

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

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* D.2 - 3	IA 3
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Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

**PRIMARY ROAD SYSTEM
PLYMOUTH COUNTY**

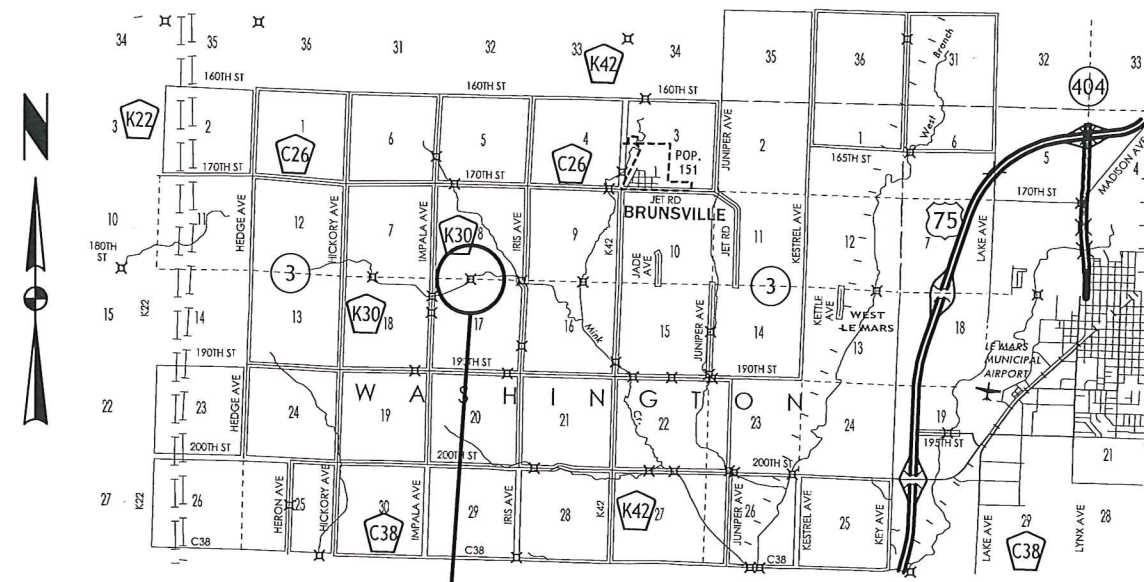
RCB CULVERT REPLACEMENT - TWIN BOX

Ditch 1.6 mi W of Co Rd K42

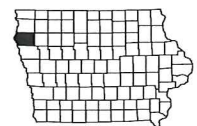
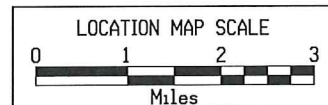
SCALES: As Noted

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



Tony Lazarowicz
Shane Tymkowicz } District 3
Darwin Bishop
Paul Flattery
Bill Crystal } Design
Paul Carlson
Mansour Manci
Kevin Patel

Dave Mulholland - Prelim Bridge
Scott Groat - ROW

*REVIEWED
 APPROVED
 PROCEED.
 KDN 8-10-17*

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

DATES:
 D3 PLAN - Date: MAY 23, 2017
 D5 PLAN - Date: AUG. 18, 2017

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.

D2 PLAN - Date: AUG. 8, 2017

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 3
ATTENTION: Tony G. Lazarowicz
FROM: Kevin K. Patel
OFFICE: Design
SUBJECT: Project Concept Statement; (Final Approval, D0)

DATE: September 1, 2016
PROJECT: Plymouth County
BRFN-003-1(95)--39-75
PIN: 15-75-003-030

KKP: jmc

cc:

C. Purcell
D. L. Maifield
N. M. Miller
G. A. Novey
A. Abu-Hawash
R. A. Younie
K. Brink
M. E. Khoda
J.W. Laaser-Webb
E. C. Wright
D. S. Schultz
D. E. Manley
V. A. Brewer
M. Sadler

M. J. Kennerly
S. J. Megivern
C. C. Poole
D. R. Claman
M. A. Swenson
D. R. Tebben
D. L. Newell
S. J. Gent
W.A. Sorenson
S. W. Tymkowicz
M. L. Wright
M. J. Carlson
FHWA
T. Jungers

K. D. Nicholson
A. A. Welch
N. L. McDonald
M. K. Solberg
M. J. Sankey
B. D. Hofer
B. E. Azeltine
T. D. Crouch
D. E. Sprengeler
D. L. Bishop
T. E. Huju
B. J. Dolan
M. E. Ross
S. Reddy Annu

This project involves the replacement of the IA 3 bridge (Maint. No. 7520.8S003) over a drainage ditch, 1.6 miles west of County Road K-42.

A concept review was held on June 29, 2016. Those present included Tony Lazarowicz, Tom Jungers, and Mark Sadler from the District 3 Office; Dave Claman from the Office of Bridges and Structures; Mike Carlson from the Office of Location and Environment; Srinath Reddy Annu from Traffic and Safety and Kevin Patel and Jason Choate from the Office of Design.

The two alternatives considered were:

1. Replace the existing 35' x 30', concrete tee beam bridge with a 90' x 40', concrete slab bridge. The cost is estimated to be \$876,700.
2. Replace the existing 35' x 30', concrete tee beam bridge with a twin 12' x 12' x 84' reinforced concrete box culvert utilizing the flowable mortar method. The cost is estimated to be \$643,000.

Alternative 2 is the preferred alternative due to lower construction costs, reduced future maintenance needs and minimizes impacts to traffic during construction.

Additional right of way will be required.

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail, placement of the flowable mortar and the HMA resurfacing.

The Draft Project Concept Statement was sent out for review and comment with concerns to be resolved by Tuesday, August 23, 2016. Comments received during the review period have been considered and resolved.

This project is recommended for construction in FY 2020. The Office of Bridges and Structures will coordinate plan preparation with assistance from the Office of Design.

FINAL PROJECT CONCEPT STATEMENT

IA 3 - Bridge over Drainage Ditch, 1.6 miles west of County Road K-42

Plymouth County
BRFN-003-1(95)--39-75
PIN: 15-75-003-030
Maint. No. 7520.8S003
FHWA No. 39810

Highway Division
Office of Design

Kevin K. Patel, P.E.
515-239-1540

September 1, 2016

Plymouth County
BRFN-003-1(95)--39-75
PIN: 15-75-003-030
Page 2

existing deterioration of this type of structure. Therefore, this bridge should be replaced.



Looking East



Looking North

I. STUDY AREA

A. Project Description

This project involves the replacement of the IA 3 bridge (Maint. No. 7520.8S003) over a drainage ditch, 1.6 miles west of County Road K-42.

The two alternatives considered were:

1. Replace the existing 35' x 30', concrete tee beam bridge with a 90' x 40', concrete slab bridge. The cost is estimated to be \$876,700.
2. Replace the existing 35' x 30', concrete tee beam bridge with a twin 12' x 12' x 84' reinforced concrete box culvert utilizing the flowable mortar method. The cost is estimated to be \$643,000.

Alternative 2 is the preferred alternative due to lower construction costs, reduced future maintenance needs and minimizes impacts to traffic during construction.

B. Need for Project

This bridge is a 35' x 30' concrete tee beam structure, built in 1954 and overlaid in 1986. The concrete in the beam ends is showing significant evidence of deterioration that will affect the capacity of the beams. The deck condition is poor at the ends. Full depth deck patching has been done at the far end. The abutment bridge seats have large hollow areas under the bearing areas of the beams. The bridge was designed for H20 loading, which is below current standards. There are no practicable repair options for

C. Present Facility

The existing structure is a 35' x 30' concrete tee beam bridge constructed in 1954.

IA 3 in the project area was a 22' wide PCC pavement with 10' wide granular shoulders and 3:1 foreslopes, constructed in 1954. However as a result of the HMA resurfacing project currently under contract (STPN-003-1(94)—2J-75), this roadway will be widened and resurfaced to provide a 28' wide roadway with 4' wide granular shoulders.

D. Traffic Estimates

The 2020 and 2040 average daily traffic estimates are 1,400 ADT with 16% trucks and 2,100 ADT with 17% trucks, respectively.

E. Sufficiency Ratings

IA 3 is classified as an Access route and is a maintenance service level "C" road. The federal bridge sufficiency rating is 51.4.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2010 through December 31, 2015, there was one crash that was a personal property crash.

II. PROJECT CONCEPT

A. Feasible Alternatives

Alternative #1 - Replace with a bridge

The existing 35' x 30' concrete tee beam bridge will be replaced with a 90' x 40', concrete slab bridge.

The typical cross section adjacent to the bridge will consist of a 28 ft. roadway with 6 ft. shoulders and 6:1/3:1 foreslopes. The new bridge will be built on the existing horizontal and vertical alignment. No new pavement will be required beyond the new bridge approach sections.

Replace the existing guardrail with new guardrail and pave the shoulders 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Place class E revetment for slope protection under the bridge.

Apply erosion control and rural seeding and fertilizing to all disturbed areas.

It appears that right of way may be required for this project.

Traffic will be maintained by an off-site detour as shown in the Detour Analysis.

Bridge Items	<u>Estimated Costs</u>
New Bridge	\$ 360,000
Bridge Removal	7,400
Revetment	30,500
Mobilization - 10%	39,800
M & C - 15%	<u>65,700</u>
Bridge Costs	\$ 503,400

Roadway Items	
Bridge Approaches	\$78,400

Removal of Pavement	8,600
Guardrail (Includes Removal)	25,200
Paved Shoulders for Guardrail	21,000
Class 10 for Guardrail Blisters	11,800
Bridge End Drains	6,500
Clearing and Grubbing	500
Erosion Control	50,000
Right of Way	10,000
Wetland Mitigation	50,000
Traffic Control - 5%	12,600
Mobilization - 5%	12,600
M & C - 30%	<u>86,100</u>
Roadway costs	\$ 373,300

Project Total **\$876,700**

Alternative #2 - Replace with a culvert utilizing the flowable mortar method

A twin 12' x 12' x 84' reinforced concrete box will be constructed under the existing 35' x 30' bridge utilizing the flowable mortar method. The typical cross section will consist of a 28 ft. roadway with 6 ft. granular shoulders and 6:1/3:1 foreslopes. The new RCB can be built under the existing bridge without disturbing the bridge. After the culvert has been constructed, flowable mortar will be used to fill the void between the RCB and bridge deck. Once the new 6:1/3:1 foreslopes have been placed adjacent to the bridge, the existing concrete bridge barrier, curb, and guardrail can be removed. The flow line of the box will be buried one foot below the existing flow line in the channel. This will allow the bottom of the box to silt in and provide a natural bottom for fish passage. Class E revetment will be placed at the ends of the RCB.

A 3" HMA overlay (1.5" intermediate and 1.5" surface) will be placed from bridge approach to bridge approach with a 50':1" taper to transition down to the existing pavement.

Apply erosion control and rural seeding and fertilizing to all disturbed areas.

Right of way will be required for this project.

It appears that the existing fiber optic line on the south side of the roadway will be impacted by the new RCB and will require relocation. See attachment A for a list of the utilities in the project area.

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail, placement of the flowable mortar and the HMA resurfacing.

	<u>Estimated Cost</u>
Bridge Items	
New Culvert	\$ 174,300
Headwalls	114,700
Revetment	23,400
Mobilization - 10%	32,000
M & C - 15%	<u>52,800</u>
Bridge Total	\$ 397,200
Roadway Items	
HMA (Includes Binder)	13,100
Barrier Rail Removal	2,800
Subdrain	500
Flowable mortar	24,900
Seed and Fertilize	500
Embankment in Place	16,700
Granular Shoulders	2,800
Clear and Grub	500
Erosion Control	50,000
Guardrail removal	1,400
Right of Way	10,000
Wetland Mitigation	50,000
Traffic Control @ 5%	8,000
Mobilization @ 5%	8,000
M&C @ 30%	<u>56,600</u>
Roadway Total	\$ 245,800
Project Total	\$ 643,000

B. Detour Analysis

Alternative 1

IA 3 will be closed and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 120 days. The detour will begin at the junction of IA 3 and County Road K-42 south three miles to County Road C-38, then west six miles on County Road C-38 to County Road K-22 then north three miles to the junction of IA 3. Out of distance travel is 6 miles. The total distance user cost is anticipated to be \$294,000. The cost for county road maintenance will be \$35,115 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000.

Alternative 2

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail, placement of the flowable mortar and the HMA resurfacing.

C. Recommendations

It is recommended that the present structure be replaced, as described in Alternative No. 2.

D. Construction Sequence

It is anticipated that all work on this project will be awarded to one prime contractor. The Office of Bridges and Structures will coordinate the plan preparation with assistance from the Office of Design.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to IA 3; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

The existing bridge is within a sag vertical curve and provides a K value of 107 which is less than the acceptable K value of 136 for a 60 mph design speed. This curve provides a stopping sight distance of approximately 470 ft. which is also less than the acceptable value of 570 ft. During the 5 year crash study period there was one crash that occurred during daytime hours in snowy and slushy conditions. No crashes have occurred at night indicating that headlight stopping distance at this location does not appear to be problematic. The AASHTO publication "A Guide for Achieving Flexibility in Highway Design", states that "Research and experience suggest that marginally deficient SSD may not translate into actual safety problems. The analysis should also consider the character of the roadway at the location of poor SSD. Referring to the above guidance, it may often be found that retention of the alignment that is just outside the traditional range is acceptable and more cost effective than reconstruction to full criteria." Therefore based upon this information it is recommended that the existing vertical alignment be used as constructed.

The ABC Rating Score of 24 is less than the first stage filter threshold of 50. Therefore, accelerated bridge construction will be dismissed from further

consideration.

No bike path or sidewalk will be required as part of this project.

Right of Way will be required for this project.

The Office of Location and Environment has reviewed this project and based on preliminary desktop observations, has determined that a Section 404 Permit will be required. It is expected that the work will be covered by Nationwide Permit 14.

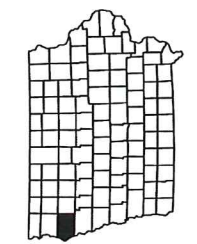
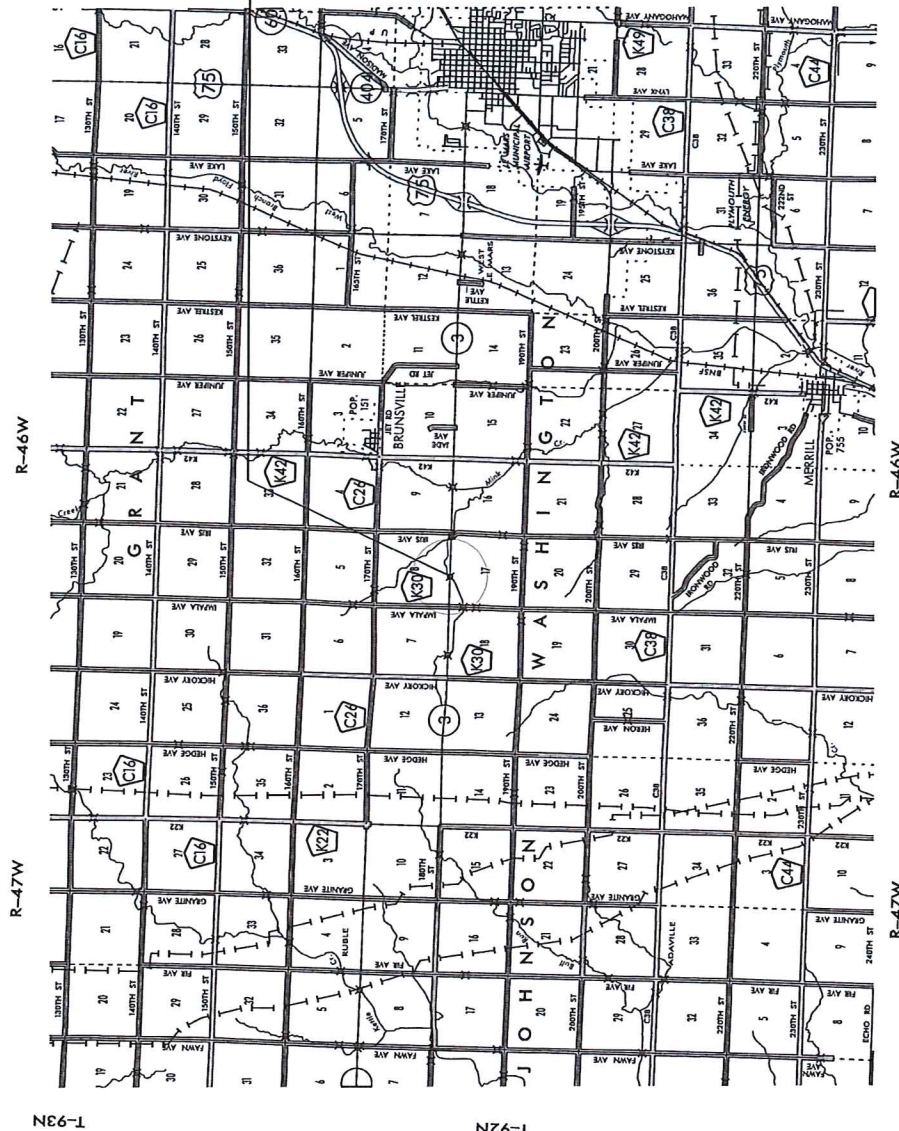
F. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2017-2021 Iowa Transportation Improvement Program with \$1,147,000 for replacement in FY 2020. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

KKP: jmc

PLYMOUTH COUNTY

STA 178+40
 FHWA 39810
 MAINT.7520.8S003
 DESIGN 1753



ON IA 3, DRAINAGE DITCH 1.6 MILES WEST
 OF Co. Rd. K42
 BRFN-003-1(95)—39-75
 PIN: 15-75-003-030

75

Attachment A

(FCI) FRONTIER COMMUNICATIONS
Contact Name :Trent Flockhart
Contact Phone: 5155731268
Contact Email: trent.flockhart@ftr.com

(MCI) MCI
Contact Name :Janette Harris
Contact Phone: 9727296650
Contact Email: janette.l.harris@verizon.com

(SSR)SOUTHERNSIOUXCOUNTY WATER
Contact Name :Russ Coons
Contact Phone: 7122782212
Contact Email: sscrws@hickorytech.net

Roadway	IA 3		
PIN Number	15-75-003-030	Submittal Date	
Project Number	BRFN-003-1(95)--39-75		Approval Date
District	District 3	Assistant District Engineer	Shane Tymkowicz
County	Plymouth (75)	or	
Route	IA 3	Office Director	
Location	Bridge over Drainage Ditch, 1.6 miles west of county road K-42		
Work Type	RCB - Flowable Mortar		
Segment Manager			
Designer			
Design Manual Section <u>1C-1</u> last update: 05-06-14	Rural Two-Lane Highways (Rural Arterials)		
Design Element	Preferred	Acceptable	Project Values
Design speed (mph)	60	50	60
Maximum superelevation rate (Refer to Section <u>2A-2</u>)	6%	8%	N/A
Design lane width (ft)	12	12	12
Full depth paved width (ft)	14	12	14
Right turn lane (ft)	12	10	N/A
Climbing Lane (ft)	12	12	N/A
Left turn lane (ft)	12	10	N/A
Pavement cross-slope (on tangent sections)	Through lanes	2%	1.5% minimum, 2% maximum
	Auxiliary and turn lanes	3%	3% maximum
	Crown break at centerline	4%	4% maximum
Shoulder cross-slope (on tangent sections)	4%	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Curb type (Refer to Section <u>3C-2</u>)	Design speed = 50 or 55 mph	6-inch sloped	6-inch standard
	Design speed ≥ 60 mph	4-inch sloped	6-inch sloped
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	3:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1
	Curbed roadways	2%	not steeper than 3:1
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)	3:1	2.5:1	2.5:1
Transverse Slopes	w/ drainage structures	8:1	6:1
	w/o drainage structures	10:1	6:1
Ditches (Refer to Section <u>3G-1</u>)	Outside ditch (depth x width) (ft)	5 x 10	--
Bridge width—new	Bridge length ≤ 200 ft	design lane widths + effective shoulder widths	design lane widths + effective shoulder widths
	Bridge length > 200 ft	design lane widths + effective shoulder widths	design lane width + 4' right and left of the design lane widths
Bridge width—existing		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft. offset left and right
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14
	Over railroad	23.3	23.3
	Sign trusses and pedestrian bridges	17.5	17
Structural Capacity	Contact Office of Bridges and Structures		Contact Office of Bridges and Structures
Level of Service	B		B

Rural Two-Lane Highways (Rural Arterials)

Roadway Design Speed (mph) =		60														
Design Manual Section 1C-1 last update: 05-06-14		Design Criteria for High Speed Roadways														
Design Element		Preferred Criteria						Acceptable Criteria						Project Values		
		Design Speed, mph						Design Speed, mph								
		50	55	60	65	70	75	50	55	60	65	70	75			
Stopping sight distance (ft) (Refer to Section 6D-1)		425	495	570	645	730	820	425	495	570	645	730	820	466 *		
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution	e _{max} = 6%		833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	N/A
		e _{max} = 8%		--	--	--	--	--	--	--	758	960	1200	1480	1810	2210
Minimum vertical curve length (ft) (Refer to Section 2B-1)		150	165	180	195	210	225	150	165	180	195	210	225	400		
Minimum rate of vertical curvature (K) (Refer to Section 2B-1)	crest vertical curves		84	114	151	193	247	312	84	114	151	193	247	312	N/A	
	sag vertical curves	roadways without fixed source lighting	96	115	136	157	181	206	96	115	136	157	181	206	107 *	
		roadways with fixed-source lighting	96	115	136	157	181	206	54	66	78	91	106	121	N/A	
Minimum gradient (%) (Refer to Section 2B-1)		0.5						0.3% with a curb, 0.0% without a curb						1.83%		
Maximum gradient (%) (Refer to Section 2B-1)	Urban roadways		4			3			7	6	6	--	--	--	N/A	
	Rural roadways		4			3			5	5	4	4	4	4	1.9%	
	Interstates		4			3			5	5	4	4	4	4	N/A	
Clear zone		See "Preferred Clear Zone" table in Section 8A-2						See "Acceptable Clear Zone" table in Section 8A-2						30		

Rural Two-Lane Highways (Rural Arterials)

Design year ADT =		2100				
Design Manual Section <u>1C-1</u> last update: 05-06-14		Effective Shoulder Width and Type for Two-Lane Highways				
Preferred (values shown in feet)			Acceptable (values shown in feet)			Project Values
	Rural Roadways	Urban Roadways		Rural Roadways	Urban Roadways	
Turn lanes with shoulders	6	6	Turn lanes with shoulders	6	0	N/A
Turn lanes with curbs	6	See Section 3C-2	Turn lanes with curbs	6	0	N/A
	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	
Climbing Lanes	6	4	Climbing Lanes	4	0	N/A
Two-Lane Highways	Effective Shoulder Width	Paved Width	Two-Lane Highways	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	Design year ADT > 2000 vpd	8	2*	8
On roadways approaching urban areas (due to increased bike traffic)	10	10				
On all curves with a superelevation rate of 7.0% or greater	10	10				
On roadways with design year ADT > 5000	10	6	Design year ADT between 400 - 2000 vpd	6	2*	
On all other NHS	10	4				
On non-NHS routes with design year ADT > 3000	10	4	Design year ADT < 400 vpd	4	2*	
On non-NHS routes with design year ADT < 3000	8	2*				

*Requires safety edge-Refer to Section 3C-6
 Curbs should be located beyond the outer edge of the effective shoulder width in rural areas
 Refer to Section 3C-2 for curb offsets in urban areas

Notes:

* - The existing bridge is within a sag vertical curve and provides a K value of 107 which is less than the acceptable K value of 136 for a 60 mph design speed. This curve provides a stopping sight distance of approximately 470 ft. which is also less than the acceptable value of 570 ft. During the 5 year crash study period there was one crash that occurred during daytime hours in snowy and slushy conditions. No crashes have occurred at night indicating that headlight stopping distance at this location does not appear to be problematic. The AASHTO publication "A Guide for Achieving Flexibility in Highway Design", states that "Research and experience suggest that marginally deficient SSD may not translate into actual safety problems. The analysis should also consider the character of the roadway at the location of poor SSD. Referring to the above guidance, it may often be found that retention of the alignment that is just outside the traditional range is acceptable and more cost effective than reconstruction to full criteria." Therefore based upon this information it is recommended that the existing vertical alignment be used as constructed.

QUESTIONS & COMMENTS

WEST OF BRIDGE – 50:1 TAPER OR VERTICAL CURVE? *Use 50':1 tapers*

PRE-CAST OR CAST-IN-PLACE RCB? *Contractor's option*

WIDENING/RETROFIT PAVED SHOULDER – COMPLETED TO BRIDGE? *Yes*

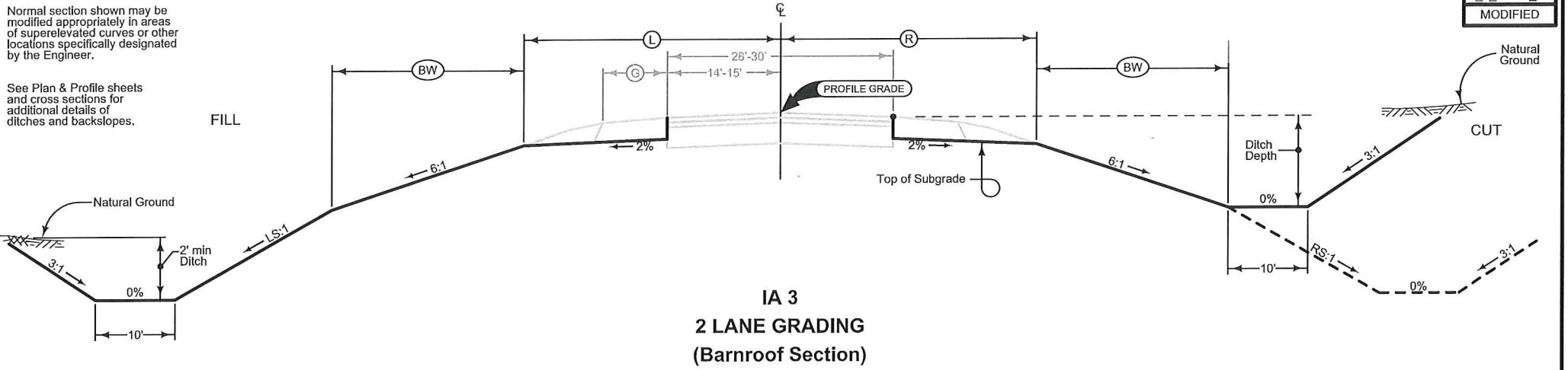
SURVEY AND 2016 RESURFACING PROJECT

Guardrail removal job requested

LOCATION		DIMENSIONS					
ROAD IDENTIFICATION	STATION TO STATION	L Feet	R Feet	BW Feet	LS Feet	RS Feet	
IA 3	175+80.00	176+30.00	24.87-22.38	24.16-22.38	0.00	4	4
IA 3	176+30.00	177+13.98	22.38	22.38	0.00	4	4
IA 3	177+13.98	177+28.11	22.38-23.95	22.38-23.95	0.00	4-3.7	4-3.7
IA 3	177+28.11	177+96.09	23.95	23.95	0.00-18.05	3.7-3	3.7-3
IA 3	177+96.09	178+82.02	23.95	23.95	18.05	3	3
IA 3	178+82.02	179+49.64	23.95	23.95	18.05-0.00	3-3.7	3-3.7
IA 3	179+49.64	179+64.13	23.95-22.38	23.95-22.38	0	3.7-4	3.7-4
IA 3	179+64.13	180+55.00	22.38	22.38	0	4	4
IA 3	180+55.00	180+80.00	22.38-22.85	22.38-28.2	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.

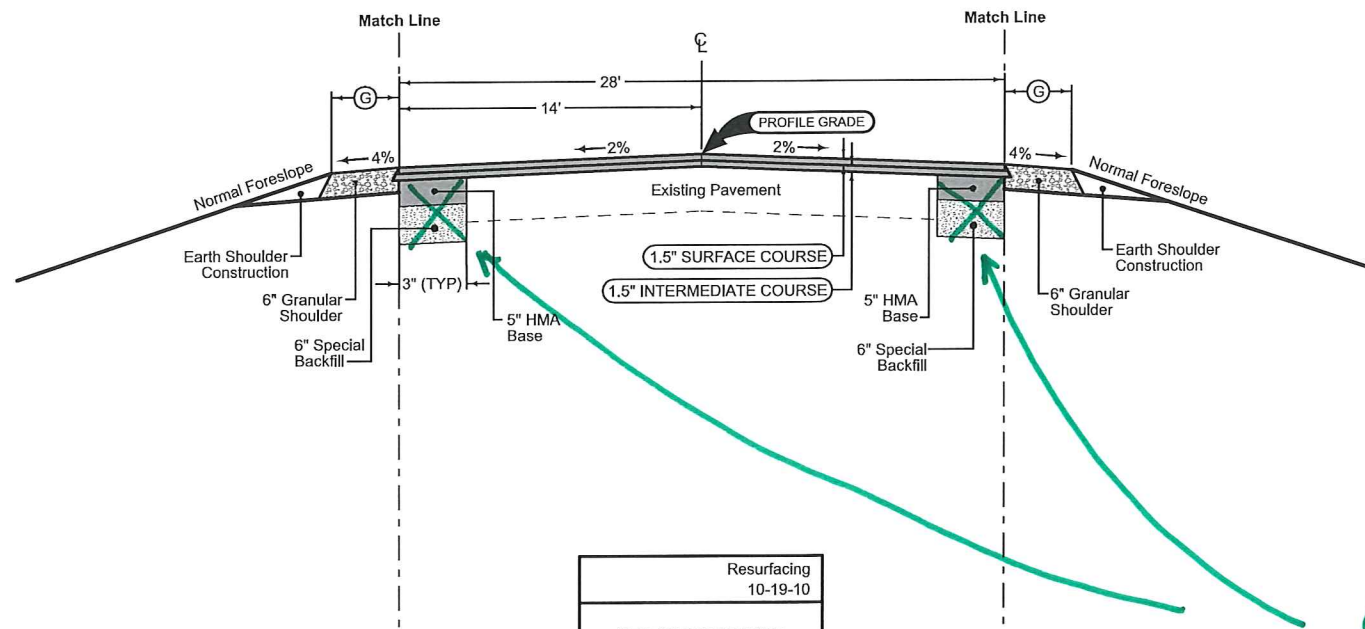


G_2_Grade_BR
MODIFIED

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

		2_C_Lt 10-15-13
STATION TO STATION		Ⓞ Feet
175+80.00	178+23.10	6.0
178+55.10	180+80.00	6.0



Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

		2_C_Rt 10-15-13
STATION TO STATION		Ⓞ Feet
175+80.00	178+23.10	6.0
178+55.10	180+80.00	6.0

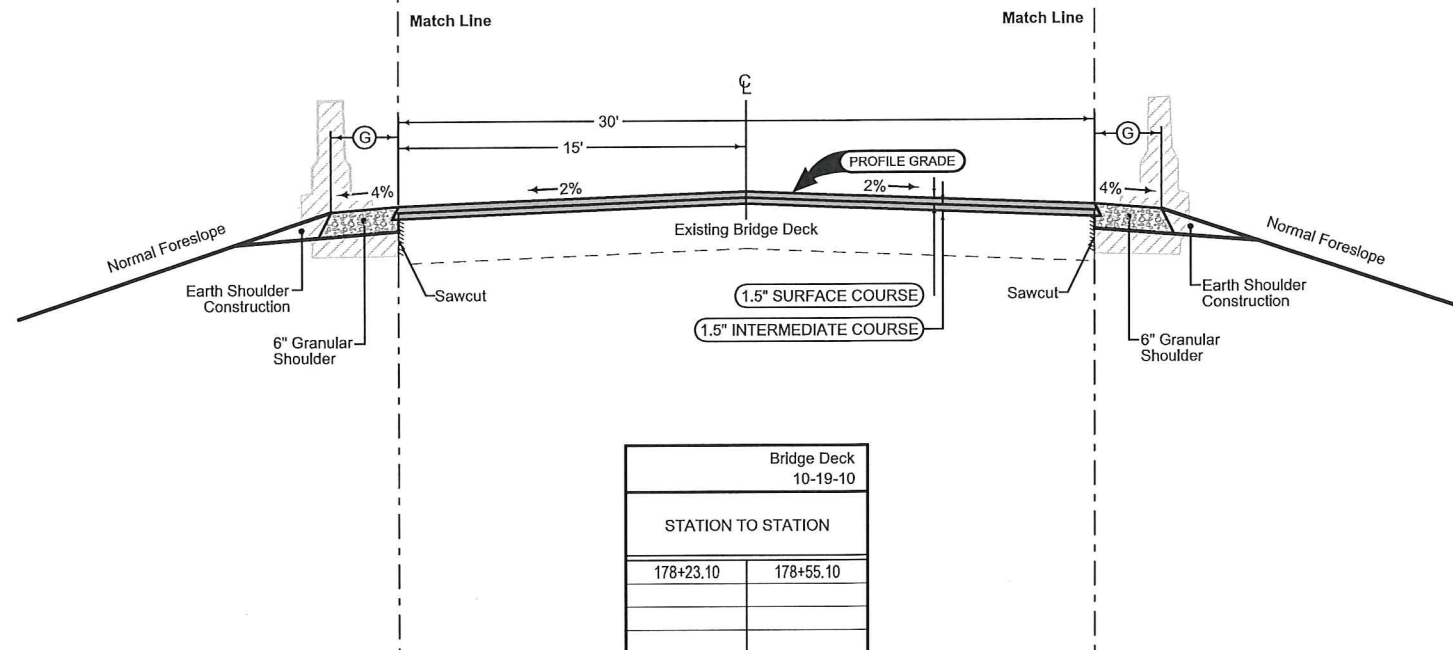
Resurfacing 10-19-10	
STATION TO STATION	
175+80.00	178+23.10
178+55.10	180+80.00

*Widening work was completed
Therefore this can be removed*

Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

		Bridge Shoulder Lt 10-15-13
STATION TO STATION		Ⓞ Feet
178+23.10	178+55.10	5.0



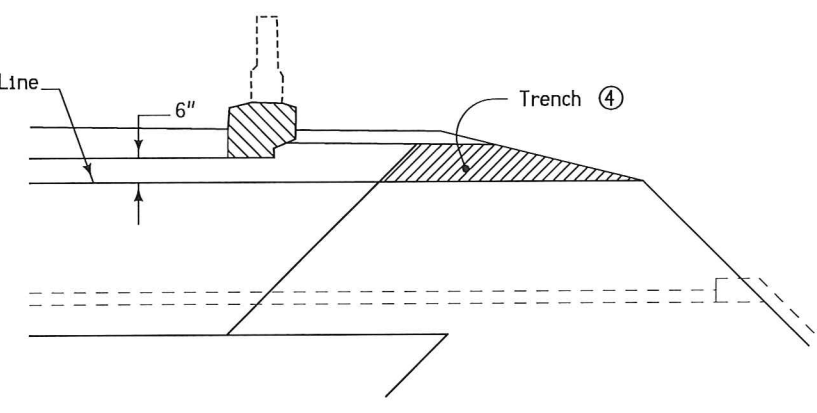
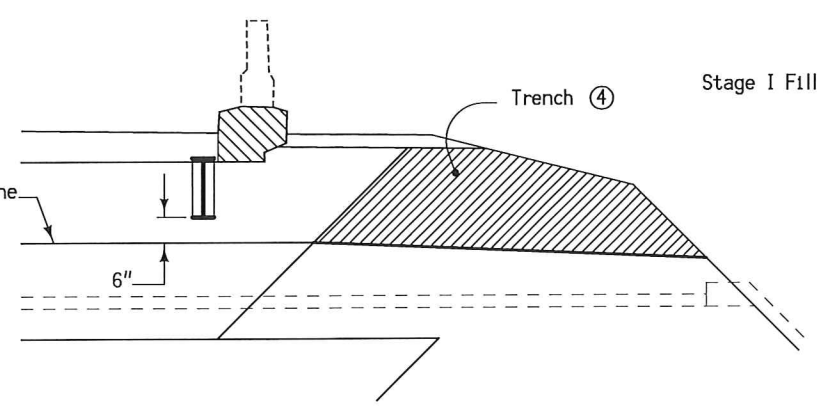
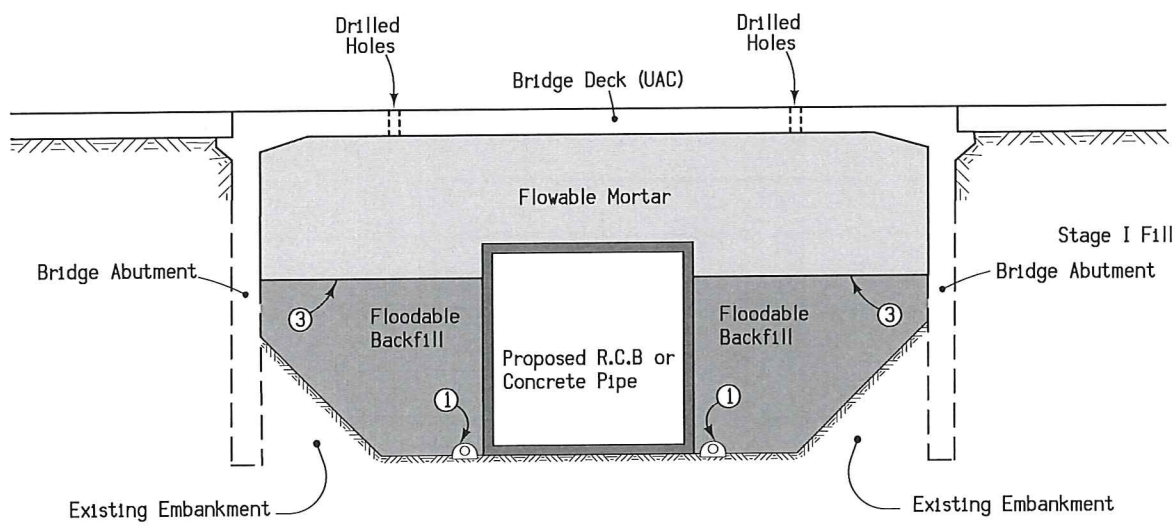
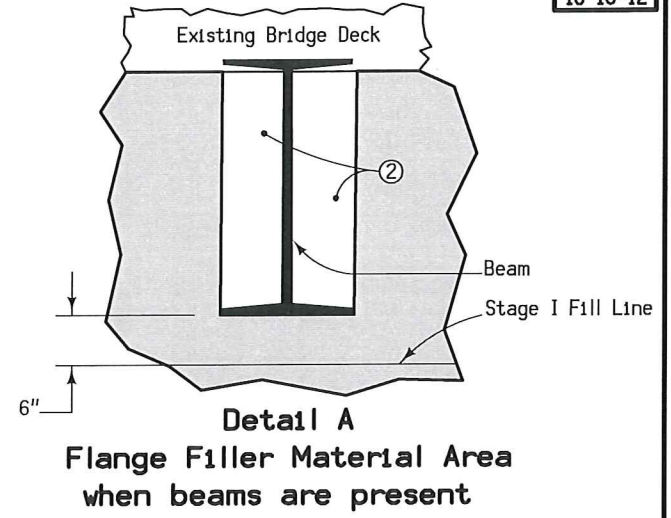
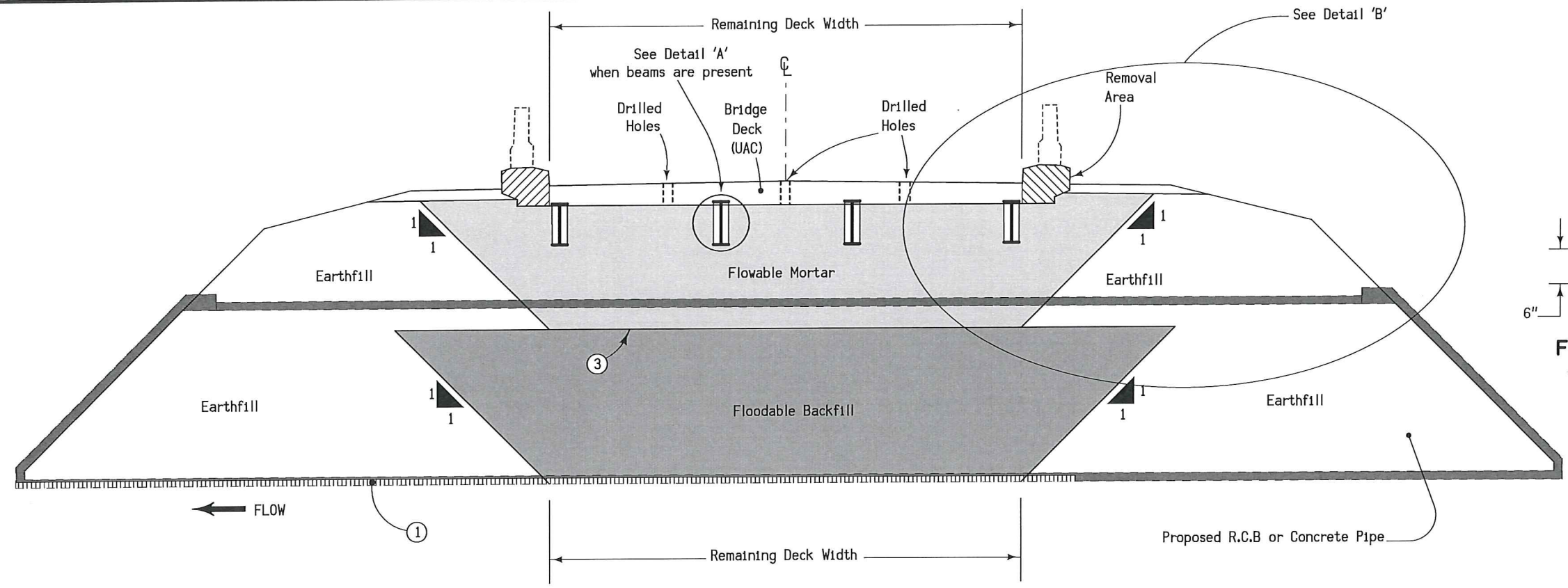
Combination Shoulder

Shoulder Jointing:
Longitudinal joint: B

		Bridge Shoulder Rt 10-15-13
STATION TO STATION		Ⓞ Feet
178+23.10	178+55.10	5.0

Bridge Deck 10-19-10	
STATION TO STATION	
178+23.10	178+55.10

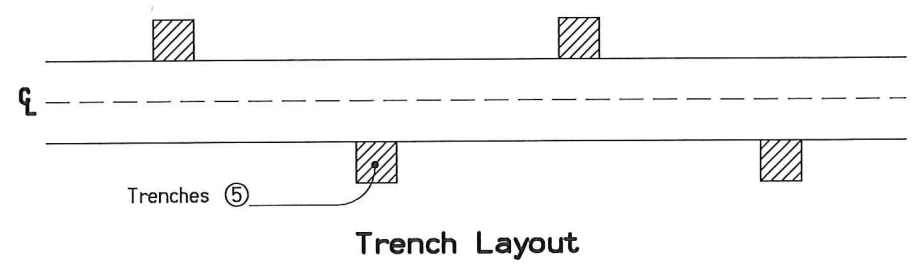
See Tab 100-24 or 100-25 for pavement quantities.
See Tab 112-9 for shoulder quantities.



Detail B (Beam Bridge)

Detail B (Slab Bridge)

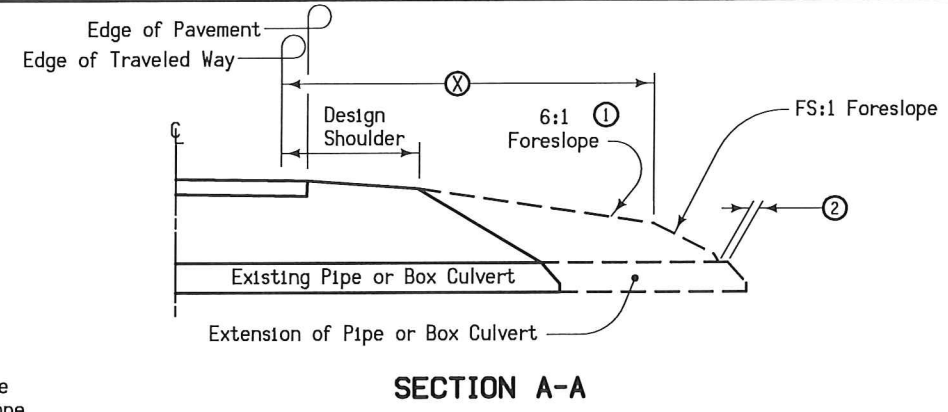
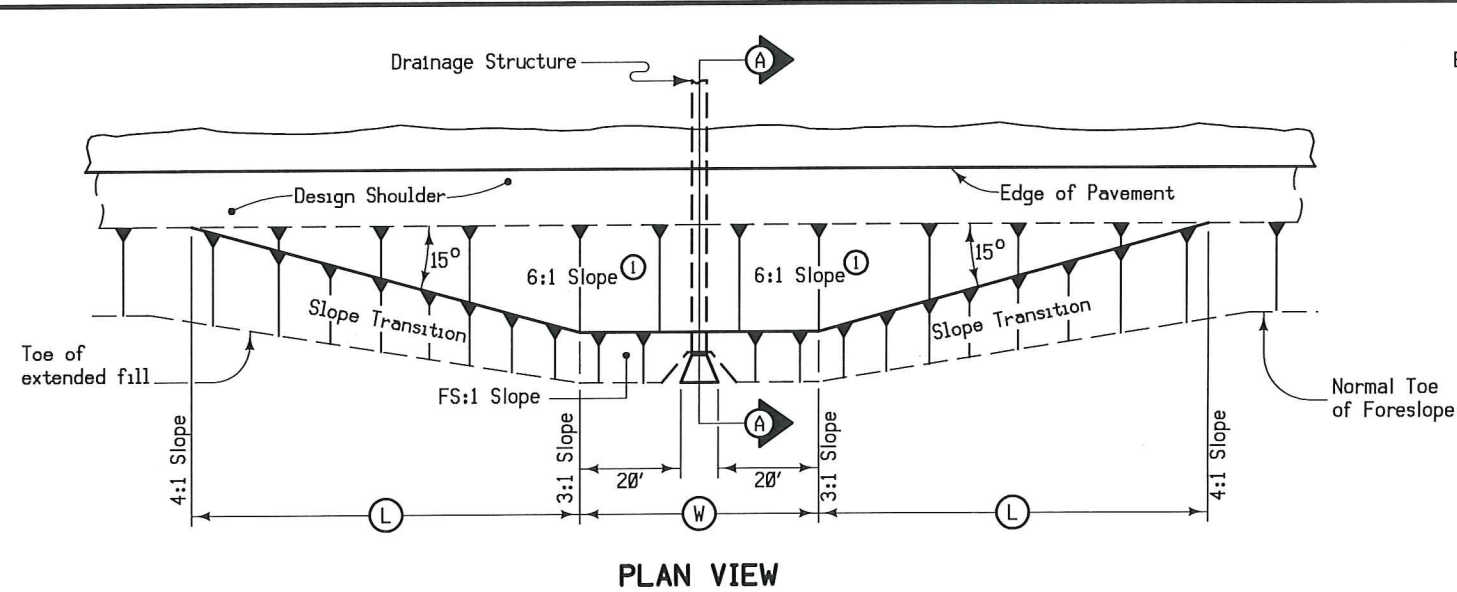
Section along Centerline



- 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

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



- 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".
 - (L) 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.

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

**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
- GDG 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 Mile Marker Post
- SBR Size of Bridge
- DTM Photogrammetry Elev Control Check
- PRO Profile Shot
- GR Ground Shot
- ✂ PL Location of Photo (Wellands)
- TPD Telephone Pedestal
- FENO FENO Monument
- BM Bench Mark

UTILITY LEGEND

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

--- *waterline*

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

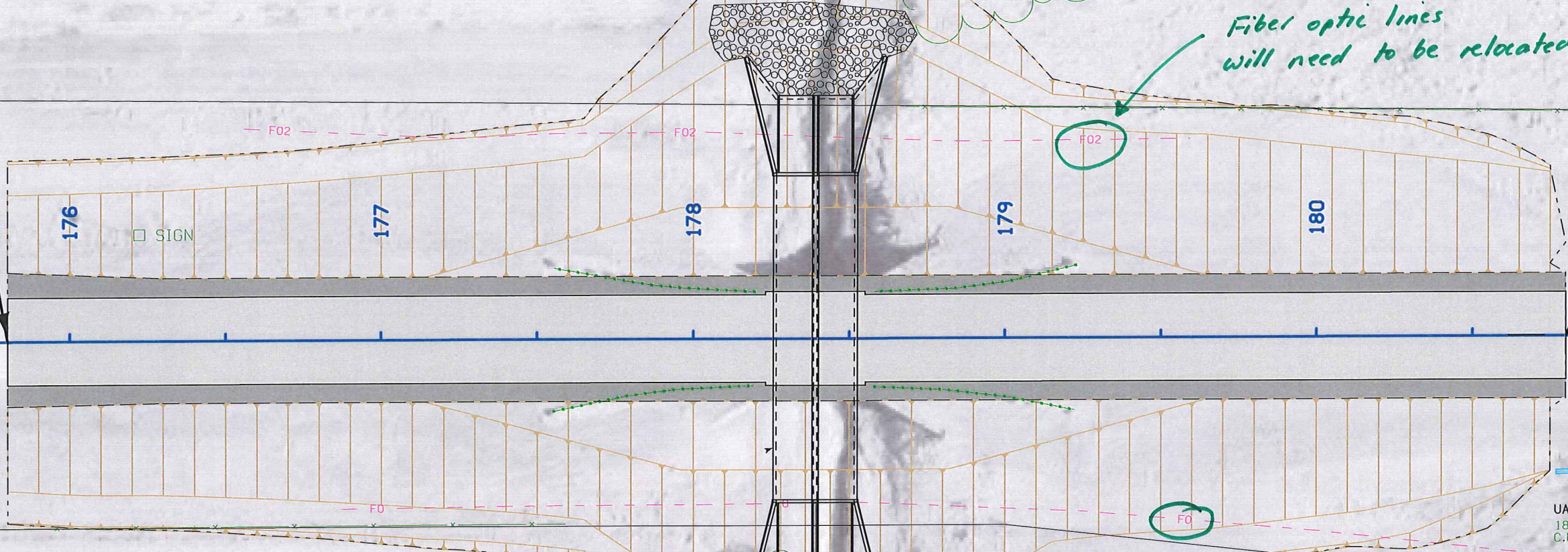


STA. 175+80.00
BEGIN PROJECT

STA. 180+80.00
END PROJECT

*Fiber optic lines
will need to be relocated*

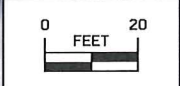
No drainage district

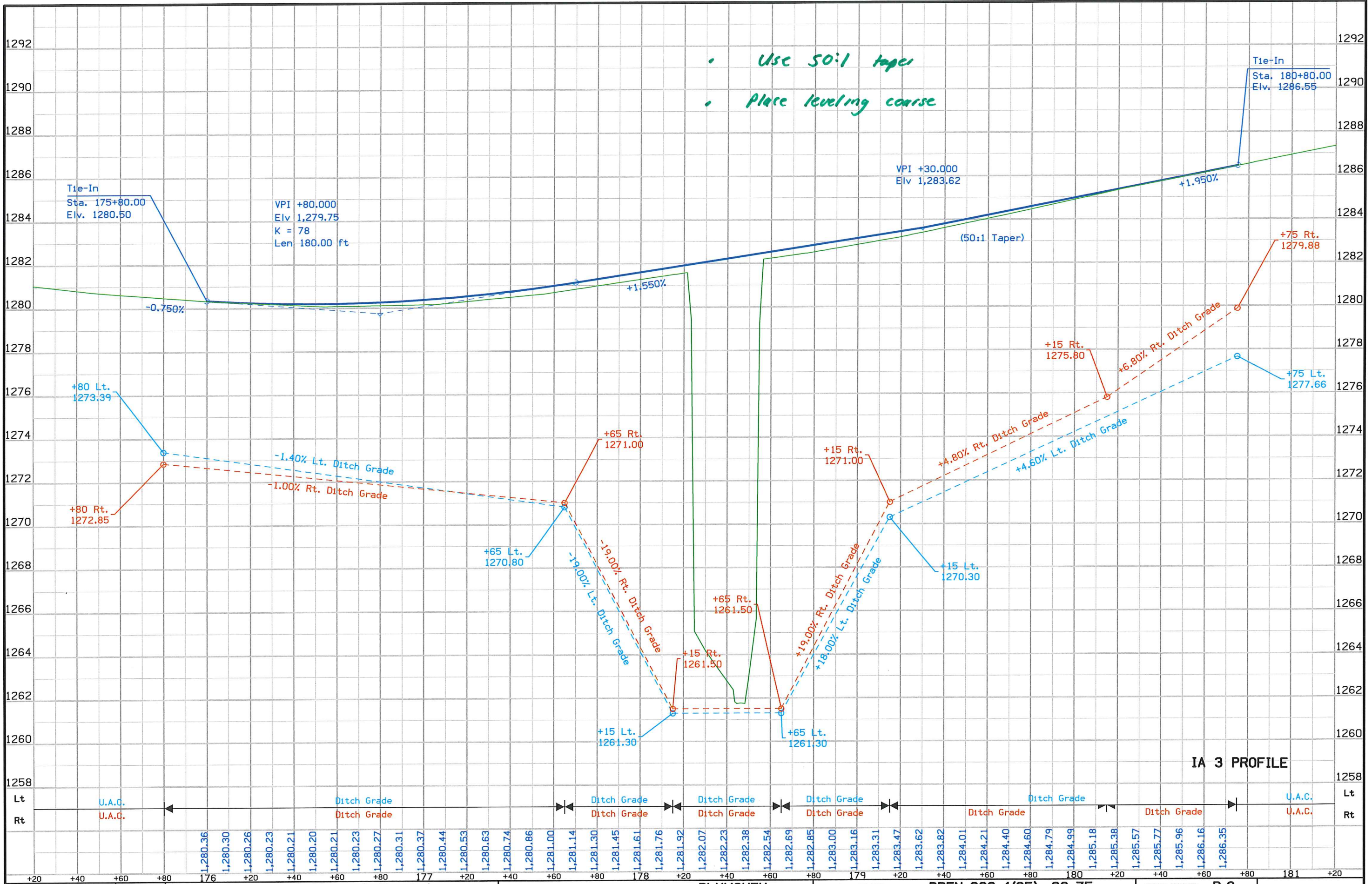


REMOVE
Sta. 178+39.10
32' x 30'
CONC GIRDER BRIDGE
DA 2800 Ac

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

UAC
18" X 92.87
C.M.P.





• Use 50:1 taper
 • Place leveling course

IA 3 PROFILE

FILE NO.	ENGLISH	DESIGN TEAM	FLATTERY \ Manc1 \ Crystal	PLYMOUTH COUNTY	PROJECT NUMBER	BRFN-003-1(95)--39-75	SHEET NUMBER	D.3
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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

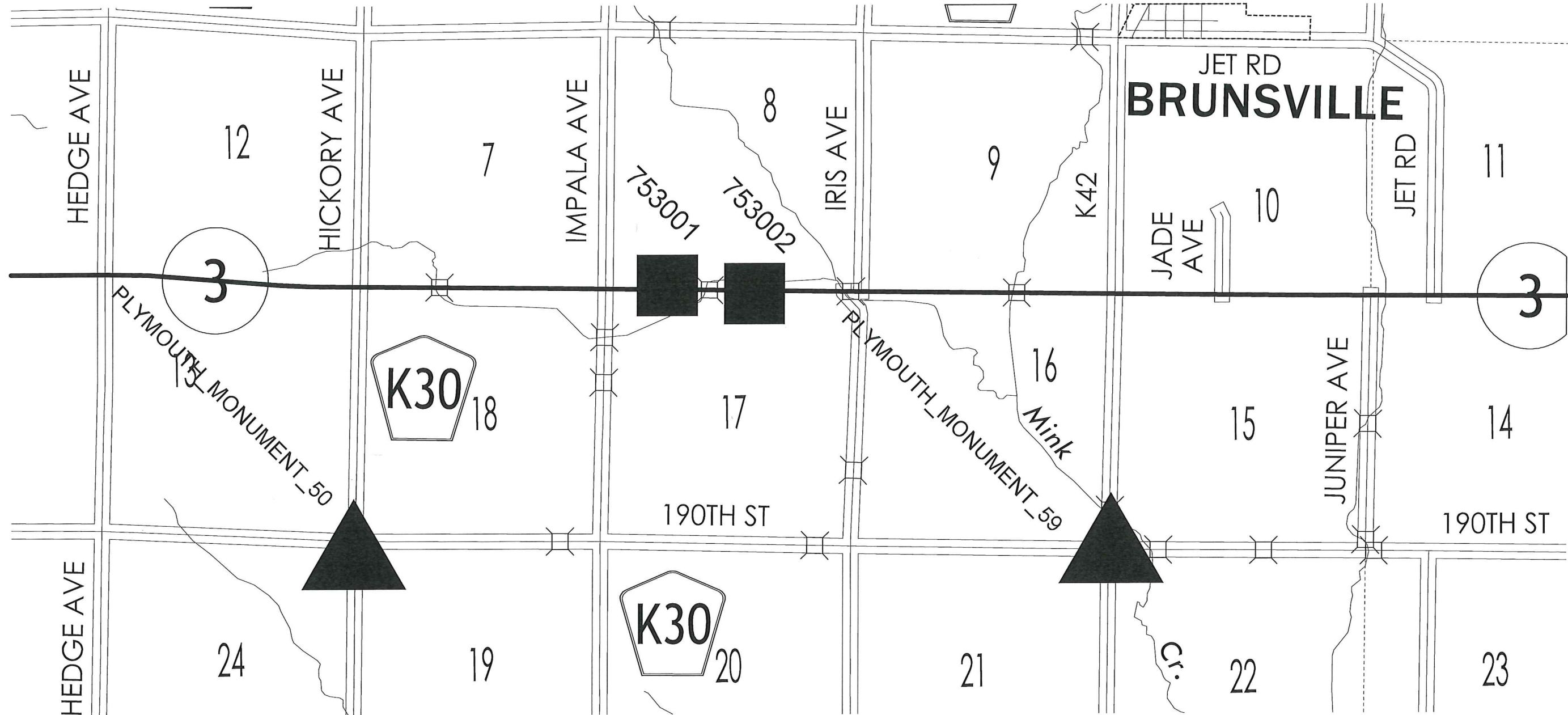
Name	Grid Northing (USft)	Grid Easting (USft)	Elevation (USft)
753001	8698211.024	14104361.11	1287.389
753002	8698037.13	14106170.26	1290.26
Lemars	8699224.169	14146951.66	1287.253
Sioux City	8609737.846	14091726.62	1165.885
Sioux City Known	8609737.832	14091726.62	1165.91
Rock Rapids	8930827.483	14150537.89	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

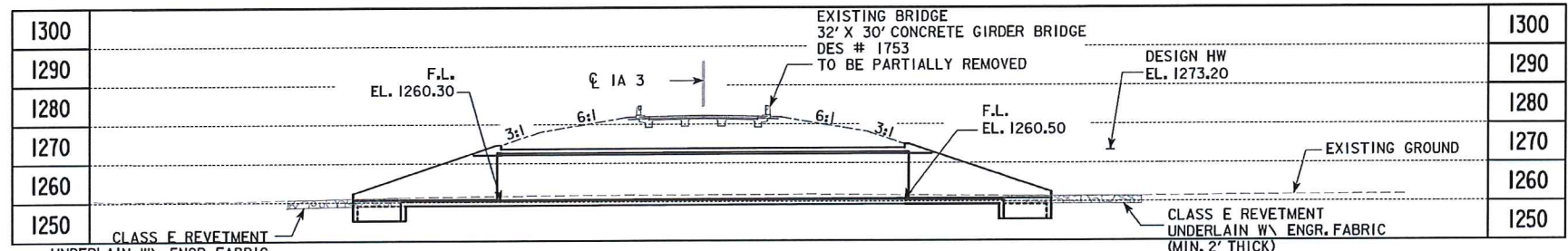
TRAFFIC CONTROL PLAN

Eastbound and westbound IA Hwy 3 traffic shall be maintained at all times.

It will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail, placement of the flowable mortar, and the HMA resurfacing.

511 TRAVEL RESTRICTIONS

Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks



LONGITUDINAL SECTION ALONG \bar{C} OF CULVERT

CULVERT FLOWLINE BURIED 1'

HYDRAULIC DATA

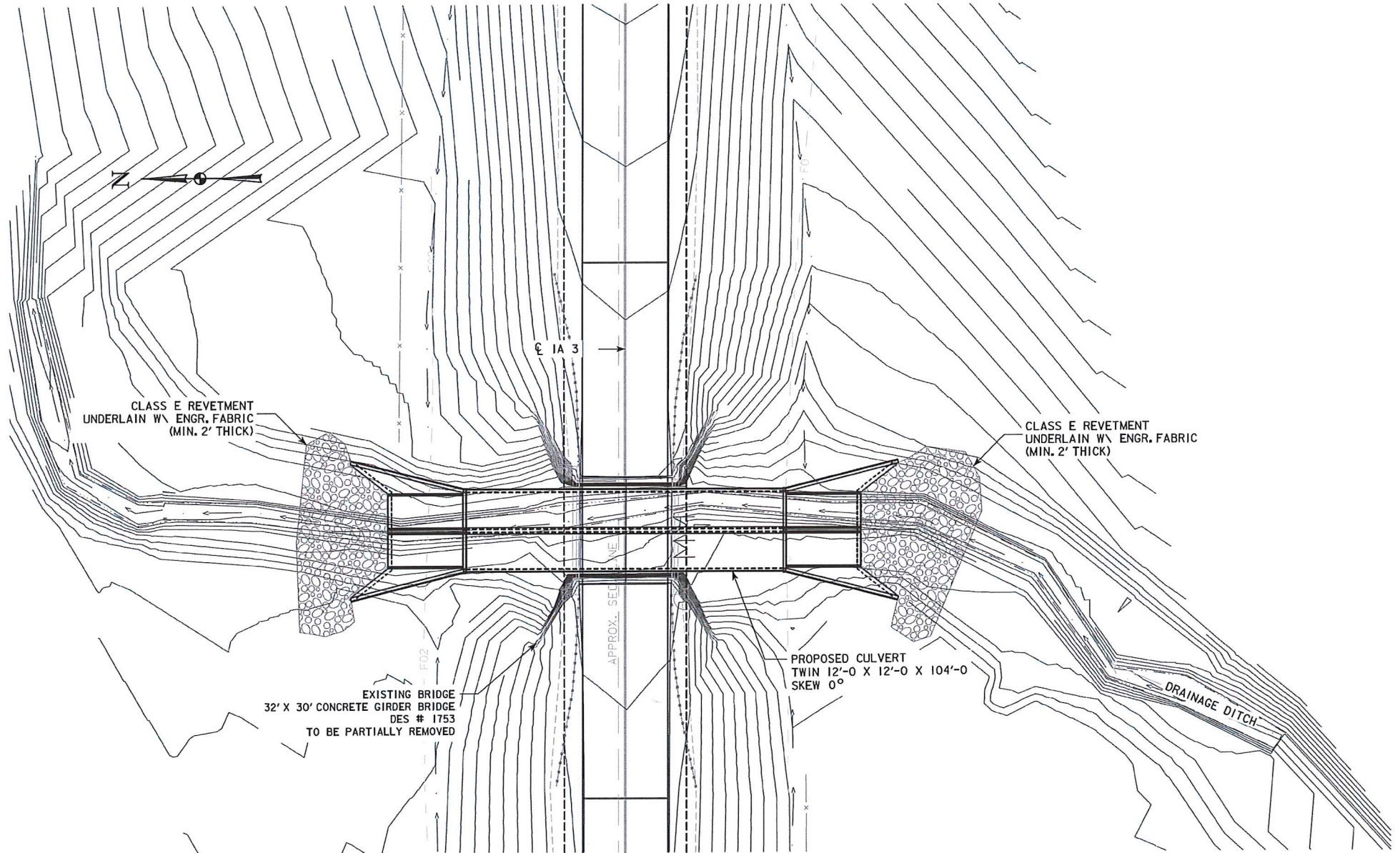
DRAINAGE AREA = 4.3 SQ. MI.
 $Q_{50} = 2,550$ CFS
 HW ELEV. = 1273.20
 STREAM SLOPE = 35.9 FT./MI.

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. 7520.85003
 LATITUDE ??.??????°
 LONGITUDE -??.??????°



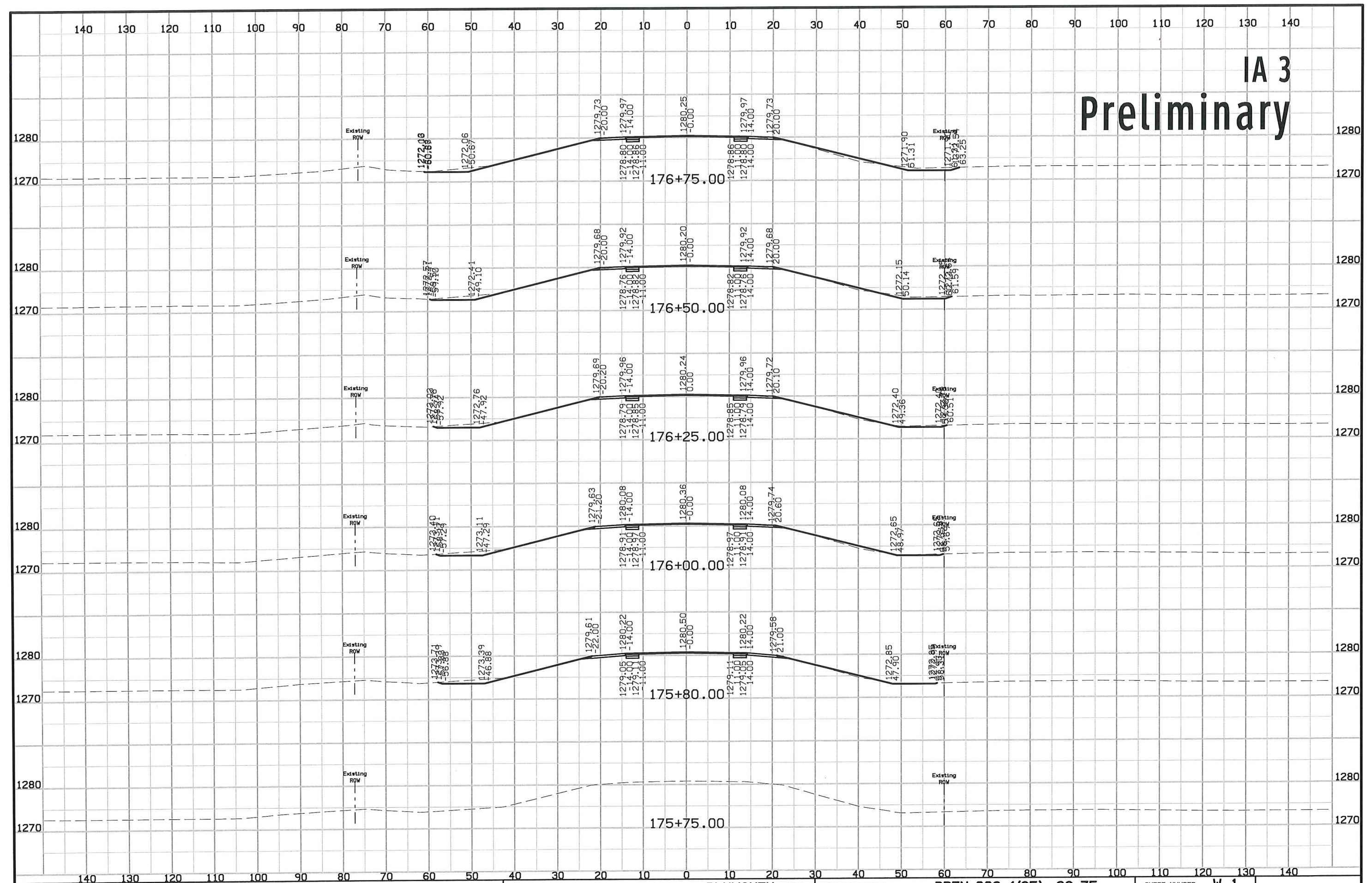
SITUATION PLAN

Pre Cast option also

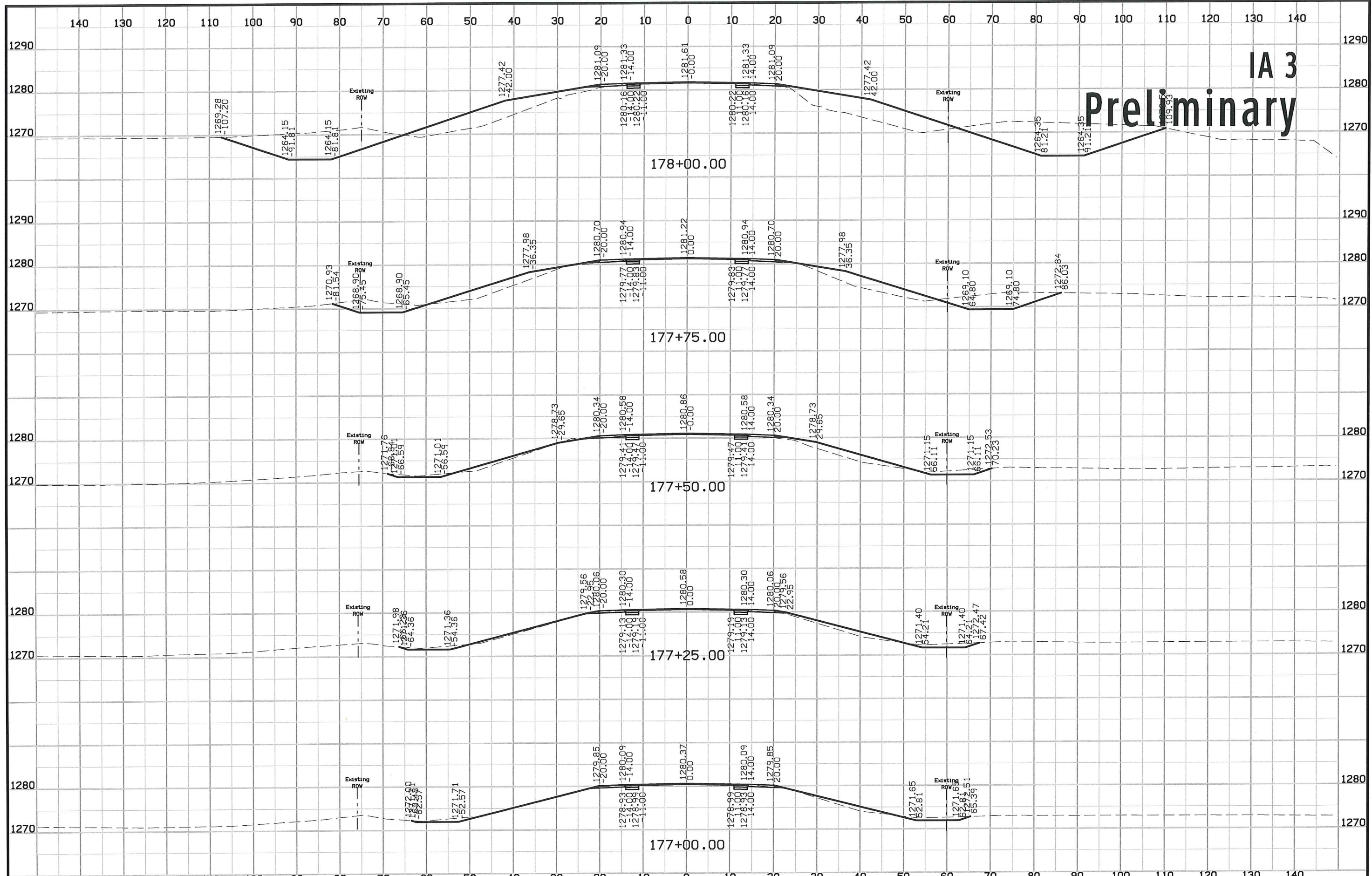


D2
 DESIGN FOR 0° SKEW
**TWIN 12'-0 X 12'-0 X 104'-0
 CAST-IN-PLACE CONCRETE CULVERT**
 SITUATION PLAN
 STATION 178+39.05 JUNE 2017
 PLYMOUTH COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. OF ? FILE NO. ? DESIGN NO. ?

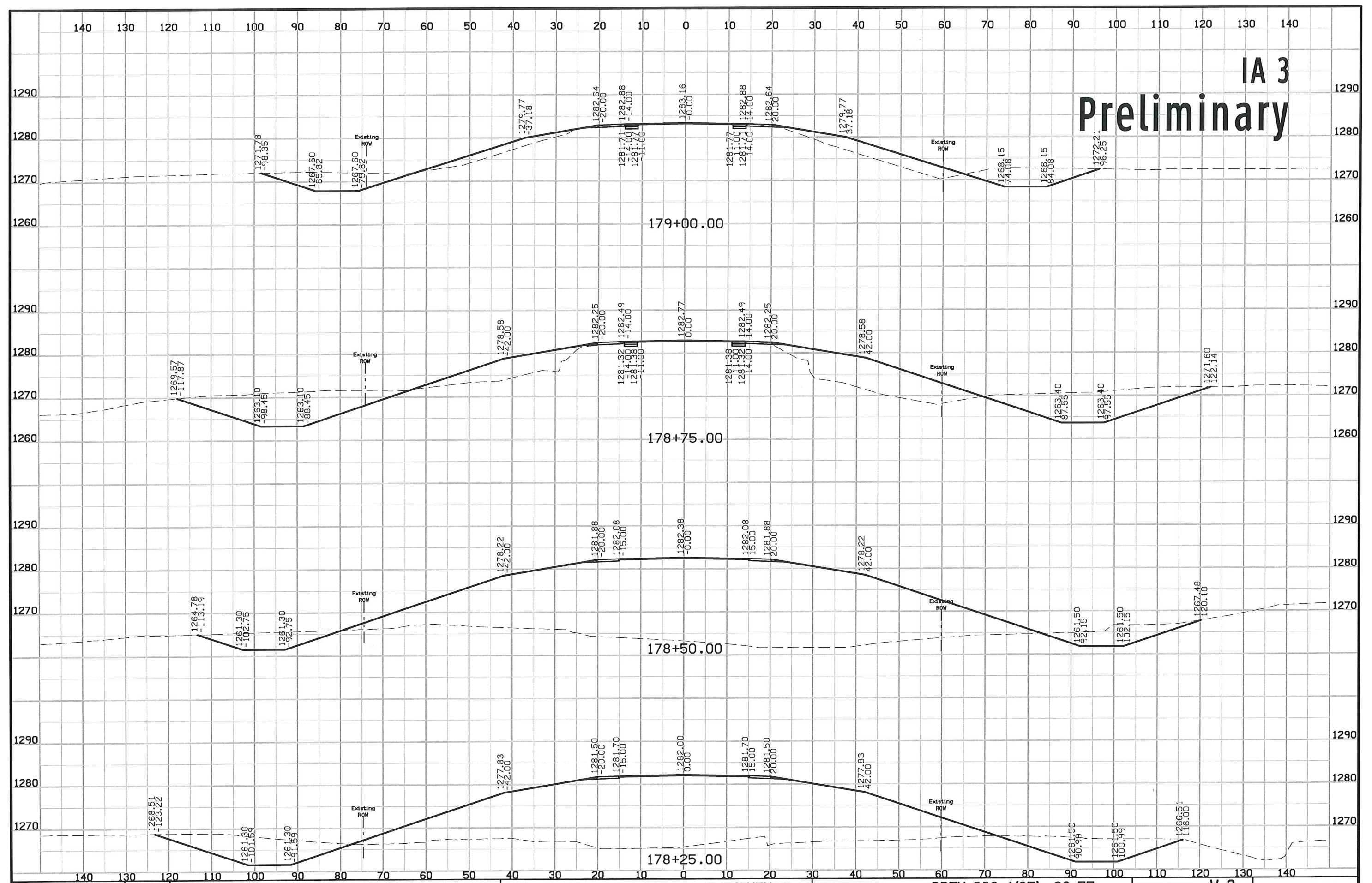
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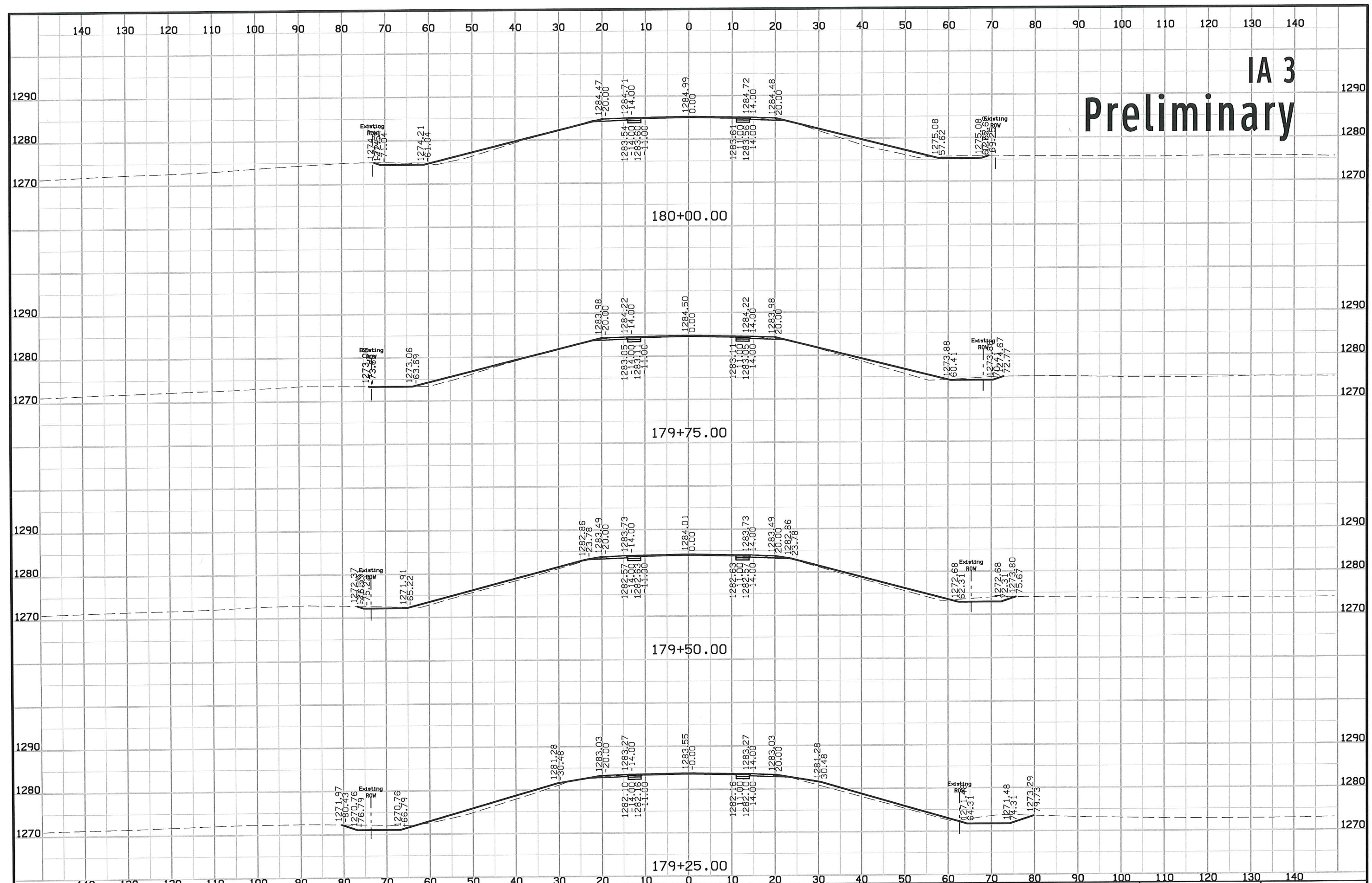
IA 3 Preliminary



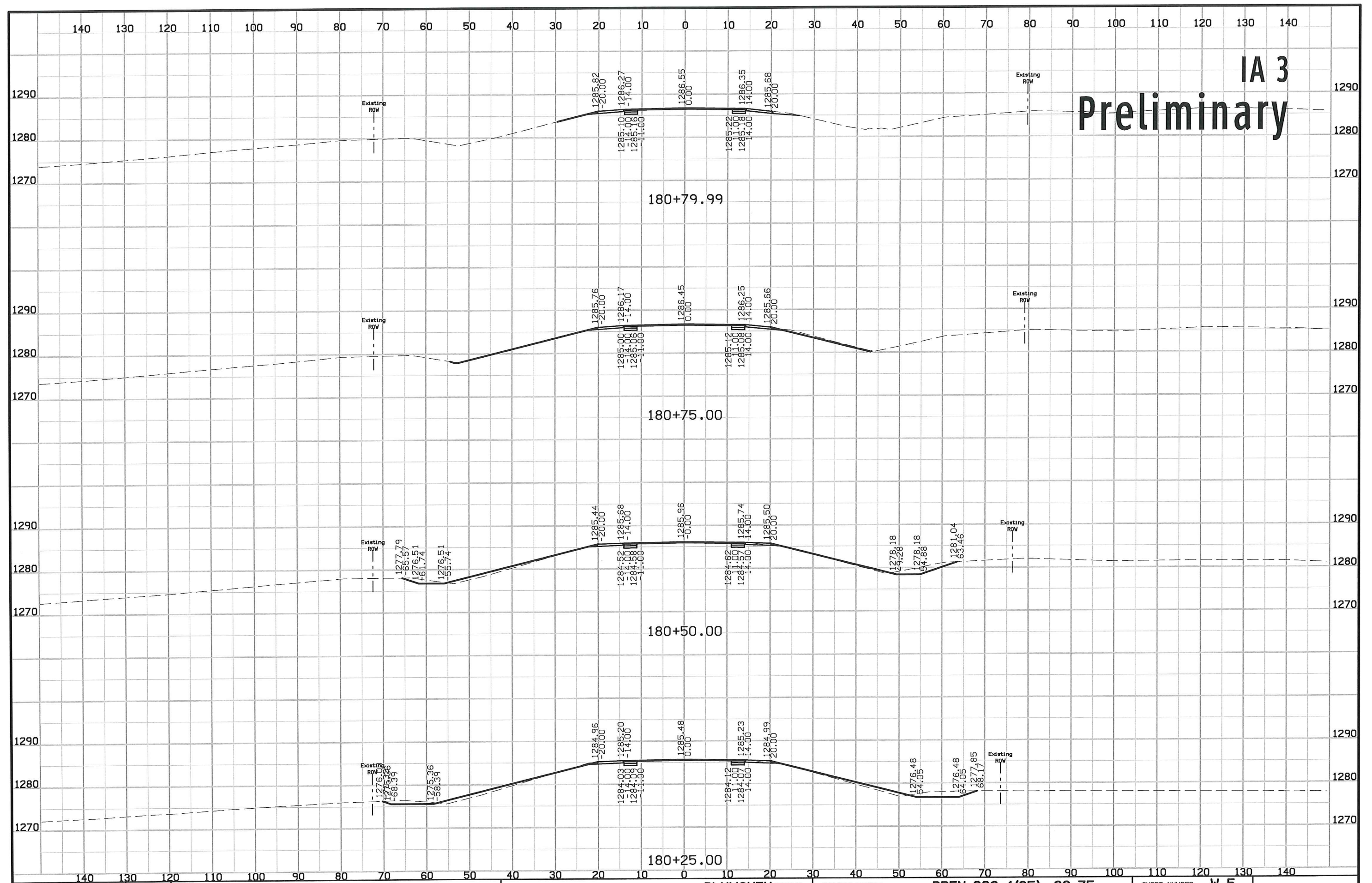
IA 3 Preliminary



IA 3 Preliminary



IA 3 Preliminary



IA 3 Preliminary

