 36" CSP                    | 60" CSP (2)                   |
| 483+57  | 124                   | 48" CSP                      | 68                  | -0.21          | 2.57           | 28          | 0.0025        | 36" CSP                    | 60" CSP (2)                   |
| 501+10  | 124                   | 48" CSP                      | 69                  | -0.21          | 3.03           | 27          | -0.0033       | 36" CSP                    | 54" CSP (2)                   |
| 521+29  | 93                    | 36" RCP                      | 65                  | -0.13          | 4.58           | 60          | 0.0012        | 36" SSP                    | 54" SSP                       |
| 535+28  | 93                    | 36" CSP                      | 35                  | -0.22          | 1.01           | 25          | -0.0164       | 36" CSP                    | 48" CSP (2)                   |
| 563+79  | 93                    | 36" CSP                      | 54                  | -0.17          | 3.09           | 59          | 0.0086        | 36" CSP                    | 48" CSP (2)                   |
| 574+16  | 40                    | 36" CSP                      | 70                  | 2.93           | 2.44           | 45          | -0.0056       | 36" CSP                    | 48" CSP (2)                   |

Orange Shading = Crossing does not meet design goals



## Erosion Control

All structures and channels will be analyzed for scour and designed to prevent erosion where necessary. Riprap protection will be provided at the outlet of side water inlet pipes, and temporary ditch checks will be required during construction.

## Right-of-Way

310<sup>th</sup> Ave and 340<sup>th</sup> St run parallel to the CD 16 Main Ditch and Branch 1 respectively. Existing Roseau County right-of-way on either side of the road centerline is 33 ft. Minnesota Trunk Highway 89 runs parallel to Lateral 1. Minnesota Department of Transportation right-of-way on either side of the road centerline is approximately 75 ft.

Permanent ditch right-of-way will be purchased for the proposed improvement. The Minnesota Statutes 103E.021 and 103F.48 require a minimum permanently vegetated buffer zone of 16.5 feet from the top of the excavated slope or to the top of the spoil slope on the ditch side, whichever is greater. Temporary right-of-way will also be purchased beyond the permanent right-of-way to provide for construction access and spoil disposal. Table 4 displays the proposed right-of-way needed in feet, listed by stations and width.

**Table 4. Right-of-Way**

| Proposed Ditch Right-of-Way (R.O.W.) |                               |                        |
|--------------------------------------|-------------------------------|------------------------|
| Location (Station)                   | Permanent R.O.W. Description  | Permanent R.O.W. Acres |
| Main Ditch (0+00 to 253+79)          | 42' from existing ditch R.O.W | 23.56                  |
| Branch 1 (300+00 to 352+80)          | 32' from existing ditch R.O.W | 3.86                   |
| Lateral 1 (400+00 to 588+72)         | 25' from existing ditch R.O.W | 10.23                  |

# Project Description and Design Alternatives

## Design Alternatives

There are 2 alternatives that were evaluated for this project. The alternatives are listed individually below. The recommended alternative which will meet every design goal is Alternative 2 as described below.

### 1. Alternative 1

This alternative was identified as the lowest cost option to improve the ditch to the desired capacity. It minimizes earthwork by keeping the existing road slopes in place and constructing a 6-foot wide ditch bottom. This alternative also minimizes costs by retaining the existing culvert crossings and adding small culverts where necessary.

### 2. Alternative 2

This alternative would meet the design goals as well as provide all new culvert crossings and gentler side slopes which could be easily maintained. This alternative also provides the desired capacity at nearly 100% below field elevations adjacent to the ditch. The ditch bottom is 8 feet wide with 4:1 (horizontal:vertical) side slopes.

Figure 15. Alternative 1 Typical Cross Section

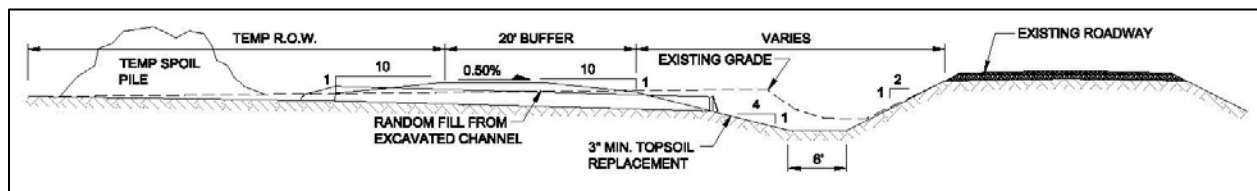
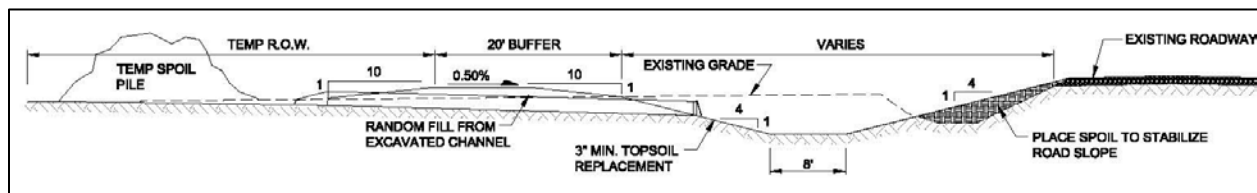


Figure 16. Alternative 2 Typical Cross Section



## Proposed Design

These alternatives have been discussed with the affected landowners and regulatory agencies, and the Viewer's Report has been completed based on Alternative 2. The calculated benefits of this alternative exceed the costs, and further cost savings will be incorporated in the final design of this Project. These cost savings will include eliminating and combining field access crossings along CD 16. The Viewer's Report has confirmed that the benefits outweigh the costs of this design, and HDR recommends completing final design and construction as proposed in this report.

## Side Inlets/Approaches

Side inlets will be installed where berms are constructed, and at every major field ditch inlet as appropriate. Each side inlet will have an apron on the inlet end, flap gate on the outlet end, and 5 cubic yards of Class II riprap at the outlet to reduce backflow and erosion. The majority of these pipes will be 18 inch Corrugated Steel Pipe (CSP).

## Outlet Grade Stabilization

Figure 17. CD 16 Lateral 1 Outlet to Roseau River



The outlet of the main ditch, from the Roseau River to station 8+71, will be designed to remain stable through a combination of grade design and reinforcement. The ditch bottom and toe will be reinforced with riprap similar to what was done with the CD 16 Lateral 1 outlet as seen above in Figure 17. Incorporating designed hydraulic jumps in the ditch leading up to the River will help to dissipate energy and reduce erosion. During the final design phase the extents of this outlet stabilization will be refined.

## Spoil Placement

Spoil from ditch excavation will be placed alongside the ditch, creating a berm within the permanent and/or temporary right-of-way. As noted in the hydraulics discussion, select portions of the berm will provide additional conveyance for the 10-year event. It is anticipated that spoil will be placed on the east side of the CD 16 – Main Ditch and CD 16 – Lateral 1. Spoil will be placed on the south side of CD 16 – Branch 1.

A portion of the proposed ditch improvement lies in the Roseau River floodplain. This project will not cause a rise in the base flood elevation. In the portions of the ditch near the Roseau River, the ditch is deep enough that a berm will not be needed to increase the conveyance capacity. In places along the ditch that require a berm, the berm will not be higher than the road on the west side of the ditch, ensuring that the berm becomes inundated before any road flooding occurs.

This means that the berm will not hold back flood flows that weren't already being held by the roads. Since the berm will be constructed using the excavated spoil from the ditch, there is no net loss of floodplain volume that is available.

## **Utilities**

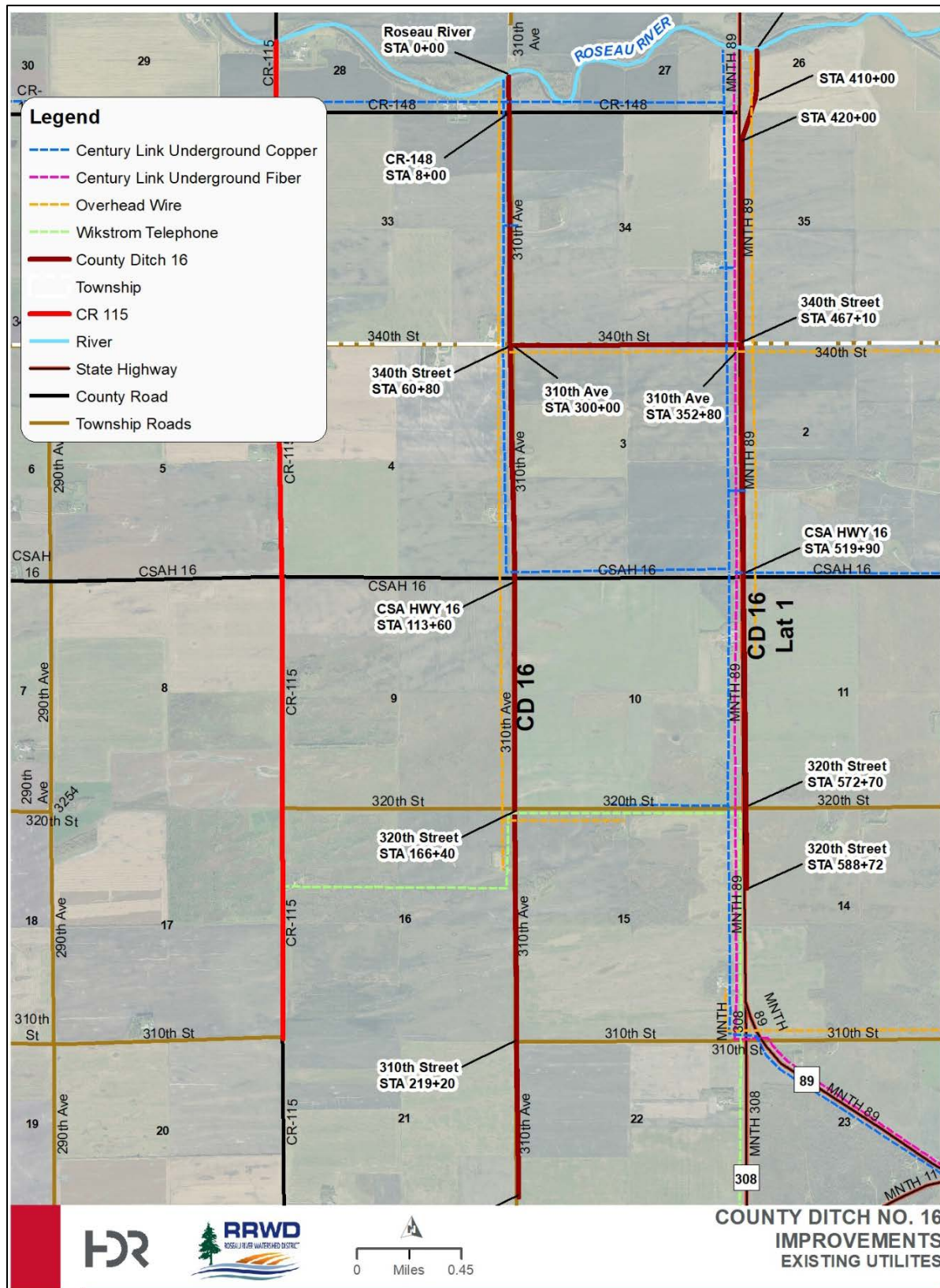
HDR conducted a Gopher State One Call to obtain information on what utilities are located inside the project area. The known utilities within the project area are shown in Figure 18. Exact locations of other utilities such as fiber optic, water lines, and underground electric crossing the ditch will also be determined during final engineering. Consideration to utility depth and the cost to relocate any utility (if necessary) will help to determine ditch depth at each location.

## **Opinion of Probable Cost**

Table 5 and Table 6 outline the estimated costs for the alternatives based on 2020 rates.



### Figure 18. Existing Utilities



**Table 5. Probable Costs – Alternative 1**

| MnDOT Spec | RRWD CD 16                               |       | Engineer's Opinion of Most Probable Cost |              |                     |  |
|------------|--|-------|--|--------------|---------------------|--|
|            | Construction Costs                       |       |  |              |                     |  |
|            | Item                                     | Unit  | Quantity                                 | Unit Cost    | Total Cost          |  |
| 2021.501   | MOBILIZATION                             | LS    | 1.00                                     | \$15,000.00  | \$15,000.00         |  |
| 2101.501   | CLEARING AND GRUBBING                    | LS    | 1  | \$8,000.00   | \$8,000.00          |  |
| 2104.502   | SALVAGE SIGN TYPE A                      | EACH  | 10                                       | \$25.00      | \$250.00            |  |
| 2105.501   | COMMON EXCAVATION HAULING (P)            | CY    | 1,000                                    | \$5.00       | \$5,000.00          |  |
| 2105.507   | COMMON EXCAVATION (P)                    | CY    | 40,000                                   | \$2.75       | \$110,000.00        |  |
| 2105.507   | COMMON BORROW (CV)                       | CY    | 1,000                                    | \$5.00       | \$5,000.00          |  |
| 2118.509   | AGGREGATE SURFACING, CLASS 5 MOD.        | TON   | 1,200                                    | \$9.50       | \$11,400.00         |  |
| 2451.507   | GRANULAR BEDDING (CV)                    | CY    | 330                                      | \$18.00      | \$5,940.00          |  |
| 2501.502   | 18" CS PIPE APRON                        | EA    | 27                                       | \$320.00     | \$8,640.00          |  |
| 2501.502   | 24" CS PIPE APRON                        | EA    | 8  | \$460.00     | \$3,680.00          |  |
| 2501.502   | 30" CS PIPE APRON                        | EA    | 2  | \$520.00     | \$1,040.00          |  |
| 2501.502   | 36" CS PIPE APRON                        | EA    | 26                                       | \$520.00     | \$13,520.00         |  |
| 2501.502   | 42" CS PIPE APRON                        | EA    | 2  | \$900.00     | \$1,800.00          |  |
| 2501.502   | FLAP GATE FOR 18"CS PIPE                 | EA    | 27                                       | \$425.00     | \$11,475.00         |  |
| 2501.503   | 18" CS PIPE CULVERT                      | LF    | 1,668                                    | \$40.00      | \$66,720.00         |  |
| 2501.503   | 24" CS PIPE CULVERT                      | LF    | 216                                      | \$45.00      | \$9,720.00          |  |
| 2501.503   | 30" CS PIPE CULVERT                      | LF    | 48                                       | \$55.00      | \$2,640.00          |  |
| 2501.503   | 36" CS PIPE CULVERT                      | LF    | 734                                      | \$65.00      | \$47,710.00         |  |
| 2501.503   | 42" CS PIPE CULVERT                      | LF    | 54                                       | \$75.00      | \$4,050.00          |  |
| 2501.503   | 54" CS PIPE CULVERT                      | LF    | 56                                       | \$100.00     | \$5,600.00          |  |
| 2501.503   | 66" CS PIPE CULVERT                      | LF    | 182                                      | \$140.00     | \$25,480.00         |  |
| 2501.503   | 36" STEEL CASING PIPE - JACK INSTALLED   | LF    | 80                                       | \$550.00     | \$44,000.00         |  |
| 2511.510   | RANDOM RIPRAP - CLASS 2                  | CY    | 270                                      | \$55.00      | \$14,850.00         |  |
| 2511.510   | RANDOM RIPRAP - CLASS 3                  | CY    | 800                                      | \$65.00      | \$52,000.00         |  |
| 2563.601   | TRAFFIC CONTROL                          | LS    | 1  | \$10,000.00  | \$7,500.00          |  |
| 2573.503   | SEDIMENT CONTROL LOG TYPE STRAW          | LF    | 3,000                                    | \$2.50       | \$7,500.00          |  |
| 2573.503   | FLOTATION SILT CURTAIN TYPE MOVING WATER | LF    | 200                                      | \$18.00      | \$3,600.00          |  |
| 2573.503   | SEDIMENT CONTROL LOG TYPE STRAW          | LF    | 2,000                                    | \$2.50       | \$5,000.00          |  |
| 2574.508   | FERTILIZER, TYPE 1                       | POUND | 11,000                                   | \$0.40       | \$4,400.00          |  |
| 2575.504   | EROSION CONTROL BLANKET, CATEGORY 0      | SY    | 2,000                                    | \$1.00       | \$2,000.00          |  |
| 2575.505   | SEEDING                                  | ACRE  | 55                                       | \$90.00      | \$4,950.00          |  |
| 2575.505   | DISK ANCHORING                           | ACRE  | 55                                       | \$58.00      | \$3,190.00          |  |
| 2575.508   | SEED MIXTURE, 25-141                     | POUND | 3,245                                    | \$3.50       | \$11,358.00         |  |
| 2575.509   | MULCH MATERIAL TYPE 1                    | TON   | 110                                      | \$110.00     | \$12,100.00         |  |
|            | Subtotal                                 |       |  |              | \$535,113.00        |  |
|            | Engineering and Administration           | %     | 20                                       |              | \$107,023.00        |  |
|            | Contingency                              | %     | 20                                       |              | \$107,023.00        |  |
|            | Utility Relocation                       | LS    | 1  | \$ 20,000.00 | \$20,000.00         |  |
|            | Right of Way Acquisition                 | 38    | ACRES x                                  | \$ 1,000.00  | \$38,000.00         |  |
|            | Temp. Right of Way                       | 60    | ACRES x                                  | \$ 300.00    | \$18,000.00         |  |
|            | Total Construction                       |       |  |              | <b>\$825,159.00</b> |  |



**Table 6. Probable Costs – Alternative 2**

| MnDOT Spec | RRWD CD 16                                      |       | Engineer's Opinion of Most Probable Cost |              |                |  |
|------------|---|-------|--|--------------|----------------|--|
|            | Construction Costs                              |       |  |              |                |  |
|            | Item  | Unit  | Quantity                                 | Unit Cost    | Total Cost     |  |
| 2021.501   | MOBILIZATION                                    | LS    | 1.00                                     | \$30,000.00  | \$30,000.00    |  |
| 2101.501   | CLEARING AND GRUBBING                           | LS    | 1  | \$8,000.00   | \$8,000.00     |  |
| 2104.503   | REMOVE 18" CS PIPE CULVERT                      | LF    | 33                                       | \$10.00      | \$330.00       |  |
| 2104.503   | REMOVE 30" CS PIPE CULVERT                      | LF    | 33                                       | \$15.00      | \$495.00       |  |
| 2104.503   | REMOVE 36" CS PIPE CULVERT                      | LF    | 166                                      | \$20.00      | \$3,320.00     |  |
| 2104.503   | REMOVE 48" CS PIPE CULVERT                      | LF    | 108                                      | \$25.00      | \$2,700.00     |  |
| 2104.503   | REMOVE 49" x 33" CS ARCH PIPE                   | LF    | 39                                       | \$20.00      | \$780.00       |  |
| 2104.503   | REMOVE 57" x 38" CS ARCH PIPE                   | LF    | 69                                       | \$25.00      | \$1,725.00     |  |
| 2104.503   | REMOVE 71" x 47" CS ARCH PIPE                   | LF    | 40                                       | \$30.00      | \$1,200.00     |  |
| 2104.503   | REMOVE 77" x 52" CS ARCH PIPE                   | LF    | 28                                       | \$35.00      | \$980.00       |  |
| 2104.503   | REMOVE 83" x 57" CS ARCH PIPE                   | LF    | 67                                       | \$40.00      | \$2,680.00     |  |
| 2104.503   | REMOVE 87" x 63" CS ARCH PIPE                   | LF    | 30                                       | \$45.00      | \$1,350.00     |  |
| 2104.503   | REMOVE 112" x 75" CS ARCH PIPE                  | LF    | 88                                       | \$50.00      | \$4,400.00     |  |
| 2104.503   | REMOVE 117" x 79" CS ARCH PIPE                  | LF    | 244                                      | \$50.00      | \$12,200.00    |  |
| 2104.503   | REMOVE 36" RC PIPE CULVERT                      | LF    | 60                                       | \$50.00      | \$3,000.00     |  |
| 2104.503   | REMOVE 48" RC PIPE CULVERT                      | LF    | 58                                       | \$50.00      | \$2,900.00     |  |
| 2104.502   | SALVAGE SIGN TYPE A                             | EACH  | 10                                       | \$25.00      | \$250.00       |  |
| 2105.501   | COMMON EXCAVATION HAULING (P)                   | CY    | 1,000                                    | \$5.00       | \$5,000.00     |  |
| 2105.507   | COMMON EXCAVATION (P)                           | CY    | 142,000                                  | \$2.75       | \$390,500.00   |  |
| 2118.509   | AGGREGATE SURFACING, CLASS 5 MOD.               | TON   | 1,200                                    | \$9.50       | \$11,400.00    |  |
| 2360.509   | TYPE SP 9.5 WEARING COURSE MIXTURE (2,B)        | TON   |  | \$195.00     | \$0.00         |  |
| 2451.507   | GRANULAR BEDDING (CV)                           | CY    | 1,670                                    | \$18.00      | \$30,060.00    |  |
| 2501.502   | 18" CS PIPE APRON                               | EA    | 27                                       | \$320.00     | \$8,640.00     |  |
| 2501.502   | FLAP GATE FOR 18"CS PIPE                        | EA    | 27                                       | \$425.00     | \$11,475.00    |  |
| 2501.503   | 18" CS PIPE CULVERT                             | LF    | 1,620                                    | \$40.00      | \$64,800.00    |  |
| 2501.503   | 24" CS PIPE CULVERT                             | LF    | 218                                      | \$45.00      | \$9,810.00     |  |
| 2501.503   | 36" CS PIPE CULVERT                             | LF    | 167                                      | \$65.00      | \$10,855.00    |  |
| 2501.503   | 48" CS PIPE CULVERT                             | LF    | 340                                      | \$80.00      | \$27,200.00    |  |
| 2501.503   | 54" CS PIPE CULVERT                             | LF    | 202                                      | \$100.00     | \$20,200.00    |  |
| 2501.503   | 60" CS PIPE CULVERT                             | LF    | 288                                      | \$120.00     | \$34,560.00    |  |
| 2501.503   | 66" CS PIPE CULVERT                             | LF    | 146                                      | \$140.00     | \$20,440.00    |  |
| 2501.503   | 49" SPAN CS PIPE ARCH CULVERT (BEVEL CUT ENDS)  | LF    | 106                                      | \$85.00      | \$9,010.00     |  |
| 2501.503   | 57" SPAN CS PIPE ARCH CULVERT (BEVEL CUT ENDS)  | LF    | 404                                      | \$90.00      | \$36,360.00    |  |
| 2501.503   | 103" SPAN CS PIPE ARCH CULVERT (BEVEL CUT ENDS) | LF    | 216                                      | \$225.00     | \$48,600.00    |  |
| 2501.503   | 117" SPAN CS PIPE ARCH CULVERT (BEVEL CUT ENDS) | LF    | 538                                      | \$250.00     | \$134,500.00   |  |
| 2501.503   | 54" STEEL CASING PIPE - JACK INSTALLED          | LF    | 80                                       | \$750.00     | \$60,000.00    |  |
| 2511.510   | RANDOM RIPRAP - CLASS 2                         | CY    | 270                                      | \$55.00      | \$14,850.00    |  |
| 2511.510   | RANDOM RIPRAP - CLASS 3                         | CY    | 800                                      | \$65.00      | \$52,000.00    |  |
| 2563.601   | TRAFFIC CONTROL                                 | LS    | 1  | \$10,000.00  | \$7,500.00     |  |
| 2573.503   | SEDIMENT CONTROL LOG TYPE STRAW                 | LF    | 3,000                                    | \$2.50       | \$7,500.00     |  |
| 2573.503   | FLOTATION SILT CURTAIN TYPE MOVING WATER        | LF    | 200                                      | \$18.00      | \$3,600.00     |  |
| 2573.503   | SEDIMENT CONTROL LOG TYPE STRAW                 | LF    | 2,000                                    | \$2.50       | \$5,000.00     |  |
| 2574.508   | FERTILIZER, TYPE 1                              | POUND | 14,000                                   | \$0.40       | \$5,600.00     |  |
| 2575.504   | EROSION CONTROL BLANKET, CATEGORY 0             | SY    | 2,000                                    | \$1.00       | \$2,000.00     |  |
| 2575.505   | SEEDING   | ACRE  | 70                                       | \$90.00      | \$6,300.00     |  |
| 2575.505   | DISK ANCHORING                                  | ACRE  | 70                                       | \$58.00      | \$4,060.00     |  |
| 2575.508   | SEED MIXTURE, 25-141                            | POUND | 4,130                                    | \$3.50       | \$14,455.00    |  |
| 2575.509   | MULCH MATERIAL TYPE 1                           | TON   | 140                                      | \$110.00     | \$15,400.00    |  |
|            | Subtotal  |       |  |              | \$1,147,985.00 |  |
|            | Engineering and Administration                  | %     | 20                                       |              | \$229,597.00   |  |
|            | Contingency                                     | %     | 20                                       |              | \$229,597.00   |  |
|            | Utility Relocation                              | LS    | 1  | \$ 20,000.00 | \$20,000.00    |  |
|            | Right of Way Acquisition                        | 38    | ACRES x                                  | \$ 1,000.00  | \$38,000.00    |  |
|            | Temp. Right of Way                              | 60    | ACRES x                                  | \$ 300.00    | \$18,000.00    |  |
|            | Total Construction                              |       |  |              | \$1,683,179.00 |  |

# Other Ongoing RRWD Projects

## Retention Site C

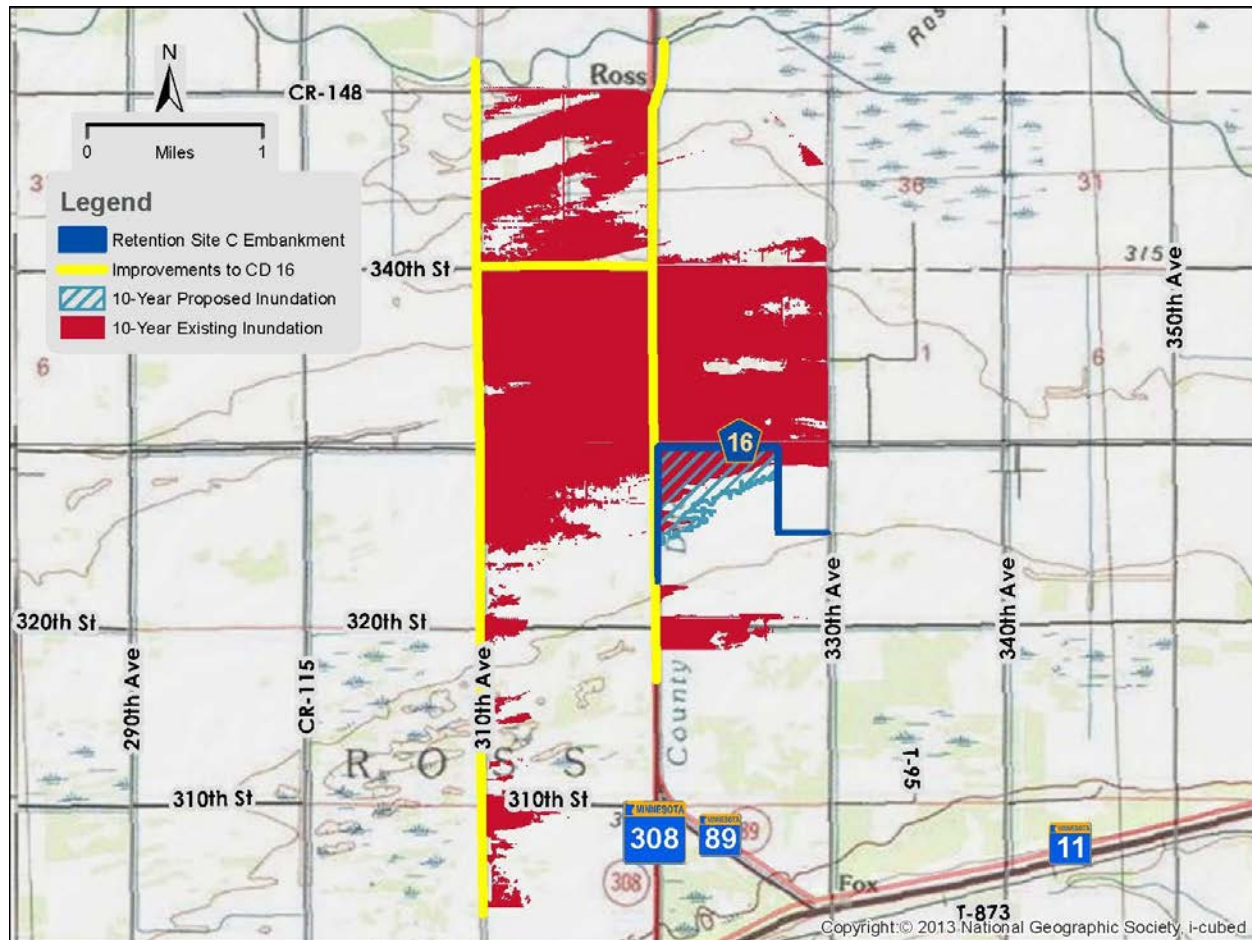
The outlet for the Retention Site C project is the CD 16 system. In its current condition, the CD 16 system wouldn't have the capacity to convey runoff from a 10 year, 24-hour event without damaging the adjacent agricultural areas. Improving the CD 16 system will help meet the Whitney Lake Subwatershed purpose and need. Results of the Retention Site C proposed storage and CD 16 drainage improvements are shown below in Table 7. Figure 19 shows results from a 10 year, 24-hour storm event in CD 16 before and after the Retention Site C and CD 16 improvements.

**Table 7. CD 16 Peak Flow and Water Surface Elevations at Roseau River Confluence**

| Event            | Existing Peak Flow Rate (cfs) | Existing Peak Water Surface Elevation (feet) | Retention Site C Peak Flow Rate (cfs) | Retention Site C Peak Water Surface Elevation (feet) | Flow Change from Existing (cfs) |
|------------------|-------------------------------|--|---------------------------------------|--|---------------------------------|
| 2 Year, 24-Hour  | 81.1                          | 1031.5                                       | 77.8                                  | 1031.5   | 3.3                             |
| 10-Year, 24-Hour | 212.7                         | 1031.52                                      | 186.3                                 | 1031.5   | 26.4                            |
| 25-Year, 24-Hour | 292                           | 1031.54                                      | 276.5                                 | 1031.5   | 15.5                            |
| 100-Year, 10-Day | 415.6                         | 1031.6                                       | 412.9                                 | 1031.5   | 2.7                             |



**Figure 19. Existing vs. Proposed 10-Year, 24-Hour Inundation with Retention Site C and CD 16 Improvements**



## Roseau Lake Rehabilitation

The Roseau Lake project is currently in the final design phase and planning on being constructed in the next few years. This project is just upstream from Ross, MN and the outlet of the CD 16 system. The Roseau Lake Project may affect flows at Ross, but it won't have any significant impact on the CD 16 improvements. Following the Technical Paper #11 design requirements, which ensures ditches allow for temporary floodplain storage during less frequent events, guarantee the ditch improvement will not hinder the Roseau Lake operations either.

# Social, Economic, and Environmental Impacts

## Adequacy of Outlet

The outlet for the proposed ditch improvement is adequate. During major flood events, almost all areas of the RRWD contribute flood water to the Roseau River. However, due to location or other characteristics, some areas may consistently contribute more to the peak flow which is the more damaging portion of a flood hydrograph. The selection and design of appropriate Flood Damage Reduction measures will depend on the timing of an area's flood water contribution to flooding in other areas of the basin. For purposes of discussion, a river basin can be divided into three timing zones as shown on the generalized map in Figure 20 and described below. The zones are labeled early, middle and late.

Early. Most of the runoff from these areas typically moves through ahead of the major flood flows from other areas of the watershed. Usually, these areas are close to the outlet of the watershed and/or are well drained. Slowing down or storing water from these areas could increase downstream flood damages if water is released during the flood peak. Conversely, speeding up the removal of water from these areas may provide downstream peak flow reduction.

Middle. Runoff from these areas typically coincides with the flood peak at the outlet of the watershed. Modification of flows from these areas will potentially provide the greatest flood control benefits. Slowing down or storing water from these areas will be especially beneficial if releases can be delayed until after floodwaters have receded. Speeding up the water could also be beneficial if it would move through ahead of the peak. Ideally the timing of flows from these areas could be controlled to allow either early or late release.

Late. Most of the runoff from these areas typically moves through after the major flood flows from other areas of the watershed. Usually, late areas are the most remote within the watershed, are poorly drained, or their runoff is delayed by existing storage facilities. Slowing down flood water from these areas will always reduce downstream peak flows and will generally provide the greatest benefit within the watershed. Conversely, speeding up water from these areas likely will increase downstream flood damages.

Note that the timing of an area's flood water contribution depends on the location of the downstream damage center being considered. Knowledge of the timing of flows within the RRWD and the Red River Basin continues to be developed based on gage data from actual flood events and by hydrologic modeling. The CD 16 system falls in the "Early Zone" of the Roseau River, so improved drainage and conveyance will be a positive '+' Flood Damage Reduction measure for Roseau River.

With ditch improvements being made to the CD 16 drainage area, peak flows may increase slightly for up to a 10-year event, but only if the Roseau River is not already above normal stages. When the Roseau River drainage area experiences a 2-year event or larger, the River will back up into CD 16 and the outlet will be submerged. For an event greater than a 10-year rainfall, the ditch will back out into the adjacent agricultural lands and therefore help maintain or

decrease peak flows at the outlet. Similarly, if the Roseau River is flooding, the outlet will be submerged and the CD 16 system will be inundated for over a mile. This ditch improvement will reduce the overall peak on the Roseau River by increasing conveyance to the Roseau River in the early stages of the River's flood.

The Roseau River, into which CD 16 discharges, is a significantly larger channel than CD 16 as proposed. When considering the proposed ditch improvement in the larger context of the Roseau River Watershed, the entire system improvements which include retention, outlet stabilization, and conveyance enhancements work together to reduce flooding problems downstream such that the adequacy of the outlet is not in question.

## **Benefitted Area**

The previous and outdated CD 16 benefitted area is shown in Figure 21. It covered 9,200 acres. This is subject to change as part of the ditch improvement process. The new, revised benefitted area is included in Appendix E – Draft Viewer's Report.

Figure 20. Runoff Timing Zones

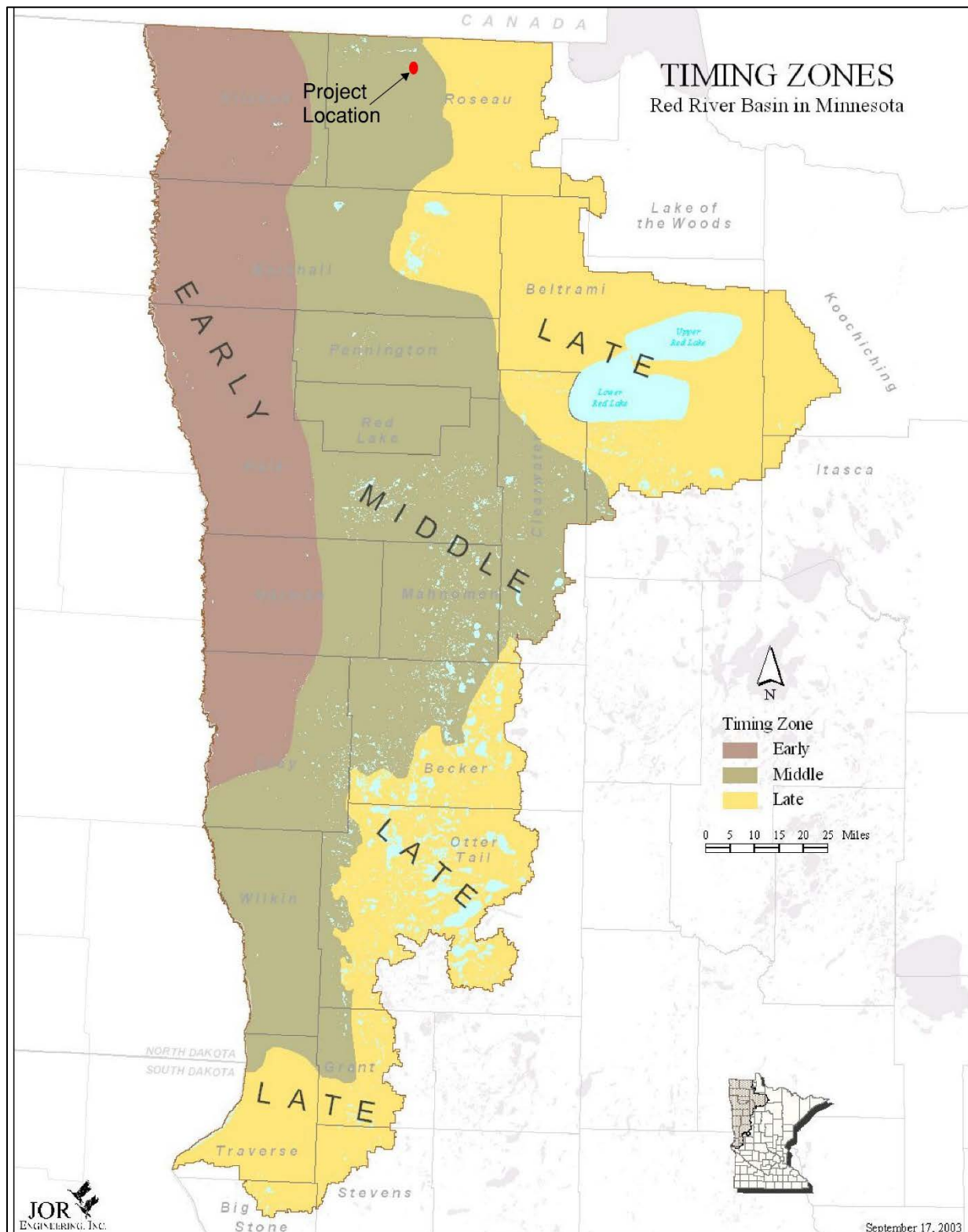
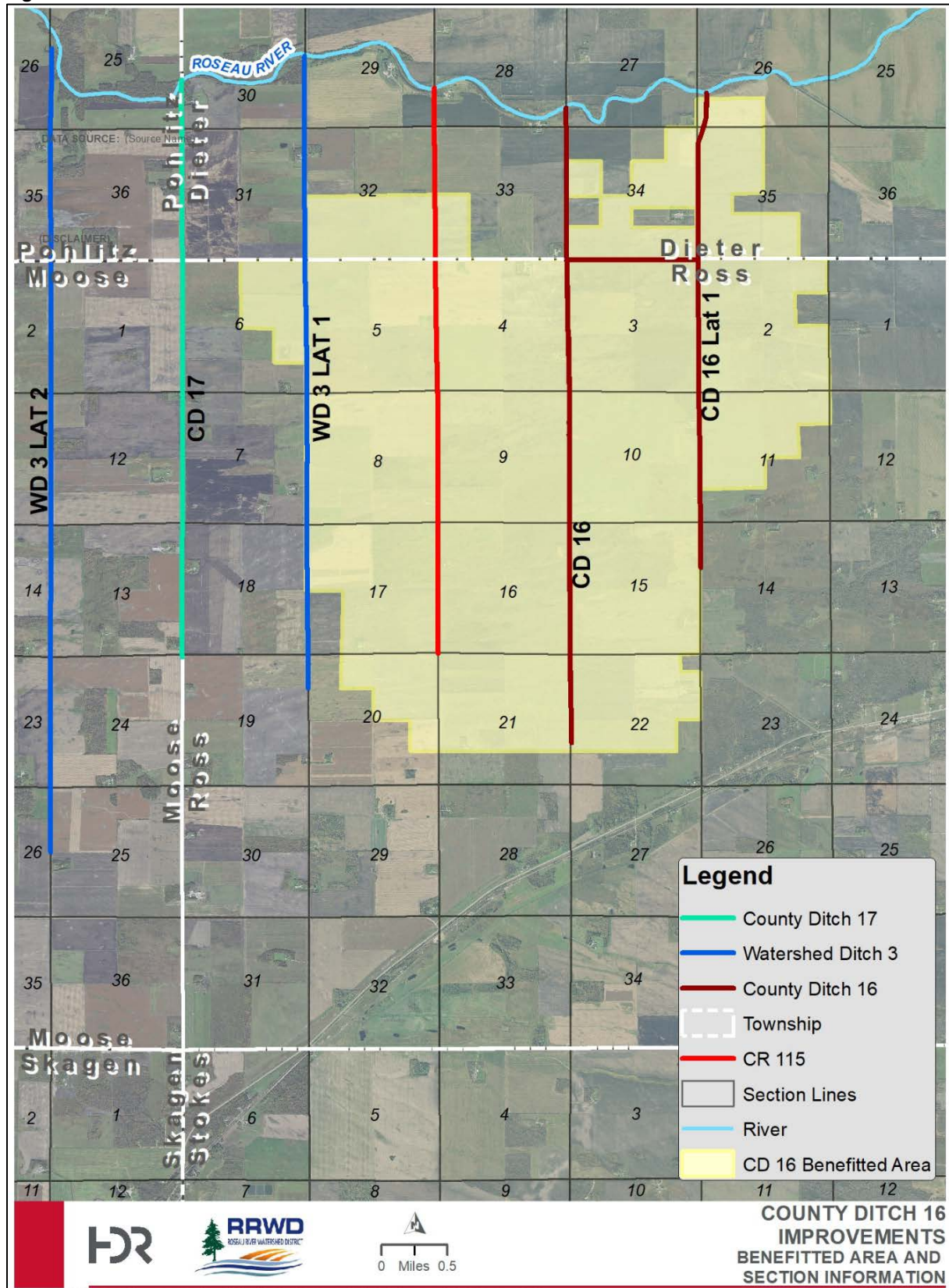


Figure credit: Anderson, Charles and Al Kean, *Red River Basin Flood Damage Reduction Work Group Technical and Scientific Advisory Committee Technical Paper Number 11 (TP-11)*, May 2004.



Figure 21. Obsolete CD 16 Benefitted Area



## Permits & Regulatory Requirements

The following permits and compliance actions would be required for construction of the Project:

### Section 404 Permit

A Section 404 permit from the United State Army Corps of Engineers (USACE) would be required for impacts on wetlands and other waters of the United States. USACE requires prior authorization of discharges of dredge or fill material, including those for temporary construction purposes, into waters of the United States (33 USC § 1344). Figure 22 shows the wetland signatures found through a desktop delineation along CD 16 and also National Wetland Inventory (NWI) data.

### National Flood Insurance Program

The Federal Emergency Management Agency categorized the northern portion of CD 16 (Sections 27, 28, 34, and 35 of Dieter Township) as a Special Flood Hazard Area Zone AE (areas that have a 1% probability of flooding every year, also known as the "100-year floodplain). A permit is required before construction or development begins within any Special Flood Hazard Area to ensure that proposed development projects meet the requirements of the National Flood Insurance Program and the community's floodplain management ordinance. Figure 23 shows the FEMA floodplain in the location of CD 16.

### National Historic Preservation Act

Should any inadvertent discoveries of cultural resources occur during the construction, work would need to be ceased in the area and the State Historic Preservation Office (SHPO) would be notified.

### Minnesota Department of Natural Resources

Prior to construction, a permit/authorization through the MNDNR Permitting and Reporting System to determine the extent of individual and general permits would be required.

### Wetland Conservation Act (WCA)

Any wetland disturbed by construction equipment, excavation, or fill material must be permitted in accordance with the Board of Water and Soil Resources (BWSR's) Wetland Conservation Act (WCA) and Section 404 of the Clean Water Act. An individual wetland permit would be required from the local government unit, which would likely include a review of operational parameters, such as wetland inundation, bounce, flood frequency, and water depth, in addition to wetland impacts from the construction footprint. Construction cannot begin until all permits are received.

### Section 402 Water Quality Certification

As part of the Section 404 permit, Section 402 established the National Pollutant Discharge Elimination System (NPDES) permit program under the Environmental Protection Agency to regulate point and non-point source discharges into waters of the United States. In Minnesota, the NPDES permit authorizing stormwater discharge associated with construction activities is General Permit No. MN R100001, administered by MPCA for all land, except native land. As a requirement of the NPDES permit, a Storm Water Pollution Prevention Plan would need to be created to meet site-specific requirements and to outline procedures to minimize erosion and to



mitigate sediment transport during and after construction activities. After a SWPPP is developed, an online stormwater permit application would need to be submitted as part of authorization for land-disturbing activities.

#### **Minnesota Private Cemeteries Act**

If human remains are found during construction activities, construction must stop in that area and procedures set forth by the state must be followed (Minnesota Statutes 307.08).

#### **Minnesota Historic Sites Act**

In the case that previously unevaluated cultural resources are discovered during construction, the area of discovery would be avoided and given adequate protection. The Natural Resource Conservation Service (NRCS) and SHPO would be notified. Procedures outlined in the cultural resources NRCS State Level Agreement would be followed.

#### **Roseau County**

A permit must be obtained by the Roseau County Environmental Services department to verify a development meets the standards of the Floodplain Management Ordinance No. 29.

An application must be obtained by the Roseau County Highway Department for a Transportation Permit prior to transporting construction materials. This permit is for roads and highways under the jurisdiction of Roseau County only, which includes county roads and county state aid highways.

#### **Roseau River Watershed District**

A permit shall be obtained from the Watershed District prior to any work being commenced per Section 3.2 of the Amended Rules of the Roseau River Watershed District.



Figure 22. CD 16 Wetlands

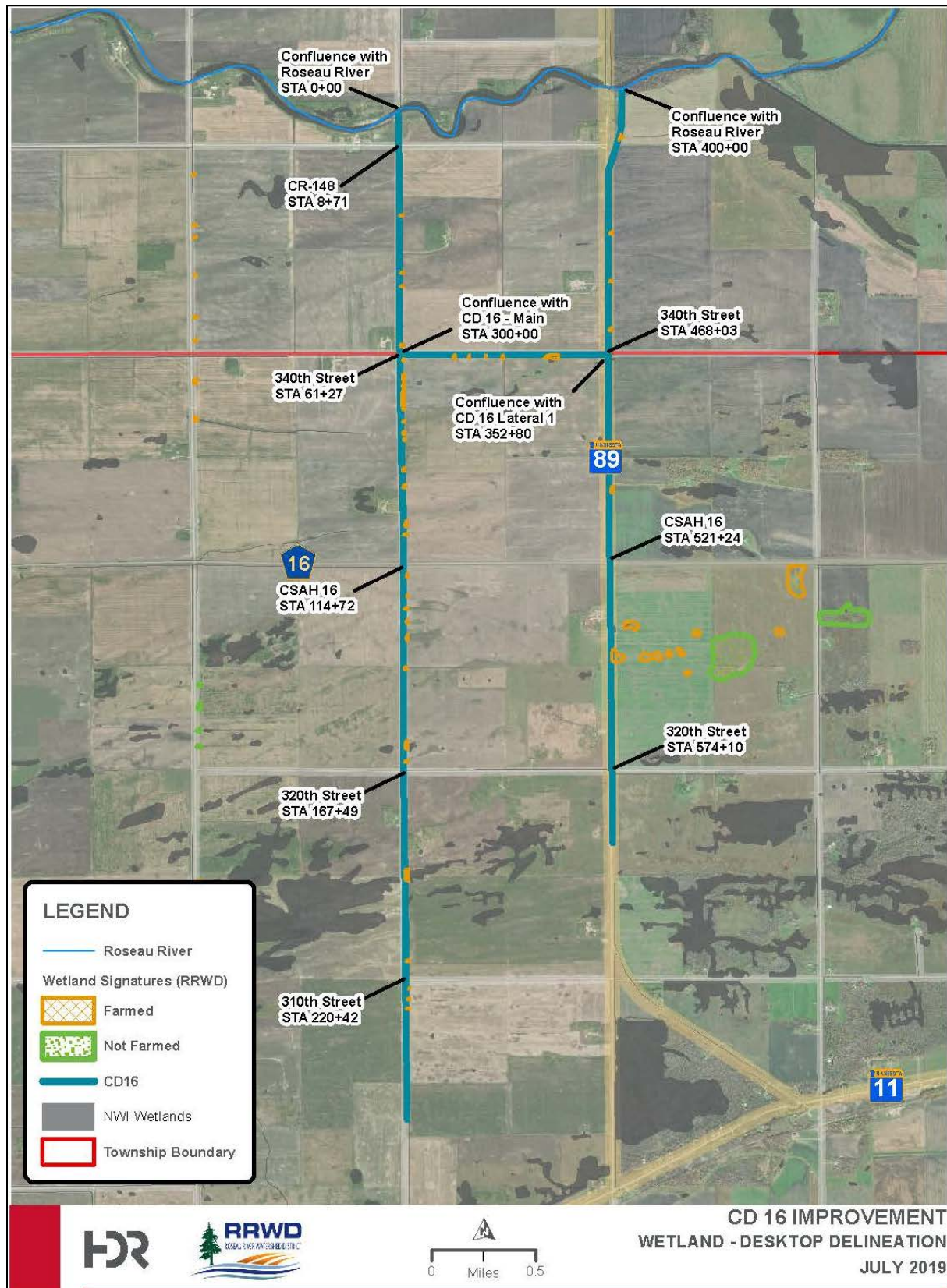
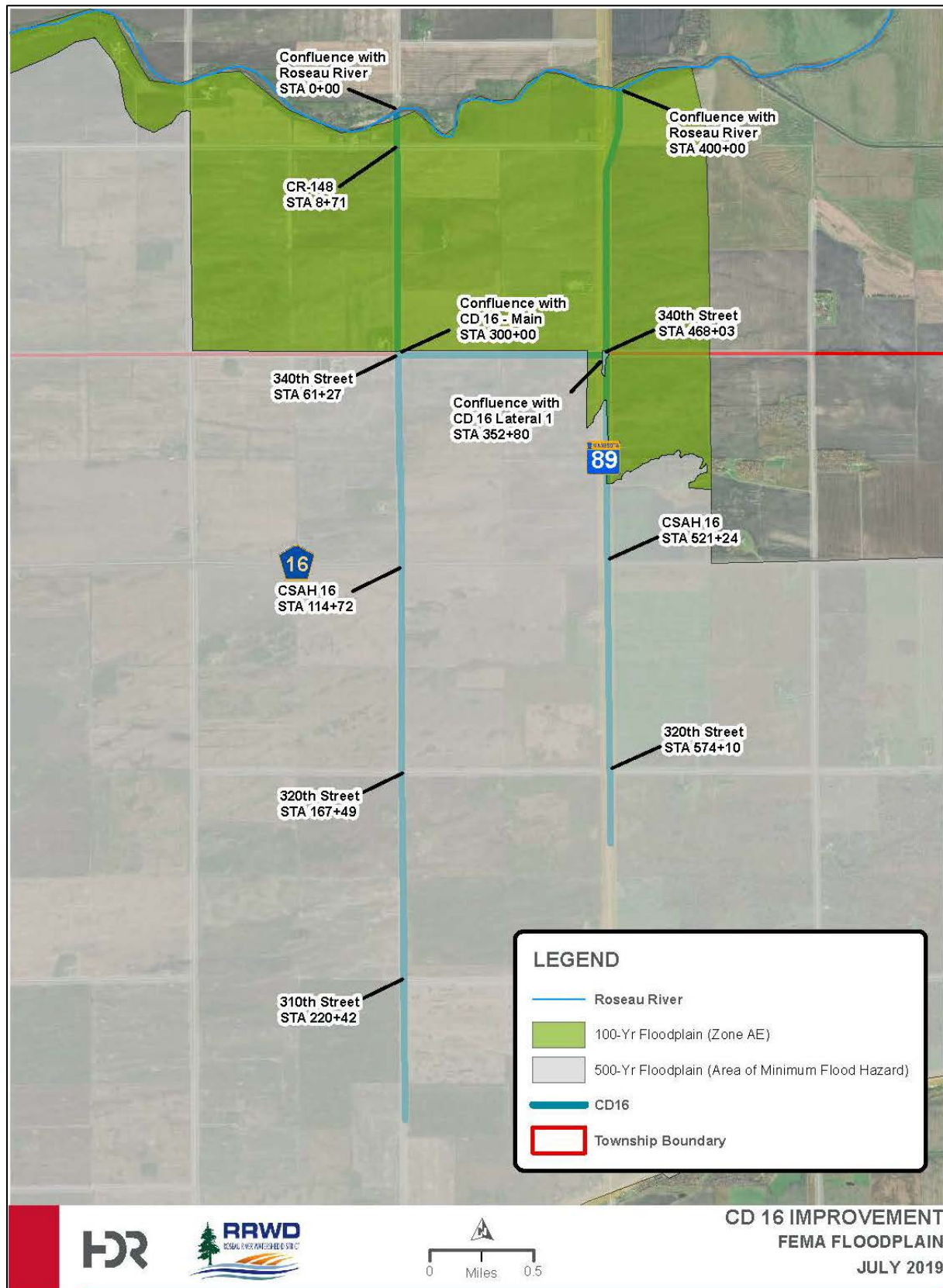




Figure 23. FEMA Floodplain Map



## Environmental, Land Use, and Multipurpose Water Management Criteria

This section addresses Minnesota Statutes 103E.015 considerations before drainage work is done.

### 1. Private and Public benefits and costs of the proposed drainage project:

The project provides private benefits by reducing crop loss due to flooding and improving the productivity of the land. In addition, overland flooding causes significant loss of topsoil. The project reduces overland flooding, incorporates side water inlets and a permanent grass buffer to reduce erosion and preserve topsoil.

### 2. Alternative measures:

The Whitney Lake Subwatershed Project identified a potential retention site adjacent to CD 16 Lateral 1 as a preferred alternative, which would be capable of storing flood waters from a portion of the CD 16 drainage area. The RRWD is pursuing this retention site as part of a comprehensive solution to the flood damages in this watershed. This measure does not meet the needs of the CD 16 Improvement, so it is not a reasonable alternative measure.

### 3. Present and anticipated land use within the drainage project or system.

The overall land use in the CD 16 system is agricultural. There are township, county and state roads. It is not anticipated that land use in the watershed will change.

### 4. Current and potential flooding characteristics of property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year flood events.

As part of the Whitney Lake Subwatershed Project planning effort, all the flooding events have been considered in conjunction with the resources of concern in the watershed. The impacts of the proposed drainage work are minimal. The downstream outlet has a drainage area of 1,086 square miles at the confluence with CD 16. The outlet is adequate to handle the 11.6 square miles of drainage area from CD 16. During events above a 5-year flood, the Roseau River outlet of CD 16 becomes inundated because it is part of the Roseau River floodplain.

### 5. Effects of the proposed drainage project on wetlands.

The project does not propose to drain any public waters. Stormwater retention is part of the Whitney Lake Subwatershed Projects (Appendix B).

### 6. Effects of the proposed drainage project on water quality.

The project will have a positive impact on water quality. The existing ditch does not incorporate any grassed buffer areas or frequent side water inlets. During the survey and site inspection it was observed that significant erosion occurred during runoff events. The proposed design incorporates the use of side water inlets and a minimum 16.5 foot grass buffer area. Flared end sections and riprap will be utilized to reduce velocities and prevent scour.

### 7. Effects of the proposed drainage project on fish and wildlife resources.

The project area contains minimal wildlife management areas. The land use is primarily agricultural. The project will have a positive benefit on water quality and will reduce sediment

transport to downstream water bodies (Roseau River). It is not anticipated that the project will negatively impact vegetation or aquatic life in the system.

8. Effects of the proposed drainage project on shallow groundwater availability, distribution, and use.

There are no known shallow groundwater reserves in the project area. Shallow groundwater irrigation or sub-surface drainage is not practiced in the watershed.

9. Overall environmental impact of all the above criteria.

The project incorporates modern ditch design principles of flatter side slopes, piped side water inlets, and grassed buffer areas. The project will likely improve downstream water quality and provide environmental improvements to the watershed.

## Recommendations

The proposed drainage project, presented as alternative 2 in this report is recommended for establishment by order of the RRWD Board of Managers. This recommended improvement meets the design goals and includes all new culvert crossings and gentler side slopes. The petitioned capacity is conveyed nearly 100% below field elevations adjacent to the ditch with a bottom width 8 feet wide with 4:1 (horizontal:vertical) side slopes. These are all preferred components versus alternative 1 which only provides the minimum requirements for capacity and has less benefits albeit at a lower cost. HDR recommends completion of final design and plans for construction for the following reasons:

- This detailed survey report and the viewer's report are complete in accordance with MN Statutes Chapter 103E requirements,
- all proceedings prescribed under MN Statutes Chapter 103E have been followed,
- the proposed drainage project is practicable,
- the proposed drainage project is necessary to prevent the ongoing flood damages along the existing drainage system and will be of public benefit and utility,
- the benefits of the proposed drainage project exceed the combined costs and awarded damages associated with construction of this improvement, and
- there are anticipated benefits to the natural environment and the outlet of the drainage system.





## Appendix A: Petition for Improvement of County Ditch No. 16







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## **ROSEAU RIVER WATERSHED DISTRICT BOARD OF MANAGERS**

### **PETITION FOR IMPROVEMENT OF DRAINAGE SYSTEM**

Jason S. Braaten and Gregory A. Braaten, Petitioners, hereby pray the Board of Managers of the Roseau River Watershed District the following relief, pursuant to Minn. Stat. 103E.215.

1. Your Petitioners request that you improve Roseau County Ditch No. 16 in order to make the ditch have a capacity to hold and carry a 3.3" rain occurring in a 24-hour period.
2. Your Petitioners request that the portion of the Ditch to be improved is as follows:

Commencing from the Northwest Quarter of the Northwest Quarter (NW $\frac{1}{4}$ NW $\frac{1}{4}$ ) of Section Twenty-two (22), Ross Township, along 310<sup>th</sup> Avenue, and thence traveling North to Section Twenty-seven (27), Dieter Township, to where the ditch enters the Roseau River;

and in addition an improvement to the connecting ditch found along the South side of 340<sup>th</sup> Street, lying between Section Three (3), Ross Township and Section Thirty-four (34), Dieter Township;

and a similar improvement to Lateral One of County Ditch 16, which runs along Minnesota Trunk Highway 89, which improvement shall commence at the Southwest corner of Section Eleven (11), Ross Township and run to a point in Section Twenty-six (26), Dieter Township, where Lateral One enters the Roseau River.

3. The portion of the drainage system to be improved as described above has insufficient capacity and needs enlarging or extending to furnish sufficient capacity;
4. The starting point, general course, and terminous of the proposed improvement are as set forth above.
5. The names and known addresses of owners of the 40-acre tracts or Government Lots and property that the improvement must pass over are set forth on the attached

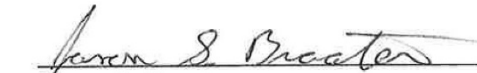
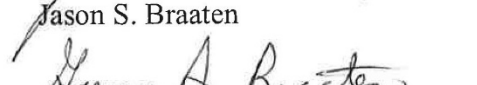
sheet.

6. The proposed improvement will be a public utility and promote the public health.

7. Your petitioners will pay all costs and expenses that may be incurred if the improvement proceedings are dismissed, and will provide to this Board an appropriate bond as may be set in a resolution accepting the Petition.

8. That your undersigned Petitioners are owners of at least twenty-six (26) per cent of the property that the proposed improvement passes over.

WHEREFORE, your Petitioners pray for an Order from this Board accepting the Petition, setting an appropriate bond for the same as may be set in a resolution accepting the Petition and appointing an engineer to examine the drainage system and make an improvement report, which motion would be contingent upon approval by counsel for the Roseau River Watershed District determining that the Petition is complete pursuant to Minn. Stat. 103E.215.

  
Jason S. Braaten  
  
Gregory A. Braaten

Braten Ditch Petition to the  
BOARD OF MANAGERS  
ROSEAU RIVER WATERSHED DISTRICT  
for Improvement of County Ditch 16 and Lateral #1

DESCRIPTION OF 40 ACRE TRACTS AND GOVERNMENT LOTS

A. Improvement of the main ditch, starting in the NW/NW of Section 22, Ross Township, and running North to the Roseau River:  
(Project Parcel number, Assessor's parcel number, total acres in parcel, owner, address, description of land effected)

- 1 PIN 280046700, 159.249 acres, FUGLEBERG THOMAS V, 30745 STATE HWY 308 BADGER, MN 56714  
Section 22 Township 162 Range 041 NW  
SW/NW  
NW/NW
- 2 PIN 280034700, 159.388 acres, PECKMAN TRUST BURL & SHEMENE PECKMAN LIVING TRUST, 17524  
W 351ST PAOLA, KS 66071  
Section 15 Township 162 Range 041 SW  
SW/SW  
NW/SW
- 3 PIN 280034100, 149.423 acres, KUJAVVA DENNIS & DEBBIE KUJAVVA, 31476 320TH E BADGER, MN 56714  
Section 15 Township 162 Range 041  
SW/NW  
NW/NW
- 4 PIN 280015700, 484.454 acres, PECKMAN TRUST BURL & SHEMENE PECKMAN LIVING TRUST 17524 W 351ST ST,



- PAOLA, KS 66071  
SECTION 10 TOWNSHIP 162 RANGE 41  
SW/SW  
NW/SW  
SW/NW  
NW/NW
- 5 PIN280003700, 138.111 acres, ERICKSON SELVIN M JR, 33277 310TH AVE BADGER, MN 56714-9130  
SECTION 3 TOWNSHIP 162 RANGE 41  
SW/SW  
NW/SW, less the N 20 acres of the SW1/4
- 6 PIN280004000, 19.810 acres, ERICKSON DOUGLAS C ETUX, 36838 300TH ST, ROSEAU, MN 56751  
SECTION 3 TOWNSHIP 162 RANGE 41  
West ½ of the N 20 AC OF SW  
  
AND  
PIN280004300, 79.247 acres  
SECTION 3 TOWNSHIP 162 RANGE 41  
SW/NW
- 7 PIN 280003400, 83.712 acres, BRAATEN JASON S, 30957 340TH ST BADGER, MN 56714  
SECTION 3 TOWNSHIP 162 RANGE 41  
GOV'T LOT 4
- 8 PIN070072700, 79.641 acres, BRAATEN JASON S, 30957 340TH ST BADGER, MN 56714  
SECTION 34 TOWNSHIP 163 RANGE 41  
SW/SW
- 9 PIN070072400, 144.900 acres, BRAATEN GREGORY A, 34323 STATE HWY 89 ROSEAU, MN 56751  
SECTION 34 TOWNSHIP 163 RANGE 41  
SW/NW LESS S 795 FT OF E 678 FT SW NW;

- NW/SW LESS N 90 FT NW SW LESS N 30 FT OF W 642 FT;
- 10 PIN070072500, 14.655 acres, EKLUND MICHAEL, 34800 310TH AVE ROSEAU, MN 56751  
SECTION 34 TOWNSHIP 163 RANGE 41  
That portion of the SW/NW and the NW/SW described as follows:  
S 795 FT OF E 678 FT SW NW & N 90 FT OF NW SW LESS N 30 FT OF W 642 THEREOF
- 11 PIN070073600, 79.914 acres, LEE GARRETT D, 30715 350TH ST BADGER, MN 56714  
SECTION 34 TOWNSHIP 163 RANGE 41  
NW/NW
- 12 PIN070057400, 93.553 acres, LEE GARRETT D, 30715 350TH ST BADGER, MN 56714  
SECTION 27 TOWNSHIP 163 RANGE 41  
That part of the SW/SW lying South of the Roseau River
- B. Improvement of the Connecting Ditch, connecting main ditch to Lateral 1, Ditch 16 on the south side of 340<sup>th</sup> Street, from East to West:
- 13 PIN280003100, 157.068 acres, BRAATEN GREGORY & JASON BRAATEN, 34323 STATE HWY 89  
ROSEAU, MN 56751  
SECTION 3 TOWNSHIP 162 RANGE 41  
GOV'T Lot 1  
GOV'T Lot 2
- 7 (see PIN 280003400 listed as #7 above)  
GOV'T Lot 3  
GOV'T Lot 4
- C. Improvement of Lateral #1, from South to North, starting from Section 11 of Ross Township to the Roseau River:
- 14 PIN280017200155.693, PECKMAN TRUST BURL & SHEMENE PECKMAN LIVING TRUST,





- 17524 W 351 ST PAOLA, KS 66071  
SECTION 11 TOWNSHIP 162 RANGE 41  
SW/NW  
NW/NW
- 15 PIN280002200, 155,828 acres, PETERSON BRANDON J, 33366 ST HWY 89 ROSEAU, MN  
SECTION 2 TOWNSHIP 162 RANGE 41  
SW/SW  
NW/SW
- 16 PIN280001900, 157,180 acres, BRAATEN GREGORY A, 34323 STATE HWY 89 ROSEAU, MN 56751  
SECTION 2 TOWNSHIP 162 RANGE 41  
SW/NW  
GOV'T Lot 4
- 17 PIN070074800, 159,312 acres, BRAATEN GREGORY A, 34323 STATE HWY 89 ROSEAU, MN 56751  
SECTION 35 TOWNSHIP 163 RANGE 41  
SW/SW  
NW/SW
- 18 PIN070074200, 159,405 acres, BRAATEN GREGORY A, 34323 STATE HWY 89 ROSEAU, MN  
SECTION 35 TOWNSHIP 163 RANGE 41  
SW/NW  
NW/NW
- 19 PIN070054500, 170,705 acres, JOHNSON JAMES P, 32499 360TH ST ROSEAU, MN 56751  
SECTION 26 TOWNSHIP 163 RANGE 41, less that listed below\*  
SW/SW, less that listed below\*  
NW/SW, less that listed below\*  
\*Excluding the W 346.05 FT OF NW SW S OF RIVER AND THE N 208.7 FT OF THE S 1394.7 FT OF E 313.05 FT OF W  
346.05 FT OF W 1/2 SW; SECTION 26 TOWNSHIP 163 RANGE 41



## Appendix B: Whitney Lake Subwatershed Project Fact Sheet





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## Whitney Lake Project

**Description/Location:** The Whitney Lake subwatershed is located in northwest Minnesota near the Canadian border. Agricultural producers in the area suffer frequent inundation from even minor events in both the spring and summer causing crop loss and/or damage.

The purpose of the project is **Flood Damage Reduction:** Reduce damages to agricultural lands for a 10 year 24 hour storm (total 3.3 inches of precipitation) and reduce damages to roadways for a 25 year 24 hour storm event (total 3.9 inches of rainfall) in the Whitney Lake subwatershed.



**Project Benefits:**

**Flood Damage Reduction**

- Reduce agricultural and private land damages
- Reduce risk of road damages

**Flood Detention**

- Reduce peak flows during high runoff events
- Contribute to regional goal of reducing peak flows to the Red River

**Erosion Reduction**

- Improve stability of watercourses
- Reduce sediment and nutrient loading from upland sources
- Improve water quality
- Positive impact for wildlife and fish

### **PROJECT STATUS June 2019**

#### **Project Team Preferred Alternative**

- Retention Site A – adjacent to SD 20 (Whitney Ditch) including Diversion 3
- Retention Site C – adjacent to CD 16 Lat 1
- Increased Conveyance along CR 115
- Improvements to Existing Legal Ditches including CD 16 and CD 17 Br 1

#### **Permitting:**

- COE Concurrence Points (CP) 1 and 2 have been approved. CP 3 submittal is anticipated in June 2019
- NRCS Review Points (RP) 1, 2, 3, 4, and 5 have been submitted. RP 6 is anticipated in June 2019

#### **Funding:**

- RCPP \$560K
- RRWMB Step I  
Approved October 2018 – Retention Site A  
Approved May 2019 – Retention Site C

### **\$10 M – Total Estimated Costs**

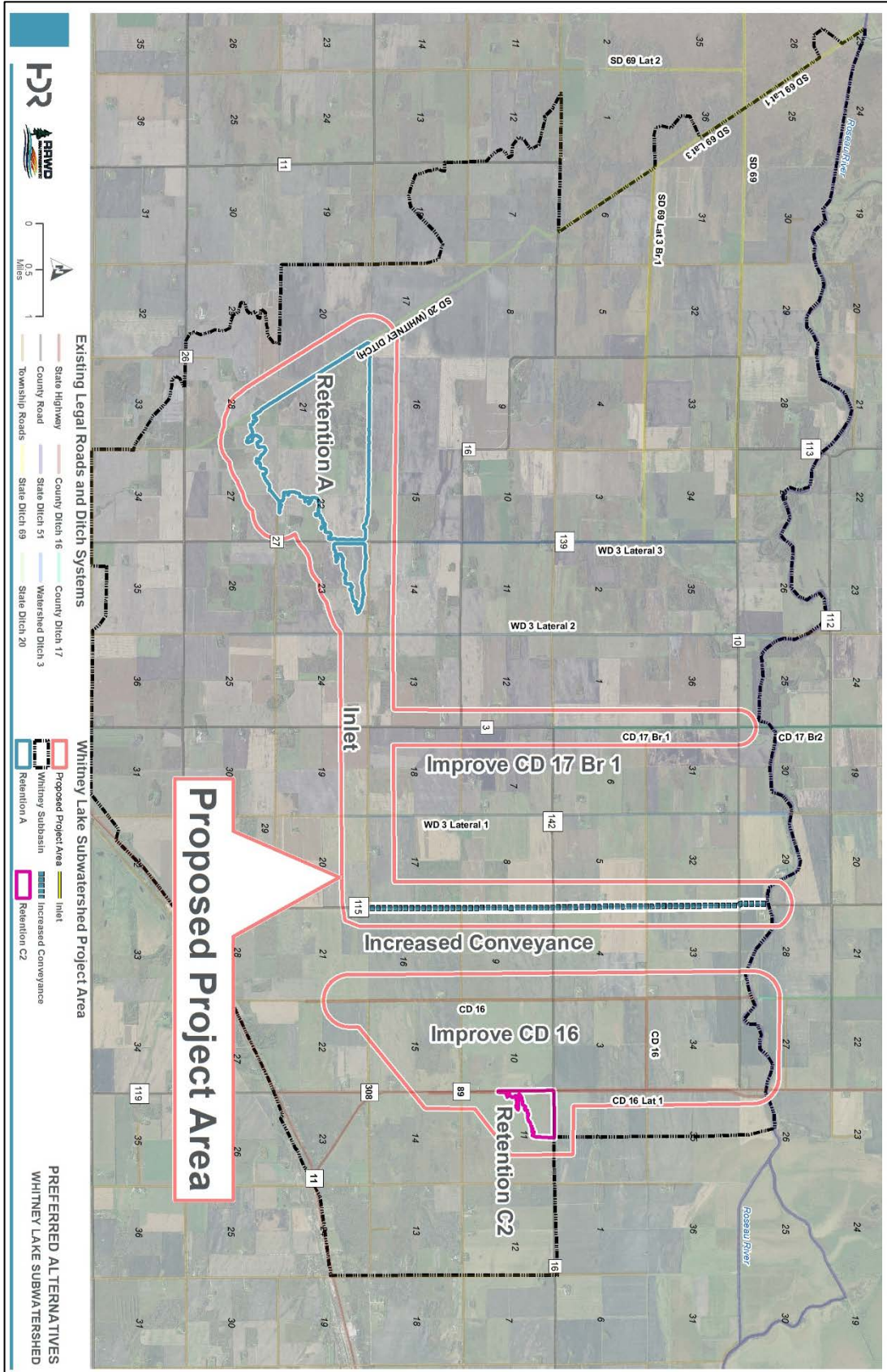
|                              |                              |
|------------------------------|------------------------------|
| \$6 M – Retention Site A     | } \$8 M FDR / Public Funding |
| \$2 M – Retention Site C     |                              |
| \$1 M – Increased Conveyance | } \$2 M Private Funding      |
| \$1 M – Ditch Improvements   |                              |

**Funding: Federal RCPP / USDA – \$0.56 M, State FDR – \$4 M, Local RRWMB – \$2.325 M, RRWD – \$1.965 M**

### **FDR Project Schedule:**

|         | Previous Expenditures                           | FY 2020<br>(7/1/19 – 6/30/20) | FY 2021<br>(7/1/20 – 6/30/21)                         | FY 2022<br>(7/1/21 – 6/30/22)               |
|---------|---|-------------------------------|---|---|
| Funding | USDA \$0.56 M<br>WD \$0.29 M                    | WD \$0.1 M<br>RB \$0.135 M    | FDR \$0.5 M<br>WD \$1.28 M<br>RB \$1.365 M            | FDR \$3.5 M<br>WD \$0.295 M<br>RB \$0.825 M |
| Tasks   | Preliminary Engineering<br>Environmental Review | Final Design, Permitting      | Final Design, Permitting<br>Acquisition, Construction | Construction                                |

**Key:** RB = Red River Watershed Management Board; WD=Watershed District; FDR=Minnesota DNR; USDA = United States Department of Agriculture







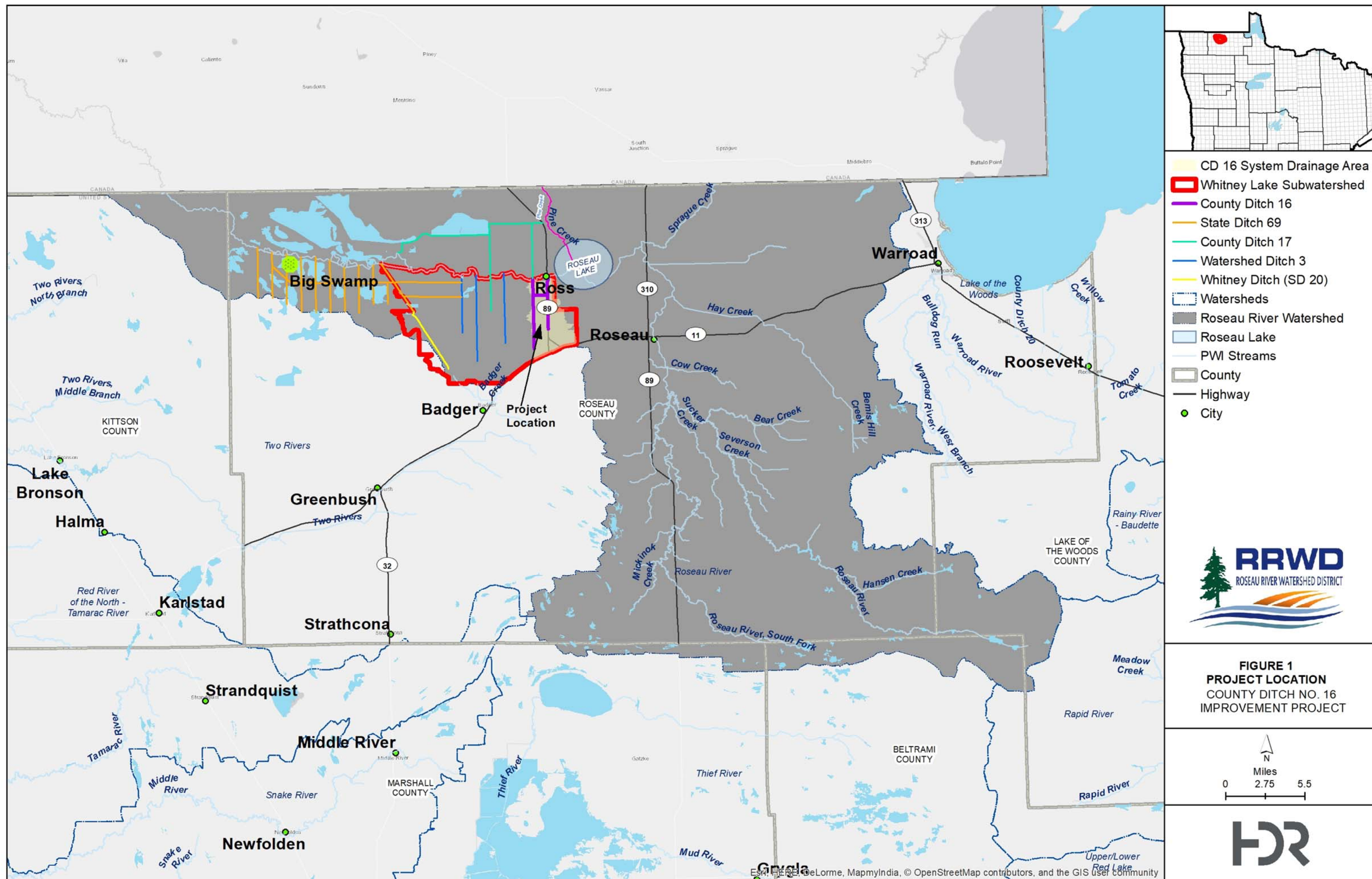
## Appendix C: Report Maps





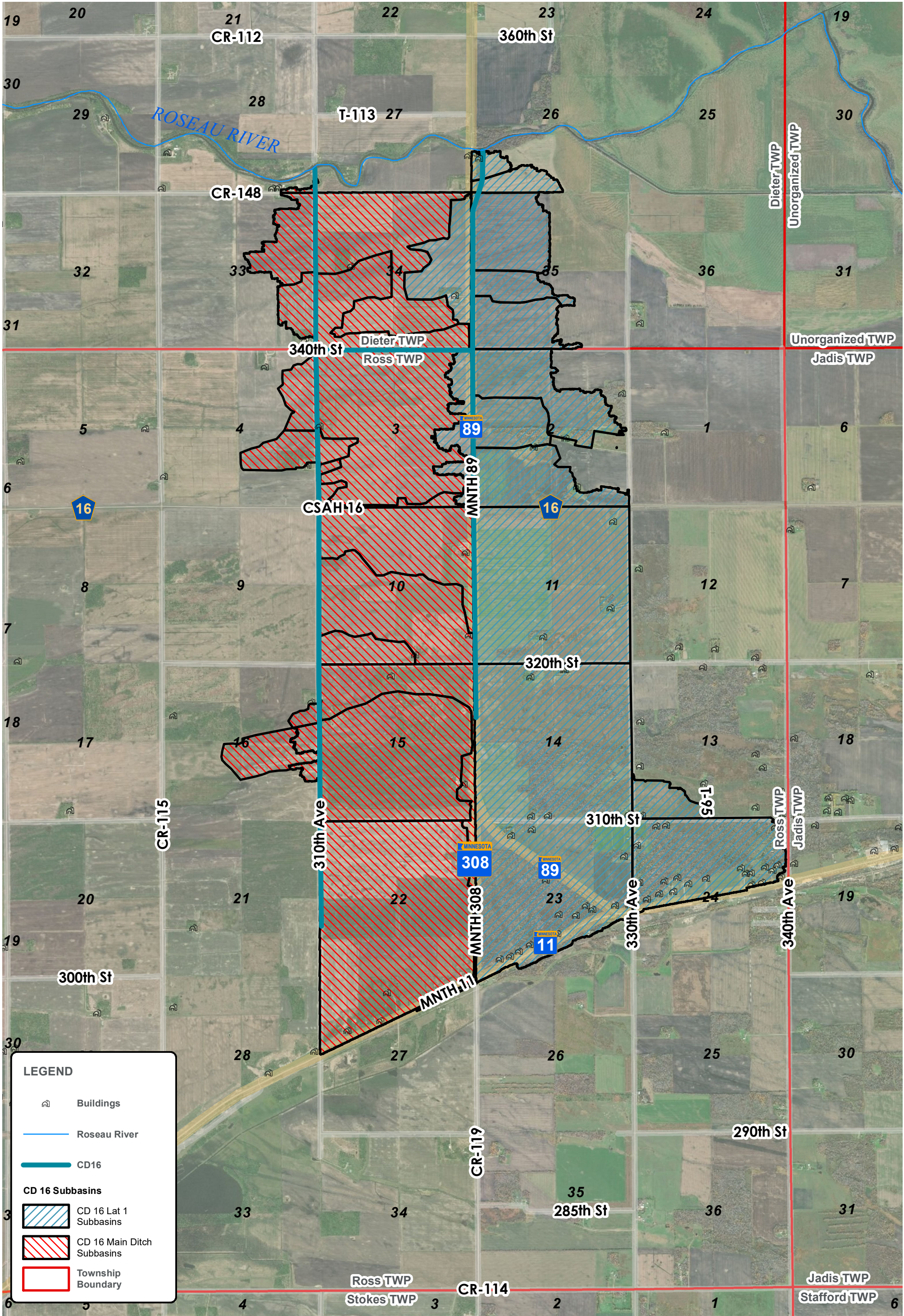


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**LEGEND**

Buildings

Roseau River

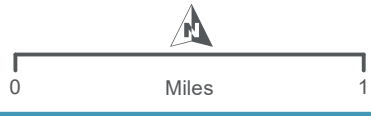
CD16

**CD 16 Subbasins**

CD 16 Lat 1 Subbasins

CD 16 Main Ditch Subbasins

Township Boundary



CD 16 IMPROVEMENT  
DRAINAGE AREA MAP  
JULY 2019  
PRELIMINARY SURVEY REPORT







## Appendix D: Technical Memorandum – Reestablishment of Ditch Records







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# Technical Memorandum

Date: Tuesday, April 21, 2020

Project: Roseau County Ditch No. 16 Reestablishment

To: Roseau River Watershed District Board of Managers

From: Jacob Huwe, P.E., Nate Dalager, P.E.  
HDR Engineering Inc.

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

Jacob Rand Huwe, P.E.  
Lic. No. 56657

Date: April 21, 2020

Subject: Reestablishment of Ditch Records for Roseau County Ditch No. 16

## Introduction

The purpose of this technical memorandum is to provide the Roseau River Watershed District (RRWD) with the findings of the investigation into the public drainage system Roseau County Ditch Number 16 (CD 16) records. The RRWD is the drainage authority for CD 16 and received a petition for improvement of the CD 16 system. RRWD appointed HDR Engineering to make a detailed survey report following requirements in Minnesota Statutes Chapter 103E. After completing the survey and thorough investigation of drainage system records, RRWD found the records establishing the alignment, cross-section, profile, and right-of-way of CD 16 are incomplete. Section 103E.101 subdivision 4a of the MN Statutes allows the drainage authority, by order, to reestablish records defining the alignment, cross-section; profile; hydraulic structure locations, materials, dimensions, and elevations; or right-of-way of the drainage system as originally constructed or subsequently improved.

## Original Constructed Alignment

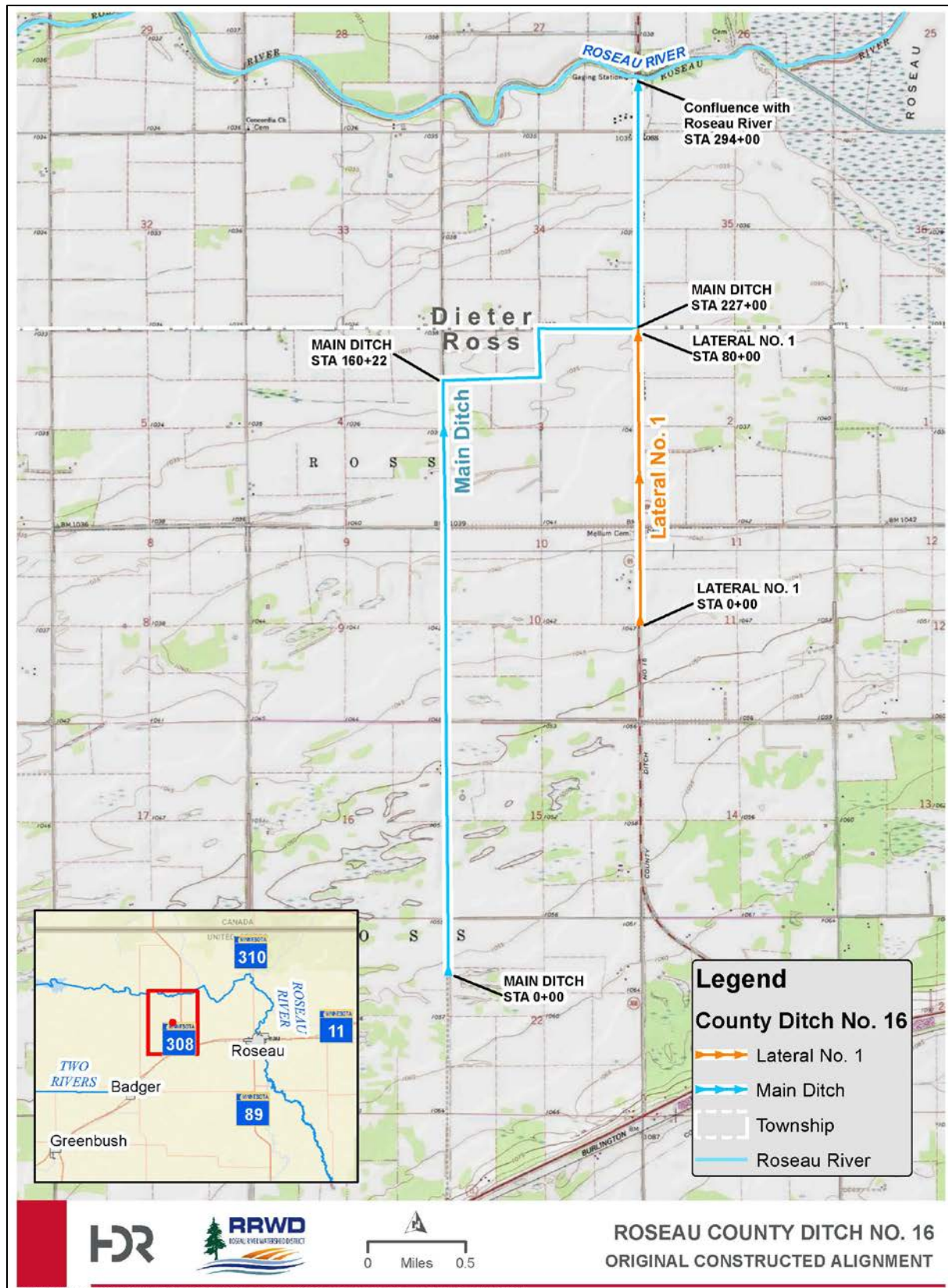
The records held by RRWD describe the as-built CD 16 as shown on Figure 1 and in words below.

Detail of Route of County Ditch No. 16, Roseau County.

COUNTY DITCH 16 – MAIN DITCH: Commencing at a point 1500 feet south of Section corner Sec. 15-16-21-22, Township 162N. Range 41 W., running thence north and 25 feet east of Section line between sections 21-22, 15-16, 9-10, 3-4 to Sta. 160+22, thence east 10 feet south of 1/16 line to Sta. 186+72, thence north 10 feet east of ¼ line to ¼ corner Sec. 3-34, said town, thence east to section corner 34-35-2-3, thence north and 25 feet east of the section line to Roseau River at Sta. 293+50.

LATERAL NO. 1 – Commencing 25 feet east and 2897 feet south of section corner 2-3-10-11 running thence north 8000 feet to Main Ditch at Sta. 226+72.

Figure 1. CD 16 Original Alignment and Stationing





## Existing/Current Alignment

The existing alignment of CD 16 that was assumed when RRWD took authority of the drainage system is shown in Figure 2 and described in words below.

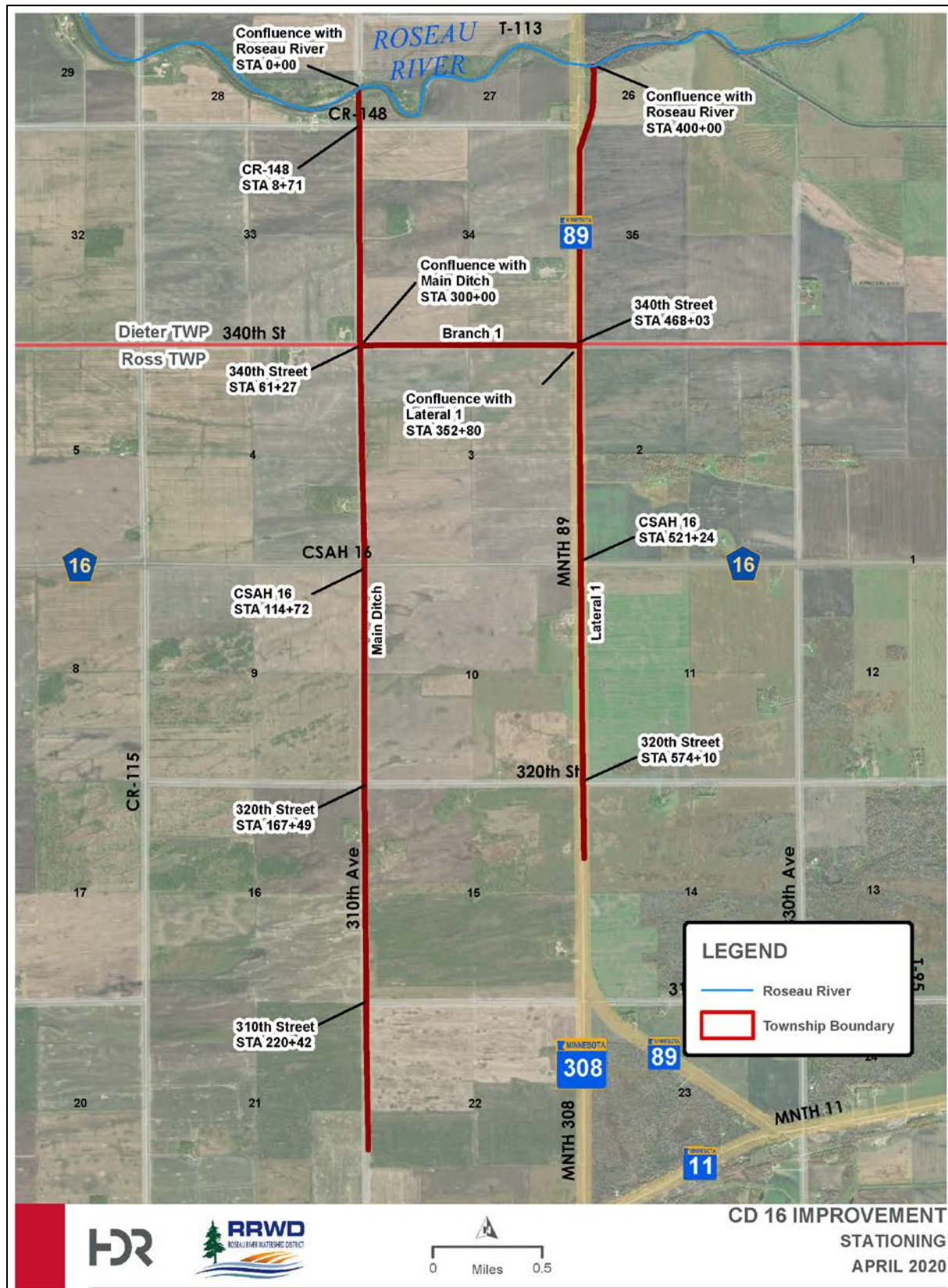
COUNTY DITCH 16 – MAIN DITCH: Commencing at a point 1500 feet south of the apparent section corner common to sections 15-16, 21-22, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 21-22, 15-16, 9-10, 3-4; thence continuing north and 25 feet east of the apparent section line between sections 33-34, 27-28, Township 163 N. Range 41 W. (Dieter Township), to the Roseau River.

COUNTY DITCH 16 – LATERAL 1: Commencing at a point 1800 feet south of the apparent section corner common to sections 14-15, 10-11, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 14-15, 10-11, 2-3; thence continuing north and 25 feet east of the apparent section line between sections 34-35, Township 163 N. Range 41 W. (Dieter Township) for 4536 feet; thence continuing in a northeasterly direction at a bearing of 18 degrees, 14 minutes east of north for 1210 feet to a point in section 26, Dieter Township; thence continuing due north to the Roseau River.

COUNTY DITCH 16 – BRANCH 1: Commencing 25 feet south of the southeast corner section 34, Township 163 N. Range 41 W; thence west between sections 3 and 34, Townships 162 and 163 N. Range 41 W. to COUNTY DITCH 16 – MAIN DITCH.



Figure 2. Existing CD 16 Alignment and Stationing





## CD 16 Improvements

### New Main Ditch Outlet to Roseau River

The drainage system records indicate there were repairs done in 1941, 1946, and 1970. These records are incomplete since they are lacking any information describing the alignment of the ditch or what improvements were made. It can only be concluded that the ditch was re-aligned to follow the roads that exist today, and that the Main Ditch was connected to a new outlet to the Roseau River which follows the section lines of sections 33-34 and 27-28 in Dieter Township. Figure 3 shows where the original Main Ditch crossed the northwest corner of Section 3 in Ross Township. That ditch is now connected to the new Main Ditch by a 24 inch culvert, and the new Main Ditch has been improved to the north with larger culverts and a lowered profile. Figure 4 shows a plan view of Section 3 and the existing structures connecting the drainage systems.

*Figure 3. Google Earth Aerial of the Abandoned Main Ditch crossing Section 3, Ross Township – Isometric View*



Figure 4. Abandoned Main Ditch Alignment and Associated Structures – Plan View



## Cross Section and Profile

The 1913 engineer's report indicates the dimensions of the constructed ditches as shown in Tables 1 and 2 below. The bottom width starts at the upstream end at 5 feet wide and widens out to 8 feet by the outlet with 1:1 side slopes throughout. There is no doubt these side slopes experienced sloughing and cleaning at the outlet became necessary over time.

Table 1. Main Ditch Dimensions – Original Construction

| Station | Invert Height<br>(unknown datum) | Bottom Width<br>(feet) | Side Slopes<br>(rise:run) |
|---------|----------------------------------|------------------------|---------------------------|
| 0       | 80.0                             | 5.0                    | 1:1                       |
| 160     | 60.3                             | 6.0                    | 1:1                       |
| 227     | 58.9                             | 8.0                    | 1:1                       |
| 294     | 56.9                             | 8.0                    | 1:1                       |

Table 2. Lateral No. 1 Dimensions – Original Construction

| Station | Invert Height<br>(unknown datum) | Bottom Width<br>(feet) | Side Slopes<br>(rise:run) |
|---------|----------------------------------|------------------------|---------------------------|
| 0       | 68.9                             | 5.0                    | 1:1                       |
| 80      | 59.4                             | 5.0                    | 1:1                       |

The existing elevations and channel dimensions are shown in Table 3 below. Survey was completed in 2019. Cross sections were taken at regular intervals along the entire CD 16 system, and all culverts and crossings were surveyed. The Main Ditch typically has a steep (2:1) roadside slope, bottom width



between 5 and 8 feet, and a depth of 3 to 6 feet. Lateral No. 1 typically has gentle side slopes (3:1 or greater), bottom width between 9 and 16 feet, and a depth of 1 to 4 feet.

Table 3. Existing CD 16 Channel Dimensions

| Station       | Invert Elevation<br>(feet NAVD88) | Existing Slope (%) | Existing Bottom<br>Width (feet) | Depth to Full<br>(feet) |
|---------------|-----------------------------------|--------------------|---------------------------------|-------------------------|
| Main Ditch    |                                   |                    |                                 |                         |
| 7+00          | 1029.5                            | 0.3                | 5.5                             | 9.0                     |
| 33+00         | 1031.7                            | 0.03               | 7.2                             | 6.0                     |
| 55+00         | 1032.5                            | 0.03               | 7                               | 6.0                     |
| 82+00         | 1034.3                            | 0.1                | 8.4                             | 3.5                     |
| 95+00         | 1035.4                            | 0.09               | 4.7                             | 3.0                     |
| 113+00        | 1036.9                            | 0.09               | 7.1                             | 2.9                     |
| 162+00        | 1043.2                            | 0.12               | 7.9                             | 4.3                     |
| 217+00        | 1051.5                            | 0.12               | 7                               | 1.5                     |
| 246+00        | 1056.4                            | 0.19               | 6.6                             | 1.0                     |
| Branch No. 1  |                                   |                    |                                 |                         |
| 319+00        | 1035.0                            | 0.02               | 5.7                             | 1                       |
| 339+32        | 1034.3                            | -0.01              | 9.56                            | 1.22                    |
| Lateral No. 1 |                                   |                    |                                 |                         |
| 413+00        | 1030.4                            | 0.37               | 4                               | 4                       |
| 438+00        | 1032.5                            | 0.09               | 11.5                            | 3.7                     |
| 464+00        | 1033.6                            | 0.05               | 17.1                            | 2.5                     |
| 499+00        | 1036.8                            | 0.11               | 13.1                            | 1                       |
| 519+00        | 1038.5                            | 0.09               | 15.9                            | 1.2                     |
| 571+00        | 1050.6                            | 0.21               | 9.2                             | 3.4                     |

## Hydraulic Structures

The originally constructed CD 16 drainage system consisted of 29 culverts. This included one (1) 48-inch culvert, eight (8) 36-inch culverts, and twenty (20) 12-inch culverts. The 12-inch culverts were placed under the roads for adjacent lands to access the ditch. The engineer's report lists the 12-inch culverts by station, whereas the main had culverts at stations 7, 23, 32, 40, 53, 63, 75, 88, 95, 112, 130, 144, 160, 185, 200, 210, and 257. The lateral no. 1 had culverts placed at stations 26, 45, and 61. Table 4 below summarizes the remaining original culverts installed on CD 16, all of which were metal culverts.

Table 4. Culverts on CD 16 - Original Construction

| Station        | Size (inches) | Length (feet) |
|----------------|---------------|---------------|
| Main Ditch (1) |               |               |
| 15+00          | 36            | 24            |
| 68+02          | 36            | 24            |
| 120+89         | 36            | 24            |
| 226+72         | 48            | 24            |
| Main Ditch (2) |               |               |
| 226+72         | 36            | 24            |
| 278+64         | 36            | 24            |

|               |    |    |
|---------------|----|----|
| Lateral No. 1 |    |    |
| 28+96         | 36 | 24 |

Currently, the CD 16 system has culverts that range from 18-inch round culverts up to a 112-inch wide by 75-inch high arched culvert. There are no records of when these culverts were installed. The conclusion is that as drainage was improved and more capacity was required, the original culverts were replaced with larger culverts. Table 5 describes the existing hydraulic structures in CD 16. The culvert at station 352+01 is underneath Minnesota Trunk Highway 89 and is the same size that was originally installed (original station 226+72).

Table 5. Culverts on CD 16 - 2019 Survey

| Station       | Existing Culvert Description | Length (feet) |
|---------------|------------------------------|---------------|
| Main Ditch    |                              |               |
| 8+71          | 112"x75" CSPA                | 88            |
| 35+61         | 87"x63" CSPA                 | 30            |
| 61+27         | 82"x59" CSPA                 | 38            |
| 87+11         | 85"x54" CSPA                 | 29            |
| 101+47        | 77"x49" CSPA                 | 28            |
| 114+72        | 72"x48" CSPA                 | 40            |
| 131+82        | 52"x31" CSPA                 | 39            |
| 150+45        | 55"x40" CSPA                 | 36            |
| 167+49        | 58"x36" CSPA                 | 33            |
| 179+88        | 48" CSP                      | 53            |
| 220+42        | 36" CSP                      | 37            |
| Branch No. 1  |                              |               |
| 325+39        | 18" CSP                      | 33            |
| 352+01        | 48" RCP                      | 58            |
| Lateral No. 1 |                              |               |
| 410+14        | 117"x79" CSPA                | 46            |
| 414+90        | 117"x79" CSPA                | 45            |
| 441+45        | 117"x79" CSPA                | 49            |
| 450+45        | 117"x79" CSPA                | 49            |
| 468+03        | 117"x79" CSPA                | 55            |
| 483+57        | 48" CSP                      | 28            |
| 501+10        | 48" CSP                      | 27            |
| 521+29        | 36" RCP                      | 60            |
| 535+28        | 36" CSP                      | 25            |
| 563+79        | 36" CSP                      | 59            |
| 574+16        | 36" CSP                      | 45            |



## Right-of-Way

The original construction of CD 16 was viewed by non-interested parties and they assessed benefits and damages to the lands along the drainage system. Damages were awarded for lands taken by the construction to the landowners, and benefits were assessed to the townships for the roads that resulted from the excavated materials. The improvements made to the roads and drainage system since the original construction are missing. However, some recorded right of way information is indicated in a set of Minnesota Department of Transportation plans for Trunk Highway 89. Originally signed in 1952 and updated in 1976, these plans reference a drainage ditch order (number 22546) and give the width of some right-of-way beyond what the Department of Transportation owns for the highway. The right-of-way width varies along the Lateral No. 1 alignment as shown in Table 6 and Figure? Below. Along CD 16 – Main Ditch and Branch No. 1, measuring the existing distance between the road centerline and the top edge of the ditch's backslope measures approximately 50 feet from the road centerline. This is the assumed existing right-of-way of Branch No. 1 and the Main Ditch. The existing drainage system already occupies this land, also known as prescriptive occupation. In the absence of recorded improvements to CD 16, this is the reestablished right-of-way.

Table 6. Existing Lateral No. 1 Right-of-Way

| Station                                       | Trunk Highway 89 Right-of-Way (width from centerline in feet) | Existing CD 16 Right-of-Way (from TH 89 centerline in feet) |
|---|---|---|
| 400+00  | N/A   | 80 (total width)  |
| 420+00  | 33  | 65  |
| 440+31  | 33  | 80  |
| 454+45  | 33  | 75  |
| 520+00  | 33  | 60  |
| 532+90  | 33  | 75  |
| 541+45  | 33  | 60  |
| 546+45  | 33  | 75  |
| 591+00<br>(1800 feet South of Section Corner) | 33  | 75  |

## Recommendations

After a thorough investigation of the CD 16 drainage records and the completion of a detailed survey, the engineer's recommendation is that the RRWD reestablishes the drainage system record as an open channel ditch as surveyed and detailed in this section.

### Alignment of Roseau County Ditch No. 16

COUNTY DITCH 16 – MAIN DITCH: Commencing at a point 1500 feet south of the apparent section corner common to sections 15-16, 21-22, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 21-22, 15-16, 9-10, 3-4; thence continuing north and 25 feet east of the apparent section line between sections 33-34, 27-28, Township 163 N. Range 41 W. (Dieter Township), to the Roseau River.





COUNTY DITCH 16 – LATERAL 1: Commencing at a point 1800 feet south of the apparent section corner common to sections 14-15, 10-11, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 14-15, 10-11, 2-3; thence continuing north and 25 feet east of the apparent section line between sections 34-35, Township 163 N. Range 41 W. (Dieter Township) for 4536 feet; thence continuing in a northeasterly direction at a bearing of 18 degrees, 14 minutes east of north for 1210 feet to a point in section 26, Dieter Township; thence continuing due north to the Roseau River.

COUNTY DITCH 16 – BRANCH 1: Commencing 25 feet south of the southeast corner section 34, Township 163 N. Range 41 W; thence west between sections 3 and 34, Townships 162 and 163 N. Range 41 W. to COUNTY DITCH 16 – MAIN DITCH.

### Profile and Cross Section of Roseau County Ditch No. 16

The existing ditch profiles and bottom widths as noted in Table 3. Side slopes of the Main Ditch are 2:1 (horizontal:vertical) on the roadside slope, and 3:1 on the backslope. Lateral No. 1 and Branch No. 1 side slopes are 3:1 on both sides.

### Hydraulic Structures on Roseau County Ditch No. 16

The hydraulic structures are as noted in Table 5.

### Right-of-Way on Roseau County Ditch No. 16

For the Main Ditch and Branch No. 1, the existing right-of-way extends from the township road centerline to a width of 50 feet or to the top of the ditch backslope, whichever is greater. On Lateral No. 1, the existing right-of-way extends from the centerline of Minnesota Trunk Highway 89 to a width as in Table 6.



## List of Consulted Documents

| Dates    |           | Description of Record   |
|----------|-----------|---|
|          | 19-Dec-12 | Petition Signed by Olaf Holdahl and others.   |
|          | 8-Nov-12  | Affected Landowners Mailed Notice of Petition   |
|          | 3-Feb-13  | Hearing of Petition Notice. Scheduled March 7. Order designating Number of Ditch No. 16   |
|          | 7-Feb-13  | Proof of posting in Ross and Dieter public places.  |
| 7-Feb-13 | 21-Feb-13 | Public Notice Published of Presentation of Petition   |
|          | 7-Mar-13  | Petition Presented. Engineer Appointed. Viewers Appointed   |
|          | 12-Apr-13 | Engineer's Report   |
|          | 14-Apr-13 | Order for Viewers Meeting. Landowners Mailed notices.   |
|          | 17-Apr-13 | Letter from landowners saying that the Branch No. 1 that would run on township line west for four miles and then north to the River would do more damage than benefit.                                  |
|          | 20-May-13 | Amended Engineers/Viewers Report. Set public hearing date   |
| 23-May   | 6-Jun-13  | Public Notice published in Roseau Region. Describes Proposed Ditch.   |
|          | 26-May-13 | Posted in Moose Township on NE corner of Section 36, NW corner Sec 12, NW corner Sec 22.  |
|          | 27-May-13 | Posted in Ross at NE corner Sec 32, SE corner Sec 23, SE corner Sec 10. Posted in Dieter on SE corner Sec 27, NW Corner Sec 3, and NE corner Sec 20.  |
|          | 27-May-13 | Affected Landowners Mailed Notice   |
| 3pm      | 20-Jun-13 | Special Meeting of County Board. Hearing of petition, engineers report, and viewers report.   |
|          | 24-Jun-13 | Objections to Establishment of CD 16 filed. Viewers Assessments Filed. Order of Establishing Ditch and Liens for assessment filed.  |
|          | 28-Jun-13 | Sale of Jobs Notice for July 29 bid letting. Work described as one main ditch and one lateral, 8 miles in length, 57,355 yards excavation, culverts, and 7 miles of roads leveling                      |
|          | 12-Jul-13 | Appeals filed by landowners and Dieter township. Disputing the benefits and damages.  |
| 4-Jul    | 15-Jul-13 | Notice published in the Roseau Region for sale of jobs  |
| 26-Jul   | 29-Jul-13 | Bids received for work.   |
| 10am     | 29-Jul-13 | All bids were rejected because they were too high. Auditor will re-advertise for bids.  |
|          | 30-Jul-13 | Second notice Sale of Jobs Notice for Aug-28 bid letting filed. Work described as One main ditch and one lateral, total of 8 miles, 57,355 yards of excavation, culverts and 7 miles of roads to level. |
| 1-Aug    | 15-Aug-13 | Notice published 3 times in the Roseau Region   |
| 10am     | 28-Aug-13 | Bid letting. Accepted Northern Culvert Co for culverts and Norquist Bros. and Mattson for installing culverts and leveling of roads and excavation.   |
|          | 2-Sep-13  | Contract for work. \$8,699.70 to Norquist. \$680 for Northern Culvert Co  |
|          | 27-Mar-14 | Assessment filed.   |
|          | 23-Nov-14 | Hearing on Completion of Ditch  |



|           |           |  |
|-----------|-----------|--|
|           | 19-Jun-41 | Order appointing Engineer for repair of County Ditches No. 16 & 23. To be cleaned and repaired. Appointed Engineer. Meeting Scheduled for July 14, 1941. |
|           | 14-Aug-46 | Repair & Levy Ordered. Notice of Sale of Construction Jobs for Cleaning the outlet of the Main Ditch. Appointed Engineer                                 |
| 22-Aug-46 | 5-Sep-46  | Public Notice of Sale of Construction Jobs in Roseau Times-Region  |
|           | 10-Dec-52 | Department of Highways Maps of Trunk Highway 89  |
|           | Year 1970 | Suave Repair Maps  |

Attached: MN Statutes 103E.101



**103E.101 DRAINAGE PROCEEDING AND CONSTRUCTION RECORDS.**

**Subdivision 1. Public records.** All maps, plats, charts, drawings, plans, specifications, and other documents that have been filed, received in evidence, or used in connection with a drainage proceeding or construction are subject to the provisions on public records in section 15.17.

**Subd. 2. Record requirements.** All maps, plats, profiles, plans, and specifications prepared and used in relation to a proceeding must:

- (1) be uniform;
- (2) have each sheet marked to identify the proceeding by the drainage project and system number;
- (3) show the name of the person preparing the sheet;
- (4) show the date the sheet was prepared; and
- (5) conform to rules and standards prescribed by the director.

**Subd. 3. Index of proceedings and records.** The auditor or secretary shall keep all orders, exhibits, maps, charts, profiles, plats, plans, specifications, and records of the proceedings. These records may not be removed except when the board makes a written order to remove them. The auditor or secretary shall keep an accurate index of the proceedings and related documents in a readily usable, resilient, and secure manner.

**Subd. 4. Engineer's documents.** All original plats, profiles, records, and field books made by the engineer during the proceedings or the construction of a drainage project are public records and the property of the drainage authority. These public records must be filed with the auditor or secretary under the direction of the drainage authority when construction is completed or when the engineer stops acting for the drainage project, whichever is earlier.

**Subd. 4a. Reestablishing records.** (a) If, after thorough investigation of drainage system records, a drainage authority finds that records establishing the alignment, cross-section, profile, or right-of-way of a drainage system that it administers are lost, destroyed, or otherwise incomplete, it may, by order, reestablish records defining the alignment; cross-section; profile; hydraulic structure locations, materials, dimensions, and elevations; or right-of-way of the drainage system as originally constructed or subsequently improved in accordance with this chapter. The procedure for reestablishing drainage system records must involve, at a minimum, investigation and a report of findings by a professional engineer licensed in Minnesota supported by existing records and evidence, including, but not limited to, applicable aerial photographs, soil borings or test pits, culvert dimensions and invert elevations, and bridge design records. The existing and reestablished records together must define the alignment; cross-section; profile; hydraulic structure locations, materials, dimensions, and elevations; and right-of-way of the drainage system. Drainage system records reestablished under this subdivision do not interrupt prescriptive occupation.

(b) The description of a drainage system under this subdivision may be initiated by the drainage authority on its own motion or by any party affected by the drainage system filing a petition. If the system is under the jurisdiction of a county board, the petition must be filed with the auditor. If the system is under the jurisdiction of a joint county drainage authority, the petition must be filed with the auditor of the county with the largest area of property in the drainage system. If the system is under the jurisdiction of a watershed district board, the petition must be filed with the secretary.



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(c) When a drainage authority directs by resolution or when a petition is filed under this subdivision, the drainage authority, in consultation with the auditor or secretary, shall set a time and location for a hearing after the engineer's report is complete. The auditor or secretary shall give notice of the hearing by mail to the commissioner of natural resources, the executive director of the Board of Water and Soil Resources, the petitioner or petitioners, and all property owners benefited or damaged by the drainage system and shall give notice to other interested parties either in a newspaper of general circulation in the drainage system area or by publication on a website of the drainage authority.

(d) Drainage system records reestablished under this subdivision constitute official drainage system records. A finding of drainage system right-of-way in the applicable order is a defense to a trespass claim and shall be given due weight in any subsequent court proceeding to establish the existence or nature of a property encumbrance.

**Subd. 5. Filing and storage facilities.** County boards shall provide the auditor, and watershed district boards shall provide the secretary, with necessary filing and storage facilities to protect the files and records of all proceedings under its jurisdiction. The county boards and watershed district boards may provide for the copying and filing of the documents and records of proceedings by photographic devices as provided for public records under section 15.17. In the event of loss of the originals, the photographic copies are originals after authentication by the auditor or secretary.

**Subd. 5a. Transferring records.** (a) When a watershed district assumes authority for a drainage system according to section 103D.625, the county or joint county board transferring authority shall transfer all of the original records for the drainage system to the watershed district, except as provided in paragraph (b).

(b) Physical or electronic copies of drainage system records that are authenticated by the county auditor having the original records may be used in place of the originals by the watershed district until the watershed district has necessary records storage facilities to protect the original records or, in the case of a partial transfer of a drainage system, until the entire drainage system is transferred to the watershed district.

**Subd. 6. Records; prima facie evidence.** The record of proceedings under this chapter and of orders made by the drainage authority or the district court in the proceedings, or a certified copy of a record or order, is prima facie evidence of the facts stated in the record or order and of the regularity of all proceedings prior to the making of the order.

**History:** 1990 c 391 art 5 s 22; 2013 c 4 s 4-9





## Appendix E: Viewer's Report





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**APPRAISERS REPORT**  
**ROSEAU RIVER WATERSHED DISTRICT DITCH #16 IMPROVEMENT**

The undersigned appraisers, appointed to appraise the benefits and damages to property affected by the Improvement of Roseau River Watershed District Ditch #16, including all property likely to be affected by the drainage system or that may be used or taken for grass buffer strips necessary to control erosion, sedimentation, improve water quality, or maintain the efficiency of the drainage system, as ordered by the Roseau River Watershed District Board of Managers. The establishment of benefits for the Improvement of Roseau River Watershed District Ditch #16 is being performed in accordance with Minnesota Statute 103E.315.

The establishment of Roseau River Watershed District Ditch #16 consists of approximately 9.2 miles of open channel including County Ditch 16 Main; County Ditch 16 Lateral 1 and County Ditch 16 Branch 1. A complete description of the proposed drainage system alignment is as follows:

County Ditch 16 – Main Ditch: Commencing at a point 1500 feet south of the apparent section corner common to sections 15-16, 21-22, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 21-22, 15-16, 9-10, 3-4; thence continuing north and 25 feet east of the apparent section line between sections 33-34, 27-28, Township 163 N. Range 41 W. (Dieter Township), to the Roseau River.

County Ditch 16 – Lateral 1: Commencing at a point 1800 feet south of the apparent section corner common to sections 14-15, 10-11, Township 162 N. Range 41 W. (Ross Township) running thence north and 25 feet east of the apparent section line between sections 14-15, 10-11, 2-3; thence continuing north and 25 feet east of the apparent section line between sections 34-35, Township 163 N. Range 41 W. (Dieter Township) for 4536 feet; thence continuing in a northeasterly direction at a bearing of 18 degrees, 14 minutes east of north for 1210 feet to a point in section 26, Dieter Township; thence continuing due north to the Roseau River.

County Ditch 16 – Branch 1: Commencing 25 feet south of the southeast corner section 34, Township 163 N. Range 41 W; thence west between sections 3 and 34, Townships 162 and 163 N. Range 41 W. to County Ditch 16 – Main Ditch.

The undersigned appraisers, pursuant to the order of the Roseau River Watershed District Board of Managers, did meet preparatory to commencing duties on the 27th day of August 2019 at Roseau River Watershed District located at 714 6<sup>th</sup> St SW, Roseau, Minnesota 56751.

Having taken the oath as required by MSA 103E.305 to faithfully and impartially perform the appraiser duties, and having received charts, maps, and diagrams, did view, all lands and properties affected by said proposed drainage system and further, we did determine the damages to lands and properties affected by establishment of a grass strip necessary to control erosion, sedimentation, improve water quality, or maintain the efficiency of the drainage system as a result of the Improvement of Roseau River Watershed District County Ditch #16.

The land use within the benefiting area of the proposed project consists of agricultural or agriculturally related purposes. The principal crops grown are row crops, wheat, barley, hay, corn and soybeans.

We were able to determine the boundaries of the benefiting area by viewing Lidar data provided by Roseau River Watershed District along with visually viewing the project area. Meetings were held with the project engineer that provided maps of the watershed boundary that identified drainage practices and patterns. We viewed the County Assessor's records and aerial photo maps to determine the number of acres of tillable -tillable land and building sites, in each forty, government lot, and all other tracts of land. The Viewers also held meetings with property owners obtaining their input on drainage patterns, rental rates and property values.

We have determined the extent and basis of benefits as prescribed under MSA 103E.315.

In accordance with MSA 103E.321, Subd. 1 (1), we have indicated in tabular form each lot, 40 acre tract, under separate ownership that is benefited or damaged, which is attached herewith.

We have shown the number of acres in each tract or lot (MSA 103E.321 Subd. 1 (3)).

We have found no acres added to a tract or lot by the proposed drainage of public waters (MSA 103E.321, Subd. 2. (4)).

We found no damage to riparian rights (MSA 103E.321, Subd. 1. (5)).

We have found no acres or amount of benefits being assessed for drainage of the area before the drainage benefits could be realized that would require a public work permit to work in public waters under section MSA 103G.245 to excavate or fill a navigable water body under United States Code, Title 33, Section 1344 (Subd.1. (8)).

We have identified wetlands utilizing the National Wetland Inventory Maps and have assessed drainage benefits to only those wetlands that in our analysis would be considered conversion of a wetland under United States Code, Title 16, Section 3821, and are currently in agricultural production (Subd. 1. (9)).

Permanent right of way will be acquired and, therefore damages will be awarded for the establishment of permanent right of way necessary to control erosion, sedimentation, improve water quality, or maintain the efficiency of the drainage system and for the same reason we found damages, (MSA 103E.321, Subd. 1. (6)), for grass strips as required in (MSA 103E.201).

We have determined direct and indirect drainage benefits on and related to the Improvement of Roseau River Watershed District County Ditch #16

#### Direct Sales Analysis – Direct Benefits – Cropland / Pasture

The increase in market value was determined by market extracted sales data for similar properties in the area. Values averaged from \$1,600.00 per acre for cropland and \$600.00 for pasture/hay land in the drained condition versus values averaged from \$1,000.00 per acre for cropland and \$300.00 per acre for pasture/hay land in the undrained condition.

#### Direct Benefits - Area 1

The increased market value was determined for these properties by comparing the existing values in the unimproved condition with these drainage systems in place operating in their full designed capacity for a 10-year channel capacity. The Viewers have determined based on these values along with allowances for any private improvement costs that the drainage system provides for an increased market value/benefit for the Class A, agricultural/tillable acres and Class C, Residential properties at a benefit rate of \$400.00/acre, and a benefit rate of \$100.00/acre, for Class D, pasture/hay land.

#### Indirect Drainage Benefits Area 2

Area 2 consists of properties that utilize the drainage systems as an outlet. The outlet benefit for these properties was calculated using the Minnesota Public Drainage Manual. The outlet benefit was calculated with these properties utilizing the drainage systems for an outlet and the impact on maintenance over the life span of the drainage system. The Viewers have determined that for Class A, agricultural/tillable acres; Class C, residential properties, Class D, pasture/hay land receive indirect outlet benefit at the rate of \$100.00/acre and a benefit rate of \$50.00/acre to woodlot/conservation land.

#### Direct Benefits - Area 3 - Secondary Outlet

The increased market value was determined for these properties using the drainage improvement as a secondary outlet. The Viewers comparing the existing values in the unimproved condition with the drainage systems in place operating in their full designed capacity for a 10-year channel capacity. The Viewers applied a frequency of use analysis provided by engineering to obtain the increased market value/benefit to the Class A agricultural/tillable land at a rate of \$150.00/acre.

#### Change in land use Class E – Converted Wetlands ALL

Benefits have been determined using the highest and best use of the property. The Viewers considered the change in land use from wetlands to cropland with the value in the improved condition. We determined the value of Class B, converted wetlands to farmland and arrived at a benefit rate of \$600/acre.

#### Road Benefits

The Viewers have determined Benefits for all State, County, Township roads by the same rate per acre which was used for agricultural properties in Areas 1 and 2 and 3. The total benefits to roads = \$74,938.32.

We prepared a Benefit and Damages Statement which describes how the benefits and damages were determined which is attached and included as Exhibit 1 of this report.



We did cause to be kept an accurate account of all our services and time engaged in making said view and examination; the nature and kind of work done by us; the days each one of us was engaged in said works; the amount charged per day by each of us; every item of expense incurred by us in said work; which we have filed with the Roseau River Watershed District Board of Managers.

That we further report that at the completion of our examination, as aforesaid, we did sum up the total benefits and damages for Roseau River Watershed District Ditch #16, and did find, and hereby report, that the grand total of benefits is \$1,881,830.32.

That we further report the damages to be paid are shown in Exhibit 1 determined at a rate of \$1000.00/acre for permanent ditch right of way and grass strips on agricultural cropland. There is a total of 26.85 acres of permanent ditch right of way easement and grass strip right of way, and hereby report, that the total damages for permanent right of way are \$26,850.00.

Damages were also determined at a rate of \$120.00/acre for temporary construction right of way. There is a total of 42.062 acres related to the Improvement of Roseau River Watershed District County Ditch #16, and we hereby report, that the total damages for temporary construction right of way is \$5,047.44.

That we further report that we have considered the relative utility and benefits derived by Roseau River Watershed District Ditch #16 and hereby report that we have identified benefits to reflect reasonable and present-day values.

It is recommended that the Roseau River Watershed District Board of Managers hold a final hearing on the report and confirm the benefits and damages and benefited and damaged areas to be used for the establishment of Roseau River Watershed District Ditch #16 and all subsequent proceedings related to the drainage system.

Dated this \_\_th day of \_\_\_\_\_ 2020.

Respectfully Submitted,

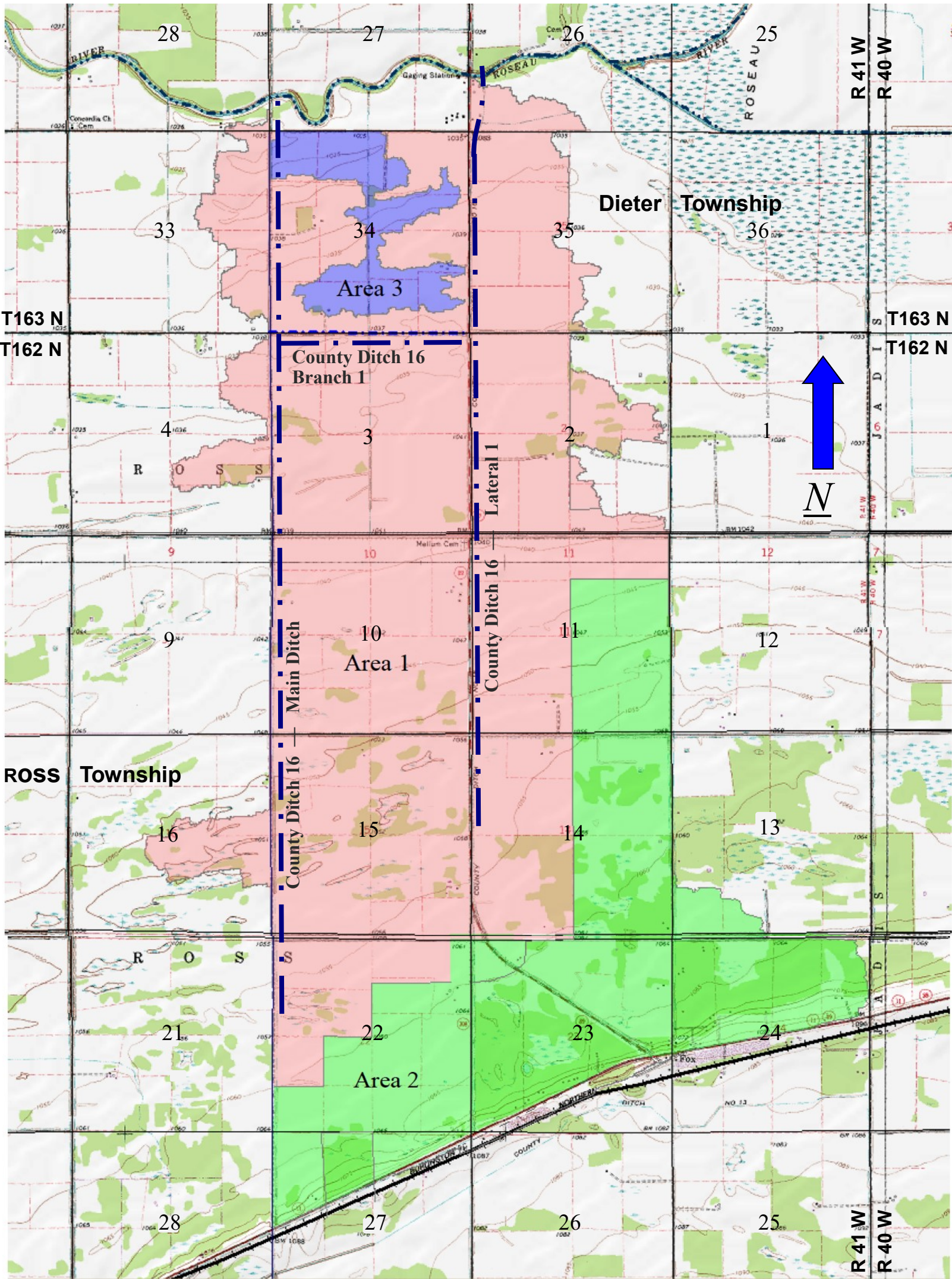
\_\_\_\_\_  
Robert Wagner

\_\_\_\_\_  
Roger Beiswenger

\_\_\_\_\_  
Mike Baumgarten

\_\_\_\_\_  
Jerry Bennet, Alternate





Roseau County Ditch 16 Improvement

|   |               |                       |  |  |
|---|---------------|-----------------------|--|--|
| <b>BENEFITS</b>   |               |                       | <b>LEGEND</b>  |  |
| <u>BENEFITS TO ROADS AND CORPORATIONS</u>                                 |               |                       | <div>AREA 1</div>  | <b>AREA 1—Direct Drainage</b><br>\$ 400.00/AC - CLASS A (AG1-CROPPED)<br>\$ 400.00/AC - CLASS C (RESIDENCIAL/COMMERCIAL)   |
| DIETER TOWNSHIP   | ACRES<br>18.0 | AMOUNT<br>\$ 7,200.00 | <div>AREA 2</div>  | <b>AREA 2—Indirect (Outlet Benefits)</b><br>\$ 100.00/AC - CLASS A, C and D (AG1-CROPP ED;<br>RESIDENCIAL/COMMERCIAL AND PASTURE)<br>\$ 50.00/AC - CLASS E (WOODLOTS/CONSERVATION) |
| ROSS TOWNSHIP   | 56.9          | \$ 13,730.00          | <div>AREA 3</div>  | <b>AREA 3 - Direct Drainage</b><br>\$ 150.00/AC—CLASS A (AG1-CROPPED)  |
| ROSEAU COUNTY ROADS   | 42.9          | \$ 17,163.45          |  | <b>Converted Wetlands (All)</b><br>\$ 600.00/AC—CLASS B (CONVERTED WETLANDS)   |
| MN DEPARTMENT OF TRANSPORTATION   | 142.6         | \$ 36,844.87          |  |  |
| BENEFITS TO LANDS =   | 6,228.5       | \$1,806,892.00        | <div></div>  | Roseau County Ditch #16 Improvement  |
| <b>Grand Total Benefits =</b>   |               | <b>\$1,881,830.32</b> |  |  |
| <b>DAMAGES</b>  |               |                       |  |  |
| Permanent ROW and Grass Strip   | 26.85         | \$ 26,850.00          |  |  |
| Temporary Construction ROW  | 42.06         | \$ 5,047.20           |  |  |
| <b>Total Damages</b>  |               | <b>\$ 31,897.2</b>    |  |  |
| Date 4-18-2020<br>Sheet 1 of 1<br>N.T.S                                   |               |                       | <b>BENEFIT MAP</b><br>PREPARED BY:<br><i>Jerry Bennett, Mike Baumgartner, Roger Beiswenger, Rob Wagner</i> |  |
| Roseau River Watershed District<br>Improvement of Roseau County Ditch #16 |               |                       |  |  |





| Parcel Number | NAMES OF OWNERS | Township Range Section | DESCRIPTION | Acres in Tract | Benefited Acres in Tract | Class "A" Benefited (AG 1 Cropland) | Area 1 Benefit Value (\$400.00) Per Acre | Class "A" Area 2 Acres Benefited (AG 1 Cropland) | Area 2 Benefit Value (\$100.00) Per Acre | Class "A" Area 3 Acres Benefited (AG 1 Cropland) | Area3 Benefit Value (\$150.00) Per Acre | Class "B" Acres Benefited (Converted Wetlands) | Benefit Value (\$600.00) Per Acre | Class "C" Acres Benefited (Residential) | Benefit Value (\$400.00) Per Acre Area 1&3; (\$100.00) Per Acre Area 2 | Class "D" Acres Benefited; AG Pasture, Hay | Benefit Value (\$100.00) Per Acre | Class "E" Acres Benefited (Woodland/C onservation) | Benefit Value (\$50.00) Per Acre | Existing R/W Acres | New Perm AG R/W Acres | Perm Ag R/W \$1,000.00 per Acre | Total Perm Ag R/W \$ | Temp R/W Acres | Temp R/W \$120.00 per Acre | Total Damages Temp R/W \$ | Benefits Per Parcel (\$) | Non converted wetlands |
|---------------|-----------------|------------------------|-------------|----------------|--------------------------|-------------------------------------|--|--|--|--|---|--|-----------------------------------|---|--|--|-----------------------------------|--|----------------------------------|--------------------|-----------------------|---------------------------------|----------------------|----------------|----------------------------|---------------------------|--------------------------|------------------------|
|---------------|-----------------|------------------------|-------------|----------------|--------------------------|-------------------------------------|--|--|--|--|---|--|-----------------------------------|---|--|--|-----------------------------------|--|----------------------------------|--------------------|-----------------------|---------------------------------|----------------------|----------------|----------------------------|---------------------------|--------------------------|------------------------|

|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|---------|-------------------------|------------|----------------|-------|-------|-------|-----------|--|--|--|-------|-----------|-----------|-----------|------|-----------|------|-----------|------|----------|------|------|-------------|----------|------|-----------|--------|-----------|--|
| 7.00545 | James P Johnson         | 26-163-041 | SW1/4 SW1/4    | 40    | 34.60 | 23.66 | \$ 400.00 |  |  |  |       |           | 0.81      | \$ 600.00 | 1.23 | \$ 400.00 | 3.68 | \$ 100.00 | 0.89 | \$ 50.00 | 4.18 | 0.15 | \$ 1,000.00 | 150.00   | 1.45 | \$ 120.00 | 174.00 | 10,854.50 |  |
|         | 32499 360th St          |            | SE1/4 SW1/4    | 40    | 24.57 | 24.57 | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        | 9,828.00  |  |
|         | Roseau, MN 56751        |            | SW1/4 SE1/4    | 40    | 3.53  | 3.53  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        | 1,412.00  |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.0061  | Garrett D Lee           | 28-163-041 | SE1/4 SE1/4    | 40    | 4.62  | 2.67  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           | 0.04 | \$ 50.00 | 1.91 |      |             |          |      |           |        | 1,070.00  |  |
|         | 30715 350th St          |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         | Badger, MN 56714        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00707 | Garrett D Lee           | 33-163-041 | NE1/4 NE1/4    | 40    | 32.25 | 29.23 | \$ 400.00 |  |  |  |       |           | 0.1       | \$ 600.00 |      |           |      |           |      |          | 2.92 |      |             |          |      |           |        | 11,752.00 |  |
|         | 30715 350th St          |            | NW1/4NE1/4     | 40    | 1.26  | 0.99  | \$ 400.00 |  |  |  |       |           | 0.27      | \$ 600.00 |      |           |      |           |      |          |      |      |             |          |      |           |        | 558.00    |  |
|         | Badger, MN 56714        |            | SW1/4 NE 1/4   | 40    | 12.46 | 12.46 | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        | 4,984.00  |  |
|         |                         |            | SE1/4 NE/4     | 40    | 40.00 | 38.8  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          | 1.2  |      |             |          |      |           |        | 15,520.00 |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00712 | Jason & Ruth Braaten    | 33-163-041 | NE1/4 SE1/4    | 40    | 32.84 | 31.6  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          | 1.24 |      |             |          |      |           |        | 12,640.00 |  |
|         | 30957 340th St          |            | SE1/4 SE1/4    | 40    | 21.92 | 17.49 | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           | 3.49 | \$ 50.00 | 0.94 |      |             |          |      |           |        | 7,170.50  |  |
|         | Badger, MN 56714        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00709 | Douglas Erickson        | 33-163-041 | NW1/4 SE1/4    | 40    | 0.98  | 0.98  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        | 392.00    |  |
|         | 36838 300th St          |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         | Roseau, MN 56751        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00715 | Roberta A Johnson Trust | 34-163-041 | NE1/4 NE 1/4 1 | 21.61 | 21.61 | 16.25 | \$ 400.00 |  |  |  |       | 3.07      | \$ 150.00 |           |      |           |      |           |      |          | 2.29 |      |             |          |      |           |        | 6,960.50  |  |
|         | 35219 Co Rd 115         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         | Badger, MN 56714        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00716 | Rickey & Rosalie Isham  | 34-163-041 | NE1/4 NE1/4 1e | 4.02  | 4.02  | 1.87  | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           | 0.78 | \$ 50.00 | 1.37 |      |             |          |      |           |        | 787.00    |  |
|         | 35216 State Hwy 89      |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         | Roseau, MN 56751        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00718 | Gregory & Jason Braaten | 34-163-041 | NE1/4 NE 1/4 1 | 17.75 | 17.75 | 16.87 | \$ 400.00 |  |  |  |       |           |           |           |      |           |      |           |      |          | 0.88 |      |             |          |      |           |        | 6,748.00  |  |
|         | 34323 State Hwy 89      |            | NW1/4 NE1/4    | 40    | 40.00 | 17.85 | \$ 400.00 |  |  |  | 19.8  | \$ 150.00 |           |           |      |           |      |           |      |          | 2.35 |      |             |          |      |           |        | 10,110.00 |  |
|         | Roseau, MN 56751        |            | SW1/4 NE1/4    | 40    | 40.00 | 9.54  | \$ 400.00 |  |  |  | 22.41 | \$ 150.00 | 6.94      | \$ 600.00 |      |           |      |           | 1.11 | \$ 50.00 |      |      |             |          |      |           |        | 11,397.00 |  |
|         |                         |            | SE1/4 NE1/4 1e | 36.34 | 36.34 | 15.97 | \$ 400.00 |  |  |  | 10.15 | \$ 150.00 | 7.52      | \$ 600.00 |      |           |      |           |      |          | 2.7  |      |             |          |      |           |        | 12,422.50 |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
| 7.00736 | Garrett D Lee           | 34-163-041 | NE1/4 NW1/4    | 40    | 40.00 | 1.71  | \$ 400.00 |  |  |  | 34.96 | \$ 150.00 |           |           |      |           |      |           |      |          | 1.85 | 1.48 | \$ 1,000.00 | 1,480.00 | 1.44 | \$ 120.00 | 172.80 | 5,928.00  |  |
|         | 30715 350th St          |            | NW1/4 NW1/4    | 40    | 40.00 | 4.41  | \$ 400.00 |  |  |  | 32.77 | \$ 150.00 |           |           |      |           |      |           |      |          | 2.82 |      |             |          |      |           |        | 6,679.50  |  |
|         | Badger, MN 56714        |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |       |           |           |           |      |           |      |           |      |          |      |      |             |          |      |           |        |           |  |

|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------|--------------------|------------|-------------|-------|-------|-------|-----------|--|--|-------|-----------|------|-----------|-------|-----------|-------|----------|----------|------|-------------|-------------|-------|-----------|-----------|-----------|-----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 7.00724 | Gregory A Braaten  | 34-163-041 | SE1/4 NW1/4 | 40    | 40.00 | 32.65 | \$ 400.00 |  |  | 7.35  | \$ 150.00 |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 14,162.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            | SW1/4 NW1/4 | 25.34 | 25.34 | 23.01 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 2.33     |      |             |             |       | 1.56      | \$ 120.00 | 187.20    | 9,204.00  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | NE1/4 SW1/4 | 40    | 40.00 | 26.26 | \$ 400.00 |  |  | 13.74 | \$ 150.00 |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 12,565.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            | NW1/4 SW1/4 | 40    | 40.00 | 36.51 | \$ 400.00 |  |  | 0.12  | \$ 150.00 |      |           |       |           |       |          | 2.11     | 1.26 | \$ 1,000.00 | 1,260.00    | 1.40  | \$ 120.00 | 168.00    | 14,622.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00725 | Michael Eklund     | 34-163-041 | SW1/4 NW1/4 | 14.66 | 14.66 | 6.81  | \$ 400.00 |  |  |       |           |      |           |       |           |       | 7.67     | \$ 50.00 | 0.11 | 0.07        | \$ 1,000.00 | 70.00 | 0.09      | \$ 120.00 | 10.80     | 3,107.50  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34800 310th Ave    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00727 | Jason S Braaten    | 34-163-041 | SW1/4 SW1/4 | 40    | 40.00 | 27.88 | \$ 400.00 |  |  | 8.56  | \$ 150.00 |      |           |       |           |       |          | 2.24     | 1.32 | \$ 1,000.00 | 1,320.00    | 1.52  | \$ 120.00 | 182.40    | 12,436.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 30957 340th St     |            | SE1/4 SW1/4 | 40    | 40.00 | 13.65 | \$ 400.00 |  |  | 25.34 | \$ 150.00 |      |           |       |           |       |          | 1.01     |      |             |             |       |           |           |           | 9,261.00  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Badger, MN 56714   |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.0073  | Gregory A Braaten  | 34-163-041 | NE1/4 SE1/4 | 38.4  | 38.40 | 22.38 | \$ 400.00 |  |  | 8.99  | \$ 150.00 |      |           |       |           |       | 4.34     | \$ 50.00 | 2.69 |             |             |       |           |           |           | 10,517.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            | NW1/4 SE1/4 | 40    | 40.00 | 22.27 | \$ 400.00 |  |  | 17.73 | \$ 150.00 |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 11,567.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | SW1/4 SE1/4 | 40    | 40.00 | 12.21 | \$ 400.00 |  |  | 23.36 | \$ 150.00 | 3.49 | \$ 600.00 |       |           |       |          | 0.94     |      |             |             |       |           |           |           | 10,482.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            | SE1/4 SE1/4 | 40    | 40.00 | 15.17 | \$ 400.00 |  |  | 12.64 | \$ 150.00 | 8.08 | \$ 600.00 |       |           |       |          | 4.11     |      |             |             |       |           |           |           | 12,812.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00733 | Gregory A Braaten  | 34-163-041 | NE1/4 SE1/4 | 1.6   | 1.60  | 1.24  | \$ 400.00 |  |  | 0.04  | \$ 150.00 |      |           |       |           |       | 0.12     | \$ 50.00 | 0.2  |             |             |       |           |           |           | 508.00    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00742 | Gregory A Braaten  | 35-163-041 | NE1/4 NW1/4 | 40    | 32.22 | 32.22 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 12,888.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            | NW1/4 NW1/4 | 40    | 40.00 | 34.95 | \$ 400.00 |  |  |       |           |      |           | 0.59  | \$ 100.00 |       |          | 4.08     | 0.38 | \$ 1,000.00 | 380.00      | 1.52  | \$ 120.00 | 182.40    | 14,039.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | SW1/4 NW1/4 | 40    | 40.00 | 37.43 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 2        | 0.57 | \$ 1,000.00 | 570.00      | 1.55  | \$ 120.00 | 186.00    | 14,972.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            | SE1/4 NW1/4 | 40    | 40.00 | 40    | \$ 400.00 |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 16,000.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00748 | Gregory A Braaten  | 35-163-041 | NE1/4 SW1/4 | 40    | 36.67 | 36.67 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 14,668.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            | NW1/4 SW1/4 | 40    | 40.00 | 37.24 | \$ 400.00 |  |  |       |           |      |           |       |           | 0.09  | \$ 50.00 | 2.14     | 0.53 | \$ 1,000.00 | 530.00      | 1.50  | \$ 120.00 | 180.00    | 14,900.50 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | SW1/4 SW1/4 | 40    | 40.00 | 36.8  | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 2.85     | 0.35 | \$ 1,000.00 | 350.00      | 1.53  | \$ 120.00 | 183.60    | 14,720.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            | SE1/4 SW1/4 | 40    | 40.00 | 39.15 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 0.85     |      |             |             |       |           |           |           | 15,660.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7.00749 | Jason S Braaten    | 35-163-041 | NW1/4 SE1/4 | 40    | 8.03  | 6.95  | \$ 400.00 |  |  |       |           | 1.08 | \$ 600.00 |       |           |       |          |          |      |             |             |       |           |           |           | 3,428.00  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 30957 340th St     |            | SW1/4 SE1/4 | 40    | 10.52 | 10.17 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 0.35     |      |             |             |       |           |           |           | 4,068.00  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Badger, MN 56714   |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ross    |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28.0001 | Aaron Magnusson    | 02-162-41  | NW1/4 NE1/4 | 40    | 6.65  | 6.59  | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 0.06     |      |             |             |       |           |           |           | 2,636.00  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 36576 270th ST     |            | SW1/4 NE1/4 | 40    | 38.38 | 35.7  | \$ 400.00 |  |  |       |           |      |           | 0.08  | \$ 100.00 | 2.6   | \$ 50.00 |          |      |             |             |       |           |           |           | 14,418.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28.0002 | Gregory A Braaten  | 02-162-41  | NE1/4 NW1/4 | 40    | 40.00 | 39.87 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 0.13     |      |             |             |       |           |           |           | 15,948.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 34323 State Hwy 89 |            | NW1/4 NW1/4 | 40    | 40.00 | 37.16 | \$ 400.00 |  |  | 0.6   | \$ 600.00 |      |           |       |           |       |          | 2.08     | 0.16 | \$ 1,000.00 | 160.00      | 1.56  | \$ 120.00 | 187.20    | 15,224.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | SW1/4 NW1/4 | 40    | 40.00 | 37.44 | \$ 400.00 |  |  |       |           |      |           |       |           |       |          | 2.47     | 0.09 | \$ 1,000.00 | 90.00       | 1.52  | \$ 120.00 | 182.40    | 14,976.00 |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            | SE1/4 NW1/4 | 40    | 40.00 | 40    | \$ 400.00 |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           | 16,000.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         |                    |            |             |       |       |       |           |  |  |       |           |      |           |       |           |       |          |          |      |             |             |       |           |           |           |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28.0002 | Brandon Peterson   | 02-162-41  | NE1/4 SW1/4 | 40    | 39.97 |       |           |  |  | 15.7  | \$ 600.00 | 2.45 | \$ 400.00 | 11.61 | \$ 100.00 | 10.21 | \$ 50.00 |          |      |             |             |       |           |           |           | 12,071.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | 33366 State Hwy 89 |            | NW1/4 SW1/4 | 40    | 40.00 |       |           |  |  | 3.87  | \$ 600.00 |      |           | 34.47 | \$ 100.00 |       |          | 1.6      | 0.06 | \$ 1,000.00 | 60.00       | 1.55  | \$ 120.00 | 186.00    | 5,769.00  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|         | Roseau, MN 56751   |            | SW1/4 SW1/4 | 40    | 40.00 |       |           |  |  |       |           |      |           | 34.72 | \$ 100.00 |       |          | 5.07     | 0.21 | \$ 1,000.00 | 210.00      | 1.49  | \$ 120.00 | 178.80    | 3,472.00  |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|---------|-------------------------|------------|----------------|-------|-------|-------|-----------|--|--|--|--|------|-----------|-------|-----------|-------|-----------|-------|----------|----------|------|-------------|-------------|----------|-----------|-----------|-----------|-----------|--|
|         |                         |            | SE1/4 SW1/4    | 40    | 40.00 |       |           |  |  |  |  | 6.57 | \$ 600.00 |       |           | 30.93 | \$ 100.00 |       |          | 2.5      |      |             |             |          |           |           | 7,035.00  |           |  |
| 28.0003 | Timothy D Knutson       | 02-162-41  | NE1/4 SE1/4 1e | 22.93 | 4.26  | 1.72  | \$ 400.00 |  |  |  |  |      |           |       |           | 0.25  | \$ 100.00 | 2.29  | \$ 50.00 |          |      |             |             |          |           |           | 827.50    |           |  |
|         | 33691 330th Ave         |            | SE1/4 NE1/4    | 40    | 19.19 | 0.6   | \$ 400.00 |  |  |  |  |      |           |       |           | 0.87  | \$ 100.00 | 17.72 | \$ 50.00 |          |      |             |             |          |           |           | 1,213.00  |           |  |
|         | Roseau, MN 56751        |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0003 | Eric D Knutson          | 02-162-41  | NW1/4 SE 1/4   | 19.85 | 14.86 |       | \$ 400.00 |  |  |  |  |      |           | 2.55  | \$ 400.00 | 0.95  | \$ 100.00 | 9.43  | \$ 50.00 |          |      |             |             |          |           |           | 1,586.50  | 1.93      |  |
|         | 33327 330th Ave         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         | Roseau, MN 56751        |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0003 | Kevin L Schumacher      | 02-162-41  | NW1/4 SE1/4 1  | 20    | 5.89  | 3.87  | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           | 1,548.00  | 2.02      |  |
|         | 32661 Co Rd 16          |            | SW1/4 SE1/4    | 40    | 29.73 | 25.47 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       | 2.34     |          |      |             |             |          |           |           | 10,188.00 | 1.92      |  |
|         | Roseau, MN 56751        |            | SE1/4 SE1/4    | 40    | 14.22 | 12.34 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       | 1.88     |          |      |             |             |          |           |           | 4,936.00  |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0003 | Gregory & Jason Braaten | 03-162-041 | NE1/4 NE1/4    | 40    | 40.00 | 34.96 | \$ 400.00 |  |  |  |  |      |           | 1.88  | \$ 600.00 |       |           |       |          | 2.46     | 0.7  | \$ 1,000.00 | 700.00      | 1.30     | \$ 120.00 | 156.00    | 15,112.00 |           |  |
|         | 34323 State Hwy 89      |            | NW1/4 NE1/4    | 40    | 40.00 | 27    | \$ 400.00 |  |  |  |  |      |           | 10.68 | \$ 600.00 |       |           |       |          | 1.54     | 0.78 | \$ 1,000.00 | 780.00      | 1.55     | \$ 120.00 | 186.00    | 17,208.00 |           |  |
|         | Roseau, MN 56751        |            | SW1/4 NE1/4    | 40    | 40.00 | 32.41 | \$ 400.00 |  |  |  |  |      |           | 7.59  | \$ 600.00 |       |           |       |          |          |      |             |             |          |           |           | 17,518.00 |           |  |
|         |                         |            | SE1/4 NE1/4    | 40    | 40.00 | 37.12 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 2.88     |      |             |             |          |           |           | 14,848.00 |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0003 | Jason S Braaten         | 03-162-041 | NE1/4 NW1/4    | 40    | 40.00 | 33.03 | \$ 400.00 |  |  |  |  |      |           | 5.49  | \$ 600.00 |       |           |       |          | 0.66     | 0.82 | \$ 1,000.00 | 820.00      | 1.46     | \$ 120.00 | 175.20    | 16,506.00 |           |  |
|         | 30957 340th St          |            | NW1/4 NW1/4    | 40    | 40.00 | 34.54 | \$ 400.00 |  |  |  |  |      |           | 3.41  | \$ 600.00 |       |           |       |          | 0.05     | 2    | \$ 1,000.00 | 2,000.00    | 2.01     | \$ 120.00 | 241.44    | 15,862.00 |           |  |
|         | Badger, MN 56714        |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0004 | Douglas C Erickson etux | 03-162-041 | SW1/4 NW1/4    | 40    | 40.00 | 35.33 | \$ 400.00 |  |  |  |  |      |           | 1.38  | \$ 600.00 |       |           |       | 1.48     | \$ 50.00 | 0.8  | 1.01        | \$ 1,000.00 | 1,010.00 | 1.52      | \$ 120.00 | 182.40    | 15,034.00 |  |
|         | 36838 300th St          |            | SE1/4 NW1/4    | 40    | 40.00 | 26.89 | \$ 400.00 |  |  |  |  |      |           | 13.11 | \$ 600.00 |       |           |       |          |          |      |             |             |          |           |           | 18,622.00 |           |  |
|         | Roseau MN 56751         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0004 | Selvin M Erickson Jr.   | 03-162-041 | NE1/4 SW1/4 1  | 30    | 30.00 | 29.72 | \$ 400.00 |  |  |  |  |      |           | 0.28  | \$ 600.00 |       |           |       |          |          |      |             |             |          |           |           | 12,056.00 |           |  |
|         | 33277 310th Ave         |            | NW1/4 SW1/4    | 30    | 30.00 | 27.89 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 1.2      | 0.91 | \$ 1,000.00 | 910.00      | 1.11     | \$ 120.00 | 133.20    | 11,156.00 |           |  |
|         | Badger, MN 56714        |            | SW1/4 SW1/4    | 40    | 40.00 | 36.09 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 2.96     | 0.95 | \$ 1,000.00 | 950.00      | 1.54     | \$ 120.00 | 184.80    | 14,436.00 |           |  |
|         |                         |            | SE1/4 SW1/4    | 40    | 40.00 | 37.9  | \$ 400.00 |  |  |  |  |      |           | 0.38  | \$ 600.00 |       |           |       |          | 1.72     |      |             |             |          |           |           | 15,388.00 |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0004 | Douglas C Erickson etux | 03-162-041 | NE1/4 SW1/4 1  | 10    | 10.00 | 10    | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           | 4,000.00  |           |  |
|         | 36838 300th St          |            | NW1/4 SW1/4    | 10    | 10.00 | 9.52  | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 0.18     | 0.3  | \$ 1,000.00 | 300.00      | 0.38     | \$ 120.00 | 45.60     | 3,808.00  |           |  |
|         | Roseau MN 56751         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0005 | Douglas C Erickson etux | 03-162-041 | NE1/4 SE1/4    | 40    | 40.00 | 37.65 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 2.35     |      |             |             |          |           |           | 15,060.00 |           |  |
|         | 36838 300th St          |            | NW1/4 SE1/4    | 40    | 40.00 | 40    | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           | 16,000.00 |           |  |
|         | Roseau MN 56751         |            | SW1/4 SE1/4    | 40    | 40.00 | 37.76 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 2.24     |      |             |             |          |           |           | 15,104.00 |           |  |
|         |                         |            | SE1/4 SE1/4    | 40    | 40.00 | 34.94 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 5.06     |      |             |             |          |           |           | 13,976.00 |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0005 | Douglas C Erickson etux | 04-162-041 | LOT 1          | 42.12 | 23.25 | 22.14 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 1.11     |      |             |             |          |           |           | 8,856.00  |           |  |
|         | 36838 300th St          |            | SE1/4 NE1/4    | 40    | 20.74 | 19.53 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          | 1.21     |      |             |             |          |           |           | 7,812.00  |           |  |
|         | Roseau MN 56751         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
| 28.0006 | Selvin M Erickson Jr.   | 04-162-041 | NE1/4 SE1/4    | 40    | 31.96 | 17.32 | \$ 400.00 |  |  |  |  |      |           | 1.62  | \$ 400.00 |       |           |       | 11.99    | \$ 50.00 | 1.03 |             |             |          |           |           | 8,175.50  |           |  |
|         | 33277 310th Ave         |            | NW1/4 SE1/4    | 40    | 23.20 | 22.65 | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       | 0.55     | \$ 50.00 |      |             |             |          |           |           | 9,087.50  |           |  |
|         | Badger, MN 56714        |            | SW1/4 SE1/4    | 40    | 3.04  | 3.04  | \$ 400.00 |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           | 1,216.00  |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |
|         |                         |            |                |       |       |       |           |  |  |  |  |      |           |       |           |       |           |       |          |          |      |             |             |          |           |           |           |           |  |

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|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|---------|-----------------------|------------|---------------------|-------|-------|--|--|-------|-----------|--|--|--|------|-----------|-----------|------|-----------|-------|----------|------|--|--|--|--|--|----------|------|
| 28.0049 | Rebecca L Housker     | 23-162-041 | SE1/4 NW1/4 1       | 3.5   | 3.50  |  |  |       |           |  |  |  |      | 1.32      | \$ 100.00 |      |           | 1.58  | \$ 50.00 | 0.29 |  |  |  |  |  | 211.00   | 0.31 |
|         | 30573 State Hwy 89    |            | SW1/4 NE1/4 1       | 1.31  | 1.31  |  |  |       |           |  |  |  |      | 0.09      | \$ 100.00 |      |           | 0.79  | \$ 50.00 | 0.43 |  |  |  |  |  | 48.50    |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0049 | Dybedahl Services LLC | 23-162-041 | NE1/4 NW1/4         | 2.9   | 2.90  |  |  |       |           |  |  |  |      |           |           |      |           | 1.06  | \$ 50.00 | 0.75 |  |  |  |  |  | 53.00    | 1.09 |
|         | 3568 County Hwy C     |            | SE1/4 NW1/4         | 32.16 | 32.16 |  |  |       |           |  |  |  |      | 0.12      | \$ 100.00 |      |           | 28.8  | \$ 50.00 | 0.12 |  |  |  |  |  | 1,452.00 | 3.12 |
|         | Rhinelanders WI 54501 |            | SW1/4 NE1/4         | 12    | 12.00 |  |  |       |           |  |  |  |      |           |           |      |           | 9.3   | \$ 50.00 | 2.7  |  |  |  |  |  | 465.00   |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0049 | Scott B Robinson      | 23-162-041 | NE 1/4 NE1/4 1      | 5     | 5.00  |  |  |       |           |  |  |  |      | 2.01      | \$ 100.00 | 0.34 | \$ 100.00 | 2.5   | \$ 50.00 | 0.15 |  |  |  |  |  | 360.00   |      |
|         | 30745 330th Ave       |            | SE 1/4 NE1/4 1      | 0.61  | 0.61  |  |  | 0.4   | \$ 100.00 |  |  |  |      |           |           |      |           | 0.15  | \$ 50.00 | 0.06 |  |  |  |  |  | 47.50    |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0049 | William A Rey         | 23-162-041 | NE 1/4 NE1/4 1      | 3.37  | 3.37  |  |  | 3.37  | \$ 100.00 |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  | 337.00   |      |
|         | 34325 490th Ave       |            | SE 1/4 NE1/4 1      | 39.39 | 39.39 |  |  | 38.67 | \$ 100.00 |  |  |  |      |           |           |      |           |       |          | 0.72 |  |  |  |  |  | 3,867.00 |      |
|         | Salol, MN 56756       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0049 | Matthew Lundgren      | 23-162-041 | NE1/4 NW1/4 1       | 2.78  | 2.78  |  |  |       |           |  |  |  |      | 1.35      | \$ 100.00 |      |           | 1.04  | \$ 50.00 | 0.39 |  |  |  |  |  | 187.00   |      |
|         | 32400 310th St        |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0055 | Robin Houske          | 23-162-041 | NW1/4 NW1/4 less tr | 11    | 11.00 |  |  |       |           |  |  |  |      | 1.49      | \$ 100.00 | 3.52 | \$ 100.00 | 2.32  | \$ 50.00 | 3.67 |  |  |  |  |  | 617.00   |      |
|         | 30796 State Hwy 89    |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0055 | Thomas V Fugleberg    | 23-162-041 | NW1/4 NW1/4 less tr | 29    | 29.00 |  |  | 15.22 | \$ 100.00 |  |  |  | 0.73 | \$ 600.00 |           |      |           | 7.37  | \$ 50.00 | 5.68 |  |  |  |  |  | 2,328.50 |      |
|         | 30745 State Hwy 308   |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Badger, MN 56714      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0054 | Thomas V Fugleberg    | 23-162-041 | SW1/4 NW1/4         | 20    | 20.00 |  |  | 0.32  | \$ 100.00 |  |  |  |      |           |           | 0.32 | \$ 100.00 | 12.41 | \$ 50.00 | 1.5  |  |  |  |  |  | 684.50   | 5.45 |
|         | 30745 State Hwy 308   |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Badger, MN 56714      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0055 | Judith V Fugleberg    | 23-162-041 | SW1/4 NW1/4         | 20    | 20.00 |  |  |       |           |  |  |  |      |           |           |      |           | 17.31 | \$ 50.00 | 1.66 |  |  |  |  |  | 865.50   | 1.03 |
|         | 2125 33rd St S        |            | NW1/4 SW1/4         | 40    | 40.00 |  |  |       |           |  |  |  |      |           |           |      |           | 36.94 | \$ 50.00 | 3.06 |  |  |  |  |  | 1,847.00 |      |
|         | Moorhead, MN 56560    |            | SW1/4 SW1/4 1       | 24.26 | 24.26 |  |  |       |           |  |  |  |      |           |           | 0.59 | \$ 100.00 | 15.53 | \$ 50.00 | 8.14 |  |  |  |  |  | 835.50   |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.0055 | Jeffrey D Bennett     | 23-162-041 | SW1/4 SW1/4 1       | 8.8   | 8.80  |  |  |       |           |  |  |  |      | 0.81      | \$ 100.00 |      |           | 7.73  | \$ 50.00 | 0.26 |  |  |  |  |  | 467.50   |      |
|         | 32155 State Hwy 11    |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         |                       |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
| 28.005  | Terrance F LeFor      | 23-162-041 | SW1/4 SW1/4 1       | 2.27  | 2.27  |  |  |       |           |  |  |  |      | 0.67      | \$ 100.00 |      |           | 1.34  | \$ 50.00 | 0.26 |  |  |  |  |  | 134.00   |      |
|         | 32253 State Hwy 11    |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |
|         | Roseau, MN 56751      |            |                     |       |       |  |  |       |           |  |  |  |      |           |           |      |           |       |          |      |  |  |  |  |  |          |      |

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|---------|------------------------|-----------|---------------|----------|---------|---------|--|--------|-----------|--------|--|-------|--|-------|-----------|--------|-----------|--------|----------|-------|-------|-------------|-----------|--------|-----------|----------|----------|--------|
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0072 | James Larter           | 27-162-41 | NE 1/4 NE 1/4 | 8.2      | 8.20    |         |  | 3.48   | \$ 100.00 |        |  |       |  |       |           | 3.48   | \$ 100.00 |        |          | 1.24  |       |             |           |        |           |          | 696.00   |        |
|         | 319 Scenic Dr          |           | NW 1/4 NE 1/4 | 32.01    | 32.01   |         |  | 8.04   | \$ 100.00 |        |  |       |  |       |           | 18.61  | \$ 100.00 | 1.55   | \$ 50.00 | 3.81  |       |             |           |        |           |          | 2,742.50 |        |
|         | Eureka, MT 59917       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0073 | Spencer V Johnston     | 27-162-41 | NE1/4 NW1/4   | 21.82    | 21.82   |         |  |        |           |        |  |       |  | 2.48  | \$ 100.00 |        |           | 13.73  | \$ 50.00 | 0.09  |       |             |           |        |           |          | 934.50   | 5.52   |
|         | 31501 St Hwy 11        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         | Badger, MN 56714       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0073 | Patrick Oneal Sullivan | 27-162-41 | NE1/4 NW1/4   | 10.84    | 10.84   |         |  |        |           |        |  |       |  | 0.79  | \$ 100.00 |        |           | 9.44   | \$ 50.00 | 0.37  |       |             |           |        |           |          | 551.00   | 0.24   |
|         | 31349 State Hwy 11     |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         | Badger, MN 56714       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0073 | Bradley L Bayerkohler  | 27-162-41 | NE1/4 NW1/4   | 13.57    | 13.57   |         |  |        |           |        |  |       |  | 1.1   | \$ 100.00 |        |           | 10.42  | \$ 50.00 | 2.05  |       |             |           |        |           |          | 631.00   |        |
|         | 31499 St Hwy 11        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         | Badger, MN 56714       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0073 | Danny M Anderson       | 27-162-41 | NW1/4 NW1/4   | 40       | 40.00   |         |  | 33.89  | \$ 100.00 |        |  |       |  |       |           |        |           | 0.72   | \$ 50.00 | 0.94  |       |             |           |        |           |          | 3,425.00 | 4.45   |
|         | 31309 St Hwy 11        |           | SW1/4 NW1/4   | 32.9     | 32.90   |         |  | 2.66   | \$ 100.00 |        |  |       |  | 2.15  | \$ 100.00 | 6.2    | \$ 100.00 | 9.66   | \$ 50.00 | 5.41  |       |             |           |        |           |          | 1,584.00 | 6.82   |
|         | Badger, MN 56714       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| 28.0073 | Daniel M Anderson      | 27-162-41 | SE1/4 NW 1/4  | 5.17     | 5.17    |         |  |        |           |        |  |       |  | 0.7   | \$ 100.00 |        |           | 3.42   | \$ 50.00 | 1.05  |       |             |           |        |           |          | 241.00   |        |
|         | 31309 St Hwy 11        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         | Badger, MN 56714       |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
|         |                        |           |               |          |         |         |  |        |           |        |  |       |  |       |           |        |           |        |          |       |       |             |           |        |           |          |          |        |
| TOTALS  |                        |           |               | 7409.615 | 6715.33 | 3708.38 |  | 520.31 |           | 241.03 |  | 182.3 |  | 139.1 |           | 605.02 |           | 832.31 |          | 285.3 | 26.85 | \$ 1,000.00 | 26,850.00 | 42.062 | \$ 120.00 | 5,047.44 |          | 174.73 |

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