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Preliminary Engineer's Report for

# Improvement of Main Open Ditch, Branch 309 & Branch C of Renville County Ditch No. 59

**S15.112473**

**January 2018**

**Submitted by:**

Bolton & Menk, Inc.  
1243 Cedar Street NE  
Sleepy Eye, MN 56085  
P: 507-794-5541  
F: 507-794-5542

# Certification

Preliminary Engineer's Report

For

Improvement

Of

Main Open Ditch, Branch 309, & Branch C

Of

Renville County Ditch No. 59

January 2018

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

By: Bill L. Helget  
Bill L. Helget, P.E.  
License No. 42046

Date: 1/10/2018

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## Exhibits

EXHIBIT 1: PRELIMINARY PLANS AND PROFILES

EXHIBIT 2: PETITION FOR CD 1B IMPROVEMENT

EXHIBIT 3: PRELIMINARY COST ESTIMATE

STATE OF MINNESOTA

RENVILLE COUNTY, MINNESOTA

IN THE MATTER OF THE PETITION FOR AN IMPROVEMENT OF RENVILLE COUNTY DITCH  
NO 59 IN RENVILLE COUNTY, MINNESOTA:

In January 2017, the Renville County Board, acting as the Ditch Authority for County Ditch No. 59 (CD 59) in Renville County, in accordance with Minnesota Statute 103E.215, accepted a petition for the improvement of portions of CD 59. Subsequent to that authorization, preliminary field surveys were performed to obtain elevations and establish an alignment for the proposed open ditch and culvert crossing improvements, as well as to evaluate the outlet for the system.

This Preliminary Engineer's Report summarizes the findings of the research, surveys, and analysis for the improvement and is submitted for consideration by the Ditch Authority.

## I. LOCATION AND SCOPE OF IMPROVEMENT

County Ditch No. 59 lies within and provides drainage to a large watershed in the north-central portion of Renville County. The open ditch system is about seven miles long and drains generally from east to west. The system provides drainage to:

- portions of two Sections in Crooks Township.
- portions of fifteen Sections in Winfield Township.
- portions of two Sections in Emmet Township.
- portions of five Sections in Troy Township.

County Ditch No. 59 serves as an outlet for County Ditch No. 17A at their confluence about two miles northwest of Danube, approximately 850 feet southwest of the CD 59 crossing of County Road 59. CD 17A drains portions of Crooks and Winfield Township. The total estimated watershed for CD 17A from USGS Streamstats data is 42.2 square miles.

The outlet for CD 59 is into County Ditch 37 about two miles west of Danube, just north of the Twin Cities & Western (TC&W) Railroad. The total estimated watershed for CD 59 from USGS Streamstats data is 58.5 square miles. However, the majority of this watershed is from CD 17A. Upstream of County Road 59, the CD 59 watershed is approximately 15.9 square miles.

The petition presented to the Board requests consideration for the improvement of the Main open ditch, Branch 309, and Branch C, of CD 59. The main open ditch initially drains from west to east and then forms a loop to drain to the west. The loop crosses US Highway 71 (TH 71) twice.

Branch 309 drains portions of Sections 32 and 33 in Winfield Township. The branch drains in general from north to south and discharges into the Main open ditch of CD 59. The existing watershed for Branch 309 is approximately 229 acres. Included in the scope of the petitioned improvements to Branch 309, is to extend the Branch tile to the north approximately 3,800 feet, and intercept the Main tile of CD 59. The goal of this portion of the improvement is to reroute the water drained by the upper portion of the system in a more direct route to the Main open ditch, and relieve the stress on the existing open ditch crossings of TH 71. The drainage area proposed to be re-routed is 628 acres.

Branch C drains portions of Sections 2, 3, and 4 in Troy Township and Section 34 in Winfield Township and drains in general from east to west. The existing watershed for Branch C is approximately 786 acres.

Bolton & Menk, Inc. collected field survey information in November of 2011 for a repair of the main open ditch conducted in 2014. This field survey information included the elevation of the

bottom of the ditch, and the top of one side of the ditch. The survey also included establishing the elevation and size of the culvert crossings, as well as centerline information of the roadway, railroad, or field crossing at the culvert crossings. Additional field survey information was collected by our firm in July of 2017, which included the top of the second side of the ditch, tile intakes near the Branch 309 and Branch C improvements, as well as ground elevations in potential storage areas.

The design of the improvements has also utilized LIDAR data provided by the Minnesota Department of Natural Resources. This data, obtained from an aerial flight, provides additional elevation data at a confidence level equal to two-foot vertical contours.

Other information used for this report includes plans obtained from Renville County files. However, the County plans do not show existing tile grades. Thus, it was necessary to use information gathered through intakes to make some interpretations regarding the existing tile grades. The existing plans, and other available information, do not identify the nomenclature of sub-branches of the CD 59 system. As a result, we have given the sub-branches unique identifiers, but only for the purposes of this improvement.

## **II. EXISTING DITCH SYSTEM**

Public information regarding the County Ditch No. 59 system was received from Renville County. This information provides a limited history of the CD 59 system. CD 59 was petitioned for establishment on June 26, 1916. Construction was completed on August 1, 1921. The original benefits for the ditch system were \$161,735.

An extensive repair of the existing system, known as Repair F occurred in 1967.

## **III. CAPACITY OF THE EXISTING DRAINAGE SYSTEM**

The portion of the proposed system improvements consists of an open ditch and underground tiles. From petitioner reports, the system is not able to drain the watershed adequately, resulting in extended ponding in portions of the watershed. This ponding results in crop stress and crop loss. Because of the limitations of the drainage system, the petitioners requested an improvement of the drainage system.

The existing drainage system analysis used standard engineering methods. The estimated capacity of the existing open ditch used the Manning equation. The capacity calculations for the culvert crossings used HY-8, a culvert modeling software developed by the Federal Highway Administration. The amount of drainage needed for modern crop production has been compared to standards recommended by the Natural Resources Conservation Service (NRCS). The NRCS Engineering Field Handbook Minnesota Supplement 650.0703 for Grassed Waterways Curve 2 was used to determine the design discharge for the ditch watershed at each of the culvert crossings within the study area. The watershed contributing flow to the open ditch at each of the culverts was delineated using the USGS Streamstats program and confirmed using LIDAR data.

The exiting capacity of the culverts within the study area was calculated by determining the headwater (upstream) elevation for each of the culverts at the design flow. NRCS Code 608 guidance states that one-foot of freeboard should be provided between the design water surface profile in the open ditch, and the ground elevation of the low areas being served by the open ditch. The headwater elevation was then compared to the maximum elevation for one-foot of freeboard for each of the culverts.

A summary of the existing headwater elevations for the culverts within and downstream of the area of the Improvement is in Table 1.

**Table 1 – Existing Ditch Capacity Computations**

Culvert Location	Culvert Size and Material	Upstream Watershed (Acres)	NRCS Ditch Flow (cfs)	NRCS Ditch Flow (In./ Day)	Ditch Bottom Width (ft)	Est. Max Depth (ft)	Ditch Grade (%)	Ditch Capacity (cfs) (n= 0.035)	Culvert Capacity (cfs) at Max Depth	Limiting Capacity (cfs)	Ditch Efficiency Ratio
TH 71 Crossing North	6' x 4' Cattle Pass	2,309	74	0.76	6	5.6	0.05	128	99	99	1.34
TH 71 Crossing South	6' x 4' Cattle Pass	4,016	125	0.74	6	5.0	0.05	102	85	85	0.68
Field Crossing Section 34	72" RCP	5060	157	0.74	8	6.6	0.03	167	139	139	0.89
310th Street	72" RCP	5,890	182	0.74	8	7.1	0.03	193	154	154	0.85
300th Street	72" RCP	7,154	220	0.73	8	8.1	0.03	250	194	194	0.88
Field Road Section 5	72" RCP	7,335	225	0.73	8	7.8	0.03	232	253	232	1.03
CSAH 1	84" RCP	8,202	251	0.73	8	8.5	0.03	276	233	233	0.93
280th Street	84" RCP	9,090	278	0.73	8	9.5	0.03	346	278	278	1.00
County Road 59	84" RCP	9,702	296	0.73	8	8.1	0.10	457	319	319	1.08
CD 59 at TC&W Crossing w/o CD 17A or CD 37	Dual 16'x10' Box Culverts	9,858	301	0.73	20	7.3	0.10	772	735	735	1.78
CD 59 with CD 17A	Dual 16'x10' Box Culverts	36,858	1111	0.72	20	7.3	0.10	772	735	735	0.48
CD 59 with CD 37	Dual 16'x10' Box Culverts	41,008	1235	0.72	20	7.3	0.10	772	735	735	0.43

As can be seen in Table 1, the culverts are generally the limiting factor that determines the capacity of the ditch. The south Highway 71 crossing has the lowest efficiency upstream of County Road 59, and the addition of the CD 17A and CD 37 watersheds have a dramatic impact on the efficiency of the TC&W crossing. The limiting factor at the TC&W crossing is the relatively low ground adjacent to the open ditch on the upstream side of the TC&W crossing. The crossing consists of dual sixteen foot wide by ten-foot tall box culverts, but the maximum depth that can be attained in the ditch while maintaining one-foot of freeboard is 7.3 feet.

The capacity of the existing tile has been estimated using the Manning equation, assuming the original hydraulic efficiency of the system as constructed. Estimated tile sizes and grades are based on limited field data collected through tile intakes and general land grades. The amount of drainage that is needed for modern crop production has been compared to standards recommended by the Natural Resource Conservation Services (NRCS). These standards recommend that for drainage of row crops in mineral soils, where surface water intakes are provided, that a modern drainage system should be able to convey 1/2 inch of runoff per day. Watershed areas have been estimated using LIDAR data. The capacity of the existing tiles in Branch 309 is shown in Table 2 and the capacity

of the existing tiles in Branch C is shown in Table 3.

**Table 2 – Branch 309 Existing Tile Capacity Computations**

Branch Label	Location	Cumulative Drainage Area (Acres)	NRCS Tile Flow (cfs) (1/2" Per Day)	Tile Size (in.)	Tile Grade (%)	Tile Capacity (cfs) (n = 0.013)	Tile Efficiency Ratio	Tile Coefficient (in./Day)
309	Br. 309 west of 300th St.	44	0.92	10	0.10*	0.69	0.75	0.38
	Br. 309 east of 300th St.	88	1.85	10	0.10*	0.69	0.38	0.19
	Low area in E1/2 of W/12 Section 33	149	3.13	12	0.10	1.13	0.36	0.18
	Br. 309 prior to Br. 309-2	167	3.51	12	0.10	1.13	0.32	0.16
	Br. 309 meets Br. 309-2	193	4.05	14	0.16	2.16	0.53	0.27
	Br. 309 meets Br. 309-1	219	4.60	14	0.16	2.16	0.47	0.23
	Br. 309 meets CD 59 Open Ditch	229	4.81	14	2.48	8.49	1.76	0.88
309-2	Br. 309-2	26	0.55	10	0.19	0.96	1.75	0.88
309-1	Br. 309-1	11	0.23	5	0.10*	0.11	0.47	0.24

\*Denotes Assumed Tile Grade

As shown in Table 2, the majority of Branch 309 is capable of draining the watershed at a rate of about 3/16" to 1/4" per day. When compared to the NRCS recommended standard of 1/2" per day, the tile system is delivering about 32% to 50% of the recommended flow. Thus, there is inadequate capacity in the existing drainage system to provide for the efficient production of row crops.

As shown in Table 3, the majority of Branch C is Capable of draining the watershed at a rate of about 3/32" to 3/16" per day. When compared to the NRCS recommended standard of 1/2" per day, the tile system is delivering about 18% to 35% of the recommended flow. Thus, there is inadequate capacity in the existing drainage system to provide for the efficient production of row crops.

Many of the existing tiles have been televised by Renville County. The existing tile systems were found to be in poor condition, showing offset joints and collapsed pipes in some areas. Since there is evidence that the pipe system is in poor repair, the system is likely delivering even less flow than has been calculated. A few of the tiles have been reconstructed at the original size and grade.

Another limitation of the existing Branch 309 and Branch C tile system is the very shallow depths at which the exiting tiles are installed. The shallow tile is prone to damage from modern farming equipment.

**Table 3 – Branch C Existing Tile Capacity Computations**

Branch Label	Location	Cumulative Drainage Area (Acres)	NRCS Tile Flow (cfs) (1/2" Per Day)	Tile Size (in.)	Tile Grade (%)	Tile Capacity (cfs) (n = 0.013)	Tile Efficiency Ratio	Tile Coefficient (in./Day)
C	Br C East 1/2 of E 1/2 of Section 2	21	0.44	6	0.40	0.36	0.81	0.40
	Br. C prior to Br. C5	78	1.64	8	0.15	0.47	0.29	0.14
	Br. C meets Br. C5	102	2.14	10	0.04	0.44	0.21	0.10
	Br. C meets Br. C-4	228	4.79	15	0.04	1.30	0.27	0.14
	Br. C meets Br. C-3	476	10.00	18	0.03	1.82	0.18	0.09
	Br. C meets Br. C-2	585	12.29	20	0.03	2.42	0.20	0.10
	Br. C meets Br. C-1	685	14.39	18	0.17	4.34	0.30	0.15
	Br. C meets Open Ditch 59	786	16.51	18	0.34	6.14	0.37	0.19
C-5	Br. C-5	24	0.50	6	0.20*	0.25	0.50	0.25
C-4	Br. C-4 beginning	34	0.71	6	0.15*	0.22	0.31	0.15
	Br. C-4 meets Br. C-4-2	40	0.84	6	0.15*	0.22	0.26	0.13
	Br. C-4 meets Br. C-4-1	102	2.14	12	0.16*	1.43	0.67	0.33
	Br. C-4 meets Br. C	109	2.29	12	0.16*	1.43	0.62	0.31
C-4-2	Br. C-4-2 meets Br. C-4	6	0.13	6	0.15*	0.22	1.73	0.86
C-4-1	Br. C-4-1 meets Br. C-4	41	0.86	8	0.20	0.54	0.63	0.31
C-3	Br. C-3 north of 840th Avenue	23	0.48	6	0.07*	0.15	0.31	0.15
	Br. C-3 meets Br. C-3-2	48	1.01	6	0.08*	0.16	0.16	0.08
	Br. C-3 meets Br. C-3-1	66	1.39	8	0.28	0.64	0.46	0.23
	Br. C-3 north of driveway	71	1.49	8	0.28	0.64	0.43	0.21
	Br. C-3 meets Br. C	79	1.66	8	0.28	0.64	0.39	0.19
C-3-2	Br. C-3-2 meets Br. C-3	25	0.53	6	0.07*	0.15	0.28	0.14
C-3-1	Br. C-3-1 East of TH 71	17	0.36	5	0.10*	0.11	0.31	0.15
C-2	Br. C-2 meets Br. C	29	0.61	6	0.18	0.24	0.39	0.20
C-1	Br. C-1	53	1.11	8	0.05*	0.27	0.24	0.12

\*Denotes Assumed Tile Grade

#### IV. DISCUSSION OF IMPROVEMENT

The petitioners for the Improvement of the Main Open Ditch, Branch 309, and Branch C of CD 59 have requested the consideration of the construction of improvements in order to increase the drainage capacity of the system. A preliminary survey and the hydrologic and hydraulic analysis of potential improvements to the drainage system has been performed in order to establish preliminary grades and sizes of the proposed improved ditch and culverts, and the preliminary grades, sizes, and depths of the tile systems, and to analyze the outlet. General observations and results of the analysis are as follows:

## A. DESCRIPTION

As shown in Exhibit 1, the proposed Improvement consists of the following:

1. **Main Open Ditch** – The improvement will consist of widening and lowering the Main Open Ditch from the downstream side of County Road 59 to the downstream side of the southerly TH 71 crossing. The remaining open ditch upstream of the Southerly TH 71 crossing will be cleaned.

The existing culvert crossings at County Road 59, 280<sup>th</sup> Street, and CSAH 1 are to be replaced with 96-inch diameter reinforced concrete pipe culverts with aprons. The existing culvert crossings at the Field Road east of CSAH 1, and the field crossing between 310<sup>th</sup> Street and the southerly TH 71 crossing are to be replaced with salvaged 84-inch diameter reinforced concrete pipe culverts without aprons. The existing culverts at 300<sup>th</sup> Street and 310<sup>th</sup> Street are to be replaced with new 84" reinforced concrete pipe culverts with aprons. The crossings of the roadways would preferably be made by open cut methods.

The existing open ditch is proposed to be reconstructed from the upstream end of County Road 59 to 280<sup>th</sup> Street at a 0.03% slope with a ten foot wide bottom and 1V:2H side slopes and from 280<sup>th</sup> Street to the southerly TH 71 crossing at a 0.03% slope with an eight foot wide bottom and 1V:2H side slopes. The improvement includes cleaning out the existing open ditch from the southerly TH 71 to the upstream end of the open ditch at the previously established ditch grade.

2. **Branch 309** – The improvement will consist of new tile to replace the existing system. The proposed tiles are offset from the existing tiles in Exhibit 1 for clarity only. The improvement will also include a new tile to the north to intercept the existing CD 59 Main Tile, and bring the runoff from a majority of the Main Tile watershed directly to the lower portion of the Main Open Ditch. The improvement also consists of an extension of Branch 309 into the Northeast Quarter of the Northeast Quarter of Section 32 of Winfield Township.

3. **Branch C** – The improvement will consist of new tiles to replace the existing system. The proposed tiles are offset from the existing tiles in Exhibit 1 for clarity only. The TH 71 crossing will be made by boring and jacking methods, and the route of Branch C-3-1 may be adjusted in the final design to avoid a second crossing of TH 71.

4. Other components of the proposed Improvement include:

- a) Reconstructing the outlets of existing tiles coming into the open ditch, and any intakes adjacent to the spoil berm impacted by the work.
- b) Construct riprap as erosion protection on the outlet side of the culverts, and at the inlet side of the culverts if warranted.
- c) Construct riprap slope stabilization along the ditch slopes where side slope stability has been an issue.
- d) Reseed the ditch slopes, a minimum of a one-rod buffer (16.5 feet), and any portions of the spoil bank that exceed a one rod width.
- e) Reconstructing the surface above the culvert crossings.
- f) Generally the new tiles will be constructed lower in elevation than the existing pipe so that all existing tiles will have an outlet.
- g) Existing tiles cut by the new tile line will be connected to the new tile.

## B. DESIGN DATA

As shown on Exhibit 1, the proposed improvements to the Main Open Ditch CD 59 consists

of improving the open ditch and replacing or reinstalling the culvert crossings. The type of pipe that should be used for the improvement is as follows:

1. Precast Reinforced Concrete Pipe (RCP) meeting the requirements of the Minnesota Department of Transportation (MnDOT).

The criteria for the design of the open ditch system are based on Natural Resources Conservation Service (NRCS) methodology. The NRCS Engineering Field Handbook Minnesota Supplement 650.0703 for Grassed Waterways Curve 2 was used to determine the design discharge for the ditch watershed at each of the culvert crossings within the study area and then sizing the culverts to provide 1-foot of freeboard as stated in NRCS Code 608 guidance.

The proposed improvements' efficiency of the Main open ditch is shown in Table 4

**Table 4 – Proposed Ditch Capacity Computations**

Culvert Location	Culvert Size and Material	Upstream Watershed (Acres)	NRCS Ditch Flow (cfs)	NRCS Ditch Flow (In./Day)	Ditch Bottom Width (ft)	Est. Max Depth (ft)	Ditch Grade (%)	Ditch Capacity (cfs) (n= 0.035)	Culvert Capacity (cfs) at Max Depth	Limiting Capacity (cfs)	Ditch Efficiency Ratio
TH 71 Crossing North	6' x 4' Cattle Pass	1,683	55	0.78	6	5.6	0.05	128	99	99	1.80
TH 71 Crossing South	6' x 4' Cattle Pass	3,390	107	0.75	6	5.0	0.05	102	102	102	0.95
Field Crossing Section 34	84" RCP	4,434	138	0.74	8	8.4	0.03	422	282	282	2.04
310th Street	84" RCP	5,264	163	0.74	8	9.0	0.03	493	314	314	1.93
300th Street	84" RCP	7,154	220	0.73	8	10.2	0.03	656	370	370	1.68
Field Road Section 5	84" RCP	7,335	225	0.73	8	10.0	0.03	627	356	356	1.58
CSAH 1	96" RCP	8,202	251	0.73	8	10.3	0.03	671	424	424	1.69
280th Street	96" RCP	9,090	278	0.73	8	11.9	0.03	937	519	519	1.87
County Road 59	96" RCP	9,702	296	0.73	10	9.0	0.03	543	417	417	1.41
CD 59 at TC&W Crossing w/o CD 17A or CD 37	Dual 16' x 10' Box Culverts	9,858	301	0.73	20	7.3	0.10	772	735	735	1.78
CD 59 with CD 17A	Dual 16' x 10' Box Culverts	36,858	1111	0.72	20	7.3	0.10	772	735	735	0.48
CD 59 with CD 37	Dual 16' x 10' Box Culverts	41,008	1235	0.72	20	7.3	0.10	772	735	735	0.43

The proposed grades for the Branch 309 and Branch C tile improvements are shown on Exhibit 1. The type of pipe to be used for the construction will be specified as one of the following:

1. Dual Wall Polyethylene Drain Tile meeting the requirements of the American Association of State Highway Transportation Officials (AASHTO) Specification No. M294. Pipe will be bedded in granular material as shown on Exhibit 1 and will be both non-perforated and perforated with a geotextile sock.
2. Reinforced concrete pipe meeting the specifications of MnDOT Specification 3352. The joints of the pipe will be covered with geotextile fabric in order to allow some infiltration.
3. Polyvinyl Chloride Sewer Pipe for the deep cut areas, meeting the Specifications of ASTM D 3034.
4. Concrete drain tile meeting the specifications of ASTM C412.

The criterion for the design of the tile system size is based on Natural Resource Conservation Services (NRCS) methodology. The minimum design coefficient recommended by the NRCS for drainage systems where row crops are raised on mineral soils, and open intakes are placed on the tile, is 1/2" per day. In other words, the system should be able to drain the amount of water produced by 1/2" of runoff over the entire watershed in one day. Since the Improvement will serve several areas which are depressional in nature, this design criteria has been selected.

The capacity of the proposed tiles for Branch 309 and Branch C are shown in Table 5 and Table 6. The tables also show the resulting runoff coefficient provided for the watershed served.

**Table 5 – Branch 309 Proposed Tile Capacity Computations**

Branch Label	Location	Cumulative Drainage Area (Acres)	NRCS Tile Flow (cfs) (1/2" Per Day)	Tile Size (in.)	Tile Grade (%)	Tile Capacity (cfs) (n = 0.012)	Tile Efficiency Ratio	Tile Coefficient (in./Day)
309	SW & SE 850th Ave. & 300th St.	91	1.91	12	0.30	2.12	1.11	0.55
	Br. 309 Upper End	114	2.39	12	0.50	2.74	1.14	0.57
	Br. 309 West of 300th Street	136	2.86	15	0.20	3.14	1.10	0.55
	Br. 309 East of 300th Street	180	3.78	18	0.15	4.42	1.17	0.58
	Low Area in E1/2 of W1/2 Section 33	241	5.06	18	0.20	5.10	1.01	0.50
	Br. 309 Prior to Br. 309-2	259	5.44	24	0.10	7.77	1.43	0.71
	Br. 309 meets Br. 309-2 & 309-3	996	20.92	36	0.10	22.91	1.10	0.55
	Br. 309 meets Br. 309-1	1022	21.47	36	0.10	22.91	1.07	0.53
	Br. 309 meets Open Ditch 59	1032	21.68	36	0.10	22.91	1.06	0.53
New 309-3	Connection to Main Tile	628	13.19	30	0.10	14.09	1.07	0.53
	Connection to Branch 240 Tile	711	14.94	30	0.12	15.43	1.03	0.52
309-2	Br. 309-2	26	0.55	8	0.30	0.72	1.32	0.66
309-1	Br. 309-1	11	0.23	6	0.20	0.27	1.18	0.59

**Table 6 – Branch C Proposed Tile Capacity Computations**

Branch Label	Location	Cumulative Drainage Area (Acres)	NRCS Tile Flow (cfs) (1/2" Per Day)	Tile Size (in.)	Tile Grade (%)	Tile Capacity (cfs) (n = 0.012)	Tile Efficiency Ratio	Tile Coefficient (in./Day)
C	Br. C Upper End	9	0.19	6	0.20	0.27	1.44	0.72
	Br. C East 1/2 of E 1/2 of Section 2	21	0.44	8	0.30	0.72	1.63	0.81
	Br. C Prior to Br. C5	78	1.64	12	0.20	1.73	1.06	0.53
	Br. C meets Br. C5	102	2.14	15	0.10	2.22	1.04	0.52
	Br. C meets Br. C-4	277	5.82	24	0.10	7.77	1.34	0.67
	Br. C meets Br. C-3-1-A	422	8.86	30	0.05	9.96	1.12	0.56
	Br. C meets Br. C-3	525	11.03	30	0.06	10.91	0.99	0.49
	Br. C meets Br. C-2	634	13.32	36	0.05	16.20	1.22	0.61
	Br. C meets Br. C-1	734	15.42	36	0.05	16.20	1.05	0.53
	Br. C meets Open Ditch 59	835	17.54	36	0.06	17.75	1.01	0.51
C-5	Br. C-5	24	0.50	8	0.20	0.59	1.16	0.58
C-4	Br. C-4 Beginning	83	1.74	12	0.20	1.73	0.99	0.50
	Br. C-4 meets Br. C-4-2	89	1.87	15	0.10	2.22	1.19	0.59
	Br. C-4 meets Br. C-4-1	151	3.17	18	0.10	3.61	1.14	0.57
	Br. C-4 meets Br. C	158	3.32	18	0.10	3.61	1.09	0.54
C-4-2	Br. C-4-2 meets Br. C-4	6	0.13	6	0.15	0.24	1.87	0.94
C-4-1	Br. C-4-1 meets Br. C-4	41	0.86	10	0.20	1.06	1.24	0.62
C-3	Br. C-3 North of 840th Avenue	23	0.48	6	0.65	0.49	1.02	0.51
	Br. C-3 Meets Br. C-3-2	48	1.01	10	0.20	1.06	1.06	0.53
	Br. C-3 Meets Br. C-3-1	49	1.03	10	0.20	1.06	1.03	0.52
	Br. C-3 North of Driveway	54	1.13	10	0.25	1.19	1.05	0.52
	Br. C-3 Meets Br. C	62	1.30	10	0.30	1.30	1.00	0.50
C-3-2	Br. C-3-2 Meets Br. C-3	25	0.53	8	0.20	0.59	1.12	0.56
C-3-1-A	Br. C-3-1-A East of TH 71	17	0.36	8	0.10	0.42	1.16	0.58
C-2	Br. C-2 Meets Br. C	29	0.61	8	0.25	0.66	1.08	0.54
C-1	Br. C-1	53	1.11	12	0.10	1.22	1.10	0.55

## V. ALTERNATIVE SOLUTIONS

### A. “DO NOTHING ALTERNATIVE”

The “Do Nothing” Alternative has been discussed. However, the petitioners have experienced poor drainage throughout the drainage system for many years with the excess surface water damaging crops and resulting in frequent crop stress or crop loss. This loss of production equates to an economic loss for Renville County and the State of Minnesota. The loss results in a reduced property value for the wet acres, thus affecting the taxing capacity of the County.

and State. In addition, the ability of the landowners to receive a reasonable return on their investment is diminished because of this inadequate drainage.

For these reasons, the “Do Nothing” alternative has been dismissed. The economic question of the cost of the Improvement versus the benefits derived still needs to be evaluated.

However, the “Do Nothing” alternative is not viewed as solving the drainage problem in the watershed.

## B. WETLAND RESTORATION

Another alternative would be to restore the typically flooded areas of the watershed to wetland use. This alternative would provide storage in the watershed depressional areas for the water that is currently accumulating in these areas and drowning out agricultural crops. The proposal would also have added benefits for wildlife and possibly water quality.

In order to be effective, this alternative would need to restore sufficient acres to wetland use so that the existing ditch system could convey the excess runoff. Utilizing NRCS data, about 380 acre feet of water cannot be discharged from the CD 59 watershed upstream of County Road 59 through the existing drainage systems in a 48-hour period for a 5-year rain event. If sufficient wetland acres were available to store this runoff at a one foot depth, approximately 380 acres of wetland restoration would be needed to provide sufficient storage capacity for the excess runoff.

In order to convert the 380 acres to wetlands, at least twice this many acres would need to be acquired for irregular wetland shapes and marginal damp soils. Thus, about 760 acres of land would be needed. This acquisition would likely involve several properties, whose owners would voluntarily need to agree to the reversion. The estimated cost of acquisition plus reconstructing tile lines for wetland restoration would likely be about \$10,000 per acre, resulting in a total cost of about \$7.60 million. Wetland restoration is about 2.0 times the estimated cost for the Improvement of the Main Ditch without additional storage, or about 1.2 times the estimated cost for the Improvement of the Main Ditch with the additional storage.

Wetland restoration remains a viable option for providing some improvement in the functioning of the drainage system. If sufficient acres of wetlands could be restored, particularly in the upper part of the watershed, it could reduce the need for as large of an outlet as is proposed. Finding willing landowners to participate in a restoration project and locating sufficient funding would be critical in order to make this option viable. Copies of this Report will be provided to the SWCD and NRCS so that early coordination can occur for potential funding and technical assistance toward this option.

## C. ONLINE STORAGE

A third alternative would be to construct the proposed improvements and create online storage within the ditch system. This alternative would provide the storage by excavating out the low areas adjacent to the ditch to the same elevation as the bottom of the ditch. The excavated material would then be placed in the remaining surrounding low areas. This alternative would have the benefit of maintaining similar peak flows for the smaller, more frequent, rainfall events. This alternative would also allow the remaining low area near the storage to be raised up, and offer additional protection from the larger rainfall events.

Three areas, as shown on Exhibit 1, were identified as sites for potential storage basins.

Storage basin number 3 is along the open ditch north of 850<sup>th</sup> Avenue and west of TH 71, just upstream of the northerly TH 71 crossing. The storage area is approximately 7 acres in size, and is approximately 8 to 10 feet lower than the existing ground. Preliminary calculations estimate 75,000 cubic yards of excavation from this site. The excavation material would be used to raise surrounding low areas to the west, and north, higher than elevation 1073.

Storage basin number 2 is along the east side of the open ditch in between the TH 71

crossings. The storage area is approximately 13 acres in size, and is approximately 6 to 8 feet lower than the existing ground. Preliminary calculations estimate 105,000 cubic yards of excavation from this site. The excavation material would be used to raise surrounding low areas higher than elevation 1072.

Construction of these two storage basins will allow the existing TH 71 crossings to be of sufficient size for the design flow event, and freeboard limitations of the surrounding fields.

Storage basin number 1 is along the north and south side of the open ditch east of County Road 59. The storage area is approximately 20 acres in size, and is approximately 12 to 14 feet lower than the existing ground. Preliminary calculations estimate 325,000 cubic yards of excavation from this site. The excavation material would be disposed of in the surrounding areas. Construction of this third storage area will allow the peak flow rate at County Road 59 for the 2-Year and 5-Year events to be similar to the existing conditions.

## VI. OTHER CONSIDERATIONS

### A. PERMIT REQUIREMENTS

A permit from the Minnesota Pollution Control Agency for stormwater and erosion control for the project would be necessary. This permit requirement, which applies to any project that disturbs more than one acre of land, requires that the contractor and owner secure a permit for the project. The permit process will also require erosion control measures to be taken during the construction. Typical erosion control measures include place of riprap and grass stabilization on the ditch bank and inlet protection around installed inlet areas. The fee for this permit is currently \$400.00. This permit will be applied for shortly before construction is scheduled so that the contractor can also sign the permit application.

A permit will also be necessary for the crossing of CR 59 and CSAH 1 from the Renville County Highway Department. This permit will be applied for after the Preliminary Hearing.

A permit will also be necessary for any work within the TH 71 right of way from MnDOT. This permit will be applied for following the Preliminary Hearing.

### B. WETLANDS

National Wetland Inventory Maps have been reviewed to locate potential wetlands subject to regulations. These maps do not show any wetlands within the project watershed, as shown on Sheet 1.01 in Exhibit 1. However, wetlands on farm ground often do not show up on the national inventory maps. Impacts of the potential drainage system on individual land parcels will be evaluated by the Natural Resources Conservation Service upon filing of a Form AD 1026 by landowners. This NRCS process will identify any wetlands and measures that need to be taken in order for the drainage project to avoid impact to these wetlands. Because of federal data privacy requirements, it is not possible for non-landowners to obtain this information. Thus, the obligation for filling out these forms and doing this investigation will rest with individual landowners.

Drainage of non-directly impacted wetland will be controlled by supplemental drainage systems installed by private owners. Owners are advised that under US Army Corps of Engineers and NRCS rules, such supplemental drainage may not be permitted, and may affect US Department of Agriculture program eligibility.

### C. PUBLIC AND PRIVATE BENEFITS AND COSTS

The estimated cost of the proposed Improvement to CD 59 is shown in Exhibit 3 of this report. Benefits for the Improvement, both public and private, will be established by the viewers and a report will be available at the final hearing.

Landowners certainly have other costs associated with construction and maintenance of their

individual drainage systems. The proposed Improvement would only serve as an outlet or collector of runoff and drainage flow from the lands within the watershed. Each landowner is responsible to construct and maintain their own drainage system in order to drain their farmlands adequately. Individual benefits for an adequate drainage system are in increased crop production from farmlands.

The estimated cost of the proposed Improvement is included in this report. The public and private benefits and damages will be available at the final hearing.

#### D. AGRICULTURAL EFFECTS

Once the improvements are constructed, the lands within the improved watershed will be largely dependent on this drainage system for both surface and subsurface drainage flows. Thus, it is imperative that the proposed system have adequate capacity in order to allow for modern farming operations.

It should be noted that many of the established ditch systems in Minnesota are now 70 to 100 years old. These systems are approaching the need for complete repair or replacement if the farmland is to remain productive. When feasible, it is economically imperative that these drainage systems be improved to become compatible with present day farming techniques and they be continually maintained. If properly maintained during normal growing seasons, the agricultural lands in the watershed are some of the most productive in the State of Minnesota.

#### E. WATER QUALITY

Little change in measurable water quality is anticipated because of this Improvement. However, there are components of the Improvement that will mitigate erosion and help improve water quality on a micro watershed scale. Some of the existing culvert crossings are hydraulically undersized, which leads to higher velocities through the undersized culvert, which can cause scour and erosion on the outlet end of the culvert. Increasing the size of the culvert crossings will lead to lower outlet velocities. At the culvert outlets, riprap will be constructed to further reduce the energy at the outlets, and lessen the erosive force. The largest source of suspended solids in tile system drainage is from water discharging into open intakes. Although open intakes will still be used on the system, ponding occurs around these intakes for any significant storm events. Thus, solids have time to settle rather than being discharged. The use of Hickenbottom risers on these intakes has been shown to result in a significant reduction in suspended solids discharge and thus their use will help with water quality. The one-rod (16.5 feet) buffer strip will be acquired if not already done so, or re-established along the Improvement limits.

As a requirement of the MPCA Erosion Control Permit, the establishment of an erosion control plan is anticipated. Incorporation of such devices as inlet protection, riprap at the outlet and permanent grasses as soon as possible following the construction are anticipated. All of these measures will help to reduce erosion and maintain water quality during the construction of the project.

The Renville County SWCD and NRCS Offices will be contacted regarding conservation measures. The SWCD encourages landowners to sign up for the Conservation Reserve Program (CRP). This is a volunteer program, so landowners are encouraged to call the local agencies to discuss additional conservation measures.

#### F. FISH AND WILDLIFE

The only threatened or endangered species to have the potential to be in Renville County at the time of this report is the northern long-eared bat. According to the Minnesota DNR, there are no known roost trees or hibernacula in Renville County. Additionally, there are no trees to be removed as a part of the improvement, so there is no impact to the northern long-eared bat. Bald eagles are present in Renville County, and are protected under the Bald and Golden

Eagle Protection Act. Again, there are no trees to be removed as a part of the improvement, so there is no impact to the bald eagle.

The open ditch and existing grass buffers are potential wildlife habitat. These areas will be temporarily impacted during the construction of the improvement, but will be restored or improved following the construction. The improvements made to the culvert crossings will reduce the water velocities through the culverts, which will allow for easier passage of fish.

Current wet areas within the project watershed do provide for transitory stop over locations for migratory waterfowl. However, these areas currently dry up following wet periods and are then under cultivation and production. It is anticipated that some of these temporary ponding areas will still exist after the construction of the Improvement although ponding times will likely be reduced. Therefore, the provisions for adequate drainage of these lands will not be of a detrimental nature to local wildlife resources.

#### G. GROUNDWATER

The purpose of an agricultural drainage system is to maintain the elevation of the shallow groundwater table sufficiently below the surface to provide for efficient production of crops. The level at which the groundwater will be maintained has been and will be determined by the depth of the tile system and private tiles in the area. The proposed Improvement will not significantly lower the bottom of the ditch or the tile system. Additionally, soils within the watershed are typically C or D soils, with low infiltration rates. Therefore, no change in the availability, distribution, or use of the groundwater beyond that necessary for the sufficient production of crops within the watershed is anticipated by this construction.

#### H. ENVIRONMENTAL IMPACT

The adverse effects of the proposed Improvement are of a temporary nature and are listed as follows:

1. Disturbing of the ground surface during construction could result in the loss of one crop within the construction limits.
2. Embankment areas will be stripped of topsoil prior to the placement of non-topsoil material in order to preserve topsoil.
3. Temporary noise and dust generation can be expected from the construction operations. These impacts are not viewed as significant since there are no residences near the proposed construction route.
4. Temporary erosion of soil may occur in the construction area until permanent ground cover and ground stabilization occurs. Although these effects need to be considered, they are not significantly different from the current topsoil loss that occurs annually from erosion of topsoil due to overland flow in the watershed. This construction erosion will be minimized using inlet protection, riprap, and rapid establishment of permanent grass cover.

Numerous beneficial effects are anticipated from the proposed Improvement. Most of these benefits are directly attributable to increased crop production from lands presently damaged through period flooding and ponding. Among the most obvious benefits are the following:

1. The re-establishment of the grass buffer along the open ditch, decreasing the outlet velocity at the culvert crossings, and the use of Hickenbottom intakes will improve water quality on a micro watershed scale.
2. Increased personal farm income
3. Increased value of benefited farm land
4. Contribution to the local economy through additional purchases, farm modernization, and expansion.

## I. LAND USE

The present use of the land in the Improvement watershed is largely agricultural. This use is expected to continue into the future.

## VII. ADEQUACY OF THE OUTLET

### A. GENERAL INFORMATION

As mentioned earlier, CD 59 flows generally east to west to an eventual outlet into County Ditch 37 about two miles west of Danube, just north of the Twin Cities & Western (TC&W) Railroad.

### B. ADEQUACY OF THE OUTLET

A HydroCAD model of the watershed was developed to estimate the change in the peak flow rates at County Road 59. HydroCAD is a computer model that computes the runoff storm hydrograph using methodology developed by the Natural Resources Conservation Service. The peak flows computed in HydroCAD are typically higher than those from other models. The intent of the 0.72" runoff event in Table 7 and Table 9 is to show the change in peak flow and elevation for a rain event with a runoff amount equal to the NRCS design ditch flow. A summary of the existing and proposed peak flows and upstream water surface elevations for various frequency flow events at County Road 59 are presented in Table 7.

**Table 7 – HydroCAD Existing vs. Proposed Model (Without Storage) Summary at County Road 59**

Flow Event	Existing Peak Flow (cfs)	Existing Peak Elevation	Proposed Peak Flow (cfs)	Proposed Peak Elevation	Change in Peak Flow (Pro.-Ex.) (cfs)	Change in Peak Elevation (Pro.-Ex.)
0.72" Runoff	350	1061.3	366	1060.0	16	-1.3
2-Year	418	1062.6	475	1061.7	57	-0.9
5-Year	455	1063.4	515	1062.7	60	-0.7
10-Year	473	1064.1	542	1063.6	69	-0.5
25-Year	498	1065.2	576	1064.7	78	-0.5
50-Year	516	1065.9	601	1065.5	85	-0.4
100-Year	574	1066.5	615	1066.3	41	-0.2

As can be seen in Table 7, the HydroCAD model shows an increase in the peak flow and a decrease in the peak headwater elevation at County Road 59.

Between the TC&W Railroad, and County Road 59, CD 17A joins with CD 59, and then CD 59 joins with CD 37. The peak flows from Streamstats was obtained at the TC&W Railroad, at CD 17A and CD 37 prior to their confluences with CD 59, and CD 59 at County Road 59.

A summary of the flows are presented in Table 8.

Table 8 – Streamstats Peak Flows				
Point Of Interest	TC&W Railroad	CD 17A Prior to CD 59	CD 59 at CR 59	CD 37 Prior to CD 59
Area (Sq Mi)	64.07	42.15	15.88	5.6
2-Year Peak Flood (cfs)	297	214	113	33.5
5-Year Peak Flood (cfs)	675	483	254	74
10-Year Peak Flood (cfs)	1030	733	383	111
25-Year Peak Flood (cfs)	1580	1130	587	171
50-Year Peak Flood (cfs)	2070	1480	769	224
100-Year Peak Flood (cfs)	2650	1890	980	287
2-Year Peak / Area (cfs/Sq Mi.)	4.64	5.08	7.12	5.98

An analysis of Table 8 shows that the peak flow at the TC&W Railroad is not simply the sum of the peak flows of the incoming streams. Peak flow is directly proportional to the watershed area, and inversely proportional to the time of concentration. Therefore, dividing the peak flows from a single event by the watershed area will yield a relationship to the time of concentration. A higher peak flow per area value means that the time of concentration for that watershed is a smaller value (shorter duration). The last row in Table 8 shows the 2-Year peak flow divided by the watershed area for each of the points of interest.

The fact that CD 59 at CR 59 has the highest peak flow / area ratio means that the time of concentration for the upstream area is the shortest, and that the peak flow of CD 59 at CR 59 happens prior to the peak flow of CD 17A.

By increasing the peak flow from CD 59 at CR 59, and moving a larger volume of water downstream quicker from a small portion of the system, the peak flow of the entire system at the TC&W Railroad crossing, which happens later, will decrease. Therefore, it is our opinion, that the outlet for the improvements, without online storage is adequate.

A summary of the existing conditions and the proposed conditions with online storage is in Table 9.

Table 9 – HydroCAD Existing vs. Proposed + Storage Model Summary at County Road 59						
Flow Event	Existing Peak Flow (cfs)	Existing Peak Elevation	Proposed+Storage Peak Flow (cfs)	Proposed+Storage Peak Elevation	Change in Peak Flow (Pro.+Stor.-Ex.) (cfs)	Change in Peak Elevation (Pro.+Stor.-Ex.)
0.72" Runoff	350	1061.3	306	1059.2	-44	-2.1
2-Year	418	1062.6	425	1060.9	7	-1.7
5-Year	455	1063.4	471	1061.7	16	-1.7
10-Year	473	1064.1	500	1062.3	27	-1.8
25-Year	498	1065.2	532	1063.3	34	-1.9
50-Year	516	1065.9	554	1064.0	38	-1.9
100-Year	574	1066.5	573	1064.6	-1	-1.9

As can be seen in Table 9, the HydroCAD model for the proposed conditions with online storage shows a decrease in the peak flow for the design 0.72" runoff event, and the 100-Year event. The model shows smaller increases in the peak flow for the 2-Year through 50-Year events than without storage, and decreases in the peak headwater elevations for all events at County Road 59.

Therefore, it is our opinion, that the outlet for the improvements with the online storage is adequate.

## VIII. ESTIMATE OF COST

The preliminary cost estimate to construct the proposed Improvements, as described in this report is shown in Exhibit 3. The total estimated project cost without online storage is approximately \$3,841,290, and with the online storage is approximately \$6,204,290. Included in the project cost estimate are the acreages of land to be permanently taken out of production for: the widening of the ditch (18.5 acres), the establishment of a one-rod (16.5-foot) buffer strip (26 acres), and the excavation of the online storage (41 acres). The cost estimate also includes compensation for agricultural land that will be temporarily taken out of production by the construction for temporary right-of-way (191.6 acres), and disposal of the online storage excavation (102 acres). The individual landowners will be compensated for this loss through the damage process of the further ditch proceedings.

## IX. RECOMMENDATIONS

The proposed Improvements to the Main Open Ditch, Branch 309, and Branch C of CD 59 in Renville County as described in this report is feasible and practical and is necessary in order to provide drainage for the cultivation of crops in this watershed area. The existing drainage in the area is inadequate to provide proper drainage for current agricultural practices. The outlet is adequate in order to convey the discharge with or without the online storage.

It is the recommendation of your engineer that the Preliminary Engineer's Report be approved, the Board determines if the online storage alternative is to be included in the scope of the improvement, that the Board appoint Viewers, and order the preparation of the Final Engineer's Report for the Improvement.

## EXHIBIT 1: PRELIMINARY PLANS AND PROFILES

PLAN REVISIONS		
REV	ISSUED FOR	DATE
-	-	-

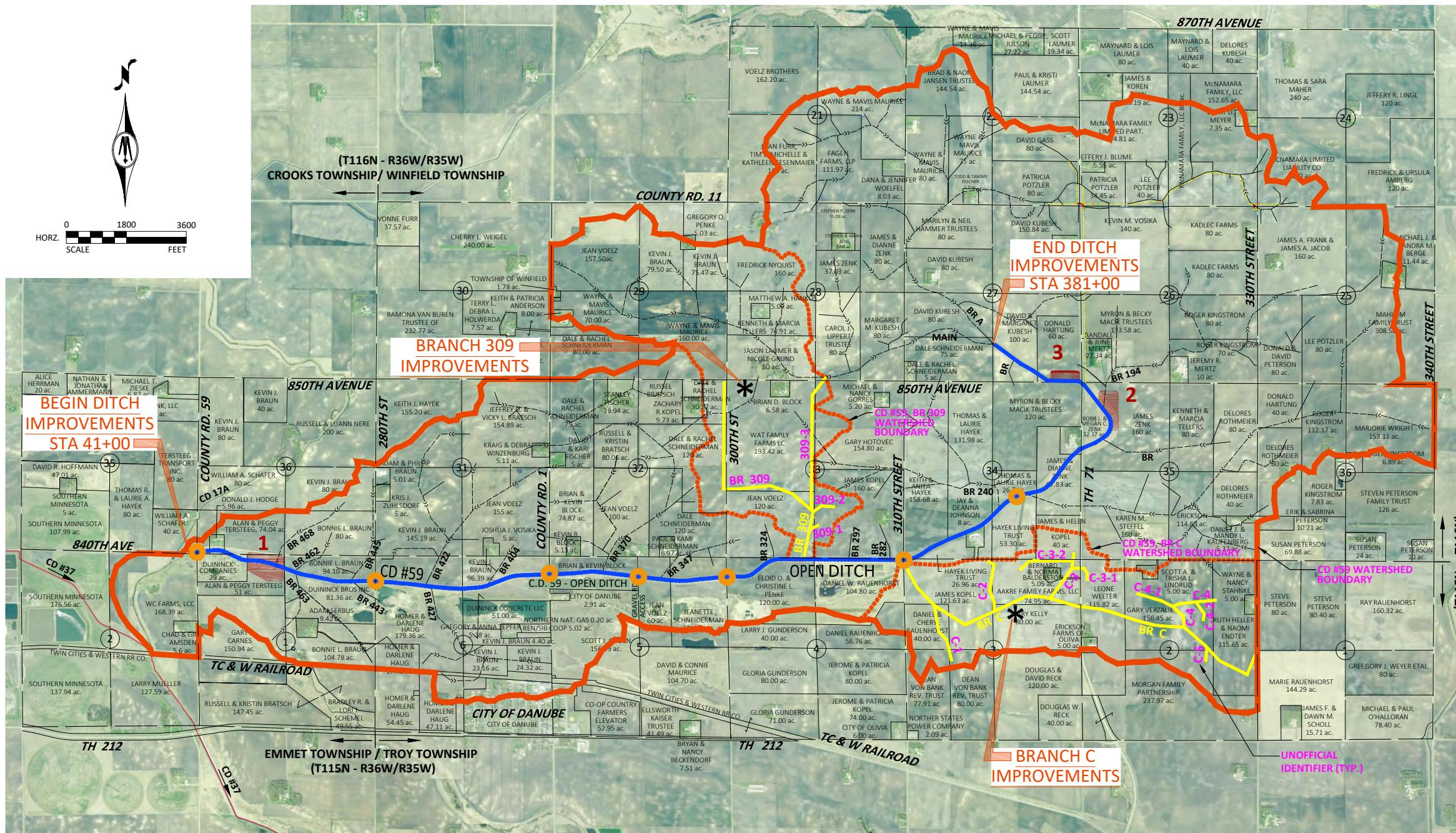
# PRELIMINARY CONSTRUCTION PLANS FOR

# COUNTY DITCH No. 59 IMPROVEMENTS

## RENNVILLE COUNTY, MINNESOTA

DITCH IMPROVEMENTS, CULVERT REPLACEMENTS, TILE AND INTAKE IMPROVEMENTS

DECEMBER, 2017



### LEGEND

- C.D. #59 OVERALL WATERSHED BOUNDARY
- PROPOSED OPEN DITCH IMPROVEMENTS
- PROPOSED TILE IMPROVEMENTS
- BR C OFFICIAL LATERAL IDENTIFIER
- C-1 UNOFFICIAL SUB-LATERAL IDENTIFIER
- C.D. #59 BRANCH 309 & C WATERSHED BOUNDARIES
- STORAGE AREAS
- 1 STORAGE AREAS IDENTIFIER
- PROPOSED CULVERT REPLACEMENT

PROJECT DATUM: RENVILLE CO COORDINATES  
HORIZONTAL: RENVILLE CO - NAD83 (2007ADJ)  
VERTICAL: NAVD88

### SHEET INDEX

<b>SHEET NO.</b>	<b>GENERAL</b> TITLE, LEGEND & NOTES
G0.01 - G0.02	<b>EXISTING CONDITIONS &amp; REMOVALS</b> SECTION NOT USED
C0.01	<b>TABLES, DETAILS &amp; PHASING</b> TYPICAL SECTIONS & DETAILS DETAILS DETAILS
C1.01	<b>EROSION CONTROL</b> SECTION NOT USED
C1.02	<b>GRADING</b> GRADING PLAN - STORAGE AREA 1 GRADING PLAN - STORAGE AREAS 2 & 3
C1.03	<b>SANITARY AND WATER</b> SECTION NOT USED
C2.01	<b>STORM SEWER</b> COUNTY DITCH 59 - STORM PLAN & PROFILES CD 59, BRANCH 309 - STORM PLAN & PROFILES CD 59, BRANCH C - STORM PLAN & PROFILES
C3.01	<b>STREETS</b> SECTION NOT USED
C3.02	<b>STANDARD DETAILS</b> SECTION NOT USED
C4.01	<b>TRAFFIC CONTROL</b> SECTION NOT USED
C5.01-C5.12	<b>CROSS SECTIONS</b> COUNTY DITCH 59 - CROSS SECTIONS
C5.21-C5.26	
C5.31-C5.43	
C6.01	
C7.01	
C8.01	
C9.01-C9.32	

THIS PLAN SET CONTAINS 70 SHEETS.

NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY GOPHER STATE ONE CALL, 1-800-252-1166 OR 651-454-0002.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

## **EXISTING**

IRON PIPE MONUMENT SET		ELECTRIC TRANSFORMER		SEMAPHORE TRAFFIC LIGHT
MONUMENT FOUND		EXHAUST VENT		SIGNAL BOX
CAST IRON MONUMENT FOUND		FLAG POLE		SIGNAL POLE - RR
STONE MONUMENT FOUND		FILL PIPE		SOIL BORING
POST SET		GAS MANHOLE		SIREN
BENCH MARK		GAS REGULATOR		SPRINKLER HEAD
AUTO SPRINKLER		GAS VALVE		STORM MANHOLE
ANTENNA		GAS METER		TELEPHONE MANHOLE
AIR CONDITIONER		ACCESS GRATE		PUBLIC TELEPHONE
ANCHOR		HANDICAPPED PARKING		TILE INLET
AIR PUMP		HAND HOLE		TILE RISER
APRON		HYDRANT		TRAFFIC ARM BARRIER
BASKETBALL HOOP		IRRIGATION CONTROL VALVE		TRAFFIC SIGN
BIRD FEEDER		LIGHT DECORATIVE		TRANSMISSION TOWER
BENCH		LIGHT POLE		UTILITY POLE
BRACE POLE		MAILBOX		VACUUM
CATCH BASIN		METER		VENT PIPE
CLOTHES LINE POLE		POST		DECIDUOUS TREE
CONTROL POINT		MANHOLE		CONIFEROUS TREE
CLEAN OUT		LIFT STATION MANHOLE		STUMP
COMMUNICATION PEDESTAL		MONITORING WELL		BUSH
CURB STOP VALVE		ORDER MICROPHONE		WELL
DITCH TOP		PARK GRILL		WATER MANHOLE
DRINKING FOUNTAIN		GAS PUMP		WATER METER
DOWN SPOUT		POST INDICATOR VALVE		WATER SPIGOT
ELECTRIC MANHOLE		PARKING METER		WATER VALVE
ELECTRIC METER		SANITARY MANHOLE		WETLAND / MARSH
ELECTRIC PEDESTAL		SATELLITE DISH		WETLAND - DELINEATED

EO	OVERHEAD ELECTRIC LINE	-----	EASEMENT LINE
EU	UNDERGROUND ELECTRIC LINE	-----	BUILDING SETBACK LINE
G	GAS LINE	X-X-X-X	FENCE LINE
FO	FIBER OPTIC LINE	□-□-□-□	GUARD RAIL
CU	UNDERGROUND COMMUNICATIONS LINE	○-○-○	ACCESS CONTROL LINE
OU	OVERHEAD UTILITY LINE	- - - - -	CENTERLINE
-   -   -   -	WATER SYSTEM	-----	PROPERTY / LOT LINE
-->-->-->-->	STORM SEWER	- - - - -	ROAD RIGHT-OF-WAY LINE
-->-->-->-->-->	TILE LINE	- - - - -	RAILROAD RIGHT-OF-WAY LINE
-->-->-->	SANITARY SEWER	-----	GRAVEL EDGE
--  --  --  --  --	SANITARY FORCemain	-----	BITUMINOUS EDGE
=====	CULVERT	-----	CONCRETE EDGE
-----	INTERMEDIATE CONTOURS	=====	CURB & GUTTER
-----	INDEX CONTOURS	-----	WATER EDGE
-----	COUNTY LINE	----- . ----- . -----	WATER CENTERLINE
-----	CITY LIMITS	-----	HIGHWATER LINE
-----	SIXTEENTH LINE	-----	WETLAND EDGE
-----	QUARTER LINE	----- . ----- . -----	SWALE CENTERLINE
-----	SECTION LINE	+++ + + + + + + + +	RAILROAD TRACKS
-----	ADJACENT LINES	~~~~~ ~~~~~ ~~~~~ ~~~~~	TREE DRIP LINE

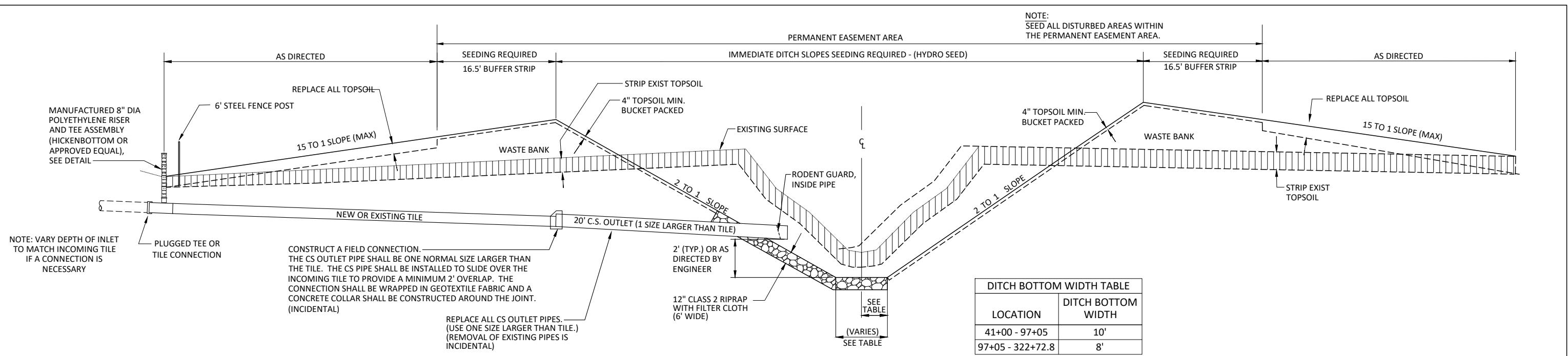
## PROPOSED

	ALIGNMENT/CENTERLINE		WATERMAIN
	RIGHT-OF-WAY LINE		WATERMAIN SERVICE
	TEMPORARY EASEMENT		WATER SYSTEM MANHOLE
	CONSTRUCTION LIMITS		HYDRANT
	CURB & GUTTER		HYDRANT W/ VALVE
	CURB & GUTTER (OUT)		VALVE
	BITUMINOUS EDGE		CURBSTOP
	CONCRETE EDGE		BEND
	GRAVEL EDGE		REDUCER
	SILT FENCE-PREASSEMBLED		CROSS
	SILT FENCE-HEAVY DUTY		TEE
	EROSION PROTECTION AT INLET		CAP
	MANHOLE		SLEEVE
	CATCH BASIN		SIGN
	STORM INLET		LIGHT POLE
	APRON		GUARD RAIL
	STORM SEWER		SOIL BORING
	PERFORATED PIPE DRAIN		WETLAND
	STORM DRAIN TILE		BUSH
	CULVERT W/APRON		CONIFEROUS TREE
	STORM MANHOLE NUMBER		DECIDUOUS TREE
	SANITARY SEWER		
	SANITARY FORCEMAIN		
	SANITARY SEWER SERVICE		
	SANITARY LIFT STATION		
	SANITARY MANHOLE		
	SANITARY MANHOLE NUMBER		

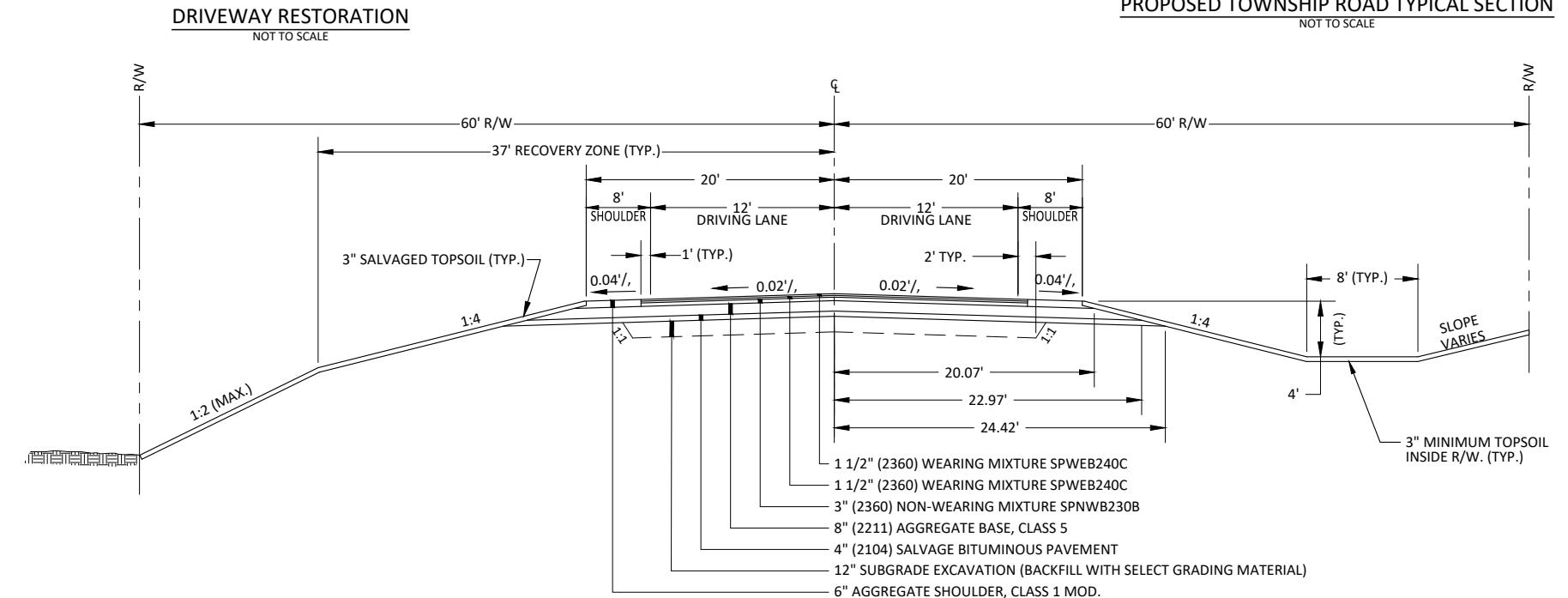
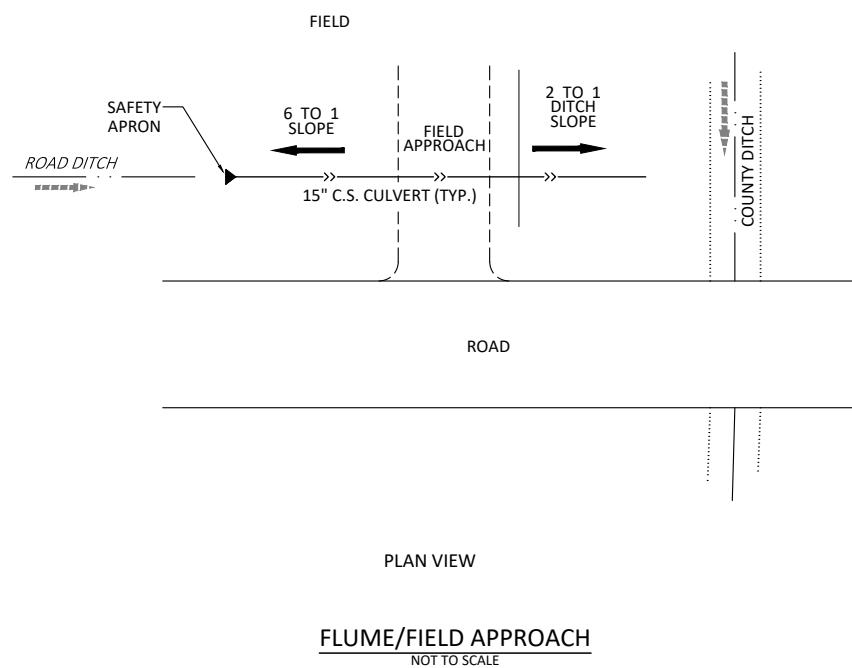
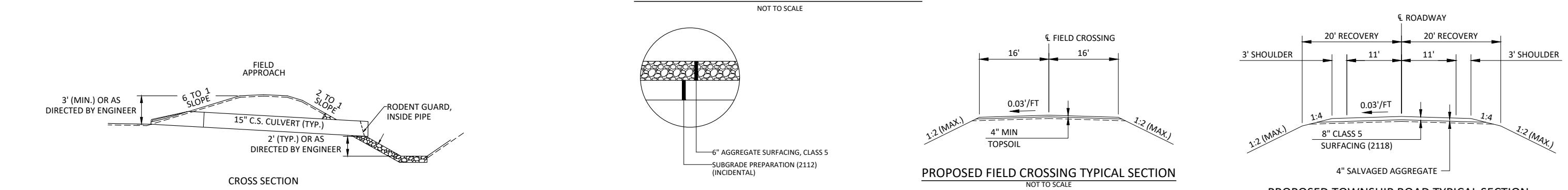


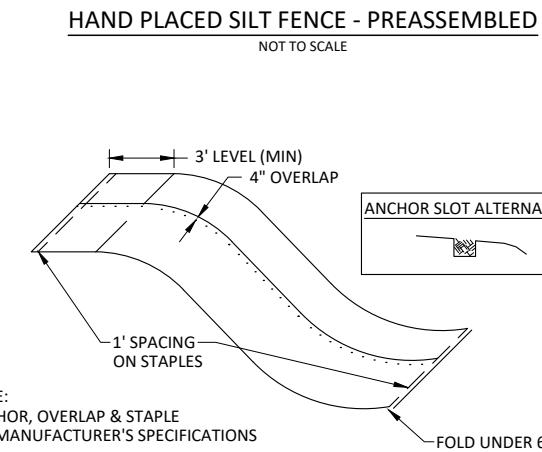
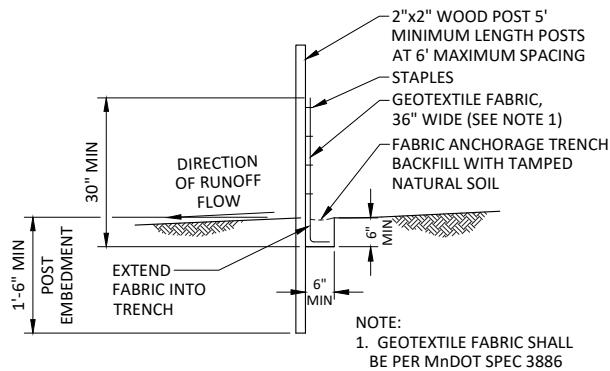
1243 CEDAR STREET NE  
SLEEPY EYE, MINNESOTA 560  
Phone: (507) 794-5541  
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1243 CEDAR STREET NE SLEEPY EYE, MINNESOTA 56085 Phone: (507) 794-5541 Email: SleepyEye@bolton-menk.com www.bolton-menk.com	REV	ISSUED FOR	DATE	I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.			DESIGNED SPL	RENNILLE COUNTY, MINNESOTA			SHEET G0.02
	.	.	.	RENNILLE COUNTY DITCH No. 59 IMPROVEMENTS							
			BILL L. HELGET, P.E. 42046			DRAWN SPL, smi	LEGEND				



TYPICAL SECTION OF OPEN DITCH 43+06 TO 322+72

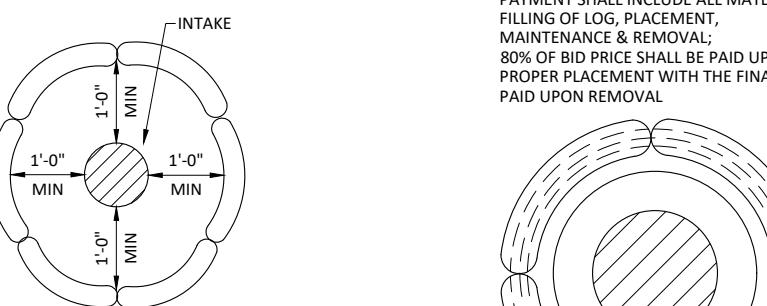




FILL ROCK LOG WITH 45 LBS. OF OPEN GRADED AGGREGATE CONSISTING OF SOUND, DURABLE PARTICLES OF CRUSHED QUARRY ROCK OR GRAVEL CONFORMING TO THE FOLLOWING GRADATION.

GRADATION	
SIEVE SIZE	PERCENT PASSING
1 1/2"	100
1"	95-100
3/4"	65-95
3/8"	30-65
NO 4	10-35
NO 10	3-20
NO 40	0.8
NO 200	0.3

NOTE:  
CRUSHED CONCRETE OR BITUMINOUS SHALL NOT BE USED FOR OPEN GRADED AGGREGATE.



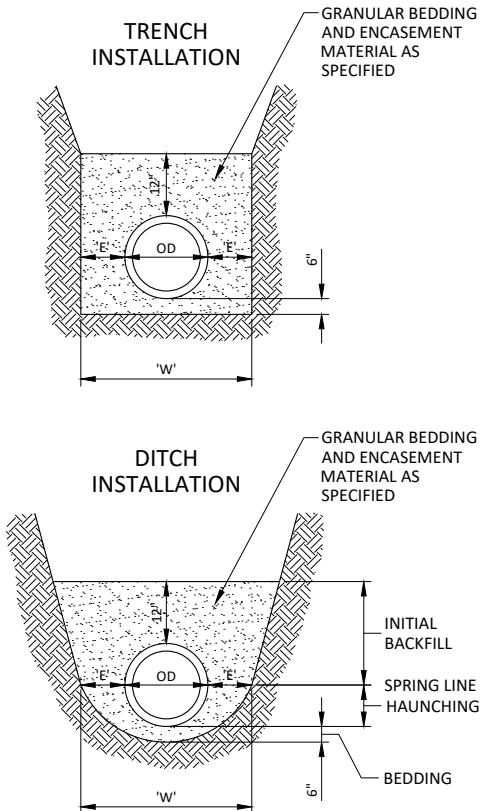
PAYMENT SHALL INCLUDE ALL MATERIALS, FILLING OF LOG, PLACEMENT, MAINTENANCE & REMOVAL;  
80% OF BID PRICE SHALL BE PAID UPON PROPER PLACEMENT WITH THE FINAL 20% PAID UPON REMOVAL

NOTES:  
1. BEDDING AND EMBEDMENT MATERIAL PER SPECIFICATIONS.

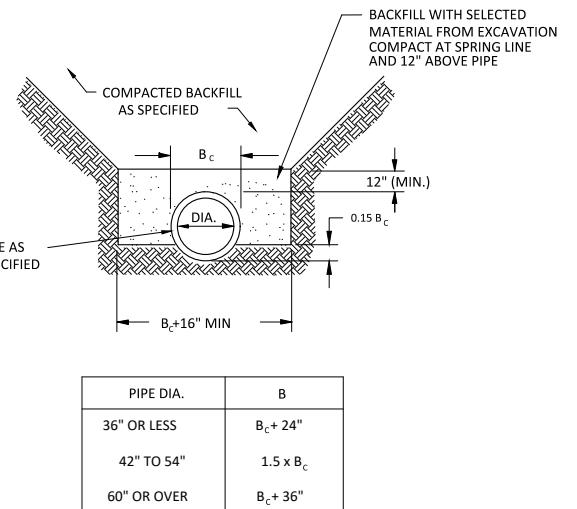
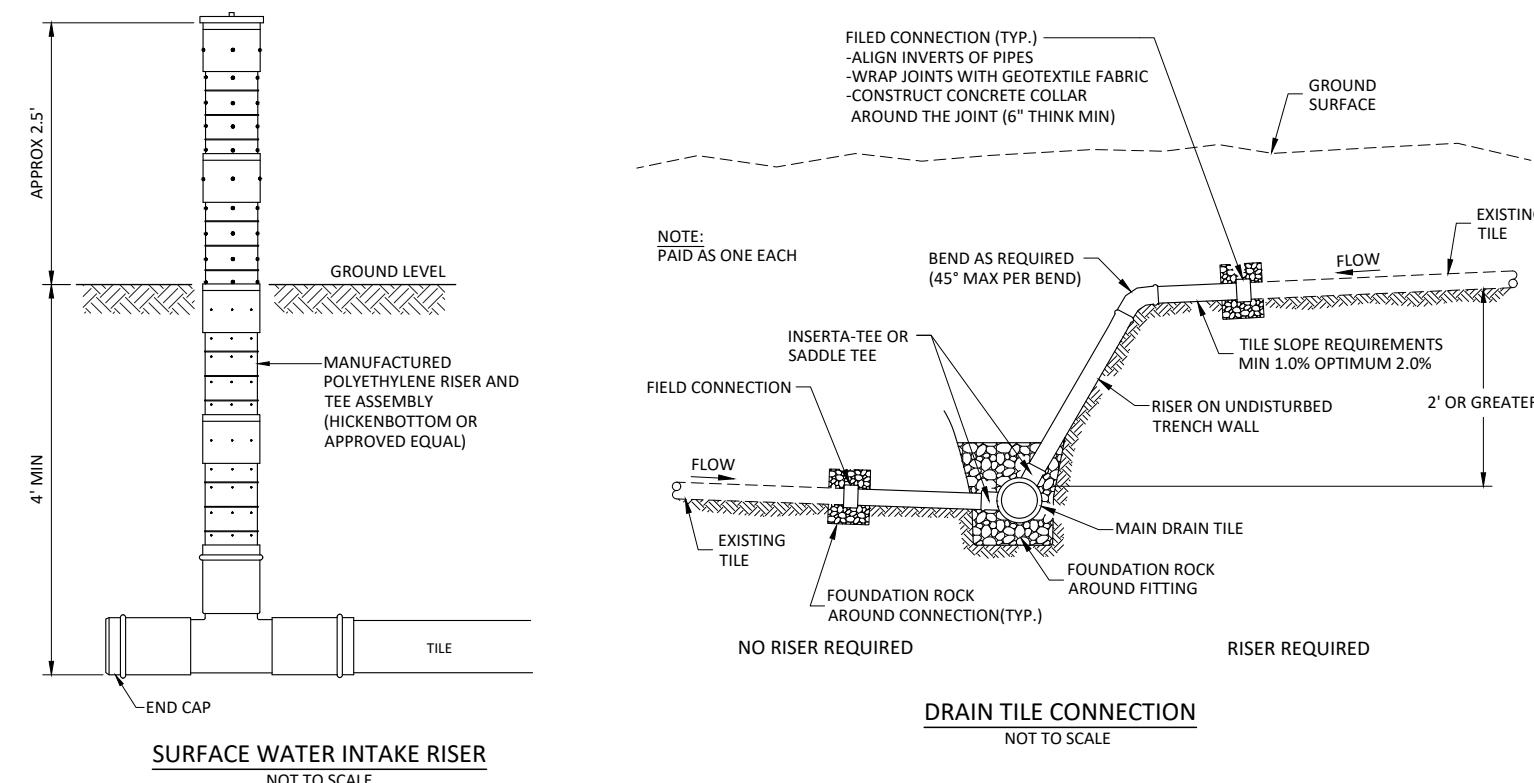
2. CONSTRUCTION REQUIREMENTS PER SPEC 2451 MODIFIED SO THAT EMBEDMENT MATERIAL IS COMPAKTED IN UNIFORM LIFTS, 8" OR LESS IN DEPTH, LOOSE MEASURE, TO 95% STANDARD PROCTOR DENSITY FROM THE BEDDING TO A MINIMUM DEPTH OF AT LEAST 12" ABOVE THE CROWN OF THE PIPE.

3. COST FOR FURNISHING AND INSTALLING GRANULAR BEDDING AND ENCASEMENT MATERIALS SHALL BE INCLUDED IN THE PRICE BID FOR POLYETHYLENE PIPE, PER LINEAL FOOT.

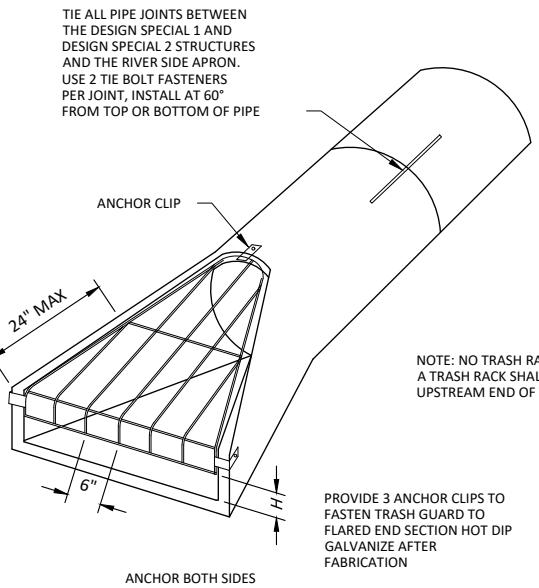
PIPE SIZE	PIPE OD (Nominal)	'E' ENVELOPE WIDTH (Minimum)	MINIMUM TRENCH WIDTH (OD+2E)
4"	4.6"	3"-4"	10"
6"	6.8"	4"-6"	14"
8"	9.5"	4"-6"	20"
10"	11.6"	5"-8"	24"
12"	14.2"	5"-8"	30"
15"	17.7"	5"-8"	34"
18"	22.0"	6"-10"	38"
24"	29.5"	8"-12"	46"
30"	35.4"	8"-12"	60"
36"	41.0"	8"-12"	65"



**DUAL WALL POLYETHYLENE TRENCH**  
NOT TO SCALE



**TRENCH DETAIL**  
**C.S. & REINFORCED CONCRETE PIPE**  
**CLASS "C" BEDDING CONDITION**  
NOT TO SCALE



TRASH GUARD SIZES			
PIPE SIZE	BARS	"H"	BOLTS
12"-18"	3/4"Ø	4"	5/8"
21"-42"	1"Ø	6"	3/4"
42"-72"	1 1/4"Ø	12"	1"

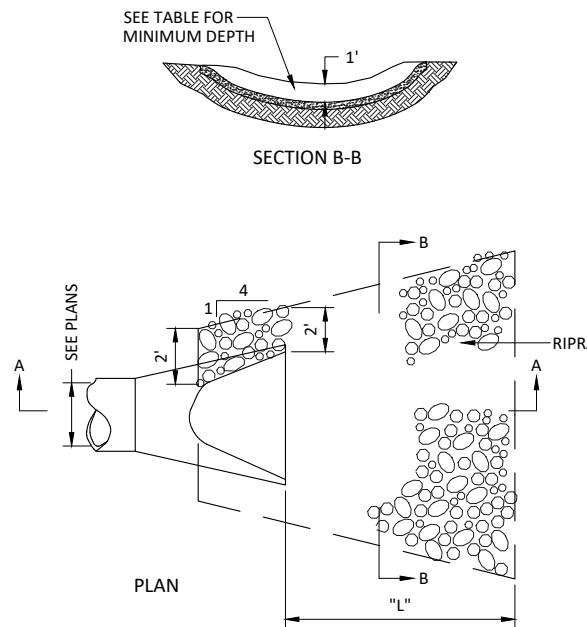
**RC APRON TRASH RACK  
(STEEL BARS)**  
NOT TO SCALE

TIE ALL PIPE JOINTS BETWEEN THE DESIGN SPECIAL 1 AND DESIGN SPECIAL 2 STRUCTURES AND THE RIVER SIDE APRON. USE 2 TIE BOLT FASTENERS PER JOINT, INSTALL AT 60° FROM TOP OR BOTTOM OF PIPE

DIA OF ROUND PIPE (IN)	L (FT)	CLASS II d50=6"	CLASS III d50=9"	CLASS IV d50=12"
12	8	5	8	10
15	8	5	8	10
18	10	6	10	15
21	10	8	15	15
24	12	10	15	20
27	12	10	15	20
30	14	15	20	25
36	16	18	25	30
42	18	20	30	40
48	20	20	40	50

NOTE: NO TRASH RACK ON DOWNSTREAM ENDS  
A TRASH RACK SHALL BE FURNISHED ON THE  
UPSTREAM END OF THE 60" RCP CULVERT

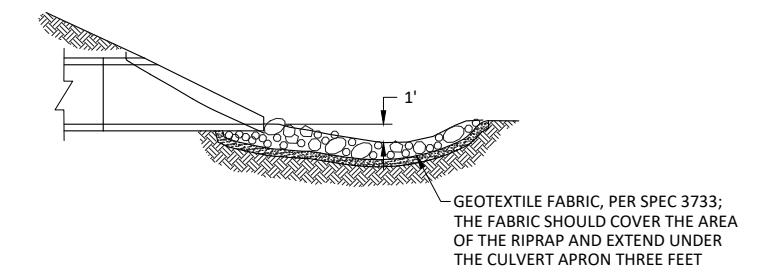
PROVIDE 3 ANCHOR CLIPS TO  
FASTEN TRASH GUARD TO  
FLARED END SECTION HOT DIP  
GALVANIZE AFTER  
FABRICATION



DIA OF ROUND PIPE (IN)	L (FT)	CLASS III d50=9"	CLASS IV d50=12"
72	40	30	200
84	40	30	200
84	100	60	1333
96	40	30	200

OR

DIA OF ROUND PIPE (IN)	L (FT)	DEPTH RIPRAP (IN)	CLASS RIPRAP
72	40	30	III
84	40	30	III
84	12	12	IV
96	40	30	III



TOP OF LEVEE AND ALL OTHER DISTURBED AREAS  
OTHER THAN SIDE SLOPES OF THE LEVEE:  
SEED & FERTILIZE WITH MnDOT MIXTURE 270 RT,  
AND STABILIZE WITH HYDRAULIC SOIL STABILIZER.

SIDE SLOPES OF LEVEE:  
SEED & FERTILIZE WITH MnDOT MIXTURE 270 RT, AND STABILIZE  
WITH EROSION CONTROL BLANKET CATEGORY 1.

EXISTING GROUND (TYP.)

FILL FROM TOP OF LEVEE TO TOP OF RIPRAP  
WITH CLAY EMBANKMENT AND 6" MIN  
SALVAGED TOPSOIL (TYP.)

TOP OF RIPRAP AT 1' BELOW TOP OF LEVEE (TYP.)

18" THICK RIPRAP CL. III

RIPRAP SLOPE (TYP.)  
SEE CROSS SECTIONS

2H:1V

GEOTEXTILE FABRIC, TYPE IV  
UNDER ALL RIPRAP (TYP.)

8°

2H:1V

TOE OF SLOPE (TYP.)

SLOPE VARIES  
SEE CROSS SECTIONS

18"

5'

5'

RIPRAP SLOPE STABILIZATION

NOT TO SCALE

CONSTRUCT 8' DEEP X 4' WIDE RIPRAP CUTOFF  
WALL ON THE UPSTREAM AND DOWNSTREAM END  
OF THE RIPRAP LIMITS

1243 CEDAR STREET NE  
SLEEPY EYE, MINNESOTA 56085  
Phone: (507) 794-5541  
Email: SleepyEye@bolton-menk.com  
www.bolton-menk.com

REV	ISSUED FOR	DATE
.	.	.

BILL L. HELGET, P.E.  
LIC. NO. 42046 DATE / /

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NOTE: DETAILS ARE NOT TO SCALE



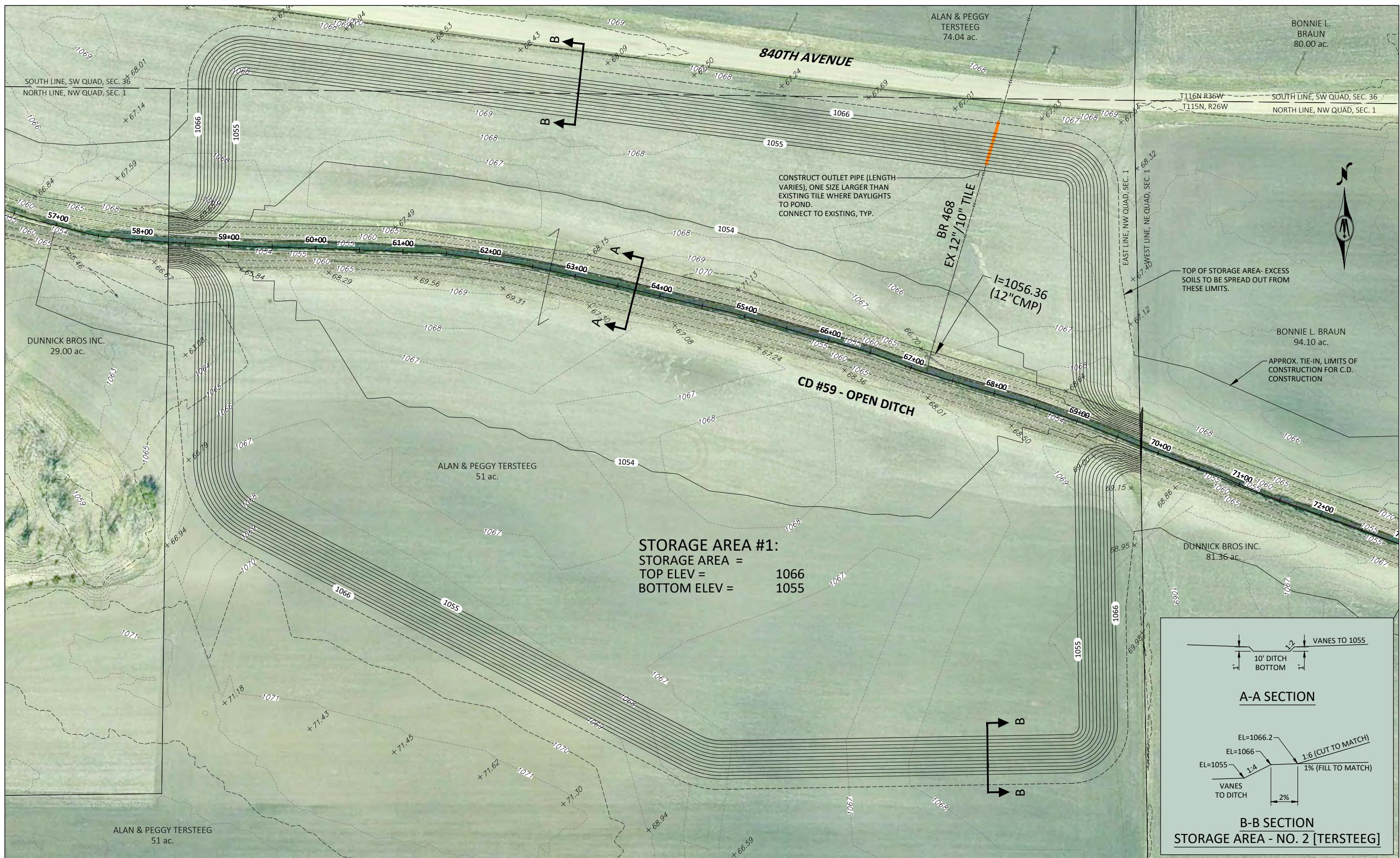
RENNVILLE COUNTY, MINNESOTA

RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

TYPICAL SECTIONS & DETAILS

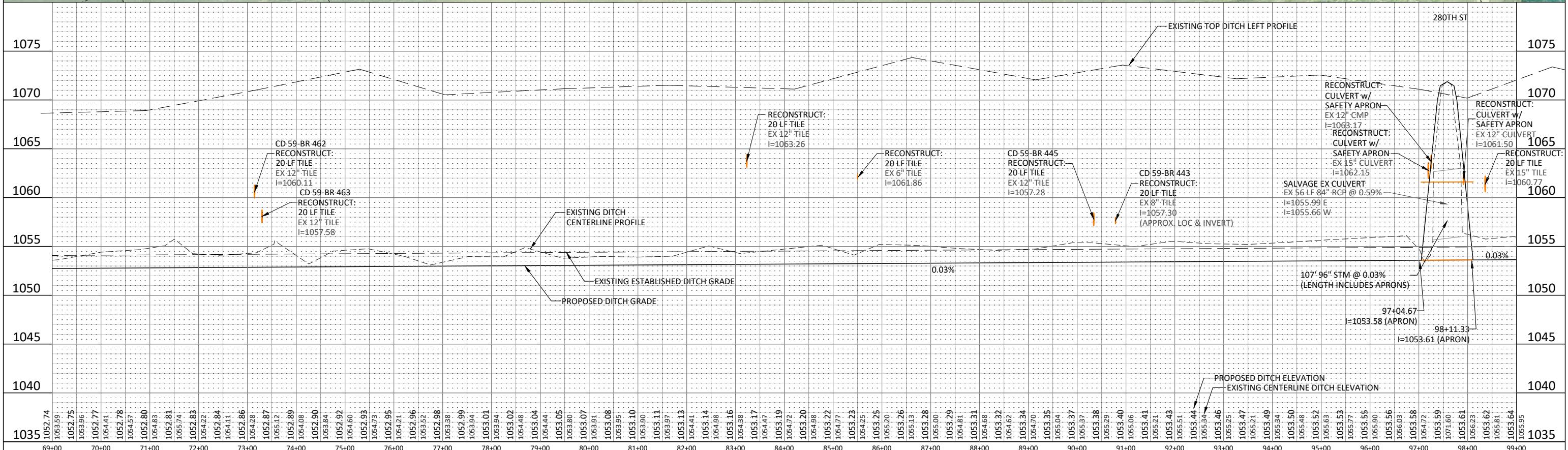
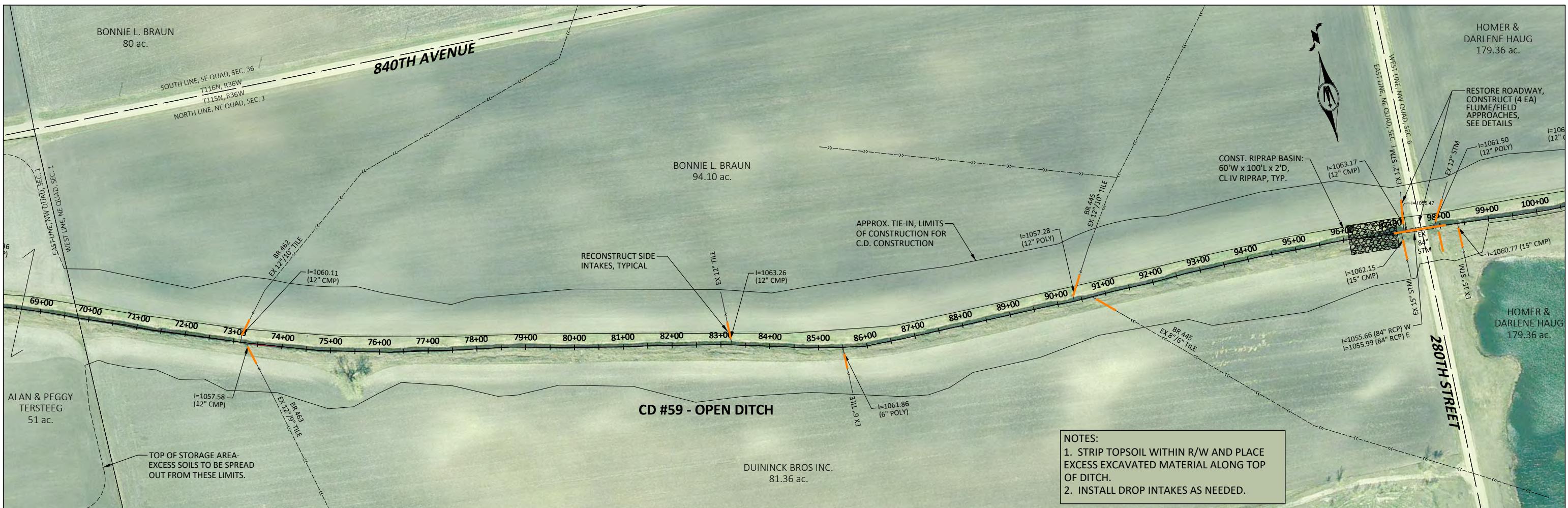
SHEET

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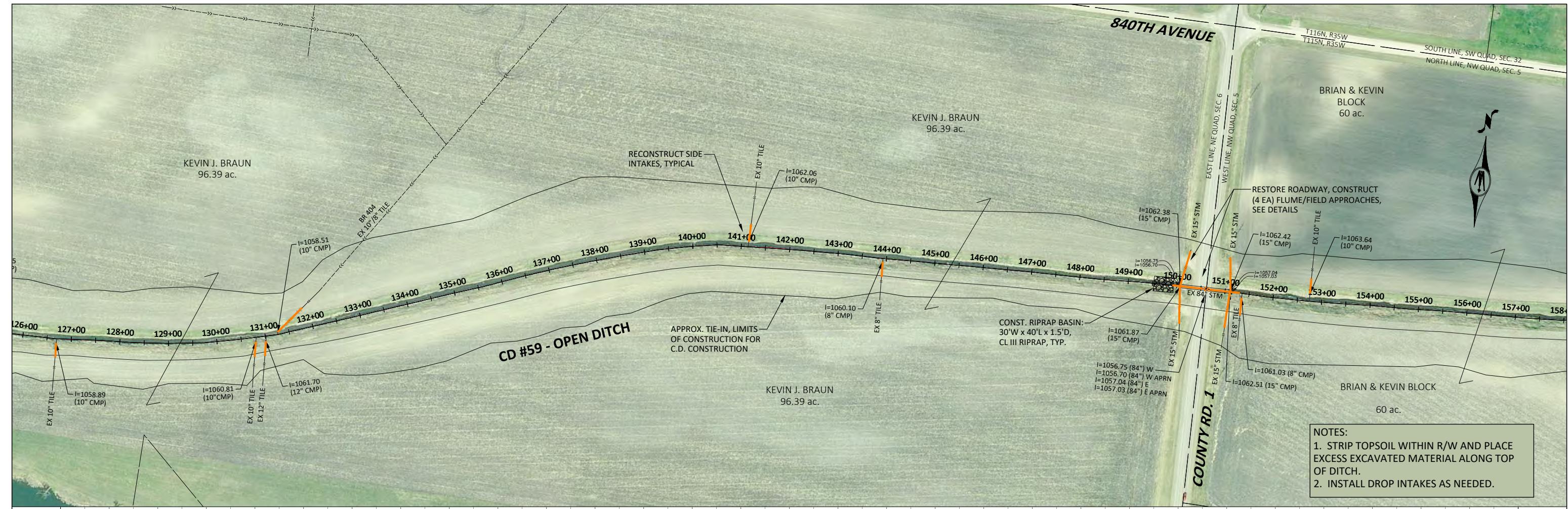






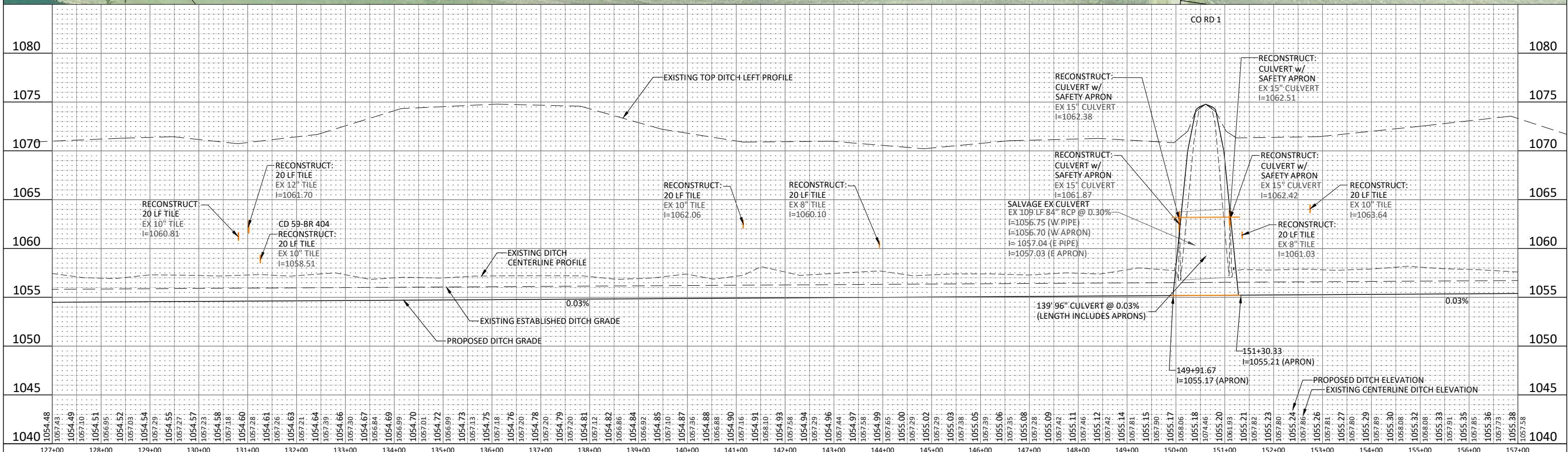






NOTES:

- . STRIP TOPSOIL WITHIN R/W AND PLACE EXCESS EXCAVATED MATERIAL ALONG TOP OF DITCH.
- . INSTALL DROP INTAKES AS NEEDED.



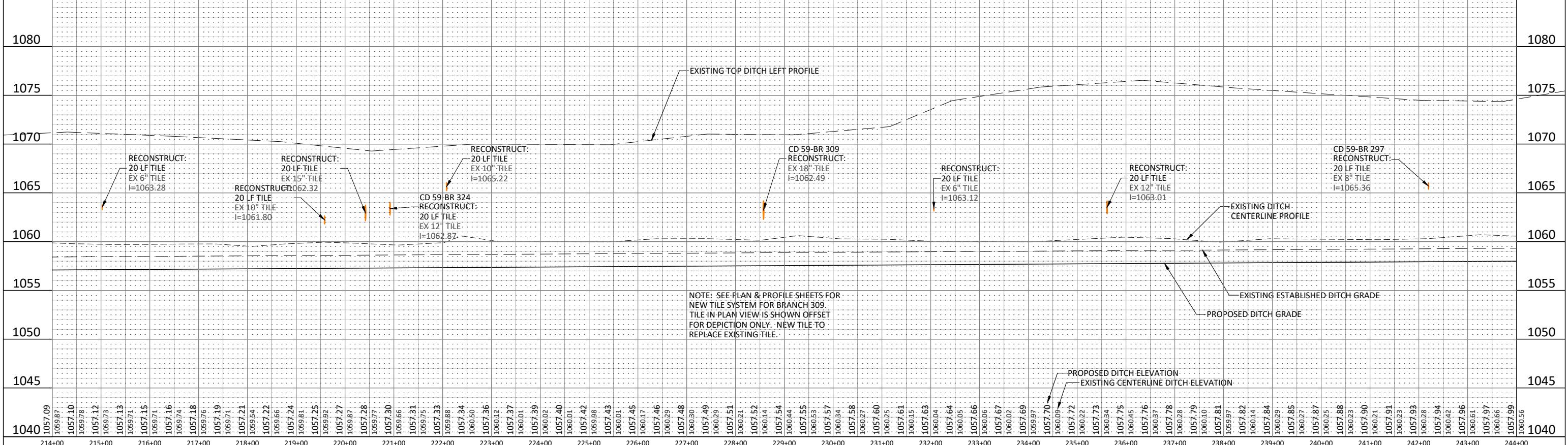
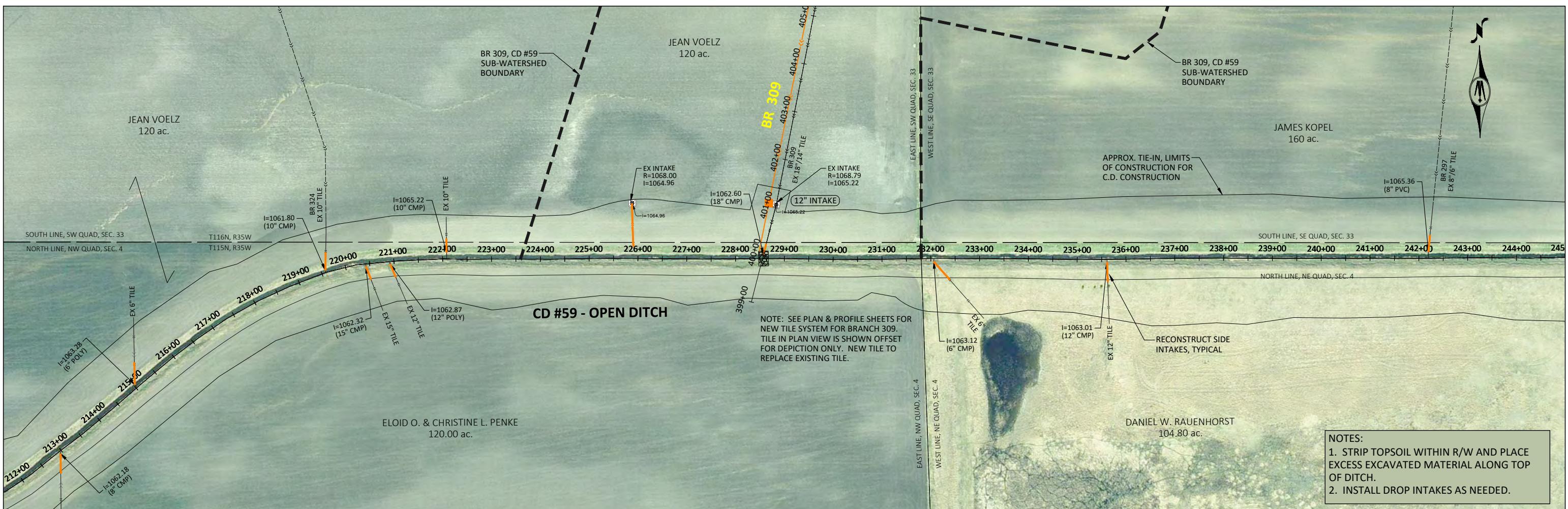
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[www.bolton-menk.com](http://www.bolton-menk.com)

<p>1243 CEDAR STREET NE SLEEPY EYE, MINNESOTA 56085 Phone: (507) 794-5541 Email: SleepyEye@bolton-menk.com www.bolton-menk.com</p>	REV	ISSUED FOR	DATE	I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.		
	.	.	.			
<p>BILL L. HELGET, P.E. LIC. NO. <u>42046</u></p>				DATE	/ /	
<p><b>RENNILLE COUNTY, MINNESOTA</b> <b>RENNILLE COUNTY DITCH No. 59 IMPROVEMENTS</b> <b>COUNTY DITCH No. 59 - DITCH PLAN &amp; PROFILE</b> <b>STA 127+00 - STA 157+00</b></p>						

SHEET  
C5.04

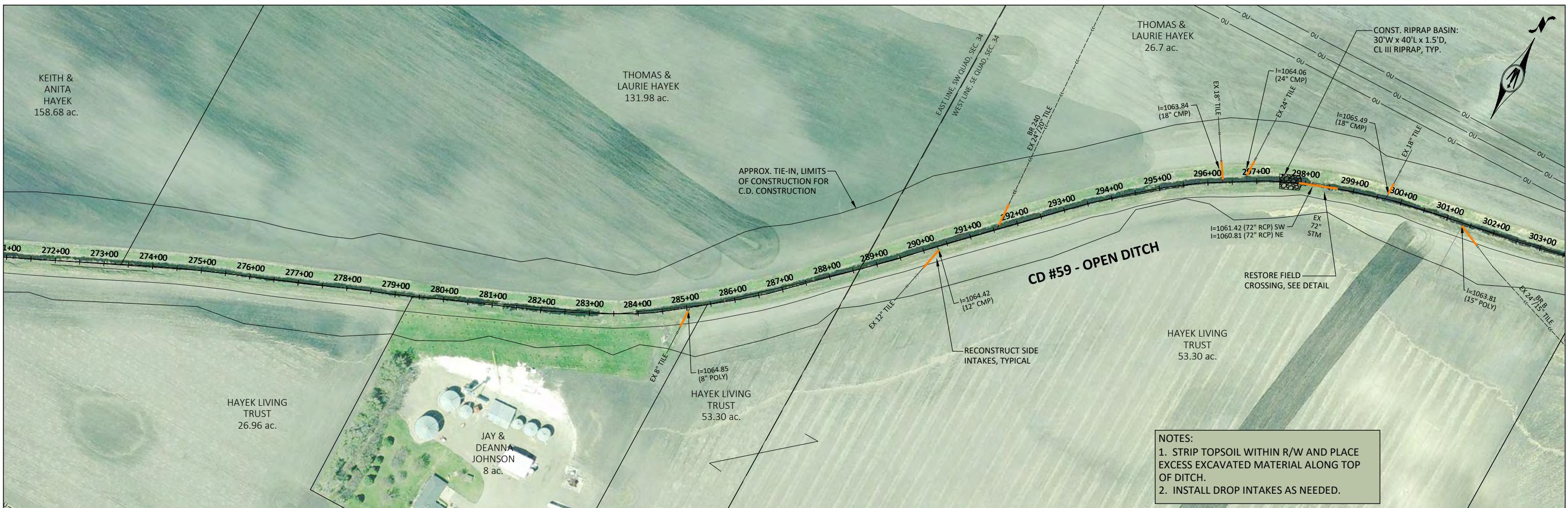






				1243 CEDAR STREET NE SLEEPY EYE, MINNESOTA 56085 Phone: (507) 794-5541 Email: SleepyEye@bolton-menk.com www.bolton-menk.com			REV.	ISSUED FOR	DATE	I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.			DESIGNED SPL	RENVILLE COUNTY, MINNESOTA	SHEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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The figure is a topographic survey map of a ditch section. Key features include:

- Elevation Labels:** 1080, 1075, 1070, 1065, 1060, 1055, 1050, 1045, 1040.
- Profile Labels:** EXISTING TOP DITCH LEFT PROFILE, EXISTING DITCH CENTERLINE PROFILE, PROPOSED DITCH GRADE, PROPOSED DITCH ELEVATION, EXISTING CENTERLINE DITCH ELEVATION.
- Reconstruction Details:**
  - RECONSTRUCT: 20 LF TILE EX 8'' TILE I=1064.85
  - RECONSTRUCT: 20 LF TILE EX 12'' TILE I=1064.42
  - RECONSTRUCT: 20 LF TILE EX 24'' TILE I=1064.06
  - RECONSTRUCT: 20 LF TILE EX 18'' TILE I=1063.84
  - CD 59-BR-240
  - CD 59-BR B
- Salvage Operations:**
  - SALVAGE EX CULVERT EX 25 LF 72" RCP @ -2.43% I=1060.81 I=1061.42
  - INSTALL 80' SALVAGED 84" STM: @ 0.03%
  - INSTALL NEW PIPE TIES (INCIDENTAL)
- Grade and Invert Information:**
  - 0.03% grade
  - 298+67.00 I=1059.53 (APRON)
  - 297+87.00 I=1059.61 (APRON)
- Coordinates:** 272+00, 273+00, 274+00, 275+00, 276+00, 277+00, 278+00, 279+00, 280+00, 281+00, 282+00, 283+00, 284+00, 285+00, 286+00, 287+00, 288+00, 289+00, 290+00, 291+00, 292+00, 293+00, 294+00, 295+00, 296+00, 297+00, 298+00, 299+00, 300+00, 301+00, 302+00.

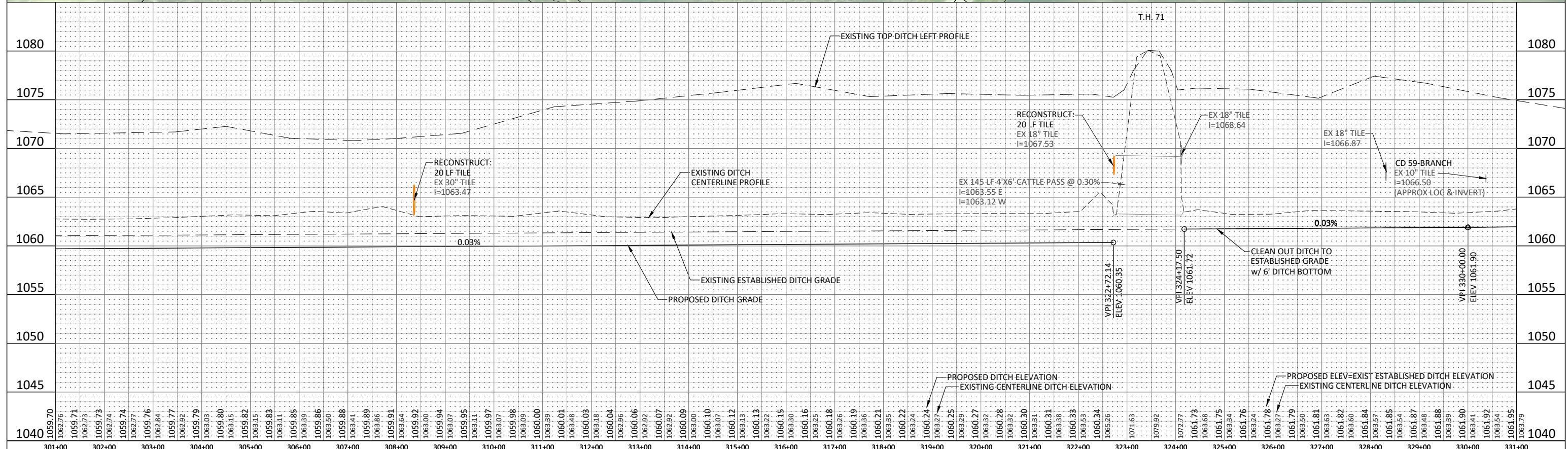
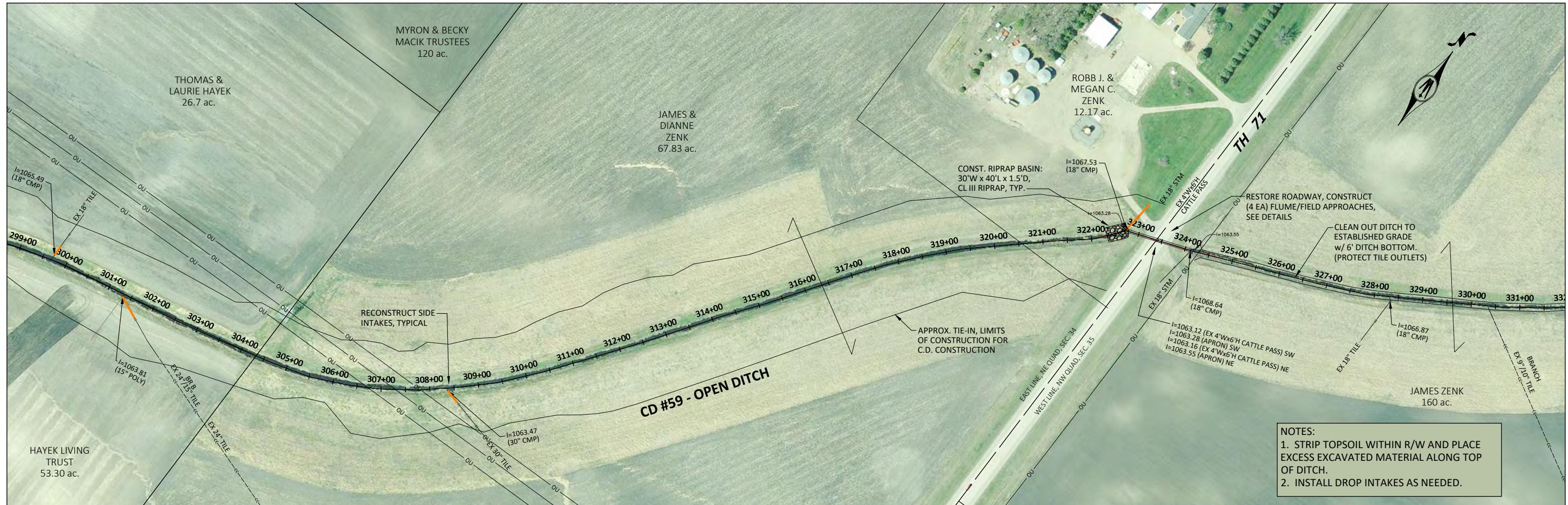


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SLEEPY EYE, MINNESOTA 56085  
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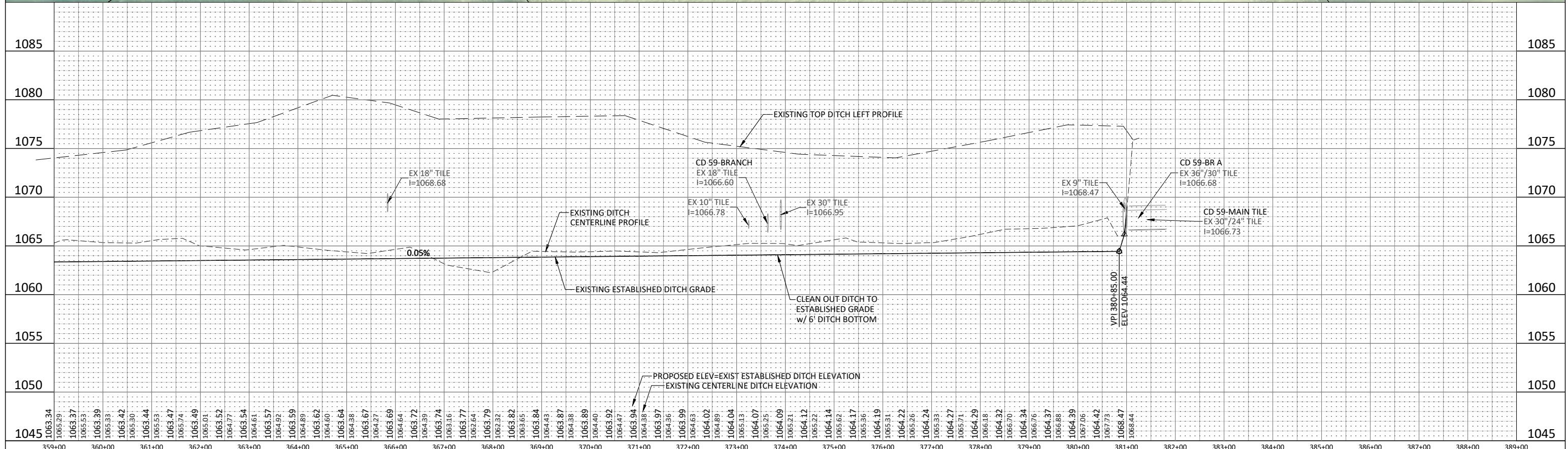
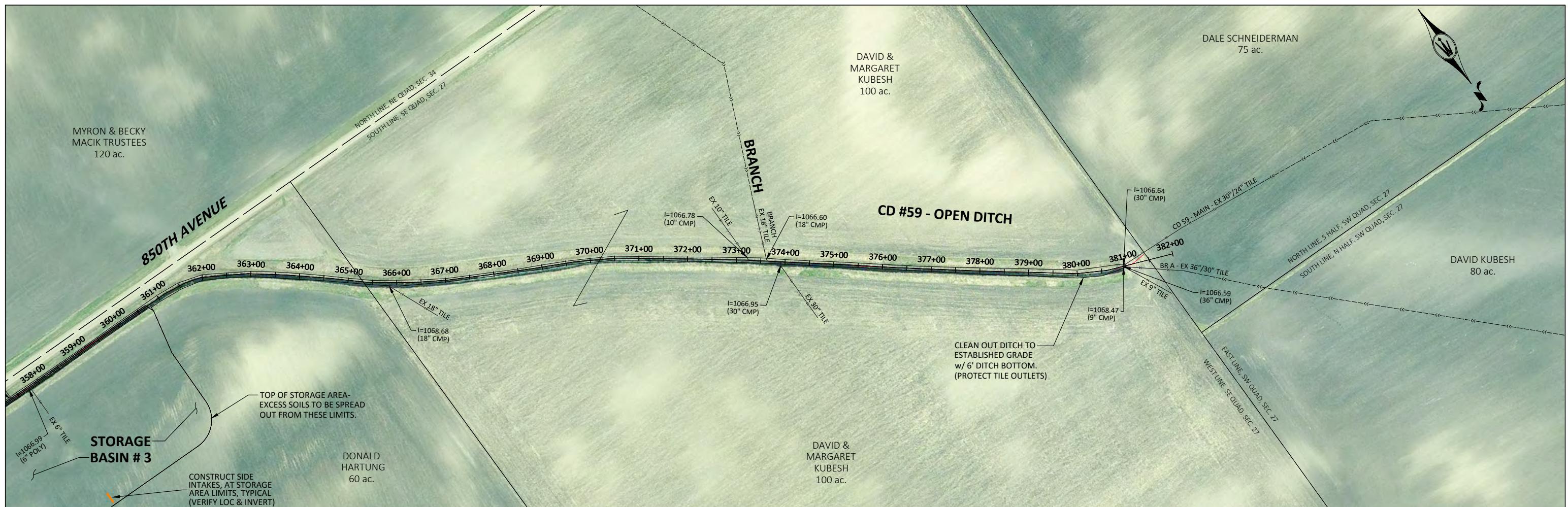
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																			RENVILLE COUNTY DITCH No. 59 IMPROVEMENTS		
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														STA 301+00 - STA 331+00							



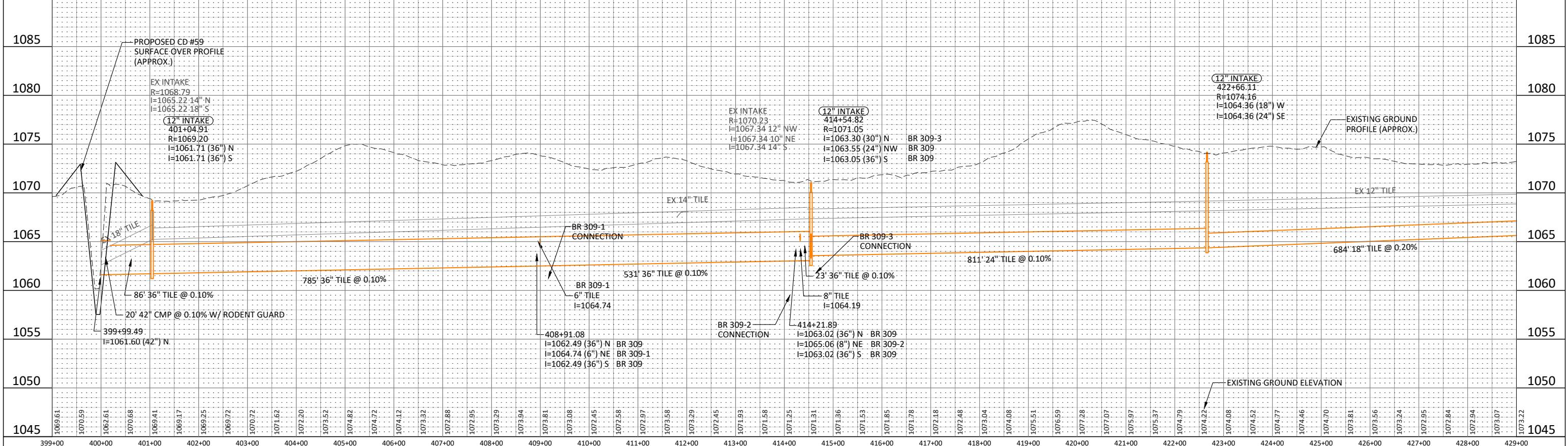
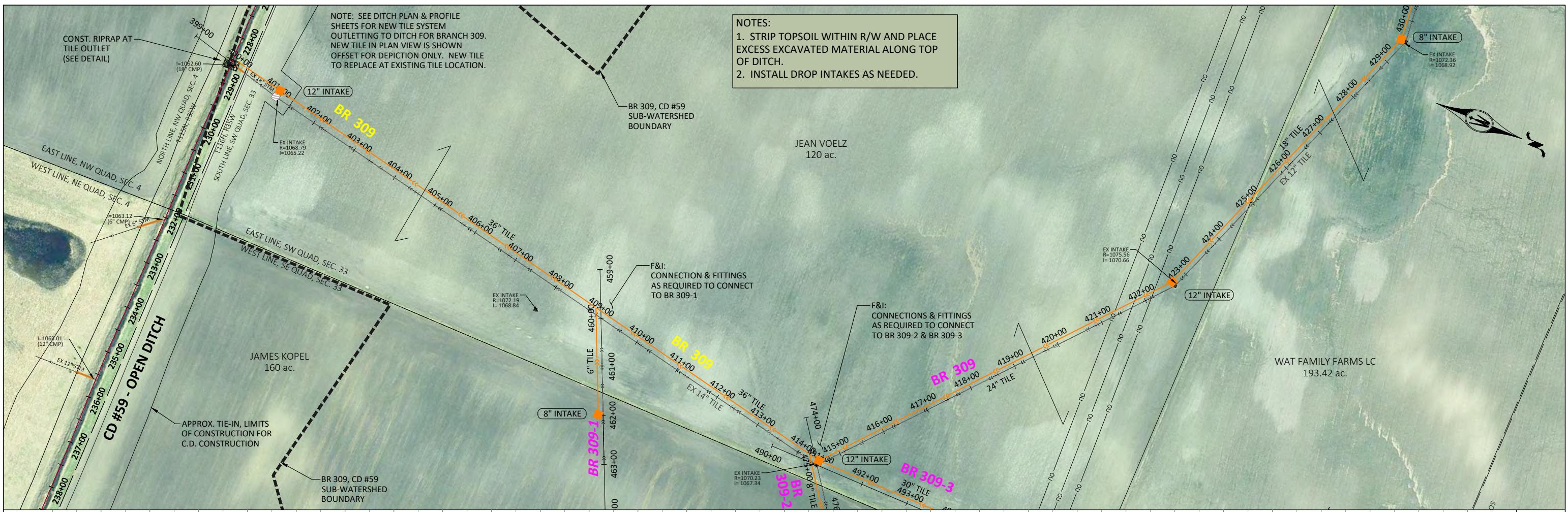


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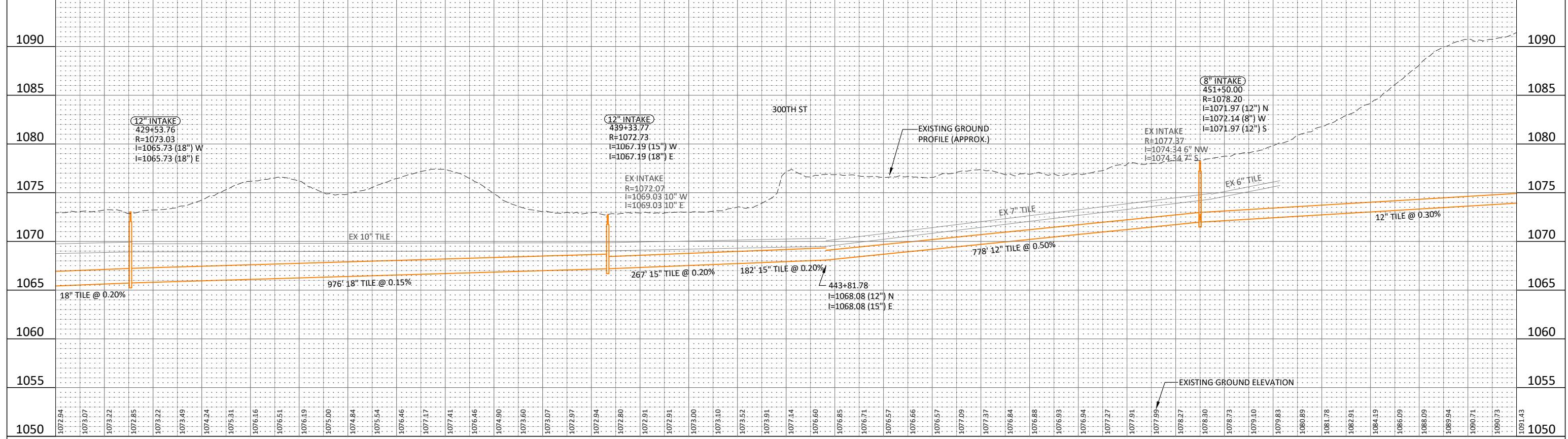
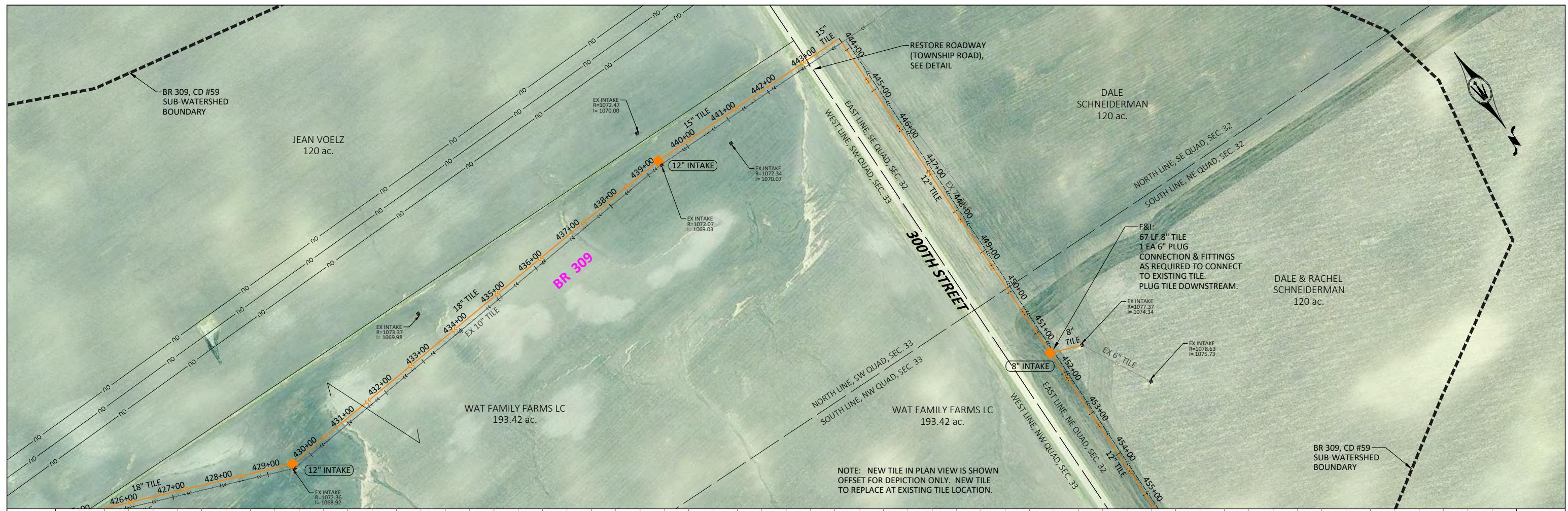
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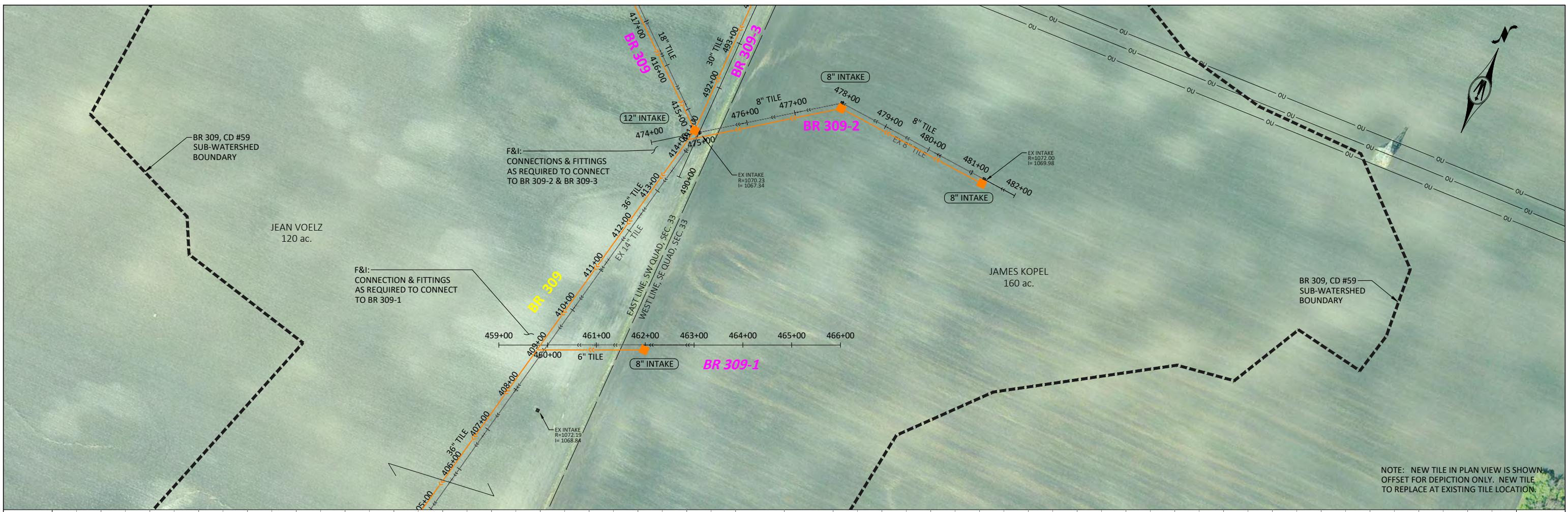
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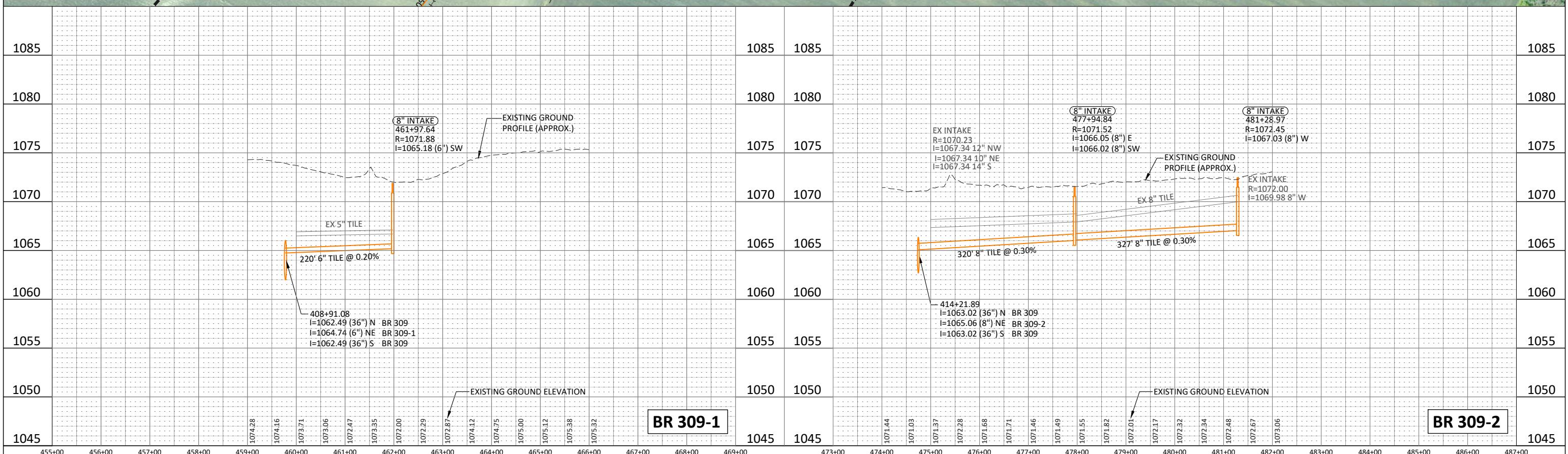
**RENNILLE COUNTY, MINNESOTA**  
**RENNILLE COUNTY DITCH No. 59 IMPROVEMENTS**  
**C.D. 59 - BRANCH 309 - TILE PLAN & PROFILE**

SHEET  
C5.22





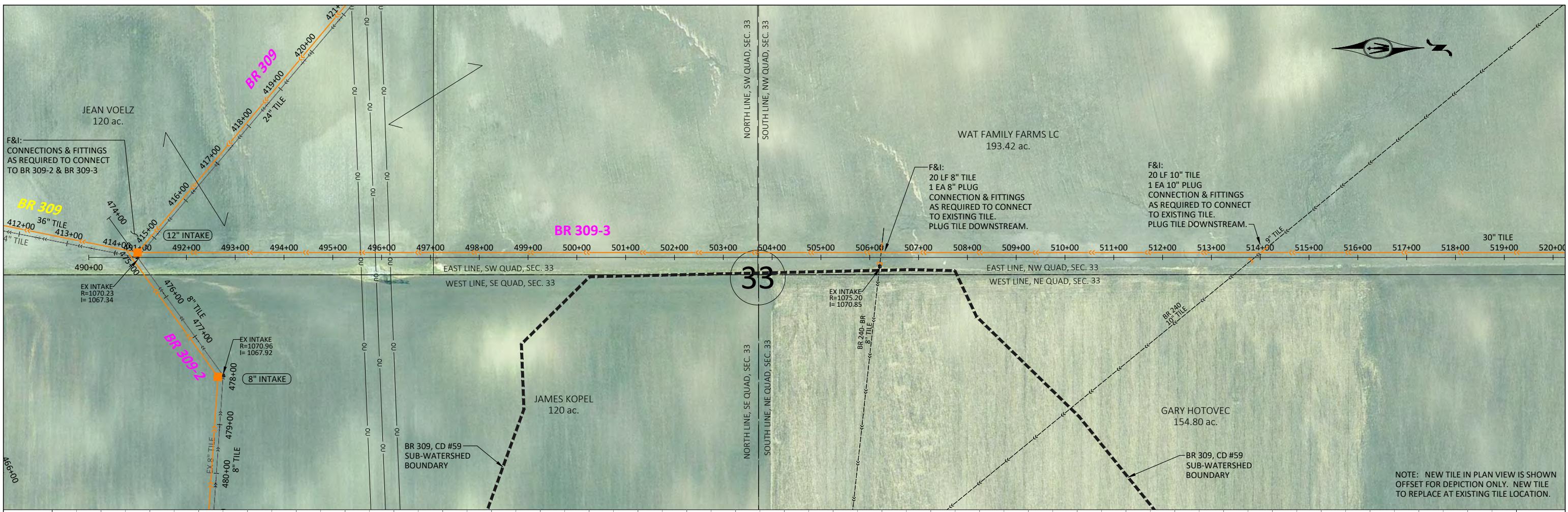
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TO REPLACE AT EXISTING TILE LOCATION.



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				LIC. NO.							

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C5.24



NOTE: NEW TILE IN PLAN VIEW IS SHOWN  
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TO REPLACE AT EXISTING TILE LOCATION.

This figure is a topographic survey map with a grid overlay. It features contour lines and spot elevations. Key features include:

- (12" INTAKE)**: Located at 414+54.82, R=1071.05, I=1063.30 (30°) N, I=1063.55 (24°) NW, I=1063.05 (36°) S.
- 23' 36" TILE @ 0.10%**: Located at 414+21.89, I=1063.02 (36°) N, BR 309, I=1065.06 (8°) NE, BR 309-2, I=1063.02 (36°) S, BR 309.
- BR 240 - BR EX 8" TILE I=1070.85**: Located at 2300' 30" STM @ 0.12%.
- BR 240 EX 10" TILE I=1072.00+-**: Located at 1279' 30" STM @ 0.10%.
- EXISTING GROUND PROFILE (APPROX.)**: A dashed line profile starting at 414+54.82 and ending at 1072.00+-.
- EXISTING GROUND ELEVATION**: A solid line profile starting at 514+00.00 and ending at 1077.99.

The map includes elevation labels along the left and right edges, ranging from 1050 to 1090. A vertical scale bar indicates distances up to 1000 feet.



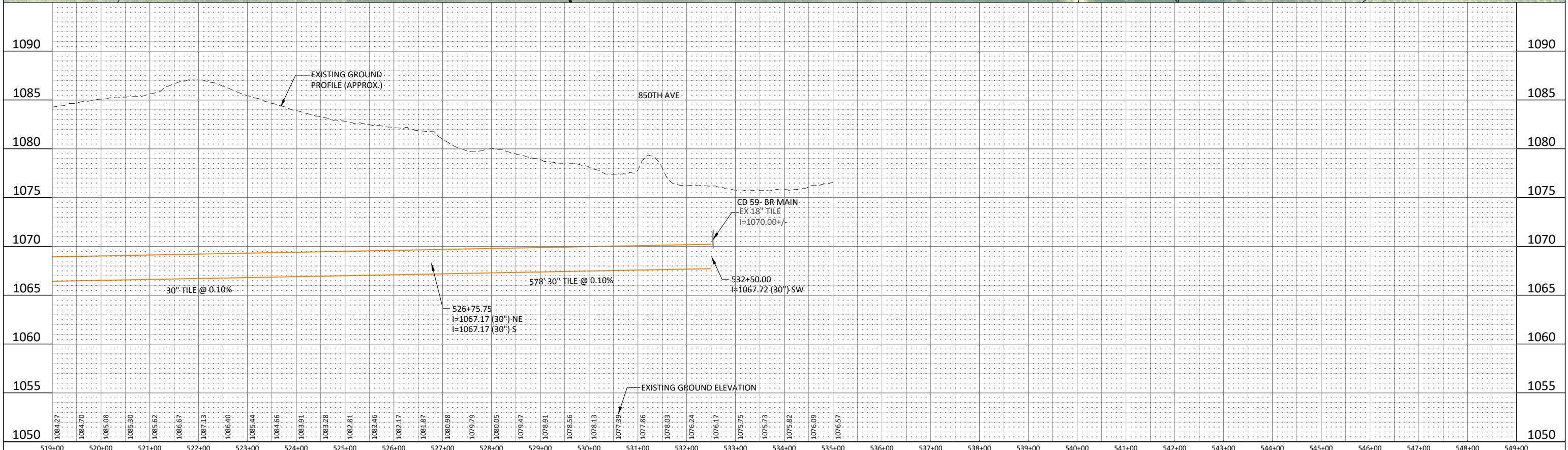
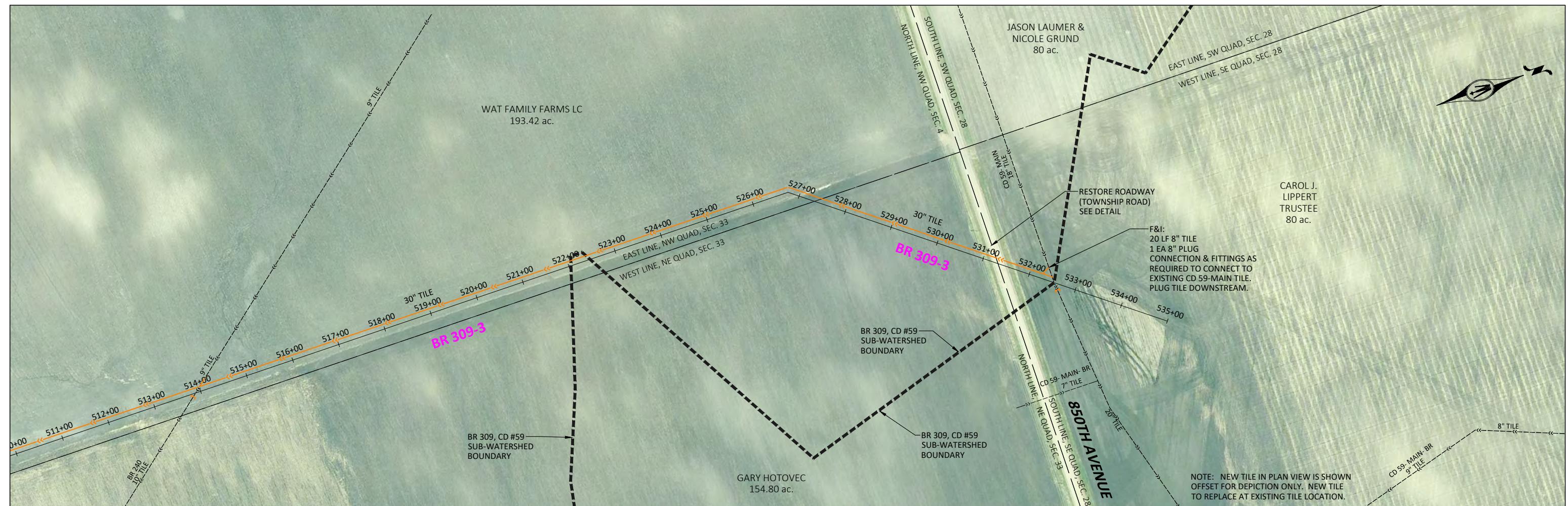
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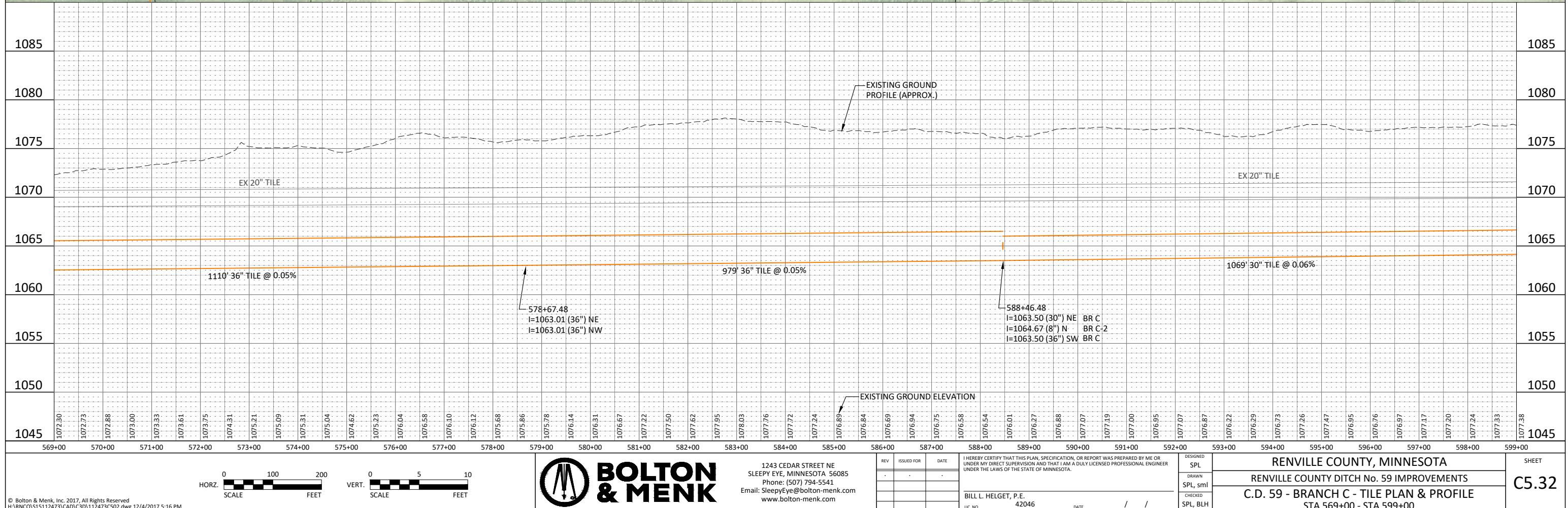
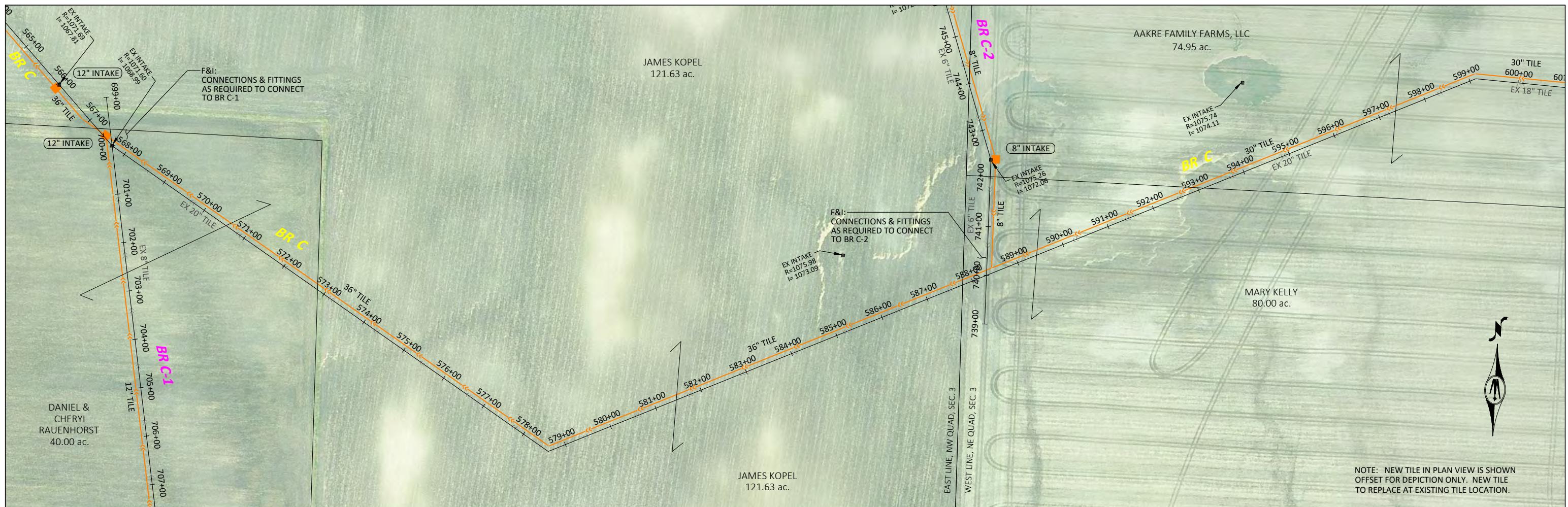
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CHECKED SPL, sml	C.D. 59 - BRANCH 309-3 - TILE PLAN & PROFILE STL 100-00 STL 100-00

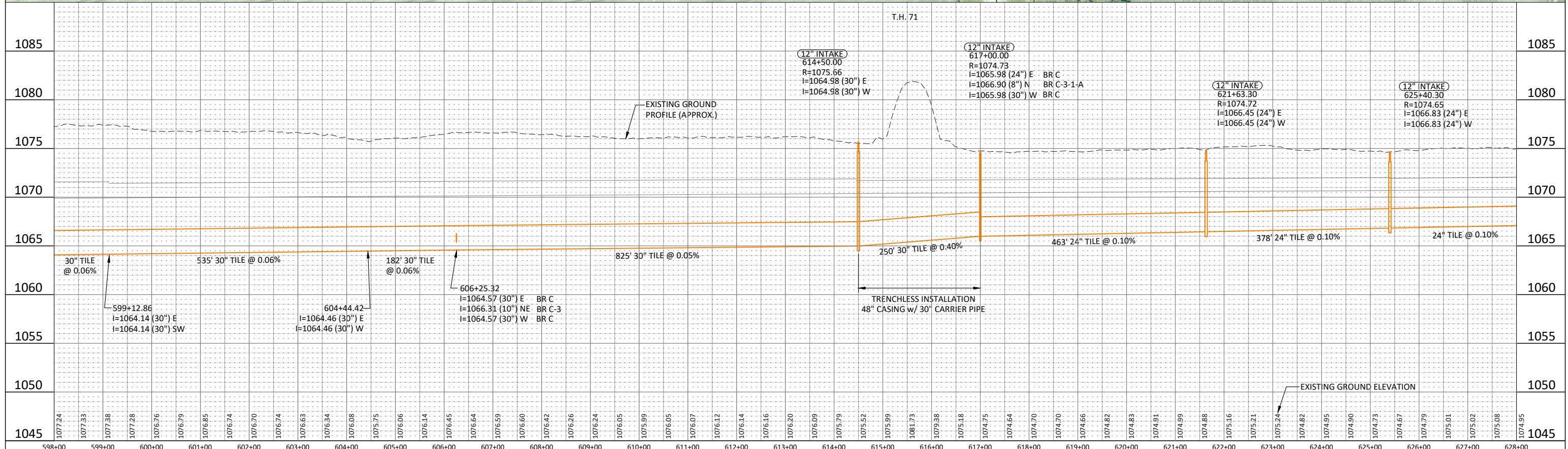
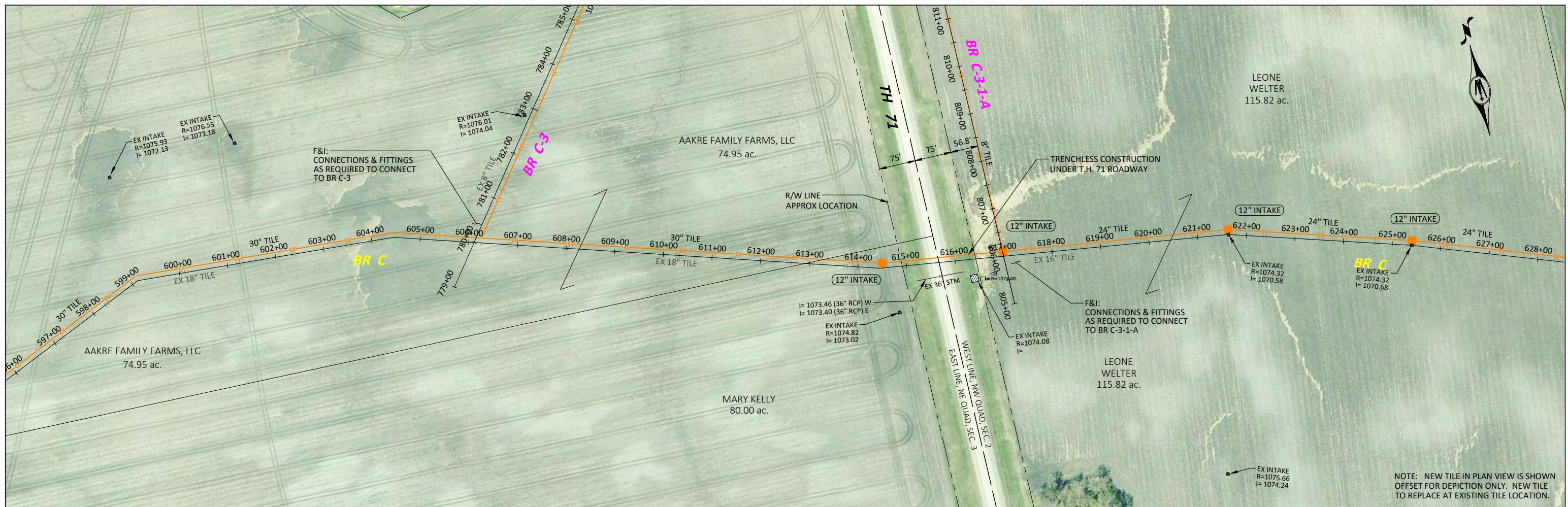
SHEET  
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	VERT.	SCALE	0 100 200 FEET							







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Detailed description of the map content:

- Intakes:**
  - 12" INTAKE at 1085: R=1075.83, I=1069.89 (12") SE
  - 12" INTAKE at 1080: R=1075.28, I=1069.89 (12") NW
  - 12" INTAKE at 1075: R=1074.96, I=1071.15 (24") E
- Tiles:**
  - 24' 15" TILE @ 0.10% (multiple sections)
  - 15" TILE (multiple sections)
  - 10" TILE (multiple sections)
- Brickwork:**
  - BRC C-4 at 1069.02 (18") N
  - BRC C at 1069.02 (24") W
  - BRC C-5 at 1070.16 (8") S
  - BRC C at 1069.87 (15") NW
- Elevations:** Vertical column of elevations from 1090 down to 1050.
- Coordinates:** Horizontal row of coordinates from 627+00 to 657+00.



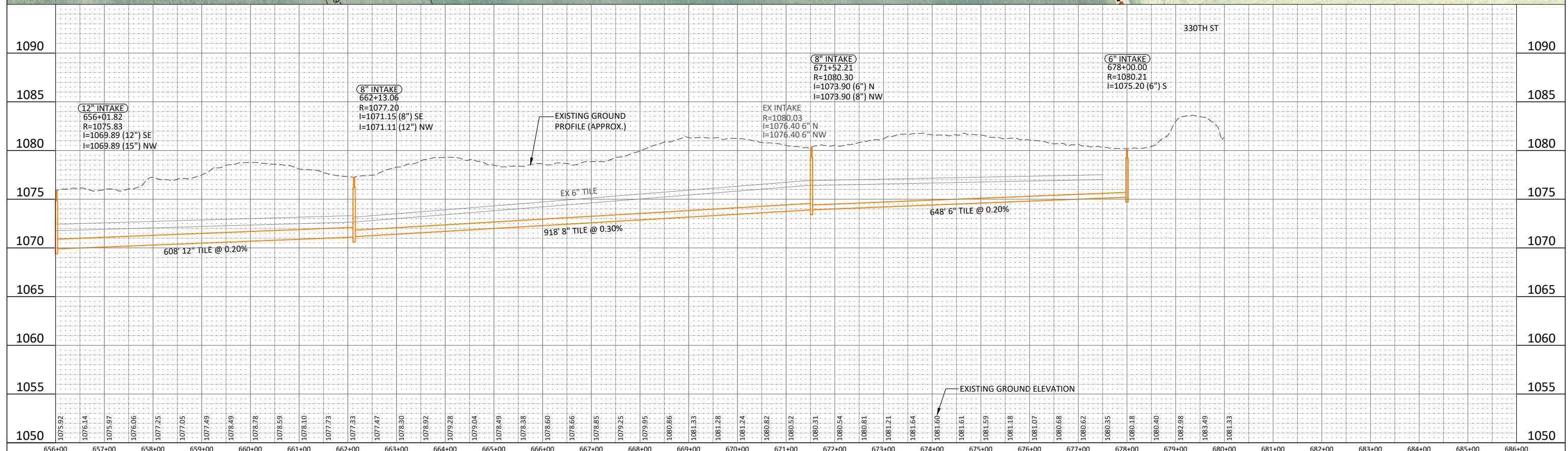
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C5.34



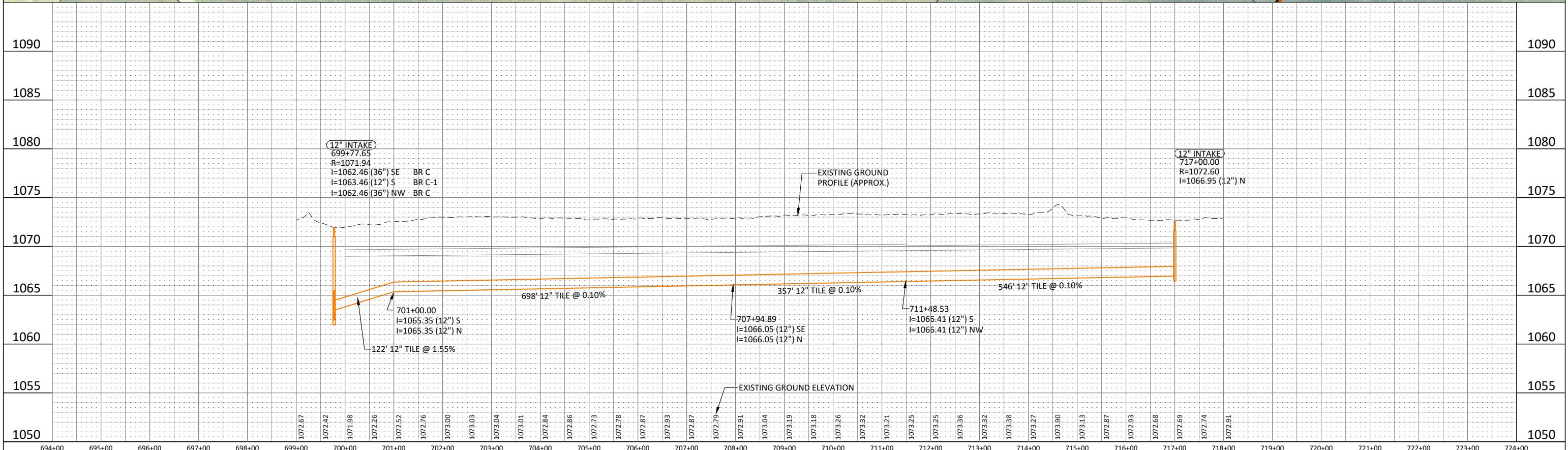
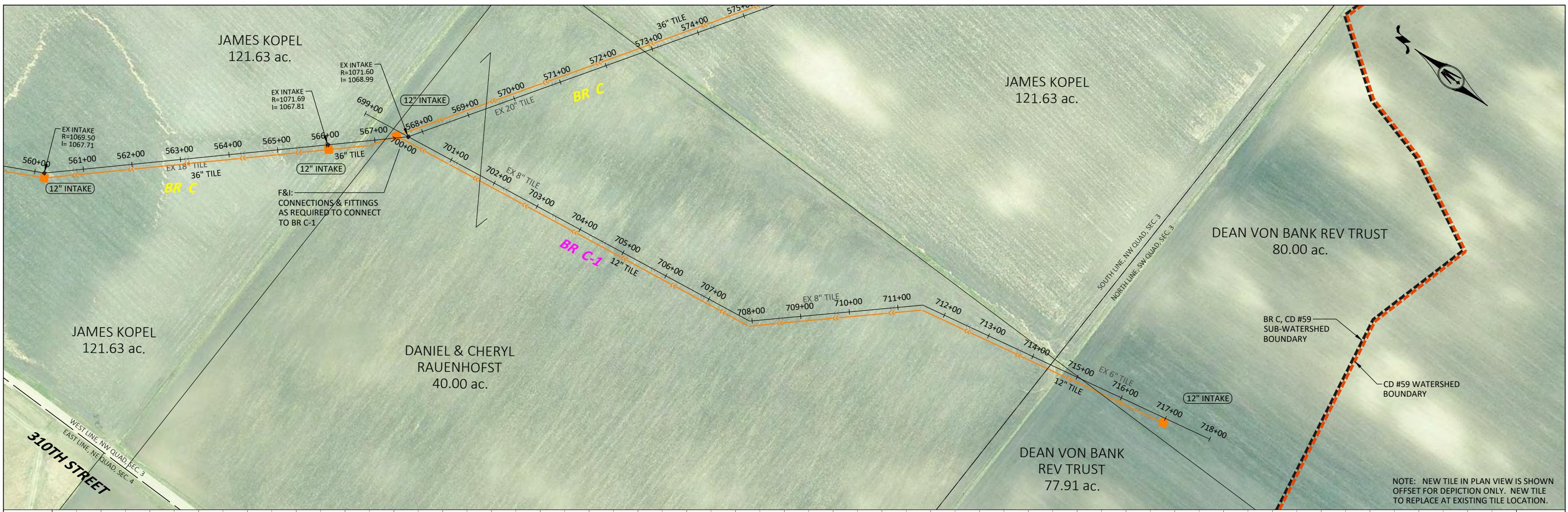
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HORZ. SCALE 0 100 FEET  
VERT. SCALE 0 5 FEET

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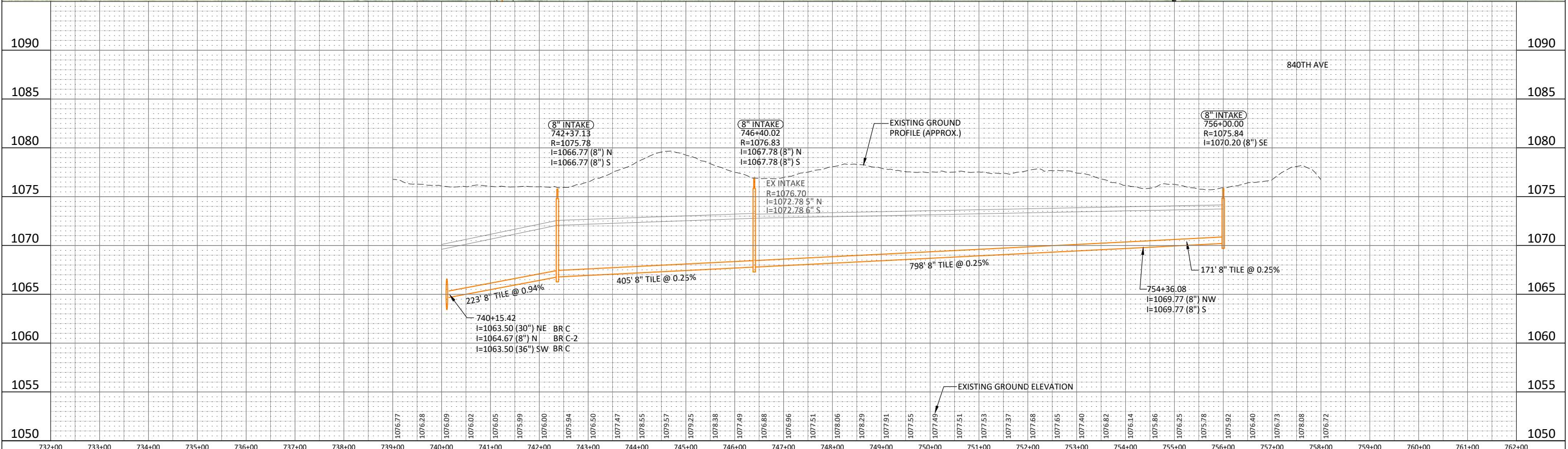


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SHEET  
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HORZ. 0 100 200  
SCALE FEET

VERT. 0 5 10  
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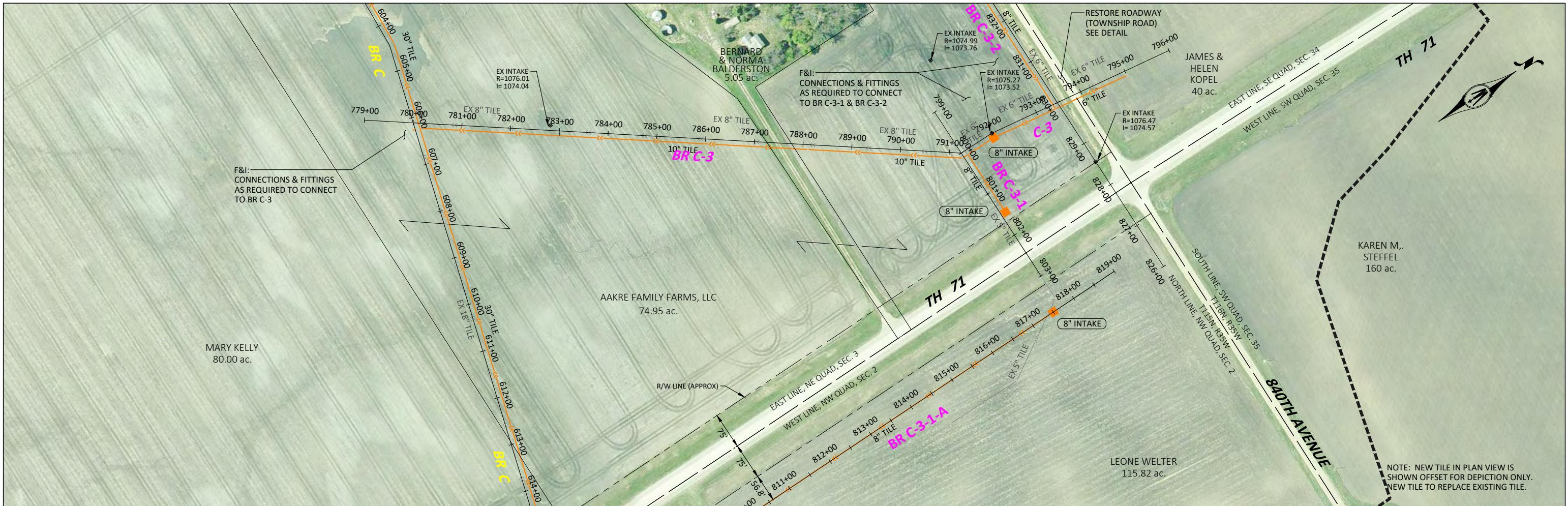
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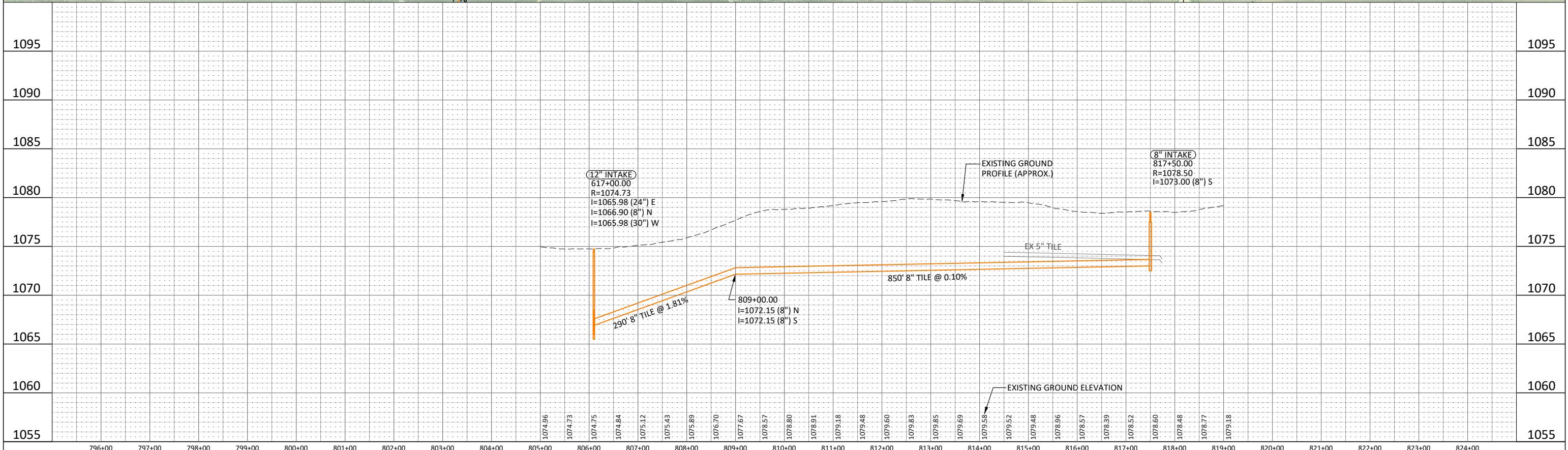
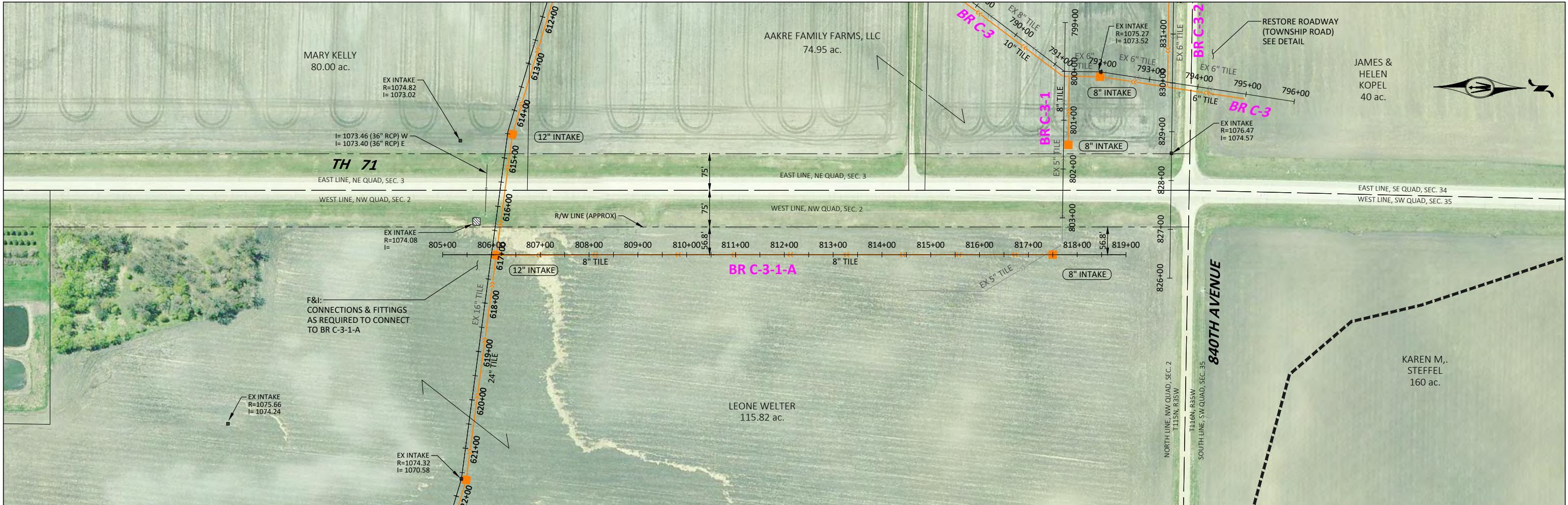
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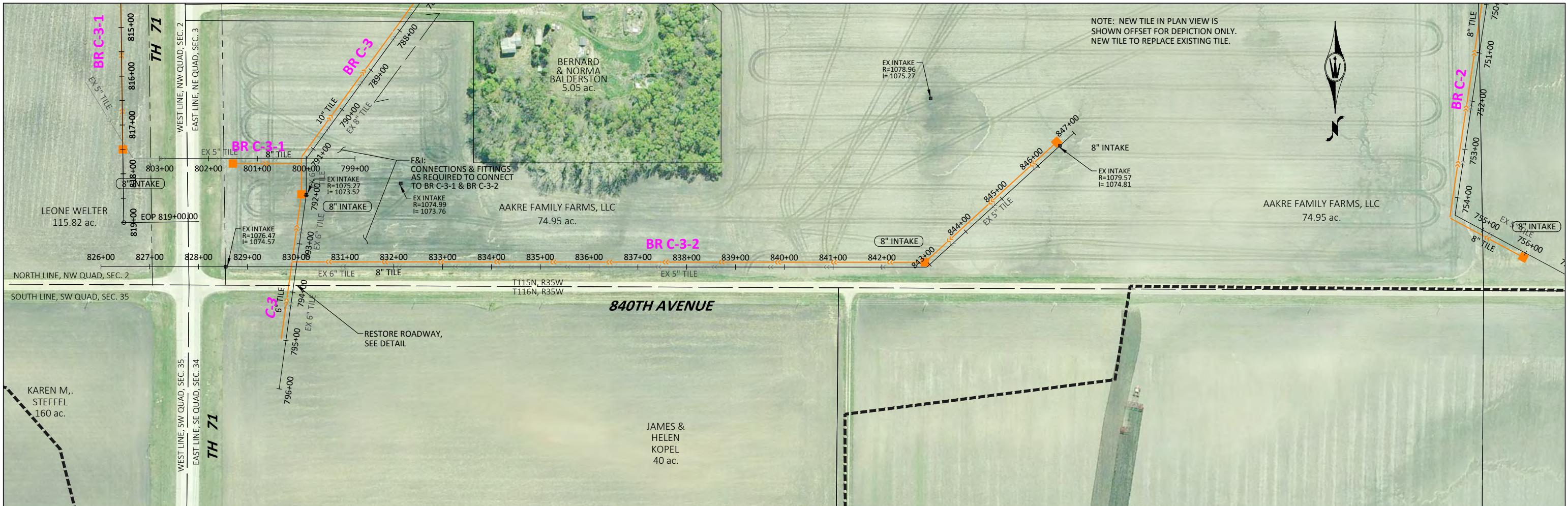


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				42046	DATE	STA 779+00 - STA 796+00 & STA 798+00 - STA 809+00
				/ /		

SHEET  
C5.38





The diagram illustrates a cross-section of a water main construction project. Key features include:

- Vertical Scale:** Elevation levels from 1055 to 1095.
- Profile Lines:**
  - EXISTING GROUND PROFILE (APPROX.):** Dashed line representing the current ground surface.
  - EXISTING GROUND ELEVATION:** Solid orange line representing the planned or existing ground level.
- Intakes:**
  - 8" INTAKE:** Located at 842+88.16 (R=1079.57), with coordinates I=1072.13 (8") SW and I=1072.13 (8") E.
  - 8" INTAKE:** Located at 846+61.08 (R=1079.86), with coordinates I=1072.86 (8") NE and I=1072.86 (8") SW.
- Pipe Sections:**
  - 365' 8" TILE @ 0.20%:** A horizontal pipe segment sloping from left to right.
  - 1297' 8" TILE @ 0.20%:** A horizontal pipe segment sloping from right to left.
  - 829+91.29:** A vertical pipe segment with coordinates I=1069.60 (8") W BR C-3, I=1069.68 (6") N BR C-3-2, and I=1069.51 (10") S BR C-3.
- Other Labels:**
  - T.H. 71
  - EX 5" TILE
  - EXISTING GROUND PROFILE (APPROX.)
  - EXISTING GROUND ELEVATION

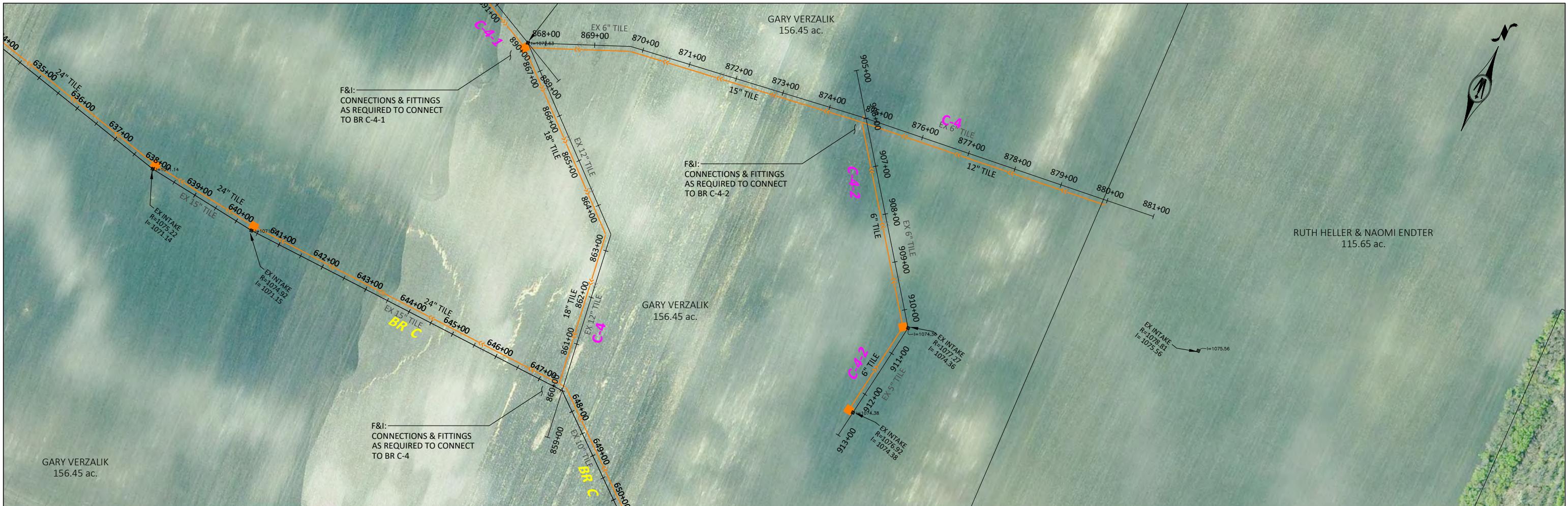


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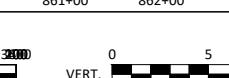
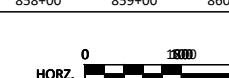
C5.40



This figure is a topographic map illustrating a water intake system. The map features a grid of elevation contours and a dashed line representing the 'EXISTING GROUND PROFILE (APPROX.)'. A vertical profile line is also present, labeled 'EXISTING GROUND ELEVATION'.

**Key Features and Data Points:**

- Intake Structure:** Located at approximately 867+56.68, elevation R=1075.85. It consists of three intake points: I=1070.14 (15") E, I=1070.01 (10") NW, and I=1070.01 (18") SE, all connected to BR C-4.
- Existing Ground Profile:** A dashed line running horizontally across the map, representing the existing ground surface.
- Profile Line:** A vertical dashed line on the right side of the map, labeled 'EXISTING GROUND ELEVATION'.
- Piping System:** The map shows several horizontal pipe segments with their elevations and gradients:
  - Segment 1: 320' 18" TILE @ 0.10% (elevation range 860+11.90 to 863+39.16)
  - Segment 2: 418' 18" TILE @ 0.10% (elevation range 863+39.16 to 869+72.80)
  - Segment 3: 215' 15" TILE @ 0.10% (elevation range 869+72.80 to 874+72.01)
  - Segment 4: 497' 15" TILE @ 0.10% (elevation range 874+72.01 to 874+72.01)
  - Segment 5: 528' 12" TILE @ 0.20% (elevation range 874+72.01 to 880+00.00)
- Vertical Elevation Labels:** The map includes vertical labels for elevations from 1050 to 1090 feet, positioned along the left and right edges.
- Other Labels:** Specific labels include 'EX INTAKE' at 867+56.68, 'R=1074.96', 'I=1071.15 15" E', 'I=1071.15 15" W', 'R=1075.48', 'I=1072.63 8" NW', 'I=1072.63 6" E', 'I=1072.63 12" SE', and '880+00.00 I=1071.91 (12") W'.



869+00 870+00 871+00  
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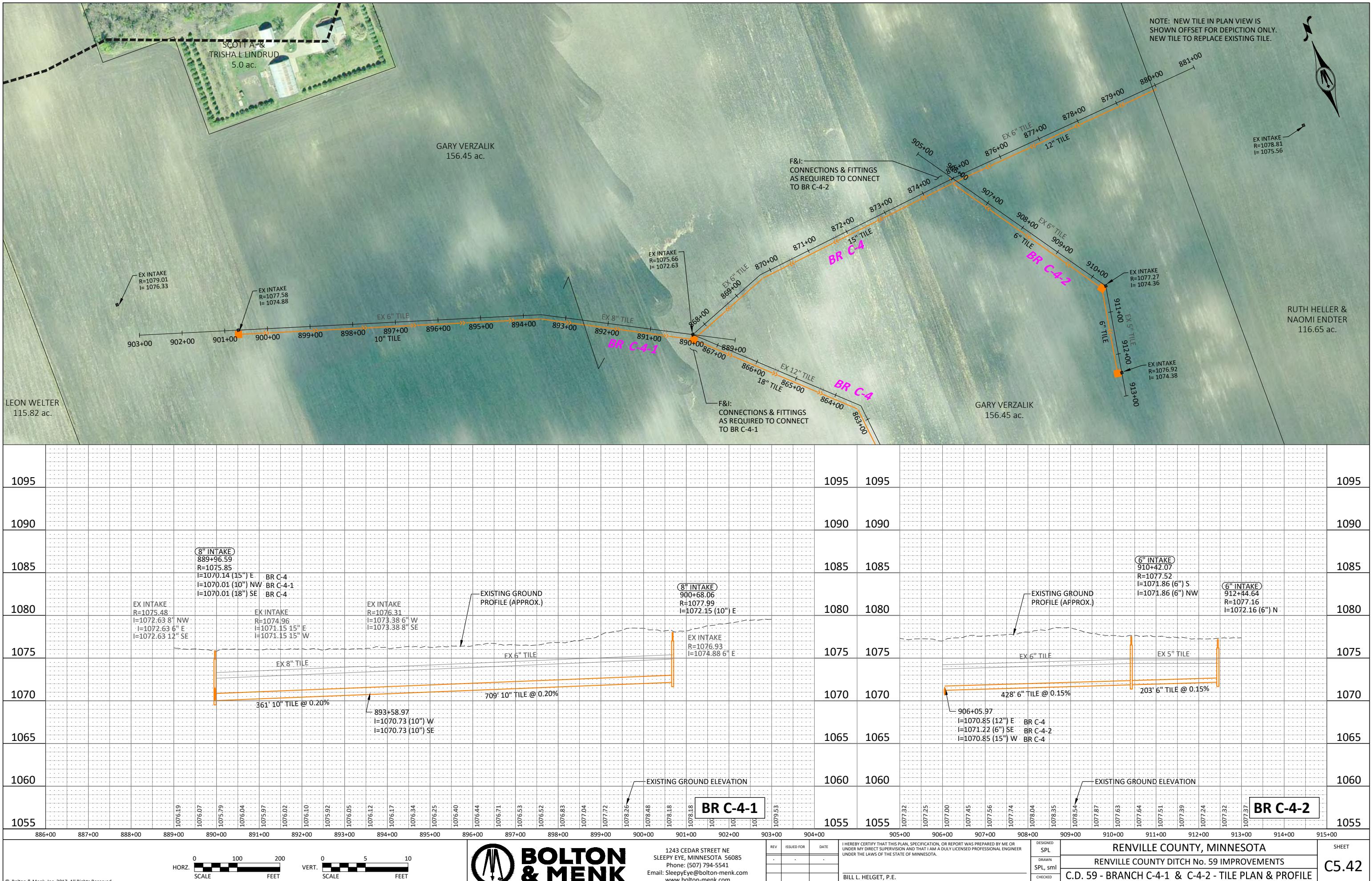
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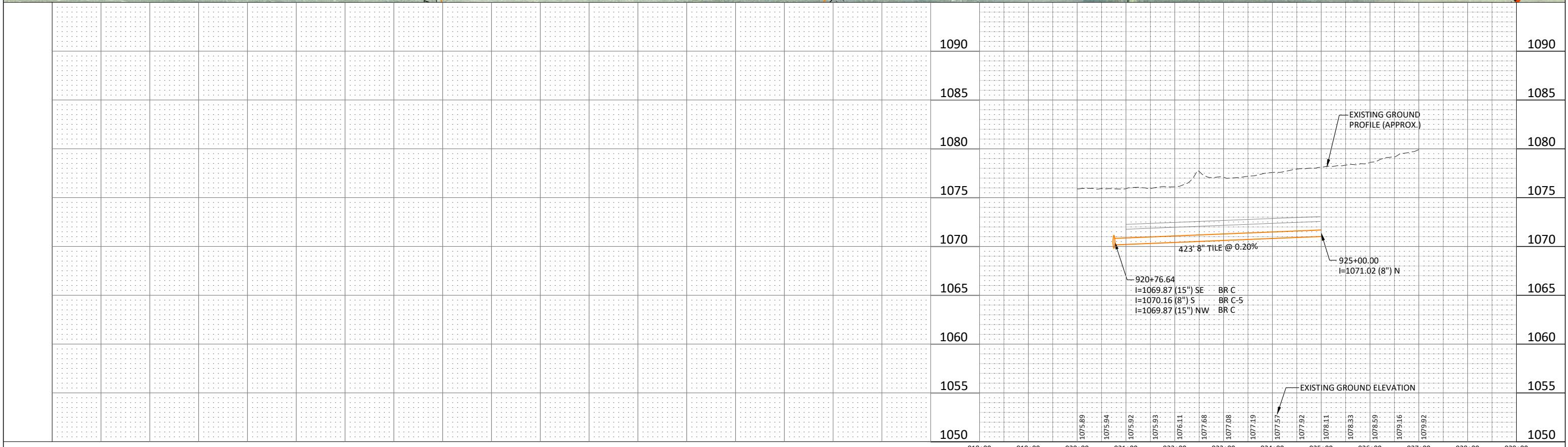
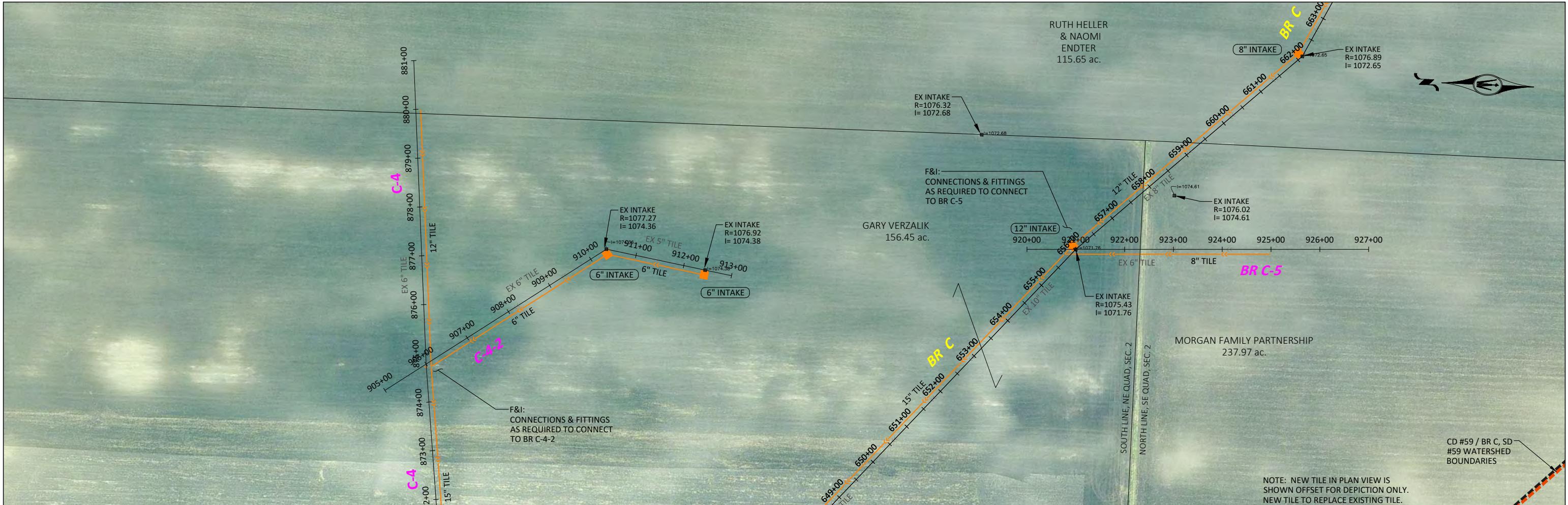
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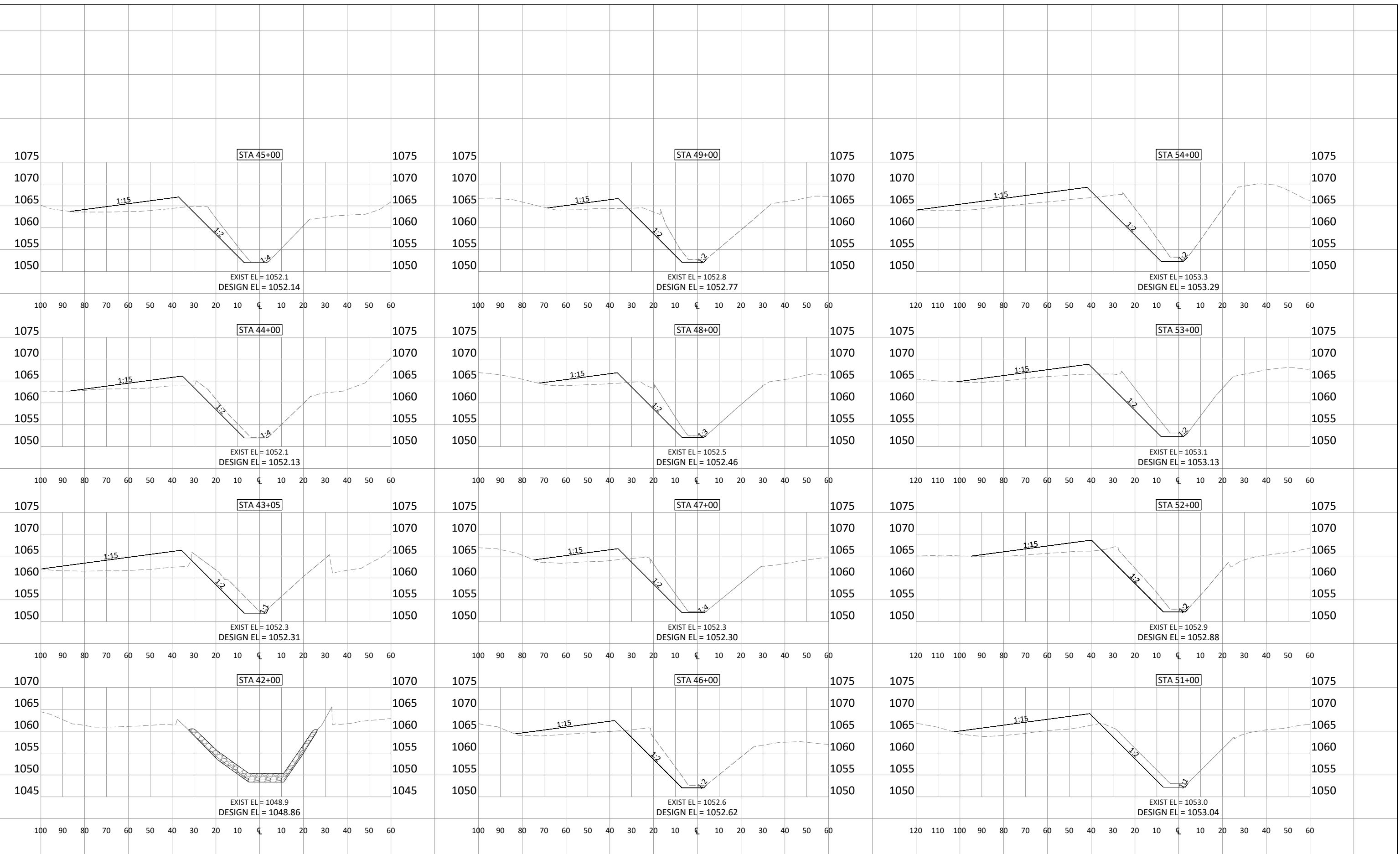
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HORZ. 0 100 200 SCALE FEET	VERT. 0 5 10 SCALE FEET	 <b>BOLTON &amp; MENK</b>	1243 CEDAR STREET NE SLEEPY EYE, MINNESOTA 56085 Phone: (507) 794-5541 Email: SleepyEye@bolton-menk.com www.bolton-menk.com	REV. . ISSUED FOR . DATE .	I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A FULLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.	DESIGNED SPL DRAWN SPL, sml CHECKED SPL, BLH	RENNVILLE COUNTY, MINNESOTA	RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS	C.D. 59 - BRANCH C-5 - TILE PLAN & PROFILE	SHEET C5.43	
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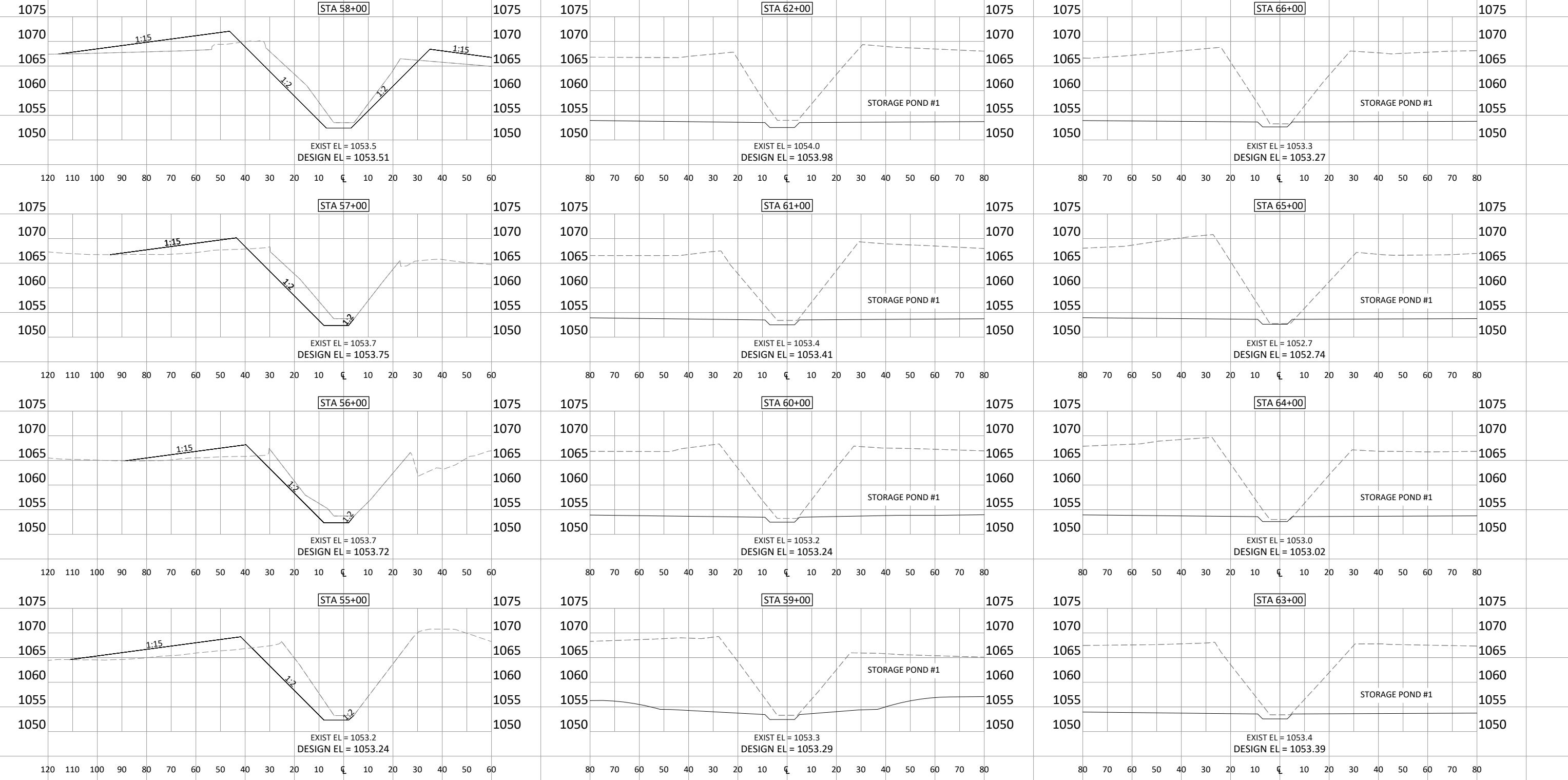
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**NOTE: STORAGE POND #1 - RIGHT & LEFT SIDES.  
SEE SHEETS IN SECTION C3.**



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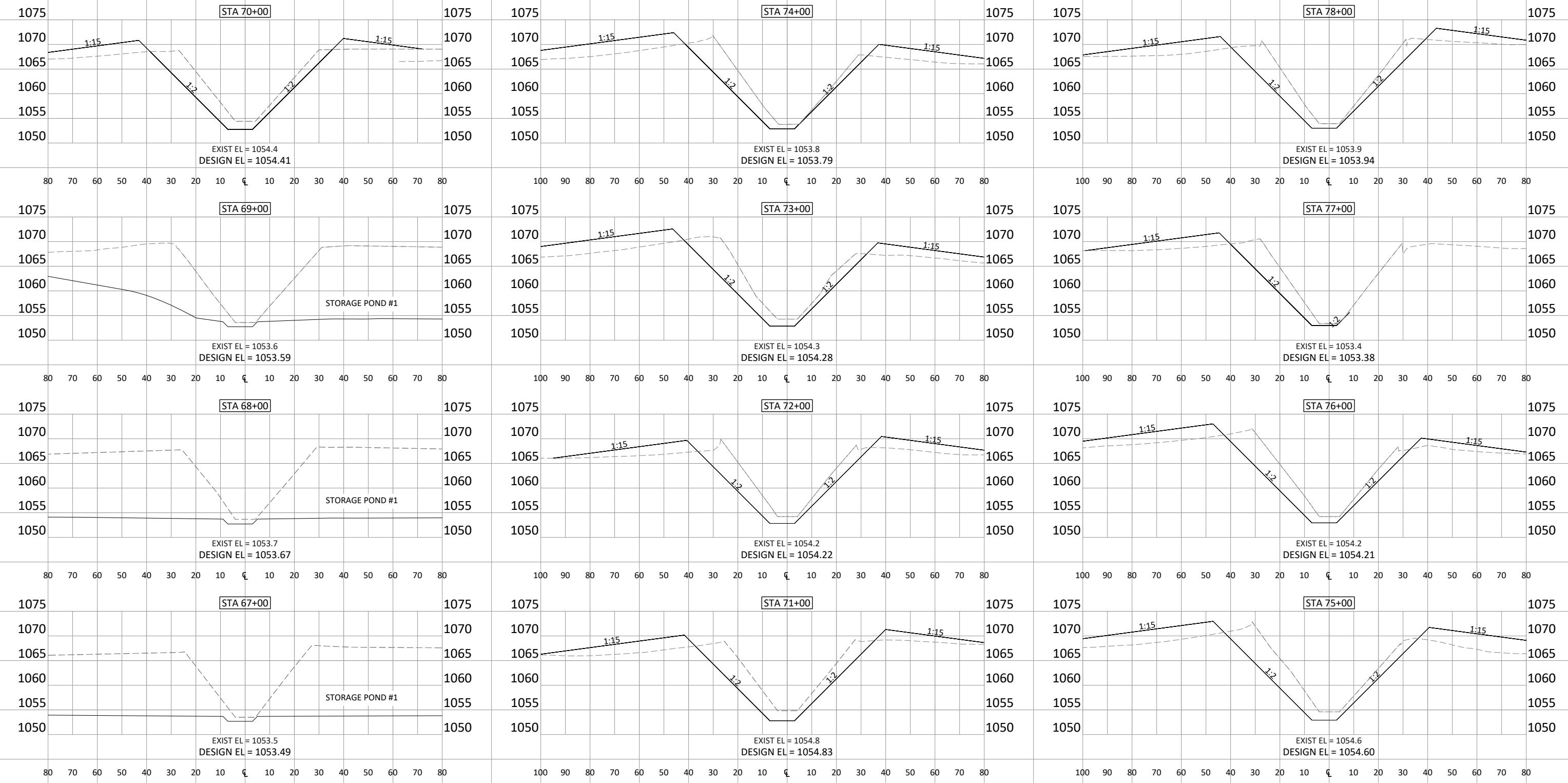
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SHEET  
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\*\* NOTE: TERSTEEG STORAGE POND - RIGHT & LEFT SIDES. SEE SHEETS IN SECTION C3.



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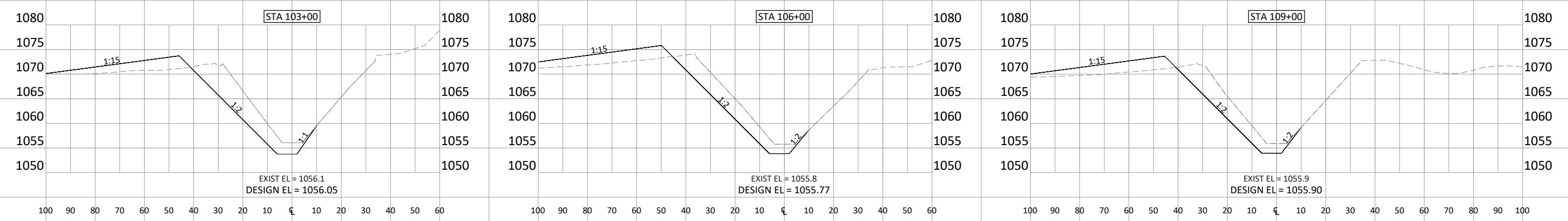
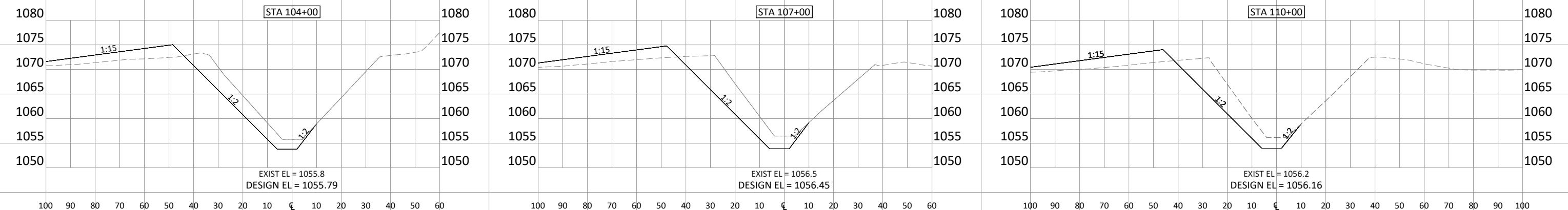
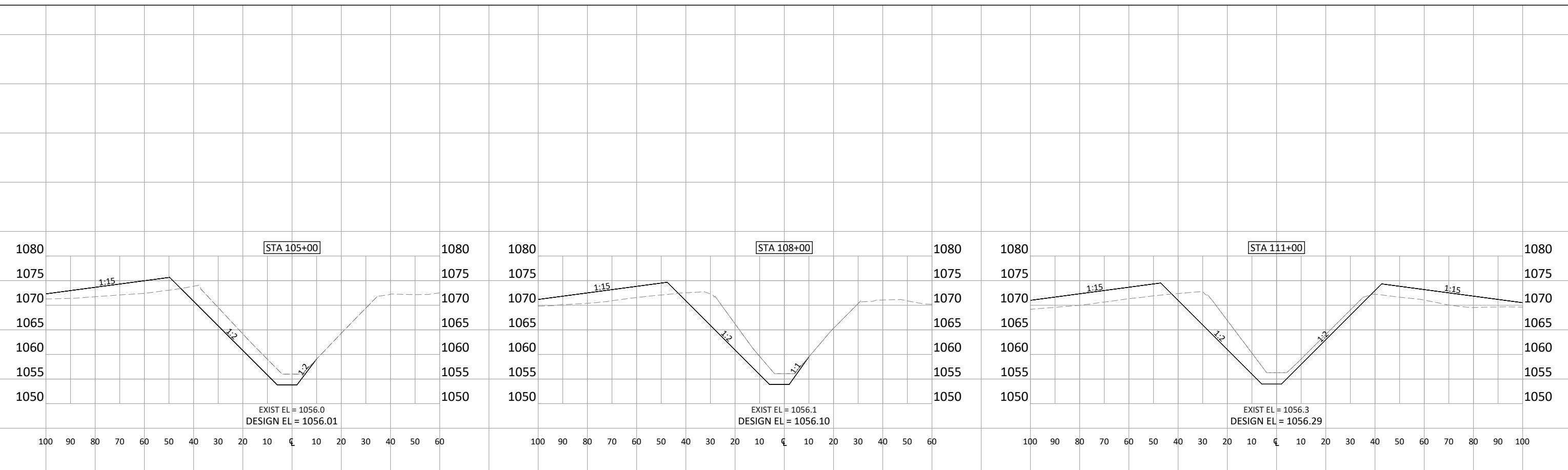
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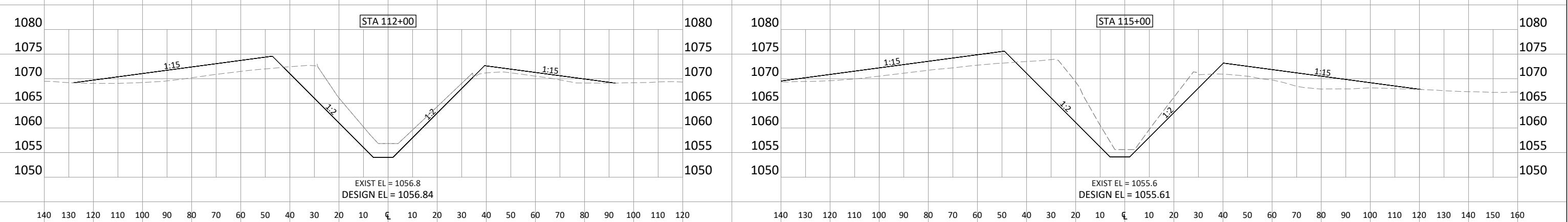
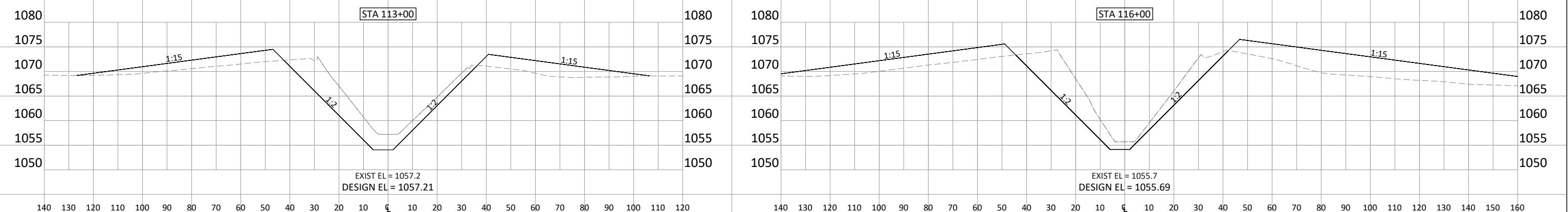
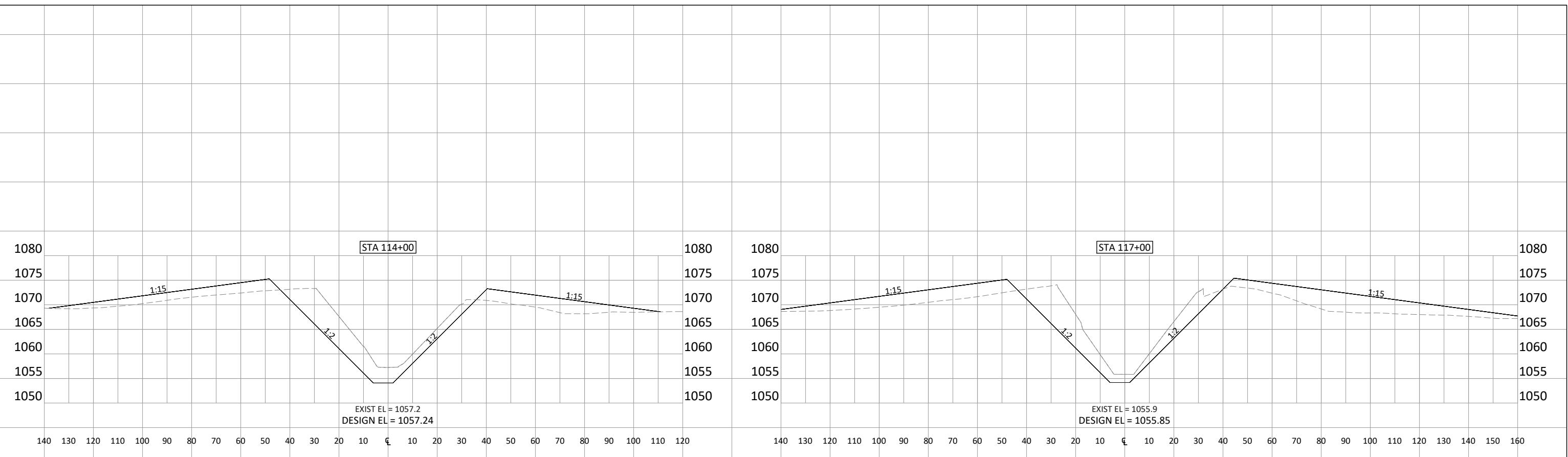
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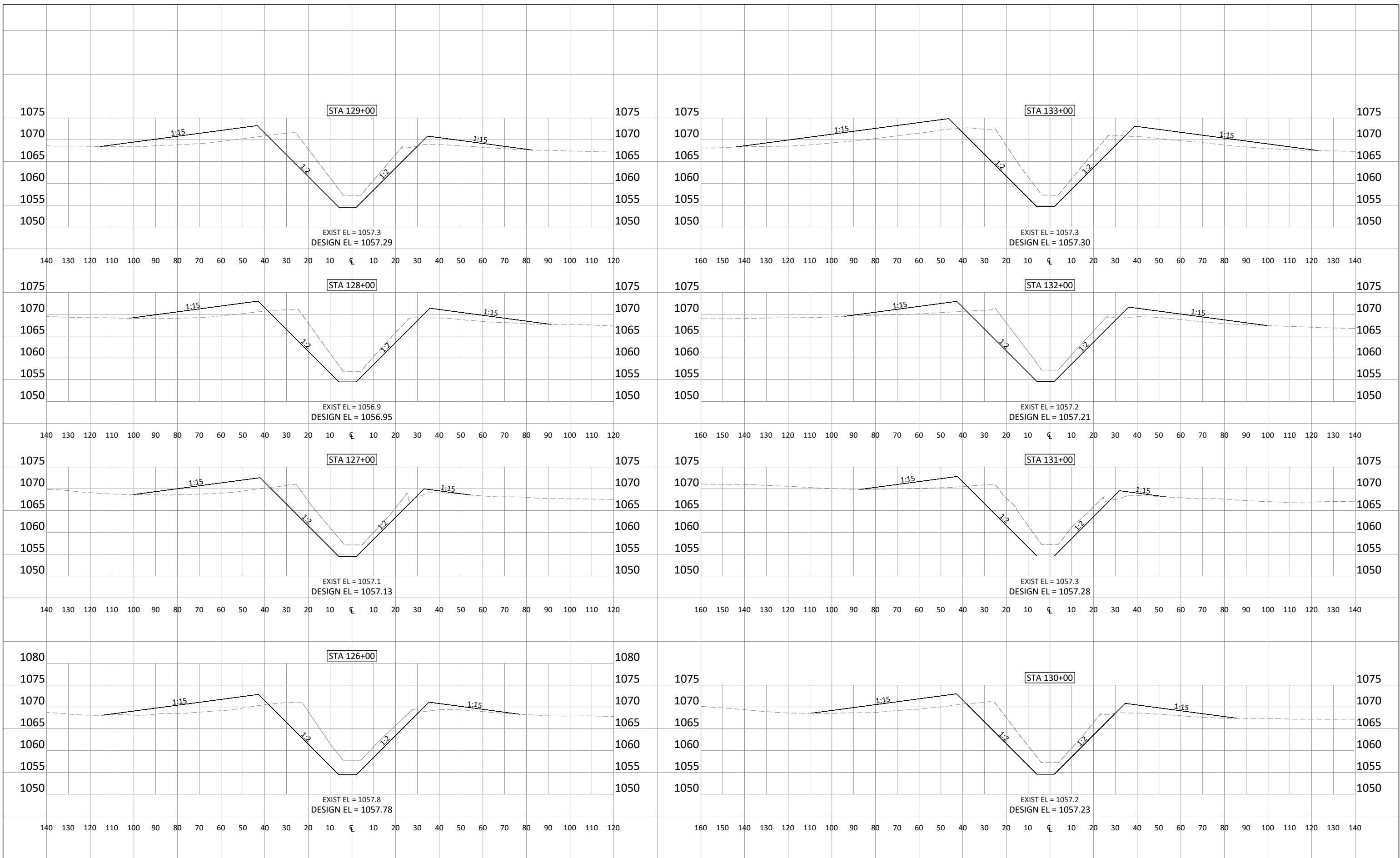
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VERT. 0 10 20  
SCALE FEET



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Email: SleepyEye@bolton-menk.com  
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DESIGNED  
SPL

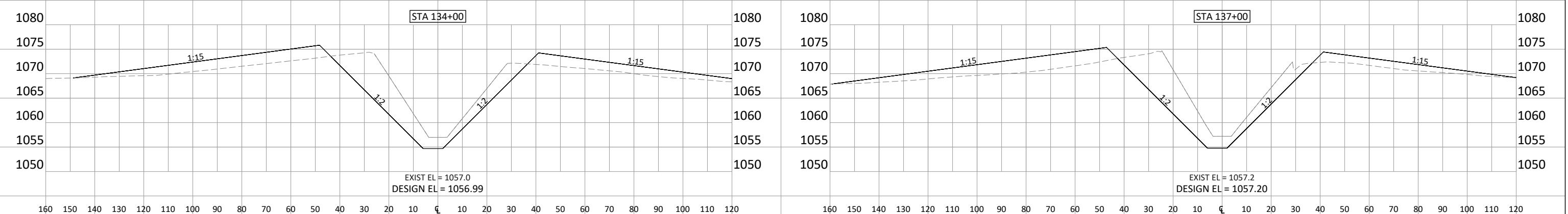
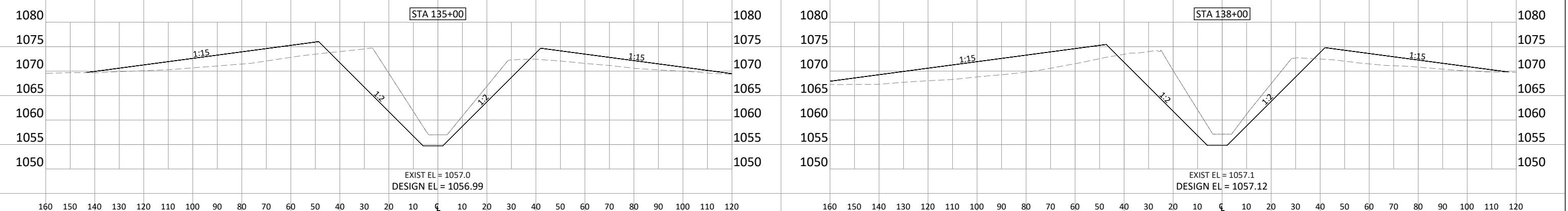
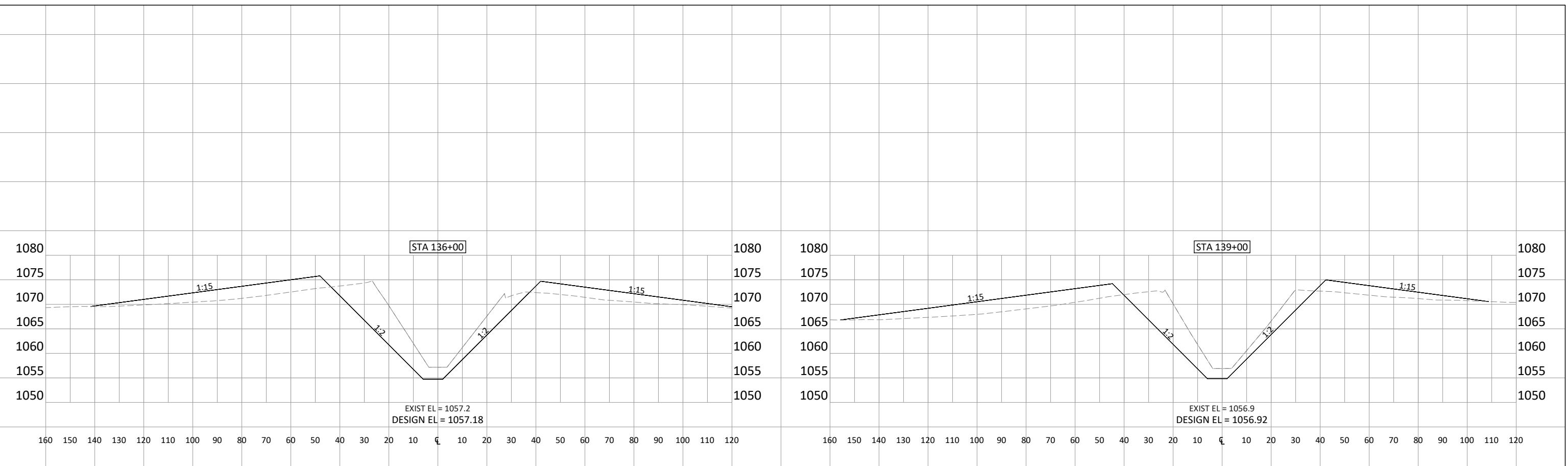
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SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

CROSS SECTIONS

SHEET  
C9.09



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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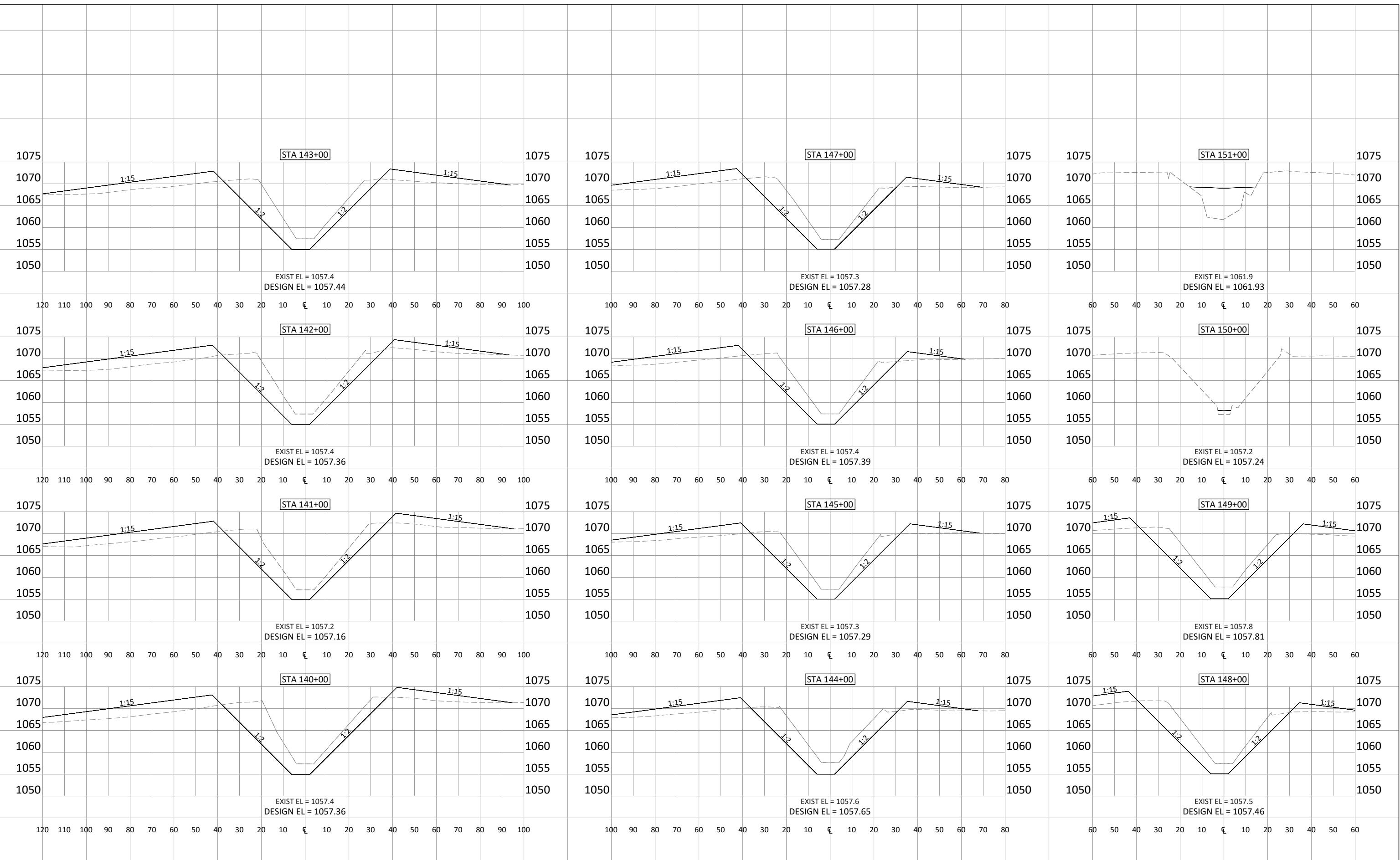
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
CROSS SECTIONS



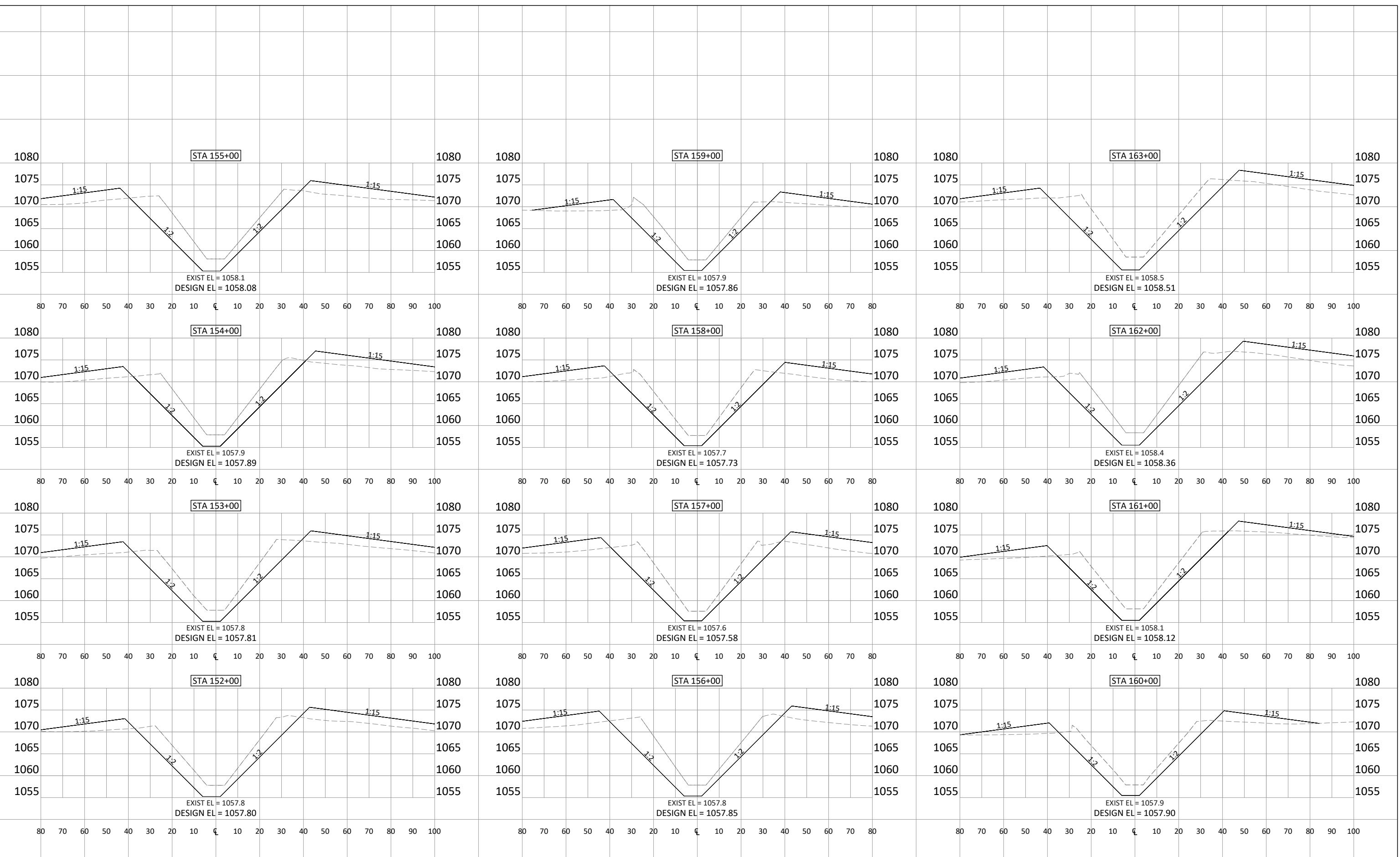
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.	.	.	
			<b>BILL L. HELGET, P.E.</b>
			Minneapolis, MN 55416

DESIGNED SPL	RENVILLE COUNTY, MINNESOTA
DRAWN SPL, sml	RENVILLE COUNTY DITCH No. 59 IMPROVEMENTS
CHECKED SPL, sml	CROSS SECTIONS

SHEET



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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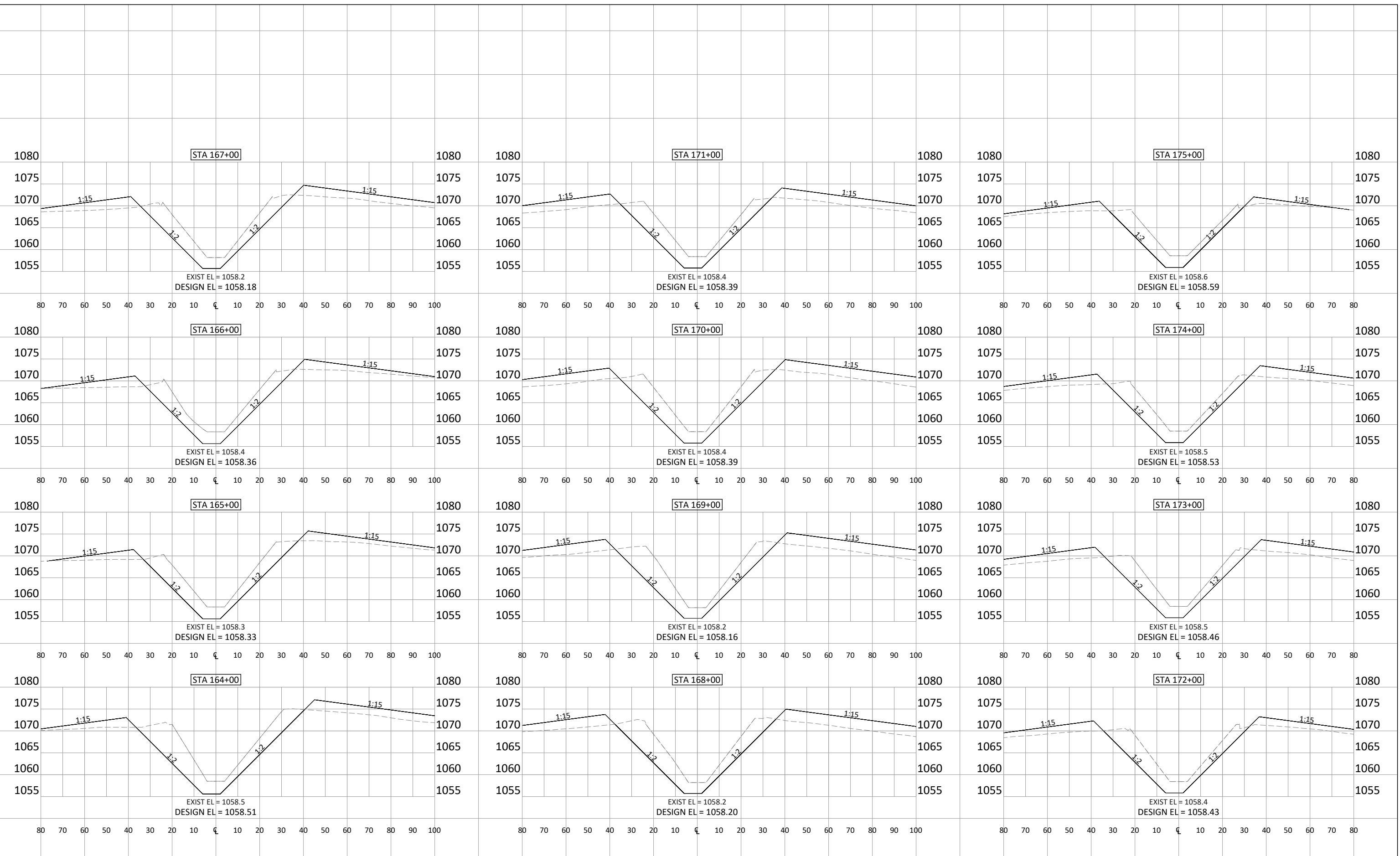
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SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

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RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
CROSS SECTIONS

SHEET  
**C9.12**



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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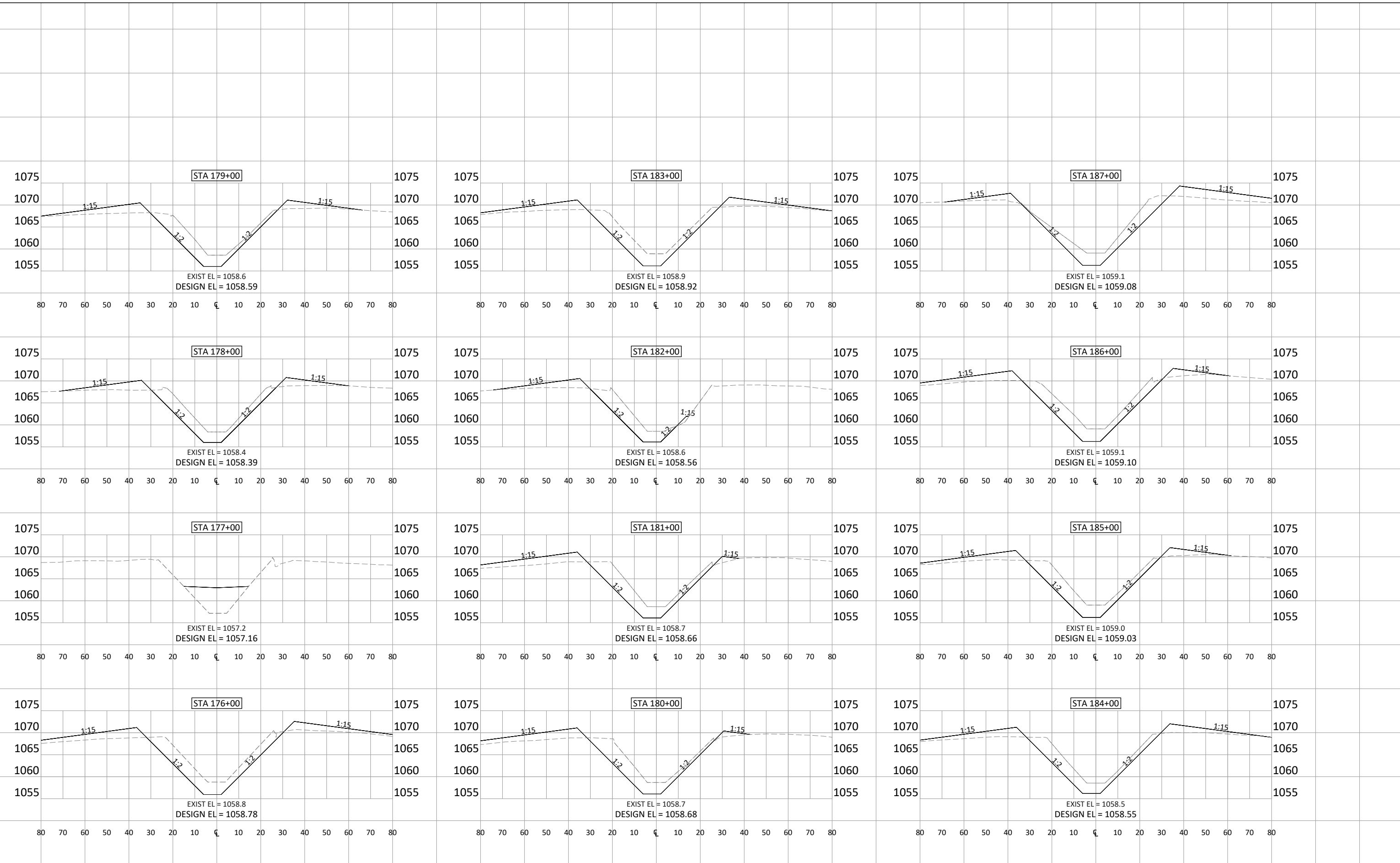
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
CROSS SECTIONS



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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SPL

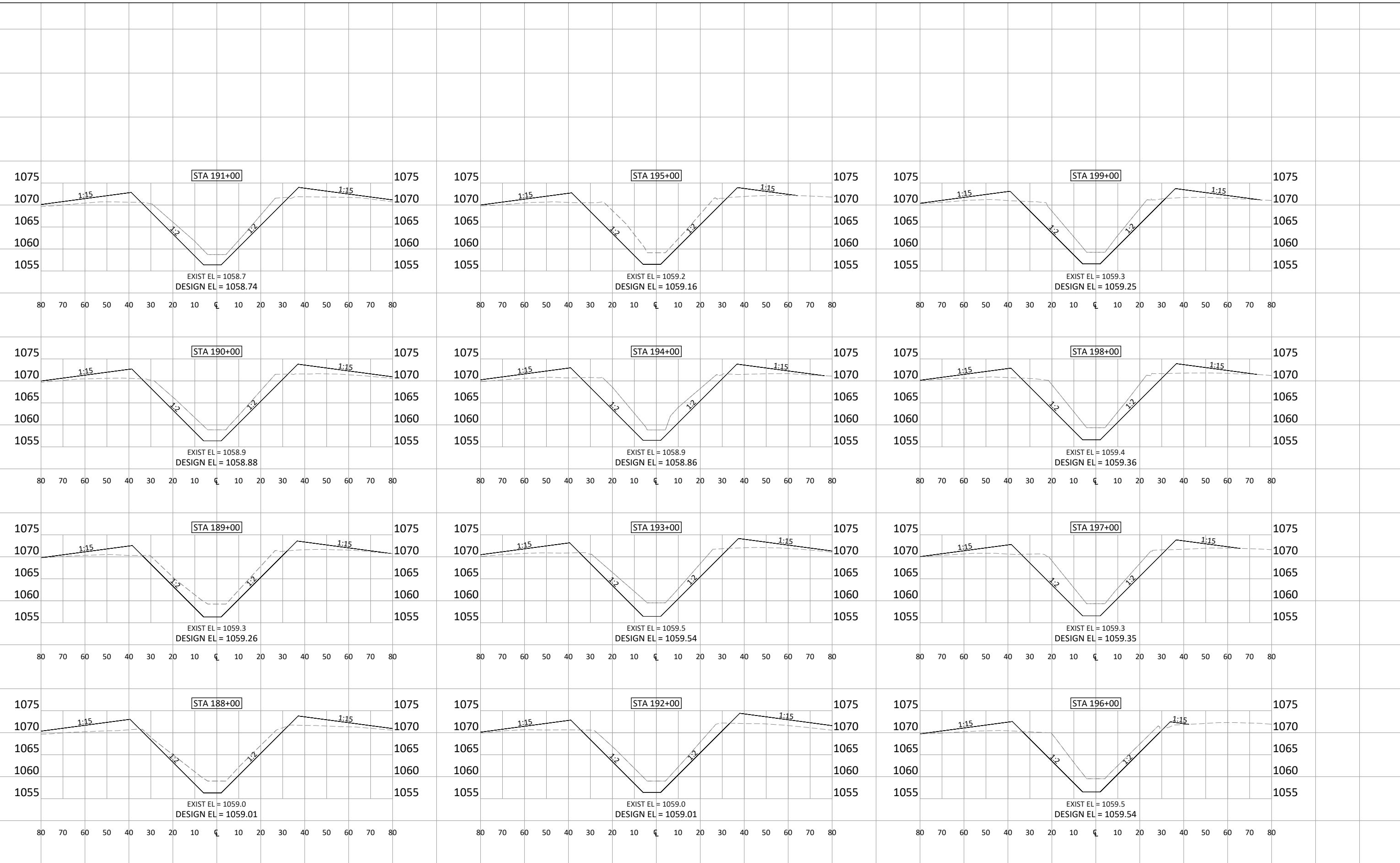
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SPL, sml

checked  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

CROSS SECTIONS

SHEET  
C9.14



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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DESIGNED

SPL

DRAWN

SPL, sml

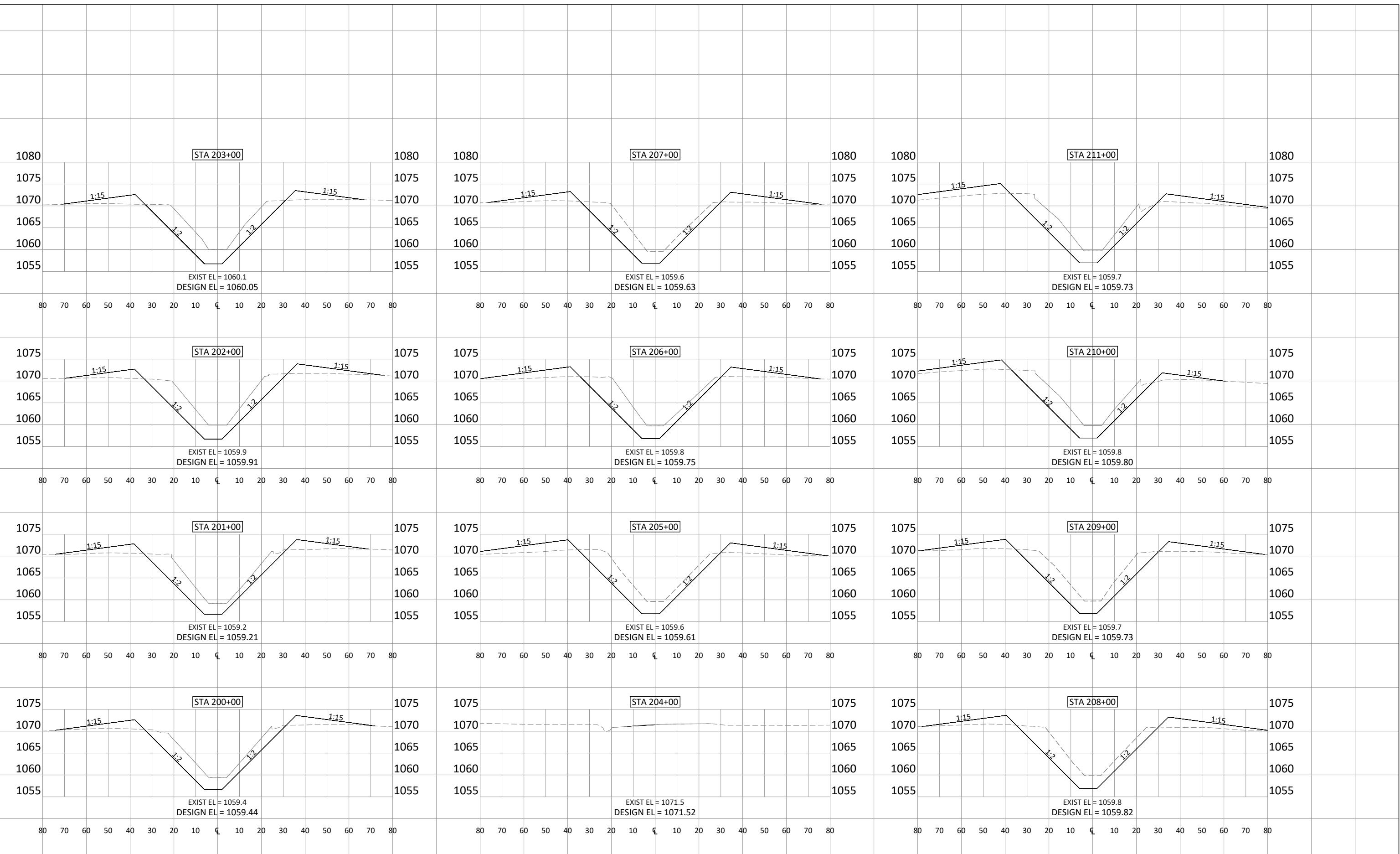
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SPL, BLH

RENNVILLE COUNTY, MINNESOTA

RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

CROSS SECTIONS



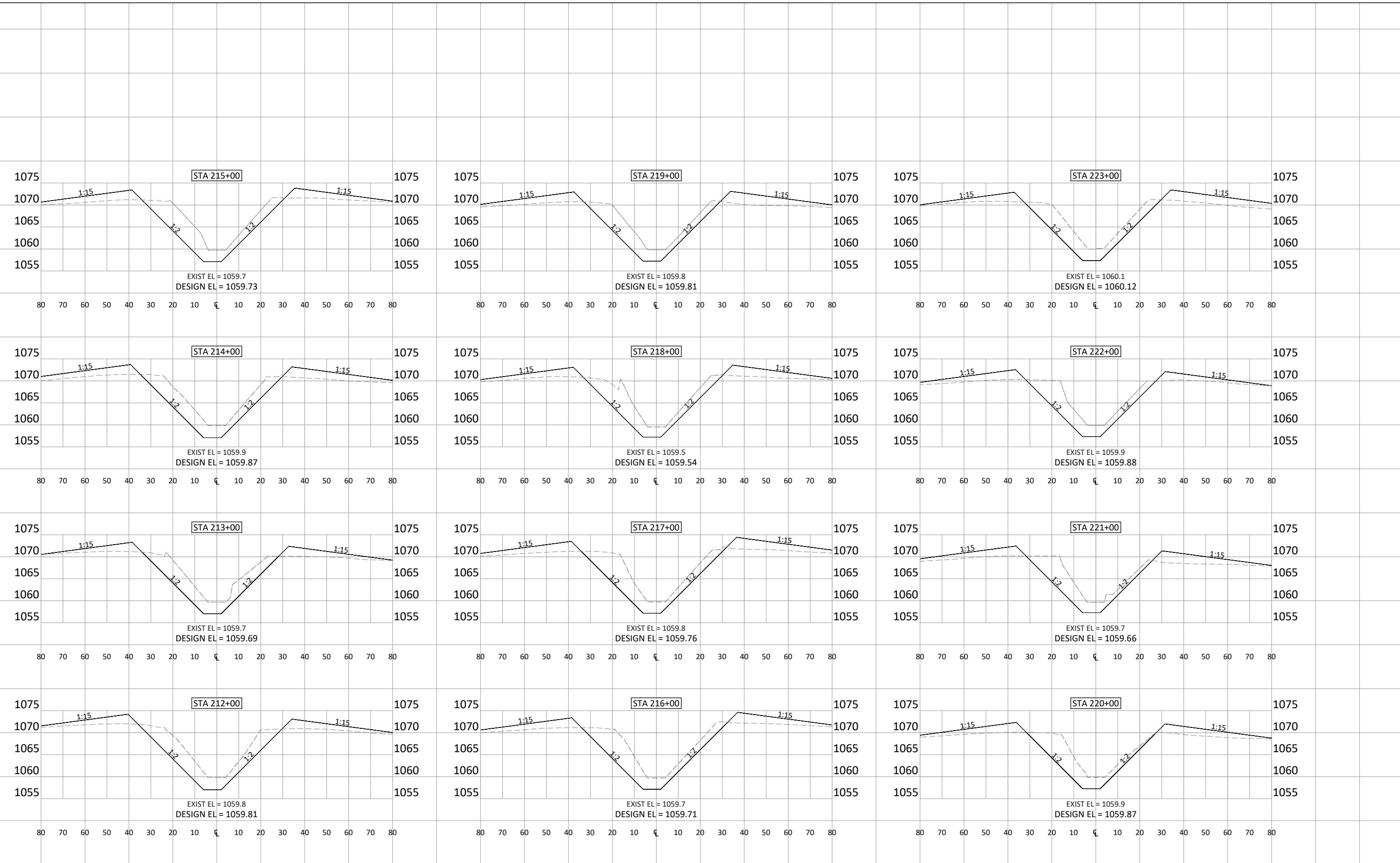
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A horizontal scale bar with numerical markings at 0 and 10. A vertical tick mark is positioned halfway between 0 and 10, corresponding to the value 5.

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**RENVILLE COUNTY DITCH No. 59 IMPROVEMENTS**  
**CROSS SECTIONS**

SHEET  
C9.16



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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ISSUED FOR

DATE

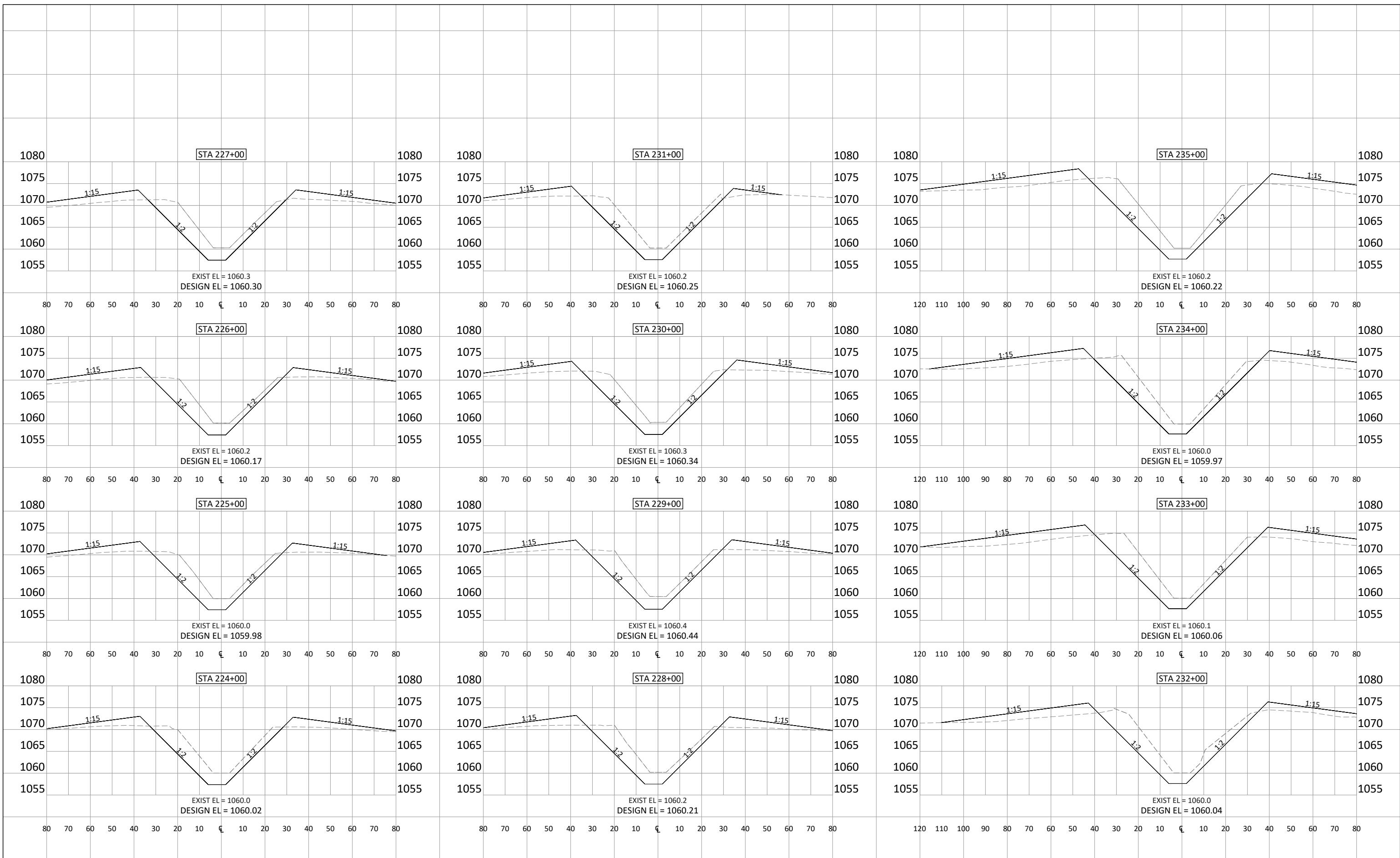
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
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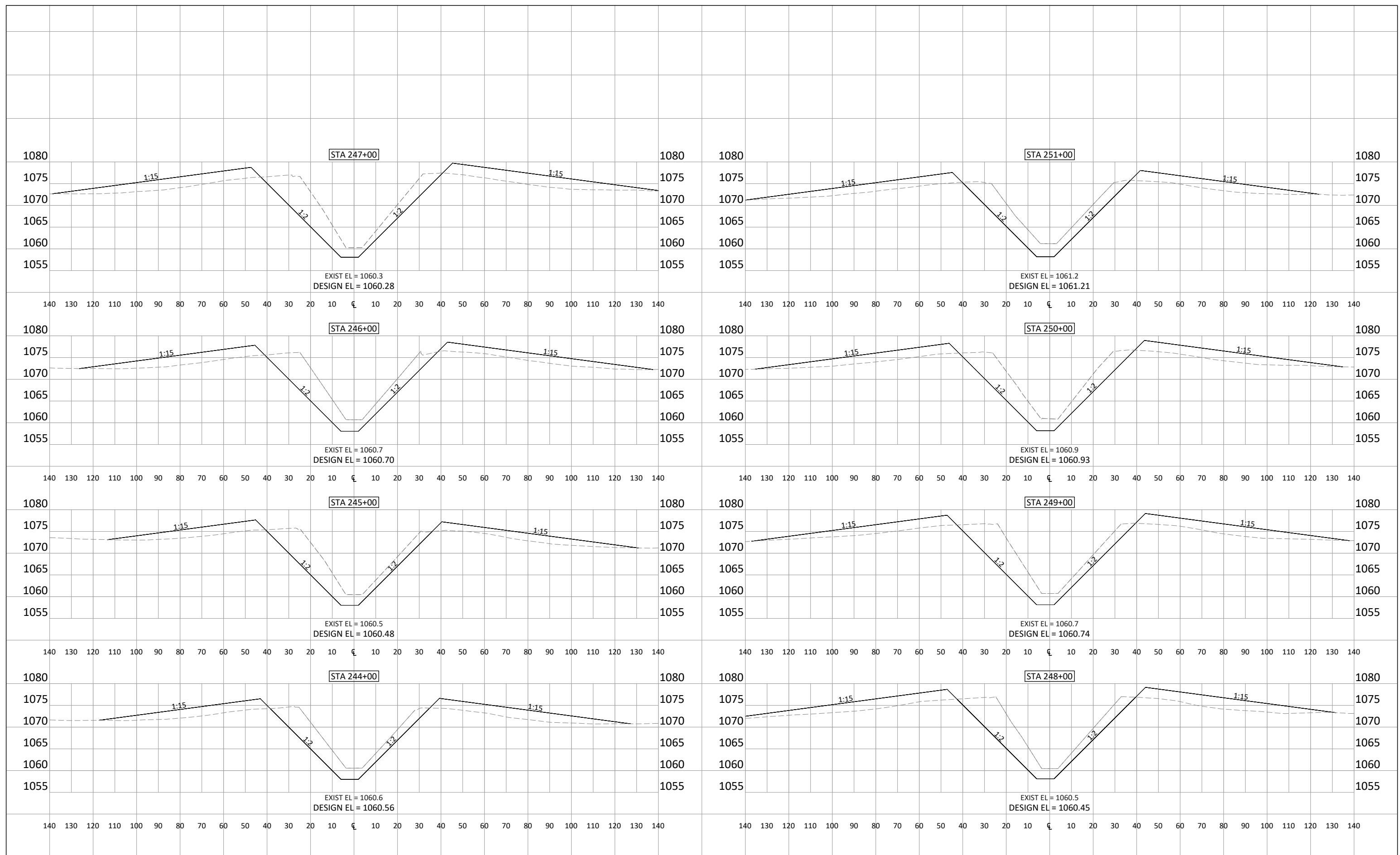
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A horizontal scale with numerical labels '0' and '10' at the ends. There are vertical tick marks along the scale, corresponding to each square of the 10x10 grid.

1243 CEDAR STREET NE SLEEPY EYE, MINNESOTA 56085 Phone: (507) 794-5541 Email: SleepyEye@bolton-menk.com www.bolton-menk.com	REV	ISSUED FOR	DATE	I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.	DESIGNED	RENNVILLE COUNTY, MINNESOTA	SHEET
					SPL	RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS	
				BILL L. HELGET, P.E.		CROSS SECTIONS	
				LIC. NO. 42046	DATE / /		
							C9.18

SHEET  
C9.18





HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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DATE

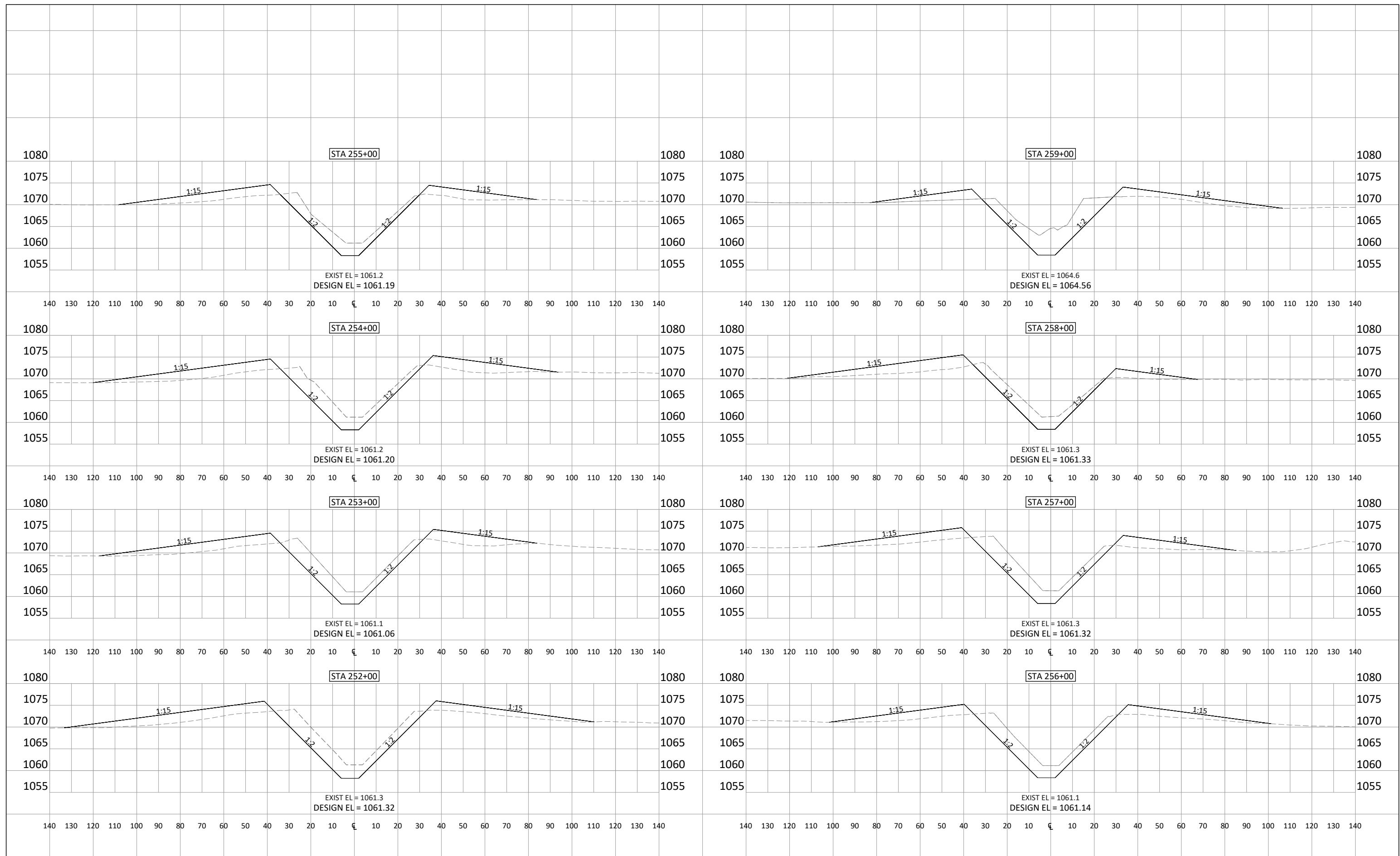
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
CROSS SECTIONS



HORZ.  
SCALE  
0 20 40  
FEET

VERT.  
SCALE  
0 10 20  
FEET



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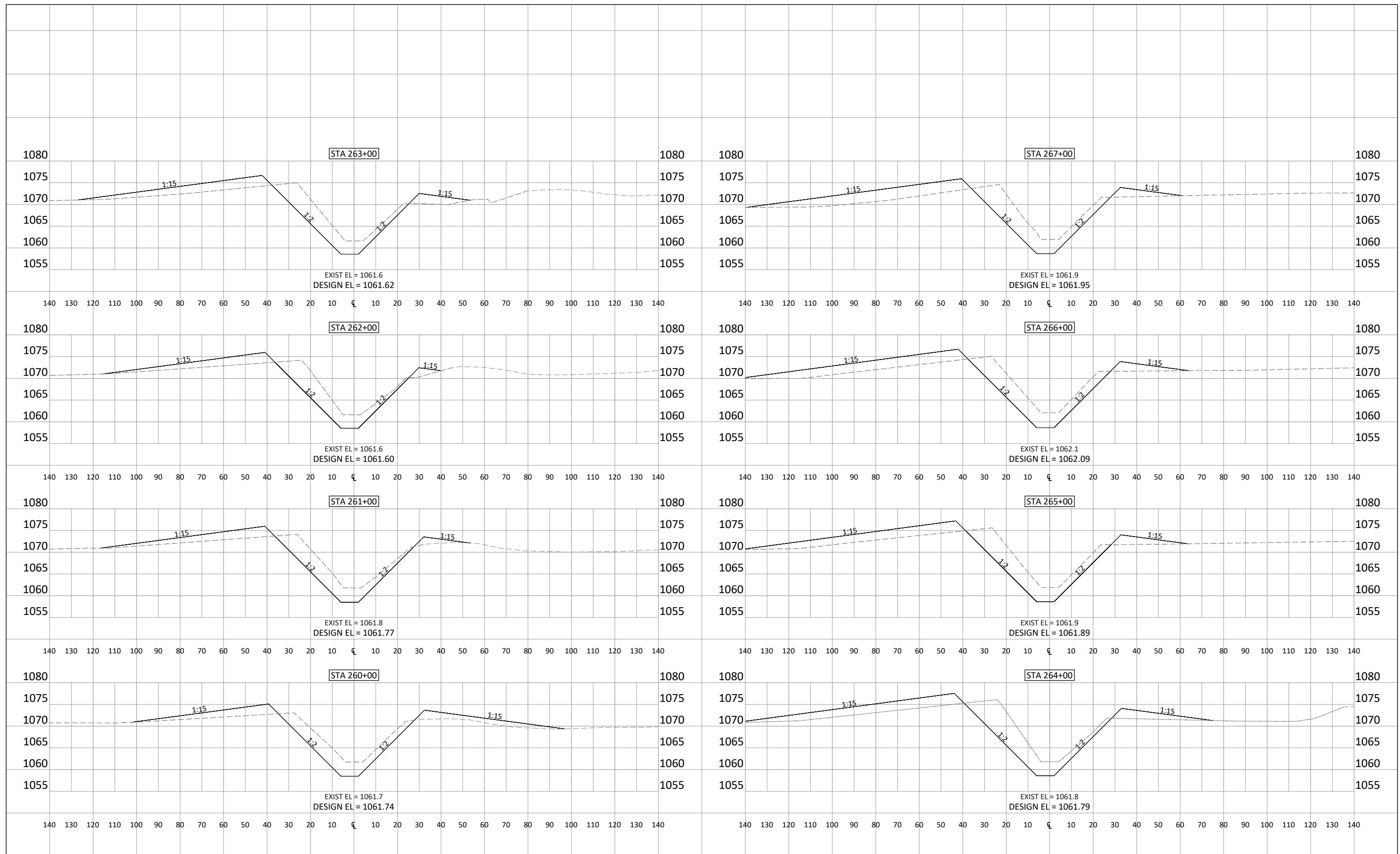
DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS  
CROSS SECTIONS

SHEET  
C9.21



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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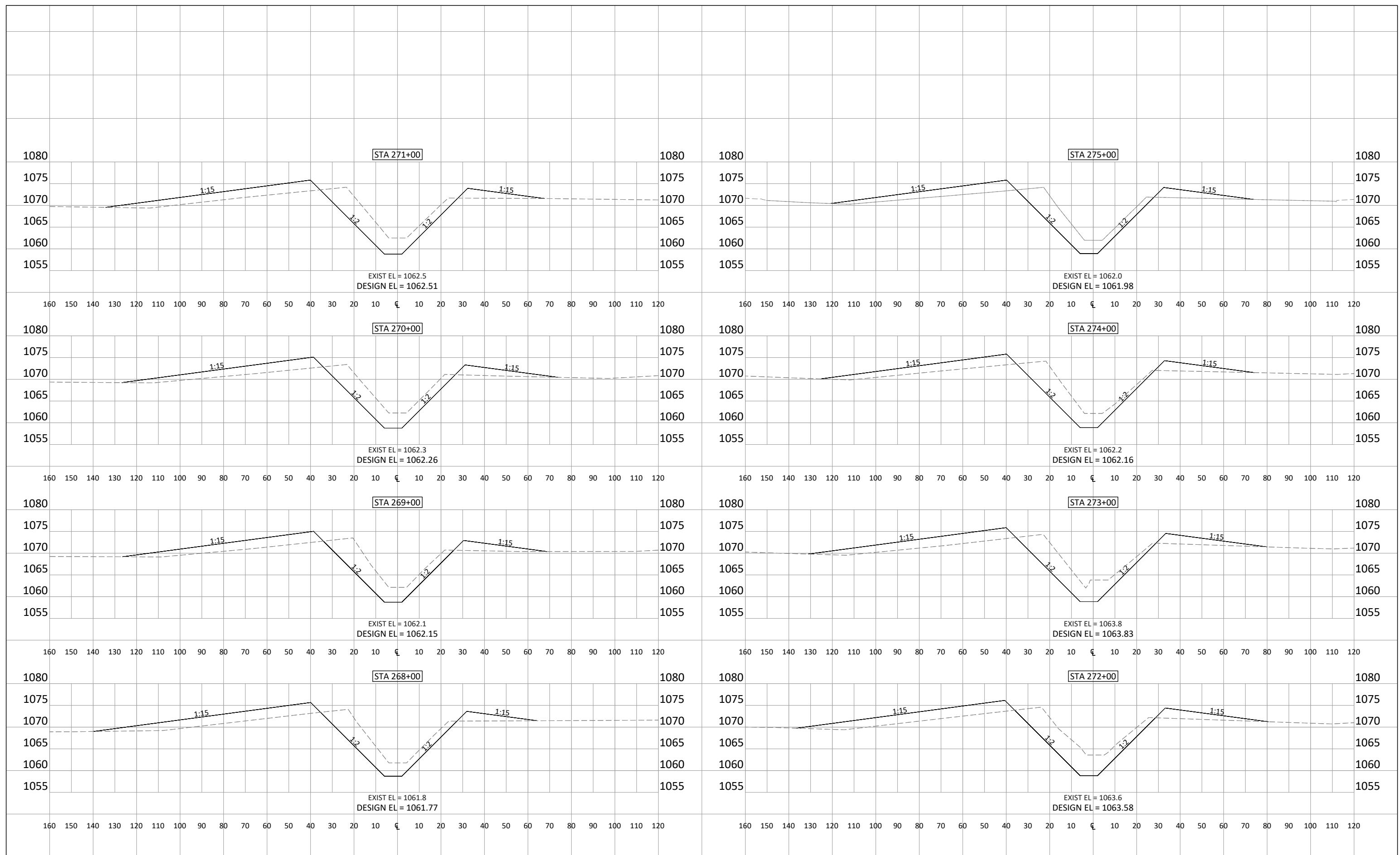
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
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CROSS SECTIONS



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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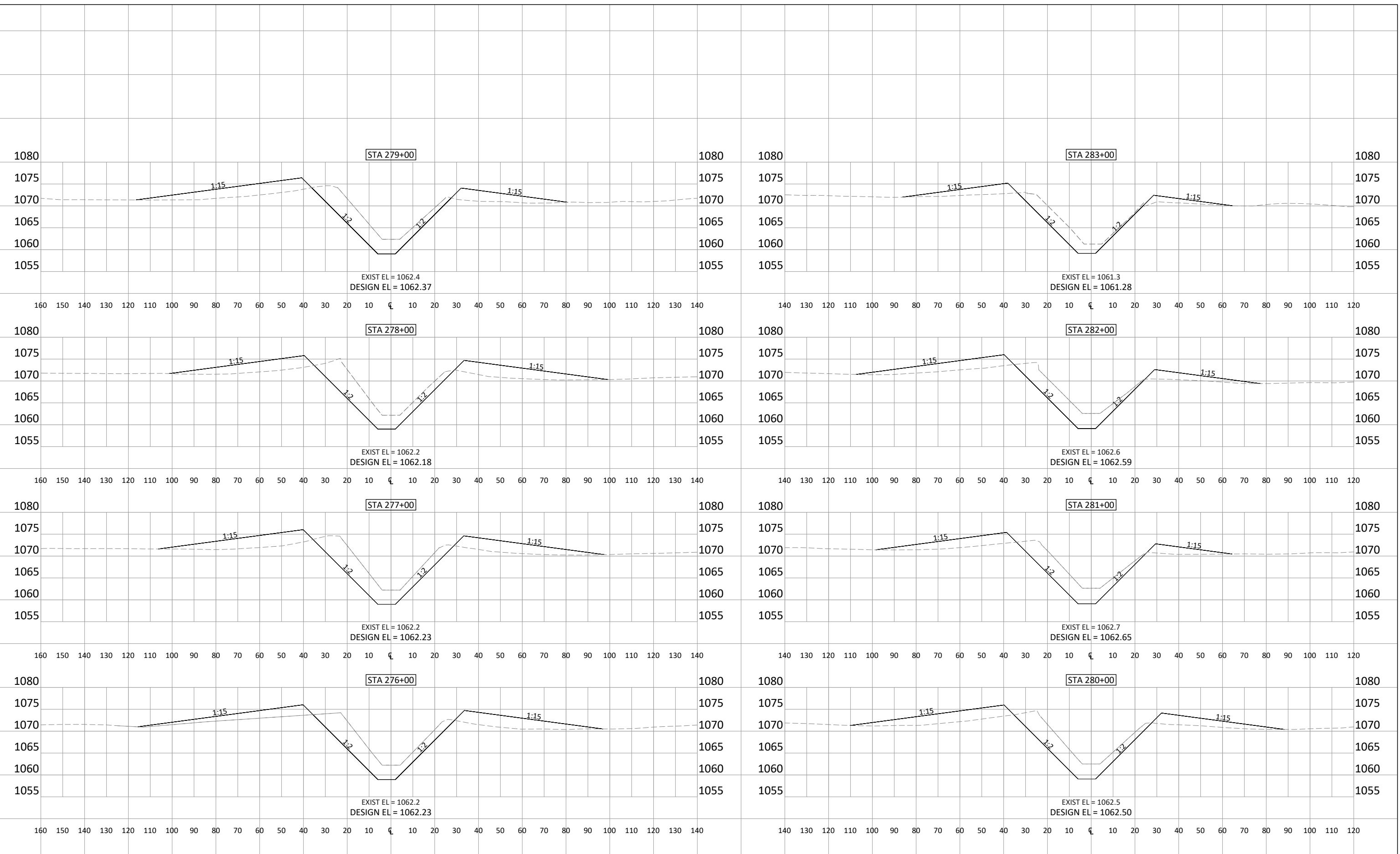
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
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CROSS SECTIONS



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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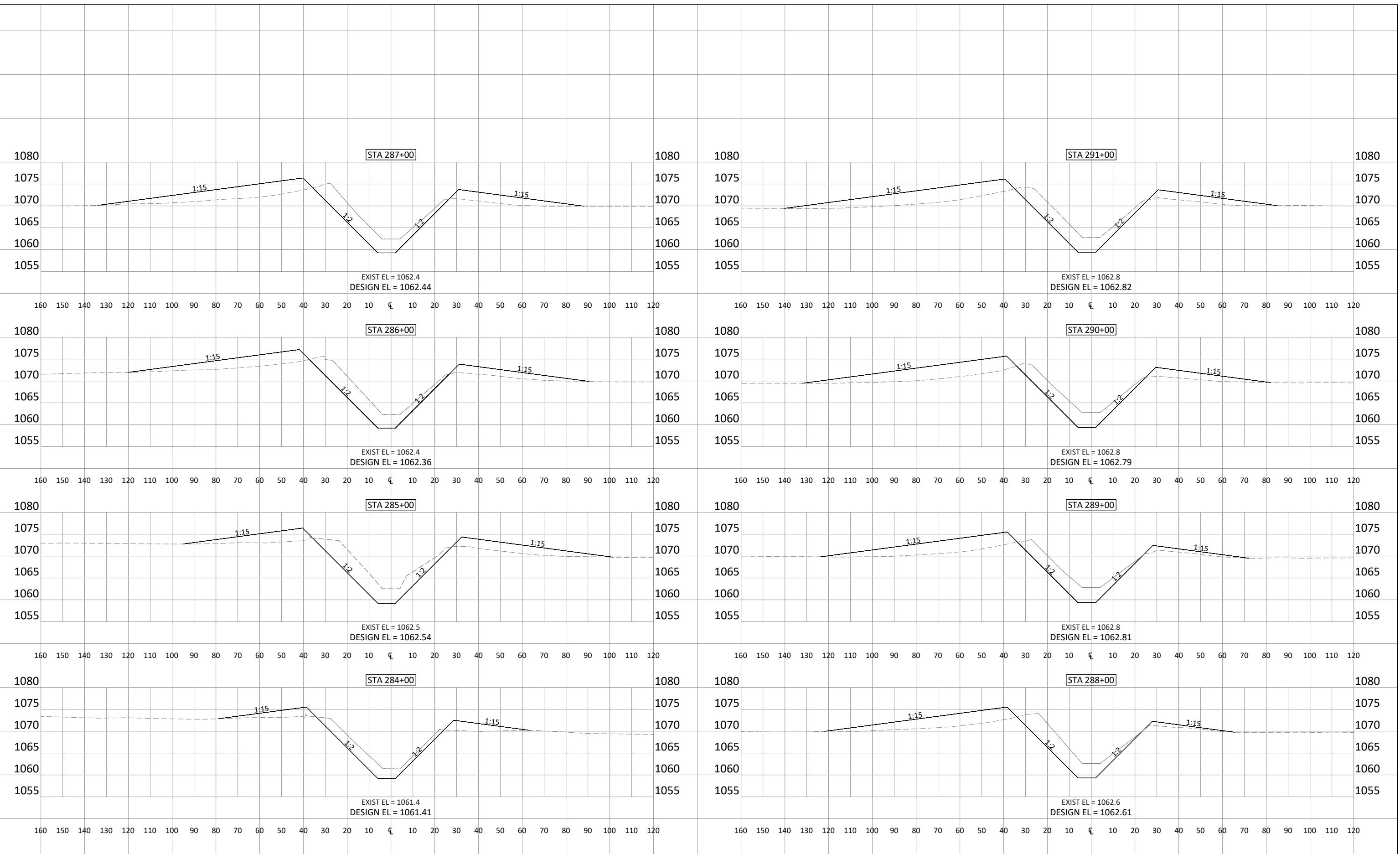
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DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

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HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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DESIGNED

SPL

DRAWN

SPL, sml

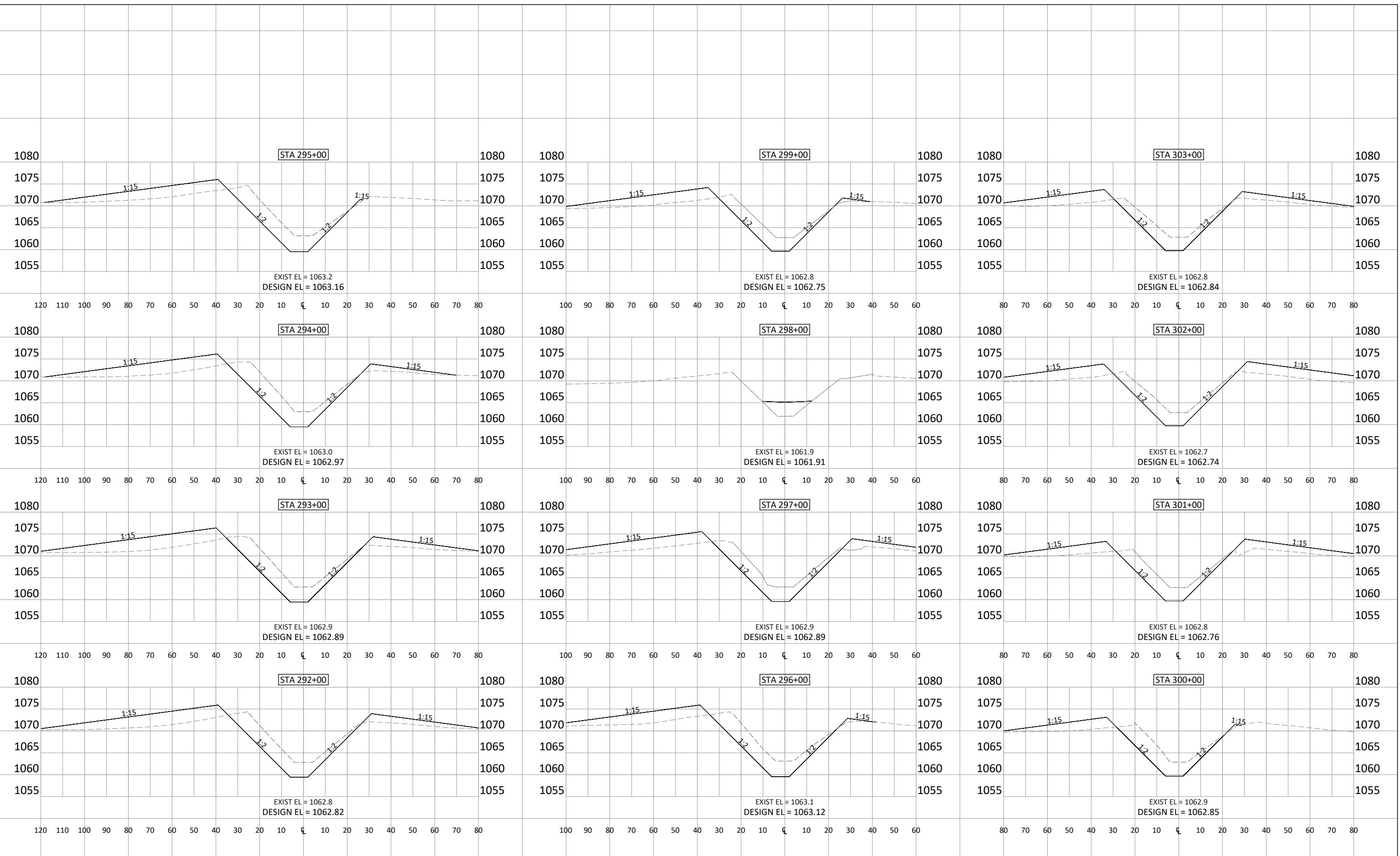
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SPL, BLH

RENNVILLE COUNTY, MINNESOTA  
RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

SHEET

C9.25



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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SPL

DRAWN

SPL, sml

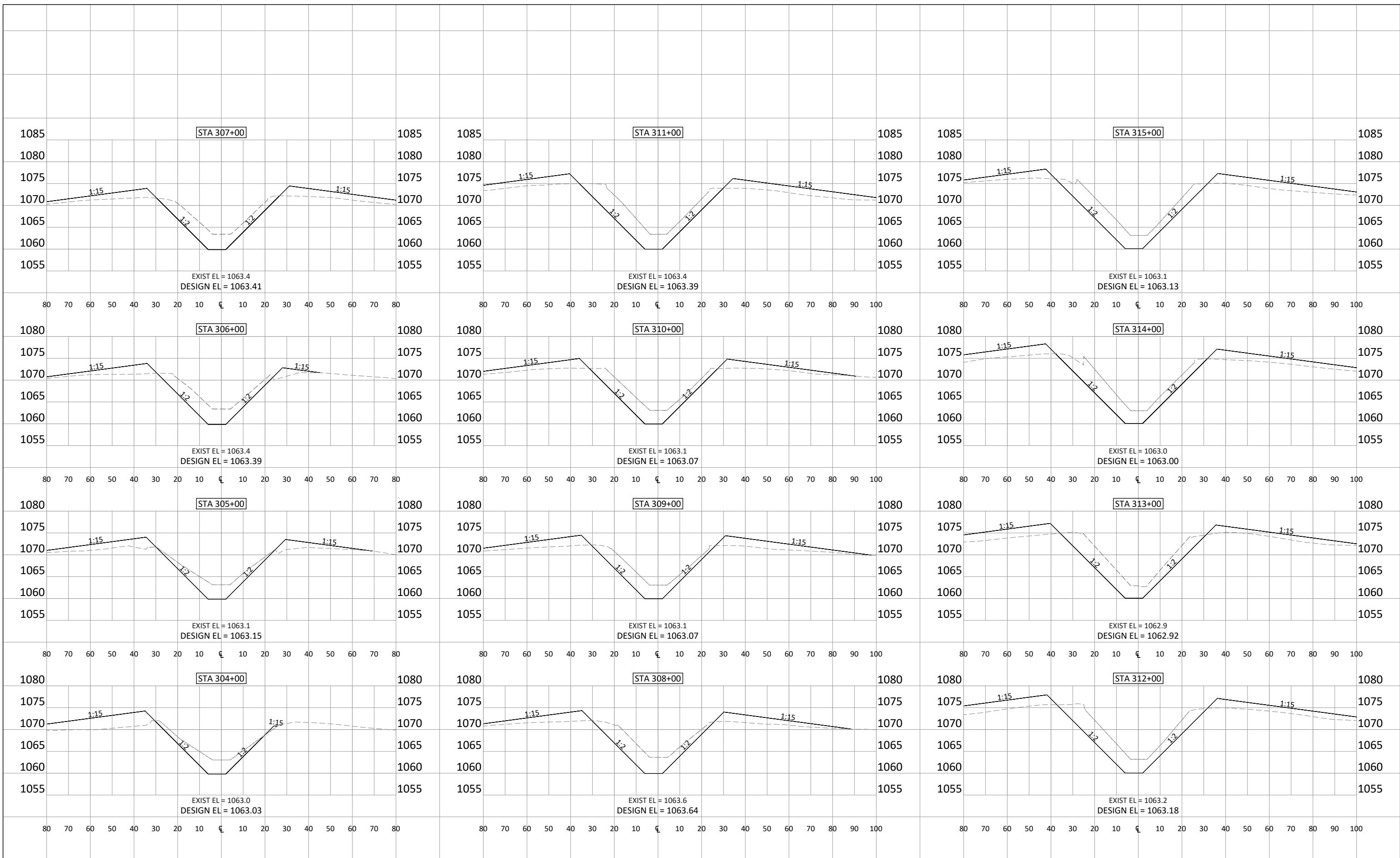
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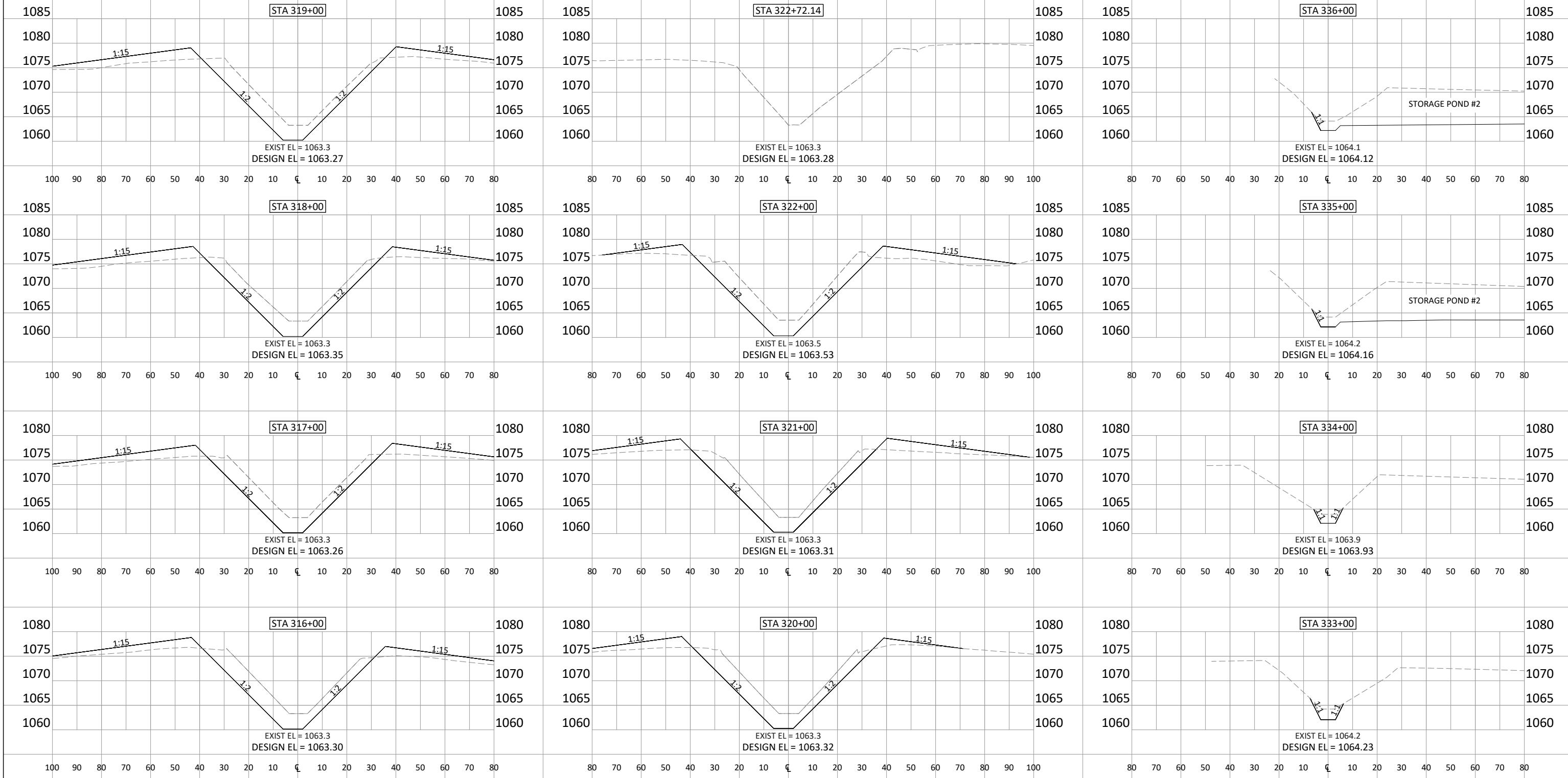
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A horizontal scale bar with numerical markings at 0 and 10. A vertical tick mark is positioned at the 0 mark.

**RENVILLE COUNTY, MINNESOTA**  
**RENVILLE COUNTY DITCH No. 59 IMPROVEMENT**  
**CROSS SECTIONS**

SHEET  
C9.27

\*\* NOTE: STORAGE POND #2- RIGHT SIDE ONLY.  
SEE SHEETS IN SECTION C3.



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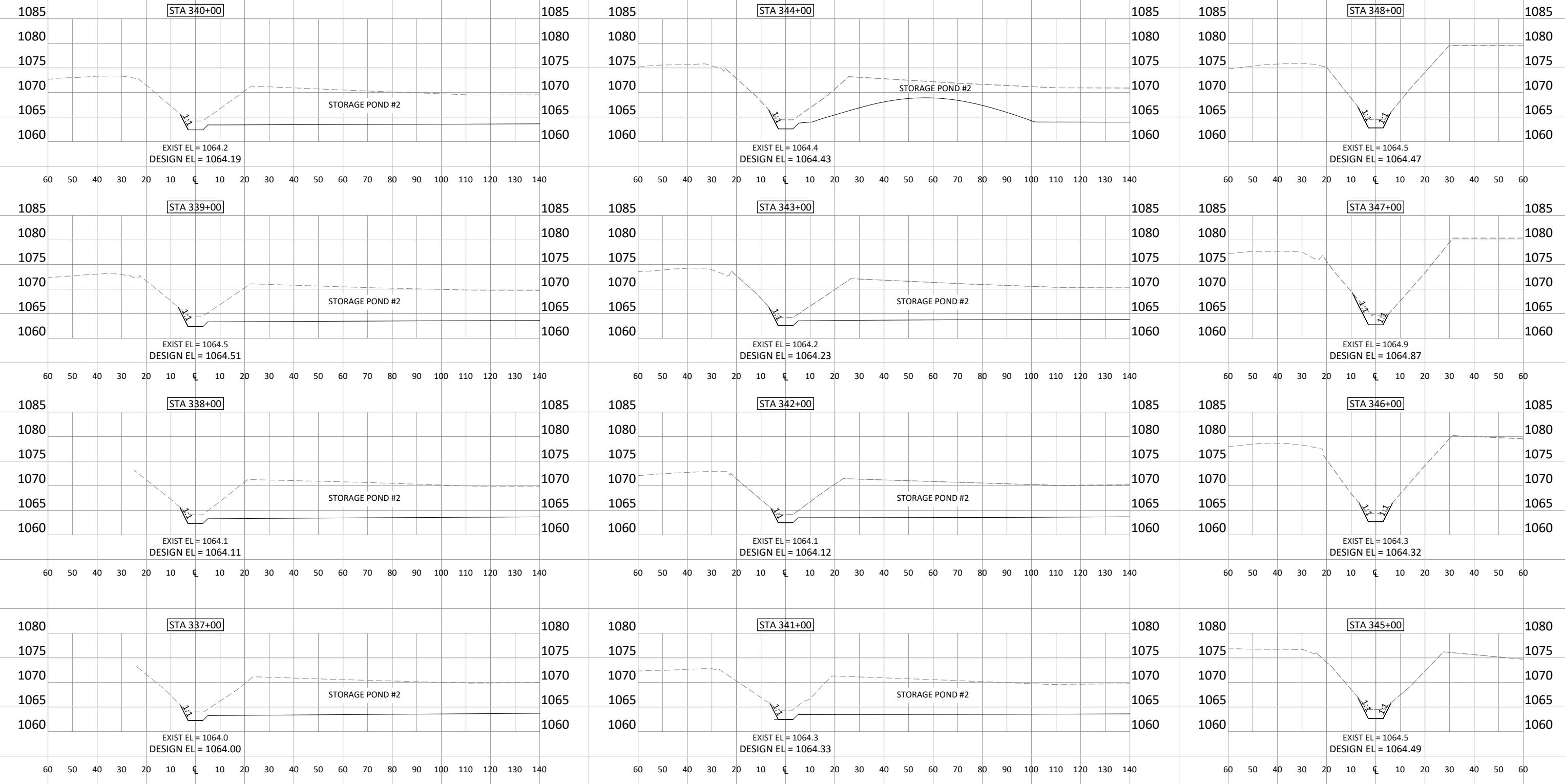
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.	.	.	
			<b>BILL L. HELGET, P.E.</b>
			4246

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**RENVILLE COUNTY DITCH No. 59 IMPROVEMENTS**  
**CROSS SECTIONS**

SHEET  
C9.28

\*\* NOTE: STORAGE POND #2- RIGHT SIDE ONLY.  
SEE SHEETS IN SECTION C3.



HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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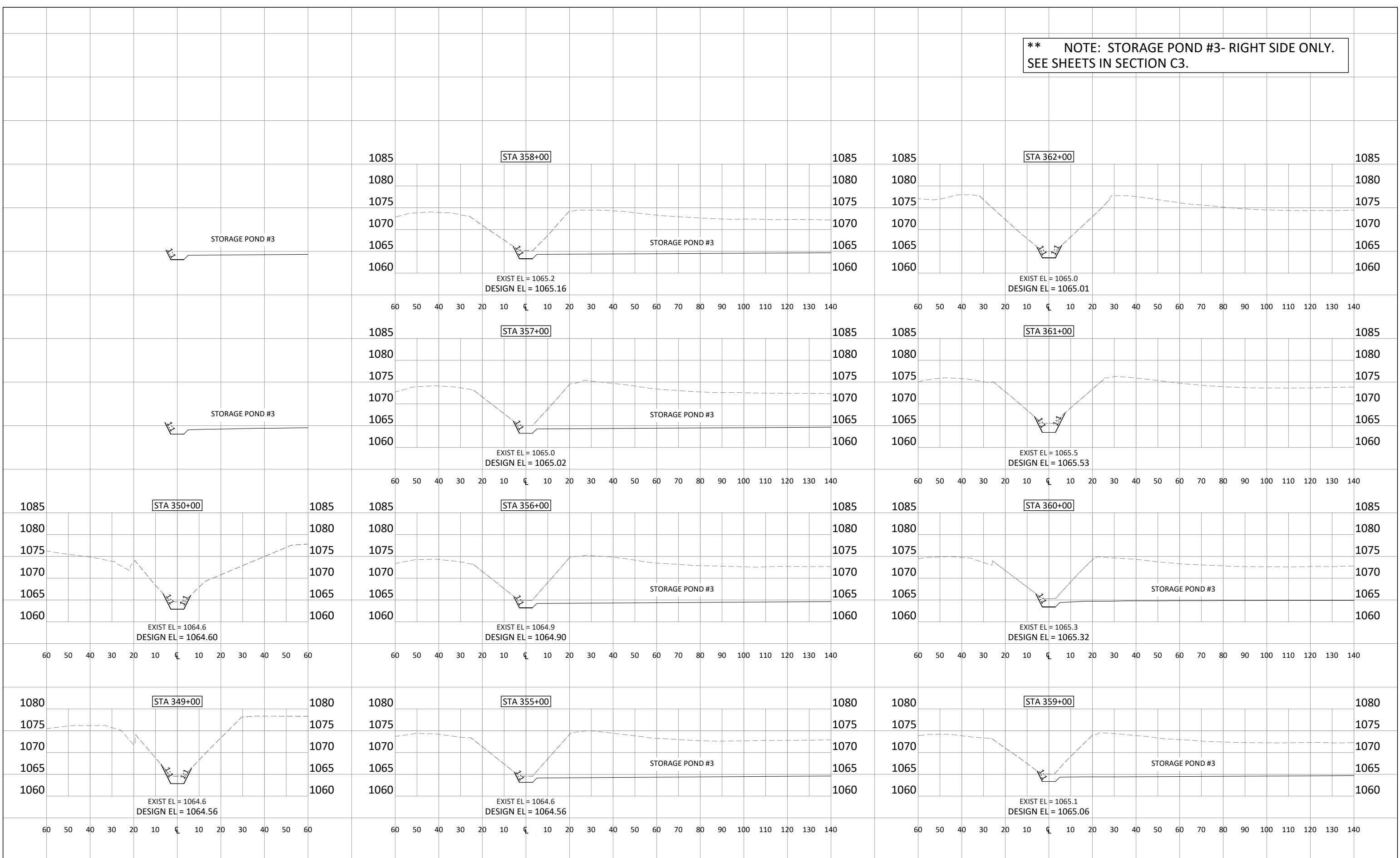
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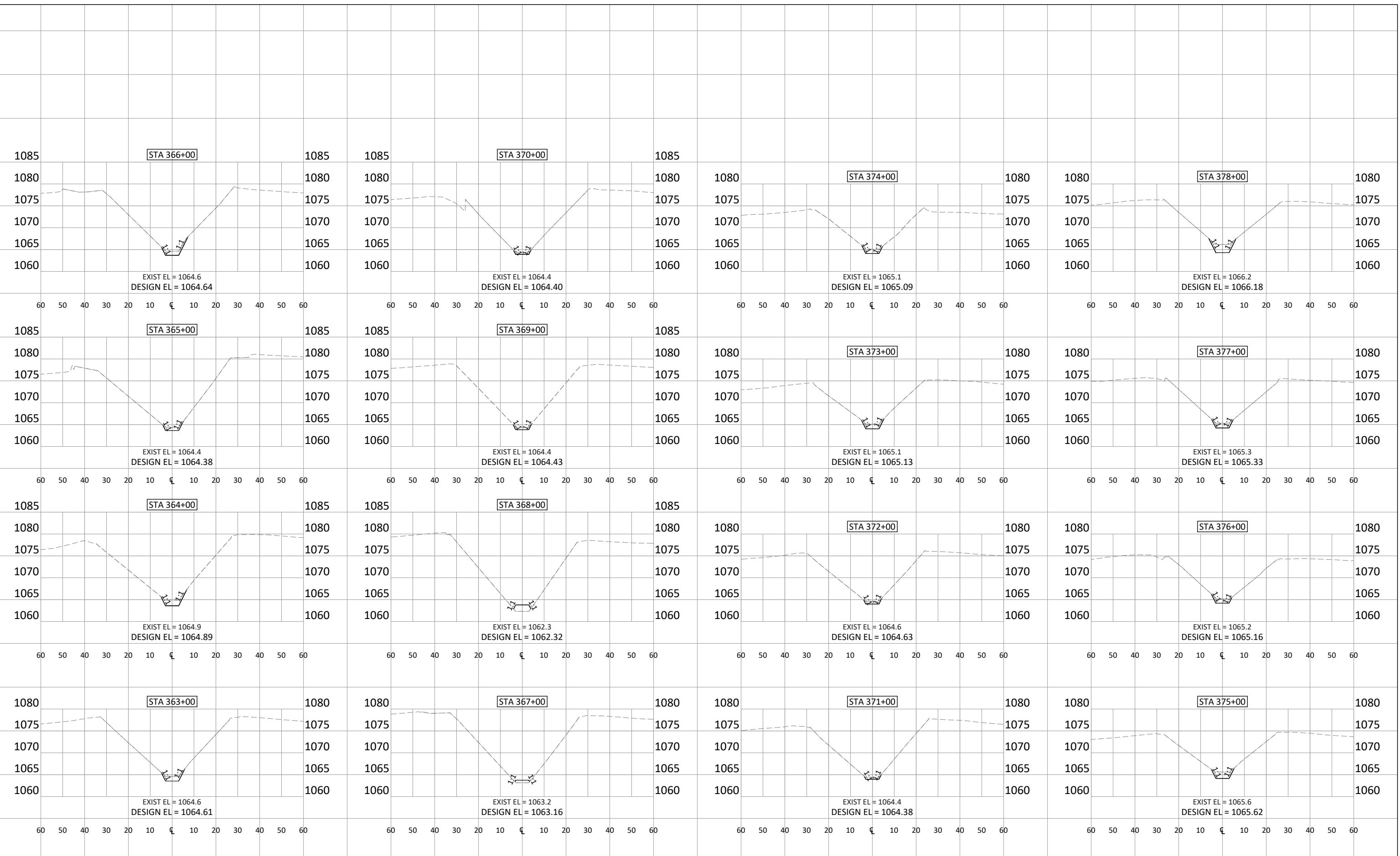
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DESIGNED SPL	RENNVILLE COUNTY, MINNESOTA	
DRAWN SPL, sml	RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS	
CHECKED SPL, BLH	CROSS SECTIONS	

BILL L. HELGET, P.E.  
LIC. NO. 42046 DATE / /

\*\* NOTE: STORAGE POND #3- RIGHT SIDE ONLY.  
SEE SHEETS IN SECTION C3.





HORZ. 0 20 40  
SCALE FEET

VERT. 0 10 20  
SCALE FEET



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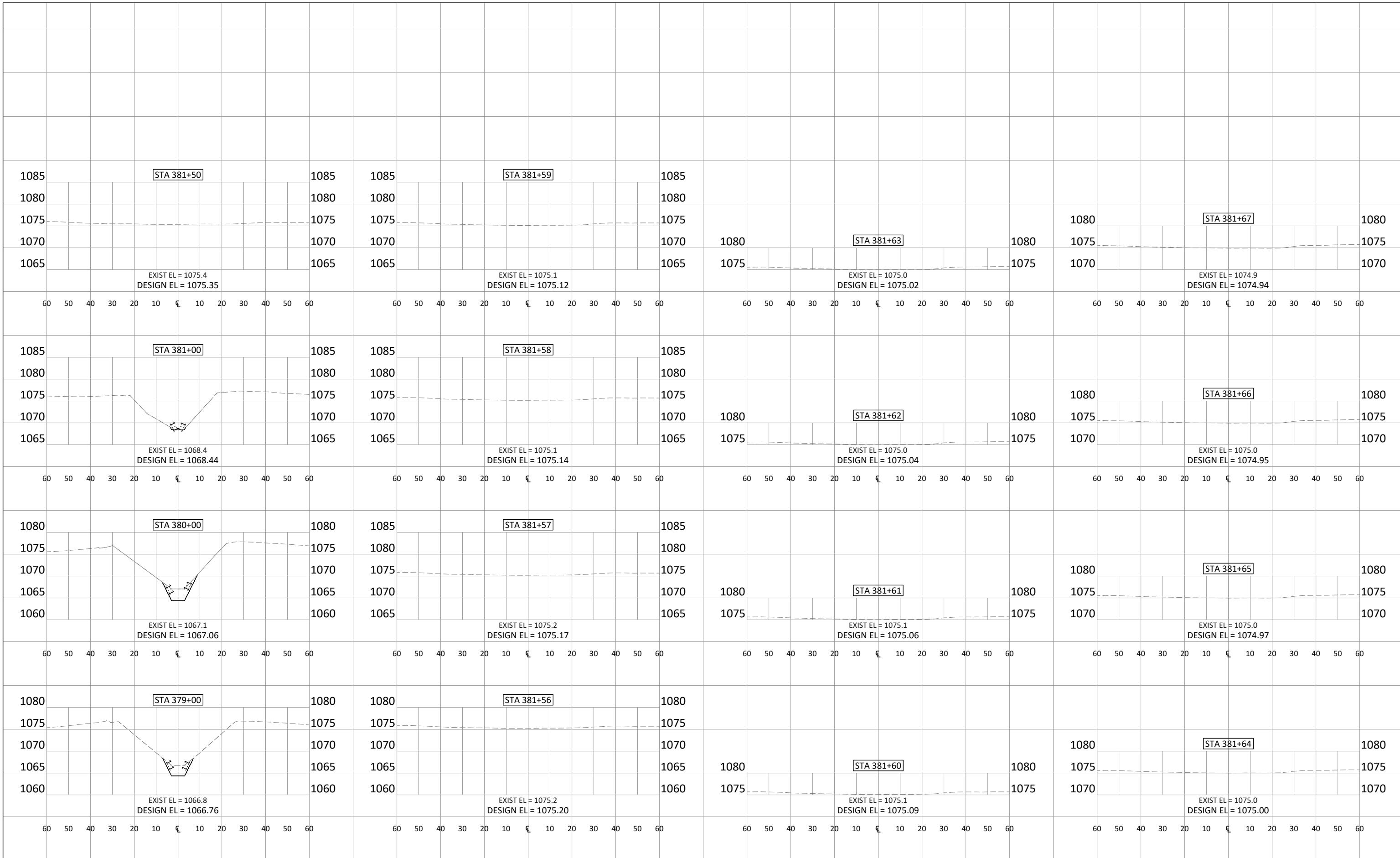
DESIGNED  
SPL

DRAWN  
SPL, sml

CHECKED  
SPL, BLH

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RENNVILLE COUNTY DITCH No. 59 IMPROVEMENTS

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.	.	.	
			<b>BILL L. HELGET, P.E.</b>
			4246

**RENVILLE COUNTY, MINNESOTA**  
**RENVILLE COUNTY DITCH No. 59 IMPROVEMENTS**  
**CROSS SECTIONS**

SHEET  
C9.32

## EXHIBIT 2: PETITION FOR CD 59 IMPROVEMENT

**STATE OF MINNESOTA  
COUNTY OF RENVILLE**

In Re:

Renville County Ditch No. 59,  
Renville County, Minnesota.

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**PETITION FOR IMPROVEMENT OF DRAINAGE SYSTEM**

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TO: THE RENVILLE COUNTY BOARD OF COMMISSIONERS, ACTING AS DRAINAGE AUTHORITY FOR RENVILLE COUNTY DITCH NO. 59;

Petitioners respectfully represent, state and request the following:

**1. Jurisdiction.**

The undersigned Petitioners constitute: (1) at least 26% of the owners of the property affected by the proposed improvement; (2) at least 26% of the owners of property that the proposed improvement passes over; (3) the owners of at least 26% of the property area affected by the proposed improvement; or (4) the owners of at least 26% of the property area that the proposed improvement passes over.

**2. Designation of Drainage System.**

This Petition requests the improvement of the drainage system known by and designated as County Ditch No. 59 located in Renville County, Minnesota.

**3. Need for Improvement.**

The drainage system has insufficient capacity or needs enlarging or extending to furnish sufficient capacity or a better outlet.

**4. Description of Proposed Improvement.**

Attached as **Exhibit A** is a map which shows the general location of the proposed improvement. Exhibit A also depicts the approximate watershed limits in the area of the proposed improvement, the parcels over which the proposed improvement will pass, and the approximate location of the properties affected by the proposed improvement. The proposed improvement would include improvement of the Main Ditch, Branch C and various sub-branches thereof as identified below, and Branch 309 and various sublaterals thereof as designated below. The general location of the Main Ditch, Branch C and its sublaterals and Branch 309 and its sublaterals are, to the best of Petitioners' information, depicted on the attached Exhibit A.

The proposed improvement would be constructed in Sections 1 and 2 of Township 115 North, Range 36 West (Emmet Township), Sections 2, 3, 4, 5, and 6 of Township 115 North, Range 35 West (Troy Township), Sections 35 and 36 of Township 116 North, Range 36 West (Crooks Township), and Sections 27, 28, 32, 33, 34, and 35 of Township 116 North, Range 35 West (Winfield Township), all in Renville County, Minnesota.

The starting point and general course of the proposed improvement are as follows:

Main Ditch

Beginning at the outlet of the Main open ditch in the Southeast Quarter of Section 2, Township 115 North, Range 36 West, said point of beginning being approximately 2,240 feet north and 1,400 feet west of the Southeast Corner of said Section 2; thence northerly and northeasterly along the Main ditch across the Southeast and Northeast Quarters of said Section 2 and the Southeast Quarter of Section 35, Township 116 North, Range 36 West to the east line of said Section 35, said point being approximately 60 feet north of the Southeast Corner of said Section 35; thence easterly across the Southwest Quarter of Section 36-116-36, the North Half of Section 1-115-36, the North Half of Sections 6, 5, and 4 of Township 115 North, Range 35 West to the Northeast Corner of said Section 4; thence northeasterly across the Southwest, Southeast and Northeast Quarter of Section 34-116-35 and the Northwest Quarter of Section 35-116-35 to the Northwest Corner of said Section 35; thence northwesterly across the Southeast Quarter of Section 27-116-35 to the north-south  $\frac{1}{4}$  line, said point being approximately 1,150 feet north of the South Quarter Corner and there terminating.

Branch C

Beginning at the outlet of the Branch C tile into the Main open ditch in the Northeast Quarter of the Northeast Quarter of Section 4, Township 115 North, Range 35 West, said point of beginning being approximately 130 feet west and 130 feet south of the Northeast Corner of said Section 4, thence southeasterly and easterly generally following the current alignment of Branch C of County Ditch 59, across the Northeast Quarter of the Northeast Quarter of Section 4, across the West Half and the Southeast Quarter of the Northwest Quarter of Section 3, across the North Half of the Northeast Quarter of Section 3, across the South Half of the Northwest Quarter of Section 2, across the Southwest Quarter of the Northeast Quarter of Section 2; and into the Northeast Quarter of the Southeast Quarter of Section 2 and there terminating, said point of termination being about 110 feet west and 30 feet south of the east Quarter Corner of said Section 2.

Branch C-1

Beginning at the outlet of the Branch C-1 tile into the Branch C tile in the Southwest Quarter of the Northwest Quarter of Section 3, Township 115 North, Range 35 West, said point of beginning being approximately 1,150 feet east and 1,740 feet south of the Northwest Corner of said Section 3, thence southerly and southeasterly generally following the current alignment of Branch C-1 of County Ditch 59, across the South Half of the Northwest Quarter of Section 3, and into the Northeast Quarter of the Southwest Quarter of Section 3 and there terminating, said point of termination being

approximately 1,400 feet east and 270 feet south of the west Quarter Corner of said Section 3.

Branch C-2

Beginning at the outlet of the Branch C-2 tile into the Branch C tile in the Northwest Quarter of the Northeast Quarter of Section 3, Township 115 North, Range 35 West, said point of beginning being approximately 2,520 feet west and 1,280 feet south of the Northeast Corner of said Section 3, thence northerly generally following the current alignment of Branch C-2 of County Ditch 59 across the Northwest Quarter of the Northeast Quarter of Section 3; and into the Northeast Quarter of the Northwest Quarter of Section 3 and there terminating, said point of termination being approximately 2,580 feet east and 90 feet south of the Northwest Corner of said Section 3.

Branch C-3

Beginning at the outlet of the Branch C-3 tile into the Branch C tile in the Northeast Quarter of the Northeast Quarter of Section 3, Township 115 North, Range 35 West, said point of beginning being approximately 600 feet west and 1,070 feet south of the Northeast Corner of said Section 3, thence northeasterly generally following the current alignment of Branch C-3 of County Ditch 59 across the Northeast Quarter of the Northeast Quarter of Section 3; and into the Southeast Quarter of the Southeast Quarter of Section 34, Township 116 North, Range 35 West, said point of termination being approximately 200 feet west and 110 feet north of the Southeast Corner of said Section 34.

Branch C-3-1

Beginning at the outlet of the Branch C-3-1 tile into the Branch C-3 tile in the Northeast Quarter of the Northeast Quarter of Section 3, Township 115 North, Range 35 West, said point of beginning being approximately 280 feet west and 400 feet south of the Northeast Corner of said Section 3, thence easterly and southeasterly generally following the current alignment of Branch C-3-1 of County Ditch 59 across the Northeast Quarter of the Northeast Quarter of Section 3; and into the Northwest Quarter of the Northwest Quarter of Section 2 and there terminating, said point of termination being approximately 540 feet east and 670 feet south of the Northwest Corner of said Section 2.

Branch C-3-2

Beginning at the outlet of the Branch C-3-2 tile into the Branch C-3 tile in the Northeast Quarter of the Northeast Quarter of Section 3, Township 115 North, Range 35 West, said point of beginning being approximately 240 feet west and 30 feet south of the Northeast Corner of said Section 3, thence westerly generally following the current alignment of Branch C-3-2 of County Ditch 59 across the North Half of the Northeast Quarter of Section 3 and there terminating, said point of termination being approximately 1,960 feet west and 220 feet south of the Northeast Corner of said Section 3.

Branch C-4

Beginning at the outlet of the Branch C-4 tile into the Branch C tile in the Southwest Quarter of the Northeast Quarter of Section 2, Township 115 North, Range 35 West, said point of beginning being approximately 2,210 feet west and 1,680 feet south of the Northeast Corner of said Section 2, thence northerly and easterly generally following the current alignment of Branch C-4 of County Ditch 59 across the West Half of the Northeast Quarter of Section 2; and into the Northeast Quarter of the Northeast Quarter of Section 2 and there terminating, said point of termination being 1,120 feet west and 910 feet south of the Northeast Corner of said Section 2.

Branch C-4-1

Beginning at the outlet of the Branch C-4-1 tile into the Branch C-4 tile in the Northwest Quarter of the Northeast Quarter of Section 2, Township 115 North, Range 35 West, said point of beginning being approximately 2,210 feet west and 1,030 feet south of the Northeast Corner of said Section 2, thence northwesterly generally following the current alignment of Branch C-4-1 of County Ditch 59 across the Northwest Quarter of the Northeast Quarter of Section 2; and into the Northeast Quarter of the Northwest Quarter of Section 2 and there terminating, said point of termination being approximately 1,990 feet east and 770 feet south of the Northwest Corner of said Section 2

Branch C-4-2

Beginning at the outlet of the Branch C-4-2 tile into the Branch C-4 tile in the Northwest Quarter of the Northeast Quarter of Section 2, Township 115 North, Range 35 West, said point of beginning being approximately 1,530 feet west and 870 feet south of the Northeast Corner of said Section 2, thence southeasterly generally following the current alignment of Branch C-4-2 of County Ditch 59 across the Northwest Quarter of the Northeast Quarter of Section 2 and there terminating, said point of termination being approximately 1,400 feet west and 1,360 feet south of the Northeast Corner of said Section 2.

Branch C-5

Beginning at the outlet of the Branch C-5 tile into the Branch C tile in the Southwest Quarter of the Northeast Quarter of Section 2, Township 115 North, Range 35 West, said point of beginning being approximately 1,480 feet west and 2,540 feet south of the Northeast Corner of said Section 2, thence southerly generally following the current alignment of Branch C-5 of County Ditch 59 across the Southwest Quarter of the Northeast Quarter of Section 2; and into the Northwest Quarter of the Southeast Quarter of Section 2 and there terminating, said point of termination being approximately 1,550 feet west and 2,440 feet north of the Southeast Corner of said Section 2.

Branch 309

Beginning at the outlet of the Branch 309 tile into the Main open ditch in the Northeast Quarter of the Northwest Quarter of Section 4, Township 115 North, Range 35 West, said point of beginning being approximately 2,200 feet east and 60 feet south of the Northwest Corner of said Section 4, thence northerly and westerly generally following the current alignment of Branch 309 of County Ditch 59 across

the Northeast Quarter of the Northwest Quarter of Section 4, across the East Half and the Northwest Quarter of the Southwest Quarter of Section 33, Township 116 North, Range 35 West, across the Northeast Quarter of the Southeast Quarter of Section 32, and into the Southeast Quarter of the Northeast Quarter of Section 32 and there terminating, said point of termination being approximately 100 feet west and 1,960 feet south of the Northeast Corner of said Section 32.

Branch 309-1

Beginning at the outlet of the Branch 309-1 tile into the Branch 309 tile in the Southeast Quarter of the Southwest Quarter of Section 33, Township 116 North, Range 35 West, said point of beginning being approximately 2,340 feet east and 560 feet north of the Southwest Corner of said Section 33, thence northeasterly generally following the current alignment of Branch 309-1 of County Ditch 59 across the Southeast Quarter of the Southwest Quarter of Section 4, and into the Southwest Quarter of the Southeast Quarter of Section 33 and there terminating, said point of termination being approximately 2,550 feet west and 770 feet north of the Southeast Corner of said Section 33.

Branch 309-2

Beginning at the outlet of the Branch 309-2 tile into the Branch 309 tile in the Northeast Quarter of the Southwest Quarter of Section 33, Township 116 North, Range 35 West, said point of beginning being approximately 2,550 feet east and 1,440 feet north of the Southwest Corner of said Section 33, thence northeasterly generally following the current alignment of Branch 309-2 of County Ditch 59 across the Northeast Quarter of the Southwest Quarter of Section 33, and into the Northwest Quarter of the Southeast Quarter of Section 33 and there terminating, said point of termination being approximately 1,790 feet west and 1,810 feet north of the Southeast Corner of said Section 33.

Branch 309-3

Beginning at the outlet of the Branch 309-3 tile into the Branch 309 tile in the Northeast Quarter of the Southwest Quarter of Section 33, Township 116 North, Range 35 West, said point of beginning being approximately 2,550 feet east and 1,440 feet north of the Southwest Corner of said Section 33, thence northerly across the Northeast Quarter of the Southwest Quarter of Section 33, across the East Half of the Northwest Quarter of Section 33, then northeasterly across the Northeast Quarter of the Northwest Quarter of Section 33, across the Northwest Quarter of the Northeast Quarter of Section 33, and into the Southwest Quarter of the Southeast Quarter of Section 28 and there terminating, said point of termination being approximately 2,350 feet west and 110 feet north of the Southeast Corner of said Section 28.

Set forth on **Exhibit B** is a list of the 40-acre tracts or government lots that the proposed improvement would pass over, together with the names and addresses of the owners of those tracts.

**5. Public Utility and Health.**

The proposed improvement will be of public utility and will promote the public health.

**6. Agreement by Petitioners.**

The undersigned Petitioners have been informed and understand that they may not withdraw as a petitioner at any time after this Petition is accepted by the drainage authority, except with the written consent of all other Petitioners on the filed Petition. Also, the undersigned Petitioners acknowledge and agree that they will pay all costs and expenses that may be incurred if the improvement proceedings are dismissed.

**7. Cost Bond.**

One or more petitioners shall cause a bond to be filed in the amount of at least \$10,000.00 payable to the drainage authority. The bond will be conditioned to pay the costs incurred if the proceedings are dismissed or if a contract is not awarded to construct the proposed improvement described in the petition.

WHEREFORE, the Petitioners respectfully request the following:

- a. That the drainage authority accept this Petition, review it and determine that it is legally adequate; and
- b. That the drainage authority appoint an engineer for purposes of the proposed improvement and direct the engineer to prepare an engineer's preliminary report for the proposed improvement, including allowing the engineer to analyze other potential routes for the proposed improvement.

Dated this 14<sup>th</sup> day of December, 2016.

  
Jeff C. Braegelmann #174701  
[jbraegelmann@gislason.com](mailto:jbraegelmann@gislason.com)  
GISLASON & HUNTER LLP  
Attorneys for Petitioners  
2700 South Broadway  
P. O. Box 458  
New Ulm, MN 56073-0458  
Phone: 507-354-3111

[Signature Pages to Follow]

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Gary Verzalik

Ownership (check one):

Individual

Co-Owners (# of co-owners: \_\_\_\_\_)

Partner (name of partnership: \_\_\_\_\_)

Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
\_\_\_\_\_)

Trust (complete name of trust: \_\_\_\_\_)

Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
SE $\frac{1}{4}$ NW $\frac{1}{4}$	2	115	35
SW $\frac{1}{4}$ NE $\frac{1}{4}$	2	115	35
NW $\frac{1}{4}$ NE $\frac{1}{4}$	2	115	35
Part of the NE $\frac{1}{4}$ NW $\frac{1}{4}$	2	115	35

Dated: 11-16-2016

Gary Verzalik  
Gary Verzalik

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Carol J. Lippert

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
SW $\frac{1}{4}$ SE $\frac{1}{4}$	28	116	35

Dated: 11-14-2016

Carol J. Lippert, Trustee  
Carol J. Lippert, Trustee

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENNVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Aakre Family Farms, LLC

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_)  
 Partner (name of partnership: \_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: Aakre Family Farms, LLC)  
 Trust (complete name of trust: \_\_\_)  
 Other (explanation: \_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
NW $\frac{1}{4}$ NE $\frac{1}{4}$	3	115	35
Part of the NE $\frac{1}{4}$ NE $\frac{1}{4}$	3	115	35

Dated: 11-9-14

  
\_\_\_\_\_  
Sally Jo Aakre Wilson

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Wat Family Farms LC

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: Wat Family Farms LC)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range
Part of NE $\frac{1}{4}$ SW $\frac{1}{4}$	33	116	35
Part of NW $\frac{1}{4}$ SW $\frac{1}{4}$	33	116	35
SE $\frac{1}{4}$ NW $\frac{1}{4}$	33	116	35
Part of NE $\frac{1}{4}$ NW $\frac{1}{4}$	33	116	35

*WAT FAMILY FARMS LLC*

Dated: 11/9/16

*Edward Mitchell*  
EDWARD D. MITCHELL,  
MANAGER OF DEVON LC, MANAGER

*1415 E. MAIN STREET  
RICHMOND, VA 23219*

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

James Zenk

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
SW $\frac{1}{4}$ NW $\frac{1}{4}$	35	116	35
NW $\frac{1}{4}$ NW $\frac{1}{4}$	35	116	35

Dated: Dec. 21, 2016

  
\_\_\_\_\_  
James Zenk

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

James Zenk  
Dianne Zenk

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: 2)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
NE $\frac{1}{4}$ SE $\frac{1}{4}$	34	116	35
Part of SE $\frac{1}{4}$ NE $\frac{1}{4}$	34	116	35

Dated: Dec. 1, 2016

  
\_\_\_\_\_  
James Zenk

Dated: 12-1-16

  
\_\_\_\_\_  
Dianne Zenk

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Daniel W. Rauenhorst  
Cheryl Rauenhorst

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: 2)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

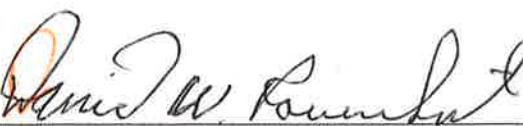
Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

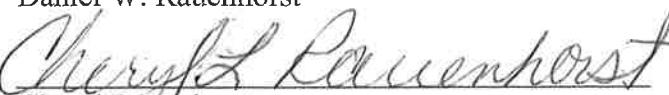
The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

Tract Description	Section	Township	Range
SW $\frac{1}{4}$ NW $\frac{1}{4}$	3	115	35

Dated: 12-3-16

  
Daniel W. Rauenhorst

Dated: 12-3-16

  
Cheryl Rauenhorst

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Daniel W. Rauenhorst

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: \_\_\_\_\_)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

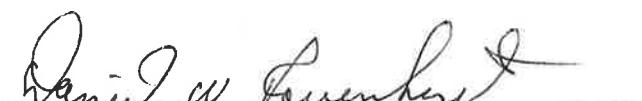
Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
NW $\frac{1}{4}$ NE $\frac{1}{4}$	4	115	35
NE $\frac{1}{4}$ NE $\frac{1}{4}$	4	115	35

Dated: 12-3-16

  
\_\_\_\_\_  
Daniel W. Rauenhorst

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Robb J. Zenk  
Megan C. Zenk

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: 2)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC: \_\_\_\_\_)  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

Statement of Authority:

The undersigned states and represents that if he or she is executing in a representative capacity, he or she has the authority to execute on behalf of the respective partnership, corporation, limited liability company, trust or other such entity.

The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
Part of SE <sup>1/4</sup> NE <sup>1/4</sup>	34	116	35

Dated: 12-8-16

  
\_\_\_\_\_  
Robb J. Zenk

Dated: 12/8/16

  
\_\_\_\_\_  
Megan C. Zenk

SIGNATURE PAGE FOR  
PETITION FOR IMPROVEMENT TO COUNTY DITCH NO. 59  
(RENNVILLE COUNTY, MINNESOTA)

Name of Petitioner(s) (please print or type):

Ruth Heller  
Naomi Endter

Ownership (check one):

- Individual  
 Co-Owners (# of co-owners: 2)  
 Partner (name of partnership: \_\_\_\_\_)  
 Corporation or limited liability company (name of corporation or LLC:  
\_\_\_\_\_  
 Trust (complete name of trust: \_\_\_\_\_)  
 Other (explanation: \_\_\_\_\_)

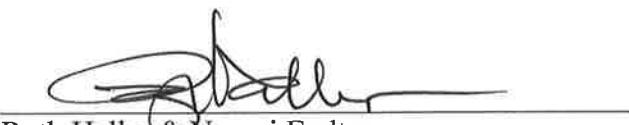
Statement of Authority:

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The above-named Petitioner(s) owns the following tract(s) which the proposed improvement will pass over or which is affected by the proposed improvement.

<u>Tract Description</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
NE $\frac{1}{4}$ SE $\frac{1}{4}$	2	115	35
SE $\frac{1}{4}$ NE $\frac{1}{4}$	2	115	35
Part of NE $\frac{1}{4}$ NE $\frac{1}{4}$	2	115	35

Dated: 11/15/2016

  
Ruth Heller & Naomi Endter  
By: Roger Heller, Power of Attorney

## **EXHIBIT A**

[Map – attached]

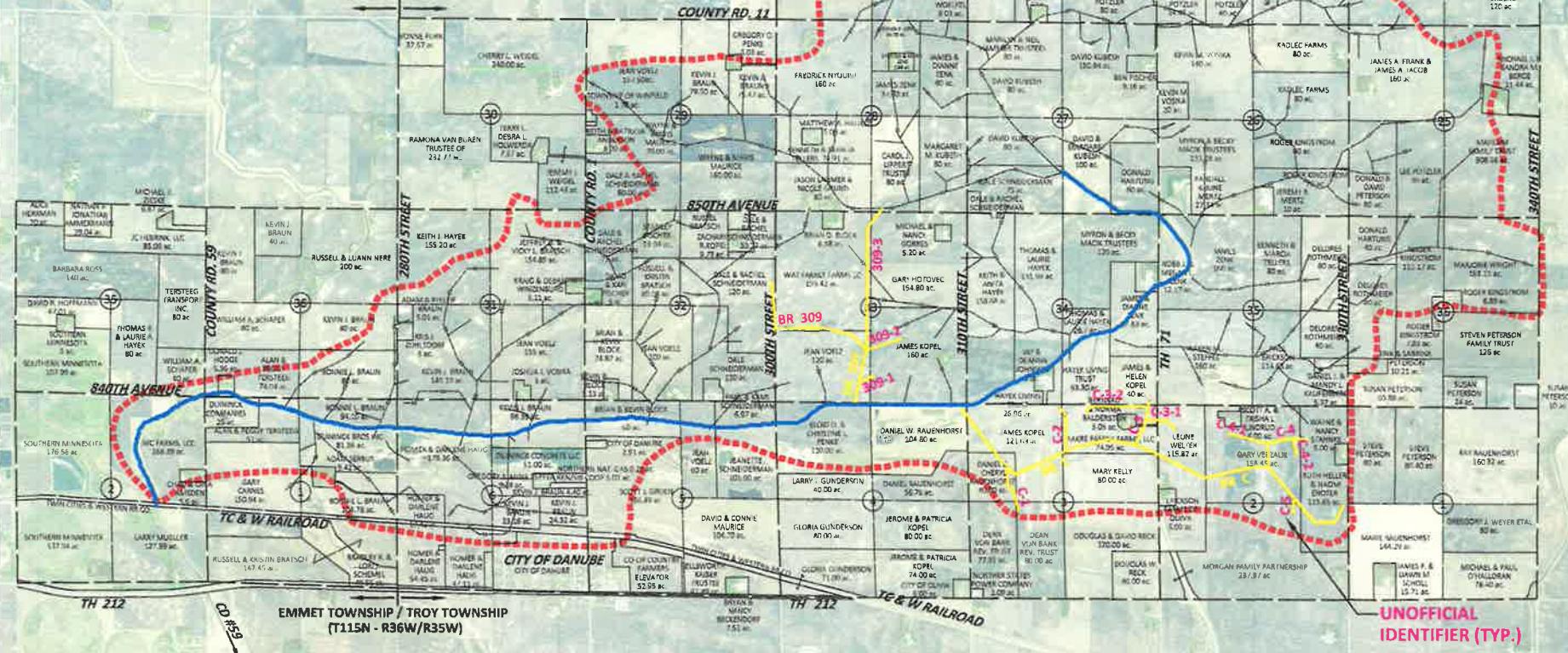
# COUNTY DITCH No. 59 IMPROVEMENTS



## LEGEND

- PROPOSED OPEN DITCH IMPROVEMENTS
- PROPOSED TILE IMPROVEMENTS
- UNOFFICIAL SUB-LATERAL IDENTIFIER

(T116N - R36W/R35W)  
CROOKS TOWNSHIP / WINFIELD TOWNSHIP



## **EXHIBIT B**

[Tract Descriptions - attached]

	<b>Location</b>	<b>Owner</b>	<b>Address</b>	<b>PID No.</b>	<b>Description</b>	<b>Section</b>	<b>Township</b>	<b>Range</b>
1	Main Ditch	Larry Mueller	26826 US Hwy 212, Danube, MN 56230	10-00070-00	NW 1/4 SE 1/4	2	115	36
2	Main Ditch	WC Farms, LLC	18105 31st Ave. N, Plymouth, MN 55447	10-00060-00	SW 1/4 NE 1/4	2	115	36
3	Main Ditch	WC Farms, LLC	18105 31st Ave. N, Plymouth, MN 55447	10-00060-00	NW 1/4 NE 1/4	2	115	36
4	Main Ditch	WC Farms, LLC	18105 31st Ave. N, Plymouth, MN 55447	10-00060-00	NE 1/4 NE 1/4	2	115	36
5	Main Ditch	William A. Schafer	84213 270th St., Renville, MN 56284	09-00480-00	SE 1/4 SE 1/4	35	116	36
6	Main Ditch	Alan & Peggy Tersteeg	PO Box 163, Olivia, MN 56277	09-00500-00	Pt SW 1/4 SW 1/4	36	116	36
7	Main Ditch	Donald J Hodge	110 Chestnut Ave SE, Renville, MN 56284	09-00570-00	Pt SW 1/4 SW 1/4	36	116	36
8	Main Ditch	Duinink Brothers, Inc.	PO Box 208, Prinsburg, MN 56281	10-00050-00	Pt NW 1/4 NW 1/4	1	115	36
9	Main Ditch	Alan & Peggy Tersteeg	PO Box 163, Olivia, MN 56277	10-00040-00	Pt NE 1/4 NW 1/4	1	115	36
10	Main Ditch	Duinink Brothers, Inc.	PO Box 208, Prinsburg, MN 56281	10-00050-00	Pt NE 1/4 NE 1/4	1	115	36
11	Main Ditch	Bonnie L. Braun	80197 Co Rd 1, Danube, MN 56230	10-00020-00	Pt NW 1/4 NE 1/4	1	115	36
12	Main Ditch	Bonnie L. Braun	80197 Co Rd 1, Danube, MN 56230	10-00020-00	Pt NE 1/4 NE 1/4	1	115	36
13	Main Ditch	Duinink Brothers, Inc.	PO Box 208, Prinsburg, MN 56281	10-00021-00	Pt NW 1/4 NE 1/4	1	115	36
14	Main Ditch	Duinink Brothers, Inc.	PO Box 208, Prinsburg, MN 56281	10-00021-00	Pt NE 1/4 NE 1/4	1	115	36
15	Main Ditch	Homer & Darlene Haug	PO Box 356, Danube, MN 56230	24-00170-00	NW 1/4 NW 1/4	6	115	35
16	Main Ditch	Homer & Darlene Haug	PO Box 356, Danube, MN 56230	24-00170-00	NE 1/4 NW 1/4	6	115	35
17	Main Ditch	Kevin J. Braun	80197 Co. Rd 1, Danube, MN 56230	24-00160-00	NW 1/4 NE 1/4	6	115	35
18	Main Ditch	Kevin J. Braun	80197 Co. Rd 1, Danube, MN 56230	24-00160-00	NE 1/4 NE 1/4	6	115	35
19	Main Ditch	Brian Block & Kevin Block	30325 850th Ave., Danube, MN 56230	24-00130-00	NW 1/4 NW 1/4	5	115	35
20	Main Ditch	Brian Block & Kevin Block	30325 850th Ave., Danube, MN 56230	24-00130-00	NE 1/4 NW 1/4	5	115	35
21	Main Ditch	Jean Voelz	29438 840th Ave., Danube MN 56230	24-00110-00	Pt NW 1/4 NE 1/4	5	115	35
22	Main Ditch	Jeanette Schneiderman	29688 840th Ave., Danube, MN 56230	24-00120-00	Pt NW 1/4 NE 1/4	5	115	35
23	Main Ditch	Jeanette Schneiderman	29688 840th Ave.. Danube, MN 56230	24-00120-00	NE 1/4 NE 1/4	5	115	35
24	Main Ditch	Eloid O & Christine Penke	29677 800th Avenue, Danube, MN 56230	24-00100-00	NW 1/4 NW 1/4	4	115	35
25	Main Ditch; Branch 309	Eloid O & Christine Penke	29677 800th Avenue, Danube, MN 56230	24-00100-00	NE 1/4 NW 1/4	4	115	35
26	Main Ditch; Branch 309; Branch 309-1	Jean Voelz	29438 840th Ave., Danube, MN 56230	27-01040-00	SE 1/4 SW 1/4	33	116	35
27	Main Ditch; Branch 309-1	James Kopel & Kathy Dillon Tr of Helen Kopel	1107 Park Ave. W, Olivia, MN 56277	27-01060-00	SW 1/4 SE 1/4	33	116	35
28	Main Ditch	James Kopel & Kathy Dillon Tr of Helen Kopel	1107 Park Ave. W, Olivia, MN 56277	27-01060-01	SE 1/4 SE 1/4	33	116	35
29	Main Ditch	Daniel W. Rauenhorst	81961 320th St., Olivia, MN 56277	24-00041-00	NW 1/4 NE 1/4	4	115	35
30	Main Ditch; Branch C	Daniel W. Rauenhorst	81961 320th St., Olivia, MN 56277	24-00041-00	NE 1/4 NE 1/4	4	115	35
31	Main Ditch; Branch C	James Kopel & Kathy Dillon Tr of Helen Kopel	1107 Park Ave. W, Olivia, MN 56277	24-00010-00	NW 1/4 NW 1/4	3	115	35
32	Main Ditch	Keith J. & Anita M. Hayek	1422 University Ave. NE, Minneapolis, MN 55413	27-01070-00	Pt SW 1/4 SW 1/4	34	116	35
33	Main Ditch	Hayek Living Trust c/o Mark & Ruth Hayek	3300 149th Ave., Ham Lake, MN 55304	27-01750-00	Pt SW 1/4 SW 1/4	34	116	35
34	Main Ditch	Hayek Living Trust c/o Mark & Ruth Hayek	3300 149th Ave., Ham Lake, MN 55304	27-01750-00	Pt SE 1/4 SW 1/4	34	116	35
35	Main Ditch	Jay L. & Deannea L. Johnson	31406 840th Ave., Olivia, MN 56277	27-01101-00	Pt SE 1/4 SW 1/4	34	116	35
36	Main Ditch	Thomas R. and Laurie A. Hayek	26158 Co. Rd. 4, Renville, MN 56284	27-01100-00	Pt SE 1/4 SW 1/4	34	116	35
37	Main Ditch	Hayek Living Trust c/o Mark & Ruth Hayek	3300 149th Ave., Ham Lake, MN 55304	27-01751-00	SW 1/4 SE 1/4	34	116	35
38	Main Ditch	Hayek Living Trust c/o Mark & Ruth Hayek	3300 149th Ave., Ham Lake, MN 55304	27-01751-00	Pt NW 1/4 SE 1/4	34	116	35
39	Main Ditch	Thomas R. and Laurie A. Hayek	26158 Co. Rd. 4, Renville, MN 56284	27-01102-00	Pt NW 1/4 SE 1/4	34	116	35
40	Main Ditch	James & Dianne Zenk	84691 US Hwy 71, Danube, MN 56230	27-01770-00	NE 1/4 SE 1/4	34	116	35
41	Main Ditch	James & Dianne Zenk	84691 US Hwy 71, Danube, MN 56230	27-01770-00	Pt. SE 1/4 NE 1/4	34	116	35
42	Main Ditch	Robb J. & Megan C. Zenk	84691 US Hwy 71, Danube, MN 56230	27-01771-00	Pt. SE 1/4 NE 1/4	34	116	35
43	Main Ditch	James Zenk	84691 US Hwy 71, Danube, MN 56230	27-01800-00	SW 1/4 NW 1/4	35	116	35
44	Main Ditch	James Zenk	84691 US Hwy 71, Danube, MN 56230	27-01800-00	NW 1/4 NW 1/4	35	116	35

	<b>Location</b>	<b>Owner</b>	<b>Address</b>	<b>PID No.</b>	<b>Description</b>	<b>Section</b>	<b>Township</b>	<b>Range</b>
45	Main Ditch	Donald L. Hartung	14941 St. Hwy 4, Cosmos, MN 56228	27-01730-00	SE 1/4 SE 1/4	27	116	35
46	Main Ditch	David & Margaret Kubesh	85554 310th St., Danube, MN 56230	27-01720-00	SW 1/4 SE 1/4	27	116	35
47	Branch C; Branch C-1	Daniel & Cheryl Rauenhorst	81961 320th St., Olivia, MN 56277	24-00030-00	SW 1/4 NW 1/4	3	115	35
48	Branch C	James Kopel & Kathy Dillon Tr of Helen Kopel	1107 Park Ave. W, Olivia, MN 56277	24-00010-00	SE 1/4 NW 1/4	3	115	35
49	Branch C; Branch C-2; Branch C-3-2	Aakre Family Farms, LLC C/O Sally Jo Aakre	80664 350th St., Olivia, MN 56277	24-01130-00	NW 1/4 NE 1/4	3	115	35
50	Branch C; Branch C-3; Branch C-3-1; Branch C-3-2	Aakre Family Farms, LLC C/O Sally Jo Aakre	80664 350th St., Olivia, MN 56277	24-01130-00	Pt. NE 1/4 NE 1/4	3	115	35
51	Branch C; Branch C-3-1;	Leone Welter C/O Virginia Hartmann	331 2nd Ave. SW, Forest Lake, MN 55025	24-01110-00	NW 1/4 NW 1/4	2	115	35
52	Branch C	Leone Welter C/O Virginia Hartmann	331 2nd Ave. SW, Forest Lake, MN 55025	24-01110-00	Pt SW 1/4 NW 1/4	2	115	35
53	Branch C	Gary Verzalik	15937 Cascade Path, Rosemount, MN 55068	24-01090-00	SE 1/4 NW 1/4	2	115	35
54	Branch C; Branch C-4; Branch C-5	Gary Verzalik	15937 Cascade Path, Rosemount, MN 55068	24-01090-00	SW 1/4 NE 1/4	2	115	35
55	Branch C	Ruth Heller & Naomi Endter, TR C/O Roger Heller	PO Box 26, Olivia, MN 56277	24-01100-00	NE 1/4 SE 1/4	2	115	35
56	Branch C-1	Dean Von Bank & Susan Von Bank Revocable Trust	725 Forrest Road, Glenview, IL 60025	24-00020-00	NE 1/4 SW 1/4	3	115	35
57	Branch C-3	Bernard & Norma Balderston	509 10th St. S, Olivia, MN 56277	24-01131-00	Pt. NE 1/4 NE 1/4	3	115	35
58	Branch C-3	James & Helen Kopel	1107 Park Ave W, Olivia, MN 56277	27-01780-00	SE 1/4 SE 1/4	34	116	35
59	Branch C-4; Branch C-4-1; Branch C-4-2	Gary Verzalik	15937 Cascade Path, Rosemount, MN 55068	24-01090-00	NW 1/4 NE 1/4	2	115	35
60	Branch C-4	Ruth Heller & Naomi Endter, TR C/O Roger Heller	PO Box 26, Olivia, MN 56277	24-01100-00	Pt NE 1/4 NE 1/4	2	115	35
61	Branch C-4-1	Gary Verzalik	15937 Cascade Path, Rosemount, MN 55068	24-01090-00	Pt NE 1/4 NW 1/4	2	115	35
62	Branch C-5	Morgan Family Partnership C/O Patrick & Rita Morgan	PO Box 107, Elmore, MN 56027	24-01120-00	NW 1/4 SE 1/4	2	115	35
63	Branch 309; Branch 309-2; Branch 309-3	Jean Voelz	29438 840th Ave., Danube, MN 56230	27-01040-00	Pt. NE 1/4 SW 1/4	33	116	35
64	Branch 309; Branch 309-3	Wat Family Farms LC	PO Box 377, Richmond, VA 23218	27-01030-00	Pt. NE 1/4 SW 1/4	33	116	35
65	Branch 309	Wat Family Farms LC	PO Box 377, Richmond, VA 23218	27-01030-00	Pt. NW 1/4 SW 1/4	33	116	35
66	Branch 309	Dale & Rachel Schneiderman	31034 850th Ave., Danube, MN 56230	27-00981-00	NE 1/4 SE 1/4	32	116	35
67	Branch 309	Dale & Rachel Schneiderman	31034 850th Ave., Danube, MN 56230	27-00981-00	SE 1/4 NE 1/4	32	116	35
68	Branch 309-2	James Kopel & Kathy Dillon Tr of Helen Kopel	1107 Park Ave. W., Olivia, MN 56277	27-01060-00	NW 1/4 SE 1/4	33	116	35
69	Branch 309-3	Wat Family Farms LC	PO Box 377, Richmond, VA 23218	27-01030-00	SE 1/4 NW 1/4	33	116	35
70	Branch 309-3	Wat Family Farms LC	PO Box 377, Richmond, VA 23218	27-01030-00	Pt. NE 1/4 NW 1/4	33	116	35
71	Branch 309-3	Gary Hotovec ETAL	87308 US Hwy 71, Danube, MN 56230	27-01050-00	NW 1/4 NE 1/4	33	116	35
72	Branch 309-3	Carol J. Lippert, Trustee	89118 Co. Rd 1, Danube, MN 56230	27-00801-00	SW 1/4 SE 1/4	28	116	35

## EXHIBIT 3: PRELIMINARY COST ESTIMATE

## **PRELIMINARY CONSTRUCTION COST ESTIMATE**

## **County Ditch No. 59 Improvement**

Renville County, MN

FILENAME: H:\RNCO\S15112473\2\_Preliminary\A\_Calculations\[112473 Preliminary Cost Estimate.xlsx]Engineers Estimate

DATE: January 9, 2018

ITEM NO.	ITEM	UNIT	UNIT PRICE	TOTAL		CD 59 IMPROVEMENT		CD 59 IMPROVEMENT		CD 59 IMPROVEMENT		CD 59 IMPROVEMENT		CD 59 IMPROVEMENT				
				EST. QUANT.	AMOUNT	MAIN OPEN DITCH		ONLINE STORAGE #1		ONLINE STORAGE #2		ONLINE STORAGE #3		BRANCH 309		BRANCH C		
						EST. QUANT.	AMOUNT	EST. QUANT.	AMOUNT	EST. QUANT.	AMOUNT	EST. QUANT.	AMOUNT	EST. QUANT.	AMOUNT	EST. QUANT.	AMOUNT	
1	Mobilization & Traffic Control	Lump Sum	\$110,000.00	1.00	\$110,000.00	0.35	\$38,500.00	0.23	\$25,300.00	0.08	\$8,800.00	0.06	\$6,600.00	0.10	\$11,000.00	0.18	\$19,800.00	
2	Exploratory Excavation	Hour	\$200.00	65	\$13,000.00	10	\$2,000.00	5	\$1,000.00	5	\$1,000.00	5	\$1,000.00	20	\$4,000.00	20	\$4,000.00	
3	Common Excavation (P)	Cubic Yard	\$2.50	715,000	\$1,787,500.00	210,000	\$525,000.00	325,000	\$812,500.00	105,000	\$262,500.00	75,000	\$187,500.00					
4	Ditch Cleanout	Station	\$200.00	55	\$11,000.00	55	\$11,000.00											
5	Salvage Pipe Culvert	Linear Foot	\$15.00	388	\$5,820.00	388	\$5,820.00											
6	Wearing Course Mixture (SPWEA230B)	Ton	\$110.00	110	\$12,100.00	110	\$12,100.00											
7	Non-wearing Course Mixture (SPNW230B)	Ton	\$110.00	110	\$12,100.00	110	\$12,100.00											
8	Aggregate Surfacing, Class 1	Ton	\$20.00	110	\$2,200.00	110	\$2,200.00											
9	Aggregate Base, Class 5	Ton	\$20.00	875	\$17,500.00	800	\$16,000.00							25	\$500.00	50	\$1,000.00	
10	Pipe Bedding Material	Ton	\$25.00	3,000	\$75,000.00	1,500	\$37,500.00									1,500	\$37,500.00	
11	6" Tile Inlet	Each	\$250.00	10	\$2,500.00	5	\$1,250.00									5	\$1,250.00	
12	8" Tile Inlet	Each	\$260.00	35	\$9,100.00	15	\$3,900.00									5	\$1,300.00	
13	10" Tile Inlet	Each	\$300.00	10	\$3,000.00	10	\$3,000.00											
14	12" Tile Inlet	Each	\$350.00	30	\$10,500.00	10	\$3,500.00									5	\$1,750.00	
15	15" Tile Inlet	Each	\$400.00	5	\$2,000.00	5	\$2,000.00											
16	18" Tile Inlet	Each	\$500.00	5	\$2,500.00	5	\$2,500.00											
17	6" Drain Tile	Linear Foot	\$8.00	1,870	\$14,960.00	200	\$1,600.00							220	\$1,760.00	1,450	\$11,600.00	
18	8" Drain Tile	Linear Foot	\$10.00	6,860	\$68,600.00	200	\$2,000.00							760	\$7,600.00	5,900	\$59,000.00	
19	10" Drain Tile	Linear Foot	\$12.00	2,620	\$31,440.00	200	\$2,400.00							20	\$240.00	2,400	\$28,800.00	
20	12" Drain Tile	Linear Foot	\$16.00	5,590	\$89,440.00	100	\$1,600.00							2,630	\$42,080.00	2,860	\$45,760.00	
21	15" Drain Tile	Linear Foot	\$20.00	2,130	\$42,600.00	100	\$2,000.00							450	\$9,000.00	1,580	\$31,600.00	
22	18" Drain Tile	Linear Foot	\$25.00	2,520	\$63,000.00	100	\$2,500.00							1,680	\$42,000.00	740	\$18,500.00	
23	24" Drain Tile	Linear Foot	\$30.00	3,895	\$116,850.00	40	\$1,200.00							815	\$24,450.00	3,040	\$91,200.00	
24	30" Drain Tile	Linear Foot	\$40.00	7,070	\$282,800.00	40	\$1,600.00							4,160	\$166,400.00	2,870	\$114,800.00	
25	36" Drain Tile	Linear Foot	\$50.00	5,150	\$257,500.00									1,425	\$71,250.00	3,725	\$186,250.00	
26	6" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$16.00	200	\$3,200.00	200	\$3,200.00											
27	8" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$18.00	300	\$5,400.00	300	\$5,400.00											
28	10" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$22.00	300	\$6,600.00	300	\$6,600.00											
29	12" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$24.00	300	\$7,200.00	300	\$7,200.00											
30	15" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$30.00	200	\$6,000.00	200	\$6,000.00											
31	18" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$32.00	200	\$6,400.00	200	\$6,400.00											
32	24" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$42.00	60	\$2,520.00	60	\$2,520.00											
33	30" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$50.00	20	\$1,000.00	20	\$1,000.00											
34	42" CS Drain Tile Outlet Pipe w Rodent Guard	Linear Foot	\$80.00	40	\$3,200.00									20	\$1,600.00	20	\$1,600.00	
35	15" CS Pipe Culvert	Linear Foot	\$40.00	920	\$36,800.00	920	\$36,800.00											
36	15" CS Safety Apron	Each	\$300.00	23	\$6,900.00	23	\$6,900.00											
37	Install Pipe Culvert	Linear Foot	\$50.00	168	\$8,400.00	168	\$8,400.00											
38	84" RC Pipe Culvert	Linear Foot	\$500.00	144	\$72,000.00	144	\$72,000.00											
39	96" RC Pipe Culvert	Linear Foot	\$600.00	280	\$168,000.00	280	\$168,000.00											
40	84" RC Pipe Apron	Each	\$4,000.00	4	\$16,000.00	4	\$16,000.00											
41	96" RC Pipe Apron	Each	\$5,000.00	6	\$30,000.00	6	\$30,000.00											
42	Random Riprap, Class II	Ton	\$45.00	800	\$36,000.00	800	\$36,000.00											
43	Random Riprap, Class III	Ton	\$50.00	780	\$39,000.00	700	\$35,000.00								40	\$2,000.00	40	\$2,000.00
44	Random Riprap, Class IV	Ton	\$60.00	1,500	\$90,000.00	1,500	\$90,000.00											
45	Filter Berm, Type 5	Linear Foot	\$50.00	150	\$7,500.00	150	\$7,500.00											
46	Storm Drain Inlet Protection	Each	\$100.00	170	\$17,000.00	100	\$10,000.00								20	\$2,000.00	50	\$5,000.00
47	Sediment Control Log, Type Straw	Linear Foot	\$3.00	6,000	\$18,000.00	5,000	\$15,000.00	500	\$1,500.00	250	\$750.00	250	\$750.00					
48	Immediate Ditch Slope Seeding	Station	\$100.00	336	\$33,600.00	336	\$33,600.00											
49	Seeding (Buffer Strip, Storage Disposal Area)	Acre	\$500.00	278.6	\$139,300.00	68.0	\$34,000.00	92.0	\$46,000.00	32.0	\$16,000.00	19.0	\$9,500.00	22.4	\$11,200.00	45.2	\$22,600.00	
50	Rapid Stabilization, Method 4	Square Yard	\$2.00	18,300	\$36,600.00	8,000	\$16,000.00	5,000	\$10,000.00	2,500	\$5,000.00	2,500	\$5,000.00	100	\$200.00	200	\$400.00	
	SUBTOTAL ESTIMATED CONSTRUCTION BID ITEMS				\$3,839,630.00		\$1,346,790.00								\$210,350.00		\$400,330.00	
	IMPROVEMENT RIGHT-OF-WAY (DITCH WIDENING)	ACRE	\$8,000.00	18.5	\$148,000.00	18.5	\$148,000.00											
	IMPROVEMENT RIGHT-OF-WAY (16.5' BUFFER STRIP EACH SIDE)	ACRE	\$8,000.00	26.0	\$208,000.00	26.0	\$208,000.00											
	IMPROVEMENT RIGHT-OF-WAY (STORAGE)	ACRE	\$8,000.00	41.0	\$328,000.00			22.0	\$176,000.00	12.0	\$96,000.00	7.0	\$56,000.00					
	TEMPORARY RIGHT-OF-WAY (80' EACH SIDE OF THE DITCH)	ACRE	\$600.00	124.0	\$74,400.00	124.0	\$74,400.00											
	TEMPORARY RIGHT-OF-WAY (STORAGE EXCAVATION DISPOSAL)	ACRE	\$600.00	102.0	\$61,200.00			70.0	\$42,000.00	20.0	\$12,000.00	12.0	\$7,200.00					
	TEMPORARY RIGHT-OF-WAY (80' TILE CONSTRUCTION)	ACRE	\$600.00	67.6	\$40,560.00										22.4	\$13,440.00	45.2	\$27,120.00
	TOTAL ESTIMATED CONSTRUCTION COST				\$4,699,790.00		\$1,777,190.00											
	10% CONSTRUCTION CONTINGENCY				\$470,300.00		\$178,800.00											
	TOTAL ESTIMATED CONSTRUCTION COST				\$5,170,090.00		\$1,954,990.00											
	ENGINEERING, VIEWING, LEGAL, PERMITS, ADMIN (20%)				\$1,034,200.00		\$391,000.00											
	TOTAL ESTIMATED PROJECT COST				\$6,204,290.00		\$2,345,990.00											
	TOTAL ACRES IN UPSTREAM WATERSHED							9702								1032		835
	ESTIMATED PROJECT COST/ACRE								9702									
										9702								
											9702							
												9702						