



**BOLTON
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**Report of Findings for the
Petition to Impound, Reroute, Divert
and Partially Abandon a Portion of
Lyon County Ditch No. 17**

24X.135017.000

August 2024

Submitted by:

Bolton & Menk, Inc.
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Certification

Report of Findings

For

Petition to Impound, Reroute, Divert and
Partially Abandon a Portion of
Lyon County Ditch No. 17

Lyon County Mn
Bolton & Menk Project No. 24X.135017.000
August 2024

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: Shaun P. Luker
Shaun P. Luker, P.E.
License No. 48756

Date: 8/6/2024

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STATE OF MINNESOTA

LYON COUNTY, MINNESOTA

IN THE MATTER OF THE PETITION FOR IMPOUNDING, REROUTING, OR DIVERTING DRAINAGE SYSTEM WATERS, AND PARTIAL ABANDONMENT IN LYON COUNTY, MINNESOTA:

The Lyon County Board, acting as the Drainage Authority for County Ditch No. 17 (CD 17) in Lyon County, in accordance with Minnesota Statutes 103E.227 and 103E.806 accepted a petition for impounding, rerouting, or diverting drainage system waters, and a partial abandonment of portions of CD 17.

This Report summarizes the findings of the research, and analysis for the impounding, rerouting, or diverting drainage system waters, and partial abandonment of CD 17 in Lyon County and is submitted for consideration by the Drainage Authority.

I. LOCATION AND SCOPE OF REROUTING AND PARTIAL ABANDONMENT

The portion of County Ditch No. 17 in the petition lies within and provides drainage to a watershed in Section 36 of Coon Creek Township in Lyon County. The tile system drains generally from south to north.

The landowner (MN DNR) in Section 36 is proposing to restore wetlands through a partnership with Pheasants Forever. As a part of the proposed wetland restoration, the DNR is proposing to reroute the portion of the existing CD 17 tile around the proposed wetland area and abandon branches within the wetland. A copy of the petition can be found in Appendix A.

Bolton & Menk, Inc. was provided a copy of the proposed figures and Statement of Work by the DNR and is included in Appendix B.

II. EFFECT OF THE PROPOSED REROUTING AND PARTIAL ABANDONMENT

The effect of the proposed rerouting and partial abandonment on the CD 17 system was analyzed by comparing the function of the CD 17 system before and after the proposed rerouting and partial abandonment. Exact grades were not specified within the Statement of Work. So, we estimated the grades by using upstream and downstream surface elevations along with historic plans.

As shown in Tables 1 & 2, the proposed re-routed tile provides more capacity than the existing tile. The watershed for this portion of CD 17 totals 368 acres. The total restored wetland area with this petition is 31 acres.

Table 1: Existing Tile Capacity				
Tile	Location	Existing Tile Size (Inches)	Existing Tile Grade (%)	Calculated Tile Capacity (CFS) $n=0.013$
Branch 1	Proposed Surface Outlet	7	0.10	0.27
Branch 6 - F1	Connect to Branch 6	6	0.06	0.14
Main Branch	200' Downstream of Branch 3 Connection	14	0.10	1.70

Table 2: Proposed Tile Capacity					
Tile	Location	Existing Tile Size (Inches)	Existing Tile Grade (%)	Calculated Tile Capacity (CFS) n=0.012	Percent Change (%)
Branch 1	Proposed Surface Outlet	8	0.10	0.42	+155%
Branch 6 - F1	Connect to Branch 6	6	0.20	0.27	+198%
Main Branch	200' Downstream of Branch 3 Connection	15	0.24	3.44	+202%

The abandonment of a portion of CD 17 Main will not impair the function of the CD 17 system. The restoration of the wetland eliminates the need for a tile in this area. The proposed wetland restoration and embankments will not negatively impact the downstream tile or the overall CD 17 tile system. During years of normal rainfall, the wetlands will provide a benefit to the downstream capacity of the CD 17 tile system by holding back excess runoff. In years of above normal rainfall, the wetlands will not add additional water to the tile system.

PIPE MATERIAL

The re-routed tiles are proposed to be constructed with non-perforated rigid dual-wall pipe. This product features a corrugated exterior like single-wall pipe and an interior wall. No specific ASTM or AASHTO requirements were noted.

III. RECOMENDATION

DUAL WALL POLYETHYLENE PIPE

We recommend that dual wall corrugated polyethylene pipe conforms to the requirements of ASTM F2648 with smooth interior and annular exterior corrugations. With bell and spigot joints meeting ASTM F2648, and gaskets meeting the requirements of ASTM F477.

Alternatively using flexible dual wall corrugated polyethylene pipe conforming to the requirements of ASTM F3390. Our recommendation is that the pipe be laid at a depth of no greater than 8-feet as measured from the invert of the pipe to the top of the existing soil grade. We recommend that flexible dual wall still be bedded with granular bedding and encasement.

PIPE BEDDING AND ENCASEMENT

The trench for all flexible pipes are recommended to be 6.0-inches below the pipe barrel to permit the installation of granular bedding and encasement. Alternatively HDPE pipe may be laid according to the spoon method meeting manufacturer requirements.

CD 17 REROUTE AND PARTIAL ABANDONMENT

Per Appendix C we show our recommended drain tile routes. All rerouted/repared tile should stay within the CD 17 system, and thereby remain under the jurisdiction of the CD 17 board. We recommend an 80-foot drainage easement centered on the tile for maintenance or repairs. This would include the unconnected portion of the CD 17 system that is to daylight on the upstream end.

IV. CONCLUSION

The petitioned reroute and abandonment located within the CD 17 tile system in Lyon County will be of a public or private benefit and it will not impair the drainage system or deprive affected landowners of their benefit.

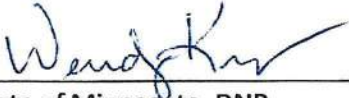
Appendix A: Petition

1. Lyon County Ditch No. 17 (CD 17) is a drainage system located in Lyon County, Minnesota.
2. The undersigned petitioning landowner is the owner of property located in portions of Section 36 of Island Lake Township, Lyon County, Minnesota.
3. The undersigned petitioner hereby petitions the Lyon County Board of Commissioners, acting as the drainage authority, to modify portions of the CD 17 tile main and its laterals located in the South ½ of Section 36, in Island Lake Township, T. 111 North, R. 43 West, Lyon County, Minnesota.
4. The petition is offered as a result of conveyance of property to the State of Minnesota from Pheasants Forever, Inc. The properties were acquired for wildlife habitat restoration of drained wetlands and adjoining uplands (Project).
5. That existing tile within the Project area is approximately 3,788 feet of the CD 17 Tile Main (Station 0+97 to Station 38+85). The size of the Tile Main as it enters the Project from the southeast is 7-inches in diameter. It exits the Project's north side as 15-inch diameter tile. See *Exhibit E* for the 1915 engineered tile map that includes the CD-17 Main and all laterals.
6. Said Project requires rerouting and abandoning portions of CD 17 Tile Main and laterals to facilitate the restoration of desired Project wetlands and to maintain the drainage benefits of surrounding properties. More specifically, the petition seeks to modify the CD 17 drainage system as follows:
 - a. That pursuant to MN Statute 103E.227, the existing reach of CD 17 Fork #1 of Branch #6 starting at station 2+27 includes 195 feet of existing 6-inch tile. The existing reach of CD 17 Branch #6 starting at station 0+0 includes 200 feet of existing 5-inch tile and 263 feet of existing 6-inch tile. This existing tile as described is currently draining the proposed wetlands #2 & #4 (see Figure 1); reroute and replace with approximately 339 feet of new, non-perforated 6-inch dual wall HDPE pipe around proposed wetlands to facilitate existing drainage and not impact wetland restorations. The reroute will reduce the amount of tile by approximately 319 feet and as a result, the average grade within this stretch will increase from 0.18% to 0.21%. The reroute will not affect drainage capacity of the Tile Main or its laterals nor will it impair the utility of the drainage system or deprive affected landowners of its benefit.
 - b. That pursuant to MN Statutes 103E.806, the following described existing reach of the CD 17 Tile Main and laterals from proposed wetlands #1, 10, 11, 14 & 16 (see Figure 1) will be abandoned and removed from the drainage system as they will no longer serve a benefit or purpose for the drainage system. This consists of abandoning the following:
 - i. Tile Main: starting at station 0+91 abandoning 209 feet of existing 7-inch tile, 500 feet of existing 8-inch tile, 100 feet of 9-inch tile, 1,400 feet of existing 12-inch tile, and 900 feet of existing 14-inch tile. Approximately 2,750 feet of new, non-perforated and 90 feet of new, perforated 8-inch dual wall HDPE pipe will be installed in order to remove all water coming through the two road culverts under County Road 15 on the east side of proposed wetland #14. The Minnesota Department of Natural Resources will be responsible for future operation and maintenance of all installed 2,840 feet of tile.
 - ii. Branch #1: starting at station 7+63 abandoning 537 feet of existing 7-inch tile and 1061 feet of existing 8-inch tile. Approximately 227 feet of new, non-perforated 8-inch dual

wall HDPE pipe will be installed in order to daylight branch #1 at elevation 1537.0 (approximately 1-ft below grade of branch #1 at station 7+63). The Minnesota Department of Natural Resources will be responsible for future operation and maintenance of the installed 227 feet of tile.

- iii. Branch #2: starting at station 0+94 abandoning 406 feet of existing 6-inch tile and 520 feet of existing 7-inch tile.
 - iv. Branch #4: starting at station 0+0 abandoning the 400 feet of existing 5-inch tile and 250 feet of existing 6-inch tile.
 - v. Fork #2 of Branch 6: starting at station 0+0 abandoning 219 feet of existing 5-inch tile.
7. That for the following reasons, the drainage authority for CD 17 be responsible for future operation and maintenance of the above described rerouted portions of Fork #1 of Branch #6:
- a. The modified, rerouted portion of Fork #1 of Branch #6 will continue to provide drainage benefits to assessed lands within the CD 17 drainage system and maintenance of it will be simpler, more effective and have a greater degree of security if managed by the drainage authority.
 - b. The costs to maintain the modified portion of Fork #1 of Branch #6 will be no greater than the cost to maintain what exists currently for this portion of the CD 17 drainage system.
8. That no other portions of the CD 17 drainage system will be modified as part of the Project. They will continue to function in their current condition and be operated and maintained by the drainage authority.
9. That included as:
- a. Figure 1- is an existing conditions overview map showing those portions of the CD 17 drainage system that currently exist within the general Project area. Additionally, Figure 1 also shows proposed tile reroute and abandonment areas.
 - b. Exhibit A - is a Project area overview map with 6-inch topographic contour lines.
 - c. Exhibit B - is a watershed map of the Project, showing Project area at top of this watershed.
 - d. Exhibit C - is a copy of the Statement of Work Summary Plan for the Project.
 - e. Exhibit D - is a subwatershed map with wetland storage capacity measured in acre-feet.
 - f. Exhibit E - is a copy of the 1915 engineered tile map for CD 17.
10. The petition does not seek through separable repairs the use of any drainage system funds for construction of the Project. Those costs will be the responsibility of the property owner for which fee title acquisition will be or has been conveyed.
11. The proposed Project is located at the top of this watershed, and thus, will directly benefit the CD 17 drainage system by providing flood control, wildlife habitat and improved water quality benefits to the downstream ditch system.
12. That pursuant to Subd. 2 of 103E.227, a bond for the Project will not be required as the petition is filed by a state agency or the local Soil and Water Conservation District in support of this conservation project and its property owners/co-petitioners.
13. That no public water work permit, water use permit, or other permits required under Minnesota Statutes 103G are needed for this project.
14. The petitioner respectfully requests the Drainage Authority to take such action as may be necessary and provided for under the laws of the State of Minnesota to make an order modifying said County Ditch No. 17 and authorizing the proposed Project.

Dated this 1st Day of May, 2024



State of Minnesota- DNR
Wendy Krueger, Area Wildlife Supervisor

Appendix B: MN DNR & Pheasants Forever Statement of Work

Exhibit A – Statement of Work Prairie Marshes WMA Addition, Wetland Restoration

Overview:

Pheasants Forever, Inc. is seeking quotes from qualified contractors for a restoration project in **Section 36, Island Lake Township (T.111N, R.43W) Lyon County, Minnesota**. Please review the plans and details below and determine if you would like to do this project and if so, what your cost would be.

Google Maps:

Prairie Marshes WMA Addition

Project Management:

This project will be managed on-the-ground by either Tyler Zimmerman with Pheasants Forever or Troy Dale with the MN DNR out of Marshall, MN. Contact Tyler for contracting related questions.

Contact Information

Tyler Zimmerman

Pheasants Forever, Inc.
26444 County Road 149
Detroit Lakes, MN 56501
(218) 849-7719
tzimmerman@pheasantsforever.org

Troy Dale

MN DNR
1400 E Lyon
Marshall, MN 56258
(507) 706-6170
troy.dale@state.mn.us

General Bid Information

Date Bids Due: All bids must be turned in to Pheasants Forever by dates specified in the Pheasants Forever RFQ in order to be considered for this project. **If you decline to bid** on the project please call, email or otherwise send a courtesy note to inform the project manager of your declination so we know not to expect your bid. Also, let us know if you would like to be removed from similar bid invitations in the future.

Format for Bid: The final bid award will be based on the lump sum amount of all restoration work combined; however, we do request that the cost for each restoration item be listed separately. You must use the summary sheet at the end of this document to track itemized costs. Although estimated fill volumes are listed in cubic yards, some experienced operators prefer to estimate costs based on the time it takes to complete the job and expected equipment hours. **Include all mobilization, materials, or other fees as needed in your single quote amount.**

Bid vs. Final Cost: It is expected that bids will be complete and as accurate as possible. Contractors will be held to the total dollar amount of their bid unless unreasonable, unforeseen circumstances arise. Final bills exceeding the bid amount, especially if in excess of the project budget, will be difficult to

accommodate and may not be payable. Measurements in the plans are best estimates based on on-site surveys; however, actual volumes and/or measurements may vary slightly because of uneven terrain and the characteristics of natural landscapes. To the extent possible, project engineering has attempted to err on the high side of estimated volumes. Contractors should allow for flexibility in their cost margins if they are concerned regarding underestimated volumes. Bids must include any associated costs such as mobilization; extra costs will not be accepted if added later. The project manager must be contacted if unforeseen circumstances arise during construction that will require changes to the original designs. All changes must be approved by the project manager. **If total bid is over the project budget some items on the itemized bid sheet may be removed or postponed until budgets allow.**

Bid Approval/Award: The winning bidder will be notified of the award by Pheasants Forever. All other bidders will also be notified at the time of award. For bid award criteria, please refer to para. 3., "Evaluation and Selection" in "Contract Terms" on page 5 of the Request for Quote. If all bids come in higher than the project budget, the project manager may choose from several options including negotiating a lower price with individual contractors, modifying the plan and rebidding it, or cancelling the project entirely.

Timeline for Project Completion: This project may start at any time but must be completed by 12/1/2024.

The contractor must maintain contact with the site manager relative to a planned start date and give at least a one-week notice before starting work. Once started, the project should be completed as quickly as is reasonably possible to limit the duration of site disturbance and to reduce the chance that weather events might cause undesired project delays or damage at vulnerable stages.

If the project is not completed prior to the deadline due to contractor delays, the project may be re-bid for the following season or awarded to an alternate contractor on the original bid.

Permits & Liabilities: The site manager will provide for any specific permissions or permits needed to do the work, should such issues arise. The contractor WILL be responsible for calling **Gopher State One Call** (1-800-252-1166) to identify any utilities **BEFORE** digging. The contractor is ultimately responsible for any liability resulting from damage by their equipment to any utilities. If the contractor or Gopher One identify any issues that would impact this project, the site manager must be informed immediately to help find a solution. The contractor is also liable for damage to any other property, infrastructure or personal injury on site due to accident or negligence and must carry the required insurance, as specified in the Request for Quote.

Contractor Responsibilities:

- Contractor is responsible for furnishing all equipment, labor, supplies, transportation, fuel, and all else necessary for job completion as described within this request.
- It is the contractor's responsibility to decide what equipment to use in each situation to obtain a desired outcome with the minimal amount of disturbance/site compaction. The contractor may sub-let any part of the project work if the contractor does not have the necessary equipment; however, all project costs must be included in the single, original bid.
- Equipment must be cleaned pre/post entry of the site for noxious and invasive species.

- Contractor must prevent damage to adjacent properties while performing enhancement/restoration work.
- Work will be conducted in a manner that will minimize rutting, disturbance or compaction of soil or sod, and prevents the spread of noxious and invasive species.
- Contractor must make sure to limit any disturbance to the established vegetation outside of the parking lot area.
- Equipment left on-site must be secured and is the sole responsibility of the contractor.
 - Please inform Site Manager of equipment left onsite.
- Monitoring site conditions and project timeline are the contractor's responsibility.
- Once started, the project should be completed as quickly as is reasonably possible.
- If the project is not completed prior to the deadline due to contractor delays, the project may be re-bid for the following season or awarded to an alternate contractor.

Project Location & Access:

See Exhibit B-E for project location, maps and designs.

Directions: The property is located approximately 10 miles southwest of Marshall, MN. Access to the project area is from several road approaches.

Site Visit: If a contractor wants to visit the sites before bidding they may do so at any time. The site has not been staked as of the date of this Request for Quote. It is recommended that contractors contact the site manager regarding site visits and for detailed construction planning information.

General Details

Site Conditions: The entire site has been seeded to prairie. Please keep disturbance to a minimum.

Equipment: Ultimately, it is the job of the contractor to decide what equipment to use in a given situation and to obtain a desired outcome. The contractor may sub-let any part of the project work if the contractor does not have the necessary equipment; however, all project costs must be included in the single, original bid.

Elevations and Survey Benchmarks: Elevations for this project will be based on mean sea level survey shots taken with a survey grade GPS. The construction manager or his representative will place a reference pin on site and label it prior to construction. All work areas will be staked and flagged by the site manager prior to the start of construction. If desired, the site manager will be available for a pre-construction meeting to explain staking.

Sediment Removal: Refer to the individual wetland specifications for specific sediment removal depths. Wetland boundaries for the scrape area will be marked by pin flags. Follow the contour of the basin not necessarily a flat cut bottom. If operators get past the "black dirt" and into a lighter grey sublayer or into a sand layer, back off into the black again as you would be too deep. Cover any exposed subsoil with black dirt. Feather the edges to at least a 10:1 to avoid leaving a straight cut and to match the

surrounding topography. Spoil will be spread on the upland outside of the full pool of the wetlands. Finished work in all disturbed areas needs to be smooth enough for planting seed and match the surrounding topography.

Ditch Plug/berm General Specifications:

- The ditch plug/berm areas must have soft topsoil and/or sod stripped off the footprint/base to a firm clay base layer prior to construction.
 - This subcut should go down to the clay layer unless otherwise specified.
 - This material must be stockpiled to be distributed evenly over the ditch plug when done.
 - If a deeper subcut is required, cost will be appropriated per unit cost.
 - See design sheets for depth of sod removal.
- Build up the ditch plug with the best quality material onsite.
 - Deposit material in 6-inch lifts across entire footprint of ditch plug.
 - **High compaction is needed between each lift.**
 - **Compact the entire lift with a vibrating roller packer (sheep's foot), or equivalent device (5,000 lbs. or greater vibrating roller packer, ride on, not skid steer attachment)**
- When grading and compaction are finished, ditch plugs must be covered with 6 inches of stockpiled topsoil and graded smooth.

Tile Checks/Removal: Refer to the individual wetland specifications for specific locations.

- **Tile Check:**
 - Check for tile by digging a cross section with an excavator at least 8 feet deep for the entire tile check distance. If tile is present, additional funds will be obligated to pay for the removal of the tile. Backfill trench and compact with bucket.
 - Additional tile check locations may be required and will be paid by contractor's price per foot on the itemized bid sheet.
- **Tile Removal:**
 - Remove tile for the entire distance as indicated on exhibit C map. If tile checks reveal tile then in general we will be removing about 150ft per location, however, each case is different and the actual removal length will be paid by the contractor's price per foot on the itemized bid sheet.
 - Concrete/clay tile can be crushed and left in 1-2 locations within the trench after backfilling. Poly or plastic tile must be hauled off-site by the contractor.
 - Cap each end of the tile to ensure a good seal. This can be done with concrete, tile caps (with tile tape), or folding single wall plastic tile several times and taping.
 - When backfilling black topsoil must be placed back on top (no mixing of clay and topsoil). **Finished work in all disturbed areas needs to be smooth enough for planting seed and match the surrounding topography.**
- All tile check and removal trenches after they are backfilled and compacted must have additional topsoil mounded over top by 1-ft to account for settlement. Material for this must be borrow from wetland scrapes. Hauling will be required for locations that are not directly adjacent to a wetland scrape.

Spillways: Spillways will be constructed around the ends of the dikes as indicated on the individual wetland design specifications. They should be cut in to the ground level so that water flows over the spillway evenly and have 5:1 slopes. The “control section” or highest/spill point of the spillway should be as smooth and uniform as possible. Spillways should be cut so they direct water downstream, away from the back of the ditch plug. Cut material can be integrated into the ditch plug or placed in the ditch downstream of the ditch plug.

Borrow Pits: Refer to the individual wetland specifications for specific locations of borrow pits

- Before fill is removed from the upland borrow site, all topsoil will be removed and stockpiled with a dozer.
- Max depth of the borrow site during fill removal will be no more than 6 feet unless approved by the project manager.
- After removal of fill for the ditch plug, the borrow site will be:
 - Graded with slopes of 8:1 or flatter before spreading of stockpiled topsoil
 - Graded so that water drains away (do not create a wetland on the upland) and contoured to blend with the existing landscape
 - All topsoil evenly spread back over the borrow site
 - The site should be able to be farmed with conventional equipment after work is complete.

Specific Project Details

AFTER CONSTRUCTION, ALL DISTURBED AREAS MUST BLEND INTO EXISTING TOPOGRAPHY, BE FREE OF DIRT CLUMPS, RUTS, HOLES, OR PILES.

*Due to project budget, the amount of wetland scrape material removed may be adjusted at any time. If adjustments are made, cubic yardage will be re-estimated and contractor will be paid according to the unit price in the itemized bid section.

Tile Checks

(The estimated total length for all 23 tile check locations is 1,772-ft)

- **Site manager must be present for all tile checks**
- Check for tile by digging a cross section with an excavator at least 8 feet deep for the entire tile check distance. If tile is present, the removal will be paid by the same unit price as the other tile removal on the project. When backfilling the trench place subsoil on bottom and topsoil on top (no mixing). Compact with bucket.
- Some checks may be shorter or longer depending on what is found. Contractor will be paid by the unit price for the actual distance checked.

- Additional tile check locations may be requested by site manager. Additions will be paid by contractor's unit price on the itemized bid sheet.
- All tile check and removal trenches after they are backfilled and compacted must have additional topsoil mounded over top by 1-ft to account for settlement. Material for this must be borrow from wetland scrapes. Hauling will be required for locations that are not directly adjacent to a wetland scrape.

Tile Removal

- Remove tile where indicated on exhibit C map. Tile locations are approximate and may require some exploration to locate.
- Concrete/clay tile can be crushed and left haphazardly within the removal trench. Poly or plastic tile must be hauled off-site by the contractor.
- Cap the downstream end of the tile to ensure a good seal. This can be done with a couple quikrete bags each, tile caps (with tile tape), or folding single wall plastic tile several times and taping.
- When backfilling black topsoil must be placed back on top (no mixing of clay and topsoil).
- The estimated total length for all tile removal locations is 3,304-ft.
- All tile check and removal trenches after they are backfilled and compacted must have additional topsoil mounded over top by 1-ft to account for settlement. Material for this must be borrow from wetland scrapes. Hauling will be required for locations that are not directly adjacent to a wetland scrape.

Wetland #1

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 1,123 CY of sediment will be removed.
- Push all wetland scrape material **SOUTHEAST**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #2

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 940 CY of sediment will be removed.
- Push all wetland scrape material **WEST** and **NORTHWEST**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

(6" HDPE non-perf pipe install)

- Install 339-ft of 6" diameter dual-wall non-perforated poly tile at the location indicated on the Exhibit C map.
- Existing tile is 6" clay/concrete.
- All tile connections must be water tight. Rubber gaskets with steel tensioning rings, and then a layer of tile tape can be used to connect to plastic or concrete tile. Plastic couplers provided by the tile companies covered with tile tape can also be used. Cover the junction with three 60lb bags of quikrete to ensure the joint does not get crushed or moved.
- When laying the pipe maintain a constant grade from the beginning to the end of the pipe.
- Place the tile in the center of the trench and delicately backfill to prevent crushing the newly installed tile. Contractor is responsible for fixing any issues related to the install. When backfill place clay first and then topsoil.

Wetland #3

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 226 CY of sediment will be removed.
- Push all wetland scrape material **SOUTHWEST**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #4

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 451 CY of sediment will be removed.
- Push all wetland scrape material **SOUTH**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #5

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 230 CY of sediment will be removed.
- Push all wetland scrape material to the **NORTHEAST** and **SOUTH** between #5 and #6.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #6

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 258 CY of sediment will be removed.
- Push all wetland scrape material to the **SOUTH** between #6 and #7.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #7

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 600 CY of sediment will be removed.
- Push all wetland scrape material **EAST**, beyond the wetland boundary.
- The spillway elevation of 1542.5 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1542.5 and taper towards the edges at 1543.5. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #8

(Ditch Fill)

- Level fill a shallow drainage ditch with an estimated 150 CY of top soil material.
- Start by removing ~4" of topsoil/sod from the entire fill area. Stockpile this material to the side and place over top when complete with placing fill.
- Borrow material by doing a small scrape, less than 12" deep, along the fringe of the wetland.
- Ditch fill dimensions:
 - Elevation: 1539.0
 - Width: 50-ft
 - Length: 81-ft
 - Front/back slopes: 5:1
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #9

(Ditch Fill)

- Level fill a shallow drainage ditch with an estimated 72 CY of top soil material.
- Start by removing ~4" of topsoil/sod from the entire fill area. Stockpile this material to the side and place over top when complete with placing fill.

- Borrow material by doing a small scrape, less than 12" deep, along the fringe of the wetland.
- Ditch fill dimensions:
 - Elevation: 1532.0
 - Width: 35-ft
 - Length: 79-ft
 - Front/back slopes: 5:1
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #10

(Berm with rock spillway and vegetated spillways)

- Construct a berm with one rock spillway in the middle of the berm and two emergency vegetated spillways (one on each end) as specified in the Exhibit C design sheet.
- 1.5-ft of soft topsoil/sod must be stripped off the berm footprint to a firm clay base layer. Stockpile this material to the side and use to spread over the completed berm to promote vegetation growth. Start by placing 6" on top of the berm. All remaining spoil can be used for the front/back slopes and to help fill in the borrow pit.
- Place 1,426 CY of material in 6 inch lifts and compact each time with a sheepsfoot or other vibrating packing equipment (**5,000 lbs. or greater vibrating roller packer, ride on, not skid steer attachment**).
- Borrow clay fill from the borrow location indicated on the map. When finished with the borrow area the sides must be contoured to blend into the topography. We want it to look as natural as possible.
- Rock Weir/Spillway
 - Construct a rock spillway with a crest elevation of 1528.0.
 - The rock weir must have 5:1 side slopes.
 - All rock must be underlain by 8 oz. non-woven geotextile fabric that is overlapped by a minimum of 1 ft and held in place with staples.
 - Lay geotextile material up and over front wetland edge of sub-cut.
 - Using a bucket edge, cut slit into original stable ground for geotextile fabric to be stapled into the ground about 2 ft below grade.
 - Depth of rock must be 12".
 - Amount of rock required is estimated at 96 cubic yards total.
 - Class II rock placed first (82 CY), with Class I rock (14 CY) used to stabilize large rock.
 - Rock is to be hauled in.
 - See wetland #10 design sheet.
- Biodegradable Erosion blanket
 - Cover the vegetated spillways including the side slopes with biodegradable erosion blanket.
 - 25' x 75' - surface area is 1,875 sq. ft (each)
 - All erosion blanket must overlap at the seams and must be held down with a sufficient number of sod staples.

Wetland #11

(Wetland Scrape - West)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 917 CY of sediment will be removed.
- Push all wetland scrape material **SOUTHWEST**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

(Wetland Scrape - East)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 970 CY of sediment will be removed.
- Push all wetland scrape material **EAST**, beyond the wetland boundary.
- The spillway elevation of 1529.5 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1530.5 and taper towards the edges at 1529.5. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #12

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 554 CY of sediment will be removed.
- Push all wetland scrape material **SOUTHWEST**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #13

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 720 CY of sediment will be removed.
- Push all wetland scrape material **NORTH** and **SOUTH**, beyond the wetland boundary.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #14

(North Berm)

- Construct a berm with the following dimensions.
 - Top width = 15-ft
 - Top elevation (clay fill) = 1529.0
 - Length = 354-ft
 - Side slopes = 5:1
 - Spillway = no spillway as this is a flat top berm
- 1.5-ft of soft topsoil/sod must be stripped off the berm footprint to a firm clay base layer. Stockpile this material to the side and use to spread over the completed berm to promote vegetation growth. Start by placing 6" on top of the berm. All remaining spoil can be used for the front/back slopes and to help fill in the borrow pit.
- Place 1,340 CY of material in 6 inch lifts and compact each time with a sheepsfoot or other vibrating packing equipment (**5,000 lbs. or greater vibrating roller packer, ride on, not skid steer attachment**).
- Borrow clay fill from the borrow location indicated on the map. When finished with the borrow area the sides must be contoured to blend into the topography. We want it to look as natural as possible.
- To prevent muskrats from burrowing into the berm use a trencher to dig a 4" wide trench on the leading wetland side of the berm and fill with concrete (see last page of Exhibit C). An estimated 15 CY of concrete is needed to fill the trench.

(South Berm)

- Construct a berm with the following dimensions.
 - Top width = 15-ft
 - Top elevation (clay fill) = 1529.0
 - Length = 352-ft
 - Side slopes = 5:1
 - Spillway = no spillway as this is a flat top berm
- 1.5-ft of soft topsoil/sod must be stripped off the berm footprint to a firm clay base layer. Stockpile this material to the side and use to spread over the completed berm to promote vegetation growth. Start by placing 6" on top of the berm. All remaining spoil can be used for the front/back slopes and to help fill in the borrow pit.
- Place 1,647 CY of material in 6 inch lifts and compact each time with a sheepsfoot or other vibrating packing equipment (**5,000 lbs. or greater vibrating roller packer, ride on, not skid steer attachment**).
- Borrow clay fill from the borrow location indicated on the map. When finished with the borrow area the sides must be contoured to blend into the topography. We want it to look as natural as possible.
- To prevent muskrats from burrowing into the berm use a trencher to dig a 4" wide trench on the leading wetland side of the berm and fill with concrete (see last page of Exhibit C). An estimated 17 CY of concrete is needed to fill the trench.

(Tile install and rock drain fields)

- Tile Install

- Install 2,750-ft of 8" diameter non-perforated Prinsco's GOLDFLEX Flexible Dual-walled tile as indicated on the Exhibit C map.
- The existing tile line northeast of wetland #10 is a 14" clay/concrete tile. Use appropriate coupling and cover the junction with three 60lb bags of quikrete to ensure the joint does not get crushed or moved.
- Maintain a constant grade of at least 1-ft drop every 1,000-ft.
- The depth along wetland #13 will be approximately 13.5-ft.
 - Sand bedding must be placed for 610-ft where the top of the tile is greater than 8-ft below the surface. 4 inches of sand bedding placed in the bottom of the trench. Then the pipe can be laid in, once the pipe is placed additional sand bedding should be placed over the pipe, bedding material should extend 18 inches above the top of the pipe before native soil can be placed in the trench.
 - An estimated 51 CY of sand bedding material is required.
- Due to the extensive length of tile and depth it is highly recommended to sub-contract the tile install so that it can be knifed in.
- Install a 30-ft long rock drain field and intake at all 3 locations:
 - Each 30-ft section of 8" diameter dual-wall HDPE tile must be perforated and is in addition to the 2,750-ft non-perforated tile described above. Dig the tile trench 30-ft long, 6-ft wide, and 3-ft deep. Spread the excavated spoil on the back slope of the berm.
 - The base of rip-rap must utilize 8 oz. non-woven geotextile fabric (20 sq. yd.).
 - Place 3" of crushed rock (2-4" diameter) into the bottom of the trench.
 - After laying the tile in the trench, fill the remaining trench with crushed rock (2-4" diameter) so that it's flush with the ground level.
 - In the center of the drain field install an 8" open riser intake with trash guard.
 - Total estimated amount of crushed rock required is 20 CY
 - Place an 8-ft t-post near the intake to mark the location.

(Spillways)

- Cut a 40-ft wide bottom width spillway on the northwest end of wetland #14 to elevation 1528.0. Two locations need to be cut, the space between currently at or lower than 1528.0.
- The current elevation is already within 1-ft. An estimated 86 CY of material will need to be cut out.
- The side slopes must be at least an 8:1.
- Spread cut material to the north so that it blends into the topography and is not more than 0.5-ft thick in any location.
- Biodegradable Erosion blanket
 - Cover the spillways including the side slopes with biodegradable erosion blanket.
 - 45' x 148' and 45' x 25'- total surface area is 7,785 sq. ft
 - All erosion blanket must overlap at the seams and must be held down with a sufficient number of sod staples.

(Silt Fence)

- Install:

- Contractor must install an estimated 2,250-ft of silt fence around the borrow area and between the toe of the berms and road ditch.
- Removal:
 - Once vegetation is established in late summer of 2025, contractor must removal all silt fence and dispose of offsite. The payment for removal will be held until after the work is complete.

Wetland #15

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 571 CY of sediment will be removed.
- Push all wetland scrape material **NORTHWEST**, beyond the wetland boundary.
- The spillway elevation of 1532.0 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1533.0 and taper towards the edges at 1532.0. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #16

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 1,565 CY of sediment will be removed.
- Push all wetland scrape material **SOUTHEAST**, beyond the wetland boundary.
- The spillway elevation of 1531.5 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1532.5 and taper towards the edges at 1531.5. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #17

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 1,216 CY of sediment will be removed.
- Start by using some spoil material to level fill the 2-ft deep washout between #17 and #18 (348-ft long). When complete with #17 and #18 scrapes this washout should also be completely level filled.
- All remaining spoil will be pushed to the EAST, outside of the wetland boundary.

- The spillway elevation of 1534.0 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1535.0 and taper towards the edges at 1534.0. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #18

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 18 inches.
- An approximate estimate of 153 CY of sediment will be removed.
- Start by using some spoil material to level fill the 2-ft deep washout between #17 and #18 (348-ft long). When complete with #17 and #18 scrapes this washout should also be completely level filled.
- All remaining spoil will be pushed to the EAST, outside of the wetland boundary.
- The spillway elevation of 1543.5 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1544.5 and taper towards the edges at 1543.5. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Wetland #19

(Wetland Scrape)

- Remove sediment in the wetland where indicated to a depth of 12 inches.
- An approximate estimate of 226 CY of sediment will be removed.
- Push all wetland scrape material **NORTH**, beyond the wetland boundary.
- The spillway elevation of 1535.25 must be maintained for at least 15-ft around the edges of the spoil.
 - The spoil must be mounded in the center to 1536.25 and taper towards the edges at 1535.25. This is to ensure water flows around the spoil and not overtop.
- All disturbed areas must be smooth enough for planting seed and blends into the surrounding topography.

Surface outlet & tile install

- **The flow coming from south of the two-track road must be maintained.**
- The existing tile on the north side of the two tract trail is 7" diameter clay/concrete and is at a depth of 3.5-4ft.
- The existing tile in this area must be removed and is already factored into the quantities for the tile removal section.

- Install 227-ft of 8" dual wall non-perforated HDPE pipe.
- All tile connections must be water tight. Rubber gaskets with steel tensioning rings, and then a layer of tile tape can be used to connect to plastic or concrete tile. Plastic couplers provided by the tile companies covered with tile tape can also be used. Cover the junction with three 60lb bags of quikrete to ensure the joint does not get crushed or moved.
- When laying the pipe maintain a constant grade from the beginning to the end of the pipe.
- Place the tile on the side of the trench and delicately backfill to prevent crushing the newly installed tile. Contractor is responsible for fixing any issues related to the install. When backfill place clay first and then topsoil.
- The flowline at the outlet will be 1-ft below the existing ground so some contouring around the outlet will be needed for it to daylight and to blend into the topography.
- At the outlet, place a 10" diameter 5-ft length CMP over the tile as a crushproof and fireproof sleeve. Also, place a rodent guard on the CMP outlet.
- Place 5 CY of class 2 rip rap at the outlet. Underlay all rock with 8oz non-woven geotextile fabric.
- See Exhibit C design sheet for required outlet specifics.
- Materials:
 - 227-ft of 8" dual wall non-perforated HDPE pipe
 - Water tight coupler, tile tape, and quikrete
 - 12" diameter 5-ft length CMP
 - Rodent guard for 10" CMP
 - 5 CY class 2 rip rap
 - 8-ft t-post
 - Other incidental materials may be required

Rock Pile Removal

- On the west side of the property there is a very large rock pile. Bury or haul off all rocks. After the rocks are taken care of, level the area so that it blends into the surrounding topography.
- ALL DISTURBED AREAS MUST BE SMOOTHED AND LEVELED AFTER CONSTRUCTION WITH NO DIRT CLUMPS, RUTS, HOLES, OR PILES REMAINING.

Parking Lot Development

- Parking lot locations are identified on the Exhibit E – Project Map.
- The location for the northern parking lot (parking lot 1) will utilize the existing field approach. The southern parking lot (Location 2) is a general location. During construction an exact location will be determined per discussion between the Managers and Contractor.
- Site/s may contain some fence posts, wire, rocks, trees, and/or other obstacles.
- Any obstacles that are encountered within the footprint of the parking lot should be removed and disposed of offsite. It may be possible for naturally occurring obstacles to be moved to a different area of the property based on consultation with the Site Manager.
- Minor grading and shaping will be required to create a clean and level parking area. The southern parking lot will require grading off of the DNR's access road. Grading of no more than a few inches is expected. It is not expected that fill will be needed in the construction of the parking lots.

Parking Lot Specifications:

1. Install 5" X 6" X 8' treated timber posts driven about 3' down. Space posts approximately every 10' with 25' spacing on posts straight in from field approach. This larger spacing is for equipment access to the site. Inside dimensions of the parking lot should be about 105' X 60'.
2. Attach reflectors to the top of each timber post.
3. Place two 2"x 6" x 8' treated boards parallel to each other across two of the timber posts at about 4'-5' off the ground to serve the purpose of a "sign board".
 - See picture below for example.



4. See *Exhibit E – Project Map* for specifications.

See next page for Itemized bid sheet

Itemized Bid Sheet

Prairie Marshes WMA Addition, Wetland Restoration

Item	Quantity	Unit	Price per Unit	Total Price
Mobilization	---	---	---	
Tile Checks (all locations)	1,772	Linear Feet		
Tile Removal (all locations)	3,304	Linear Feet		
#1 (scrape)	1,123	Cubic Yards		
#2 (scrape)	940	Cubic Yards		
#2 (6" non-perf tile install)	339	Linear Feet		
#3 (scrape)	226	Cubic Yards		
#4 (scrape)	451	Cubic Yards		
#5 (scrape)	230	Cubic Yards		
#6 (scrape)	258	Cubic Yards		
#7 (scrape)	600	Cubic Yards		
#8 (ditch fill)	150	Cubic Yards		
#9 (ditch fill)	72	Cubic Yards		
#10 (berm)	1,426	Cubic Yards		
#10 (class I riprap)	14	Cubic Yards		
#10 (class II riprap)	82	Cubic Yards		
#10 (biodegradable erosion blanket)	3,750	Square Feet		
#11 (scrape - west)	917	Cubic Yards		
#11 (scrape - east)	970	Cubic Yards		
#12 (scrape)	554	Cubic Yards		
#13 (scrape)	720	Cubic Yards		
#14 (berm - north)	1,340	Cubic Yards		
#14 (berm - south)	1,647	Cubic Yards		
#14 (concrete for muskrat prevention trench)	32	Cubic Yards		
#14 (8" tile install)	2,750	Linear Feet		
#14 (sand bedding)	51	Cubic Yards		

#14 (rock drain field, tile riser install, all materials + labor)	3	each		
#14 (spillways)	86	Cubic Yards		
#14 (biodegradable erosion blanket)	7,785	Square Feet		
#14 (silt fence install & removal)	2,250	Linear Feet		
#15 (scrape)	571	Cubic Yards		
#16 (scrape)	1,565	Cubic Yards		
#17 (scrape)	1,216	Cubic Yards		
#18 (scrape)	153	Cubic Yards		
#19 (scrape)	226	Cubic Yards		
Surface outlet & tile install (8" tile install)	227	Linear Feet		
Surface outlet & tile install (all additional materials for non-perf install)	---	---	---	
Rock Pile Removal	---	---	---	
Parking Lot Development	2	---		

Total Price -	
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Appendix C: Recommended Drain Reroute Plan



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