

**FINAL**



# Technical Memorandum

**To:** Chris Byrd, PE  
Benton County Engineer  
**From:** Garrett Monson, PE  
Houston Engineering, Inc.  
**Subject:** Benton County Ditch 6 Repair Report  
**Date:** April 21, 2021  
**Project:** 6183-0001

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am duly Licensed Professional Engineer under the laws of the State of Minnesota.

*Garrett Monson*

Garrett Monson  
Reg. No. 54326

4-23-2021

Date

## INTRODUCTION AND EXECUTIVE SUMMARY

Benton County Ditch 6 (CD 6) is in disrepair and in need of repair. The channel is poorly defined in several areas, several culverts are perched and/or undersized, and there is significant sedimentation in some reaches of the ditch system.

Benton County as the Drainage Authority for CD 6 has contracted with Houston Engineering (HEI) to prepare a repair report for the CD 6 public drainage system. The purpose of this report is to provide a description and analysis of repair alternatives, including hydrologic and hydraulic analyses and a preliminary opinion of probable cost for the recommended repairs.

To restore the function of CD 6, we recommend the County complete a repair of the County Ditch 6 open channel to the As-Constructed and Subsequently Improved Condition (ACSIC). We conclude the proposed repairs are necessary to restore the function of the drainage system and meet future stormwater management needs, and they are in the best interest of benefitted property owners.

A total of 9 culvert crossings on CD 6 were identified during this study. We recommend that 8 of them be replaced to allow the ditch to function as constructed. The remaining crossing is appropriately sized, at the ACSIC grade, and in good condition.

To assist the County, preliminary design and cost information are provided in this report (**see Attachments A and B**). However, detailed construction plans, bid documents, and specifications will need to be prepared subsequent to the County establishing and ordering a repair be completed. Benton County retains the decision whether to accept, reject, or modify the Engineer's recommendation.



## CURRENT SYSTEM

### LOCATION OF THE PUBLIC DRAINAGE SYSTEM

Benton County Ditch 6 (CD 6), shown in **Figure 1**, is a 4.0-mile open channel system that consists of a 2.9-mile Main Trunk and 1.1-mile Branch 1. The system is located northwest of Gilman in Sections 25, 26, 27, and 28 of Graham Township (T38N, R30W) in Benton County.

The Main Trunk flows east to west from 1,300 feet east of County Road (CR) 41 to 850 feet west of 45<sup>th</sup> Ave NE where it drains into a natural watercourse 3,700 feet upstream of Mayhew Creek. Branch 1 flows east to west from State Highway 25 (MN-25) 2,300 feet east of CR 41 to its confluence with the Main Branch near the middle of section 26.

The total drainage area tributary to CD 6 is approximately 2.8 square miles (1,805 acres) located in Graham Township. The 1905 historical benefitted area includes 1.6 square miles (1,040 acres). At the time of writing the system is undergoing a redetermination of benefits proceeding. Current land use in the tributary watershed is agricultural along with wetland, forest, and rural residential.

### CURRENT CONDITION OF THE SYSTEM

Field survey data, including photographs and elevations, was collected in September of 2019. The survey data established the existing conditions and elevations of the open channel system and located culverts and other crossings along the ditch system. Additionally, soil borings were completed to assist in determining the As-Constructed and Subsequently Improved Condition (ACSIC) profile.

All survey data was referenced to the North American Vertical Datum 1988 (NAVD88). (Note: Unless otherwise noted, all elevations provided herein are based on the NAVD88 datum).

HEI prepared an engineer's report dated 1/29/2020 and amended 2/11/2020 investigating and detailing the historic drainage system record for CD 6. On May 5, 2020, Benton County ordered the reestablishment of the drainage system record per the engineer's report in accordance with M.S. 103E021 Subd. 4a. This proceeding established the ACSIC of the ditch, which is referenced within this report. The alignment of CD 6 is shown in **Figure 1**.

The physical survey completed by HEI revealed that parts of the CD 6 system are in disrepair, with specific areas of concern documented below.

### SPECIFIC PROBLEM AREAS

Many of the existing culvert crossings are not functioning as originally constructed due to elevations above the ACSIC profile or being sized too small to handle design flows.

Soil borings taken during the field survey verified excessive sedimentation throughout the CD 6 system. Sediment depths of up to 2' were observed in parts of the Main Trunk and Branch 1. One of the primary causes of this sediment build-up are the several culvert crossings that are currently above the ACSIC grade, which effectively create a trap for the sediment.

## PROPOSED REPAIR

The purpose of the proposed repair is to restore the drainage system function to a level of service consistent with the ACSIC of CD 6 within the project area. For the open channel portion of CD 6, restoration can be completed by excavating to the grades of the ACSIC profile and cross-section described in the *Reestablishment of Benton County Ditch 6 Public Drainage Records*.

A total of 9 crossings are located along the CD 6 alignment (see **Table 1**), and 8 of these are recommended for replacement. Four culverts are located at roadway crossings, and of those, three are recommended for replacement. Five private crossings were identified on the system, and of those, all five are recommended for replacement.

Each of these culverts proposed for replacement is either substantially higher than the ACSIC channel grade, too small to adequately convey flows in the public drainage system, and/or in disrepair. Culvert sizes under field crossings were evaluated based on the ability to pass the 2-year discharge (calculated with USGS Regression Equations<sup>1</sup>) without overtopping the banks and similarity with sizes of upstream and downstream culverts.

Culverts at county road crossings were sized to convey the 50-year peak discharge without overtopping the roadway and township road crossings were sized to convey the 10-year peak discharge without overtopping the roadway. Where appropriate, culverts have been sized to match the existing conditions. However, five culverts are proposed to increase in size:

- Main Trunk – Station 23+24 – Field Crossing – Replace 18" CPP with 48" CPP
- Main Trunk – Station 68+00 – CR 59 – Replace 48" CMP with 60" RCP
- Main Trunk – Station 104+40 – Field Crossing – Replace 18" CPP with 36" CPP
- Main Trunk – Station 140+19 – CR 41 – Replace 40" CMPA with 48" RCP
- Branch 1 – Station 32+76 – CR 41 – Replace 36" CMP with 42" RCP

**Table 1** lists the CD 6 culverts and the proposed replacement actions, culvert sizes, and materials. **Figure 2** shows the locations of CD 6 culverts and proposed replacement actions. Details of the culvert assessment are included in **Attachment C**.

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<sup>1</sup> Lorenz, D.L., Sanocki, C.A., and Kocian, M.J., 2010, Techniques for estimating the magnitude and frequency of peak flows on small streams in Minnesota based on data through water year 2005: U.S. Geological Survey Scientific Investigations Report 2009-5250, 54 p.

Table 1: County Ditch 6 Culverts

Maintenance Responsibility	Crossing	Location	Existing	Recommendation	Notes
<b>Graham Township</b>	45th Ave NE	Main Trunk STA 8+71	72" CMP	No Action	Existing culvert is appropriately sized and at the ACSIC grade.
<b>Private</b>	Field Crossing	Main Trunk STA 23+24	18" CPP	Replace with 48" CPP at ACSIC grade	Existing culvert is undersized and substantially above the ACSIC grade.
<b>Private</b>	Field Crossing	Main Trunk STA 39+35	48" CMP	Replace with 48" CPP at ACSIC grade	Existing culvert is appropriately sized, but above the ACSIC grade and in poor condition.
<b>Benton County</b>	CR 59/55th Ave NE	Main Trunk STA 68+00	48" CMP	Replace with 60" RCP w/aprons at ACSIC grade	Existing culvert is undersized, above the ACSIC grade, and in poor condition.
<b>Private</b>	Private Driveway	Main Trunk STA 102+69	42" CMP	Replace with 42" CPP at ACSIC grade	Existing culvert is appropriately sized and at the ACSIC grade, but is in poor condition.
<b>Private</b>	Field Crossing	Main Trunk STA 104+40	18" CPP	Replace with 36" CPP at ACSIC grade	Existing culvert is near the ACSIC grade, but is undersized.
<b>Benton County</b>	CR 41/65th Ave NE	Main Trunk STA 140+19	40" CMPA	Replace with 48" RCP w/aprons at ACSIC grade	Existing culvert is undersized and above the ACSIC grade.
<b>Benton County</b>	CR 41/65th Ave NE	Branch 1 STA 32+76	36" CMP	Replace with 42" RCP w/aprons at ACSIC grade	Existing culvert is at the ACSIC grade, but is undersized.
<b>Private</b>	Field Crossing	Branch 1 STA 46+28	24" CMP	Replace with 24" CPP at ACSIC grade	Existing culvert is appropriately sized but above the ACSIC grade.

## EVALUATION OF REPAIR

### HYDRAULIC IMPACTS

County Ditch 6 has significant sedimentation and several culverts located above the ACSIC grade. The proposed repair would remove these obstructions to open channel flow and restore the hydraulic efficiency of the system. The proposed repairs will reduce peak water levels for smaller rain events, but they are not expected to significantly impact peak water levels for the 100-year flood event.

All proposed culverts are comparable in size to upstream and downstream locations. Capacities of the recommended replacements are not larger than the ACSIC channel; they will not result in an increase in channel capacity (and thus fit the statutory definition of "repair"), but they will reduce ponding behind structures during larger events compared to the current (obstructed) condition.

## REGULATORY CONSIDERATIONS

### Wetlands

There are three regulatory programs that may be triggered by a drainage system repair project, including the Minnesota Department of Natural Resources (MnDNR) Public Waters Permitting Program, the federal Clean Water Act (CWA) implemented by the US Army Corps of Engineers (USACE), and the state Wetland Conservation Act (WCA) implemented by the Local Government Unit, in this case Benton County. The following is a review of the repair project relative to these three regulatory programs.

As seen in **Figure 3**, CD 6 does not intersect any state-listed Public Waters or Public Water Wetlands. The CD 6 channel is listed as a Public Watercourse but is categorized as a “Public Ditch / Altered Watercourse”, which does not require a Public Waters permit or permission from the MnDNR. However, Benton County should notify the DNR of the intent to repair following ordering of the repair and include the DNR on any public notifications related to the drainage system.

The CD 6 public drainage system intersects wetlands identified in the MnDNR National Wetland Inventory (NWI) as shown in **Figure 3**. Under the two wetland regulatory programs, (Minnesota WCA and Federal CWA) activities related to repair of a public drainage system are generally exempt from permitting and mitigation requirements. These activities related to public drainage system maintenance and repair, and include:

- Excavation in wetlands when limited to removal of accumulated sediment or debris such as trees, logs, stumps, beaver dams, blockage of culverts, and trash, provided the removal does not result in alteration of the original cross-section of the wetland or watercourse;
- Removing those materials placed by beaver;
- Removing or moving materials blocking installed roadway culverts and related drainage structures; and
- Temporary or seasonal water level management activities done for the purpose of performing maintenance.

Under the federal CWA, drainage system maintenance or repair is exempt from regulation. Under the state WCA, activities related to maintenance or repair of a public drainage system are exempt from replacement, include:

- Maintenance or repair of a public drainage system which drains Type 1, 2, 6, 7, or 8 wetlands; and
- Maintenance or repair of a public drainage system which drains Type 3, 4, or 5 wetlands that have existed for 25 years or less.

Based on a review of the NWI data and aerial photography to confirm wetland types, the wetlands identified within proximity to CD 6 are Type 1 and 2 wetlands (**Figure 3**). There do not appear to be any natural Type 3, 4, or 5 wetlands adjacent to the CD 6 channel, therefore the drainage system repair project will meet the exemption criteria of the state WCA.

### Threatened and Endangered Species

Public drainage systems may encounter situations where Minnesota's Endangered Species Statute (MS 84.0895) and the associated Rules apply. The endangered species program regulates activities that take,

import, transport, or sell any portion of an endangered or threatened species where these acts may be allowed by permit issued by the DNR. The statutes exempt the accidental, unknowing destruction of designated plants. However, it is the responsibility of the Engineer when preparing a final report to complete due diligence to avoid impacts to threatened and endangered species.

Based on the MnDNR's Natural Heritage Information System (NHIS) data (Houston Engineering License Agreement LA-944), there are no state-listed threatened or endangered species identified within the CD 6 area.

## PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

A Preliminary Opinion of Probable Construction Cost (POPCC) was developed for the recommended repairs and is included as **Attachment 2**. The estimated cost is shown in **Table 2**.

**Table 2: Preliminary Opinion of Probable Construction Cost Summary**

Category	Cost
<i>Public Road Crossings</i>	\$72,990
<i>Public Drainage Infrastructure</i>	\$279,010
Construction Costs*	\$422,400
Engineering**	\$70,000
Legal and Administrative	\$20,000
<b>Total Repair Project Cost</b>	<b>\$512,400</b>

\* Construction costs include a 20% contingency

\*\* Engineering Costs are estimated and consist of development of plans and specifications and 6 weeks of construction management, this does not include the sunk costs of the Record Reestablishment and Repair Report.

The public drainage infrastructure cost includes open channel excavation, replacement of private culverts, tree clearing, and seeding and stabilization in the ditch right-of-way.

## CONCLUSION / RECOMMENDATION

To restore the function of the CD 6 public drainage system to the condition as it was originally constructed, we recommend the County complete a repair of the system to the ACSIC as depicted in **Attachment A**. We conclude that the proposed repairs are necessary to meet the current and future stormwater management needs, and that the repairs are in the best interest of the property owners. The recommended repairs are believed to balance the need to provide serviceable drainage and stormwater management with the desire to minimize environmental impacts while implementing the best value alternative.

We further recommend the Drainage Authority and their staff begin coordination with the County Highway Department and Townships to determine their preference for roles and timelines in completing the culvert replacements under public roadways.

To assist the Drainage Authority, concept-level design and cost information are provided in this memorandum. However, detailed construction plans, bid documents, and specifications will need to be prepared subsequent to

**FINAL**

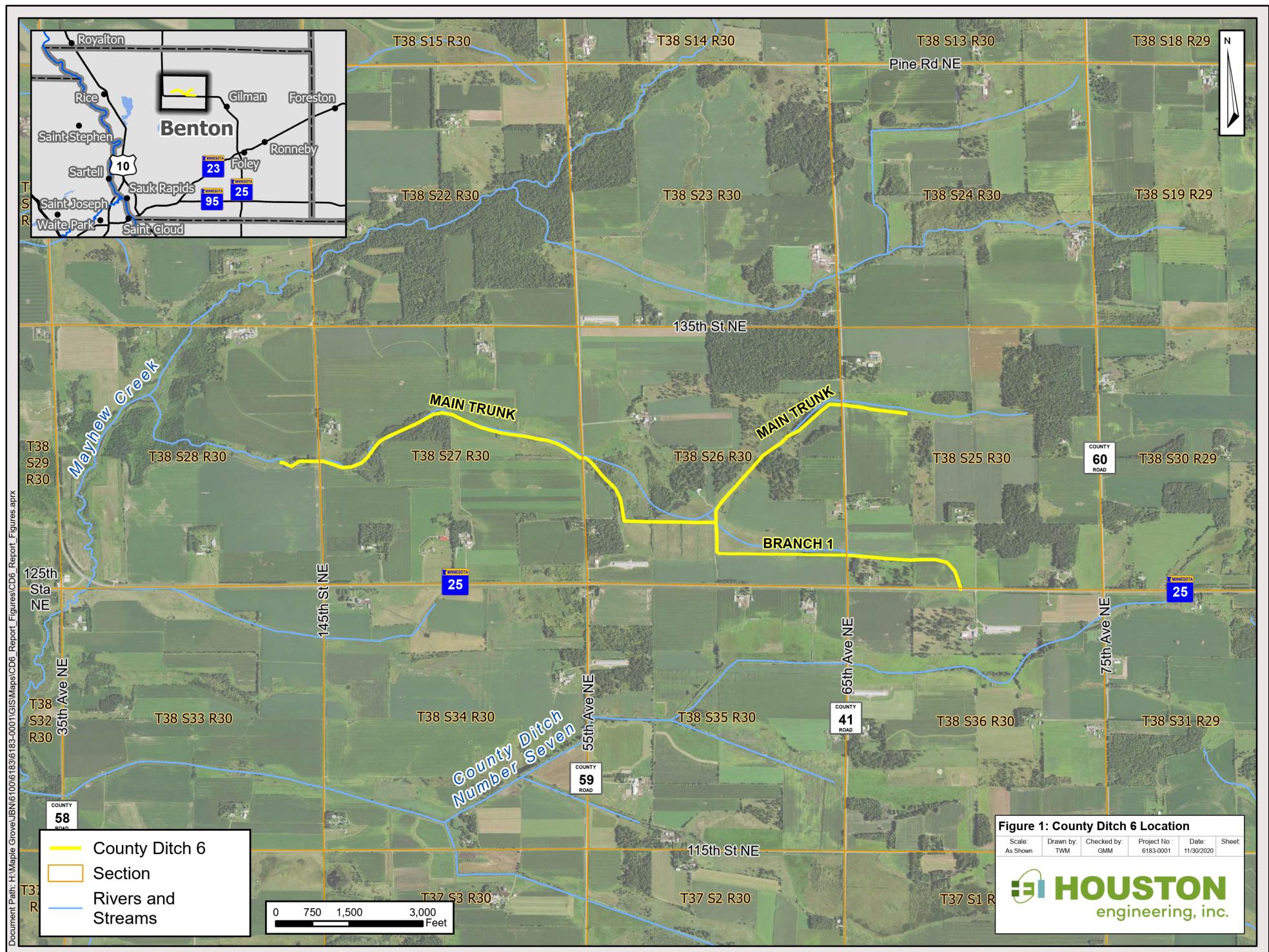


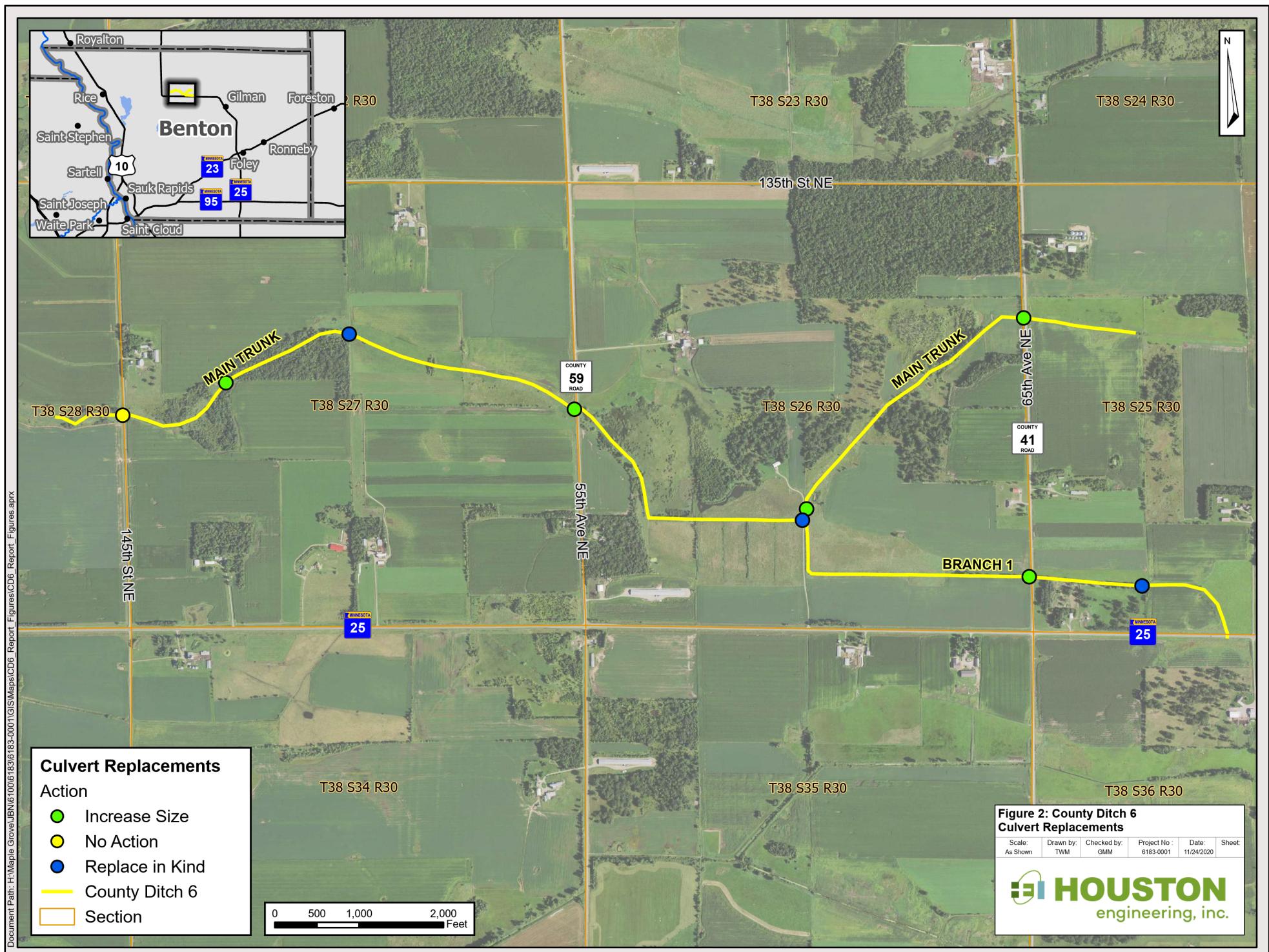
the Drainage Authority establishing and ordering a repair. The Drainage Authority retains the decision whether to accept, reject or modify the Engineer's Recommendation.

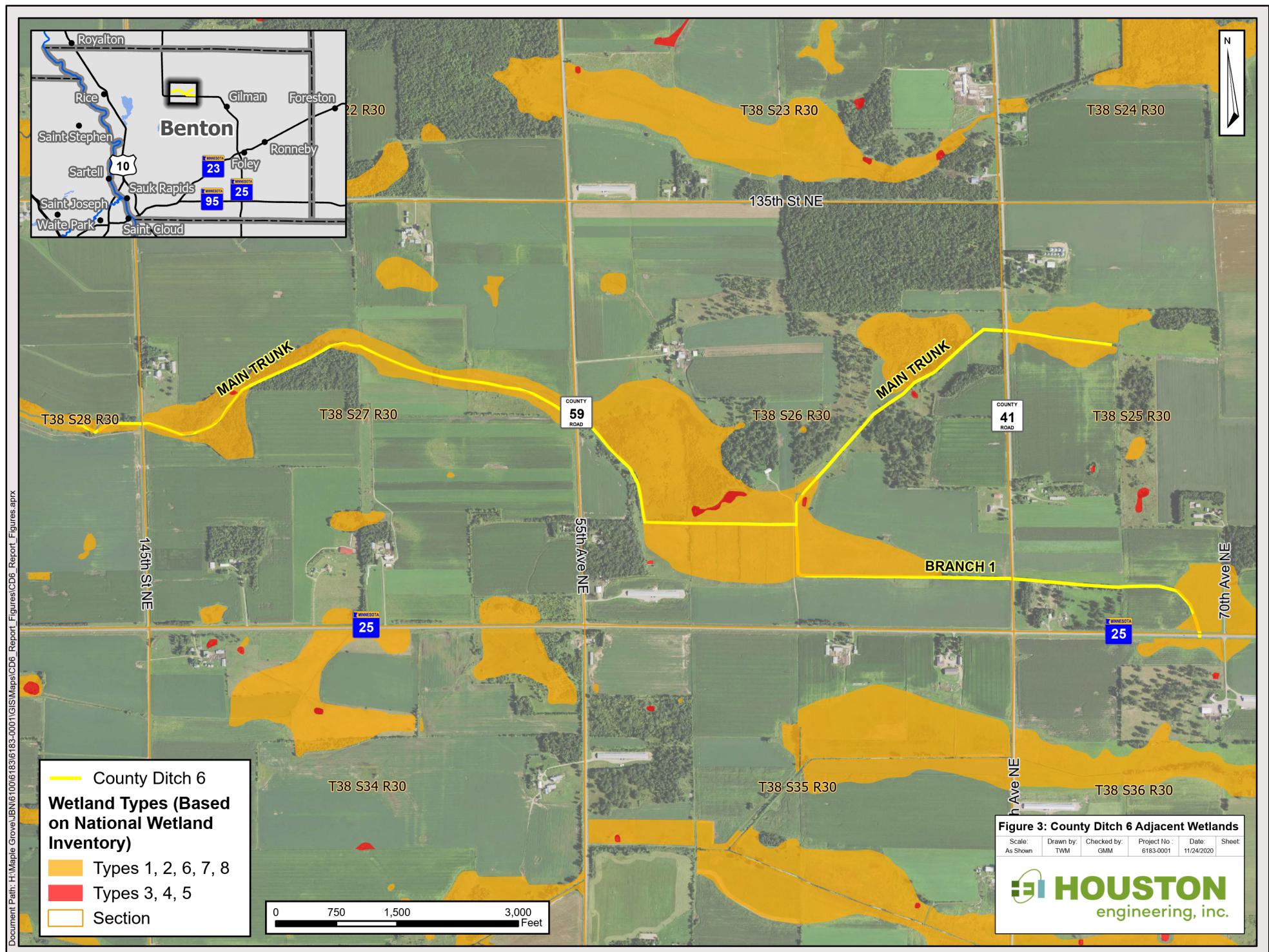
## LIST OF ATTACHMENTS

- Attachment A: Benton County Ditch 6 Repair Plans
- Attachment B: Preliminary Opinion of Probable Construction Cost
- Attachment C: Culvert Details



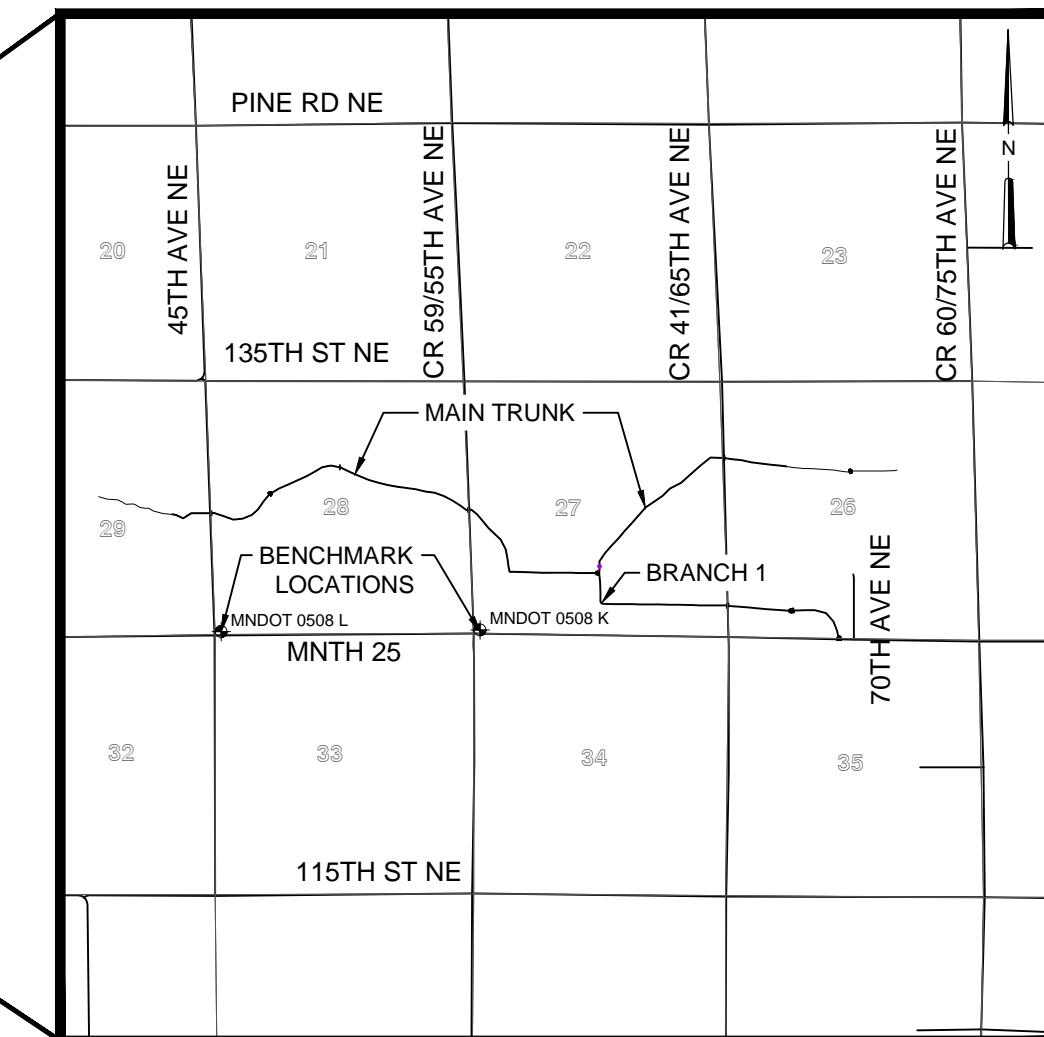
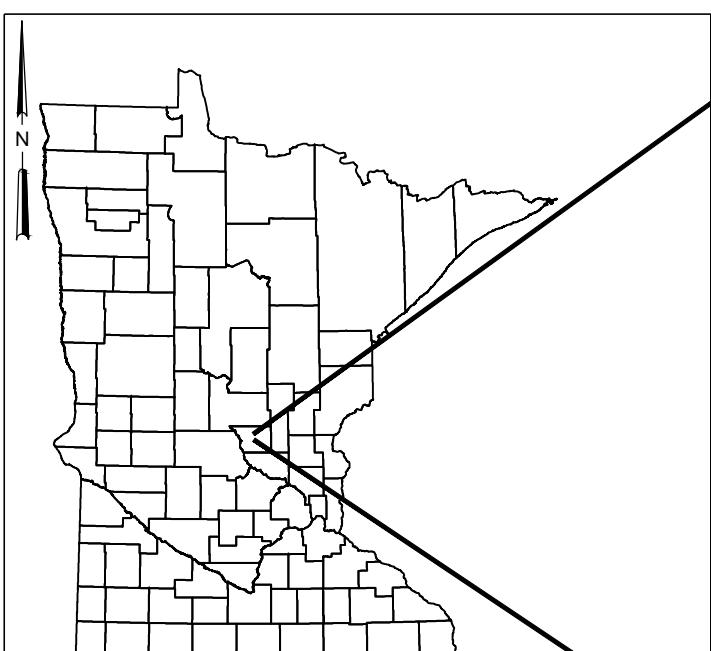






**BENTON COUNTY**  
**REPAIR REPORT**  
**FOR**  
**BENTON COUNTY DITCH NO. 6**  
**GRAHAM TOWNSHIP IN BENTON COUNTY**  
**JANUARY 2021**

Sheet List Table	
1	TITLE SHEET
2	PLAN AND PROFILE MAIN TRUNK
3	PLAN AND PROFILE MAIN TRUNK
4	PLAN AND PROFILE MAIN TRUNK
5	PLAN AND PROFILE BRANCH 1
6	DETAILS
7	QUANTITIES & TABLES



**PRELIMINARY**  
 Not for Construction

NOTES:

1. GEODETIC CONTROL

VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

HORIZONTAL: COUNTY COORDINATES (MNDOT), BENTON COUNTY, US FOOT

FIELD SURVEY COMPLETED BY HOUSTON ENGINEERING INC. STAFF IN SEPTEMBER 2019.

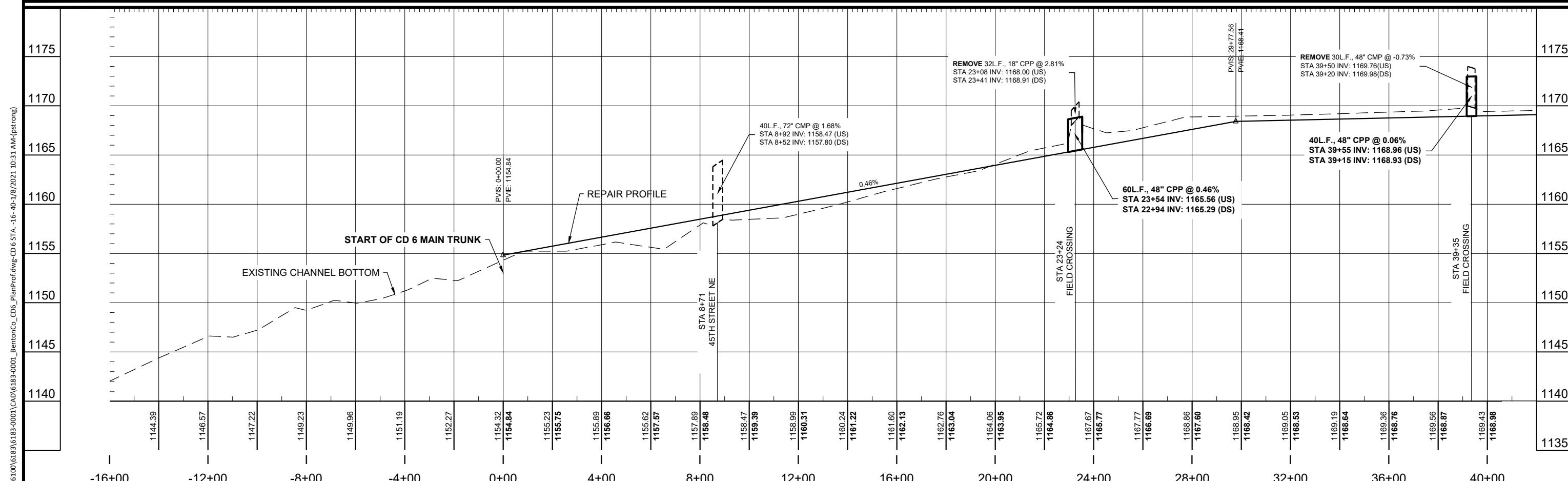
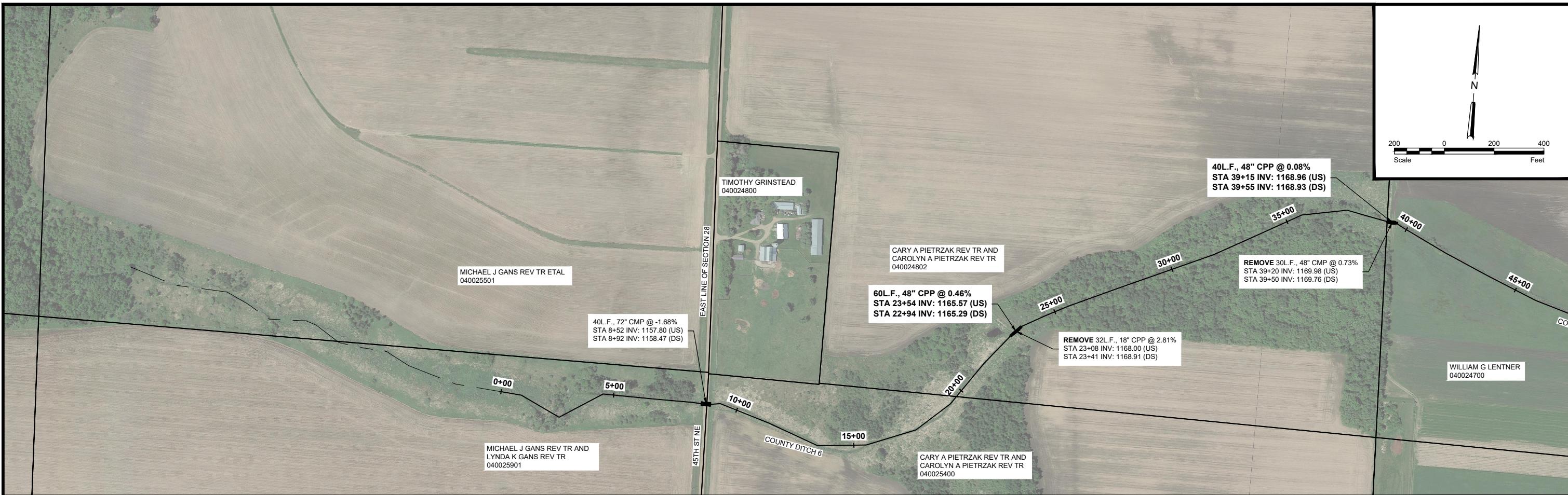
CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VISIT THE SITE TO INFORM THEMSELVES AS TO ALL EXISTING CONDITIONS AND LIMITATIONS.
2. THE CONTRACTOR IS RESPONSIBLE UNDER MINNESOTA STATE STATUTE 216D AND MINNESOTA RULES CHAPTER 7560 TO CONTACT GOPHER STATE ONE CALL FOR THE LOCATION OF UNDERGROUND UTILITY FACILITIES IN PROXIMITY TO THE EXCAVATION SITE. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY RESULT FROM ITS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
3. CONSTRUCTION LIMITS TO BE VERIFIED IN FIELD BY ENGINEER.
4. CONTRACTOR SHOULD BE AWARE OF EROSION CONTROL SPECIFICATIONS, AND WILL BE RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF SAID CONTROL MEASURES. IN ADDITION, THE CONTRACTOR WILL BE REQUIRED TO APPLY AS A CO-PERMITTEE FOR A MPCA GENERAL STORM WATER PERMIT FOR CONSTRUCTION ACTIVITIES. AS A CO-PERMITTEE THE CONTRACTOR WILL ACCEPT AND ENSURE ALL TERMS OF THE SAID PERMIT ARE IMPLEMENTED AND MAINTAINED.

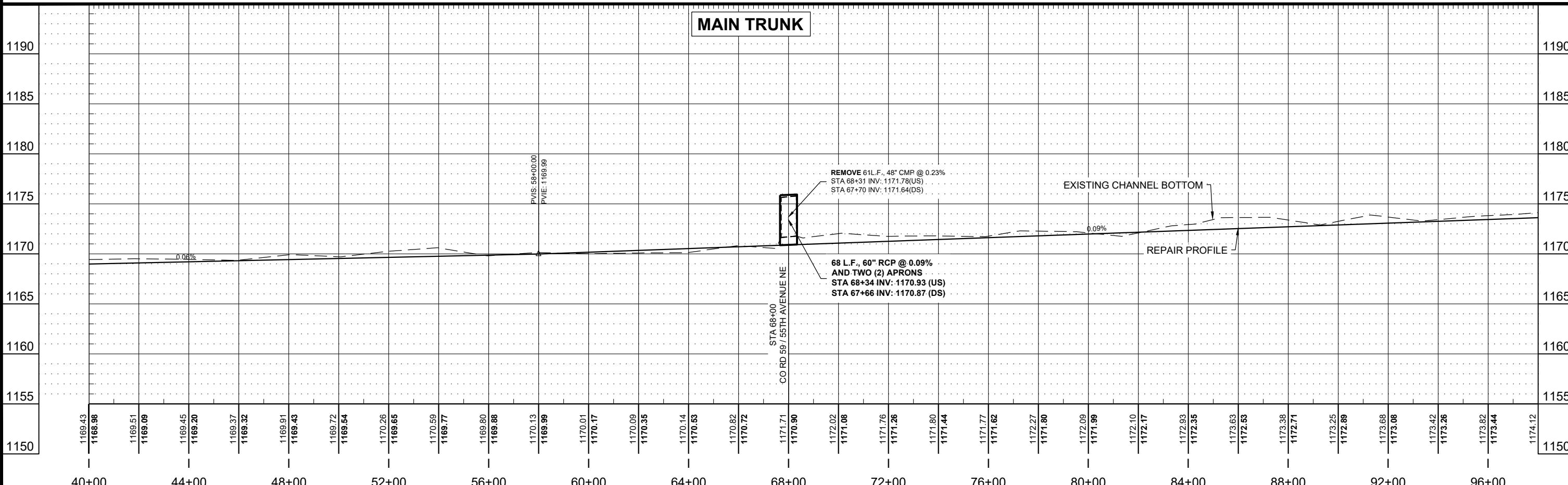
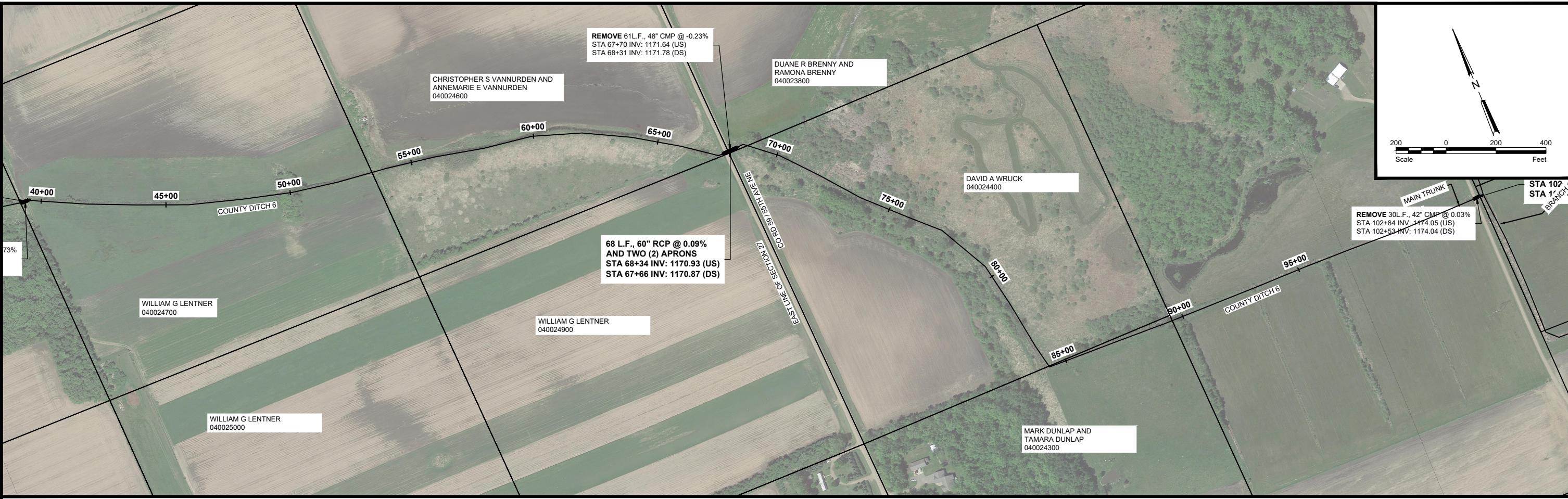
**PREPARED BY:**



MAPLE GROVE, MINNESOTA



PRELIMINARY				HOUSTON		Maple Grove	Drawn by PAS	Date 1-8-2021	BENTON COUNTY DITCH 6 REPAIR PLAN			BENTON COUNTY DITCH 6 STA. -16+00 - 40+00 PROJECT NO. 6183-0001		SHEET 2 of 7
No.	Revision	Date	By	HOUSTON		P: 763.493.4522	Checked by GM	Scale AS SHOWN	BENTON COUNTY GILMAN, MN					



No.	Revision	Date	By

**PRELIMINARY**  
Not for Construction



Maple Grove

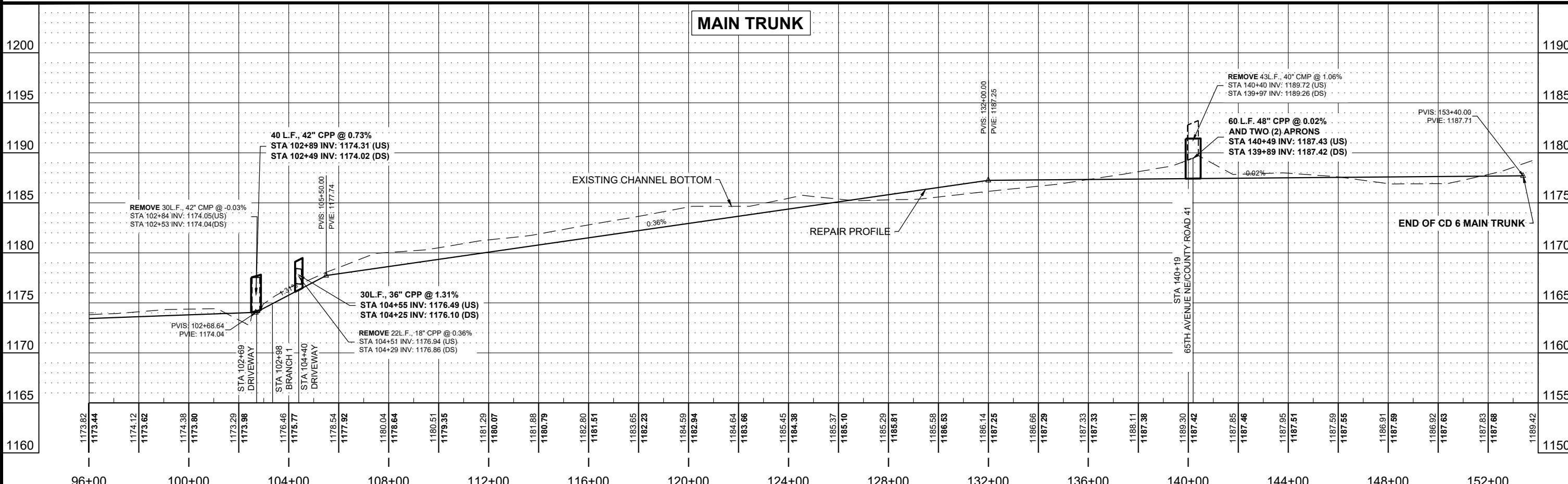
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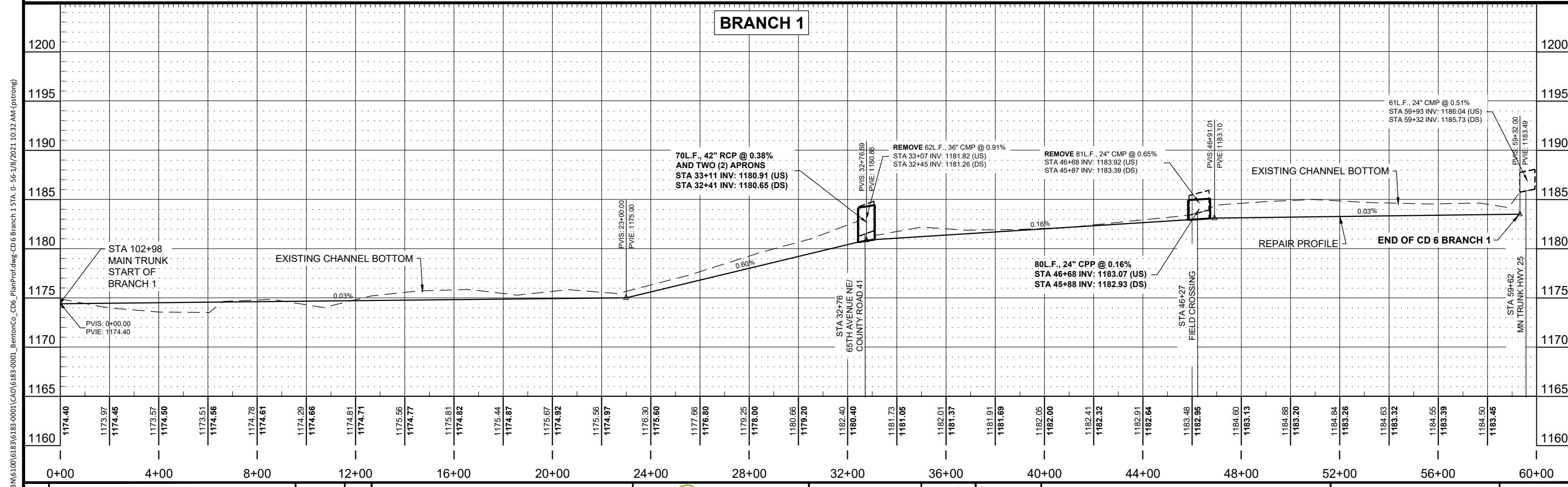
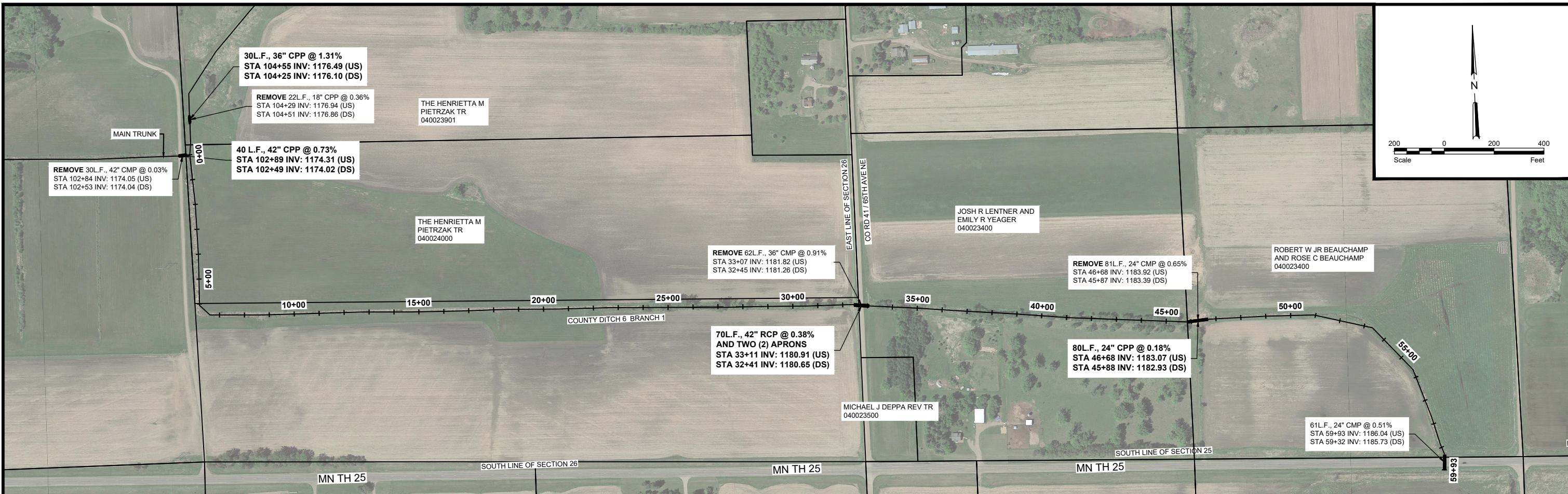
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BENTON COUNTY DITCH 6 REPAIR PLAN  
BENTON COUNTY  
GILMAN, MN

BENTON COUNTY DITCH 6  
STA. 40+00 - 96+00  
PROJECT NO. 6183-0001

SHEET  
3 of 7





# PRELIMINARY

Not for Construction



## Maple Gro

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E: 763.493.5

Drawn  
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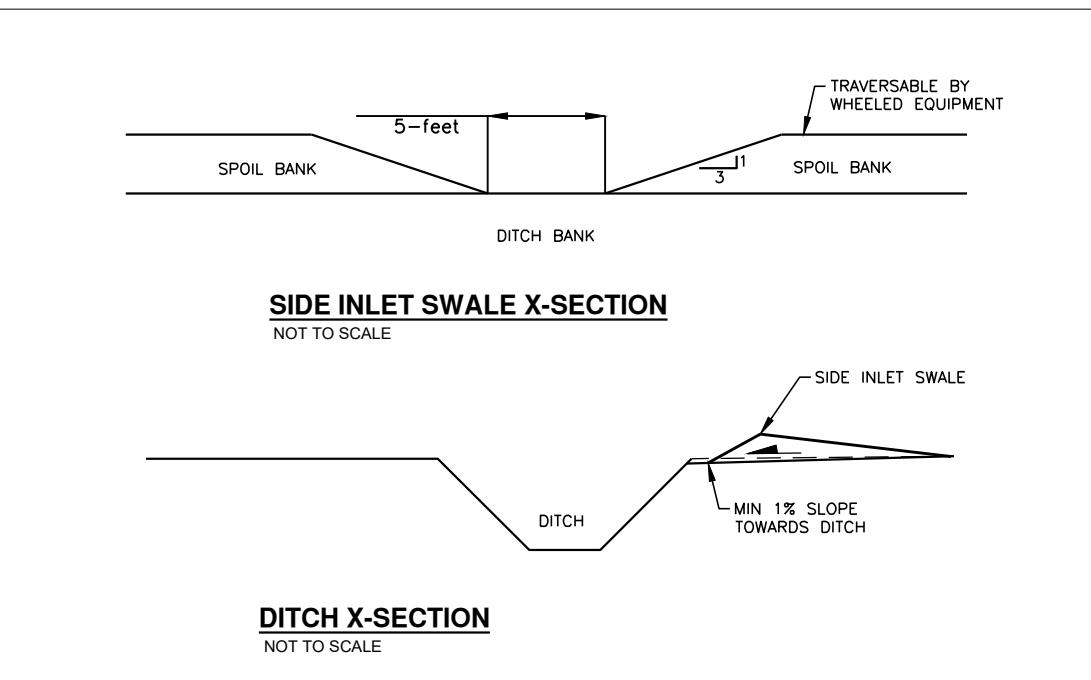
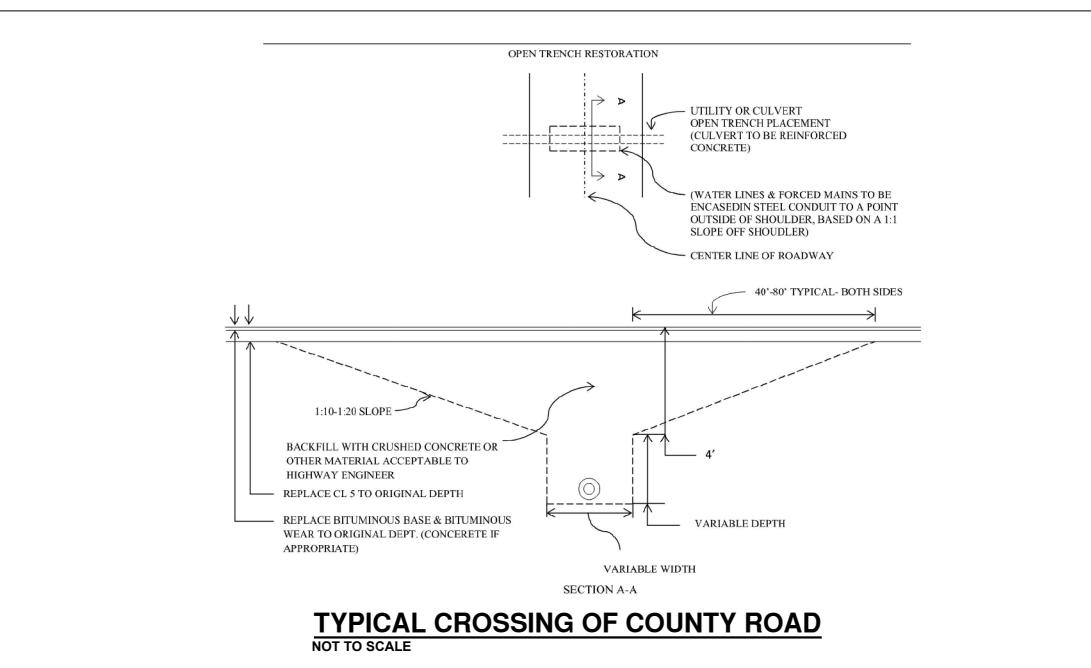
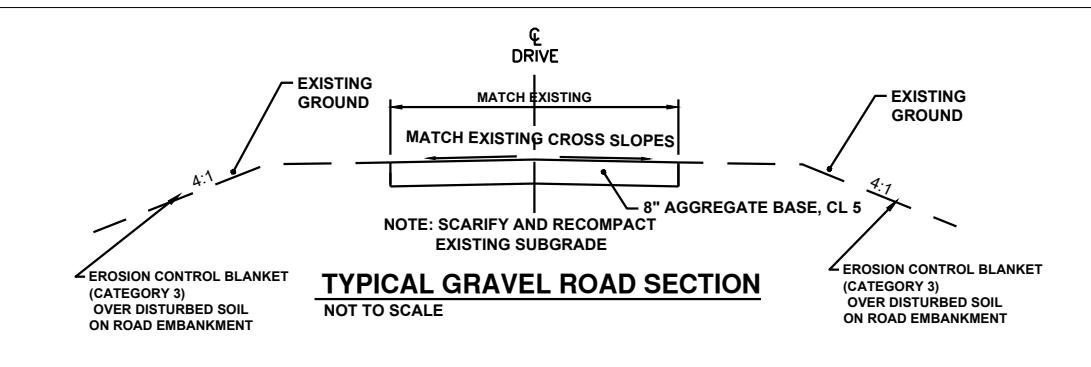
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by Scale AS SHOWN

BENTON COUNTY DITCH 6 REPAIR PLAN  
BENTON COUNTY  
GILMAN, MN

BENTON COUNTY DITCH 6  
STA. 0+00 - 56+00  
PROJECT NO. 6183-0001

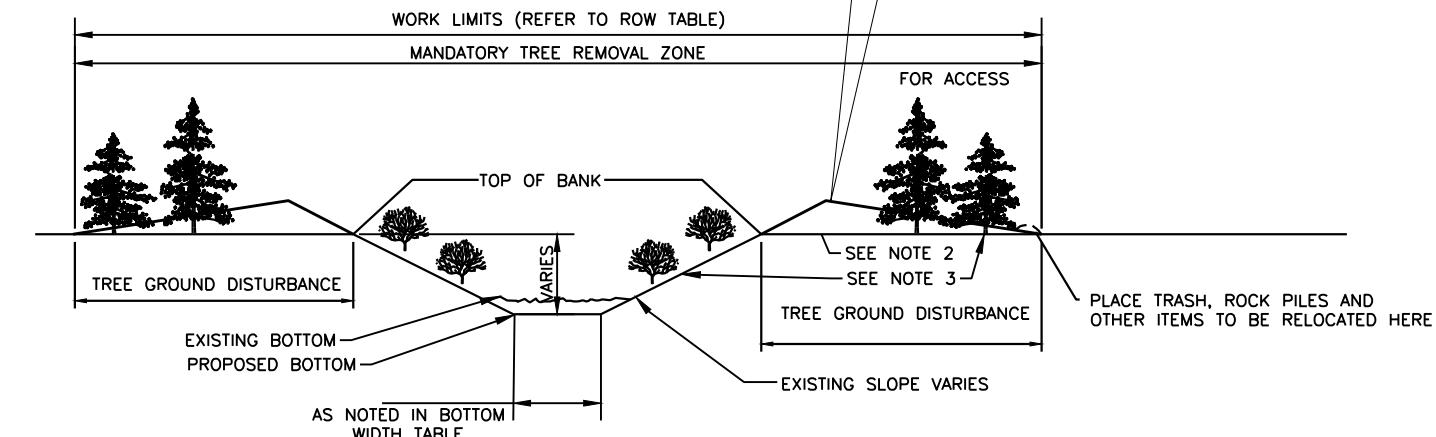
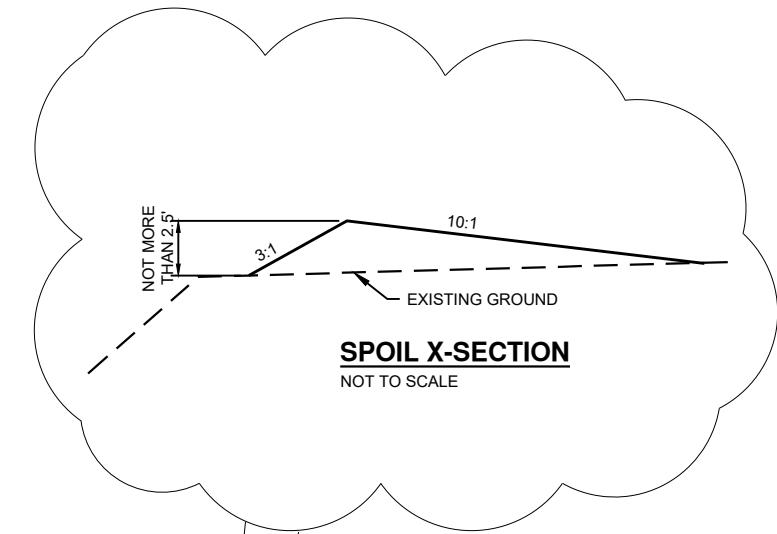
SHEET  
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RIGHT-OF-WAY		
	STATION	ROW WIDTH (FT)*
MAIN TRUNK	0+00 to 6+00	60
	6+00 to 24+00	65
	24+00 to 36+00	70
	36+00 to 132+00	65
	132+00 to 142+00	70
	142+00 to 153+40	65
BRANCH 1	00+00 to 24+00	65
	24+00 to 27+00	70
	27+00 to 42+00	65
	42+00 to 46+00	70
	46+00 to 59+32	65

\*CENTERED ON THE CHANNEL

BOTTOM WIDTH TABLE			
	Start Station	End Station	Bottom Width (ft)
Main Trunk	0+00	109+50	4
Main Trunk	109+50	153+40	3
Branch 1	0+00	59+32	3



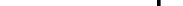
**\*NOTES:**

- 1) WORK LIMITS EXTEND FROM TOP OF BANK TO WORK LIMIT STAKES OR AS SHOWN, ON EITHER SIDE OF THE DITCH.
- 2) EXISTING SPOILS TO BE SPREAD AND SMOOTHED.
- 3) TREES CUT TO 2" OR LESS ABOVE GROUND SURFACE PER SPECIFICATIONS.
- 4) LEAVE SIDE INLET SWALE OR INSTALL SIDE INLET PIPE IN LOW AREAS TO PROVIDE DRAINAGE AND AS DIRECTED BY ENGINEER.
- 5) WHEN SEDIMENT REMOVAL DEPTH IS GREATER THAN 1.5", PLACE SPOIL ON BOTH SIDES OF DITCH UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- 6) SIDE SLOPES ARE NOT TO BE DISTURBED UNLESS INDICATED IN THE PLANS.
- 7) TREES AND BRUSH FROM CLEARING OPERATIONS MUST BE DISPOSED OF OFF-SITE AT CONTRACTOR'S EXPENSE.

**DITCH CLEANING, SPOIL PLACEMENT, AND WORK LIMITS**

NOT TO SCALE

Item Number	Description	Units	Est'd Quantity
1	Mobilization	Lump Sum	1
2	Traffic Control	Lump Sum	1
3	Temporary and Permanent Removals	Lump Sum	1
4	Excavation of Open Channel (P)	Linear Foot	21272
5	Spoil Management (P)	Linear Foot	21272
6	Tree Clearing, Chipping, and Removal	Acre	2
7	Removal of Existing Culvert	Linear Foot	363
8	24" CP Pipe Culvert	Linear Foot	80
9	36" CP Pipe Culvert	Linear Foot	30
10	42" CP Pipe Culvert	Linear Foot	30
11	42" RCP Culvert	Linear Foot	70
12	42" RCP Apron	Each	2
13	48" CP Pipe Culvert	Linear Foot	100
14	48" RCP Culvert	Linear Foot	60
15	48" RCP Apron	Each	2
16	60" RCP Culvert	Linear Foot	68
17	60" RCP Apron	Each	2
18	Gravel Roadway Patch	Each	3
19	SWPPP Documentation & Reporting	Lump Sum	1
20	Seeding and Mulch (P)	Acre	9.85
21	Silt Fence; Type PA	Linear Foot	100
22	Sediment Control Log	Linear Foot	100
23	Erosion Control Blanket Cat. 3	Square Yard	500

No.	Revision	Date	By		 HOUSTON ENGINEERING INC.	Maple Grove	Drawn by PAS	Date 1-8-2021	BENTON COUNTY DITCH 6 REPAIR PLAN BENTON COUNTY GILMAN, MN	QUANTITIES & TABLES	SHEET 7 of 7

## Attachment A: Preliminary Opinion of Probable Construction Cost

## Public Drainage System Infrastructure

Item Number	Description	Units	Est'd Quantity	Unit Price	Extension
1	Mobilization	Lump Sum	1	\$20,000	\$20,000
2	Traffic Control	Lump Sum	1	\$10,000	\$10,000
3	Temporary and Permanent Removals	Lump Sum	1	\$2,000	\$2,000
4	Excavation of Open Channel (P)	Linear Foot	21272	\$5	\$106,360
5	Spoil Management (P)	Linear Foot	21272	\$2	\$42,544
6	Tree Clearing, Chipping, and Removal	Acre	2.0	\$10,000	\$20,000
7	Removal of Existing Culvert	Linear Foot	197	\$15	\$2,955
8	24" CP Pipe Culvert	Linear Foot	90	\$45	\$4,050
9	36" CP Pipe Culvert	Linear Foot	30	\$80	\$2,400
10	42" CP Pipe Culvert	Linear Foot	30	\$100	\$3,000
11	48" CP Pipe Culvert	Linear Foot	100	\$140	\$14,000
12	SWPPP Documentation & Reporting	Lump Sum	1	\$2,500	\$2,500
13	Seeding and Mulch (P)	Acre	9.75	\$5,000	\$48,750
14	Silt Fence; Type PA	Linear Foot	100	\$5	\$500
15	Sediment Control Log	Linear Foot	100	\$4	\$400
				Public Drainage Subtotal	\$279,459

## Public Road Crossings

Item Number	Description	Units	Est'd Quantity	Unit Price	Extension
1	Removal of Existing Culvert	Linear Foot	166	\$15	\$2,490
2	42" CP Pipe Culvert	Linear Foot	70	\$100	\$7,000
3	48" CP Pipe Culvert	Linear Foot	60	\$140	\$8,400
4	60" CM Pipe Culvert	Linear Foot	68	\$140	\$9,520
5	Gravel Roadway Patch	Each	3	\$5,000	\$15,000
6	Seeding and Mulch (P)	Acre	0.1	\$5,000	\$500
7	Erosion Control Blanket Cat. 3	Square Yard	500	\$4	\$2,000
<b>Public Road Crossings Subtotal</b>					<b>\$44,910</b>

**Construction Subtotal**

Engineering	\$70,000
Legal/Admin	\$20,000
Contingency	\$64,874

**TOTAL PROJECT COST** \$479,243

Attachment C - CD 6 Repair Culvert Details

Authority	Branch	Center Station	US Station	US Invert	DS Station	DS Invert	Existing Length (ft)	Existing Size (in)	Existing Type	2-year discharge (cfs)	10-year discharge (cfs)	25-year discharge (cfs)	50-year discharge (cfs)	100-year discharge (cfs)
Graham Township	Main Trunk	8+71	8+92	1158.47	8+52	1157.80	40	72	CMP	39.0	113.0	165.4	210.4	262.0
Private	Main Trunk	23+24	23+41	1168.91	23+08	1168.00	32	18	CPP	37.2	108.5	159.1	202.6	252.6
Private	Main Trunk	39+35	39+50	1169.76	39+20	1169.98	30	48	CMP	36.2	105.9	155.4	198.2	247.2
Benton County	Main Trunk	68+00	68+31	1171.78	67+70	1171.64	61	48	CMP	33.1	97.7	144.0	184.2	230.2
Private	Main Trunk	102+69	102+84	1174.05	102+53	1174.04	30	42	CMP	27.8	84.1	124.8	160.6	201.6
Private	Main Trunk	104+40	104+51	1176.94	104+29	1176.86	22	18	CPP	20.9	65.7	99.0	128.7	162.8
Benton County	Main Trunk	140+19	140+40	1189.72	139+97	1189.26	43	40	CMPA	16.2	53.2	81.3	106.8	136.2
Benton County	Branch 1	32+76	33+07	1181.82	32+45	1181.26	62	36	CMP	12.9	44.2	68.5	90.9	116.9
Private	Branch 1	46+28	46+68	1183.92	45+87	1183.39	81	24	CMP	11.4	40.2	62.9	83.9	108.4

Authority	Branch	Center Station	US Station	US Invert	DS Station	DS Invert	Existing Length (ft)	Existing Size (in)	Existing Type	Action	Proposed Length (ft)	Proposed Size (in)	Proposed Type	Proposed US Station	Proposed US Invert	Proposed DS Station	Proposed DS Invert
Graham Township	Main Trunk	8+71	8+92	1158.47	8+52	1157.80	40	72	CMP	No Action	40	72	CMP	8+92	1158.47	8+52	1157.80
Private	Main Trunk	23+24	23+41	1168.91	23+08	1168.00	32	18	CPP	Increase Size	60	48	CPP	23+54	1165.57	22+94	1165.29
Private	Main Trunk	39+35	39+50	1169.76	39+20	1169.98	30	48	CMP	Replace in Kind	40	48	CPP	39+55	1168.96	39+15	1168.93
Benton County	Main Trunk	68+00	68+31	1171.78	67+70	1171.64	61	48	CMP	Increase Size	68	60	CMP	68+34	1170.93	67+66	1170.87
Private	Main Trunk	102+69	102+84	1174.05	102+53	1174.04	30	42	CMP	Replace in Kind	30	42	CPP	102+84	1174.24	102+54	1174.03
Private	Main Trunk	104+40	104+51	1176.94	104+29	1176.86	22	18	CPP	Increase Size	30	36	CPP	104+55	1176.49	104+25	1176.10
Benton County	Main Trunk	140+19	140+40	1189.72	139+97	1189.26	43	40	CMPA	Increase Size	60	48	CPP	140+49	1187.43	139+89	1187.42
Benton County	Branch 1	32+76	33+07	1181.82	32+45	1181.26	62	36	CMP	Increase Size	70	42	CPP	33+11	1180.91	32+41	1180.65
Private	Branch 1	46+28	46+68	1183.92	45+87	1183.39	81	24	CMP	Replace in Kind	90	24	CPP	46+73	1183.07	45+83	1182.93