

PIPE CULVERTS
BRFN-151-5(66)--39-31

LETTING DATE
02/19/2019

DUBUQUE CO.

INDEX OF SHEETS	
No.	DESCRIPTION
A Sheets	Title Sheets
* A.1	Title Sheet with Location Map
B Sheets	Typical Cross Sections and Details
B.1	Typical Cross Sections and Details
C Sheets	Quantities and General Information
C.1 - 6	Tabulations
CS Sheets	Soils Tabulations
CS.1	Soils Tabulations
D Sheets	Mainline Plan and Profile Sheets
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2 - 14	Aerial and Background Sheets with Proposed Work Areas
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J Sheets	Traffic Control and Staging Sheets
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Q Sheets	Soils Sheets
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V Sheets	Bridge and Culvert Situation Plans
* V.1 - 6	Design 119
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* V.19 - 21	Culvert Situation Plans * Color Plan Sheets



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM DUBUQUE COUNTY PIPE CULVERTS U.S. 151

0.30 mi South of North Cascade Rd to 0.46 mi South of U.S. 61

SCALE: As Noted

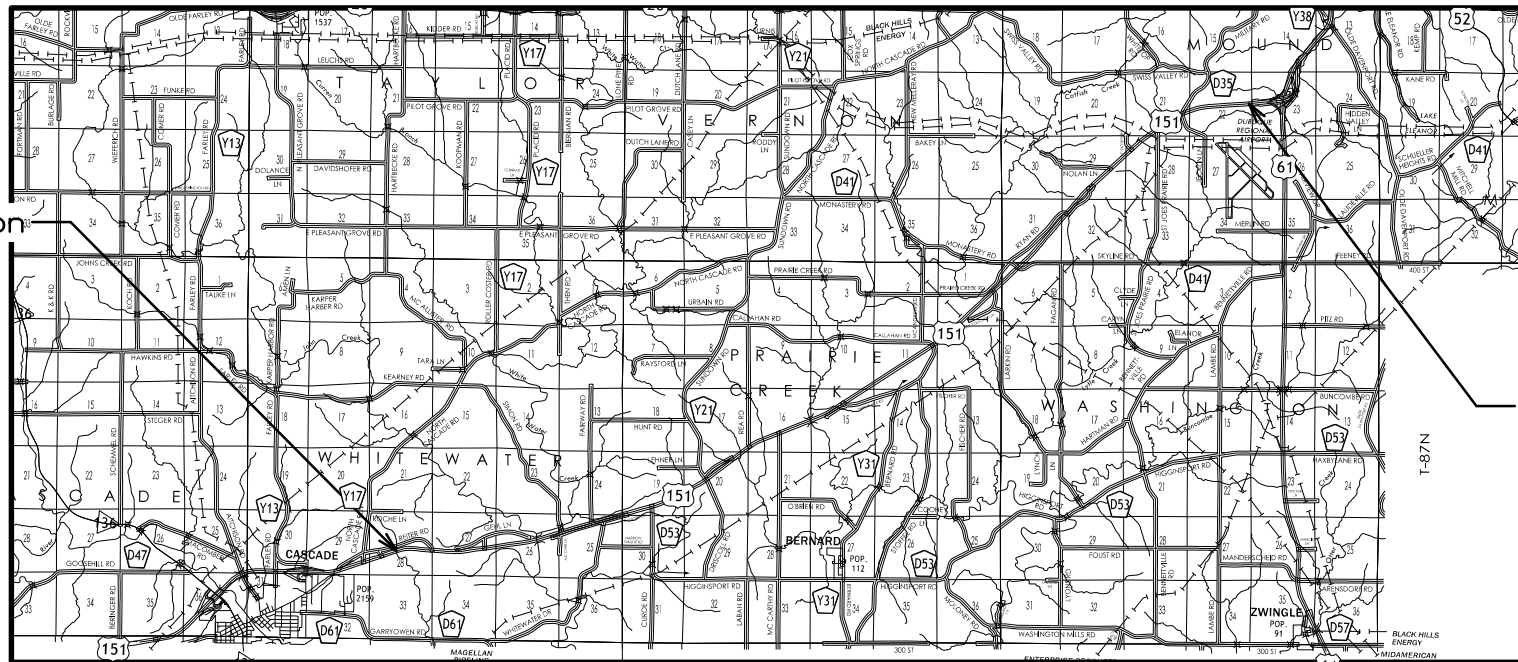
Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.14 of the Specifications.

NO MILEAGE SUMMARY



Sta. 244+60
Begin Construction



Sta. 1128+40
End Construction



INDEX OF SEALS		
SHEET NO.	NAME	TYPE
A.1	Cindy A. Spencer	Primary Signature Block
CS.1	Justin Humke	Geotechnical
V.1	Jordan A. Gustafson	Structural Design

LICENSED PROFESSIONAL ENGINEER

CINDY A. SPENCER

17561

IOWA

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Cindy A. Spencer, P.E. _____ Date _____

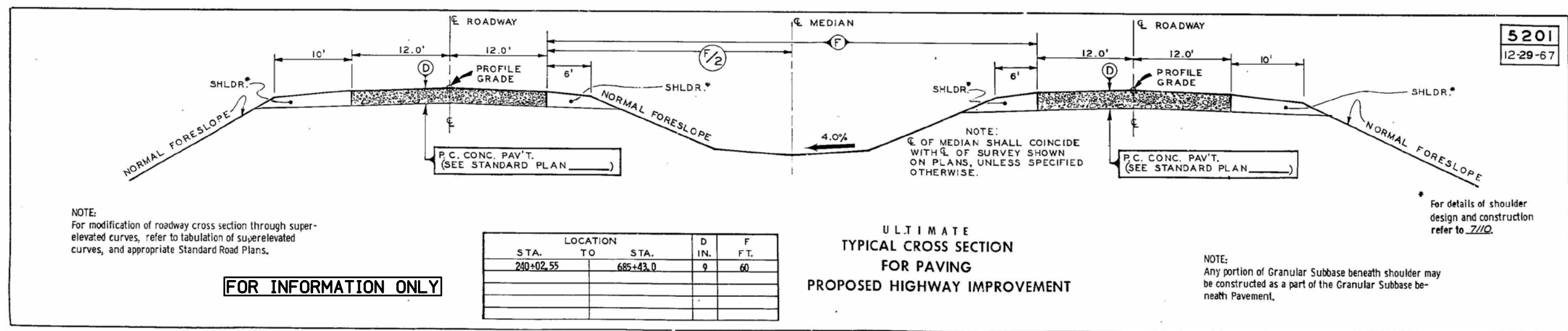
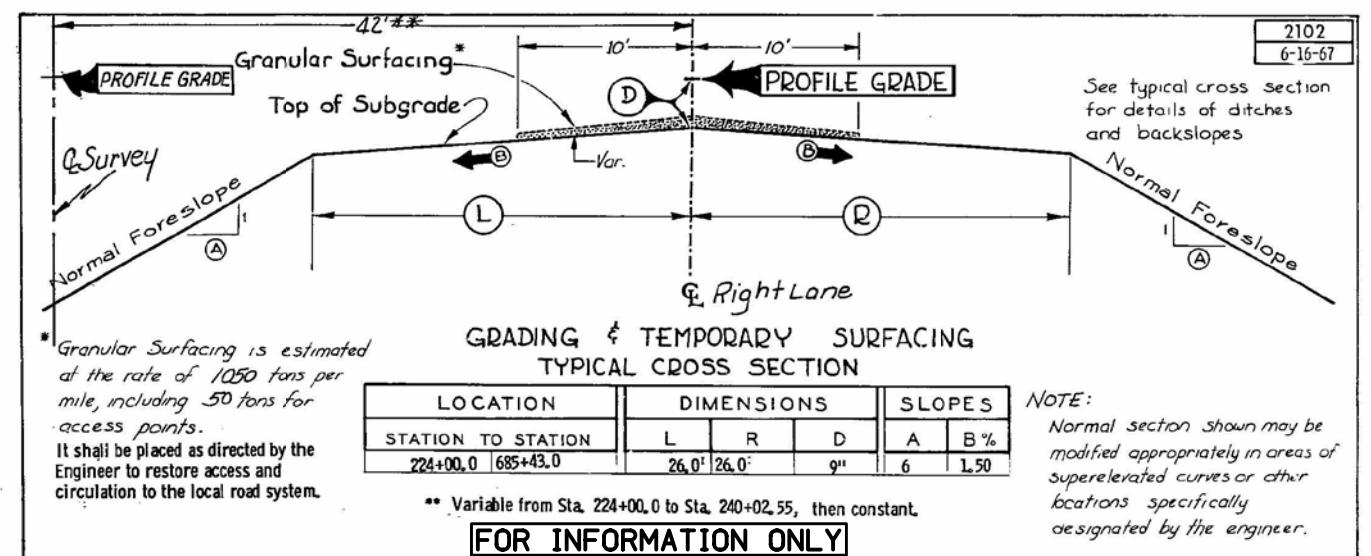
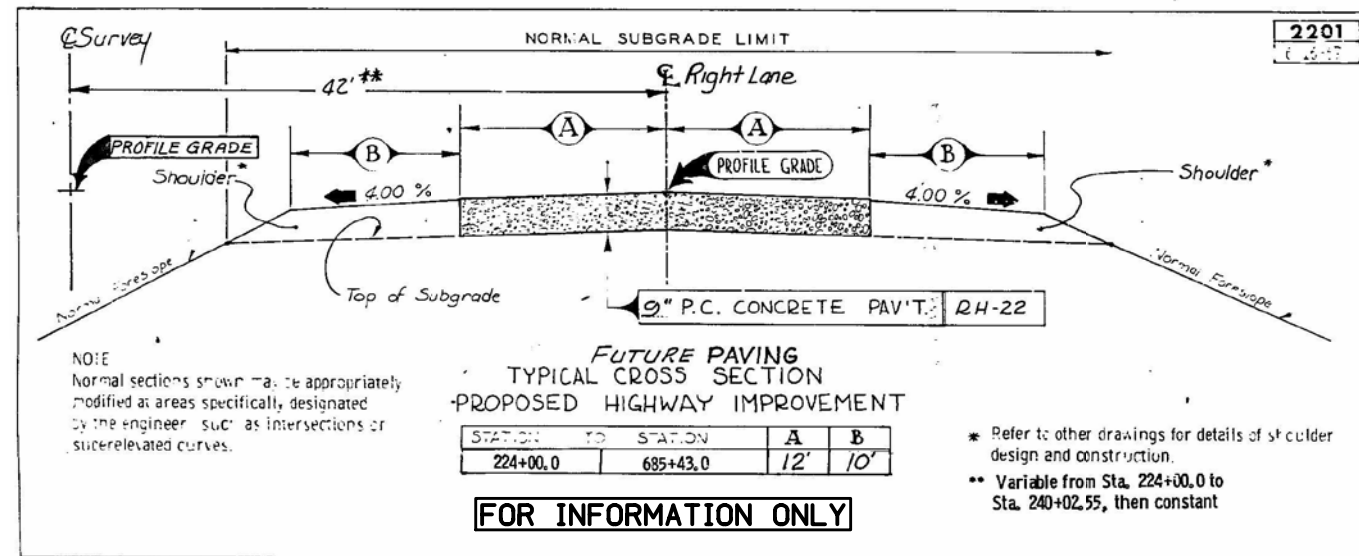
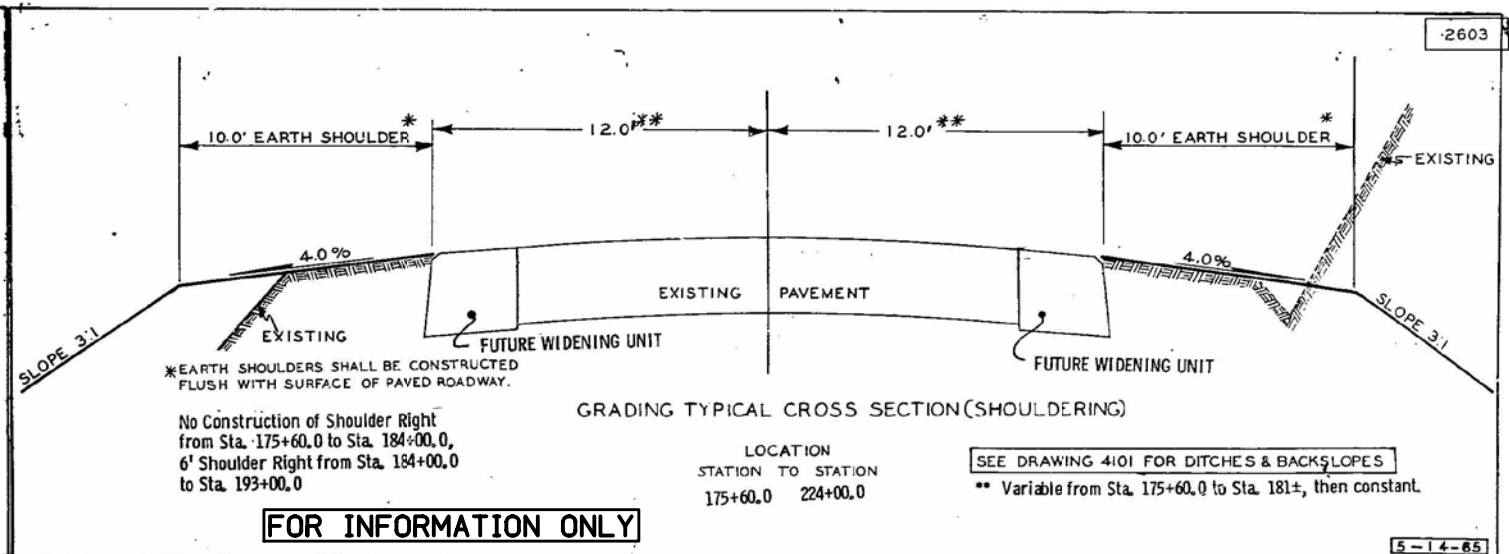
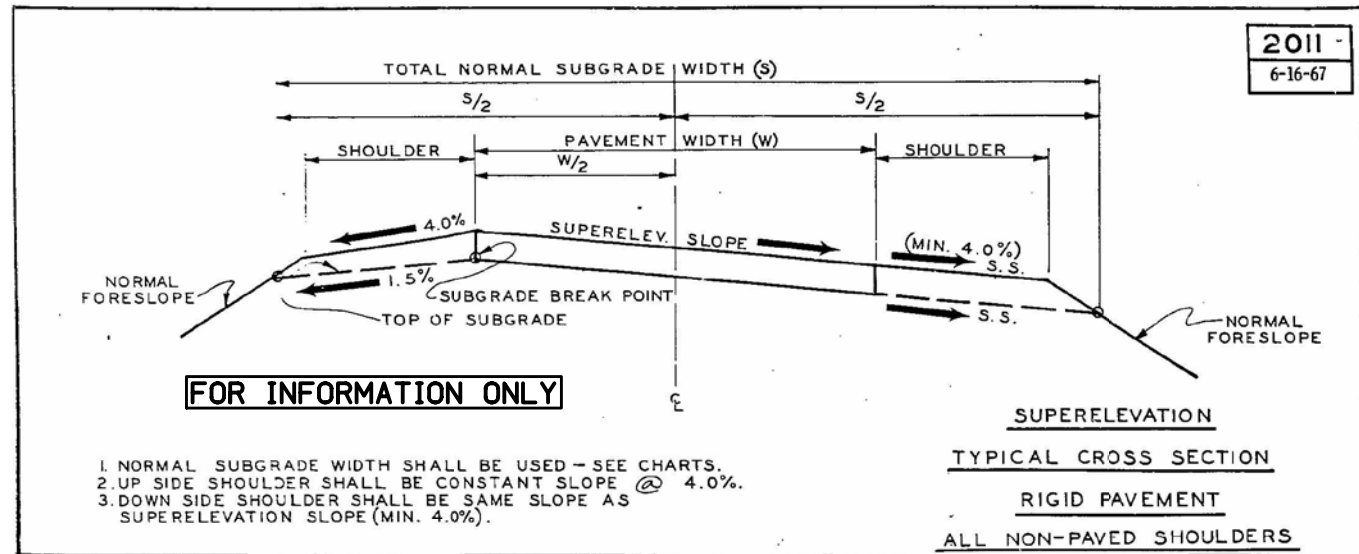
License Number 17561

My License Renewal Date is December 31, 2018

Pages or sheets covered by this seal:
A.1, B.1, C.1-C.6, D.1-D.14, G.1-G.4, J.1, U.1, V.19-V.21

REVISIONS

TOTAL
62
PROJECT IDENTIFICATION NUMBER
14-31-151-010
PROJECT NUMBER
BRFN-151-5(66)--39-31
R.O.W. PROJECT NUMBER
BRFN-151-5(66)--39-31



100-1D 10-18-05
PROJECT DESCRIPTION
This project is for culvert rehabilitation on U.S. 151, between Cascade and U.S. 61.

105-4 10-18-11		
STANDARD ROAD PLANS		
The following Standard Road Plans apply to construction work on this project.		
Number	Date	Title
DR-101	04-18-17	Pipe Culvert (Bedding and Backfill)
DR-102	04-21-15	Pipe Culvert (Cover and Camber)
DR-103	04-21-15	Pipe Culvert (Installation Details)
DR-104	04-19-16	Depth of Cover Tables for Concrete and Corrugated Pipe
DR-111	04-17-18	Box Culvert (Backfill)
DR-121	10-17-17	Connected Pipe Joints
DR-122	10-18-16	Construction of Type "C" Concrete Adaptors for Pipe Culvert Connections
DR-201	10-16-18	Concrete Aprons
DR-203	04-21-15	Metal Pipe Aprons and Beveled Ends
DR-213	10-17-17	Pipe Apron Guard
DR-601	04-18-17	Reinforced Concrete Pipe Culvert
DR-621	04-18-17	Pipe Extension
DR-625	04-18-17	Pipe Extension Letdown Structure with Metal Apron
DR-631	04-18-17	Corrugated Pipe Culvert Letdown Structure with Single Elbow
EC-101	04-19-16	Wood Excelsior Mat for Ditch Protection
EC-103	04-21-15	Wood Excelsior Mat for Slope Protection
EC-201	10-16-18	Silt Fence
EC-204	04-18-17	Perimeter and Slope Sediment Control Devices
EC-301	10-18-16	Rock Erosion Control (REC)
EW-403	04-18-17	Temporary Erosion Control Measures
EW-501	10-20-15	Rural Entrance
PV-101	10-16-18	Joints
TC-1	04-16-13	Work Not Affecting Traffic (Two-Lane or Multi-Lane)
TC-202	04-21-15	Work Within 15 ft of Traveled Way
TC-252	04-19-16	Routes Closed to Traffic
TC-402	04-21-15	Work Within 15 ft of Traveled Way
TC-418	04-17-18	Lane Closure on Divided Highway

100-0A 10-28-97					
ESTIMATED ROADWAY QUANTITIES (1 DIVISION PROJECT)					
Item No.	Item Code	Item	Unit	Total	As Built Qty.
1	2101-0850002	CLEARING AND GRUBBING	UNIT	241.40	
2	2301-1033080	STANDARD OR SLIP-FORM PCC PAVEMENT, CLASS C, CLASS 3, 8 INCH	SY	100.00	
3	2312-8260051	GRANULAR SURFACING ON ROAD, CLASS A CRUSHED STONE	TON	18.50	
4	2315-8275025	DRIVEWAY SURFACING, CLASS A CRUSHED STONE	TON	29.10	
5	2402-0425040	FLOODED BACKFILL	CY	73.10	
6	2402-2720100	EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERTS	CY	2163.00	
7	2416-0100024	APRONS, CONCRETE, 24 INCH	EACH	10.00	
8	2416-0100030	APRONS, CONCRETE, 30 INCH	EACH	3.00	
9	2416-0100036	APRONS, CONCRETE, 36 INCH	EACH	2.00	
10	2416-0100042	APRONS, CONCRETE, 42 INCH	EACH	1.00	
11	2416-1180024	CULVERT, CONCRETE ROADWAY PIPE, 24 INCH	LF	128.00	
12	2416-1180036	CULVERT, CONCRETE ROADWAY PIPE, 36 INCH	LF	40.00	
13	2416-1262024	CULVERT, CONCRETE PIPE, 2000D, TRENCHLESS, 24"	LF	50.00	
14	2417-1007000	CULVERT, CORRUGATED POLYETHYLENE ENTRANCE PIPE, 30"	LF	101.00	
15	2417-1130018	CULVERT, CORRUGATED POLYETHYLENE ENTRANCE PIPE, 18"	LF	90.00	
16	2417-1130024	CULVERT, CORRUGATED POLYETHYLENE ENTRANCE PIPE, 24"	LF	164.00	
17	2417-1140024	CULVERT, CORRUGATED POLYETHYLENE ROADWAY PIPE, 24"	LF	160.00	
18	2417-1140030	CULVERT, CORRUGATED POLYETHYLENE ROADWAY PIPE, 30"	LF	335.00	
19	2503-0200036	REMOVAL OF STORM SEWER PIPE LESS THAN OR EQUAL TO 36 INCH	LF	1481.00	
20	2506-4984000	FLOWABLE MORTAR	CY	12.60	
21	2507-3250005	ENGINEERING FABRIC	SY	985.20	
22	2507-6800061	REVEMENT, CLASS E	TON	684.70	
23	2510-6745850	REMOVAL OF PAVEMENT	SY	100.00	
24	2526-8285000	CONSTRUCTION SURVEY	LS	1.00	
25	2528-8445110	TRAFFIC CONTROL	LS	1.00	
26	2533-4980005	MOBILIZATION	LS	1.00	
27	2599-9999005	TIE JOINTS	EACH	46.00	
28	2601-2634100	MULCHING	ACRE	1.00	
29	2601-2636043	SEEDING AND FERTILIZING (RURAL)	ACRE	1.00	
30	2601-2638352	SLOPE PROTECTION, WOOD EXCELSIOR MAT	SQ	87.80	
31	2601-2640350	SPECIAL DITCH CONTROL, WOOD EXCELSIOR MAT	SQ	27.20	
32	2601-2643110	WATERING FOR SOD, SPECIAL DITCH CONTROL, OR SLOPE PROTECTION	MGAL	23.00	
33	2601-2643300	MOBILIZATION FOR WATERING	EACH	3.00	
34	2602-0000020	SILT FENCE	LF	194.00	
35	2602-0000030	SILT FENCE FOR DITCH CHECKS	LF	365.00	
36	2602-0000071	REMOVAL OF SILT FENCE OR SILT FENCE FOR DITCH CHECKS	LF	559.00	
37	2602-0000101	MAINTENANCE OF SILT FENCE OR SILT FENCE FOR DITCH CHECKS	LF	56.00	
38	2602-0000160	ROCK CHECK DAM	LF	432.00	
39	2602-0000170	MAINTENANCE OF ROCK CHECK DAM	EACH	48.00	
40	2602-0000180	REMOVAL OF ROCK CHECK DAM	EACH	16.00	
41	2602-0000320	PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE, 20 INCH	LF	208.00	
42	2602-0000350	REMOVAL OF PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE	LF	208.00	
43	2602-0010010	MOBILIZATIONS, EROSION CONTROL	EACH	2.00	
44	2602-0010020	MOBILIZATIONS, EMERGENCY EROSION CONTROL	EACH	1.00	

232-10 04-18-17	
EMERALD ASH BORER	
Any living, dead, cut or fallen material of the ash (Fraxinus spp.) including trees, nursery stock, logs, firewood, stumps, roots, branches, and composted or uncomposted ash chips can be freely moved within the yellow areas of the most recent Federal EAB Quarantine & Authorized Transit.	
https://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/eab_quarantine_map.pdf .	
Obtain appropriate Compliance Agreements from USDA APHIS PPQ prior to moving any of the above listed ash articles to areas outside the yellow zone on the map.	
For questions, concerns, and general assistance, contact:	
USDA APHIS PPQ, Iowa office, 515-414-3295	
Or	
Iowa Department of Agriculture & Land Stewardship 515-725-1470 Entomology@IowaAgriculture.gov	

110-17 04-18-17																					
CLEARING AND GRUBBING																					
Location		Work and Material Type	Trees, Stumps, and Logs and Down Timber Material Diameters													All Other Materials		Estimated Quantities			Remarks
Station to Station or Ref. Loc. Sign to Ref. Loc. Sign or Description	Direction of Travel		3"-6"	>6"-9"	>9"-12"	>12"-15"	>15"-18"	>18"-24"	>24"-30"	>30"-36"	>36"-42"	>42"-48"	>48"-60"	>60"-72"	>72"	Length	Width	Units	Area	Herbicide Application	
			FT	FT	Units	Acres	Each														
409+35 RT	EB	Trees - Clearing and Grubbing			1													6.7			
662+75 RT	EB	Trees - Clearing and Grubbing	4															6.4			
924+60 RT	EB	Trees - Clearing and Grubbing			2		1											26.9			
1098+60 RT	EB	Trees - Clearing and Grubbing			2	2				1								61.2			
1104+20 RT	EB	Trees - Clearing and Grubbing	1			2			1									71.4			
1108+50 RT	EB	Trees - Clearing and Grubbing			2													13.4			
1111+50 RT	EB	Trees - Clearing and Grubbing		3														11.7			
1115+00 RT	EB	Trees - Clearing and Grubbing	3	2	2													26.0			
1118+30 RT	EB	Trees - Clearing and Grubbing	1		1	1												17.7			

ESTIMATE REFERENCE INFORMATION

Item No.	Item Code	Description
1	2101-0850002	CLEARING AND GRUBBING Refer to Tab. 110-17 for locations and quantities.
2	2301-1033080	STANDARD OR SLIP-FORM PCC PAVEMENT, CLASS C, CLASS 3, 8 INCH Refer to Tab. 100-24 for locations.
3	2312-8260051	GRANULAR SURFACING ON ROAD, CLASS A CRUSHED STONE For surfacing on McCarthy Road.
4	2315-8275025	DRIVEWAY SURFACING, CLASS A CRUSHED STONE Refer to Tab. 102-3 for locations and quantities.
5	2402-0425040	FLOODED BACKFILL
6	2402-2720100	EXCAVATION, CLASS 20, FOR ROADWAY PIPE CULVERTS Refer to Tab. 104-3 for locations and quantities.
19	2503-0200036	REMOVAL OF STORM SEWER PIPE LESS THAN OR EQUAL TO 36 INCH Refer to Tab. 110-9 for locations. Includes removal of roadway culverts and half pipe.
20	2506-4984000	FLOWABLE MORTAR Refer to Tab. 104-3 and 110-9 for locations and quantities.
22	2507-3250005	ENGINEERING FABRIC
23	2507-6800061	REVEMENT, CLASS E Refer to Tab. 100-23 for locations and quantities.
23	2510-6745850	REMOVAL OF PAVEMENT Refer to Tab. 100-1 for locations and quantities.
25	2528-8445110	TRAFFIC CONTROL Refer to J sheets for additional information.
27	2599-9999005	TIE JOINTS Install ties on pipe joints per Standard Road Plan DR-121. Includes removing and resetting sections of pipe to ensure that joints are tight, including bedding material as necessary. Refer to Tab. 104-3 for locations. Each location where joints will be tied shall be counted (may be multiple joints tied at each location). Each end of a pipe is considered a separate location. Contractor will be paid the contract unit price for each location where joints are tied. Payment will be full compensation for furnishing all labor, equipment, and materials necessary to complete work.
30	2601-2638352	SLOPE PROTECTION, WOOD EXCELSIOR MAT
31	2601-2640350	SPECIAL DITCH CONTROL, WOOD EXCELSIOR MAT Refer to Tab. 100-22 for locations and quantities.
32	2601-2643110	WATERING FOR SOD, SPECIAL DITCH CONTROL, OR SLOPE PROTECTION Estimate assumes 4 waterings at 50 gal / SQ.
34	2602-0000020	SILT FENCE Refer to Tab. 100-17 for locations. The tabulation includes estimated locations for placement of silt fence to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 25% additional quantity for field adjustments and replacements.
35	2602-0000030	SILT FENCE FOR DITCH CHECKS Refer to Tab. 100-18 for locations. The tabulation includes estimated locations for placement of silt fence for ditch checks to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 50% additional quantity for field adjustments and replacements.
36	2602-0000071	REMOVAL OF SILT FENCE OR SILT FENCE FOR DITCH CHECKS This item is included for all silt fence and silt fence for ditch check removal required for staging reasons, for replacement (replacement to be paid separately), or for areas that have achieved 70% permanent growth.
37	2602-0000101	MAINTENANCE OF SILT FENCE OR SILT FENCE FOR DITCH CHECKS This item is included for cleanout and repair of the silt fence and silt fence for ditch checks during the project.
38	2602-0000160	ROCK CHECK DAM Refer to Sheet U.1 for details, and Tab. 100-32 for locations and quantities.
41	2602-0000320	PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE, 20 INCH Refer to Tab. 100-19 for locations. Quantity increased 10% to account for replacements.

CULVERT ABANDONMENT AND REMOVAL

Refer to Details 4315 and 4316

* Not a bid item

Location Station	Description	Removal Length	Abandon Length	Fill Material		4" Perforated Subdrain*	Remarks
				Flowable Mortar	Granular Backfill*		
				FT	FT		
352+15.50	30" RCP Half Pipe	16.0					
409+35.00	36" CMP	51.0					
428+74 RT	24" CMP	42.0	42.0	4.9			RT ditch letdown Under Simon Rd. Remove aprons
500+20.00	24" RCP Half Pipe	30.0					
500+20.00	24" RCP	16.0					
554+50.00	24" RCP Half Pipe	30.0					
602+53.00	18" CMP	55.0					Entrance pipe RT. Under McCarthy Rd.
630+35.00	36" CMP	54.0					RT ditch letdown
663+00.00	24" CMP	180.0					RT ditch letdown
765+00.00	30" CMP	110.0					RT entrance pipe
818+50.00	24" CMP	127.0					RT entrance pipe
821+50.00	36" CMP	65.0					RT ditch letdown
924+60.00	30" Half Pipe	15.0					
951+50.00	36" CMP	40.0					RT ditch letdown
957+00.00	30" CMP	40.0					RT ditch letdown
1098+00.00	24" CMP	50.0					RT ditch letdown
1108+30.00	30" CMP	82.0					
1111+50.00	30" CMP	134.0					
1115+00.00	24" RCP Half Pipe	60.0					Pipe broken / undermined Includes intact pipe only
	24" RCP	34.0					
1118+30.00	24" RCP Half Pipe	48.0					
	24" RCP	40.0					
1128+40.00	30" RCP Half Pipe	42.0					
	30" RCP	72.0					
3881+25.00	24" RCP	48.0					Under Jecklin Ln.

REMOVAL OF PAVEMENT

Refer to Tabulation 102-5

* Not a Bid Item

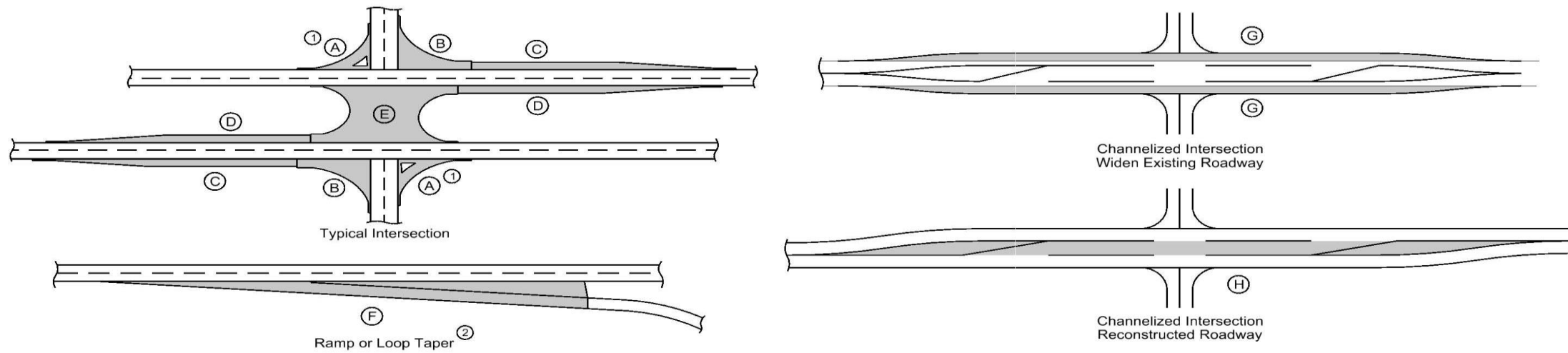
Begin Station	End Station	Side	Pavement Type	Area		Saw Cut*	Remarks
				SY	LF		
428+74, 130' RT	428+74, 105' RT		HMA	100.0	73.8		Simon Road

ROADWAY ITEMS FOR DRAINAGE STRUCTURES INSTALLED BY CULVERT CONTRACTOR

* Not a Bid Item
① Backfill according to DR-111

Location	Design Number	Size	Kind	By Road Contractor						Floodable* Backfill (A) CY	Porous* Backfill (B) CY	Flooded Backfill ① (A+B) CY	Excavation		Revetment		Engineering Fabric SY	Remarks	
				Dike				Compacting Backfill Adjacent CY	Compaction w/Moisture Control CY				Compaction w/Moisture and Density CY	Type	Quantity CY	Type			Quantity TONS
				Rt. Lt.	Location Station	Top. Elev.	Type												
288+94.00	119	6'x8'	Flume														Headwall only		
532+35.00	219	6'x6'	RCB																
1104+20.00	319	6'x6'	Flume																

PCC PAVEMENT



- ① Does not include raised island area or curb. Refer to tabulation 112-4 for quantities.
- ② Refer to PV-410, PV-411, PV-412, and PV-414.
- ③ Quantity includes Pavement Header.

Road Identification	Direction of Travel	Location		Mainline			Area ③								Total Area By Pavement Thickness		Special Backfill TONS	Modified Subbase CY	Granular Subbase SY	Remarks
		Station to Station	Width	Length	Area	A ①	B	C	D	E	F ②	G	H	SY						
		FT	FT	FT	SY	SY	SY	SY	SY	SY	SY	SY	SY	10 IN	8 IN					
Simon Rd.	Both	428+74, 130' RT	428+74, 105' RT	Var.	25.0	100.0														

ACCESS POINTS AND SAFETY RAMPS

Refer to Cross-Sections

Length of unclassified pipe calculated is based on using Reinforced Concrete Pipe.

- ① Refer to MI-210
 - ② Refer to EW-501.
 - ③ Refer to EW-501 or EW-502. Lengths left and right are full height pipe only and are exclusive of beveled ends.
- *Not a bid item

Location	Type	Length of Opening ①			W	Pipe Culvert ③			Beveled Ends* (DR-203) No.	Driveway Surface Area		Driveway Surfacing Material TON	Remarks		
		Case	1 1/2" Dropped Curb	3" Dropped Curb		H	Size	Pipe Length		Lt.	Rt.			HMA	PCC
		1 or 2	LF	LF		FT	IN	LF		LF	LF			SY	SY
602+53.00	RT C				20.0				2			14.000	Use HDPE pipe		
765+00.00	RT C				15.0				2				See Tab. 104-3		
818+50.00	RT C				15.0				2			15.100	See Tab. 104-3		

ROCK EROSION CONTROL

Refer to EC-301

Location Road Identification	Begin Station	End Station	Side Lt./Rt.	Rock Erosion Control (REC)		Material Bid Quantities					Remarks			
				L FT	W FT	Type 1	Type 2	Type 3	Type 4	Type 5		Erosion Stone	Class E Revetment	Eng. Fabric
						Rock Ditch Check	Rock Ditch	Rock Flume	Rock Splash Basin	Rock Slope Protection		TON	TON	SY
U.S. 151	352+15.50		RT	10.5	35			X				40.4	62.8	Betw FES and tile
	428+32.00		RT	10.5	10				X			11.6	22.6	
	500+20.00		RT	10.5	10				X			11.6	22.6	
	554+50.00		RT	10.5	10				X			11.6	22.6	
	629+49.00		RT	12.7	10				X			14.0	26.0	
	661+34.00	663+01.00	RT	167	16		X					293.7	380.0	
	820+70.00	821+34.00	RT	64	16		X					112.6	151.1	
	924+60.00		RT	11.6	20			X				25.5	41.6	
	1098+02.00	1098+60.00	RT	58	16		X					102.1	137.8	
	1108+30.00		RT	11.6	10				X			12.8	24.3	
	1111+50.00		RT	11.6	10				X			12.8	24.3	
	1115+00.00		RT						X			11.6	22.6	
	1118+30.00		RT						X			11.6	22.6	
	1128+40.00		RT						X			12.8	24.3	

TABULATION OF SILT FENCES

Refer to EC-201

Location			Side	Length LF	Remarks
Begin Station	End Station				
288+50.00	288+90.00	R	60.0		
532+05.00	532+30.00	R	45.0		
1104+90.00	1105+20.00	R	50.0		

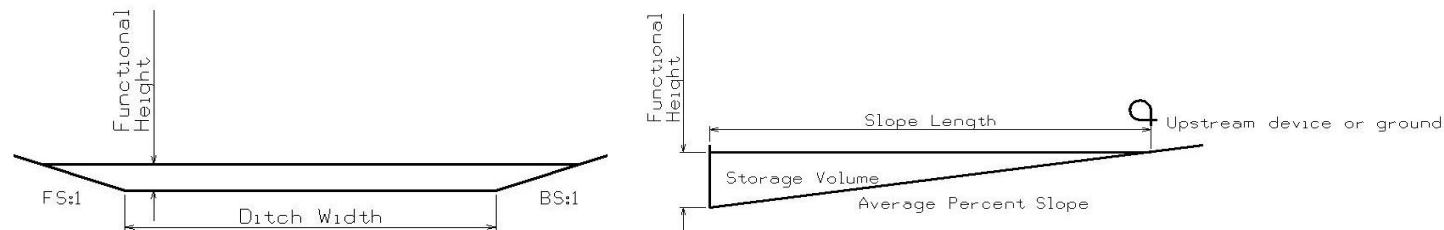
ROLLED EROSION CONTROL

Refer to EC-101, EC-103 and EC-104

Location Road Identification	Begin Station	End Station	Side	Turf Reinforcement Mat (TRM) (EC-104)		Slope Protection (EC-103) Squares	Special Ditch Control (EC-101) Squares	Remarks				
				L FT	W FT				Type 1	Type 2	Type 3	Type 4
									Squares	Squares	Squares	Squares
U.S. 151	500+20.00		RT	21	16			3.4				
	950+76.00	951+42.00	RT	66	19			12.5				
	956+15.00	956+92.00	RT	77	19			14.6				
	1108+30.00		RT	79	16			12.6				
	1111+50.00		RT	124	16			19.8				
	1115+00.00		RT	115	16			18.4				
	1118+30.00		RT	89	16			14.2				
	1128+40.00		RT	121	16			19.4				

ROCK CHECK DAM

Possible Detail: 570-2



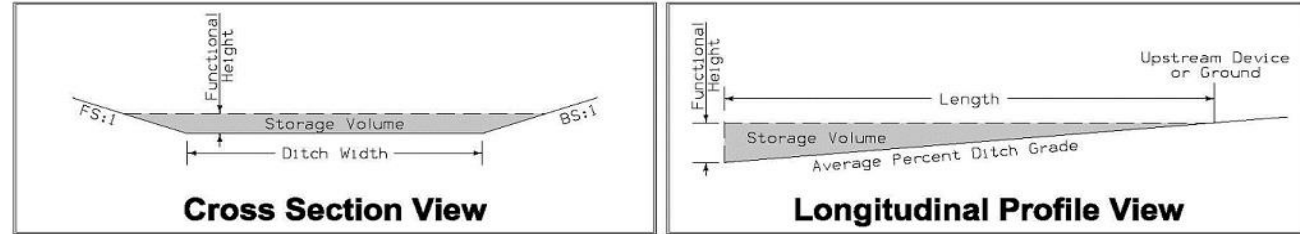
* The functional height used in the volume equation is 90% of effective height. Effective height is 2 feet as shown in 570-2.

* Volume equation: $[0.5 * Spacing * (0.5 * H^2 * FS + DW * H + 0.5 * H^2 * BS)]$

Basin No.	Location		Bid Items				Stormwater Storage Volume Summary					Remarks
	Station	Side	Offset FT	Installation LF	Maintenance Each	Removal Each	Foreslope FS:1	Backslope BS:1	Ditch Width FT	Avg. % Slope	Volume* CF	
	661+34.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	661+54.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	661+74.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	661+94.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	662+14.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	662+34.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	662+54.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	662+74.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	662+94.00	RT		27.0	3	1	6.0	2.5	10.0	9.5%		
	820+70.00	RT		27.0	3	1	6.0	2.5	10.0	12.0%		
	820+90.00	RT		27.0	3	1	6.0	2.5	10.0	12.0%		
	821+10.00	RT		27.0	3	1	6.0	2.5	10.0	12.0%		
	821+30.00	RT		27.0	3	1	6.0	2.5	10.0	12.0%		
	1098+20.00	RT		27.0	3	1	6.0	2.5	10.0	13.0%		
	1098+40.00	RT		27.0	3	1	6.0	2.5	10.0	13.0%		
	1098+60.00	RT		27.0	3	1	6.0	2.5	10.0	13.0%		

SILT FENCES FOR DITCH CHECKS

Possible Standard: EC-201 Possible Detail: 570-4



* The functional height used in the volume equation is 85% of effective height. Effective height is 1.58 feet as shown on EC-201.
* Volume equation: $[0.5 * Spacing * (0.5 * H^2 * FS + DW * H + 0.5 * H^2 * BS)]$

Basin No.	Type	Location		Bid Items			Stormwater Storage Volume Summary					Remarks
		Station	Side	Installation LF	Maintenance LF	Removal LF	Foreslope FS:1	Backslope BS:1	Ditch Width FT	Avg.% Slope Ditch Grade	Volume* CF	
1		408+80.00	RT	27.0			6.0	2.5	10.0	1.5%		
1		764+10.00	RT	27.0			6.0	2.5	10.0	3.6%		
1		764+50.00	RT	27.0			6.0	2.5	10.0	3.6%		
1		951+42.00	RT	27.0			6.0	2.5	10.0	1.1%		
1		952+42.00	RT	27.0			6.0	2.5	10.0	1.1%		
1		953+42.00	RT	27.0			6.0	2.5	10.0	1.1%		
1		954+42.00	RT	27.0			6.0	2.5	10.0	1.1%		
1		955+42.00	RT	27.0			6.0	2.5	10.0	1.1%		
1		1098+90.00	RT	27.0			6.0	2.5	10.0	1.8%		

PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE

Possible Standards: EC-204

Location			Length of Installation			Remarks
Begin Station	End Station	Side	9 inch Dia LF	12 inch Dia LF	20 inch Dia LF	
950+76.00		RT			27.0	Ditch checks
950+98.00		RT			27.0	
951+20.00		RT			27.0	
956+15.00		RT			27.0	
956+32.00		RT			27.0	
956+49.00		RT			27.0	
956+66.00		RT			27.0	

LIST OF SUBDRAIN WORK

Possible Standards: DR-121, DR-201, DR-203, DR-301, DR-302, DR-303, DR-305 and DR-306. Possible Detail: 500-10.

* Not a bid item

Location		Pipe			Aprons		Outlets			Connected Pipe Joints*	Trench Drain	Granular Material	Porous Backfill*	Class "A" Crushed Stone*	Remarks
No.	Station to Station	Type of Installation	Concrete, C.M.P., or Plastic	Dia.	Length	DR-201	DR-203	500-10	DR-305						
		DR-301, DR-302, DR-303		IN	LF	No.	No.	No.	Type	No.	No.	Blanket CY	CY	CY	
1	288+37.00	288+49.00										5.0			1-Foot Granular Material for Working Blanket
2	532+14.00	532+23.00										5.0			1-Foot Granular Material for Working Blanket
3	1104+96.00	1105+11.00										5.0			1-Foot Granular Material for Working Blanket
Total												15.0			

103-6
10-17-17

EMBANKMENT WITH MOISTURE CONTROL

Moisture Control is required for all Class 10 fill placed in all locations and depths. Stability berms placed outside the normal foreslope template and topsoil will not require Moisture Control.

103-7
08-01-08

SHRINKAGE DATA

Material	%	Remarks
Topsoil	40%	Shrinkage
Class 10	30%	Shrinkage

SPECIAL ATTENTION (SLIVER FILL)

Special attention should be given to Article 2107.03.C, of the current Standard Specification Series, on this project.

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.

7/2/2018
Date

Signature
Justin D. Humke

Printed or Typed Name
My license renewal date is December 31, 20 19

Pages or sheets covered by this seal: CS.1, Q.1-Q.12

SURVEY SYMBOLS

- PLG Location of General Photo
- PIP Pipe Culvert
- ⊙ X LC Lot Corner
- PPA Power Pole Co. 1
- SIGN SI Sign
- FW Wire Fence
- ⊙ TDC Tree Deciduous
- * TEV Evergreen Tree
- OUT Tile Outlet
- CUL Culvert
- TLNR Tree Line Right
- MIS Miscellaneous
- ⊙ MM MM Mile Marker Post
- ⊙ TP TPD Telephone Pedestal
- TLNL Tree Line Left
- ⊙ INB Storm Sewer Beehive Intake
- BRG Bridge
- MH Utility Access (Manhole)
- SP Stream Profile
- D Centerline Draw or Stream (Down)
- DU Centerline Draw or Stream (Up)
- CON Concrete or A/C Slab
- SNP Unpaved Shoulder
- △ EP Edge of Paved Roads (ML or SR)
- △ RIP Rip-Rap
- ▽ BNK Stream Bank
- ENU Edge Unpaved Entrance & Parking
- CU Back of Curb
- PRO Profile Shot
- UE Utility Elevation
- TW Top of Water
- GP GP Guard Post (Less Than 4 Posts)
- EB EB Electrical Box
- EG Edge of Gravel Road

UTILITY LEGEND

PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Topographic Features and Labels
Blue	(1)	Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation
Magenta	(5)	Existing Utilities
SHADING	Design Color No.	
Yellow	(4)	Highlight for Critical Notes or Features
Red	(3)	Delineates Restricted Areas
Lavender	(9)	Temporary Pavement Shading
Gray, Light	(48)	Proposed Pavement Shading
Gray, Med	(80)	Proposed Granular Shading
Gray, Dark	(112)	Proposed Grade and Pave Shading "In conjunction with a paving project"
Brown, Light	(236)	Grading Shading
Tan	(8)	Proposed Sidewalk Shading
Blue, Light	(230)	Proposed Sidewalk Landing Shading
Pink	(11)	Proposed Sidewalk Ramp Shading

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Ground Line Profile
Blue	(1)	Proposed Profile and Annotation
Magenta	(5)	Existing Utilities
Blue, Light	(230)	Proposed Ditch Grades, Left
Black	(0)	Proposed Ditch Grades, Median
Rust	(14)	Proposed Ditch Grades, Right

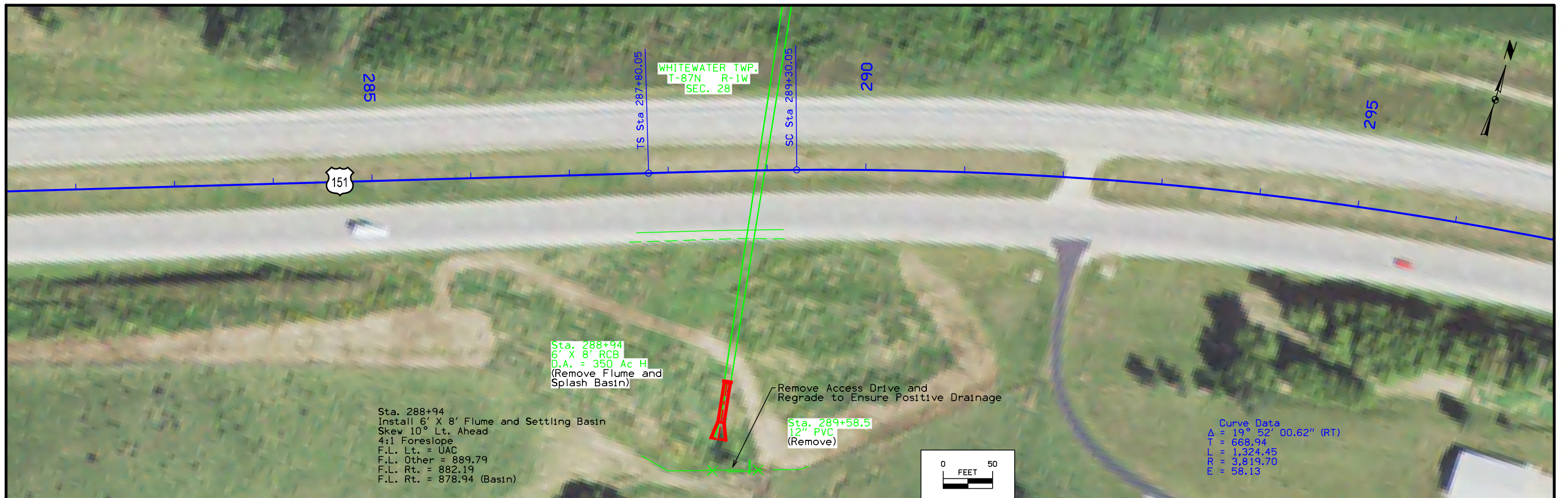
- Reference Point
- Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

- ▲ Proposed Right-of-Way
- △ Existing Right of Way
- ▲ Existing and Proposed Right-of-Way
- ▲ Easement and Existing Right-of-Way
- Easement (Temporary)
- Easement
- C/A Access Control
- Property Line

PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES D, E, F, & K)



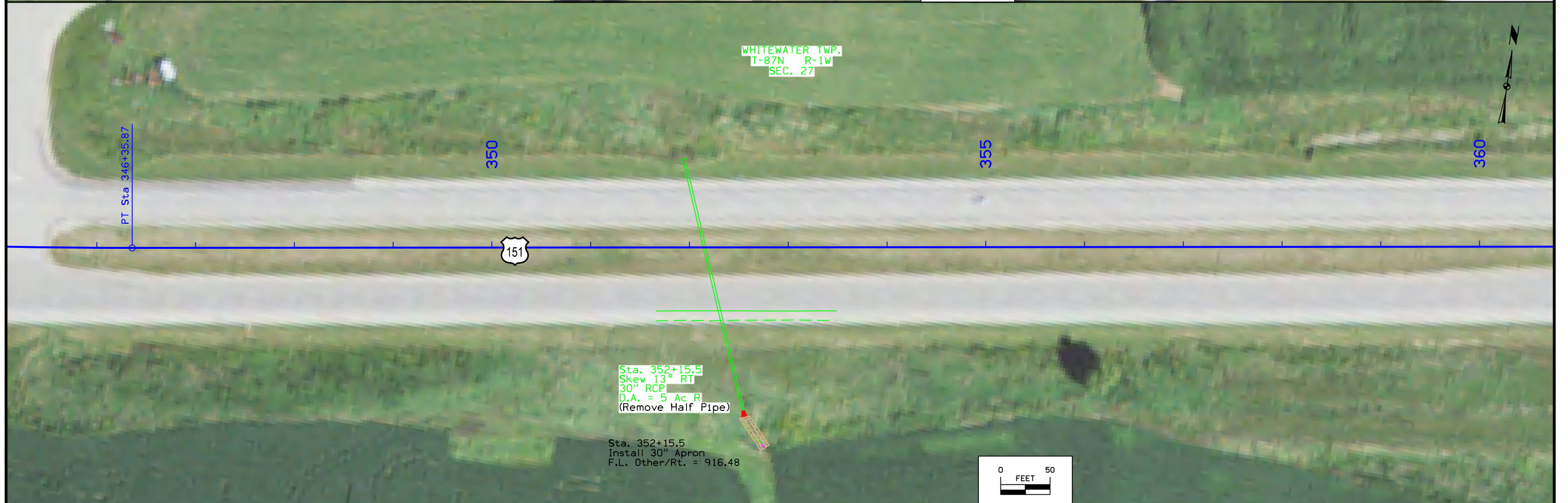
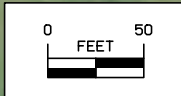
Sta. 288+94
 Install 6' X 8' Flume and Settling Basin
 Skew 10° Lt. Ahead
 4:1 Foreslope
 F.L. Lt. = UAC
 F.L. Other = 889.79
 F.L. Rt. = 882.19
 F.L. Rt. = 878.94 (Basin)

Sta. 288+94
 6' X 8' RCB
 D.A. = 350 Ac H
 (Remove Flume and
 Splash Basin)

Remove Access Drive and
 Regrade to Ensure Positive Drainage

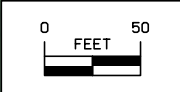
Sta. 289+58.5
 12" PVC
 (Remove)

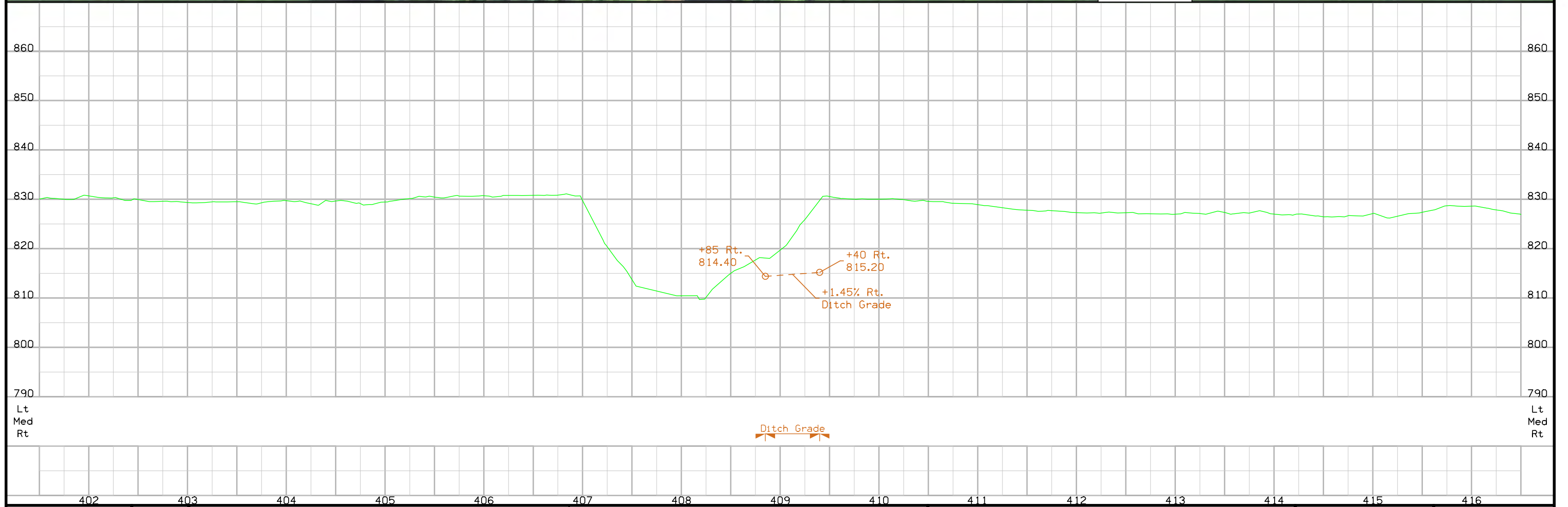
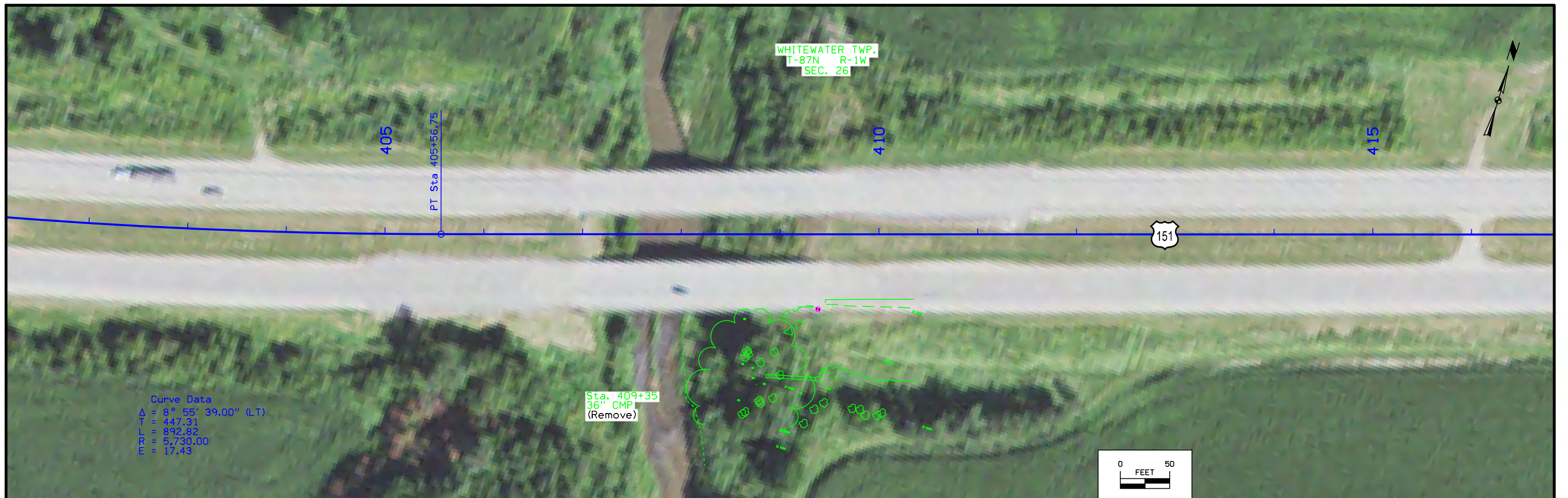
Curve Data
 $\Delta = 19^\circ 52' 00.62''$ (RT)
 T = 668.94
 L = 1,324.45
 R = 3,819.70
 E = 58.13

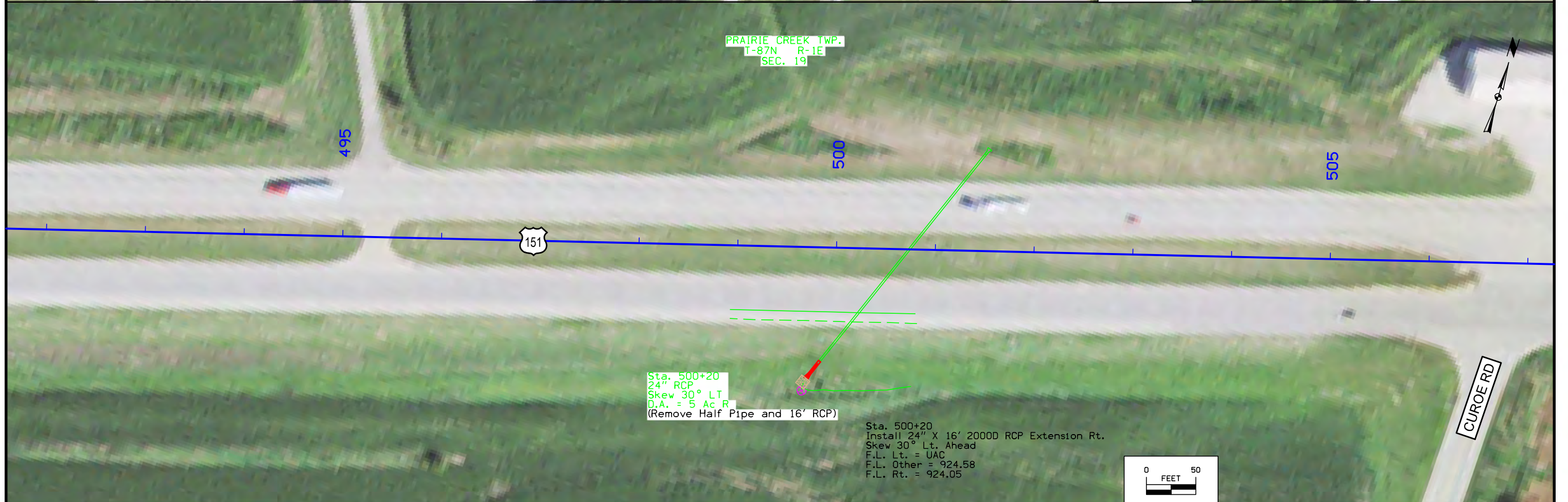
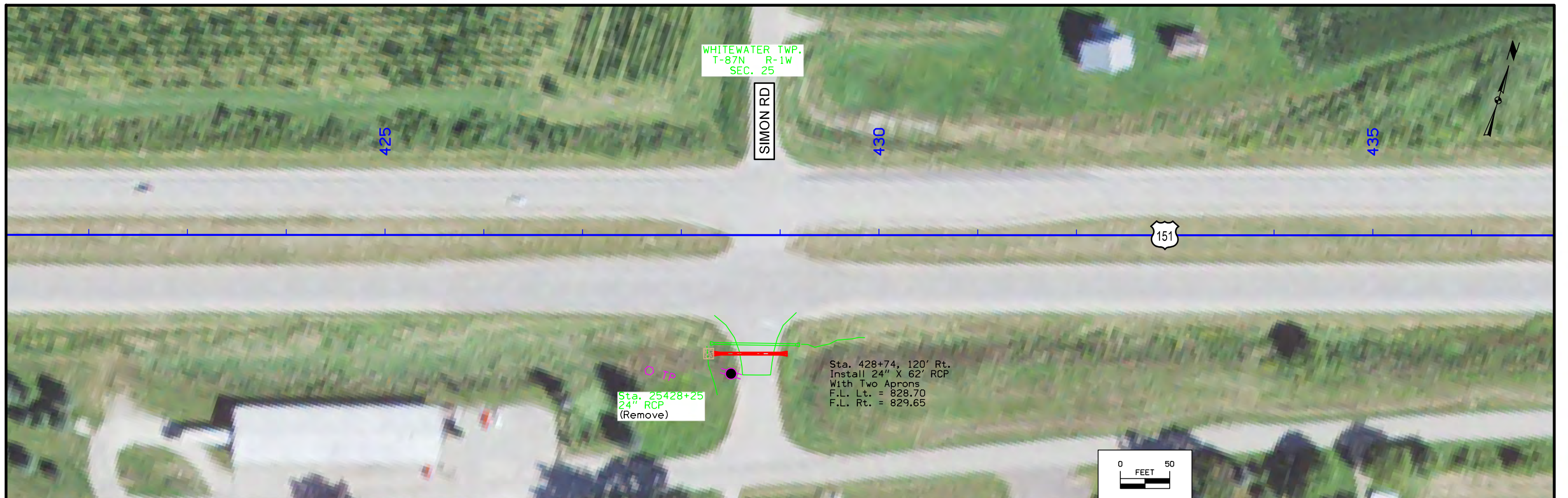


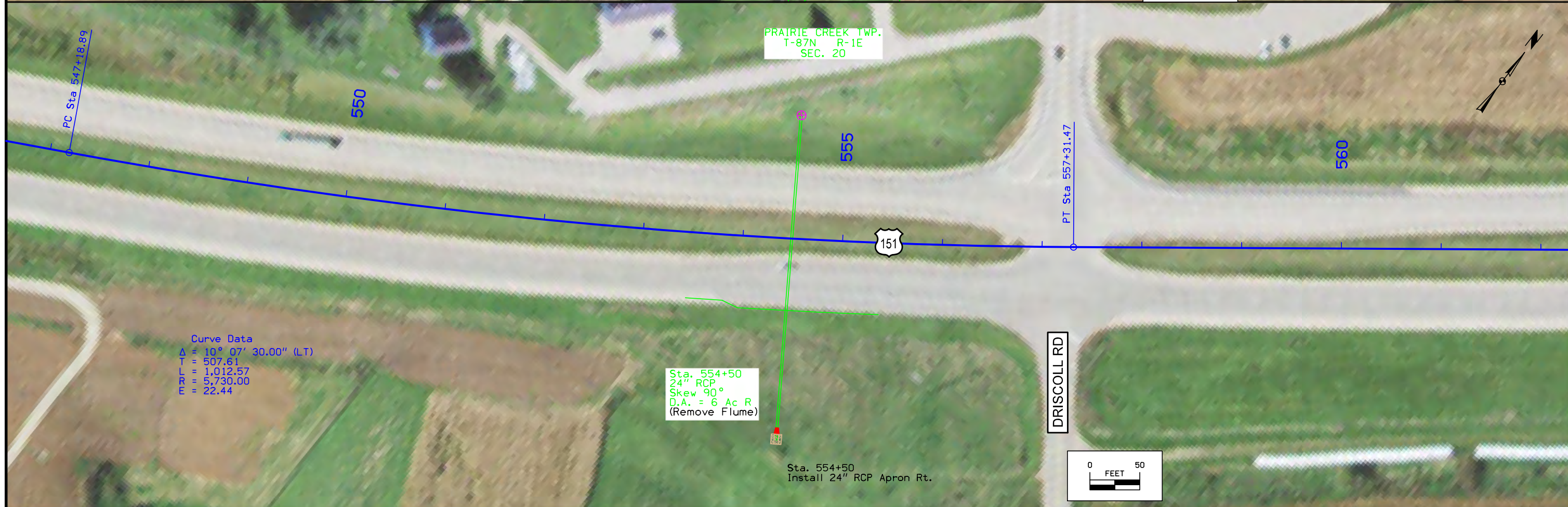
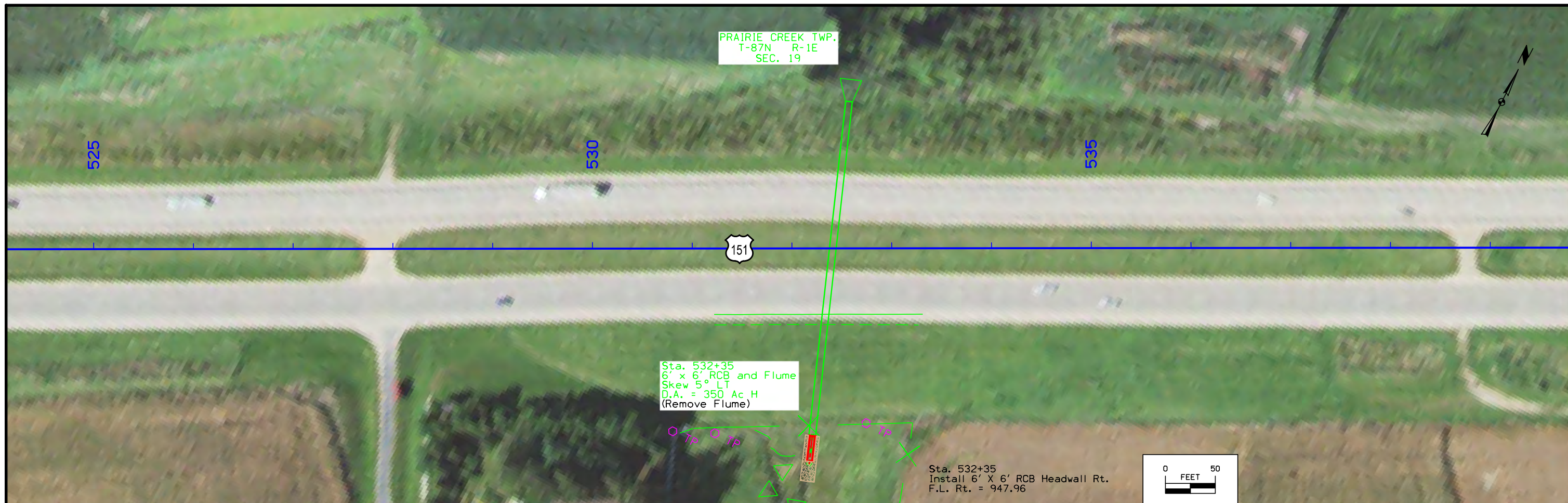
Sta. 352+15.5
 Skew 13° RT
 30" RCP
 D.A. = 5 Ac R
 (Remove Half Pipe)

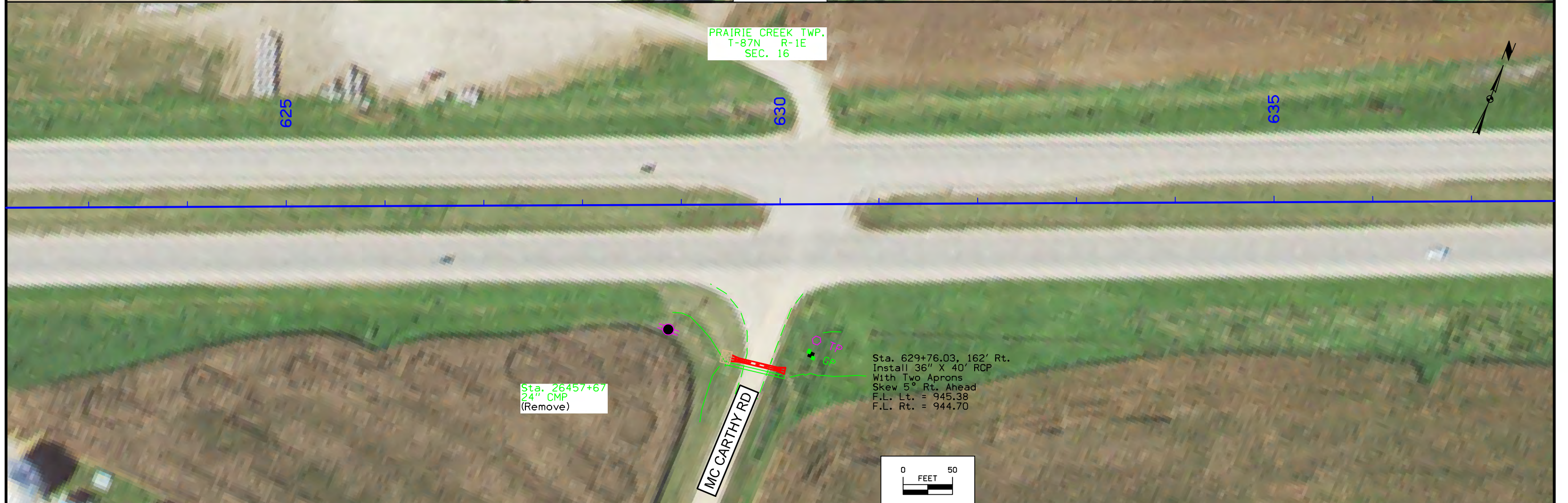
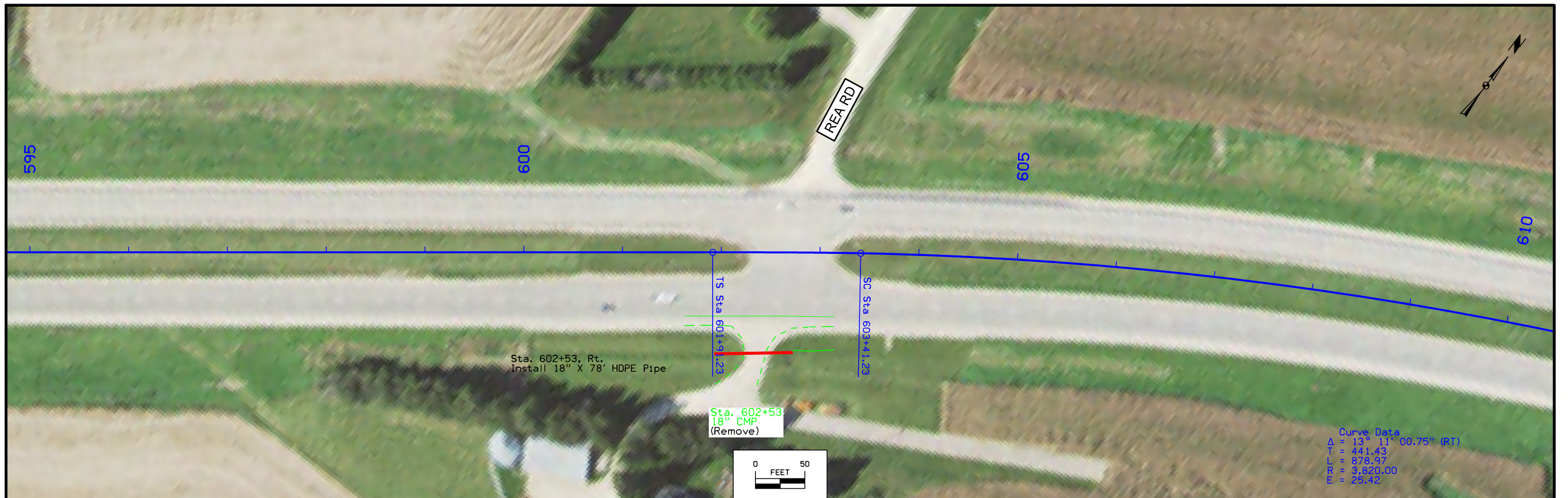
Sta. 352+15.5
 Install 30" Apron
 F.L. Other/Rt. = 916.48

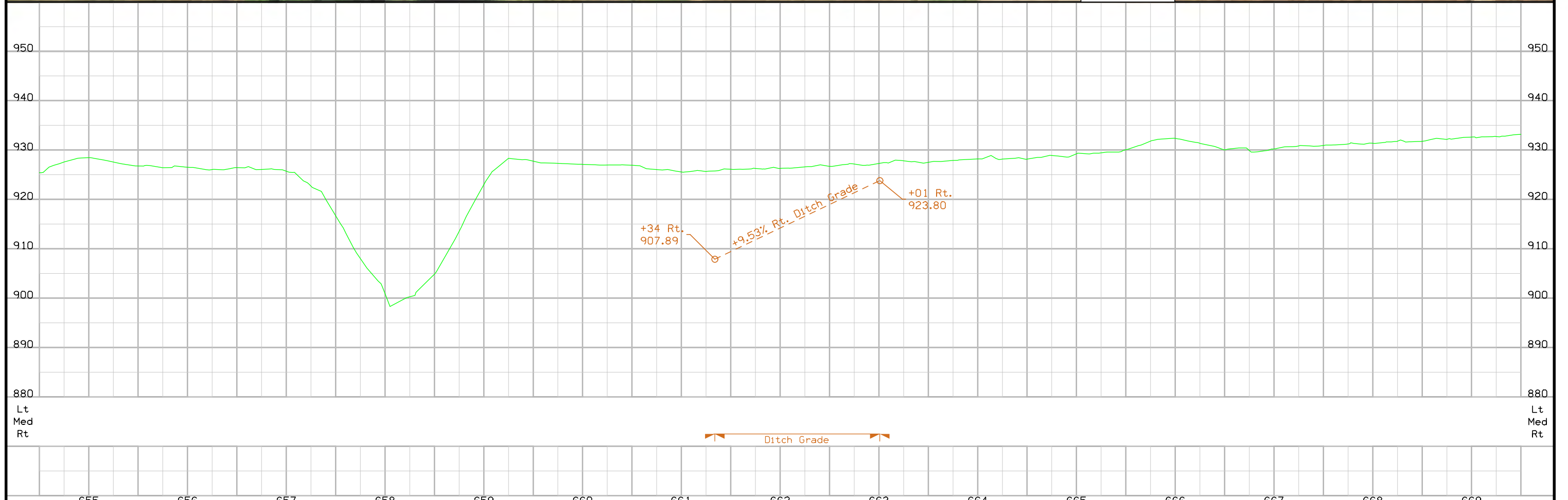


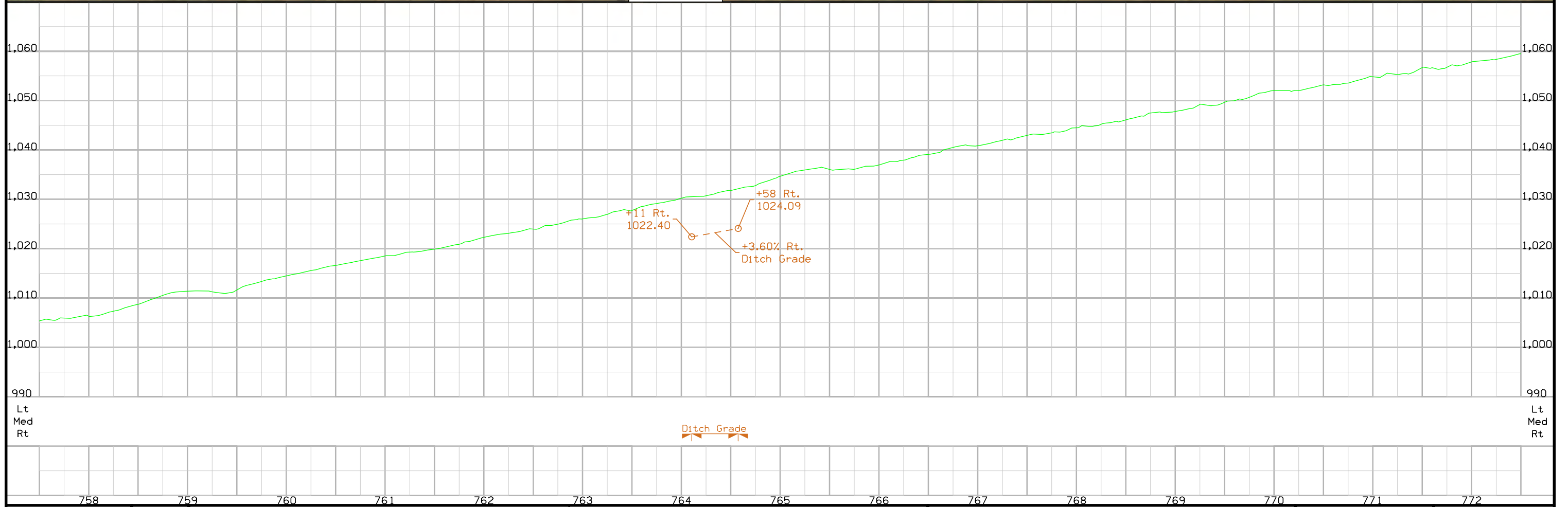
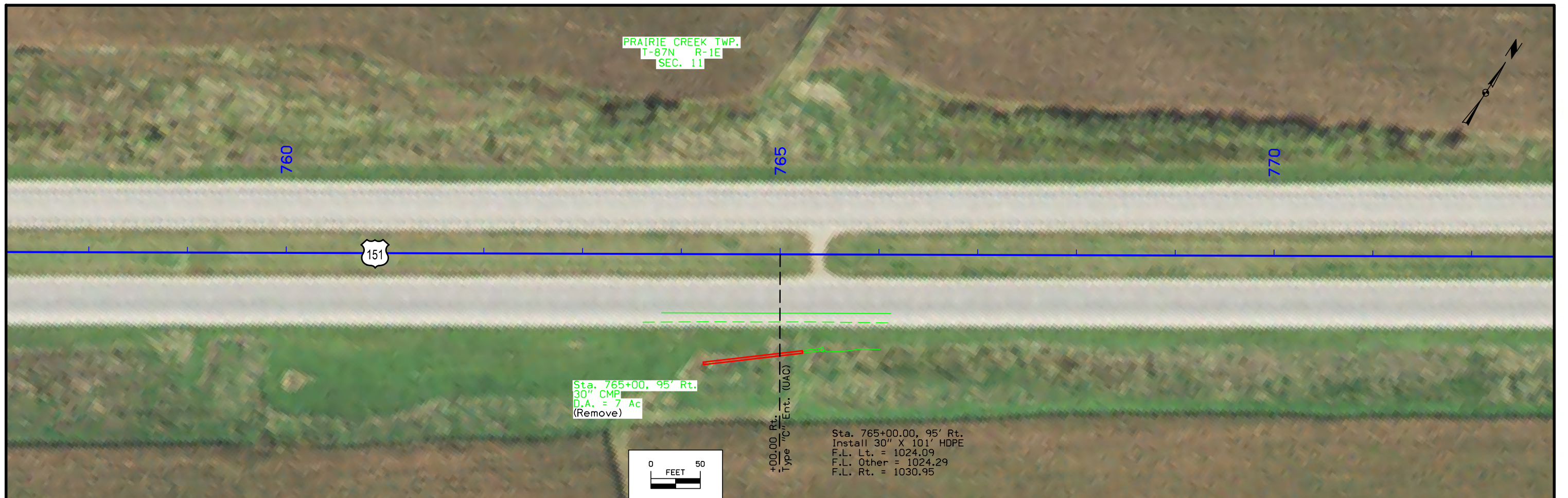


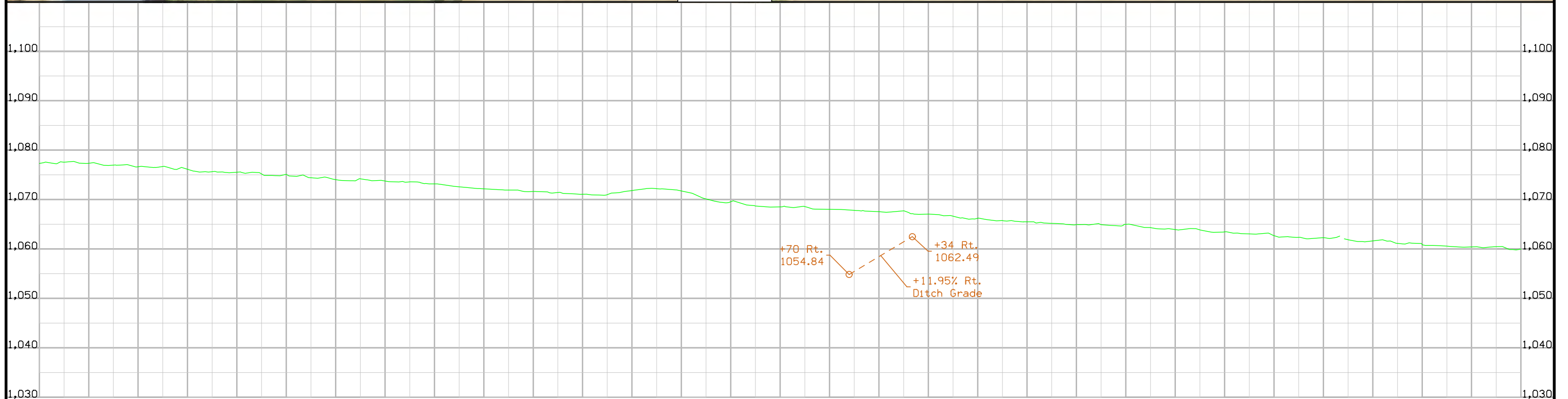
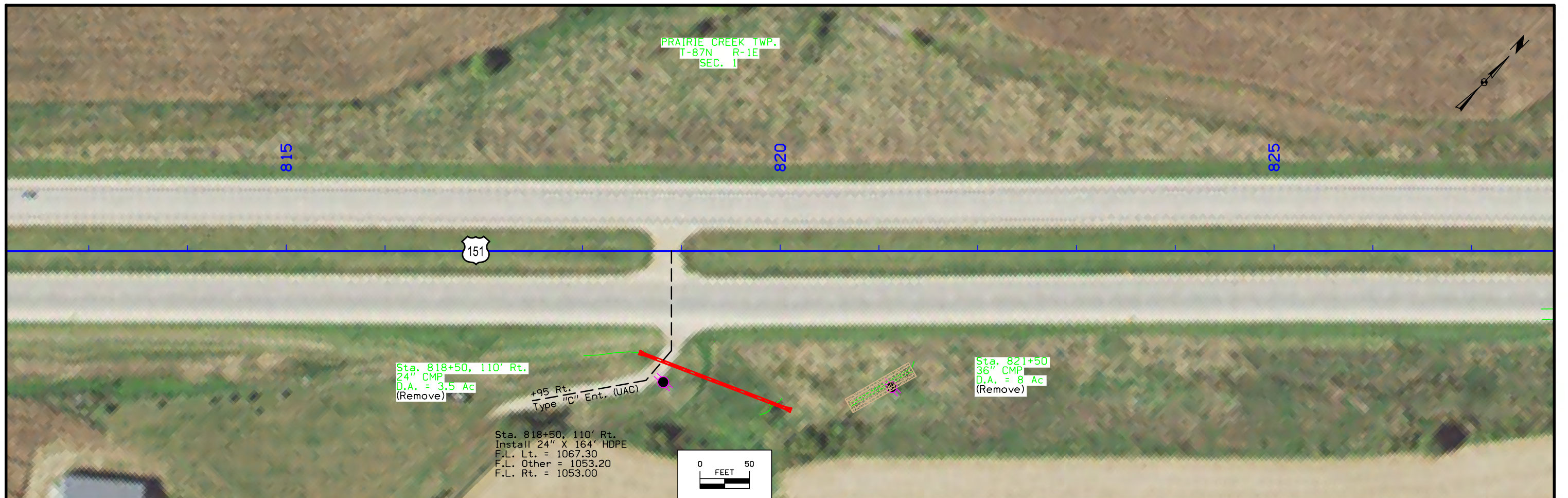




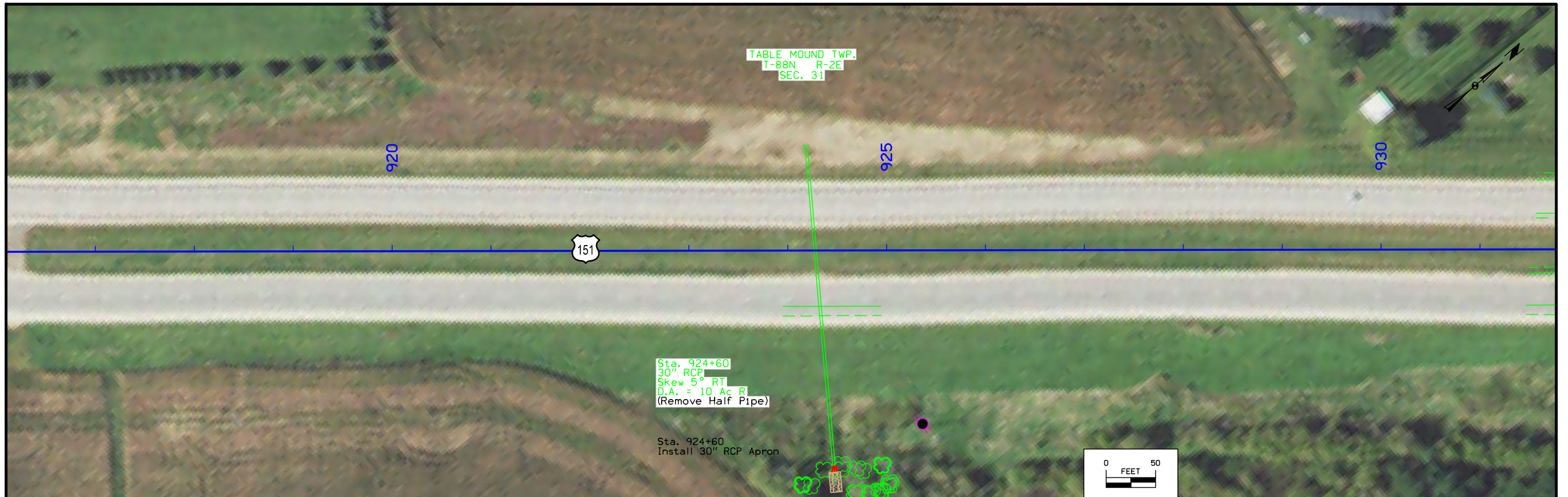


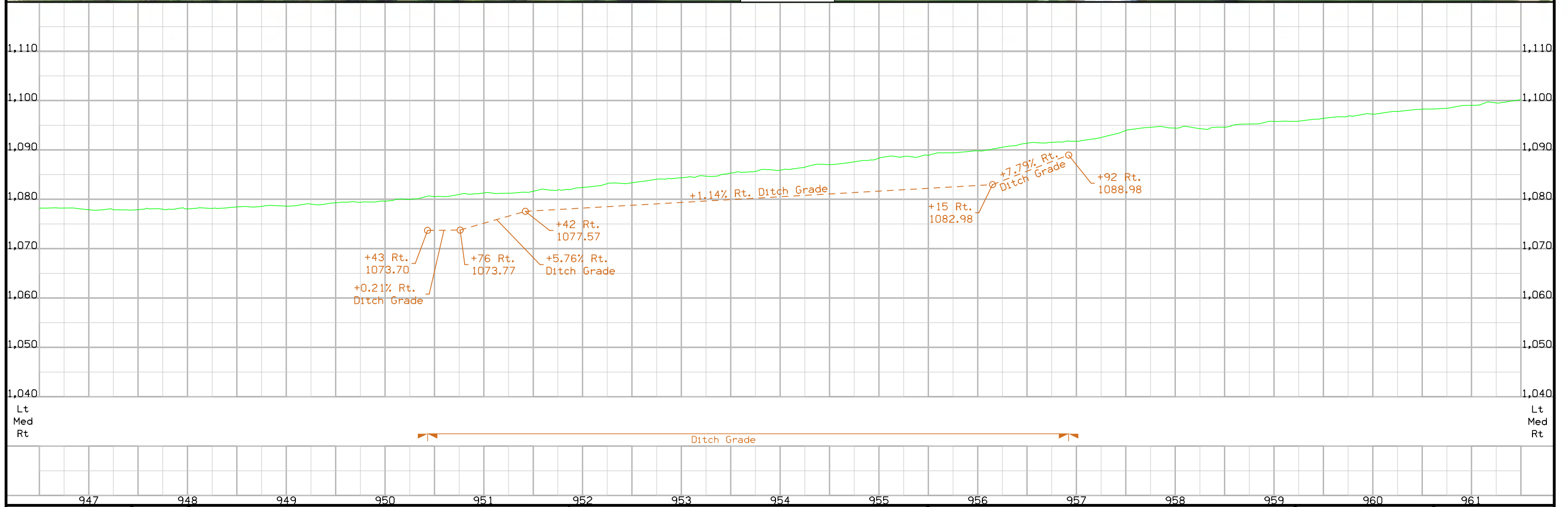
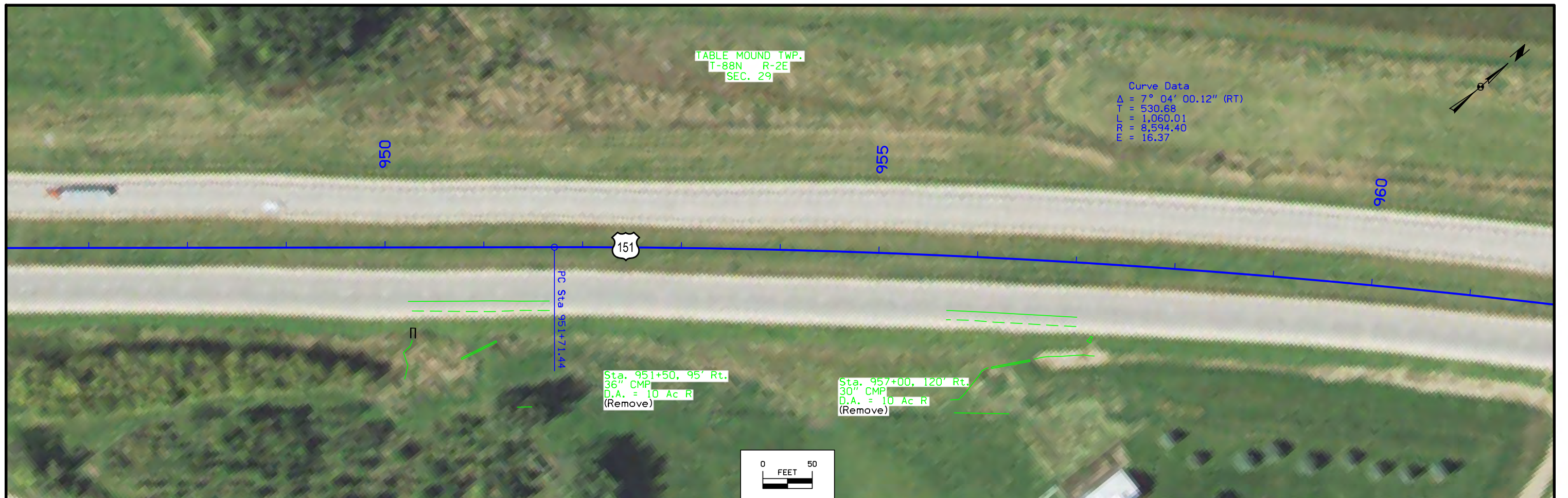






FILE NO.	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827
ENGLISH	DESIGN TEAM SNYDER & ASSOCIATES, INC.										DUBUQUE COUNTY	PROJECT NUMBER	BRFN-151-5(66)--39-31	SHEET NUMBER	D.9





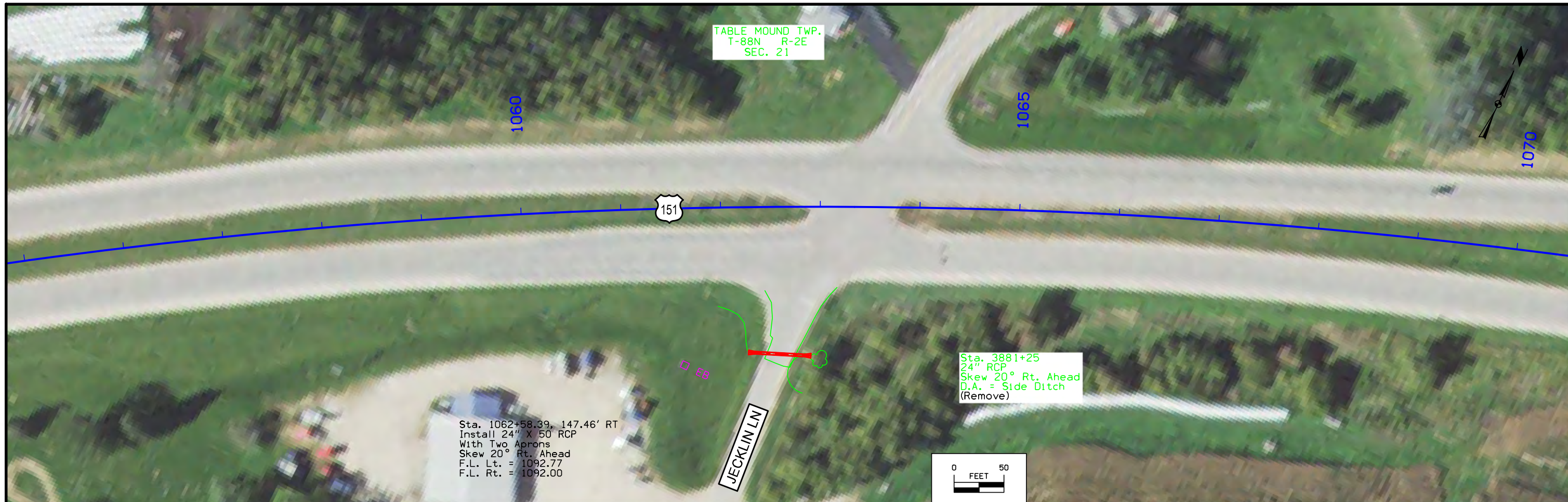


TABLE MOUND TWP.
T-88N R-2E
SEC. 22

Sta. 1104+20
Install 6' X 6' Flume and Settling Basin
3:1 Foreslope
Skew = 30° Rt. Ahead
F.L. At End of Flume = 852.00
F.L. Other = 877.20

Sta. 1108+30 EBL
Install 30" X 83' HDPE Extension
F.L. Lt. = UAC
F.L. Other = 880.48
F.L. Other = 858.70
F.L. Rt. = 858.40

Sta. 1111+50 EBL
Install 30" X 128' HDPE Extension
F.L. Lt. = UAC
F.L. Other = 877.52
F.L. Other = 840.80
F.L. Rt. = 840.50

Sta. 1098+00
24" CMP
(Remove)

Sta. 1104+20
6' x 6' RCB and Flume
Skew 30° Rt. Ahead
D.A. = 189 Ac Mt
(Remove Flume)

Sta. 1108+30
30" RCP/CMP
D.A. = 5 Ac Mt
(Remove CMP)

Sta. 1111+50
30" RCP/CMP
D.A. = 7 Ac Mt
(Remove CMP)

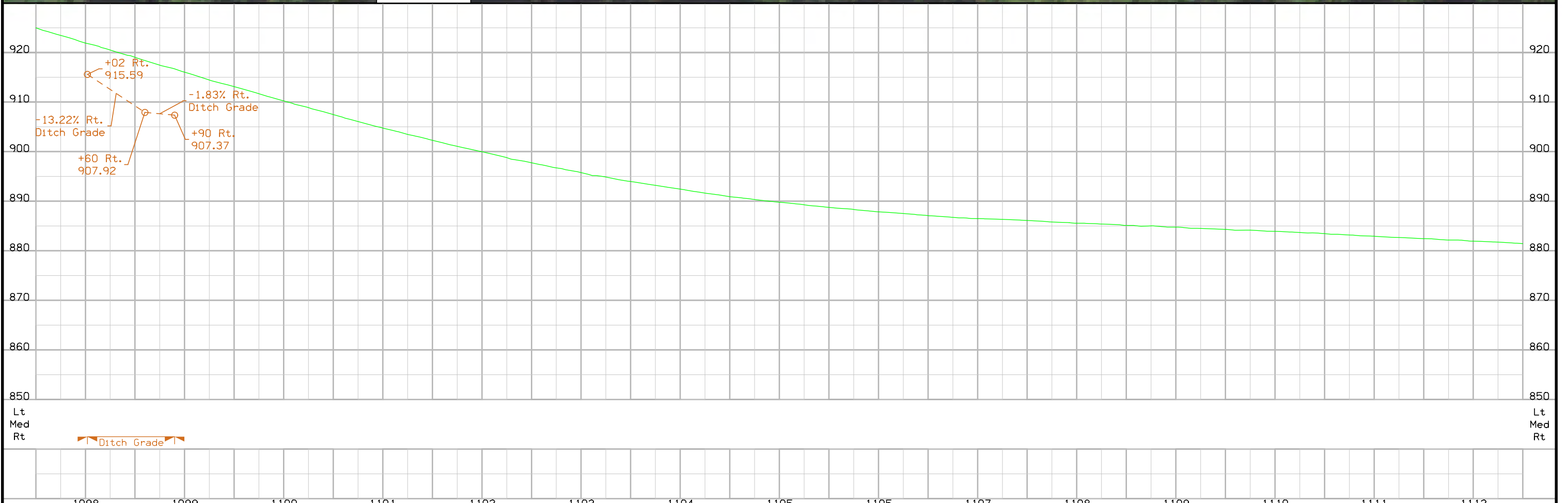
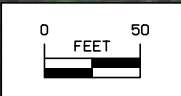
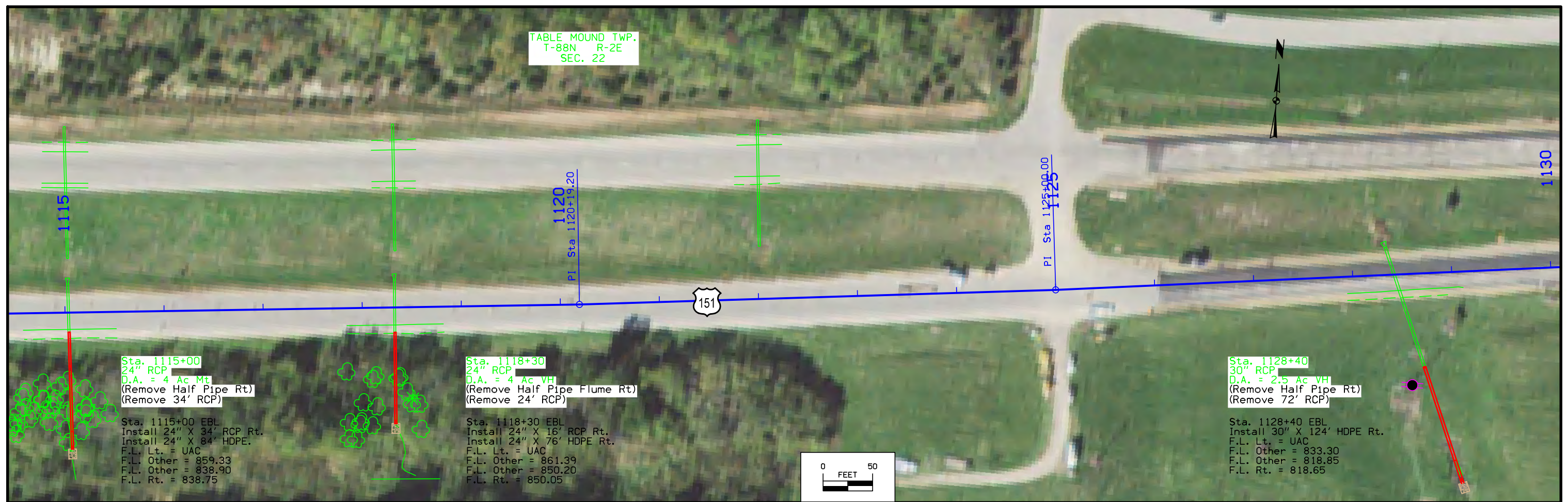


TABLE MOUND TWP.
T-88N R-2E
SEC. 22



Sta. 1115+00
24" RCP
D.A. = 4 Ac Mt
(Remove Half Pipe Rt)
(Remove 34' RCP)

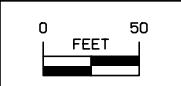
Sta. 1115+00 EBL
Install 24" X 34' RCP Rt.
Install 24" X 84' HDPE.
F.L. Lt. = UAC
F.L. Other = 859.33
F.L. Other = 838.90
F.L. Rt. = 838.75

Sta. 1118+30
24" RCP
D.A. = 4 Ac VH
(Remove Half Pipe Flume Rt)
(Remove 24' RCP)

Sta. 1118+30 EBL
Install 24" X 16' RCP Rt.
Install 24" X 76' HDPE Rt.
F.L. Lt. = UAC
F.L. Other = 861.39
F.L. Other = 850.20
F.L. Rt. = 850.05

Sta. 1128+40
30" RCP
D.A. = 2.5 Ac VH
(Remove Half Pipe Rt)
(Remove 72' RCP)

Sta. 1128+40 EBL
Install 30" X 124' HDPE Rt.
F.L. Lt. = UAC
F.L. Other = 833.30
F.L. Other = 818.85
F.L. Rt. = 818.65



Chain ML151_BEGIN

Chain ML151_BEGIN contains:
20000 SCS ML151_BEGIN-1 20001

Beginning chain ML151_BEGIN description

Point 20000 N 8,352,625.3921 E 21,381,580.1111 Sta 279+00.00

Course from 20000 to TS ML151_BEGIN-1B N 71° 21' 58.60" E Dist 880.0517

SCS ML151_BEGIN-1 found within chain ML151_BEGIN, contains:
SPI ML151_BEGIN-1B CUR ML151_BEGIN-1 SPI ML151_BEGIN-1A

PISCS ML151_BEGIN-1 N 8,353,169.0858 E 21,383,192.5243 STA 296+01.61
 Total Back Tangent = 821.5591
 Total Ahead Tangent = 821.5494
 Total Length = 1,624.4295
 Total Delta = 22° 07' 00.12" (RT)
 Back Tangent = N 71° 21' 58.60" E
 Ahead Tangent = S 86° 31' 01.28" E

Beginning SCS ML151_BEGIN-1 description

Spiral Back
Spiral ML151_BEGIN-1B Type 1 Spiral Element

Angle	1° 07' 30.02" (RT) P	0.2454	BK N 71° 21' 58.60" E
LS	150.0000	74.9990	AH N 72° 29' 28.62" E
R	3,819.7000	100.0020	CB N 71° 44' 28.61" E
YS	0.9817	50.0018	Defl 0° 22' 30.00"
XS	149.9942	149.9974	Deg 1° 30' 00.03"

Point	Spiral Coordinates		Station
	North	East	
TS	8,352,906.5837	21,382,414.0310	287+80.05
PI	8,352,938.5360	21,382,508.7910	288+80.05
SC	8,352,953.5791	21,382,556.4763	289+30.05
CC	8,349,310.8412	21,383,705.6363	

Chain ML151_BEGIN - Continued

Circular Section

Curve Data

Curve ML151_BEGIN-1
 P.I. Station 295+98.99 N 8,353,154.8304 E 21,383,194.4255
 Delta = 19° 52' 00.62" (RT)
 Degree = 1° 30' 00.03"
 Tangent = 668.9404
 Length = 1,324.4495
 Radius = 3,819.7000
 External = 58.1331
 Long Chord = 1,317.8245
 Mid. Ord. = 57.2616
 P.C. Station 289+30.05 N 8,352,953.5791 E 21,382,556.4763
 P.T. Station 302+54.50 N 8,353,127.3066 E 21,383,862.7994
 C.C. N 8,349,310.8412 E 21,383,705.6363
 Back = N 72° 29' 28.62" E
 Ahead = S 87° 38' 30.76" E
 Chord Bear = N 82° 25' 28.93" E

Spiral Ahead
Spiral ML151_BEGIN-1A Type 2 Spiral Element

Angle	1° 07' 29.48" (RT) P	0.2454	BK S 87° 38' 30.76" E
LS	149.9800	74.9890	AH S 86° 31' 01.28" E
R	3,819.7000	99.9887	CB S 86° 53' 31.10" E
YS	0.9815	49.9952	Defl 0° 22' 29.82"
XS	149.9742	149.9774	Deg 1° 30' 00.03"

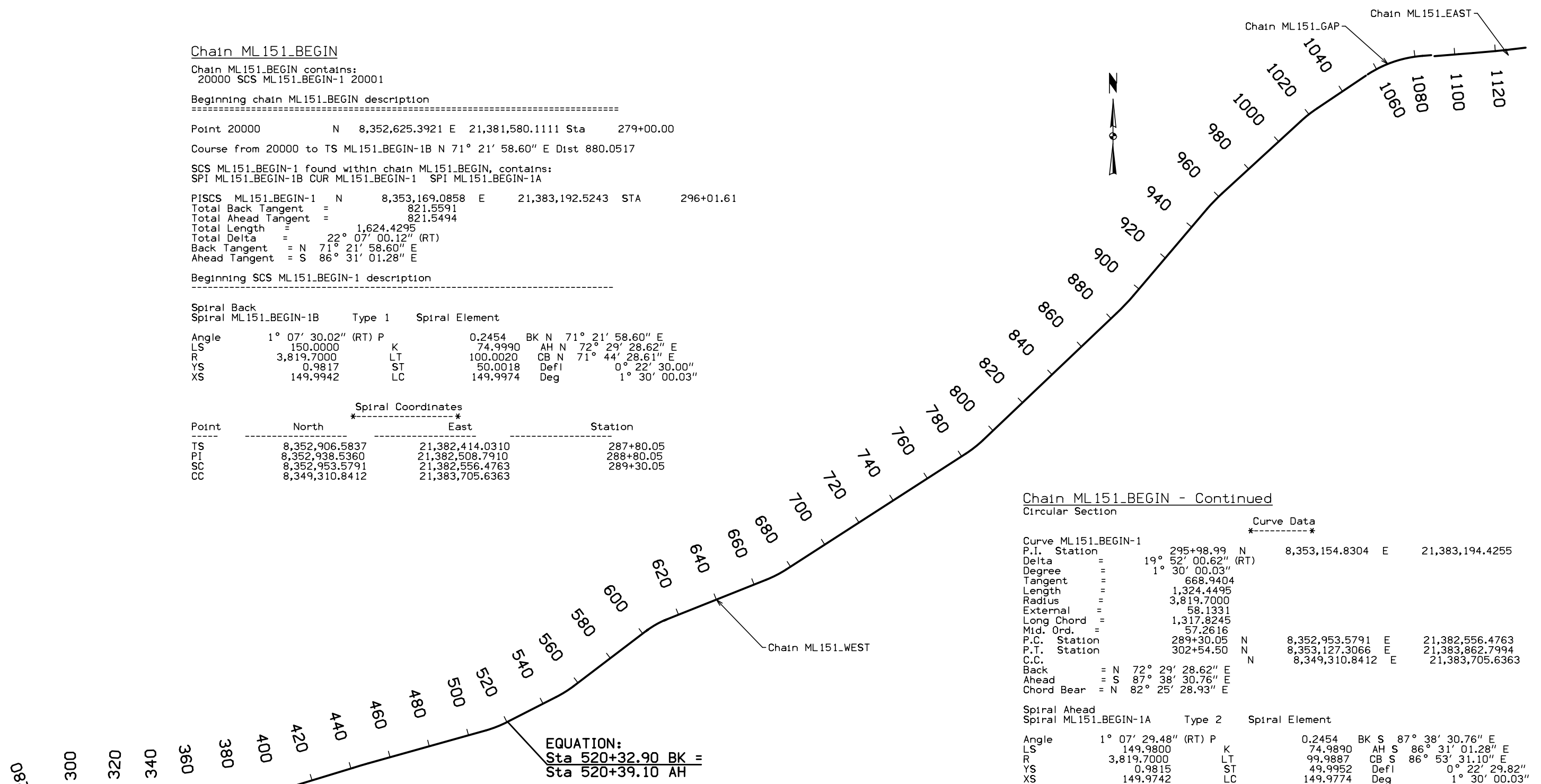
Point	Spiral Coordinates		Station
	North	East	
CS	8,353,127.3066	21,383,862.7994	302+54.50
PI	8,353,125.2495	21,383,912.7523	303+04.50
ST	8,353,119.1750	21,384,012.5563	304+04.48
CC	8,349,310.8412	21,383,705.6363	

Ending SCS ML151_BEGIN-1 description

Course from ST ML151_BEGIN-1A to 20001 S 86° 31' 01.28" E Dist 2,070.0474

Point 20001 N 8,352,993.4155 E 21,386,078.7800 Sta 324+74.53

Ending chain ML151_BEGIN description



Chain ML151_WEST

Chain ML151_WEST contains:
 CUR ML151_WEST-2 CUR ML151_WEST-3 CUR ML151_WEST-4 CUR M-
 L151_WEST-5 9999 CUR ML151_WEST-6 SCS ML151_WEST-7 CUR ML151_WEST-8 CUR ML151_W-
 EST-9 CUR ML151_WEST-10 CUR ML151_WEST-11 CUR ML151_WEST-12 30001

Beginning chain ML151_WEST description

Curve Data

Curve ML151_WEST-2
 P.I. Station = 340+61.11 N 8,352,898.5747 E 21,387,637.0097
 Delta = 11° 31' 59.88" (LT)
 Degree = 0° 59' 59.73"
 Tangent = 578.6627
 Length = 1,153.4150
 Radius = 5,730.0000
 External = 29.1449
 Long Chord = 1,151.4686
 Mid. Ord. = 28.9975
 P.C. Station = 334+82.45 N 8,352,933.7296 E 21,387,059.4158
 P.T. Station = 346+35.87 N 8,352,979.6122 E 21,388,209.9700
 C.C. = N 87° 42' 58.78" E
 Back = S 86° 31' 01.28" E
 Ahead = N 81° 56' 58.84" E
 Chord Bear = N 87° 42' 58.78" E

Course from PT ML151_WEST-2 to PC ML151_WEST-3 N 81° 56' 58.84" E Dist 5,028.0640

Curve Data

Curve ML151_WEST-3
 P.I. Station = 401+11.24 N 8,353,746.3992 E 21,393,631.3899
 Delta = 8° 55' 39.00" (LT)
 Degree = 0° 59' 59.73"
 Tangent = 447.3132
 Length = 892.8158
 Radius = 5,730.0000
 External = 17.4333
 Long Chord = 891.9129
 Mid. Ord. = 17.3804
 P.C. Station = 396+63.93 N 8,353,683.7562 E 21,393,188.4847
 P.T. Station = 405+56.75 N 8,353,877.0154 E 21,394,059.2083
 C.C. = N 81° 56' 58.84" E
 Back = N 81° 56' 58.84" E
 Ahead = N 73° 01' 19.84" E
 Chord Bear = N 77° 29' 09.34" E

Course from PT ML151_WEST-3 to PC ML151_WEST-4 N 73° 01' 19.84" E Dist 3,546.1314

Curve Data

Curve ML151_WEST-4
 P.I. Station = 444+92.59 N 8,355,026.2885 E 21,397,823.5224
 Delta = 1° 17' 56.04" (RT)
 Degree = 0° 09' 59.96"
 Tangent = 389.7154
 Length = 779.3974
 Radius = 34,380.0000
 External = 2.2087
 Long Chord = 779.3807
 Mid. Ord. = 2.2086
 P.C. Station = 441+02.88 N 8,354,912.4910 E 21,397,450.7916
 P.T. Station = 448+82.27 N 8,355,131.6077 E 21,398,198.7370
 C.C. = N 73° 01' 19.84" E
 Back = N 73° 01' 19.84" E
 Ahead = N 74° 19' 15.88" E
 Chord Bear = N 73° 40' 17.86" E

Course from PT ML151_WEST-4 to PC ML151_WEST-5 N 74° 19' 15.88" E Dist 6,004.7646

Curve Data

Curve ML151_WEST-5
 P.I. Station = 514+57.96 N 8,356,908.6618 E 21,404,529.7485
 Delta = 11° 22' 48.00" (LT)
 Degree = 0° 59' 59.73"
 Tangent = 570.9200
 Length = 1,138.0838
 Radius = 5,730.0000
 External = 28.3721
 Long Chord = 1,136.2141
 Mid. Ord. = 28.2323
 P.C. Station = 508+87.04 N 8,356,754.3728 E 21,403,980.0717
 P.T. Station = 520+25.12 N 8,357,168.3771 E 21,405,038.1751
 C.C. = N 74° 19' 15.88" E
 Back = N 74° 19' 15.88" E
 Ahead = N 62° 56' 27.88" E
 Chord Bear = N 68° 37' 51.88" E

Course from PT ML151_WEST-5 to 9999 N 62° 56' 27.88" E Dist 7.7775

Equation: Sta 520+32.90 (BK) = Sta 520+39.10 (AH) ----- End Region 1
 ----- Begin Region 2
 Point 9999 N 8,357,171.9151 E 21,405,045.1013 Sta 520+39.10

Chain ML151_WEST - Continued

Course from 9999 to PC ML151_WEST-6 N 62° 56' 27.88" E Dist 2,679.7935

Curve Data

Curve ML151_WEST-6
 P.I. Station = 552+26.50 N 8,358,621.8853 E 21,407,883.6081
 Delta = 10° 07' 30.00" (LT)
 Degree = 0° 59' 59.73"
 Tangent = 507.6089
 Length = 1,012.5746
 Radius = 5,730.0000
 External = 22.4401
 Long Chord = 1,011.2576
 Mid. Ord. = 22.3525
 P.C. Station = 547+18.89 N 8,358,390.9707 E 21,407,431.5624
 P.T. Station = 557+31.47 N 8,358,928.6718 E 21,408,288.0199
 C.C. = N 62° 56' 27.88" E
 Back = N 62° 56' 27.88" E
 Ahead = N 52° 48' 57.88" E
 Chord Bear = N 57° 52' 42.88" E

Course from PT ML151_WEST-6 to TS ML151_WEST-7B N 52° 48' 57.88" E Dist 4,459.7642

SCS ML151_WEST-7 found within chain ML151_WEST, contains:
 SPI ML151_WEST-7B CUR ML151_WEST-7 SPI ML151_WEST-7A

PISCS ML151_WEST-7 N 8,361,982.2255 E 21,412,313.2735 STA 607+83.88
 Total Back Tangent = 592.6469
 Total Ahead Tangent = 592.6421
 Total Length = 1,178.9575
 Total Delta = 15° 25' 59.88" (RT)
 Back Tangent = N 52° 48' 57.88" E
 Ahead Tangent = N 68° 14' 57.76" E

Beginning SCS ML151_WEST-7 description

Spiral Back
 Spiral ML151_WEST-7B Type 1 Spiral Element

Angle 1° 07' 29.70" (RT) P 0.2454 BK N 52° 48' 57.88" E
 LS 150.0000 K 74.9990 AH N 53° 56' 27.59" E
 R 3,820.0000 LT 100.0020 CB N 53° 11' 27.78" E
 YS 0.9816 ST 50.0018 Defl 0° 22' 29.90"
 XS 149.9942 LC 149.9974 Deg 1° 29' 59.60"

Spiral Coordinates

Point	North	East	Station
TS	8,361,624.0443	21,411,841.1121	601+91.23
PI	8,361,684.4830	21,411,920.7836	602+91.23
SC	8,361,713.9150	21,411,961.2057	603+41.23
CC	8,358,625.7840	21,414,209.7267	

Circular Section
 Curve Data

Curve ML151_WEST-7
 P.I. Station = 607+82.67 N 8,361,973.7505 E 21,412,318.0651
 Delta = 13° 11' 00.75" (RT)
 Degree = 1° 29' 59.60"
 Tangent = 441.4331
 Length = 878.9675
 Radius = 3,820.0000
 External = 25.4211
 Long Chord = 877.0297
 Mid. Ord. = 25.2530
 P.C. Station = 603+41.23 N 8,361,713.9150 E 21,411,961.2057
 P.T. Station = 612+20.20 N 8,362,145.3485 E 21,412,724.7803
 C.C. = N 62° 56' 27.88" E
 Back = N 53° 56' 27.59" E
 Ahead = N 67° 07' 28.33" E
 Chord Bear = N 60° 31' 57.96" E

Spiral Ahead
 Spiral ML151_WEST-7A Type 2 Spiral Element

Angle 1° 07' 29.43" (RT) P 0.2454 BK N 67° 07' 28.33" E
 LS 149.9900 K 74.9940 AH N 68° 14' 57.76" E
 R 3,820.0000 LT 99.9954 CB N 67° 52' 27.96" E
 YS 0.9815 ST 49.9985 Defl 0° 22' 29.81"
 XS 149.9842 LC 149.9874 Deg 1° 29' 59.60"

Spiral Coordinates

Point	North	East	Station
CS	8,362,145.3485	21,412,724.7803	612+20.20
PI	8,362,164.7844	21,412,770.8466	612+70.20
ST	8,362,201.8394	21,412,863.7228	613+70.19
CC	8,358,625.7840	21,414,209.7267	

Ending SCS ML151_WEST-7 description

Chain ML151_WEST - Continued

Course from ST ML151.WEST-7A to PC ML151.WEST-8 N 68° 14' 57.76" E Dist 5,272.8164

Curve Data

Curve ML151.WEST-8
P.I. Station = 671+98.53 N
Delta = 11° 04' 30.00" (LT)
Degree = 0° 59' 59.73"
Tangent = 555.5215
Length = 1,107.5816
Radius = 5,730.0000
External = 26.8658
Long Chord = 1,105.8581
Mid. Ord. = 26.7405
P.C. Station = 666+43.01 N
P.T. Station = 677+50.59 N
C.C. = N
Back = N 68° 14' 57.76" E
Ahead = N 57° 10' 27.76" E
Chord Bear = N 62° 42' 42.76" E

Course from PT ML151.WEST-8 to PC ML151.WEST-9 N 57° 10' 27.76" E Dist 10,500.0210

Curve Data

Curve ML151.WEST-9
P.I. Station = 787+86.37 N
Delta = 10° 40' 59.88" (LT)
Degree = 0° 59' 59.73"
Tangent = 535.7575
Length = 1,068.4087
Radius = 5,730.0000
External = 24.9923
Long Chord = 1,066.8616
Mid. Ord. = 24.8837
P.C. Station = 782+50.61 N
P.T. Station = 793+19.02 N
C.C. = N
Back = N 57° 10' 27.76" E
Ahead = N 46° 29' 27.88" E
Chord Bear = N 51° 49' 57.82" E

Course from PT ML151.WEST-9 to PC ML151.WEST-10 N 46° 29' 27.88" E Dist 9,044.0956

Curve Data

Curve ML151.WEST-10
P.I. Station = 889+72.06 N
Delta = 6° 04' 59.88" (LT)
Degree = 0° 29' 59.87"
Tangent = 608.9470
Length = 1,216.7496
Radius = 11,460.0000
External = 16.1673
Long Chord = 1,216.1782
Mid. Ord. = 16.1445
P.C. Station = 883+63.11 N
P.T. Station = 895+79.86 N
C.C. = N
Back = N 46° 29' 27.88" E
Ahead = N 40° 24' 28.00" E
Chord Bear = N 43° 26' 57.94" E

Course from PT ML151.WEST-10 to PC ML151.WEST-11 N 40° 24' 28.00" E Dist 5,591.5756

Curve Data

Curve ML151.WEST-11
P.I. Station = 957+02.12 N
Delta = 7° 04' 00.12" (RT)
Degree = 0° 39' 59.99"
Tangent = 530.6774
Length = 1,060.0091
Radius = 8,594.4000
External = 16.3683
Long Chord = 1,059.3373
Mid. Ord. = 16.3371
P.C. Station = 951+71.44 N
P.T. Station = 962+31.45 N
C.C. = N
Back = N 40° 24' 28.00" E
Ahead = N 47° 28' 28.12" E
Chord Bear = N 43° 56' 28.06" E

Chain ML151_WEST - Continued

Course from PT ML151.WEST-11 to PC ML151.WEST-12 N 47° 28' 28.12" E Dist 5,239.1135

Curve Data

Curve ML151.WEST-12
P.I. Station = 1019+87.57 N
Delta = 8° 36' 00.00" (RT)
Degree = 0° 49' 59.78"
Tangent = 517.0090
Length = 1,032.0760
Radius = 6,876.0000
External = 19.4097
Long Chord = 1,031.1075
Mid. Ord. = 19.3550
P.C. Station = 1014+70.56 N
P.T. Station = 1025+02.64 N
C.C. = N
Back = N 47° 28' 28.12" E
Ahead = N 56° 04' 28.12" E
Chord Bear = N 51° 46' 28.12" E

Course from PT ML151.WEST-12 to 30001 N 56° 04' 28.12" E Dist 2,879.9332

Point 30001 N 8,388,930.4712 E 21,447,222.3715 Sta 1053+82.57

Ending chain ML151.WEST description

Chain ML151_EAST

Chain ML151_EAST contains:
40000 40001 40002 40003 40004 40005

Beginning chain ML151_EAST description

Point 40000 N 8,389,888.4316 E 21,450,594.1435 Sta 1090+00.00

Course from 40000 to 40001 N 85° 22' 56.47" E Dist 1,191.7000

Point 40001 N 8,389,984.3706 E 21,451,781.9754 Sta 1101+91.70

Course from 40001 to 40002 N 85° 22' 56.47" E Dist 712.8000

Point 40002 N 8,390,041.7552 E 21,452,492.4618 Sta 1109+04.50

Course from 40002 to 40003 N 85° 04' 59.63" E Dist 1,114.7000

Point 40003 N 8,390,137.2945 E 21,453,603.0600 Sta 1120+19.20

Course from 40003 to 40004 N 84° 14' 35.46" E Dist 480.8000

Point 40004 N 8,390,185.5219 E 21,454,081.4351 Sta 1125+00.00

Course from 40004 to 40005 N 83° 24' 44.37" E Dist 1,000.0000

Point 40005 N 8,390,300.2454 E 21,455,074.8326 Sta 1135+00.00

Ending chain ML151_EAST description

Chain ML151_GAP

Chain ML151_GAP contains:
CUR ML151_GAP-1 CUR ML151_GAP-2 50001

Beginning chain ML151_GAP description

Curve Data

Curve ML151_GAP-1
P.I. Station = 1059+17.92 N
Delta = 8° 12' 52.06" (RT)
Degree = 0° 59' 04.07"
Tangent = 417.9211
Length = 834.4100
Radius = 5,820.0000
External = 14.9857
Long Chord = 833.6955
Mid. Ord. = 14.9472
P.C. Station = 1055+00.00 N
P.T. Station = 1063+34.41 N
C.C. = N
Back = N 57° 10' 29.33" E
Ahead = N 65° 23' 21.40" E
Chord Bear = N 61° 16' 55.37" E

Curve Data

Curve ML151_GAP-2
P.I. Station = 1073+60.27 N
Delta = 19° 59' 35.07" (RT)
Degree = 0° 59' 04.07"
Tangent = 1,025.8603
Length = 2,030.8598
Radius = 5,820.0000
External = 89.7199
Long Chord = 2,020.5720
Mid. Ord. = 88.3578
P.C. Station = 1063+34.41 N
P.T. Station = 1083+65.27 N
C.C. = N
Back = N 65° 23' 21.40" E
Ahead = N 85° 22' 56.47" E
Chord Bear = N 75° 23' 08.93" E

Course from PT ML151_GAP-2 to 50001 N 85° 22' 56.47" E Dist 434.7302

Point 50001 N 8,389,937.3535 E 21,450,435.3739 Sta 1088+00.00

Ending chain ML151_GAP description

CONTROL POINTS

ALL CONTROL POINTS SET ARE 1/2 IRON RODS WITH RED CAPS UNLESS OTHERWISE NOTED

Survey Information

DUBUQUE COUNTY
 PIN:14-31-151-010
 BRFN-151-5(66)-39-31
 PIPE CULVERTS ALONG
 HWY 151 IN DUBUQUE COUNTY
 SAP:828.3

General Information

Measurement units for this survey are US survey feet. This survey is for the design of improvements relating to the proposed culvert updates for hwy 151 in Dubuque Co. IA. Project datum and control information is provided by Design Survey Office. This project is a complete field survey, except for underground utility information (surface features only).

Vertical Control

Vertical datum for this survey is relative to NAVD88, Geoid 12a (IARTN GPS Derived).

Horizontal Control

Measurement units for this survey are U.S. Survey Feet.

Horizontal datum for this survey is unmodified Iowa State IARCSZONE11 coordinate system. Horizontal positions were established by 120 second averaged observations utilizing the IARTN.

Point	North	East	Elevation	Feature	Description
G10053	8358637.3470	21408016.4900	1020.3190	CP	1/2 IRS RED CAP
G10051	8357573.1210	21406008.2100	977.8520	CP	1/2 IRS RED CAP
G10054	8358753.9220	21408183.2000	1019.9810	CP	1/2 IRS RED CAP
F10073	8382608.6560	21439728.2500	1089.2390	CP	1/2 IRS RED CAP
G10055	8352809.9740	21382380.7500	935.7530	CP	1/2 IRS RED CAP
F10071	8382210.7600	21439375.0700	1081.2420	CP	1/2 IRS RED CAP
G10056	8352886.8660	21382604.9600	933.1130	CP	1/2 IRS RED CAP
F10069	8380177.4400	21437644.3600	1088.7220	CP	1/2 IRS RED CAP
G10057	8352973.8130	21388746.0000	937.2630	CP	1/2 IRS RED CAP
F10067	8372664.2580	21430260.5200	1071.8460	CP	1/2 IRS RED CAP
G10058	8353000.8030	21388926.8100	935.8730	CP	1/2 IRS RED CAP
F10065	8369264.4450	21426020.0500	1028.3880	CP	1/2 IRS RED CAP
G10059	8353839.5090	21394212.9900	830.6870	CP	1/2 IRS RED CAP
F10079	8389995.3600	21452348.1700	883.7890	CP	1/2 IRS RED CAP
G10060	8353938.9390	21394543.4900	828.8080	CP	1/2 IRS RED CAP
A10052	8357685.4820	21406232.6300	975.7860	CP	1/2 IRS RED CAP
CP303	8362697.9780	21414327.5400	952.0160	CP	1/2 IRS
A10058	8353938.9390	21394543.4900	828.8080	CP	1/2 IRS RED CAP
CP302	8362765.1810	21414486.9900	951.0190	CP	1/2 IRS
G10049	8363980.7250	21417538.0500	929.0890	CP	1/2 IRS RED CAP
CP301	8354504.7050	21396390.6600	835.6300	CP	1/2 IRS
F10077	8389961.8420	21451936.5800	891.9240	CP	1/2 IRS RED CAP
CP300	8354447.6810	21396210.0100	831.0770	CP	1/2 IRS
A10072	8382342.3090	21439486.5600	1083.5320	CP	1/2 IRS RED CAP
F10081	8390045.0600	21452931.5600	878.4850	CP	1/2 IRS RED CAP
G10052	8357685.4820	21406232.6300	975.7860	CP	1/2 IRS RED CAP
F10074	8382745.6710	21439855.5200	1093.6030	CP	1/2 IRS RED CAP
F10075	8389910.9100	21451332.3500	923.9460	CP	1/2 IRS RED CAP
F10072	8382342.3090	21439486.5600	1083.5320	CP	1/2 IRS RED CAP
A10069	8380177.4400	21437644.3600	1088.7220	CP	1/2 IRS RED CAP
A10068	8372944.6430	21430549.6700	1067.3230	CP	1/2 IRS RED CAP
A10067	8372664.2580	21430260.5200	1071.8460	CP	1/2 IRS RED CAP
F10070	8380335.4680	21437779.2900	1087.6250	CP	1/2 IRS RED CAP
A10066	8369403.7030	21426235.8600	1038.2550	CP	1/2 IRS RED CAP
F10068	8372944.6430	21430549.6700	1067.3230	CP	1/2 IRS RED CAP
A10073	8382608.6560	21439728.2500	1089.2390	CP	1/2 IRS RED CAP
A10074	8382745.6710	21439855.5200	1093.6030	CP	1/2 IRS RED CAP
F10066	8369403.7030	21426235.8600	1038.2550	CP	1/2 IRS RED CAP
A10065	8369264.4450	21426020.0500	1028.3880	CP	1/2 IRS RED CAP
A10064	8352886.8660	21382604.9600	933.1130	CP	1/2 IRS RED CAP
F10078	8389978.9830	21452140.3100	886.2550	CP	1/2 IRS RED CAP
G10061	8356414.3330	21403072.9700	933.5320	CP	1/2 IRS RED CAP
G10062	8356445.2540	21403182.1900	936.5890	CP	1/2 IRS RED CAP
G10085	8390205.5640	21454539.5800	849.1260	CP	1/2 IRS RED CAP
G10084	8390180.9480	21454352.1800	855.9840	CP	1/2 IRS RED CAP
G10083	8390101.7390	21453571.8100	873.6240	CP	1/2 IRS RED CAP
G10082	8390072.0940	21453234.9500	876.2850	CP	1/2 IRS RED CAP
A10075	8389910.9100	21451332.3500	923.9460	CP	1/2 IRS RED CAP
A10076	8389926.4470	21451518.9600	912.7270	CP	1/2 IRS RED CAP
A10077	8389961.8420	21451936.5800	891.9240	CP	1/2 IRS RED CAP
A10078	8389978.9830	21452140.3100	886.2550	CP	1/2 IRS RED CAP
G10063	8353019.4580	21384341.9600	963.8510	CP	1/2 IRS RED CAP
G10064	8353002.9910	21384619.3500	968.7940	CP	1/2 IRS RED CAP
G10065	8369264.4450	21426020.0500	1028.3880	CP	1/2 IRS RED CAP
G10066	8369403.7030	21426235.8600	1038.2550	CP	1/2 IRS RED CAP
G10067	8372664.2580	21430260.5200	1071.8460	CP	1/2 IRS RED CAP
G10068	8372944.6430	21430549.6700	1067.3230	CP	1/2 IRS RED CAP
CP305	8389267.0390	21447966.9600	1097.6530	CP	1/2 IRS
CP304	8389335.5850	21448106.7900	1095.0830	CP	1/2 IRS
F10076	8389926.4470	21451518.9600	912.7270	CP	1/2 IRS RED CAP
G10050	8363849.4160	21417213.8800	925.2190	CP	1/2 IRS RED CAP
F10080	8390016.4660	21452568.4500	882.3150	CP	1/2 IRS RED CAP
A10079	8389995.3600	21452348.1700	883.7890	CP	1/2 IRS RED CAP
A10080	8390016.4660	21452568.4500	882.3150	CP	1/2 IRS RED CAP
A10081	8390045.0600	21452931.5600	878.4850	CP	1/2 IRS RED CAP
A10082	8390072.0940	21453234.9500	876.2850	CP	1/2 IRS RED CAP
A10083	8390101.7390	21453571.8100	873.6240	CP	1/2 IRS RED CAP
F10084	8390180.9480	21454352.1800	855.9840	CP	1/2 IRS RED CAP
F10085	8390205.5640	21454539.5800	849.1260	CP	1/2 IRS RED CAP
G10080	8390016.4660	21452568.4500	882.3150	CP	1/2 IRS RED CAP
G10069	8380177.4400	21437644.3600	1088.7220	CP	1/2 IRS RED CAP
G10070	8380335.4680	21437779.2900	1087.6250	CP	1/2 IRS RED CAP
G10071	8382210.7600	21439375.0700	1081.2420	CP	1/2 IRS RED CAP
G10072	8382342.3090	21439486.5600	1083.5320	CP	1/2 IRS RED CAP
G10073	8382608.6560	21439728.2500	1089.2390	CP	1/2 IRS RED CAP
A10063	8352809.9740	21382380.7500	935.7530	CP	1/2 IRS RED CAP
A10062	8353002.9910	21384619.3500	968.7940	CP	1/2 IRS RED CAP
A10084	8390180.9480	21454352.1800	855.9840	CP	1/2 IRS RED CAP
A10085	8390205.5640	21454539.5800	849.1260	CP	1/2 IRS RED CAP
A10049	8363980.7250	21417538.0500	929.0890	CP	1/2 IRS RED CAP
A10050	8363849.4160	21417213.8800	925.2190	CP	1/2 IRS RED CAP
A10051	8357573.1210	21406008.2100	977.8520	CP	1/2 IRS RED CAP
A10061	8353019.4580	21384341.9600	963.8510	CP	1/2 IRS RED CAP
A10053	8358637.3470	21408016.4900	1020.3190	CP	1/2 IRS RED CAP
A10054	8358753.9220	21408183.2000	1019.9810	CP	1/2 IRS RED CAP
A10055	8352973.8130	21388746.0000	937.2630	CP	1/2 IRS RED CAP
A10060	8356445.2540	21403182.1900	936.5890	CP	1/2 IRS RED CAP
A10059	8356414.3330	21403072.9700	933.5320	CP	1/2 IRS RED CAP
G10079	8389995.3600	21452348.1700	883.7890	CP	1/2 IRS RED CAP
G10078	8389978.9830	21452140.3100	886.2550	CP	1/2 IRS RED CAP
G10077	8389961.8420	21451936.5800	891.9240	CP	1/2 IRS RED CAP
G10076	8389926.4470	21451518.9600	912.7270	CP	1/2 IRS RED CAP
G10075	8389910.9100	21451332.3500	923.9460	CP	1/2 IRS RED CAP
G10074	8382745.6710	21439855.5200	1093.6030	CP	1/2 IRS RED CAP
A10056	8353000.8030	21388926.8100	935.8730	CP	1/2 IRS RED CAP
A10057	8353839.5090	21394212.9900	830.6870	CP	1/2 IRS RED CAP
A10071	8382210.7600	21439375.0700	1081.2420	CP	1/2 IRS RED CAP
CP407	8361636.6400	21411990.7200	975.1710	CP	1/2 IRS RED CAP
CP406	8361545.0690	21411867.6400	973.9460	CP	1/2 IRS RED CAP

VERTICAL CONTROL

Point	North	East	Elevation	Feature	Description
D31424	8382221.0590	21439397.4400	1079.6260	BM	CUT X RCB HEADWALL
A50000	8372682.7890	21430357.2300	1070.4750	BM	RRSPIKEINPP ENTRANCE
F15642	8352988.2180	21388825.0400	937.4680	BM	1/2 IRS
F19012	8352685.9400	21382475.4900	908.5280	BM	RR SPIKE IN PP
K75043	8362701.6000	21414464.6400	946.9550	BM	RRSPIKEINPPPOST
K75015	8354412.6130	21396293.3400	833.4370	BM	RRSPIKEPP
F15507	8363919.5440	21417535.0600	934.0120	BM	RR SPIKE IN FENCE POST
F15549	8358731.4270	21408264.2800	1007.9720	BM	RR SPIKE IN PP
D31431	8352879.1060	21384442.2800	933.1850	BM	CUT X IN RCB HDWL
F15500	8356301.2270	21403177.7700	919.7030	BM	RR SPIKE IN PP
D31299	8380114.4560	21454446.8700	840.5360	BM	RR SPIKE IN PP
D31279	8389999.8610	21452389.3600	883.4100	BM	1/2 IRS
C30190	8390061.0930	21453072.8000	878.2280	BM	1/2 IRS
D31089	8389958.0960	21452042.9900	885.4750	BM	CUT X IN HEADWALL
C30205	8389888.8030	21452706.6300	855.7810	BM	RR SPIKE IN PP
F15768	8353916.7520	21394440.3400	833.6350	BM	DOT PLUG TOP OF BARRIER RAIL
K75101	8389098.1990	21447979.4400	1103.3380	BM	RRSPIKEPP
D31389	8380261.4460	21437850.9500	1072.0890	BM	RR SPIKE IN PP
F15749	8357609.8790	21406291.0400	959.0090	BM	RR SPIKE IN PP WEST SIDE
C30268	8389929.0270	21451491.7500	915.1520	BM	1/2 IRS
C30004	8369295.2310	21426181.4100	1032.4710	BM	1/2 IRS
S80127	8361516.8810	21411842.3000	971.9250	BM	1/2 IRS

108-23A
08-01-08

TRAFFIC CONTROL PLAN

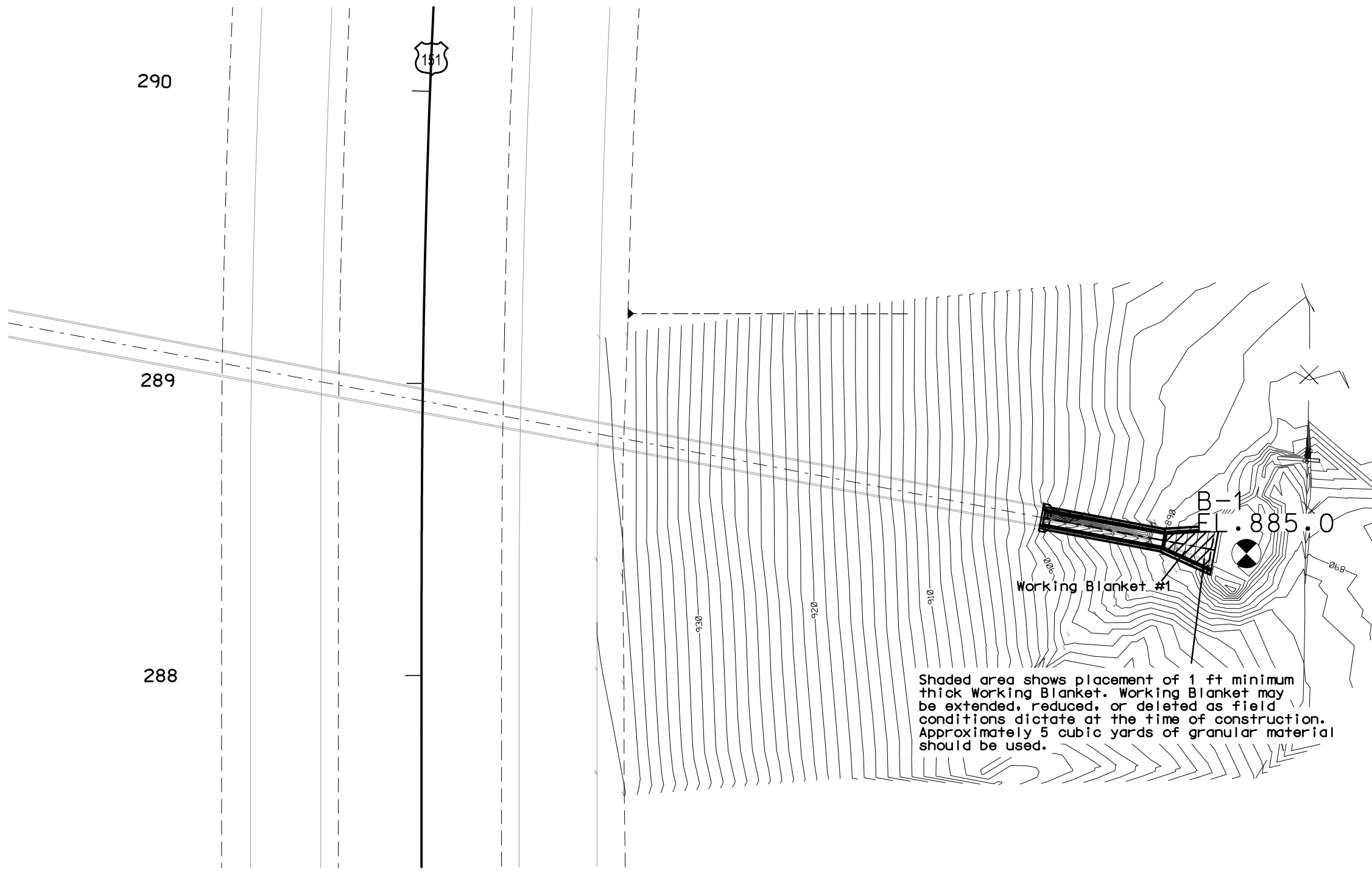
1. U.S. 151 will remain open to traffic at all times.
2. Shoulder closures as necessary shall be per the Standard Road Plans listed elsewhere in these plans.
3. One lane of Simon Road may be closed at a time for replacement of culvert.
4. Access to individual properties shall be maintained at all times.

111-01
04-17-12

COORDINATED OPERATIONS

Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.

Project	Type of Work



Shaded area shows placement of 1 ft minimum thick Working Blanket. Working Blanket may be extended, reduced, or deleted as field conditions dictate at the time of construction. Approximately 5 cubic yards of granular material should be used.

LOCATION

US 151
T-87N R-1W
SECTION 28
WHITEWATER TOWNSHIP
DUBUQUE COUNTY
LATITUDE: 42.315575°
LONGITUDE: -90.967653°

DESIGN FOR 10° SKEW LT AHEAD

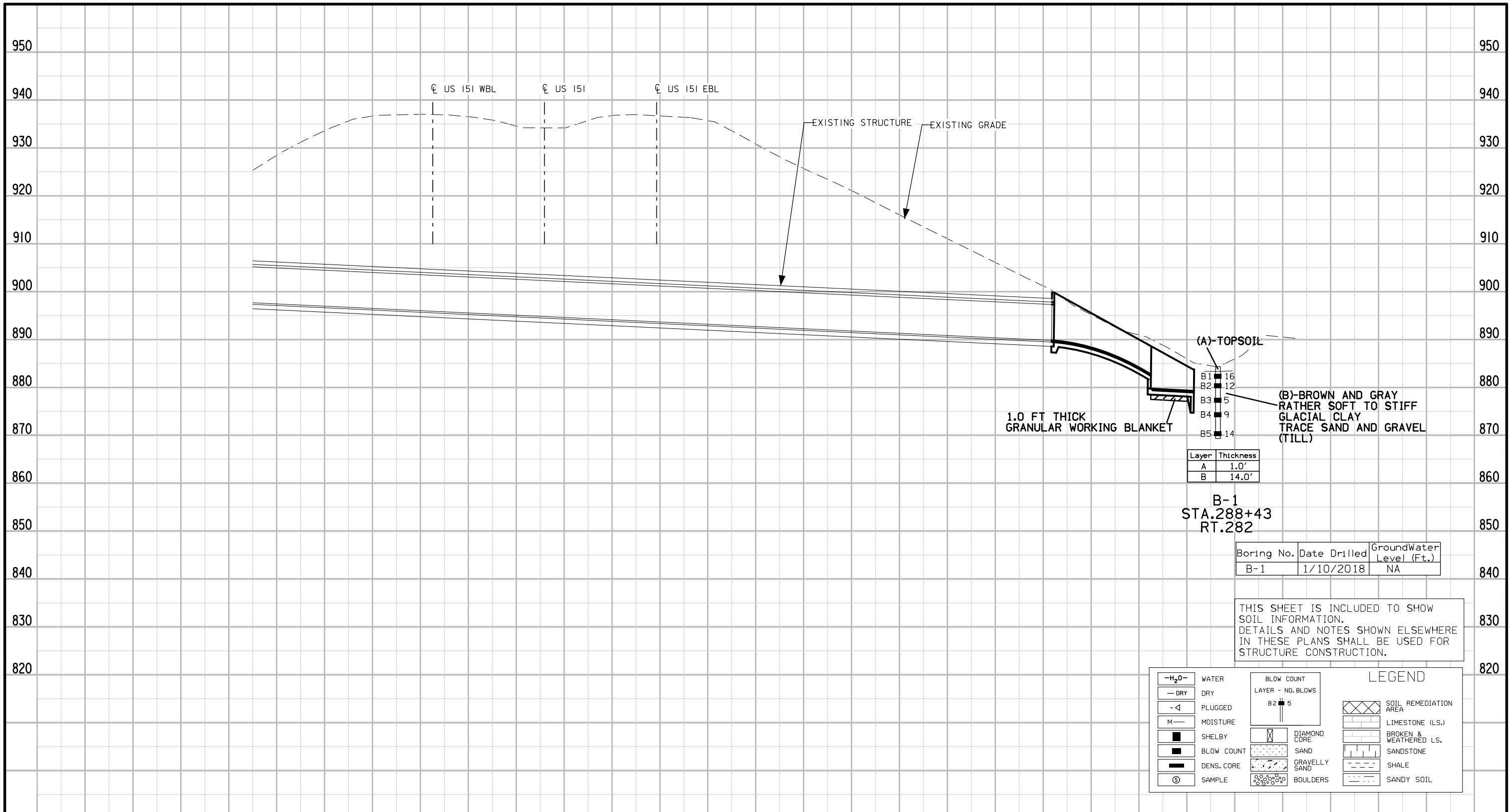
6' X 8' REINFORCED CONCRETE FLUME

STA. 288+94.00, 42' RT C US 151 DEC. 2018

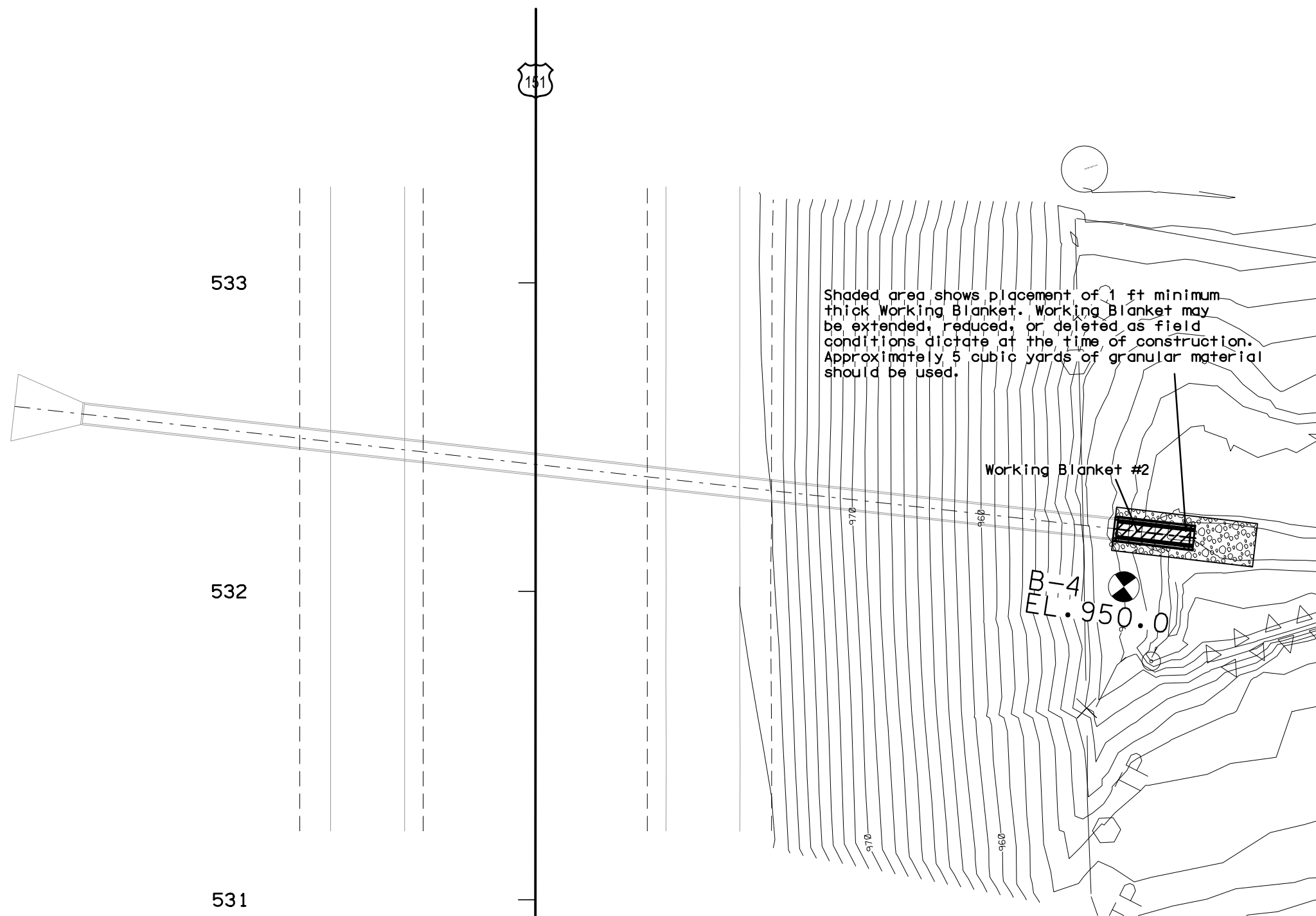
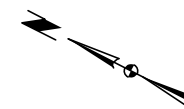
DUBUQUE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 1 OF 12 FILE NO. 31561 DESIGN NO. 119



DESIGN FOR 10° SKEW LT AHEAD
6' X 8'
REINFORCED CONCRETE FLUME
 STA. 288+94.00, 42' RT ☉ US 151 DEC. 2018
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 2 OF 12 FILE NO. 31561 DESIGN NO. 119



Shaded area shows placement of 1 ft minimum thick Working Blanket. Working Blanket may be extended, reduced, or deleted as field conditions dictate at the time of construction. Approximately 5 cubic yards of granular material should be used.

Working Blanket #2

B-4
EL. 950.0

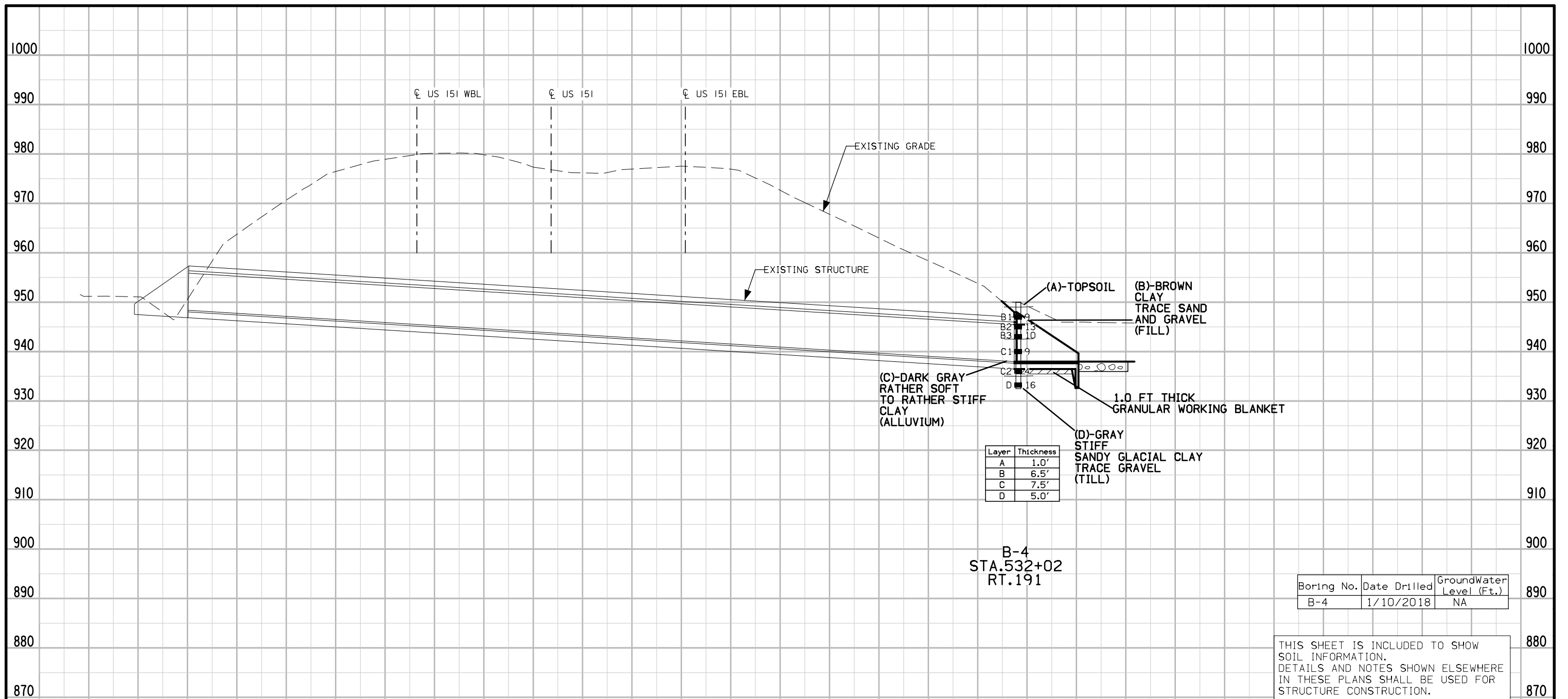
LOCATION

US 151
T-87N R-1W
SECTION 19
PRAITIE CREEK TOWNSHIP
DUBUQUE COUNTY
LATITUDE: 42.328942°
LONGITUDE: -90.880525°

DESIGN FOR 7° SKEW LT AHEAD
6' X 8'
REINFORCED CONCRETE BOX
CULVERT

STA. 532+35.00 @ US 151 DEC. 2018

DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 3 OF 12 FILE NO. 31561 DESIGN NO. 219



THIS SHEET IS INCLUDED TO SHOW SOIL INFORMATION. DETAILS AND NOTES SHOWN ELSEWHERE IN THESE PLANS SHALL BE USED FOR STRUCTURE CONSTRUCTION.

WATER	DRY	PLUGGED	MOISTURE	SHELBY	BLOW COUNT	DENS. CORE	SAMPLE			
BLOW COUNT LAYER - NO. BLOWS B2 5	DIAMOND CORE	SAND	GRAVELLY SAND	BOULDERS	SOIL REMEDIATION AREA	LIMESTONE (L.S.)	BROKEN & WEATHERED L.S.	SANDSTONE	SHALE	SANDY SOIL

DESIGN FOR 7° SKEW LT AHEAD

6' X 8' REINFORCED CONCRETE BOX CULVERT

STA. 532+35.00 @ US 151 DEC. 2018

DUBUQUE COUNTY

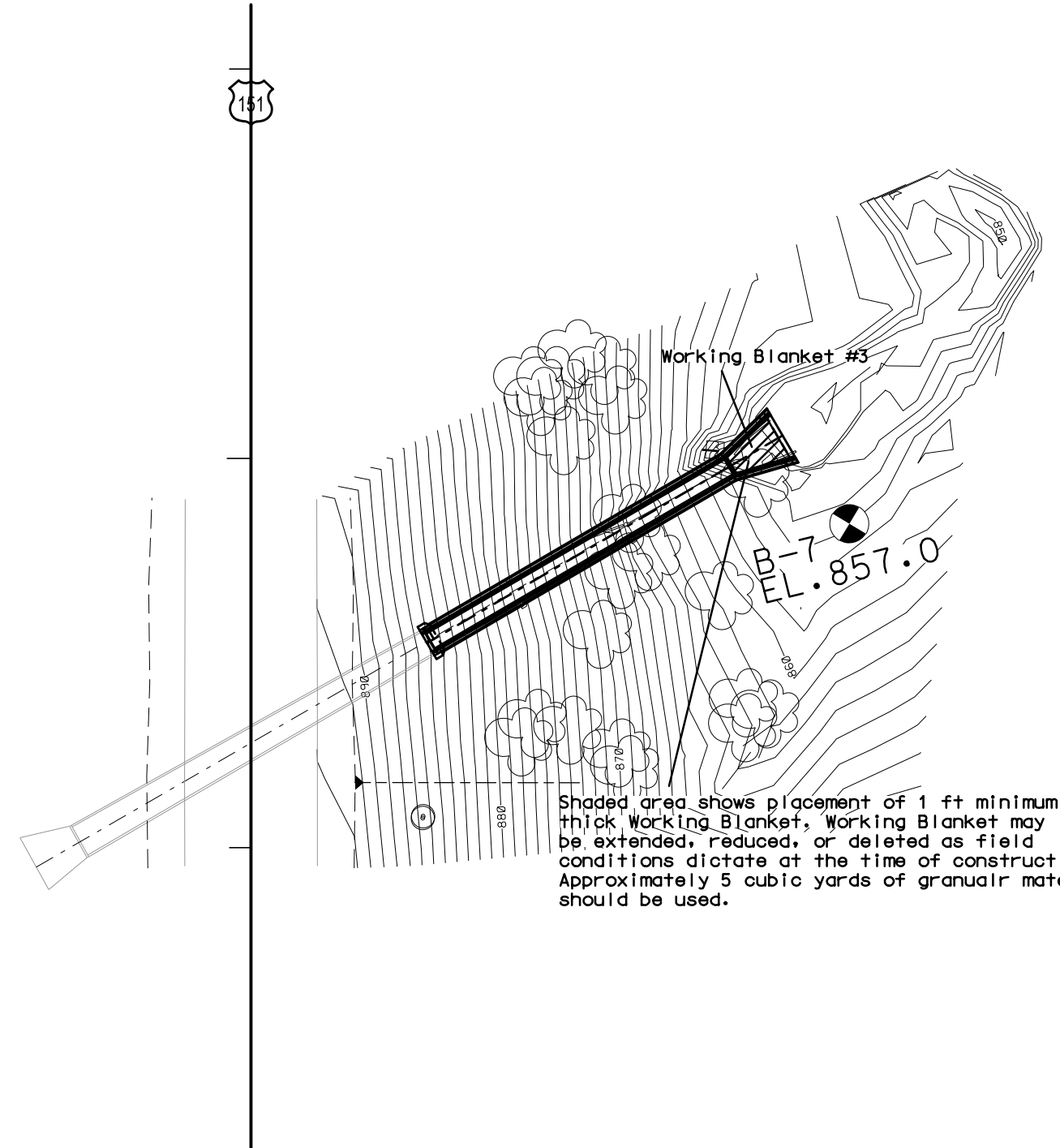
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 4 OF 12 FILE NO. 31561 DESIGN NO. 219

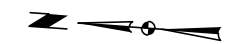
1106

1105

1104



Shaded area shows placement of 1 ft minimum thick Working Blanket, Working Blanket may be extended, reduced, or deleted as field conditions dictate at the time of construction. Approximately 5 cubic yards of granular material should be used.



LOCATION

US 151
T-88N R-2E
SECTION 22
TABLE MOUND TOWNSHIP
DUBUQUE COUNTY
LATITUDE: 42.417931°
LONGITUDE: -90.711036°

DESIGN FOR 30° SKEW RT AHEAD

6' X 6'

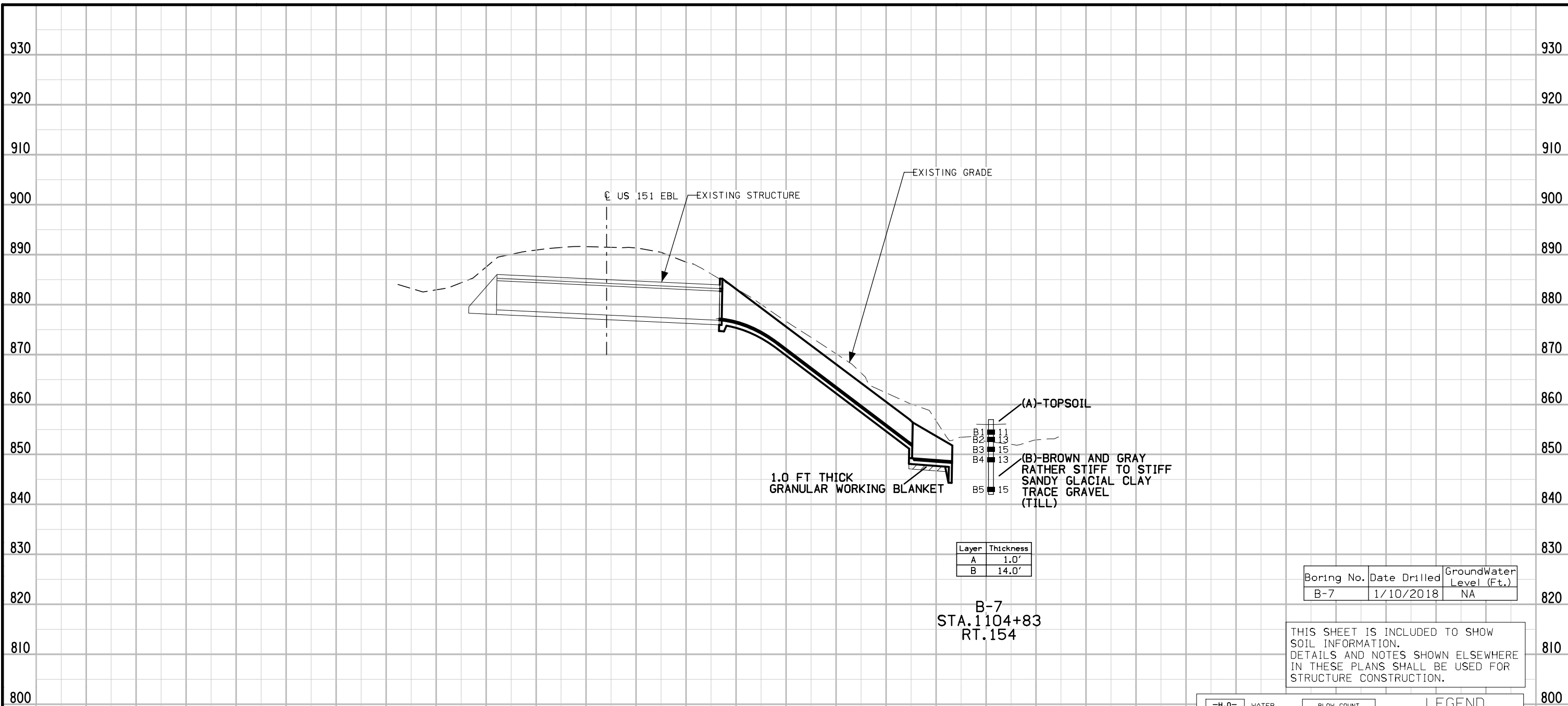
REINFORCED CONCRETE FLUME

STA. 1104+20.00 @ US 151 DEC. 2018

DUBUQUE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 5 OF 12 FILE NO. 31561 DESIGN NO. 319



Layer	Thickness
A	1.0'
B	14.0'

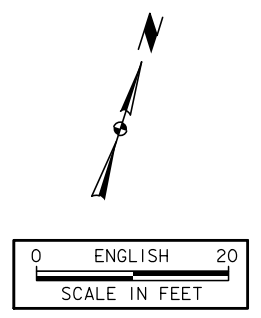
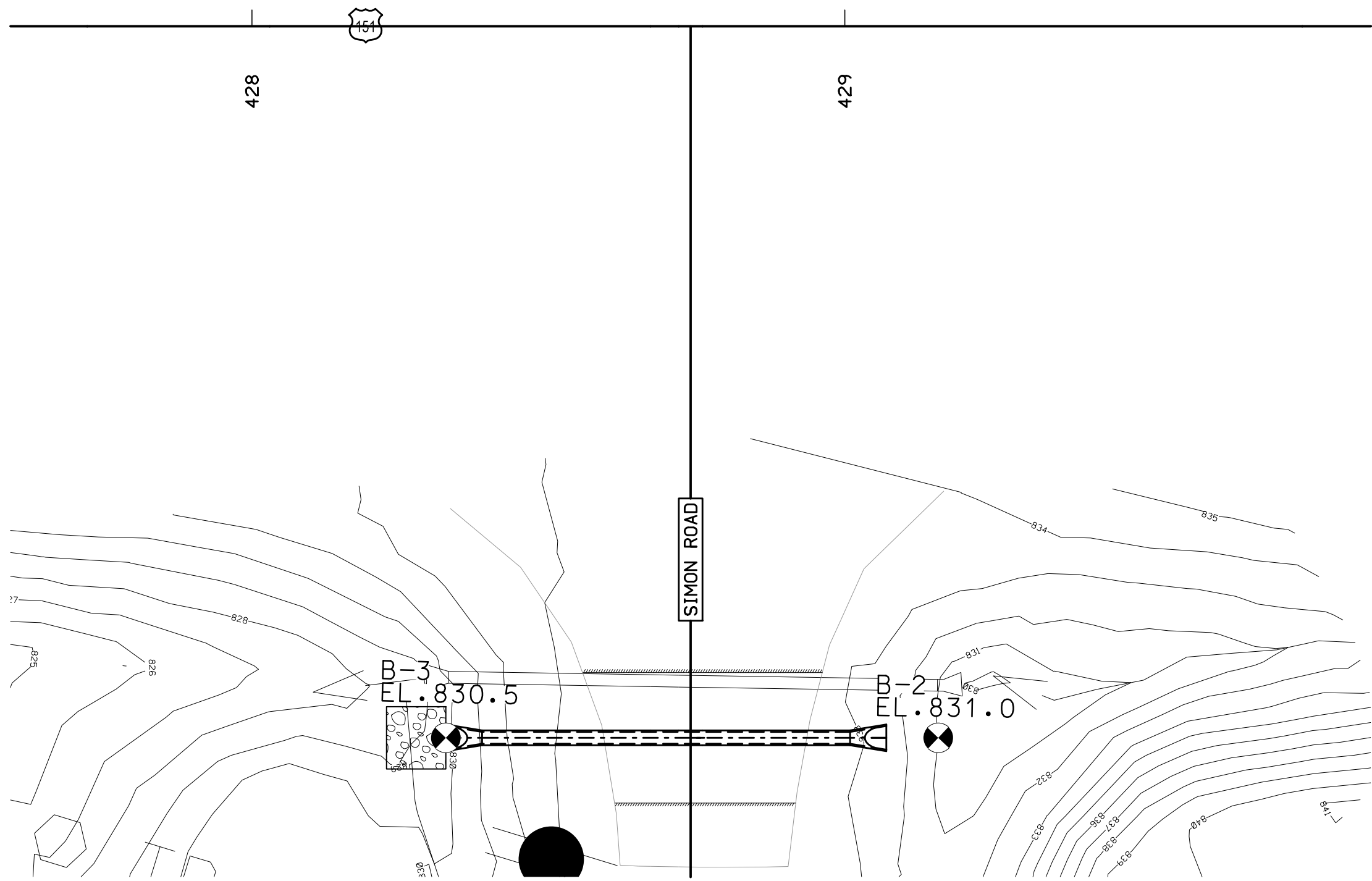
B-7
STA. 1104+83
RT. 154

Boring No.	Date Drilled	GroundWater Level (Ft.)
B-7	1/10/2018	NA

THIS SHEET IS INCLUDED TO SHOW SOIL INFORMATION. DETAILS AND NOTES SHOWN ELSEWHERE IN THESE PLANS SHALL BE USED FOR STRUCTURE CONSTRUCTION.

LEGEND	
WATER	BLOW COUNT LAYER - NO. BLOWS B2 5
DRY	DIAMOND CORE
PLUGGED	SAND
MOISTURE	GRAVELLY SAND
SHELBY	BOULDERS
BLOW COUNT	SOIL REMEDIATION AREA
DENS. CORE	LIMESTONE (L.S.)
SAMPLE	BROKEN & WEATHERED L.S.
	SANDSTONE
	SHALE
	SANDY SOIL

DESIGN FOR 30° SKEW RT AHEAD
6' X 6'
REINFORCED CONCRETE FLUME
STA. 1104+20.00 CL US 151
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 6 OF 12 FILE NO. 31561 DESIGN NO. 319
DEC. 2018



LOCATION

T-87N R-1W
SECTION 25
WHITEWATER TOWNSHIP
DUBUQUE COUNTY

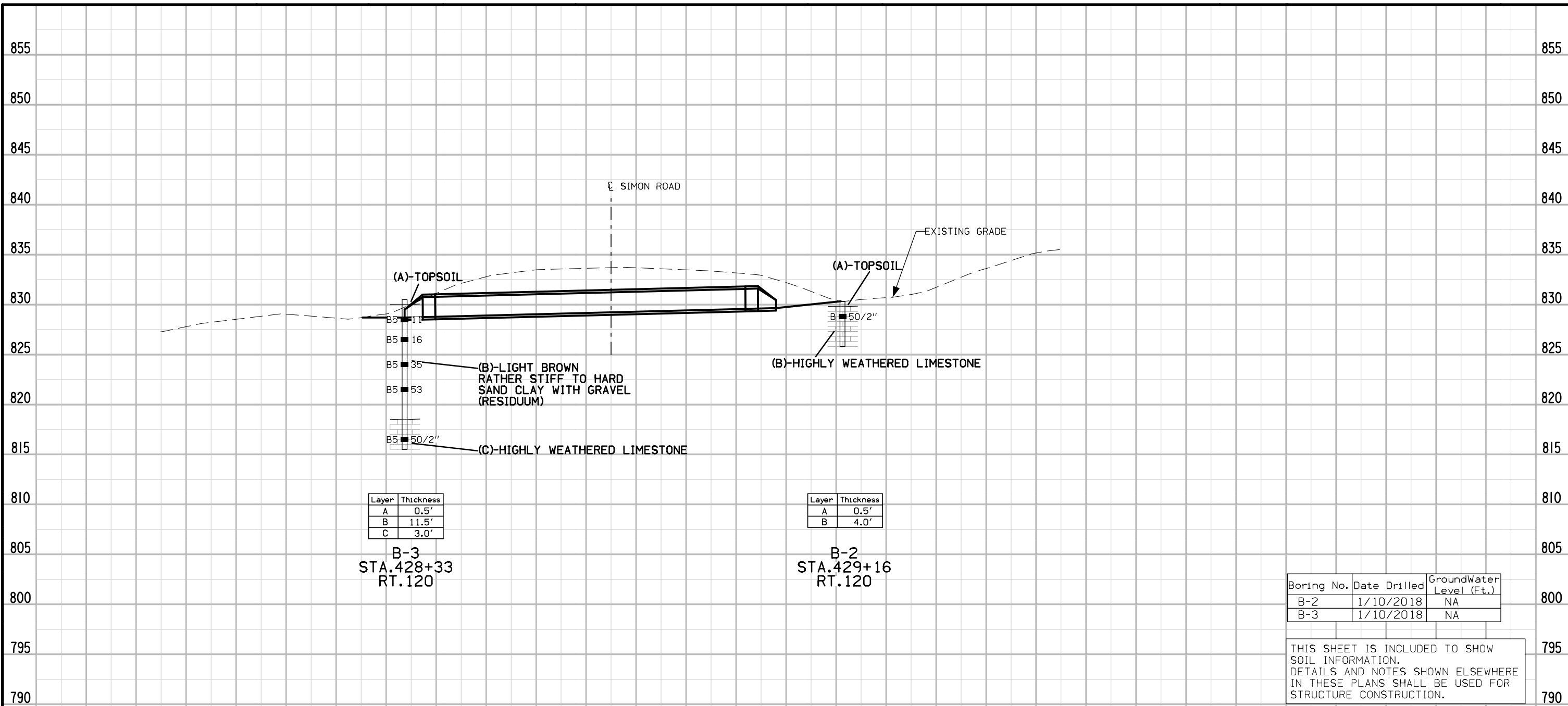
STAGING NOTES

CULVERT IS TO BE CONSTRUCTED HALF-AT-A-TIME.
CONSTRUCT DOWNSTREAM PORTION OF CULVERT
FIRST. ABANDON/REMOVE EXISTING CULVERT UPON
COMPLETION OF NEW CULVERT.

DESIGN FOR 0° SKEW
24" X 62'
REINFORCED CONCRETE PIPE

STA. 428+74.00, 120' RT @ U.S.-151
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 7 OF 12 FILE NO. 31561 DESIGN NO. _____

DEC. 2018



Layer	Thickness
A	0.5'
B	11.5'
C	3.0'

B-3
STA. 428+33
RT. 120

Layer	Thickness
A	0.5'
B	4.0'

B-2
STA. 429+16
RT. 120

Boring No.	Date Drilled	GroundWater Level (Ft.)
B-2	1/10/2018	NA
B-3	1/10/2018	NA

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WATER	BLOW COUNT	LEGEND
DRY	LAYER - NO. BLOWS	
PLUGGED	DIAMOND CORE	SOIL REMEDIATION AREA
MOISTURE	SAND	LIMESTONE (L.S.)
SHELBY	GRAVELLY SAND	BROKEN & WEATHERED L.S.
BLOW COUNT	BOULDERS	SANDSTONE
DENS. CORE		SHALE
SAMPLE		SANDY SOIL

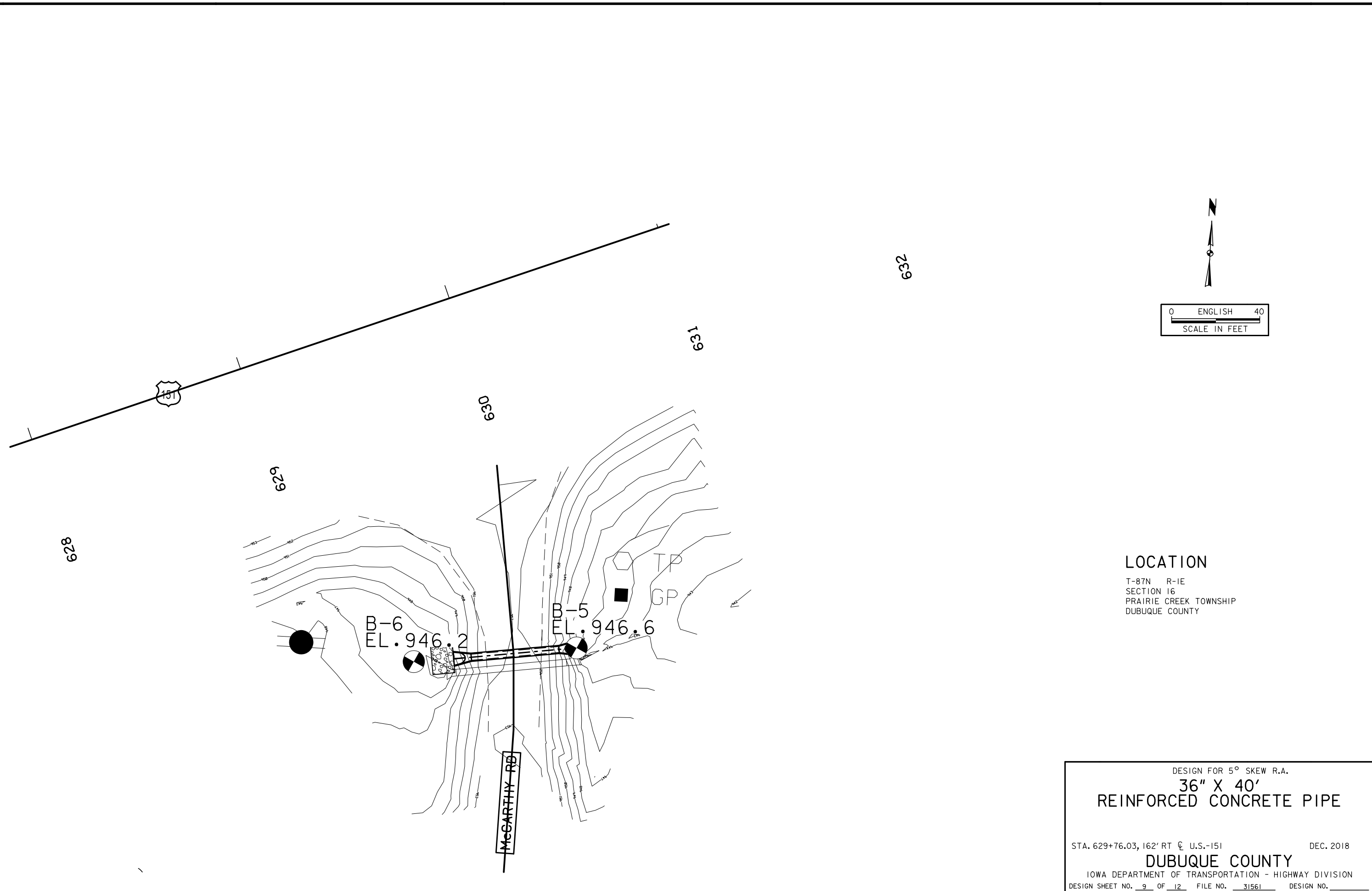
DESIGN FOR 0° SKEW
24" X 62'
REINFORCED CONCRETE PIPE

STA. 428+74.00, 120' RT. U.S.-151 DEC. 2018

DUBUQUE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

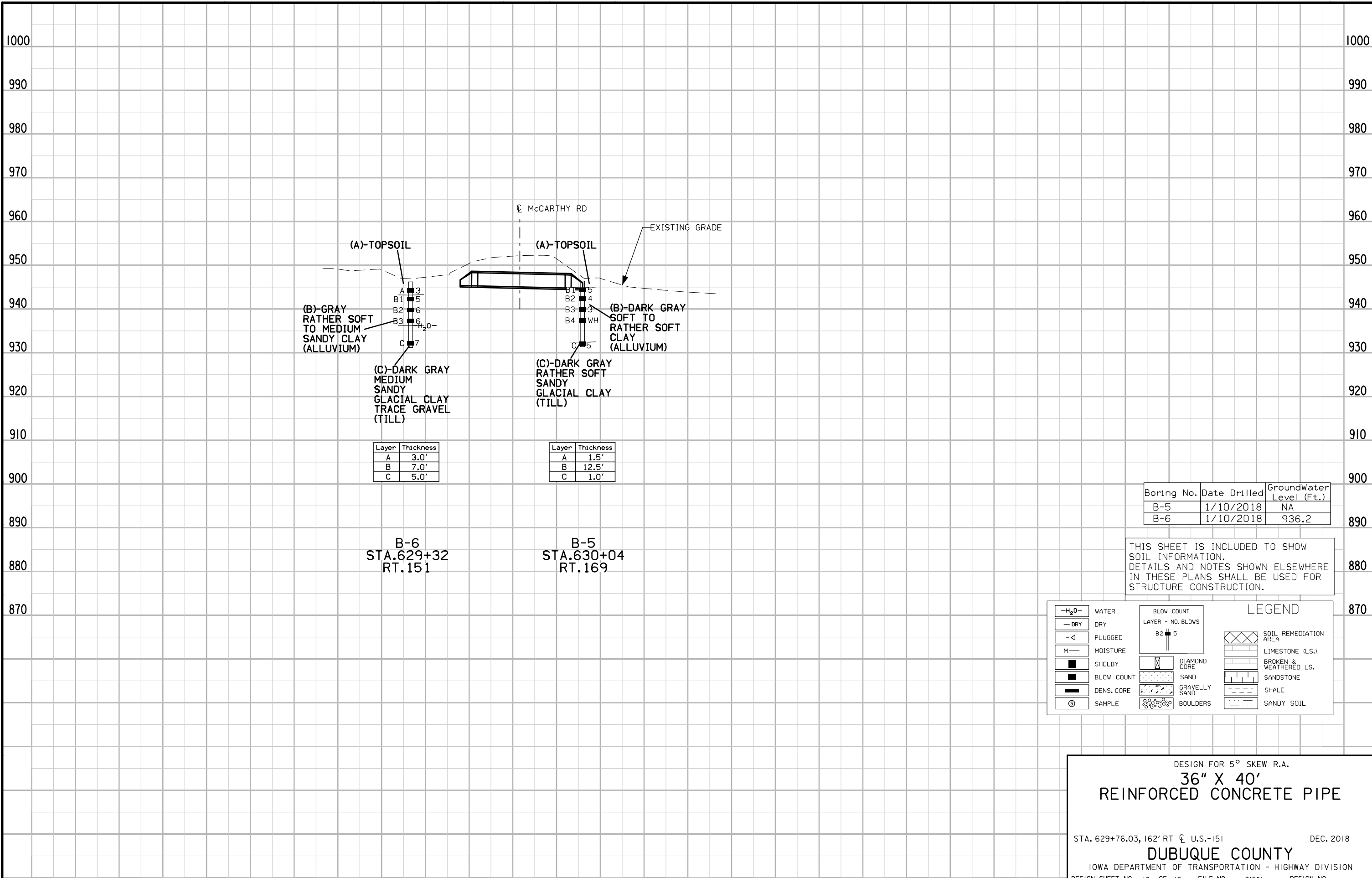
DESIGN SHEET NO. 8 OF 12 FILE NO. 31561 DESIGN NO.



LOCATION
 T-87N R-1E
 SECTION 16
 PRAIRIE CREEK TOWNSHIP
 DUBUQUE COUNTY

DESIGN FOR 5° SKEW R.A.
36" X 40'
REINFORCED CONCRETE PIPE
 STA. 629+76.03, 162' RT @ U.S.-151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 9 OF 12 FILE NO. 31561 DESIGN NO. _____

FILE NO.	ENGLISH	DESIGN TEAM	SNYDER & ASSOCIATES, INC./BRAUN INTERTEC	DUBUQUE COUNTY	PROJECT NUMBER	BRFN-151-5(66)--39-31	SHEET NUMBER	Q.9
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(A)-TOPSOIL

(B)-GRAY RATHER SOFT TO MEDIUM SANDY CLAY (ALLUVIUM)

(C)-DARK GRAY MEDIUM SANDY GLACIAL CLAY TRACE GRAVEL (TILL)

Layer	Thickness
A	3.0'
B	7.0'
C	5.0'

B-6
STA. 629+32
RT. 151

McCARTHY RD

EXISTING GRADE

(A)-TOPSOIL

(B)-DARK GRAY SOFT TO RATHER SOFT CLAY (ALLUVIUM)

(C)-DARK GRAY RATHER SOFT SANDY GLACIAL CLAY (TILL)

Layer	Thickness
A	1.5'
B	12.5'
C	1.0'

B-5
STA. 630+04
RT. 169

Boring No.	Date Drilled	GroundWater Level (Ft.)
B-5	1/10/2018	NA
B-6	1/10/2018	936.2

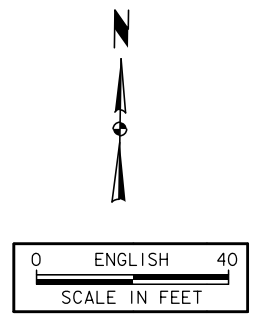
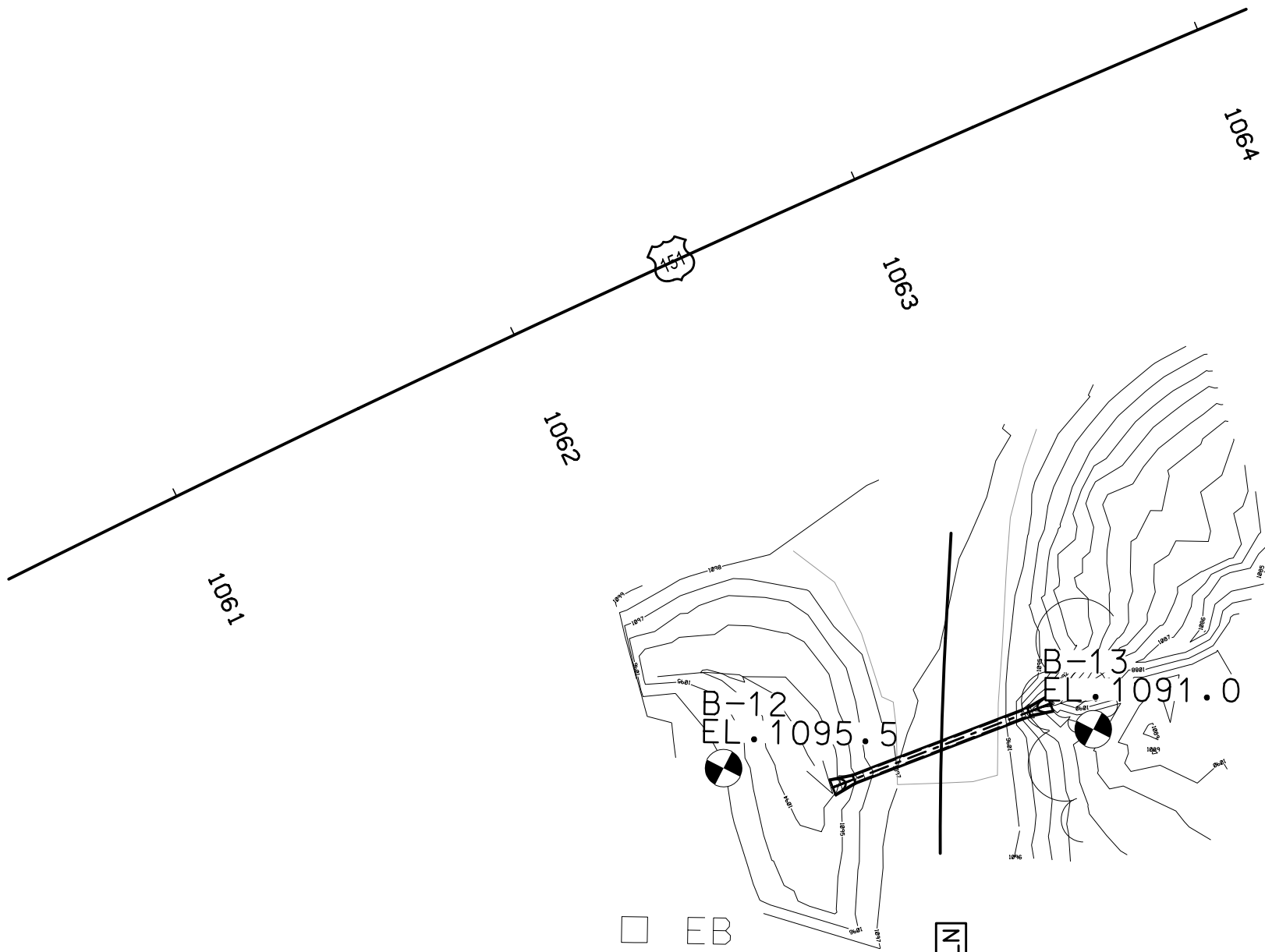
THIS SHEET IS INCLUDED TO SHOW SOIL INFORMATION. DETAILS AND NOTES SHOWN ELSEWHERE IN THESE PLANS SHALL BE USED FOR STRUCTURE CONSTRUCTION.

LEGEND

WATER	BLOW COUNT LAYER - NO. BLOWS B2 5	SOIL REMEDIATION AREA
DRY	DIAMOND CORE	LIMESTONE (L.S.)
PLUGGED	SAND	BROKEN & WEATHERED L.S.
MOISTURE	GRAVELLY SAND	SANDSTONE
SHELBY	BOULDERS	SHALE
BLOW COUNT		SANDY SOIL
DENS. CORE		
SAMPLE		

DESIGN FOR 5° SKEW R.A.
36" X 40'
REINFORCED CONCRETE PIPE

STA. 629+76.03, 162' RT. U.S.-151 DEC. 2018
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 10 OF 12 FILE NO. 31561 DESIGN NO. _____

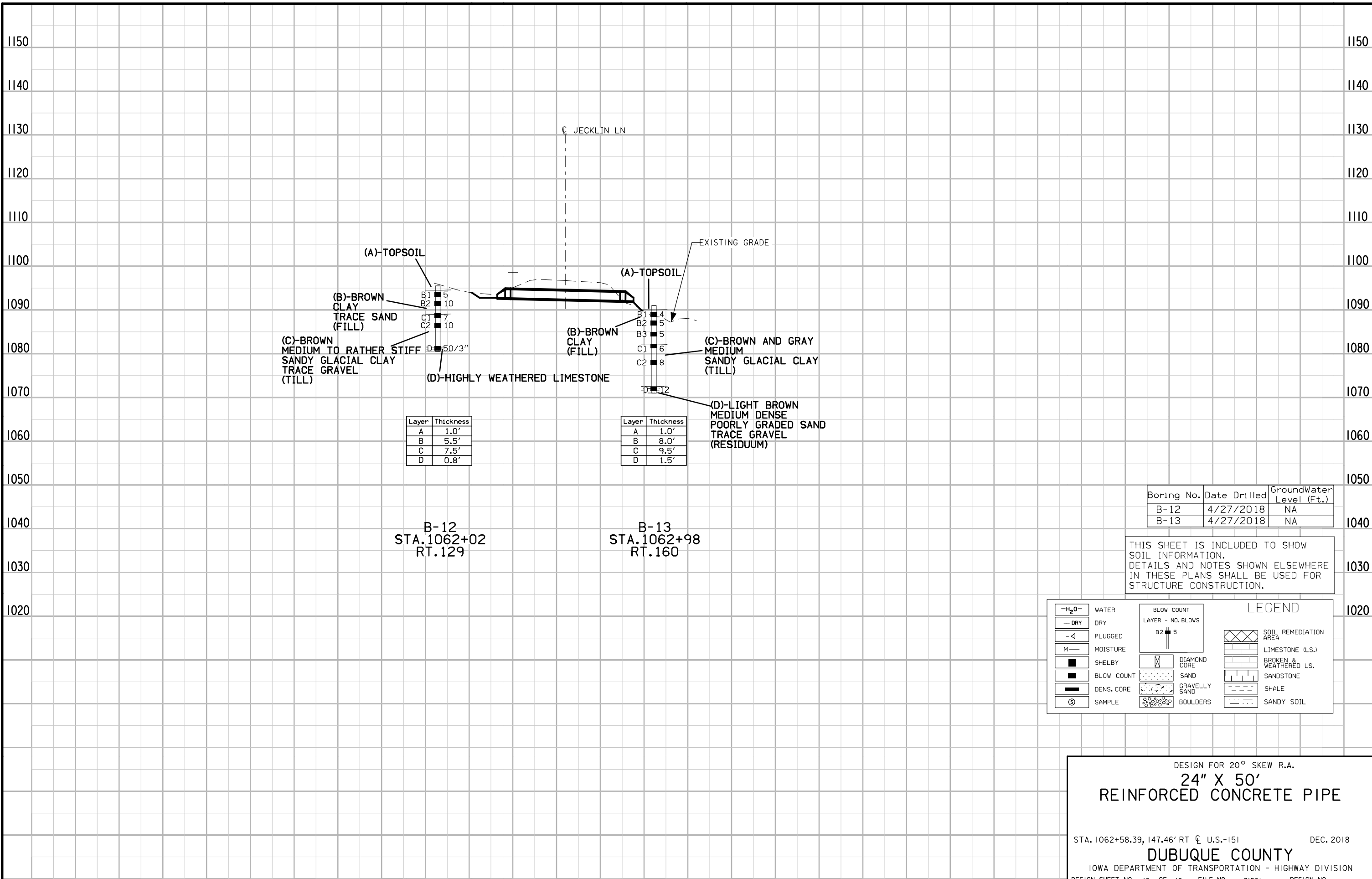


LOCATION

T-88N R-2E
SECTION 21
TABLE MOUND TOWNSHIP
DUBUQUE COUNTY

DESIGN FOR 20° SKEW R.A.
24" X 50'
REINFORCED CONCRETE PIPE

STA. 1062+58.39, 147.46' RT @ U.S.-151 DEC. 2018
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 11 OF 12 FILE NO. 31561 DESIGN NO. _____



Layer	Thickness
A	1.0'
B	5.5'
C	7.5'
D	0.8'

Layer	Thickness
A	1.0'
B	8.0'
C	9.5'
D	1.5'

Boring No.	Date Drilled	GroundWater Level (Ft.)
B-12	4/27/2018	NA
B-13	4/27/2018	NA

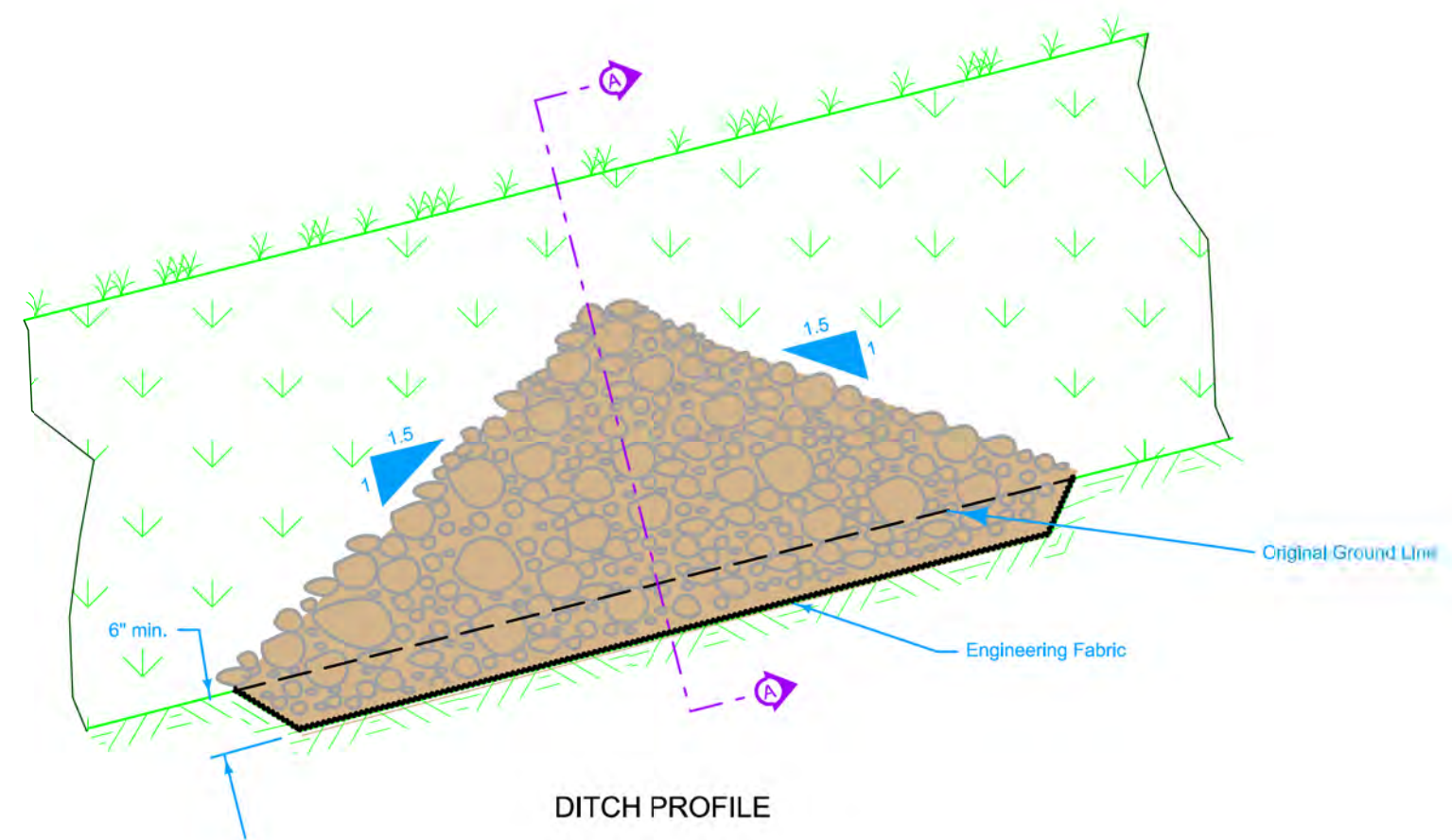
THIS SHEET IS INCLUDED TO SHOW SOIL INFORMATION. DETAILS AND NOTES SHOWN ELSEWHERE IN THESE PLANS SHALL BE USED FOR STRUCTURE CONSTRUCTION.

LEGEND

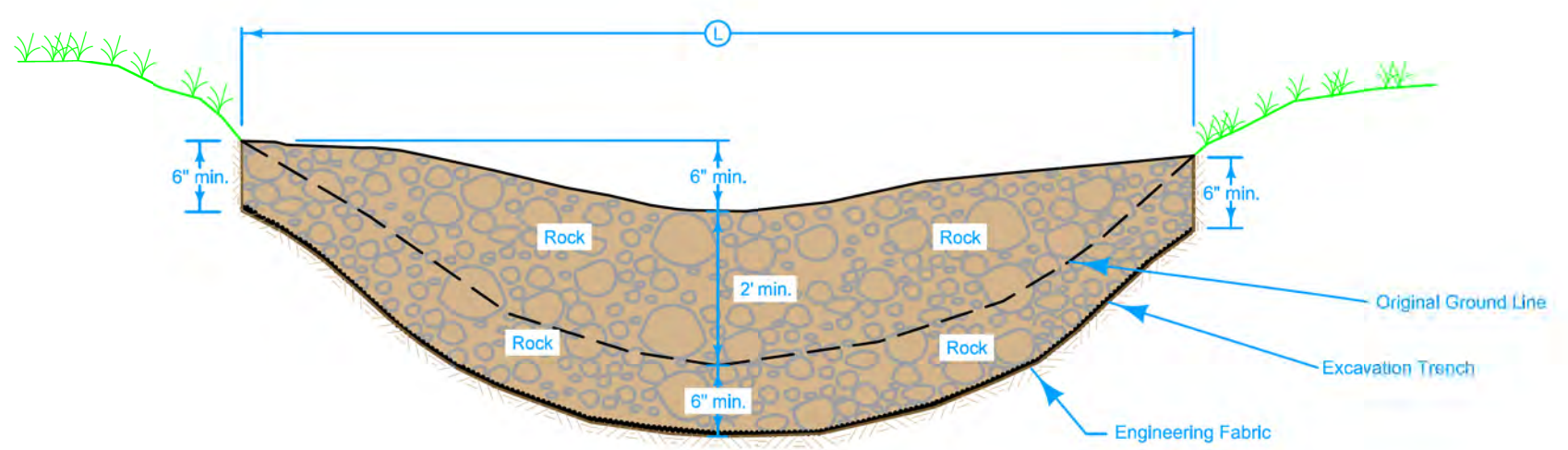
WATER	BLOW COUNT LAYER - NO. BLOWS B2 5	SOIL REMEDIATION AREA
DRY	DIAMOND CORE	LIMESTONE (L.S.)
PLUGGED	SAND	BROKEN & WEATHERED L.S.
MOISTURE	GRAVELLY SAND	SANDSTONE
SHELBY	BOULDERS	SHALE
BLOW COUNT		SANDY SOIL
DENS. CORE		
SAMPLE		

DESIGN FOR 20° SKEW R.A.
24" X 50'
REINFORCED CONCRETE PIPE

STA. 1062+58.39, 147.46' RT. U.S.-151 DEC. 2018
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 12 OF 12 FILE NO. 31561 DESIGN NO. _____



DITCH PROFILE



SECTION A-A

Use Class D Revetment to construct Rock Check Dam.

Method of Measurement for Rock Check Dam will be in linear feet to the nearest 0.1 feet.

Basis of Payment for Rock Check Dam will be the contract unit price per linear foot. Payment is full compensation for all materials, labor, and equipment required to construct the Rock Check Dam as shown. Class 10 excavation required to cut trench and engineering fabric installed prior to placing revetment are incidental and will not be paid for separately.

Method of Measurement for Maintenance of Rock Check Dam will be by count.

Basis of Payment for Maintenance of Rock Check Dam will be at the contract unit price for each occurrence. Payment is full compensation for clean out and disposal of material when capacity reaches 50%, and for any repair that is needed during the project.

Method of Measurement for Removal of Rock Check Dam will be by count.

Basis of Payment for Removal of Rock Check Dam will be at the contract unit price for each Rock Check Dam removed. Payment is full compensation for all labor and equipment required to remove all rock and material above original ditch grade. Rock, silt, and engineering fabric that is flush with and/or below final ditch grade will be allowed to remain in the excavation trench.

Possible Contract Items:
 Rock Check Dam
 Maintenance of Rock Check Dam
 Removal of Rock Check Dam

Possible Tabulation:
 100-32

ROCK CHECK DAM

ESTIMATED CAST IN PLACE CULVERT QUANTITIES - DESIGN #119

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2401-6750001	REMOVALS, AS PER PLAN	LS	1.00	
2	2402-2720000	EXCAVATION, CLASS 20	CY	420	
3	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT)	CY	63.0	
4	2404-7775000	REINFORCING STEEL	LB	10,749	
5	2533-4980005	MOBILIZATION	LS	1.00	

ESTIMATE REFERENCE INFORMATION - DESIGN #119

ITEM NO.	ITEM CODE	DESCRIPTION
1	2401-6750001	REMOVALS, AS PER PLAN INCLUDES ALL WORK FOR REMOVAL AND OFF-SITE DISPOSAL OF THE EXISTING FLUME, FLUME BASIN, AND FLUME BELL JOINTS AT THE SOUTH END OF THE EXISTING CULVERT. REMOVAL OF SCHEDULED ITEMS SHALL BE IN ACCORDANCE WITH SECTION 2401, OF THE STANDARD SPECIFICATIONS. ANY DAMAGE TO MATERIAL NOT TO BE REMOVED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND REPAIRED AT NO EXTRA COST TO THE STATE.
2	2402-2720000	EXCAVATION, CLASS 20 THE METHOD OF MEASUREMENT SHALL BE IN ACCORDANCE WITH ARTICLE 2402.04, B, 4. THE EXCAVATION QUANTITY IS MEASURED FROM THE EXISTING GROUND SURFACE. INCLUDES FILLING AND COMPACTING LOW AREAS AROUND PROPOSED CULVERT.
3	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT) INCLUDES ALL RESILIENT JOINT FILLER REQUIRED.
4	2404-7775000	REINFORCING STEEL --
5	2533-4980005	MOBILIZATION --

SPECIFICATIONS:

DESIGN:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010.

CONSTRUCTION:
IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, CURRENT SERIES, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010:
REINFORCING STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 5, GRADE 60.
CONCRETE IN ACCORDANCE WITH AASHTO LRFD SECTION 5, f'c = 4.0 KSI.

STANDARDS: FOR DETAILS AND NOTES NOT SHOWN REFER TO THE FOLLOWING IOWA D.O.T. - HIGHWAY STANDARDS:		
STANDARD	ISSUED	REVISED

SUMMARY OF REINFORCING STEEL

LOCATION	QUANTITY	TOTAL
FLUME JUNCTION BELL	1	527
FLUME	1	6111
FLUME CHUTE BELL	1	429
FLUME BASIN	1	3682
TOTAL (LB)		10,749

CONCRETE PLACEMENT QUANTITIES

LOCATION	FOOTING	WALLS	TOTAL
FLUME JUNCTION BELL	1.5	1.6	3.1
FLUME	17.3	20.0	37.3
FLUME CHUTE BELL	1.3	1.0	2.3
FLUME BASIN	12.4	7.9	20.3
TOTAL (CY)		32.5	63.0

STRUCTURAL DESIGN



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.

CHECK PLANS 10-22-2018

Signature: Jordan A. Gustafson Date: _____
Printed or Typed Name

My license renewal date is December 31, 2019

Pages or sheets covered by this seal: SHEETS V.I THRU V.18
(V.3, V.9, V.15 EXCLUDING HYDRAULIC DATA)

NOTE:
ROADWAY QUANTITIES SHOWN
ELSEWHERE IN THESE PLANS.

**DESIGN HISTORY
AT THIS SITE**

DES. NO.	TYPE OF WORK
1368	ORIGINAL DESIGN
119	FLUME REPLACEMENT

DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
ESTIMATED QTY/EST. REFERENCE
STA. 288+94.00, 42' RT @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 1 OF 6 FILE NO. 31561 DESIGN NO. 119

GENERAL NOTES:

IT IS THE INTENT OF THIS DESIGN TO REPLACE THE EXISTING FLUME AT THE SOUTH END OF THE EXISTING 6'-0 X 8'-0 X 329'-0 REINFORCED CONCRETE BOX CULVERT, SKEWED 10 DEGREES L.A. AT STATION 288+94.00.

ELECTRONIC COPIES OF ORIGINAL DESIGN PLANS ARE AVAILABLE TO THE CONTRACTOR AS PART OF THE E-FILES SUPPLIED WITH THE CONTRACT DOCUMENTS. DIMENSIONS SHOWN ON THESE PLANS ARE BASED ON DESIGN PLANS (ORIGINAL DESIGN NO. 1368).

- REINFORCING BAR CLEARANCES WILL BE AS FOLLOWS:
- EDGE CLEARANCES: 2" EXCEPT
 - TOP OF FLOOR 2 1/4" TO NEAR TRANSV. REINF. BAR
 - BOTTOM OF FLOOR 3 1/2" TO NEAR TRANSV. REINF. BAR
- END CLEARANCES:
- VERTICAL TOP 2"
 - VERTICAL BOTTOM 3 1/2"
 - TRANSVERSE 2"

FLOOR OF FLUME IS TO BE FINISHED SMOOTH. SIDES OF FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE.

ALL FLOOR REINFORCING STEEL IS TO BE SUPPORTED AT INTERVALS OF NOT MORE THAN 3'-0 IN EITHER DIRECTION AS OUTLINED IN THE STANDARD SPECIFICATIONS.

THE VERTICAL BARS IN THE WALLS MAY BE SPLICED ABOVE THE FOOTING AT THE CONTRACTOR'S OPTION AS FOLLOWS:

BAR SIZE NUMBER	4	5	6	7	8
MINIMUM SPLICE LENGTH	21"	26"	31"	41"	54"

THIS SPLICE, IF USED WILL BE AT THE CONTRACTOR'S EXPENSE.

BEVELED 2x4 KEYWAYS ARE TO BE USED FOR 9" AND 10" WALLS AND 2x6 KEYWAYS ARE USED FOR 11" AND GREATER WALL THICKNESS.

KEYWAY DIMENSIONS SHOWN ON THE PLANS ARE BASED ON NOMINAL DIMENSIONS UNLESS STATED OTHERWISE. IN ADDITION, THE BEVEL USED ON THE KEYWAY SHALL BE LIMITED TO A MAXIMUM OF 10 DEGREES FROM VERTICAL.

FAINT LINES ON PLANS INDICATE EXISTING STRUCTURE.

UTILITY COMPANIES AND MUNICIPALITIES WHOSE FACILITIES ARE SHOWN ON THE PLANS OR KNOWN TO BE WITHIN THE CONSTRUCTION LIMITS SHALL BE NOTIFIED BY THE CONTRACTOR OF THE CONSTRUCTION STARTING DATE.

THE CONTRACTOR MAY SUBMIT ALTERNATE FROST TROUGH DIMENSIONS FOR APPROVAL. ANY ADDITIONAL COSTS DUE TO CHANGE IN THE FROST TROUGH DIMENSIONS IS TO BE PAID FOR BY THE CONTRACTOR.

ALL REINFORCING BARS AND BARS NOTED AS DOWELS SUPPLIED FOR THIS STRUCTURE SHALL BE DEFORMED REINFORCEMENT UNLESS OTHERWISE NOTED OR SHOWN.

CLASS 20 EXCAVATION MATERIAL UNSUITABLE FOR BACKFILLING SHALL BE DISPOSED OF IN A MANNER THAT WILL LEAVE THE SITE IN A NEAT CONDITION.

ALL DIMENSIONS AND DETAILS SHOWN ON THESE PLANS PERTINENT TO NEW CONSTRUCTION IN RELATION TO EXISTING PORTIONS OF THE STRUCTURE SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE STARTING CONSTRUCTION.

THE PRICE BID FOR "REMOVALS, AS PER PLAN" SHALL INCLUDE THE COST FOR REMOVALS OF THE ENTIRE EXISTING FLUME, INCLUDING BELL JOINTS AND BASIN.

ALL REMOVALS SHALL BE CAREFULLY ACCOMPLISHED AND ANY CONCRETE DAMAGED BY THE CONTRACTOR THAT IS NOT TO BE REMOVED SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXTRA COST TO THE STATE. REMOVALS SHALL BE IN ACCORDANCE WITH SECTION 2401 OF THE STANDARD SPECIFICATIONS.

THE REMOVAL OF THE EXISTING FLUME SHALL BE ACCOMPLISHED WITHOUT ANY ADDITIONAL REMOVAL TO THE EXISTING BARREL OR PARAPET.

THE PROPOSED FLUME REPLACEMENT SHALL ABUT AGAINST THE EDGE OF EXISTING BARREL WALLS AND FLOOR. NO DOWEL REINFORCING IS REQUIRED BETWEEN THE FLUME REPLACEMENT AND THE EXISTING BARREL.

THE ROADWAY WILL BE OPEN TO TRAFFIC DURING CONSTRUCTION.

SINCE THE HIGHWAY WILL NOT BE CLOSED TO TRAFFIC DURING THIS CONSTRUCTION, THE CONTRACTOR MAY FEEL TEMPORARY SHORING (SHEET PILE OR OTHER) IS NECESSARY TO ENSURE THAT THE SHOULDER WILL NOT SLOUGH IN WHILE CULVERT IS BEING EXTENDED. HOWEVER, IF FOR ANY REASON SUCH SHORING IS DEEMED NECESSARY, THE CONTRACTOR WILL SUBMIT THE SHORING PLAN TO THE ENGINEER FOR APPROVAL. COST OF SHORING IF REQUIRED WILL BE CONSIDERED INCIDENTAL TO CONSTRUCTION AND NO DIRECT PAYMENT WILL BE MADE. THEREFORE, ALL MATERIAL USED FOR SHORING SHALL REMAIN THE PROPERTY OF THE CONTRACTOR. IN ADDITION TO THE REQUIREMENTS NOTED ABOVE, ARTICLE 1107.07, OF THE STANDARD SPECIFICATIONS, STILL APPLIES.

THESE BRIDGE PLANS LABEL ALL REINFORCING STEEL WITH ENGLISH NOTATION (501 IS 5/8 INCH DIAMETER BAR). ENGLISH REINFORCING STEEL RECEIVED IN THE FIELD MAY DISPLAY THE FOLLOWING "BAR DESIGNATION". THE "BAR DESIGNATION" IS THE STAMPED IMPRESSION ON THE REINFORCING BARS, AND IS EQUIVALENT TO THE BAR DIAMETER IN MILLIMETERS.

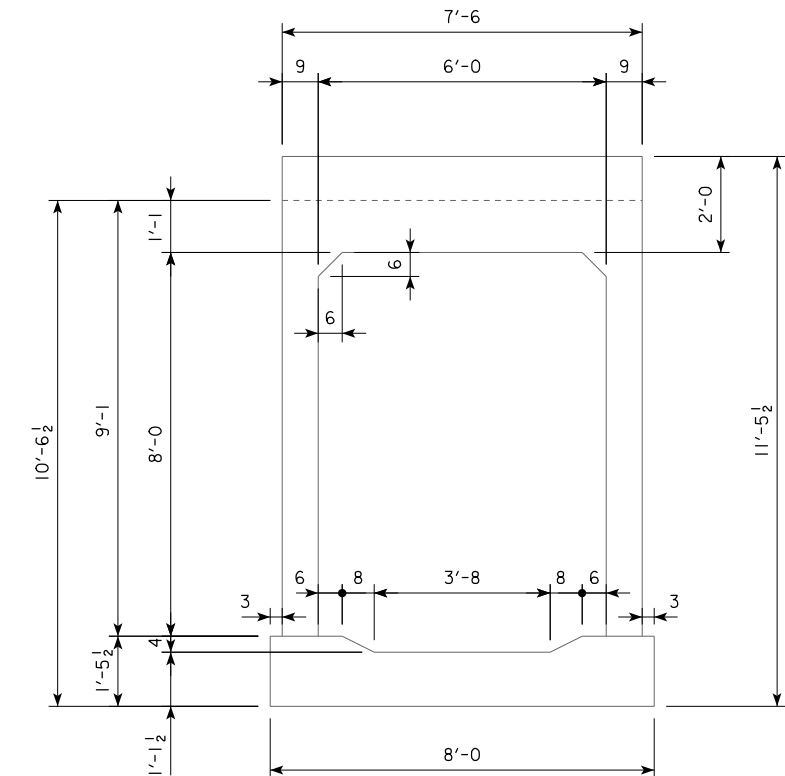
ENGLISH SIZE	3	4	5	6	7	8	9	10	11
BAR DESIGNATION	10	13	16	19	22	25	29	32	36

TRAFFIC WILL BE MAINTAINED AT ALL TIMES IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS SHOWN IN THESE PLANS.

TRAFFIC CONTROL ADJACENT TO THE CULVERT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR CONSTRUCTING THE CULVERT AND IS TO COORDINATE CONSTRUCTION OF THE CULVERT WITH THE CONTRACTOR DOING THE GRADING.

ANY DIMENSIONAL TRANSITION REQUIRED BETWEEN EXISTING STRUCTURE AND THE FLUME REPLACEMENT SHALL BE MADE IN THE FIRST 2'-0 OF NEW WORK.

WHEN DE-WATERING PRESENTS A PROBLEM FOR PLACING THE CURTAIN WALLS AS DETAILED, ALTERNATE METHODS SUCH AS STEEL SHEET PILE AND PRECAST CONCRETE WALLS MAY BE APPROVED BUT AT NO ADDITIONAL COST. THE CONTRACTOR IS TO SUBMIT TO THE ENGINEER FOR APPROVAL COMPLETE DRAWINGS OF THE PROPOSED CURTAIN WALL ALTERNATE BEFORE BEGINNING CONSTRUCTION.

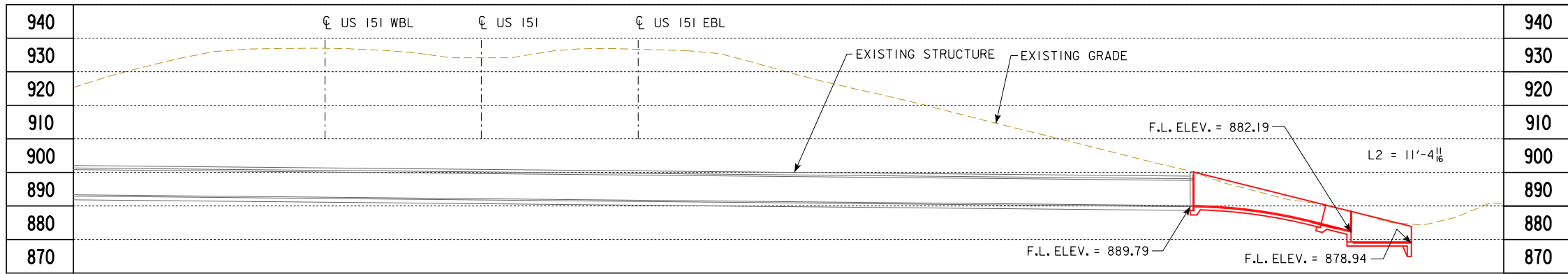


SECTION THRU EXISTING BARREL AT PARAPET
(REINFORCING NOT SHOWN)

TRAFFIC CONTROL PLAN

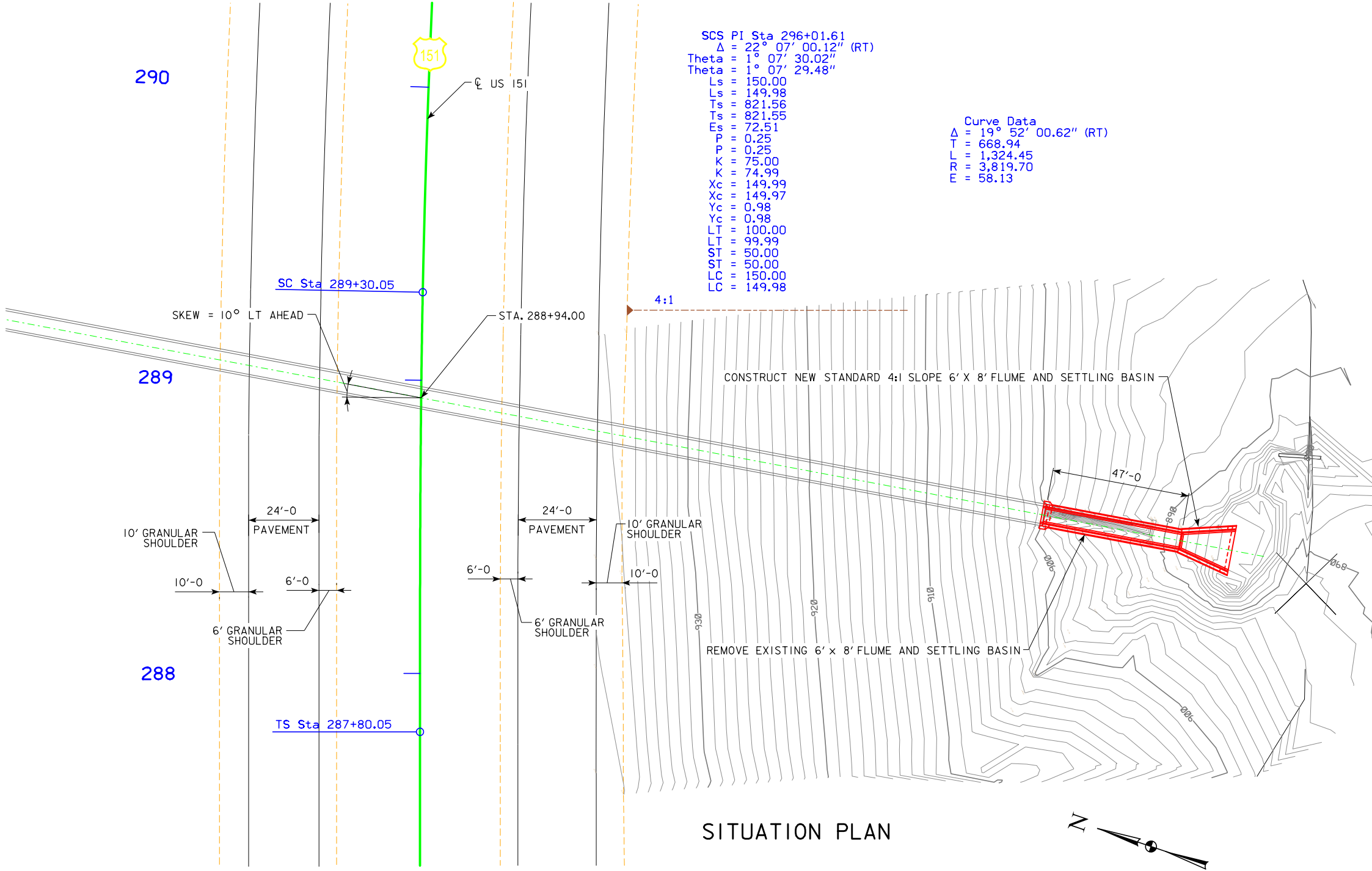
NOTE: THE ROADWAY WILL BE OPEN TO THRU TRAFFIC. REFER TO THE TRAFFIC CONTROL PLAN ON THE ROAD PLANS IN THESE PLANS.

DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
GENERAL NOTES
 STA. 288+94.00, 42' RT @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 2 OF 6 FILE NO. 31561 DESIGN NO. 119



LONGITUDINAL SECTION ALONG ϕ CULVERT

BENCH MARK NO. F19012
 ELEV. 908.53
 STA. 287+93.26, 228.71' RT
 RR SPIKE IN POWER POLE



SCS PI Sta 296+01.61
 $\Delta = 22^\circ 07' 00.12''$ (RT)
 Theta = $1^\circ 07' 30.02''$
 Theta = $1^\circ 07' 29.48''$
 Ls = 150.00
 Ls = 149.98
 Ts = 821.56
 Ts = 821.55
 Es = 72.51
 P = 0.25
 P = 0.25
 K = 75.00
 K = 74.99
 Xc = 149.99
 Xc = 149.97
 Yc = 0.98
 Yc = 0.98
 LT = 100.00
 LT = 99.99
 ST = 50.00
 ST = 50.00
 LC = 150.00
 LC = 149.98

Curve Data
 $\Delta = 19^\circ 52' 00.62''$ (RT)
 T = 668.94
 L = 1,324.45
 R = 3,819.70
 E = 58.13

TRAFFIC ESTIMATE:
 2013 AADT, 7,400 VPD
 17% TRUCKS
 DESIGN ESALs -----

HYDRAULIC DATA
 DRAINAGE AREA = 344 ACRES HILLY
 $Q_{50} = 493$ CFS

UTILITIES LEGEND:
 REFER TO SHEET D.1 FOR UTILITY LEGEND

LOCATION
 US 151
 T-87N R-1W
 SECTION 28
 WHITEWATER TOWNSHIP
 DUBUQUE COUNTY
 LATITUDE: 42.315575°
 LONGITUDE: -90.967653°

DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
SITUATION PLAN
 STA. 288+94.00, 42' RT ϕ US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 3 OF 6 FILE NO. 31561 DESIGN NO. 119
 FEBRUARY, 2019

REINFORCING BAR LIST - FLUME					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5a1	WALLS FFV		92	LISTED	790
5b1	WALLS FFH - SECTION 1		10	VARIABLES	412
4b2	WALLS BFH - SECTION 1		10	VARIABLES	264
5b3	WALLS FFH - SECTION 2		10	VARIABLES	86
4b4	WALLS BFH - SECTION 2		10	VARIABLES	55
5b5	WALLS FFH - SECTION 1		6	LISTED	83
4b6	WALLS BFH - SECTION 1		6	LISTED	53
5c2	BOTT. FLOOR & WALLS BFV - SPLICED		91	13'-7"	1289
5c3	WALLS BFV		182	LISTED	1372
6f1	FLOOR LONGIT. TOP - SECTION 1		7	38'-1"	400
5f2	FLOOR LONGIT. BOTT. - SECTION 1		7	37'-11"	277
6f3	FLOOR LONGIT. TOP - SECTION 2		7	8'-11"	94
5f4	FLOOR LONGIT. BOTT. - SECTION 2		7	9'-1"	66
6m1	FLOOR TRANSV. TOP		49	7'-10"	577
6s1	WALLS BOTH F ALONG SLOPE - SECTION 1		4	40'-3"	242
6s2	WALLS BOTH F ALONG SLOPE - SECTION 2		4	7'-6"	45
5u1	FENCE ANCHORS (GALVANIZED)		2	2'-10"	6
TOTAL (LBS.)					6111

FLUME DATA

$\Delta A = 14^{\circ}02'$
 $\Delta C = 1^{\circ}00'$
 $B = 18'-3\frac{3}{4}"$
 $SL = 48'-5\frac{3}{8}"$
 $V = 6'-2\frac{1}{4}"$
 $W = 11'-9"$
 $M = 6'-0"$
 $T = 0'-11"$
 $H = 8'-0"$

CURVE DATA

C. L. = 47'-0"
 $L2 = 11'-4\frac{1}{16}"$
 $L3 = 35'-7\frac{5}{16}"$
 $D = 17'-10\frac{1}{16}"$
 $E = 17'-9\frac{1}{4}"$
 P. C. ELEV. = 889.79
 P. I. ELEV. = 889.48
 P. P. ELEV. = 889.17
 P. T. ELEV. = 885.04
 $X1 = 4'-1\frac{9}{16}"$
 $X2 = 2'-3\frac{3}{8}"$
 $X3 = 1'-0\frac{3}{8}"$
 $X4 = 0'-3\frac{1}{16}"$
 $L3/4 = 8'-10\frac{3}{16}"(+)$

LISTED BARS

BAR 5a1
 46 BARS EACH WALL
 45 SPACES AT 1'-0" EACH WALL
 LENGTH VARIES - 2 EA. LGTH. (ONE LGTH. EA. WALL)
 10'-8" MAX, 6'-8" MIN - L3 LENGTH (72 BARS TOTAL)
 6'-8" - L2 LENGTH (20 BARS TOTAL)

BAR 5c3
 91 BARS EACH WALL
 90 SPACES AT 0'-6" EACH WALL
 LENGTH VARIES - 2 EA. LGTH. (ONE LGTH. EA. WALL)
 9'-8" MAX, 5'-8" MIN - L3 LENGTH (142 BARS TOTAL)
 5'-8" - L2 LENGTH (40 BARS TOTAL)

BAR 5b5 AND 4b6
 6 BARS - 2 EA. LGTH.
 (20'-10", 12'-6", 6'-4")

NOTES:

- SEE SHEETS V.1 AND V.2 FOR FLUME INFORMATION AND DETAILS NOT SHOWN.
- SEE SHEET V.5 FOR BELL JOINT INFORMATION AND DETAILS NOT SHOWN.
- SEE SHEET V.6 FLUME BASIN INFORMATION AND DETAILS NOT SHOWN.
- FLUME DETAILS ARE BASED ON A 1°00' ANGLE 'C.'

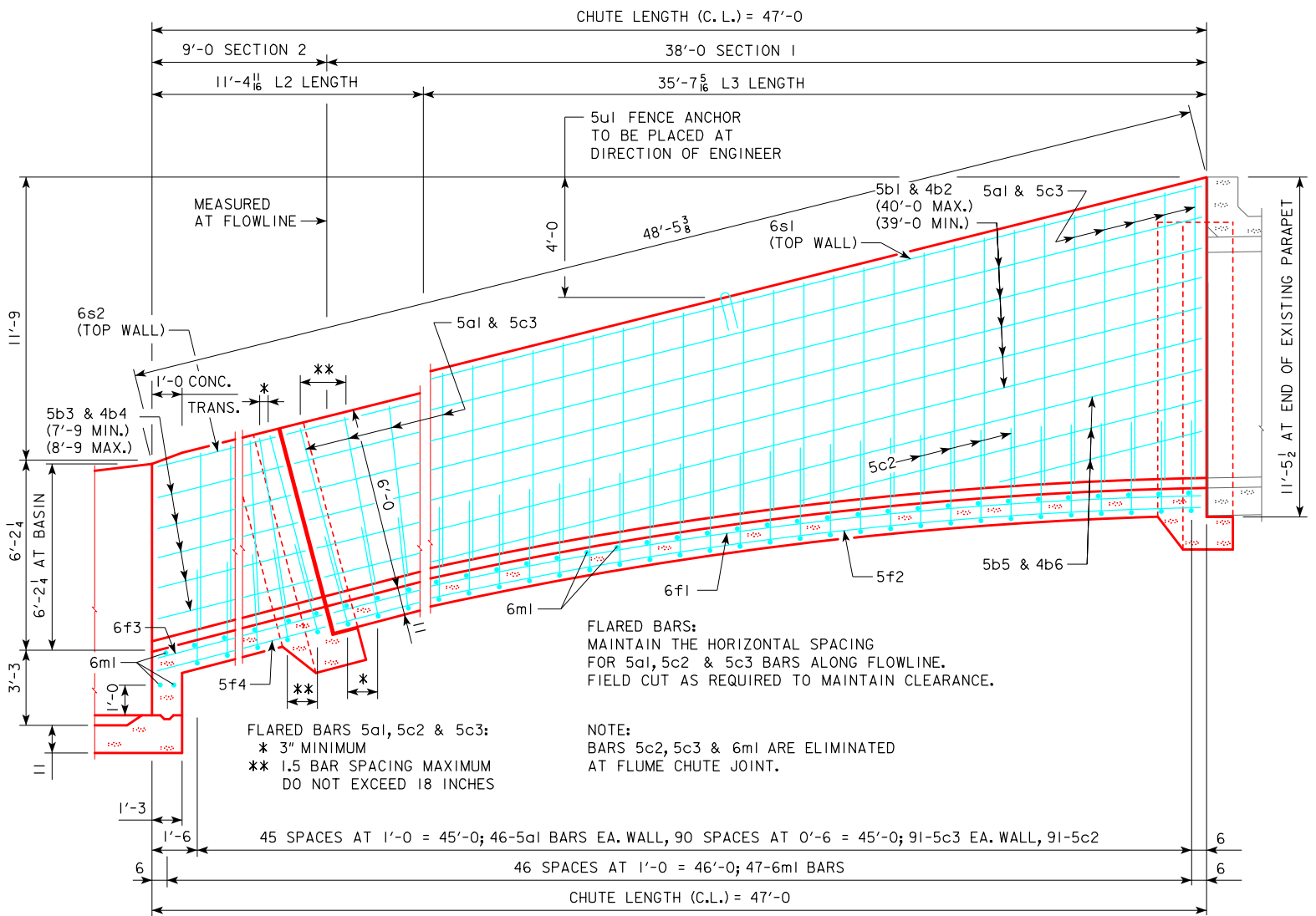
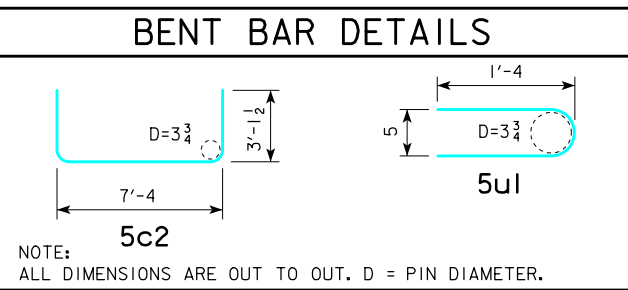


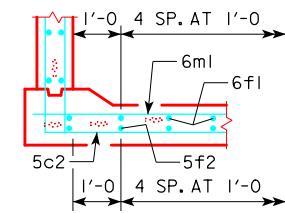
TABLE OF FLUME DIMENSIONS									
K	M	V	L	N	O	P	R	T	U
15'-0"	6'-0"	6'-2 1/4"	18'-0"	3'-3"	4'-11"	4'-0"	1'-3"	0'-11"	0'-10"



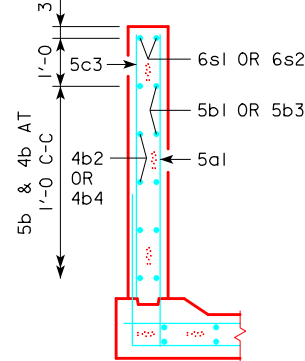
CONCRETE PLACEMENT QUANTITIES			
LOCATION	FOOTING	WALLS	TOTAL
* FLUME - SECTION 1	13.3	16.8	30.1
* FLUME - SECTION 2	Δ 4.0	3.2	7.2
JUNCTION BELL	1.5	1.6	3.1
CHUTE BELL	1.3	1.0	2.3
BASIN	12.4	7.9	20.3
TOTAL (C.Y.)	32.5	30.5	63.0

* L3 LENGTH TOTAL IS 15.9 C.Y. FOR WALLS AND 12.4 C.Y. FOR FOOTING;
 L2 LENGTH PER FOOT IS 0.360 C.Y. FOR WALLS AND 0.354 C.Y. FOR FOOTING.
 Δ INCLUDES FLUME BASIN CURTAIN.

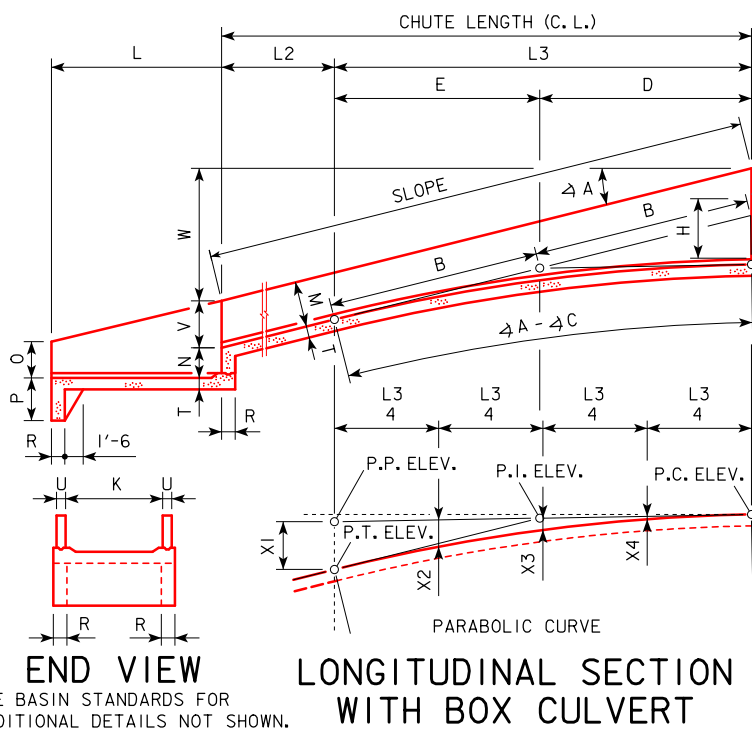
FLUME FLOOR HALF SECTION (NORMAL TO FLOWLINE)



FLUME WALL SECTION (NORMAL TO FLOWLINE)

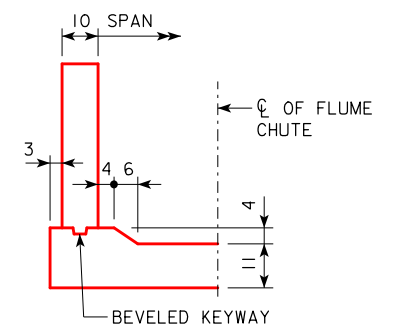


FLUME WALL SECTION (NORMAL TO FLOWLINE)



FLUME CHUTE - LONGITUDINAL SECTION

FLUME CHUTE DETAILS (NORMAL TO FLOWLINE)



DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
FLUME DETAILS
 STA. 288+94.00, 42' RT @ US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 4 OF 6 FILE NO. 31561 DESIGN NO. 119

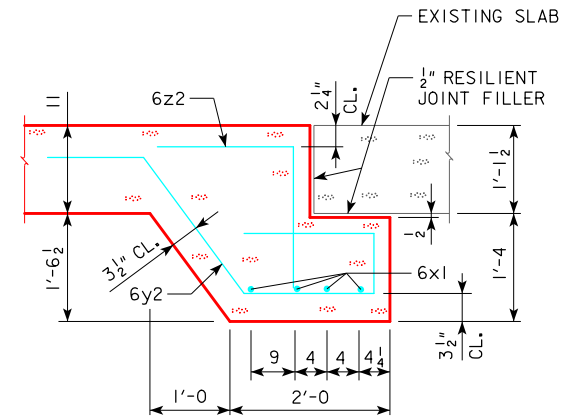
ESTIMATE OF QUANTITIES - FLUME BELL JOINTS

JUNCTION BELL JOINT					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6x1	WALLS & FLOOR		4	17'-11"	108
6x3	WALLS VERT.		8	8'-4"	100
6y1	WALLS HORIZ.		20	6'-3"	188
6y2	FLOOR VERT.		8	7'-5"	89
6z2	FLOOR VERT.		8	3'-6"	42
TOTAL WEIGHT (LBS.)					527

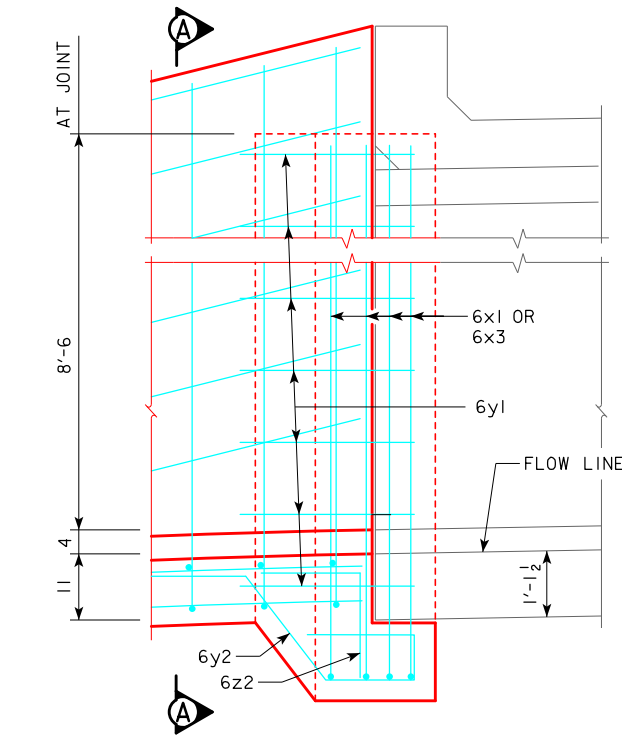
CONCRETE (CY)	FOOTING	1.5
	WALLS	1.6
	TOTAL	3.1

CHUTE BELL JOINT					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6x2	WALLS & FLOOR		4	17'-9"	107
6x4	WALLS VERT.		8	5'-6"	66
6y3	WALLS HORIZ.		14	6'-3"	131
6y4	FLOOR VERT.		8	7'-2"	86
6z1	FLOOR VERT.		8	3'-3"	39
TOTAL WEIGHT (LBS.)					429

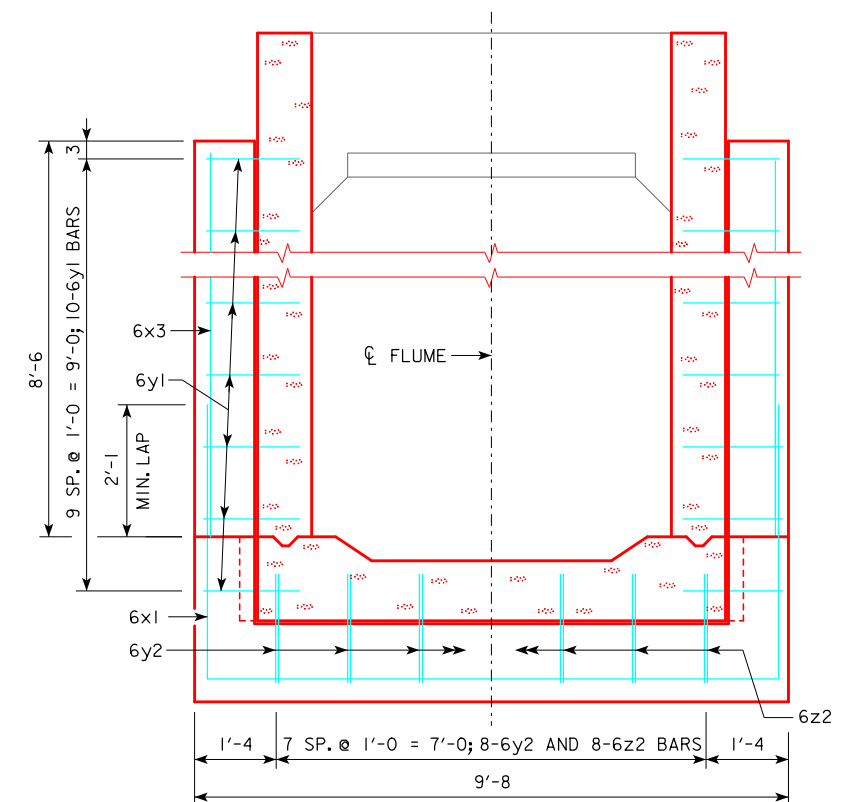
CONCRETE (CY)	FOOTING	1.3
	WALLS	1.0
	TOTAL	2.3



JUNCTION FOOTING

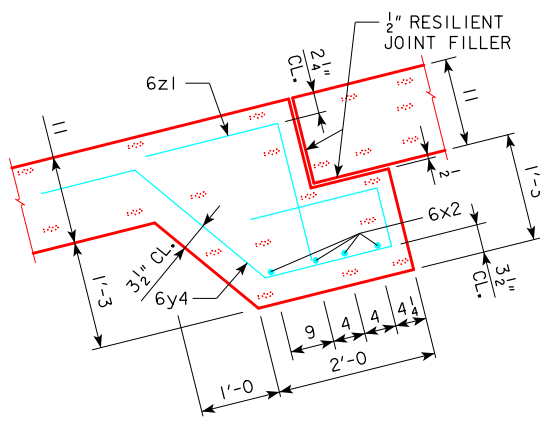
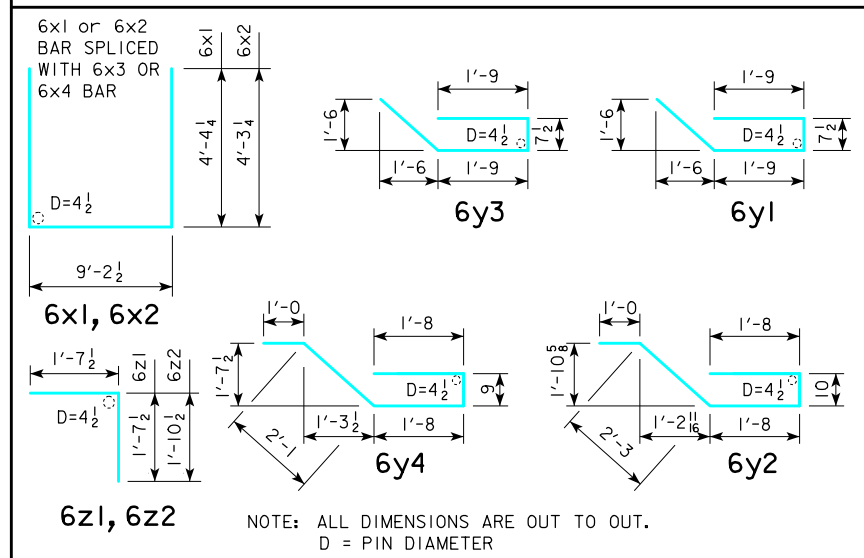


PART ELEV. - JUNCTION BELL JT.

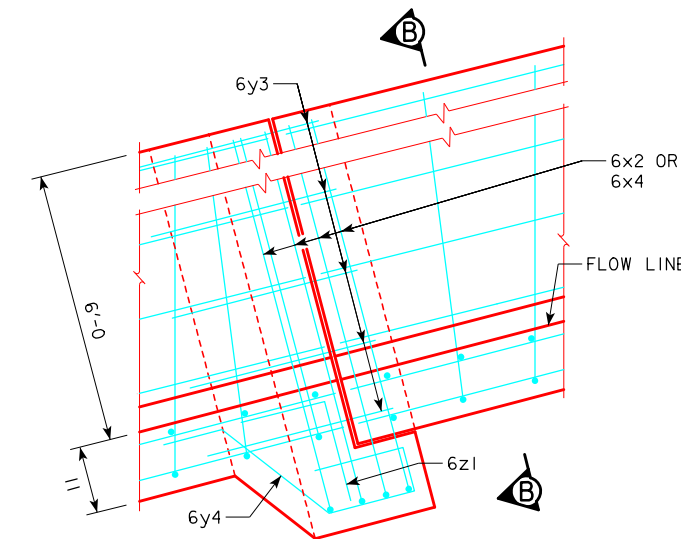


SECTION A-A

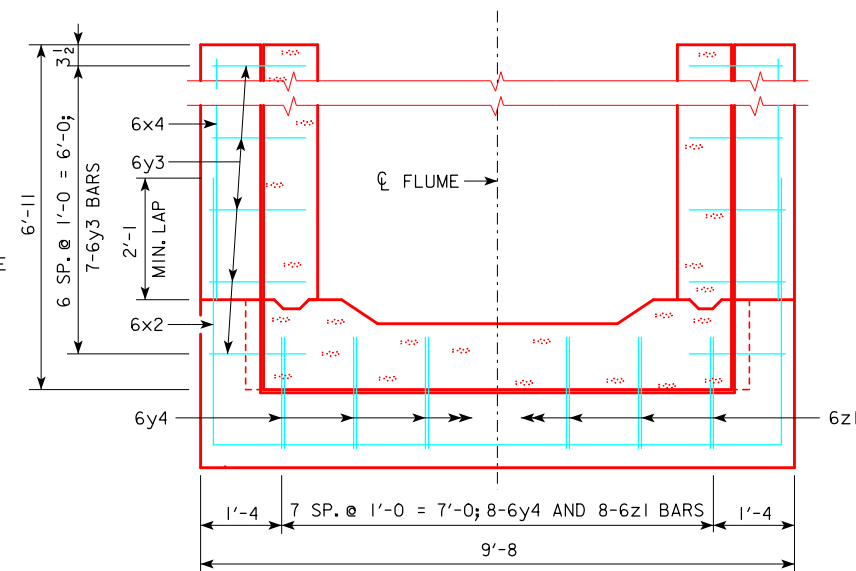
BENT BAR DETAILS



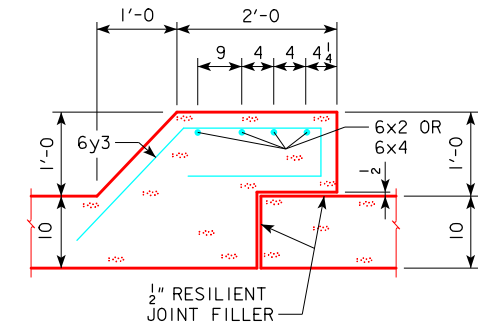
CHUTE FOOTING



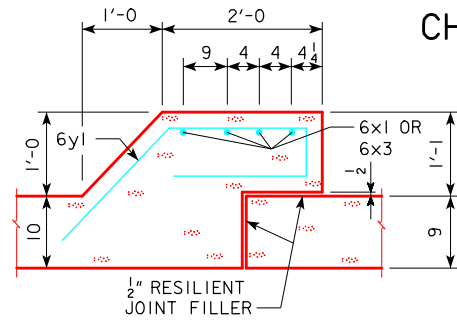
PART ELEVATION - CHUTE BELL JT.



SECTION B-B



CHUTE WALLS

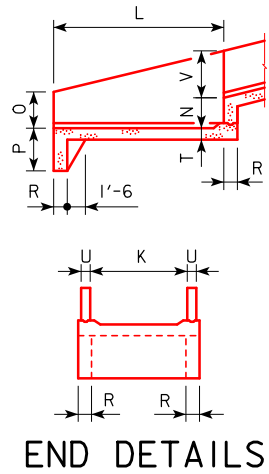


JUNCTION WALLS

NOTES:

- FLOOR BARS 6m1 ARE TO BE SHORTENED 6" AT BELL JOINTS.
- SEE SHEETS V.1 AND V.2 FOR GENERAL INFORMATION.

DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
FLUME BELL JOINT DETAILS
 STA. 288+94.00, 42° RT @ US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 5 OF 6 FILE NO. 31561 DESIGN NO. 119



FLUME BASIN NOTES:

1. SEE SHEETS V.1 AND V.2 FOR GENERAL INFORMATION.
2. 5c2 & 5c3 BARS ARE LAPPED.

ESTIMATE OF QUANTITIES - FLUME BASIN					
BILL OF REINFORCING STEEL					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5a1	WALLS - VERT. - F.F.		38	5'-6:10'-0	307
5b1	WALLS - LONGIT.- F.F. & B.F.		24	20'-5	511
5b2	WALLS - LONGIT.- F.F. & B.F.		8	19'-5	162
5c1	WALLS - VERT. - B.F.		5	27'-1:27'-4	142
5c2	WALLS - VERT. - B.F.		32	13'-7:21'-4	583
5c3	WALLS - VERT. - B.F.		64	5'-2:9'-1	476
6f1	FLOOR - LONGIT.- TOP		16	18'-11	455
5f2	FLOOR - LONGIT.- BOTT.		16	18'-11	316
5g1	CURTAIN BRACKET - VERT.		4	6'-3	26
5h1	BASIN BACKWALL - VERT.		8	10'-4	86
6m1	FLOOR TRANS. - TOP		19	7'-10:16'-7	348
6p1	CURTAIN - TRANS.		2	16'-5,16'-8	50
6s1	WALL - TOP SLOPE		4	20'-8	124
5t1	CURTAIN - VERT.		13	7'-1	96
TOTAL WEIGHT (LB)					3682
CONCRETE (CY)		FOOTING		12.4	
		WALLS		7.9	
		TOTAL		20.3	

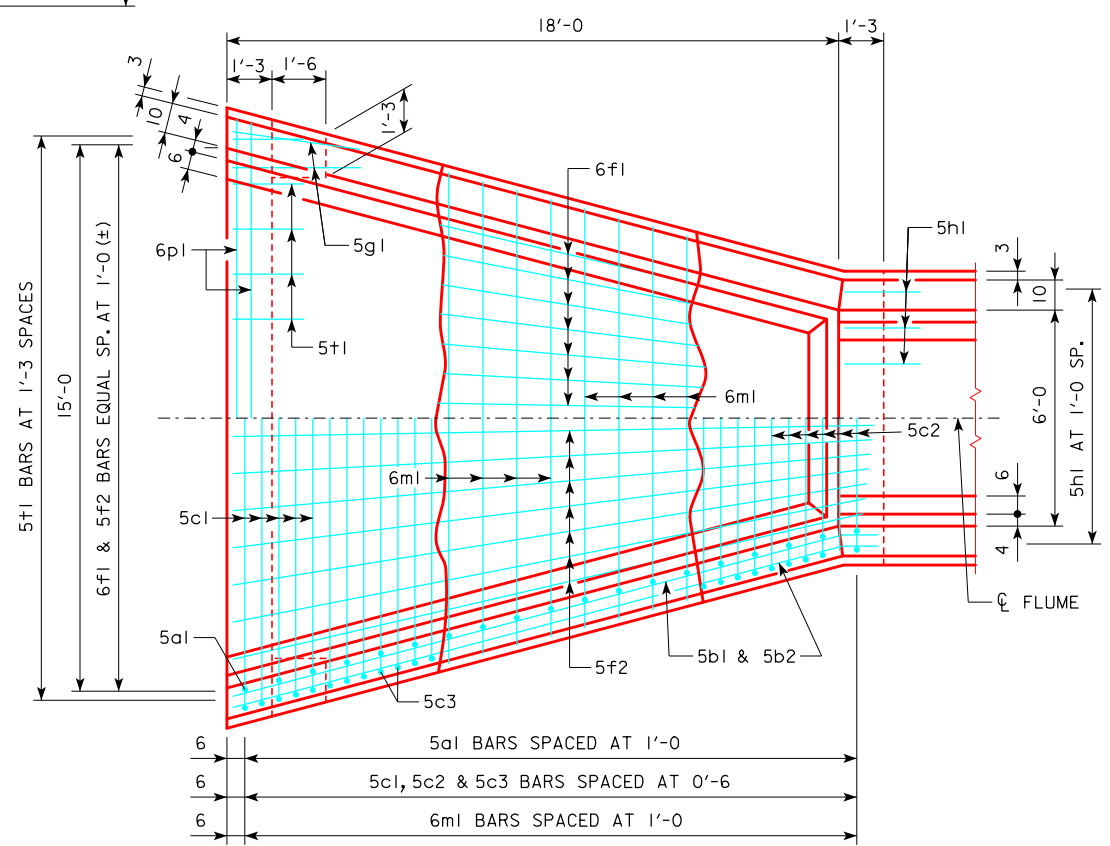
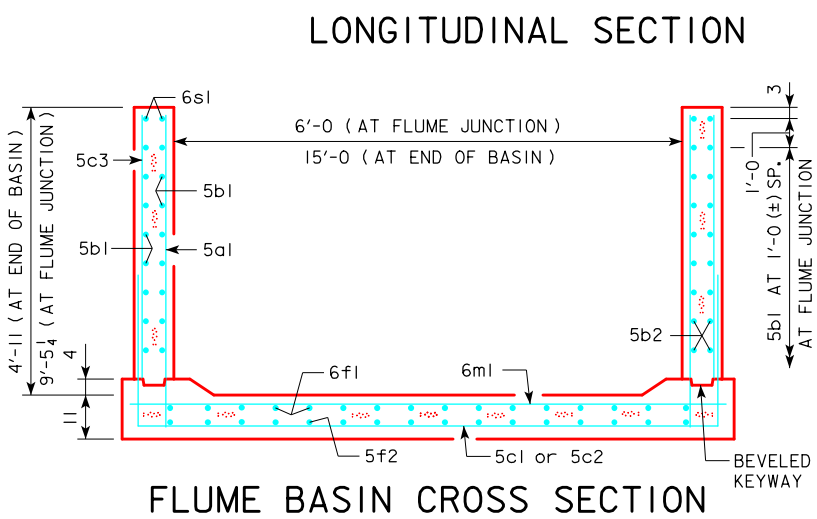
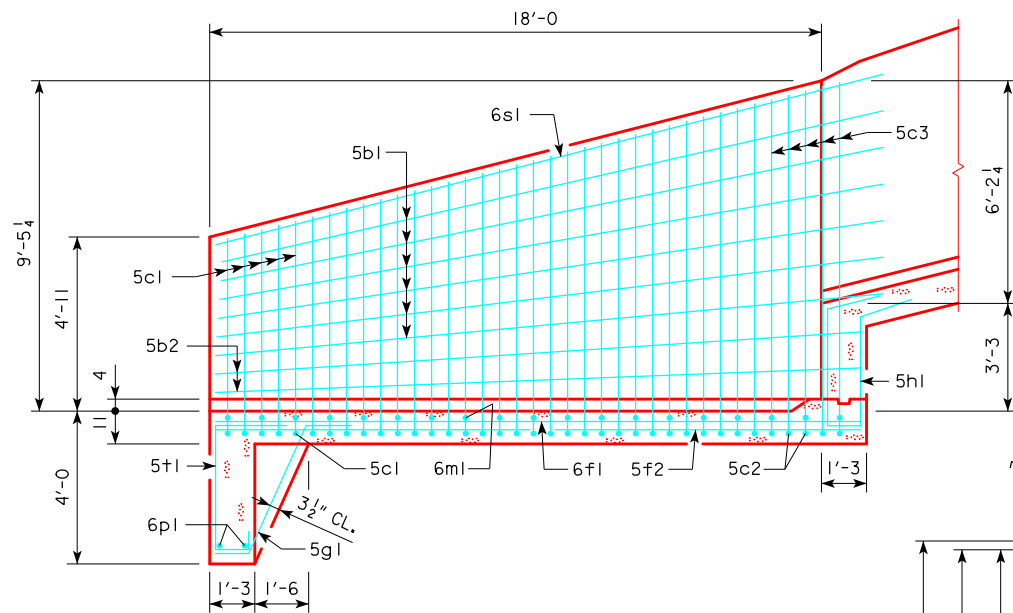
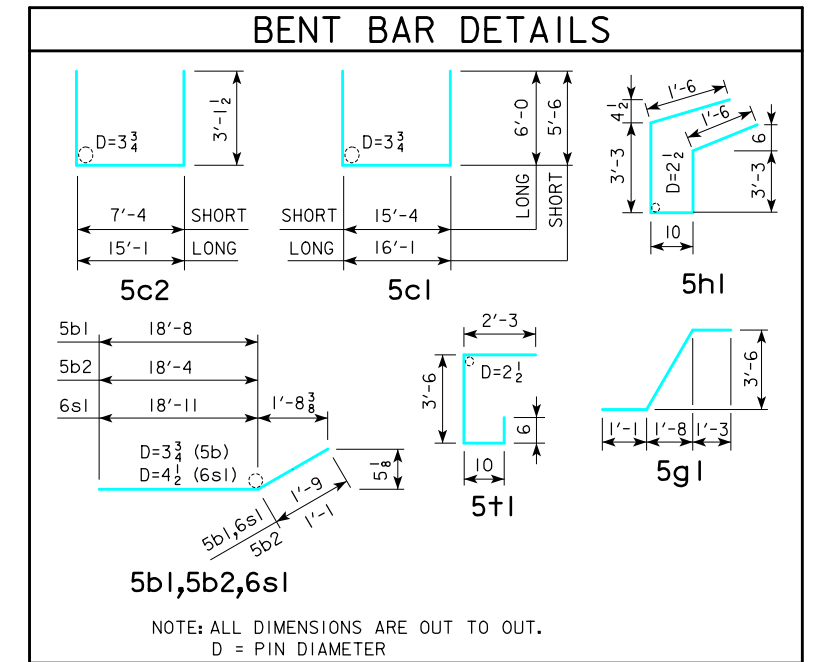


TABLE OF FLUME BASIN DIMENSIONS										
K	L	M	N	O	P	R	T	U	V	
15'-0	18'-0	6'-0	3'-3	4'-11	4'-0	1'-3	0'-11	0'-10	6'-2 1/4	



DESIGN FOR 10° (L.A.) SKEW
6' X 8'
REINFORCED CONCRETE FLUME
FLUME BASIN DETAILS
 STA. 288+94.00, 42' RT @ US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 6 OF 6 FILE NO. 31561 DESIGN NO. 119

GENERAL NOTES:

IT IS THE INTENT OF THIS DESIGN TO REMOVE THE EXISTING FLUME AND PARAPET, REPLACE A PORTION OF THE EXISTING BARREL, AND CONSTRUCT A NEW PARAPET AND STANDARD 0 DEGREE SKEW PARALLEL WING HEADWALL AT THE SOUTH END OF THE EXISTING 6'-0" x 6'-0" x 238'-0" REINFORCED CONCRETE BOX CULVERT, SKEWED 5 DEGREES L.A.

ELECTRONIC COPIES OF ORIGINAL DESIGN PLANS ARE AVAILABLE TO THE CONTRACTOR AS PART OF THE E-FILES SUPPLIED WITH THE CONTRACT DOCUMENTS. DIMENSIONS SHOWN ON THESE PLANS ARE BASED ON DESIGN PLANS (ORIGINAL DESIGN NO. 2368). FAINT LINES ON PLANS INDICATE EXISTING STRUCTURE.

UTILITY COMPANIES AND MUNICIPALITIES WHOSE FACILITIES ARE SHOWN ON THE PLANS OR KNOWN TO BE WITHIN THE CONSTRUCTION LIMITS SHALL BE NOTIFIED BY THE CONTRACTOR OF THE CONSTRUCTION STARTING DATE.

THE R.C.B. CULVERT REPLACEMENT IS DESIGNED FOR HL-93 LIVE LOAD AND EARTH FILLS OF 4-7 FEET. THIS DESIGN IS BASED ON LOAD AND RESISTANCE FACTOR DESIGN, ACCORDING TO THE 2010 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

VERTICAL EARTH PRESSURE, $E_v = 0.120$ kcf.
HORIZONTAL EARTH PRESSURE, $E_{Hmax} = 0.060$ kcf MAX, $E_{Hmin} = 0.030$ kcf.

THE RCB CULVERT SECTIONS ARE DESIGNED FOR CLASS I EXPOSURE CONDITIONS. THE CONTRACTOR MAY SUBMIT ALTERNATE FROST TROUGH DIMENSIONS FOR APPROVAL. ANY ADDITIONAL COSTS DUE TO CHANGE IN THE FROST TROUGH DIMENSIONS IS TO BE PAID FOR BY THE CONTRACTOR.

FLOOR OF BARREL IS TO BE FINISHED SMOOTH. SIDES OF FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE.

SEE CURRENT STANDARD SPECIFICATIONS REGARDING CONCRETE FORM REMOVAL. THE PERMISSIBLE CONSTRUCTION JOINT AT THE TOP OF THE WALLS MAY BE LOWERED AT THE CONTRACTOR'S OPTION WITH ENGINEER'S APPROVAL.

THE VERTICAL BARS IN THE WALLS MAY BE SPLICED ABOVE THE FOOTING AT THE CONTRACTOR'S OPTION AS FOLLOWS:

BAR SIZE NUMBER	4	5	6	7	8
MINIMUM SPLICE LENGTH	21"	26"	31"	41"	54"

THIS SPLICE, IF USED WILL BE AT THE CONTRACTOR'S EXPENSE.

METAL BAR CHAIRS SPACED AT NOT OVER 3'-0" C.-C. IN EITHER DIRECTION ARE TO BE USED TO SUPPORT ALL SLAB AND FLOOR STEEL AS OUTLINED IN THE STANDARD SPECIFICATIONS.

THE REINFORCEMENT SUPPLIED FOR THIS STRUCTURE SHALL BE GRADE 60.

REINFORCING BAR CLEARANCES WILL BE AS FOLLOWS:

EDGE CLEARANCES: 2" EXCEPT
TOP OF FLOOR 2 1/4" TO NEAR TRANSV. REINF. BAR
BOTTOM OF FLOOR 3 1/2" TO NEAR TRANSV. REINF. BAR

END CLEARANCES:
VERTICAL TOP 2"
VERTICAL BOTTOM 3" OR 3 1/2" IF OVERALL HEIGHT OF THE CULVERT IS NOT TO A FULL INCH

TRANSVERSE 2"
ALL REINFORCING BARS AND BARS NOTED AS DOWELS SUPPLIED FOR THIS STRUCTURE SHALL BE DEFORMED REINFORCEMENT UNLESS OTHERWISE NOTED OR SHOWN.

CLASS 20 EXCAVATION MATERIAL UNSUITABLE FOR BACKFILLING SHALL BE DISPOSED OF IN A MANNER THAT WILL LEAVE THE SITE IN A NEAT CONDITION.

THE PRICE BID FOR "REMOVALS AS PER PLAN" SHALL INCLUDE THE COST FOR REMOVALS OF PORTIONS OF THE EXISTING CULVERT, AND THE SETTING OF THE DOWEL REINFORCING BARS INTO EXISTING CONCRETE.

ALL DIMENSIONS AND DETAILS SHOWN ON THESE PLANS PERTINENT TO NEW CONSTRUCTION IN RELATION TO EXISTING PORTIONS OF THE STRUCTURE SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE STARTING CONSTRUCTION.

THE REMOVAL OF THE EXISTING CULVERT SHALL BE AT A LOCATION OF 6'-0" FROM THE FRONT FACE OF EXISTING PARAPET AS DETAILED ON SHEET V.10. REMOVALS SHALL BE ON A VERTICAL PLANE PARALLEL WITH THE FRONT FACE OF THE EXISTING PARAPET, AND TO THE WIDTH OF THE FLOOR OF THE PROPOSED REPLACEMENT. THE WALLS SHALL BE CUT NORMAL TO THE BARREL WALLS AND AS SHOWN ON THE "PART REMOVAL PLAN". THE REMOVAL LINE SHALL BE INITIATED WITH A 2 1/2"± DEEP SAW CUT ON THE TOP AND BOTH SIDES OF EACH WALL, AND ACROSS THE TOP OF THE FLOOR. THIS SAW CUT SHOULD CUT THRU ANY EXISTING LONGITUDINAL REINFORCING THEREBY FACILITATING A NEAT NON-SPLALLED BREAK LINE.

ALL REMOVALS SHALL BE CAREFULLY ACCOMPLISHED AND ANY CONCRETE DAMAGED BY THE CONTRACTOR THAT IS NOT TO BE REMOVED SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXTRA COST TO THE STATE. REMOVALS SHALL BE IN ACCORDANCE WITH SECTION 2401 OF THE STANDARD SPECIFICATIONS.

THE PROPOSED CULVERT REPLACEMENT SHALL ABUT AGAINST THE FACE OF THE EXISTING CULVERT AFTER REMOVALS. 5z1 x 2'-6" DOWEL REINFORCING BARS WITH A 10" MINIMUM EMBEDMENT INTO EXISTING CONCRETE SHALL BE SET AROUND THE ENTIRE PERIPHERY OF THE EXISTING CULVERT. 5z1 DOWEL REINFORCING BARS SHALL BE CENTERED IN THE EXISTING SLAB, WALLS AND FLOOR. 5z1 DOWEL REINFORCING BARS SHALL BE AT 1'-0" MAXIMUM SPACING C.-C. OF DOWELS. 5z1 DOWEL REINFORCING BARS SHALL BE SET WITH POLYMER GROUT IN ACCORDANCE WITH ARTICLE 2301.03, E, OF THE STANDARD SPECIFICATIONS, AND CURRENT SUPPLEMENTAL SPECIFICATIONS OF THE IOWA D.O.T. HIGHWAY DIVISION.

THE ROADWAY WILL BE OPEN TO TRAFFIC DURING CONSTRUCTION.

SINCE THE HIGHWAY WILL NOT BE CLOSED TO TRAFFIC DURING THIS CONSTRUCTION, THE CONTRACTOR MAY FEEL TEMPORARY SHORING (SHEET PILE OR OTHER) IS NECESSARY TO ENSURE THAT THE SHOULDER WILL NOT SLOUGH IN WHILE CULVERT IS BEING EXTENDED. HOWEVER, IF FOR ANY REASON SUCH SHORING IS DEEMED NECESSARY, THE CULVERT CONTRACTOR SHALL SUBMIT THE SHORING PLAN TO THE ENGINEER FOR APPROVAL. COST OF SHORING, IF REQUIRED, WILL BE CONSIDERED INCIDENTAL TO CONSTRUCTION AND NO DIRECT PAYMENT WILL BE MADE. THEREFORE, ALL MATERIAL USED FOR SHORING SHALL REMAIN THE PROPERTY OF THE CONTRACTOR. IN ADDITION TO THE REQUIREMENTS NOTED ABOVE, ARTICLE 1107.07, OF THE STANDARD SPECIFICATIONS, STILL APPLIES.

KEYWAY DIMENSIONS SHOWN ON THE PLANS ARE BASED ON NOMINAL DIMENSIONS UNLESS STATED OTHERWISE. IN ADDITION, THE BEVEL USED ON THE KEYWAY SHALL BE LIMITED TO A MAXIMUM OF 10 DEGREES FROM VERTICAL.

THESE BRIDGE PLANS LABEL ALL REINFORCING STEEL WITH ENGLISH NOTATION (5z1 IS 1/2 INCH DIAMETER BAR). ENGLISH REINFORCING STEEL RECEIVED IN THE FIELD MAY DISPLAY THE FOLLOWING "BAR DESIGNATION". THE "BAR DESIGNATION" IS THE STAMPED IMPRESSION ON THE REINFORCING BARS, AND IS EQUIVALENT TO THE BAR DIAMETER IN MILLIMETERS.

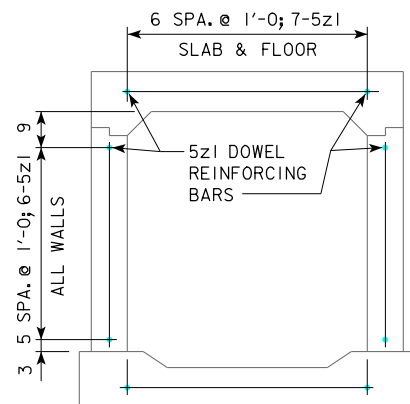
ENGLISH SIZE	3	4	5	6	7	8	9	10	11
BAR DESIGNATION	10	13	16	19	22	25	29	32	36

TRAFFIC WILL BE MAINTAINED AT ALL TIMES IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS SHOWN IN THESE PLANS.

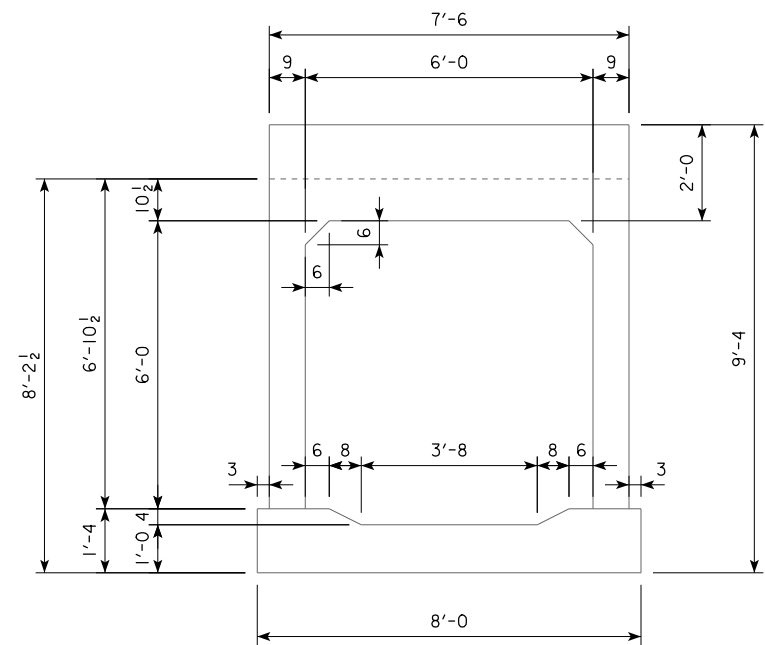
TRAFFIC CONTROL ADJACENT TO THE CULVERT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR CONSTRUCTING THE CULVERT AND IS TO COORDINATE CONSTRUCTION OF THE CULVERT WITH THE CONTRACTOR DOING THE GRADING.

ANY DIMENSIONAL TRANSITION REQUIRED BETWEEN EXISTING STRUCTURE AND THE NEW CONSTRUCTION SHALL BE MADE IN THE FIRST 2'-0" OF NEW WORK.

WHEN DE-WATERING PRESENTS A PROBLEM FOR PLACING THE CURTAIN WALLS AS DETAILED, ALTERNATE METHODS SUCH AS STEEL SHEET PILE AND PRECAST CONCRETE WALLS MAY BE APPROVED BUT AT NO ADDITIONAL COST. THE CONTRACTOR IS TO SUBMIT TO THE ENGINEER FOR APPROVAL COMPLETE DRAWINGS OF THE PROPOSED CURTAIN WALL ALTERNATE BEFORE BEGINNING CONSTRUCTION.



SECTION NEAR BARREL REPLACEMENT
(SHOWING SPACING OF 5z1 DOWEL REINFORCING BARS)

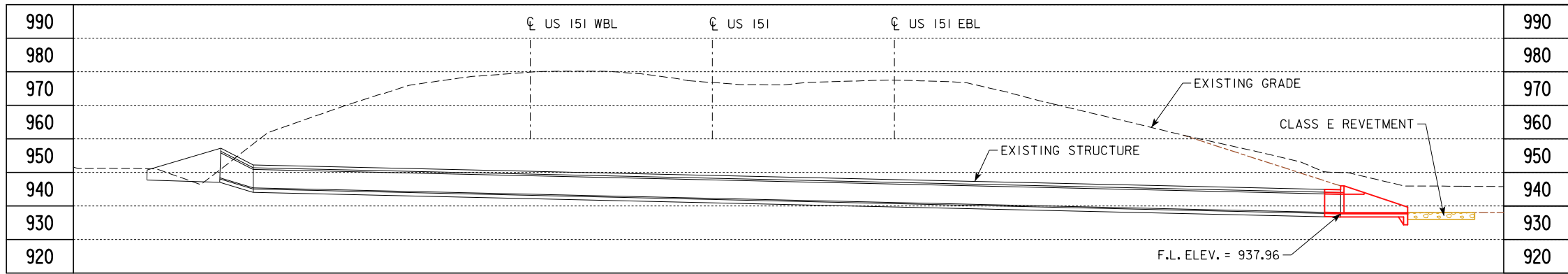


SECTION THRU EXISTING BARREL AT PARAPET
(REINFORCING NOT SHOWN)

TRAFFIC CONTROL PLAN

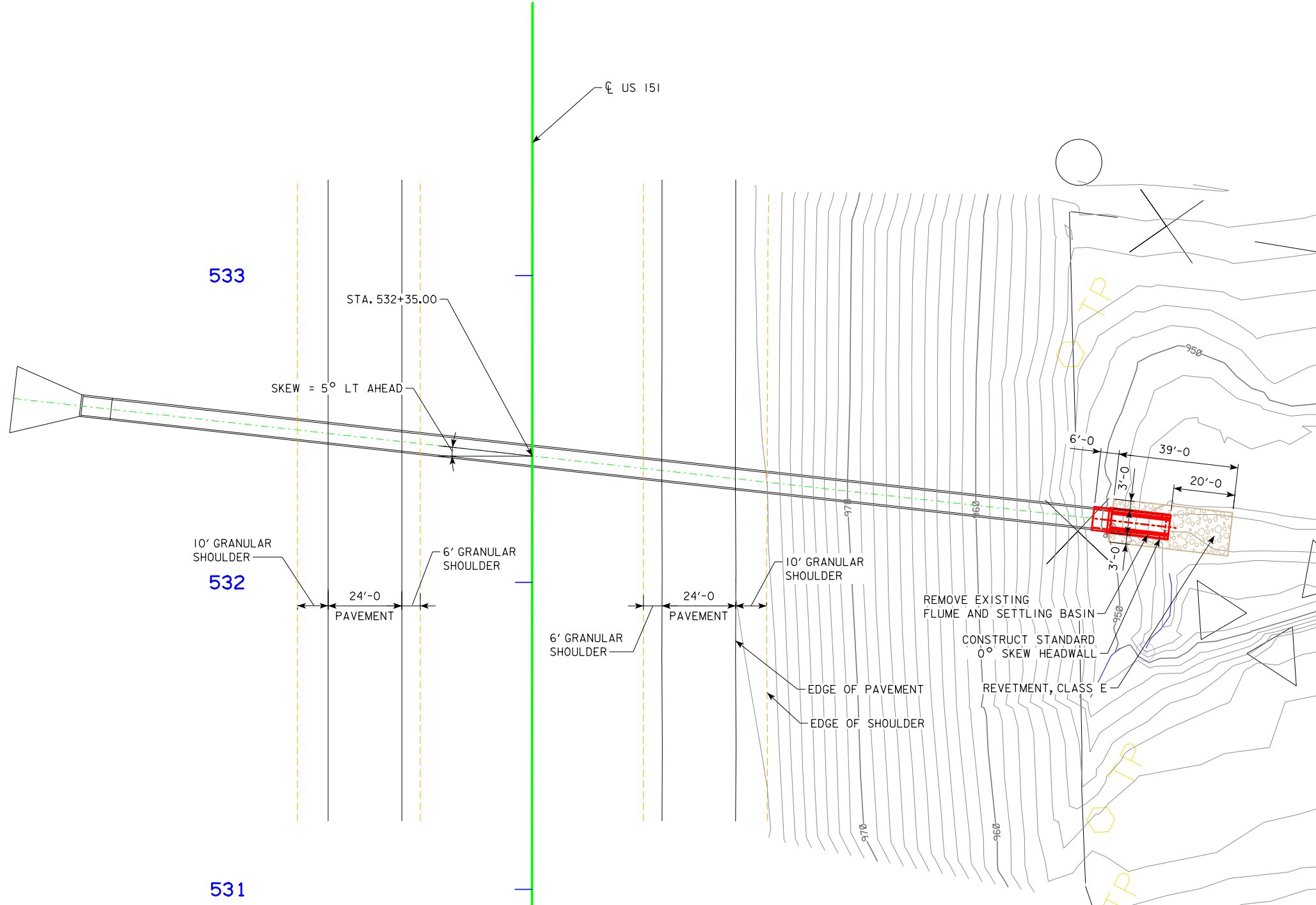
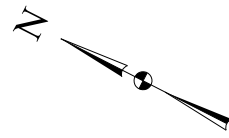
NOTE: THE ROADWAY WILL BE OPEN TO THRU TRAFFIC. REFER TO THE TRAFFIC CONTROL PLAN ON THE ROAD PLANS IN THESE PLANS.

DESIGN FOR 5° (L.A.) SKEW
6' X 6'
REINFORCED CONCRETE BOX CULVERT
GENERAL NOTES
STA. 532+35.00, @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 2 OF 6 FILE NO. 31561 DESIGN NO. 219



LONGITUDINAL SECTION ALONG CL CULVERT

BENCH MARK NO. F15749
 ELEV. 959.01
 STA. 533+47.89 R 2, 176.76' RT
 RR SPIKE IN POWER POLE WEST SIDE



SITUATION PLAN

TRAFFIC ESTIMATE:
 2013 AADT, 7,400 VPD
 2035 AADT, XX,XXX VPD
 17% TRUCKS
 DESIGN ESALs -----

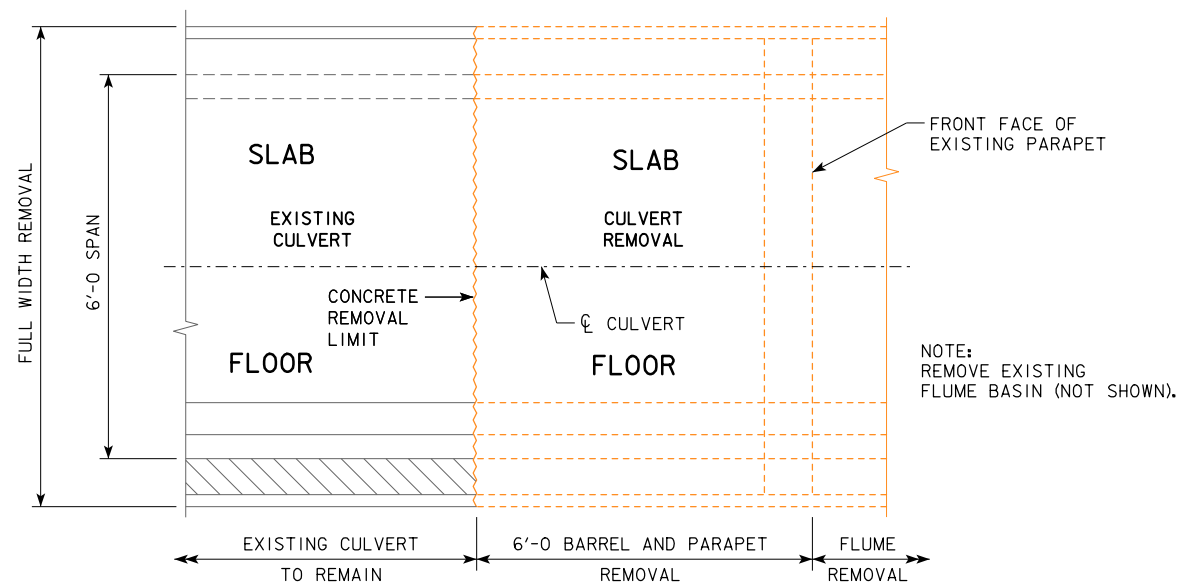
HYDRAULIC DATA
 DRAINAGE AREA = 457 ACRES HILLY
 Q₅₀ = 612 CFS

UTILITIES LEGEND:
 REFER TO SHEET D.I FOR UTILITY LEGEND

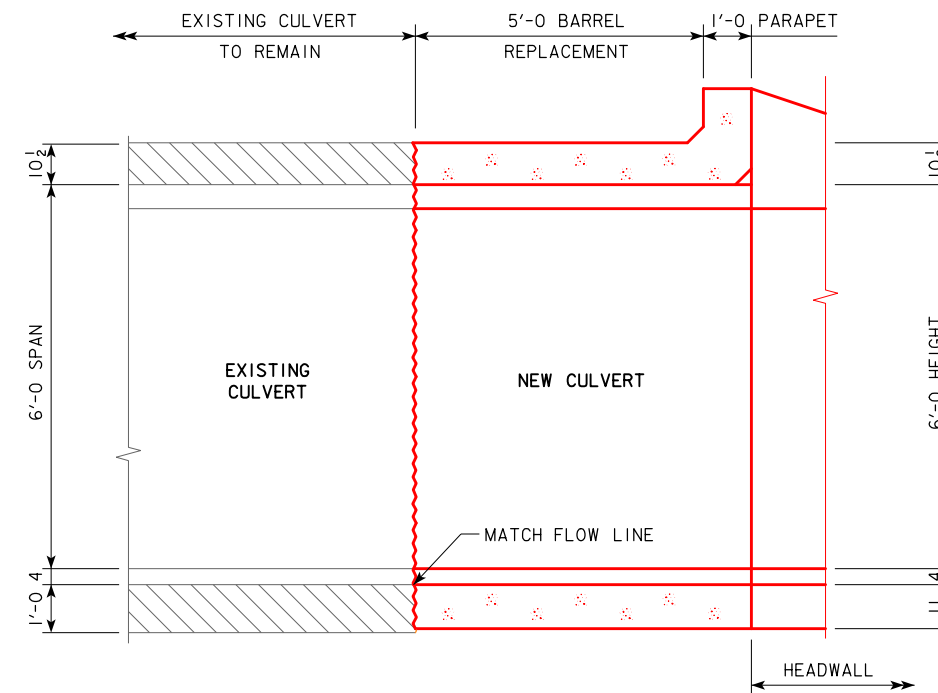
LOCATION

US 151
 T-87N R-1W
 SECTION 19
 PRAIRIE CREEK TOWNSHIP
 DUBUQUE COUNTY
 LATITUDE: 42.328942°
 LONGITUDE: -90.880525°

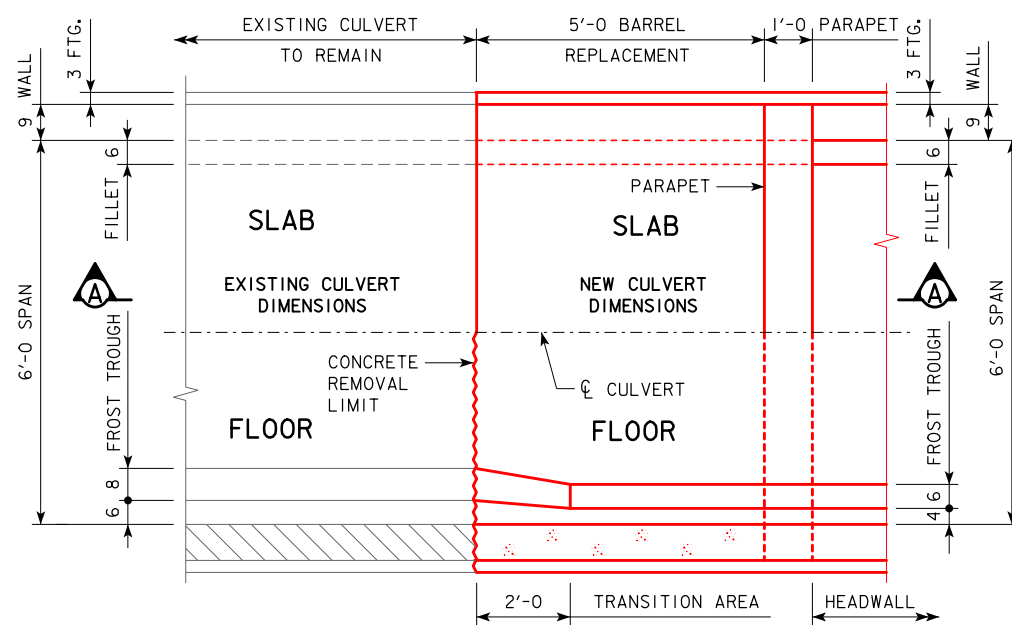
DESIGN FOR 5° (L.A.) SKEW
6' X 6'
REINFORCED CONCRETE BOX
CULVERT
SITUATION PLAN
 STA. 532+35.00, CL US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 3 OF 6 FILE NO. 31561 DESIGN NO. 219
 FEBRUARY, 2019



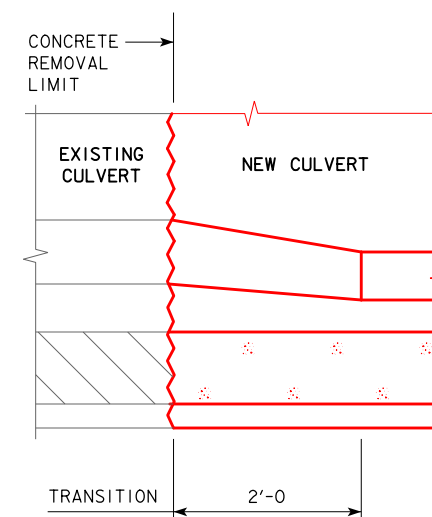
CONCRETE REMOVAL DETAILS
(PLAN VIEW, FLUME JUNCTION BELL JOINT NOT SHOWN)



SECTION A-A



CONCRETE TRANSITION DETAILS
(PLAN VIEW)



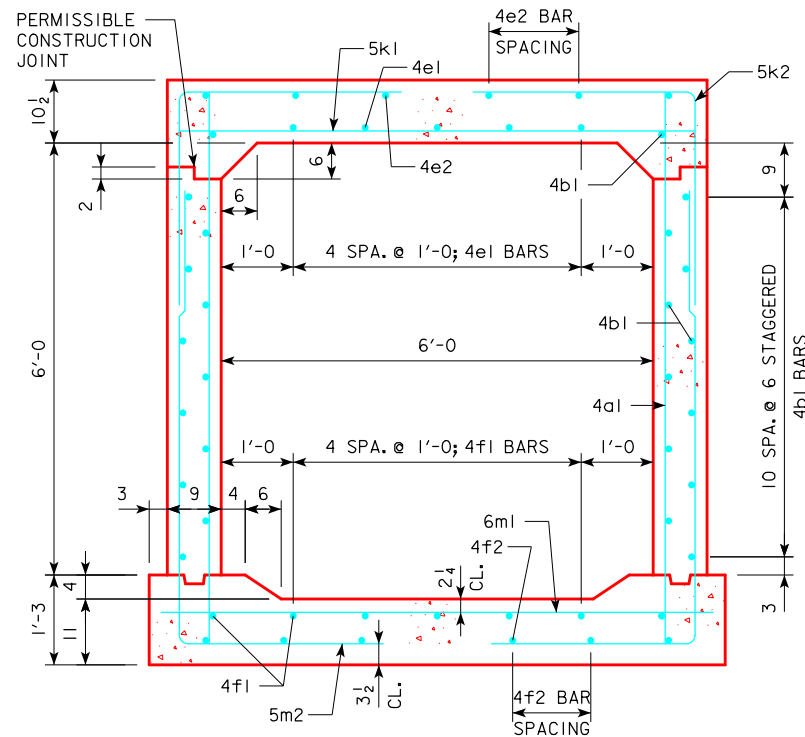
NEW BARREL CONCRETE THICKNESSES SHALL BE MAINTAINED MINIMALLY WHEN TRANSITIONING TO MEET EXISTING BARREL INTERIOR SURFACES. OUTSIDE CONCRETE SURFACES DO NOT HAVE TO BE TRANSITIONED TO MATCH EXISTING SURFACES.

CONCRETE TRANSITION DETAILS
(ONLY FROST TROUGH TRANSITION IS REQUIRED)

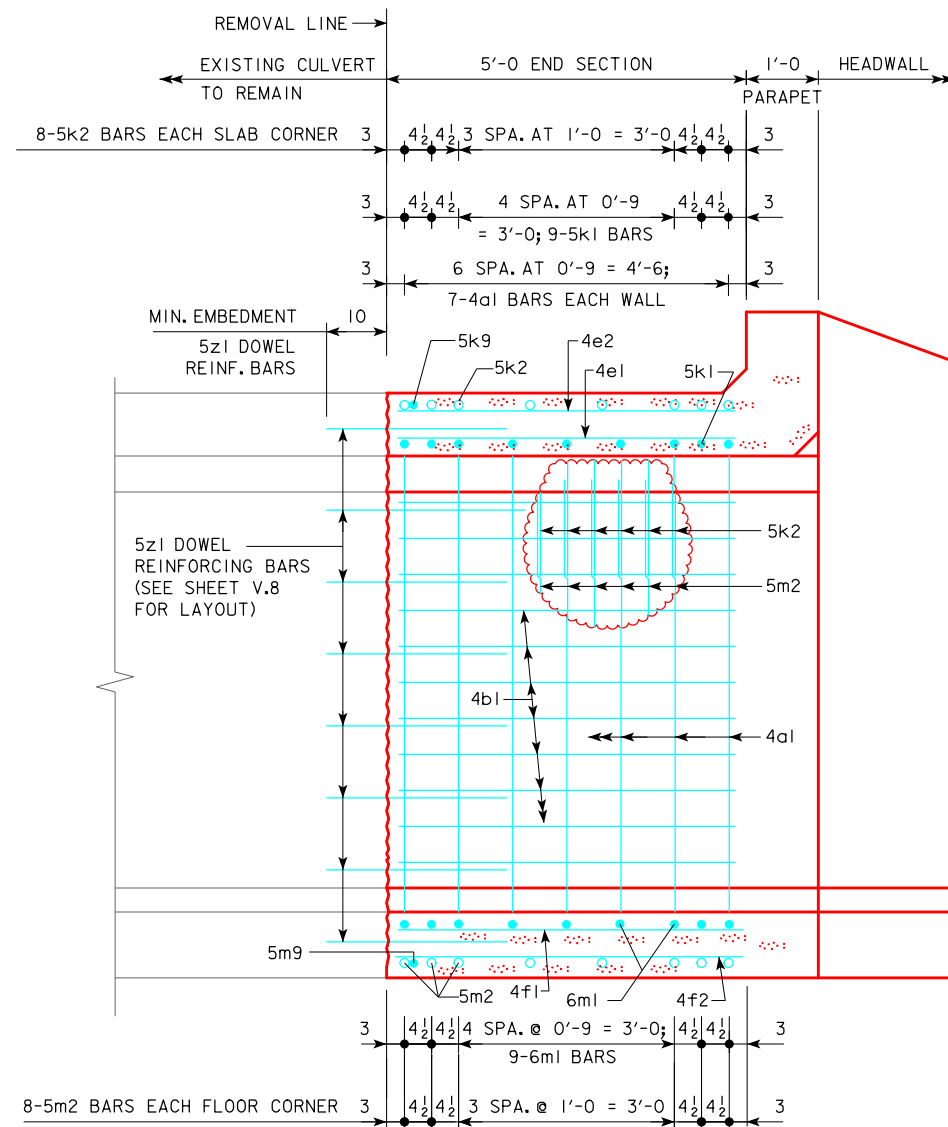
NOTE: REFER TO THE BRIDGE DESIGN MANUAL, SECTION 7 FOR CULVERT EXTENSION DETAILS FOR TRANSITION INFORMATION.

NOTE: DETAILS OF PARAPET AND HEADWALL ARE GIVEN IN THE IOWA DOT STANDARDS LISTED ON SHEET V.7.

DESIGN FOR 5° (L.A.) SKEW
6' X 6'
REINFORCED CONCRETE BOX
CULVERT
REMOVAL & TRANSITION DETAILS
 STA. 532+35.00, CL US 151
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 4 OF 6 FILE NO. 31561 DESIGN NO. 219

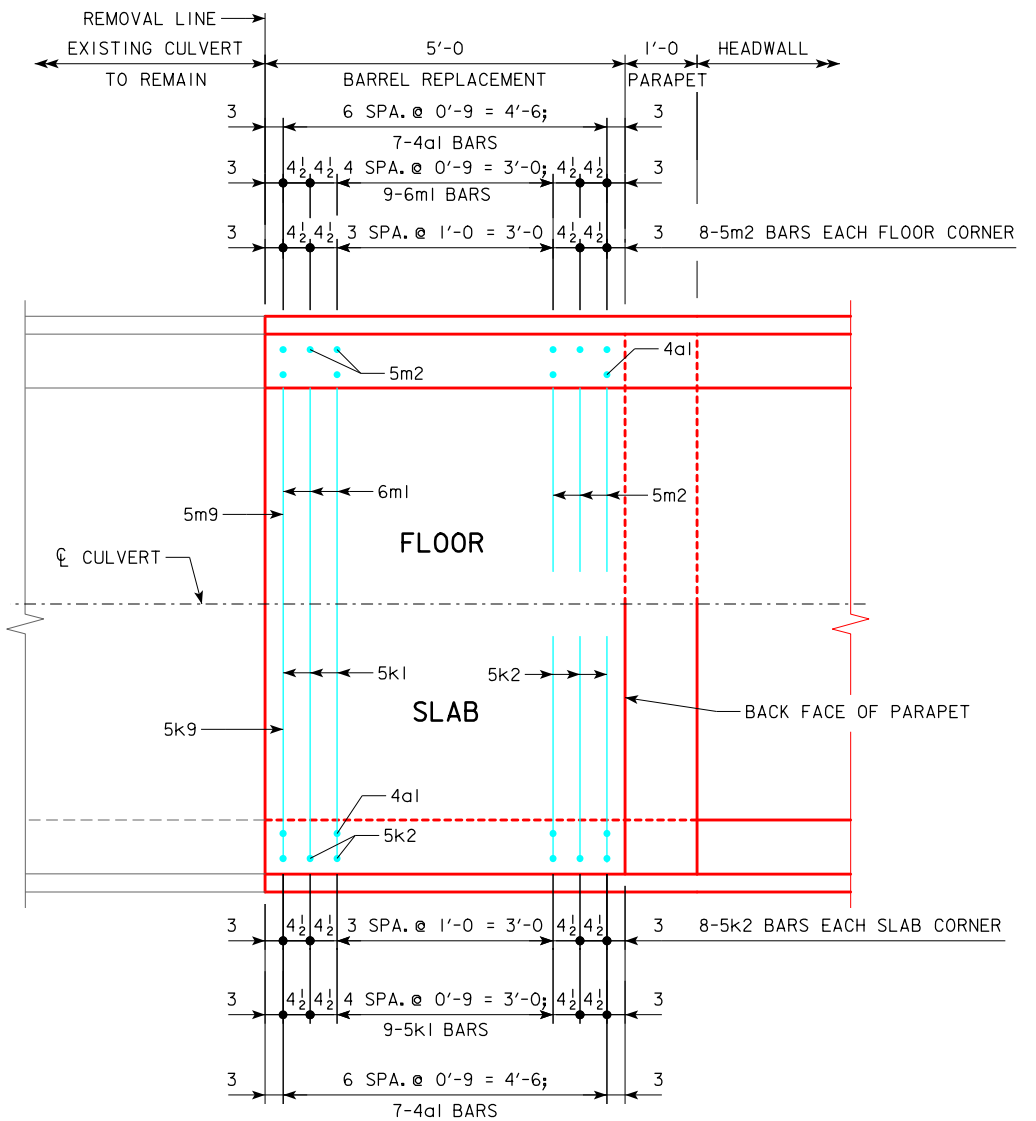


BARREL REPLACEMENT CROSS SECTION
(5z1 DOWEL BARS NOT SHOWN, SEE SHEET V.8 FOR LAYOUT.)



PART LONGITUDINAL SECTION
(ALONG ϕ OF CULVERT)

(PARAPET AND HEADWALL REINFORCING NOT SHOWN, SEE REFERENCED STANDARDS ON SHEET V.7)
NOTE: ALL LONGITUDINAL BARREL STEEL SHALL EXTEND AT LEAST TO THE BACKFACE OF PARAPET.



BARREL REPLACEMENT PART PLAN VIEW
(FROST TROUGH NOT SHOWN)

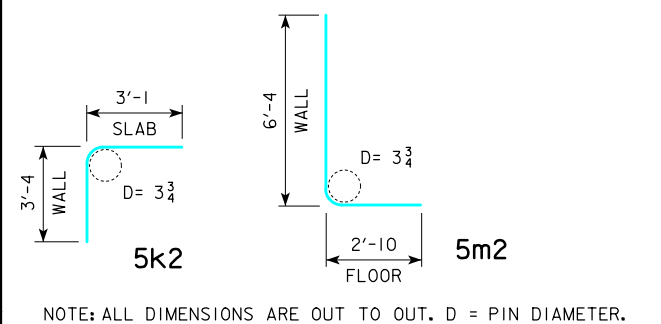
(5z1 DOWEL BARS NOT SHOWN, SEE SHEET V.8 FOR LAYOUT.)
(PARAPET AND HEADWALL REINFORCING NOT SHOWN, SEE REFERENCED STANDARDS ON SHEET V.7)

NOTE:
ALL TRANSVERSE REINFORCING BARS AND HORIZONTAL LEGS OF CORNER BARS SHALL BE PLACED PARALLEL TO THE CONCRETE REMOVAL LINE AND NEW PARAPET.
DIMENSIONS SHOWN FOR ϕ - ϕ OF TRANSVERSE BARS, VERTICAL WALL BARS, AND CORNER BARS ARE MEASURED ALONG ϕ CULVERT.
CONCRETE PER FOOT OF BARREL:
SLAB = 0.276 CU. YDS.
WALLS = 0.310 CU. YDS.
FLOOR = 0.311 CU. YDS.
TOTAL = 0.897 CU. YDS./FT.

REINFORCING BAR LIST - BARREL REPLACEMENT

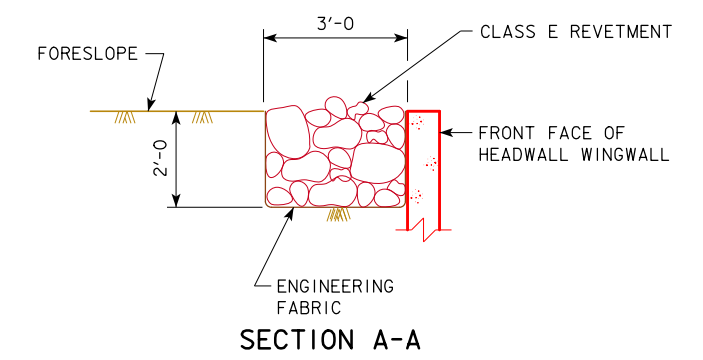
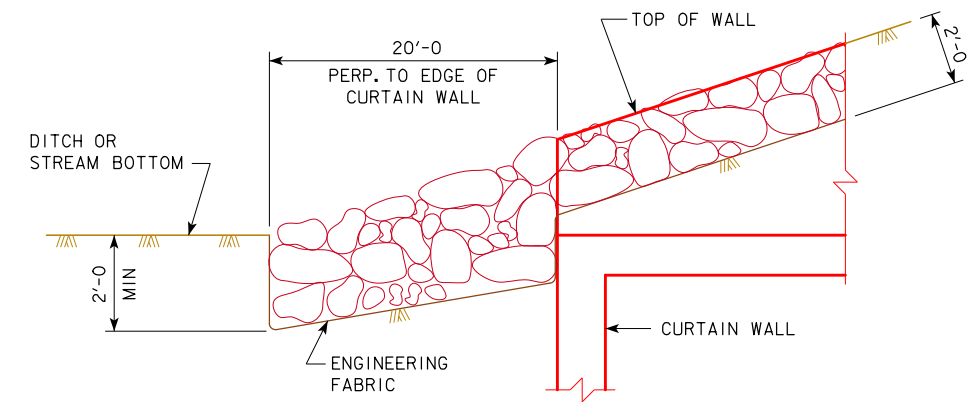
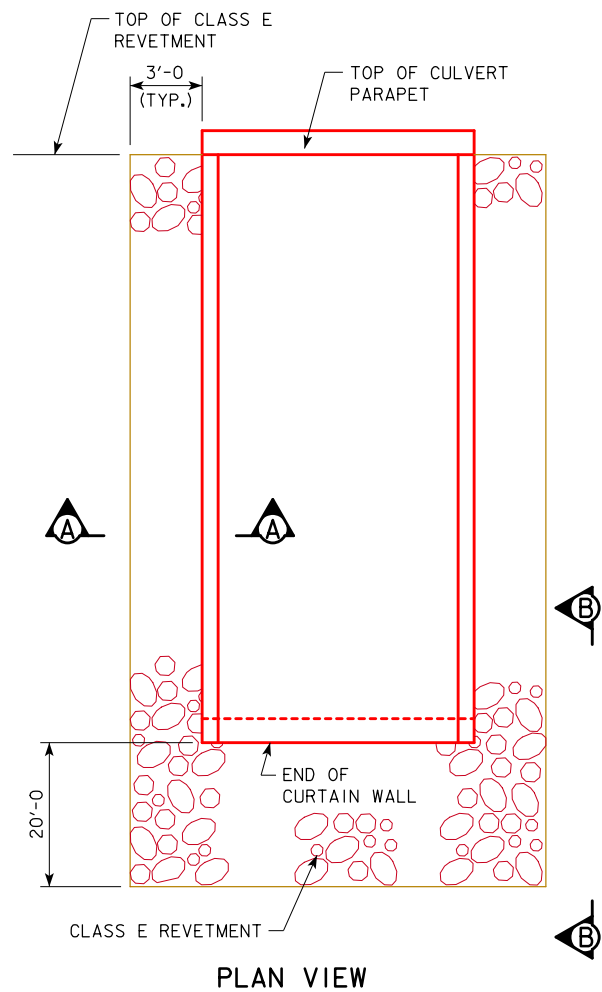
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
4a1	WALLS, F.F.V.	—	14	7'-8	72
4b1	WALLS, F.F.H. & B.F.H.	—	24	4'-10	78
4e1	SLAB, BOTT. LONGIT.	—	5	4'-10	16
4e2	SLAB, TOP LONGIT.	—	6	4'-10	19
4f1	FLOOR, TOP LONGIT.	—	7	4'-10	23
4f2	FLOOR, BOTT. LONGIT.	—	6	4'-10	19
5k1	SLAB, BOTT. TRANSV.	—	9	7'-2	67
5k2	SLAB, TOP CORNER	—	16	6'-5	107
5k9	SLAB, TOP TRANSV.	—	1	7'-2	7
6m1	FLOOR, TOP TRANSV.	—	9	7'-8	104
5m2	FLOOR, BOTT. CORNER	—	16	9'-2	153
5m9	FLOOR, BOTT. TRANSV.	—	1	7'-8	8
5z1	DOWEL REINFORCING BARS	—	26	2'-6	68
REINFORCING STEEL - TOTAL (LBS.)					741

BENT BAR DETAILS

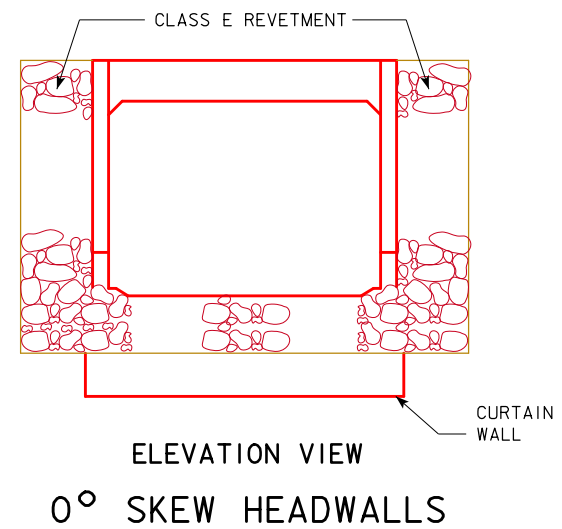


NOTE:
BARREL REPLACEMENT WALLS AND FLOOR THICKNESSES DETAILED TO MATCH HEADWALL STANDARDS.
BARREL REPLACEMENT SLAB THICKNESS DETAILED TO MATCH EXISTING PLANS. BARREL REPLACEMENT REINFORCING DETAILED TO MATCH BARREL STANDARDS FOR 4-7 FEET OF FILL.

DESIGN FOR 5° (L.A.) SKEW
6' X 6'
REINFORCED CONCRETE BOX
CULVERT
CULVERT BARREL REPLACEMENT DETAILS
STA. 532+35.00, ϕ US 151
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 5 OF 6 FILE NO. 31561 DESIGN NO. 219



TYPICAL DETAILS



CONSTRUCTION NOTES:

CLASS E REVETMENT SHALL BE USED AND PLACED ACCORDING TO ARTICLE 2507.03, OF THE STANDARD SPECIFICATIONS.
THE ENGINEERING FABRIC SHALL MEET THE MATERIAL REQUIREMENTS IN ACCORDANCE WITH ARTICLE 4196.01, B, 3, OF THE STANDARD SPECIFICATIONS.

DESIGN FOR 5° (L.A.) SKEW
6' X 6'
REINFORCED CONCRETE BOX
CULVERT
REVTMENT PROTECTION DETAILS
STA. 532+35.00, CL US 151
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 6 OF 6 FILE NO. 31561 DESIGN NO. 219
FEBRUARY, 2019

ESTIMATED CAST IN PLACE CULVERT QUANTITIES - DESIGN #319

ITEM NO.	ITEM CODE	ITEM	UNIT	TOTAL	AS BUILT QUAN.
1	2401-6750001	REMOVALS, AS PER PLAN	LS	1.00	
2	2402-2720000	EXCAVATION, CLASS 20	CY	417	
3	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT)	CY	72.5	
4	2404-7775000	REINFORCING STEEL	LB	12,361	
5	2533-4980005	MOBILIZATION	LS	1.00	

ESTIMATE REFERENCE INFORMATION - DESIGN #319

ITEM NO.	ITEM CODE	DESCRIPTION
1	2401-6750001	REMOVALS, AS PER PLAN INCLUDES ALL WORK FOR REMOVAL AND OFF-SITE DISPOSAL OF THE EXISTING FLUME, FLUME BASIN, AND FLUME BELL JOINTS AT THE SOUTH END OF THE EXISTING CULVERT. REMOVAL OF SCHEDULED ITEMS SHALL BE IN ACCORDANCE WITH SECTION 2401, OF THE STANDARD SPECIFICATIONS. ANY DAMAGE TO MATERIAL NOT TO BE REMOVED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND REPAIRED AT NO EXTRA COST TO THE STATE.
2	2402-2720000	EXCAVATION, CLASS 20 THE METHOD OF MEASUREMENT SHALL BE IN ACCORDANCE WITH ARTICLE 2402.04, B, 4. THE EXCAVATION QUANTITY IS MEASURED FROM THE EXISTING GROUND SURFACE. INCLUDES FILLING AND COMPACTING LOW AREAS AROUND PROPOSED CULVERT.
3	2403-0100020	STRUCTURAL CONCRETE (RCB CULVERT) INCLUDES ALL RESILIENT JOINT FILLER REQUIRED.
4	2404-7775000	REINFORCING STEEL --
5	2533-4980005	MOBILIZATION --

SPECIFICATIONS:

DESIGN:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010.

CONSTRUCTION:
IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, CURRENT SERIES, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DEVELOPMENTAL SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH ED., SERIES OF 2010:
REINFORCING STEEL IN ACCORDANCE WITH AASHTO LRFD SECTION 5, GRADE 60.
CONCRETE IN ACCORDANCE WITH AASHTO LRFD SECTION 5, $f'c = 4.0$ KSI.

STANDARDS: FOR DETAILS AND NOTES NOT SHOWN REFER TO THE FOLLOWING IOWA D.O.T. - HIGHWAY STANDARDS:		
STANDARD	ISSUED	REVISED

SUMMARY OF REINFORCING STEEL

LOCATION	QUANTITY	TOTAL
FLUME JUNCTION BELL	1	456
FLUME	1	8315
FLUME CHUTE BELL	2 AT 389	778
FLUME BASIN	1	2812
TOTAL (LB)		12,361

CONCRETE PLACEMENT QUANTITIES

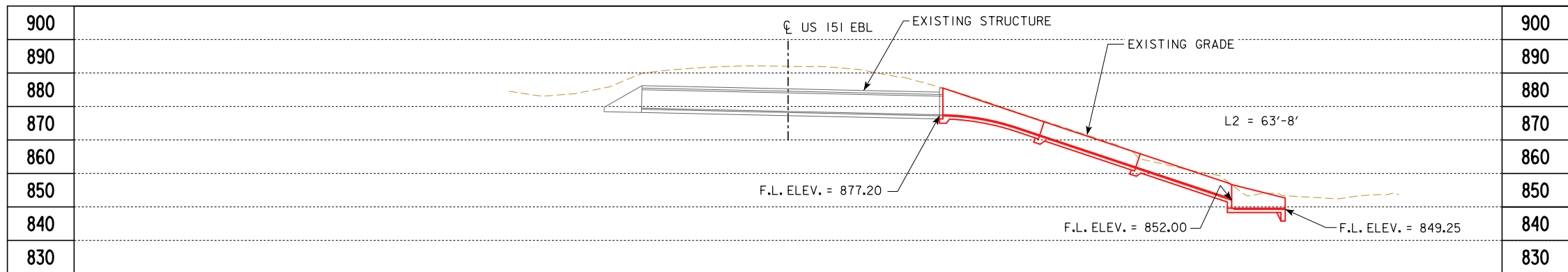
LOCATION	FOOTING	WALLS	TOTAL
FLUME JUNCTION BELL	1.4	1.2	2.6
FLUME	28.6	22.6	51.2
FLUME CHUTE BELL	2 AT 1.3	2 AT 0.8	4.2
FLUME BASIN	9.8	4.7	14.5
TOTAL (CY)		42.4	72.5

NOTE:
ROADWAY QUANTITIES SHOWN
ELSEWHERE IN THESE PLANS.

**DESIGN HISTORY
AT THIS SITE**

DES. NO.	TYPE OF WORK
5268	ORIGINAL DESIGN
319	FLUME REPLACEMENT

DESIGN FOR 30° (R.A.) SKEW
6' X 6'
REINFORCED CONCRETE FLUME
ESTIMATED QTY/EST. REFERENCE
STA. 1104+20.00 @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 1 OF 6 FILE NO. 31561 DESIGN NO. 319



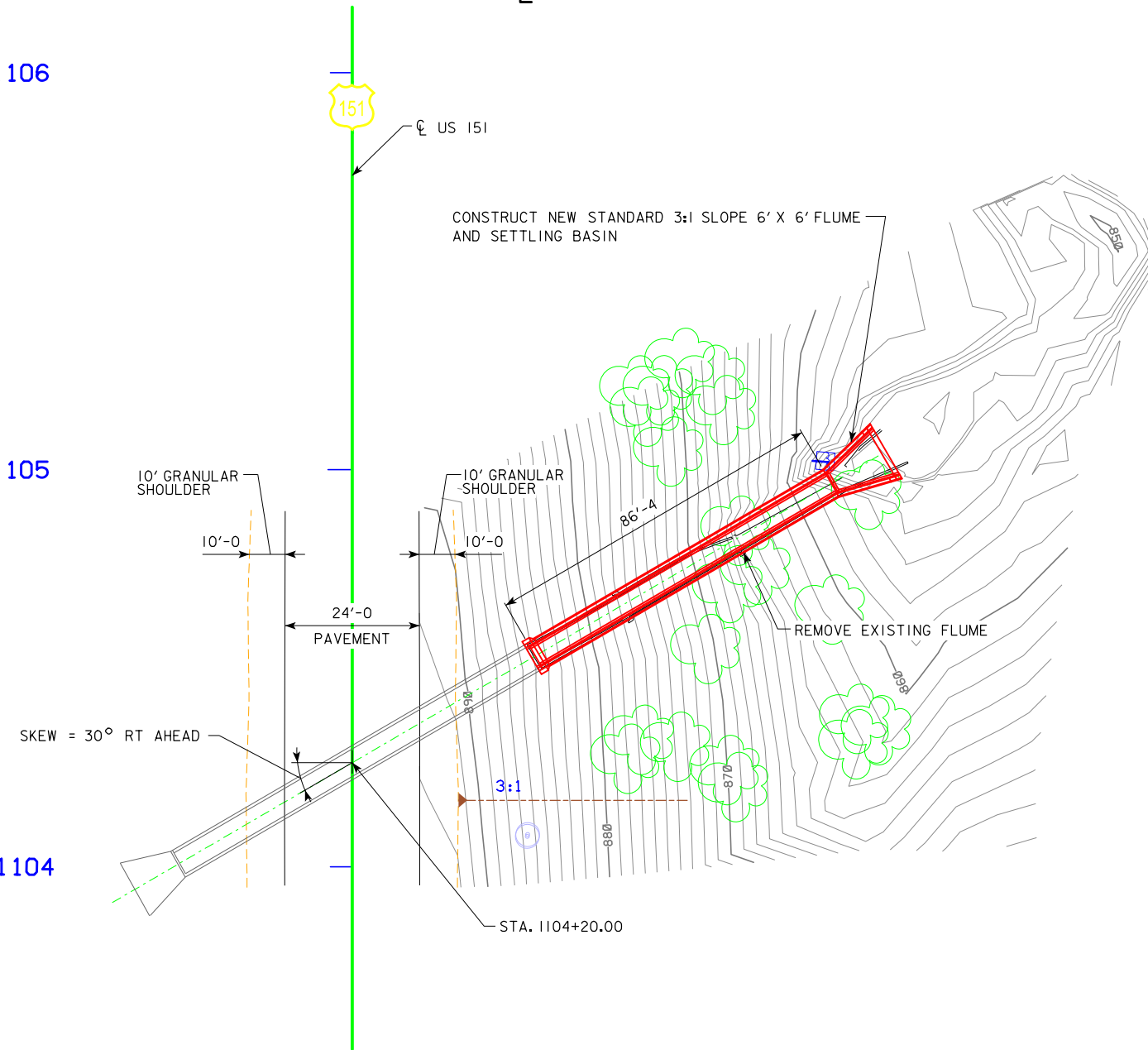
LONGITUDINAL SECTION ALONG ϕ CULVERT

BENCH MARK NO. C30205
 ELEV. 855.78
 STA. 1111+04.77, 170.75' RT
 RR SPIKE IN POWER POLE

1106

1105

1104



SITUATION PLAN

TRAFFIC ESTIMATE:

2013 AADT, 5,800 VPD
 2035 AADT, XX,XXX VPD
 21% TRUCKS
 DESIGN ESALS -----

HYDRAULIC DATA

DRAINAGE AREA = 178 ACRES VERY HILLY
 $Q_{50} = 336.3$ CFS

UTILITIES LEGEND:

REFER TO SHEET D.1 FOR UTILITY LEGEND

LOCATION

US 151
 T-88N R-2E
 SECTION 22
 TABLE MOUND TOWNSHIP
 DUBUQUE COUNTY
 LATITUDE: 42.417931°
 LONGITUDE: -90.711036°

DESIGN FOR 30° (R.A.) SKEW
6' X 6'
REINFORCED CONCRETE FLUME
SITUATION PLAN
 STA. 1104+20.00 ϕ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 3 OF 6 FILE NO. 31561 DESIGN NO. 319

REINFORCING BAR LIST - FLUME

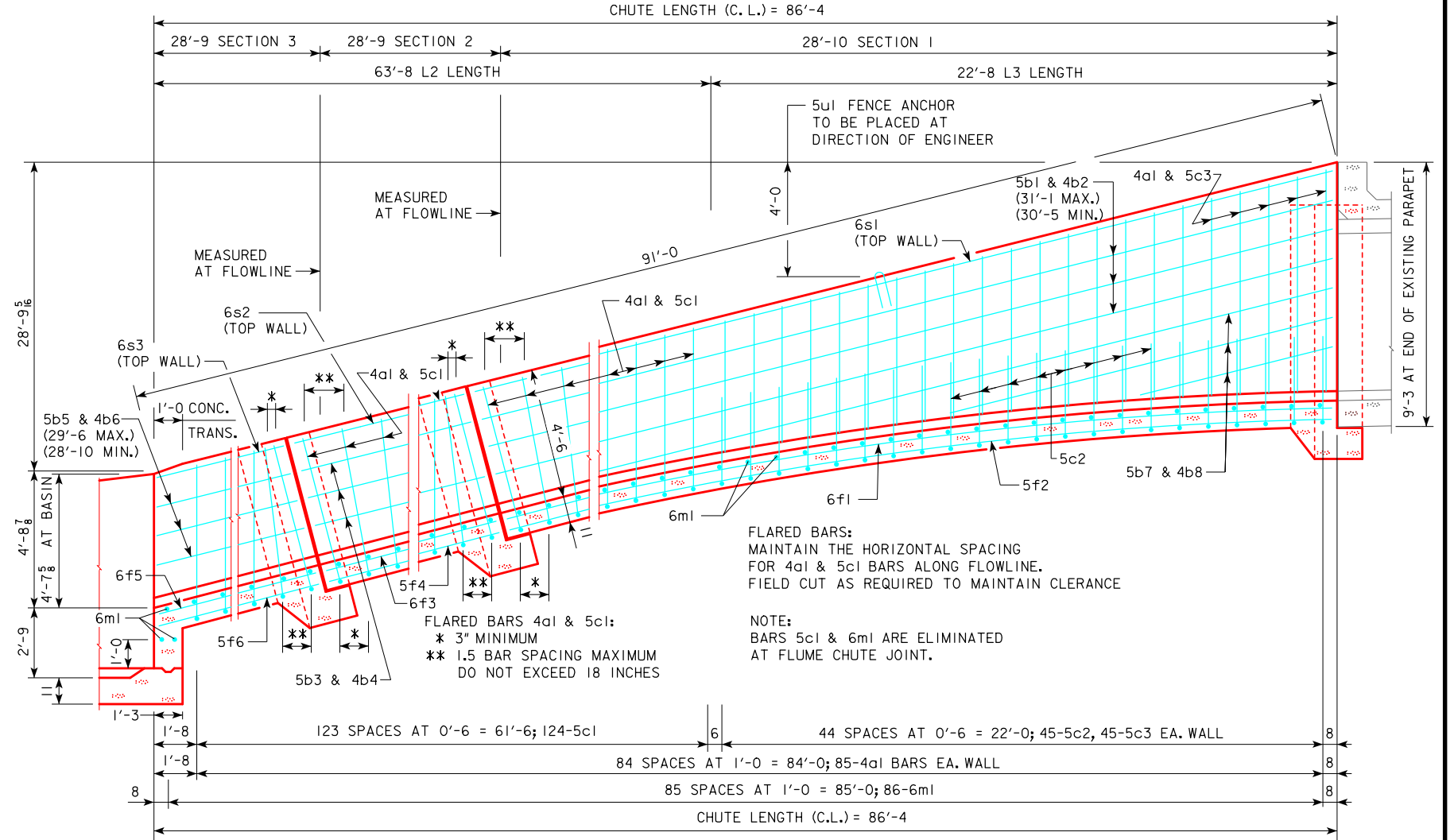
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
4a1	WALLS FFV		170	LISTED	639
5b1	WALLS FFH - SECTION 1		6	VARIABLES	192
4b2	WALLS BFH - SECTION 1		6	VARIABLES	123
5b3	WALLS FFH - SECTION 2		6	30'-0"	188
4b4	WALLS BFH - SECTION 2		6	30'-0"	120
5b5	WALLS FFH - SECTION 3		6	VARIABLES	183
4b6	WALLS BFH - SECTION 3		6	VARIABLES	117
5b7	WALLS FFH - SECTION 1		6	LISTED	65
4b8	WALLS BFH - SECTION 1		6	LISTED	42
5c1	BOTT. FLOOR & WALLS BFV		124	17'-6"	2263
5c2	BOTT. FLOOR & WALLS BFV		45	13'-6"	634
5c3	WALLS BFV		90	LISTED	602
6f1	FLOOR LONGIT. TOP - SECTION 1		7	29'-2"	307
5f2	FLOOR LONGIT. BOT. - SECTION 1		7	29'-1"	212
6f3	FLOOR LONGIT. TOP - SECTION 2		7	30'-0"	315
5f4	FLOOR LONGIT. BOT. - SECTION 2		7	30'-0"	219
6f5	FLOOR LONGIT. TOP - SECTION 3		7	30'-0"	315
5f6	FLOOR LONGIT. BOT. - SECTION 3		7	30'-2"	220
6m1	FLOOR TRANSV. TOP		88	7'-8"	1013
6s1	WALLS BOTH F ALONG SLOPE - SECTION 1		4	31'-5"	189
6s2	WALLS BOTH F ALONG SLOPE - SECTION 2		4	30'-0"	180
6s3	WALLS BOTH F ALONG SLOPE - SECTION 3		4	28'-6"	171
5u1	FENCE ANCHORS (GALVANIZED)		2	2'-10"	6
TOTAL (LBS.)					8315

FLUME DATA

$\Delta A = 18^{\circ}26'$
 $\Delta C = 1^{\circ}00'$
 $B = 11'-10\frac{1}{8}"$
 $SL = 91'-0"$
 $V = 4'-8\frac{7}{8}"$
 $W = 28'-9\frac{5}{16}"$
 $M = 4'-6"$
 $T = 0'-11"$
 $H = 6'-0"$

CURVE DATA

$C.L. = 86'-4"$
 $L2 = 63'-8"$
 $L3 = 22'-8"$
 $D = 11'-4\frac{3}{8}"$
 $E = 11'-3\frac{5}{8}"$
 $P.C. ELEV. = 877.19$
 $P.I. ELEV. = 876.99$
 $P.P. ELEV. = 876.79$
 $P.T. ELEV. = 873.22$
 $X1 = 3'-6\frac{1}{8}"$
 $X2 = 2'-0\frac{1}{8}"$
 $X3 = 0'-10\frac{1}{16}"$
 $X4 = 0'-2\frac{1}{16}"$
 $L3/4 = 5'-8"$



LISTED BARS

BAR 4a1
 85 BARS EACH WALL
 84 SPACES AT 1'-0" EACH WALL
 LENGTH VARIES - 2 EA. LGTH. (ONE LGTH. EA. WALL)
 8'-7" MAX, 5'-2" MIN - L3 LENGTH (46 BARS TOTAL)
 5'-2" - L2 LENGTH (124 BARS TOTAL)

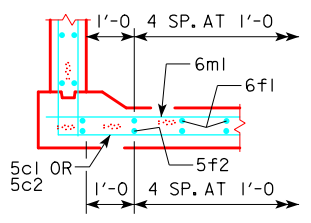
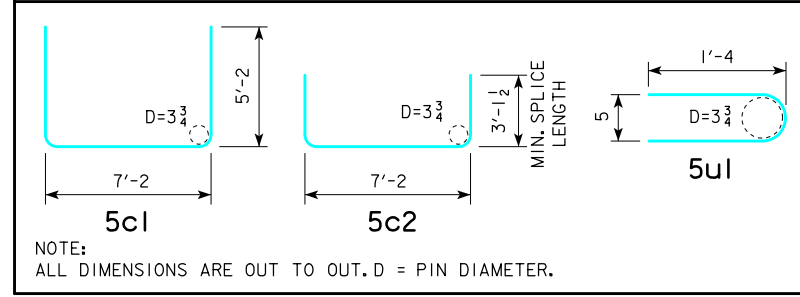
BAR 5b7 AND 4b8
 6 BARS - 2 EA. LGTH.
 (17'-4, 9'-5, 4'-5)

BAR 5c3
 45 BARS EACH WALL
 44 SPACES AT 0'-6" EACH WALL
 LENGTH VARIES - 2 EA. LGTH. (ONE LGTH. EA. WALL)
 7'-8" MAX, 5'-2" MIN - L3 LENGTH (90 BARS TOTAL)

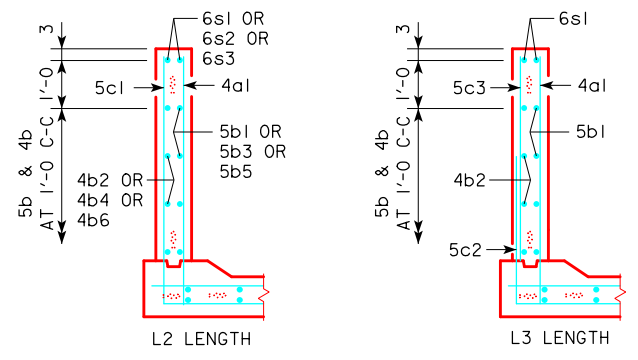
TABLE OF FLUME DIMENSIONS

K	M	V	L	N	O	P	R	T	U
14'-0"	4'-6"	4'-8 $\frac{7}{8}"$	16'-0"	2'-9"	3'-5"	3'-6"	1'-3"	0'-11"	0'-9"

BENT BAR DETAILS



FLUME FLOOR HALF SECTION (NORMAL TO FLOWLINE)

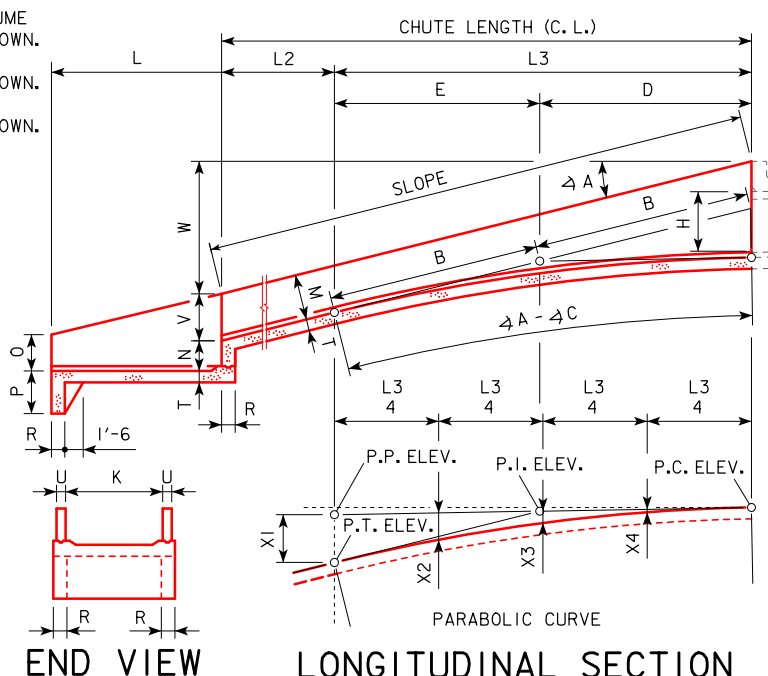


FLUME WALL SECTION (NORMAL TO FLOWLINE)

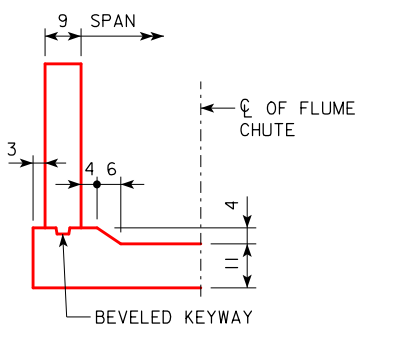
NOTES:

- SEE SHEETS V.13 AND V.14 FOR FLUME INFORMATION AND DETAILS NOT SHOWN.
- SEE SHEET V.17 FOR BELL JOINT INFORMATION AND DETAILS NOT SHOWN.
- SEE SHEET V.18 FLUME BASIN INFORMATION AND DETAILS NOT SHOWN.
- FLUME DETAILS ARE BASED ON A 1 $^{\circ}00'$ ANGLE 'C.'

FLUME CHUTE - LONGITUDINAL SECTION



LONGITUDINAL SECTION WITH BOX CULVERT



FLUME CHUTE DETAILS (NORMAL TO FLOWLINE)

DESIGN FOR 30 $^{\circ}$ (R.A.) SKEW

6' X 6'

REINFORCED CONCRETE FLUME

FLUME DETAILS

STA. 1104+20.00 CL US 151

FEBRUARY, 2019

DUBUQUE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 4 OF 6 FILE NO. 31561 DESIGN NO. 319

ESTIMATE OF QUANTITIES - FLUME BELL JOINTS

ONE JUNCTION BELL JOINT

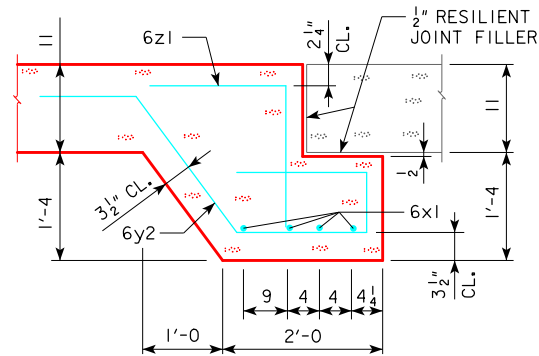
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6x1	WALLS & FLOOR		4	17'-8"	106
6x3	WALLS VERT.		8	6'-4"	76
6y1	WALLS HORIZ.		16	6'-2"	148
6y2	FLOOR VERT.		8	7'-3"	87
6z1	FLOOR VERT.		8	3'-3"	39
TOTAL WEIGHT (LBS.)					456

CONCRETE (CY)	FOOTING	
	WALLS	1.4
	TOTAL	1.2
TOTAL		2.6

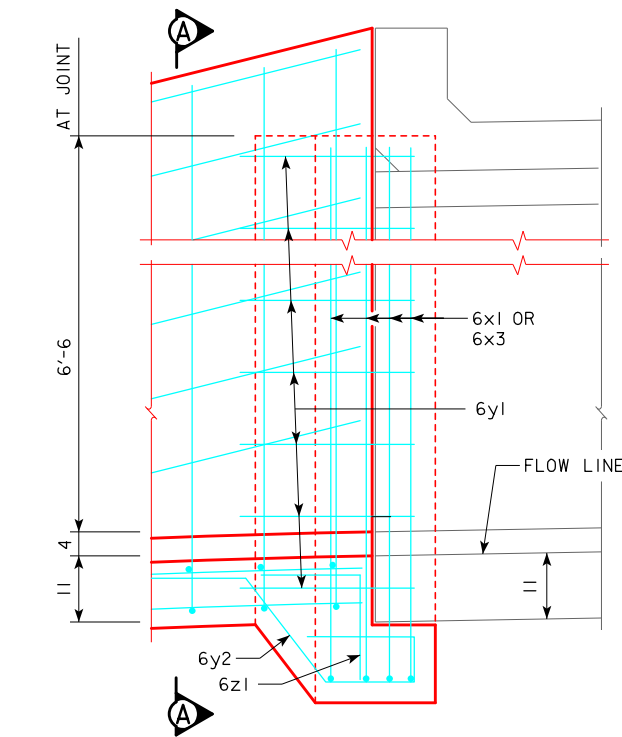
ONE CHUTE BELL JOINT

BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
6x2	WALLS & FLOOR		4	17'-6"	105
6x4	WALLS VERT.		8	4'-0"	48
6y3	WALLS HORIZ.		12	6'-2"	111
6y4	FLOOR VERT.		8	7'-2"	86
6z1	FLOOR VERT.		8	3'-3"	39
TOTAL WEIGHT (LBS.)					389

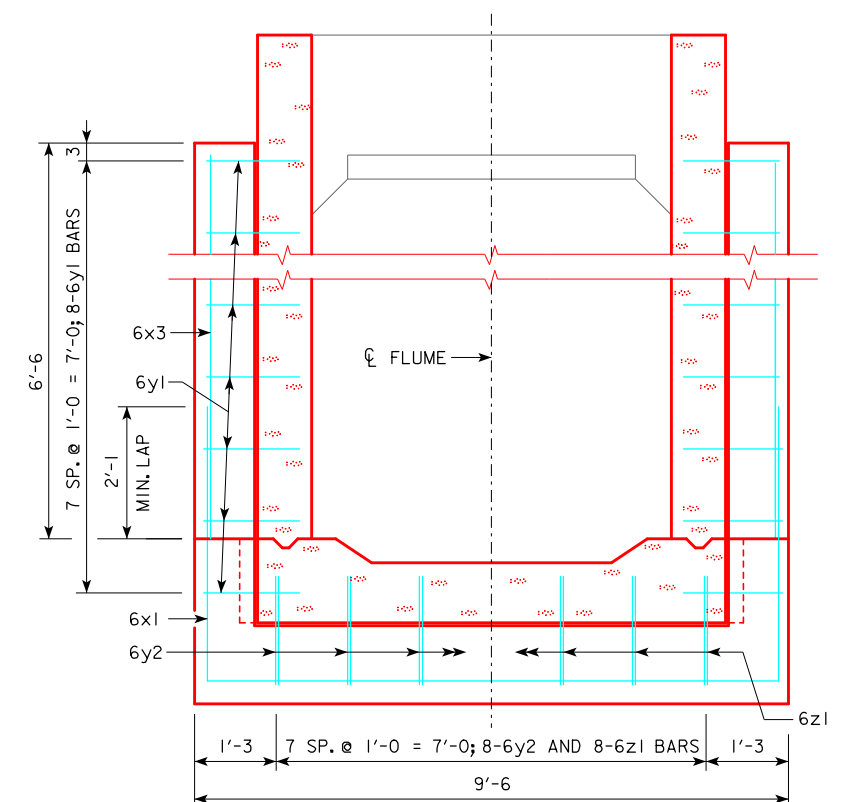
CONCRETE (CY)	FOOTING	
	WALLS	1.3
	TOTAL	0.8
TOTAL		2.1



JUNCTION FOOTING

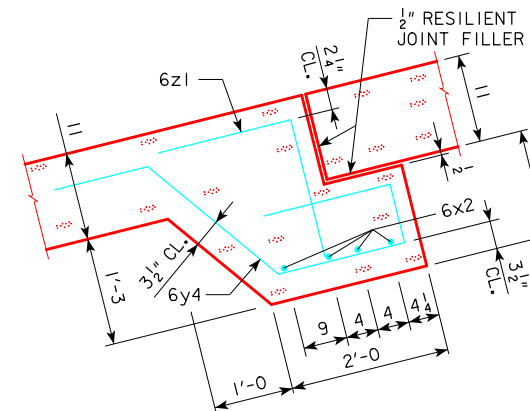
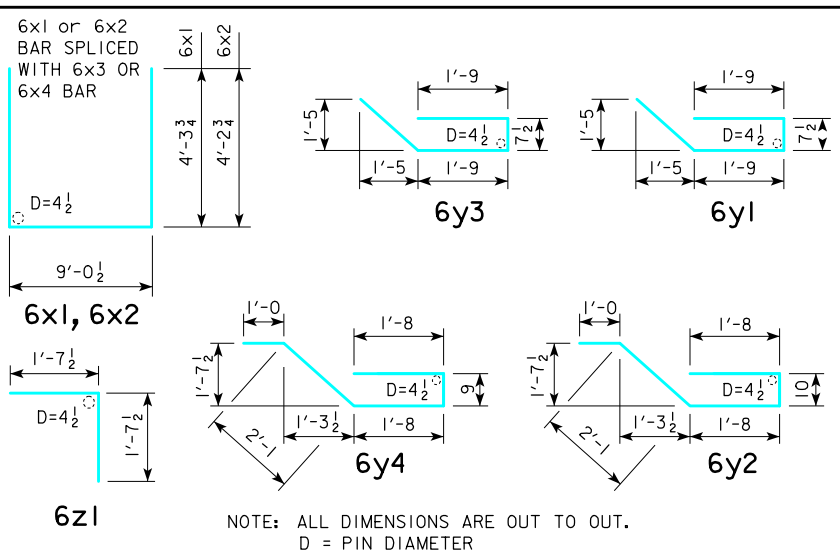


PART ELEV. - JUNCTION BELL JT.

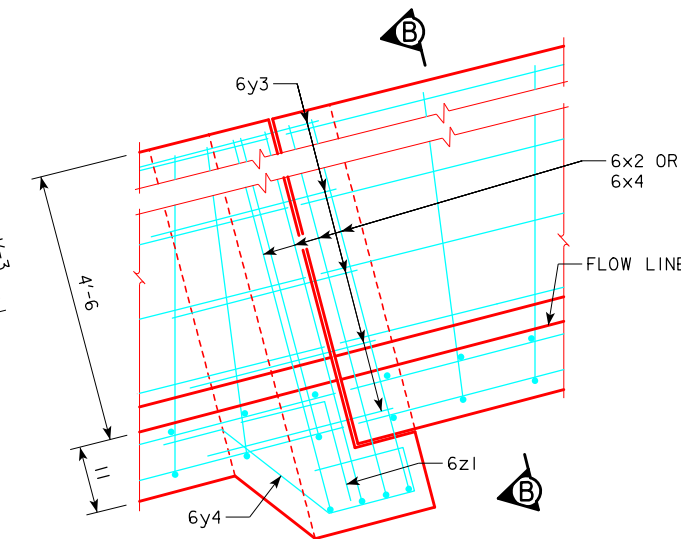


SECTION A-A

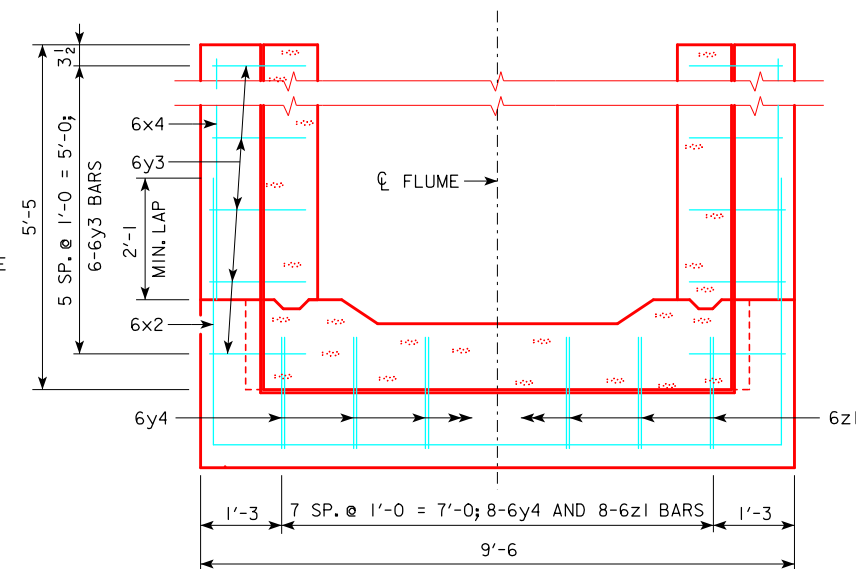
BENT BAR DETAILS



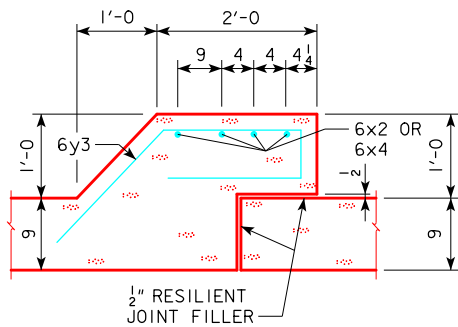
CHUTE FOOTING



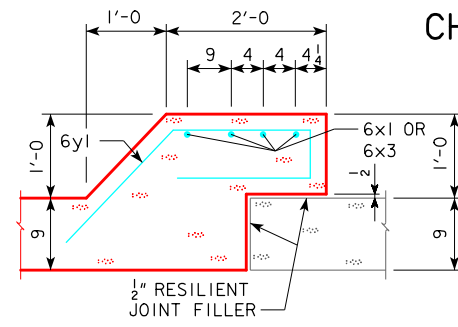
PART ELEVATION - CHUTE BELL JT.



SECTION B-B



CHUTE WALLS

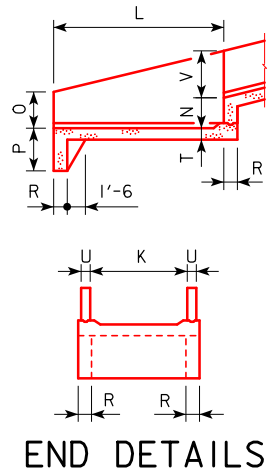


JUNCTION WALLS

NOTES:

- FLOOR BARS 6m1 ARE TO BE SHORTENED 6" AT BELL JOINTS.
- SEE SHEETS V.13 AND V.14 FOR GENERAL INFORMATION.

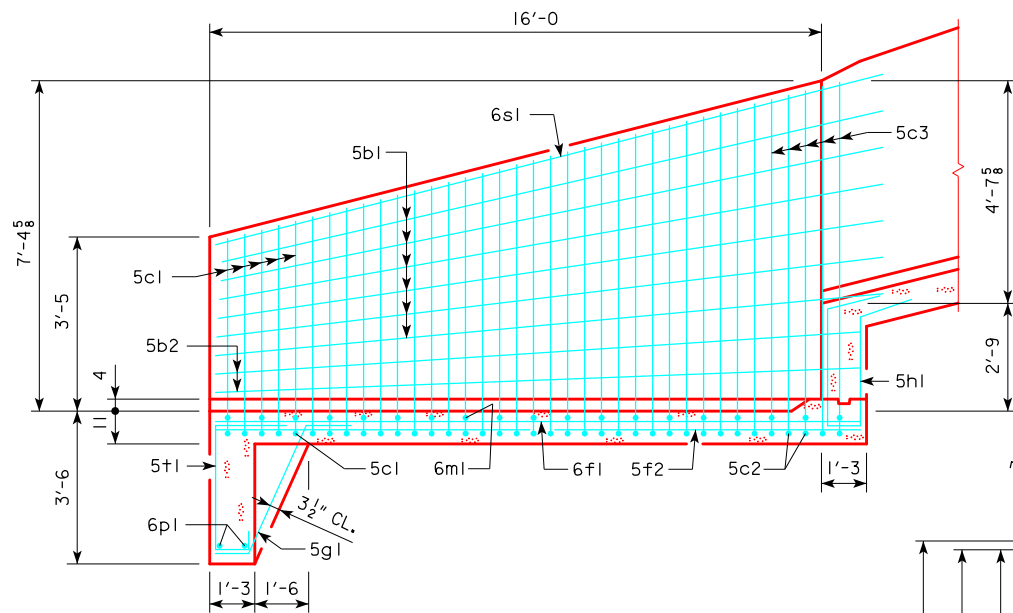
DESIGN FOR 30° (R.A.) SKEW
6' X 6'
REINFORCED CONCRETE FLUME
FLUME BELL JOINT DETAILS
 STA. 1104+20.00 @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 5 OF 6 FILE NO. 31561 DESIGN NO. 319



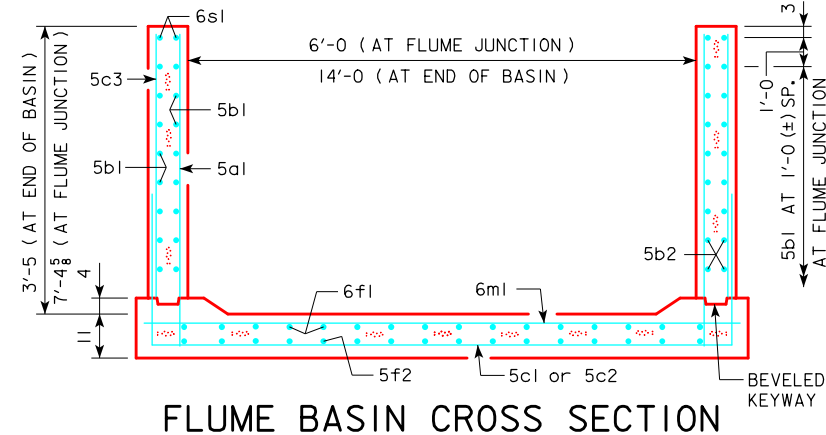
FLUME BASIN NOTES:

1. SEE SHEETS V.13 AND V.14 FOR GENERAL INFORMATION.
2. 5c2 & 5c3 BARS ARE LAPPED.

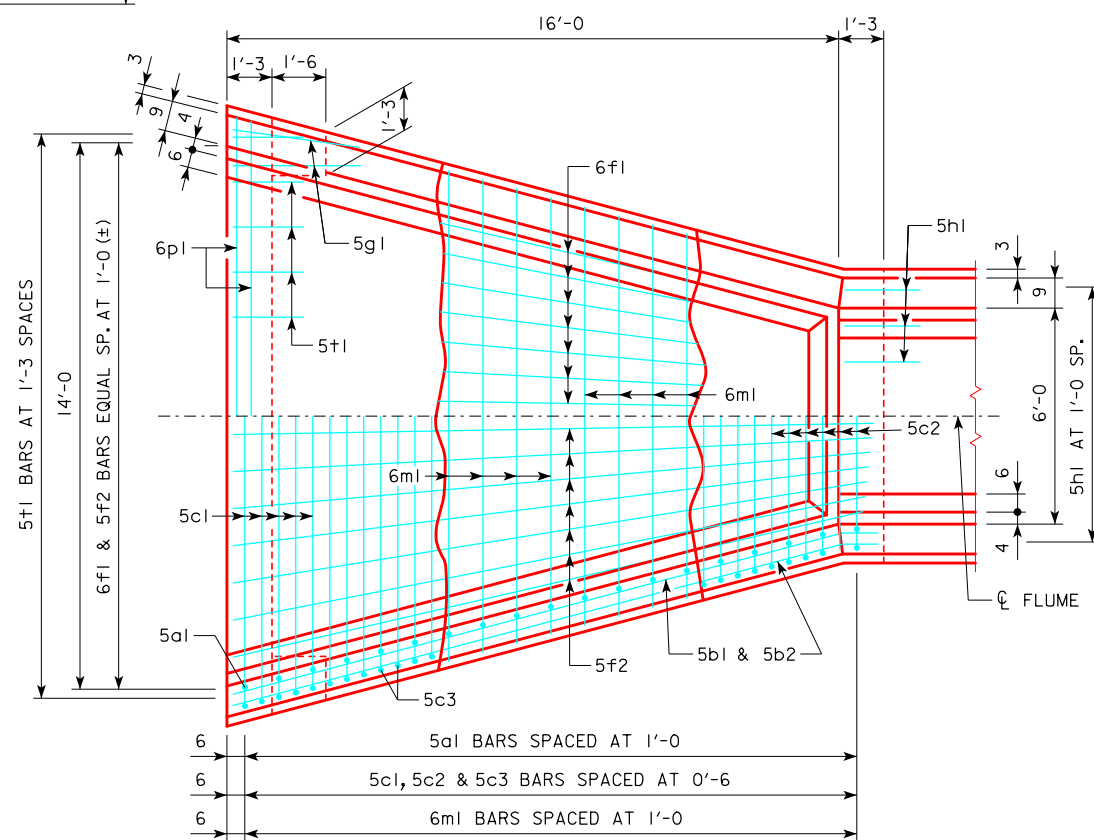
ESTIMATE OF QUANTITIES - FLUME BASIN					
BILL OF REINFORCING STEEL					
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT
5a1	WALLS - VERT. - F.F.		34	4'-0:7'-11	211
5b1	WALLS - LONGIT.- F.F. & B.F.		16	18'-4	306
5b2	WALLS - LONGIT.- F.F. & B.F.		8	17'-5	145
5c1	WALLS - VERT. - B.F.		17	22'-11:23'-2	409
5c2	WALLS - VERT. - B.F.		16	13'-5:17'-2	255
5c3	WALLS - VERT. - B.F.		32	5'-2:7'-0	203
6f1	FLOOR - LONGIT.- TOP		15	16'-11	381
5f2	FLOOR - LONGIT.- BOTT.		15	16'-11	265
5g1	CURTAIN BRACKET - VERT.		4	5'-9	24
5h1	BASIN BACKWALL - VERT.		8	9'-4	78
6m1	FLOOR TRANS. - TOP		17	7'-8:15'-5	295
6p1	CURTAIN - TRANS.		2	15'-3:15'-6	46
6s1	WALL - TOP SLOPE		4	18'-7	112
5t1	CURTAIN - VERT.		12	6'-7	82
TOTAL WEIGHT (LB)					2812
CONCRETE (CY)			FOOTING		9.8
			WALLS		4.7
			TOTAL		14.5



LONGITUDINAL SECTION

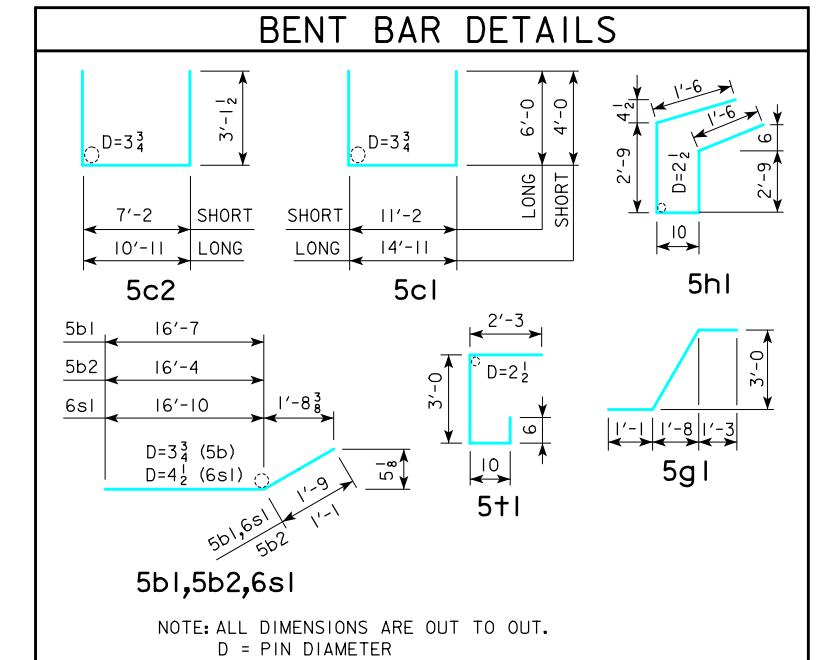


FLUME BASIN CROSS SECTION

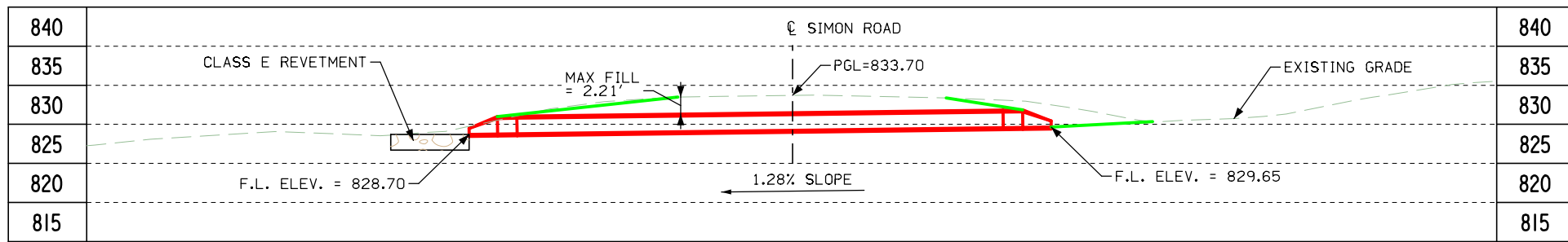


PLAN VIEW

TABLE OF FLUME BASIN DIMENSIONS										
K	L	M	N	O	P	R	T	U	V	
14'-0	16'-0	4'-6	2'-9	3'-5	3'-6	1'-3	0'-11	0'-9	4'-7 ⁵ / ₈	

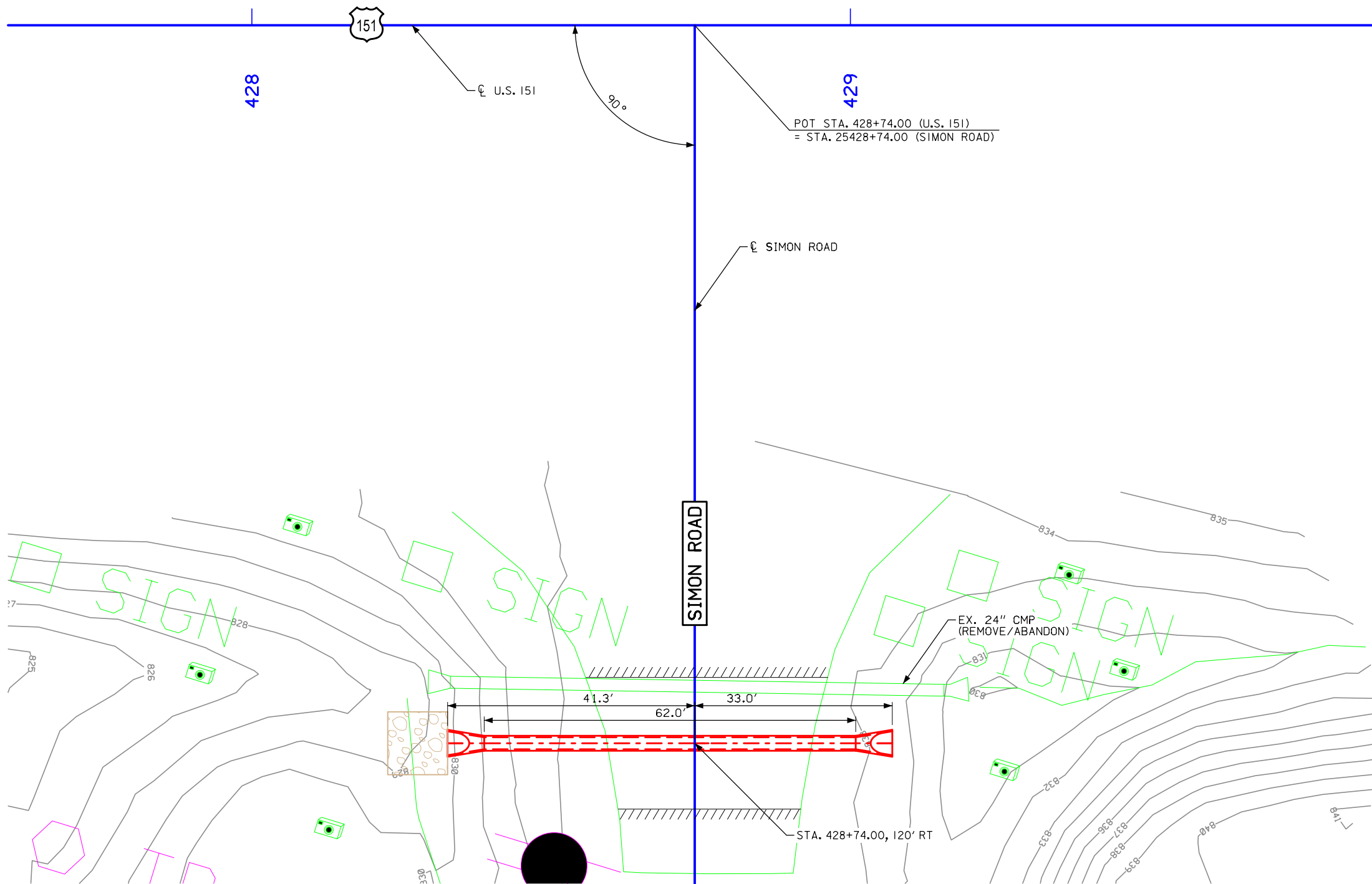


DESIGN FOR 30° (R.A.) SKEW
6' X 6'
REINFORCED CONCRETE FLUME
FLUME BASIN DETAILS
 STA. 1104+20.00 @ US 151 FEBRUARY, 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 6 OF 6 FILE NO. 31561 DESIGN NO. 319



LONGITUDINAL SECTION ALONG \varnothing CULVERT

BENCH MARK NO. K75015
 ELEV. 833.44
 STA. 428+49.90, 140.11' RT
 RR SPIKE POWER POLE



PLAT PLAN

HYDRAULIC DATA

DRAINAGE AREA = 5.64 ACRES ROLLING
 $Q_{50} = 16.27$ CFS

UTILITIES LEGEND:

REFER TO SHEET D.1 FOR UTILITY LEGEND

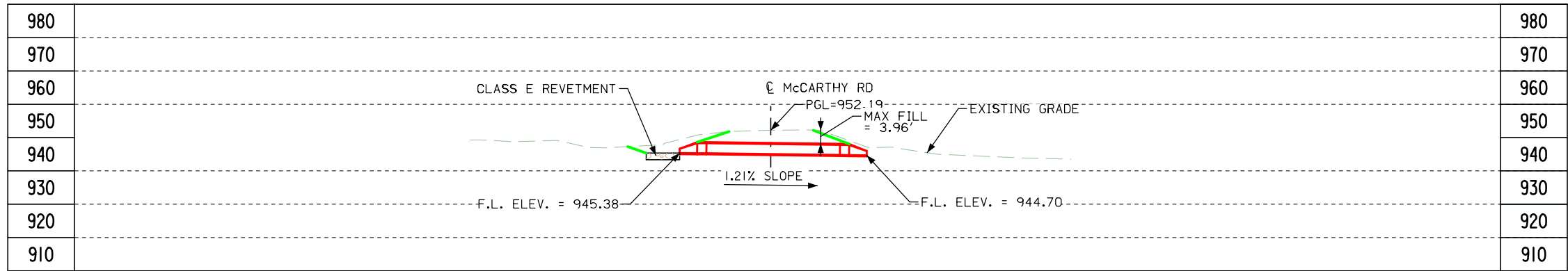
LOCATION

T-87N R-1W
 SECTION 25
 WHITEWATER TOWNSHIP
 DUBUQUE COUNTY

STAGING NOTES

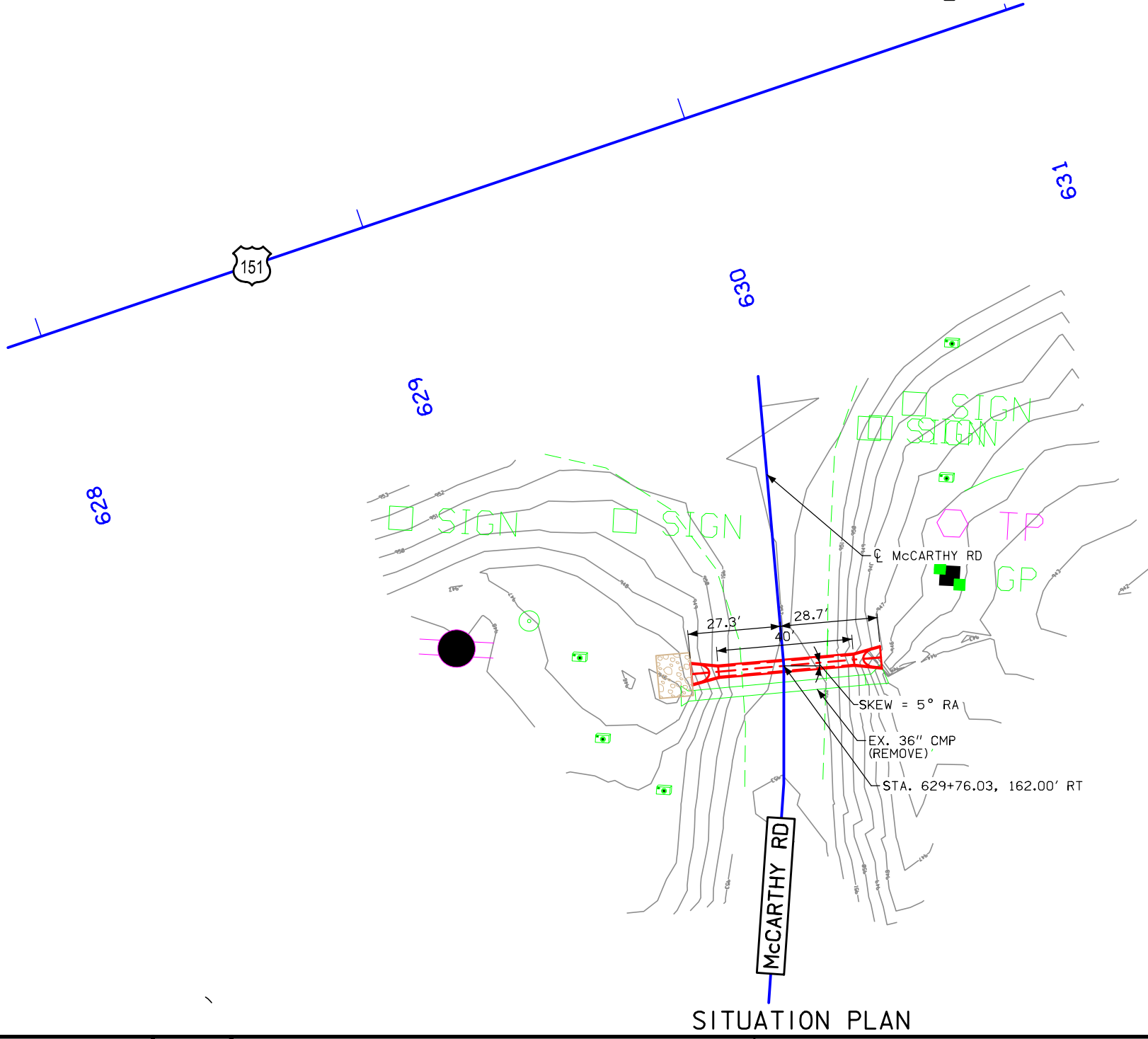
CULVERT IS TO BE CONSTRUCTED HALF-AT-A-TIME.
 CONSTRUCT DOWNSTREAM PORTION OF CULVERT
 FIRST. ABANDON/REMOVE EXISTING CULVERT UPON
 COMPLETION OF NEW CULVERT.

DESIGN FOR 0° SKEW
24" X 62'
REINFORCED CONCRETE PIPE
 PLAT PLAN
 STA. 428+74.00, 120' RT \varnothing U.S.-151 FEB. 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____



LONGITUDINAL SECTION ALONG \bar{C} CULVERT

BENCH MARK NO. K75043
 ELEV. 946.96
 STA. 630+42.25, 129.25' RT
 RR SPIKE IN FENCE POST

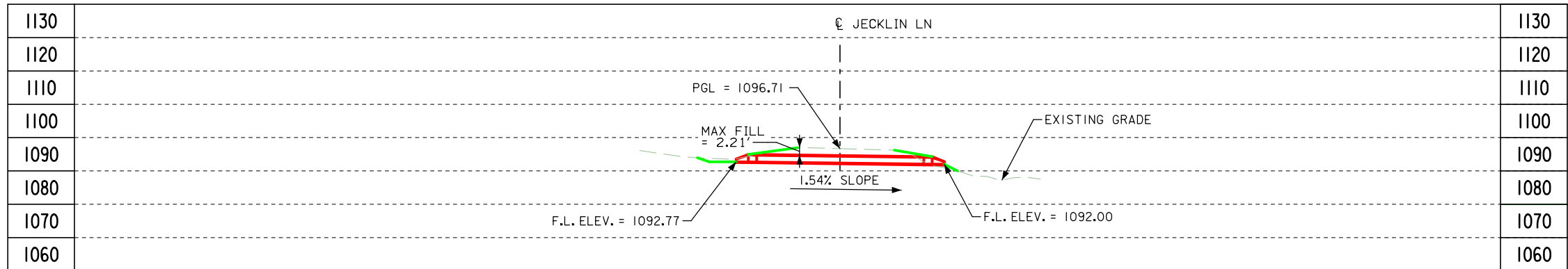


HYDRAULIC DATA
 DRAINAGE AREA = 13.1ACRES ROLLING / HILLY
 $Q_{50} = 36.00$ CFS

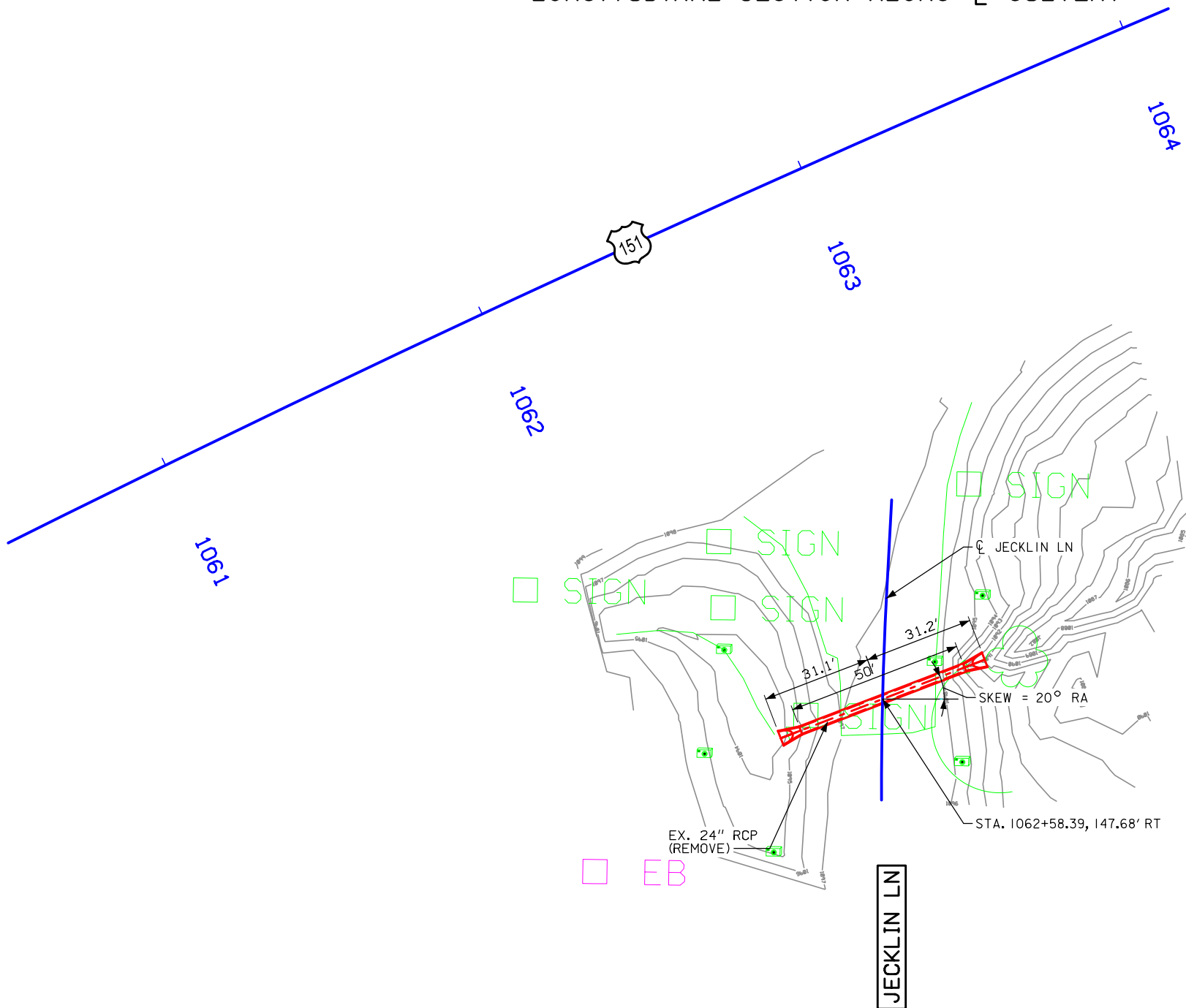
UTILITIES LEGEND:
 REFER TO SHEET D.1 FOR UTILITY LEGEND

LOCATION
 T-87N R-1E
 SECTION 16
 PRAIRIE CREEK TOWNSHIP
 DUBUQUE COUNTY

DESIGN FOR 5° SKEW R.A.
36" X 40'
REINFORCED CONCRETE PIPE
 PLAT PLAN
 STA. 629+76.03, 162' RT \bar{C} U.S.-151 FEB. 2019
DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____



LONGITUDINAL SECTION ALONG \bar{C} CULVERT



SITUATION PLAN

BENCH MARK NO. K75101
 ELEV. 1103.338
 N = 8389098.199
 E = 21447979.440
 RAILROAD SPIKE IN POWER POLE



HYDRAULIC DATA

DRAINAGE AREA = 7.2 ACRES ROLLING / FLAT
 Q 21/64 = 16.30 CFS

UTILITIES LEGEND:

REFER TO SHEET D.1 FOR UTILITY LEGEND

LOCATION

T-88N R-2E
 SECTION 21
 TABLE MOUND TOWNSHIP
 DUBUQUE COUNTY

DESIGN FOR 20° SKEW R.A.
24" X 50'
REINFORCED CONCRETE PIPE
 PLAT PLAN
 STA. 1062+58.39, 147.46' RT \bar{C} U.S.-151 FEB. 2019
 DUBUQUE COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ___ OF ___ FILE NO. ___ DESIGN NO. ___