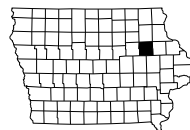


NOT TO SCALE



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM
BUCHANAN COUNTY
 PIPE CULVERTS

Iowa 150
 Benton County to Fayette County

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.
 Value Engineering Saves. Refer to Article 1105.15 of the Specifications.



REVISIONS

TOTAL

28

PROJECT IDENTIFICATION NUMBER

14-10-150-010

PROJECT NUMBER

NHSN-150-3(72)--2R-10

R.O.W. PROJECT NUMBER

NHSN-150-3(73)--2R-10

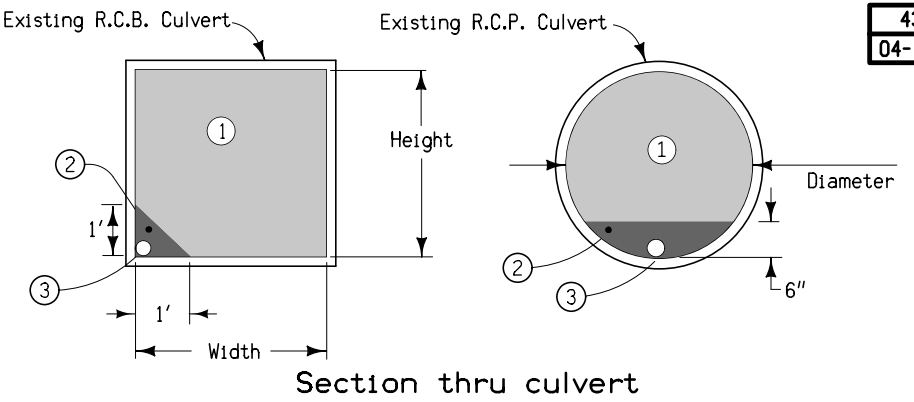
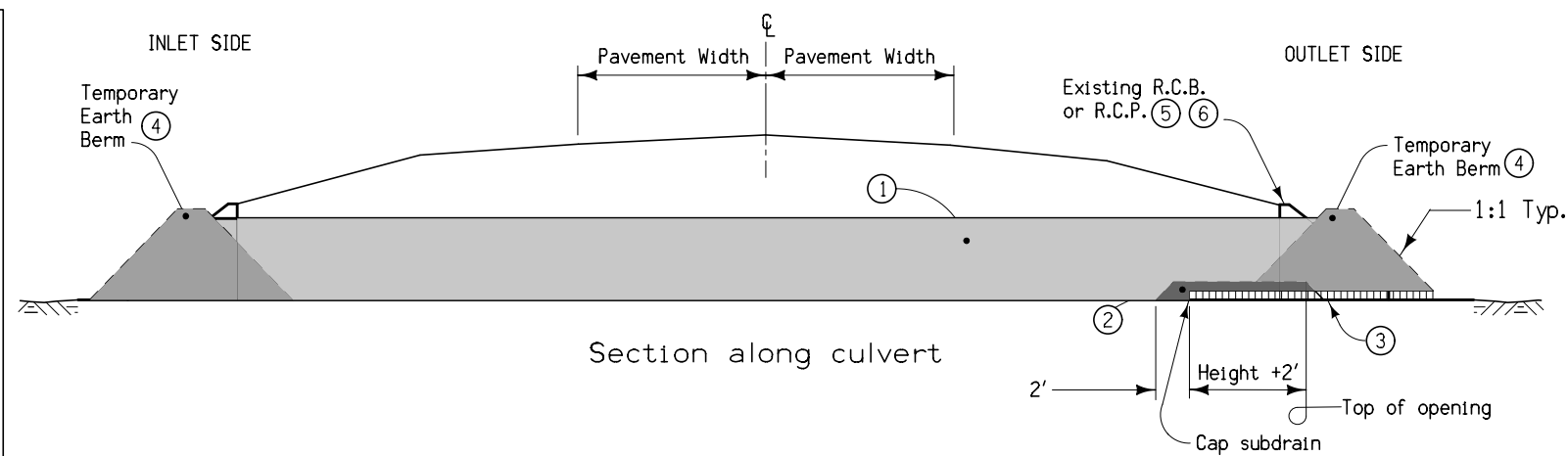
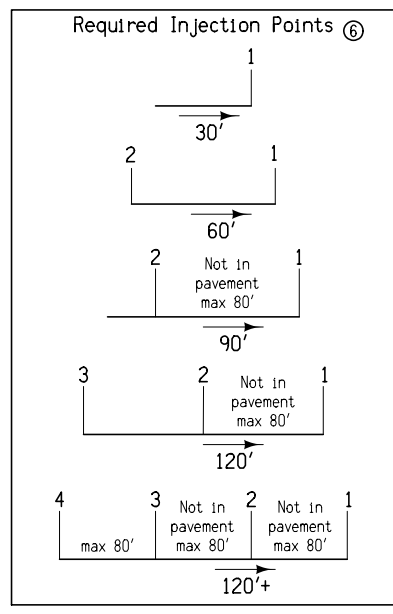
INDEX OF SHEETS

No.	DESCRIPTION
A Sheets	Title Sheets
* A.1	Title Sheet with Location Map
B Sheets	Typical Cross Sections and Details
B.1 - 2	Typical Cross Sections and Details
C Sheets	Quantities and General Information
C.1	Tabulations
D Sheets	Mainline Plan and Profile Sheets
* D.1	Plan and Profile Legend and Symbol Information Sheet
* D.2 - 12	Aerial and Background Sheets with Proposed Work Areas
G Sheets	Survey Sheets
G.1	Alignment Information
G.2	Reference Ties and Bench Marks
J Sheets	Traffic Control and Staging Sheets
J.1	Staging Notes and Tabulations
M Sheets	Storm Sewer Sheets
M.1	Storm Sewer Tabulations
U Sheets	500 Series, Mod.Stds. and Detail Sheets
U.1	Special Details
V Sheets	Bridge and Culvert Situation Plans
* V.1 - 7	Bridge and Culvert Situation Plans
	* Color Plan Sheets

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.

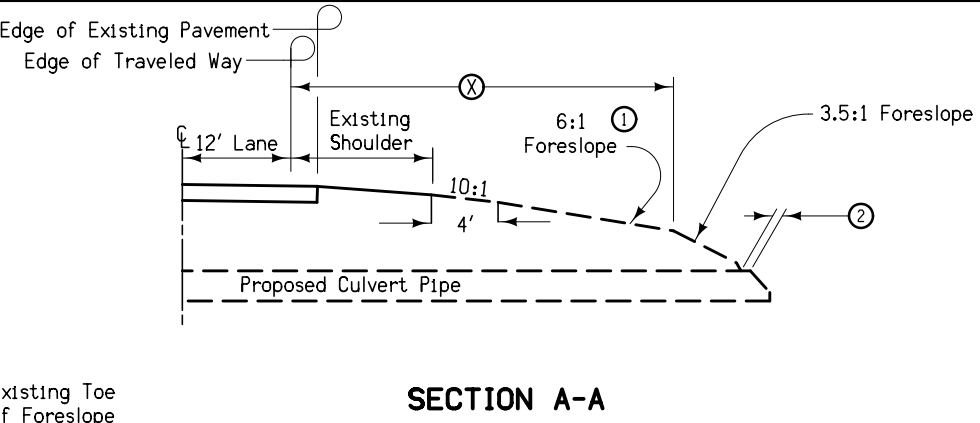
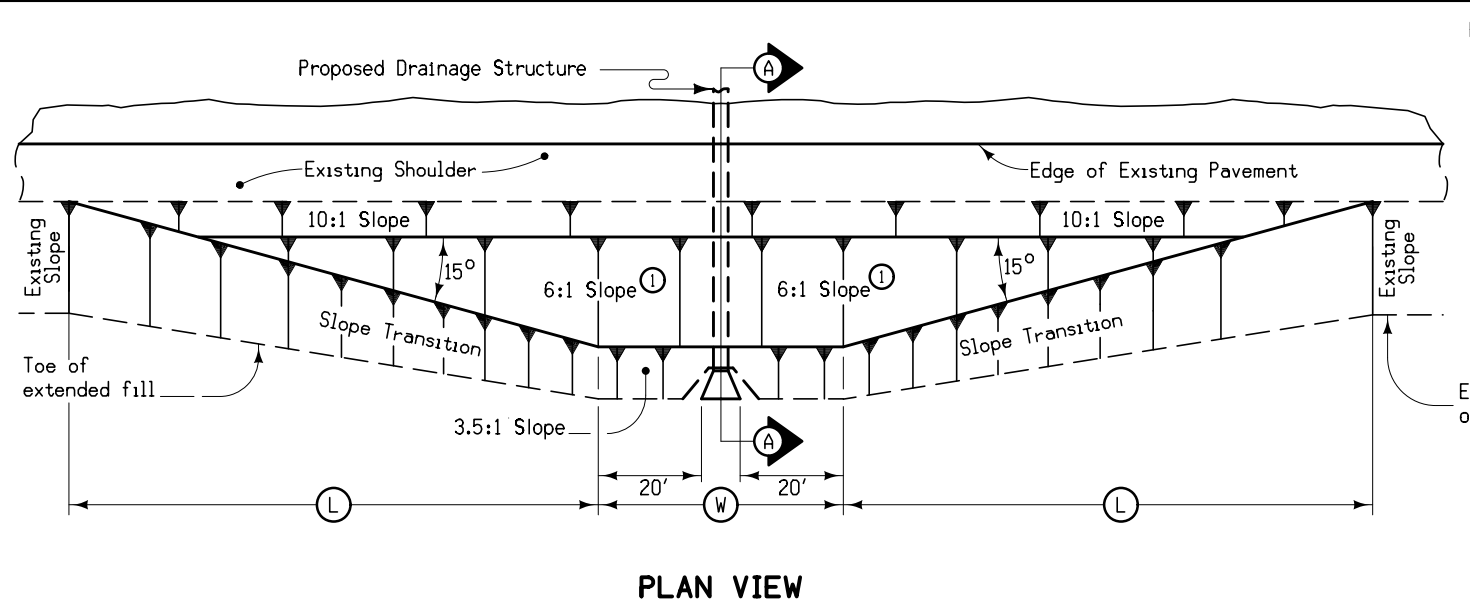
Cindy A. Spencer, P.E. Date _____
 License Number 17561
 My License Renewal Date is December 31, 2018

Pages or sheets covered by this seal:
 A.1, B.1-B.2, C.1, D.1-D.12, G.1-G.2,
 J.1, M.1, U.1, V.1-V.7



- ① Flowable Mortar.
- ② Granular Backfill.
- ③ 4" subdrain at flowline elevation of culvert shall be extended into the culvert a distance of 2' plus the height of the culvert. Granular Backfill covers subdrain and extends an additional 2'. Subdrain and granular backfill are incidental to flowable mortar.
- ④ Ends of culvert shall be plugged sufficiently to retain flowable mortar. Temporary earth berms are incidental to flowable mortar.
- ⑤ Removal of headwalls may be required.
- ⑥ Outlet shall be filled first. See injection point detail for additional information.

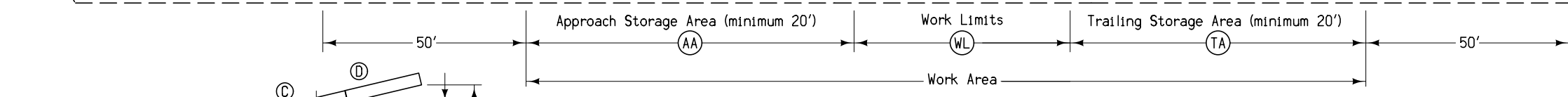
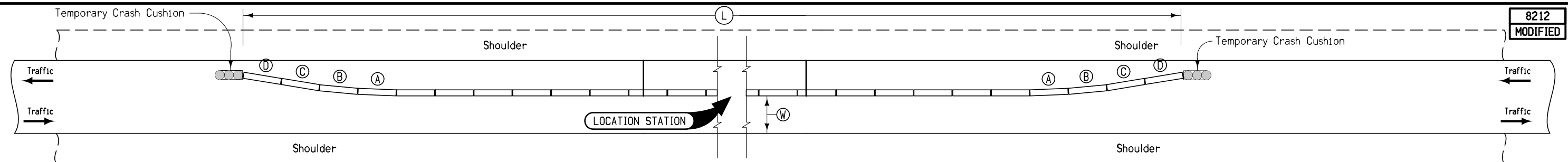
DETAILS OF CULVERT ABANDONMENT WITH FLOWABLE MORTAR
(Rectangular structures less than 8' in either height or width.
Circular structures less than 10' Dia.)



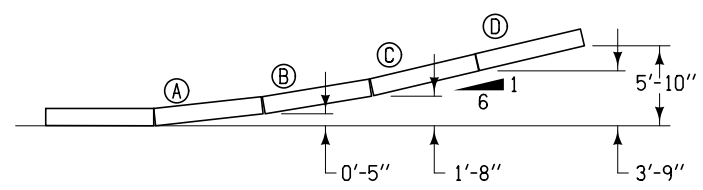
- Notes:
- At locations where newly constructed drainage structure extends beyond the normal foreslope cover, flatten the foreslope as indicated so as to cover the structure. Minimum earth cover is 6".
 - ① Slope may be flatter than 6:1.
 - ② 6" Minimum for pipe installations or to top of headwall on R.C.B.
 - ③ North side: carry full barnroof to side road embankment.
 - W = Pipe or R.C.B. width plus 20 feet each side.

STRUCTURE LOCATION		W	L	X	FS
STATION	SIDE	Feet	Feet	Feet	Feet
232+45.25	B	47.8	81	26	3.5
286+15.50	B	45.0	80	26	3.5
365+11.13	B	54.5	79	26	3.5
375+05.90	B	45.6	81	26	3.5
382+25.90	B	45.6	81	26	3.5
397+13.70	B	48.9	80	26	3.5
319+92.00	B	45.7	73	26	3.5

BARNROOF FORESLOPE AT DRAINAGE STRUCTURE



- Ⓛ Place TBR 3 feet left of center line.
- Ⓜ Lane width



BARRIER OFFSETS FOR FLARE SECTIONS

Station	Side	ⓂⓂ	ⓂⓁ	Ⓜⓐ	Ⓜ	Anchored X	Ⓜ	Remarks
		Feet	Feet	Feet	Feet		Ft-Inches	
17+15.00	L	25	25	25	175		12'-0	Ⓛ
67+03.70	L	25	25	25	175		12'-0	Ⓛ
286+15.50	L	25	25	25	175	X	12'-0	
286+15.50	R	25	25	25	175	X	12'-0	
365+11.13	L	25	37.5	25	187.5	X	12'-0	
365+11.13	R	25	37.5	25	187.5	X	12'-0	
319+92.00	L	25	25	25	175	X	12'-0	
319+92.00	R	25	25	25	175	X	12'-0	

**TEMPORARY CONCRETE BARRIER LAYOUT
for Two-Way Traffic**

ROCK EROSION CONTROL

Refer to EC-301

Location				Rock Erosion Control (REC)					Material Bid Quantities			Remarks		
Road Identification	Begin Station	End Station	Side	(L)	(W)	Type 1	Type 2	Type 3	Type 4	Type 5	Erosion Stone		Class E Revetment	Eng. Fabric
				Lt./Rt.	FT	FT	Rock Ditch Check	Rock Ditch	Rock Flume	Rock Splash Basin	Rock Slope Protection		TON	TON
Iowa 150	232+45.25		LT	14	14				X				23.6	34.3
Iowa 150	286+16.00		LT	10	10				X			12.0	20.0	at pipe outlet
Iowa 150	365+11.13		RT	24	15				X			43.2	57.4	at pipe outlet
Iowa 150	375+05.90		RT	12	12				X			17.3	26.7	at pipe outlet
Iowa 150	382+25.90		RT	12	14				X			20.2	30.3	at pipe outlet
Iowa 150	397+13.70		RT	15	10				X			18.0	27.8	at pipe outlet
Iowa 150	586+25.00		RT	35	47				X			197.4	219.3	Settling Basin
Iowa 150	319+92.00		LT	14	10				X			16.8	26.3	at pipe outlet

DRAINAGE STRUCTURE BY ROAD CONTRACTOR

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

- * Not a bid item
- (1) Diameter or equivalent diameter
- (2) UNCL = Unclassified Pipe CMP = Corrugated Metal Pipe RCP = Reinforced Concrete Pipe LCP = Arch or Elliptical Low Clearance Pipe SARC = Steel Arch Pipe

Drainage Area ACRE	Location	Type	Size (1) IN	Kind Of Pipe (2)	Length New Const. LF	Bedding Class	Design Cover (H) FT	Camber* (DR-102) FT	Apron No.		Apron Guard* (DR-213)		Elbow* (DR-141)	Diaphragm* (DR-501)	Tee Section* (DR-142)	"D" Section* (DR-141)	Reducer*	Type 'C' Connections* (DR-122)	Connected Pipe Joint* (DR-121)	4" Perforated Subdrain*	Tie Joints		Flow Line Elevations				Dimensions Lin. Ft.		Skew Ahead Degrees		Dike			Class 20 CY	Flowable Mortar CY	Floodable* Backfill CY (A)	Porous* Backfill CY (B)	Flooded Backfill CY (A+B)	Remarks											
									Lt.	Rt.	No.	No.	No.	No.	No.	Type	No.	FT	Lt.	Rt.	Lt.	Rt.	Other	Other	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.							Rt.	Lt.	Rt.	Location Station	Top Elev.	Type					
									Total		Extensions		CY		CY		CY																																	
	17+15.00		42	RCP														C-2	1			1																NOTE 1												
	67+03.70		36	RCP														C-2	1																			NOTE 1												
67.0	232+45.25	2000D	48	RCP	80	B			1	1	2								Type 3								886.80	889.32			52.0	44.0								Jack pipe										
	262+90.00		30	RCP					1		1								Type 3																															
	279+18.70		36	RCP																		1	1																											
32.0	286+16.00	2000D	42	LCP	74	B			1	1	2	1							Type 3									888.69	891.30			47.0	43.0								20 degree elbow									
	292+37.40		30	RCP																		1	1																											
80.0	365+07.50	2000D	42	LCP	70	B			1	1	2								Type 3									907.99	907.50			43.0	43.0																	
	365+14.76	2000D	42	LCP	70	B			1	1	2								Type 3									907.99	907.50			43.0	43.0																	
9.0	375+05.90	2000D	30	RCP	74	B			1	1	2								Type 3									912.75	911.25			43.2	43.2																	
10.0	382+25.90	2000D	30	RCP	78	B			1	1	2								Type 3									911.00	910.50			44.4	45.9																	
140.0	397+13.70	2000D	66	RCP	72	B			1	1	2								Type 3									906.20	905.40			44.3	44.3								Jack pipe									
	1458+99.00		24	RCP	106																	2	1																	Jack pipe										
	1470+16.00		24	RCP																																			Line Pipe											
47.0	319+92.00	2000D	48	LCP	70	B			1	1	2								Type 3									986.90	988.60			43.0	43.0									RT	319+58.00	990.40	G		10.4		8.8	8.8

NOTE 1: Replace connection on between pipe and existing RCB on the left side of the roadway. Class 20 quantity for exposing and re-covering pipe.

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.
- *Predetermined for access point not constructed with this project.

Location		Type	Length of Opening (1)			(W)	(1)(2)	(2)	Pipe Culvert (3)					Aprons	Driveway Surface Area		Driveway Surfacing Material TON	Remarks
Station	Side	A, B, C, Safety Ramp, or Predetermined*	Case	1 1/2" Dropped Curb	3" Dropped Curb	(H)	Size	Pipe Length	Lt.	Rt.	Size	HMA	PCC					
		1 or 2			LF	LF	FT	FT	FT	FT	LF	LF	LF	SY	SY	TON		
582+13.80	RT																	
584+00.00	RT																	
584+61.00	RT																	
Refer to M sheets for drainage information																		

SURVEY SYMBOLS

- SAA Sanitary Sewer Line Co. 1
- TLA Underground Telephone Line Co. 1
- ELA Underground Electric Line Co. 1
- TLB Underground Telephone Line Co. 2
- TVA Underground TV Cable Co. 1
- GLA Underground Gas Line Co. 1
- FOA Underground Fiber Optic Co. 1
- TLC Underground Telephone Line Co. 3
- FOB Underground Fiber Optic Co. 2
- ELB Underground Electric Line Co. 2
- FOC Underground Fiber Optic Co. 3
- GLB Underground Gas Line Co. 2
- STA Storm Sewer Line Co. 1
- FOD Underground Fiber Optic Co. 4
- GLC Underground Gas Line Co. 3
- DU Centerline Draw or Stream (Up)
- D Centerline Draw or Stream (Down)
- EP Edge of Paved Roads (ML or SR)
- SNP Unpaved Shoulder
- CU Back of Curb
- DIK Centerline of Dike or Dam
- RIP Rip-Rap
- GU Gutter In Front of Curb
- SWK Sidewalk
- CON Concrete or A/C Slab
- ENP Edge Paved Entrance & Park Lot
- ENT Centerline BL of Entrance
- ENU Edge Unpaved Entrance & Parking
- BNK Stream Bank
- EG Edge of Gravel Road
- EW Edge of Water
- SH Paved Shoulder
- SNK Sink Hole
- TPD Telephone Pedestal
- PPA Power Pole Co. 1
- SI Sign
- PIP Pipe Culvert
- FW Wire Fence
- PLG Location of General Photo
- TLNR Tree Line Right
- IN Storm Sewer Intake
- MIS Miscellaneous
- LUM Luminaire
- TDC Tree Deciduous
- BLD Building or Foundation
- PR Electric Riser Pole
- UB Utility Box
- SL Speed Limit Sign
- MH Utility Access (Manhole)
- FHD Fire Hydrants
- WV Water Valve
- RET Retaining Walls
- FCL Chain Link and Security Fence
- CUL Culvert
- EB Electrical Box
- SHR Shrub
- SEP Septic Tank
- TEV Evergreen Tree
- TLNL Tree Line Left
- BIN Grain Bin
- LP L.P. Tank
- FWD Wood Fence
- GV Gas Valve
- WEL Well
- GDL Guard Rail Steel
- FLG Flag Poles
- WHD Water Hydrant
- BB Billboard
- OUT Tile Outlet
- GP Guard Post (Less Than 4 Posts)
- TV Satellite TV Dish
- MM Mile Marker Post
- TVP TV Pedestal
- LC Lot Corner
- INB Storm Sewer Beehive Intake
- TFR Tree Fruit

UTILITY LEGEND

- GL2B Gas Line Mid American
- TV2B TV Cable Century Link
- EL2B Electric Line
- TL3B Telephone Line City of Independence
- TV3B TV Cable Mediacom
- WL1B Water Line
- SA1B Sanitary Sewer
- FO1B Fiber Optic Windstream
- FO2B Fiber Optic Century Link
- TV4B TV Cable Windstream

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

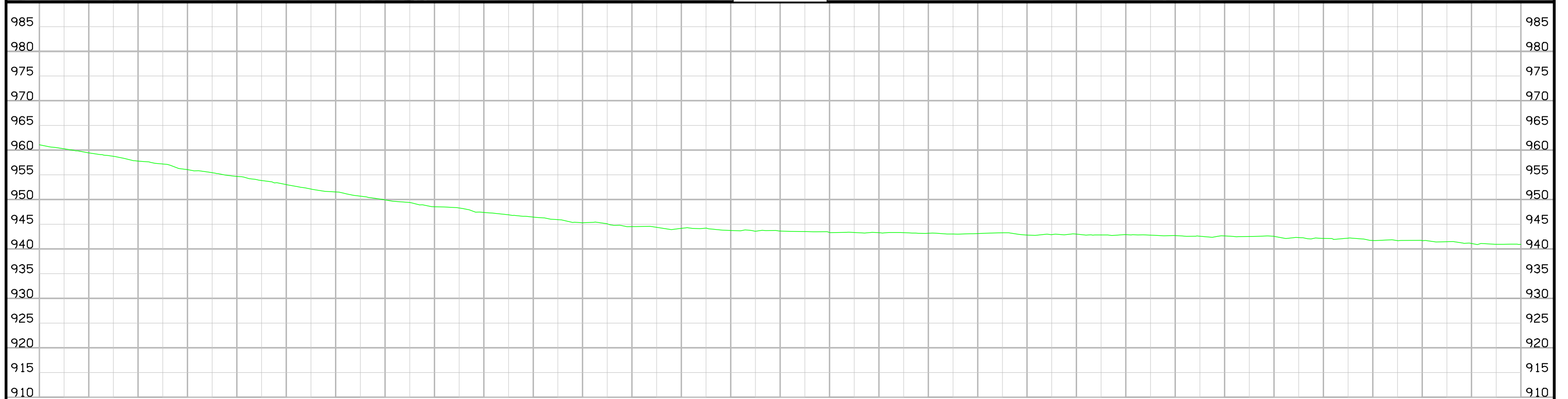
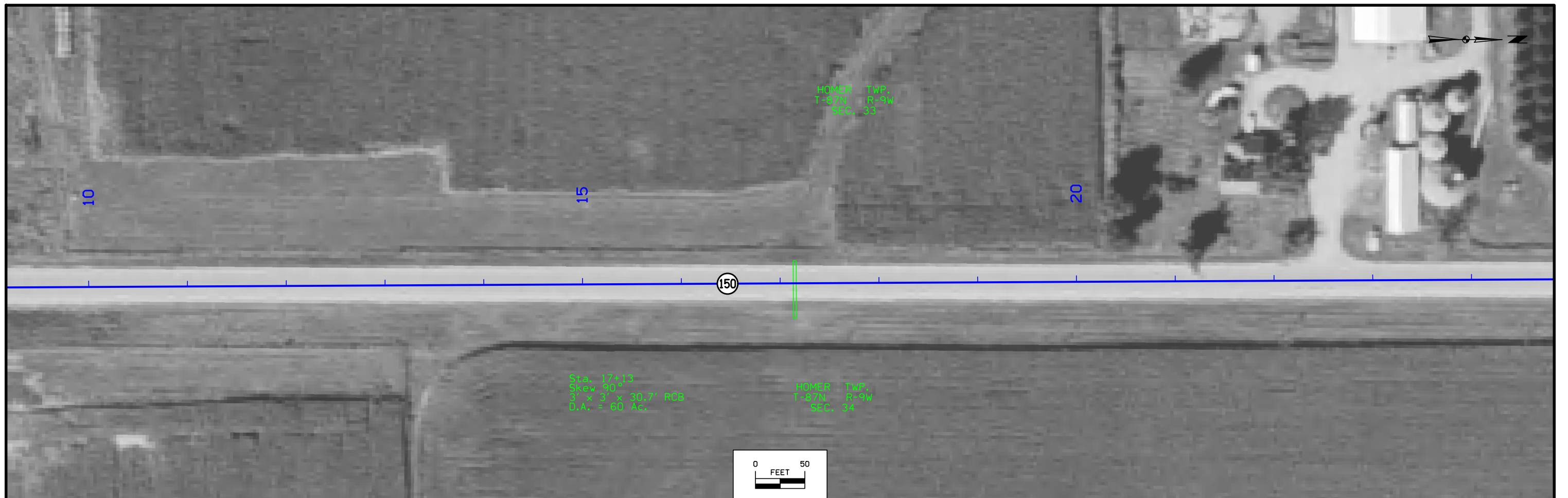
- Reference Point
- Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

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
- Access Control
- Property Line

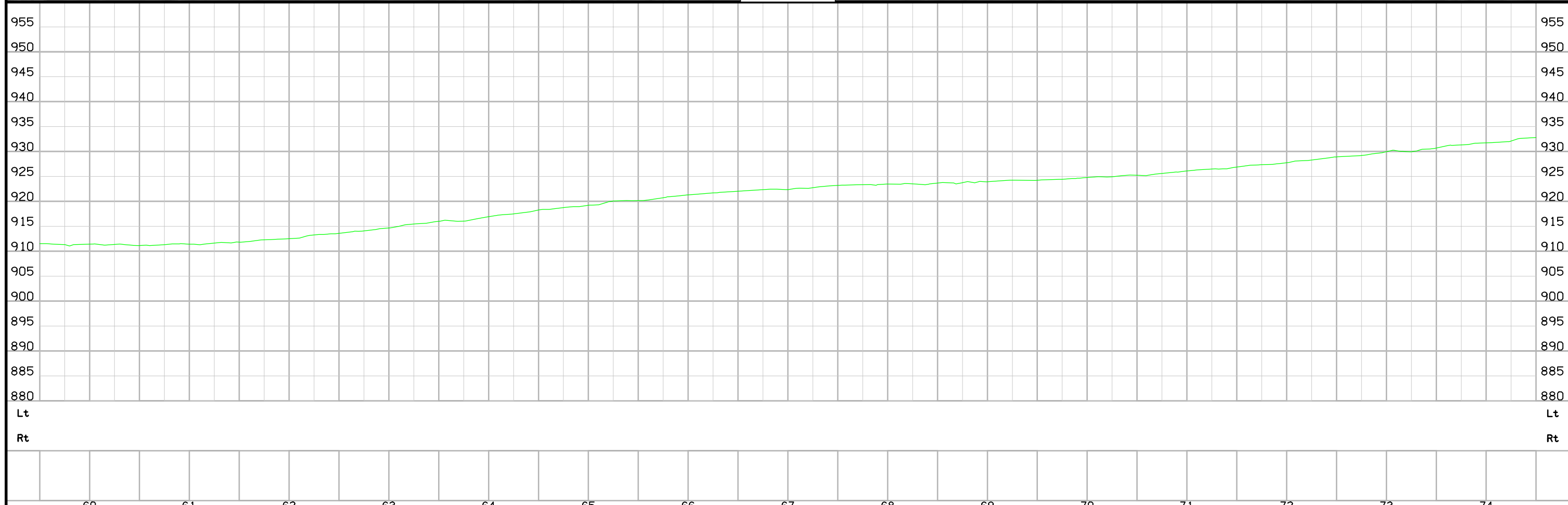
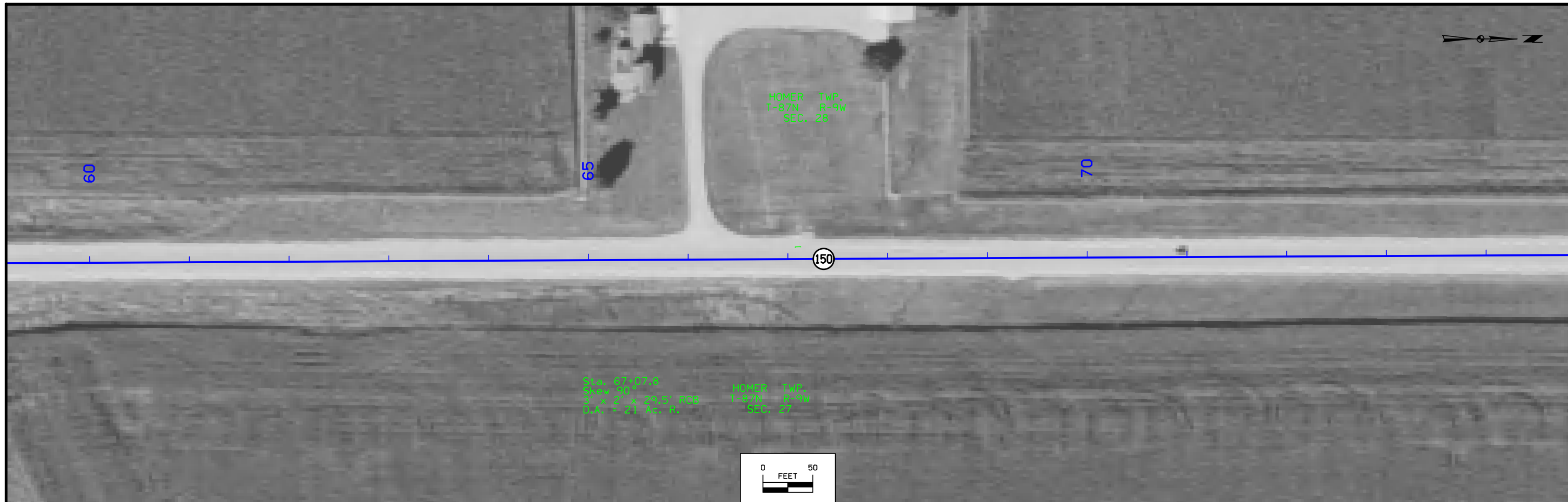
PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

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

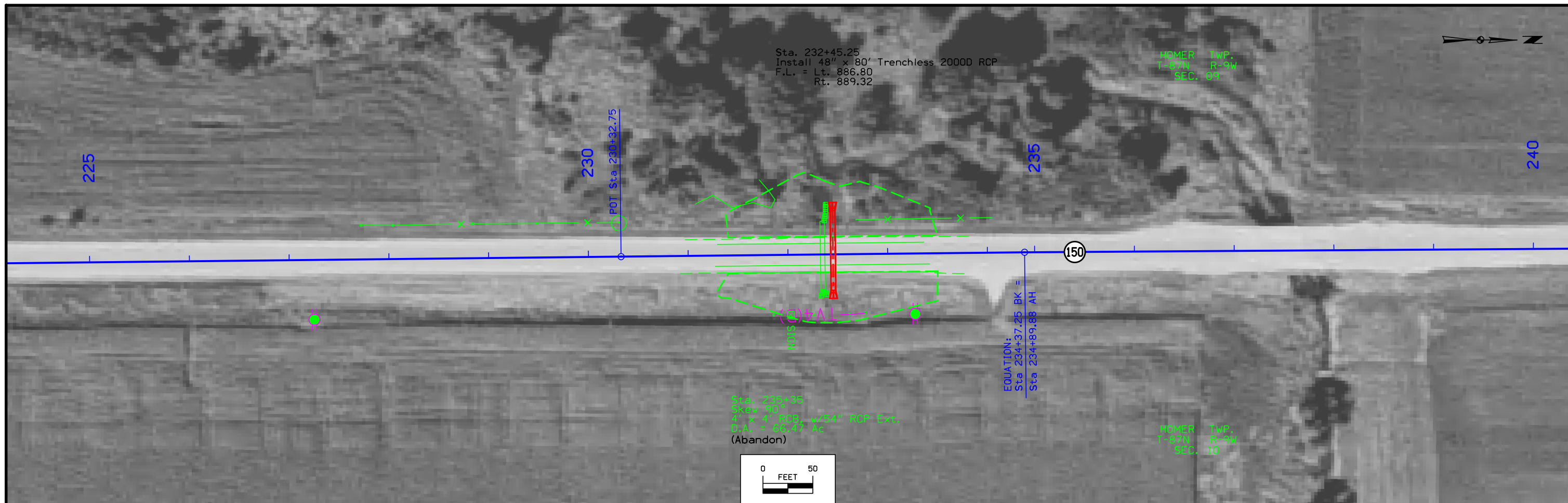


Lt Rt Lt Rt

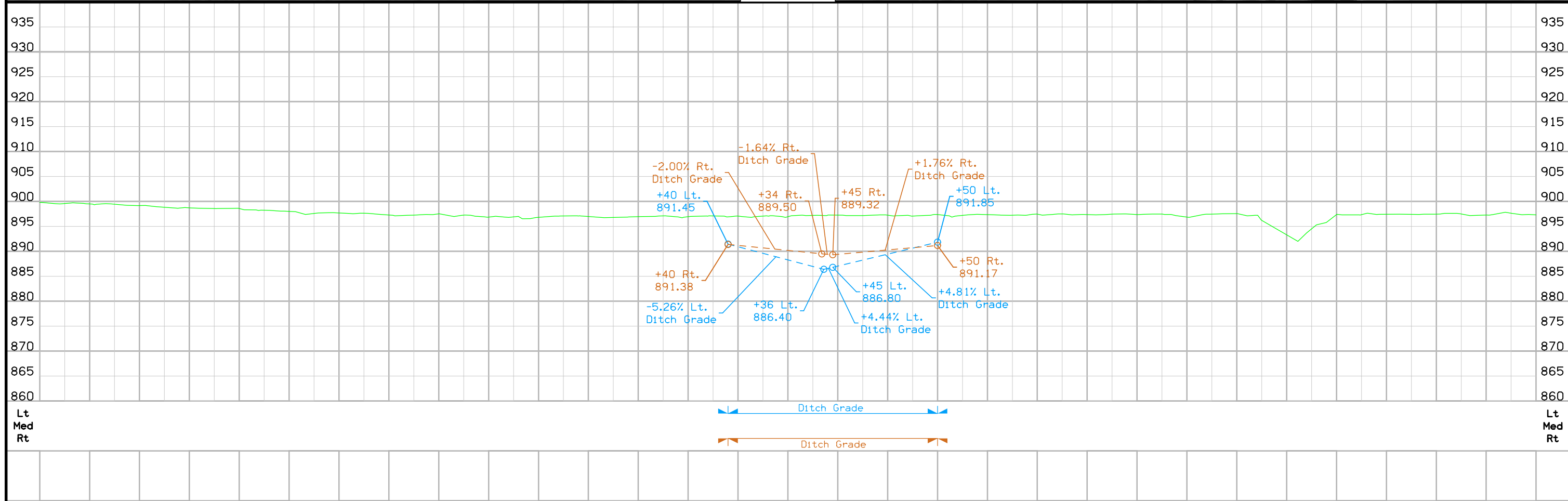
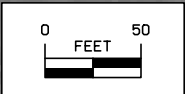
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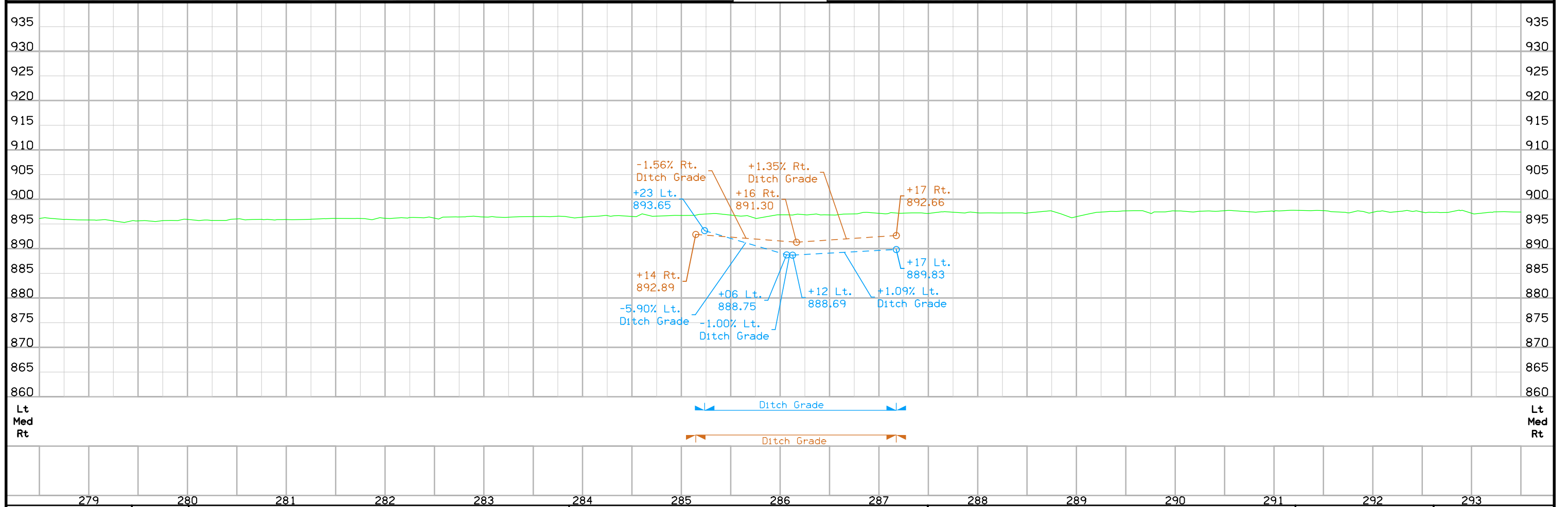
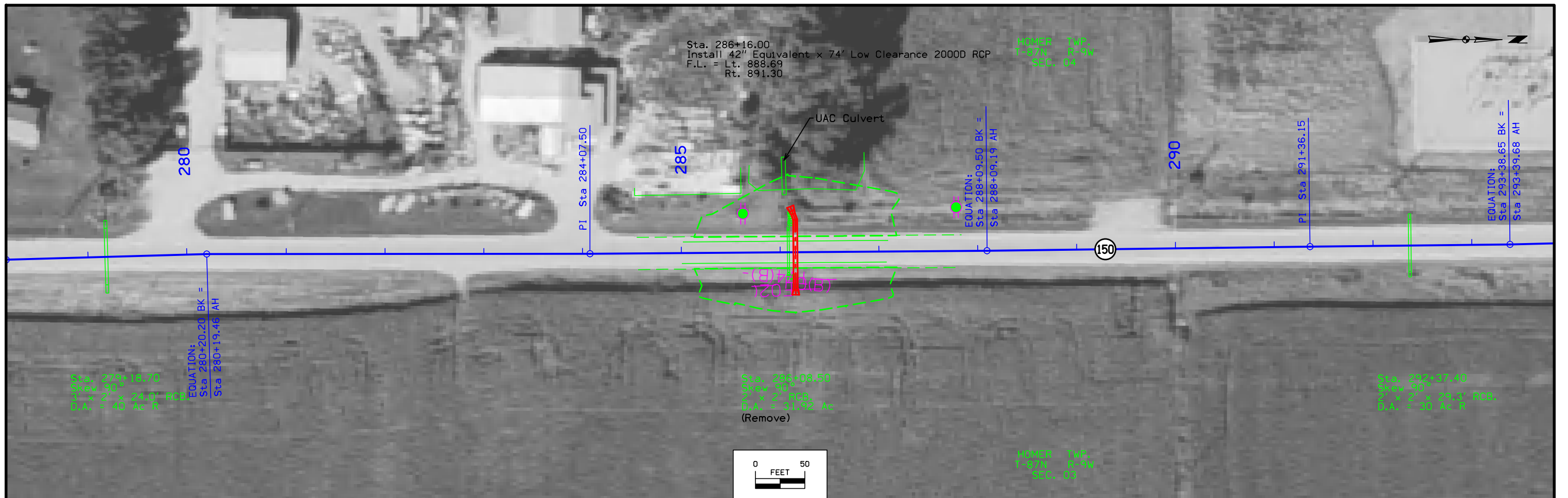


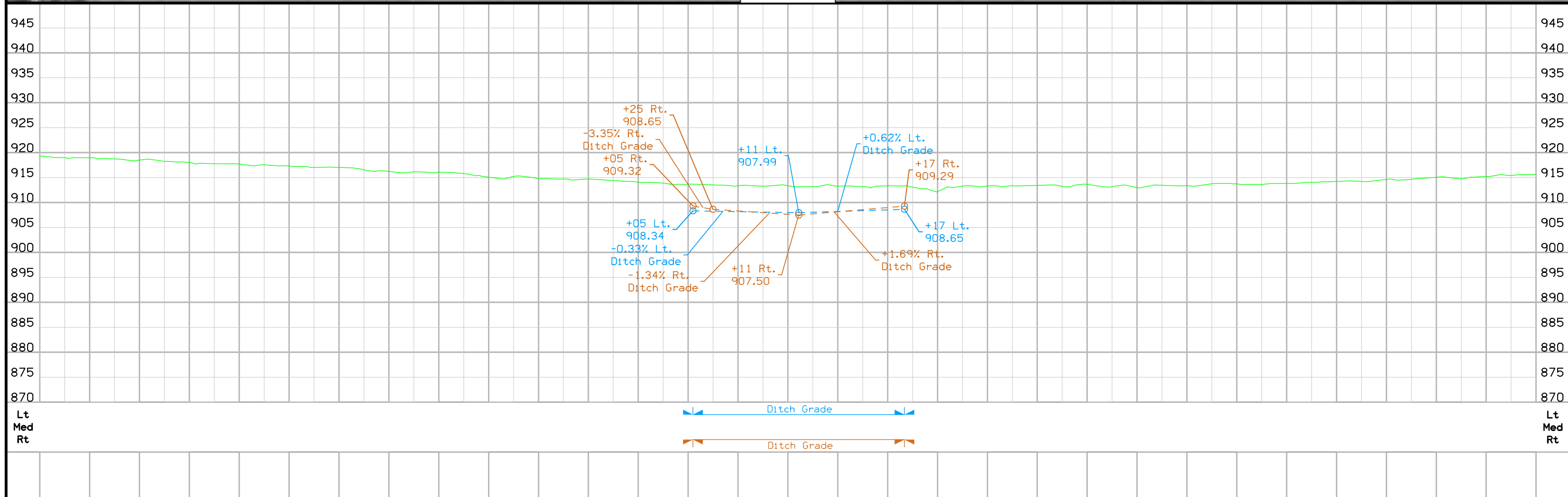
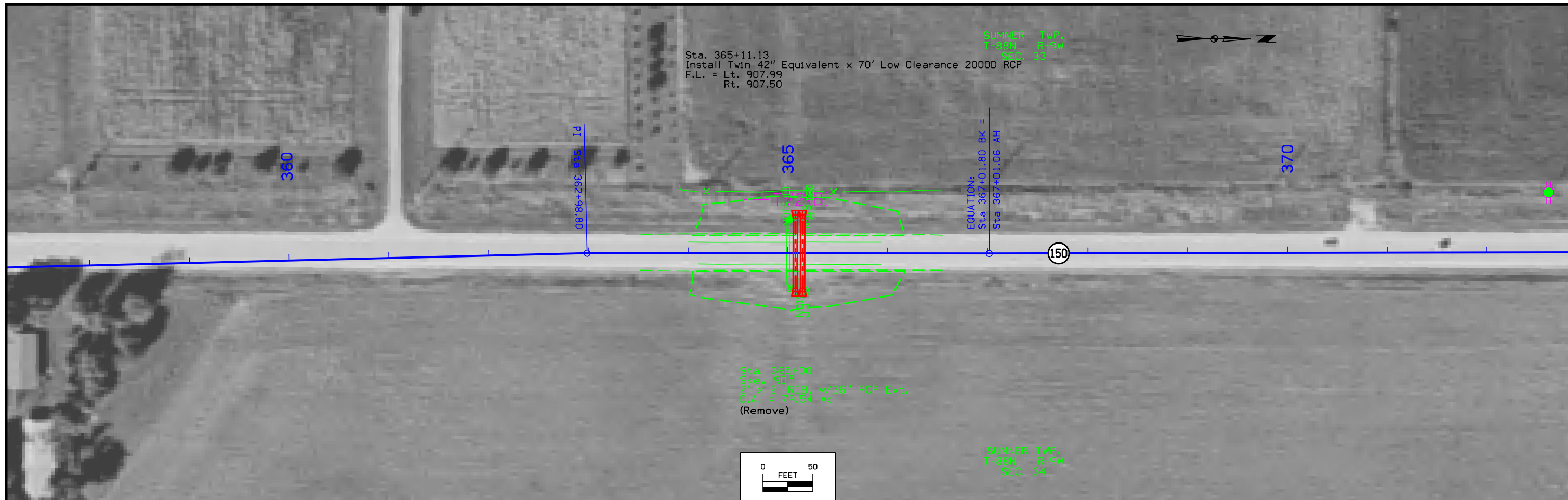
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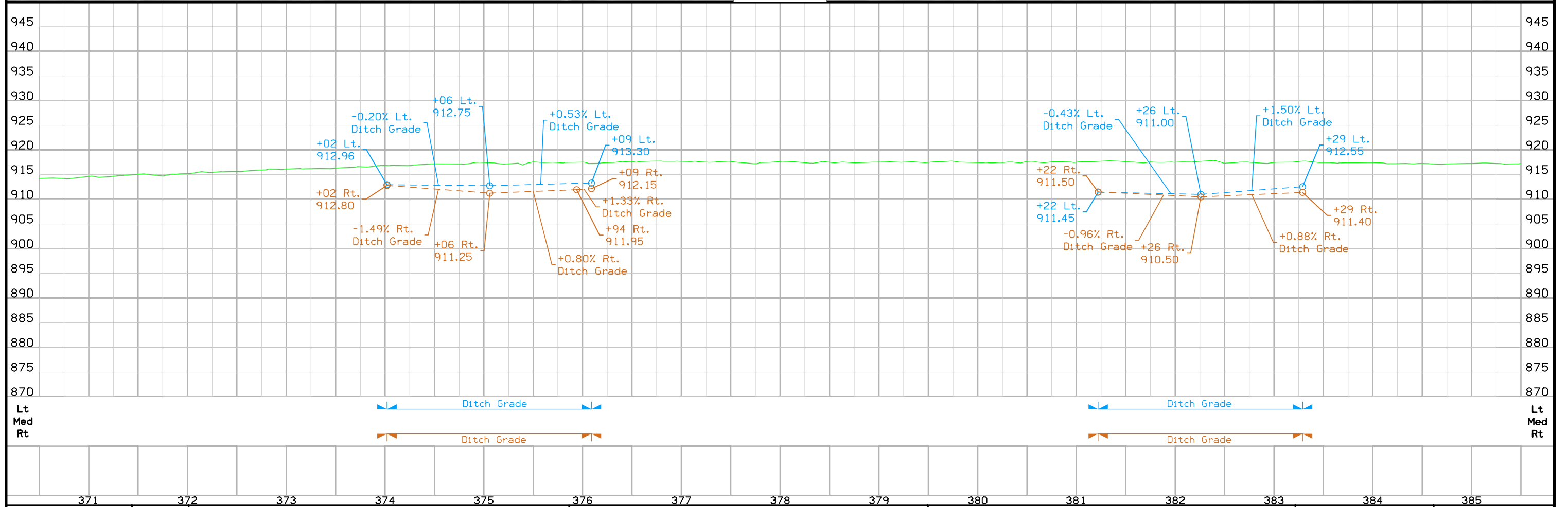


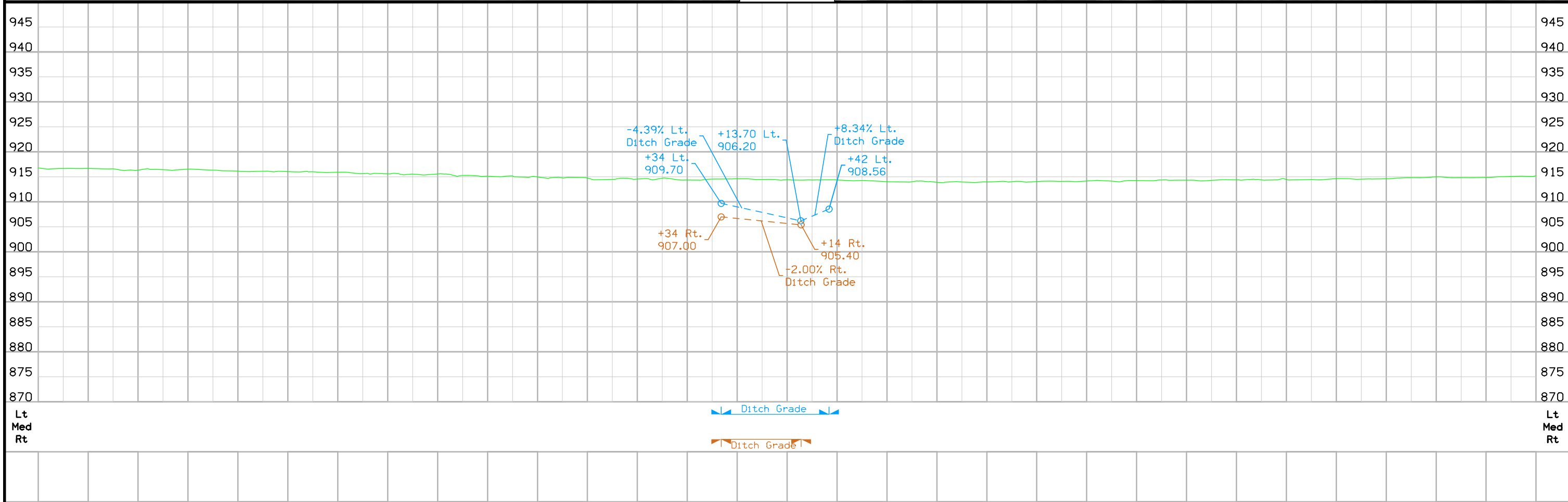
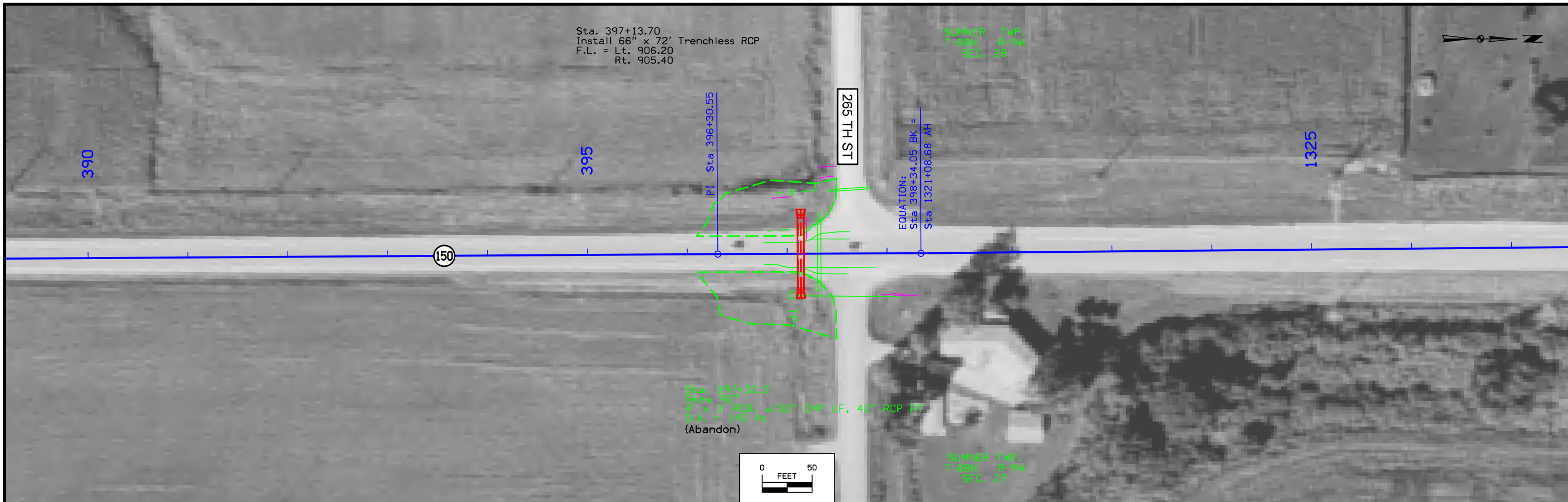
Sta. 235+35
 Skew 90°
 4' x 4' RCP w/54" RCP Ext.
 D.A. = 66.47 Ac
 (Abandon)

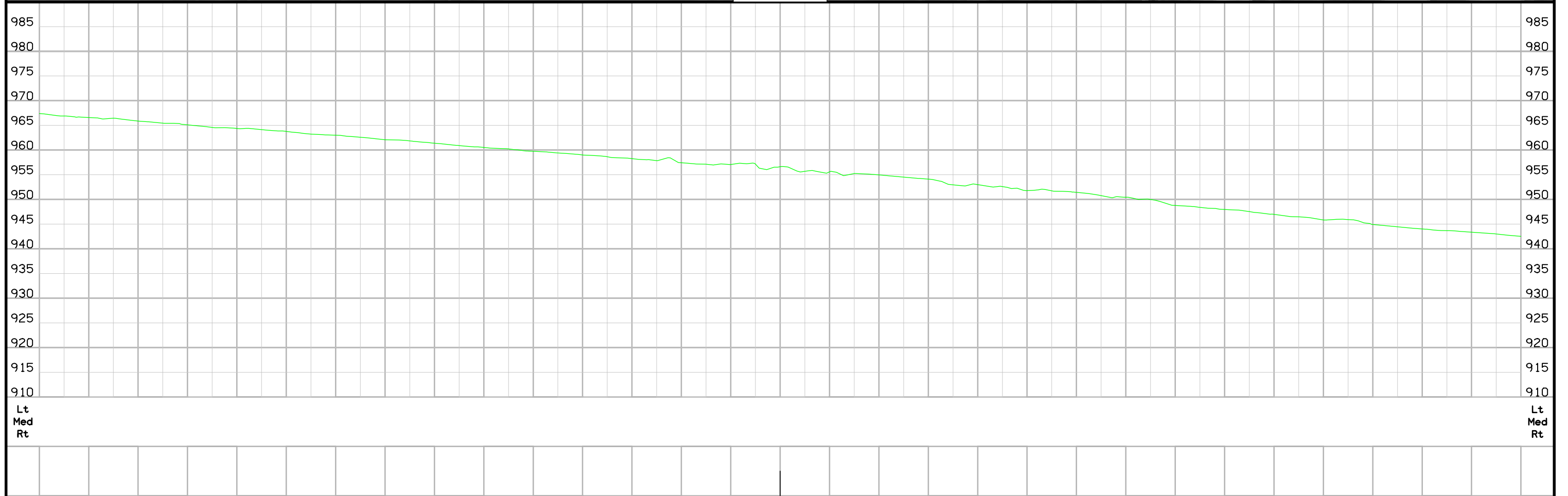
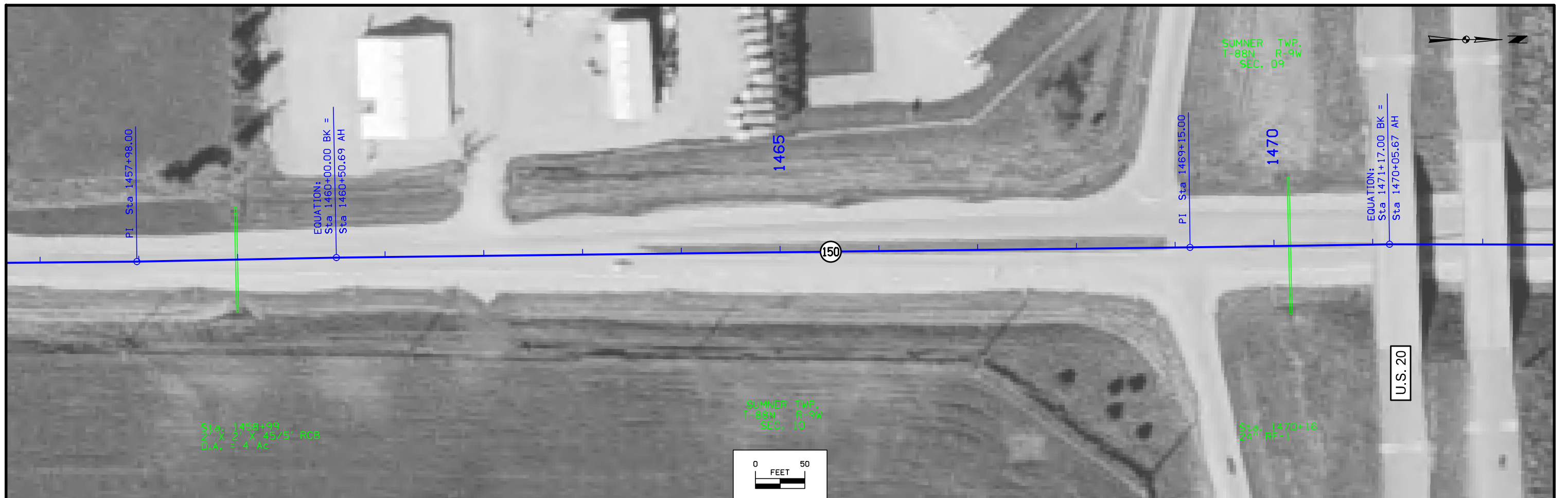




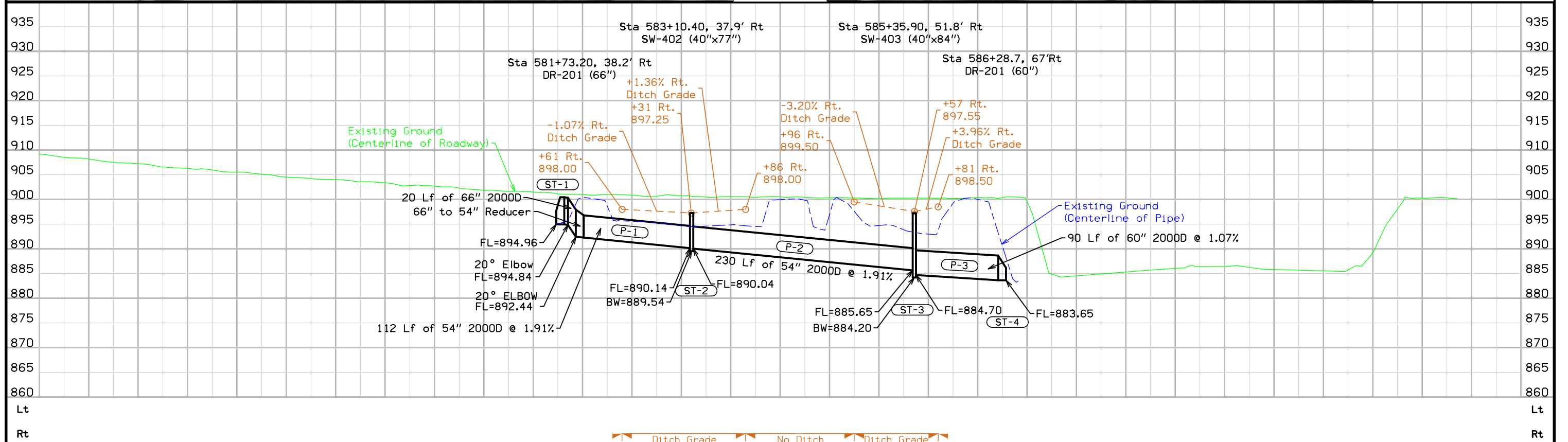
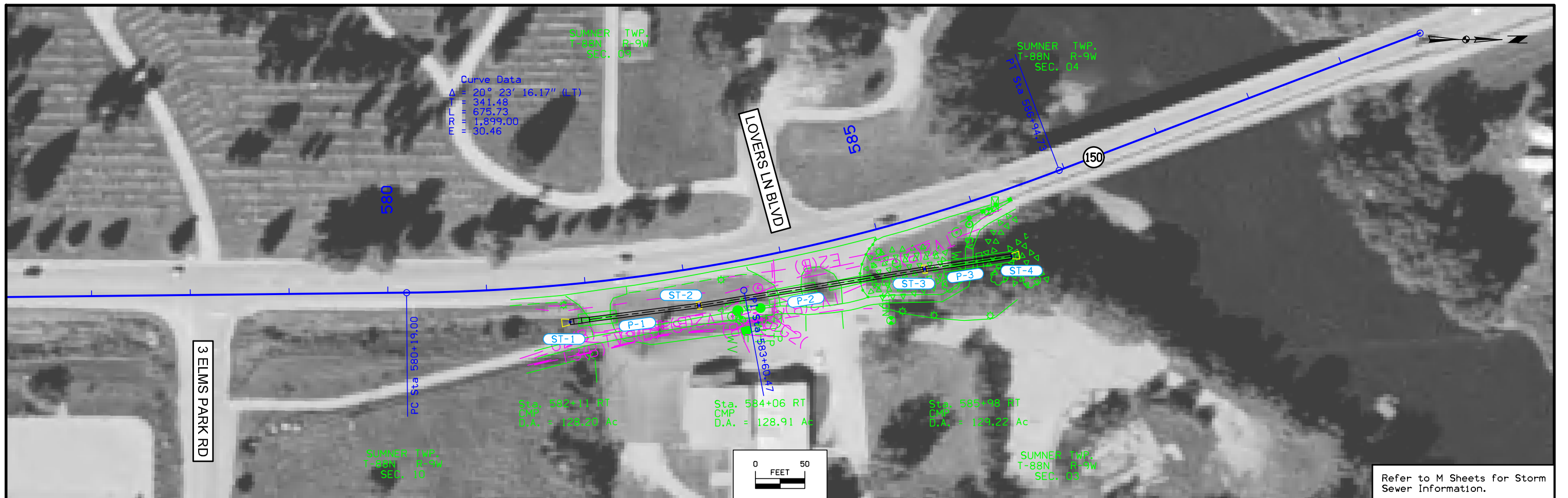


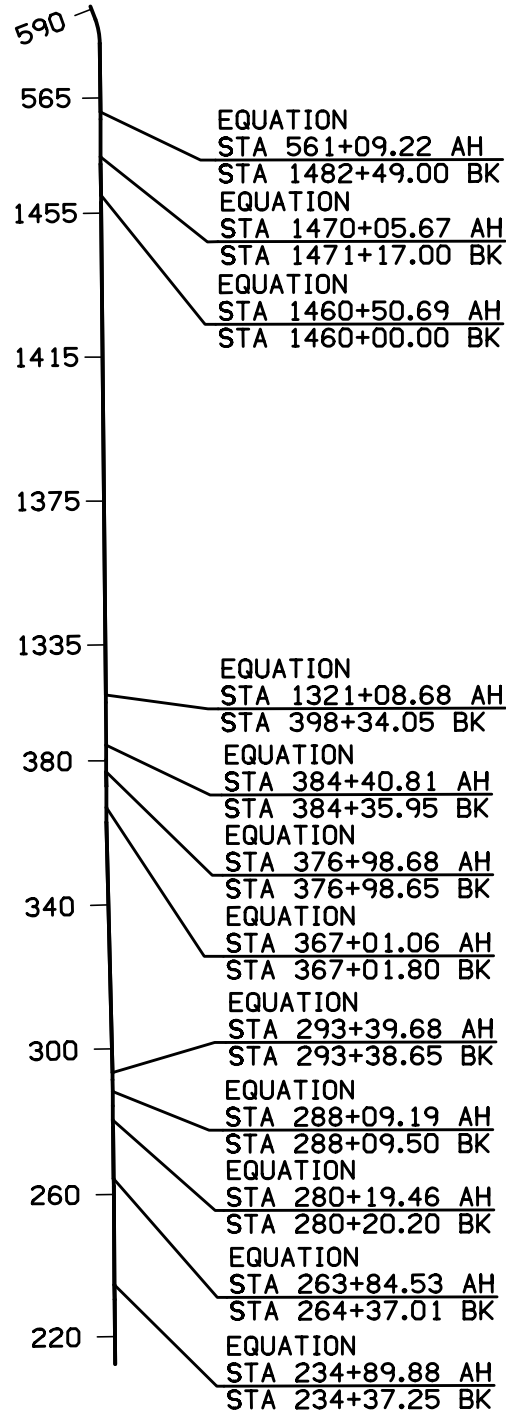






FILE NO.	ENGLISH	DESIGN TEAM	SNYDER AND ASSOCIATES, INC.	1465	1466	1467	1468	1469	1470	1471	1472	
				BUCHANAN COUNTY		PROJECT NUMBER		NHSN-150-3(72)--2R-10		SHEET NUMBER		D.10





Point MLHWY1	N	8,793,237.0193	E	15,597,513.5218	Sta	212+34.83
Course from MLHWY1 to MLHWY2 N 0° 36' 47.12" W Dist 1,797.9182						
Point MLHWY2	N	8,795,034.8345	E	15,597,494.2837	Sta	230+32.75
Course from MLHWY2 to 1000 N 0° 36' 47.12" W Dist 404.5001						
Equation: Sta 234+37.25 (BK) = Sta 234+89.88 (AH)					-----	End Region 1

-----					Begin Region 2	
Point 1000	N	8,795,439.3114	E	15,597,489.9555	Sta	234+89.88
Course from 1000 to MLHWY4 N 0° 22' 31.39" W Dist 2,744.1250						
Point MLHWY4	N	8,798,183.3775	E	15,597,471.9769	Sta	262+34.01
Course from MLHWY4 to 1001 N 0° 46' 44.34" W Dist 203.0000						
Equation: Sta 264+37.01 (BK) = Sta 263+84.53 (AH)					-----	End Region 2

-----					Begin Region 3	
Point 1001	N	8,798,386.3588	E	15,597,469.2170	Sta	263+84.53
Course from 1001 to MLHWY6 N 0° 37' 28.89" W Dist 1,432.6678						
Point MLHWY6	N	8,799,818.9414	E	15,597,453.5971	Sta	278+17.20
Course from MLHWY6 to 1002 N 1° 37' 37.61" W Dist 203.0000						
Equation: Sta 280+20.20 (BK) = Sta 280+19.46 (AH)					-----	End Region 3

-----					Begin Region 4	
Point 1002	N	8,800,021.8596	E	15,597,447.8329	Sta	280+19.46
Course from 1002 to MLHWY8 N 0° 02' 33.05" W Dist 388.0364						
Point MLHWY8	N	8,800,409.8959	E	15,597,447.5450	Sta	284+07.50
Course from MLHWY8 to 1003 N 0° 26' 27.46" W Dist 402.0000						
Equation: Sta 288+09.50 (BK) = Sta 288+09.19 (AH)					-----	End Region 4

-----					Begin Region 5	
Point 1003	N	8,800,811.8840	E	15,597,444.4512	Sta	288+09.19
Course from 1003 to MLHWY10 N 0° 43' 25.34" W Dist 326.9592						
Point MLHWY10	N	8,801,138.8170	E	15,597,440.3214	Sta	291+36.15
Course from MLHWY10 to 1004 N 0° 37' 34.07" W Dist 202.5000						
Equation: Sta 293+38.65 (BK) = Sta 293+39.68 (AH)					-----	End Region 5

-----					Begin Region 6	
Point 1004	N	8,801,341.3050	E	15,597,438.1086	Sta	293+39.68
Course from 1004 to MLHWY12 N 1° 25' 13.68" W Dist 6,959.1228						
Point MLHWY12	N	8,808,298.2892	E	15,597,265.5969	Sta	362+98.80
Course from MLHWY12 to 1005 N 0° 02' 28.58" E Dist 403.0003						
Equation: Sta 367+01.80 (BK) = Sta 367+01.06 (AH)					-----	End Region 6

-----					Begin Region 7	
Point 1005	N	8,808,701.2893	E	15,597,265.8872	Sta	367+01.06
Course from 1005 to MLHWY14 N 0° 07' 01.61" W Dist 595.0876						
Point MLHWY14	N	8,809,296.3757	E	15,597,264.6708	Sta	372+96.15
Course from MLHWY14 to 1006 N 0° 18' 45.23" W Dist 402.5003						
Equation: Sta 376+98.65 (BK) = Sta 376+98.68 (AH)					-----	End Region 7

-----					Begin Region 8	
Point 1006	N	8,809,698.8700	E	15,597,262.4750	Sta	376+98.68
Course from 1006 to MLHWY16 N 0° 23' 32.14" W Dist 333.7679						
Point MLHWY16	N	8,810,032.6301	E	15,597,260.1900	Sta	380+32.45
Course from MLHWY16 to 1007 N 0° 22' 30.78" W Dist 403.5002						
Equation: Sta 384+35.95 (BK) = Sta 384+40.81 (AH)					-----	End Region 8

-----					Begin Region 9	
Point 1007	N	8,810,436.1216	E	15,597,257.5476	Sta	384+40.81
Course from 1007 to MLHWY18 N 0° 21' 53.58" W Dist 1,189.7361						
Point MLHWY18	N	8,811,625.8336	E	15,597,249.9709	Sta	396+30.55
Course from MLHWY18 to 1008 N 0° 14' 35.86" W Dist 203.5000						
Equation: Sta 398+34.05 (BK) = Sta 1321+08.68 (AH)					-----	End Region 9

-----					Begin Region 10	

Point 1008	N	8,811,829.3317	E	15,597,249.1068	Sta	1321+08.68
Course from 1008 to MLHWY20 N 0° 32' 23.73" W Dist 13,689.3178						
Point MLHWY20	N	8,825,518.0418	E	15,597,120.1076	Sta	1457+98.00
Course from MLHWY20 to 1009 N 1° 08' 50.97" W Dist 202.0000						
Equation: Sta 1460+00.00 (BK) = Sta 1460+50.69 (AH)					-----	End Region 10

-----					Begin Region 11	
Point 1009	N	8,825,720.0012	E	15,597,116.0624	Sta	1460+50.69
Course from 1009 to MLHWY22 N 0° 41' 05.62" W Dist 864.3145						
Point MLHWY22	N	8,826,584.2540	E	15,597,105.7309	Sta	1469+15.00
Course from MLHWY22 to 1010 N 0° 53' 48.18" W Dist 201.9999						
Equation: Sta 1471+17.00 (BK) = Sta 1470+05.67 (AH)					-----	End Region 11

-----					Begin Region 12	
Point 1010	N	8,826,786.2291	E	15,597,102.5696	Sta	1470+05.67
Course from 1010 to MLHWY24 N 0° 06' 41.42" E Dist 1,043.3278						
Point MLHWY24	N	8,827,829.5550	E	15,597,104.6000	Sta	1480+49.00
Course from MLHWY24 to 1011 Due North Dist 200.0000						
Equation: Sta 1482+49.00 (BK) = Sta 561+09.22 (AH)					-----	End Region 12

-----					Begin Region 13	
Point 1011	N	8,828,029.5550	E	15,597,104.6000	Sta	561+09.22
Course from 1011 to PC ML 150-1 N 0° 37' 24.07" W Dist 1,909.7783						
Curve Data *-----*						
Curve ML 150-1						
P.I. Station	=	583+60.47	N	8,830,280.6870	E	15,597,081.3477
Delta	=	20° 23' 16.17"	(LT)			
Degree	=	3° 01' 01.76"				
Tangent	=	341.4758				
Length	=	675.7301				
Radius	=	1,899.0000				
External	=	30.4576				
Long Chord	=	672.1707				
Mid. Ord.	=	29.9768				
P.C. Station	=	580+19.00	N	8,829,939.2202	E	15,597,083.8229
P.T. Station	=	586+94.73	N	8,830,599.9007	E	15,596,960.0699
C.C.	=		N	8,829,925.4556	E	15,595,184.8728
Back	=	N 0° 24' 55.10"	W			
Ahead	=	N 20° 48' 11.27"	W			
Chord Bear	=	N 10° 36' 33.18"	W			
Course from PT ML 150-1 to MLHWY26 N 20° 48' 11.27" W Dist 390.9229						
Point MLHWY26	N	8,830,965.3379	E	15,596,821.2305	Sta	590+85.65



Survey Information

BUCHANAN COUNTY
 PIN:14-10-150-010
 NHSN-150-3(72)--2R-10
 PIPE CULVERTS ALONG
 HWY 150 IN BUCHANAN COUNTY
 SAP:0642.1

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 Highway 150 in Buchanan 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 IARCSZONE5 coordinate system. Horizontal positions were established by 120 second averaged observations utilizing the IARTN.

VERTICAL CONTROL

Point	North	East	Elevation	Feature	Description
BM1	8795329.4530	15597552.5700	894.1340	BM	◇ BENCH MARK
BM2	8800564.9830	15597406.7500	894.8560	BM	60 D SPIKE PP◇ BENCH MARK
BM3	8808416.5710	15597204.5700	912.6110	BM	NAIL PP◇ BENCH MARK
BM4	8809544.0000	15597202.7500	917.1040	BM	◇ BENCH MARK
BM5	8810372.0800	15597196.6100	916.1100	BM	◇ BENCH MARK
BM6	8830297.2120	15597099.6600	899.8390	BM	SE BOTTOM BOLT◇ BENCH MARK
BM7	8865818.7140	15593033.2800	991.5260	BM	CON MON◇ BENCH MARK

CONTROL POINTS

Point	North	East	Elevation	Feature	Description
B3780	8828069.4920	15597044.1400	929.5190	CP	1/2 IRS◇ CONTROL POINT
B3788	8811928.1640	15597220.6000	912.5470	CP	1/2 IRS◇ CONTROL POINT
CP21	8830531.6680	15597111.4300	900.5690	CP	◇ CONTROL POINT
CP15	8809391.6680	15597282.2900	915.6720	CP	◇ CONTROL POINT
CP10	8799967.5210	15597469.8800	894.4710	CP	◇ CONTROL POINT
CP13	8808410.9560	15597284.5200	912.4470	CP	◇ CONTROL POINT
CP9	8799866.9950	15597470.3100	894.4210	CP	◇ CONTROL POINT
CP8	8798192.0570	15597442.6300	900.3560	CP	◇ CONTROL POINT
CP6	8795386.3470	15597516.5500	896.5570	CP	◇ CONTROL POINT
CP2	8773761.3770	15597563.3800	941.8390	CP	◇ CONTROL POINT
CP7	8798344.1030	15597231.1400	895.1650	CP	◇ CONTROL POINT
CP23	8865790.8730	15592965.4000	989.9220	CP	◇ CONTROL POINT
CP5	8795144.1190	15597511.4300	895.7040	CP	◇ CONTROL POINT
CP11	8800503.5940	15597465.5700	895.3830	CP	◇ CONTROL POINT
CP14	8808592.9670	15597283.2700	912.1750	CP	◇ CONTROL POINT
CP12	8800710.3290	15597462.7300	895.9790	CP	◇ CONTROL POINT
CP1	8773639.6990	15597563.9600	942.4430	CP	◇ CONTROL POINT
CP3	8778653.5630	15597537.3500	921.1330	CP	◇ CONTROL POINT
CP4	8778753.4340	15597536.7100	922.0200	CP	◇ CONTROL POINT
CP20	8830319.2390	15597106.5800	900.1170	CP	◇ CONTROL POINT
CP16	8809586.9590	15597280.2200	916.2960	CP	◇ CONTROL POINT
CP17	8810139.2660	15597277.0200	916.2410	CP	◇ CONTROL POINT
CP18	8810359.4710	15597275.4000	916.0800	CP	◇ CONTROL POINT
B3784	8827837.8850	15597134.2700	928.8110	CP	1/2 IRS◇ CONTROL POINT
CP19	8830131.3740	15597135.5700	900.0070	CP	◇ CONTROL POINT
B3792	8811665.6970	15597223.0100	913.0480	CP	1/2 IRS◇ CONTROL POINT
CP22	8865784.0890	15593035.3000	989.9050	CP	◇ CONTROL POINT

Buchanan	ROW: NHSN-150-3(73)--2R-10					PIN 14-10-150-010													
	Benton Co to Fayette Co																		
			STATE			COUNTY						TEMP EASE		BORROW					
PARCEL NO	OWNER NAME	FEE	EASE	FEE	EASE	FEE	EASE	EXCESS				FEE	T.E.	MITIGATION	OTHER	HOUSE	BUILDING(S)	A/C ONLY	TOTAL ACQ.
1	Shirley A Grover - Fee		0.25 AC									0 SF							
2	Margaret Prahm Kephart - Fee		0.01 AC									3178 SF							
3	Ceramatech Corporation Inc. - Fee		0.08 AC																
4	Daniel Denbeste - Fee		0.04 AC																
5	Lorraine M. Mochal Trust - Fee		0.09 AC																
6	Richard P Wiese - Fee		0.06 AC																
7	Keith Smith - Fee		0.25 AC									8370 SF							
8	Robert D. Crawford - Fee		0.04 AC																
9	Betty J. Anderson - Fee		0.04 AC																
10	K A L M Farms, LLC - Fee Lisa M Patton, REM - Fee Kimberly S Holub, REM - Fee Andrew C Johnson, REM - Fee Melanie K Svoboda, REM - Fee Susan J. Johnson, LE - Fee		0.01 AC																
11	Burco Land, LC - Fee		0.09 AC																
12	Rodney P Brandt - Fee Ronald H Brandt - Fee		0.04 AC																
13	Farmer's Savings Bank - Fee John C Shannon - CP1											217 SF							
14	City of Independence - Fee											865 SF							
14 Parcels	"TOTALS	0 AC	1 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0 AC	0 AC		0 AC	0 AC	0 AC				
		0 SF		0 SF	0 SF	0 SF	0 SF	0 SF	0 SF	0 SF	0 SF	12630 SF							

NO ACCESS RIGHTS ARE TO BE ACQUIRED ON THIS PROJECT.

ACCESS CONTROL PREVIOUSLY ACQUIRED

HOMER TWP.
T-87N R-9W
SEC. 09

①
SHIRLEY A. GROVER

Sta. 232+45.25
Install 48" x 80' Trenchless 2000D RCP
F.L. = Lt. 886.80
Rt. 889.32

230+85 ϕ 25'±EX R/W
231+95 ϕ 95'
232+15 ϕ 90'
232+70 ϕ 80'
232+95 ϕ 95'
233+45 ϕ 50'
233+75 ϕ 25'±EX R/W

232+05 ϕ 71'± EX R/W
231+95 ϕ 105'
232+20 ϕ 75'
232+95 ϕ 105'
232+80 ϕ 71'±EX R/W
232+60 ϕ 75'

Sta. 235+35
Skew 90°
4' x 4' RCB, w/54" RCP Ext.
D.A. = 66.47 Ac
(Abandon)

U.A.C.
Ent. +92 R/W



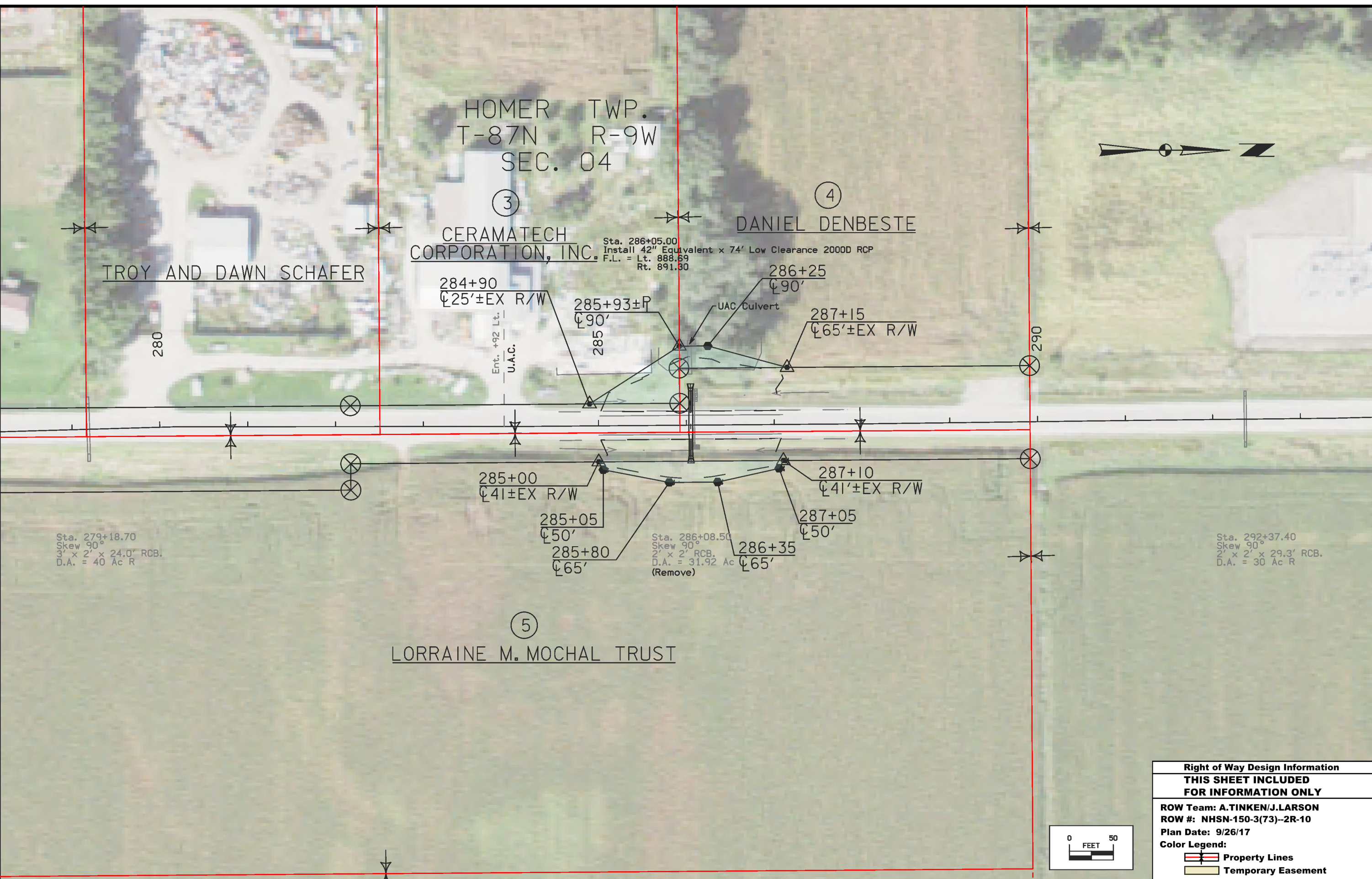
Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: A.TINKEN/J.Larson	
ROW #: NHSN-150-3(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

HOMER TWP.
T-87N R-9W
SEC. 04



③ CERAMATECH CORPORATION, INC.
④ DANIEL DENBESTE

TROY AND DAWN SCHAFER



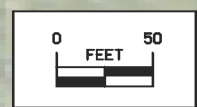
Sta. 279+18.70
Skew 90°
3' x 2' x 24.0' RCB.
D.A. = 40 Ac R

Sta. 286+08.50
Skew 90°
2' x 2' RCB.
D.A. = 31.92 Ac
(Remove)

Sta. 292+37.40
Skew 90°
2' x 2' x 29.3' RCB.
D.A. = 30 Ac R

⑤ LORRAINE M. MOCHAL TRUST

Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-3(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

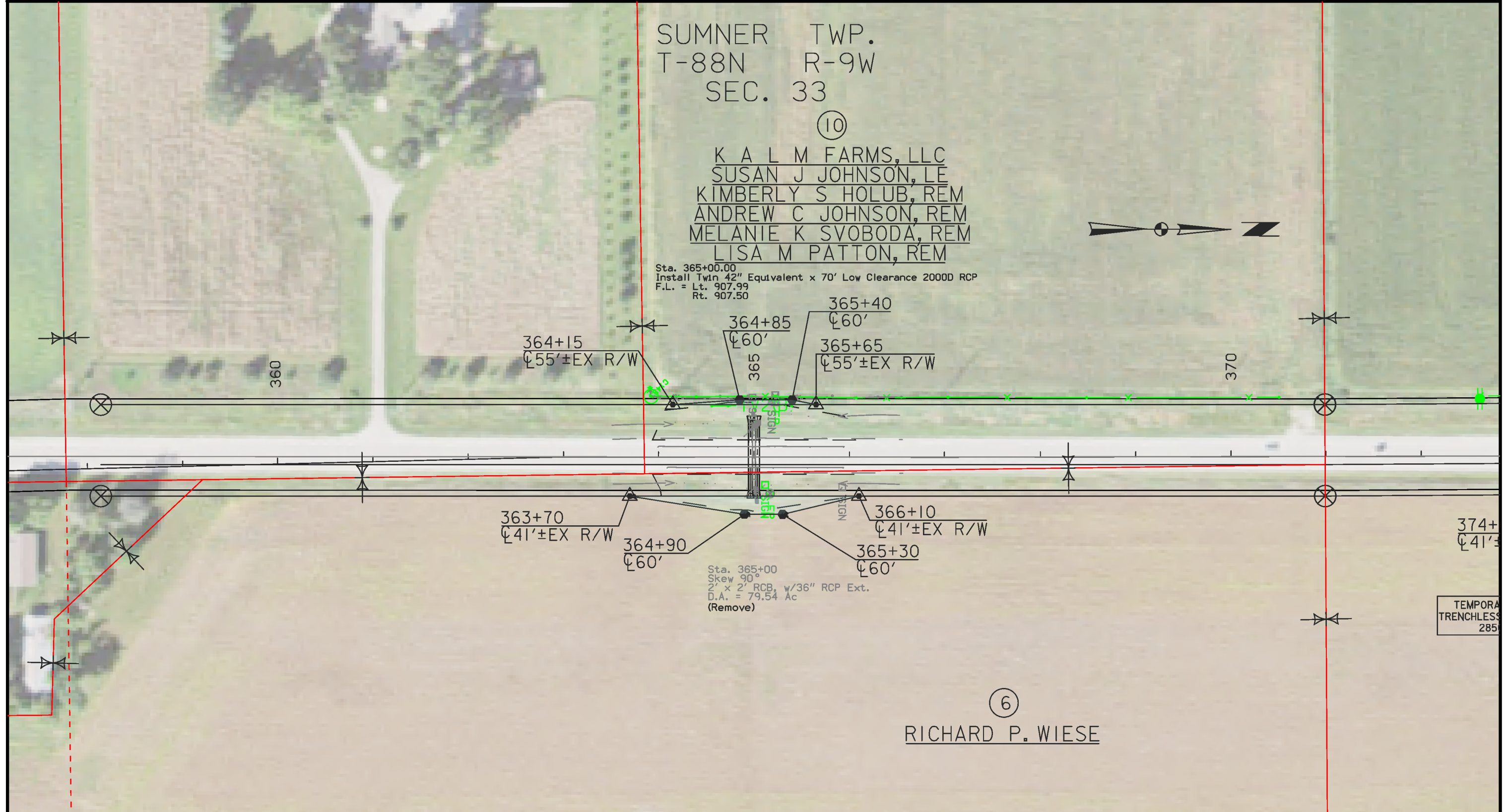
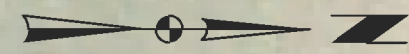


SUMNER TWP.
T-88N R-9W
SEC. 33

⑩

K A L M FARMS, LLC
SUSAN J JOHNSON, LE
KIMBERLY S HOLUB, REM
ANDREW C JOHNSON, REM
MELANIE K SVOBODA, REM
LISA M PATTON, REM

Sta. 365+00.00
Install Twin 42" Equivalent x 70' Low Clearance 2000D RCP
F.L. = Lt. 907.99
Rt. 907.50



Sta. 365+00
Skew 90°
2' x 2' RCB, w/36" RCP Ext.
D.A. = 79.54 Ac
(Remove)

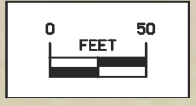
TEMPORARY
TRENCHLESS
285'

⑥

RICHARD P. WIESE

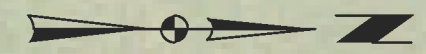
SUMNER TWP.
T-88N R-9W
SEC. 34

Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-3(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition



SUMNER TWP.
T-88N R-9W
SEC. 28

9
BETTY J. ANDERSON



Sta. 375+05.90
Install 30" x 74' Trenchless RCP
F.L. = Lt. 912.75
Rt. 911.25

Sta. 382+25.90
Install 30" x 78' Trenchless RCP
F.L. = Lt. 911.00
Rt. 910.50

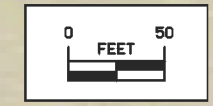
TEMPORARY EASEMENT FOR
TRENCHLESS PIPE INSTALLATION
2850 SQ FT

Sta. 374+97
Skew 90°
2' x 2' RCB, w/30" RCP Ext.
D.A. = 8.83 Ac
(Abandon)

Sta. 382+34
Skew 90°
RCB
D.A. = 10.30 Ac
(Abandon)

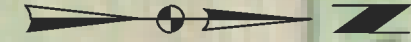
SUMNER TWP.
T-88N R-9W
SEC. 27

7
KEITH AND LINDA SMITH



Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-2(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

SUMNER TWP.
T-88N R-9W
SEC. 28



⑧
ROBERT D. CRAWFORD, ETAL

397+21±EX R/W
⌀75'

Sta. 397+13.70
Install 66" x 72' Trenchless RCP
F.L. = Lt. 906.20
Rt. 905.40

396+60
⌀80'

396+20
⌀55'±EX R/W

395

390

1325

396+20
⌀41'±EX R/W

396+30
⌀65'

396+65
⌀105'

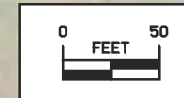
Sta. 397+32.3
Skew 90°
4' x 3' RCB. w/30" CMP LF, 42" RCP RT
D.A. = 140 Ac
(Abandon)

397+23±EX R/W
⌀90'

397+22±EX R/W
⌀105'

⑦
KEITH AND LINDA SMITH

SUMNER TWP.
T-88N R-9W
SEC. 27



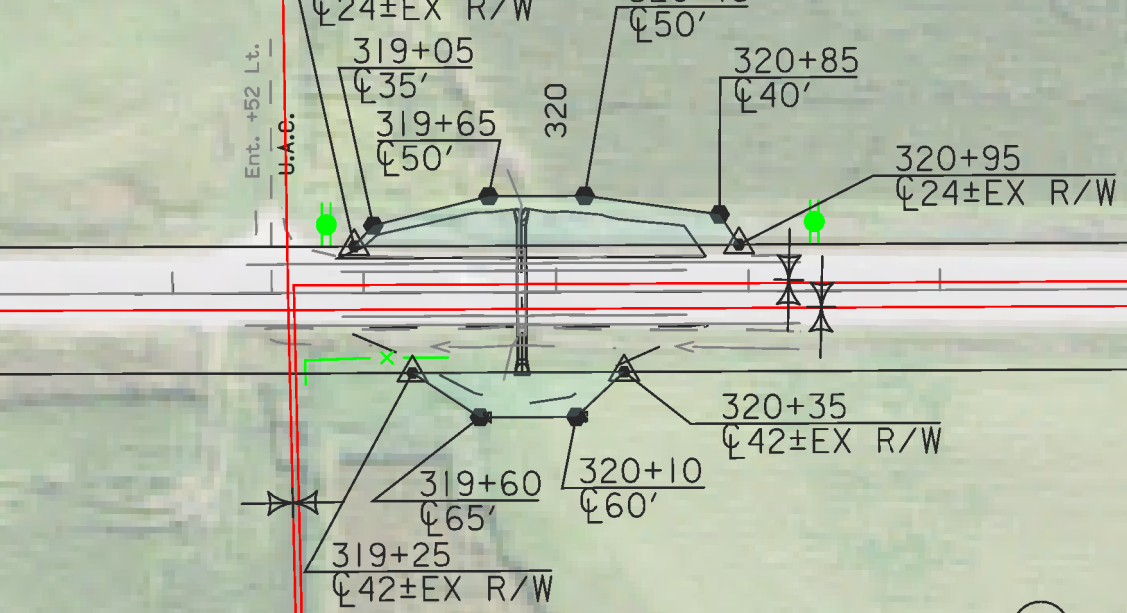
Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-2(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

HAZELTON TWP.
T-90N R-9W
SEC. 33



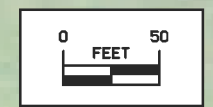
Ⓜ
BURCO LAND LC

Sta. 319+82.00
Install 48" Equivalent x 70' Low Clearance RCP
F.L. = L.t. 986.90
R.t. 988.60



Ⓜ
RODNEY P. AND MARY ELLEN BRANDT
AND RONALD H. AND RUTH E. BRANDT

HAZELTON TWP.
T-90N R-9W
SEC. 34



Right of Way Design Information	
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ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-2(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

HAZELTON TWP.
T-90N R-9W
SEC. 33



580

585

590

Sta. 582+11 RT
CMP
D.A. = 128.20 Ac.

Sta. 584+08 RT
CMP
D.A. = 128.9

Sta. 585+98 RT
CMP
D.A. = 129.22 Ac

584+38±P
±55.05'

584+75±P
±65'

584+95
±65'

585+45
±80'

585+65
±75'±EX R/W

CITY OF INDEPENDENCE

TEMPORARY EASEMENT
TO SHAPE

FARMER'S SAVINGS BANK
CP: JOHN C SHANNON

TEMPORARY EASEMENT
TO SHAPE

HAZELTON TWP.
T-90N R-9W
SEC. 34



Right of Way Design Information	
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ROW Team: A.TINKEN/J.LARSON	
ROW #: NHSN-150-2(73)--2R-10	
Plan Date: 9/26/17	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

108-23A
08-01-08

TRAFFIC CONTROL PLAN

1. At least one lane of traffic on Iowa 150 shall be maintained at all times.
2. Shoulder closures as necessary to jack pipe or tie joints shall be per Standard Road Plan TC-202.
3. Lane closures as necessary to install trenched pipe, tie joints, or repair collars shall be per Standatr Road Plan TC-217 and details shown elsewhere in these plans.
4. Access to individual properties shall be maintained at all times.

108-26A
08-01-08

STAGING NOTES

Culverts installed by open trench methods shall be constructed half-at-a-time using single lane closures and TBR. Abandon existing culvert once new culvert is complete.

Stage construction of storm sewer system near Sta. 584 such that at least one entrance to the property remains open at all times.

113-2
04-16-13

PEDESTRIAN PATH CLOSURES

Refer to TC-601.

*Assumes 6 foot wide barricade.
Closures may need to be removed and re-established.

Location	Side	Type III Barricades*	Remarks
		No.	
Sta. 580+75	RT	2	
Sta. 585+50	RT	2	

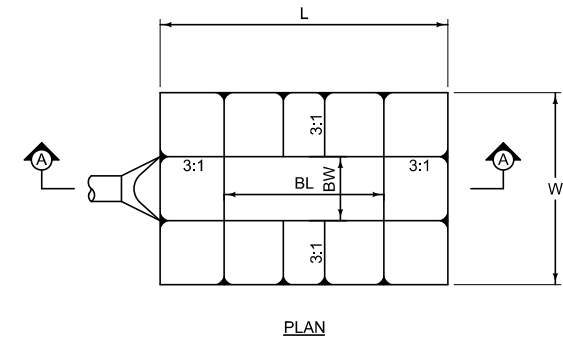
STORM SEWER

① Diameter or equivalent diameter

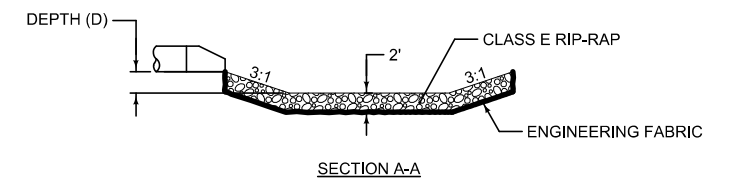
* Bid Item

** For SW-545

INTAKES AND UTILITY ACCESSES							PIPES													
							Design Length, Slope, and Flowlines are calculated from center of structure to center of structure along CL of pipe.													
No.	Location Station and Offset	*Type or Standard Road Plan	Form Grade	Bottom Well	Extension Length**	Notes	Line Number	Intake/Utility Access No.		Class 'D'	Pipe Size ①	Bid* Length	Design Length	Slope %	Connected Pipe Joint (DR-121) Type	Flow Lines			Pipe Profile Sheet No.	Notes
			Elev.	Elev.	FT			From	To							IN	FT	FT		
1	581+73.2, 38.2' RT	DR-201				66"	P1	1	BEND	2000	66	4	12.0	1.00		894.96		894.84		20 DEG BEND
2	583+10.4, 37.9' RT	SW-402	897.25	889.54		40" x 77"		BEND	BEND	2000	66	8	8.0	30.00				892.44		20 DEG BEND
3	585+35.9, 51.8' RT	SW-403	897.22	884.2		40" x 84"		BEND	RED	2000	66	8	8.0	1.91				892.28		W 66"-54" REDUCER
4	586+28.7, 67.0' RT	DR-201				60"		RED	2	2000	54	112	112.0	1.91			890.14			
							P2	2	3	2000	54	230	230.0	1.91		890.04		885.65		
							P3	3	4	2000	60	90	98.0	1.07		884.70		883.65		



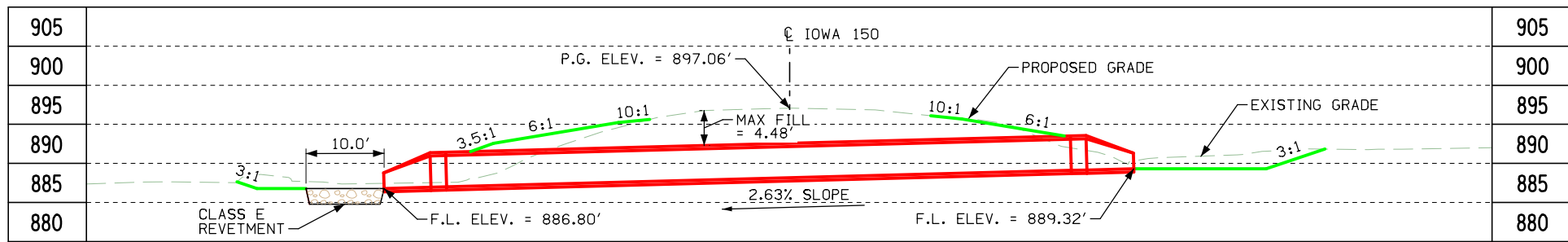
PLAN



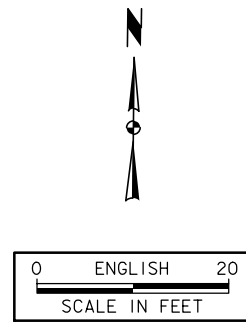
SECTION A-A

Refer to Tab 100-23
For further information

SETTLING BASIN



LONGITUDINAL SECTION ALONG CL CULVERT



BENCH MARK NO.1
 ELEV. 894.13
 STA. 233+26.73, 61' RT
 60D SPIKE IN POWER POLE

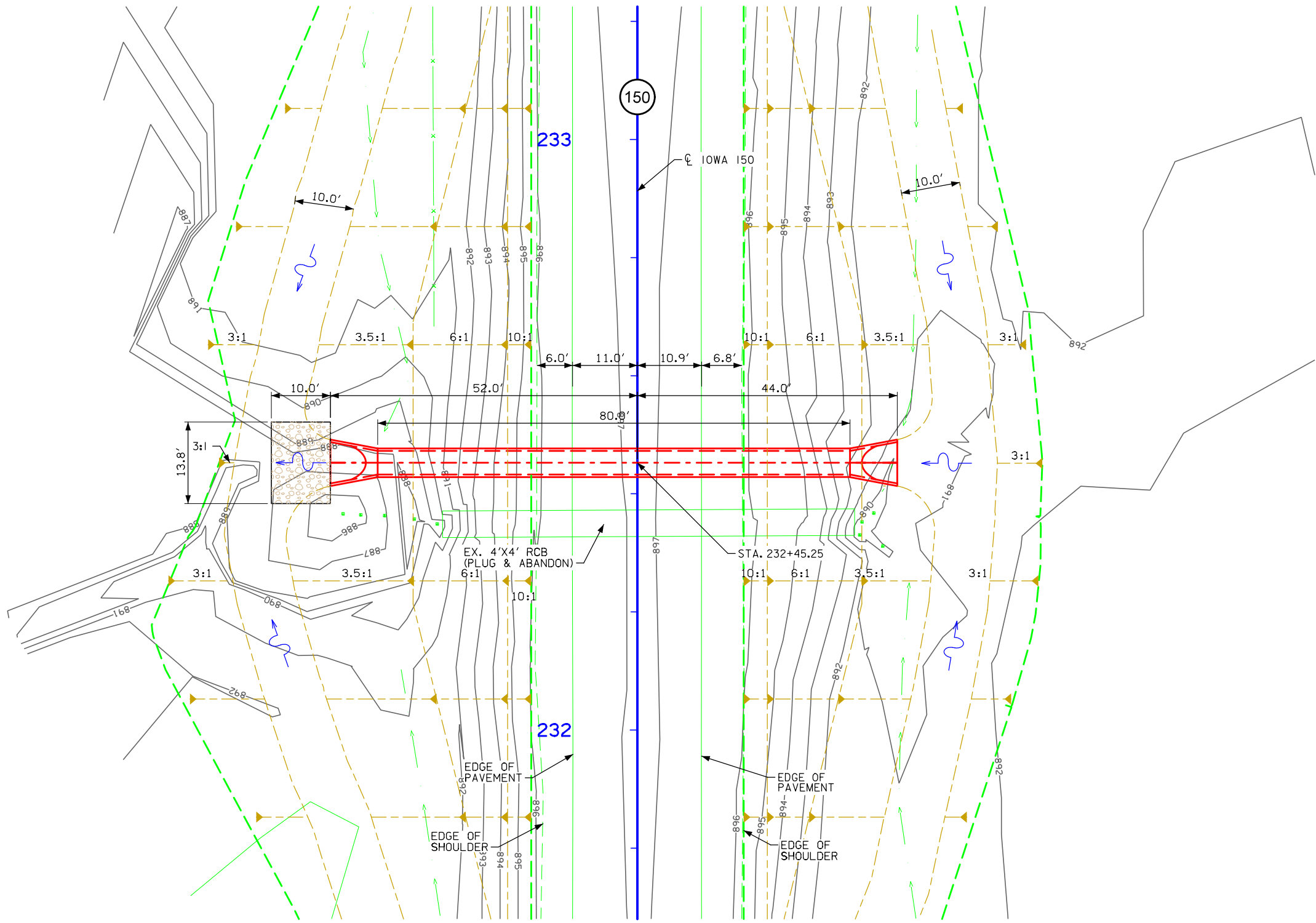
HYDRAULIC DATA

DRAINAGE AREA = 66.47 ACRES
 $Q_{50} = 108.35$ CFS
 HW ELEV. = 894.18'

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

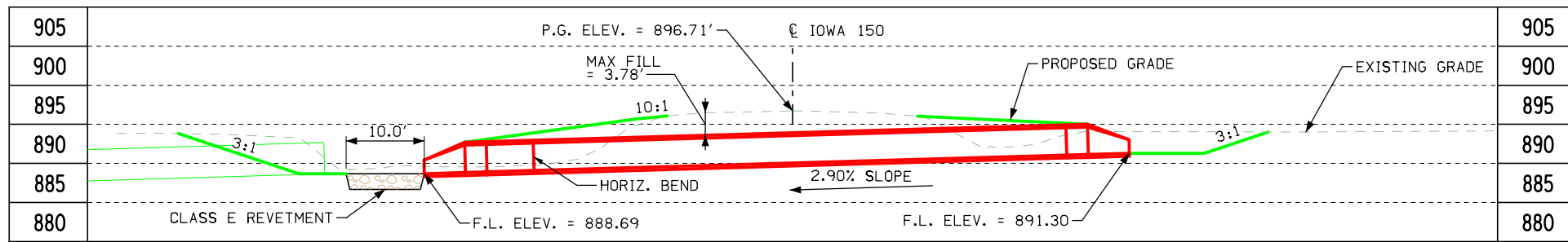
LOCATION

IOWA 150
 T-87N R-9W
 SECTION 9 & 10
 HOMER TOWNSHIP
 BUCHANAN COUNTY

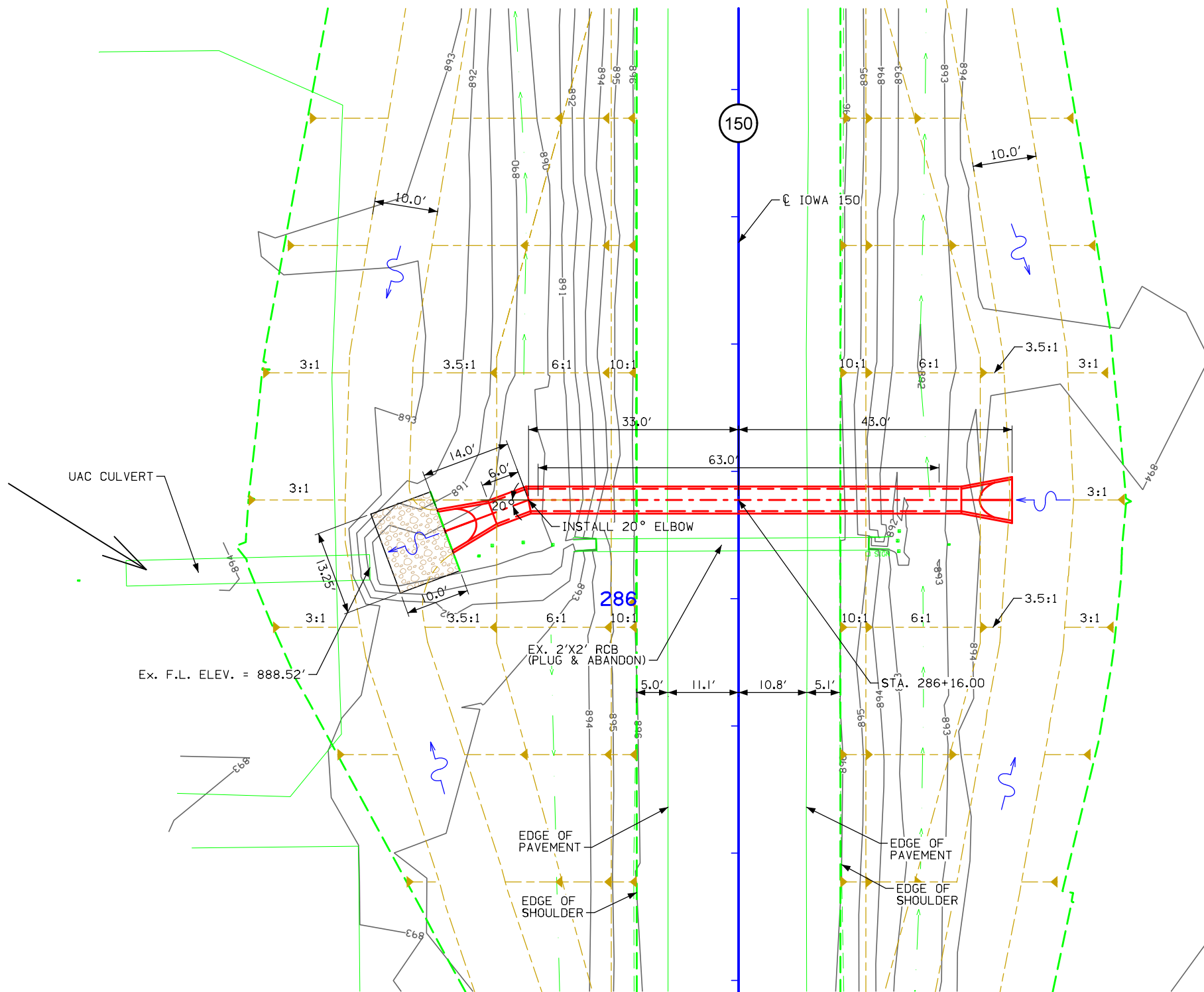


PLAT PLAN

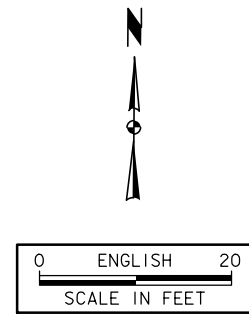
DESIGN FOR 0° SKEW
48" (TRENCHLESS) X 80'
REINFORCED CONCRETE PIPE
 PLAT PLAN
 STA. 232+45.25 CL IOWA 150 DEC. 2018
BUCHANAN COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ___ OF ___ FILE NO. ___ DESIGN NO. ___



LONGITUDINAL SECTION ALONG CL CULVERT



PLAT PLAN



BENCH MARK NO.2
ELEV. 894.86
STA. 285+62.86, 40' LT
60D SPIKE IN POWER POLE

HYDRAULIC DATA

DRAINAGE AREA = 31.92 ACRES
Q₅₀ = 63.01 CFS
HW ELEV. = 893.04

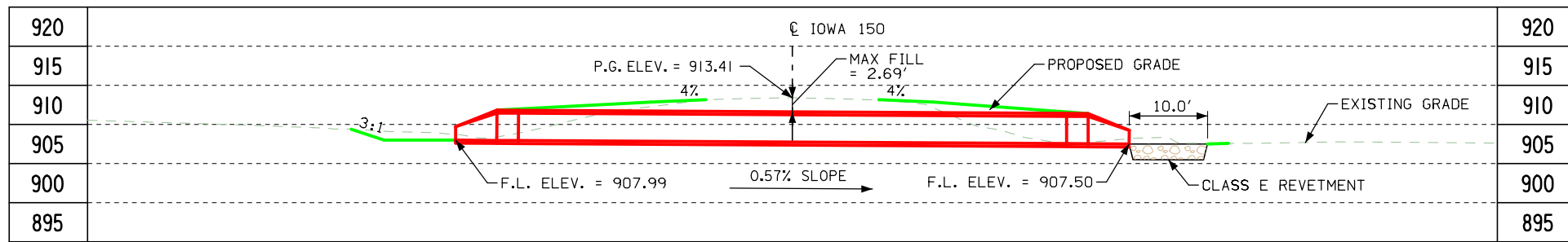
UTILITIES LEGEND:

REFER TO SHEET D.1 FOR UTILITY LEGEND

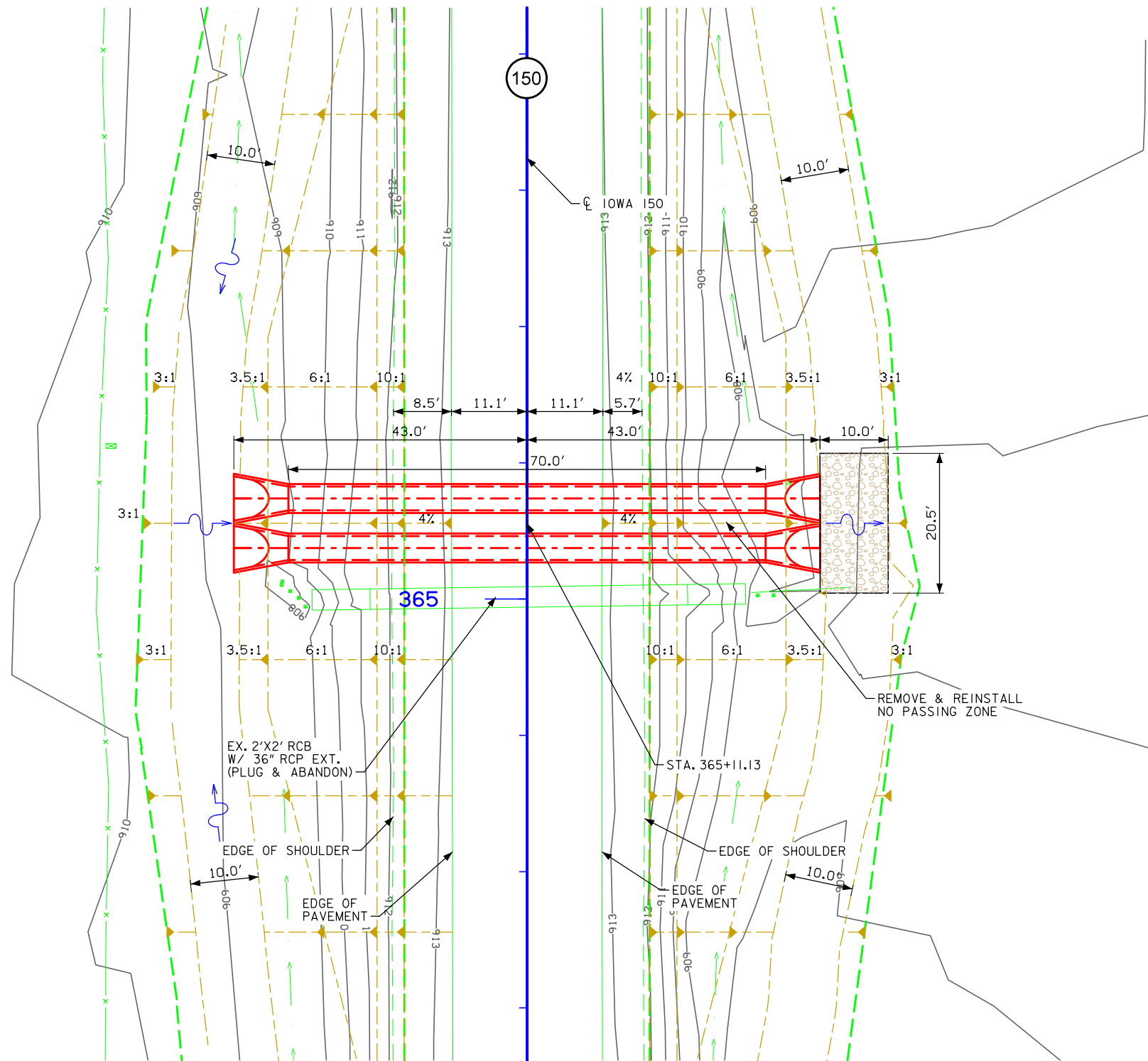
LOCATION

IOWA 150
T-87N R-9W
SECTION 3 & 4
HOMER TOWNSHIP
BUCHANAN COUNTY

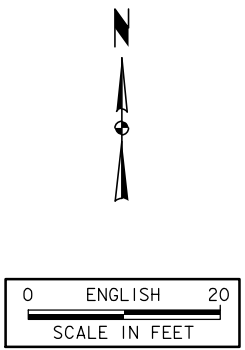
DESIGN FOR 0° SKEW
**42" EQUIVALENT X 74'
LOW CLEARANCE
REINFORCED CONCRETE PIPE
PLAT PLAN**
STA. 286+16.00 CL IOWA 150 DEC. 2018
BUCHANAN COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____



LONGITUDINAL SECTION ALONG CULVERT



PLAT PLAN



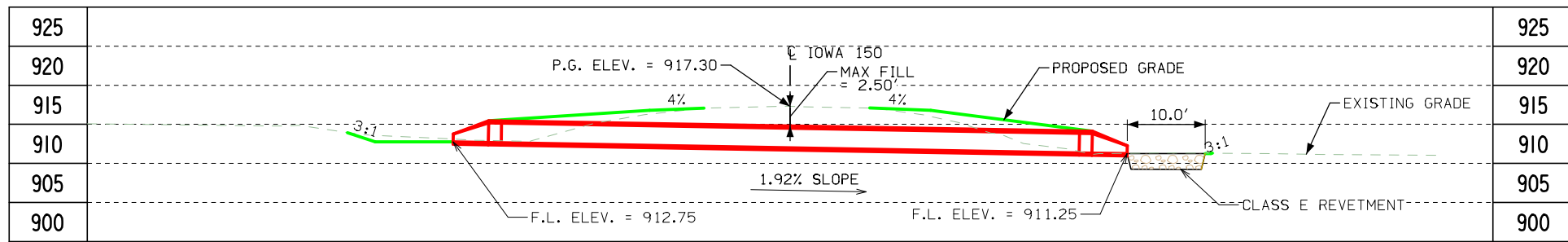
BENCH MARK NO.3
 ELEV. 912.61
 STA. 364+17.04, 61' LT
 60D SPIKE IN POWER POLE

HYDRAULIC DATA
 DRAINAGE AREA = 79.54 ACRES
 Q₅₀ = 124.25 CFS

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

LOCATION
 IOWA 150
 T-88N R-9W
 SECTION 33 & 34
 SUMNER TOWNSHIP
 BUCHANAN COUNTY

DESIGN FOR 0° SKEW
**TWIN 42" EQUIVALENT X 70'
 LOW CLEARANCE
 REINFORCED CONCRETE PIPE
 PLAT PLAN**
 STA. 365+11.13 CULVERT IOWA 150 DEC. 2018
BUCHANAN COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



LONGITUDINAL SECTION ALONG CULVERT



BENCH MARK NO.4
 ELEV. 917.10
 STA. 375+44.11, 61' LT
 60D SPIKE IN POWER POLE

HYDRAULIC DATA

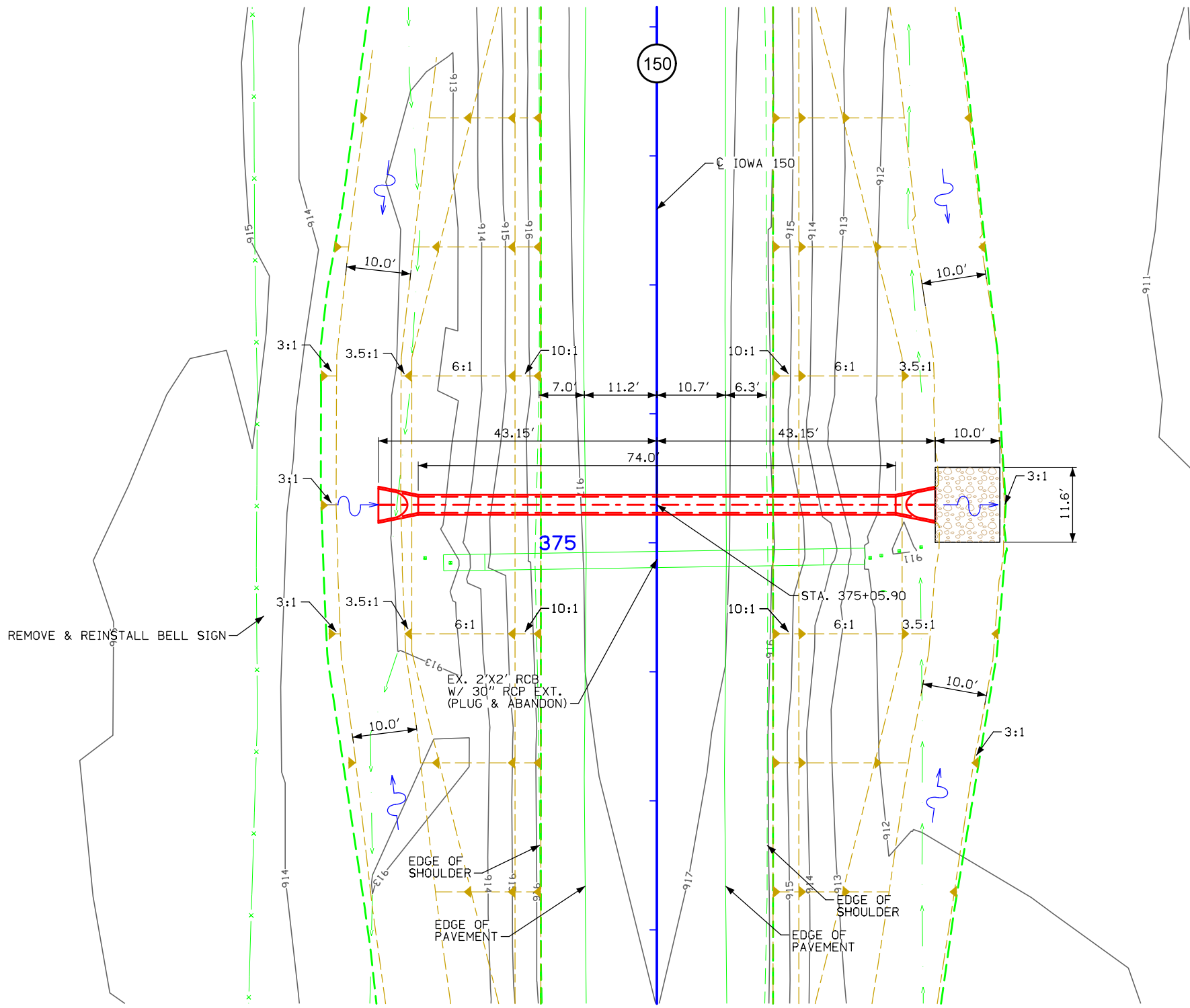
DRAINAGE AREA = 8.83 ACRES
 $Q_{50} = 24.72$ CFS

UTILITIES LEGEND:

REFER TO SHEET D.1 FOR UTILITY LEGEND

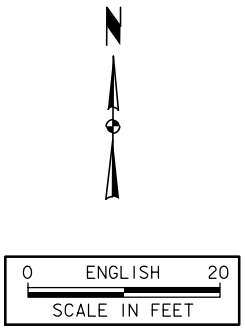
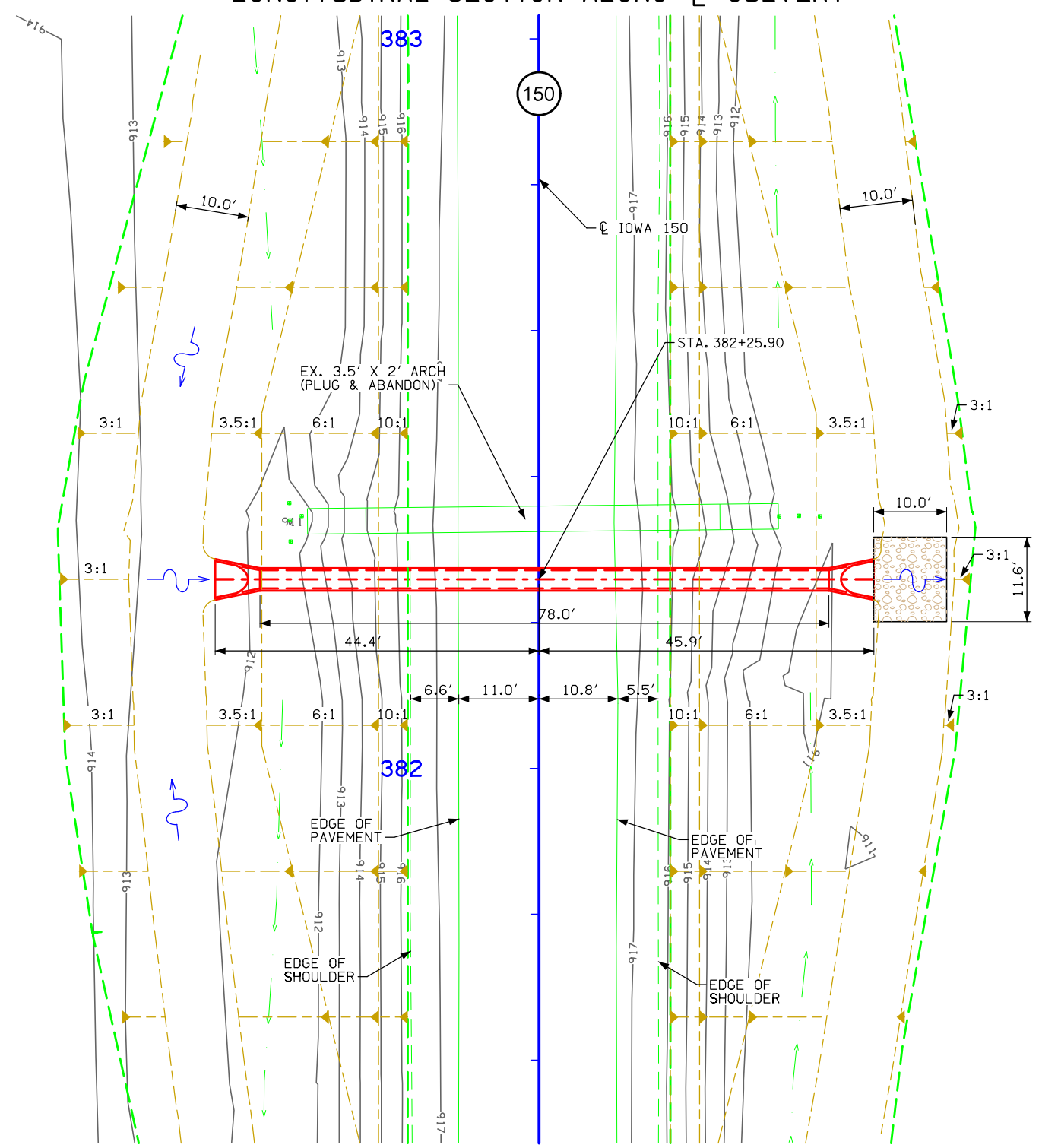
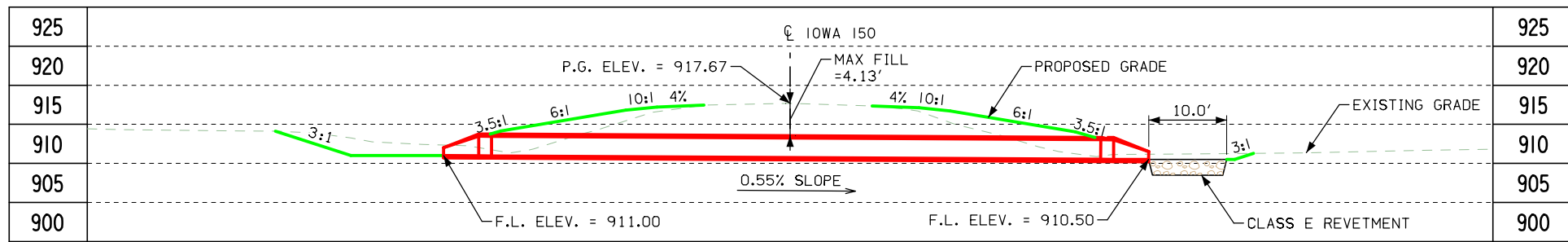
LOCATION

IOWA 150
 T-88N R-9W
 SECTION 27 & 28
 SUMNER TOWNSHIP
 BUCHANAN COUNTY



PLAT PLAN

DESIGN FOR 0° SKEW
30" (TRENCHLESS) X 74'
REINFORCED CONCRETE PIPE
 PLAT PLAN
 STA. 375+05.90 C IOWA 150 DEC. 2018
BUCHANAN COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. ____ OF ____ FILE NO. ____ DESIGN NO. ____



BENCH MARK NO.5
ELEV. 916.11
STA. 383+72.31, 61' LT
60D SPIKE IN POWER POLE

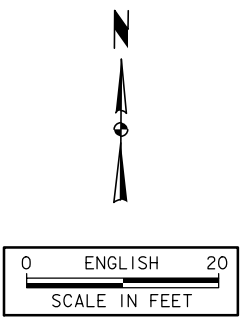
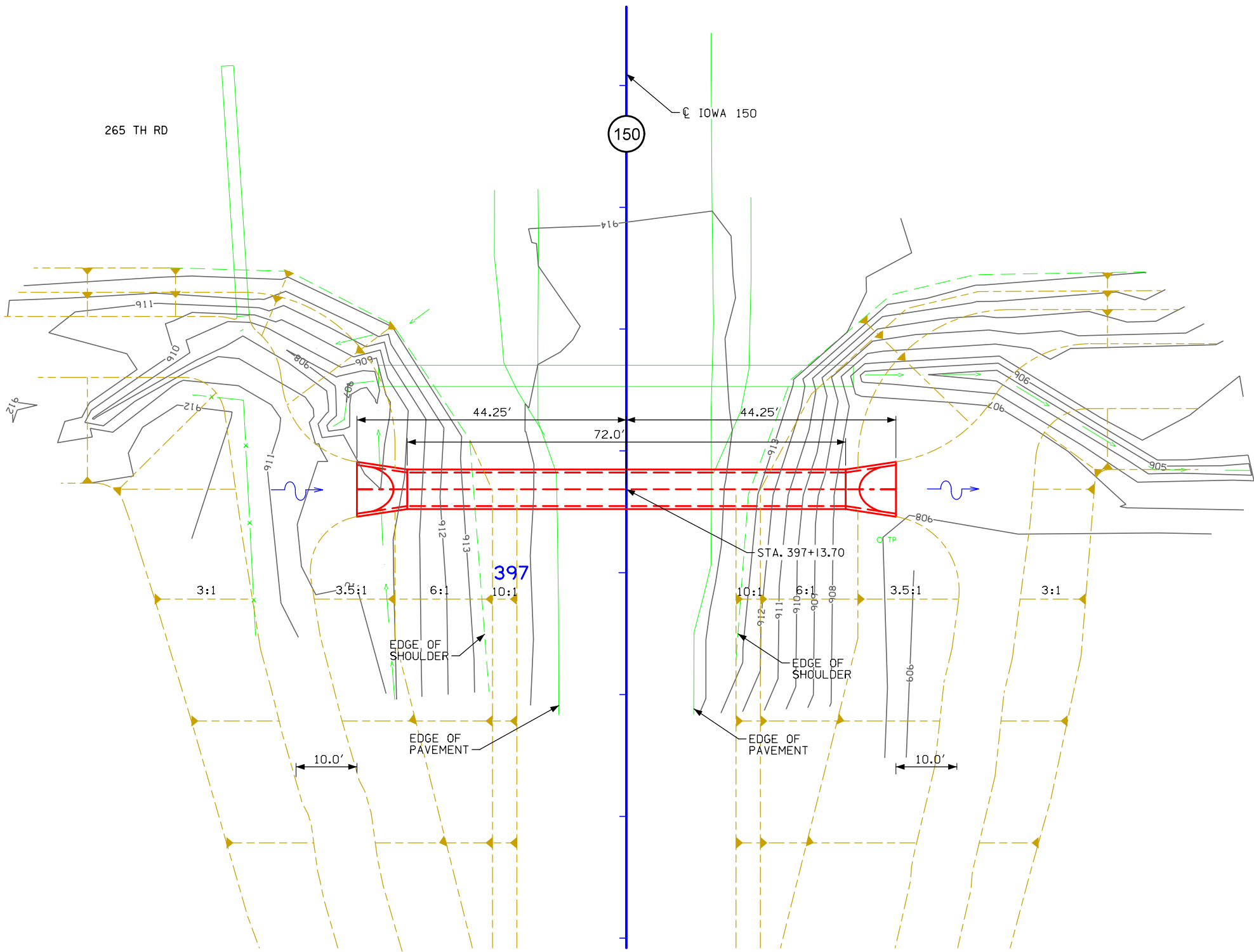
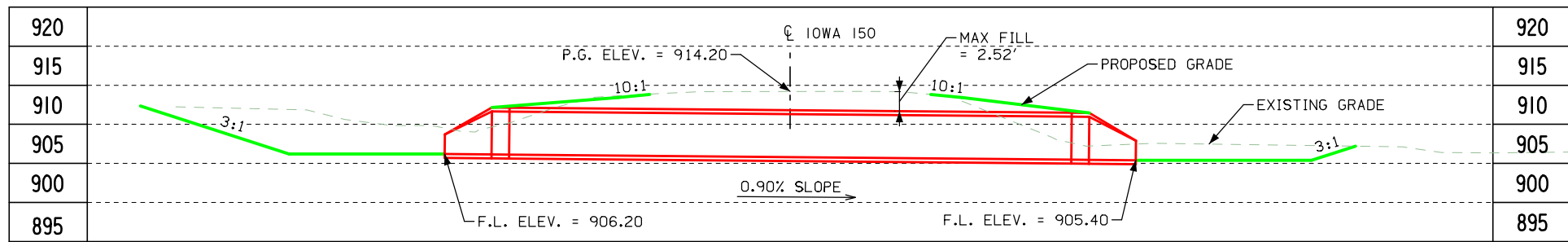
HYDRAULIC DATA
DRAINAGE AREA = 10.30 ACRES
 $Q_{50} = 27.31$ CFS

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

LOCATION
IOWA 150
T-88N R-9W
SECTION 27 & 28
SUMNER TOWNSHIP
BUCHANAN COUNTY

DESIGN FOR 0° SKEW
**30" (TRENCHLESS) X 78'
REINFORCED CONCRETE PIPE**

PLAT PLAN
STA. 382+25.90 ϕ IOWA 150 DEC. 2018
BUCHANAN COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____



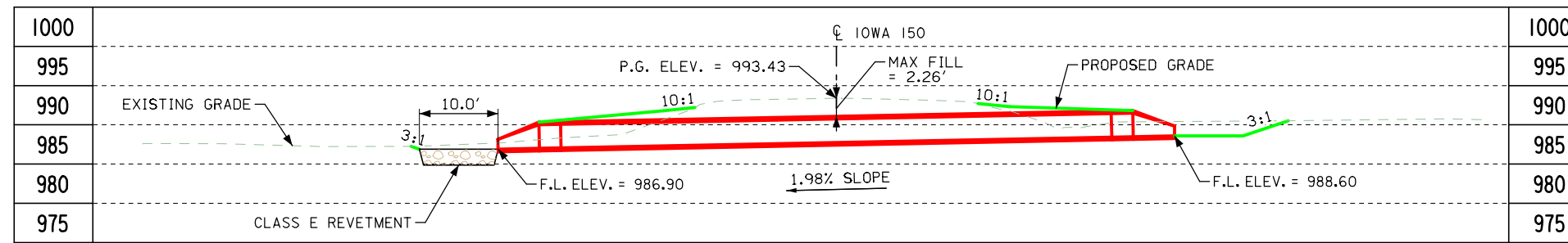
BENCH MARK NO.7
ELEV. 991.53
STA. 318+95.66, 33' RT
2" ALUMINIUM DISC

HYDRAULIC DATA
DRAINAGE AREA = 140 ACRES
 Q_{50} = 188.00 CFS

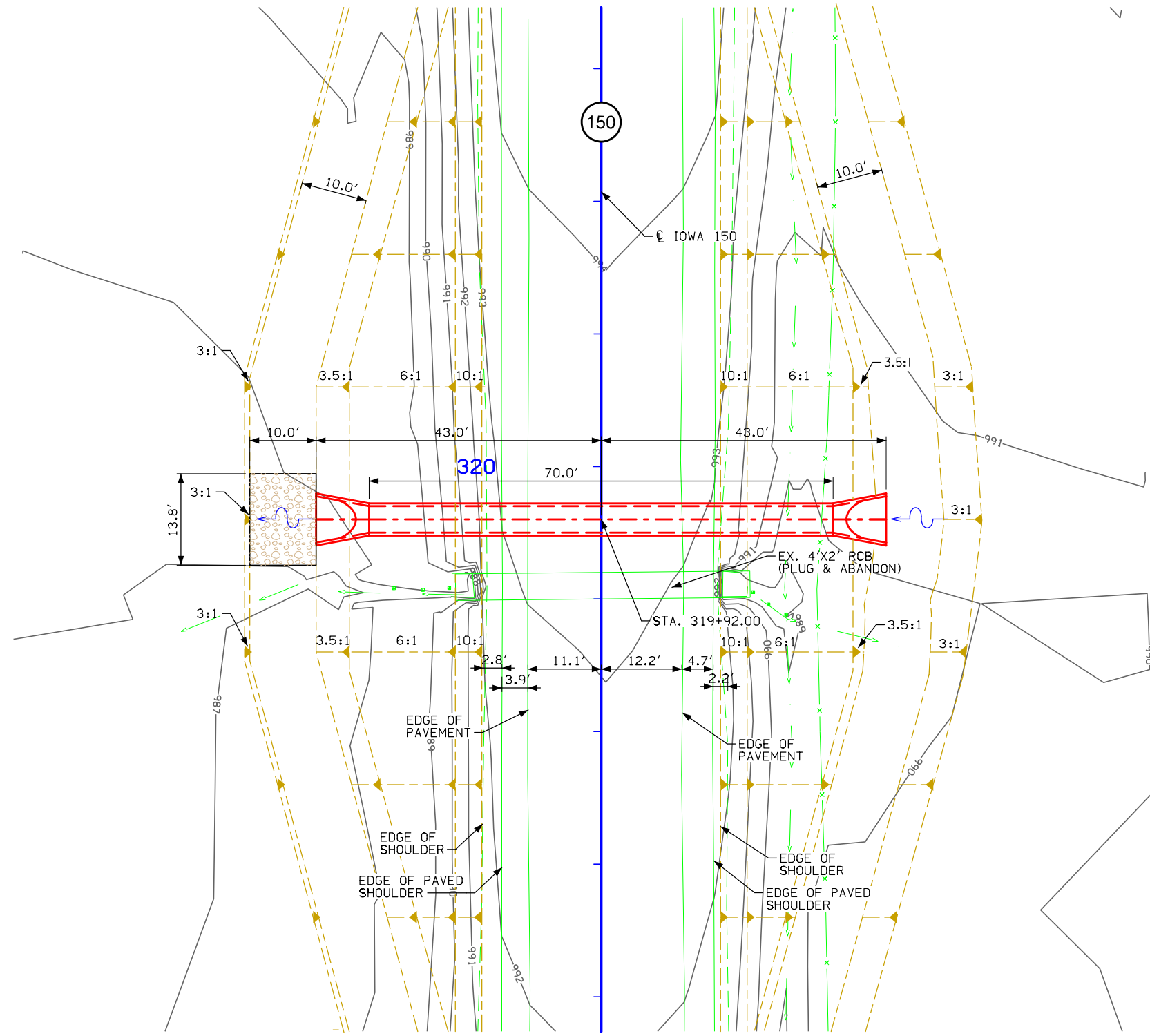
UTILITIES LEGEND:
REFER TO SHEET D.1 FOR UTILITY LEGEND

LOCATION
IOWA 150
T-89N R-9W
SECTION 3 & 4
WASHINGTON TOWNSHIP
BUCHANAN COUNTY

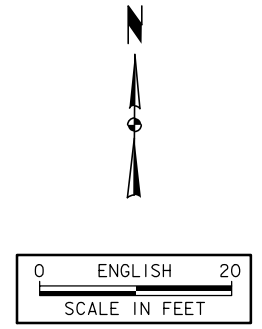
DESIGN FOR 0° SKEW
**66" (TRENCHLESS) X 72'
REINFORCED CONCRETE PIPE**
PLAT PLAN
STA. 397+13.70 ϕ IOWA 150 DEC. 2018
BUCHANAN COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. ___ OF ___ FILE NO. ___ DESIGN NO. ___



LONGITUDINAL SECTION ALONG CL CULVERT



PLAT PLAN



BENCH MARK NO.7
ELEV. 991.53
STA. 318+95.66, 33' RT
2" ALUMINIUM DISC

HYDRAULIC DATA
DRAINAGE AREA = 47.59 ACRES
 $Q_{50} = 84.65$ CFS

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

LOCATION
IOWA 150
T-89N R-9W
SECTION 3 & 4
WASHINGTON TOWNSHIP
BUCHANAN COUNTY

DESIGN FOR 0° SKEW
**48" EQUIVALENT X 70'
LOW CLEARANCE REINFORCED
CONCRETE PIPE
PLAT PLAN**
STA. 319+92.00 CL IOWA 150 DEC. 2018
BUCHANAN COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. _____ OF _____ FILE NO. _____ DESIGN NO. _____