

**PLYMOUTH CO. RCB CULVERT REPLACEMENT - TWIN BOX**  
**BRFN-003-1(95)--39-75**  
 LETTING DATE  
**DEC. 17, 2019**

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No.	DESCRIPTION
<b>A Sheets</b>	<b>Title Sheets</b>
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<b>B Sheets</b>	<b>Typical Cross Sections and Details</b>
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<b>D Sheets</b>	<b>Mainline Plan and Profile Sheets</b>
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2 - 3	IA 3
<b>G Sheets</b>	<b>Survey Sheets</b>
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<b>J Sheets</b>	<b>Traffic Control and Staging Sheets</b>
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<b>V Sheets</b>	<b>Bridge and Culvert Situation Plans</b>
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<b>W Sheets</b>	<b>Mainline Cross Sections</b>
W.1 - 6	IA 3
	* Color Plan Sheets



**Highway Division**

PLANS OF PROPOSED IMPROVEMENT ON THE

**PRIMARY ROAD SYSTEM**  
**PLYMOUTH COUNTY**

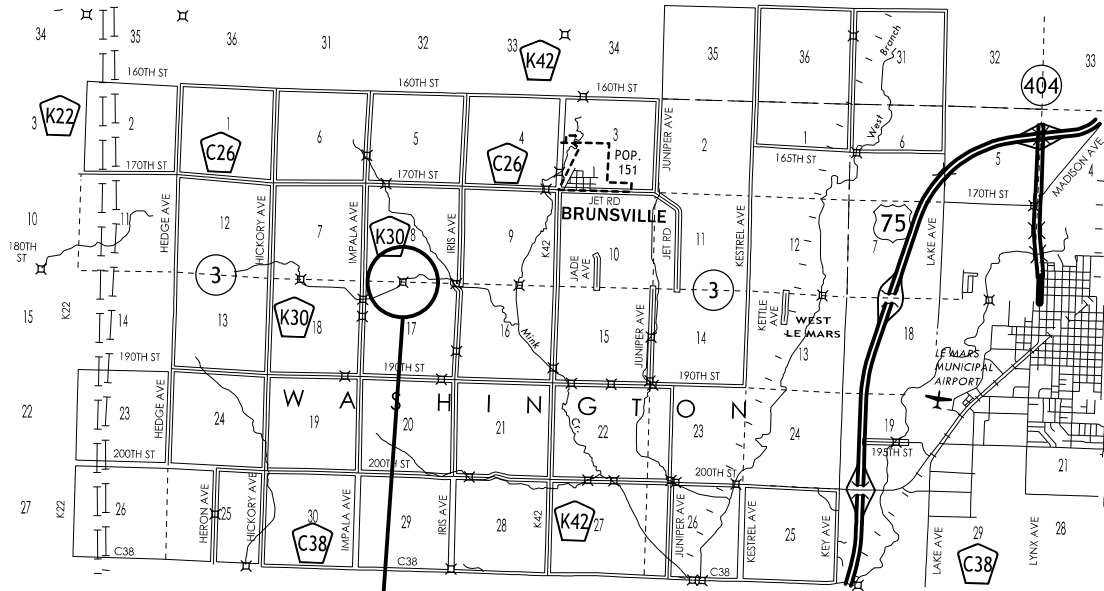
**RCB CULVERT REPLACEMENT - TWIN BOX**

Ditch 1.6 mi W of Co Rd K42

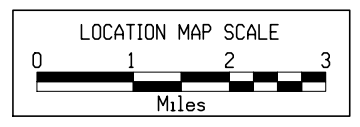
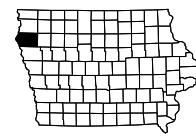
SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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



**Project Location**  
**Sta. 178+40**  
**Ref. Loc. 20.80**  
**Maint. No. 7520.8S003**  
**FHWA No. 39810**



CUT	(ML)	2230 CY
FILL+30%	(ML)	6122 CY
CONTRACTOR FURNISH		3892 CY

DESIGN DATA RURAL			
2020 AADT	1,400	V.P.D.	
2040 AADT	2,100	V.P.D.	
20-- DHV	--	V.P.H.	
TRUCKS	16-17	%	
Total Design ESALs	--		

INDEX OF SEALS		
SHEET NO.	NAME	TYPE
A.1	Paul W. Flattery	Primary Signature Block

**PRELIMINARY PLANS**

Subject to change by final design.

**D5 PLAN - Date: NOV. 17, 2017**

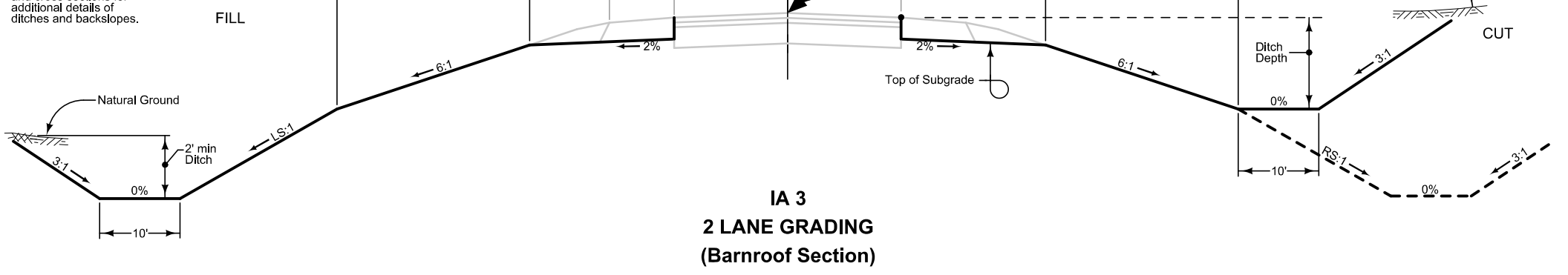
REVISIONS	TOTAL
	17

PROJECT IDENTIFICATION NUMBER	15-75-003-030
PROJECT NUMBER	BRFN-003-1(95)--39-75
R.O.W. PROJECT NUMBER	STPN-003-1(96)--2J-75

LOCATION		DIMENSIONS				
ROAD IDENTIFICATION	STATION TO STATION	(L) Feet	(R) Feet	(BW) Feet	(LS) Feet	(RS) Feet
IA 3	176+70.00 - 177+00.00	23.40-21.20	23.16-21.19	0.00	4	4
IA 3	177+00.00 - 177+13.98	21.20	21.19	0.00	4	4
IA 3	177+13.98 - 177+20.00	21.20-21.83	21.19-21.83	0.00	4-3.9	4-3.9
IA 3	177+20.00 - 177+96.09	21.83	21.83	0.00-20.02	3.9-3	3.9-3
IA 3	177+96.09 - 178+23.10	21.83	21.83	20.02	3	3
IA 3	178+23.10 - 178+55.50	23.95	23.98	18.03	3	3
IA 3	178+55.50 - 178+82.02	21.83	21.83	20.02	3	3
IA 3	178+82.02 - 179+55.00	21.83	21.83	20.02-0.00	3-3.9	3-3.9
IA 3	179+55.00 - 179+64.13	21.83-21.20	21.83-21.19	0	3.9-4	3.9-4
IA 3	179+64.13 - 179+77.97	21.20	21.19	0	4	4
IA 3	179+77.97 - 180+10.00	21.20-22.14	21.19-23.36	0	4	4

Normal section shown may be modified appropriately in areas of super-elevated curves or other locations specifically designated by the Engineer.

See Plan & Profile sheets and cross sections for additional details of ditches and backslopes.

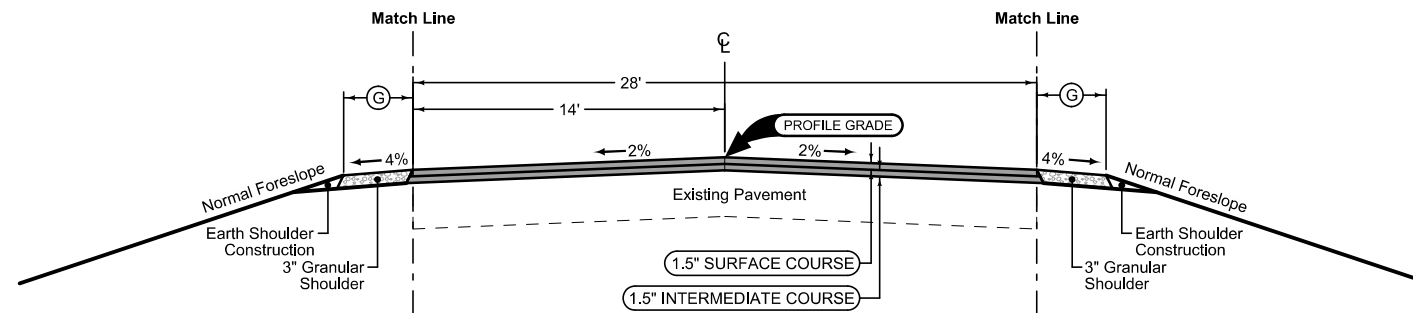


G\_2\_Grade\_BR  
MODIFIED

**Combination Shoulder**

Shoulder Jointing:  
Longitudinal joint: B

STATION TO STATION		Ⓞ Feet
176+70.00	177+00.00	8.0-6.0
177+00.00	178+23.10	6.0
178+55.50	179+80.00	6.0
179+80.00	180+10.00	6.0-8.0



STATION TO STATION	
175+80.00	178+23.10
178+55.10	180+80.00

**Combination Shoulder**

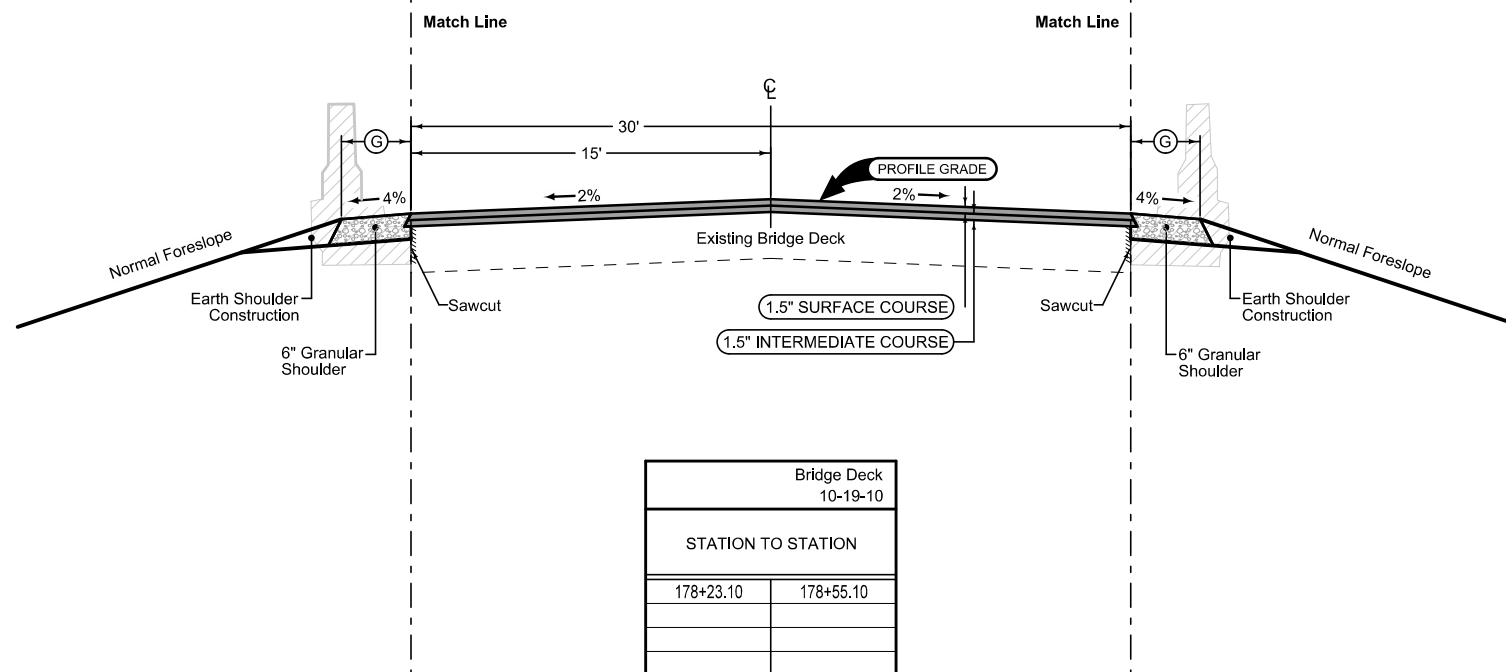
Shoulder Jointing:  
Longitudinal joint: B

STATION TO STATION		Ⓞ Feet
176+70.00	177+00.00	8.0-6.0
177+00.00	178+23.10	6.0
178+55.50	179+80.00	6.0
179+80.00	180+10.00	6.0-8.0

**Combination Shoulder**

Shoulder Jointing:  
Longitudinal joint: B

STATION TO STATION		Ⓞ Feet
178+23.10	178+55.50	5.0



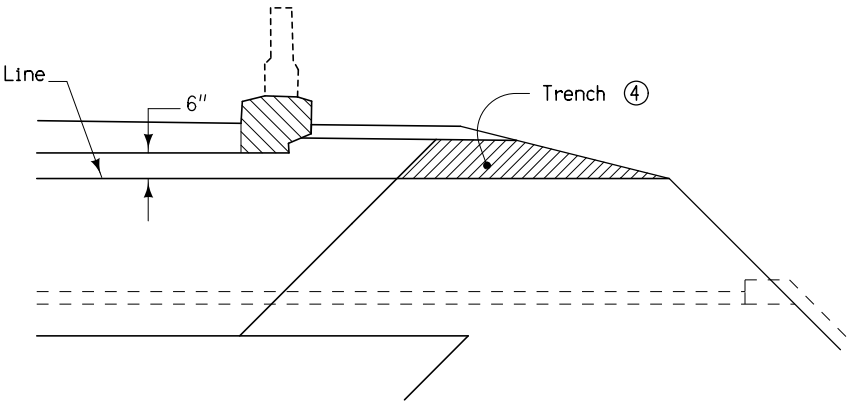
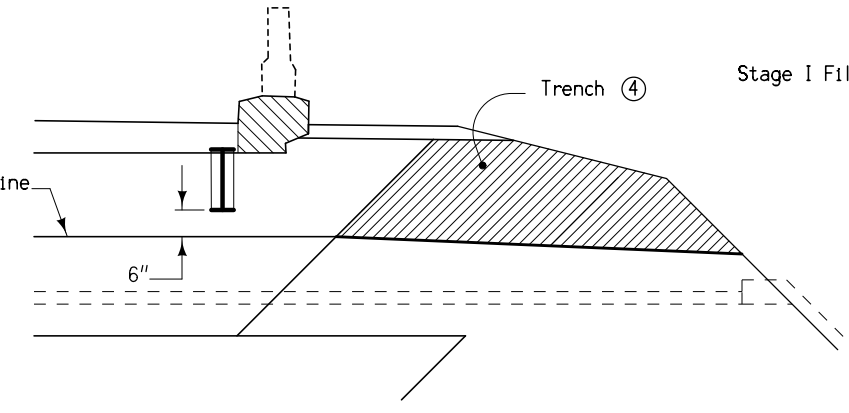
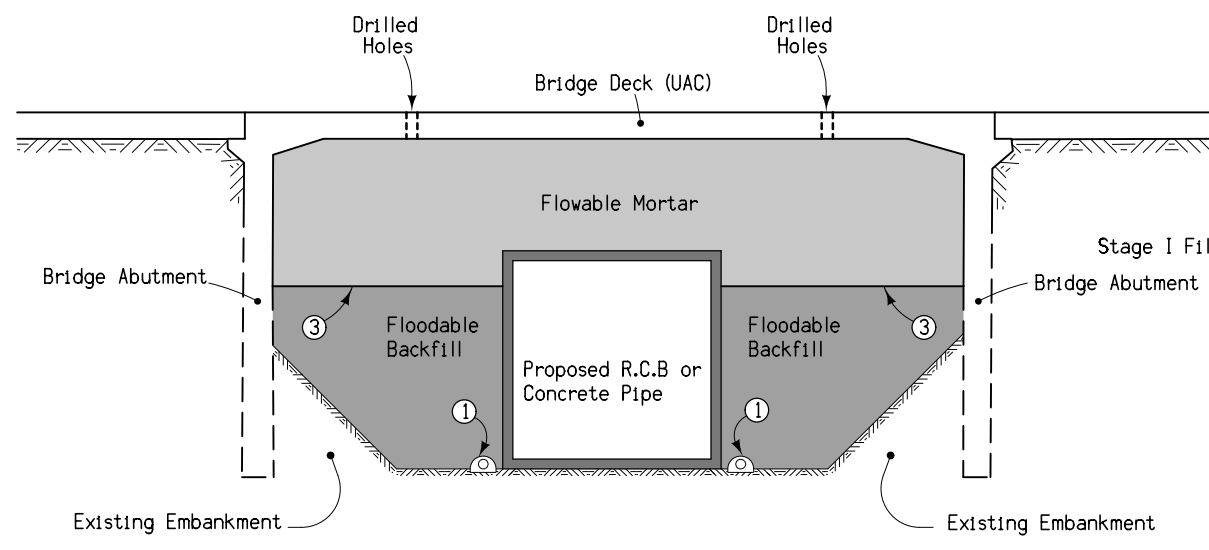
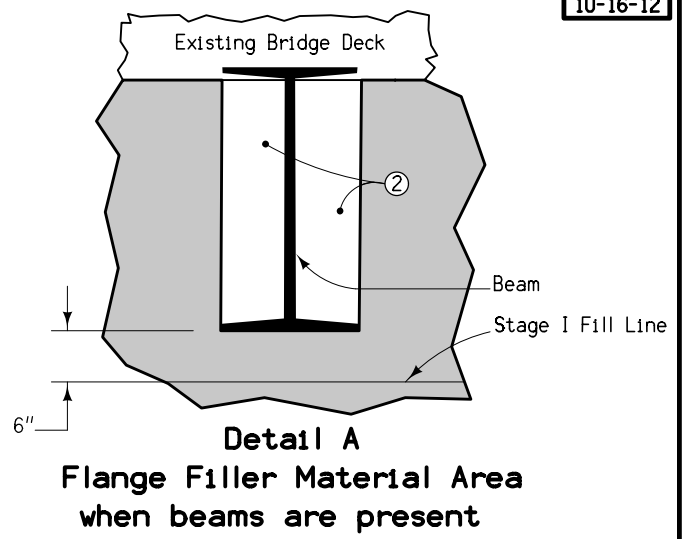
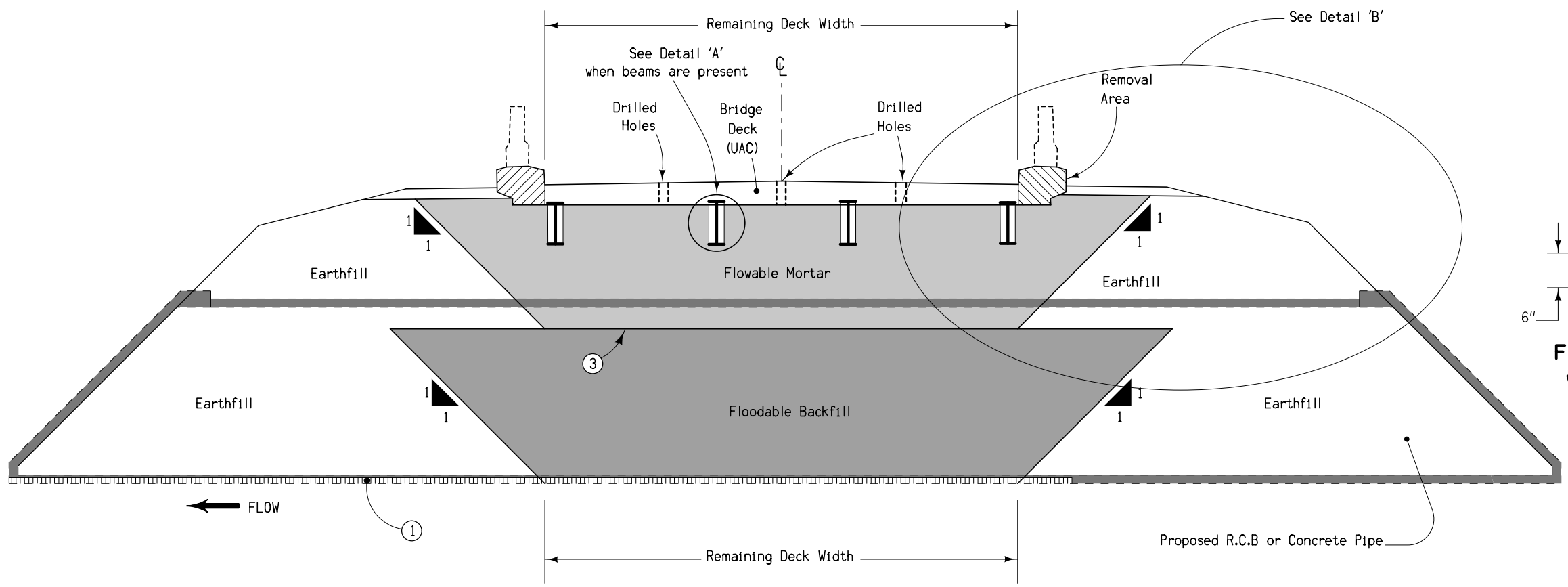
STATION TO STATION	
178+23.10	178+55.10

**Combination Shoulder**

Shoulder Jointing:  
Longitudinal joint: B

STATION TO STATION		Ⓞ Feet
178+23.10	178+55.50	5.0

See Tab 100-24 or 100-25 for pavement quantities.  
See Tab 112-9 for shoulder quantities.

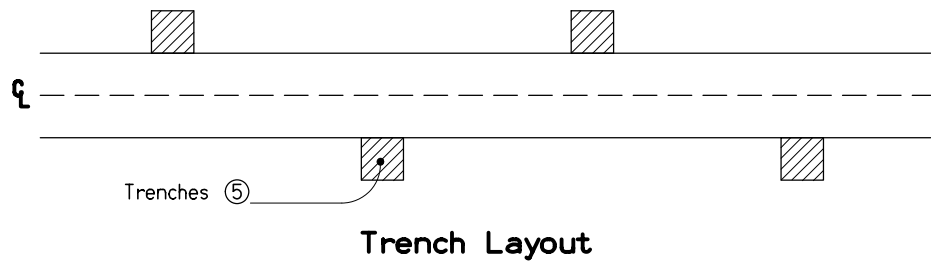


Section along Centerline

Detail B (Beam Bridge)

Detail B (Slab Bridge)

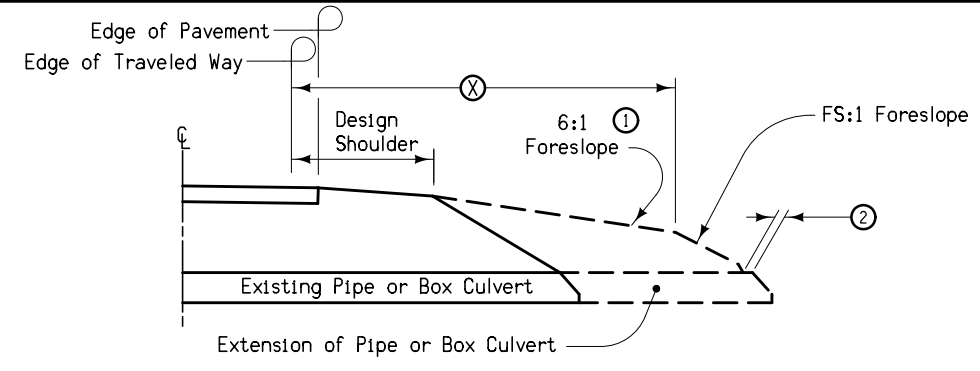
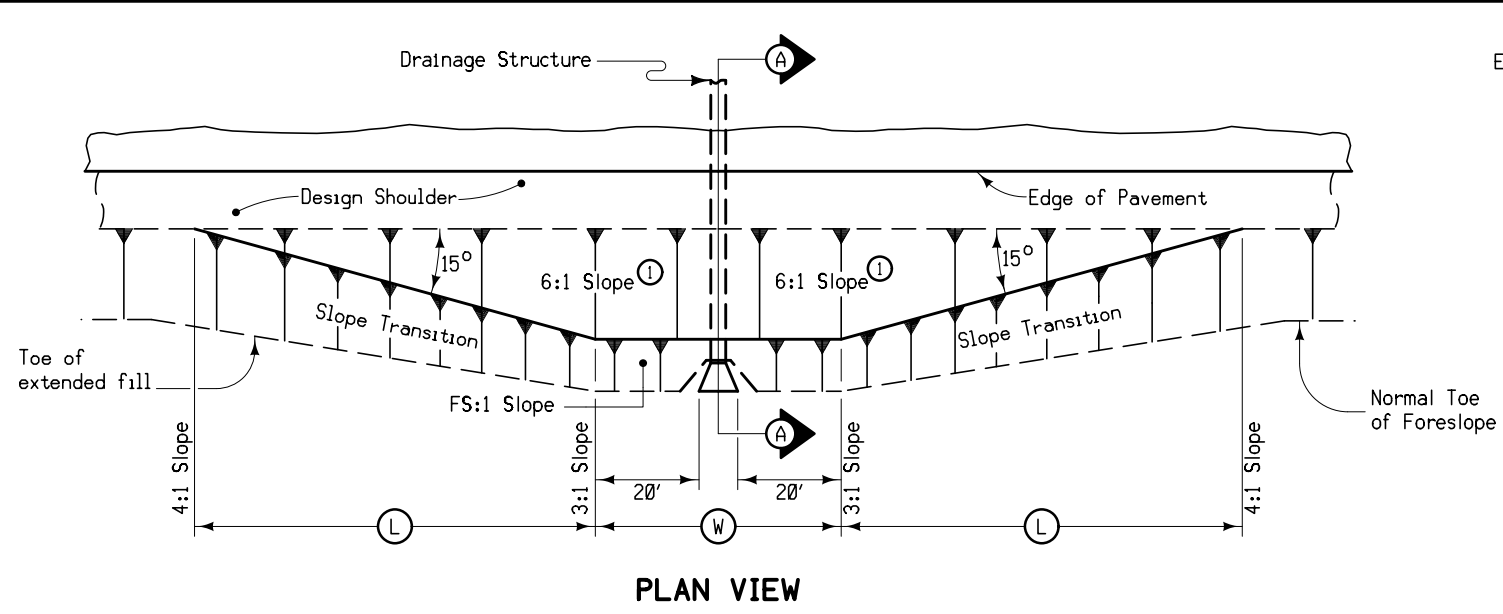
Denotes pay limits for flowable mortar  
 Denotes pay limits for flooded backfill



Trench Layout

- ① 4" Subdrain at flowline elevation of culvert with 4" cover of porous backfill.
- ② Place Flange Filler Material to fill pocket area between flanges to prevent flowable mortar from building up. Flange Filler Material is incidental to flowable mortar.
- ③ Fill void with the maximum amount of Floodable Backfill possible. Distance from Floodable Backfill to bridge beams (when present) or bridge deck shall not exceed 5'.
- ④ Cut trenches in the soil plug to provide drainage for the flowable mortar. Backfill the trenches with open graded crushed stone, gravel, or recycled PCC to allow water to drain. Backfill material is incidental to flowable mortar.
- ⑤ Place trenches at 20' spacing with a minimum of two trenches on each side of the roadway.

**FILL FOR CULVERT USED IN BRIDGE REPLACEMENTS**



SECTION A-A

STRUCTURE LOCATION		(W)	(L)	(X)	(FS)
STATION	SIDE	Feet	Feet	Feet	
178+39.05	Both	86.0	82.1	30.0	3

- Notes:
- At locations where an extended or 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.
  - (W) = Pipe or R.C.B. opening width plus 20 feet each side.

**BARNROOF FORESLOPE  
AT DRAINAGE STRUCTURE**

### SURVEY SYMBOLS

- BCL Bridge Centerline
- BD Bridge Deck
- BL Topo Breakline
- BLS Bridge Low Steel
- BNK Stream Bank
- BRG Bridge
- C Centerline BL of Road (ML or SR)
- D Centerline Draw or Stream (Down)
- DU Centerline Draw or Stream (Up)
- ENT Centerline BL of Entrance
- ENU Edge Unpaved Entrance & Parking
- EP Edge of Paved Roads (ML or SR)
- EW Edge of Water
- F0 --- FO1D Fiber Optic Co. 1 - Quality D
- F02 --- FO2D Fiber Optic Co. 2 - Quality D
- x --- FW Wire Fence
- GDL Guard Rail Steel
- PIP Pipe Culvert
- SNP Unpaved Shoulder
- ▲ PCP Photo Control Point
- POT Tangent Point
- WC Wild Card (Misc. Field Shot)
- SOP Size of Pipe or Culvert
- TW Top of Water
- SP Stream Profile
- MM MM Mile Marker Post
- SBR Size of Bridge
- DTM Photogrammetry Elv Control Check
- PRO Profile Shot
- GR Ground Shot
- ✂ PL Location of Photo (Wetlands)
- TP TPD Telephone Pedestal
- ▣ FENO FENO Monument
- BM Bench Mark

### UTILITY LEGEND

- F0 --- FO1D Fiber MCI - Quality D
- F02 --- FO2D Fiber Frontier Communications - Quality D

### 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
- ▲ 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)

Washington TWP.  
T-92N R-46W  
SEC. 8

STA. 176+70.00  
BEGIN PROJECT

STA. 180+10.00  
END PROJECT

176

SIGN

177

178

179

180

181

3

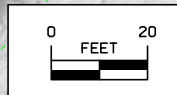
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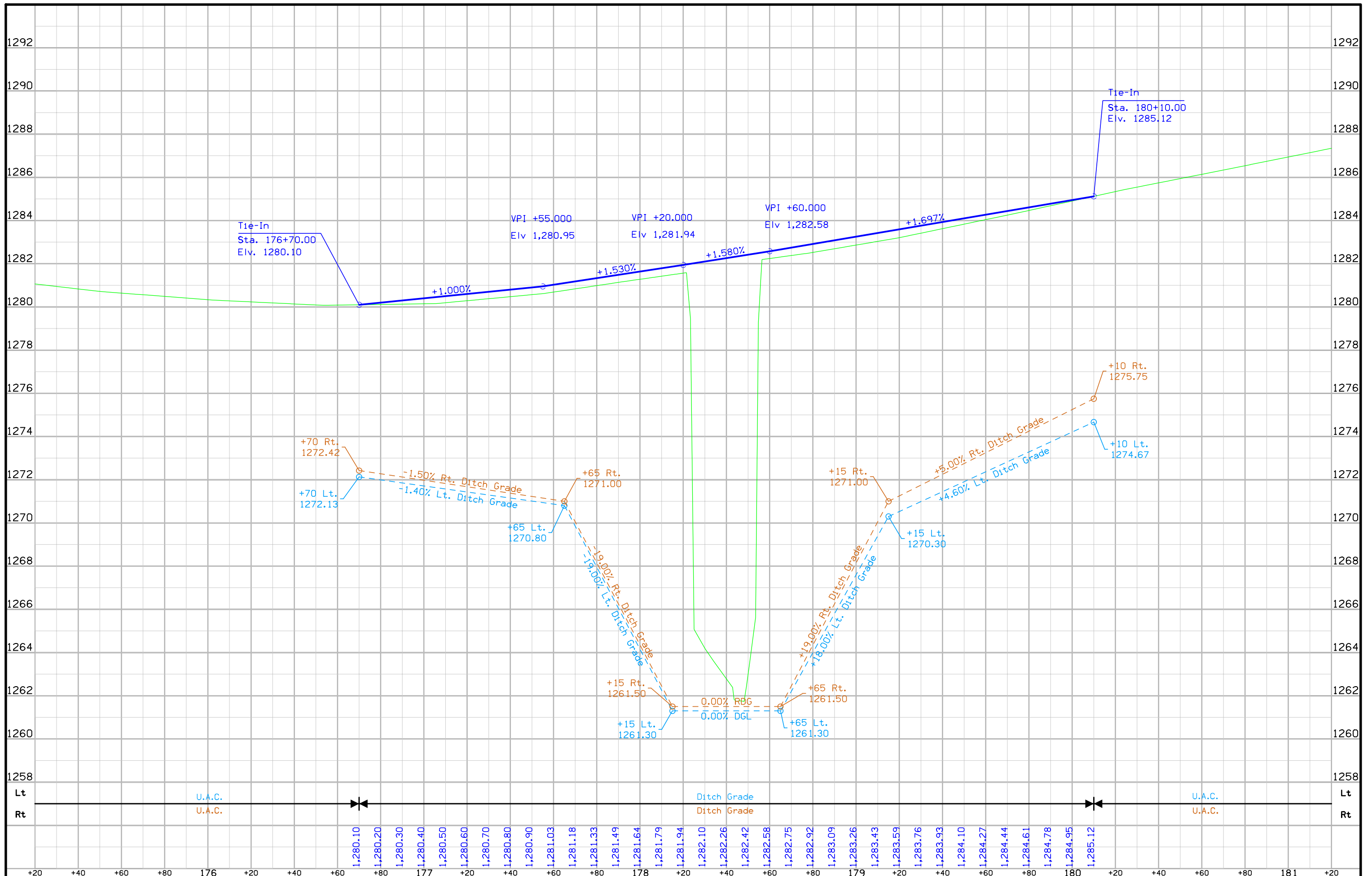
UAC  
18" X 92.87  
C.M.P.

REMOVE

Sta. 178+39.10  
32' x 30'  
CONC GIRDER BRIDGE  
DA 2800 Ac

Sta. 178+39.05  
Proposed Culvert  
Twin 12'-0 x 12'-0 x 104'-0  
Skew 0 degrees







## Survey Information

Plymouth County  
 SAP-780.1  
 PIN 15-75-003-030  
 BRFN-003-1(95)--39-75  
 Location: Ditch 1.6 mi W of Co Rd K42  
 Type of Work: RCB Culvert Replacement – Twin Box  
 Project Directory: 7500303015

### Party Personnel

Jason Arn- Party Chief  
 Clayton Henningsen- Party Chief

### Date(s) of Survey

Begin Date            11/30/2016  
 End Date              02/21/2017

### General Information

Measurement units for this survey are US survey feet. This survey is for proposed Bridge Replacement with a twin box RCB culvert. Project datum and control information is provided by Design Survey Office. This project is a Partial DTM, with Photo Control.

### Alignment Information

The horizontal alignment for this survey is a retrace of As Built Plans for project No. F 910(3). Survey stationing was equated to the plan POT at Sta. 156+79.80 and run ahead.

Survey stationing relates to as built plan stationing as follows:

POT Sta. 156+79.80 F Project Plans No. 910(3)  
 Survey POT Sta. 156+79.80

POT Sta. 188+79.4 F Project Plans No. 910(3)  
 Survey POT Sta. 188+79.10

Project name: 0780.ttp  
 Surveyor: Jason Arn Party Chief  
 Comment: Computations Norman Miller Survey Manager, PLS  
 Linear unit: USFeet  
 Projection: laRCS Zone 4  
 Geoid: g2012au2

### Control Network Adjustment Report

3 laRTN reference stations encompassing the project were used to establish project control. Step 1 was to check how well measurements between reference stations compared to known locations fixing to the known position of the nearest reference station at LeMars. The chart below indicates that the horizontal and vertical checks were very good. LeMars Reference station was held fixed and the project control was adjusted to that 1 fixed position. laRCS Zone 4 is the project coordinate system. Network Datum is NAD83(2011) (EPOCH 2013.00). Vertical Datum is NAVD88 (computed using Geoid 12A)

### Minimum and Full Constraint Network Observations

Note: Points ending with the suffix "Known" are known reference station positions projected from Network Datum to laRCS Zone 4. Points without suffix are unconstrained observed positions. LeMars constrained to the known position.

### Full Constraint Project Adjustment Zone 14

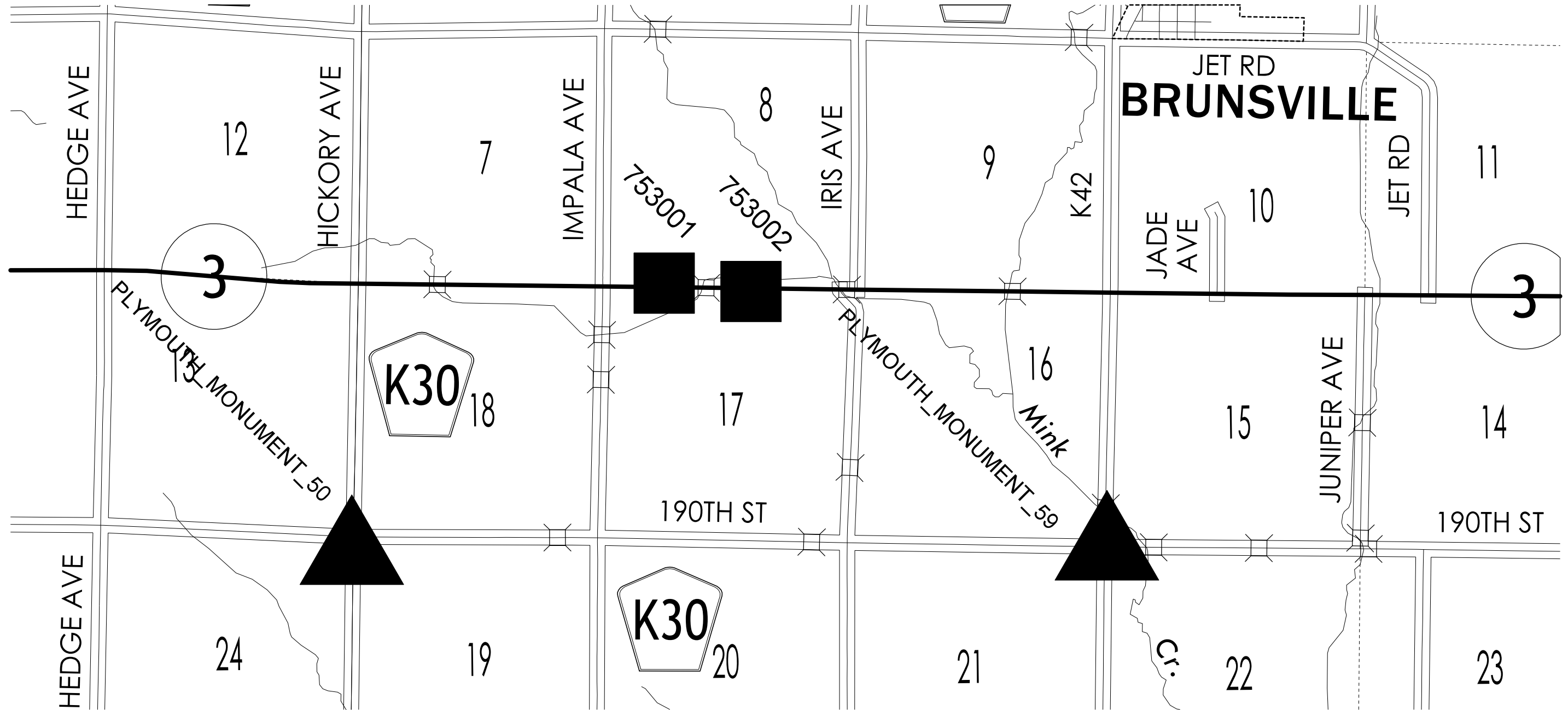
Name	Grid Northing (USft)	Grid Easting (USft)	Elevation (USft)
753001	8698211.024	14104361.11	1287.389
753002	8698037.13	14106170.26	1290.26
Lemars	8699224.169	14146951.66	1287.253
Sioux City	8609737.846	14091726.62	1165.885
Sioux City Known	8609737.832	14091726.62	1165.91
Rock Rapids	8930827.483	14150537.89	1419.257
Rock Rapids Known	8930827.48	14150537.89	1419.242
Plymouth_Monument_50	8692551.776	14097851.06	1426.667
Plymouth County Pt 50 Known	8692551.765	14097850.97	1426.763
Plymouth_Monument_59	8692643.65	14113589.94	1227.869
Plymouth County Pt 59 Known	8692643.641	14113589.9	1228.008

### Quality Control Check

Two local existing county control points were observed to ensure that the reference station broadcast position is within acceptable tolerance of the known positions on the datasheet. These checks were made to ensure that there is not an unacceptable difference between project control and known coordinates of local benchmarks. Having project control relative to the laRTN broadcast positions enables future network RTK work to proceed with no adjustments or localization. Plymouth County Control Pt. 50 was checked for vertical and horizontal tolerance. The horizontal difference is 0.1 ft. and the vertical difference is 0.1 ft. Plymouth County Control Pt. 59 was checked for vertical and horizontal tolerance. The horizontal difference is less than 0.1 ft. and the vertical difference is 0.1 ft. Note: The County mark system is using NAD83(96) datum so there is a small expected difference in horizontal coordinates. Height differences are within tolerance. Network RTK observations were made to check the coordinates of the project control included in this report. All network RTK positions checked well compared to the coordinates listed.

### CONTROL POINT VICINITY MAP

This map is a guide to the vicinity of the primary project control points  
 Primary control is for use with RTK base stations and for RTN validation.  
 Future surveys will use primary project control to establish temporary control as needed for construction or other surveying applications.



HORIZ. DATUM: NAD83(2011) EPOCH 2013.00

VERT. DATUM: NAVD88

1a. Regional Coordinate System Zone 4

Coordinate listing from next sheet will be used with 1aRTN for monument recovery. No other reference ties are given.

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

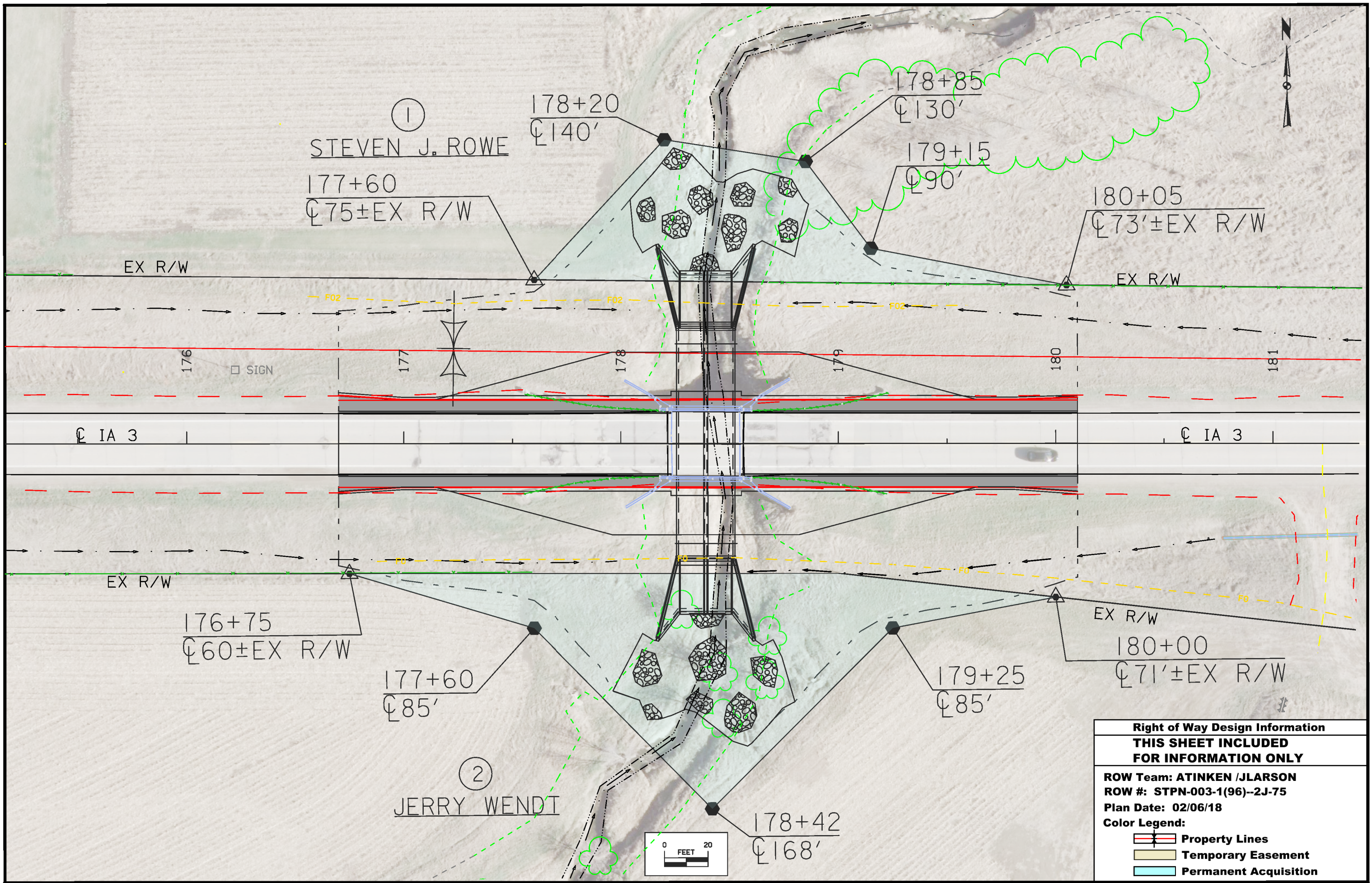
HORIZ. DATUM: NAD83(2011) EPOCH 2013.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 4

Point	Northing	Easting	Elevation	Feature	Description Definition
753001	8698211.02	14104361.11	1287.39	FENO	75' NORTH OF CENTERLINE IA 3 ALONG FIELD ENT 300' WEST OF DRIVE TO ADDRESS# 26301
753002	8698037.13	14106170.26	1290.26	FENO	60' SOUTH OF CENTERLINE ALONG FIELD ENT BETWEEN STA 185 & 190
PLYMOUTH_MONUMENT_59	8692643.65	14113589.94	1227.87	BM	5/8 INCH DIA DRIVEN ALUM ROD WITH ALUM CAP NEAR NE COR. SEC. 22-92-46...50 FT E OF CL CO RD K42...72 FT S OF 190TH ST
PLYMOUTH_MONUMENT_50	8692551.78	14097851.06	1426.67	BM	5/8 INCH DIA DRIVEN ALUM ROD WITH ALUM CAP NEAR NW COR. SEC. 24-92-47...30 FT W OF CL HICKORY AVE...20 FT S OF FIELD ENT...400 FT S OF 190TH ST

NO ACCESS RIGHTS ARE TO BE ACQUIRED ON THIS PROJECT.

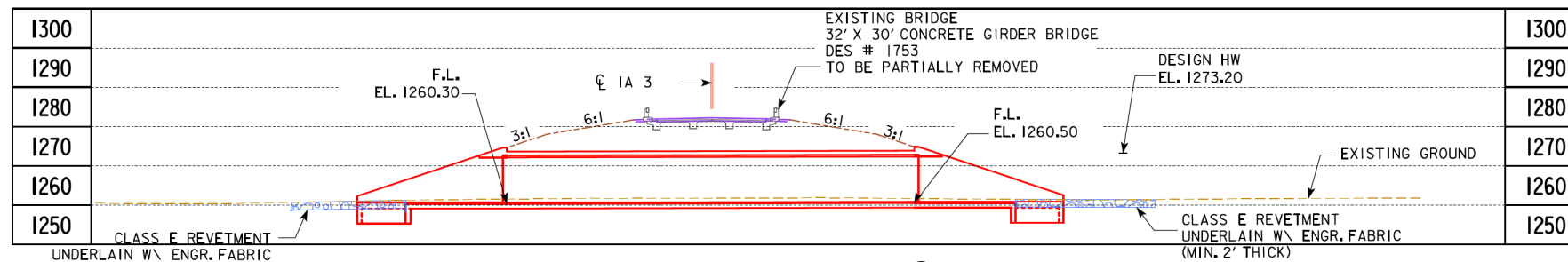


**Right of Way Design Information**  
**THIS SHEET INCLUDED FOR INFORMATION ONLY**

**ROW Team: ATINKEN /JLARSON**  
**ROW #: STPN-003-1(96)--2J-75**  
**Plan Date: 02/06/18**

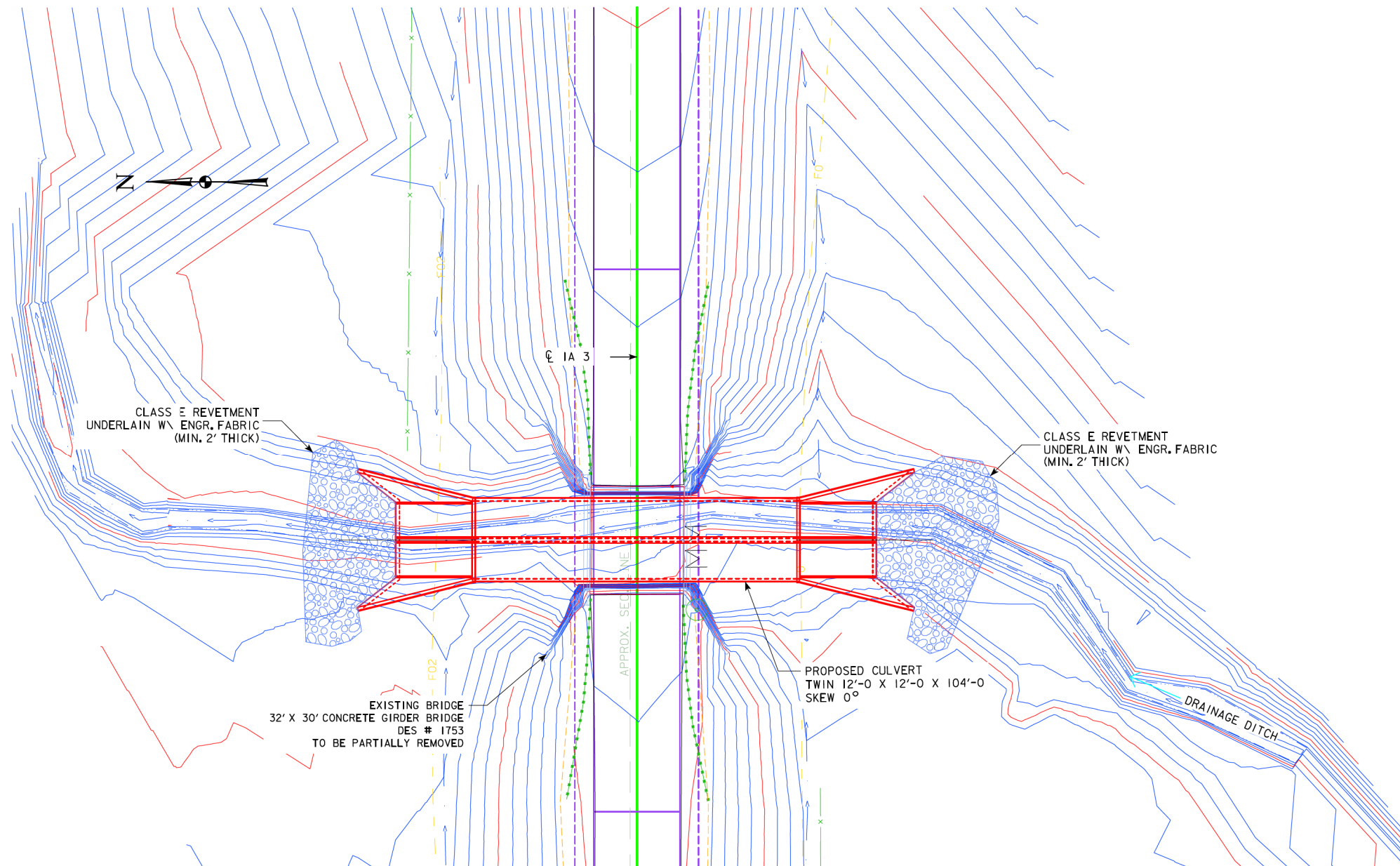
**Color Legend:**

- Property Lines**
- Temporary Easement**
- Permanent Acquisition**



LONGITUDINAL SECTION ALONG CL OF CULVERT

CULVERT FLOWLINE BURIED 1'



SITUATION PLAN

HYDRAULIC DATA

DRAINAGE AREA = 4.3 SQ. MI.  
 $Q_{50} = 2,550$  CFS  
 HW ELEV. = 1273.20  
 STREAM SLOPE = 35.9 FT./MI.

TRAFFIC ESTIMATE

2014 AADT 1180 V.P.D.  
 202\_ AADT - V.P.D.  
 202\_ DHV - V.P.H.  
 TRUCKS 16 %  
 TOTAL DESIGN ESALs -

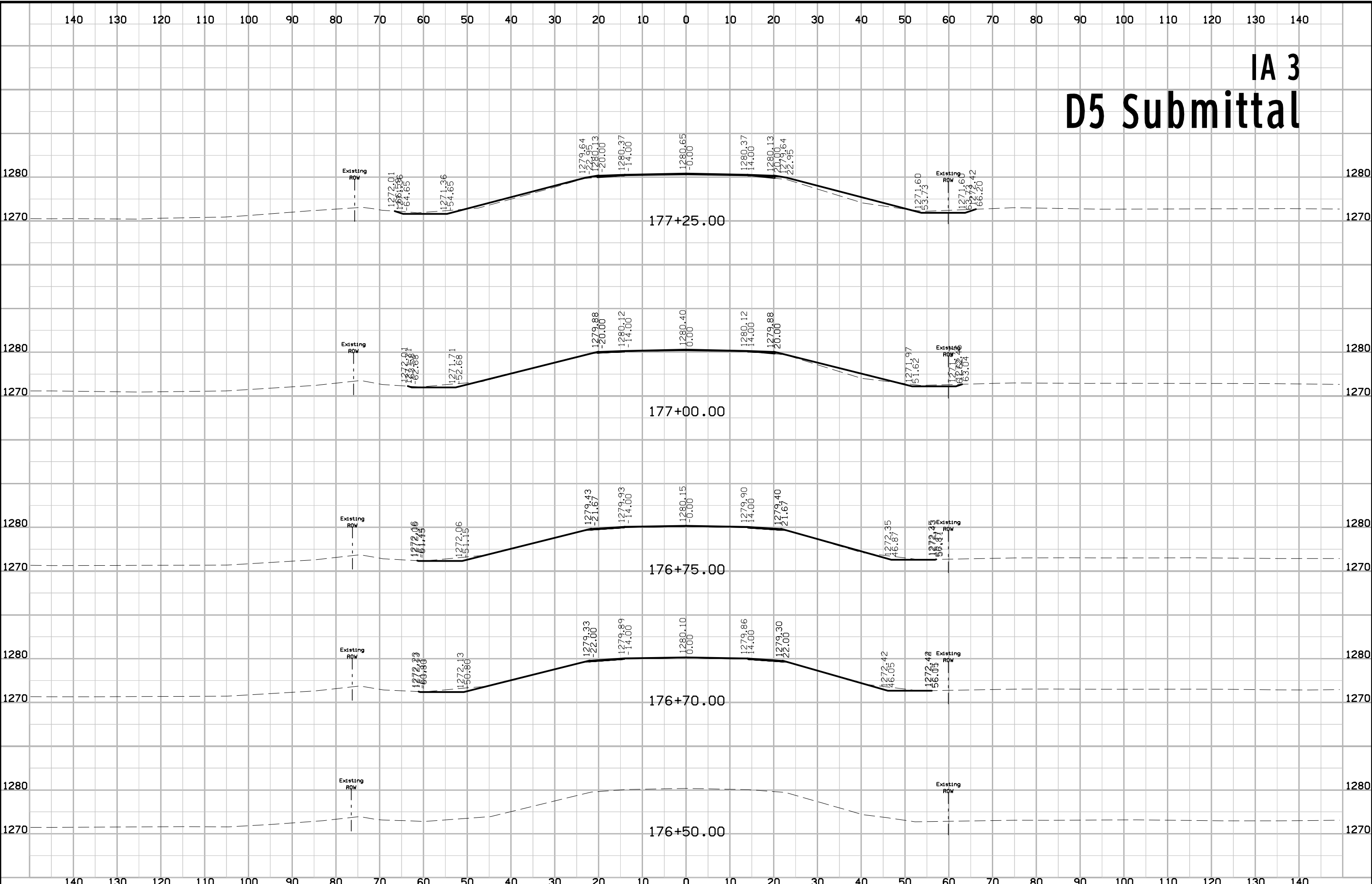
LOCATION

IA 3 BRIDGE OVER DRAINAGE DITCH  
 T-92N R-46W  
 SECTION 8/17  
 WASHINGTON TOWNSHIP  
 PLYMOUTH COUNTY  
 FHWA NO. ?  
 BRIDGE MAINT. NO. 7520.8S003  
 LATITUDE ??.?????°  
 LONGITUDE -??.?????°

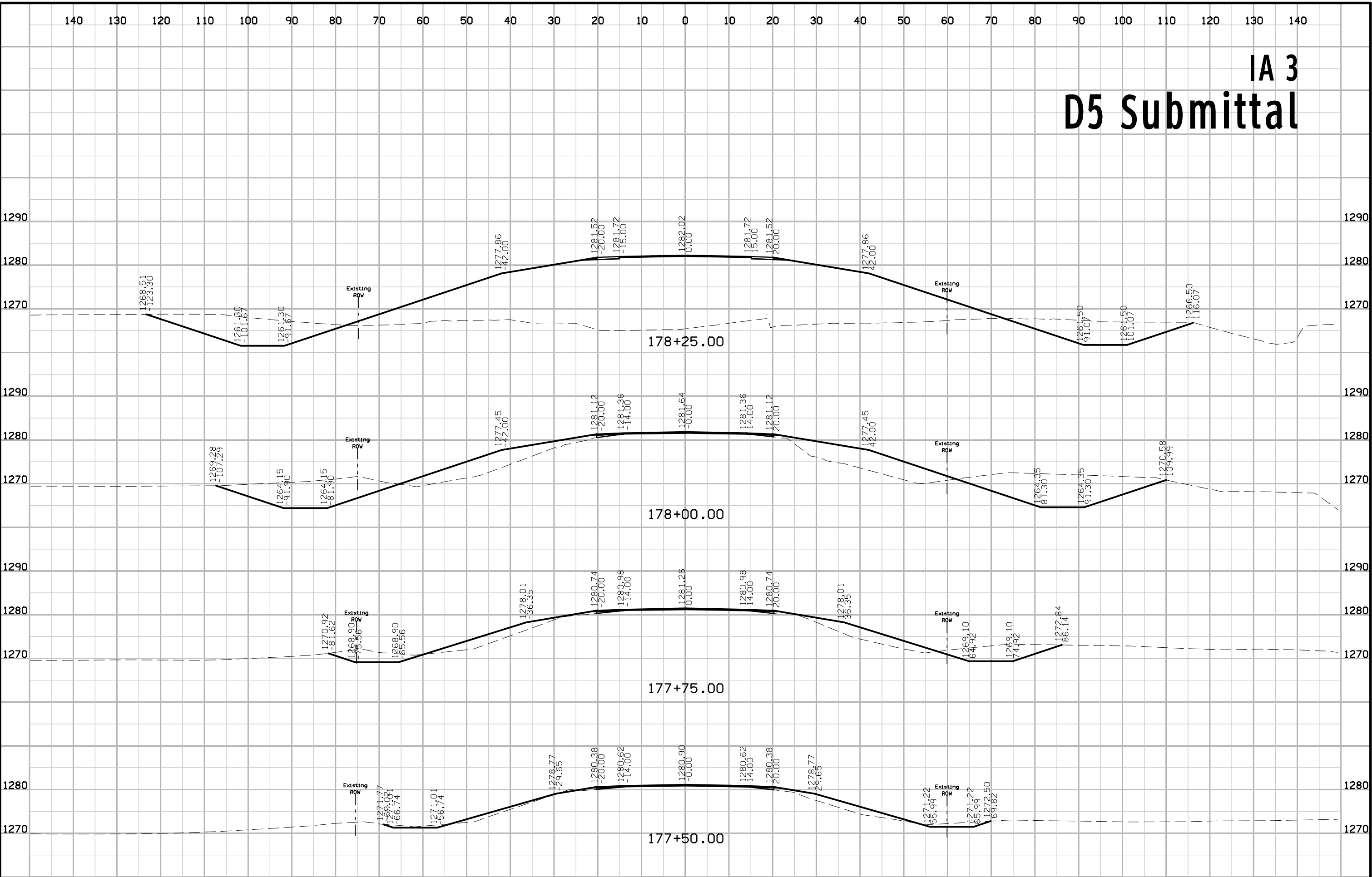


D2  
 DESIGN FOR 0° SKEW  
**TWIN 12'-0 X 12'-0 X 104'-0**  
**CAST-IN-PLACE CONCRETE CULVERT**  
 SITUATION PLAN  
 STATION 178+39.05 JUNE 2017  
**PLYMOUTH COUNTY**  
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION  
 DESIGN SHEET NO. OF ? FILE NO. ? DESIGN NO. ?

# IA 3 D5 Submittal

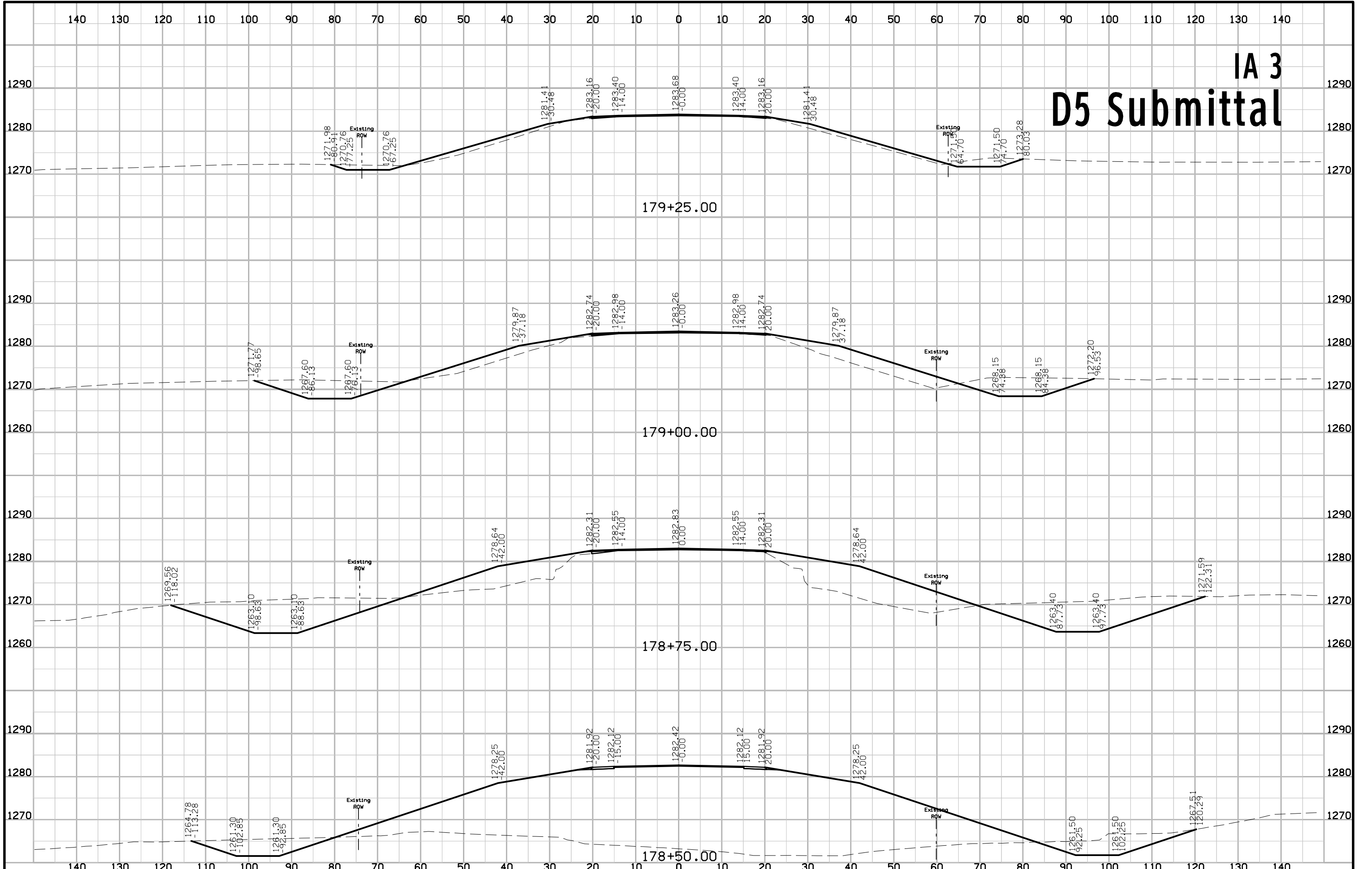


# IA 3 D5 Submittal

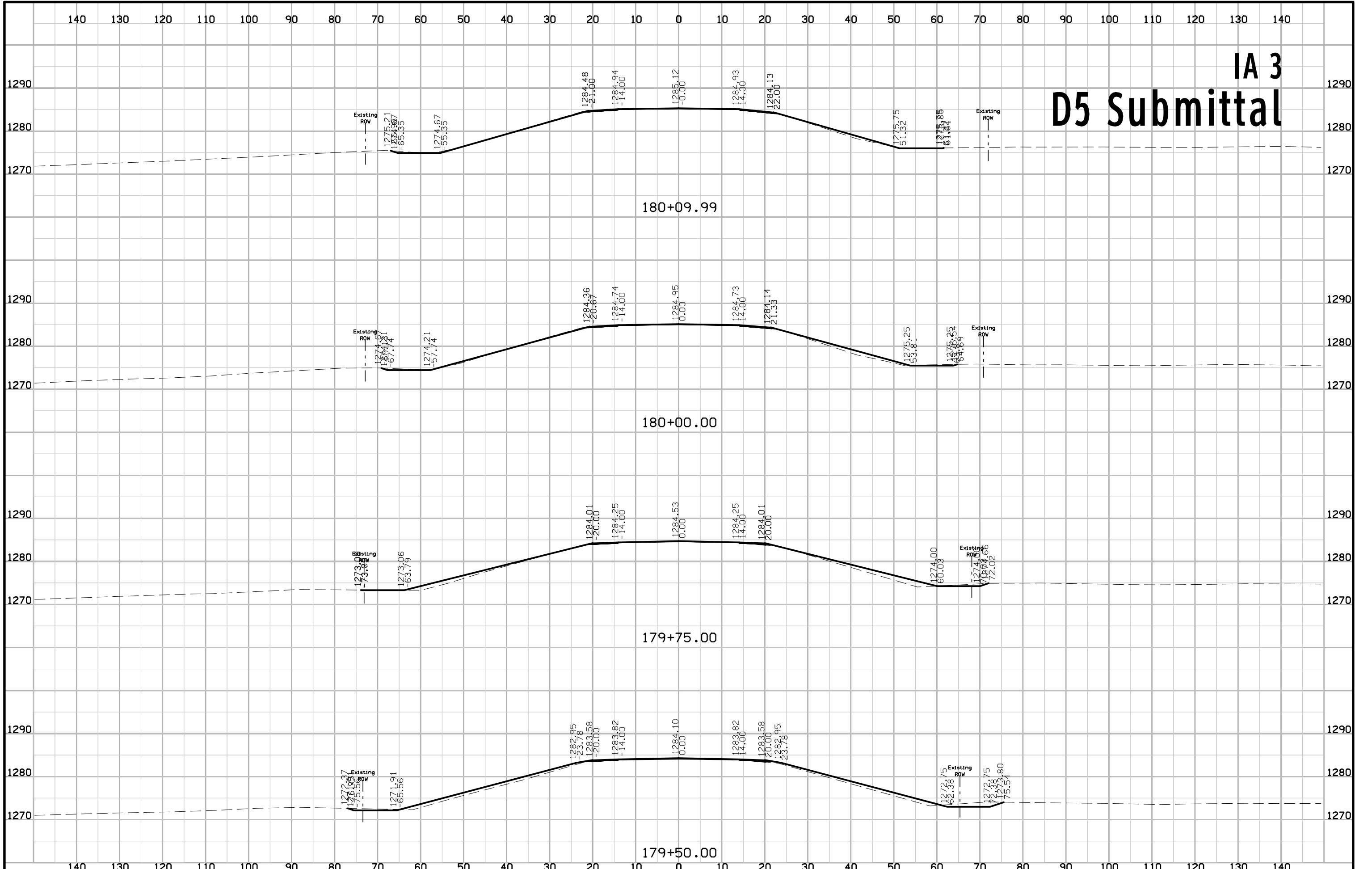




# IA 3 D5 Submittal



# IA 3 D5 Submittal



# IA 3 D5 Submittal

