



**BOLTON  
& MENK**

Real People. Real Solutions.

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August 23, 2024

Board of Supervisors  
Worth County Courthouse  
1000 Central Ave  
Northwood, Iowa 50459

RE: Amendment No. 2 to the Engineer's Report  
Drainage District No. 18  
Project No.: 24X135030000

Dear Board Members:

This amendment serves to provide additional information to the Engineer's Report originally filed in April 2016. This information was requested at an informational landowner meeting on July 8, 2024.

### Background

The proposed improvements in 2016 called for a 36" tile providing a half-inch drainage coefficient. At that time, the landowners decided against pursuing improvements and independently constructed an open ditch for the first 1,200 feet of the district. After heavy rains this year, several landowners voiced concerns with the existing tile and asked us to update the Engineer's Report. Five options were discussed at the informational meeting. These included a half-inch DC tile, three-quarters-inch DC tile, one-inch DC tile, open ditch and supplemental waterway.

### Tile Options:

These options are the most straightforward. The alignment for all three tile options would be approximately the same as was proposed in 2016, the only change being the size of the tile for each option. All three would consist of boring a tile under the railroad to outlet into the existing open ditch. The cost of the three options is shown below:

Option	Estimated Total Cost
½" DC- 36" Tile	\$1,439,000
¾" DC- 42" Tile	\$1,842,000
1" DC- 48" Tile	\$2,060,000

### Open Ditch Option:

Typically, a drainage district of this size would not construct an open ditch. However, an open ditch will provide the most drainage especially in large storm events compared to a tile. The estimated cost for the open ditch is shown below. This includes estimates for purchasing right-of-way and severance payments to landowners whose farms would be divided by the open ditch. This is only an estimate, right-of-way and severance would be determined by an appointed commission and may differ from what is estimated.

Option	Estimated Total Cost
Open Ditch	\$1,950,000

There are some potential drawbacks with constructing an open ditch in this district.

- The alignment of the open ditch would cross seven natural gas lines. We don't know the depth of these gas lines, but the lines would likely need to be re-laid lower to not become exposed. We have talked with Northern Natural Gas and would verify the depth of their lines this fall after harvest.
- Our proposal deepens the ditch under the railroad bridge. Therefore, the bridge under the railroad tracks would likely need to be replaced.
- There are two Worth County roads that would be crossed by the open ditch. We would work with the county engineer to determine the best path forward regarding installing new culverts. There are also fiber optic lines in the road ditch which may need to be lowered to accommodate an open ditch.
- An open ditch would require Iowa DNR and Army Corp approval. They would likely require some environmental enhancements to the design with their approval.

All of these could necessitate design changes, and possibly cause delays in construction. An open ditch also has more unknowns than a tile. For example, if the ditch alignment runs through sand, it will become more difficult to hold the designed cross section and will require using riprap or pulling the slopes back to create a stable slope.

#### **Supplemental Waterway Option:**

There is an existing grass waterway through the Beverly farm in Section 33. This waterway could be regraded from the road culvert under S14 and extended downstream to the railroad bridge. It would be designed as a parabolic waterway similarly to a NRCS designed waterway. The waterway could also be extended further upstream as far as the district would like. We have not included plans for this option, but it would follow the existing swale with a grade matching the flowlines of the culverts. We estimate the cost to excavate and shape the waterway at \$300/Station. A waterway would help in high storm events removing water via the surface to take pressure off the tile.

We have only updated the cost estimate for the Main Tile, we have not updated the costs for the branch tiles. They were not individually broken out in 2016. If the landowners would like to pursue any branch tiles, we have reviewed their plans and could bring them forward. The cost to construct the branch tiles would only be assessed to landowners using the branch tiles.

Evaluating the options, we recommend the 36" half-inch DC option with the supplemental waterway. We think this option would be the most cost-effective design to provide relief for the district's tiles and provide supplemental surface water relief.

Sincerely,

**Bolton & Menk, Inc.**



**Jacob Hagan, P.E.**

Project Engineer

Attached:

Engineer's Opinion of Probable Costs for all Options  
Preliminary Plans for Open Ditch and Tile Options

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

**Construction Division 1--Main Tile Work on Private Lands**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
100	Excavation	STA	12	\$250	\$3,000
101	Spoil Leveling	STA	12	\$200	\$2,400
102	Open Ditch Seeding	STA	12	\$100	\$1,200
103	Temporary Seeding	STA	12	\$30	\$360
104	Spoil Tillage and Rock Pick Up	STA	12	\$80	\$960
105	Riprap, Class D	TNS	200	\$50	\$10,000
106	2000D R.C.P., 18" Dia.	LF	525	\$42	\$22,050
107	2000D R.C.P., 24" Dia.	LF	2,500	\$47	\$117,500
108	2000D R.C.P., 30" Dia.	LF	3,100	\$62	\$192,200
109	2000D R.C.P., 36" Dia.	LF	7,318	\$80	\$585,440
110	12" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	11	\$1,094	\$12,034
111	24" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	4	\$1,094	\$4,376
112	18" Dia., R.C.P. Elbow Section, Fabrication Only	EA	1	\$520	\$520
113	24" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$600	\$1,800
114	30" Dia., R.C.P. Elbow Section, Fabrication Only	EA	7	\$687	\$4,809
115	36" Dia., R.C.P. Elbow Section, Fabrication Only	EA	12	\$798	\$9,576
116	24" to 18" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$916	\$916
117	30" to 24" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,430	\$1,430
118	36" to 30" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,880	\$1,880
119	Beehive Tile Intakes	EA	6	\$500	\$3,000
120	Crush Existing Tile	LF	13,800	\$5	\$69,000
121	Lateral Tile Connections, 10" Dia. or Smaller	EA	50	\$481	\$24,050
122	Lateral Tile Connections, 12" Dia. or Larger	EA	10	\$851	\$8,510
123	Tile Trench Stabilization and Cradling Rock	TN	270	\$26	\$7,020
124	Administration of Erosion Management Plan	LS	1	\$3,000	\$3,000
125	Silt Fence Install and Review	LF	750	\$3	\$1,875
126	Spot Tile Exploration	HR	15	\$220	\$3,300
127	Fence Cuts	EA	3	\$250	\$750
128	Mobilization	LS	1	\$58,000	\$58,000
<b>Estimated Division 2 Subtotal</b>					<b>\$1,151,000</b>

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

**Construction Division 2--Bored Secondary Roads Crossings (Worth County)**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
201	Steel Casing, " Wall, Jacked and Bored, 18"	LF	80	\$500	\$40,000
203	Steel Casing, " Wall, Jacked and Bored, 36"	LF	160	\$1,000	\$160,000
205	2000D R.C.P., 18" Dia.	LF	20	\$50	\$1,000
206	2000D R.C.P., 36" Dia.	LF	20	\$100	\$2,000
208	Hickenbottom Intake, 12"	EA	6	\$1,000	\$6,000
209	Tile Trench Stabilization and Cradling Rock	TN	230	\$25	\$5,750
210	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
211	Traffic Control	LS	1	\$3,750	\$3,750
212	Silt Fence-Install and Remove	LF	700	\$3	\$2,100
213	Mobilization	LS	1	\$12,000	\$12,000

**Estimated Division 2 Subtotal      \$236,000**

**Construction Division 3--Bored Railroad Crossing**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
301	Steel Casing, " Wall, Jacked and Bored, 36"	LF	100	\$1,000	\$100,000
302	Tile Trench Stabilization and Cradling Rock	TN	50	\$25	\$1,250
303	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
304	Railroad Protective Liability Insurance Provisions	LS	1	\$30,000	\$30,000
305	Silt Fence-Install and Remove	LF	100	\$3	\$300
306	Mobilization	LS	1	\$13,500	\$13,500

**Estimated Division 3 Subtotal      \$149,000**

**Subtotal of Construction Divisions 1, 2, 3 AND 4      \$1,536,000**

**Construction Contingency      \$58,000**

**Total Estimated Construction Cost      \$1,594,000**

**Less Estimated Secondary Roads Construction Costs Paid by Others      \$385,000**

**Total Estimated Assessable Construction Cost      \$1,209,000**

Construction Related Damages

Work Area Rental (33.0 ac)	\$33,000
Other Damages	\$40,000

Basic Engineering Services



**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

Survey, Study & Report. Meetings & Hearing	\$30,000
Permitting	\$3,000
Construction Plans, Specifications, & Bid Letting	\$15,000
Construction Engineering Services	\$35,000
Legal Services, Publications, Mailings, Etc..	\$5,000
Finance, Interest & Contingency	<u>\$68,500</u>
<b>Total Estimated Assessable Project Cost</b>	<b>\$1,439,000</b>
Estimated Average Cost Per Currently Assessed Acre (1,416 ac)	\$1,016

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

**Construction Division 1--Tile Work on Private Lands**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
100	Excavation	STA	12	\$250	\$3,000
101	Spoil Leveling	STA	12	\$200	\$2,400
102	Open Ditch Seeding	STA	12	\$100	\$1,200
103	Temporary Seeding	STA	12	\$30	\$360
104	Spoil Tillage and Rock Pick Up	STA	12	\$80	\$960
105	Riprap, Class D	TNS	200	\$50	\$10,000
106	1500D R.C.P., 24" Dia.	LF	525	\$47	\$24,675
107	2000D R.C.P., 30" Dia.	LF	2,500	\$62	\$155,000
108	2000D R.C.P., 36" Dia.	LF	3,100	\$80	\$248,000
109	2000D R.C.P., 42" Dia.	LF	7,318	\$115	\$841,570
110	12" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	11	\$1,094	\$12,034
111	24" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	4	\$1,094	\$4,376
112	24" Dia., R.C.P. Elbow Section, Fabrication Only	EA	1	\$600	\$600
113	30" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$687	\$2,061
114	36" Dia., R.C.P. Elbow Section, Fabrication Only	EA	7	\$798	\$5,586
115	42" Dia., R.C.P. Elbow Section, Fabrication Only	EA	12	\$950	\$11,400
116	30" to 24" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,430	\$1,430
117	36" to 30" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,880	\$1,880
118	42" to 36" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$2,100	\$2,100
119	Beehive Tile Intakes	EA	6	\$500	\$3,000
120	Crush Existing Tile	LF	13,800	\$5	\$69,000
121	Lateral Tile Connections, 10" Dia. or Smaller	EA	50	\$481	\$24,050
122	Lateral Tile Connections, 12" Dia. or Larger	EA	10	\$851	\$8,510
123	Tile Trench Stabilization and Cradling Rock	TN	300	\$26	\$7,800
124	Administration of Erosion Management Plan	LS	1	\$3,000	\$3,000
125	Silt Fence Install and Review	LF	750	\$3	\$1,875
126	Spot Tile Exploration	HR	15	\$220	\$3,300
127	Fence Cuts	EA	3	\$250	\$750
128	Mobilization	LS	1	\$75,000	\$75,000
<b>Estimated Division 2 Subtotal</b>					<b>\$1,507,000</b>

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

**Construction Division 2--Bored Secondary Roads Crossings (Worth County)**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
201	Steel Casing, " Wall, Jacked and Bored, 24" Diameter	LF	80	\$600	\$48,000
203	Steel Casing, " Wall, Jacked and Bored, 42" Diameter	LF	160	\$1,200	\$192,000
205	2000D R.C.P., 24" Dia.	LF	20	\$75	\$1,500
206	2000D R.C.P., 42" Dia.	LF	20	\$125	\$2,500
208	Hickenbottom Intake, 12"	EA	6	\$1,000	\$6,000
209	Tile Trench Stabilization and Cradling Rock	TN	230	\$25	\$5,750
210	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
211	Traffic Control	LS	1	\$3,750	\$3,750
212	Silt Fence-Install and Remove	LF	700	\$3	\$2,100
213	Mobilization	LS	1	\$16,000	\$16,000
<b>Estimated Division 2 Subtotal</b>					<b>\$281,000</b>

**Construction Division 3--Bored Railroad Crossing**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
301	Steel Casing, " Wall, Jacked and Bored, 42"	LF	100	\$1,200	\$120,000
302	Tile Trench Stabilization and Cradling Rock	TN	50	\$25	\$1,250
303	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
304	Railroad Protective Liability Insurance Provisions	LS	1	\$30,000	\$30,000
305	Silt Fence-Install and Remove	LF	100	\$3	\$300
306	Mobilization	LS	1	\$15,500	\$15,500
<b>Estimated Division 3 Subtotal</b>					<b>\$171,000</b>

**Subtotal of Construction Divisions 1, 2, 3 AND 4** **\$1,959,000**

**Construction Contingency** **\$75,000**

**Total Estimated Construction Cost** **\$2,034,000**

**Less Estimated Secondary Roads Construction Costs Paid by Others** **\$452,000**

**Total Estimated Assessable Construction Cost** **\$1,582,000**

Construction Related Damages

Work Area Rental (33.0 ac) \$33,000

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

Other Damages	\$51,000
Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	\$30,000
Permtting	\$3,000
Construction Plans, Specifications, & Bid Letting	\$15,000
Construction Engineering Services	\$35,000
Legal Services, Publications, Mailings, Etc..	\$5,000
Finance, Interest & Contingency	<u>\$87,700</u>
<b>Total Estimated Assessable Project Cost</b>	<b>\$1,842,000</b>
Estimated Average Cost Per Currently Assessed Acre (1,416 ac)	\$1,301

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

**Construction Division 1--Tile Work on Private Lands**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
100	Excavation	STA	12	\$250	\$3,000
101	Spoil Leveling	STA	12	\$200	\$2,400
102	Open Ditch Seeding	STA	12	\$100	\$1,200
103	Temporary Seeding	STA	12	\$30	\$360
104	Spoil Tillage and Rock Pick Up	STA	12	\$80	\$960
105	Riprap, Class D	TNS	200	\$50	\$10,000
106	1500D R.C.P., 24" Dia.	LF	525	\$47	\$24,675
107	2000D R.C.P., 30" Dia.	LF	1,600	\$62	\$99,200
108	2000D R.C.P., 36" Dia.	LF	2,600	\$80	\$208,000
109	2000D R.C.P., 42" Dia.	LF	3,205	\$115	\$368,575
110	2000D R.C.P., 48" Dia.	LF	5,510	\$135	\$743,850
111	12" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	11	\$1,094	\$12,034
112	24" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	4	\$1,094	\$4,376
113	24" Dia., R.C.P. Elbow Section, Fabrication Only	EA	1	\$600	\$600
114	30" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$687	\$2,061
115	36" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$798	\$2,394
116	42" Dia., R.C.P. Elbow Section, Fabrication Only	EA	8	\$950	\$7,600
117	48" Dia., R.C.P. Elbow Section, Fabrication Only	EA	8	\$1,150	\$9,200
118	30" to 24" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,430	\$1,430
119	36" to 30" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$1,880	\$1,880
120	42" to 36" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$2,100	\$2,100
121	48" to 42" Dia., R.C.P. Reducer, Fabrication Only	EA	1	\$2,350	\$2,350
122	Beehive Tile Intakes	EA	6	\$500	\$3,000
123	Crush Existing Tile	LF	13,800	\$5	\$69,000
124	Lateral Tile Connections, 10" Dia. or Smaller	EA	50	\$481	\$24,050
125	Lateral Tile Connections, 12" Dia. or Larger	EA	10	\$851	\$8,510
126	Tile Trench Stabilization and Cradling Rock	TN	350	\$26	\$9,100
127	Administration of Erosion Management Plan	LS	1	\$3,000	\$3,000
128	Silt Fence Install and Review	LF	750	\$3	\$1,875
129	Spot Tile Exploration	HR	15	\$220	\$3,300
130	Fence Cuts	EA	3	\$250	\$750
131	Mobilization	LS	1	\$85,000	\$85,000

**Estimated Division 2 Subtotal      \$1,698,000**

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

<b>Construction Division 2--Bored Secondary Roads Crossings (Worth County)</b>					
<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
201	Steel Casing, " Wall, Jacked and Bored, 24" Diameter	LF	80	\$600	\$48,000
203	Steel Casing, " Wall, Jacked and Bored, 48" Diameter	LF	160	\$1,500	\$240,000
205	2000D R.C.P., 24" Dia.	LF	20	\$71	\$1,410
206	2000D R.C.P., 36" Dia.	LF	20	\$100	\$2,000
208	Hickenbottom Intake, 12"	EA	6	\$1,000	\$6,000
209	Tile Trench Stabilization and Cradling Rock	TN	230	\$25	\$5,750
210	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
211	Traffic Control	LS	1	\$3,750	\$3,750
212	Silt Fence-Install and Remove	LF	700	\$3	\$2,100
213	Mobilization	LS	1	\$16,000	\$16,000
<b>Estimated Division 2 Subtotal</b>					<b>\$329,000</b>

<b>Construction Division 3--Bored Railroad Crossing</b>					
<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
301	Steel Casing, " Wall, Jacked and Bored, 48" Diameter	LF	100	\$1,500	\$150,000
302	Tile Trench Stabilization and Cradling Rock	TN	50	\$25	\$1,250
303	Seeding and Fertilizing (Rural)	LS	1	\$3,750	\$3,750
304	Railroad Protective Liability Insurance Provisions	LS	1	\$30,000	\$30,000
305	Silt Fence-Install and Remove	LF	100	\$3	\$300
306	Mobilization	LS	1	\$18,500	\$18,500
<b>Estimated Division 3 Subtotal</b>					<b>\$204,000</b>

**Subtotal of Construction Divisions 1, 2, 3 AND 4** **\$2,231,000**

**Construction Contingency** **\$85,000**

**Total Estimated Construction Cost** **\$2,316,000**

**Less Estimated Secondary Roads Construction Costs Paid by Others** **\$533,000**

**Total Estimated Assessable Construction Cost** **\$1,783,000**

**Construction Related Damages**

Work Area Rental (33.0 ac)	\$33,000
Other Damages	\$58,000

**Engineer's Opinion of Probable Cost  
Proposed Tile Improvements  
Drainage District No. 18  
Worth County, Iowa  
2024**

Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	\$30,000
Permitting	\$3,000
Construction Plans, Specifications, & Bid Letting	\$15,000
Construction Engineering Services	\$35,000
Legal Services, Publications, Mailings, Etc..	\$5,000
Finance, Interest & Contingency	<u>\$98,100</u>
	<b>Total Estimated Assessable Project Cost</b>
	<b>\$2,060,000</b>
Estimated Average Cost Per Currently Assessed Acre (1,416 ac)	\$1,455

# ENGINEER'S ESTIMATE

DRAINAGE REPAIRS- OPEN DITCH  
DRAINAGE DISTRICT NO. 18  
DALLAS COUNTY, IOWA  
BMI PROJECT NO. 24X135030000



Real People. Real Solutions.

Date: 8/23/2024

Item No.	Item	Estimated Quantity	Unit	Unit Price	Total Amount
<b>CONSTRUCTION DIVISION 1 - DD 18 MAIN OPEN DITCH CONSTRUCTION</b>					
101	EXCAVATION	77,000	CY	\$4.00	\$308,000.00
102	TOPSOIL STRIPPING	20,600	CY	\$4.00	\$82,400.00
103	SPOIL LEVELING (BOTH SIDES)	111	STA	\$300.00	\$33,300.00
104	DAILY SEED & FERTILIZE BANKS	111	STA	\$100.00	\$11,100.00
105	SPOIL TILLAGE AND ROCK PICK-UP	111	STA	\$50.00	\$5,550.00
106	SPOIL TEMPORARY SEEDING	111	STA	\$80.00	\$8,880.00
107	TILE EXTENSION, 12" CMP	800	LF	\$30.00	\$24,000.00
108	TILE EXTENSION, 15" CMP	120	LF	\$35.00	\$4,200.00
109	TILE EXTENSION, 18" CMP	40	LF	\$45.00	\$1,800.00
110	SURFACE DRAIN, 24" CMP	880	LF	\$60.00	\$52,800.00
111	RIPRAP, CLASS D	400	TN	\$65.00	\$26,000.00
112	EROSION MANAGEMENT PLAN	1	LS	\$1,000.00	\$1,000.00
113	SILT FENCE	100	LF	\$3.00	\$300.00
114	FENCE CUTS	2	EA	\$250.00	\$500.00
115	TILE OUTLET MODIFICATIONS	25	EA	\$250.00	\$6,250.00
116	MOBILIZATION	1	LS	\$30,000.00	\$30,000.00
					<b>\$596,080.00</b>
<b>CONSTRUCTION DIVISION 2 - DD 18 OPEN DITCH REPAIR</b>					
201	EXCAVATION	12	STA	\$250.00	\$3,000.00
202	SPOIL LEVELING (BOTH SIDES)	12	STA	\$200.00	\$2,400.00
203	DAILY SEED & FERTILIZE BANKS	12	STA	\$100.00	\$1,200.00
204	SPOIL TILLAGE AND ROCK PICK-UP	12	STA	\$30.00	\$360.00
205	SPOIL TEMPORARY SEEDING	12	STA	\$80.00	\$960.00
206	ADMINISTRATION OF EROSION MANAGEMENT PLAN	1	LS	\$1,000.00	\$1,000.00
207	SILT FENCE	100	LF	\$3.00	\$300.00
208	MOBILIZATION	1	LS	\$500.00	\$500.00
<b>CONSTRUCTION DIVISION 3 - DD 18 OPEN MAIN TILE IMPROVEMENT</b>					
301	2000D R.C.P. 18" DIA.	525	LF	\$42.00	\$22,050.00
302	2000D R.C.P. 24" DIA.	1,900	LF	\$50.00	\$95,000.00



303	12" ON XX" DIA. R.C.P. TEE	17	EA	\$1,000.00	\$17,000.00
304	18" DIA. R.C.P. ELBOW SEC., FABRICATION	1	EA	\$600.00	\$600.00
305	24" DIA. R.C.P. ELBOW SEC., FABRICATION	3	EA	\$700.00	\$2,100.00
306	24" TO 18" DIA. R.C.P. REDUCER, FABRICATION	1	EA	\$1,200.00	\$1,200.00
307	BEEHIVE TILE INTAKES	2	EA	\$500.00	\$1,000.00
308	CRUSH EXISTING TILE	2,425	LF	\$5.00	\$12,125.00
309	LATERAL TILE CONNECTIONS, 10" DIA. OR SMALLER	10	EA	\$550.00	\$5,500.00
310	LATERAL TILE CONNECTIONS, 12" DIA. OR LARGER	2	EA	\$1,100.00	\$2,200.00
311	TILE TRENCH STABILIZATION & CRADLING ROCK	50	TN	\$30.00	\$1,500.00
312	ADMINISTRATION OF EROSION MANAGEMENT PLAN	1	LS	\$1,000.00	\$1,000.00
313	FENCE CUTS	1	EA	\$250.00	\$250.00
314	MOBILIZATION	1	LS	\$8,000.00	\$8,000.00
					<b>\$169,525.00</b>

<b>ESTIMATED CONSTRUCTION COSTS TOTAL:</b>	<b>\$765,600.00</b>
<b>CONSTRUCTION CONTINGENCY</b>	<b>\$38,300.00</b>

**ALTERNATIVE ADDITIONAL SEEDING METHODS**

401	HYDRAULIC MULCH SEEDING	123	STA	<u>\$250.00</u>	<u>\$30,750.00</u>
402	CONVENTIONAL MULCH SEEDING	123	STA	<u>\$250.00</u>	<u>\$30,750.00</u>

**Associated Project Costs**

DAMAGES	\$36,000.00
RIGHT-OF-WAY AND SEVERANCE	\$810,000.00

**Engineering**

SURVEY, STUDY & REPORT THOROUGH HEARINGS	<u>\$50,000.00</u>
PERMITS AND ENVIRONMENTAL COMPLIANCE	<u>\$50,000.00</u>
CONSTRUCTION PLANS, SPECIFICATIONS & BID LETTING	<u>\$15,000.00</u>
CONSTRUCTION ENGINEERING SERVICES	<u>\$35,000.00</u>
LEGAL SEVICES, PUBLICATIONS, MAILINGS, ETC.	<u>\$5,000.00</u>
FINANCE & INTEREST	<u>\$144,400.00</u>

**ESTIMATED ASSOCIATED PROJECT COSTS TOTAL: \$1,145,400.00**

**ESTIMATED PROJECT COST : \$1,949,300.00**

**TOTAL ESTIMATED COST ASSESSED TO LANDOWNERS : \$1,950,000.00**

Estimated Average Cost Per Benefited Acre (1,416 ac)	\$1,377
Estimated Average Cost Per Acre Per Year (10 years)	\$198
Estimated Average Cost Per Acre Per Year (20 years)	\$127

GOVERNING SPECIFICATIONS

THE 2024 EDITION OF THE "IOWA STATEWIDE URBAN SPECIFICATIONS FOR PUBLIC IMPROVEMENTS".

MUTCD 2009 AS ADOPTED BY IOWA DEPARTMENT OF TRANSPORTATION.

ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITHIN THE CONSTRUCTION OF THIS PROJECT.

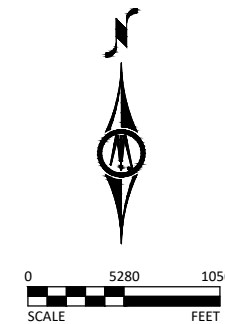
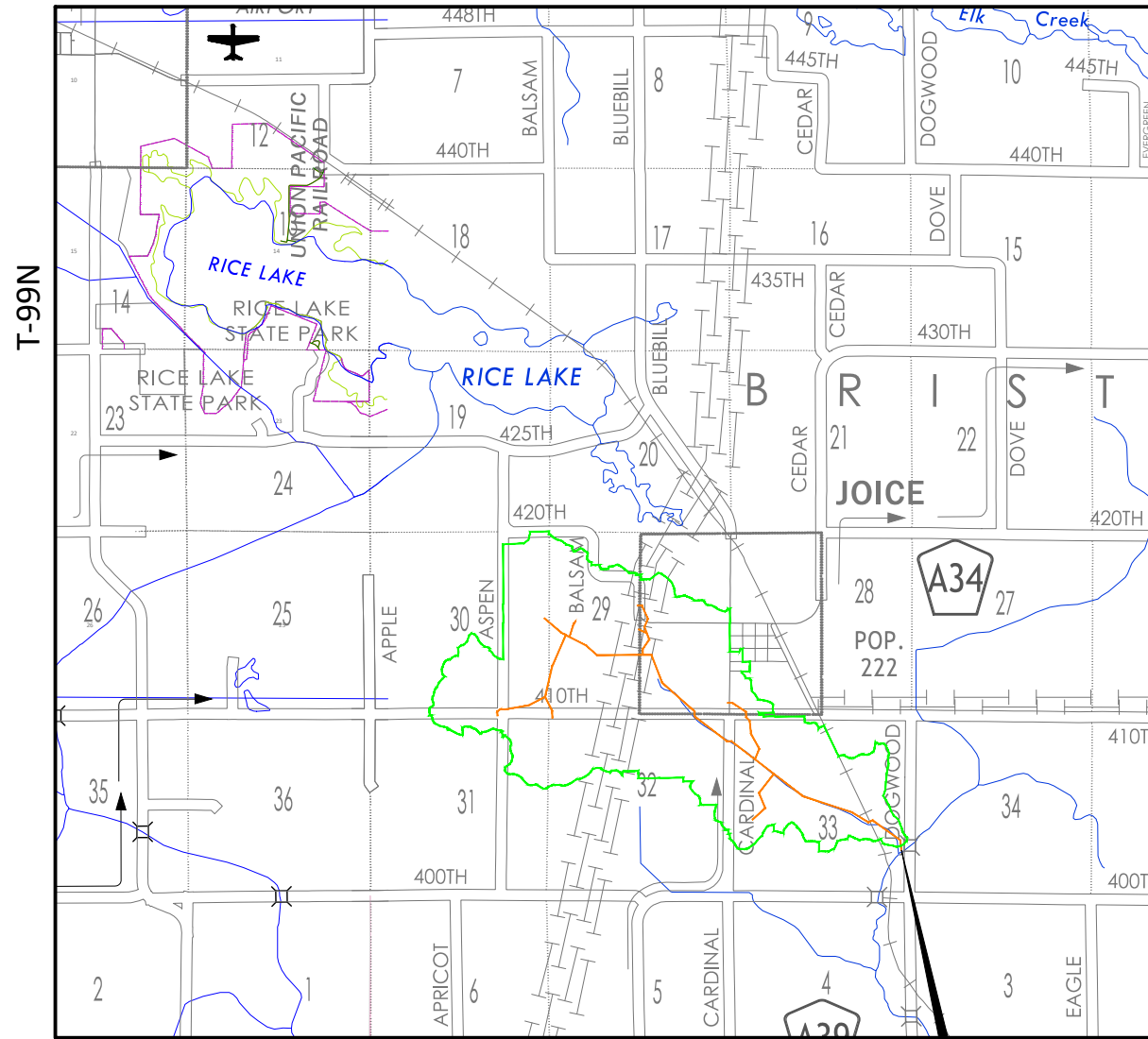
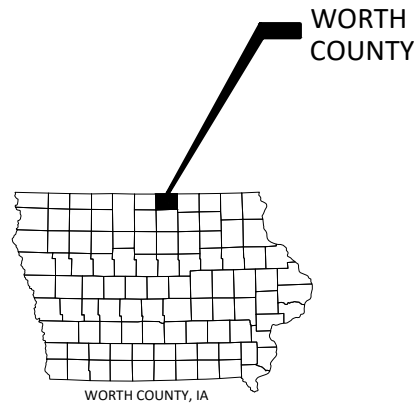


NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL 1-800-292-8989 OR 811

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D UNLESS OTHERWISE NOTED. THIS UTILITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-22, ENTITLED "STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".

# PRELIMINARY PLANS FOR DRAINAGE DISTRICT No. 18 PROPOSED TILE IMPROVEMENTS WITH OPTIONS WORTH COUNTY, IOWA 2024

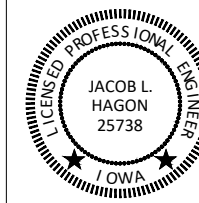
Sheet List Table	
Sheet Number	Sheet Title
A.01	TITLE SHEET
A.02	LEGEND SHEET
B.01	RCP INSTALLATION
B.02	CPDT INSTALLATION
B.03	TILE INTAKE DETAILS
C.01	QUANTITIES
C.02	ESTIMATE REFERENCE NOTES
C.03	CONSTRUCTION NOTES
C.04	SWEMP
D.01	PLAN & PROFILE - OPEN DITCH OPTION
D.02	PLAN & PROFILE - OPEN DITCH OPTION
D.03	PLAN & PROFILE - OPEN DITCH OPTION
D.04	PLAN & PROFILE - OPEN DITCH OPTION
M.01	PLAN & PROFILE - MAIN TILE
M.02	PLAN & PROFILE - MAIN TILE
M.03	PLAN & PROFILE - MAIN TILE
M.04	PLAN & PROFILE - MAIN TILE
M.05	PLAN & PROFILE - MAIN TILE
M.06	PLAN & PROFILE - BRANCH A
M.07	PLAN & PROFILE - BRANCH B
M.08	PLAN & PROFILE - BRANCH'S C & C-1
M.09	PLAN & PROFILE - BRANCH'S D1 & E
M.10	PLAN & PROFILE - BRANCH F
M.11	PLAN & PROFILE - MAIN TILE - 1 in COEFF. OPTION
M.12	PLAN & PROFILE - MAIN TILE - 1 in COEFF. OPTION
M.13	PLAN & PROFILE - MAIN TILE - 1 in COEFF. OPTION
M.14	PLAN & PROFILE - MAIN TILE - 1 in COEFF. OPTION
M.15	PLAN & PROFILE - MAIN TILE - 1 in COEFF. OPTION



R-22W

PROJECT LOCATION

PROJECT DATUM: STATE PLANE  
HORIZONTAL: IOWA NORTH  
VERTICAL: NAVD 1988



I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

JACOB L. HAGON, P.E.

LICENSE NUMBER: 25738 DATE: \_\_\_\_\_

MY LICENSE RENEWAL DATE IS 12/31/2024

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL SHEET

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Email: jefferson@bolton-menk.com  
www.bolton-menk.com

DESIGNED	REV	DESCRIPTION	DATE
JLH			
CLH			
JLH			
CLIENT PROJ. NO.	24X135030000		

PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS

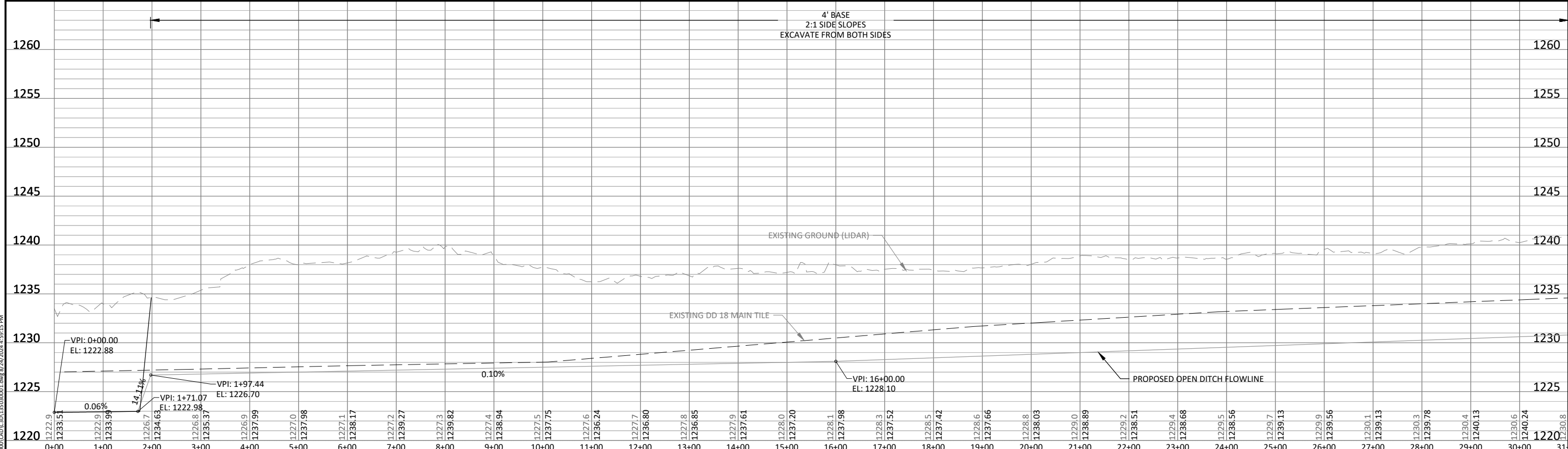
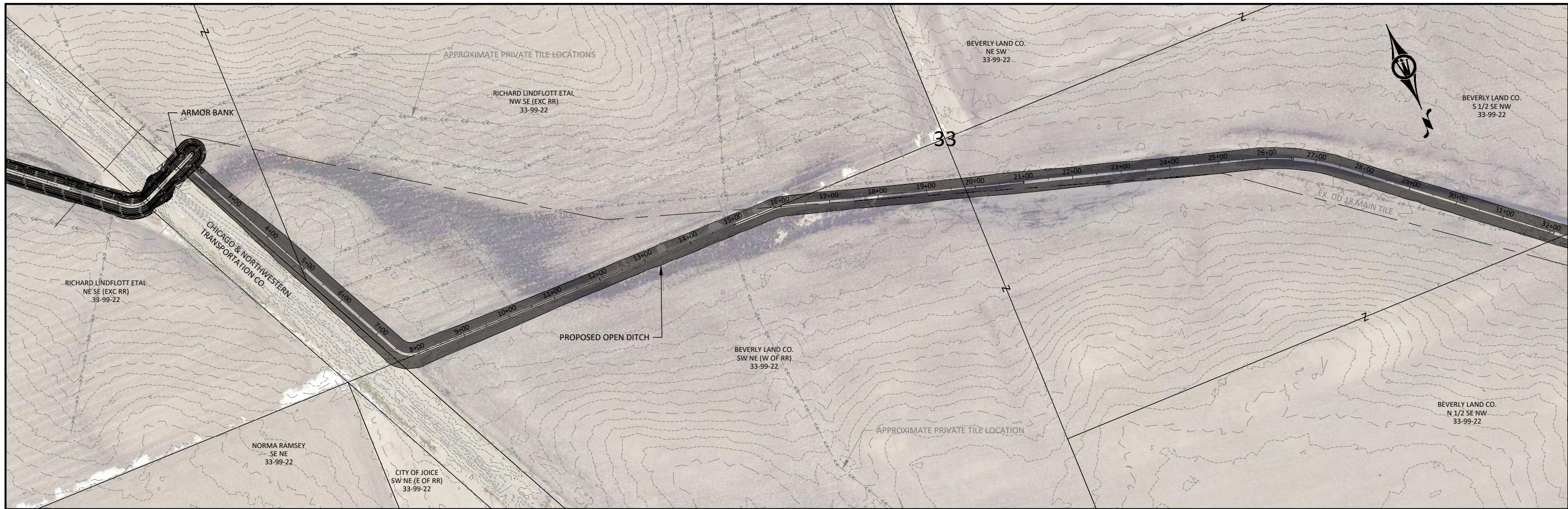
WORTH COUNTY, IOWA

TITLE SHEET

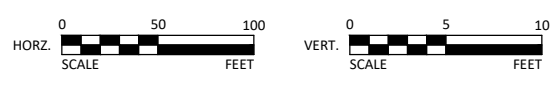
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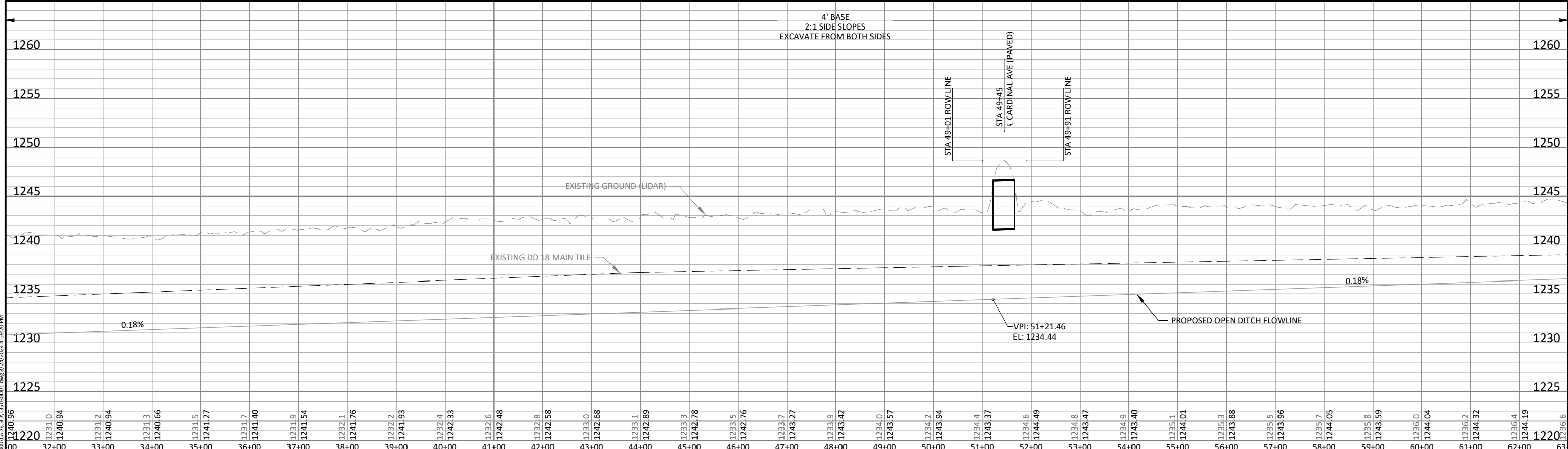
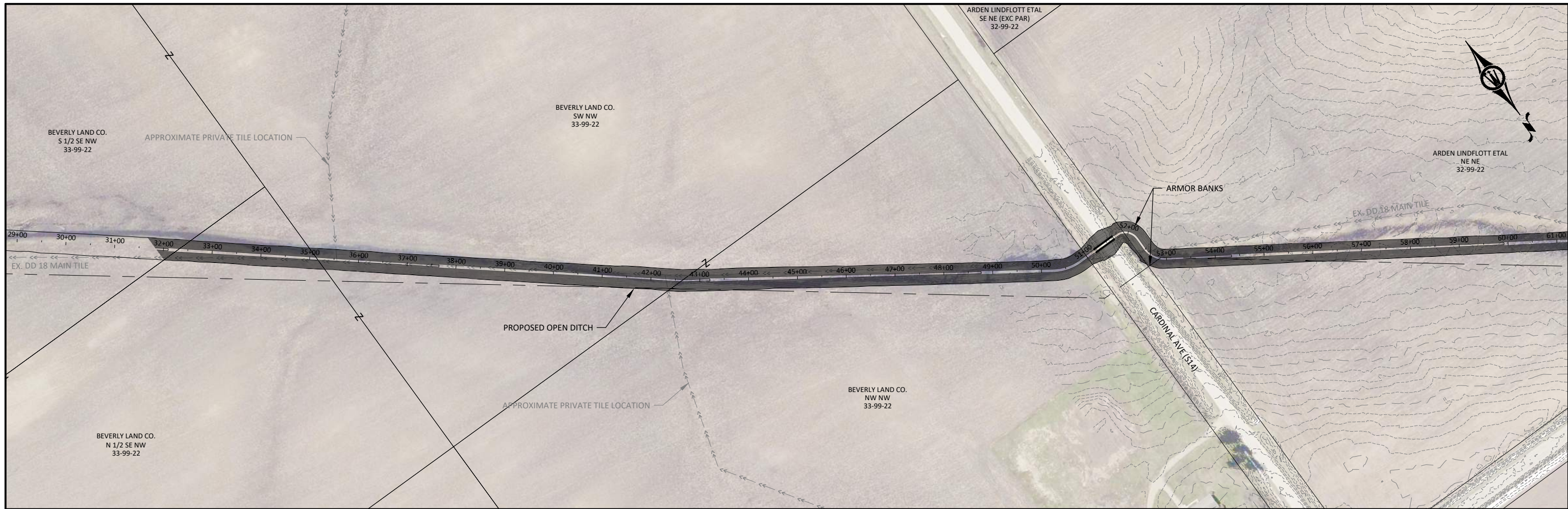
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JLH			
CLIENT PROJ. NO.	24X135030000		

**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
WORTH COUNTY, IOWA  
**PLAN & PROFILE - OPEN DITCH OPTION**

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**D.01**





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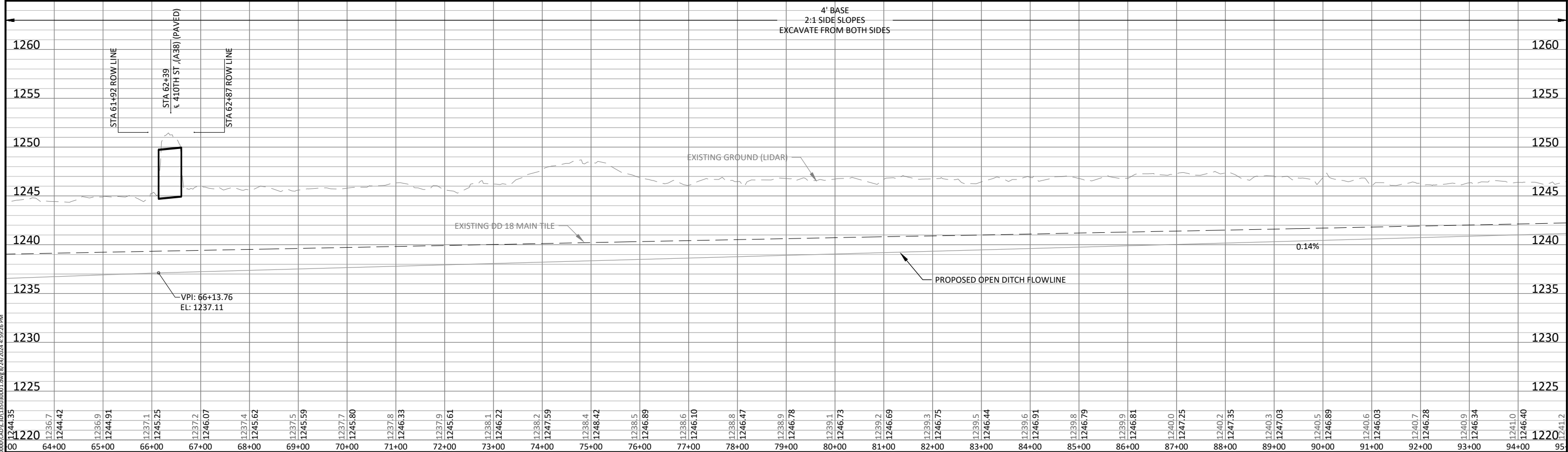
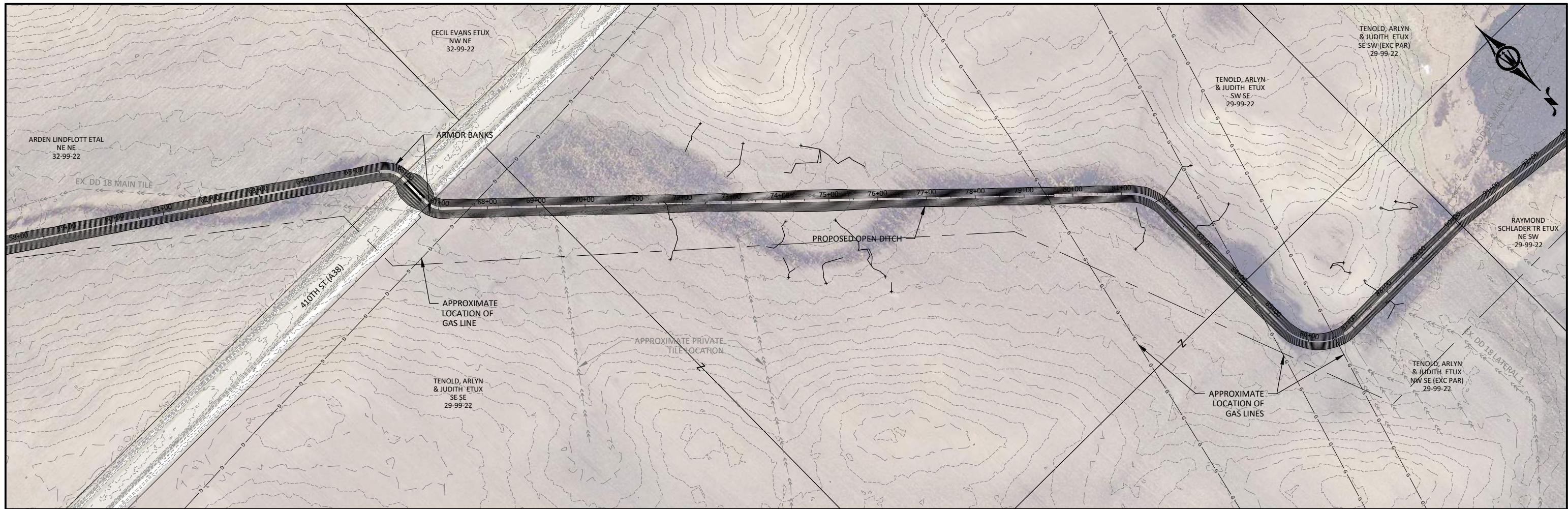
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 PLAN & PROFILE - OPEN DITCH OPTION

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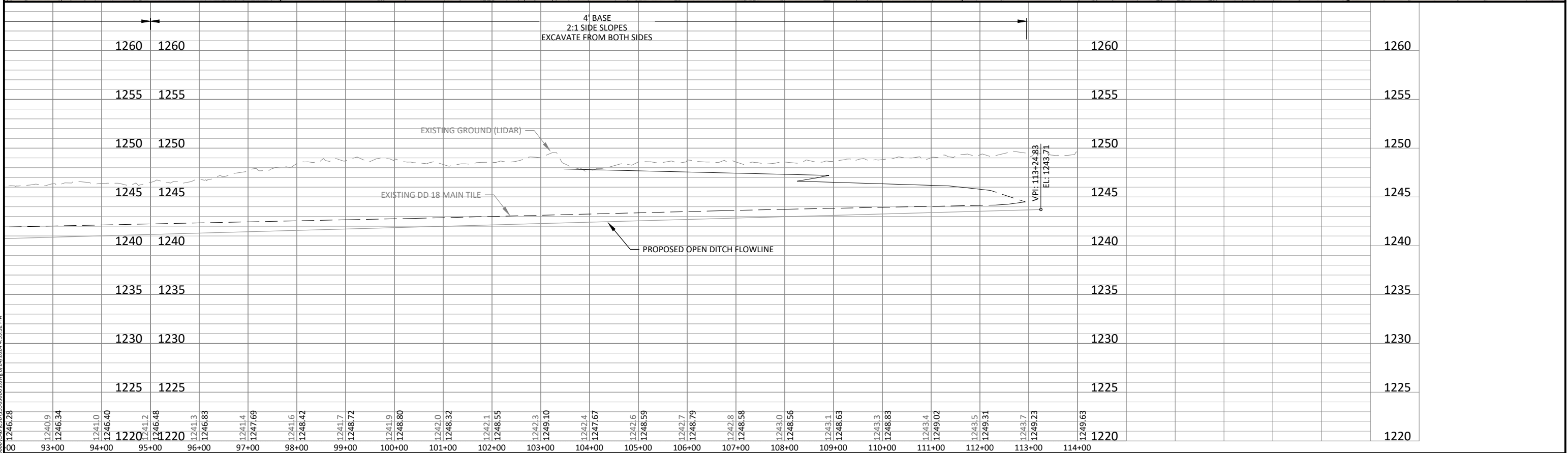
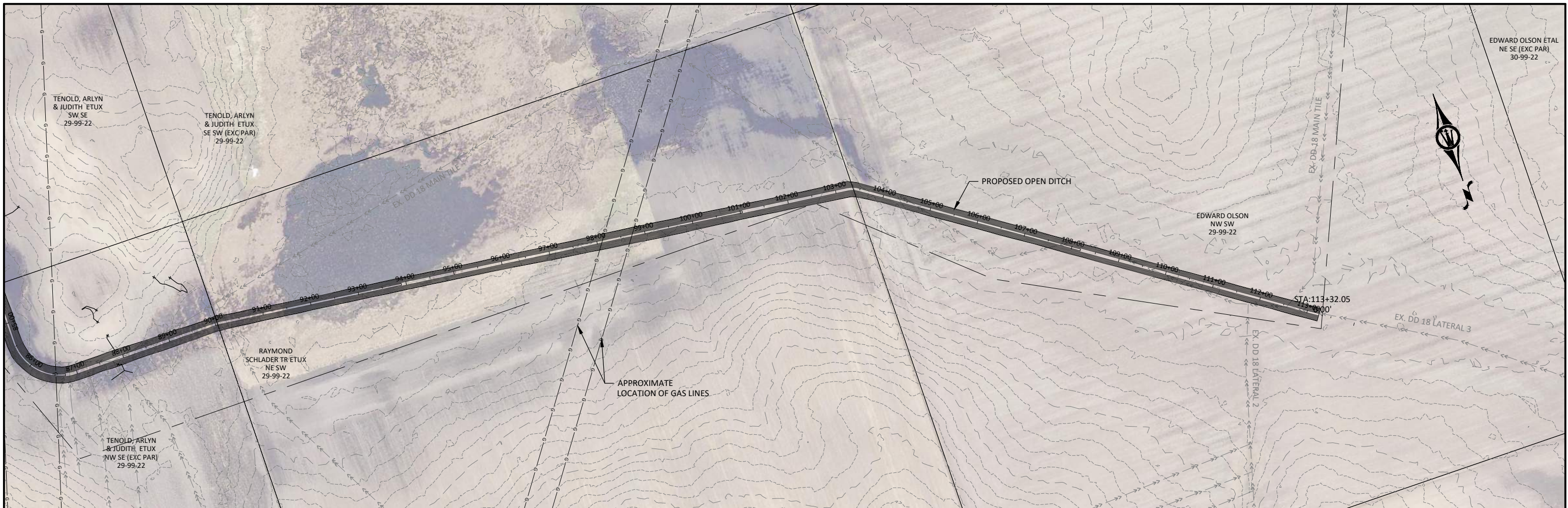
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**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
 WORTH COUNTY, IOWA

PLAN & PROFILE - OPEN DITCH OPTION

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**D.03**





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PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS

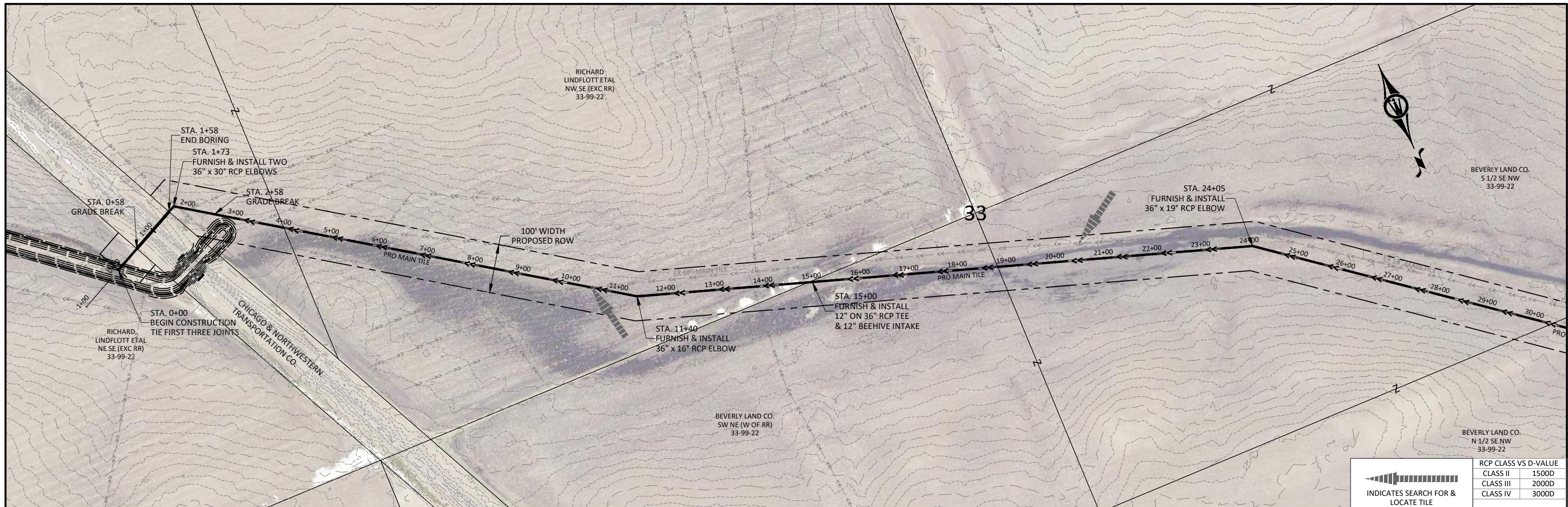
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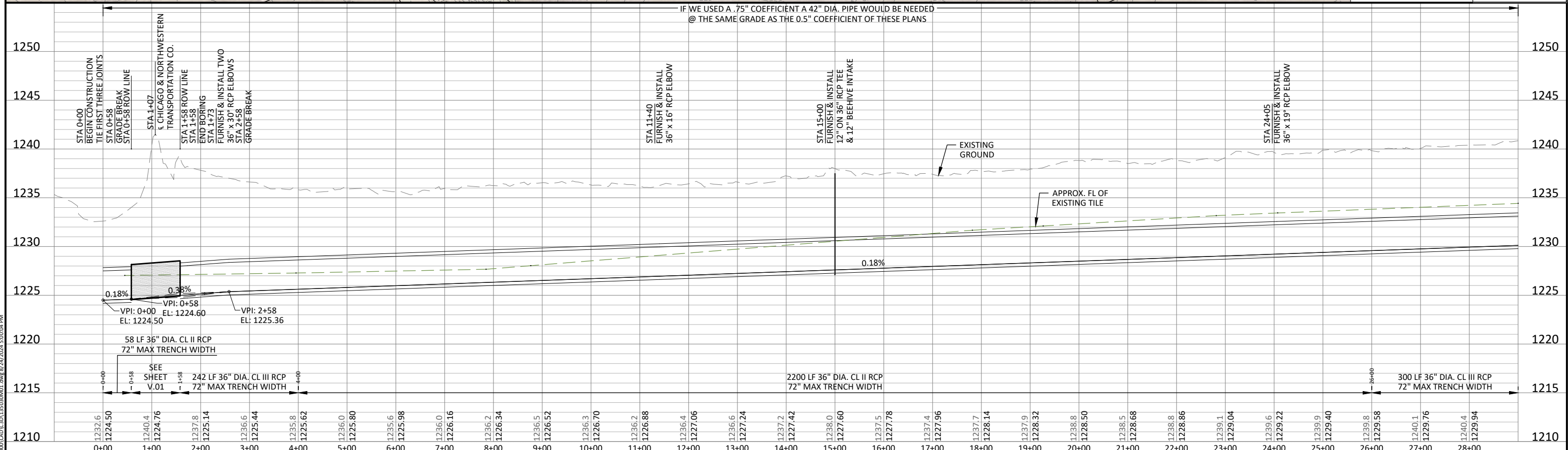
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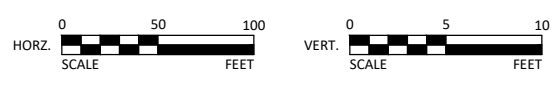




RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D



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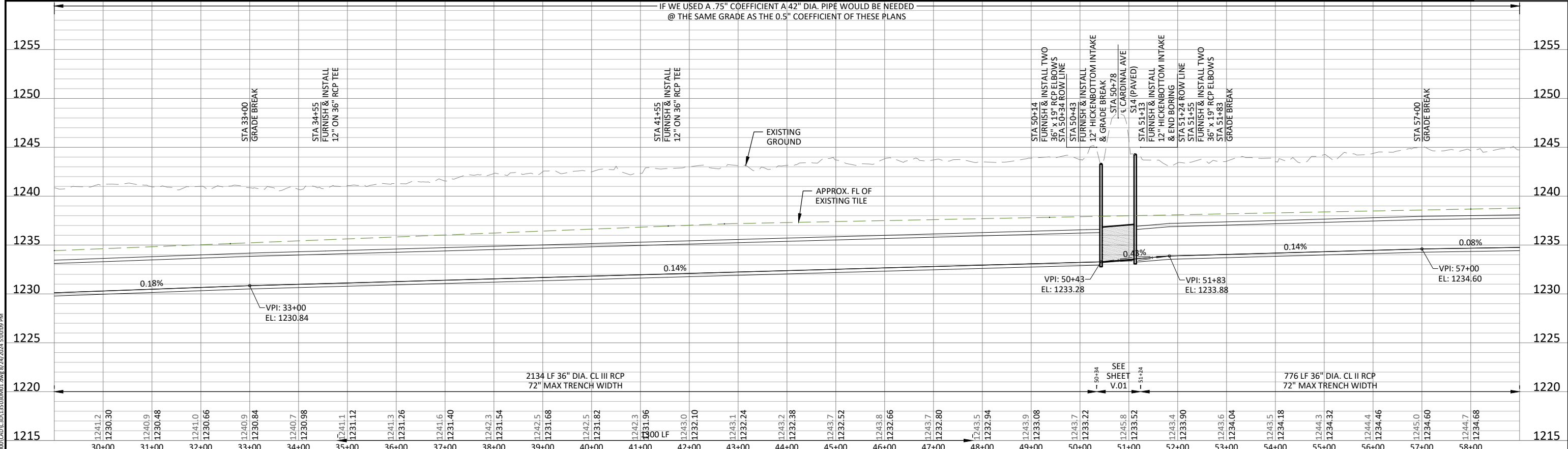
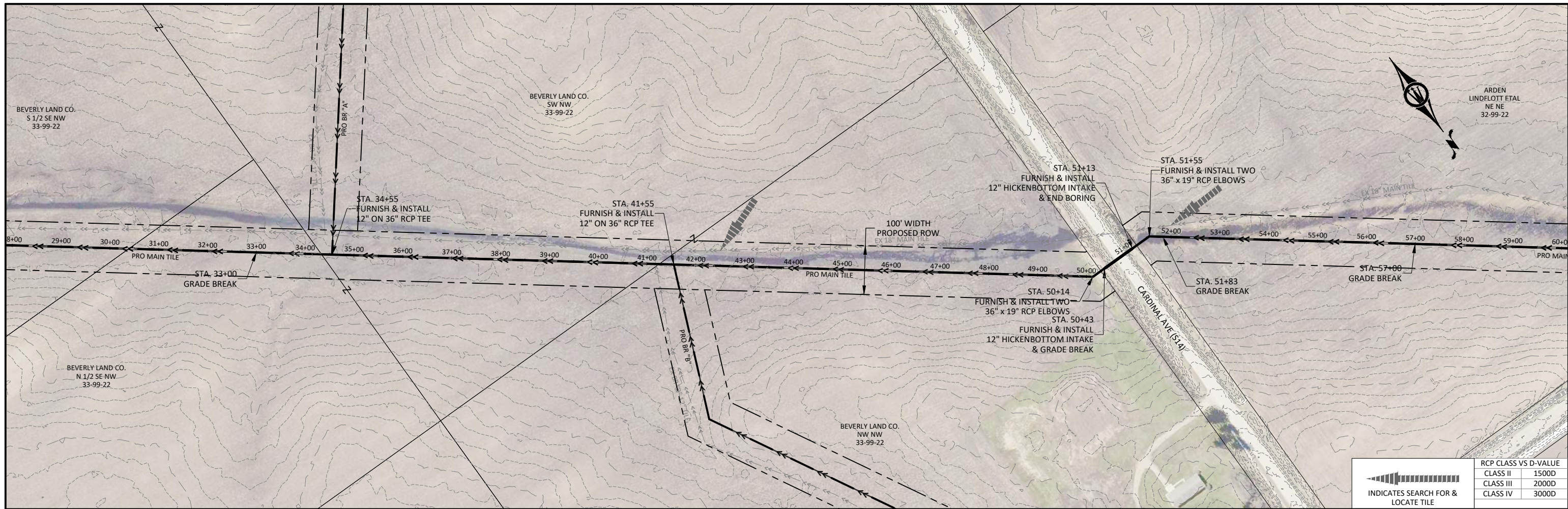
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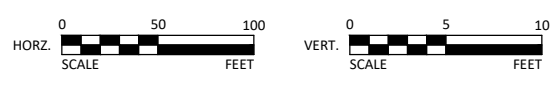
**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
 WORTH COUNTY, IOWA  
**PLAN & PROFILE - MAIN TILE**

SHEET **M.01**





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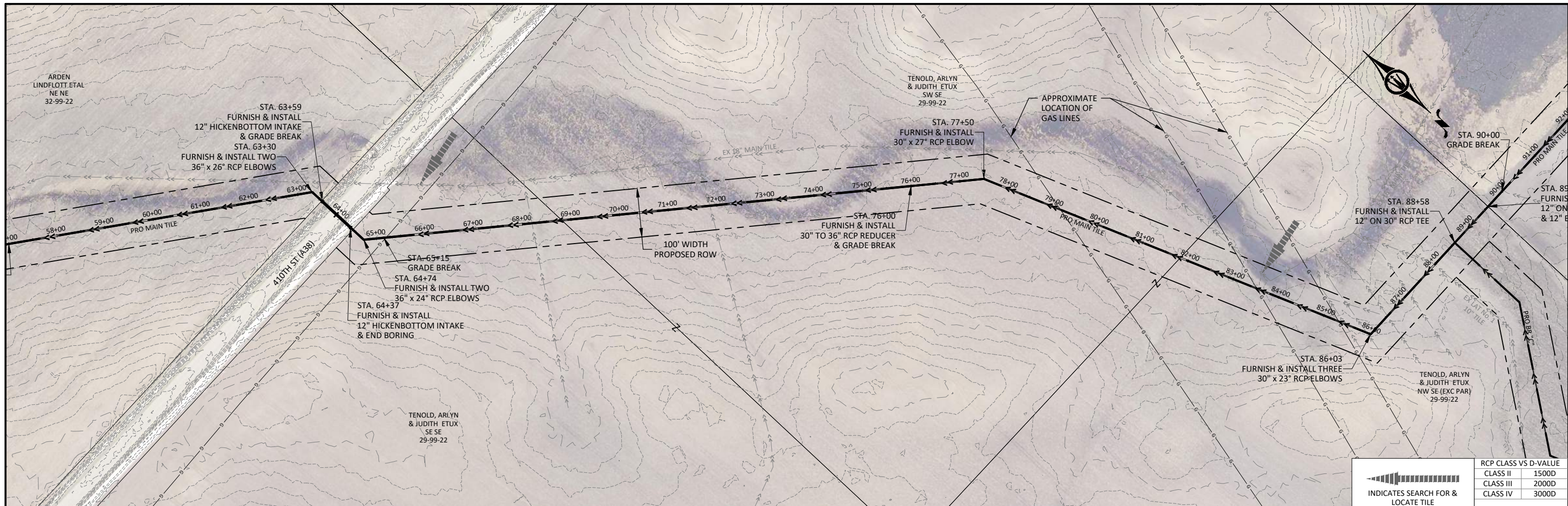
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PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA  
PLAN & PROFILE - MAIN TILE

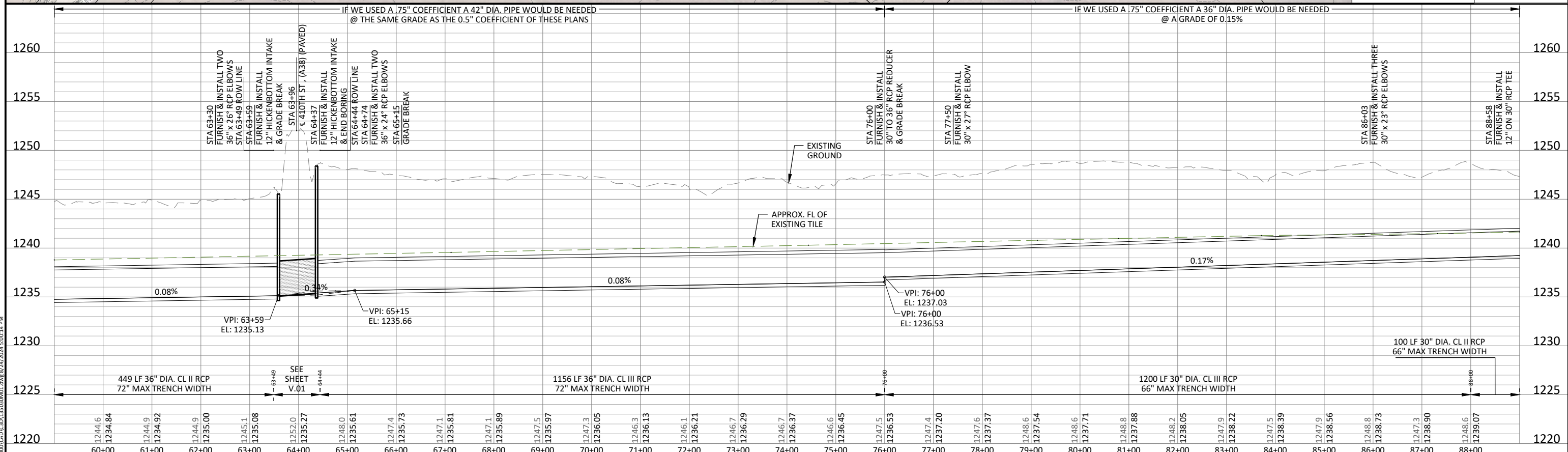
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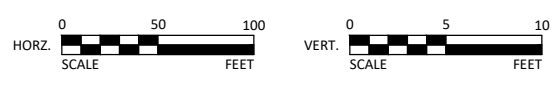


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CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE



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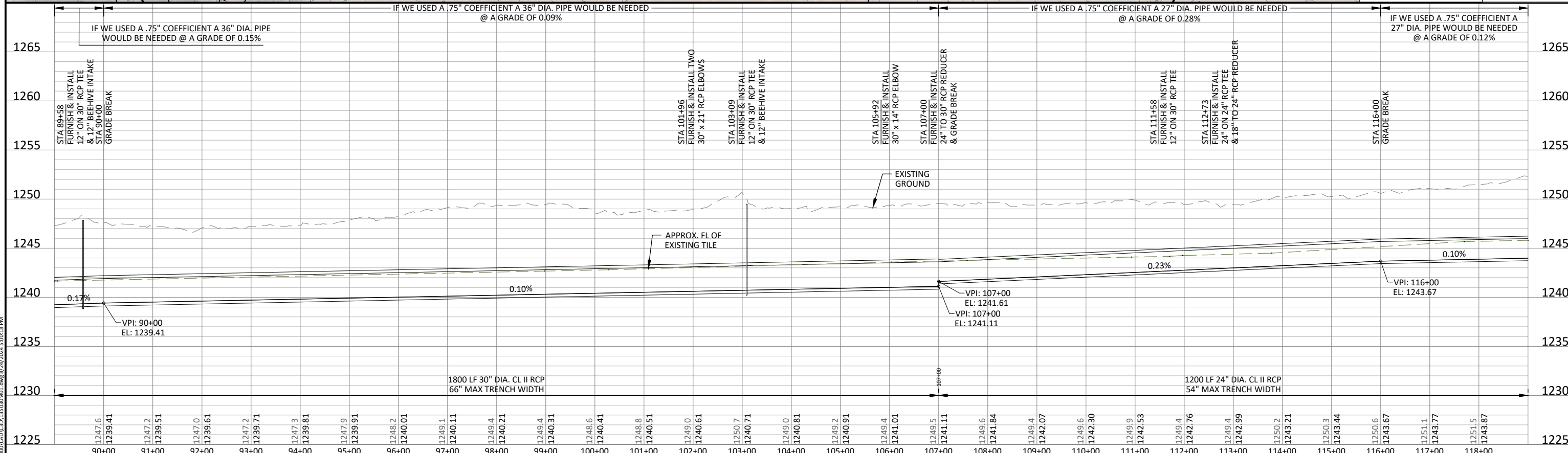
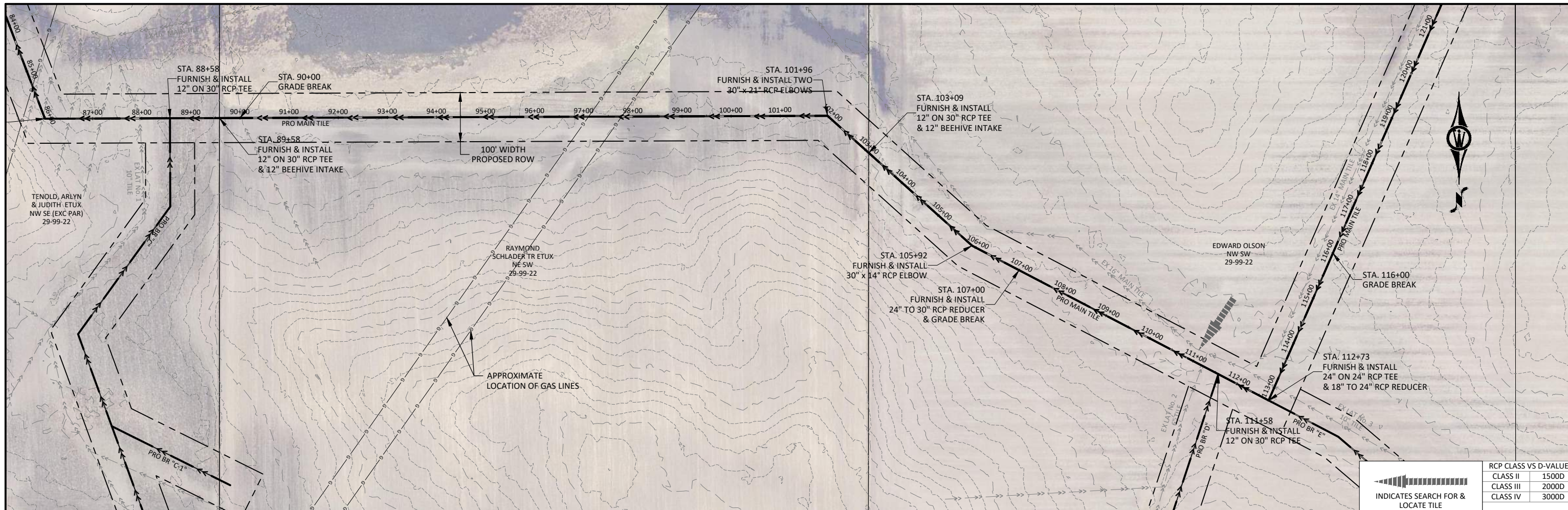
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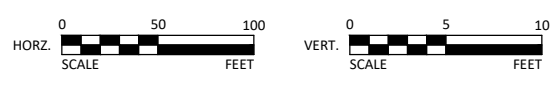
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 WORTH COUNTY, IOWA  
 PLAN & PROFILE - MAIN TILE

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**M.03**





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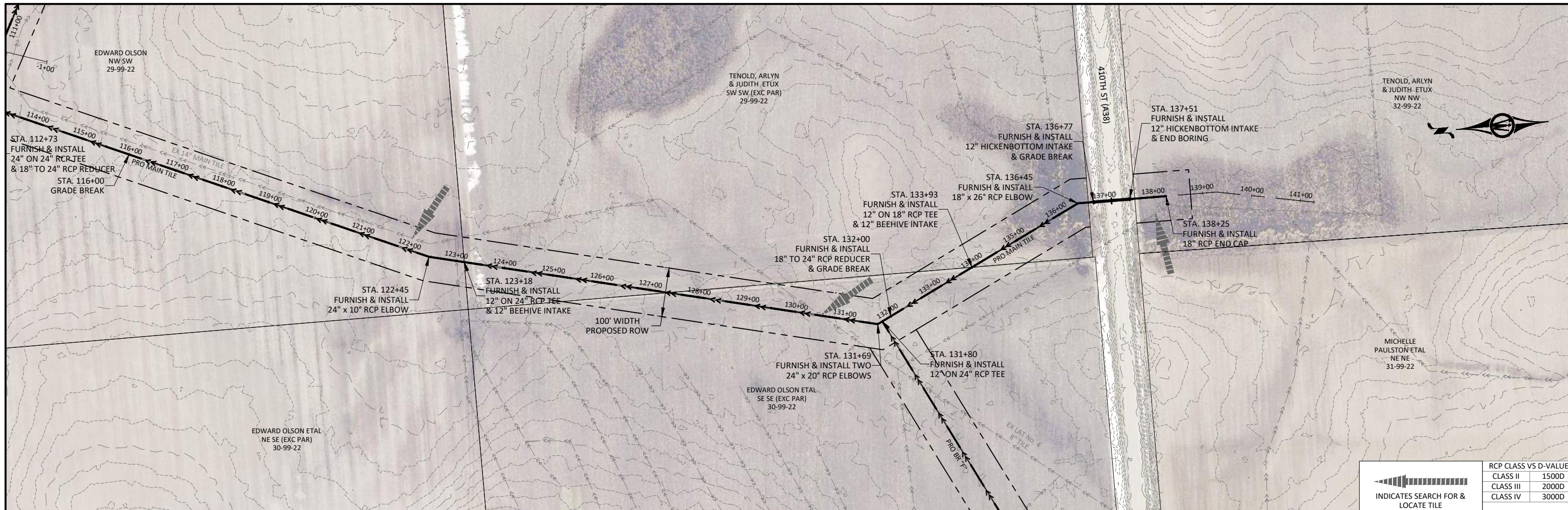
PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA

PLAN & PROFILE - MAIN TILE

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M.04

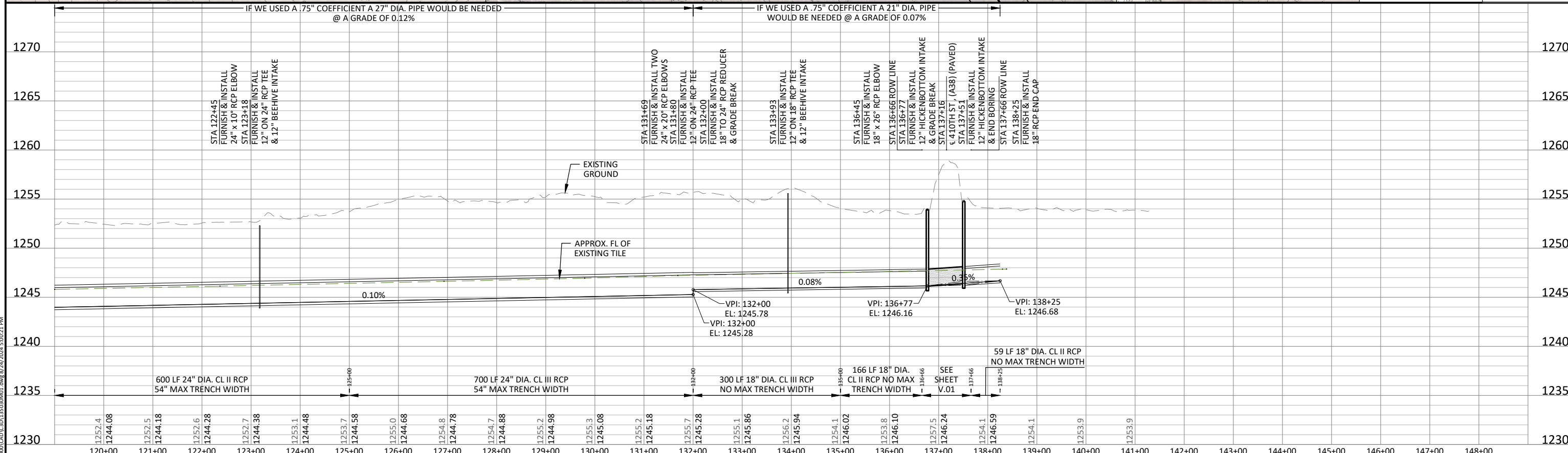
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CLASS III	2000D
CLASS IV	3000D





RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE



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SCALE FEET

0 5 10  
SCALE FEET

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CLH			
JLH			

CLIENT PROJ. NO.: 24X135030000

**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**

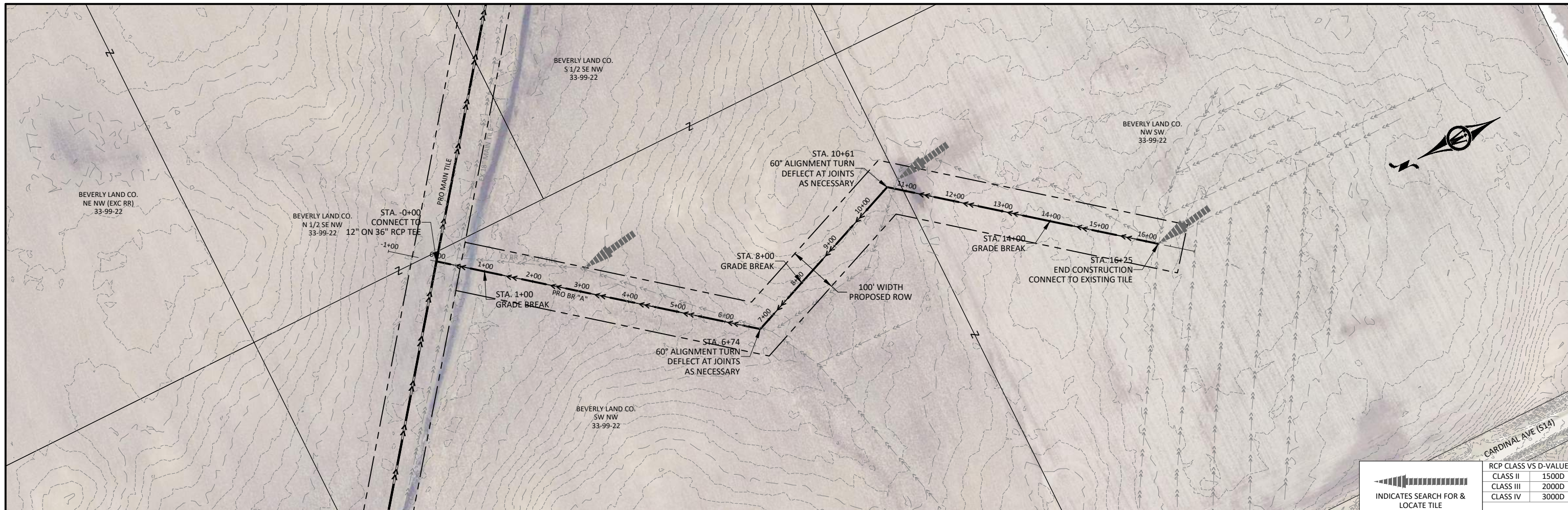
WORTH COUNTY, IOWA

PLAN & PROFILE - MAIN TILE

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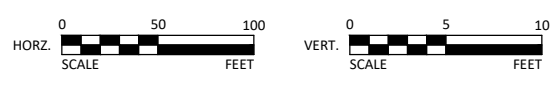
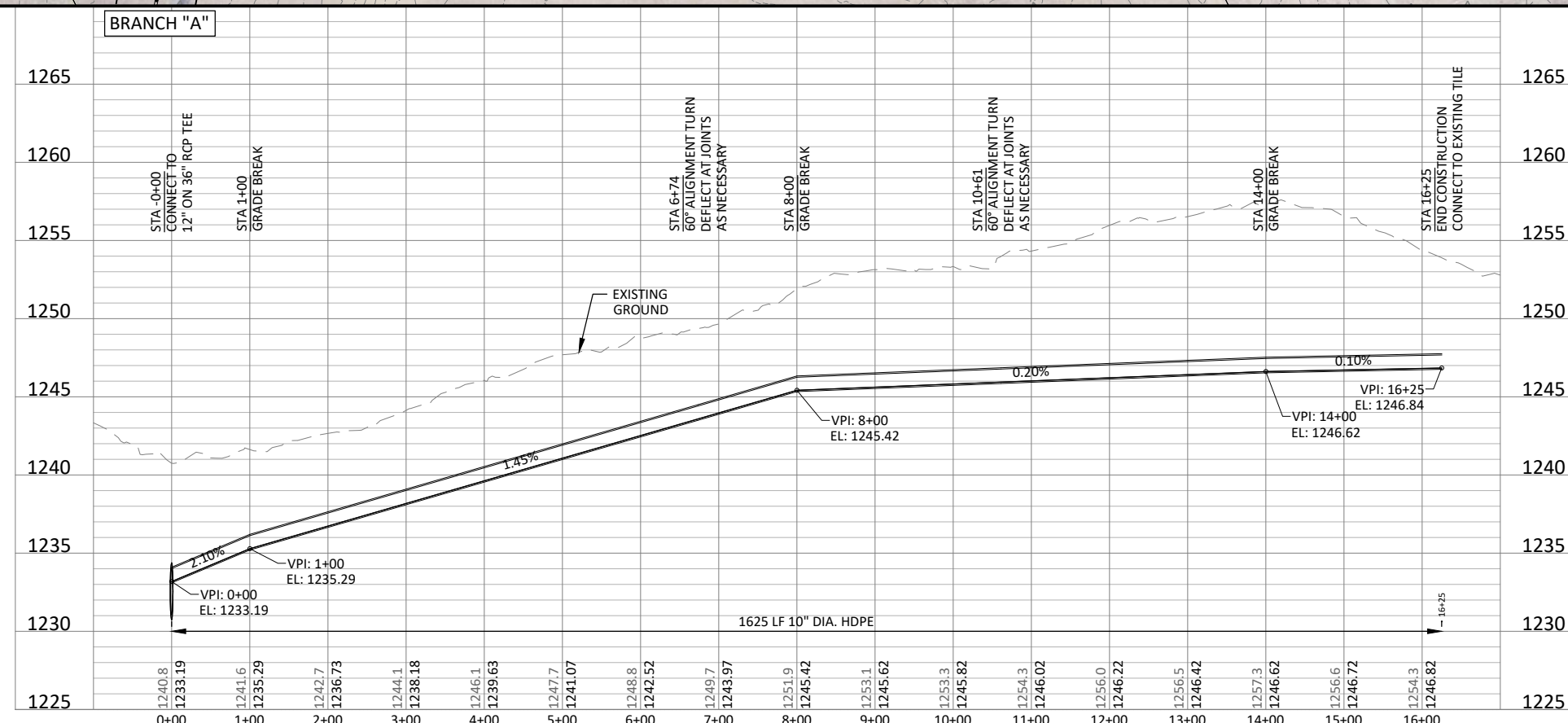
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RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE



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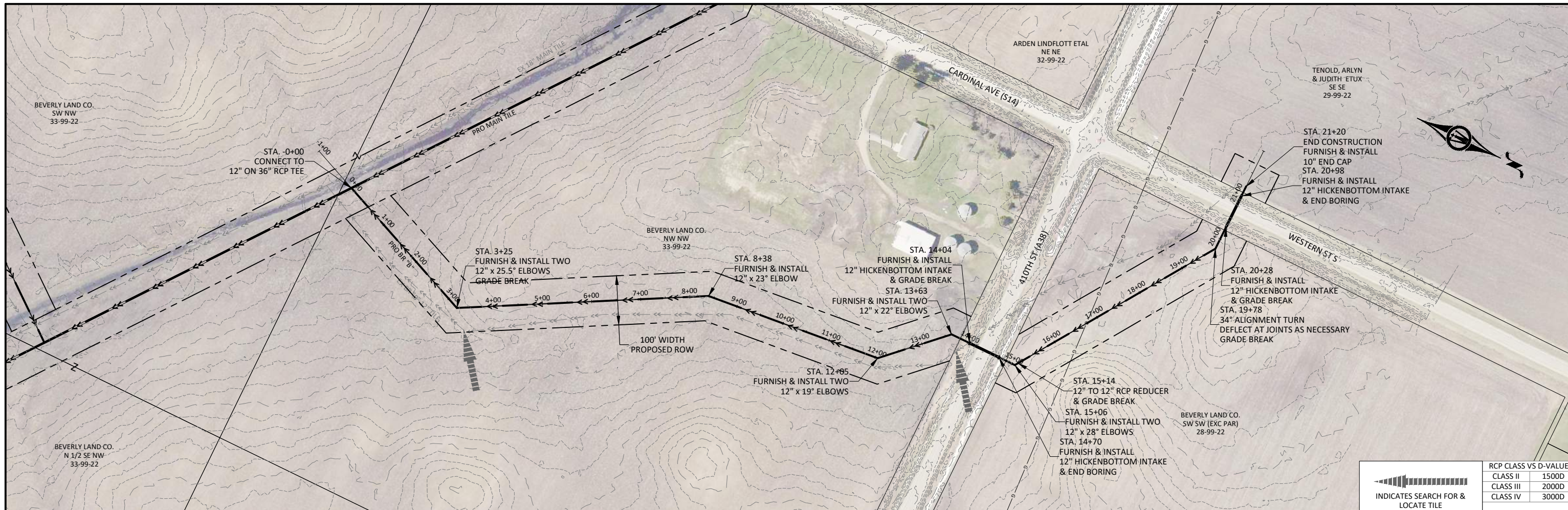
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PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
 WORTH COUNTY, IOWA  
 PLAN & PROFILE - BRANCH A

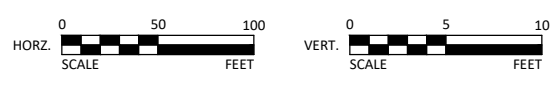
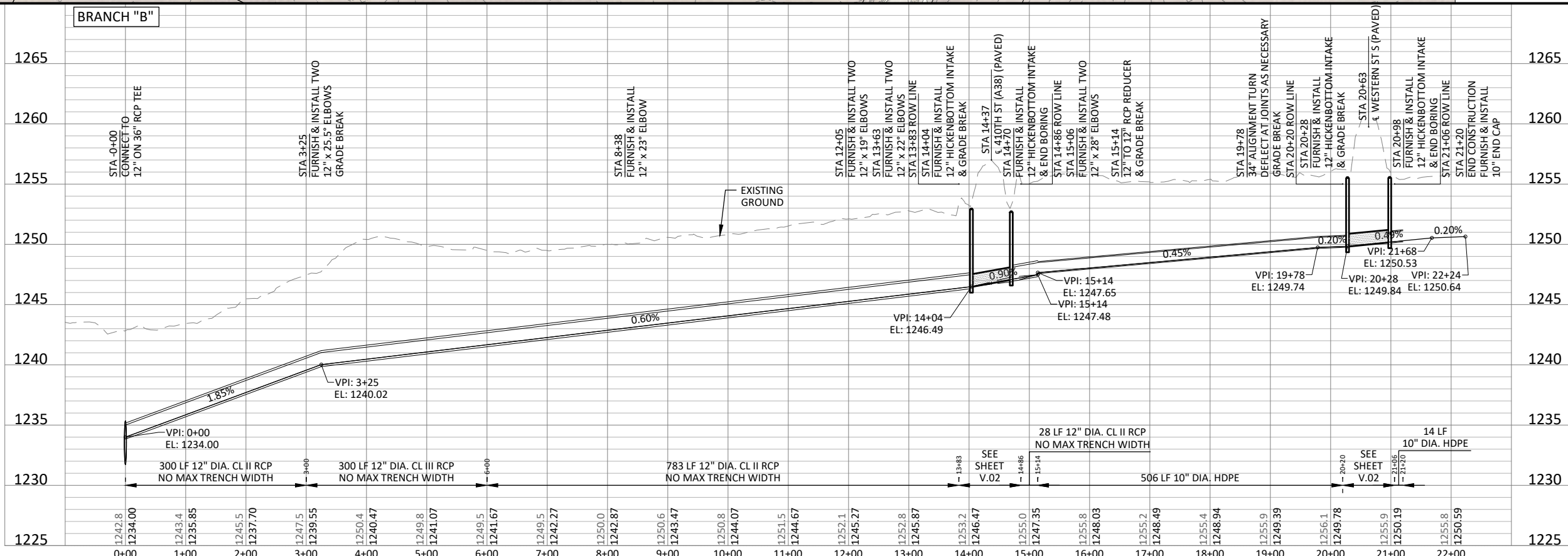
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INDICATES SEARCH FOR & LOCATE TILE	RCP CLASS VS D-VALUE
█	CLASS II 1500D
█	CLASS III 2000D
█	CLASS IV 3000D



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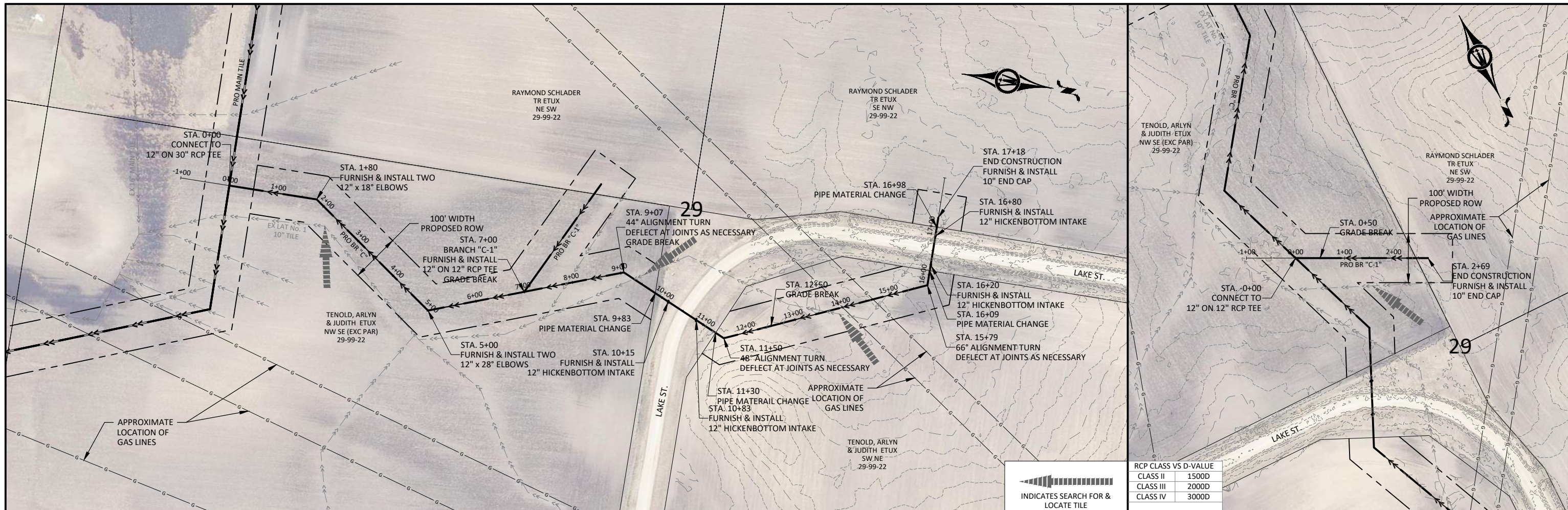
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**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
 WORTH COUNTY, IOWA  
**PLAN & PROFILE - BRANCH B**

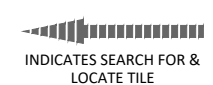
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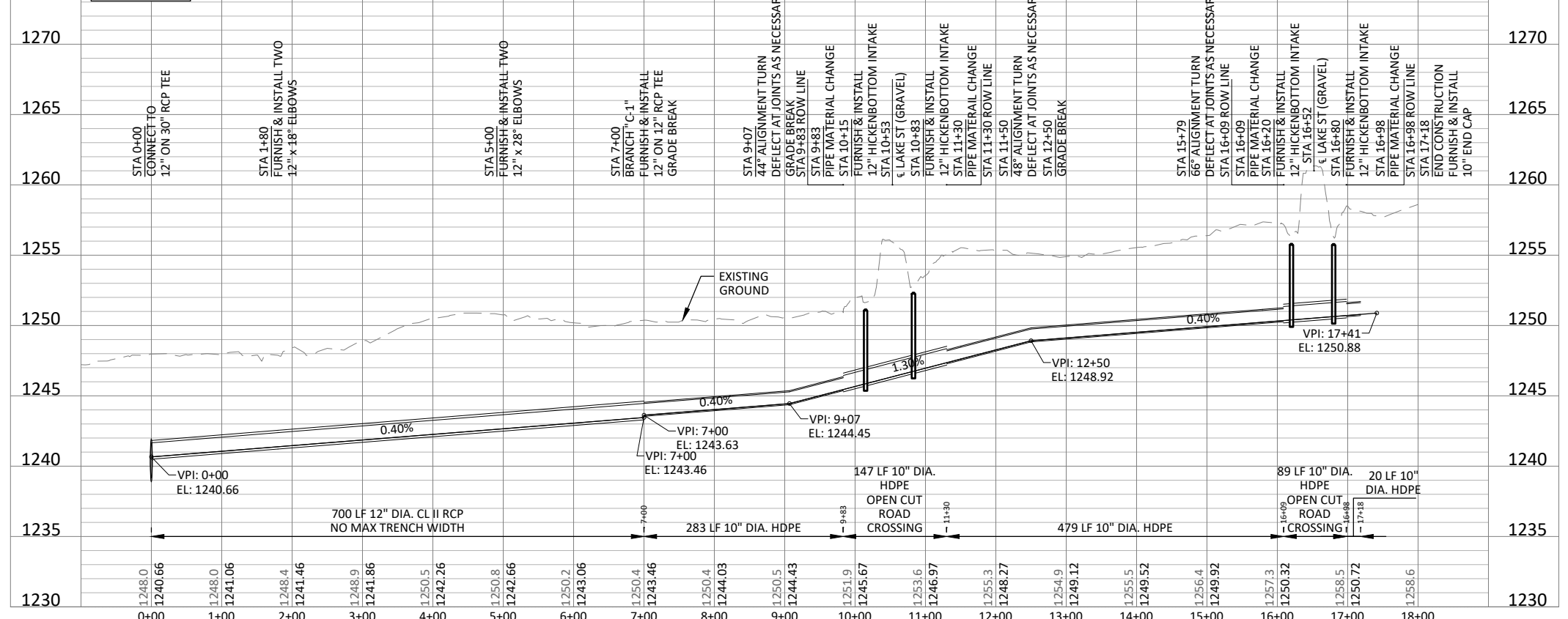




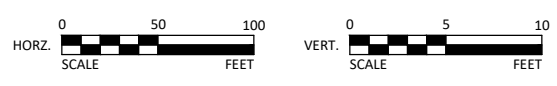
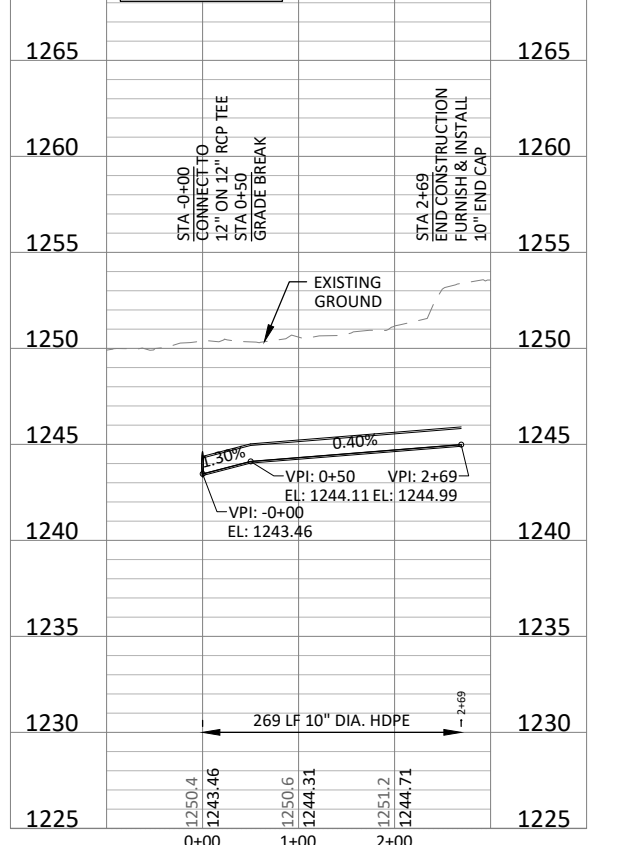
RCP CLASS	V-S D-VALUE
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D



**BRANCH "C"**



**BRANCH "C-1"**



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Email: jefferson@bolton-menk.com  
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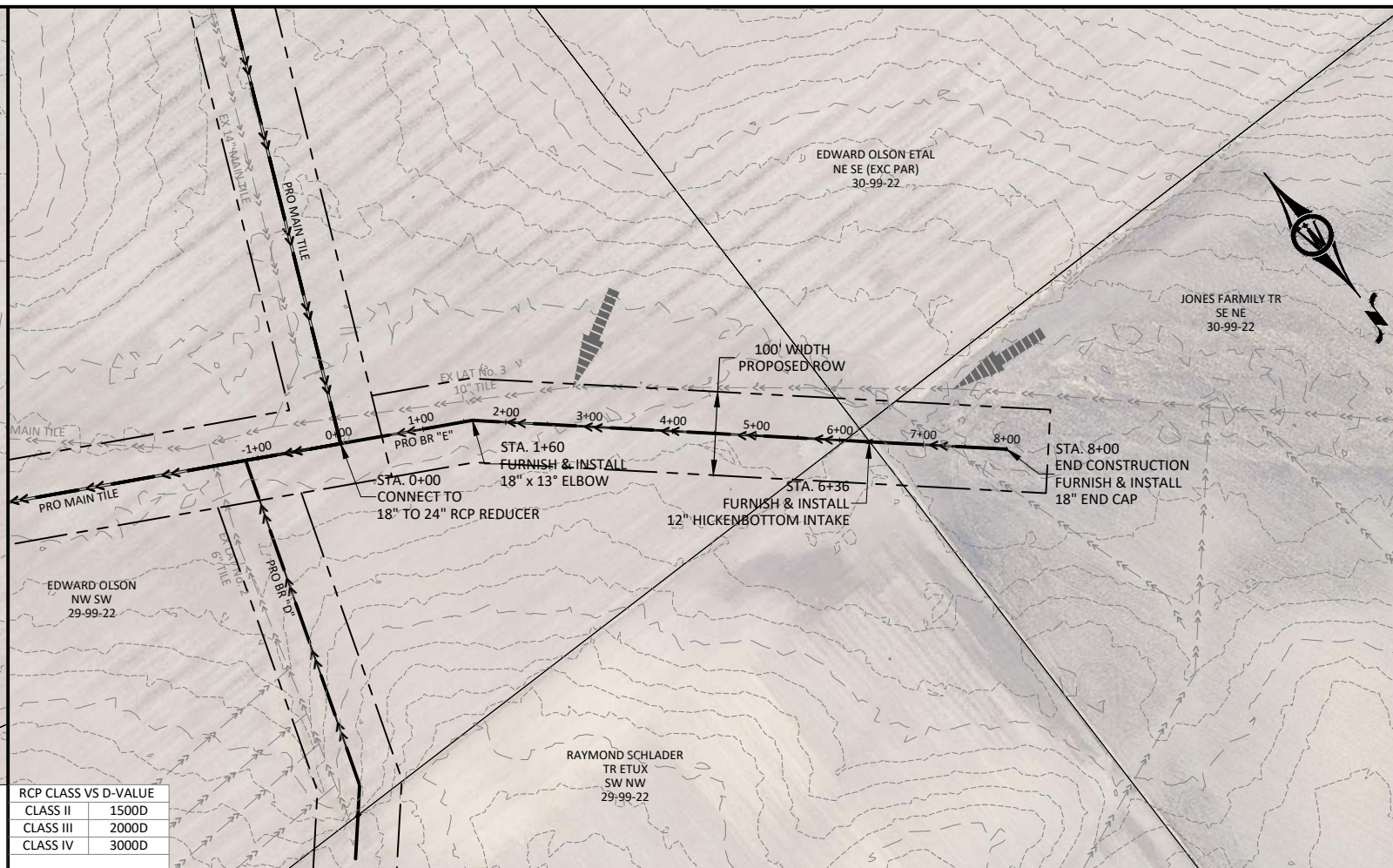
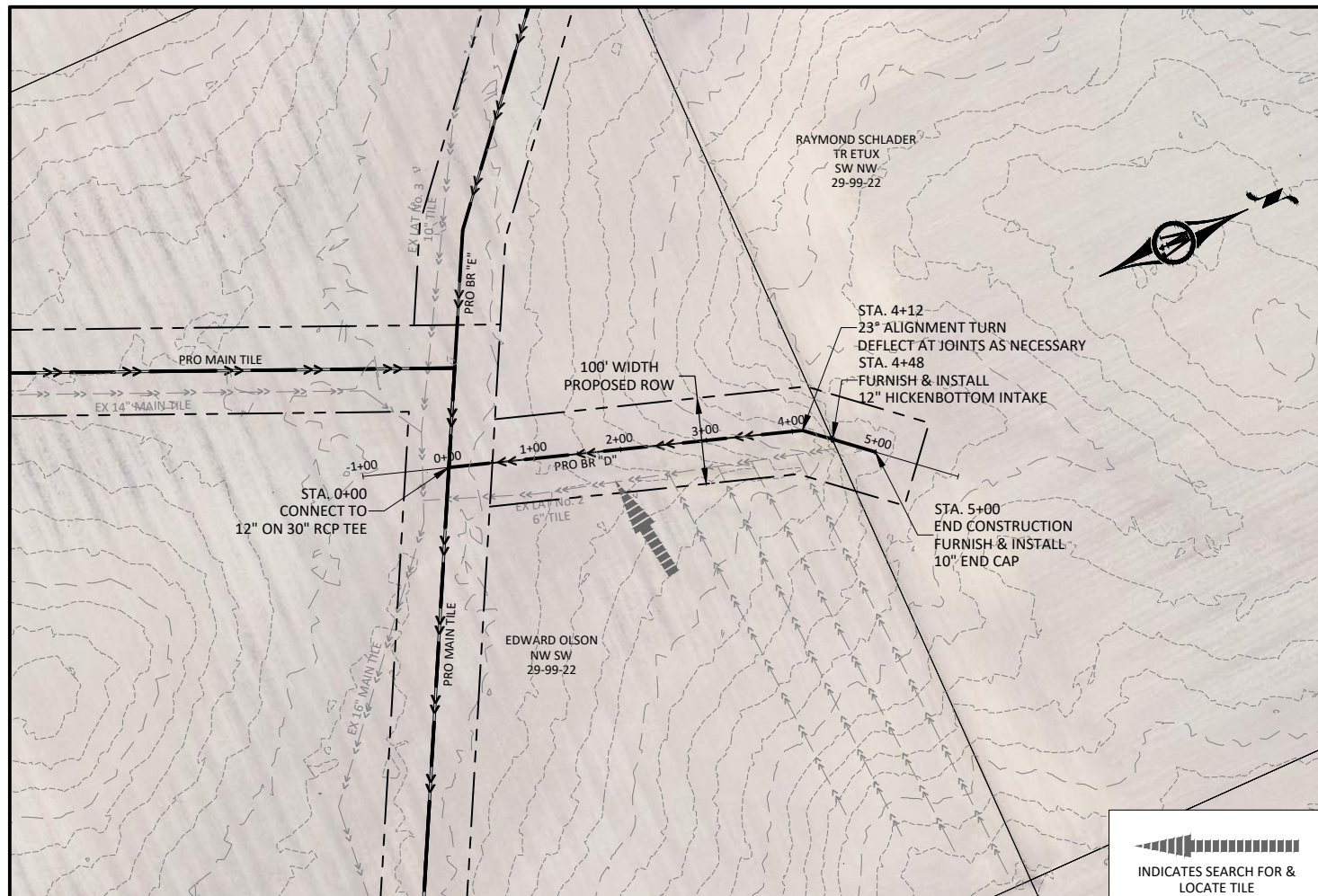
PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA

PLAN & PROFILE - BRANCH'S C & C-1

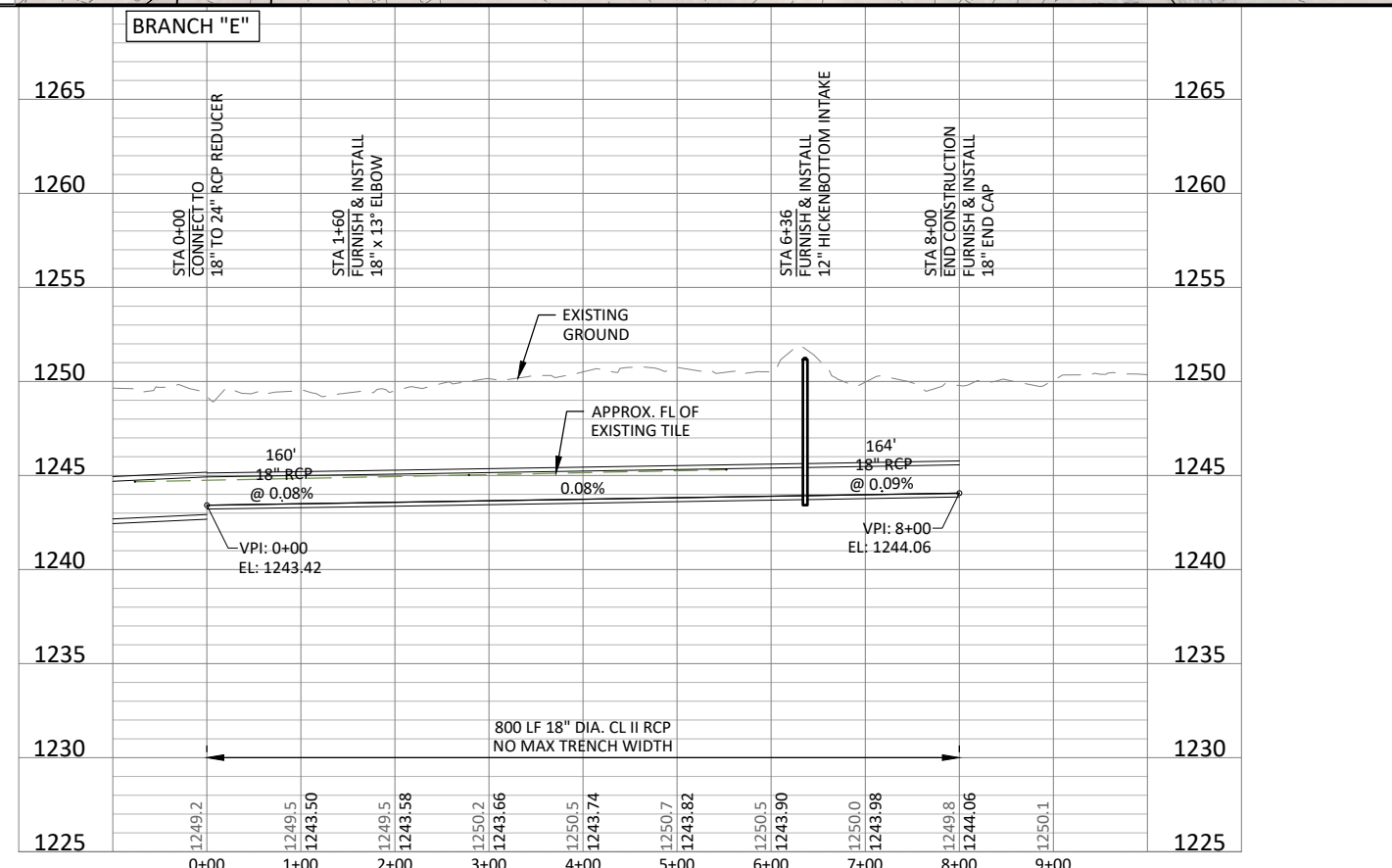
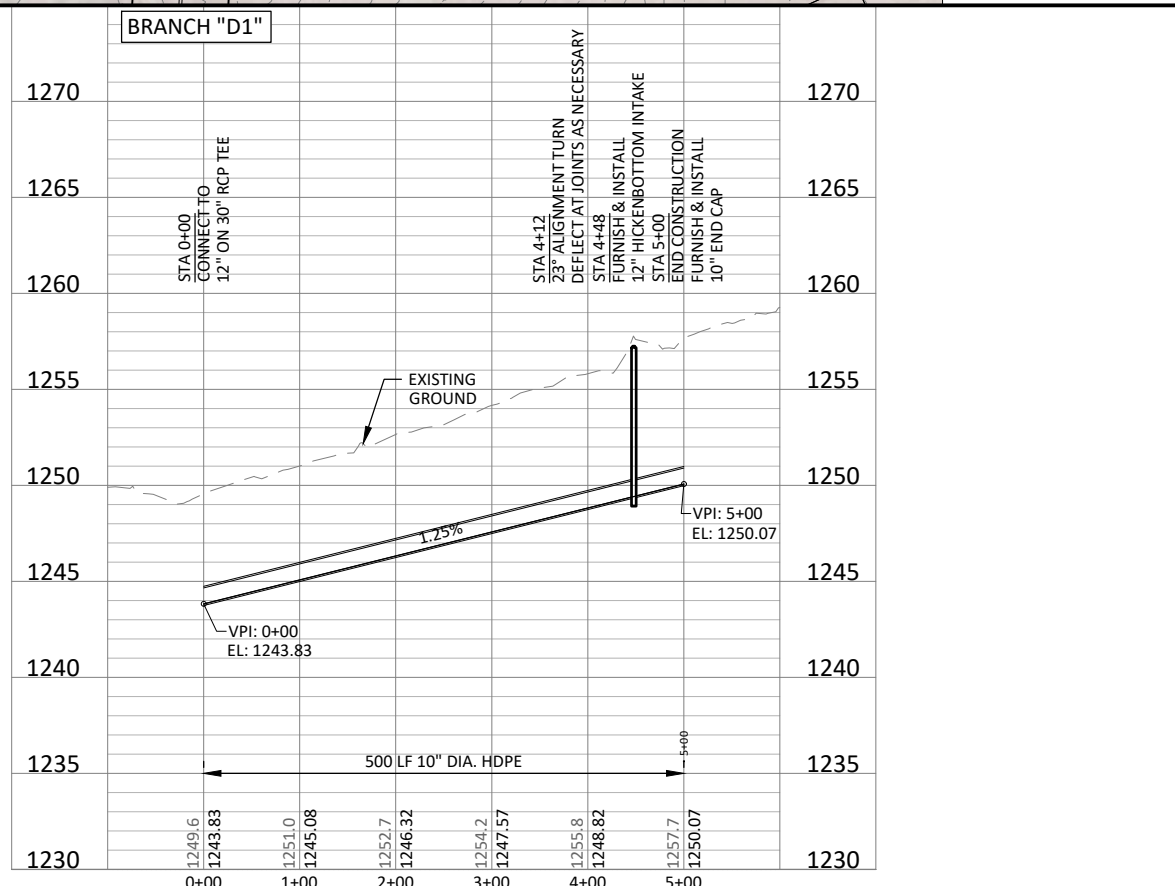
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RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D



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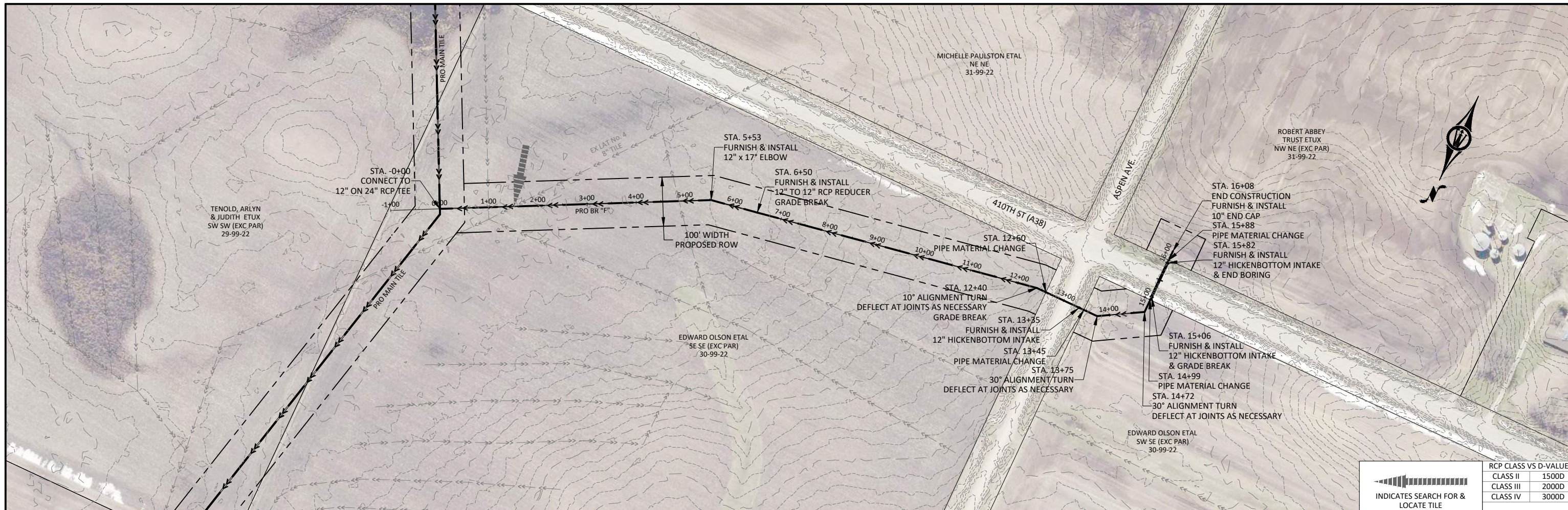
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PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA

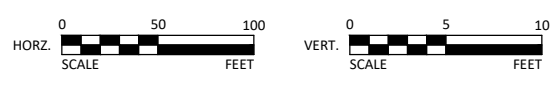
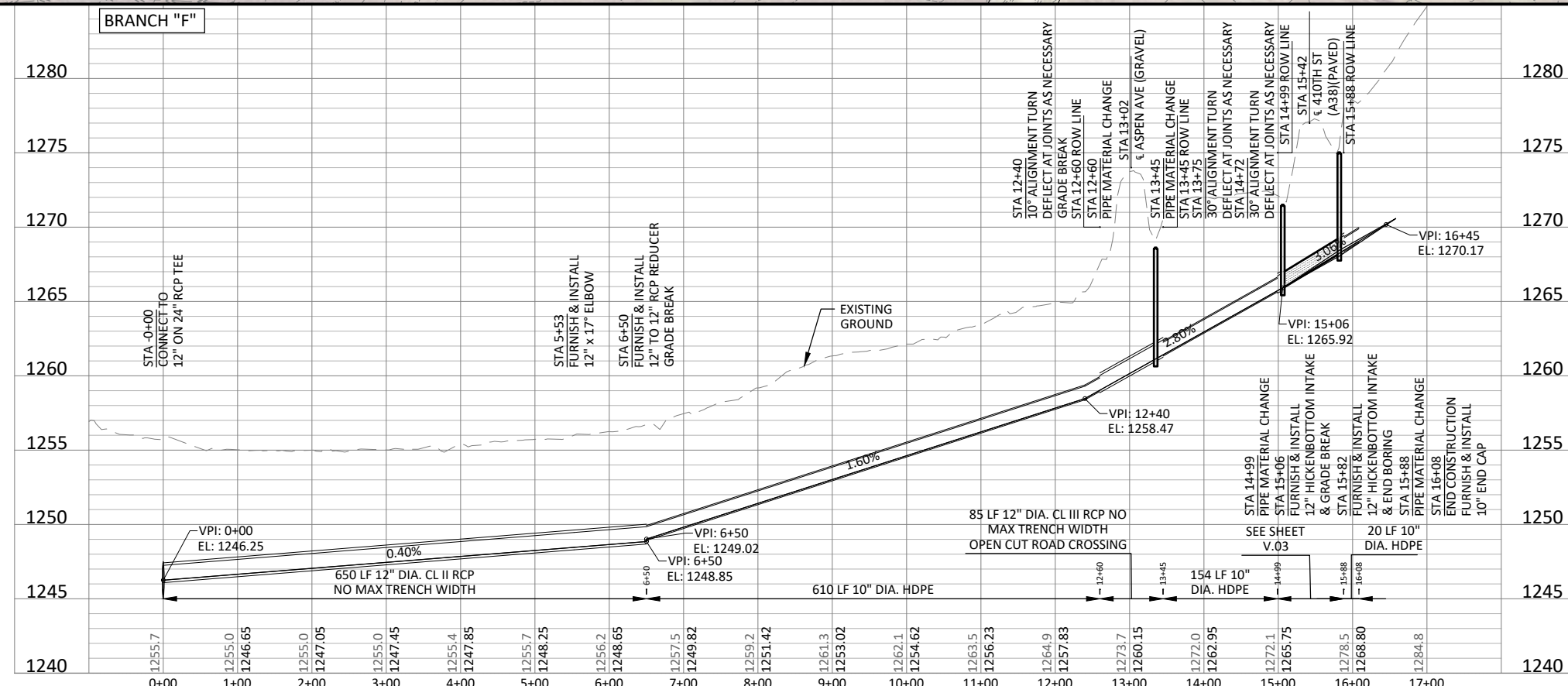
PLAN & PROFILE - BRANCH'S D1 & E

SHEET  
M.09





INDICATES SEARCH FOR & LOCATE TILE		RCP CLASS VS D-VALUE	
CLASS II	1500D	CLASS II	1500D
CLASS III	2000D	CLASS III	2000D
CLASS IV	3000D	CLASS IV	3000D



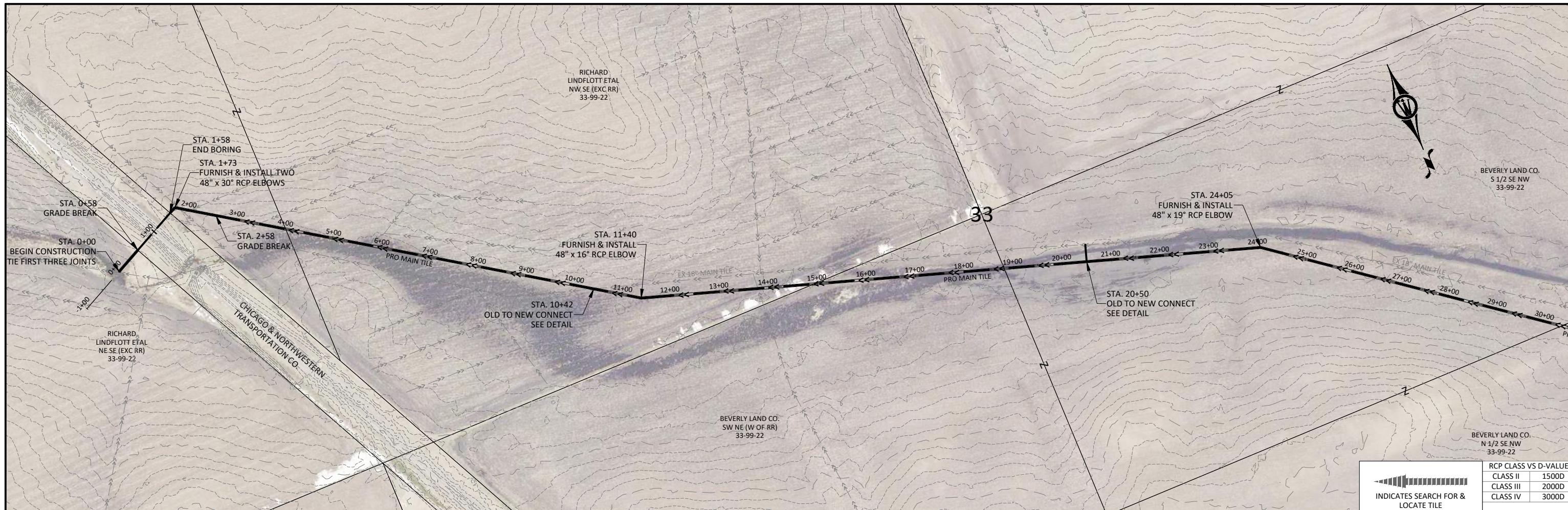
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DESIGNED	REV	DESCRIPTION	DATE
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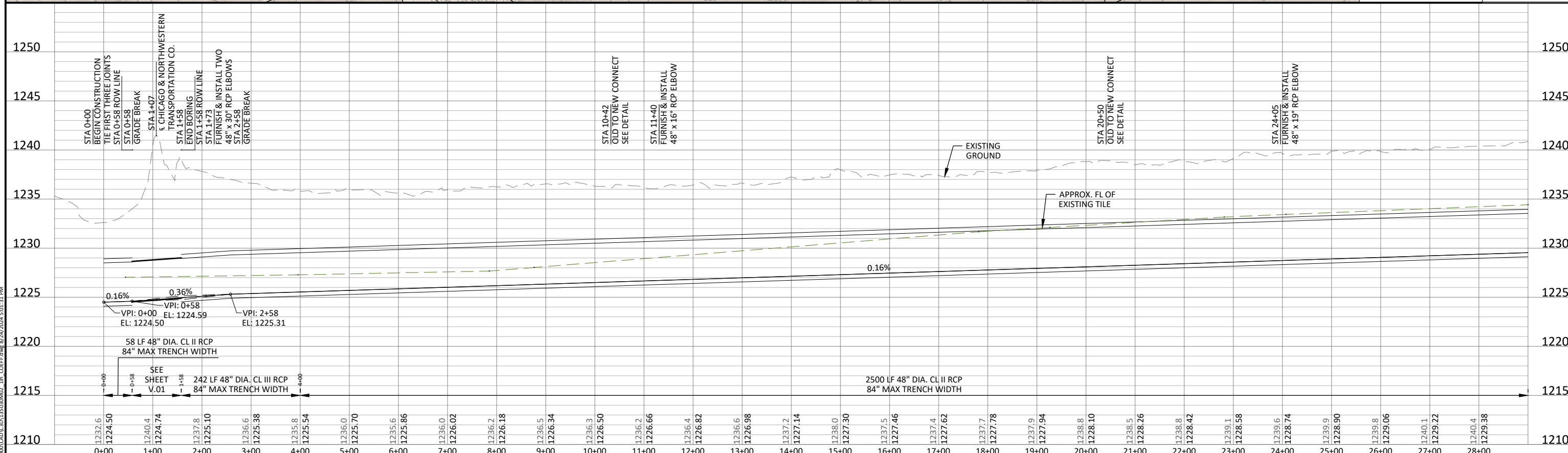
PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
 WORTH COUNTY, IOWA  
 PLAN & PROFILE - BRANCH F  
 SHEET M.10

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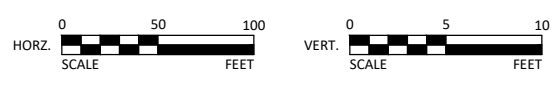




INDICATES SEARCH FOR & LOCATE TILE		RCP CLASS VS D-VALUE	
CLASS II	15000	CLASS II	15000
CLASS III	20000	CLASS III	20000
CLASS IV	30000	CLASS IV	30000



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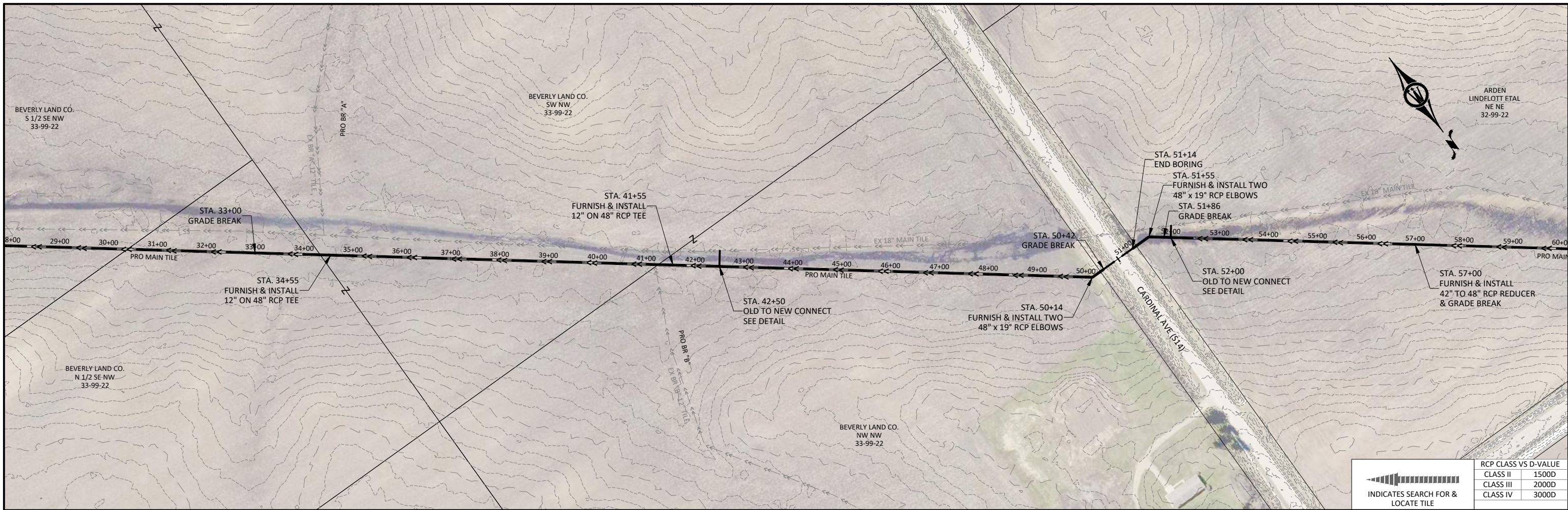
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**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
 WORTH COUNTY, IOWA

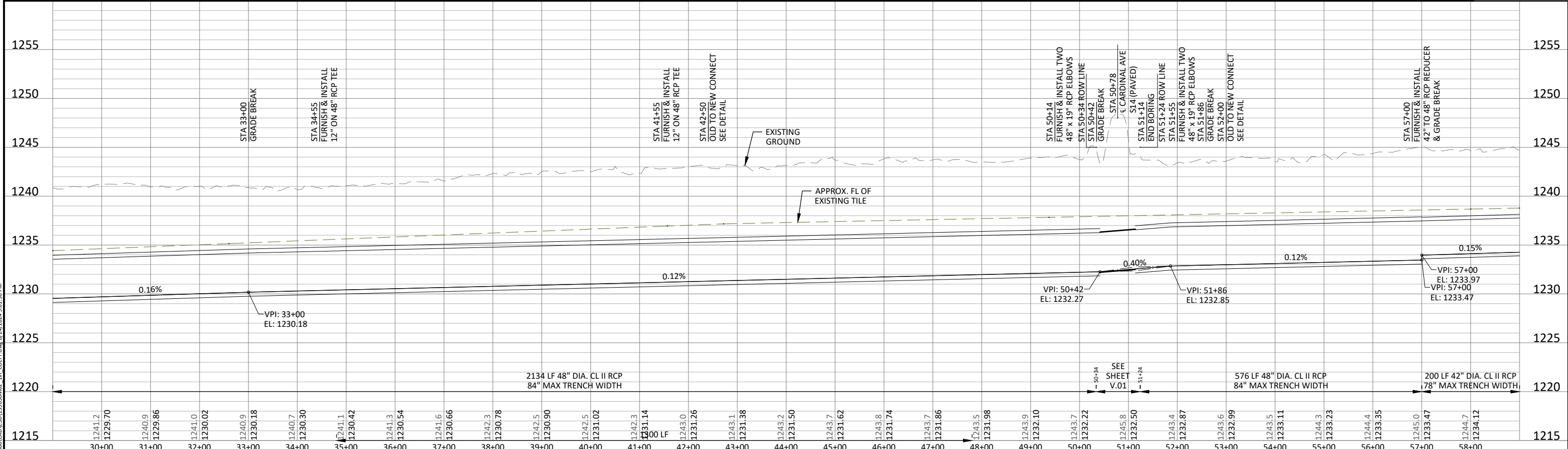
PLAN & PROFILE - MAIN TILE 1 IN COEFF. OPTION

SHEET  
**M.11**

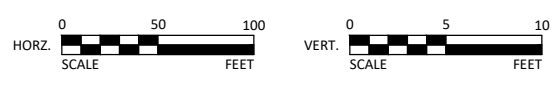




RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D



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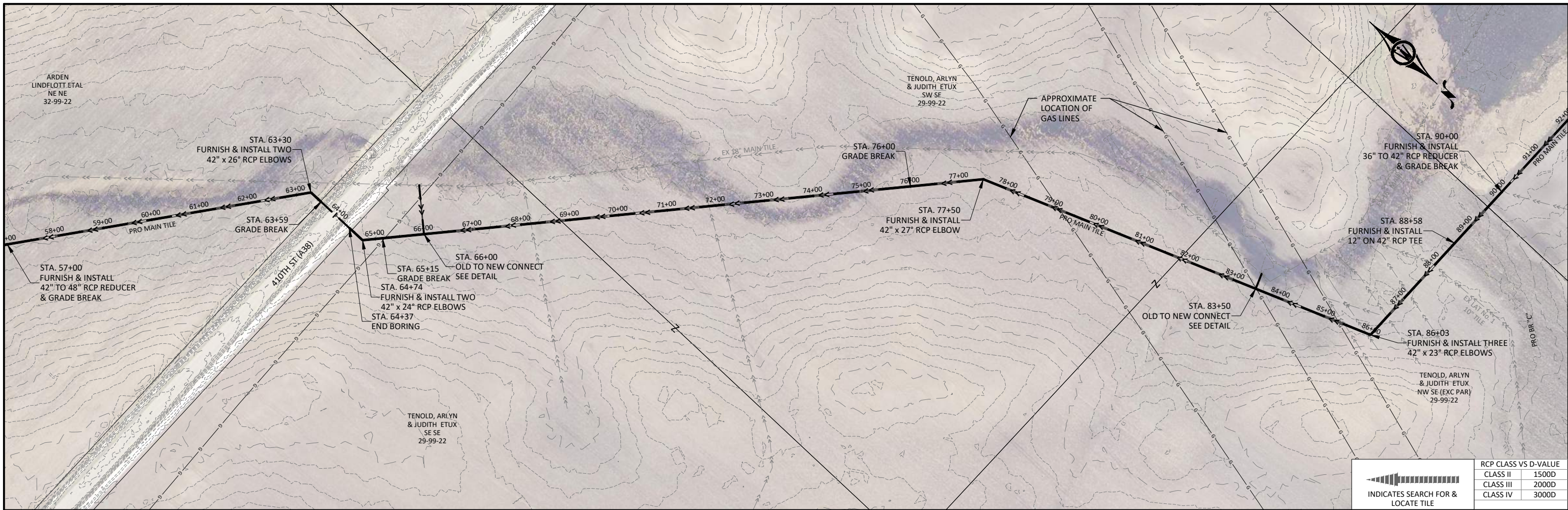
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**PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS**  
 WORTH COUNTY, IOWA

**PLAN & PROFILE - MAIN TILE 1 IN COEFF. OPTION**

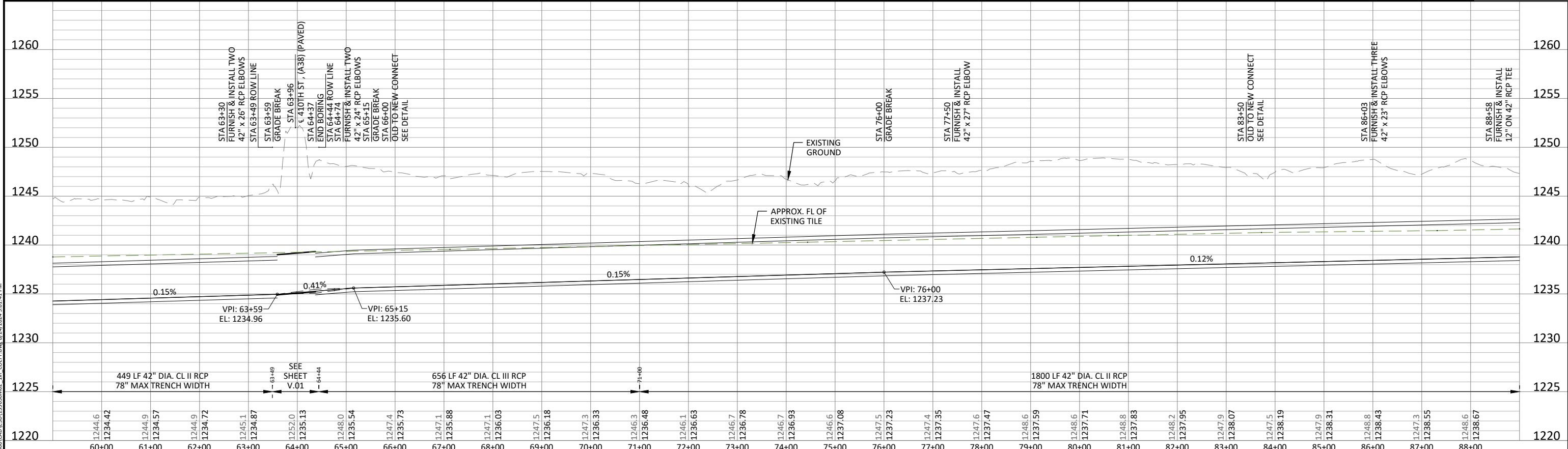
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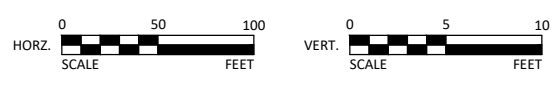


RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE



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DESIGNED	REV	DESCRIPTION	DATE
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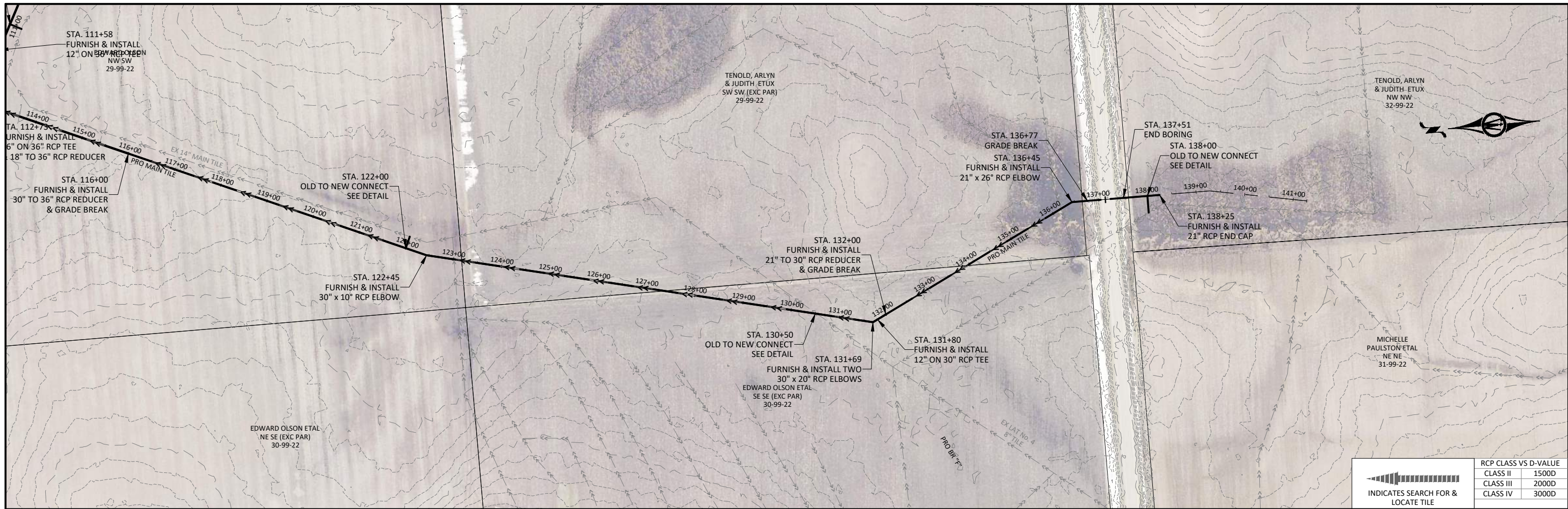
PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA  
PLAN & PROFILE - MAIN TILE 1 IN COEFF. OPTION

SHEET  
**M.13**



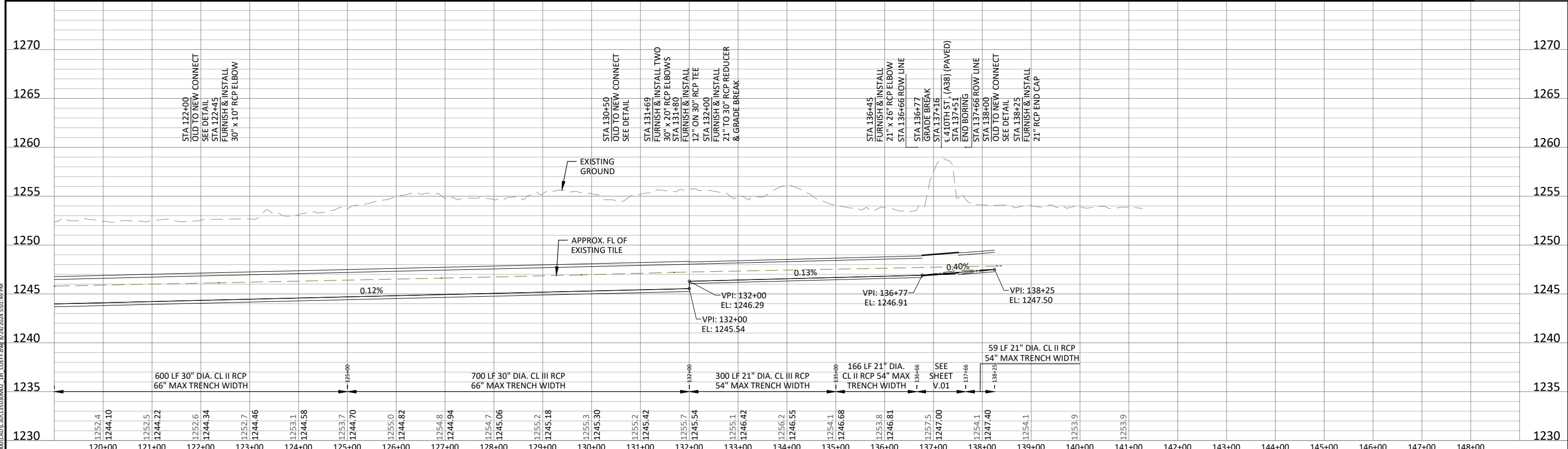




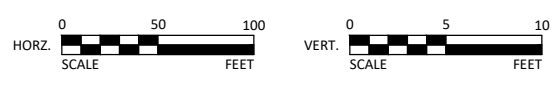


RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE



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JLH			
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PROPOSED DRAINAGE DISTRICT No. 18 TILE IMPROVEMENTS  
WORTH COUNTY, IOWA  
PLAN & PROFILE - MAIN TILE 1 IN COEFF. OPTION

SHEET  
**M.15**