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Final Engineer's Report

Improvement of County Ditch No. 14 Lyon County, Minnesota

July 2021

S15.116176

Submitted by:

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Certification

Preliminary Engineer's Report

For

Improvement of County Ditch No. 14


In

Lyon County, Minnesota

S15.116176

July 2021

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.

By: 
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Date: 7-20-2021

Table of Contents

I.	LOCATION AND SCOPE OF IMPROVEMENT	1
II.	EXISTING DITCH SYSTEM.....	1
III.	CONDITION OF THE EXISTING DRAINAGE SYSTEM	2
IV.	CAPACITY OF EXISTING DRAINAGE SYSTEM.....	2
V.	DISCUSSION OF IMPROVEMENT	3
A.	DESCRIPTION	3
B.	DESIGN DATA.....	3
C.	TILE SYSTEM DEPTH.....	5
D.	TEMPORARY STORAGE AND TILE REDUCTION	5
VI.	ALTERNATIVE SOLUTIONS.....	6
A.	“DO NOTHING” ALTERNATIVE	6
B.	WETLAND RESTORATION.....	6
VII.	OTHER CONSIDERATIONS	7
A.	PERMIT REQUIREMENTS.....	7
B.	WETLANDS.....	7
C.	PUBLIC AND PRIVATE BENEFITS AND COSTS.....	8
D.	AGRICULTURAL EFFECTS.....	8
E.	ALTERNATIVE MEASURES	8
F.	WATER QUALITY	9
G.	FISH AND WILDLIFE.....	9
H.	GROUNDWATER	9
I.	ENVIRONMENTAL IMPACT	9
J.	LAND USE.....	10
K.	GUIDANCE TO VIEWERS REGARDING IMPROVEMENT BENEFITS.....	10
VIII.	ADEQUACY OF THE OUTLET	10
A.	GENERAL INFORMATION	10
B.	ADEQUACY OF THE OUTLET.....	10
IX.	ESTIMATE OF COST	12
X.	RECOMMENDATIONS	12

Tables

Table 1: Original Established System Tile Capacity.....	3
Table 2: Proposed Tile Capacity ½"/Day Design – Single Outlet Main	4
Table 3: Proposed Tile Capacity ½"/Day Design – Dual Outlet Main Only	5
Table 4: Depth of Proposed Tile.....	5
Table 5: Proposed Tile Capacity 1/4"/Day Design for the Outlet	6
Table 6: Calculation of Additional Flow	11
Table 7: Impact to the Unnamed Stream	11

Appendix

Exhibit 1: Preliminary Plans and Profiles
Exhibit 2: Petition for CD 14 Improvement
Exhibit 3: Preliminary Cost Estimate
Exhibit 4: Separable Maintenance
Exhibit 5: Technical Specifications
Exhibit 6: Right-of-Way Table

STATE OF MINNESOTA

LYON COUNTY

IN THE MATTER OF THE PETITION FOR AN IMPROVEMENT TO COUNTY DITCH NO. 14 IN LYON COUNTY, MINNESOTA:

In March 2018, the Lyon County Board acting as the Drainage Authority for Lyon County Ditch No. 14 accepted a petition for the improvement of Lyon County Ditch No. 14 (CD 14) in accordance with Minnesota Statute 103E.215. After authorization, field surveys were performed to obtain field elevations and establish an alignment for a proposed drain tile improvement as well as to evaluate the outlet for the system.

A Preliminary Engineers report was presented in May of 2020. At that time, the Authority found that the proposed project meets the requirements for an Improvement, and the ordered the preparation of this Final Engineer's Report and appointed Viewers to determine the benefits and damages for the system.

This report summarizes the findings of the research, surveys and analysis and is submitted for consideration by the Drainage Authority.

I. LOCATION AND SCOPE OF IMPROVEMENT

The petitioned improvement area of County Ditch No. 14 lies within and provides drainage to portions of Sections 5,6,7,8,17,18, and 20 of Custer Township and portions of Sections 1,11,12, and 13 of Rock Lake Township in Lyon County. The system consists of a Main tile about 2.8 miles in length and three branches that vary in length. The outlet for this tile system is into an unnamed stream in Section 32 of Sodus Township. The unnamed stream then continues northeast and outlets into the Cottonwood River in Section 32 of Sodus Township in Lyon County. The system is located about 2.5 miles northeast of Balaton, Minnesota. The total estimated watershed for the tile system from Lidar contour data, is 2,874 acres.

The proposed improvement of County Ditch No. 14 includes the replacement of the Main tile along with Branches 1, 1A, and 2. Exhibit 1 shows the general location of CD 14 and the proposed improvement. Exhibit 2 is the copy of the petition for the improvement.

Field survey information was collected by Bolton & Menk, Inc. in June of 2018. The survey included GPS locations and elevations for the outlet of the tile and for private and public intakes on the system. The tile system design utilized Lidar data, provided by the Minnesota Department of Natural Resources. This data, obtained from an aerial flight, results in contours of equal elevation at 2' vertical intervals.

Other information used for this report included plans obtained from the Lyon County files. However, the plans do not provide accurate location and elevation data. If the project proceeds to construction, performing exploratory excavations at key locations to verify the existing tile sizes, locations, and elevations is recommended.

II. EXISTING DITCH SYSTEM

Public records regarding the County Ditch No. 14 system were reviewed from Lyon County. This information provides a limited history of the CD 14 system.

CD 14 was petitioned for establishment in 1914 and thereafter constructed. The Main tile, and Branches 1 through 2 were included in this petition.

III. CONDITION OF THE EXISTING DRAINAGE SYSTEM

The existing tile system consists largely of clay tile that was constructed around 1914. Determining the condition of the existing tile is important for several reasons. The first reason is deficiencies in the tile, such as offset joints, misaligned pipe, root intrusion, and broken or collapsed pipe all cause water to flow slower through the tile than originally designed. The second reason is that deteriorated pipe reduces the reliability of the system. A third reason is that a deteriorated tile system will incur increasingly greater maintenance costs to keep the system functioning.

These reasons contribute to determining if the existing drainage system needs repair. Repairing a drainage system means to restore all or part of a drainage system as nearly as practicable to the same hydraulic capacity as originally constructed and subsequently improved. It should be noted that Minnesota Statute 103E.705 means that the Drainage Authority has an affirmative duty to maintain the drainage systems located in its jurisdiction, and to provide the repairs necessary to make the drainage system efficient. As it pertains to the improvement process, the repair costs may be added as a benefit to offset the cost of the improvement, as discussed in section VII.K of this report.

From the reports of the petitioners that the tile is draining the lands at a slower rate than in the past and given its age, we have determined that the existing CD 14 tile system within the improvement area needs repair.

IV. CAPACITY OF EXISTING DRAINAGE SYSTEM

The portion of the CD 14 system proposed to be improved consists of underground tiles. From reports of the petitioners, the system is not able to adequately drain the CD 14 watershed, resulting in extended ponding in portions of the watershed. This ponding results in crop stress and crop loss. Because of this limitation of the drainage system, the petitioners have now requested that the drainage system be improved.

As a way of evaluating the capacity of the existing tile system, an analysis has been performed of the existing system using standard engineering methods. The capacity of the existing tile was estimated using the Manning equation, assuming the original hydraulic efficiency of the system as constructed and subsequently improved. In other words, the analysis of the existing system is of the capacity as established in the original design of the system based on existing plans and documentation. Tile sizes and grades are based on original design plans supplemented with limited field data collected through tile intakes and general land grades. The amount of drainage needed for modern crop production was compared to standards recommended by the Natural Resource Conservation Service (NRCS). These standards recommend drainage of row crops in mineral soils, where surface water intakes are provided, that a modern drainage system should be able to convey 1/2 of an inch of runoff per day. Watershed areas have been estimated using DNR Lidar maps. Table 1 shows the results of this analysis.

From Table 1, the main tile can drain the lands within the watershed at rates ranging from 0.03" to 0.04" per day. The limiting capacity in the main of 0.03" per day is near the outlet. This bottleneck in the system throttles the capacity of the upstream tiles down to 0.03" per day. When compared to the recommended standard of 1/2" (0.5") per day, in its originally constructed condition, the main tile is delivering less than 6% of the recommended flow. The lateral branches can drain respective watersheds at rates ranging from about 0.09" per day to 0.26" per day, with the majority being 0.17" per day or less. Thus, as constructed, most of the system provided inadequate capacity for the efficient production of row crops. Since there is evidence that the pipe system needs repair, the system is delivering even less flow than has been calculated.

Table 1: Original Established System Tile Capacity							
Tile/Branch	Location	Drainage Area (Acres)	NRCS Flow (CFS) 1/2"/Day	Existing Tile Size (Inches)	Existing Tile Grade (%)	Calculated Tile Capacity (CFS) n=0.013	Calculated Coefficient (In. Per Day)
CD 14 Main	West Side of 230th Ave/DNR Wetland	615	12.92	10	0.16	0.88	0.03
	East Side of 230th Ave.	2224	46.72	16	0.12	2.67	0.03
	Main Prior to Branch 1	2238	47.01	16	0.12	2.67	0.03
	N 1/2 of NW Quarter of Section 7	2496	52.43	18	0.14	3.94	0.04
	South Side of 150th St.	2518	52.90	18	0.14	3.94	0.04
	North Side of 150th St.	2539	53.34	18	0.14	3.94	0.04
	Main Prior to Branch 2	2618	55.00	18	0.16	4.21	0.04
	West Side of CSAH 7	2740	57.56	18	0.10	3.33	0.03
	South Side of 160th St.	2874	60.37	18	0.10	3.33	0.03
Branch 1A	North of 150th St.	26	0.55	6	0.20	0.25	0.23
	South Side of 150th St.	35	0.74	8	0.10	0.38	0.26
Branch 1	North Side of 150th St.	83	1.74	8	0.25	0.61	0.17
	West Side of 230th Ave.	130	2.73	8	0.15	0.47	0.09
	Branch 1 Prior to Main	183	3.84	12	0.12	1.24	0.16
Branch 2	NE Quarter of SE Quarter of Section 6	76	1.60	8	0.20	0.54	0.17

V. DISCUSSION OF IMPROVEMENT

As noted earlier, the petitioners for the Improvement of CD 14 have requested the consideration of construction of an improved tile system to increase the capacity. A preliminary survey and hydrologic and hydraulic analysis of such a drainage system was performed to establish preliminary grades and depths for the tile system, to determine quantities for construction of such a system, to determine the size of proposed tile lines and analyze the outlet. General observations and results of the analysis are summarized as follows:

A. DESCRIPTION

As shown in Exhibit 1, the proposed Improvement consists of 8-inch to 54-inch diameter tile to physically replace the existing CD 14 tile system from the outlet to the upper end. The tile sizes shown in Exhibit 1 are for a proposed 1/2" drainage coefficient design. CSAH 7 road crossing is proposed to be completed by trenchless installation, while crossing of Township roads will be by open trench methods with the road surface restored with class 5 gravel. The Lyon County Highway Department is exploring the potential to open cut the CSAH 7 road crossing. The new tile will replace existing tile. The new tile will be constructed at a lower elevation than existing tile to allow all existing tiles to be connected to the new tile. The exiting tile will be decommissioned by crushing the pipe and reconnecting all existing tiles to the new main.

B. DESIGN DATA

The proposed grades for the tile improvements are shown on Exhibit 1 and vary from 0.10% to 4.8%. The type of pipe should be used for the construction will be bid as a contractor option as follows:

1. Dual Wall Polyethylene Drain Tile meeting the requirements of the American Society for Testing Materials F 2648. Pipe will be bedded in granular material as shown on Exhibit 1. Non-perforated pipe will be used where the tile is to be greater than 6 feet deep, and perforated pipe will be used where the tile is to be less than 6 feet deep. The perforated pipe will include a drain tile sock or micro perforations/slots to avoid granular infiltration into the pipe. An option would be provided for the contractor to shape the bottom of the trench to conform to the pipe and eliminate some of the granular bedding if the pipe manufacturer would warrant the material installation.
2. Reinforced concrete pipe (RC) meeting requirements of MnDOT Specification 2501, with joints being covered with geotextile fabric.
3. Dual Wall or Triple Wall Polypropylene Drain Tile meeting the requirements of the American Society for Testing Materials F2376. Pipe will be bedded in granular material as shown on Exhibit 1.
4. RC tile or polypropylene tile is proposed for all diameters larger than 36-inch diameter.

The criterion for design of the tile system size is based on Natural Resource Conservation Service (NRCS) methodology. The design coefficient recommended by the NRCS for drainage systems where row crops are raised on mineral soils, and open intakes are placed on the tile, is 1/2" per day. In other words, the system should be able to drain the amount of water produced by approximately 1/2" of runoff over the entire watershed in one day. Since the Improvement will serve several areas which are depressional in nature, this design criterion was selected. The capacity of the proposed tiles for 1/2"/ day design coefficient calls for two options. Option 1a is to construct a single main tile that ranges in size up to 54 inches as shown in Table 2.

Table 2: Proposed Tile Capacity 1/2"/Day Design – Single Outlet Main							
Tile/Branch	Location	Drainage Area (Acres)	NRCS Flow (CFS) 1/2"/Day	Proposed Tile Size (Inches)	Proposed Tile Grade (%)	Calculated Tile Capacity (CFS) n=0.012	Calculated Coefficient (In. Per Day)
CD 14 Main	West Side of 230th Ave/DNR Wetland	615	12.92	30	0.16	17.82	0.69
	East Side of 230th Ave.	2224	46.72	48	0.12	54.05	0.58
	Main Prior to Branch 1	2238	47.01	48	0.12	54.05	0.57
	N 1/2 of NW Quarter of Section 7	2496	52.43	48	0.14	58.38	0.56
	South Side of 150th St.	2518	52.90	48	0.14	58.38	0.55
	North Side of 150th St.	2539	53.34	48	0.14	58.38	0.55
	Main Prior to Branch 2	2618	55.00	48	0.16	62.41	0.57
	West Side of CSAH 7	2740	57.56	54	0.10	67.55	0.59
	South Side of 160th St.	2874	60.37	54	0.10	67.55	0.56
Branch 1A	North of 150th St.	26	0.55	8	0.20	0.59	0.54
	South Side of 150th St.	35	0.74	10	0.10	0.75	0.51
Branch 1	North Side of 150th St.	83	1.74	12	0.25	1.94	0.55
	West Side of 230th Ave.	130	2.73	15	0.15	2.72	0.50
	Branch 1 Prior to Main	183	3.84	18	0.12	3.95	0.51
Branch 2	NE Quarter of SE Quarter of Section 6	76	1.60	12	0.20	1.73	0.54

Option 1b is to construct two smaller diameter main tiles for the lower portions of the Main tile. The cost of concrete pipe, and dual-wall tile has fluctuated dramatically in the last few years, and we feel that it is best to competitively bid the tile options. The capacity and proposed sizes for a dual tile outlet is shown in Table 3.

Table 3: Proposed Tile Capacity 1/2" /Day Design – Dual Outlet Main Only							
Tile/Branch	Location	Drainage Area (Acres)	NRCS Flow (CFS) 1/2"/Day	Proposed Tile Size (Inches)	Proposed Tile Grade (%)	Calculated Tile Capacity (CFS) n=0.012	Calculated Coefficient (In. Per Day)
CD 14 Main	West Side of 230th Ave/DNR Wetland	615	12.92	30	0.16	17.82	0.69
	East Side of 230th Ave.	2224	46.72	2-36	0.12	50.20	0.54
	Main Prior to Branch 1	2238	47.01	2-36	0.12	50.20	0.53
	N 1/2 of NW Quarter of Section 7	2496	52.43	2-36	0.14	54.22	0.52
	South Side of 150th St.	2518	52.90	2-36	0.14	54.22	0.51
	North Side of 150th St.	2539	53.34	2-36	0.14	54.22	0.51
	Main Prior to Branch 2	2618	55.00	2-36	0.15	56.12	0.51
	West Side of CSAH 7	2740	57.56	2-36	0.16	57.96	0.50
	South Side of 160th St.	2874	60.37	2-36	0.18	61.48	0.51

Also included as part of the project will be provisions to strip and replace the topsoil on the trench area, to provide riprap as erosion protection at the outlet, and to construct several intakes on the system. The detail sheet C1.01 in Exhibit 1 provides more information on several of these items.

C. TILE SYSTEM DEPTH

Exhibit 1 shows profile views for the proposed tile system. The minimum and maximum depths of cut to the flow line of the pipes are as shown on Table 4.

Table 4: Depth of Proposed Tile		
Tile Branch	Minimum Depth	Maximum Depth
CD 14 Main	8.3'	23.2'
Branch 1A	5.2'	6.3'
Branch 1	5.6'	10.6'
Branch 2	5.3'	6.7'

D. TEMPORARY STORAGE AND TILE REDUCTION

A second design alternative is to design the Main Tile outlet for a 1/4" per day drainage coefficient and provide temporary storage for 1/4" of runoff. Exhibit 1 shows the locations for the proposed temporary storage basins. The proposed basins are sized to store the volume of runoff that would have been conveyed by the Main Tile outlet over the course of two days had the Main Tile outlet been sized for a 1/2" per day drainage coefficient.

The capacity of the proposed tiles for a 1/4" drainage coefficient downstream of the temporary storage basin is shown in Table 5. Table 5 also shows the resulting runoff coefficient provided for the watershed served. The difference in the 1/4" outlet design and the 1/2" design is in the CD 14 Main tile can be reduced twelve inches in diameter.

Table 5: Proposed Tile Capacity 1/4"/Day Design for the Outlet							
Tile/Branch	Location	Drainage Area (Acres)	NRCS Flow (CFS) 1/4"/Day	Proposed Tile Size (Inches)	Proposed Tile Grade (%)	Calculated Tile Capacity (CFS) n=0.012	Calculated Coefficient (In. Per Day)
CD 14 Main	West Side of 230th Ave/DNR Wetland	615	9.69	24	0.16	9.83	0.38
	Location of Temporary Storage Basin						
	East Side of 230th Ave.	2224	35.04	36	0.12	25.10	0.27
	Main Prior to Branch 1	2238	35.26	36	0.12	25.10	0.27
	N 1/2 of NW Quarter of Section 7	2496	39.33	36	0.14	27.11	0.26
	South Side of 150th St.	2518	39.67	36	0.14	27.11	0.26
	North Side of 150th St.	2539	40.00	36	0.14	27.11	0.25
	Main Prior to Branch 2	2618	41.25	36	0.16	28.98	0.26
	West Side of CSAH 7	2740	43.17	42	0.10	34.56	0.30
	South Side of 160th St.	2874	45.28	42	0.10	34.56	0.29

The storage volume required to store the excess runoff is approximately 103 acre-feet.

The current storage volume identified upstream of the improvement is 92.6 acres, or approximately 90% of the total volume needed to allow for a 1/2" per day discharge. A Permanent Flood Easement would be paid by the drainage system to the landowners for temporarily retaining the water on their land. The total easement area is approximately 59 acres.

VI. ALTERNATIVE SOLUTIONS

Several other alternative solutions to the proposed Improvement have been evaluated as part of this study.

A. "DO NOTHING" ALTERNATIVE

The "Do Nothing" Alternative was discussed. However, petitioners have experienced poor drainage throughout the drainage system for many years with excess surface water damaging crops and resulting in frequent crop stress or crop loss. The loss of production equates to an economic loss for Lyon County and the State of Minnesota. The loss results in reduced property value for the wet acres, thus affecting the taxing capacity of the County and State. Also, the ability of the landowners to receive a reasonable return on their investment is diminished because of inadequate drainage.

For these reasons, the "Do Nothing" alternative was dismissed. The economic question of the cost of the Improvement versus the benefits derived still needs to be evaluated. However, the "Do Nothing" alternative is not viewed as solving the drainage problem in the watershed.

B. WETLAND RESTORATION

Another alternative would be to restore the typically flooded areas of the watershed to wetland use. This alternative would provide storage in watershed depressional areas for water which is currently accumulating in these areas and drowning out agricultural crops. The proposal would also have added benefits for wildlife and possibly water quality.

To be effective, this alternative needs to restore enough acres to wetland use so the existing drain tile system could convey excess runoff. Utilizing NRCS data, it is estimated about 319 acre-feet of water runs off the watershed during a 5-year storm event. Of this total, about 305-acre feet of water is not able to be discharged through the existing drainage systems in a 48-

hour period following the storm event. If enough wetland acres were available to store this runoff at a one-foot depth, approximately 305 acres of wetland restoration would be needed to provide a 5-year storm event protection.

To convert the 305 acres to wetlands, at least twice these many acres would need to be acquired for irregular wetland shapes and marginal damp soils. Thus about 610 acres of land would be needed. This acquisition would likely involve multiple properties who would voluntarily need to agree to the reversion. The estimated cost of acquisition plus reconstructing tile lines would probably range around \$8,000 per acre. Applying this price to the estimated 610 acres results in a total cost of about \$4,880,000 or about 2 times more than the cost of the improvement.

Wetland restoration remains a viable option for providing some improvement in the functioning of the tile drainage system. If enough acres of wetlands were restored, particularly in the upper part of the watershed, it could reduce the need for as large of an outlet tile as is proposed. Finding willing landowners to participate in a restoration project and locating enough funding would be critical to make this option viable. Copies of the Preliminary Report were provided to the SWCD and NRCS so early coordination could occur for potential funding and technical assistance toward this option. At the time of this Final Engineer's Report, no additional restoration or funding has been identified.

VII. OTHER CONSIDERATIONS

A. PERMIT REQUIREMENTS

A permit from the Minnesota Pollution Control Agency for stormwater and erosion control for the project would be necessary. This permit requirement, which applies to any project which disturbs more than one acre of land, requires that the contractor and owner secure a permit for the project. The permit process will also require erosion control measures to be taken during construction. Typical erosion control measures include placing of riprap and grass stabilization of the ditch bank and inlet protection around installed inlet areas. The fee for this permit is currently \$400.00. This permit will be applied for shortly before construction is scheduled so the contractor can sign the permit application.

A permit from Lyon County for the tile crossing of the County Highway will be required. This permit will be applied for after to the Final Hearing.

B. WETLANDS

National Wetland Inventory Maps was reviewed to locate potential wetlands subject to regulations. Most of the landowners along the improvement have already provided documentation from the NRCS to identify any additional potential wetlands. The location of these mapped, but not delineated, wetlands are shown on Exhibit 1. Negative impacts to the wetlands will be mitigated by constructing non-perforated tile through, and near, these wetlands.

Impacts of the potential drainage system on individual land parcels will be evaluated by the Natural Resources Conservation Service upon filing of a Form AD 1026 by landowners. This NRCS process will identify any wetlands and measures which need to be taken for the drainage project to avoid impact to these wetlands. Because of federal data privacy requirements, it is not possible for non-landowners to obtain this information. Thus, the obligation for filling out these forms and doing this investigation will rest with individual landowners.

Drainage of non-directly impacted wetlands will be controlled by supplemental drainage systems installed by private owners. Owners are advised that such supplemental drainage may not be permitted under State Wetland Conservation Act, US Army Corps of Engineers

and NRCS rules and may affect US Department of Agriculture program eligibility.

C. PUBLIC AND PRIVATE BENEFITS AND COSTS

The estimated cost of the proposed Improvement to CD 14 is shown in Exhibit 3 of this report. Benefits for the Improvement, both public and private, will be established by the viewers and a report will be available at the final hearing.

Landowners certainly have other costs associated with construction and maintenance of their individual drainage systems. The proposed Improvement would only serve as an outlet or collector of runoff and drainage flow from the lands within the watershed. Each landowner is responsible to construct and maintain their own drainage system to adequately drain their farmlands. Individual benefits for an adequate drainage system are in increased crop production from farmlands.

The estimated cost of the proposed Improvement is included in this report. The public and private benefits and damages will be available at the final hearing.

D. AGRICULTURAL EFFECTS

Once installed, the lands within the improved watershed will be largely dependent on this drainage system for both surface and subsurface drainage flows. Thus, it is imperative that the proposed system have adequate capacity to allow for modern farming operations.

It should be noted that many of the established ditch systems in Minnesota are now 70 to 100 years old. These systems are approaching the need for complete repair or replacement if the farmland is to remain productive. When feasible, it is economically imperative that these drainage systems be improved to become compatible with present day farming techniques and they be continually maintained. If properly maintained during normal growing seasons, portions of the agricultural lands in the watershed are some of the most productive in the State of Minnesota.

E. ALTERNATIVE MEASURES

Alternative measures, including those identified in the Lyon County Water Management Plan have been considered in conjunction with this project. Specific proposals as part of the project to incorporate these measures include:

1. Measures to conserve, allocate and use drainage waters include the use of non-perforated tiles for the deeper installations so that groundwater is preserved for crop use and the continued infiltration which will occur in depressional areas of the watershed.
2. Measures to reduce downstream peak flows and flooding include the use of hickenbottom risers on intakes which limit the flow capacity of tile intakes, limiting the capacity of the proposed tiles to the minimum recommended standard of the NRCS to limit downstream flows, and construction of the proposed water and sediment control basin.
3. Measures to provide adequate drainage system capacity are being accomplished by designing the size of the tile system to meet recommended standards of the NRCS.
4. Measures to reduce erosion and sedimentation include the use of hickenbottom risers on tile intakes which result in reduced discharge of suspended solids, the restoration of the tile trench as soon as possible so surface erosion of disturbed soil is reduced, the use of inlet protection during construction so the discharge of suspended solids is reduced and the use of a rock filter at the outlet during construction so suspended solids are captured. Straw mulch will be utilized to temporarily stabilize disturbed areas until they can return to agricultural production.

F. WATER QUALITY

Little change in measurable water quality is anticipated because of this Improvement. However, there are components of the Improvement that will mitigate erosion and help improve water quality on a micro watershed scale. Tile system velocities are generally low, so soil from the surrounding envelop is seldom carried into the tile. Thus, the largest source of suspended solids in tile system drainage is from water discharging into open intakes. Although open intakes will still be used on the system, ponding occurs around these intakes for any significant storm events. Thus, solids have time to settle rather than being discharged.

As a requirement of the MPCA Erosion Control Permit, the establishment of an erosion control plan is anticipated. Incorporation of such devices as inlet protection, riprap at the outlets and permanent grasses as soon as possible following construction are anticipated. These measures will help to reduce erosion and maintain water quality during construction.

G. FISH AND WILDLIFE

The threatened or endangered species having the potential to be in Lyon County at the time of this report are the Dakota skipper, Poweshiek skipperling, northern long-eared bat, and the prairie bush clover. According to the Minnesota DNR and US Fish & Wildlife Service, there are no known Dakota skippers or Poweshiek skipperlings within the project area. According to the Minnesota DNR, there are no known northern long-eared bat roost trees or hibernacula in Lyon Counties. Additionally, there are no trees to be removed as a part of the improvement, so there is no anticipated impact to the northern long-eared bat. The prairie bush clover is found within native prairie on well drained soils. The project will take place within agricultural fields, so no impact to the prairie bush clover is anticipated. Bald eagles are present in Lyon County, and are protected under the Bald and Golden Eagle Protection Act. Again, there are no trees to be removed as a part of the improvement, so there is no impact to the bald eagle.

Current wet areas within the project watershed do provide for transitory stop over locations for migratory waterfowl. However, these areas currently dry up following wet periods and are then under cultivation and production. It is anticipated that some of these temporary ponding areas will still exist after the construction of the Improvement although ponding times will likely be reduced. Therefore, the provisions for adequate drainage of these lands will not be of a detrimental nature to local wildlife resources.

II. GROUNDWATER

The purpose of an agricultural drainage system is to maintain the elevation of the shallow groundwater table sufficiently below the surface to provide for efficient production of crops. The level at which groundwater will be maintained has been and will be determined by the depth of the tile system and private tiles in the area. Although the proposed Improvement is somewhat deeper than existing tiles in the areas, the depth increase is not significant or unusual for drainage systems. Additionally, tiles with a depth of 6 feet or greater to the invert of pipe will be non-perforated. Therefore, no change in the availability, distribution or use of shallow groundwater beyond that necessary for sufficient production of crops within the watershed is anticipated by construction.

I. ENVIRONMENTAL IMPACT

Adverse effects of the proposed Improvement are temporary in nature and are as follows:

1. Disturbing of the ground surface during construction could result in the loss of one crop within the construction limits.
2. Restored trench area will be less productive for the first few years following construction and will require more fertilizer to be as productive as the undisturbed adjoining farmland. The topsoil in this area will be removed and replaced to maintain

soil productivity.

3. Temporary noise and dust generation can be expected from construction operations. These impacts are not viewed as significant since there are few residences near the proposed construction route.
4. Temporary erosion of soil may occur in the construction area until permanent ground cover and ground stabilization occurs. Although these effects need to be considered, they are probably not significantly different than the current topsoil loss that occurs annually from erosion of topsoil due to overland flow in the watershed. This construction erosion will be minimized using inlet protection, riprap and rapid establishment of permanent grass cover.

Numerous beneficial effects are anticipated from the proposed Improvement. Most of these benefits are directly attributable to increased crop production from lands presently damaged through period flooding and ponding. Among the most obvious benefits are:

1. Increased personal farm income.
2. Increased value of benefited farmland.
3. Contribution to the local economy through additional purchases, farm modernization and expansion.

J. LAND USE

The present use of land in the CD 14 watershed is largely agricultural. This use is expected to continue.

K. GUIDANCE TO VIEWERS REGARDING IMPROVEMENT BENEFITS

Discussions with landowners in the CD 14 system provided evidence of the condition of the existing tile systems of CD 14. In addition, years of use and settlement of sections of the tile have reduced the hydraulic capacity of the tile. Even if CD 14 had not been petitioned for improvement, a repair is warranted, as discussed in Section III of this report.

Another way to describe this is related to the benefit of avoiding inevitable repair/reconstruction costs on the ditch. Since repair of the system, as required by Minnesota Statute 103E.705, would otherwise be paid for by the entire drainage system to restore the system to its as-constructed, and subsequently improved, hydraulic efficiency, the cost of repair may be used to offset a portion of the improvement cost. Thus, the cost of new tiles may be added as a benefit since it avoids costs otherwise required to repair the system. With this information, it is the intent of the Improvement to replace the existing tile. Thus, a portion of the cost of the new CD 14 tile system should be allocated as a Repair cost. The application of this principal is known as Separable Benefits under the ditch statutes.

The amount of the Improvement which can be allocated to Separable Benefits is shown in Exhibit 4 as \$1,046,992. It is recommended that the Board apply these Separable Benefits to the Improvement in the further ditch proceedings.

VIII. ADEQUACY OF THE OUTLET

A. GENERAL INFORMATION

As mentioned earlier, the outlet for this tile system is into an unnamed stream in Section 32 of Sodus Township. The unnamed stream then continues northeast and outlets into the Cottonwood River in Section 32 of Sodus Township in Lyon County.

B. ADEQUACY OF THE OUTLET

The adequacy of unnamed stream to accept the additional flow resulting from the

Improvement has been evaluated as required by the ditch statutes. This evaluation has been performed in the following manner:

1. The watershed contributing flow to the unnamed stream at the outlet for CD 14 Improvement was delineated.
2. A HydroCAD model of the CD 14 watershed was developed to estimate change in peak flow rates at the outlet of CD 14. HydroCAD is a computer model that computes the runoff storm hydrograph using methodology developed by the NRCS. The change in peak flow rates because of the Improvement were calculated as shown in Table 6.

Table 6: Calculation of Additional Flow					
Runoff Event	Existing Flow (CFS)	Proposed Flow ½” Design (CFS)	Change in Flow ½” Design (CFS)	Proposed Flow 1/4” Design (CFS)	Change in Flow 1/4” Design (CFS)
2-Year	78.1	152.5	74.4	134.8	56.7
5-Year	123.5	209.5	86	165.8	42.3
10-Year	157.2	247.6	90.4	195.5	38.3
25-Year	209.1	310.5	101.4	242.7	33.6
50-Year	467.0	389.4	-77.6	296.1	-170.9
100-Year	905.2	814.1	-91.1	371.6	-533.6

3. Resultant flow rates were used to estimate the “before project” and “after project” depths of flow in the unnamed stream using Manning’s equation for open channel flow assuming normal depth flow.

Table 7: Impact to the Unnamed Stream					
Flood Frequency	Existing Depth	Proposed Depth ½” Design	Depth Increase ½” Design (ft)	Proposed Depth 1/4” Design	Depth Increase 1/4” Design (ft)
2-Year	2.1	3.1	1	2.9	0.8
5-Year	2.8	3.7	0.9	3.3	0.5
10-Year	3.2	4.1	0.9	3.6	0.4
25-Year	3.7	5.3	1.6	4.0	0.3
50-Year	5.8	5.6	-0.2	4.5	-1.3
100-Year	8.1	7.6	-0.5	5.6	-2.5

As can be seen from Table 6, construction of the Improvement for all design scenarios will increase flows to the existing unnamed stream for the 2-Year through 25-Year events because of the larger pipe outlet, but will reduce the peak flow rate for the 50-Year and greater events because the larger tile will transport runoff through the tile rather than overland.

Table 7 presents peak ditch flow rates and depth of flow before and after construction of the Improvement for all the design scenarios. Again, construction of the Improvement will the flow depth in the unnamed stream for the 2-Year through 25-Year events but will reduce the flow depth for the 50-Year and greater events.

The Improvement will reduce the peak flow rates and peak depths in the unnamed stream for large storm events. These velocities in the unnamed stream for the large events will also be reduced. It should be noted that all the existing and proposed events are contained within the unnamed stream. It is therefore our opinion that the outlet is adequate for the proposed Improvement.

IX. ESTIMATE OF COST

The preliminary cost estimate to construct the proposed Improvement, is described in this report is shown in Exhibit 3. The total estimated cost for the ½” per day design 1a with the single main outlet is \$3,688,637, and for the ½” per day design with two outlets is \$2,684,077. The total estimated cost for the ¼” per day design with storage is \$2,888,087. If Lyon County were to allow the open cut of the CSAH 7 roadway, each of the estimated project costs could be reduced by approximately \$25,000.

Included in the first two estimates are the approximate 32 acres of agricultural land which will be temporarily taken out of production by construction. Included in the third estimate is the approximate 42 acres of agricultural land which will be temporarily taken out of production by construction, and 59 acres of land that would be obtained as a flood easement over the existing flooded areas. The individual landowners will be compensated for this loss through the damage process of further ditch proceedings.

X. RECOMMENDATIONS

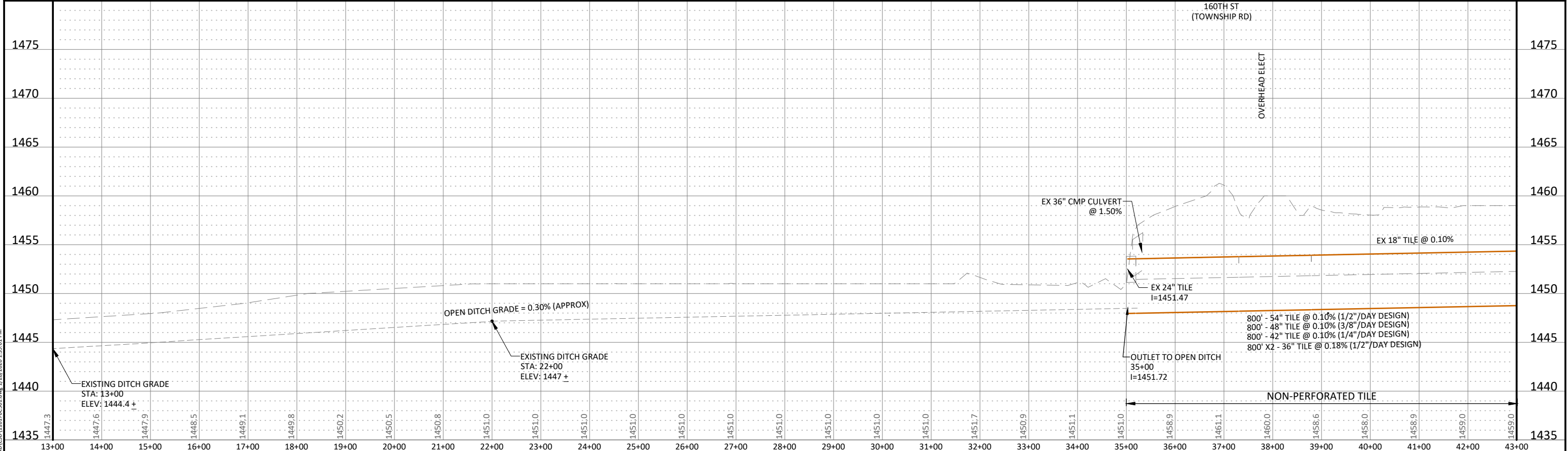
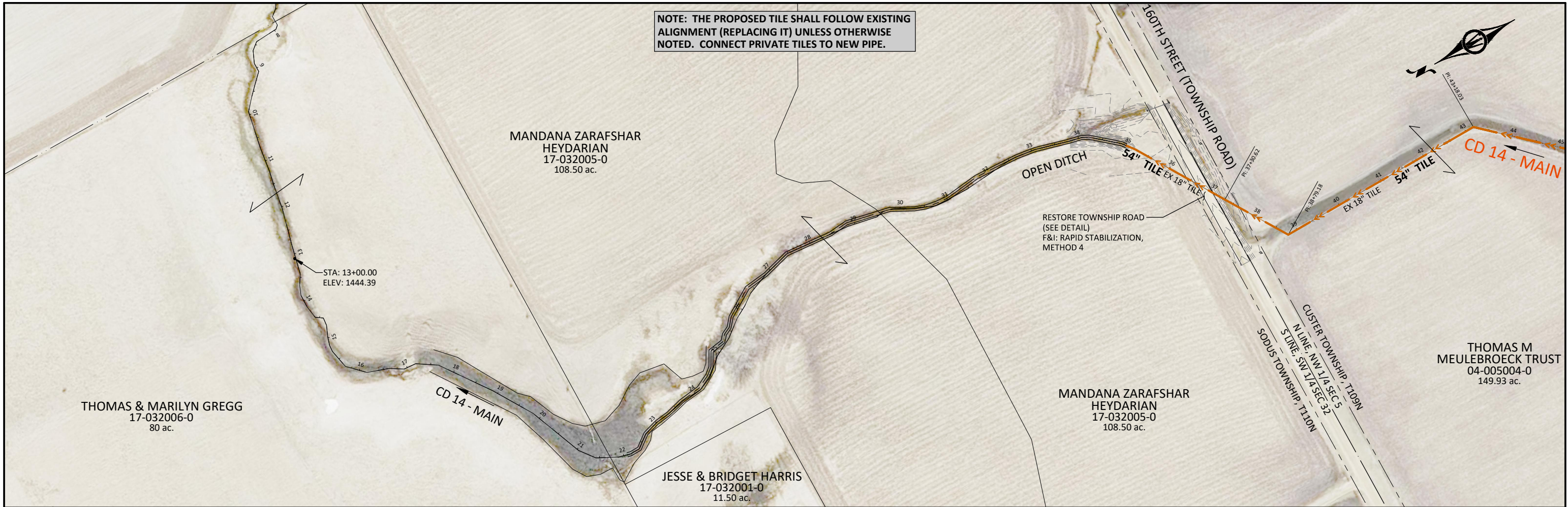
The proposed Improvement of CD 14 in Lyon County, as described in this report, is feasible, practical and necessary to provide drainage for the cultivation of crops within the watershed area. The existing tile system is inadequate to provide proper drainage for current agricultural practices. The outlet is adequate to convey the discharge.

It is our recommendation to proceed with the ½” per day dual outlet design but allow us to monitor pipe prices in case the single outlet option becomes economically viable.

It is the recommendation of your engineer that the Final Engineer’s Report be approved and that if there are adequate benefits, the Drainage Authority order the Improvement.

Exhibit 1: Preliminary Plans and Profiles

NOTE: THE PROPOSED TILE SHALL FOLLOW EXISTING ALIGNMENT (REPLACING IT) UNLESS OTHERWISE NOTED. CONNECT PRIVATE TILES TO NEW PIPE.



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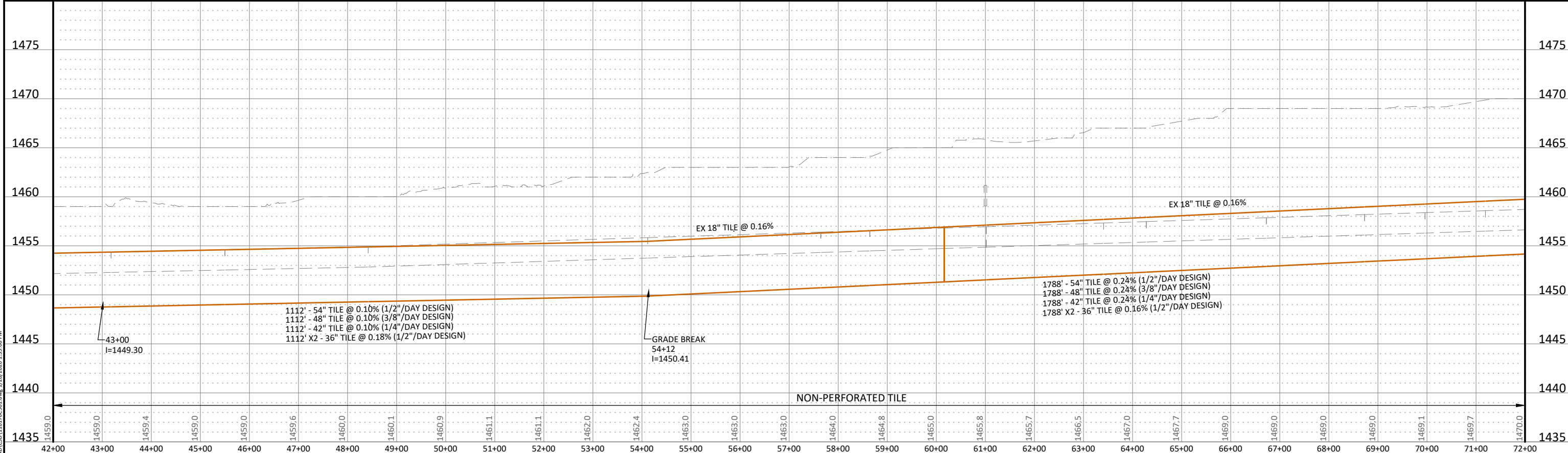
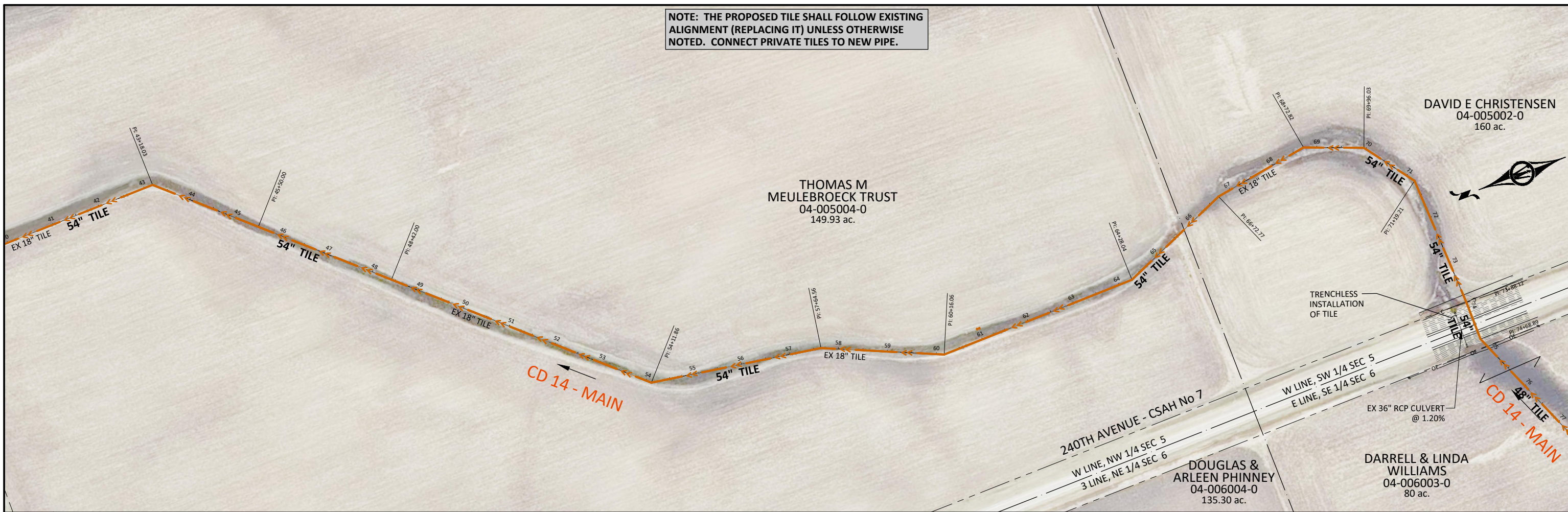
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Email: SleepyEye@bolton-menk.com
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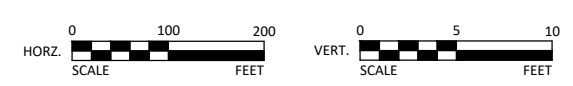
LYON COUNTY, MINNESOTA
COUNTY DITCH No. 14 - MAIN, BR 1, BR 1A & BR2 IMPROVEMENTS
STORM PLAN & PROFILE - COUNTY DITCH NO. 14 - MAIN
STA 1+00 - STA 31+00

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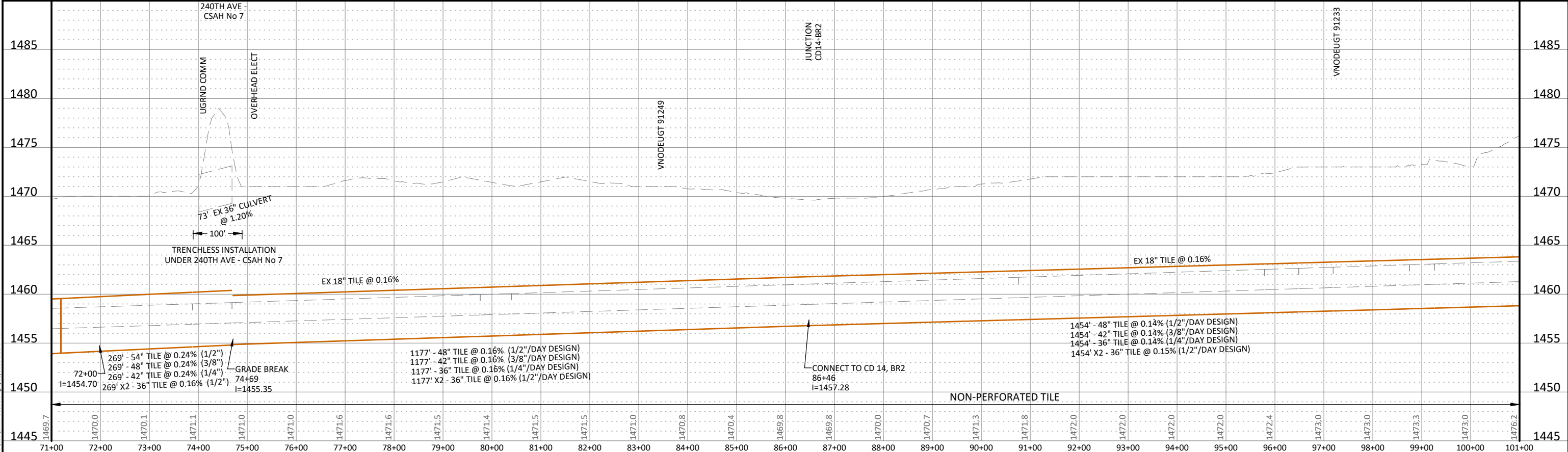
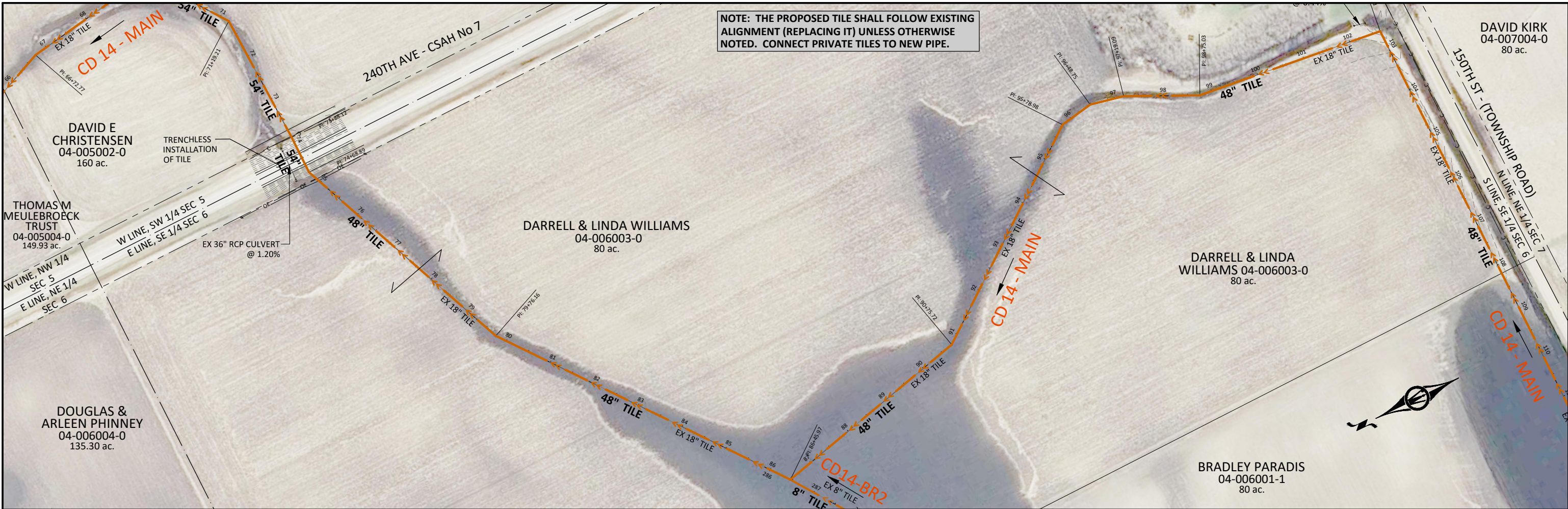
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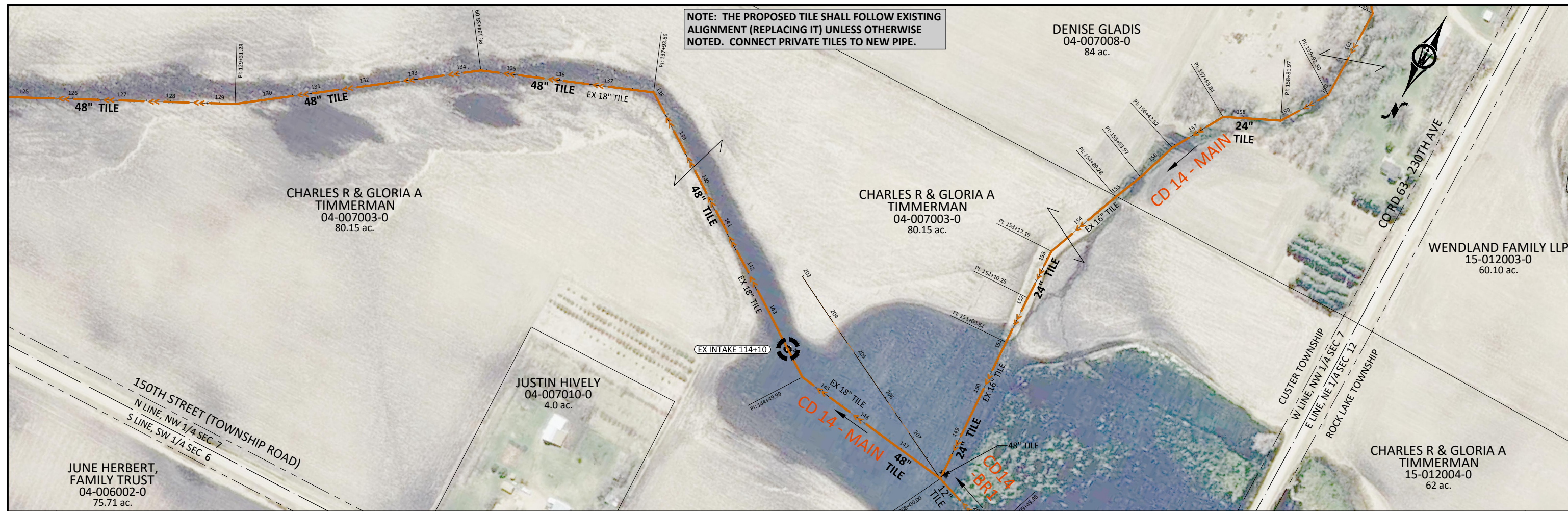


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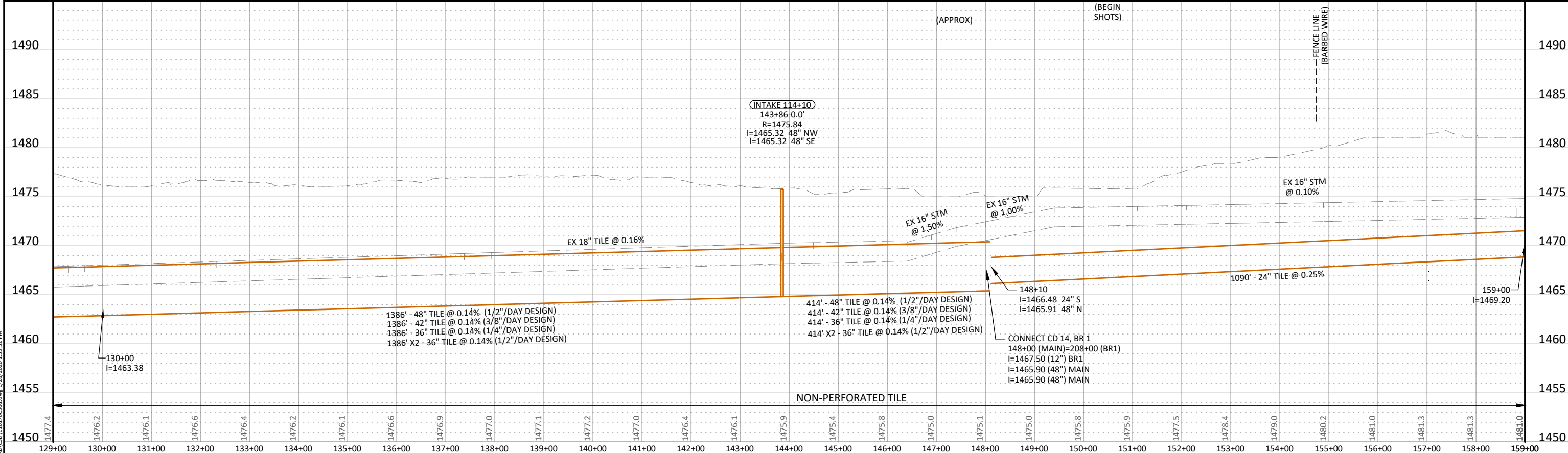
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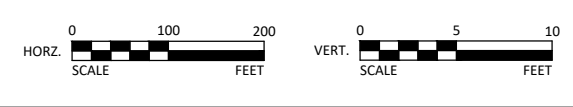
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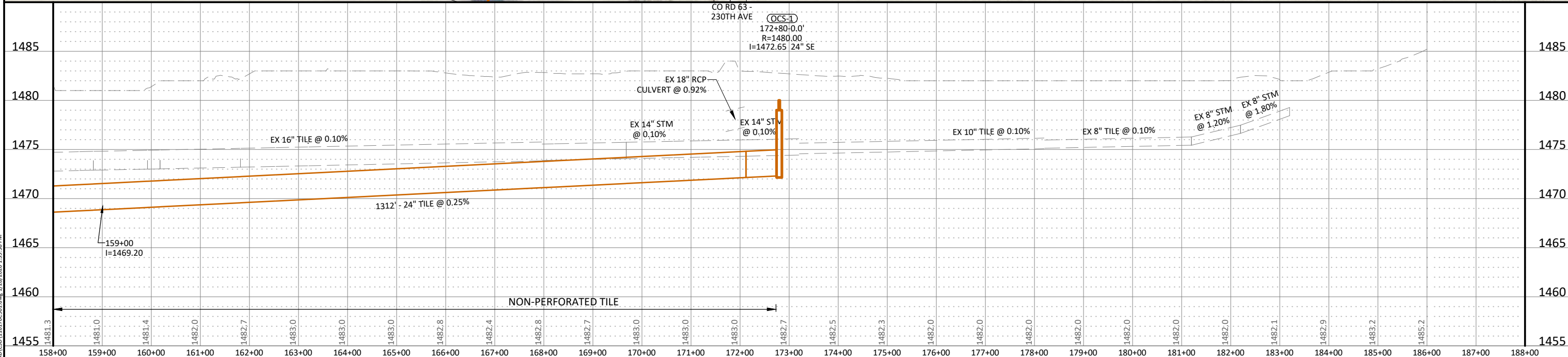
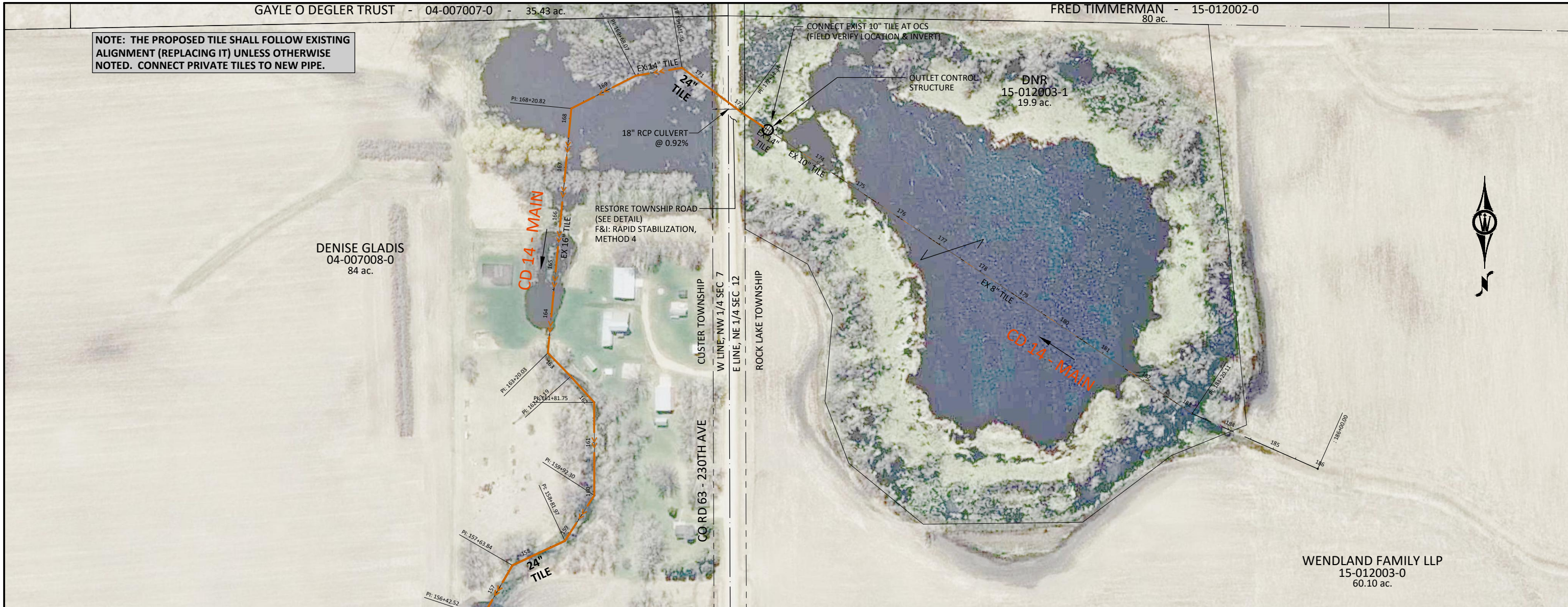
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DENISE GLADIS
04-007008-0
84 ac.

DNR
15-012003-1
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WENDLAND FAMILY LLP
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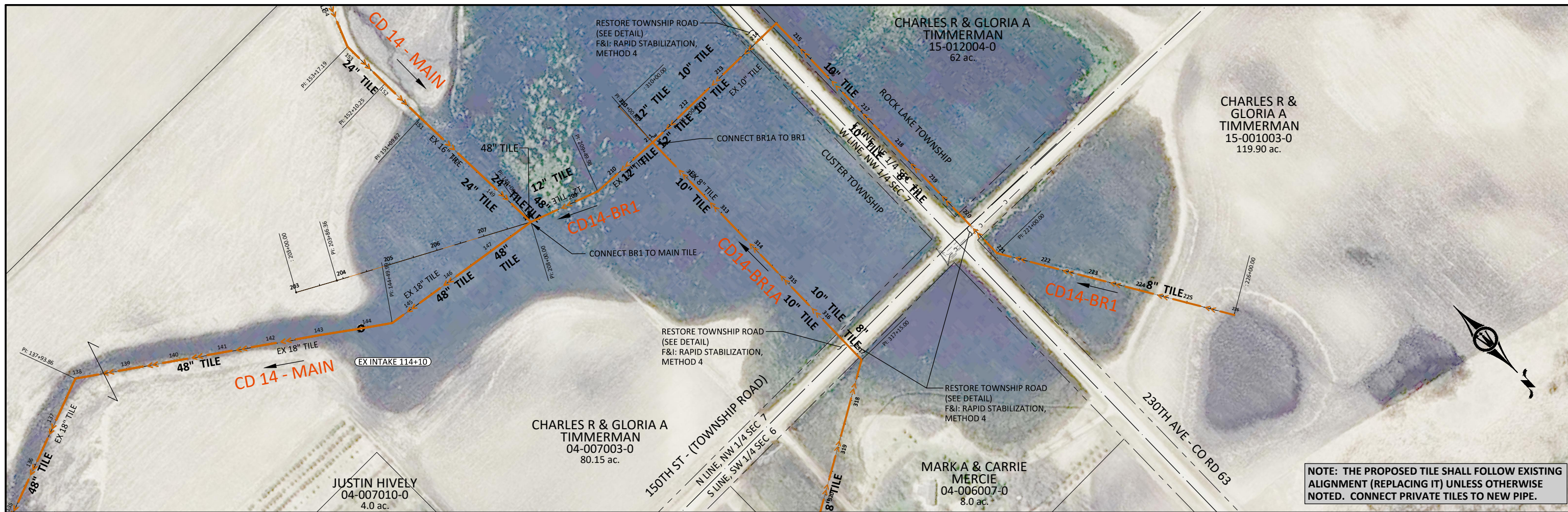


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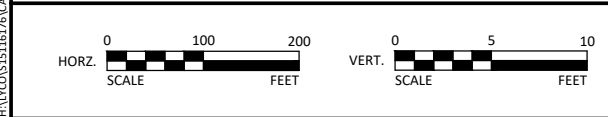
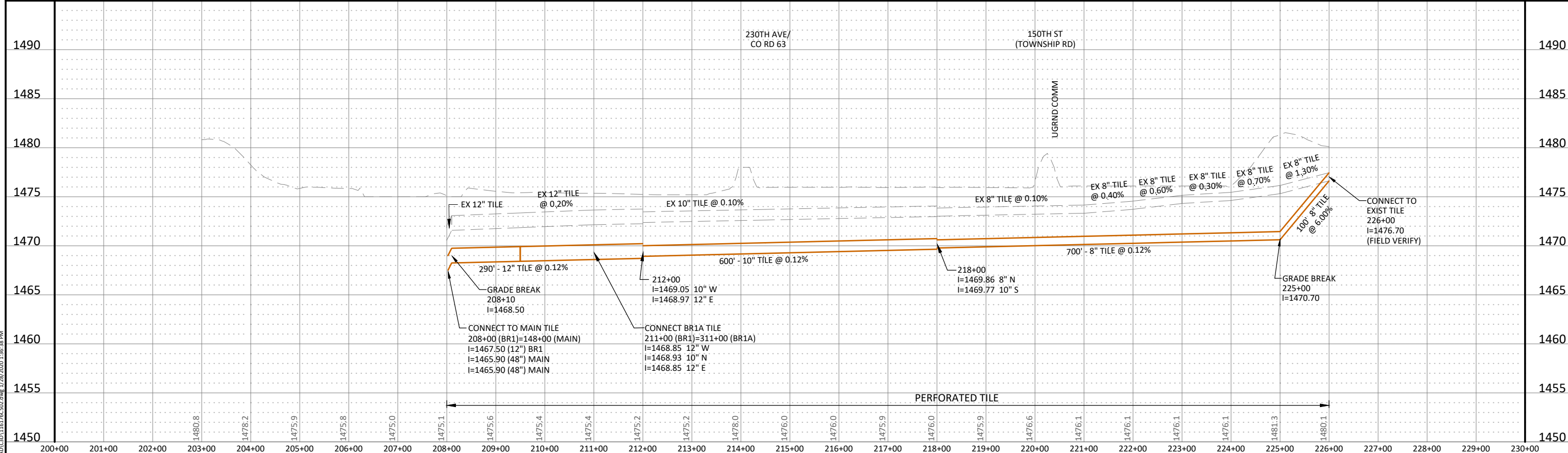
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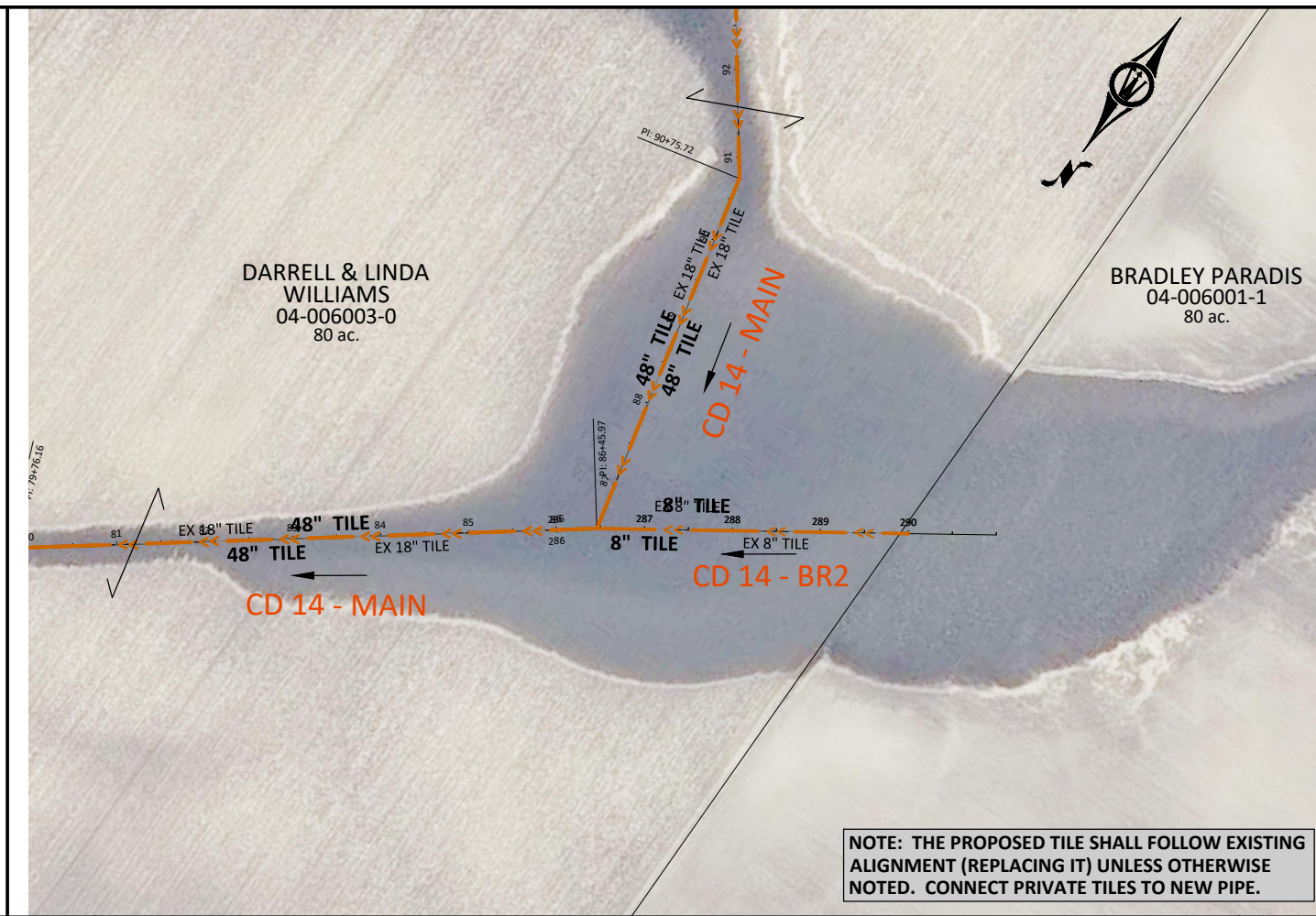
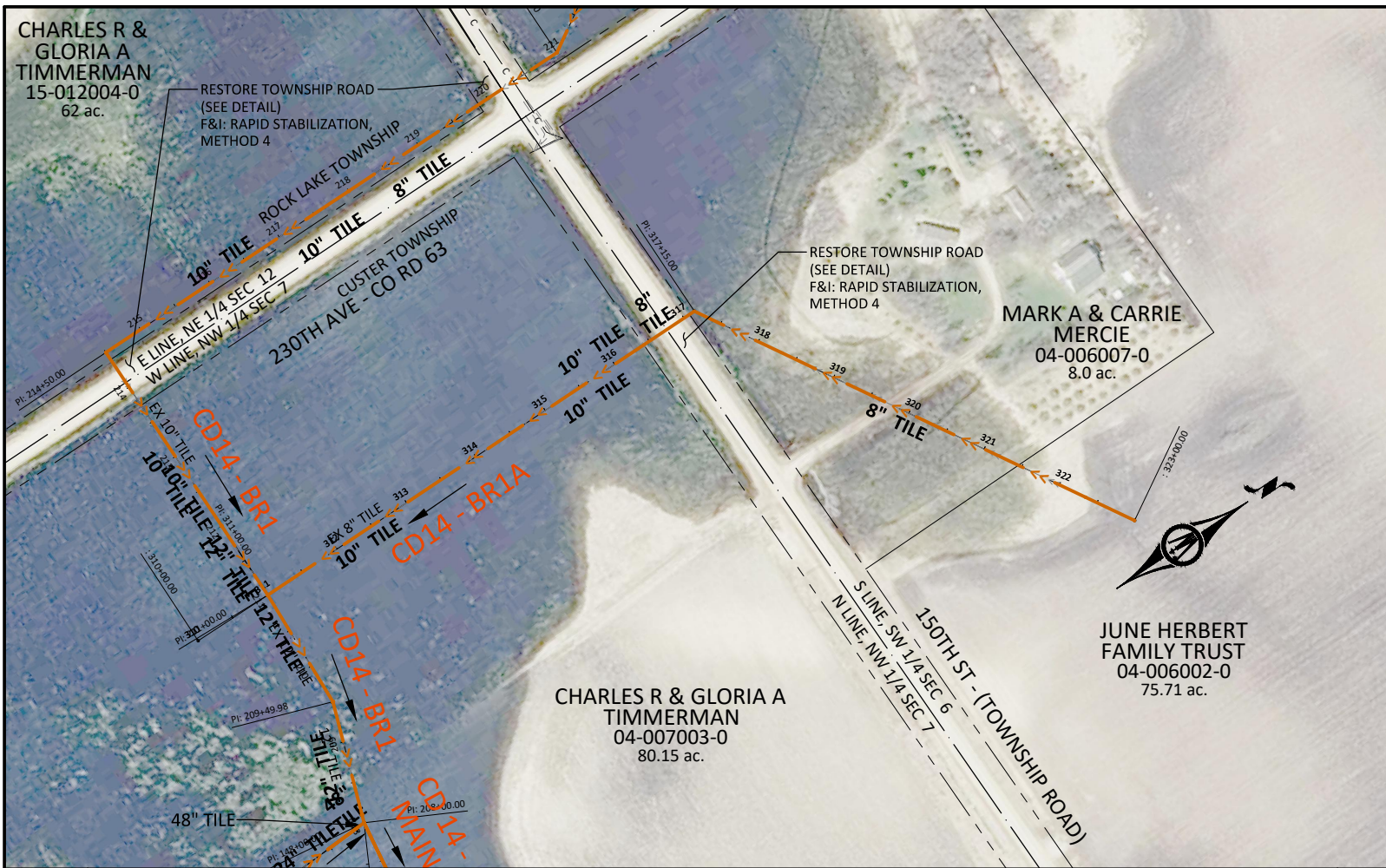


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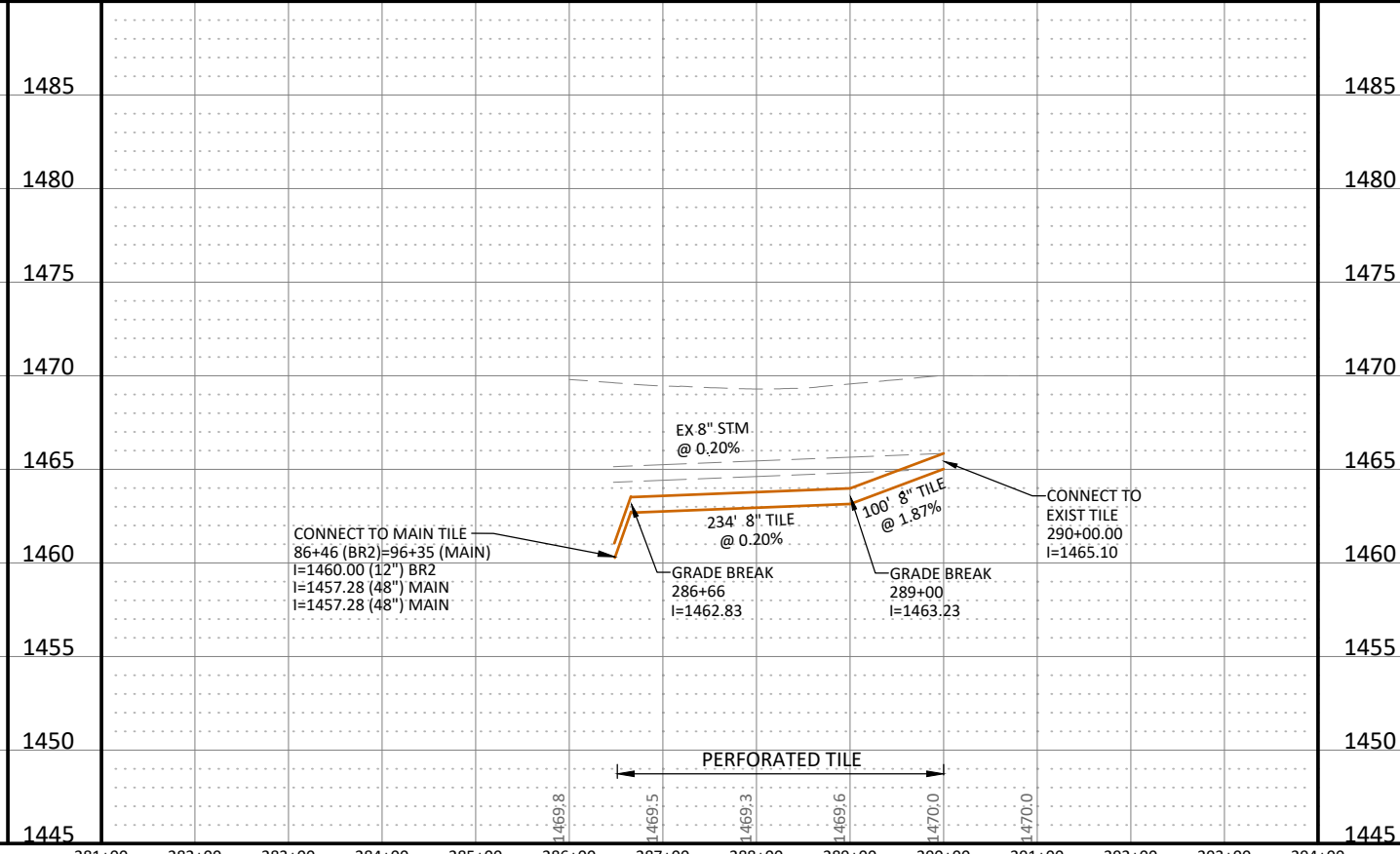
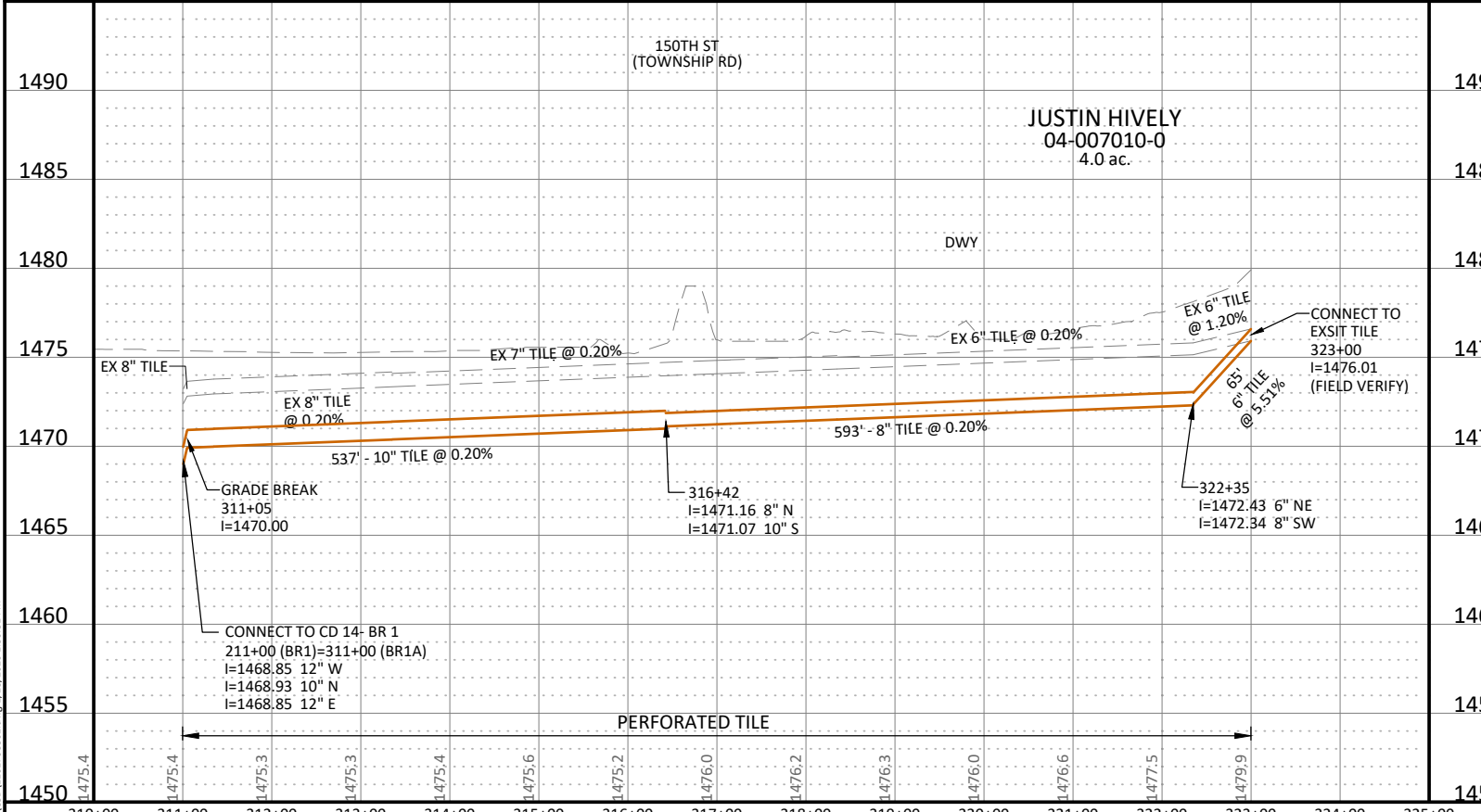
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CLIENT PROJ. NO.	515.116176

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BR 1A STA 309+00 - STA 225+00

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BR 1A STA 190+00 - STA 204+00 / BR 2 STA 282+00 - STA 294+00

SHEET
C5.08

Exhibit 2: Petition for CD 14 Improvement



RINKE NOONAN
attorneys at law

February 19, 2018

Direct Dial: 320-656-3503
Jkolb@RinkeNoonan.com

Mr. E.J. Moberg
Lyon County Auditor/Treasurer
607 West Main Street
Marshall, MN 56258

**Re: Petition for Improvement and Separable Maintenance Request –
Lyon County Ditch 14
Our File No. 26802-0001**

Dear Mr. Moberg:

Enclosed for filing is a Petition for Improvement and Separable Maintenance Request by Charles and Gloria Timmerman regarding Lyon County Ditch 14. Also enclosed is a copy of the required bond in the amount of \$10,000. Please let me know when the Petition will be presented to the County Board.

If you have any questions, please do not hesitate to contact me.

Sincerely,

John C. Kolb
JCK/cmt

Enclosures

cc: Charles and Gloria Timmerman (w/encls.)

STATE OF MINNESOTA

LYON COUNTY BOARD OF COMMISSIONERS, DRAINAGE AUTHORITY FOR LYON COUNTY
DITCH 14

In the matter of the Improvement of Lyon
County Ditch 14

Petition for Improvement and Separable
Maintenance Request

For their petition for the improvement of Lyon County Ditch 14 (hereinafter "CD 14"), the undersigned Petitioners state and allege the following:

1. Petitioners file this petition for improvement of portions of CD 14 pursuant to statutes section 103E.215.
2. CD 14 provides beneficial drainage to agricultural properties and Township and County roads in Section 5, 6, 7, 8, 17, 18 and 20 of Custer Township (Township 109 N, Range 41 W); Section 32 of Sodus Township (Township 110 N, Range 41 W); and Sections 1, 12 and 13 of Rock Lake Township (Township 109 N, Range 42 W) of Lyon County, Minnesota.
3. CD 14 is in need of repair. CD 14 has remained in service since its original establishment in 1914 and construction in 1915-1916. The original ditch consisted of the Main and three branches. A petition was filed in 1916 to extend the outlet which was constructed in 1917. A redetermination of benefits was later conducted in 1985.
4. Being over 100 years old, the tile is experiencing more frequent failure and is at the end of its useful life.
5. Even in a repaired state, CD 14 is inadequate to support beneficial drainage for current farming and drainage practices. CD 14 has insufficient capacity and needs enlarging to

furnish sufficient capacity. CD 14 does not meet current design criteria: the original construction of CD 14 was not deep enough to accommodate adequate drainage to much of the watershed it was intended to serve; new drainage and farming practices in the watershed of the ditch create further need for increased tile capacity; and shallow installation depth must be corrected to reduce frequency of repair to accommodate current farming implements.

6. The proposed improvements include: lowering the depth of the improved portions of the drainage system to accommodate current farming practices, tile outlets and improve drainage efficiency; increasing the size of existing tile segments to accommodate improved flow; and construction of new surface intakes where necessary to provide improved, buffered and stabilized inlets and to prevent erosion of soil into the system.
7. The course of the proposed improvement is described as follows:
 - a. **Branch 1:** from its junction with the Main in the center of the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of §7, T109N, R41W to its terminus in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of §1, T109N, R44W.
 - b. **Fork 1, Branch 1 (aka Branch 1A):** from its junction with the Branch 1 in the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of §7, T109N, R41W to the north line of the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of §7, T109N, R41W (south of the 151st St. Right of Way).
 - c. **Branch 2:** from its junction with the Main in the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of §6, T109N, R41W to its terminus in the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of §6, T109N, R41W.
 - d. **Main:** from the outlet in the SE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of §32, T110N, R41W to the south line of the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of §7, T109N, R41W.

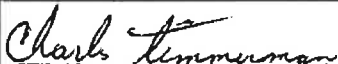

8. The improvement passes over 12 40-acre parcels under the following ownership (listed from downstream to upstream along the course of the proposed improvement):

	Owner	Address	Description	Sec	Twp	Rg
1	Mandana Z. Heydarian	1369 Lancia Dr. McLean VA 22102	SE 1/4 SW 1/4	32	110N	41W
2	Thomas M. and James F. Meulebroeck	108 Donita Avenue Marshall, MN 56258	NW 1/4 NW 1/4	5	109N	41W
3	Thomas M. and James F. Meulebroeck	108 Donita Avenue Marshall, MN 56258	SW 1/4 NW 1/4	5	109N	41W
4	David E. Christensen	6600 Lyndale Ave. S. Unit 1401 Richfield MN 55423	NW 1/4 SW 1/4	5	109	41
5	Darrell A. and Linda Williams	2392 – 150 th Street Balaton, MN 56115	NE 1/4 SE 1/4	6	109N	41W
6	Darrell A. and Linda Williams	2392 – 150 th Street Balaton, MN 56115	SE 1/4 SE 1/4	6	109N	41W
7	Bradley and D'ann Paradis	1731 – 260 th Avenue Tracy, MN 56175-2137	SW 1/4 SE 1/4	6	109N	41W
8	David Kirk	1534 County Road 5 Balaton, MN 56115	NW 1/4 NE 1/4	7	109N	41W
9	Charles A. and Gloria A. Timmerman	2271 – 150 th Street Balaton, MN 56115	NE 1/4 NW 1/4	7	109N	41W
10	Charles A. and Gloria A. Timmerman	2271 – 150 th Street Balaton, MN 56115	NW 1/4 NW 1/4	7	109N	41W
11	Charles A. and Gloria A. Timmerman	2271 – 150 th Street Balaton, MN 56115	NE 1/4 NE 1/4	12	109N	42W
12	Charles A. and Gloria A. Timmerman	2271 – 150 th Street Balaton, MN 56115	SE 1/4 SE 1/4	1	109N	42W

9. A diagram of the proposed improvement, showing the general location of the proposed improvement and the owners of properties crossed by the improvement, is attached as **Exhibit A**. Parcels numbered in the exhibit correspond to the parcels listed in the table above.
10. Petitioners are the owners of 4 of the 12 40-acre parcels that the proposed improvement passes over and, as such, represent more than 26 percent of the owners of property that the proposed improvement passes over as required by statutes section 103E.215.

11. Because CD 14 is in need of repair, Petitioners request, to the extent practicable, that the Drainage Authority consider, under statutes section 103E.215, subd. 6, the separable maintenance portion of the work when determining benefits and assessing costs of the improvement.
12. Property in section 32 of Sodus Township is included in this petition to leave open the possibility of improvement or stabilization of the outlet of CD 14.
13. The improvement of CD 14 will be of public utility and promote public health.
14. Accompanying this Petition is the Petitioners' initial bond in the amount of \$10,000. Petitioners acknowledge and agree that additional bonds may be required as additional costs are incurred in the improvement proceedings. Petitioners agree to pay all costs and expenses that may be incurred if the improvement proceedings are dismissed.
15. Petitioners have hired Rinke Noonan to represent them in the improvement proceedings and request the legal costs of Petitioners' attorney be paid from the bond and/or the project as provided in statutes section 103E.645.
16. Petitioners request the appointment of an engineer to examine the drainage system and make an improvement report. Petitioners recommend appointment of William Helget, P.E. of the firm Bolton and Menk, Inc., as an engineer and firm familiar with drainage systems in Lyon County and competent to perform engineering duties in a drainage system improvement proceeding.
17. This Petition may be signed in counterparts.

Respectfully submitted by:

Owner Signature	Property Owned	Sec	Twp	Rg	Mailing Address	Dated
 Charles A. Timmerman	NW 1/4 NW 1/4 NE 1/4 NW 1/4	7 7	109 109	41 41	2271 - 150 th Street Balaton, MN 56115	<u>1-16-18</u>
 Gloria A. Timmerman	SE 1/4 SE 1/4 NE 1/4 NE 1/4	1 12	109 109	42 42		<u>1-16-18</u>

Petition for Improvement of Lyon CD 14

Sect 32-118-41

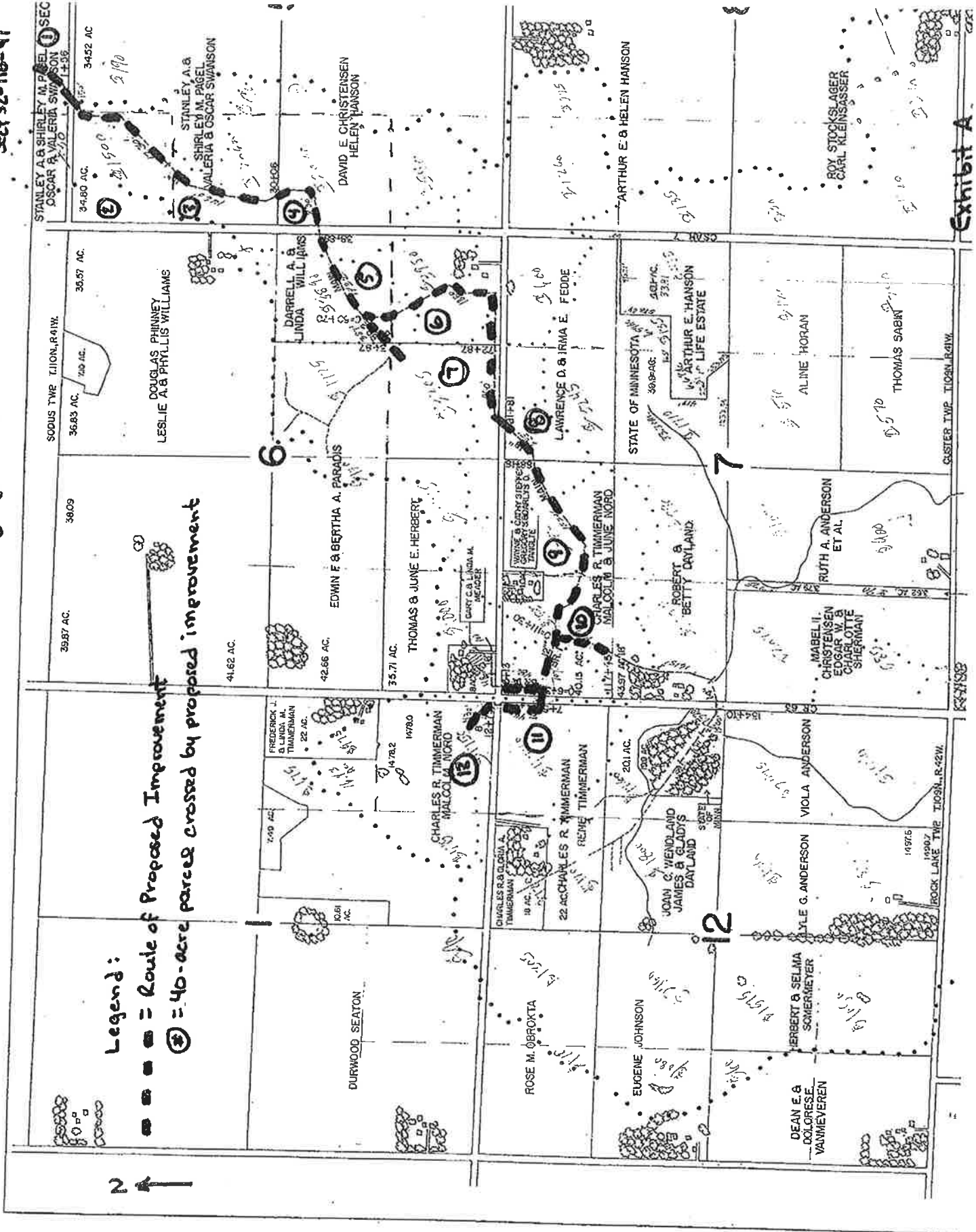


Exhibit A

Exhibit 3: Preliminary Cost Estimate

ENGINEER'S ESTIMATE - 0.5"/DAY SINGLE PIPE OPTION

IMPROVEMENT OF COUNTY DITCH 14
LYON COUNTY
BMI PROJECT NO. S15.116176



Real People. Real Solutions.

Date: 7/20/2021

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total Amount
BASE BID					
1	Mobilization & Traffic Control	1	LUMP SUM	\$115,000.00	\$115,000.00
2	Exploratory Excavation	60	HOUR	\$200.00	\$12,000.00
3	Aggregate Base, Class 5	125	TON	\$25.00	\$3,125.00
4	Ditch Cleanout	14	STATION	\$250.00	\$3,500.00
5	6" Drain Tile	400	EACH	\$12.00	\$4,800.00
6	8" Drain Tile	2200	EACH	\$14.00	\$30,800.00
7	10" Drain Tile	1200	EACH	\$16.00	\$19,200.00
8	12" Drain Tile	400	EACH	\$18.00	\$7,200.00
9	24" Drain Tile	2470	LIN FT	\$30.00	\$74,100.00
10	48" Drain Tile	7340	LIN FT	\$175.00	\$1,284,500.00
11	Jack & Auger 54" RC Pipe	100	LIN FT	\$1,000.00	\$100,000.00
12	54" Tile	3870	LIN FT	\$200.00	\$774,000.00
13	54" Pipe Apron	1	EACH	\$2,500.00	\$2,500.00
15	Drain Tile Connections	40	EACH	\$500.00	\$20,000.00
17	8" Tile Inlet	10	EACH	\$800.00	\$15,750.00
18	12" Tile Inlet	15	EACH	\$1,000.00	\$18,000.00
19	Outlet Control Structure	1	LIN FT	\$10,000.00	\$10,000.00
20	Stabilized Construction Exit	1	EACH	\$1,000.00	\$1,000.00
21	Rapid Stabilization, Method 4	500	SQ YD	\$3.00	\$1,500.00
22	Random Riprap, Class III	80	TON	\$60.00	\$4,800.00
23	Ditch Check, Type Rock	1.00	EACH	\$350.00	\$350.00
24	Storm Drain Inlet Protection	25	EACH	\$150.00	\$3,750.00
25	Mulch, Type 1	64	TON	\$200.00	\$12,800.00
SUBTOTAL ESTIMATED CONSTRUCTION BID ITEMS:					\$2,518,675.00
	Temporary Right-of-Way	42.02	ACRE	\$600.00	\$25,212.00
SUBTOTAL:					\$2,543,887.00
CONTINGENCY:					\$508,780.00
TOTAL ESTIMATED CONSTRUCTION COST:					\$3,052,667.00
DESIGN, ADMINISTRATION AND CONSTRUCTION ENGINEERING:					\$635,970.00
TOTAL ESTIMATED PROJECT COST:					\$3,688,637.00

ENGINEER'S ESTIMATE- 0.5"/DAY DUAL PIPE OPTION

IMPROVEMENT OF COUNTY DITCH 14
 LYON COUNTY
 BMI PROJECT NO. S15.116176



Real People. Real Solutions.

Date: 7/20/2021

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total Amount
BASE BID					
1	Mobilization & Traffic Control	1	LUMP SUM	\$80,000.00	\$80,000.00
2	Exploratory Excavation	60	HOUR	\$200.00	\$12,000.00
3	Aggregate Base, Class 5	125	TON	\$25.00	\$3,125.00
4	Ditch Cleanout	14	STATION	\$250.00	\$3,500.00
5	6" Drain Tile	400	EACH	\$12.00	\$4,800.00
6	8" Drain Tile	2200	EACH	\$14.00	\$30,800.00
7	10" Drain Tile	1200	EACH	\$16.00	\$19,200.00
8	12" Drain Tile	400	EACH	\$18.00	\$7,200.00
9	24" Drain Tile	2470	LIN FT	\$30.00	\$74,100.00
10	36" Drain Tile	23000	LIN FT	\$60.00	\$1,380,000.00
11	36" Drain Tile - Trenchless Installation	200	LIN FT	\$500.00	\$100,000.00
12	42" CMP	40	LIN FT	\$80.00	\$3,200.00
13	Drain Tile Connections	40	EACH	\$500.00	\$20,000.00
14	Dual Main Cross Connections	10	EACH	\$2,000.00	\$20,000.00
15	8" Tile Inlet	10	EACH	\$800.00	\$15,750.00
16	12" Tile Inlet	15	EACH	\$1,000.00	\$18,000.00
17	Outlet Control Structure	1	LIN FT	\$10,000.00	\$10,000.00
18	Stabilized Construction Exit	1	EACH	\$1,000.00	\$1,000.00
19	Rapid Stabilization, Method 4	500	SQ YD	\$3.00	\$1,500.00
20	Random Riprap, Class III	80	TON	\$60.00	\$4,800.00
21	Ditch Check, Type Rock	1.00	EACH	\$350.00	\$350.00
22	Storm Drain Inlet Protection	25	EACH	\$150.00	\$3,750.00
23	Mulch, Type 1	64	TON	\$200.00	\$12,800.00
SUBTOTAL ESTIMATED CONSTRUCTION BID ITEMS:					\$1,825,875.00
	Temporary Right-of-Way	42.02	ACRE	\$600.00	\$25,212.00
SUBTOTAL:					\$1,851,087.00
CONTINGENCY:					\$370,220.00
TOTAL ESTIMATED CONSTRUCTION COST:					\$2,221,307.00
DESIGN, ADMINISTRATION AND CONSTRUCTION ENGINEERING:					\$462,770.00
TOTAL ESTIMATED PROJECT COST:					\$2,684,077.00

ENGINEER'S ESTIMATE- 0.25"/DAY WITH STORAGE

IMPROVEMENT OF COUNTY DITCH 14
LYON COUNTY
BMI PROJECT NO. S15.116176

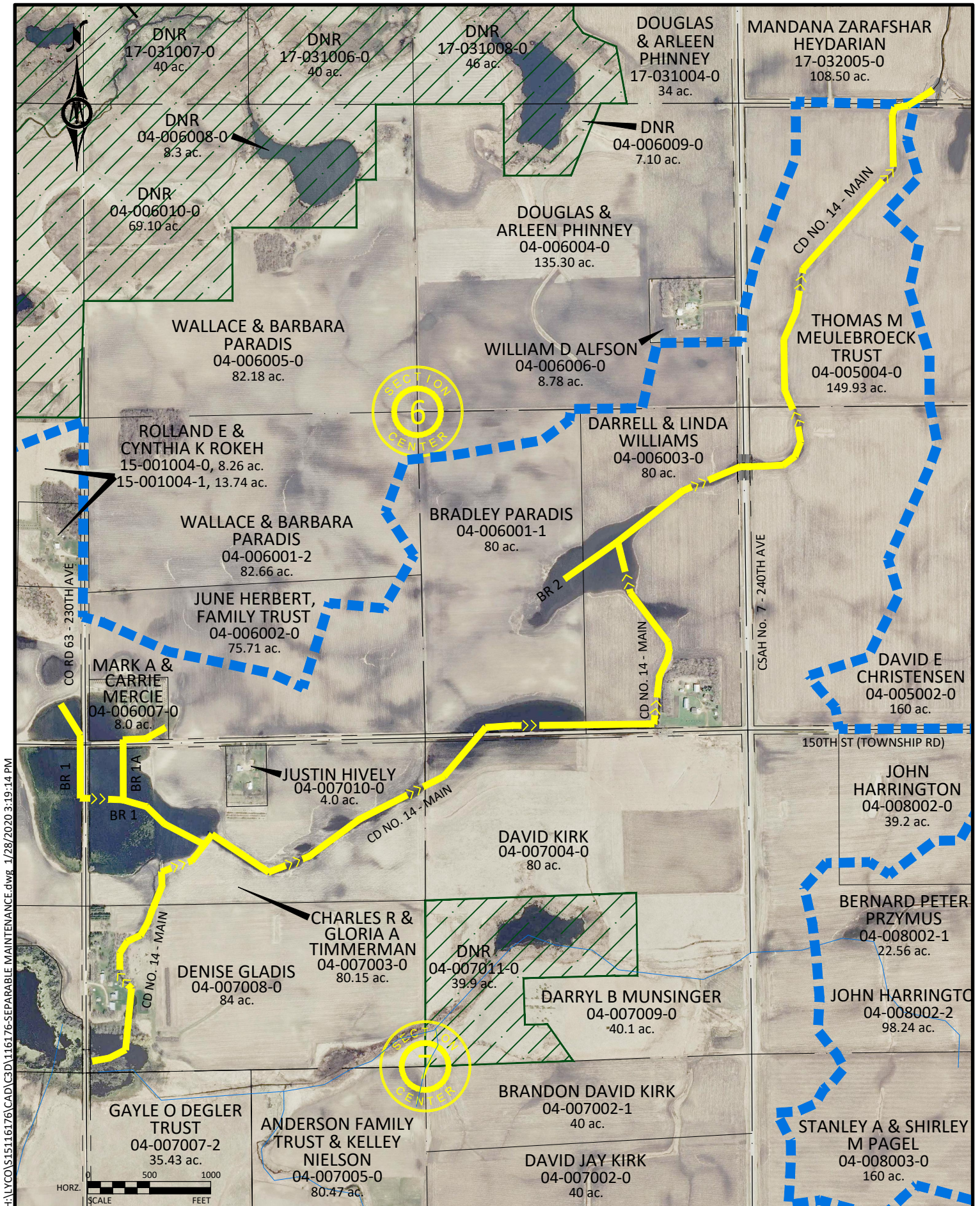


Real People. Real Solutions.

Date: 7/20/2021

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total Amount
BASE BID					
1	Mobilization & Traffic Control	1	LUMP SUM	\$80,000.00	\$80,000.00
2	Exploratory Excavation	60	HOUR	\$200.00	\$12,000.00
3	Aggregate Base, Class 5	125	TON	\$25.00	\$3,125.00
4	Ditch Cleanout	14	STATION	\$250.00	\$3,500.00
5	Common Embankment	8350	CU YD	\$10.00	\$83,500.00
6	6" Drain Tile	400	EACH	\$12.00	\$4,800.00
7	8" Drain Tile	2200	EACH	\$14.00	\$30,800.00
8	10" Drain Tile	400	EACH	\$16.00	\$6,400.00
9	24" Drain Tile	2170	LIN FT	\$30.00	\$65,100.00
10	36" Drain Tile	7140	LIN FT	\$60.00	\$428,400.00
11	Jack & Auger 42" RC Pipe	100	LIN FT	\$800.00	\$80,000.00
12	42" Drain Tile	3870	LIN FT	\$150.00	\$580,500.00
13	42" RC Pipe Apron	1	EACH	\$1,500.00	\$1,500.00
14	Drain Tile Connections	40	EACH	\$500.00	\$20,000.00
15	8" Tile Inlet	10	EACH	\$800.00	\$15,750.00
16	12" Tile Inlet	15	EACH	\$1,000.00	\$18,000.00
17	Outlet Control Structure	2	LIN FT	\$10,000.00	\$20,000.00
18	Stabilized Construction Exit	1	EACH	\$1,000.00	\$1,000.00
19	Rapid Stabilization, Method 4	500	SQ YD	\$3.00	\$1,500.00
20	Random Riprap, Class III	120	TON	\$60.00	\$7,200.00
21	Ditch Check, Type Rock	1.00	EACH	\$350.00	\$350.00
22	Storm Drain Inlet Protection	25	EACH	\$150.00	\$3,750.00
23	Mulch, Type 1	100	TON	\$200.00	\$20,000.00
SUBTOTAL ESTIMATED CONSTRUCTION BID ITEMS:					\$1,487,175.00
	Temporary Right-of-Way	42.02	ACRE	\$600.00	\$25,212.00
	Permanent Flood Easement	59	ACRE	\$7,000.00	\$413,000.00
SUBTOTAL:					\$1,925,387.00
CONTINGENCY:					\$385,080.00
TOTAL ESTIMATED CONSTRUCTION COST:					\$2,310,467.00
DESIGN, ADMINISTRATION AND CONSTRUCTION ENGINEERING:					\$577,620.00
TOTAL ESTIMATED PROJECT COST:					\$2,888,087.00

Exhibit 4: Separable Maintenance



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SEPARABLE MAINTENANCE ESTIMATE

IMPROVEMENT OF COUNTY DITCH 14
 LYON COUNTY
 BMI PROJECT NO. S15.116176



Real People. Real Solutions.

Date: 7/20/2021

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total Amount
BASE BID					
1	Mobilization & Traffic Control	1	LUMP SUM	\$60,000.00	\$60,000.00
2	Exploratory Excavation	60	HOUR	\$200.00	\$12,000.00
3	Aggregate Surfacing, Class 5	125	STATION	\$200.00	\$25,000.00
4	Ditch Cleaning	14	LIN FT	\$15.00	\$210.00
5	6" Drain Tile	1080	LIN FT	\$8.00	\$8,640.00
6	8" Drain Tile	2200	LIN FT	\$10.00	\$22,000.00
7	10" Drain Tile	600	LIN FT	\$12.00	\$7,200.00
8	12" Drain Tile	400	LIN FT	\$16.00	\$6,400.00
9	15" Drain Tile	200	LIN FT	\$20.00	\$4,000.00
10	18" Drain Tile	13400	LIN FT	\$25.00	\$335,000.00
11	18" Drain Tile - Trenchless Installation	100	LIN FT	\$30.00	\$3,000.00
12	24" CMP Pipe	20	LIN FT	\$40.00	\$800.00
13	Drain Tile Connections	40	EACH	\$500.00	\$20,000.00
14	8" Tile Inlet	10	EACH	\$800.00	\$8,000.00
15	12" Tile Inlet	15	EACH	\$1,000.00	\$15,000.00
16	Outlet Control Structure	1	LUMP SUM	\$5,000.00	\$5,000.00
17	Stabilized Construction Exit	1	LUMP SUM	\$1,000.00	\$1,000.00
18	Rapid Stabilization, Method 4	500	SQ YD	\$3.00	\$1,500.00
19	Random Riprap, Class III	80	TON	\$60.00	\$4,800.00
20	Ditch Check, Type Rock	1	EACH	\$350.00	\$350.00
21	Storm Drain Inlet Protection	25	EACH	\$150.00	\$3,750.00
22	Mulch, Type 1	64	TON	\$200.00	\$12,800.00
SUBTOTAL ESTIMATED CONSTRUCTION BID ITEMS:					\$556,450.00
	Temporary Right-of-Way	42.02	ACRE	\$600.00	\$25,212.00
SUBTOTAL:					\$581,662.00
CONTINGENCY:					\$116,330.00
TOTAL ESTIMATED CONSTRUCTION COST:					\$697,992.00
DESIGN, ADMINISTRATION AND CONSTRUCTION ENGINEERING:					\$349,000.00
TOTAL ESTIMATED PROJECT COST:					\$1,046,992.00

Exhibit 5: Technical Specifications

TECHNICAL SPECIFICATIONS
IMPROVEMENT OF COUNTY DITCH No. 14
LYON COUNTY, MN

02210 - SUBSURFACE INVESTIGATION
02220 - REMOVING PIPE AND MISCELLANEOUS STRUCTURES
02240 - DEWATERING
02320 - TRENCH EXCAVATION, BEDDING AND BACKFILL
02370 - EROSION CONTROL
02625 - AGRICULTURAL DRAIN TILE
02630 - SURFACE WATER INTAKES
02920 - TURF RESTORATION

SECTION 02210 - SUBSURFACE INVESTIGATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to conducting subsurface investigation as shown on the drawings, as specified herein, and/or as specified by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

- 1. No exception to the referenced specification is made.

1.3 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2123 shall apply, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. No exception to the referenced specification is made.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall:
 - 1. Perform underground utility exploration as directed by the Engineer which involves excavation to locate pipelines for location and elevation verification.
 - 2. Other work associated with the Project, as directed by the Engineer.
 - 3. Subsurface investigation shall consist of a rubber-tired backhoe, operator and laborer to find the tile.
- B. Where exploratory excavation is performed in a location that will not be disturbed later, the backfill shall be placed and compacted to the density specified elsewhere in these Specifications for the type of utility located.

****END OF SECTION****

SECTION 02220 - REMOVING PIPE AND MISCELLANEOUS STRUCTURES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the removal of pipe and miscellaneous structures as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. The UNIT PRICE bid for removing miscellaneous structures shall include all costs of labor, materials, equipment and ultimate disposal required to complete the work, as specified.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:
 - 1. Off-site disposal of debris.
 - 2. Fees and permits for the disposal of materials.
 - 3. Removal and disposal of existing tiles which conflict with the construction
 - 4. Bulkheading the ends of existing pipes designated by the Engineer to be abandoned in place.
 - 5. Salvage and reinstall fence (as needed)
 - 6. Protection from damage of structures or other surface improvements that are not to be removed, and subsequent repair and/or replacement if damaged by Contractor operations.

1.3 SPECIFICATIONS REFERENCES

- A. Mn/DOT Specification Section 2104 shall apply to the removal of pipe and miscellaneous structures, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Salvage existing fences where shown on the plans and/or required for the construction of the project, including posts and hardware. Replace when construction is complete, including new posts and wire if needed.

- B. Dispose of all concrete items, rubbish and debris outside of the construction zone. It shall be the Contractor's responsibility to secure all required permits and pay all fees associated with the disposal of the material and to secure the disposal site.
- C. The Contractor shall take full responsibility to protect structures or other surface improvements from damage that are not to be removed. If damage to these facilities occurs due to the construction of the project, the Contractor shall replace or repair them.
- D. Where existing pipes are to be abandoned in place, the exposed pipe ends shall be bulkheaded shut with a watertight non-shrink concrete grout at a thickness of not less than one pipe diameter.

******END OF SECTION******

SECTION 02240 - DEWATERING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the dewatering of trenches as necessary to construct the elements shown on the drawings or as specified herein.
- B. This item shall be considered exempt from the requirements of Supplementary Condition 11.03.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. No dewatering payment will be made for dewatering for the construction.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for other associated improvements, as indicated. Such items of work include but are not limited to:
 - 1. The costs of furnishing discharge pumps, rock, piping including bends, and adapters, include in the price bid for tile construction.
 - 2. Protecting existing improvements from damage, include in the price bid for tile construction.
 - 3. Digging a portion of the ditch, allowing it to dewater, and returning later to finish the installation, include in the price bid for tile construction.

1.3 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2451.3C shall apply to the dewatering of trenches, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. None

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall furnish and install all necessary discharge piping and obtain all permits, easements, rights-of-way, etc. to convey and discharge the water at a sufficient distance from the project area to eliminate recharge of the ground water at the project site.
- B. Water from dewatering operations shall not be discharged where it will pond or cause damage to cropland or personal property due to the presence of standing or flowing water.

- C. Water shall be discharged into temporary sedimentary basins prior to ultimate discharge into natural streams or waterways.

******END OF SECTION******

SECTION 02320 - TRENCH EXCAVATION, BEDDING AND BACKFILL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to maintenance of utility service, trench excavation, bedding and backfill necessary for the construction of underground utilities and structures, as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

- A. Excess Material - Material that is not needed to complete the earthwork balance.
- B. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.
- C. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Rock Excavation
 - (a) No extra payment will be made for rock excavation.
 - 2. Items specifically identified in the *Schedule of Unit Prices* will be compensated in accordance with the description of measurement and payment contained in the section applicable to the individual item. Otherwise, no direct compensation shall be granted for compliance with the provisions contained herein.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the individual pipeline items associated with the stated specific item or work effort. Such items of work include but are not limited to:
 - 1. Interference with other above and underground structures and utilities.
 - (a) The removal and restoration, or protection of existing structures and utilities that are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.
 - 2. Any dewatering necessary for construction.
 - 3. Foundation materials placed in addition to or in lieu of performing necessary dewatering.
 - 4. Bulkheading of existing pipes to be abandoned in place.
 - 5. Granular foundation, granular bedding and granular encasement materials.
 - 6. Granular foundation materials used in lieu of bedding materials in the specified bedding zone, where specified.
 - 7. Granular foundation materials used in unstable trench conditions.
 - 8. The removal and disposal of native materials that are unsuitable for bedding and/or backfill.

9. Providing and maintaining flow through the existing tiles.
10. The removal of excess materials above the original topography resulting from the additional volume created from pipe and pipe bedding.
11. Delays due to other utility conflicts that result during the course of construction.
12. Protecting existing improvements and previously accepted elements of this construction from damage.
13. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages that threaten to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil that accumulated during the construction.
14. Providing temporary bypass pumping / control of storm water flows around the construction zone, include in the price bid for the associated items being installed.
15. The use of special construction techniques such as trench boxes, sheeting, shoring, etc., include in the price bid for the associated items being installed.
16. Shaping and grading of the construction zone so that surface drainage is restored following the construction.

1.4 SPECIFICATION REFERENCES

- A. Reference CEAM Specification No. 2600 shall apply to excavating, installing bedding, and backfilling all trench excavation construction necessary for the completion of work, except as modified herein.
 1. All references to Mn/DOT specifications shall mean the specific edition, including Supplemental Specifications and Technical Memoranda as identified in Section 01420 of these Specifications.
 2. CEAM Specification 2600.3.A1 Maintenance of Traffic is hereby deleted, See Section 01555 of these Specifications.
 3. CEAM Specification 2600.3.A2 Establishing Line and Grade is modified by Section 01720 of these Specifications.
 4. CEAM Specification 2600.3.A3 Protection of Surface Structures:
 - (a) The last sentence in the third paragraph is deleted.
 5. CEAM Specification 2600.3.A5 Removal of Surface Improvements - All rubble and debris to be disposed of off-site, shall be disposed of at a location secured by the Contractor and in a manner in compliance with applicable Local, State and Federal regulations.
 6. CEAM Specification 2600.3.B3 Excavation Limits and Requirements - OSHA limitations shall also apply to the top of trench width determination. The seven day written notice is waived if changing soil conditions and OSHA compliance apply.
 7. CEAM 2600.3.F1 Turf Restoration is hereby deleted, See Section 02920 of these Specifications.
 8. CEAM 2600.4 Method of Measurement Paragraphs B and C are hereby deleted. See applicable sections of these Specifications.
- B. Reference Mn/DOT Specification No. 2451 shall apply to granular materials for foundation, bedding and encasement of utility line construction, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

2.1 GRANULAR MATERIALS

- A. Granular Bedding and Granular Encasement - Granular bedding and granular encasement materials used in the pipe zone in dry conditions shall conform to CEAM specifications, with the gradation limits modified as shown below.

<u>Granular Bedding and Granular Encasement</u>	
Sieve Size	Percent Passing
1½"	100
# 4	35 - 85
# 10	20 - 70
# 40	5 - 35
# 200	0 - 15

- B. Granular Foundation - Granular foundation material shall be rock material, with the gradation limits as modified as shown below. This material shall be used in lieu of standard granular bedding and granular encasement materials where added pipe support is needed due to poor or wet subgrade soil conditions. This rock material shall also be used along with the required trench dewatering to provide for a stable pipe foundation.

<u>Granular Foundation</u>	
Sieve Size	Percent Passing
2"	100
1½"	95 - 100
¾	20 - 40
# 4	0 - 5

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

3.2 EXCAVATION AND PREPARATION OF TRENCH

- A. Interference and Protection of Underground Structures
1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.
 2. The inverts of existing tiles, culverts, drains, etc. shall be protected during construction. The Contractor is responsible to inspect and clean, if necessary, all lines which have become compromised by the construction operations.
- B. Excavation Limits and Requirements

1. The trench for all flexible pipe shall be undercut six-inches below the pipe barrel to permit the installation of granular bedding or foundation material.
2. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations
3. Use of granular foundation material in lieu of performing dewatering is permitted.

C. Preparation and Maintenance of Foundation

1. Flexible Pipe Materials

- (a) In ordinary trench conditions, the pipe shall be bedded in compacted granular bedding which extends from 6" below the bottom of the pipe to the spring line of the pipe. The Contractor shall bed and encase the pipe in bedding and encasement material, as shown on the plan details. The bedding and encasement shall be compacted to 95% Standard Proctor Density, or as recommended by the pipe manufacturer, whichever is denser.
- (b) Where the trench foundation has been found to be unstable and/or not suitable for pipe support, the trench shall be undercut until acceptable conditions are found. The Contractor shall furnish and install compacted granular foundation material from the bottom of the excavation to the bottom of the pipe. Bedding material shall then be placed to the spring line of the pipe.

3.3 INSTALLATION OF PIPE AND FITTINGS

- A. The Contractor shall keep accurate records as to the location of the tile connections, utility crossings, etc. either constructed or encountered during the construction. Measurements to lines shall be taken from the two nearest permanent structures (i.e., roads, intakes, etc). Final payment for the project will not be made until the information is in the possession of the Owner.
- B. When connection to an existing tile is required, the Contractor shall expose and verify the elevation of the existing tile prior to laying any pipe toward, or away from, the connection point. If the elevation of the existing tile does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.
- C. Connection and Assembly of Joints
 1. For dual wall polyethylene pipe, a soil-tight joint is required.
- D. Bulkheading Open Pipe Ends
 1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream tile system. The plug shall be placed at the beginning of the project or at the end of each working day at the end of the day's operation.
 2. When flows are diverted from an existing tile to be abandoned in place, the Contractor shall construct a water-tight plug on the open end of the abandoned pipe.
 3. Permanent watertight plugs shall be constructed with concrete grout with a thickness of not less than 1 pipe diameter.

3.4 BACKFILLING OPERATIONS

- A. Backfill material around all utilities shall be compacted with hand machines. The maximum lift thickness shall be 6-inches.
- B. Flexible Pipe Materials
 1. Granular bedding and granular encasement material shall be furnished, placed and compacted to bed and encase the pipe to an elevation 12 inches above the pipe the full width of the trench. The

contractor shall bed and encase the pipe in granular bedding and granular encasement material to 95% Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser. Select native material shall be used above the bedding and encasement material (12-inches above the pipe) up to the bottom of the subgrade excavation zone.

- C. Trench backfill for road crossing shall be compacted in accordance with the Quality Compaction Method. In agricultural fields, no compaction is required on the trench above the bedding and encasement zone.

3.5 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of granular materials.

******END OF SECTION*****

SECTION 02370 -EROSION & SEDIMENT CONTROL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm water management as indicated on the plans or as specified herein or as directed by the Engineer.
- B. The Contractor and Owner shall identify a person knowledgeable and experienced in the application of erosion and sediment control BMP's who will oversee the implementation of the SWPPP.
- C. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001)
 1. The **Owner** has developed a **Storm Water Pollution Prevention Plan (SWPPP)** in accordance with Part III (Storm Water Discharge Design Requirements) of the National Pollutant Discharge Elimination System (NPDES)/State Disposal System Permit that is included in the Appendix or in the drawings.
 2. As a condition of the Award, the Contractor shall assume the role of "**Operator**" under the NPDES Permit by applying and paying for the permit within 7 days of acknowledging the *Notice of Award*. Late submittals will not be rejected; however, the MPCA reserves the right to take enforcement for any unpermitted discharges or permit noncompliance for the new registered party that has assumed control of the site.
 3. For **storm water** discharges from construction activities where the **Owner** or **Operator (Contractor)** changes, the new **Owner** or **Operator** can implement the original **SWPPP** created for the project or develop and implement their own **SWPPP**.
 4. **Permittee(s)** shall ensure either directly or through coordination with other **Permittee(s)** that their **SWPPP** meets all terms and conditions of this permit and that their activities do not render ineffective another party's **erosion prevention** and **sediment control Best Management Practices (BMP's)**."
 5. The Contractor shall maintain copies of the SWPPP on the project site at all times and comply with all provisions contained therein.
 6. Process Summary:
 - (a) Owner issues *Notice of Award* to Contractor
 - (b) Contractor acknowledges the *Notice of Award*
 - (c) Within 7 days of acknowledgement, the Contractor applies and pays for the **MPCA Permit Application** to the MPCA to accept the responsibilities of the "Operator" on the NPDES Permit. Copies of the application shall be sent to the Owner and the Engineer.
 - (d) The Contractor may then review the SWPPP and propose changes or a new SWPPP to the Engineer for review and comment; and the Owner for approval.
 - (1) During the review and modification period, all work performed on the project shall be in compliance with the original SWPPP, including having copies available on the project site.
 - (2) Once a SWPPP is modified / amended, the Contractor shall distribute new copies to the Owner, the Engineer, the on-site project supervisor and the construction observer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Erosion and Sediment Control
 - (a) Payment for "Inlet Protection" shall be at the contract price per EACH for furnishing, installing, maintaining, and removing the materials as detailed in the plans. Eighty percent (80%) of payment shall be made upon installation. The remaining 20% shall be made upon complete removal of the control measure, removal of any accumulated sediment and surface restoration.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the associated erosion control and excavation items. Such items of work include but are not limited to:
 - 1. Complying with the Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001) – Reference Storm Water Pollution Prevention Plan (SWPPP) included in the Appendix.
 - 2. Maintaining clean exit areas or roads from the site.
 - 3. Clean adjacent roads of excess soil.
 - 4. Cleaning drain tiles and culverts that have been partially or completely obstructed by sediment that originated from the site.
 - 5. Geotextile fabric for rock installation.
 - 6. Emergency erosion control mobilization.

1.3 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2573 shall apply to temporary erosion control.
- B. Mn/DOT Specification Section 1717.2 shall apply to erosion control.
- C. Section 02930 of these specifications shall apply to Rapid Stabilization, if applicable.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 EROSION CONTROL

- A. Seeding shall be performed as outlined in Section 02920.

PART 3 -- EXECUTION

3.1 GENERAL

- A. Construction and/or installation of all erosion & sediment control devices shall be completed prior to any soil disturbing activities. The rock check dam shall be installed prior to starting any excavation work.
- B. Prior to construction, the Owner, Engineer and Contractor shall observe the existing open ditch and discharge area and shall document the existing conditions. Upon completion of turf establishment, the open ditch and discharge area shall be observed and all increased sediment deposits shall be removed and disposed of by the Contractor. All increases in sediment deposits shall be considered to have originated from the project site.

- C. Exit areas or roads shall be kept clean of excess soil by routine blading.
- D. The Contractor shall salvage, transport and place cohesive materials excavated from the work for use in constructing berms for temporary sediment traps.

3.2 CONSTRUCTION REQUIREMENTS

- A. A goal of the project during construction is to get the cleanest water possible into the drainage system and protect critical and unique areas. Every effort shall be required by the Contractor to achieve these goals.
- B. The Contractor shall limit the area of disturbance and shall finish shaping and restoring an area before progressing into new areas. **Less than one half mile of tile shall be under construction and not fully graded and leveled at any one time.**
- C. The Contractor shall control drainage and erosion on the project including: haul roads, temporary construction, waste disposal sites, plant and storage locations. The contractor shall clean up the area, shape the area to allow storm runoff with a minimum of erosion and/or siltation, replace topsoil, and establish vegetative cover to the satisfaction of the Engineer on areas where the potential for pollution has been increased due to the Contractor's operations.
- D. If Contractor fails to install and/or perform the appropriate erosion and sediment control practices, as determined by the Engineer, the Engineer may issue a written order to the Contractor. The Contractor shall respond within 24 hours with sufficient personnel, equipment and/or materials and conduct the **required work or be subject to a \$ 500 per calendar day deduction for non-completion.**
- E. When the Engineer determines that the erosion and/or sediment control practices installed by the Contractor have failed, the Contractor shall correct the cause and alleviate all sediment deposition, to the fullest extent possible. If the corrective action is not taken in a timely manner, the Engineer may issue a written order to the Contractor. The Contractor shall respond within 24 hours with sufficient personnel, equipment and/or materials and conduct the **required work or be subject to a \$ 500 per calendar day deduction for non-completion.**
- F. The Contractor shall remove all deltas and sediment deposited in drainage ways or tiles and re-stabilize the areas where sediment removal results in exposed soil. The removal and stabilization shall take place within 7 calendar days of discovery.
- G. Where applicable, the Contractor will be required to co-sign for a "General Storm Water Permit" for construction activity with the Minnesota Pollution Control Agency (MPCA). The application form and information is included an appendix of these specifications. The Owner will initiate the Permit process and pay the required "Application Fee." The Contractor will be required to comply with all of the terms and conditions of the Permit that also includes performing the required inspections of the erosion control devices and maintaining an Inspector's Log for the MPCA Storm Water Permit. A copy of the proposed log form is available from the Engineer.
- H. Energy dissipation or other outlet treatment must be installed within 24 hours of connection to surface water.

3.3 EROSION CONTROL

- A. Unless precluded by snow cover, all exposed soil areas, including topsoil stockpiles, shall have temporary erosion control or permanent cover for the exposed soil areas within 14 days where the area has not been, or will not be, worked by the Contractor.

NOTE THAT THIS REQUIREMENT WILL RESULT IN MULTIPLE MOBILIZATIONS IN ORDER TO PROVIDE THE REQUIRED STABILIZATION.

3.4 SEDIMENT CONTROL

- A. The Contractor shall install Sediment Control Devices where control is required and/or where directed by the Engineer. The control measures as shown on the plans shall be considered the minimum requirements with additional measures required dependent on construction sequencing and scheduling.
- B. Inlet Protection shall be used around inlets and/or other surface water accesses to any existing or proposed storm water conveyance system.
- C. The Contractor shall take all steps necessary to prevent excess soil erosion of the project. Temporary erosion control devices shall be constructed, maintained and left in place to such time as permanent erosion control measures are in place or instructed to remove them by the Engineer.
- D. The Contractor shall construct temporary sediment traps with granular outlets within the disturbed area and shall stockpile a sufficient quantity of suitable fill material to regrade sedimentation ponds and temporary ditches to match the subgrade elevation.

3.5 INSPECTION AND MAINTENANCE:

- A. The Contractor shall routinely inspect the construction site once every seven (7) days during active construction and within 24 hours of a rainfall event greater than 0.5 inches in a 24 hour period.
- B. All inspections performed during construction must be recorded and records retained with the SWPP in accordance with the Storm Water Permit.
- C. Silt fence, erosion control, and other BMP's must be replaced, repaired, or supplemented when they reach 50% design load.

3.6 FINAL STABILIZATION:

- A. The Contractor shall ensure final stabilization of the site. The Contractor shall submit a Notice Of Termination within 30 days after final stabilization is complete or control has been passed to another owner.
- B. The Contractor shall remove all temporary erosion control measures and BMP's as part of the final site stabilization.
- C. The storm water permit further defines final stabilization and its requirements.

*****END OF SECTION*****

SECTION 02625 – AGRICULTURAL DRAIN TILE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to drain tile construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Drain Tile Pipe

- (a) Measurement of main line drain tile pipe shall be along the centerline of the pipe. Payment shall be at the unit price bid for the specified size, type and class of pipe, regardless of depth.

2. Tile Connections

- (a) Measurement for the connection of existing lateral drain tile to the new main line tile where necessary, shall be per each connection and paid for at the unit price bid.

- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the drain tile items, as indicated. Such items of work include but are not limited to:

1. Excavating, salvaging, stockpiling and replacing the full depth of existing topsoil over the trench in agricultural and turf areas, include in the price bid for drain tile.
2. Providing, installing and compacting granular bedding and encasement material for the polyethylene tile construction.
3. Providing and installing granular foundation materials if unsuitable soils are encountered, include in the price bid for drain tile.
4. Furnishing and placing geotextile fabric at open pipe joints, include in the price bid for drain tile.
5. Furnishing and installing necessary bends, fittings, wyes, tees and adaptors on the drain tile line, include in the unit price bid for the drain tile.
6. Providing an inventory of additional pipe, bends, fittings, wyes, tees and adaptors of various sizes at the project site to accommodate changes which occur during construction and ordering additional materials as needed to complete the work, include in the price bid for drain tile.
7. Marking the location of existing tiles with lathe so that the Engineer can record the location on the plan, include in the price bid for lateral tile connection.
8. Connection of existing lateral drain tiles to the new main tile, including tees, wyes, bends and fittings, include in the price bid for lateral tile connection.
9. Performing the required 12 inch deep tillage of all disturbed areas, include in the price bid for drain tile.
10. Trench excavation, backfill and compaction, include in the price bid for drain tile.
11. Bulkheading of existing pipes to be abandoned in place, include in the price bid for drain tile.

12. Maintenance of an appropriate drain tile outlet during construction, include in the price bid for drain tile.
13. Dewatering or trench pumping necessary for drain tile construction, include in the price bid for drain tile.
14. Removing and replacing fences as necessary to construct the improvements, include in the price bid for drain tile.
15. Removing and disposing of miscellaneous trees and brush necessary to construct the improvements, include in the price bid for drain tile.
16. Delays due to other utility conflicts, which result during the course of construction, include in the price bid for drain tile.
17. Protecting existing improvements from damage, include in the price bid for drain tile.
18. Protecting the inverts of other pipes from the accumulation of debris and soil, the removal of blockages which threaten to damage property, and/or the clearing of both the newly constructed lines and the existing lines of all debris and soil which accumulated during construction, include in the unit price bid for drain tile.
19. Interference and protection of underground structures and utilities, include in the price bid for drain tile.
 - (a) The removal and restoration, or protection of existing utilities for which there is no bid item for removing and restoring, or working around the utility.
 - (b) The utility information included on the Plan may not be complete and is furnished from information supplied by various utility companies as an indication of the presence of utility lines in the vicinity of construction. The Contractor shall contact the utility companies to determine the extent and exact location of their facilities. In the event of accidental damage to any such facility, the Contractor shall immediately notify the utility company and cooperate fully in whatever is necessary to repair such facility or restore service.

1.3 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. CEAM Specification No. 2621 shall apply to construction of pipe sewers/drain tile, except as modified herein.
- C. MnDOT Specification No. 2503 shall apply to measurement and payment of pipe sewers/drain tile, except as modified herein.
- D. MnDOT Standard Plates Manual with latest revisions.
- E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 DRAIN TILE PIPE

- A. Perforated Dual Wall Polyethylene Pipe
 1. Dual wall perforated and non-perforated corrugated polyethylene pipe shall conform to the requirement of the American Society for Testing Materials F2648 and shall be perforated or non-perforated as shown on the plans. Perforated pipe shall be installed with woven geotechnical sock. Joints shall be water tight gasketed joints.

B. Reinforced concrete pipe

1. All reinforced concrete pipe shall meet MnDOT Standard Plate 3000 or 3006.
2. Reinforced concrete pipe shall conform to MnDOT 3236 with tongue and groove joints, Class 3 minimum except as shown otherwise on the plans. Provide geotextile wrap of all joints.
3. Pipe ties shall be required for all joints.
4. Fittings for bends and lateral tile connections shall be precast.
5. Connections of private tile shall be made by sawing a hole in the pipe and making a field connection using inserta-tee fittings or equivalent connections.

2.2 GEOTEXTILE FABRIC

- A. Mn/DOT 3733, Type I, knit sock.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

A. Drain Tile

1. All piping shall be installed in accordance with the details in the Plans. Granular bedding and encasement materials shall be installed and compacted as noted.

B. Equipment

1. The use of rubber tired earth moving equipment shall not be permitted on the agricultural fields. Backfill and leveling shall be accomplished with dozers.

C. Bulkheading Open Pipe Ends

1. When flows are diverted from an existing drain tile to be abandoned in place, the Contractor shall construct a water-tight plug on the open ends of the abandoned tile. The plugs shall be constructed with concrete grout and with a thickness of not less than 1 pipe diameter.

D. Backfilling

1. The initial lift of native backfill material, from the top of the granular material to 2' higher, shall be gently placed with a backhoe to avoid placing rocks on the pipe and to avoid impacting the pipe.

3.2 DRAIN TILE CONNECTIONS

A. Connect to Main Tile

1. When connection to an existing tile or concrete main is made, the Contractor shall expose and verify the elevation of the existing tile prior to laying any tile to, or from, the connection point. If the elevation of the existing tile does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.
2. When connecting to a plastic main, appropriate fittings shall be furnished and installed for the connection so that the main tile does not need to be cut for the connection.
3. If there is a vertical elevation difference of more than 2 feet between the existing tile and the new tile connection, the existing tile shall be reconstructed upstream to a point where the tile can be laid at a 45 degree slope to the connection. The tile shall rest on undisturbed soil or soil which has been compacted to a density of the adjacent soil.

****END OF SECTION****

SECTION 02630 – SURFACE WATER INTAKES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to intake construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Surface Water Intakes
 - (a) Surface water intakes shall be measured by the individual unit based on the inside diameter of the riser.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the intake items, as indicated. Such items of work include but are not limited to:
 - 1. Locating and connecting to drain tile, include in the price bid for Surface Water Intakes.
 - 2. The costs of furnishing bends and adapters, include in the price bid for Surface Water Intakes.
 - 3. Trench excavation, backfill and compaction, include in the price bid for Surface Water Intakes.
 - 4. Furnishing and installing a Hickenbottom riser, or approved equal, on the intake.
 - 5. Furnishing and installing a field marker at each intake.

1.3 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. CEAM Specification No. 2621 shall apply to construction of pipe, except as modified herein.
- C. Mn/DOT Standard Plates Manual with latest revisions.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 PIPE AND FITTINGS

- 1. Dual Wall polyethylene pipe as specified in Section 02625.
- 2. Hickenbottom tee and riser sections, or approved equal.

2.2 GEOTEXTILE FABRIC

- A. Mn/DOT 3733, Type II, non-woven for use in wrapping joints in pipe.

PART 3 -- EXECUTION

- A. Surface water intake locations and sizes will be staked by the Engineer as the project progresses. Surface water intakes shall be constructed within two days following the tile construction.
- B. The Contractor shall assure that surface water has an outlet at all times into either the existing tile system, or once it is constructed, the new tile. If the Contractor fails to provide such an outlet, any claims for crop damages will be deducted from payments to the Contractor.
- C. Additional grading shall be performed around the intakes to permit farming operations around the intakes.

******END OF SECTION******

SECTION 02920 - TURF RESTORATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to turf restoration as indicated on the drawings or as specified herein.
- B. A goal of the project during construction is to get the cleanest water possible into the protected drainage systems as quickly as possible and protect critical and unique areas. Every effort shall be required by the Contractor to achieve these goals.
- C. Temporary seeding may be necessary during construction in erosion sensitive areas. The Contractor shall do temporary seeding work as specified herein, as required to comply with the MPCA permit or as directed by the Engineer at no additional expense.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment for seeding shall include the costs for furnishing and placing the designated seed mixture, fertilizer and mulch at the rate specified and shall be measured by the ACRE.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the associated seeding and sodding items. Such items of work include but are not limited to:
 - 1. Complying with the Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001) – Reference Section 02370 – Storm Water Pollution Prevention Plan (SWPPP).
 - 2. Subgrade preparation and topsoil placement as required on all areas shown on the plans.
 - 3. Maintenance of newly seeded areas, as specified, include in the unit price for the associated items.
 - 4. All re-work necessary to repair areas that do not grow, include in the unit price for the associated items.

1.3 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Sections 2575, 3876, and 3878, Controlling Erosion, Establishing Vegetation and Seed shall apply to the establishment of grass and sod as shown on the plans.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Seeding Items
 - 1. The seed mixtures to be used are shown below. In general, all application rates for mixes, except oats, are 150% the rate in Mn/DOT Table.
 - 2. Seeding with the various seed mixture designations shall utilize the following combinations of seed, fertilizer and mulch:

- (a) Type 1 mulch shall consist of clean straw with no pasture hay.
- (b) Temporary seeding, if required, shall use Seed Mixture – 110B Oats.
- (c) Fertilizer shall be 22-5-10. (Phosphorous use in fertilizer for first establishment and the first year is allowed unless limited or prohibited by local ordinances.)

APPLICATION RATES						
Seed Mix	FERTILIZER		MULCH		Typical Use	
	Rate	Type	Rate	Type		
	lb/AC		lb/AC	ton/AC		
25-141 (Mesic General Roadside)	105	22-5-10	200	1	2	All.
21-111 (Oats)	100	22-5-10	200	1	2	All, temporary seeding
Temporary Stabilization- Ag Areas				1	2	Pipe Trench Areas

B. Seed Mixtures:

- 1. The application rates for Mn/DOT seed mixes shall be at 1.5 times that specified in the referenced specification.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. GENERAL

- 1. Prior to construction, the Owner, Engineer and Contractor shall observe the existing storm water outfall system and discharge area and shall document the existing conditions. Upon completion of surface restoration (i.e., paving and turf establishment), the storm water outfall system and discharge area shall be observed and all increased sediment deposits shall be removed and disposed of by the Contractor. All increases in sediment deposits shall be considered to have originated from the project site.
- 2. Prior to construction, the Owner, Engineer and Contractor shall review the project to identify critical areas that could require rapid stabilization during the construction process, and develop a plan to either mitigate disturbance to those areas or identify the methods of rapid stabilization most appropriate.
- 3. If Contractor fails to install and/or perform the appropriate rapid stabilization practices and immediate ditch seeding within 7 days following final slope shaping, the Contractor will **be subject to a \$ 500 per calendar day deduction for non-completion.**
- 4. The subgrade shall be shaped to approximate contour of the finished surface. All construction debris shall be removed from the area prior to the placement of the topsoil.
- 5. The topsoil shall be shaped to the approximate the contour of the finished surface, with a minimum depth of 12-inches.. All construction debris shall be removed from the area prior to seeding. The topsoil shall be loosened with a disc or harrow to its full depth prior to seeding.
- 6. The Contractor shall be responsible for providing water and maintenance until final acceptance by the Engineer or Owner, to firmly establish the seed. The term maintenance shall include mowing, weed control and watering, as necessary.
- 7. The Contractor shall remove all rocks and debris from the surface prior to seeding and mulching.

B. SEEDING REQUIREMENTS

- 1. Turf establishment by seeding shall be done utilizing the various combinations of seed mixtures, fertilizing and mulching as described.
- 2. Areas prepared for seeding shall be free of rocks, debris and clumps of soil. The areas shall be graded uniformly dragged until free of chunks exceeding 1 inches diameter.

3. Seed shall be applied with a drill seeder, unless otherwise approved in writing by the Engineer.
4. The Contractor shall furnish weight tickets documenting pounds of fertilizer placed and pounds of seed placed. The seed tickets shall show individual plant species along with the percent purity and percent germination. The fertilizer tickets shall show mix proportions. The Contractor shall also furnish its QA/QC data to the Engineer.
5. Dormant seeding and snow seeding may be utilized in accordance with the referenced specification and technical memorandum, provided the final acceptance standards are met.
6. Final acceptance of seeding shall be based on an established growth of 6-inches with a uniform density to cover 70% of the designated area, free of weeds and bare spots. Any re-seeding necessary shall be performed at the Contractor's expense.

******END OF SECTION******

Exhibit 6: Right-of-Way Table

Improvement of County Ditch No. 14

Lyon County, MN

Right-of-way Table

H:\LYCO\S15116176\3_Design\A_Calculations\[116176_ROW.xlsx]Sheet1

3/22/2021

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Parcel No.	Property Owner	Legal Description	Improvement Right-of-Way Damages				Amount/Ac \$600	
			Station to Station	Length	Width	Area (Acres)		
Main								
17-032005-0	Heydarian/Mandana Zarafshar	SE 1/4 SW 1/4 32-110-41	35+00	36+41	141	80	0.26	\$156.00
04-005004-0	Thomas M Meulebroeck Trust	NW1/4 NW1/4 5-109-41	37+65	52+63	1498	80	2.76	\$1,656.00
		SW 1/4 NW 1/4 5-109-41	52+63	65+75	1312	80	2.41	\$1,446.00
04-005002-0	Christensen/David E	NW 1/4 SW 1/4 5-109-41	65+75	73+87	812	80	1.50	\$900.00
04-006003-0	Williams/Darrell & Linda	NE 1/4 SE 1/4 6-109-41	74+88	89+04	1416	80	2.61	\$1,566.00
		SE 1/4 SE 1/4 6-109-41	89+04	108+16	1912	80	3.52	\$2,112.00
04-006001-1	Paradis/Bradley	SW 1/4 SE 1/4 6-109-41	108+16	116+92	876	80	1.61	\$966.00
04-007004-0	Kirk/David	NW 1/4 NE 1/4 7-109-41	117+80	123+30	550	80	1.02	\$612.00
04-007003-0	Timmerman/Charles R & Gloria A	NE 1/4 NW 1/4 7-109-41	123+30	139+23	1593	80	2.93	\$1,758.00
		NW 1/4 NW 1/4 7-109-41	139+23	155+15	1592	80	2.93	\$1,758.00
04-007008-0	Gladis/Denise	SW 1/4 NW 1/4 7-109-41	155+15	173+41	1826	80	3.36	\$2,016.00
15-012003-1	DNR	SE 1/4 NE 1/4 12-109-42	172+23	172+64	41	80	0.08	\$48.00
Branch 1								
04-007003-0	Timmerman/ Charles R & Gloria A	NW 1/4 NW 1/4 7-109-41	148+00	213+74	6574	80	12.08	\$7,248.00
15-012004-0	Timmerman/ Charles R & Gloria A	NE 1/4 NE 1/4 12-109-42	214+39	219+87	548	80	1.01	\$606.00
15-001003-0	Timmerman/ Charles R & Gloria A	SE 1/4 SE1/4 1-109-42	220+53	226+00	547	80	1.01	\$606.00
Branch 1A								
04-007003-0	Timmerman/ Charles R & Gloria A	NW 1/4 NW 1/4 7-109-41	311+00	316+42	542	80	1.00	\$600.00
04-006007-0	Mercie/Mark A & Carrie	SW 1/4 SW 1/4 6-109-41	317+08	321+48	440	80	0.81	\$486.00
04-006002-0	June Herbert Family Trust	SW 1/4 SW 1/4 6-109-41	321+48	323+00	152	80	0.28	\$168.00
Branch 2								
04-006003-0	Williams/Darrell & Linda	NE 1/4 SE 1/4 6-109-41	286+46	289+89	343	80	0.63	\$378.00
04-006001-1	Paradis/Bradley	NW 1/4 SE 1/4 6-109-41	289+89	291+00	111	80	0.21	\$126.00
	Total		Total Improvement Right-of-Way Damages =			42.02	\$25,212.00	