ENGINEER'S REPORT
FOR
TILE IMPROVEMENTS
DRAINAGE DISTRICT NO. 9
OSCEOLA, IOWA
DECEMBER, 2015

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1.0 INTRODUCTION

1.1 Scope of Work

The following report is presented to provide information relative to a tile improvement project for Drainage District No. 9, Osceola County, Iowa.

On July 22, 2014, the Osceola County Board of Supervisors acting as Trustees for Drainage District No. 9 (DD9) received a petition from landowners in the northern part of the District (see Appendix A for the landowners' petition). The petition requested an investigation of the capacity of the District's tile main and the need for improvement. In late October the Board of Supervisors hired I+S Group, Inc. (ISG) to conduct a preliminary investigation and report our findings. A Preliminary Report was filed on February 3, 2015 with an informational meeting held with the landowners on February 26, 2015 to discuss our findings.

The tile system of DD9 is tied into the top end of the tile main of DD43 in the SE1/4 of SE1/4 of Section 3, East Holman Township. The tile main of DD43 then traverses easterly approximately 1.25 miles discharging to the Main Open Ditch of Drainage District No. 11 (DD11). Since any improvement to DD9 will affect the facilities of DD43, the Board acting as Trustees for DD43 directed ISG to evaluate the need for joint improvements to the facilities of Drainage District No. 43 and Drainage District No. 9. Our preliminary findings and recommendations were submitted to the Board by letter report dated August 24, 2015. An informal meeting with the landowners of both Districts was held on September 16, 2015. Landowners present from DD43 did not support the construction of a surface relief channel and most indicated they would only support an improvement to the existing tile main if DD9 im-

proved their tile system. Since, Drainage District No. 9 has the full right to improve its facilities and increase the discharge to the lands downstream in Drainage District No. 43 and No. 11, the Board of Supervisors acting as Trustees of Drainage District No. 9 has directed us to proceed with filing our final Engineer Report with recommendations to address the lack of drainage capacity in this District.

Our investigation included researching the history of the District's records and the use of existing District plats, aerial photography, soils and topographical maps. Following is our final report.

1.2 Location & Description

Drainage District No. 9 consists of a tile main, one (1) tile lateral and seven (7) tile branches. The Main Tile runs from its outlet in SE1/4 of SE1/4 of Section 3, East Holman Township in a northeasterly direction 15,300 LF terminating in the NW1/4 of NE1/4 of Section 33, Wilson Township (Please refer Sheet A.01). The tile system of DD9 originally outletted to the surface in the west road ditch of Redwood Ave. There is an existing concrete toe-wall drop structure with the original tile outlet still existing through the headwall. The structure provided both grade control for surface flows and a stable outlet for the tile main discharge. When Drainage District No. 43 was constructed in 1920, the tile system of DD9 was picked up and tied into the top end of the DD43 tile main in the SE1/4 of SE1/4 of Section 3, East Holman Township. The headwall still remains, providing grade stabilization for surface drainage flows above Redwood Ave.

The tile main of DD43 then traverses easterly approximately 1.25 miles discharging to the Main Open Ditch of Drainage District No. 11 (DD11).

The lands in the lower 35% of the DD9 watershed have surface drainage relief available to them while the lands in the upper plus 65% of the watershed rely on the tile main to serve as their outlet for both surface and subsurface water. Refer to Sheet A.02 of the plans for a plat of DD9.

1.3 History Summary

A petition for establishment of DD9 was filed on April 6, 1908, with an Engineer's Report filed July 13, 1908. Final construction of the Drainage District facility was approved January 3, 1911. There have been various repairs and additional assessments since 1933. There is also a history of storm water flooding in Section 33 of Wilson Township. The written letter petition for drainage relief by Harold Schwarz dated June 1, 1991, outlines reverse drainage flow from intakes on his property in Section 33. His petition states the problem has become more prevalent since 1978. The Board of Supervisors approved an investigation but there is no record of an Engineer's Report being filed addressing the requested drainage relief. (See Appendix B for History Outline)

2.0 INVESTIGATION

2.1 Preliminary Investigation of Existing Facilities

There was no tile profile of record that reflected the design elevations of the tile main. Therefore, we have prepared a profile of the existing ground surface over the tile main alignment from Lidar topographic data and field survey data gathered in early summer of 2015. We have plotted the gradeline of the existing main based on slope and depth of cover data found in the District Records. Our evaluation of original capacity and proposed tile improvements are based on this profile as reported in our Preliminary Report filed on February 3, 2015.

We analyzed the capacity of the tile based on thirteen (13) sub-drainage areas and computed the existing capacity based on assuming the tile to be on line and in original condition. Standards for good agricultural drainage recommend a tile facility to be sized to drain 1/2 inch of runoff from the lands in the watershed in a 24 hour period when the lands in the watershed do not have sufficient surface drainage. For lands with surface drainage, the tile system is recommended to be sized based on a 3/8 inch drainage coefficient. Our investigation concluded the lands in the upper portion of the watershed, above Station 61+50, do not have adequate surface drainage. Therefore, the

recommended design capacity of this tile system was calculated using a 1/2 inch drainage coefficient for 950 acres of land in the upper portion of the District and 3/8 inch drainage coefficient for the lower 520 acres. The results of this evaluation are summarized within Table 1 of this report.

Table 1 – Drainage District 9 – Original Design Tile Capacities

Station	Size (in)	Slope (ft/ft)	A (ft^2)	P (ft)	R (ft/ft)	n	DA Ac. 1/2" Ac. 3/8"	Recom. Q Ac. 1/2" Ac. 3/8"	Original Q (cfs)	Original Q/Recom. Q (%)
Main 0+00	20	0.002	2.182	5.236	0.417	0.0108	950 520	19.95 10.92	7.49	26.6%
Main 16+00	20	0.0015	2.182	5.236	.4167	0.0108	950 317	19.95 4.99	6.49	26.0%
Main 19+00	18	0.003	1.767	4.712	0.375	0.0108	950 242	19.95 3.81	6.93	29.1%
Main 56+00	18	0.002	1.767	4.712	0.375	0.0108	950 59	19.95 0.93	5.65	27.08%
Main 59+00	18	0.001	1.767	4.712	0.375	0.0108	950 2	19.95 0.03	4.00	20.0%
Main 61+50	18	0.001	1.767	4.712	0.375	0.0108	711	14.93	4.00	26.8%
Main 80+00	15	0.0035	1.227	3.927	0.312	0.0108	691	14.51	4.60	31.7%
Main 85+00	15	0.0015	1.227	3.927	0.312	0.0108	632	13.27	3.01	22.7%
Main 97+00	15	0.002	1.227	3.927	0.312	0.0108	519	10.90	3.48	31.9%
Main 109+00	12	0.002	0.785	3.142	0.250	0.0108	323	6.78	1.92	28.3%
Main 118+00	10	0.006	0.545	2.618	0.208	0.0108	230	3.21	2.04	63.6%
Main 130+00	10	0.003	0.545	2.618	0.208	0.0108	63	1.32	1.44	109.2%
Main 132+00	8	0.003	0.349	2.094	0.167	0.0108	60	1.26	0.80	63.2%

2.2 Capacity Findings

The Main Tile at its outlet provides 26.6% of the capacity recommended. The Main just above Branch No. 1 provides just 26.8% of the needed capacity

making the tile main severely under capacity for the lands with no surface drainage relief.

The petition filed is for drainage relief due to the lack of capacity of the tile outlet system. From our preliminary study we have found the existing main to be undersized for current cropping practices and the acres served. The District would benefit from an improvement project that would increase the capacity of the tile system.

2.3 Replacement Tile Sizing

We have evaluated the necessary sizing and grade of a replacement tile to provide the drainage capacity recommend for good agricultural drainage. A summary of the replacement is given below in Table 2.

Table 2 – Drainage District 9 – Improvement Tile Design Capacities

Station	Recom. Size (in)	Recom. Slope (ft/ft)	Recom. A (ft^2)	Recom. P (ft)	Recom. R (ft/ft)	Recom. n	DA Ac. 1/2" Ac. 3/8"	Rec. Q Ac. 1/2" Ac. 3/8"	Original Q/Recom. Q (%)	Planned Q/Recom. Q (%)
Main 0+00	30	0.003	4.91	7.854	0.625	0.0108	950 520	19.95 8.19	26.6%	**96.1%**
Main 16+00	30	0.003	4.91	7.854	0.625	0.0108	950 317	19.95 4.99	26.0%	**108.4%**
Main 19+00	30	0.003	4.91	7.854	0.625	0.0108	950 242	19.95 3.81	29.1%	**113.8%**
Main 56+00	30	0.003	4.91	7.854	0.625	0.0108	950 59	19.95 0.93	27.08%	**129.5%**
Main 59+00	30	0.003	4.91	7.854	0.625	0.0108	950 2	19.95 0.03	20.0%	**135.3%**
Main 61+22	30	0.001	4.91	7.854	0.625	0.0108	711	14.93	26.8%	**104.6%**
Main 80+00	30	0.001	4.91	7.854	0.625	0.0108	691	14.51	31.7%	**107.6%**
Main 85+00	30	0.001	4.91	7.854	0.625	0.0108	632	13.27	22.7%	**117.6%**
Main 97+00	30	0.001	4.91	7.854	0.625	0.0108	519	10.90	31.9%	**143.3%**
Main 98+96	24	0.002	3.14	6.28	0.50	0.0108	335	7.04	49.4%	**173.1%**

Main 109+00	24	0.002	3.14	6.28	0.50	0.0108	323	6.78	28.3%	**179.5%**
Main 116+50	15	0.005	1.23	3.93	0.313	0.0108	230	4.83	39.7%	**113.8%**
Main 118+00	15	0.005	1.23	3.93	0.313	0.0108	153	3.21	63.6%	**171.1%**
Main 130+00	10	0.005	0.545	2.618	0.208	0.0108	63	1.32	109.2%	**141.0%**
Main 132+00	10	0.005	0.545	2.618	0.208	0.0108	60	1.26	63.2%	**148.0%**
Main 138+00	8	0.0034	0.349	2.09	0.167	0.0108	36	0.76	105.4%	**112.2%**

2.4 Impact to DD43 Tile System

At the informal meeting held with landowners of both DD9 and DD43, we explained that the tile main of DD43 was found to have 70 percent of the recommended capacity at its outlet reducing to 65 percent above Station 36+00. During large storm events, the tile main of DD9 will pressure relieve by means of a surface intake structure at the west road ditch of Redwood Avenue. The discharge will flow by means of an existing surface channel across SW1/4 of SW1/4 of Section 2 of East Holman Township and continue to flow by natural grade to the culvert under Highway No. 59 in NE1/4 of NE1/4 of Section 11, East Holman Township. We had recommended at the informal meeting on September 16, 2015 that DD43 consider constructing a full relief surface channel in combination with the tile improvement of DD9. Due to the grade of the existing surface relief, we believe the existing tile system in combination with a surface channel will provide good agricultural drainage for the lands below DD9. Since all of the lands in the assessment boundary of DD9 are also contained within the assessment boundary of DD43, the cost of constructing this waterway would be shared by all 2,300 plus acres in the combined watershed.

2.5 Road Crossings

The proposed relief tile will cross one (1) county secondary road, Redwing Avenue (L44), and one (1) State Highway (US-9). Iowa Law (code section 468.108) requires that the costs of crossing county and state roadways with

drainage District facilities be paid from the appropriate road funds. Since these are paved roads it is assume that both crossings will be performed by jack and bore of the new tile. It is up to the IDOT and Osceola County Engineer to decide as to the methods of installation for these crossings. The crossings involve the following roads and tile sizes:

US Highway 9 -	30" RC Pipe
Redwing Ave. (L44) -	30" RC Pipe

The IDOT and Osceola County may choose to separately contract for the construction of the crossings or to include it with the District's improvement project. If the work is to be included with the District project under one construction contract, the District will be reimbursed for the cost of construction by the County Secondary Roads Department and the Iowa Department of Transportation when the work is completed.

2.6 Other Crossings

There are no railroad or entrance crossings associated with the existing tile alignment.

2.7 Utilities

The Contractor will be responsible to notify the utility companies and to cooperate in locating, marking and protecting their facilities during the tile installation, including those utilities within the County's and IDOT road right-of-way. There are no existing gas or ammonia pipelines known to cross the alignment of the existing tile system.

2.8 Fence Cuts

There are two (2) fence lines that will be crossed by the proposed improvement. Where the propose relief tile line will cross fences, the Contractor will be responsible for performing a fence cut and repairing these fences as part of the contract.

2.9 District Right-of-Way

Tile District easement is discussed in Iowa Drainage Code Section 468.27, "Following its establishment, the drainage District is deemed to have acquired by permanent easement all right-of-way for drainage District ditches, tile lines, settling basins and other improvement,... The permanent easement includes the right of ingress and egress across adjoining land and the right of access for maintenance, repair, improvement, and inspection. The owner or lessee shall be reimbursed for any crop damages incurred in the maintenance, repair, improvement, and inspection except within the right-of-way of the drainage District."

Even though the improvement tile will follow the existing tile alignment, damages will be paid according to the claim process to the landowners for construction of the new improvements. It is planned that the Contractor will be required to segregate and separately stockpile 12 inches of topsoil from over the tile trench. This topsoil shall be spread over the top of the finished tile trench to reduce fertility issues from the construction. Therefore, damages are typically limited to crop and property damage from the construction and landowners are required to file claims at the time of the completion hearing.

3.0 PROPOSED IMPROVEMENT

The analysis of the tile systems confirms additional capacity is required in order to provide the watershed with good agricultural drainage. The current tile system is nearing 100 years in age and may be approaching it's useful life. In addition, the lower 3,000 feet of the existing tile system is quite shallow and does not have adequate depth of cover for a larger tile system on the same gradeline. This condition exists because the existing tile main originally outletted to the surface. Since the tile main of DD9 now outlets to the tile main of DD43, a larger tile installed at a deeper depth is feasible. Therefore, it is our engineering opinion that improving the capacity of the tile system by replacing the existing tile with larger capacity tile is the logical option for this District.

3.1 Proposed Tile Alignment

The proposed replacement tile line will follow the existing tile line with the new line installed at a deeper depth. By following the existing line all of the existing tile connections will be easy identified and tied directly into the new main at a deeper depth. The Contractor will need to make adjustments in the field so manufactured elbows can be used in the field where alignment turns are necessary.

3.2 Method of Construction

During construction, the Contractor will need to daily determine a feasible length of tile for replacement and block off the existing tile line. Then the Contractor will follow the segment of original tile below the block; removing the existing tile and installing the new tile. After the new tile is installed and backfilled with at least 18 inches of clean soil, the old tile will be crushed and buried in the same trench above the new tile. See detail on Sheet D.01 of plans.

3.3 Proposed Tile Sizes

The improvement will involve the replacement of all 15,300 linear feet of the tile main and will be comprised of the following linear feet of each size of RCP tile: 9,696'-30"; 1,754'-24; 1,350'-15"; 800'-10" and 1,518-8". These lengths do not include the required 200 feet of tile across Highway 9 or County Road L44.

We are recommending the use of reinforced concrete pipe because of its +100 year design life, suppliers are competitively pricing the pipe, the pipe strength tolerates deviations from expected trench and envelope conditions and because the installation method does not demand as high a level of observation as do the installation methods of other products.

3.4 Outlet Grade Stabilization Structure

As noted in Section 1.2 of this report, there is an existing toe wall structure at the outlet of DD9 that still provides grade stabilization for surface drainage flows above Redwood Ave. This structure is in poor shape and should be replaced as part of this project to provide 4 feet of elevation drop for the surface flows from the 500 plus acres in this watershed. An aluminum structural plat drop structure is what is proposed for this replacement.

3.5 Engineer's Opinion of Cost

The Board of Supervisors acting as Trustees of the District are responsible to see to the maintenance of the District facilities. If the facilities are found to be in a poor state of repair and not providing the original design capacity, repairs to the system are required by Iowa Drainage Law. In the case of DD9, we do not know of any failures of the tile system, however, the existing tile main is significantly lacking in capacity and does not provide adequate drainage for good agricultural drainage. Therefore, we are recommending the system be improved by full replacement with a large tile main. The true cost to improve the capacity of this system is the difference between the repair/replacement cost and the improvement/replacement cost.

We have prepared itemized cost estimates for both replacing the existing system (See Estimates in Appendix C) with the same size tile on the same grade and the cost of the proposed improvement. A summary follows:

Repair/Replacement – The current construction cost to replace the existing tile main with the same size tile at same grade is estimated at a subtotal cost of $566,182 with the total project cost being $837,612.

Improvement/Replacement – We have estimated construction the cost of the proposed improvement to be $893,621 with the total project cost being $1,289,861.

The improve cost, that being the difference between the repair/replacement cost and the improvement/replacement cost is $452,249. The average cost

per acre for the improvement of capacity is $308 per acre. The average cost to just maintain the existing capacity is $570 per acre. The combined cost is $878 per acre.

Landowners who will pay for this cost need to consider the following when considering the proposed improvement; increased future maintenance costs with the current system, increased wear on equipment working wet ground, the improved crop yields with the increase capacity (estimated by ISU to average around 7%) and the increase value of their property with good agricultural drainage.

4.0 ANNEXATION & RECLASSIFICATION REVIEW

4.1 Annexation/Reclassification Evaluation

As part of our field investigation, we have mapped the watershed boundary of the entire District using LiDAR data and aerial photography to determine the lands that drain by surface or subsurface into the District. From this review, (Please refer to Sheet A.02 and A.03 of the drawings) it became apparent that there are approximately 447 acres of land draining to facilities of DD9 that are not included in the original assessment boundary of the overall District. Even if this improvement project does not proceed, we would recommend the Trustees of the District consider annexation of these lands.

It should also be noted that when this District was originally established, all of the facilities of the District were paid for under one (1) assessment schedule. The District has not been reclassified since its original assessment schedule was adopted in 1918. Therefore, when work is done on any branch of the District facilities, all landowners in the District pay for this work even if they receive no benefit. Section 468.131 of the Iowa Code states, "When an assessment for improvements as provided in Section 468.126, exceeds twenty-five percent of the original assessment and the original or subsequent assessment or report of the benefit commission as confirmed did not designate separately the amount each tract should pay for the main ditch and tile lateral drains then the board shall order a reclassification in accordance with the principles and rules set forth in Section 468.41."

Therefore, even if the improvement project does not proceed we would recommend the additional lands benefitting from the facilities of the District be annexed and the District reclassified to designate separately the amount each tract should pay for the upkeep and maintenance of the Branch tile systems separately from the tile main and to redistribute the benefits to all lands in the District with the incorporation of the annexed lands.

5.0 DISCUSSION & RECOMMENDATIONS

5.1 General

Based on the evaluation of the existing tile system it is apparent that there is a need to improve the capacity of the existing facilities in order to provide drainage relief to the agricultural lands of DD9. This is more apparent in the upper portion of the watershed where the lands do not have any surface drainage relief. Our recommendation proposes an improvement by replacing the existing tile with large tile, providing a tile main outlet that has the capacity for good agricultural drainage for the entire watershed of DD9.

If the recommended tile improvements for DD9 are approved, we would strongly recommend DD43 consider moving forward with an improvement to their tile main. Since the use of a relief surface channel was not supported at the informal meeting on September 16, 2015, we would recommend a parallel relief tile main be investigated. In addition, since all the lands in DD9 are also contained in the assessment boundary of DD43, these landowners will benefit the greatest by the improvement to DD43 system and would paid the largest portion of the cost of this relief line. Merging these two (2) Districts was recommended at the joint informal meeting and continues to be our recommendation.

5.2 Jurisdictional Wetlands

The USDA Farm Program has long included wetland conservation compliance "swampbuster" provisions administrated by the Natural Resources Conservation Service (NRCS). These rules and policies require that the lost functions,

values and area of each converted (better drained) farmed wetland be replaced (mitigated). Under Part 12 of Title 7 of the Federal Regulations, "activities of a Water Resource District, Drainage District, or similar entity will be attributed to all persons within the jurisdiction of the District or other entity who are assessed for the activities of the District or entity. Accordingly, where a person's wetland is converted due to the actions of the District or entity, the person shall be considered to have caused or permitted the drainage." However, Drainage Districts in Iowa have the right to maintain the existing drainage capacity of their facilities. Therefore, under a repair option the only wetlands that could be affected would be wetlands or farmed wetlands located adjacent to the tile main that may have spoil placed in them during the excavation of the tile for repair. This situation can be avoided.

The US Army Corps of Engineer (USACE) in conjunction with the US Environmental Protection Agency (USEPA) also have jurisdiction to wetlands under the Federal Clean Water Act Section 404. However, for the wetlands to be jurisdictional they have to be connected to waters of the United States and not isolated wetlands. To be connected, the wetlands would need to be adjacent and the surface connected to the open ditch of DD11 that the tile main of DD43 and DD9 outlet to.

Therefore, if an improvement option is approved that increases the capacity of the outlet system, impacts to wetlands will need to be considered both under the Farm Bill and Clean Water Act. To determine if wetlands will be impacted, the NRCS requires that all lands in the watershed must have a wetland determination completed prior to any construction by the District. The landowners or their tenants are the only individuals that can request these determinations. If a landowner does not request a certified wetland determination and the District proceeds with an improvement project, the landowner may be found to be in violation of the farm program rules and not eligible for program benefits. In addition, the USDA could file claim for refund of farm program payments. Therefore, if the proposed tile improvement is approved, we will encourage all landowners within the watershed boundary to request a certified wetland determination from the NRCS. Please note the NRCS will only provide determinations on agricultural lands producing a commodity crop. For other lands, a consultant will need to be hired to make the wetland

determination. Additionally, if a landowner refuses to sign up for a determination, we will recommend the Board approve hiring a consultant to make the wetland determination assessment for review by the NRCS. The cost of these determinations will be paid by the District and are estimated to be $4,500.

If farmed wetlands in this watershed are affected by the proposed relief tile the cost of mitigation is estimated at $20,000 per acre. If verified to be impacted wetland, we would recommend the cost of mitigation be shared between the landowner and the District. This is because all landowners in the District will benefit from the improvement in capacity, and therefore it has become typical that the District participates along with the landowner in the cost of mitigation.

5.3 Conservation and Nutrient Reduction Measures

We encourage the landowners of this District to consider multi-purpose drainage management, which incorporates Best Management Practices (BMPs) which utilize effective measures aimed at reducing sediment and nutrient loading, and improving water quality. These BMPs are divided into three (3) areas: preventative measures, control measures, and treatment measures. Preventative measures that can be applied throughout the watershed include crop rotation, cover crops, residue management, and nutrient management. These measures are aimed at controlling sediment, minimizing erosion and nutrient loss, and sustaining the soils health, all without dramatically changing the current land use of the landscape.

Control measures are practices aimed at improving water quality directly associated with the flow of water by reducing peak flows, providing in stream storage, sedimentation, and nutrient uptake. Examples of control measures include alternative tile intakes, grassed waterways, two (2) stage ditches, water control structures, and controlled subsurface drainage. These practices are directly linked to the conveyance of subsurface tile water or open channel ditch flow.

The function of treatment measures is to improve water quality by directly removing sediment and nutrients from the subsurface or surface water flow throughout a watershed. Examples of treatment measures include surge basins (storage ponds), filter/buffer strips, wetland restorations, woodchip bioreactors, and water and sediment control basins (WASCOBs). These practices may be incorporated to either the public or private drainage systems.

Funding options are available to land owners through the Environmental Quality Incentives Program (EQIP) and the Iowa Water Quality Initiative. EQIP is a voluntary program that provides financial assistance to individual land owners for various conservative practices as identified above. Also, the State of Iowa through the Iowa Water Quality Initiative provides cost share funds to participating landowners to voluntarily install nutrient reduction practices. For information on these programs and to receive free planning assistance contact your local Soil and Water Conservation District.

5.4 Recommendations

Replacing the nearly 100 year old tile main with a larger tile system will provide the needed additional capacity to provide the necessary outlet capacity for good agricultural drainage for all of the lands in the watershed. Therefore, we recommend the Joint Board of Supervisors, acting as Trustees for the District hold a public hearing on this report to consider the input of the District's landowners.

Annexation & Reclassification. As Section 5.1 explains, annexation of the lands receiving benefit that are currently not assessed by the District is recommended. Also, reclassification of DD9 is considered necessary for an equitable distribution of benefits even if the improvement project does not proceed.

Installment Payments. Iowa Drainage District Law Code Section 468.57 provides that large assessments may be paid in not less than ten (10) or more than twenty (20) annual installments at the discretion of the Board of Supervisors acting as Trustees for the District. Based on the estimated cost

of this project, we recommend twenty (20) installments be considered by the Board.

It is recommended that the Board of Supervisors of Osceola County, acting as Trustees for Drainage District No.9, take appropriate action, with legal guidance, to accomplish the following:

1) Tentatively accept this Engineer's Report as filed.
2) Hold a public hearing and consider the input of the District land-owners.
3) Adopt the proposed improvement option and modify as deemed appropriate, to satisfy the desires of the District.
4) Initiate wetland determination proceedings along with impact assessments.
5) Direct the Engineer to prepare the necessary plans and specifications, obtain the necessary permits, and to proceed toward a bid letting.
6) Adopt a resolution of necessity for the annexation of additional lands, if that is the desire of the District.
7) Initiate reclassification procedures.

APPENDIX A:

LANDOWNERS' PETITION

DRAINAGE DISTRICT NO. 9

DRAINAGE PETITION AND BOND

FORM 85AA

Iowa Official Form No. 202 Sections 455.9, 455.10, Code

DRAINAGE PETITION

DR#9

TO THE BOARD OF SUPERVISORS OF _____ COUNTY, IOWA:

The undersigned ask that a drainage Study and improvement

commencing at Sec. 33 W. 150m

and running thence SE

and terminating at Sec. 31 East Holman

be

Your petitioners further state that the lands situated in

are subject to overflow (or are too wet for cultivation or subject to erosion or flood danger), and the public benefit, utility, health, convenience and welfare will be promoted by the above mentioned project.

NAMES	NAMES
Anita Dreesen) executor Tena Stevens estate	
Melanie S & C by Brett Young POA	
Mark A Langevin	

APPENDIX B:

HISTORY OUTLINE

DRAINAGE DISTRICT NO. 9

DRAINAGE DISTRICT NO. 9, OSCEOLA COUNTY, IOWA
HISTORY FROM DRAINAGE RECORDS

Aug. 6, 1908	Petition for establishment of Drainage District No. 9
April 27, 1908	Appoint engineer Walter Barber to do preliminary survey & report
June 3, 1908	Additional survey and designation of DD9
July 3, 1908	Sheriff served Notice to landowners
July 9, 1908	Published Notice of public hearing
July 1908	Board received written objections
July 13, 1908	Establishment of DD9 postponed until further survey investigation, Engineer's Report filed
July 1908	After further investigation, Engineer still recommends the establishment DD9
July 27, 1908	Board overruled objections, motion to establish DD9 with hearing set Aug 27
Aug. 27, 1908	Recommended to public to proceed with establishment of DD9
Sept. 12, 1908	Board Approved Establishment of DD9
Sept. 18, 1908	Published Notice of classification/assessments
Sept. 25, 1908	Sheriff delivered written notices to five landowners
Oct. 17, 1908	Several objection of assessments filed
Nov. 11, 1908	Amendment of assessments using Barber's calculations/recommendations
Nov.12, 1908	Approved new assessments, heard more objections, then adopted by motion
Nov.12, 1908	Published Notice of Appeal and opportunity to appear in court on Jan 4, 1909
Jan. 2, 1909	Court ordered new appraisal and used different Engineer (Guy R. Campbell) and two other new appraisers.
April 22, 1909	Board ask Court for additional time to come up with a fair assessment value
April 30, 1909	Board dismissed and appointed two new appraisers to assist Engineer
May 5, 1909	Board approved new appraised assessment
May 14, 1909	Published Notice of Assessment
May 17, 1909	Sheriff served 16 written notices
June 1, 1909	View written objections

June 8, 1909	Board approved new assessments
July 8, 1909	Published Notice for bids
July 12, 1909	Open bids, approved contract to NW Eng. Co. of Sibley ($13,500) and Elliott Drainage of Onawa ($11,995)
Aug. 30, 1909	Advertise to sell bonds
Sept. 19, 1909	Approved sell of bonds
Sept. 12, 1910	Submitted completion of ditch
Jan. 3, 1911	Approved completion of ditch
1933 thru 1962	Numerous improvements and assessments
May 7, 1985	Petition for flood repairs
May 31, 1991	Request for repairs on DD9 & DD43
June 1, 1991	20 landowners petition for additional improvement and assessment, 2 objected, board proceeded with investigation.
July 22, 2014	Petition requesting an investigation of capacity for a possible improvement received by the Board. Directed I+S Group, Inc. to conduct a preliminary investigation and report findings.

APPENDIX C:

ENGINEER'S ESTIMATE OF PROBABLE COSTS

REPAIR/REPLACEMENT
IMPROVEMENT/REPLACEMENT

TILE REPAIR/REPLACEMENT
DRAINAGE DISTRICT 9 OSCEOLA COUNTY
ENGINEER'S ESTIMATE OF PROBABLE COSTS

PROJECT NUMBER: 17276

DD9 REPAIR/REPLACEMENT

ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1.	Mobilization	1	JOB	26,970.00	$26,970.00
2.	Non-reinforced Concrete Pipe, 8" Dia.	2,100	LF	14.00	$29,400.00
3.	1500D Reinforced Concrete Pipe, 10" Dia.	1,400	LF	17.00	$23,800.00
4.	1500D Reinforced Concrete Pipe, 12" Dia.	900	LF	18.00	$16,200.00
5.	1500D Reinforced Concrete Pipe, 15" Dia.	2,700	LF	21.00	$56,700.00
6.	1500D Reinforced Concrete Pipe, 18" Dia.	6,100	LF	26.00	$158,600.00
7.	1500D Reinforced Concrete Pipe, 20" Dia.	1,900	LF	29.00	$55,100.00
8.	Alignment Turns				
	a. 8" Dia. R.C.P. Elbow Section, Fabrication Only	6	EA	250.00	$1,500.00
	b. 10" Dia. R.C.P. Elbow Section, Fabrication Only	2	EA	275.00	$550.00
	c. 12" Dia. R.C.P. Elbow Section, Fabrication Only	2	EA	290.00	$580.00
	d. 15" Dia. R.C.P. Elbow Section, Fabrication Only	8	EA	300.00	$2,400.00
	e. 18" Dia. R.C.P. Elbow Section, Fabrication Only	26	EA	325.00	$8,450.00
	f. 20" Dia. R.C.P. Elbow Section, Fabrication Only	5	EA	375.00	$1,875.00
9.	Junction Structures	1	EA	5,000.00	$5,000.00
10.	Grade Stabilization Drop Structure	1	EA	20,000.00	$20,000.00
11.	Bulkhead Removal	1	EA	3,500.00	$3,500.00
10.	Tile End Caps				
	a. 8" Dia., Fabrication Only	1	EA	70.00	$70.00
11.	Lateral Tile Connections	7	EA	500.00	$3,500.00
12.	Misc. Drain Tile Repairs & Connections	38	EA	300.00	$11,400.00
13.	Topsoil Strip, Stockpile, Respread	18,670	CY	2.25	$42,007.50
14.	Tile Trench Stabilization and Cradling Rock	220	TN	25.00	$5,500.00
15.	Spot Tile Exploration	12	HR	165.00	$1,980.00
16.	Crush & Bury Existing Tile	15,100	LF	6.00	$90,600.00
17.	Fence Cuts	2	EA	250.00	$500.00
	CONSTRUCTION COST SUBTOTAL				**$566,182.50**
	Engineering Services:				
	Survey				$10,000.00
	Engineer Administration & Design Services				$45,300.00
	Research/Study/Engineering Report				$22,650.00
	Final Plans & Specs				$16,990.00
	Construction Admin/Staking/Observation				$16,990.00
	Legal & Auditor Services, Publication, Misc.				$1,500.00
	Damages (35.0 AC @ $700/AC)				$24,500.00
	Contingencies				$56,620.00
	REPLACEMENT PROJECT COST SUBTOTAL				**$760,732.50**
	Other Potential District Costs:				
	Annexation (447 AC)				$5,000.00
	Reclassification (1,470 AC @ $6.00/AC, 950 AC Branch Tile @ $5.00/AC)				$13,570.00
	Project Warrant Interest				$58,310.00
	TOTAL ESTIMATED PROJECT COST				**$837,612.50**
	Average Cost per Assessed Acre (1,470 acres)				$569.80
	Average Cost per Watershed Acre for 10 years				$56.98
	NON-DISTRICT COSTS				
	Secondary Roads: Bored Cut				
	Furnish & Install 15" 3000D RCP, Highway 9	100	LF	375.00	$37,500.00
	Furnish & Install 15" 3000D RCP, Red Wing Ave	100	LF	375.00	$37,500.00
	TOTAL ESTIMATED NON-DISTRICT COSTS				**$75,000.00**

TILE IMPROVEMENT/REPLACEMENT
DRAINAGE DISTRICT 9 OSCEOLA COUNTY
ENGINEER'S ESTIMATE OF PROBABLE COSTS

PROJECT NUMBER: 17276

DD9 IMPROVEMENT/REPLACEMENT

ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1.	Mobilization	1	JOB	41,550.00	$41,550.00
2.	Non-reinforced Concrete Pipe, 8" Dia.	1,518	LF	14.00	$21,252.00
3.	1500D Reinforced Concrete Pipe, 10" Dia.	800	LF	17.00	$13,600.00
4.	1500D Reinforced Concrete Pipe, 15" Dia.	1,350	LF	21.00	$28,350.00
5.	1500D Reinforced Concrete Pipe, 24" Dia.	1,754	LF	37.00	$64,898.00
6.	1500D Reinforced Concrete Pipe, 30" Dia.	9,696	LF	53.00	$513,888.00
7.	Alignment Turns				
	a. 8" Dia. R.C.P. Elbow Section, Fabrication Only	4	EA	250.00	$1,000.00
	b. 10" Dia. R.C.P. Elbow Section, Fabrication Only	3	EA	275.00	$825.00
	c. 15" Dia. R.C.P. Elbow Section, Fabrication Only	1	EA	300.00	$300.00
	d. 24" Dia. R.C.P. Elbow Section, Fabrication Only	5	EA	425.00	$2,125.00
	e. 30" Dia. R.C.P. Elbow Section, Fabrication Only	36	EA	580.00	$20,880.00
8.	Junction Structures	1	EA	5,000.00	$5,000.00
9.	Grade Stabilization Drop Structure	1	EA	20,000.00	$20,000.00
10.	Bulkhead Removal	1	EA	3,500.00	$3,500.00
11.	Tile End Caps				
	a. 8" Dia., Fabrication Only	1	EA	70.00	$70.00
12.	Lateral Tile Connections	7	EA	500.00	$3,500.00
13.	Misc. Drain Tile Repairs & Connections	38	EA	300.00	$11,400.00
14.	Topsoil Strip, Stockpile, Respread	18,670	CY	2.25	$42,010.00
15.	Tile Trench Stabilization and Cradling Rock	225	TN	25.00	$5,625.00
16.	Spot Tile Exploration	16	HR	165.00	$2,640.00
17.	Crush & Bury Existing Tile	15,118	LF	6.00	$90,708.00
18.	Fence Cuts	2	EA	250.00	$500.00
	CONSTRUCTION COST SUBTOTAL				**$893,621.00**
	Engineering Services:				
	Survey				$10,000.00
	Engineer Administration & Design Services				$71,490.00
	Research/Study/Engineering Report				$35,750.00
	Final Plans & Specs				$26,810.00
	Construction Admin/Staking/Observation				$26,810.00
	Legal & Auditor Services, Publication, Misc.				$1,500.00
	Damages (35.0 AC @ $700/AC)				$24,500.00
	Contingencies				$89,370.00
	REPLACEMENT PROJECT COST SUBTOTAL				**$1,179,851.00**
	Other Potential District Costs:				
	Annexation (447 AC)				$5,000.00
	Reclassification (1,470 AC @ $6.00/AC, 950 AC Branch Tile @ $5.00/AC)				$13,570.00
	Project Warrant Interest				$91,440.00
	TOTAL ESTIMATED PROJECT COST				**$1,289,861.00**
	Average Cost per Assessed Acre (1,470 acres)				$877.46
	Average Cost per Watershed Acre for 10 years				$87.75
	NON-DISTRICT COSTS				
	Secondary Roads: Bored Cut				
	Furnish & Install 30" 3000D RCP, Highway 9	100	LF	700.00	$70,000.00
	Furnish & Install 30" 3000D RCP, Red Wing Ave	100	LF	700.00	$70,000.00
	TOTAL ESTIMATED NON-DISTRICT COSTS				**$140,000.00**

PRELIMINARY PLAN SET

A.01	TITLE SHEET
A.02	DISTRICT PLAT
A.03	FLOWPATH MAP
D.01 – D.07	TILE PROFILE