

ENGINEER'S REPORT FOR:

TILE REPAIRS

DRAINAGE DISTRICT NO. 4  
OSCEOLA COUNTY, IOWA

FEBRUARY, 2016  
Project No. 14-17235



I+S GROUP

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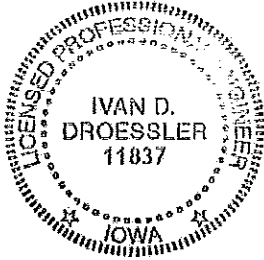
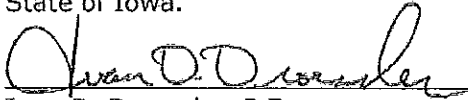
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DRAINAGE DISTRICT NO. 4  
OSCEOLA COUNTY, IOWA

PROJECT NO. 14-17235

	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.</p> <p> <u>2/23/2016</u> Ivan D. Droessler, P.E. Date</p> <p>License No.: 11837</p> <p>My License Renewal Date is December 31, 2017</p>
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H+S GROUP

1725 NORTH LAKE AVENUE  
STORM LAKE, IOWA 50588

**ENGINEER'S REPORT  
FOR  
TILE REPAIRS  
DRAINAGE DISTRICT NO. 4  
OSCEOLA, IOWA  
FEBRUARY, 2016**

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**ENGINEER'S REPORT  
FOR  
TILE REPAIRS  
DRAINAGE DISTRICT NO. 4  
OSECOLA COUNTIES, IOWA  
FEBRUARY, 2016**

**1.0 INTRODUCTION**

**1.1 Scope of Work**

The following report is presented to provide information relative to a tile repair project for Drainage District No. 4, Osceola County, Iowa.

In the fall of 2014, the Osceola County Board of Supervisors acting as Trustees for Drainage District No. 4 (DD4) received a petition from landowners; Robyn Wilson, Bruce Lorch, and Dan Hartwig, in the central part of the District (see Appendix A for the landowners' petition). The petition called for an investigation of damages to the District's tile main and the need for upgrades. In late October of 2014 the Board of Supervisors hired I+S Group, Inc. (ISG) to conduct a preliminary investigation and report our findings. A Preliminary Report was filed with the Board on January 13, 2015 that outlines the tile main being severely under sized with inadequate capacity for good agricultural drainage. An informational meeting was held with the landowners on February 5, 2015 to discuss the findings and proposed improvement options. There was a lot of concern expressed about the cost of the improvements at the meeting with the Board asking the landowners to provide written comments, objections and recommendations to the Board. On March 10, 2015 the Board authorized ISG to perform a field survey to verify tile elevations and to confirm the failed condition of the tile in the NW ¼ of Section 7, Allison Township. In addition, the Board directed ISG to prepare a letter requesting the landowners of the District to provide wetland determinations for their property so the impact of drainage improvements to existing farmed wetlands could be determined. The letter was sent in March of 2015, raising additional questions and concerns from landowners in the District. Thereafter, the petition for improvements to the tile system was withdrawn, but the need for repair of the District tile in Section 7, Allison Township remains. Section 486.126 (1) Iowa Drainage Code states; "When any levee or drainage Dis-

trict has been established and the improvement constructed, the improvement shall be at all times under the supervision of the board of supervisors except as otherwise provided for control and management by a board of trustees and the board shall keep the improvement in repair as provide in this Section. In addition, Section 486.126 (1) a. provides that; "The Board may at any time on its own motion, without notice, may order done whatever is necessary to restore or maintain a drainage or levee improvement in its original efficiency or capacity, and for that purpose may remove silt and debris, repair any damaged structures, remove weeds and other vegetable growth, and whatever else may be needed to restore or maintain such efficiency or capacity or to prolong its useful life."

This report addresses the necessary repairs to the tile system to restore the failed tile. Our investigation included the use of existing District plats, aerial photography, soils and topographical maps along with our own field survey.

## **1.2 Location & Description**

The tile system of DD4 serves approximately 1,693 acres and outlets to an unnamed tributary of the Ocheyedan River. Drainage District No. 4 consists of one (1) tile main, one (1) branch and one (1) open ditch. The open ditch runs from its outlet in SW ¼ of SE ¼ of Section 7, Allison Township in a northerly direction for approximately 928 linear feet where the main tile outlets through a bulkhead into the open ditch. The main tile then traverses northerly 4,372 linear feet into the NW ¼ of NE ¼ of Section 7, where the main tile then turns abruptly southwesterly. The original plat of the District shows this tile extending 6,700 feet into the SW ¼ of SE ¼ of Section 12 of Ocheyedan Township. However, it should be noted that upper 3,200 tile main is assumed abandoned with the establishment of "Sutton Lake" and the tile assumed to terminate at Approximately Station 87+95.

Branch No. 1 is then shown to junction with the tile main at Station 53+00 and to proceed northerly for approximately 800 linear feet crossing 160<sup>th</sup> Street. Then this tile branch turns easterly for approximately 3,300 linear feet, crossing Vine Avenue and then south in the SW ¼ of SW ¼ of Section 5 crossing 160<sup>th</sup> Street for the second time. Branch No. 1 continues south for approximately 2,500 linear feet until termination in the SW ¼ of NW ¼ of Section 8, Allison Township (please refer Sheet A.01 for a plat of the tile facilities).

### **1.3 History Summary**

The District was established on October 5, 1905 with construction completed on September 15, 1908. Then on February 6, 1914 the Board of Supervisors approved the annexation of additional lands into the District that were found to be benefitting from the District's drainage improvements. Also, it is noted in records that an improvement to the unnamed tributary of the Ocheyedan River downstream of the District's outlet was also considered in 1914. This improvement would have involved the establishment of Drainage District 19. However; on April 20, 1914, the Board of Supervisors abandoned the plan and the establishment of Drainage District 19 was discontinued.

Additional lands were again annexed into DD4 on November 25, 1986 and in 1997, the Board of Supervisors engaged the engineering firm of Jacobson Westergard & Associates, Inc. to prepare a Preliminary Engineering Report evaluating the existing facilities of the District. That Report filed in January of 1998 documented that the existing system was undersized and did not provide adequate drainage (based on a drainage coefficient of ½ inch). The Report provided various improvement alternatives, including increased tile sizes and construction of open ditches. However, on June 23, 1998, the Board of Supervisors rejected enacting any of the proposed improvements. A landowner acting on his own accord with approval of the county engineer replaced 1,400 linear feet of tile of the tile main from Station 73+95 to 87+95. See Appendix B for complete outline of the District's history.

## **2.0 INVESTIGATION**

### **2.1 Evaluation of Existing Facilities**

There was no tile profile of record that reflected the design elevations or grade of the tile main. Therefore, we have prepared a profile of the existing ground surface over the tile main alignment from Station 53+00 to 87+95 from LiDAR topographic data, a tile investigation completed by Rocky Marco as part of the 1998 tile repair, and field survey data gathered by ISG in early summer of 2015. The grade determined from this information for the main tile from Station 9+28 to 53+00 is 0.10% (0.001 ft/ft), and the grade for Station 53+00 to 87+94.75 is 0.05% (0.0005 ft/ft). The

grade for Branch No. 1 was determined to be 0.10% (0.001 ft/ft). Our evaluation of original capacity and proposed tile repair are based on this profile as reported in our Preliminary Report filed on January 13, 2015.

We analyzed the capacity of the tile based on five (5) 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 ½ 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 ¾ inch drainage coefficient. Our investigation concluded the majority of the lands in the watershed do not have adequate surface drainage. Therefore, the recommended design capacity of this tile system was calculated using a ½ inch drainage coefficient for 1,544 acres of land. The results of this evaluation are summarized within Table 1 of this report.

Table 1 –Existing Tile Capacities-Drainage District No. 4

STATION	SIZE (in)	SLOPE (ft/ft)	A (ft <sup>2</sup> )	P (ft)	R (ft/ft)	n	Q (CFS)	DA (Ac.)	Drainage Coeff.	% of 1/2" Coeff.
<b>MAIN TILE</b>										
STA 9+28 to STA 53+00	20	0.001	2.1817	5.236	0.4167	0.0108	5.30	1544	0.082	16.3%
STA 53+00 to STA 89+95	12	0.0005	0.7854	3.142	0.2500	0.0108	0.96	483	0.0477	9.5%
<b>BRANCH 1</b>										
STA 0+00 to STA 32+00	15	0.001	1.2272	3.927	0.3125	0.0108	2.46	302	0.194	38.7%
STA 32+00 to STA 55+00	12	0.001	0.7854	3.142	0.2500	0.0108	1.36	213	0.151	30.2%
STA 55+00 to STA 65+00	10	0.001	0.5454	2.618	0.2083	0.0120	0.75	104	0.170	34.1%

## **2.2 Existing Capacity Findings**

The existing tile main provides only provides approximate 15 percent of the recommended capacity for good agricultural drainage and restricts the capacity of the overall tile system. Our Preliminary Report of January 13, 2015 outlined that based on a ½ inch drainage coefficient, the tile main would need to be increased from 20 inch diameter to 42 inch from Station 9+25 to 53+00 and then from 12 inch to 24 inch from Station 53+00 to 87+95. Branch 1 would be increased from 15 Inch to 24 inch from junction with main to Station 39+92.

## **2.3 Existing Tile Condition**

Our field investigation has confirmed the reports by the landowner traversed by the tile main in the NW ¼ of Section 7, Allison Township that the tile main from Station 53+00 to 73+95 has failed with the tile collapsing in several locations and is now filled with sediment and not functioning. Above, Station 73+95 the tile main is assumed to be in good condition, for 1400 linear feet of this tile has been confirmed to have been replaced in 1998 by Rocky Marco.

Therefore, to restore the tile to its original condition, it is necessary to replace the original tile main from approximately Station 53+00, just above the junction with Branch No. 1, to approximately Station 73+95.

## **2.4 Right-of-Way Crossings**

There are no road, railroad or entrance crossings associated with the proposed tile repairs.

## **2.5 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.



## **2.6 Fence Cuts**

There are no fence lines that will be crossed by the proposed repair.

## **2.7 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 replacement 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 REPAIR**

Since the original petitioners withdrew their request for an improvement to the District's Tile Main, it is necessary to restore the original drainage capacity by replacing the tile from Station 53+00 to 73+95.

### **3.1 Tile Replacement**

Due to the shallow cover conditions we are recommending dual wall polypropylene plastic (PP) pipe be utilized and installed with aggregate bedding and backfill to provide support to the pipe. Polypropylene plastic (PP) meets all the ASTM and ASHTO specifications that HDPE (high density polyethylene) meets and has a design life of

+100 years but PP pipe has a higher load rating than HDPE, which is preferred for this shallow soil cover situation.

The work will involve the removal, crushing and burial of the existing tile and the installation of approximately 2,095 linear feet of new 12 inch tile following the existing alignment and grade of the tile main.

Above Station 87+95, the existing tile system should be investigated to ensure that the original tile under Sutton Lake has been abandoned with the tile main capped off properly to ensure no intrusion of sediment.

The proposed replacement tile line will follow the existing tile line at the same grade and depth. By following the existing line all of the existing tile connections will be easily identified and tied directly into the new main with the Contractor making adjustments in the field as necessary.

### **3.2 Method of Construction**

Before installation of the replacement tile, the Contractor will be required to field check the planned gradeline of the new tile by excavating the existing tile at both ends of the replacement segment. During construction, the Contractor will need to determine a feasible length of tile for replacement each day with the upper end of the existing tile block off to prevent drainage discharge into the daily trenching. 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 a trench adjacent to the new tile.

### **3.3 Engineer's Opinion of Cost**

We have prepared itemized cost estimate (see Appendix C) for repair of the existing tile main. The current construction cost to replace the existing tile main from Station 53+00 to 73+95 with the same size tile at same grade is estimated at \$71,315.

In Section 4.1 of this Report we discuss the current assessment schedule of this District and our recommendations for reclassification. Also, we further discuss which

lands are benefitted by this tile repair and how these costs and future maintenance costs should be distributed with separate assessment schedules.

#### **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) there were no lands found to be inside of the watershed boundary that are not in the current assessment schedule.

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 with all lands in the District paying a portion of the cost. This was typical practice at the time of establishment of a District. However, then as repairs became necessary new maintenance schedules should have been developed with only those lands receiving benefit from the individual facilities paying for the upkeep of that individual facility.

Drainage District No. 4 has not been reclassified since the original construction. Therefore, when repair work is done on any segment of the tile system, 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, because the proposed repair is a major repair to this tile facility, we are recommending Drainage District No. 4 be reclassified with separate assessment schedules developed to distribute the benefits of the individual facilities. As part of this reclassification, we are also recommending that the tile from Station 53+00 to Station 87+95 on the original tile main be re-designated Branch No. 2 and only the lands served by Branch No. 2 assessed for this replace (see Sheet A.02 for sub-

watershed areas). In addition, we are recommending the first 800 LF of tile currently designated Branch 1 (from the junction at Station 53+00, traversing northerly across 160<sup>th</sup> Street) be re-designated tile main for this tile serves as the only outlet to a large portion of the watershed north of 160<sup>th</sup> street. Branch 1 will then continue from this point easterly.

Therefore, during reclassification there will be four (4) separate assessment schedules developed; Main Open Ditch, Tile Main, Branch 1 and Branch 2. The cost of reclassification will be distributed back to each of these individual schedules. The benefitted acres and estimate cost of reclassification is as follows:

1.	Main Open Ditch	1,693 acres	\$8,465
2.	Tile Main	1,544 acres	\$6,176
3.	Branch 1	302 acres	\$1,208
4.	Branch 2	483 acres	\$1,932

We would also recommend all engineering costs incurred prior to this Engineer's Report for the evaluation of improvement options for this District, be paid under the new open ditch schedule. However, the engineering and construction costs to repair the failed tile segment should be assessed to the 483 acres that will comprise Branch No. 2.

## **5.0 DISCUSSION & RECOMMENDATIONS**

### **5.1 General**

The need to restore the drainage capacity of tile system upstream of Station 53+00 is apparent and will involve replacing the failed 12 inch tile with a new 12 inch tile.

### **5.2 Jurisdictional Wetlands**

The USDA Farm Program has long included wetland conservation compliance "swampbuster" provisions administered 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 jurisdic-

tion 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. This project would only involve restoring the historical drainage of this District.

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 DD4 that the tile main of DD4 outlet too. Any wetland in this watershed would be considered to be isolated wetlands and not under the jurisdiction of the USACE.

### **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**

Without a major improvement project, the historical drainage capacity of this tile system will remain inadequate for good agricultural drainage. However, as discussed Section 1.1 of this Report, the Board of Trustees under Section 468.126 (1) of Iowa Drainage Code is required to keep the existing facilities of the District in repair. Therefore, the proposed replacement of the failed tile segment is found necessary by our investigation and required by Iowa Drainage Law. Therefore, we recommend the 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 prior to proceeding with a bid letting for this work.

**Reclassification.** Section 5.1 explains the need for reclassification of Drainage District No. 4 and advises that separate assessment schedules should be developed to redistribute the benefit that each of the lands in this District receives from the existing facilities of the District.

**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 Trus-

tees for the District. Based on the estimated cost of this project and the 483 acres receiving benefit we would recommend ten (10) installments be considered by the Board. The average cost (assuming all 483 acres of land received the same benefit) is \$147.65 per acre or 14.77 per acre per year for 10 years.

It is recommended that the Board of Supervisors of Osceola County, acting as Trustees for Drainage District No. 4, 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 landowners.
- 3) Adopt the proposed repair and modify as deemed appropriate, to satisfy the desires of the District.
- 4) Direct the Engineer to prepare the necessary plans and specifications, obtain the necessary permits, and to proceed toward a bid letting.
- 5) Initiate reclassification procedures.

**APPENDIX A:**

**LANDOWNERS' PETITION**

**DRAINAGE DISTRICT NO. 4**



Calvin Bosma

DRAINAGE PETITION

DIST 4

TO THE BOARD OF SUPERVISORS OF \_\_\_\_\_ COUNTY, IOWA:

The undersigned ask that a drainage  
commencing at NW 1/4 Sec 7 Allison  
and running thence \_\_\_\_\_

*file is damaged and it  
should be upgraded*

and terminating at \_\_\_\_\_

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

*Robert Wilson*  
*Bruce Lorch*  
*Dan Hartwig*

NAMES

*Robert Wilson*  
*Bruce Lorch*  
*Dan Hartwig*

**APPENDIX B:**  
**HISTORY OUTLINE**  
**DRAINAGE DISTRICT NO. 4**

**DRAINAGE DISTRICT NO. 4, OSCEOLA COUNTY, IOWA  
HISTORY FROM DRAINAGE RECORDS**

Oct. 5, 1905	Drain # 4 established
March, 1907	Auditor instructed to advertise for bids and bonds
April, 1907	Notice of letting published (Sta. 0 to 97 tiles; 97 to 120 open ditch )
April 16, 1907	Accepted bid from Sibley Cement Co. Inc.
May, 1907	Helen Barta objected to ditch and installed tile and built bulkhead
May 15, 1907	Approved contract
Sept 15, 1908	Drain completed
July 15, 1910	Filed petition to have adjoining landowners outside of District # 4 to remove tiles to stop water from entering into District # 4
Aug.9, 1910	Appoint Engineer Walter Barber to examine problem of additional tiles
Sept. 12, 1910	Engineers report shows findings that several landowners empty tiles into DD # 4, these lands were omitted from the district inadvertently, and recommends they be annexed into the district.
Feb. 20, 1911	Heard objections for annexation
April 17, 1911	Set hearing for annexation of addition lands in district # 4
Nov. 14, 1912	Board hears from several landowners request for annexation
April 20, 1914	Abandon District # 19, which is an extention of District # 4
1930 thru 1983	Continued assessments for additional repairs.
May 19, 1986	Mailed notice of proposed annexation of certain lands into DD # 4
June 17, 1986	Request Jacobson-Westergard to complete study for annexation of certain lands and reclassification of existing
Aug. 6, 1986	Notice for reclassification
Oct. 7, 1986	Hearing on reclassification
Nov. 25, 1986	Additional lands annexed and reclassified
April 15, 1998	Notice for additional repairs
May 4, 1998	Public hearing
June 23, 1998	Objection read, rejected
June 26, 1998	Sheriff served notice to 22 landowners

**APPENDIX C:**  
**ENGINEER'S ESTIMATE OF PROBABLE COSTS**  
**REPAIR/REPLACEMENT**

REPAIR-PARTIAL REPLACEMENT  
DRAINAGE DISTRICT NO. 4, OSCEOLA COUNTY  
PRELIMINARY ENGINEER'S ESTIMATE OF PROBABLE COSTS



PROJECT NUMBER: 17235

TILE REPAIRS - PARTIAL REPLACEMENT  
STATIONS 53+00 to 73+95

ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1.	Mobilization	1.00	JOB	3,600.00	\$3,600.00
2.	Perforated, Dual Wall PP (Polypropylene) Pipe, 12" Dia.	2,095	LF	18.00	\$37,710.00
3.	Aggregate Base, Class 1 Material	43	TN	25.00	\$1,075.00
4.	Dual Wall PP Elbow Section 12" Dia.	2	EA	250.00	\$500.00
5.	Connect to Existing Tile	2	EA	55.00	\$110.00
6.	Lateral Tile Connections	10	EA	500.00	\$5,000.00
7.	Topsoil Strip, Stockpile, Respread	3,880	CY	2.25	\$8,730.00
8.	Tile Trench Stabilization and Cradling Rock, Class 1 Material	27	TN	25.00	\$675.00
9.	Cap Abandoned Tile	1	EA	355.00	\$355.00
10.	Spot Tile Exploration	3	EA	330.00	\$990.00
11.	Crush and Bury Existing Tile	2,095	LF	6.00	\$12,570.00
<b>CONSTRUCTION COST SUBTOTAL=</b>					<b>\$71,315.00</b>
Engineering Services:					
Repair Design, Plans, and Report					\$6,100.00
Final Plans & Specs					\$2,250.00
Construction Services					\$2,250.00
Contingencies					\$7,100.00
Damages					\$1,500.00
Other Potential District Costs:					
Reclassification - Branch No. 2 (483 Acres)					\$1,932.00
<b>REPAIR PROJECT COST TOTAL</b>					<b>\$92,447.00</b>
Average Cost per Benefited Acre (483 acres)					\$147.65
Average Cost per Benefited Acre for 10 years					\$14.77

## **PRELIMINARY PLAN SET**

A.01	TITLE SHEET
A.02	DISTRICT PLAT
A.03	FLOWPATH MAP
D.01 – D.06	TILE PROFILE