STORY COUNTY

BOARD OF SUPERVISORS

MEETING AS

DRAINAGE DISTRICT TRUSTEES

TENTATIVE AGENDA

August 19, 2015
Public Meeting Room, Administration Building
900 Sixth St, Nevada, IA

CALL TO ORDER 6:30 p.m.

1. Present Preliminary Engineering Report for Drainage District Richland #20.
2. Hear comments/concerns/suggestions from land owners in Richland #20.
3. Present drainage issues in Drainage District #20A and possible repairs.
4. Hear comments/concerns/suggestions from land owners in Richland #20A.
5. Consider a course of action for each district and direct the engineer to proceed with plans and specifications as necessary.

Engineer's Report:

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

Date: June 23th, 2015
Report No: 15-17551

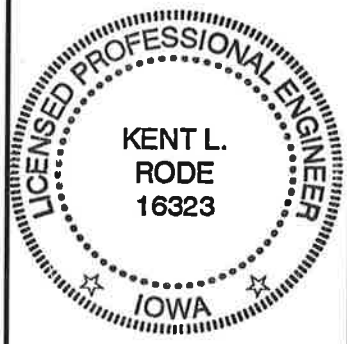
ENGINEER'S REPORT

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

2015

ISG PROJ. NO: 15-17551



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. 6-23-15
Date

License No: 16323

My License Renewal Date is December 31, 2015

Sections covered by this seal:
All Sections Listed in the Table of Contents

ENGINEER'S REPORT

DRAINAGE DISTRICT NO. 20
STORY COUNTY, IOWA
2015

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ENGINEER'S REPORT

DRAINAGE DISTRICT NO. 20
STORY COUNTY, IOWA
2015

1. INTRODUCTION

1.1. Scope of Work

The purpose of this report is to provide information relative to drainage relief requested by a landowner within Drainage District No. 20, Story County, Iowa (DD#20). The Board of Supervisors appointed I+S Group, Inc. (ISG) to complete the necessary preliminary survey, study, and engineering report.

This report addresses a landowner request for repairs to the existing West Fork Tile of DD#20. This report also examines the conditions that would be necessary to increase the drainage efficiency to a ½" drainage coefficient throughout the drainage district. In addition, this report discusses the annexation of materially benefited lands laying outside of the current assessment boundary along with classification/reclassification of all benefited lands.

1.2. Location

This drainage district lies within Story County located generally northeast of the City of Nevada and northwest of the City of Colo. The watershed of the district is located in Sections 16, 20, 21, 22, 26, 27, 28, 29, 33, 34, and 35 of Richland Township (T-84-N, R-22-W). There are approximately 3,236 acres within the existing watershed of which 3,038 acres are currently assessed for benefits on the existing district schedule.

Drainage District No. 20 consists of two main tile systems that form two watersheds. The West Fork Tile system flows from the north to the south and passes underneath the existing railway and outlets into the western branch of the open ditch system that is shared by both main tiles. The East Fork Tile system flows from the north to the south and outlets into the eastern branch of the shared open ditch system.

The open ditch of DD#20 outlets into the East Indian Creek in the NW¼ NE¼ of Section 10-83-22. East Indian Creek continues south to Indian Creek to the South Skunk River and to the Skunk River eventually draining to the Mississippi River.

1.3. District Facilities

The DD#20 facilities consist of a main open ditch that forks to accommodate a West Fork Tile system and an East Fork Tile system as well as five (5) branch tile lines. The original

petition for establishment of DD#20 was filed February 1st, 1909 and John M Wells, from Nevada, was appointed as the engineer. His engineer's report outlining proposed improvements to the district was filed October 9th, 1909. The report of Commissioners to assess benefits was filed March 28th, 1910. A Sub-drainage District No. 20A was stablished in 1937 for the Town of Fernald. Appendix A show a district plat that outlines tile locations and tile sizes. Appendix B displays the tile sizes and tile grades along with tile capacities of the originally planned system.

2. INVESTIGATION

2.1. Survey & Investigation

During the spring of 2015, ISG performed a field review and preliminary survey of the West Fork Tile from the west side of the Union Pacific Railroad right-of-way through the railroad right-of-way and of the main open ditch. Tile locations and flow line elevations were recorded and used to develop profiles of existing tile lines. Likewise, topographic data was gathered along the open ditch and elevated railway berm to determine the sediment level in the open ditch and the typical dimensions and locations of the open ditch and railway berm. This survey of the main open ditch was completed from the West Fork Tile outlet upstream approximately 300 feet to the existing exposed West Fork Tile and beyond until the tile was located on the west side of the railroad berm. LIDAR elevation information was also obtained for the DD#20 drainage basin and utilized for areas not included in the field review.

Based on information obtained in the survey, it was determined that a section of the West Fork Tile has failed on the west side of the railroad right-of-way and continuing to the original tile outlet. The tile is plugged and not functioning through the Union Pacific Railroad right-of-way causing poor sub-surface drainage upstream. Erosion has also occurred over top of the tile near its original outlet causing the lower portion of the tile to be washed out. Figure 1 shows the location of the railroad culverts on the east side of the railroad right-of-way. This is the approximate location where the West Fork Tile crosses the right-of-way. Large amounts of sediment have been deposited at this location.

Figure 1 Culvert outlets on the east side of the railroad.

Additionally, the open ditch was found to be encroaching onto the slope of the railway berm. Continued erosion is causing ditch movement and an undesired merging of open ditch and railway berm. Figures 2 and 3 show this erosion and ditch migration. Figure 2 displays the erosion around a culvert underneath the railway. Erosion around the culvert has displaced earth and rocks from the top of the rail berm. Figure 3 shows the open ditch location adjacent to the railroad berm. It is recommended that the open ditch be moved away from the railroad right-of-way.

Figure 2 Displays erosion around railway culvert

Figure 3 Displays the existing open ditch position relative to the rail berm

2.2. Capacity Analysis

The existing dimensions of the open ditch, approximately 8 foot bottom with 2:1 side slopes, were determined based on the surveyed cross-sections in an effort to match the original conditions. The grade of the open ditch was based on original plan grade and was correlated to the original plans using existing ground elevations.

The tile size and slopes were determined from a review of the original plan and profile records. Appendix B displays tile capacities based on these records. The actual existing capacities may be considerably less. The standard design method for sub-surface tile drains utilizes drainage coefficients. The drainage coefficient is the rate at which water can be removed and is expressed as the equivalent depth of water covering the design area that can be removed in 24 hours.

The tile conduit of DD#20 controls the capacity of the system. Currently the system capacity is approximately $^{1}/_{8}$ inches per day. That was the common standard for that time, however today's drainage standard is at least three times that rate at 3/8" per day with good surface drainage and up to 1" per day for depressional areas. We recommend a ½" per day drainage coefficient for DD#20. The 1/8" capacity is approximately 25% of the recommended ½ inches per day drainage coefficient.

2.3. District Right-of-Way

Under Iowa Code 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 open ditch right-of-way is essential to maintaining district quality and efficiency. Right-of-way would normally be established upon the creation of the drainage district.

For construction methods used at the time of original construction, the right-of-way 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. We have determined the average width of the top of bank of the open ditch to be approximately 40 feet. Therefore, in accordance with Iowa Code 468.126(B), an approximately 80 feet wide right-of-way would have been required at that time. This report establishes the original open ditch right-of-way as 80 feet wide centered on the ditch centerline. Refer to Appendix D – Right-of-Way Tabulation.

2.4. Buffer Strips

It appears there may be some farm program buffer strips in place along the open ditch. There are some manageable drawbacks which must be addressed by the owners of the buffer strips.

The destruction of buffer strip vegetation by spoil placement or leveling from cleaning the open ditch places the landowner in violation of farm program conservation rules. The penalties can include loss of the CRP contract, forfeiture of back CRP payments, and penalties. To avoid these, landowners 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 done. If the work on the open ditch is authorized, all farm program buffer strip owners on the repair portion of the ditch must independently seek the FSA County Committee waivers. This process will take two or three months and should be initiated immediately if a repair or improvement 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 and it is not expected to be an issue.

The United States Army Corps of Engineer (USACE) in conjunction with the United States Environmental Protection Agency (USEPA) also have jurisdiction of 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.

However, if a recommendation 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 authorized, 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.

3. PROPOSED WORK

The investigation has confirmed the need for drainage relief in the district. It is necessary to, at a minimum, repair the West Fork Tile segment underneath the railroad from the railroad to the tile outlet.

A study of the tile system has shown the existing tile system to be undersized compared to today's standards. Therefore, we have included options for improvement of the tile systems to meet the ½ inch coefficient. All options are summarized in the following sections.

3.1. Repair and Improvement Options

Three different options exist to provide drainage relief within DD#20. These options consist of repair and improvement for not only the West Fork Tile but also the complete DD#20 System. Appendix C contains cost estimates for all potential options.

Option 1: West Fork Repair: Option 1 focuses on the West Fork Tile from the existing tile outlet to the west railroad right-of-way. This option also includes an open ditch cleaning from the district boundary to the existing outlets of both the West and East Tile Forks. The existing West Fork Tile would be crushed in place and replaced with the next largest commercial tile relative to the existing conditions except for the segment of tile underneath the Union Pacific Railroad right-of-way. This section of tile would be

replaced with a 42 inch tile to allow for system improvements later without having to replace tile underneath the railway. The grade of the system would be maintained or repaired back to original planned conditions. Tile alignment would be adjusted to allow for a perpendicular crossing with the railroad right-of-way. The open ditch cleaning would restore the original slope, shape, and capacity by creating a cross section with 8 foot bottoms and 2:1 side slopes. The open ditch would also be realigned to move it out of the Union Pacific Railroad right-of-way. The spoil material would be uniformly leveled and shaped to a typical cross section with a relatively flat top (2% slope) that is 14-18 feet wide, adjacent to the ditch with a 10:1 back-slope onto the adjacent land. Drop structures would be incorporated onto the ends of tile outlets for both the East and West Fork Tiles. These structures would reduce tile sedimentation and overland flow erosion. In an effort to minimize erosion, new corrugated metal pipe (CMP) surface drainage pipes would be placed at locations of surface drainage flow into the open ditch. Likewise, new CMP tile extensions would be placed at the ends of all field tiles entering the open ditch. Fertilizing and seeding of the open ditch areas outside of the buffer strips would be completed to control erosion.

Option 2: West Fork Improvements: Option 2 also focuses on the West Fork Tile underneath the railroad right-of-way and the connecting open ditch system. To increase system capacity and improve the systems drainage coefficient to the ½" per day recommendation, the open ditch would be extended from the district boundary north past the existing West Fork Tile outlet to the location of the existing West Fork Tile and Railroad right-of-way crossing. Similar to Option 1, the open ditch would have an 8 foot bottom with 2:1 side slopes and would be realigned to be moved out of the railroad right-of-way. An 84" reinforced concrete pipe (RCP) would be used as a culvert underneath the Union Pacific Railroad right-of-way and would attach to a 100 foot section of open ditch constructed on the western side of the railroad right-of-way that would share the same characteristics as the section of ditch on the east side of the railway. Spoil material would be leveled adjacent to the ditch with the same typical cross section described in Option 1. Drop structures would also be incorporated into the improvement design to limit outlet sedimentation and surface erosion. Likewise, field tile extensions and CMP surface drains would be utilized to maintain surface drainage capabilities. Lastly, as in Option 1, fertilizing and seeding of the open ditch areas would occur. Landowners would seed and fertilize buffer strips to control erosion Landowners would be reimbursed for the cost of seeding and fertilizing these buffer strips.

Option 3: Complete System Improvements: Option 3 is a complete system improvement that would improve the system drainage coefficient from 1/8" per day to ½" per day. All existing tile would be crushed and buried in place while the main and branch tiles would be replaced and increased in size for both the East and West Fork Tile systems to achieve the recommended ½" per day drainage coefficient. The open ditch would be extended as in Option 2. Likewise with Option 2, the open ditch would extend to the west side of the railroad right-of-way and both segments would be

connected with an 84" culvert. Drop structures, CMP surface drains, CMP tile extensions, fertilizing, and seeding would also be incorporated into Option 3 as they had been in previous Options.

3.2. Railroad Right-of-Way Crossing

When a drainage district is considering a repair or improvement option that crosses a railway, Section 468.109 of the Iowa Code states "Whenever the board of supervisors shall have established any levee, or drainage district, or change of any natural watercourse and the levee, ditch, drain, or watercourse as surveyed and located crosses the right-of-way of any railroad company, the county auditor shall immediately cause to be served upon such railroad company, in the manner provided for the service of original notices, a notice in writing stating the nature of the improvement to be constructed, the place where it will cross the right-of-way of such company, and the full requirements for its complete construction across such right-of-way as shown by the plans, specifications, plat, and profile of the engineer appointed by the board, and directing such company to construct such improvement according to said plans, and specifications at the place designated, across its right-of-way, and to build and construct or rebuild and reconstruct the necessary culvert or bridge where any ditch, drain, or watercourse crosses its right-of-way, so as not to obstruct, impede, or interfere with the free flow of the water therein, within thirty days from the time of the service of such notice upon it."

Once said notice is served Section 468.110 of the Iowa Code states "Upon receiving the notice provided in section 468.109, such railroad company shall construct the improvement across its right of way according to the plans and specifications prepared by the engineer for said district."

With respect to payment for the construction of the improvement Section 468.111 of the Iowa Code states "The cost of building, rebuilding, constructing, reconstructing, changing, or repairing, as the case may be, any culvert or bridge, when such improvement is located at the place of the natural waterway or place provided by the railroad company for the flow of the water, shall be borne by such railroad company without reimbursement therefor."

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 lines 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 and tile limits would be set at approximately 50 to 75 feet on either side of the tile centerline.

It is anticipated that the repair work will commence in 2016. Crops that are damaged during construction would be paid for by the District based on crop appraisals. The construction zone would be minimized and the work scheduled to minimize the loss of crops.

Buffer Strips 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 in Appendix A shows the nearly 200 acres of benefited land not included on the DD#20 assessment schedule. These areas are outside the district assessment boundary but drain to the facilities of this district. Some of these lands are not currently assessed for benefit in any adjacent drainage district and should be added to the schedule of DD#20 because they materially benefit from these facilities. Other lands are being assessed in adjacent drainage districts yet they still benefit from the facilities of DD#20.

The cost of the annexation of the nearly 200 acres is estimated at $5,000. 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/or the tile system and should share in the cost of the proposed and future maintenance work.

It would be cost effective to perform 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 the benefit is small, the assessment is also relatively small. We recommend annexation of all benefiting areas.

3.5. Right-of-Way Needs

Drainage districts acquire easements or rights-of-way for drainage district open ditches. The district secures authority to enter onto private land to construct these ditches and to maintain them by following the procedural steps laid out in the Code of Iowa. The current right-of-way width of the existing open ditch has been established as 80 feet wide.

The original construction required approximately 80 feet of right of way along the current open ditch. However, based on current construction practices, it is recommended the drainage district acquire a more uniform permanent right-of-way of 100-feet to maintain the open ditch. We recommend that DD#20 acquire an additional 20 foot of permanent right-of-way along the original open ditch to facilitate maintenance now and into the future. This 100 foot right-of-way will be centered on the open ditch with 50 feet on each

side of the completed ditch for maintenance access. This represents additional right of way outside of the 80 feet that was needed to construct the original drainage ditch. Refer to Appendix D – Right-of-Way Tabulation for right-of-way plats and landowner tabulations.

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 enter 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 estimating for this project, $2000/acre was used 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 estimate for all recommendations is contained in Appendix C. This estimate represents 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

Drainage District No. 20 pays all of its expenses by levying assessments upon the assessment schedule as adopted in 1910. 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. Roughly 6% of the lands in the watershed of DD#20 materially

benefit from the facilities of the district but have not been assessed for the maintenance of those facilities.

It is recommended that these lands now lying outside the district but which materially benefit from DD#20, be annexed to the district. The lands recommended to be annexed are shown as the shaded areas on the plat of the district located in Appendix A.

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

If the Board approves the annexation of additional benefited lands, these lands will need to be classified in accordance with the current assessment schedules. If the Board does not approve annexation or if annexation is deemed unnecessary it is still recommended that lands within Drainage District No. 20 be reclassified because the existing assessment schedule is over 105 years old and is not based on the more accurate data available through modern soils maps and LIDAR elevation data as well as today's classification methods.

The existing 1910 classification is relatively equitable when considered in the context of common classification procedures used at that time. However, reclassification should be considered in order to better apportion benefits. In the 1910 schedule, landowners on the lower portion of the main tile which only use a short portion of the tile are assessed the same relative benefit as those near the top of the watershed which use a much larger reach of the tile. Also, those landowners which only utilize the open ditch or one of the two forked tile systems may be assessed for repairs to a tile system which they may not even utilize. Additionally, the lateral tile branches should be separated into individual schedules in the same manner as the two main tiles and open ditch.

Section 468.41(2) of the Iowa Code also allows, but does not require, reclassification for repair projects. However, it is recommended that the facilities of DD#20 be reclassified to provide a fair and equitable method of paying for construction of the needed repairs and future maintenance of all facilities of the District. Individual schedules would be prepared for the Open Ditch, West Fork and East Fork Systems, and all Branch Tiles.

6. DISCUSSION AND RECOMMENDATIONS

This report has confirmed the need to, at a minimum, restore the drainage efficiency and capacity of the district's West Fork Tile. The work described herein for Option 1 can accomplish that restoration. However, the West Fork Improvement for Option 2

accomplishes the repair for a lower cost to landowners. A repair or an improvement is warranted and can be accomplished by performing the work outlined in this report. We recommend proceeding with Option 2.

The proposed repair or improvement is considered to be of public benefit and are conducive to the public health, convenience or welfare.

Annexation Recommended. Almost 200 acres of lands within the watershed (6.12%) of DD#20 materially benefit from the facilities of DD#20 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. A single schedule exists for all facilities within DD#20. This schedule does not account for lands that only use a select portion or length of facility. This single schedule requires landowners to pay for repairs on facilities that they have never used, and will never use. We recommend reclassification of DD#20 and the existing single that the schedule be divided into separate schedules per district facility. These separate schedules would include: the open ditch, both main forks (east and west), and all tile branches.

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. Be reminded that final individual assessments are based upon benefits and that some parcels will likely bear two to three times the average per acre costs.

Recommended Steps. It is recommended that the Boards of Supervisors acting as trustees for Drainage District No. 20 take appropriate action, with legal guidance, to accomplish the following:

1. Tentatively approve this engineer's report and schedule a public hearing to receive and consider the input of the district landowners.
2. Adopt either a repair or improvement recommendation 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 the district open ditch.

Respectfully submitted,
I+S GROUP, INC.

Kent L. Rode, P.E.

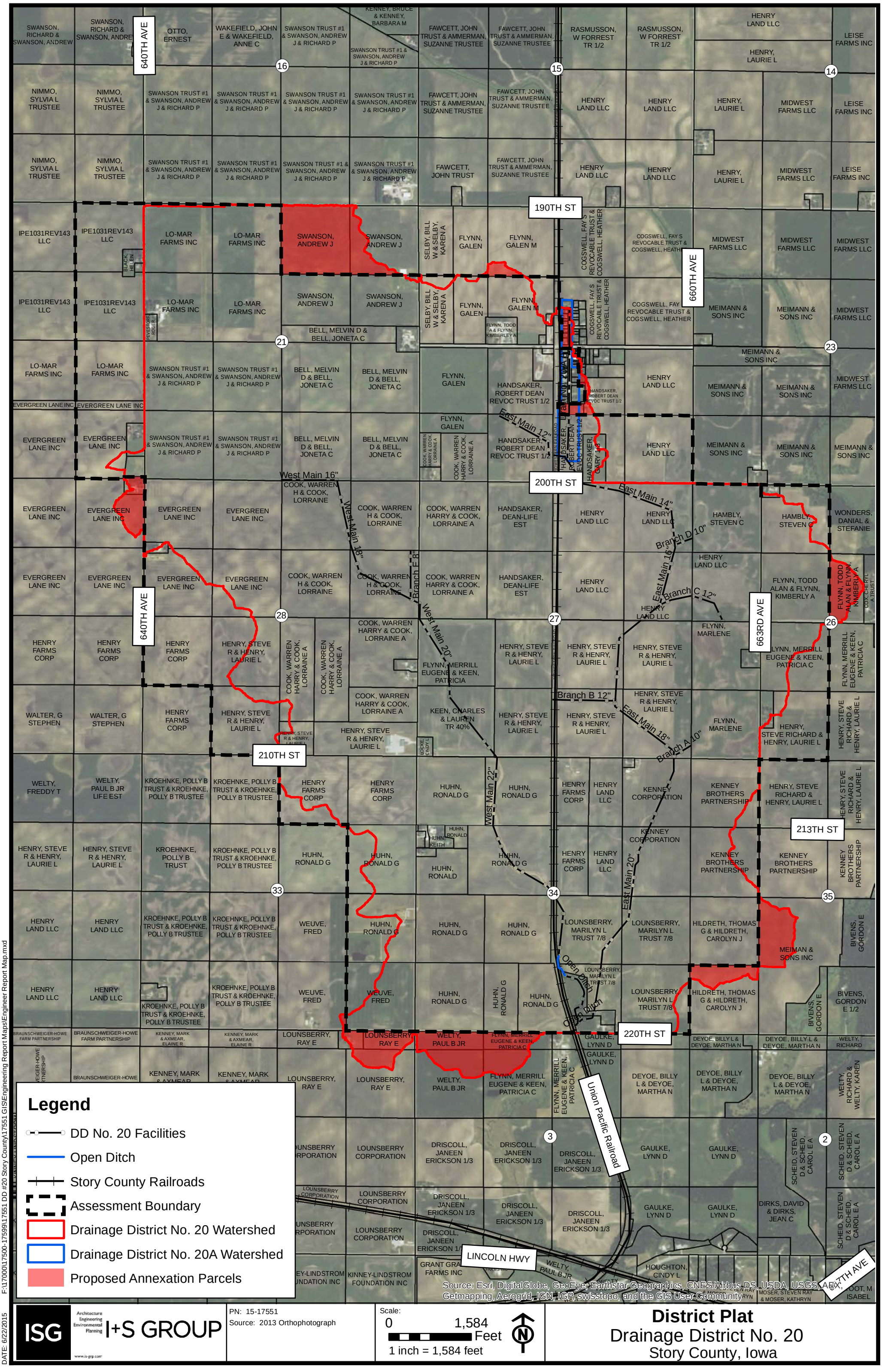
The following appendices are included with this report:

- Appendix A – District Plat
- Appendix B – Tile Capacities
- Appendix C – Opinions of Probable Costs
- Appendix D – Right-of-Way Plat and Tabulation

APPENDIX A

DISTRICT PLAT AND

CONSTRUCTION OPTION MAPS



Legend

- DD No. 20 Facilities
- Open Ditch
- Story County Railroads
- Assessment Boundary
- Drainage District No. 20 Watershed
- Drainage District No. 20A Watershed
- Proposed Annexation Parcels

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

ISG Architecture Engineering Environmental Planning I+S GROUP www.is-grp.com

PN: 15-17551
Source: 2013 Orthophotograph

Scale:
0 1,584 Feet
1 inch = 1,584 feet

District Plat
Drainage District No. 20
Story County, Iowa

DATE: 6/22/2015
F:\17000\17500-17599\17551 DD #20 Story County\17551 GIS\Engineering Report Maps\Engineer Report Map.mxd

HUHN, RONALD

HUHN, RONALD G

West Main 22"

HENRY FARMS CORP

HENRY LAND LLC

KENNEY CORPORATION

West Main 42"

34

HUHN, RONALD G

HUHN, RONALD G

West Main 24"

LOUNSBERRY, MARILYN L TRUST 7/8

East Main 20"

LOUNSBERRY, MARILYN L TRUST 7/8

MIDWESTERN RAILROAD

MACK, RICHARD M & MACK, NORMA J

LOUNSBERRY, MARILYN L TRUST 7/8

Union Pacific Railroad

Open Ditch

HUHN, RONALD G

HUHN, RONALD G

HUHN, RONALD G

LOUNSBERRY, MARILYN L TRUST 7/8

Open Ditch

MACK, RICHARD C & MACK, NORMA J

220TH ST

WELTY, PAUL B JR

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

GAULKE, LYNN D

DEYOE, BILLY L & DEYOE, MARTHA N

GAULKE, LYNN D

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

MIDWESTERN RAILROAD

DEYOE, BILLY L & DEYOE, MARTHA N

DRISCOLL, JANEEN ERICKSON 1/3

DRISCOLL, JANEEN ERICKSON 1/3

GAULKE, LYNN D

3

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- DD No.20 Facilities
- Open Ditch
- West Main 24"
- West Main 42"
- Story County Railroads
- Assessment Boundary
- Drainage District No. 20 Watershed
- Drainage District No. 20A Watershed
- Proposed Annexation Parcels

ISG Architecture Engineering Environmental Planning I+S GROUP www.is-grp.com

PN: 15-17551
Source: 2013 Orthophotograph

Scale:
0 350 Feet
1 inch = 350 feet

N

West Fork Repair
Drainage District No. 20
Story County, Iowa

DATE: 6/22/2015 F:\17000\17500-17599\17551 DD #20 Story County\17551 GIS\Engineering Report Maps\Engineer Report Project Area Map Repair.mxd

HUHN, RONALD

HUHN, RONALD G

West Fork 22"

HENRY FARMS CORP

HENRY LAND LLC

KENNEY CORPORATION

Open Ditch

Culvert 84"

34

HUHN, RONALD G

HUHN, RONALD G

HUHN, RONALD G

LOUNSBERRY, MARILYN L TRUST 7/8

East Fork 20"

LOUNSBERRY, MARILYN L TRUST 7/8

MIDWESTERN RAILROAD

Open Ditch

MACK, RICHARD M & MACK, NORMA J

LOUNSBERRY, MARILYN L TRUST 7/8

Union Pacific Railroad

HUHN, RONALD G

HUHN, RONALD G

HUHN, RONALD G

LOUNSBERRY, MARILYN L TRUST 7/8

Open Ditch

MACK, RICHARD C & MACK, NORMA J

220TH ST

WELTY, PAUL B JR

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

GAULKE, LYNN D

DEYOE, BILLY L & DEYOE, MARTHA N

WELTY, PAUL B JR

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

FLYNN, MERRILL EUGENE & KEEN, PATRICIA C

GAULKE, LYNN D

DEYOE, BILLY L & DEYOE, MARTHA N

MIDWESTERN RAILROAD

DRISCOLL, JANEEN ERICKSON 1/3

DRISCOLL, JANEEN ERICKSON 1/3

GAULKE, LYNN D

3

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- DD No.20 Facilities
- Culvert 84"
- Open Ditch
- Story County Railroads
- Assessment Boundary
- Drainage District No. 20 Watershed
- Drainage District No. 20A Watershed
- Proposed Annexation Parcels

F:\17000\17500-17599\17551 DD #20 Story County\17551 GIS\Engineering Report Maps\Engineer Report Project Area Map Improvement.mxd

DATE: 6/22/2015

ISG Architecture Engineering Environmental Planning I+S GROUP www.is-grp.com

PN: 15-17551

Source: 2013 Orthophotograph

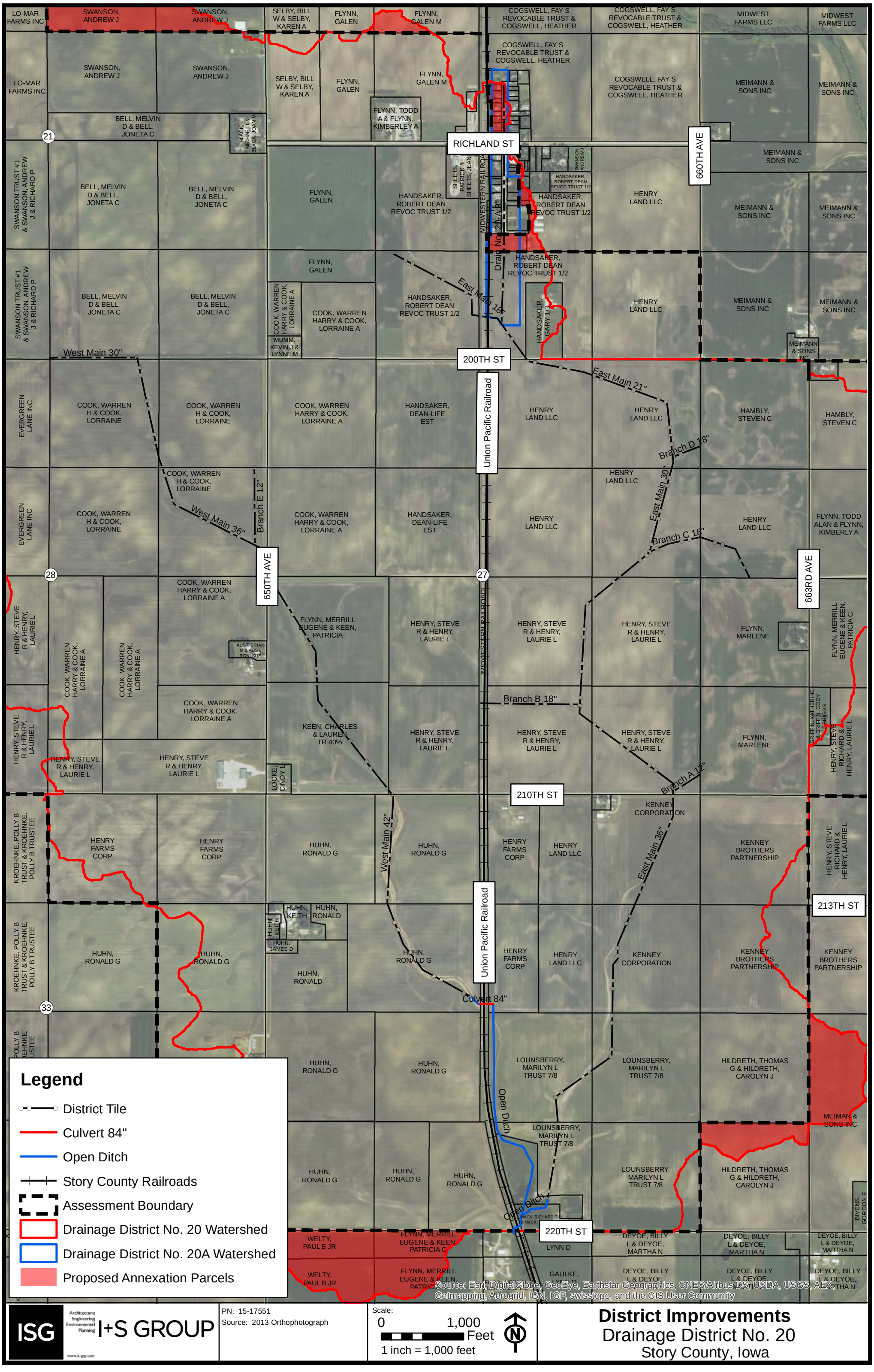
Scale: 0 350 Feet

1 inch = 350 feet

West Fork Improvement

Drainage District No. 20

Story County, Iowa



Legend

- District Tile
- Culvert 84"
- Open Ditch
- Story County Railroads
- Assessment Boundary
- Drainage District No. 20 Watershed
- Drainage District No. 20A Watershed
- Proposed Annexation Parcels

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

ISG Architecture Engineering Environmental Planning I+S GROUP www.is-grp.com

PN: 15-17551
Source: 2013 Orthophotograph

Scale:
0 1,000 Feet
1 inch = 1,000 feet

District Improvements
Drainage District No. 20
Story County, Iowa

DATE: 6/22/2015
F:\17000\17500-17599\17551 DD #20 Story County\17551 GIS\Engineering Report Maps\Engineer Report Map District Improvements.mxd

APPENDIX B

TILE CAPACITIES

Drainage District Number 20 - Story County, Iowa								
West Fork								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	24+50	22	0.270	0.014	1720.36	0.120	24.0%
2	24+50	64+50	22	0.240	0.014	1605.85	0.121	24.3%
3	64+50	74+50	20	0.240	0.014	1243.51	0.122	24.3%
4	74+50	84+50	20	0.190	0.014	1231.70	0.109	21.8%
5	84+50	112+50	18	0.190	0.014	1039.70	0.098	19.5%
6	112+50	122+50	16	0.190	0.014	734.13	0.101	20.2%

East Fork								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	45+50	22	0.300	0.014	1294.96	0.168	33.6%
2	45+50	70+50	22	0.160	0.014	984.88	0.162	32.3%
3	70+50	92+50	18	0.160	0.014	821.83	0.113	22.7%
4	92+50	109+50	16	0.200	0.014	576.98	0.132	26.4%
5	109+50	115+50	14	0.840	0.014	275.29	0.397	79.3%
6	115+50	130+50	14	0.270	0.014	263.22	0.235	47.0%
7	130+50	137+50	14	0.340	0.014	229.19	0.303	60.6%
8	137+50	150+25	12	0.340	0.014	183.17	0.251	50.3%

Branch A								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	4+00	10	0.200	0.014	59.44	0.365	73.1%

Branch B								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	0+00	12+00	12	0.150	0.014	150.49	0.203	40.7%

Branch C								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	16+00	12	0.130	0.014	150.10	0.190	37.9%

Branch D								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	3+50	10	0.150	0.014	136.18	0.138	27.6%

Branch E								
Segment	Station Start	Station End	Size (in)	Grade (%)	n	Drainage Area (ac)	Drainage Coefficient (in)	% of 1/2" Coefficient
1	00+00	9+30	8	0.450	0.014	30.15	0.596	119.2%

	<50%

APPENDIX C

OPINIONS OF PROBABLE COSTS

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

OPTION 1

OPEN DITCH AND WEST FORK TILE REPAIR THROUGH RAILROAD

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Total
	CONSTRUCTION COST				
1	OPEN DITCH EXCAVATION	CY	14000	$ 4.50	$ 63,000.00
2	SPOIL BANK LEVELING - TWO SIDES	STA	22.5	$ 300.00	$ 6,750.00
3	CORRUGATED METAL PIPE SURFACE DRAIN, 18" DIA.	LF	250	$ 40.00	$ 10,000.00
4	CORRUGATED METAL PIPE SURFACE DRAIN APRON, 18" DIA.	EA	5	$ 300.00	$ 1,500.00
5	CORRUGATED METAL PIPE TILE EXTENSION, 12" DIA.	LF	60	$ 44.00	$ 2,640.00
6	STEEL DROP STRUCTURE	LS	2	$ 30,000.00	$ 60,000.00
7	REINFORCED CONCRETE PIPE, 24" DIA, CLASS 3	LF	1,480	$ 65.00	$ 96,200.00
8	STEEL CASING, 3/16" WALL, JACKED AND BORED, 42" DIA.	LF	100	$ 650.00	$ 65,000.00
9	24" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	4	$ 800.00	$ 3,200.00
10	42" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	1	$ 900.00	$ 900.00
11	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	5	$ 400.00	$ 2,000.00
12	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	1,490	$ 3.00	$ 4,470.00
13	SPOT TILE EXPLORATION	HR	4	$ 250.00	$ 1,000.00
14	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	125	$ 25.00	$ 3,125.00
15	RIPRAP, IDOT CLASS E	TN	55	$ 45.00	$ 2,475.00
16	GEOTEXTILE FABRIC	SY	100	$ 4.00	$ 400.00
17	SEED AND FERTILIZE OPEN DITCH	STA	22.5	$ 300.00	$ 6,750.00
18	MULCH OPEN DITCH	STA	22.5	$ 200.00	$ 4,500.00
19	SILT FENCE	LF	250	$ 2.50	$ 625.00
20	REMOVAL OF SILT FENCE	LF	250	$ 1.00	$ 250.00
21	CLEANING AND GRUBBING	LS	1	$ 15,000.00	$ 15,000.00
22	MOBILIZATION	LS	1	$ 17,500.00	$ 17,500.00
23	CONSTRUCTION CONTINGENCY	LS	1	$ 36,700.00	$ 36,700.00
				TOTAL CONSTRUCTION COST:	**$ 403,985.00**
	NON-CONSTRUCTION COST				
1	CONSTRUCTION RELATED DAMAGES	LS	1	$ 5,000.00	$ 5,000.00
2	RIGHT-OF-WAY ACQUISITION	AC	1.50	$ 2,000.00	$ 3,000.00
3	FINANCE	LS	1	$ 24,200.00	$ 24,200.00
4	ENGINEERING SERVICES				
	CLASSIFICATION/RECLASSIFICATION	LS	1	$ 38,800.00	$ 38,800.00
	RIGHT-OF-WAY	LS	1	$ 6,000.00	$ 6,000.00
	ANNEXATION	LS	1	$ 5,000.00	$ 5,000.00
	ENGINEER REPORT	LS	1	$ 20,000.00	$ 20,000.00
	BIDDING	LS	1	$ 3,800.00	$ 3,800.00
	INSPECTION	LS	1	$ 16,200.00	$ 16,200.00
	STAKING	LS	1	$ 8,100.00	$ 8,100.00
	DESIGN DEVELOPMENT	LS	1	$ 31,500.00	$ 31,500.00
	CONSTRUCTION ADMINISTRATION	LS	1	$ 7,900.00	$ 7,900.00
5	LEGAL SERVICES, PUBLICATIONS, MAILINGS, ETC.	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL NON-CONSTRUCTION COST:	**$ 179,500.00**
				TOTAL PROJECT COST:	**$ 583,485.00**
				COST PER ACRE WEST FORK (1972 AC):	$ 256.00
				COST PER ACRE EAST FORK (1264 AC):	$ 63.00

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

OPTION 2

WEST MAIN TILE IMPROVEMENT

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Total
	CONSTRUCTION COST				
	DIVISION I - WORK ON PRIVATE PROPERTY				
1	OPEN DITCH EXCAVATION	CY	26700	$ 4.50	$ 120,150.00
2	SPOIL BANK LEVELING - TWO SIDES	STA	36.5	$ 300.00	$ 10,950.00
3	CORRUGATED METAL PIPE SURFACE DRAIN, 18" DIA.	LF	350	$ 40.00	$ 14,000.00
4	CORRUGATED METAL PIPE SURFACE DRAIN APRON, 18" DIA.	EA	7	$ 300.00	$ 2,100.00
5	CORRUGATED METAL PIPE TILE EXTENSION, 12" DIA.	LF	60	$ 44.00	$ 2,640.00
6	STEEL DROP STRUCTURE	LS	2	$ 30,000.00	$ 60,000.00
7	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	7	$ 400.00	$ 2,800.00
8	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	1,515	$ 3.00	$ 4,545.00
9	RIPRAP, IDOT CLASS E	TN	315	$ 45.00	$ 14,175.00
10	GEOTEXTILE FABRIC	SY	575	$ 4.00	$ 2,300.00
11	SEED AND FERTILIZE OPEN DITCH	STA	36.5	$ 300.00	$ 10,950.00
12	MULCH OPEN DITCH	STA	36.5	$ 200.00	$ 7,300.00
13	SILT FENCE	LF	250	$ 2.50	$ 625.00
14	REMOVAL OF SILT FENCE	LF	250	$ 1.00	$ 250.00
15	CLEANING AND GRUBBING	LS	1	$ 15,000.00	$ 15,000.00
16	MOBILIZATION	LS	1	$ 13,400.00	$ 13,400.00
17	CONSTRUCTION CONTINGENCY	LS	1	$ 28,100.00	$ 28,100.00
				DIVISION I CONSTRUCTION COST:	**$ 309,285.00**
	DIVISION II - WORK IN UNION PACIFIC RIGHT-OF-WAY				
1	STEEL CASING, 3/16" WALL, JACKED AND BORED, 84" DIA.	LF	100	$ 1,000.00	$ 100,000.00
2	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	55	$ 25.00	$ 1,375.00
3	SILT FENCE	LF	100	$ 2.50	$ 250.00
4	REMOVAL OF SILT FENCE	LF	100	$ 1.00	$ 100.00
				DIVISION II CONSTRUCTION COST:	**$ 101,725.00**
				CONSTRUCTION COST SUBTOTAL:	**$ 411,010.00**
				CONSTRUCTION COST TOTAL ASSESSABLE TO DISTRICT:	**$ 309,285.00**
	NON-CONSTRUCTION COST				
1	CONSTRUCTION RELATED DAMAGES	LS	1	$ 6,700.00	$ 6,700.00
2	RIGHT-OF-WAY ACQUISITION	AC	5	$ 2,000.00	$ 10,000.00
3	FINANCE	LS	1	$ 18,600.00	$ 18,600.00
4	ENGINEERING SERVICES				
	CLASSIFICATION/RECLASSIFICATION	LS	1	$ 38,800.00	$ 38,800.00
	RIGHT-OF-WAY	LS	1	$ 6,000.00	$ 6,000.00
	ANNEXATION	LS	1	$ 5,000.00	$ 5,000.00
	ENGINEER REPORT	LS	1	$ 20,000.00	$ 20,000.00
	BIDDING	LS	1	$ 3,800.00	$ 3,800.00
	INSPECTION	LS	1	$ 16,200.00	$ 16,200.00
	STAKING	LS	1	$ 8,100.00	$ 8,100.00
	DESIGN DEVELOPMENT	LS	1	$ 31,500.00	$ 31,500.00
	CONSTRUCTION ADMINISTRATION	LS	1	$ 7,900.00	$ 7,900.00
5	LEGAL SERVICES, PUBLICATIONS, MAILINGS, ETC.	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL NON-CONSTRUCTION COST:	**$ 182,600.00**
				TOTAL PROJECT COST:	**$ 491,885.00**
				COST PER ACRE WEST FORK (1972 AC):	$ 205.00
				COST PER ACRE EAST FORK (1264 AC):	$ 70.00

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

OPTION 3

COMPLETE DISTRICT IMPROVEMENTS

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Total
	CONSTRUCTION COST				
	DIVISION I - WORK ON PRIVATE PROPERTY				
	MAIN OPEN DITCH REPAIRS				
1	OPEN DITCH EXCAVATION	CY	26700	$ 4.50	$ 120,150.00
2	SPOIL BANK LEVELING - TWO SIDES	STA	36.5	$ 300.00	$ 10,950.00
3	CORRUGATED METAL PIPE SURFACE DRAIN, 18" DIA.	LF	350	$ 40.00	$ 14,000.00
4	CORRUGATED METAL PIPE SURFACE DRAIN APRON, 18" DIA.	EA	7	$ 300.00	$ 2,100.00
5	CORRUGATED METAL PIPE TILE EXTENSION, 12" DIA.	LF	60	$ 44.00	$ 2,640.00
6	STEEL DROP STRUCTURE	LS	2	$ 30,000.00	$ 60,000.00
7	RIPRAP, IDOT CLASS E	TN	315	$ 45.00	$ 14,175.00
8	GEOTEXTILE FABRIC	SY	575	$ 4.00	$ 2,300.00
9	CLEARING AND GRUBBING	LS	1	$ 15,000.00	$ 15,000.00
10	SEED AND FERTILIZE OPEN DITCH	STA	36.5	$ 300.00	$ 10,950.00
11	MULCH OPEN DITCH	STA	36.5	$ 200.00	$ 7,300.00
	MAIN TILE & ALL TILE BRANCH IMPROVEMENTS				
12	REINFORCED CONCRETE PIPE, 42" DIA, CLASS 3	LF	4,875	$ 95.00	$ 463,125.00
13	REINFORCED CONCRETE PIPE, 36" DIA, CLASS 3	LF	14,050	$ 75.00	$ 1,053,750.00
14	REINFORCED CONCRETE PIPE, 30" DIA, CLASS 3	LF	2,700	$ 70.00	$ 189,000.00
15	REINFORCED CONCRETE PIPE, 21" DIA, CLASS 3	LF	2,100	$ 60.00	$ 126,000.00
16	REINFORCED CONCRETE PIPE, 18" DIA, CLASS 3	LF	4,725	$ 55.00	$ 259,875.00
17	REINFORCED CONCRETE PIPE, 12" DIA, CLASS 3	LF	1,330	$ 30.00	$ 39,900.00
18	42" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	13	$ 950.00	$ 12,350.00
19	36" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	50	$ 900.00	$ 45,000.00
20	30" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	6	$ 850.00	$ 5,100.00
21	21" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	6	$ 800.00	$ 4,800.00
22	18" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	10	$ 775.00	$ 7,750.00
23	18" ON 36" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 900.00	$ 900.00
24	18" ON 30" DIA R.C.P. TEE, FABRICATION ONLY	EA	2	$ 875.00	$ 1,750.00
25	12" ON 36" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 850.00	$ 850.00
26	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	28	$ 400.00	$ 11,200.00
27	CRUSH IN PLACE AND BURY EXISTING TILE	LF	31,355	$ 3.00	$ 94,065.00
28	SPOT TILE EXPLORATION	HR	16	$ 250.00	$ 4,000.00
29	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	2,500	$ 25.00	$ 62,500.00
	MOBILIZATION & PROTECTION MEASURES				
31	SILT FENCE	LF	2,400	$ 2.50	$ 6,000.00
32	REMOVAL OF SILT FENCE	LF	2,400	$ 1.00	$ 2,400.00
33	FENCE CUTS	EA	20	$ 300.00	$ 6,000.00
34	MOBILIZATION	LS	1	$ 132,800.00	$ 132,800.00
35	CONSTRUCTION CONTINGENCY	LS	1	$ 278,900.00	$ 278,900.00
				DIVISION I CONSTRUCTION COST:	$ 3,067,580.00
	DIVISION II - WORK IN UNION PACIFIC RIGHT-OF-WAY				
1	STEEL CASING, 3/16" WALL, JACKED AND BORED, 84" DIA.	LF	100	$ 1,000.00	$ 100,000.00
2	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	55	$ 25.00	$ 1,375.00
3	SILT FENCE	LF	100	$ 2.50	$ 250.00
4	REMOVAL OF SILT FENCE	LF	100	$ 1.00	$ 100.00
				DIVISION II CONSTRUCTION COST:	$ 101,725.00
				CONSTRUCTION COST SUBTOTAL:	$ 3,169,305.00
				CONSTRUCTION COST TOTAL ASSESSABLE TO DISTRICT:	$ 3,067,580.00

NON-CONSTRUCTION COST					
1	CONSTRUCTION RELATED DAMAGES	LS	1	$ 23,790.00	$ 23,790.00
2	RIGHT-OF-WAY ACQUISITION	AC	5	$ 2,000.00	$ 10,000.00
3	FINANCE	LS	1	$ 184,100.00	$ 184,100.00
4	ENGINEERING SERVICES				
	CLASSIFICATION/RECLASSIFICATION	LS	1	$ 38,800.00	$ 38,800.00
	RIGHT-OF-WAY	LS	1	$ 6,000.00	$ 6,000.00
	ANNEXATION	LS	1	$ 5,000.00	$ 5,000.00
	ENGINEER REPORT	LS	1	$ 20,000.00	$ 20,000.00
	BIDDING	LS	1	$ 3,800.00	$ 3,800.00
	INSPECTION	LS	1	$ 122,700.00	$ 122,700.00
	STAKING	LS	1	$ 61,400.00	$ 61,400.00
	DESIGN DEVELOPMENT	LS	1	$ 183,000.00	$ 183,000.00
	CONSTRUCTION ADMINISTRATION	LS	1	$ 45,700.00	$ 45,700.00
5	LEGAL SERVICES, PUBLICATIONS, MAILINGS, ETC.	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL NON-CONSTRUCTION COST:	**$ 714,290.00**
				TOTAL PROJECT COST:	**$ 3,781,870.00**
				COST PER ACRE WEST FORK (1972 AC):	$ 897.00
				COST PER ACRE EAST FORK (1264 AC):	$ 1,592.00

DRAINAGE DISTRICT NO. 20

STORY COUNTY, IOWA

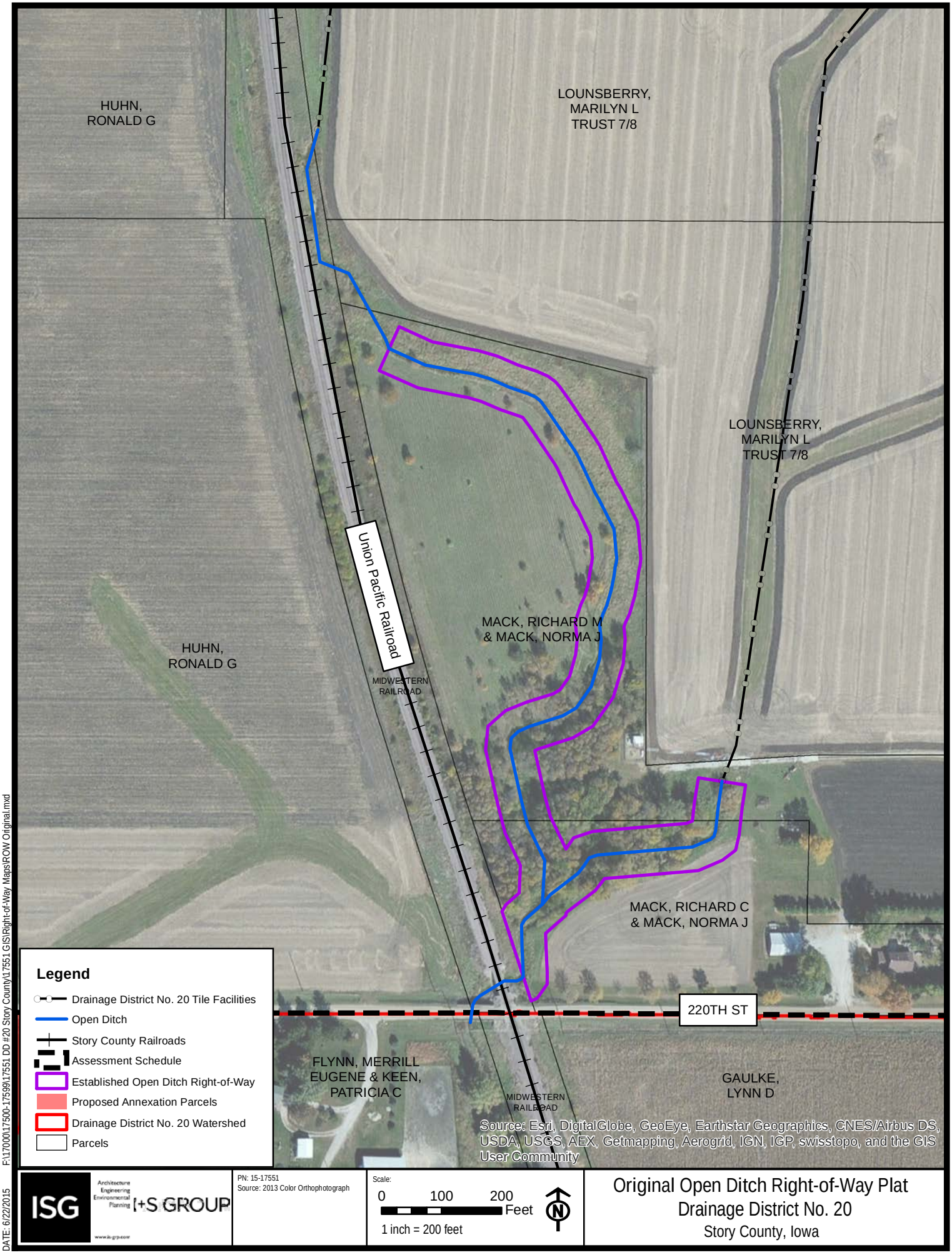
ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

BRANCH IMPROVEMENTS - INCLUDED IN COMPLETE DISTRICT IMPROVEMENTS

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Total
	Branch A				
1	REINFORCED CONCRETE PIPE, 12" DIA, CLASS 3	LF	400	$ 30.00	$ 12,000.00
2	12" ON 36" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 850.00	$ 850.00
3	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	1	$ 400.00	$ 400.00
4	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	400	$ 3.00	$ 1,200.00
5	SPOT TILE EXPLORATION	HR	2	$ 250.00	$ 500.00
6	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	32	$ 25.00	$ 800.00
7	MOBILIZATION	LS	1	$ 800.00	$ 800.00
8	CONSTRUCTION CONTINGENCY	LS	1	$ 1,700.00	$ 1,700.00
				CONSTRUCTION COST:	$ 18,250.00
	Branch B				
1	REINFORCED CONCRETE PIPE, 18" DIA, CLASS 3	LF	1200	$ 55.00	$ 66,000.00
2	18" ON 36" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 900.00	$ 900.00
3	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	3	$ 400.00	$ 1,200.00
4	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	1200	$ 3.00	$ 3,600.00
5	SPOT TILE EXPLORATION	HR	3	$ 250.00	$ 750.00
6	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	96	$ 25.00	$ 2,400.00
7	MOBILIZATION	LS	1	$ 3,700.00	$ 3,700.00
8	CONSTRUCTION CONTINGENCY	LS	1	$ 7,900.00	$ 7,900.00
				CONSTRUCTION COST:	$ 86,450.00
	Branch C				
1	REINFORCED CONCRETE PIPE, 18" DIA, CLASS 3	LF	1200	$ 55.00	$ 66,000.00
2	18" DIAMETER, R.C.P. ELBOW SECTION, FABRICATION ONLY	EA	3	$ 775.00	$ 2,325.00
3	18" ON 30" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 875.00	$ 875.00
4	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	3	$ 400.00	$ 1,200.00
5	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	1200	$ 3.00	$ 3,600.00
6	SPOT TILE EXPLORATION	HR	3	$ 250.00	$ 750.00
7	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	96	$ 25.00	$ 2,400.00
8	MOBILIZATION	LS	1	$ 3,900.00	$ 3,900.00
9	CONSTRUCTION CONTINGENCY	LS	1	$ 8,100.00	$ 8,100.00
				CONSTRUCTION COST:	$ 89,150.00
	Branch D				
1	REINFORCED CONCRETE PIPE, 18" DIA, CLASS 3	LF	350	$ 55.00	$ 19,250.00
2	18" ON 30" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 875.00	$ 875.00
3	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	1	$ 400.00	$ 400.00
4	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	350	$ 3.00	$ 1,050.00
5	SPOT TILE EXPLORATION	HR	2	$ 250.00	$ 500.00
6	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	28	$ 25.00	$ 700.00
7	MOBILIZATION	LS	1	$ 1,100.00	$ 1,100.00
8	CONSTRUCTION CONTINGENCY	LS	1	$ 2,400.00	$ 2,400.00
				CONSTRUCTION COST:	$ 26,275.00
	Branch E				
1	REINFORCED CONCRETE PIPE, 12" DIA, CLASS 3	LF	930	$ 30.00	$ 27,900.00
2	12" ON 36" DIA R.C.P. TEE, FABRICATION ONLY	EA	1	$ 850.00	$ 850.00
3	LATERAL TILE CONNECTIONS, 10" DIAMETER OR SMALLER	EA	3	$ 400.00	$ 1,200.00
4	CRUSH IN PLACE AND BURY EXISTING MAIN TILE	LF	930	$ 3.00	$ 2,790.00
5	SPOT TILE EXPLORATION	HR	4	$ 250.00	$ 1,000.00
6	TILE TRENCH STABILIZATION AND CRADLING ROCK	TN	74	$ 25.00	$ 1,850.00
7	MOBILIZATION	LS	1	$ 1,800.00	$ 1,800.00
8	CONSTRUCTION CONTINGENCY	LS	1	$ 3,700.00	$ 3,700.00
				CONSTRUCTION COST:	$ 41,090.00
				TOTAL CONSTRUCTION COST:	**$ 261,215.00**

APPENDIX D

RIGHT-OF-WAY PLAT AND TABULATION



F:\17000\17500-17599\17551 DD #20 Story County\17551 GIS\Right-of-Way Maps\ROW Original.mxd

DATE: 6/22/2015

ISG Architecture Engineering Environmental Planning [+S] GROUP

PN: 15-17551
Source: 2013 Color Orthophotograph

Scale:
0 100 200 Feet
1 inch = 200 feet

Original Open Ditch Right-of-Way Plat
Drainage District No. 20
Story County, Iowa

RIGHT-OF-WAY TABULATION
MAIN, EAST, & WEST OPEN DITCH
DRAINAGE DISTRICT NO. 20
STORY COUNTY, IOWA

Landowner	Section & Township	Parcel	Total ROW To Be Established (ac)
MACK, RICHARD C & MACK, NORMA J	34 84 22	SECTION:34 TOWNSHIP:84 RANGE:22 84 SW SE BEG 491.4' E S1/4 COR NW ALONG RR ROW 343' E557' S172.1' E276.4' S153.8' W723.9' TO BEG	1.02
	34 84 22	SECTION:34 TOWNSHIP:84 RANGE:22 84 SW SE PARCEL"A"CFN 11-89	2.12
		Land Totals:	**3.14**

Note: The acres needed to be established are close approximations enabled by GPS survey methods. No right-of-way is required on the public road and railroad crossings