



Engineer's Report:

MAIN TILE AND OPEN DITCH

JOINT DRAINAGE DISTRICT NO.1

STORY AND MARSHALL COUNTIES, IOWA

May 1, 2014
13-16319

ENGINEER'S REPORT

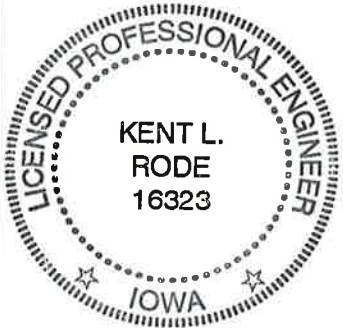
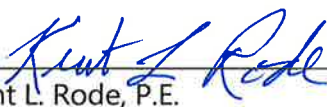
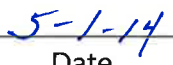
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2014

I&S PROJ. NO. 13-16319

 KENT L. RODE 16323 IOWA	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.  Kent L. Rode, P.E.  Date License No: 16323 My License Renewal Date is December 31, 2015 Sections covered by this seal: <u>All Sections Listed in the Table of Contents</u>
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TABLE OF CONTENTS

1.0	INTRODUCTION
1.1	Scope of Work
1.2	Location
1.3	District Facilities
1.4	History
2.0	INVESTIGATION
2.1	Survey and Investigation
2.2	Channel and Tile Capacity
2.3	District Right-of-Way
2.4	Conservation Acres
2.5	Jurisdictional Wetlands
2.6	Impacts to Wetlands
3.0	PROPOSED WORK & ESTIMATE OF PROBABLE COSTS
3.1	Option 1 - Main Tile and Open Ditch Repairs
3.2	Option 2 – Main Tile Improvements and Open Ditch Repair
3.3	Work Limits and Damages
3.4	Annexation
3.5	Right-of-Way Needs
4.0	OPINIONS OF PROBABLE COSTS
5.0	ASSESSMENT SCHEDULE REVIEW
5.1	Benefited Lands
5.2	Reclassification
6.0	DISCUSSION & RECOMMENDATIONS
APPENDIX – A	Photographs
APPENDIX – B	Opinions of Probable Costs
APPENDIX – C	Preliminary Proposed Plans

ENGINEER'S REPORT

MAIN TILE AND OPEN DITCH JOINT DRAINAGE DISTRICT NO. 1 STORY AND MARSHALL COUNTIES, IOWA 2014

1. INTRODUCTION

1.1. Scope of Work

The purpose of this report is to provide information relative to drainage relief requested by landowners within Joint Drainage District No. 1 Story and Marshall Counties, Iowa (JDD1). A request was presented by a landowner to the Joint Board of Supervisors for drainage repairs in 2013 and the Joint Board appointed I&S Group, Inc. in December, 2013 to complete a preliminary study and engineering report.

This report includes two options for Main Ditch and Tile of the Joint District:

1. Option one is for repairs including a clean out of the existing open ditch and replacement of a portion of the main tile with the same size tile. The repaired system would restore the same drainage capacity as the current system, which is about 1/8 inch per day.
2. Option two includes a tile and open ditch improvement which would clean and widen the open ditch, and would replace the existing 30 inch tile with new 42 inch tile. This improved system would increase the drainage capacity of the main tile and ditch to the modern criteria of 3/8 inch per day drainage capacity.

These two options will include the acquisition of needed right-of-way for the existing open ditch facility. In addition, this report discusses the annexation of additional benefited lands that drain to this open ditch and tile facility along with classification/reclassification of all benefited lands to an open ditch/main assessment schedule.

1.2. Location

This district lies on the boundary of Story and Marshall Counties located generally northwest of the City of State Center and northeast of the City of Colo. The watershed of the joint district is located in Sections 25, 26, 27, 34, 35 and 36 of Sherman Township (T-84-N, R-21-W) and in Sections 1, 2, 3, 10, 11 and 12 in New Albany Township (T-83-N, R-21-W) in Story County and in Sections 29, 30, 31 and 32 of Minerva Township (T-84-N, R-20-W) and in Sections 5, 6 and 7 of State Center Township (T-83-N, R-20-W) in Marshall County.

The current lands of the joint district are listed as 4,573 acres. Our review of the watershed boundary using recent LIDAR data finds 4,773 acres to drain by surface to the outlet of JDD1, compared to the 4,573 acres on the current assessment schedule. A majority of these additional acres are draining to the outlet ditch, which appears to have been extended after the initial district construction but the district was apparently not reclassified to include these areas that drain to the outlet ditch.

The open ditch of JDD1 outlets into Linn Creek in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 32-84-20. Linn Creek continues easterly to the Iowa River.

1.3. District Facilities

There are several existing district facilities that lie within the jurisdiction of JDD1. The JDD1 facilities consist of an open ditch, a tile main and four (4) branch lateral tile lines. A description of the general location and route of each follows:

Main

Open Ditch- Outlets to a Linn Creek in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 32-84-20 that continues easterly to the Iowa River. The open ditch extends in a southwesterly direction approximately 3,050 feet from Linn Creek towards the south line of the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 7-96-18 to the outlet of the main tile. Records indicate that it has been extended downstream from the original construction location during subsequent cleanouts.

Main Tile- Outlets to the upper end of the Main open ditch at a headwall in the center of Section 6-83-20. This tile extends southwest from the open ditch approximately 2,200 feet in the SW $\frac{1}{4}$ Section 6-83-20. This tile then continues west in the SW $\frac{1}{4}$ Section 1-83-21 for approximately 3100 feet to the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 1-83-21. This tile then continues northwest, then southwest to the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 1-83-21 where it ends at Branches A and B.

Branch A- Outlets to the main tile in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 1-83-21. This tile extends west and south for approximately 9000 feet to the NW $\frac{1}{4}$ of Section 11-83-21.

Branch B- Outlets to the main tile in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 1-83-21. This tile extends west and south for approximately 5000 feet to the NE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 2-83-21.

Branch C- Outlets to the main tile in the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 1-83-21. This tile extends west and north for approximately 14000 feet to the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 26-84-21.

Branch D- Outlets to the main ditch in the SW1/4 SW ¼ Section 32-84-20. This branch extends northwesterly about 2000 feet as an open ditch, then extends another 4700 feet as a tile to the west line of the NW1/4 of the NE1/4 of Section 36-84-21. The records of the Joint District do not indicate when or how this tile and ditch were built; it is not shown on a 1925 plat, but is shown as existing on an undated plat of the same decade.

1.4. History

The drainage district records are not complete and several key documents including the original plans, right of way documents and plat for the original drain tile and ditch construction are not available. Recorded County documents and the records of the Joint Drainage district trustees indicate the following history:

August 31, 1905	Petition for Drainage District and Drain
December 27, 1905	Original Report of Commissioners recommends construction of open ditch throughout the district to drain 4500 acres
November 28, 1906	Drainage Improvements
January 14, 1907	Supplemental report with revised recommendation by engineer to substitute drain tile for the open ditch in part of the district and to extend one Branch tile. Many landowners dropped their objections to the open drainage ditch after this revision
May 29, 1907	Let bids for drainage improvements. Bids rejected and readvertised
June 10, 1907	Rebid drainage project
August 2, 1907	Petition to Abandon Branch C
August 2, 1907	Engineer's Supplemental Report recommends extending the 18" tile and no 16" tile be used
1907 – 1910	Drainage improvement construction. Engineer reports that contractor has not started work by his contract completion time. Various letters and meetings are held regarding construction delays and subcontracting work to other contractors. Documented construction problems include tile that are left open during construction and silt closed, open pipe joints of pipe not properly installed, broken tile during or soon after construction and outlet ditch not cleaned satisfactorily.

November 14, 1911	Joint Board meets to approve final settlement with contractor. Penalties charged for work completed 665 days after contract completion date. Contractor payment is withheld for outlet ditch not satisfactorily cleaned, and Contractor is given until June 1, 2012 to complete ditch cleaning or forfeit withheld sums. The amount of unpaid bills from suppliers are deducted from Contractor's final payment amount. Additional assessment in the amount of 51% of the original assessment is approved to cover final project costs.
June 30, 1920	Petition by E. A. Hilleman and five others for parallel tile drains along existing Main tile and Branches A, B & C, and an open ditch or tile along the present open ditch and extending as necessary.
Undated	Engineer's report states that existing tile are too small and recommends improvements with parallel tile to existing, additional branch tile to serve additional parcels in the district that are not connected and outlet ditch cleaning, deepening and extension for 128 rods. Recommends adding 295 acres to original 4500 acres of the District.
February 21, 1925	Commissioners Report states that present open ditch has partially filled, 30" tile has one foot of water over the top at its outlet, existing tile are too small, and recommends improvements with parallel tile, additional tile branches and improved and deeper outlet ditch in response to petition of E. A. Hilleman and others. No record that this improvement was built.
May 14, 1925	Petition by E. A. Hilleman and four others to clarify that their 1920 petition for improvements was for a repair of the existing drainage system and not for a new drainage system, and to modify their original 1920 petition.
May 14, 1924	Remonstrance against proposed Drainage District claims original petition was for repairs rather than new drainage system, proposed cost is excessive, original tile installation was defective and was not inspected properly, and that 30' tile was filled with mud over half full during original construction.
May 14, 1924	Joint Board holds public hearing and then unanimously dismisses proceedings on proposed drainage improvements
June 26, 1925	Joint Board directs cleanout and repair of drain unless landowners place drain under trustee management by filing proper petitions before July 15, 1925.

July 13, 1925	Petition is filed to transfer control and management of joint drainage district to trustees.
July 22, 1925	Boards of Supervisors of Marshall and Story Counties meet and vote to assess 7% of original drainage assessment to provide funds to take care of outstanding indebtedness of joint drainage district, and then to transfer control and management to trustees and call for trustee elections.
September 5, 1925	Election of Trustees
September 21, 1925	First meeting of Board of Trustees of Marshall Story Drainage District Number One to organize and to inspect the drainage system.
September 22, 1925	Board of Trustees meeting to review blueprints and to test the use of dynamite on open ditch at Marshall Roberts farm. Dynamite tests were not entirely satisfactory, and further tests were proposed. Authorized contacting contractors and dredge manufacturers.
October 5, 1925	Board of Trustees meets and hears that further tests with dynamite were not entirely satisfactory and authorizes hiring engineer and advertising for ditch cleanout.
October 14, 1925	Specifications and advertising for ditch cleaning
October 20, 1925	Trustee Board receives Bids, awards ditch cleaning contract to Louis Davis. Ditch has 4' bottom with 1.25:1 sideslopes
August 23, 1926	Trustee Board approves completed construction work by Louis Davis
November 6, 1928	Trustee Board approves purchase of dredge for \$700 plus \$30 freight
January 18, 1930	Trustee Board approves selling dredge after recleaning ditch is completed
1920s and 1930s	Many labor and tile payments for tile repairs
September 6, 1930	Board approves rebuilding bulkhead
June 21, 1933	Trustees meet at Ernie Hilleman farm to review 26" and 30" tile and open ditch; 6-26" tile and 50' of 30" tile are out and broken down, 5-26" tile fills, 8-30" tile fills and open ditch needs cleaning from bulkhead to about 60 rods east.
Feb 21, 1941	Dredge owned by district cannot be repaired

March 26, 1941	Approve Marshall County dragline and operator to clean ditch
April 12, 1941	Marshall County has cleaned ditch and it is acceptable; sold old drag line for \$125 to O.A. Eatwell
January 28, 1950	Repair with 3 pieces of 30"x18' steel pipe
June 29, 1951	Petition requests a drainage overflow channel to let surface water flow out of the flat area in Sect. 6-83-20 and to run west across Sect. 6-83-20; Sect. 1-83-21, and into Sect. 2-83-21. Lands in Sections 1, 2 & 11-83-21 and Sections 26, 27 & 35-84-21 are subject to overflow.
November 17, 1951	Invoice for 60' of 30" culvert pipe
Aug 19, 1952	Work on tile line
May 19, 1955	Filled Ditch at Kenneth Lively property
August 10, 1955	Invoice for 80' of 28" CMP
October 21, 1955	Filled Ditch at Rueben Hilleman property
November 2, 1955	Invoice for 100' of 20"x24" concrete drain tile
November 23, 1955	Filled Ditch at Henry Chitty property
April 18, 1957	Letter from Farm Manager L.L. Mally regarding J.T. Shilling farm in Section 6 of State Center Township; H.F. Chitty is the tenant. Large washout is reported over 30" tile and three or four depressions along tile main indicate additional repair is needed.
December 20, 1961	Trustees met at ASC office to discuss repair of ditch or new ditch
November 30, 1962	Work on Culvert pipe 3 ¼ miles east of junction of Highway 65 and 30 near Colo. Invoice for 40' of 16"CMP, 20' of 24"CMP, 100' of 28"CMP and 12' of 30" CMP
July 5, 1963	Repair to reinstall culvert. Invoice for 32' of 30" CMP
July 7, 1963	Repair on broken tile drain. Invoices for 140' of 28" CMP and 20" of 18" CMP
April 1, 1964	Work on Ditch, repair on tile drain
May 27, 1964	Repair along drainage ditch to Linn Creek outlet
November, 1964	Engineer Hamm gives oral report, will not give engineering data
December 10, 1964	Marshall County protests lowering culvert

January 6, 1966	Repair steel culvert pipe.
June 1, 1966	Repair on Roscoe Reimenschneider Farm
December 28, 1966	Repair 3 holes in 28" tile.
February 13, 1968	Invoices for 20' of 24"CMP, 400' of 18"CMP and 40' of 28" CMP
March 29, 1968	Drilling Holes at Kenneth Lively and Roscoe Reimenschneider properties
April 13, 1968	Repair on 30"; 350' pipe installed.
January 25, 1969	Clayton Carmody asks about improving drainage
November 26, 1969	Work done on drainage ditch between Rueben Hilleman and Kenneth Lively properties
Aug 17, 1971	Work on County tile, Rueben Hilleman property located in the southeast quarter of the southwest quarter of Sect. 1 in Township 83 North, Range 21 West
May 19, 1988	Replace pipe in Liston Pond.
December 28, 1989	Repair on Jim Lively Farm
April 20, 1994	Repair on tile
September 9, 1995	Clean Drainage ditch NE ¼ of NW ¼ of Sect. 6, Twp. 83 North Range 20 West
January 31, 2013	Trustees review petition to return district management to supervisor control and vote to accept petition to return management control of Marshall-Story #1 to supervisor control as valid and effective immediately.
September 4, 2013	Joint Board meeting considers request from Jim Lively for repairs to 30" tile and large blowout holes on his land.
December 10, 2013	Public hearing on repairs or improvements to joint drainage district facilities; authorizes engineering report.

2. INVESTIGATION

2.1. Survey & Investigation

During the winter of 2013-14, we performed a field review of the JDD 1 Main Tile and Ditch route with a preliminary survey of the open ditch route. Profile data was gathered

along with cross-sections to determine the sediment level in the channel and the typical dimension of the channel. Tile elevations and sizes were measured where they were exposed at collapses and blowouts. This survey was completed from the channel outlet to Linn Creek upstream to the junction of the main tile with the Branch C Tile at Station 80+50. The total length of this tile and drainage channel segment is 12,000 feet. LIDAR elevation information was also obtained for the JDD1 drainage basin.

The downstream open ditch segment from Linn Creek to the road culvert under Binford Avenue and 220th Street at ditch station -2+00 is generally at an adequate slope and elevation to allow free drainage of the upstream pipes and ditch.

The upstream open ditch section from the culvert at Binford and 220th Street to the main tile outlet is filled to a level that blocks the Main No. 1 tile outlet to over half of the pipe depth.

Several tile blowouts were observed over the 30 inch tile. There are several very large holes where tile pipe has been completely exposed and washed out of the line and grade of the original installation, and soil has eroded and washed into the tile, apparently for many years. The tile is reportedly plugged or blocked in many locations. In some locations replacement tile pipe has been installed, and the adjacent tile reportedly collapsed or was blown out. The pipe elevation and location was measured where it was exposed at the blowouts.

LIDAR elevation information was used to update the surface drainage basin areas that drain into JDD1.

2.2. Channel and Tile Capacity

The existing dimensions of the open ditch were determined based on the surveyed cross-sections. The tile size and slopes were determined from a review of the original plans, repair records, and field surveys of the visible blowouts where the top of pipe and the pipe invert was visible. The following summarizes the tile capacities on the key locations:

Location	Tile	Drainage Area (Acres)	Drainage Coefficient (in/day)	Percentage of 3/8" Drainage Coefficient
Main Tile	30" Concrete	3290	0.101	27%
Main Tile	26" Concrete	1167	0.275	73%
Branch A	20" Concrete	733	0.152	41%
Branch B	16" Concrete	434	0.143	38%
Branch C	20" Concrete	1576	0.072	19%
Branch D	18"	855	0.122	33%

The tile conduit controls the capacity of the system, with an existing drainage coefficient of 3/32 – 1/8 inches per day drainage coefficient. This capacity appears to provide marginal drainage with good surface relief, although it is much less than the current design standard of 3/8 inches per day that is currently used on new projects on lands which have good surface drainage relief. Making a repair to the existing tile will not bring the drainage coefficient and hydraulic capacity up to this current design standard.

2.3. District Right-of-Way

There is no record of right-of-way on the JDD1 open ditch segment. This right-of-way would normally have been acquired at establishment of the district and would have included the land required to dig the ditch and pile the spoil on either side, typically 20 feet from the top of bank. For construction methods used at the time of original construction, an approximately 80 feet wide right-of-way would have been required.

2.4. Conservation Acres

We note that there may be an area of conservation along the existing open ditch. There are some manageable drawbacks to be addressed because of these conservation areas.

The destruction of vegetation by spoil placement or leveling with open ditch construction is not normally allowed as part of the farm program conservation rules. The owner of any Conservation Reserve Program acres must request a waiver from the USDA Farm Service Agency County Committee. The county committee will grant waivers for ditch maintenance if seeding restoration, in compliance with NRCS requirements, is completed. If the project is authorized, all farm program conservation program owners on the repair portion of the ditch must independently seek the FSA County Committee waivers. This process should be initiated immediately if the repair is authorized.

2.5. 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 open ditch that may have spoil placed in them during the excavation of the open ditch. 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 surface connected to the Main Open Ditch of this district.

Therefore, if an improvement option is selected 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 this determination. 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 an improvement option 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.

2.6. Impacts to Wetlands

The watershed of JDD1 has natural surface relief along with a tile system with a capacity of about $3/32 - 1/8$ inch per day drainage coefficient. It is therefore probable that there are no wetlands or farmed wetlands in this watershed. In an effort to determine the potential of wetlands, we have reviewed USFWS Wetland Inventory Maps to assess the likelihood of non-converted wetlands. Some scattered areas do show on these maps as potential wetland. Therefore, with documentation of the District's tile along the drainage course, we would expect these lands would be found to be prior converted lands. Based on this review, we do not expect mitigation of wetlands will be necessary if an improvement to the drainage system is approved and therefore no costs for mitigation have been included in our estimates. This needs to be confirmed by each landowner in the district for their individual property.

3. PROPOSED WORK

The investigation has confirmed the need for drainage relief in the district. It is necessary to remove the sediment from the open ditch, and to replace the failing 30 inch tile main.

Both a repair and an improvement option were evaluated at the request of the JDD1 Board and are summarized in the following sections.

3.1. Option 1 – Main Tile and Open Ditch Repairs

This option includes cleaning the existing main ditch to restore its original slope and capacity and replacing the Main tile with a 30 inch Reinforced Concrete Pipe tile from the current outlet location to the upstream end of the 30 inch tile size at the junction with Branch C.

The 8 foot wide open ditch with 2:1 side slopes would be cleaned from the culvert under 220th Street at Binford Avenue upstream approximately 3,050 feet to the outlet of the main drain tile. This cross section is based on our cross sections of the existing ditch at several locations.

This report shows the replacement tile installed along the same route as the current tile.

The Joint District should acquire the necessary right of way to establish a permanent 100 foot right of way for the existing open ditch segment to allow future maintenance.

3.2. Option 2 – Main Tile Improvements and Open Ditch Repair

This option includes cleaning the main open ditch construction and installing a new 42 inch tile to replace the existing 30 inch main tile. The new facilities would be designed to provide a 3/8 inch per day drainage coefficient for the new construction.

The 8 foot wide open ditch with 2:1 side slopes would be cleaned from the culvert under 220th Street at Binford Avenue upstream approximately 3,050 feet to the outlet of the main drain tile. This cross section is based on our cross sections of the existing ditch at several locations. This existing width and slope provides the necessary capacity for containing and carrying the increased drainage flows within the banks of the open ditch.

At the upstream end of this widened ditch, a new 42 inch drain tile would be installed at the same slope and route as the existing 30 inch main tile. The existing tile connections to the 30 inch tile would be connected to the new 42 inch tile. The existing 30 inch tile would be crushed and filled after the new tile is operating.

This new tile would be considered an improvement rather than maintenance, and the larger tile could trigger NRCS review of upstream farmed wetlands for potential consequences of additional draining. Landowners would be responsible to check and delineate their own wetlands on their property to document their compliance with all farm program requirements. Noncompliance with this wetland review requirement by a landowner could potentially disqualify their property from future farm program payments.

3.3. Work Limits and Damages

Landowners are entitled to full reimbursement for damages resulting from the work on said drainage tile and outside of open ditch rights-of-way. These damages will be established at a project completion hearing after the work is complete. The contractor will be assigned temporary work limits along each side of the ditch and tile to allow for construction activities. The work limits for the open ditch will be set at approximately 35 to 50 feet outside of the toe of the spoil pile of the ditch. Along the tile replacement areas, the work limits would be 50 feet wide.

It is anticipated that the repair work will commence in 2014 or 2015. Crops that are damaged during construction would be paid for by the Joint District based on crop appraisals. The construction zone would be minimized and the work scheduled to minimize the loss of crops.

Wetland reviews by regulatory agencies for options that are considered to be improvements may also require additional approval time in the project schedule.

Conservation acres may exist within the work area. Seeding of these areas is typically performed by the landowner with reimbursement being made at the project completion hearing. Seed mixes for these lands is often very specific for the type of conservation practice which is utilized.

3.4. Annexation

The district plat on sheet A.02 of the proposed plans show the roughly 225 acres of benefiting land not included on the JDD1 assessment schedule. These areas are outside the district assessment boundary but drain to the facilities of this district. These lands are not currently assessed for benefit in any adjacent drainage district and should be added to the schedule of JDD1 for they do receive benefit from these facilities.

The cost of the annexation of the 225 acres is estimated at \$4,500. The annexed lands would generate more than enough funds on this upcoming project to justify the annexation. These acres benefit by draining to the open ditch and should share in the cost of the proposed and future maintenance work.

It would be cost effective to do this annexation as part of the proposed project. Most landowners now in the drainage district would likely support the annexation; those being annexed would tend to be opposed. It should be emphasized to the owners of the annexed lands that assessments are based upon relative benefits and that if this benefit is small, the assessment is also relatively small. We recommend annexation of all benefiting areas at this time.

3.5. Right-of-Way Needs

Drainage districts acquire easements or rights-of-way for drainage district open ditches. The district secures authority to go onto private land to construct these ditches and to maintain them by following the procedural steps laid out in the Code of Iowa. No right-of-way appears to have previously been acquired for the JDD1 open ditch. It is now recommended to be acquired through this report.

Under Section 468.27 Dismissal or establishment – permanent easement – Second paragraph “ 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 improvements, unless they are acquired be fee simple, in the dimensions shown on the survey, plat and profile, if one is made.

Under Section 468.126 Repair, Subsection 8. – If the drainage records on file in the auditor’s office for a particular district do not define specifically that land taken for right-of-way for drainage purposes, the Board may at any time upon its own motion employ a land surveyor to make a survey and report of the district and actually define the right-of-way taken for drainage purposes.

The original ditch was constructed and subsequently extended with no record of right-of-way being acquired. The original construction required approximately 80 feet of right of way along the current open ditch. We recommend that JDD1 acquire a permanent right-of-way of 100-feet in width along the original open ditch to facilitate maintenance now and into the future. This right-of-way will usually be centered on the open ditch with typically 50 feet on each side of the completed ditch for maintenance access. This represents additional right of way outside the 80 feet that was needed to construct the original drainage ditch.

Drainage districts do not acquire easements or rights-of-way for closed (underground) drainage district tile mains or branch laterals. The district secures authority to go onto private land to construct the tile main and laterals and to maintain them by following the procedural steps laid out in the Code of Iowa.

The price for the right-of-way will be recommended to the board by appointed appraisers. An appraisal commission made up of two landowners from the county and

the engineer are appointed by the board to recommend fair payment. The right-of-way appraiser's report is considered at a public hearing prior to adoption.

For right-of-way acquisition, the price of lands outside the top of bank is reduced from market value for two reasons, 1) the landowner has the beneficial use of the leveled spoil pile inside the right-of-way subject to the needs of the district, and 2) the open ditch right-of-way is exempted from real estate taxes and drainage district assessments. In our estimating for this project, we used \$1000/acre for lands which will remain in the beneficial use of the landowner. Lands that are used for spoil material from the ditch cleanout will be shaped and leveled to allow continued crop production. Some areas may not be suitable for continued crop production because of ditch widening or reshaping to convey surface drainage to surface drain pipes and would become un-farmable.

4. OPINIONS OF PROBABLE COST

The cost estimates for Options 1 and 2 are contained in Appendix B. These estimates represent our best judgment of the probable cost based upon our experience with similar projects. The quantities and unit costs for construction are believed to be reasonably accurate for use in this report and hearing. Actual costs are subject to the market for the respective components and to other economic forces. These estimates carry no actual or implied guarantees.

5. ASSESSMENT SCHEDULE REVIEW

5.1. Benefited Lands

Joint Drainage District No. 1 pays all of its expenses by levying assessments upon the assessment schedule as adopted in 1931. Each County assesses the lands in its county. This assessment schedule does not include all of the lands believed to be receiving benefit from the tile and open ditch. The landowners in the district pay disproportionate shares of assessments because these lands have avoided assessment.

It is recommended that these lands now lying outside the district but which benefit from Joint Drainage District No. 1 be annexed to the district. The lands recommended to be annexed are shown on the plats of the district on attached plan sheets A.02.

Section 468.119 of the Iowa Code states "...if the board becomes convinced that additional lands contiguous to the district, and without regard to county boundaries, are benefited by the improvement to said district as contemplated in Section 468.126, board may adopt with or without a petition from owners of the proposed annexed lands, a resolution of necessity for annexation of such additional land."

5.2. Reclassification

The current assessment schedules do not separate the ditch, main and branch tile lines into separate assessment schedules. However, if the Board approves the annexation of additional benefited lands, these lands will need to be classified in accordance with the current assessment schedule. The resulting adjusted schedule will be over 100 years old and not based the more accurate data available through modern soils maps and LIDAR elevation data.

Also, Section 468.131 (Reclassification Required) of the Iowa Code provides that:

“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.”

Section 468.41(2) of the Iowa Code also allows, but does not require, reclassification for repair projects.

Any significant improvement cost will require a reclassification of the lands and a new assessment schedule developed with current criteria. Therefore, it is recommended that the facilities of JDD1 be reclassified to provide a fair and equitable method of paying for construction of the needed repairs, needed improvements and future maintenance of all facilities of the District.

6. DISCUSSION AND RECOMMENDATIONS

This report has confirmed the need to restore the drainage efficiency and repair of the district’s Main tile and open ditch. A repair or improvement is warranted and can be accomplished by doing the work shown on the preliminary plans contained in this report for any one of the two alternatives shown.

However, we recommend the Joint Board of Supervisors acting as Trustees for the District approve and adopt Option No. 2. This option calls for the repair/cleanout of the open ditch, and improvement of the main tile. We believe the capacity of the JDD1 drainage system was inadequate in its original state because of the low drainage capacity of the tile sizes. Over the years, pipe failures of the tile main and siltation of the main open ditch have caused the tile system to be pressurized during times of larger flows. This has resulted in the tile blowouts and tile failures of the main tile. The repair/cleanout of the open ditch and tile improvement will provide proper efficiency and capacity of the district facilities. The proposed repairs and improvements are

considered to be of public benefit and are conducive to the public health, convenience or welfare.

Annexation Recommended. 225 acres of lands within the watershed of JDD1 appear to benefit from the facilities of JDD1 but have not been assessed for the maintenance of those facilities. In order to fairly distribute the costs of future maintenance, as well as any repair or improvements, it is recommended that the annexation procedure be implemented.

Reclassification Recommended. There are material inequities in the current assessment schedule used by the district. Several areas that drain into the joint district are not included in the current assessment schedule. Some areas are assessed for repairs that are not downstream of their properties. Also, Iowa law requires a reclassification of lands for any significant improvement expenditure. Because of this need for reclassification, repairs or improvements to the Main tile and open ditch would currently not be paid for by some parcels which would be receiving benefit, and might be paid by some other parcels that do not benefit. We recommend that reclassification of the open ditch and tile schedules be pursued.

Installment Payments. Iowa drainage law allows for drainage district costs for large projects to be spread over as many as twenty years at the discretion of the Board of Supervisors. Typically, the board would spread assessments of the magnitude contemplated in this report over ten years. If we assume that the Board will adopt Option No. 2 and allow ten annual installments at 5% interest, the average annual per acre improvement project costs for lands in the district that are tributary to the improvement location, including newly annexed lands, would be approximately \$19 per acre per year. Be reminded that final individual assessments are based upon benefits and that some parcels will likely bear two to three times the average assessments.

Recommended Steps. It is recommended that the Joint Boards of Supervisors acting as trustees for Joint Drainage District No. 1 take appropriate action, with legal guidance, to accomplish the following:

1. Tentatively approve this engineer's report and schedule a public hearing to hear and consider the input of the district landowners.
2. Adopt Option No. 2 for construction, modified as deemed appropriate, to satisfy the desires of the District.
3. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.
4. Appoint appraisers to set values upon the district right-of-way. Review and approve the report of the appraisers. Acquire right-of-way along the existing open ditch.
5. Initiate annexation of benefited lands not on the assessment schedule.
6. Initiate reclassification of benefits for all district open ditch and tile facilities.

Respectfully submitted,
I&S GROUP, INC.

Kent L. Rode, P.E.

The following appendices are included with this report:

- Appendix A – Photographs
- Appendix B – Opinions of Probable Costs
- Appendix C – Preliminary Plans

APPENDIX A

PHOTOGRAPHS



Main Tile Washout



**Open Ditch Looking East
From Tile Outlet**



Main Tile Washout

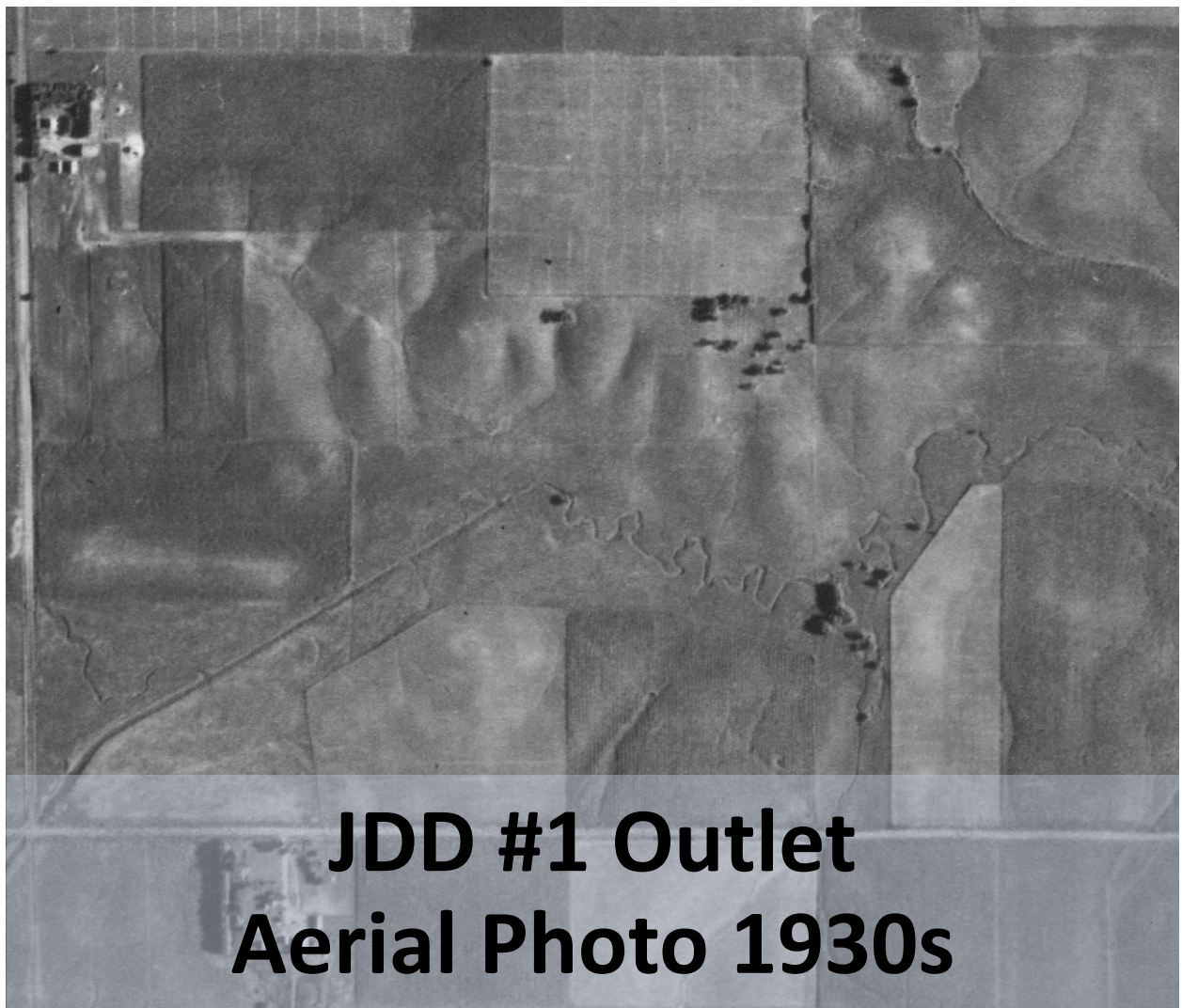


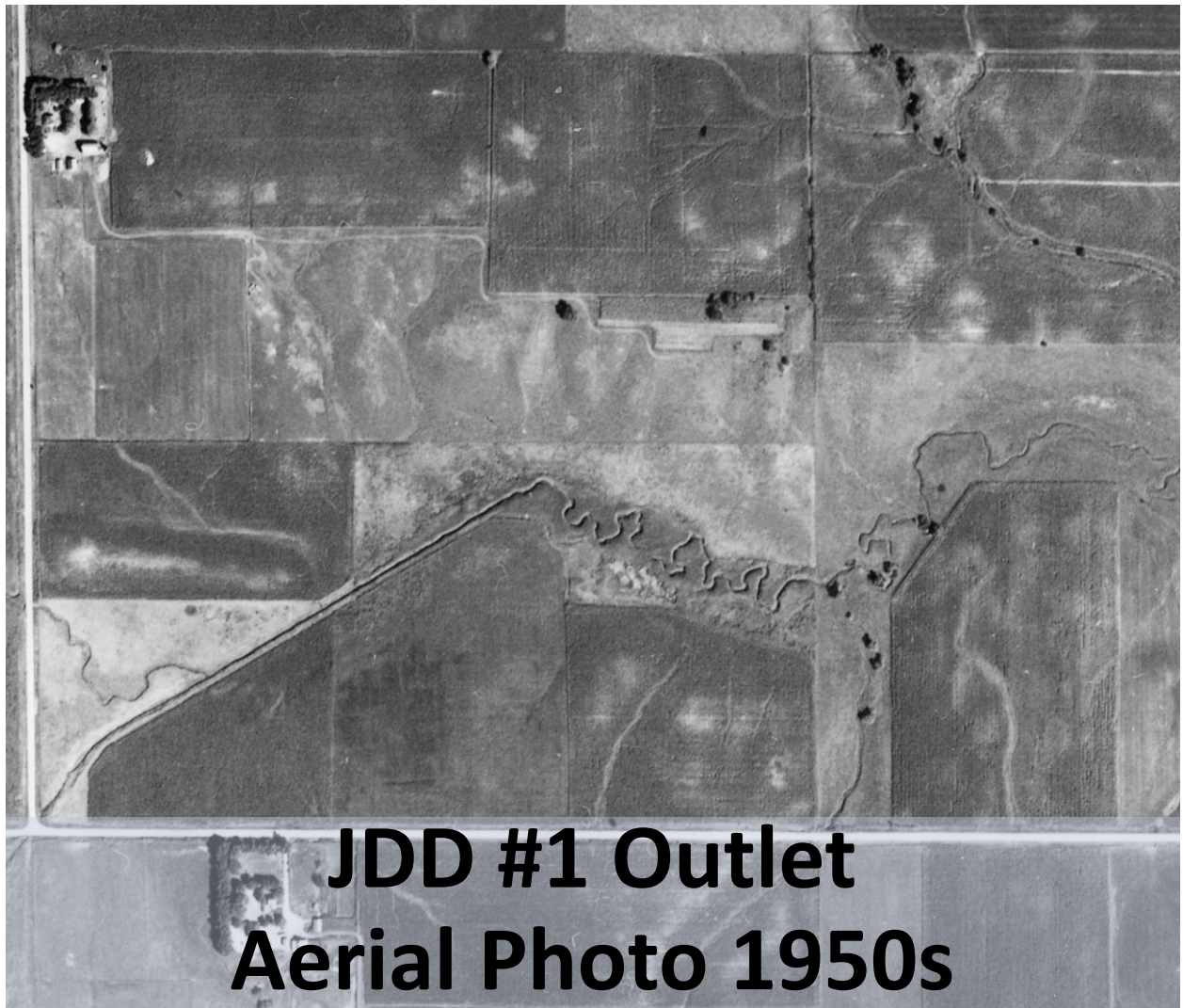
Main Tile Washout



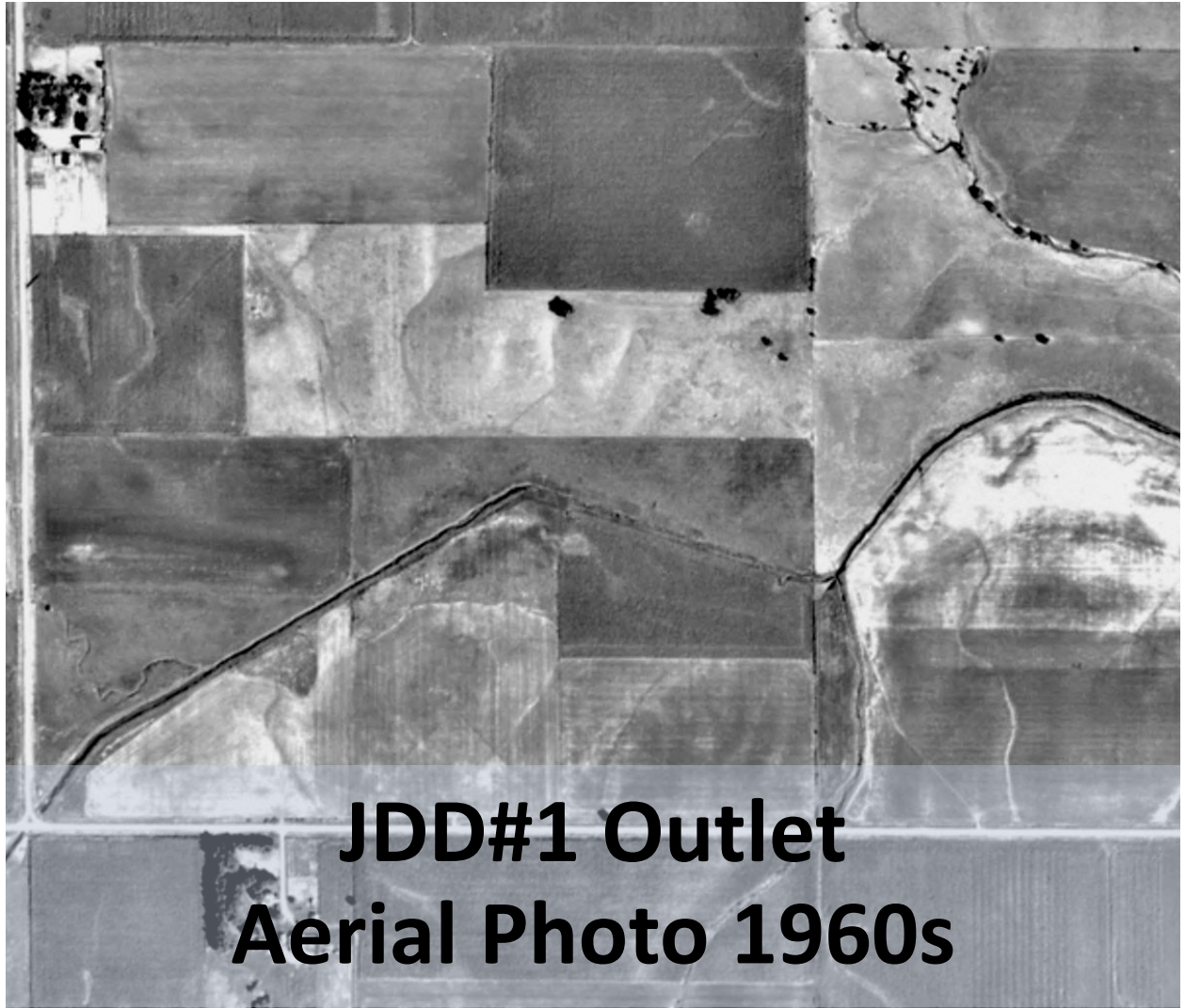








**JDD #1 Outlet
Aerial Photo 1950s**



JDD#1 Outlet
Aerial Photo 1960s

APPENDIX B

OPINIONS OF PROBABLE COSTS

OPTION NO. 1 - MAIN TILE AND OPEN DITCH REPAIRS

MAIN TILE AND OPEN DITCH JOINT DRAINAGE DISTRICT NO. 1 STORY AND MARSHALL COUNTIES

ENGINEER'S OPINION OF PROBABLE PROJECT COST

ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1.	Mobilization	1	LS	\$20,000	\$20,000
2.	Clearing and Grubbing	1	LS	\$2,500.00	\$2,500
3.	Open Ditch Excavation	9,400	CY	\$3.00	\$28,200
4.	Hauling and Filling Washouts	2,500	CY	\$5.00	\$12,500
5.	Corrugated Metal Pipe Tile Extension, 15" Dia.	80	LF	\$25.00	\$2,000
6.	Spoil Bank Leveling (Two Sides)	30.50	STA	\$110	\$3,355
7.	Open Ditch Fertilizing and Seeding	31	STA	\$175	\$5,338
8.	2000D Reinforced Concrete Pipe, 30" Dia.	5,200	LF	\$40	\$208,000
9.	30" Dia. R.C.P. Elbow Section, Fabrication Only	10	EA	\$1,000	\$10,000
10.	30" Inlet/Relief Well/Junction Box	2	EA	\$3,000	\$6,000
11.	Connect 30" Pipe to Existing Headwall	1	EA	\$1,500	\$1,500
12.	Tile Trench Stabilization and Cradling Rock	350	TN	\$28	\$9,800
13.	Lateral Tile Connections, 10" Dia. Or Smaller	6	EA	\$400	\$2,400
14.	18" CMP Surface Drain	600	LF	\$30	\$18,000
15.	Crush in Place and Bury Existing Main Tile	5,200	LF	\$5	\$26,000
16.	Contingencies @ 10%				\$32,959

ESTIMATED CONSTRUCTION COST

\$388,552

Engineering Services:

Survey	\$4,000
Engineer Report, Preliminary Plans and Hearings	\$18,000
Plans, Specifications and Bidding	\$28,500
Construction Staking	\$4,100
Resident Observation Services	\$8,000
Construction Admin Services	\$17,500

Legal & Auditor Services, Publication, Misc.	\$3,000
Crop and Seeding Damages	\$10,000
Finance Costs	\$25,000

PROJECT COST SUBTOTAL

\$506,652

Other District Costs:

District Right-of-Way (3 AC @ \$1000.00)	\$3,000
Engineering Services:	
Right-of-Way Acquisition	\$4,000
Annexation	\$4,500
Reclassification	\$37,500

TOTAL ESTIMATED PROJECT COST

\$555,652

Average Cost per Currently Assessed Acres (4573 AC) =	\$122
Average Cost per Acre for 10 years =	\$15.74

Average Cost per Benefited Acre (4798 AC) =	\$116
Average Cost per Acre for 10 years =	\$15.00

OPTION NO. 2 - MAIN TILE IMPROVEMENTS AND OPEN DITCH REPAIR

MAIN TILE AND OPEN DITCH JOINT DRAINAGE DISTRICT NO. 1 STORY AND MARSHALL COUNTIES

ENGINEER'S OPINION OF PROBABLE PROJECT COST

ITEM	DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
1.	Mobilization	1	LS	\$25,000	\$25,000
2.	Clearing and Grubbing	1	LS	\$2,500	\$2,500
3.	Open Ditch Excavation	9,400	CY	\$3.00	\$28,200
4.	Hauling and Filling Washouts	2,500	CY	\$5.00	\$12,500
5.	Corrugated Metal Pipe Tile Extension	80	LF	\$25.00	\$2,000
6.	Spoil Bank Leveling (Two Sides)	30.5	STA	\$110	\$3,355
7.	Open Ditch Fertilizing & Seeding	30.5	STA	\$175	\$5,338
8.	2000D Reinforced Concrete Pipe, 42" Dia.	5,200	LF	\$60	\$312,000
9.	42" Dia. R.C.P. Elbow Section, Fabrication Only	10	EA	\$2,500	\$25,000
10.	42" Inlet/Relief Well/Junction Box	2	EA	\$4,000	\$8,000
11.	Connect 42" Pipe to Existing Headwall	1	EA	\$2,500	\$2,500
12.	Tile Trench Stabilization and Cradling Rock	350	TN	\$28	\$9,800
13.	Lateral Tile Connections, 10" Dia. Or Smaller	6	EA	\$400	\$2,400
14.	18" CMP Surface Drain	600	LF	\$30	\$18,000
15.	Crush in Place and Bury Existing Main Tile	5,200	LF	\$5	\$26,000
16.	Contingencies @ 10%				\$45,659

ESTIMATED CONSTRUCTION COST

\$528,252

Engineering Services:

Survey	\$4,000
Engineer Report, Preliminary Plans and Hearings	\$18,000
Plans, Specifications, and Bidding	\$28,500
Wetland Administration	\$5,000
Construction Staking	\$4,100
Resident Observation Services	\$8,000
Construction Admin Services	\$17,500

Legal & Auditor Services, Publication, Misc.

Crop and Seeding Damages	\$3,000
Finance Costs	\$10,000

PROJECT COST SUBTOTAL

\$651,352

Other District Costs:

District Right-of-Way (3 AC @ \$1000.00)	\$3,000
Engineering Services:	
Right-of-Way Acquisition	\$4,000
Annexation	\$4,500
Reclassification	\$35,000

TOTAL ESTIMATED PROJECT COST

\$697,852

Average Cost per Currently Assessed Acres (4573 AC) =	\$153
Average Cost per Acre for 10 years =	\$19.76

Average Cost per Benefited Acre (4798 AC) =	\$145
Average Cost per Acre for 10 years =	\$18.84

APPENDIX C

PRELIMINARY PROPOSED PLANS

