

DESIGN DATA				
Traffic	Average Daily			Location
Current 2024	Pass: 735	Trucks: 180	Total: 915	RP 317.185 to RP 322.180
Clear Zone Distance: 4:1; 36' 10:1; 24'		Design Speed: 65		

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NH-6-005(055)319
Pembina County
Structure 0005-319.917 ~ 5.5 miles East of Cavalier
Structure 0005-322.119 ~ Southeast of Hamilton
Culvert Pipes, Structure Removal, Grading, Hot Mix Asphalt,
Milling, Aggregate Base, Pavement Markings, Incidentals

GOVERNING SPECIFICATIONS

Date Published and Adopted
by the North Dakota
Department of Transportation

Standard Specifications

7/1/2025

Supplemental Specifications

NONE

PROJECT NUMBER \ DESCRIPTION

NET MILES

GROSS MILES

Structure No. 0005-319.917

0.099

0.099

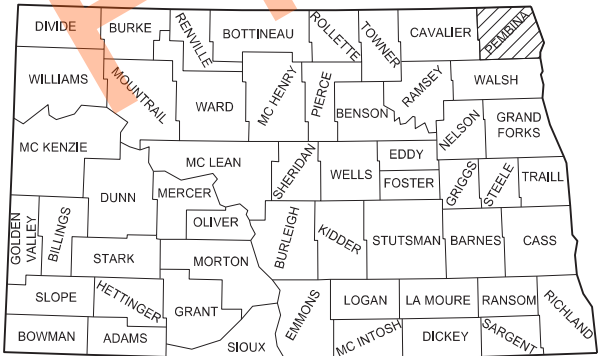
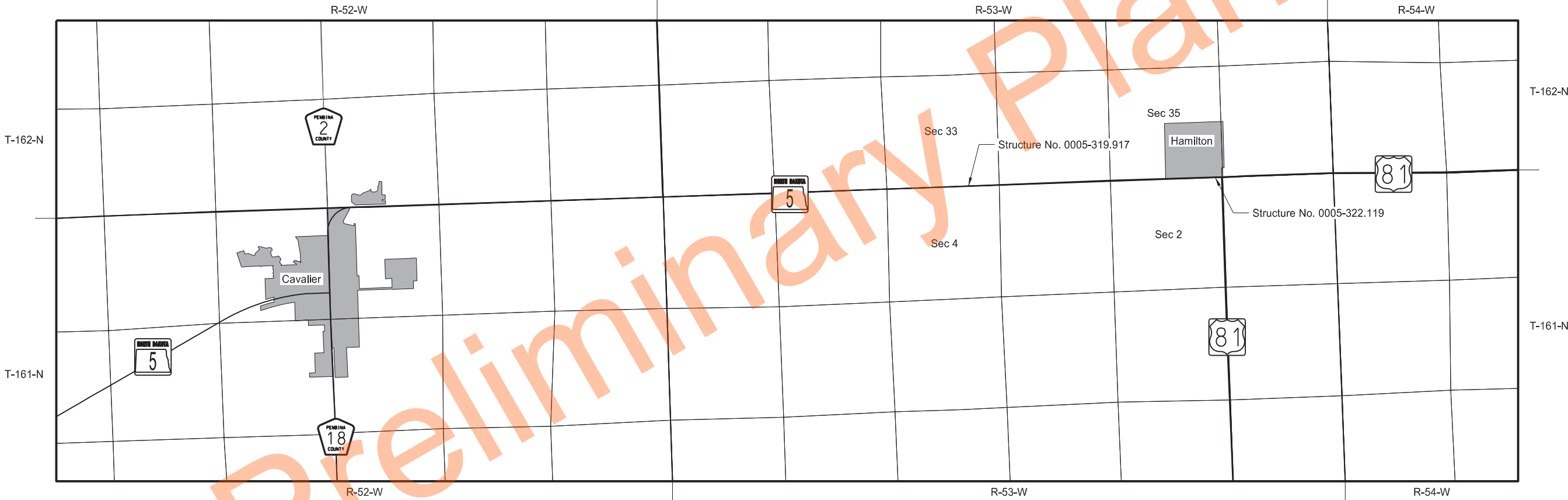
Structure No. 0005-322.119

0.100

0.100

0.199

0.199



STATE COUNTY MAP

DESIGNER Adam McGill
DESIGNER Jonathon Backer
DESIGNER Mason Heustis
DESIGNER Marcus Rosing

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

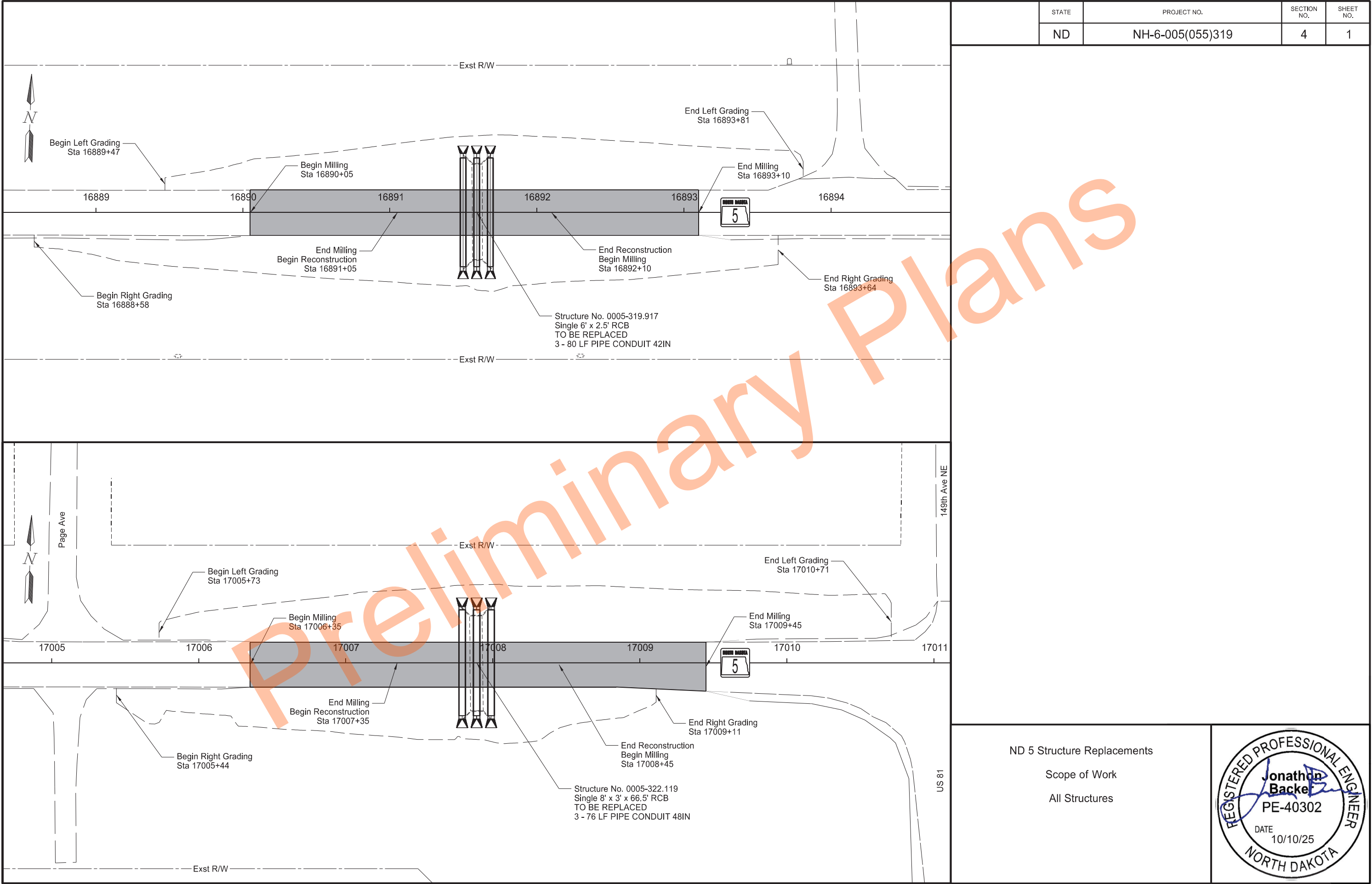
Jason Thorenson

Jason Thorenson
10/13/25

KLJ



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Number	Description							
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SSP 10	E-Ticketing							
SP 96(25)	Temporary Water Diversion							
SP 97(25)	Utility Coordination							
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NOTES

107-P01 MAINTAINING TRAFFIC – UNEVEN SHOULDER: If a shoulder and the adjacent lane are uneven due to milling or paving operations, the requirements of Section 704.04 O, “Traffic Control for Uneven Pavement” apply. If the uneven shoulder and adjacent lane are due to other circumstances, the contents of this note apply.

If, at the end of the workday, drop-offs greater than 2 inches and less than 18 inches or slopes steeper than 4:1 exist between the edge of a traffic lane and the outside edge of the proposed roadway, perform one of the following actions:

- Construct a traversable wedge in the area of the drop-off or steep slope; or
- Close the lane adjacent to the drop-off or steep slope and provide 24-hour flagging or pilot car operations.

When constructing a wedge, construct a wedge composed of aggregate or earthen materials with a 4:1 or flatter slope along the entire length of the area. Compact materials using Type C compaction, as specified in 203.04 G.4, “Compaction Control Type C”.

Install stackable vertical panels that meet the requirements of Section 704.03 H, “Stackable Vertical Panels”, along the edge of the driving lane closest to the wedge.

The Engineer will measure stackable vertical panels as specified in Section 704.05, “Method of Measurement” and will pay for panels as specified in Section 704.06, “Basis of Payment”.

The Engineer will not measure material used to construct the wedge. Include the cost of materials, equipment, labor, and incidentals required for this operation in the price bid for “AGGREGATE BASE COURSE CL 5”.

If a 4:1 or flatter wedge is not installed, provide 24-hour flagging or pilot car operations and associated traffic control at no additional cost to the Department.

109-P01 MEASUREMENT OF QUANTITIES: A prismatic method was used for volume calculations of the earthwork items.

202-P01 REMOVAL OF BITUMINOUS SURFACING: Removal of Bituminous Surfacing consists of removing the existing bituminous pavement and base, less the bottom two inches of base. Existing pavement thicknesses shown on the existing typical sections in Section 30 were created from previous construction plans and maintenance data.

203-010 SHRINKAGE: 25% percent additional volume is included for shrinkage in earth embankment.

203-385 AVERAGE HAUL: No average haul has been computed for this project.

260-P01 SILT FENCE: Do not trench silt fence when in a wetland.

261-P01 TEMPORARY EROSION CONTROL WITHIN WETLANDS: Fiber Rolls and Silt Fence have been provided for placement between the earthen berm at the perimeter of the work area and adjacent wetlands. Do not place fiber rolls inside a wetland. Use silt fence if installation area is inside a wetland. Apply temporary seed and mulch to the berm according to permit timelines. Temporary seed mix and mulch for this use will be paid for as “TEMPORARY COVER CROP” and “STRAW MULCH”.

704-500 PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

Install PRS as part of the temporary traffic control when the following signs are also part of the required traffic control set up:

- “Be Prepared to Stop” (W3-4); and
- “Flagger” symbol (W20-7)

Install PRS that meet the following criteria:

- Have no adhesives or fasteners required for placement;
- Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

- A single piece;
- Interlocking segments; or
- Two pieces hinged at the midpoint.

An installed array of PRS consists of a minimum of 3 individual strips.

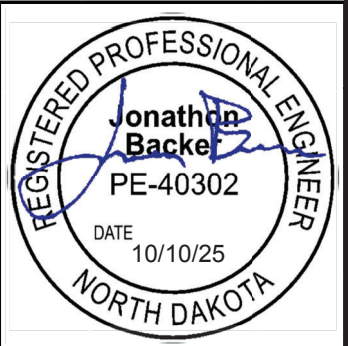
Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "PORTABLE RUMBLE STRIPS".

704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the following layouts shown in the Standard Drawings and layouts provided in the plans.

- All Sites
 - Section 100 Sheet 2 Overview
 - D-704-15 Type A Temporary Road Closure with Flaggers
 - D-704-26 Miscellaneous Sign Layouts (As Needed)
 - D-704-33 Two-Lane Roadway Portable Rumble Strips

On Sheet 100-1, "Traffic Control Device List", phase "O" represents the Overview and phases 1 and 2 represent the two site locations 0005-319.917 and 0005-322.119, respectively. Phase "T" represents the sum of all traffic control devices required for both sites concurrently. Traffic control sign units and devices will be paid for when installed at each individual site regardless of the number of sites being worked on concurrently.



NOTES

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704-P02 TRAFFIC CONTROL PHASING: Replace all structures in the following phases:

Phase 1:

- Set up traffic control signage, portable rumble strips, and flagging operations in accordance with D-704-33.
- Install all traffic control signs and devices along the roadway following Section 100 Sheet 3, maintaining a minimum of 15 feet of the existing pavement surface. Establish a single lane of traffic with flaggers.
- Remove existing bituminous surfacing and aggregate base course within the roadway work-zone. Remove embankment and grade the temporary inslope from the existing pavement surface maintaining a 2:1 inslope.
- Remove existing box culvert, maintaining 2 feet of clear distance from the toe of the temporary inslope.
- Install culvert pipes.
- Backfill around and above culvert pipes to provide at least 12 inches of cover, 15-foot wide. Maintain a maximum profile grade of 7%, and a minimum of 1-foot of cover over the new pipes.
- Install traffic control signs and devices along the temporary roadway following Section 100 Sheet 3. Shift traffic to the new temporary roadway.

Phase 2:

- Remove the remaining bituminous surfacing, aggregate base course, roadway embankment, and box culvert.
- Install remaining culvert pipes
- Backfill around and above culvert pipes up to top of proposed subgrade.
- Install traffic control signs and devices on the roadway base following Section 100 Sheet 3, maintaining a minimum of 15 feet of driving surface. Shift traffic onto the new temporary roadway.

Phase 3:

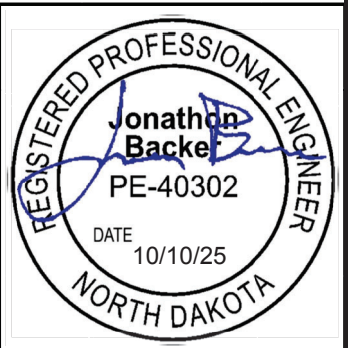
- Remove the temporary roadway from phase 1 and grade to proposed subgrade.
- Place aggregate base course.
- Install bituminous surfacing while shifting traffic between sides of the roadway.
- Establish normal traffic patterns.

Remove lane closures at the end of each workday, providing one lane of traffic in each direction, with the following:

- Minimum 27' Top Roadway Width
 - Two - 12' driving lanes
 - 1.5' shoulder for devices
- Minimum 6" Aggregate
- Minimum 4:1 Foreslopes

Open the roadway to two lanes of traffic at the end of each work day or provide continuous flagging until two lanes of traffic are open.

754-P01 OBJECT MARKERS – CULVERTS: Remove existing object markers located at culvert end sections that are impacted by earthwork activities and pipe replacements. Include the cost for removal and disposal in the price bid for "OBJECT MARKERS – CULVERTS".



ENVIRONMENTAL NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	6	3

ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation and the Federal Highway have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 AQUATIC NUISANCE SPECIES (ANS): Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the North Dakota Game and Fish Department (NDGFD) website) requires an inspection by NDGFD. Notify the NDGFD at least 10 business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGFD sufficient time to inspect any and all such equipment for ANS. Contact the NDGFD ANS Coordinator, Ben Holen by e-mail - bholen@nd.gov for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to work taking place in the water: (1) the NDGFD inspection report, (2) documented NDGFD correspondence (email or signed letter).

EN-2 THREATENED AND ENDANGERED SPECIES: The project is located near/within suitable habitat for the species listed in the following table:

SPECIES	HABITAT	PRESENCE
Northern Long-Eared Bat	Forested/Wooded Areas/Bridges/Box Culverts/Caves/Mines	Active Season: April 15 - October 31* Inactive Season: Nov 1 – April 14*

*Time frames can differ slightly, depending on the year

If any of the above threatened and endangered species are identified within 1 mile of the project, the Contractor will notify the Engineer immediately and cease construction activities in the vicinity until an avoidance area is established. The Engineer will establish an avoidance area that is at least a 0.5 mile and immediately coordinate with the USFWS (701-355-8513), FHWA (701-221-9464), and NDDOT Environmental and Transportation Services (701-328-2592). The Contractor will not resume work within the avoidance area until the Engineer has confirmed with the agencies that work may proceed (either the species have left the area, or approved avoidance/minimization measures have been implemented).

EN-3 TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands and or other waters are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.

Estimated Quantities						STATE	PROJECT NO.	SECTION NO.	SHEET NO.
						ND	NH-6-005(055)319	8	1
					Mainline:				
SPEC	CODE	ITEM DESCRIPTION	UNIT						TOTAL
103	0100	CONTRACT BOND	L SUM	1					1
202	0104	REMOVAL OF STRUCTURE	EA	2					2
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	734					734
203	0109	TOPSOIL	CY	965					965
203	0140	BORROW-EXCAVATION	CY	1532					1532
216	0100	WATER	M GAL	39					39
251	0200	SEEDING CLASS II	ACRE	1.2					1.2
251	2000	TEMPORARY COVER CROP	ACRE	1.2					1.2
253	0101	STRAW MULCH	ACRE	2.4					2.4
255	0103	ECB TYPE 3	SY	285					285
260	0300	SILT FENCE	LF	1337					1337
260	0301	REMOVE SILT FENCE	LF	1337					1337
261	0112	FIBER ROLLS 12IN	LF	2332					2332
261	0113	REMOVE FIBER ROLLS 12IN	LF	489					489
261	0120	FIBER ROLLS 20IN	LF	360					360
261	0121	REMOVE FIBER ROLLS 20IN	LF	180					180
302	0120	AGGREGATE BASE COURSE CL 5	TON	766					766
411	0114	MILLING PAVEMENT SURFACE - 2 INCH	SY	1375					1375
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	441					441
702	0100	MOBILIZATION	L SUM	1					1
704	0100	FLAGGING	MHR	750					750
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2293					2293
704	1048	PORTABLE RUMBLE STRIPS	EA	4					4
704	1052	TYPE III BARRICADE	EA	4					4
704	1060	DELINEATOR DRUMS	EA	20					20
704	1080	STACKABLE VERTICAL PANELS	EA	20					20
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	480					480
714	4120	PIPE CONDUIT 42IN	LF	240					240
714	4125	PIPE CONDUIT 48IN	LF	228					228
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	50					50
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	84					84
754	0805	OBJECT MARKERS - CULVERTS	EA	8					8
760	0025	SINUSOIDAL RUMBLE STRIP - ASPHALT SHOULDER	MILE	0.4					0.4
760	0027	SINUSOIDAL RUMBLE STRIP - ASPHALT CENTERLINE	MILE	0.2					0.2
762	0432	SHORT TERM 6IN LINE-TYPE NR	LF	4265					4265
762	1106	PVMT MK PAINTED 6IN LINE	LF	2755					2755
900	1000	TEMPORARY STREAM DIVERSION	EA	2					2

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	ND	NH-6-005(055)319	10	1

PAVING SUMMARY						
Structure 0005-319.917						
Material	Unit	Begin Sta	End Sta	Area (SF)	Quantity	Unit
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	16890+05	16891+05	3082	39	TON
TACK COAT @ 0.05 Gal/SY - Incidental	GAL			3082	18	GAL
302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	TON	16891+05	16892+10	4337	377	TON
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON			3514	141	TON
TACK COAT @ 0.05 Gal/SY - Incidental (1st Lift)	GAL			3762	21	GAL
TACK COAT @ 0.05 Gal/SY - Incidental (2nd Lift)				3570	20	
TACK COAT @ 0.05 Gal/SY - Incidental (3rd Lift)				3417	19	
PRIME COAT @ 0.35 Gal/SY - Incidental	GAL			3762	147	GAL
BLOTTER MATERIAL CL 44 @ 12 Lb/SY - Incidental	TON			3762	3	TON
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	16892+10	16893+10	3065	38	TON
TACK COAT @ 0.05 Gal/SY - Incidental	GAL			3065	18	GAL
Structure 0005-322.119						
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	17006+35	17007+35	3078	38	TON
TACK COAT @ 0.05 Gal/SY - Incidental	GAL			3078	18	GAL
302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	TON	17007+35	17008+45	4477	389	TON
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON			3615	146	TON
TACK COAT @ 0.05 Gal/SY - Incidental (1st Lift)	GAL			3875	22	GAL
TACK COAT @ 0.05 Gal/SY - Incidental (2nd Lift)				3674	21	
TACK COAT @ 0.05 Gal/SY - Incidental (3rd Lift)				3514	20	
PRIME COAT @ 0.35 Gal/SY - Incidental	GAL			3875	151	GAL
BLOTTER MATERIAL CL 44 @ 12 Lb/SY - Incidental	TON			3875	3	TON
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	17008+45	17009+45	3133	39	TON
TACK COAT @ 0.05 Gal/SY - Incidental	GAL			3133	18	GAL

762 0432 SHORT TERM 6IN LINE-TYPE NR				
Roadway	Site Location	Begin Station	End Station	Quantity (LF)
ND 5	Structure 0005-319.917 Centerline - 1st Lift	16891+05	16892+10	130
	Structure 0005-319.917 2nd Lift			130
	Structure 0005-319.917 3rd Lift (Top Lift)	16890+05	16891+10	130
	Structure 0005-319.917 Fogged Rumble Strips			1,000
	Subtotal =			1,390
	Structure 0005-322.119 Centerline - 1st Lift	17007+35	17008+45	625
	Structure 0005-322.119 2nd Lift			625
	Structure 0005-322.119 3rd Lift (Top Lift)	17006+35	17007+45	625
	Structure 0005-322.119 Fogged Rumble Strips			1,000
	Subtotal =			2,875
Total =			4,265	

754 0805 OBJECT MARKERS - CULVERTS			
Roadway	Site Location	Station	Quantity (EA)
ND 5	Structure 0005-319.917	16891+59	4
	Structure 0005-322.119	17007+89	4
Total =			8

LOCATION	EARTHWORK SUMMARY			TOPSOIL SUMMARY
	Embankment ①	Excavation	203 0140 BORROW-EXCAVATION	203 0109 TOPSOIL
	(CY)	(CY)	(CY)	(CY)
	A	B	C = A - B	D
Structure 0005-319.917	780	-	780	476
Structure 0005-322.119	752	-	752	489
TOTAL =	1,532	-	1,532	965

- Notes:
① Additional 25% volume for shrinkage.
② Earthwork summary does not include excavation and backfill materials identified in the Section 20 Pipe Backfill Detail.

762 1106 PVMT MK PAINTED 6IN LINE									
Roadway	Site Location	6" Yellow Barrier Line Rt				6" Yellow Centerline (10' Line 30' Skip)			
		6" Yellow Skip (10' Line 30' Skip) Lt				Begin Sta	End Sta	Total	Unit
		Begin Sta	End Sta	Total	Unit				
ND 5	Structure 0005-319.917	-	-	-	LF	16889+10	16894+10	130	LF
	Structure 0005-322.119	17005+40	17010+40	625	LF	-	-	-	LF
Subtotal =				625	LF	Subtotal =		130	LF
						Total =		755	LF

762 1106 PVMT MK PAINTED 6IN LINE									
Roadway	Site Location	White Lt Edge Line				White Rt Edge Line			
		Begin Sta	End Sta	Total	Unit	Begin Sta	End Sta	Total	Unit
ND 5	Structure 0005-319.917	16889+10	16894+10	500	LF	16889+10	16894+10	500	LF
	Structure 0005-322.119	17005+40	17010+40	500	LF	17005+40	17010+40	500	LF
Subtotal =				1,000	LF	Subtotal =		1,000	LF
						Total =		2,000	LF

216 0100 WATER					
Roadway	Site Location	Material	Basis	Basis Quantity	Quantity (MGAL)
ND 5	Structure 0005-319.917	Dust Palliative	25 Mgal/Mile	0.02	1
		Aggregate	15 Gal/Ton	377	6
		Embankment	10 Gal/CY	1226	13
	Subtotal =				20
	Structure 0005-322.119	Dust Palliative	25 Mgal/Mile	0.04	1
		Aggregate	15 Gal/Ton	389	6
		Embankment	10 Gal/CY	1185	12
	Subtotal =				19
	Total =				39

760 0025 SINUSOIDAL RUMBLE STRIPS - ASPHALT SHOULDER										
Roadway	Site Location	Begin Station	End Station	Offset	Basis	Quantity (MILE)				
ND 5	Structure 0005-319.917	16891+05	16892+10	Lt	5,280 LF/Mile/Shldr	0.1				
				Rt		0.1				
	Structure 0005-322.119	17007+35	17008+45	Lt		0.1				
				Rt		0.1				
				Total =					0.4	

760 0027 SINUSOIDAL RUMBLE STRIPS - ASPHALT CENTERLINE					
Roadway	Site Location	Begin Station	End Station	Basis	Quantity (MILE)
ND 5	Structure 0005-319.917	16891+05	16892+10	5,280 LF/Mile/Shldr	0.1
	Structure 0005-322.119	17007+35	17008+45		0.1
Total ■					0.2

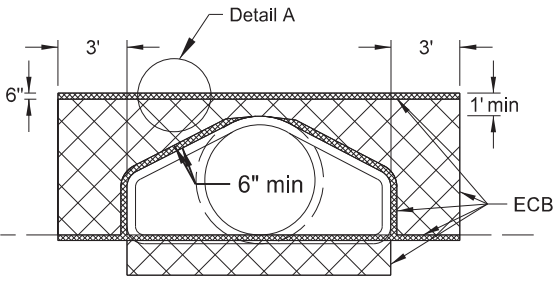
Materials:
Aggregate Base Course CL 5 @ 1.875 Ton/CY
Tack Coat @ 0.05 Gal/SY
Blotter Material CL 44 @ 12 Lb/SY
Prime Coat @ 0.35 Gal/SY
Superpave FAA 43 @ 2 Ton/CY
PG 58S-34 Asphalt Cement @ 6.3%

ND 5 Structure Replacements
Basis of Estimate
All Structures

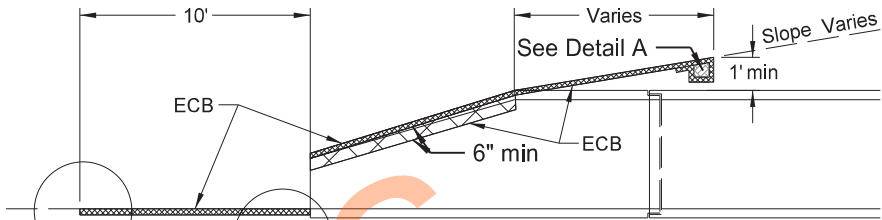


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	20	1

255 0103 ECB TYPE 3 CENTERLINE CULVERTS								
Location of Surface Area to be Protected			Pipe Diameter	No.	X	Y	Unit Quantity	Total Quantity
Structure	Station	Offset	(IN)		(FT)	(FT)	(SY)	(SY)
ND 5								
0005-319.917	16891+50	Lt	42	2	31.8	19.2	67.7	136
	16891+59	Lt						
	16891+68	Lt						
0005-322.119	17007+79	Lt	48	2	33.5	20.0	74.4	149
	17007+89	Lt						
	17007+99	Lt						
TOTAL =								285

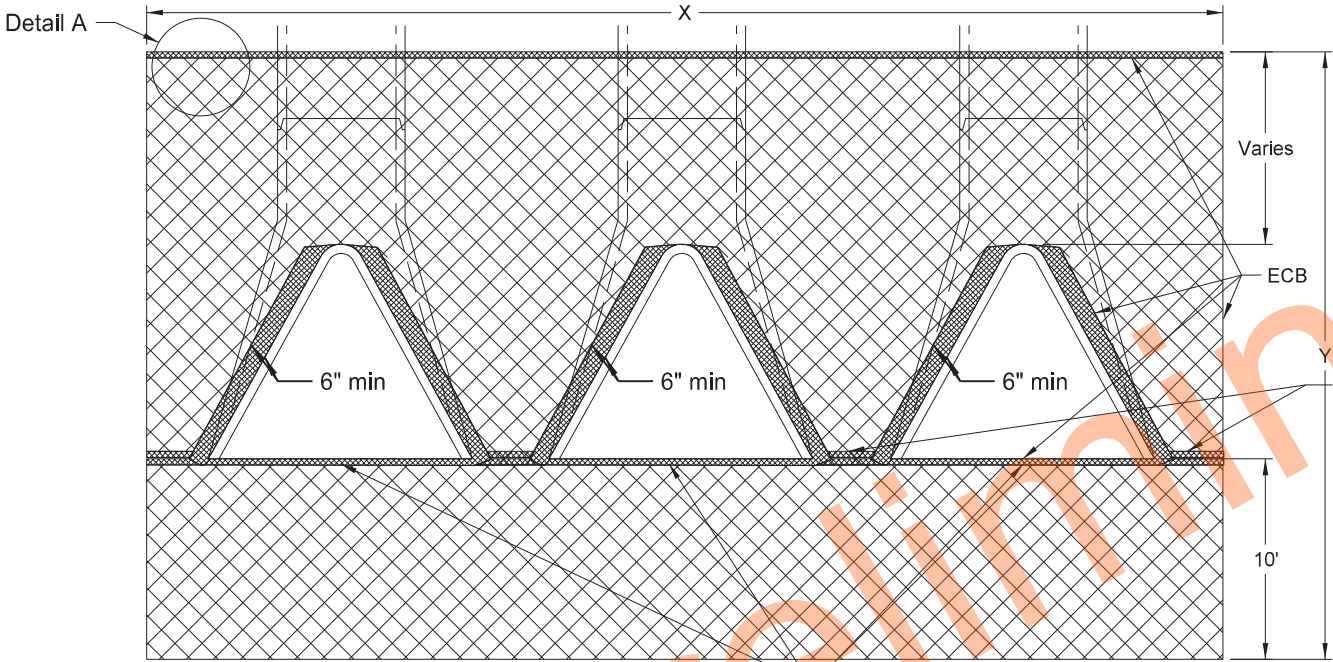


FRONT VIEW



SIDE VIEW

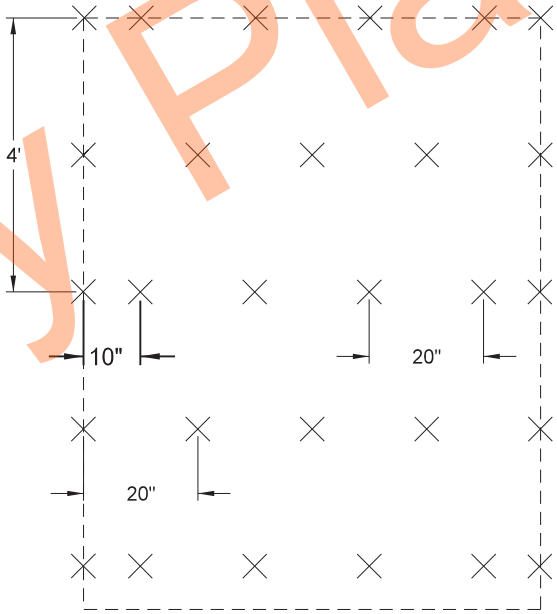
See Pipe Inlet & Outlet Details



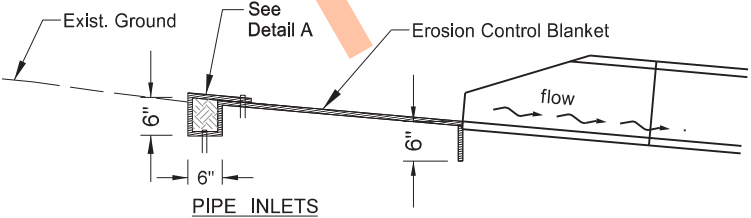
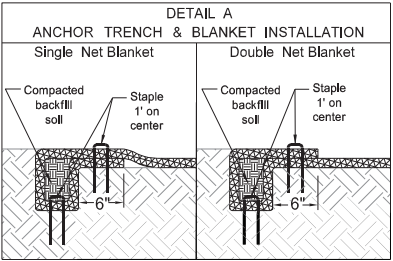
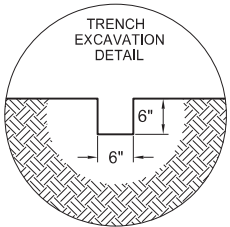
TOP VIEW

Inlet side - see applicable detail for pipe inlet.
Outlet side - see applicable detail for pipe outlet.

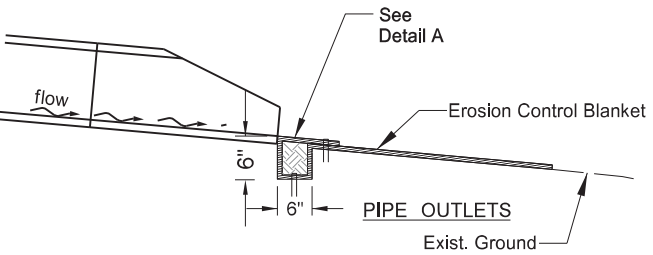
Tuck this end a minimum of 6" into the embankment.



STAPLE PATTERN



PIPE INLETS



PIPE OUTLETS

NOTES:

- Quantities based on 4:1 inslopes for mainline culverts.
- Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.

ND 5 Structure Replacements

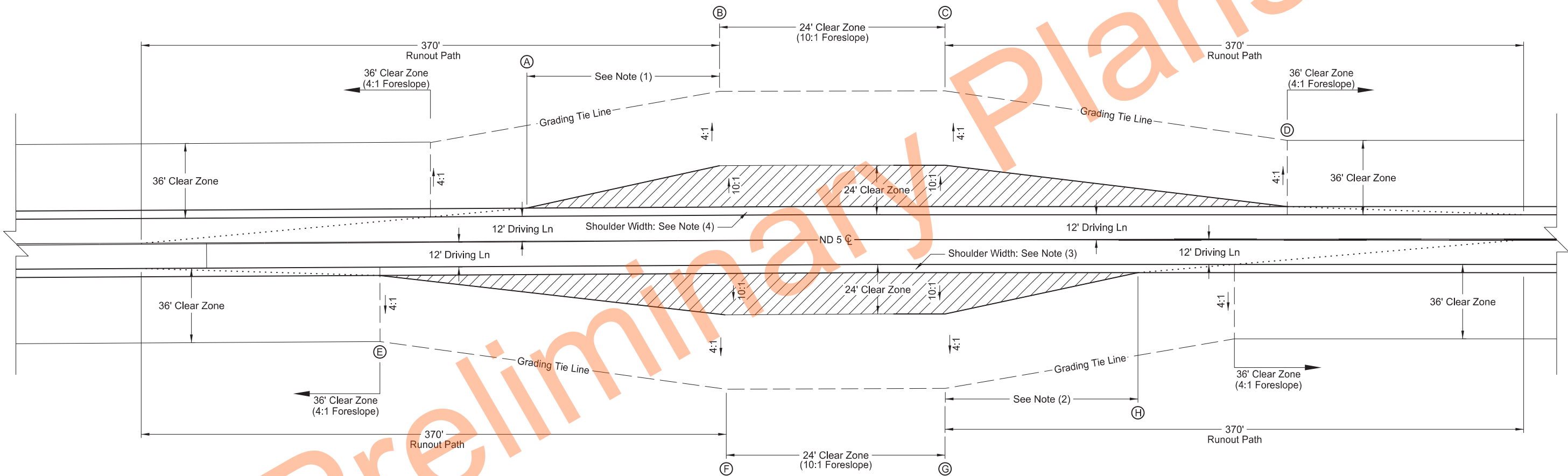
General Details
Erosion Control Blanket Details

All Structures



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	20	2

Foreslope Transition Left of Roadway Centerline	
Point	Station
Structure 0005-319.917	
A	16889+23.60
B	16891+40.00
C	16891+78.00
D	16887+64.56
Structure 0005-322.119	
A	17005+50.65
B	17007+73.50
C	17008+04.50
D	17011+29.04



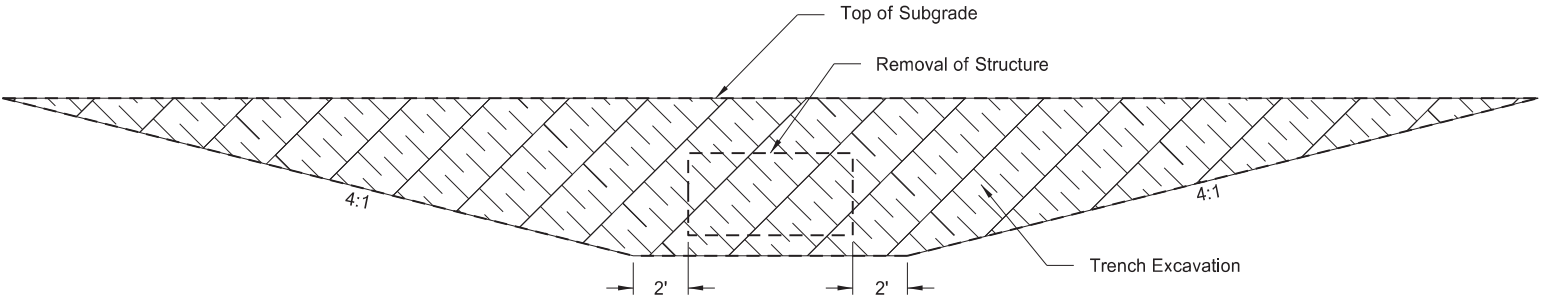
Foreslope Transition Right of Roadway Centerline	
Point	Station
Structure 0005-319.917	
E	16888+24.29
F	16891+40.00
G	16891+78.00
H	16893+87.13
Structure 0005-322.119	
E	17004+70.75
F	17007+73.50
G	17008+04.50
H	17009+66.50

- Notes:
- (1) Structure 0005-319.917 transition length = 216.4'
Structure 0005-322.119 transition length = 228.9'
 - (2) Structure 0005-319.917 transition length = 209.2'
Structure 0005-322.119 transition length = 162.0'
 - (3) Structure 0005-319.917 right shoulder = 3.8'
Structure 0005-322.119 right shoulder = 5.4'
 - (4) Structure 0005-319.917 left shoulder = 3.3'
Structure 0005-322.119 left shoulder = 2.0'

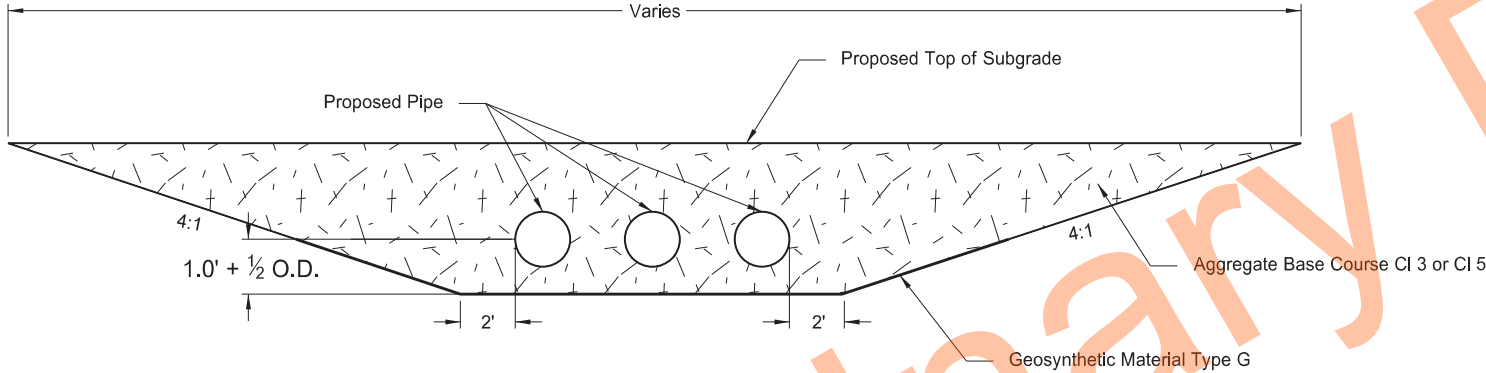
ND 5 Structure Replacements
General Details
Inslope Flattening
All Structures



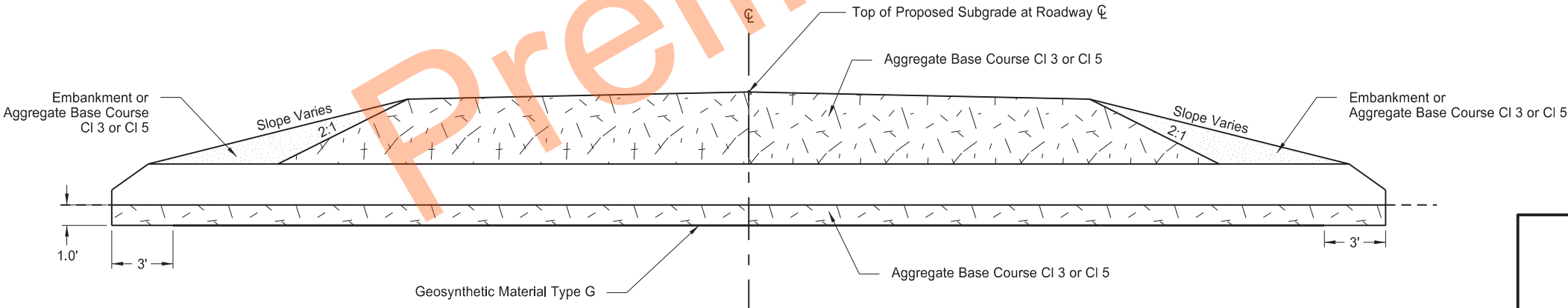
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	20	3



TRENCH EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Removal of Pipe (if required)
- 3) Geosynthetic Material Type G

*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

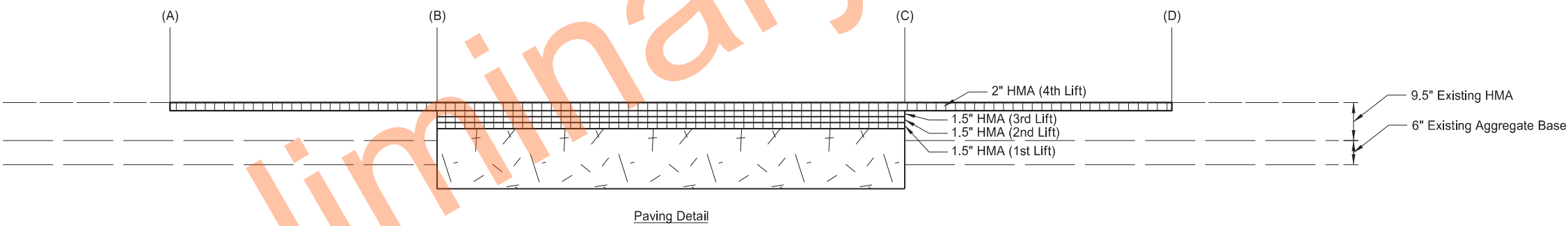
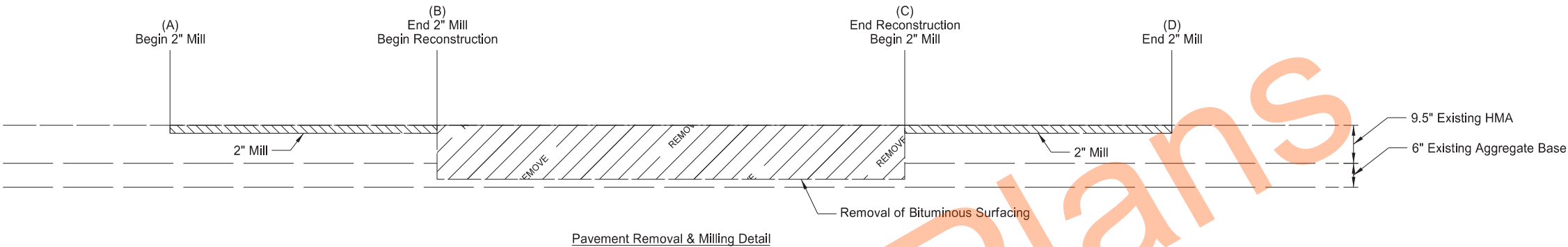
NOTES:

- 1) Embankment may be either Borrow Excavation or Common Excavation - Type A

ND 5 Structure Replacements
General Details
Pipe Backfill Detail for Centerline Pipes
All Structures



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	20	4

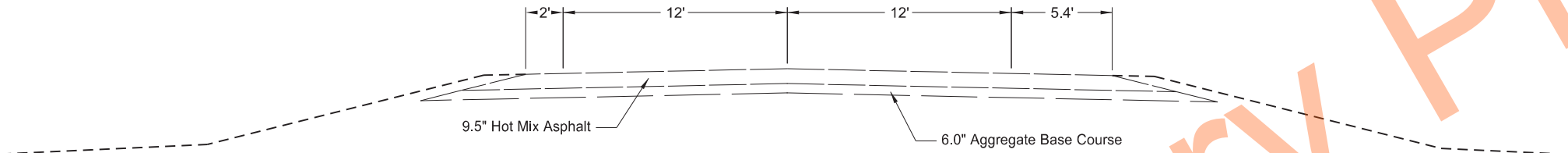
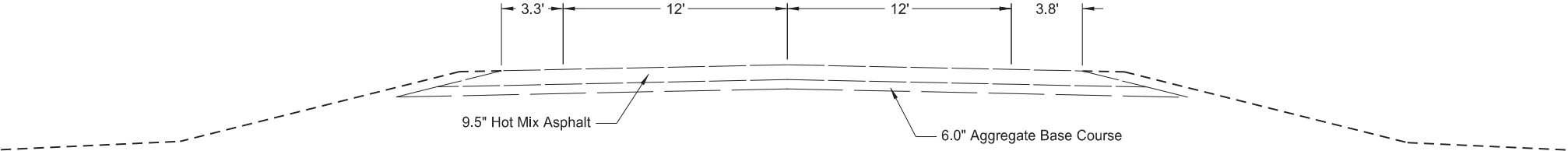


Paving / Milling Detail				
Structure	A	B	C	D
0005-319.917	16890+05.00	16891+05.00	16892+10.00	16893+10.00
0005-322.119	17006+35.00	17007+35.00	17008+45.00	17009+45.00

ND 5 Structure Replacements
General Details
Paving / Milling Detail
All Structures



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	30	1



Preliminary Plans

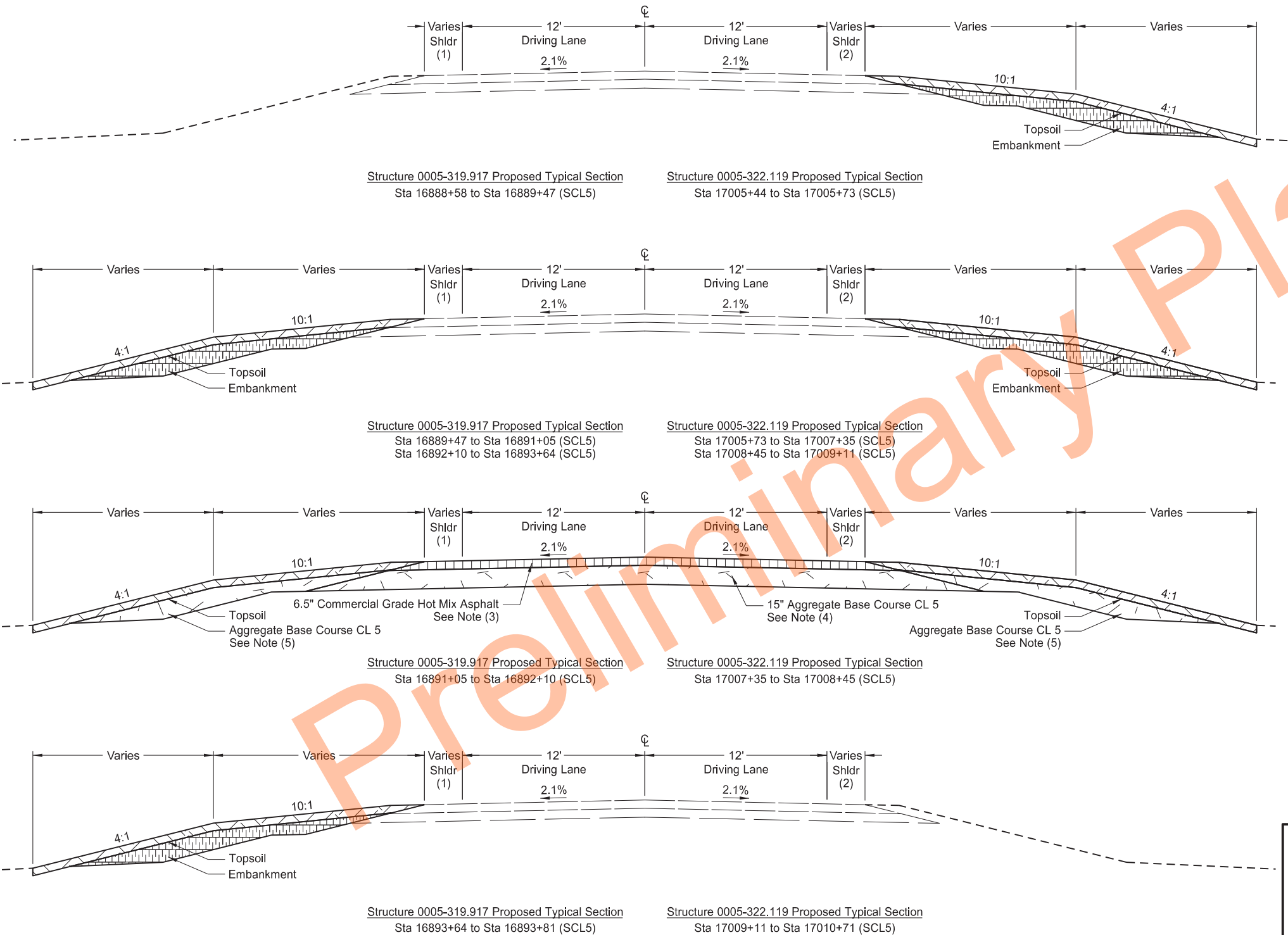
ND 5 Structure Replacements
Existing Typical Sections
All Structures



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	30	2

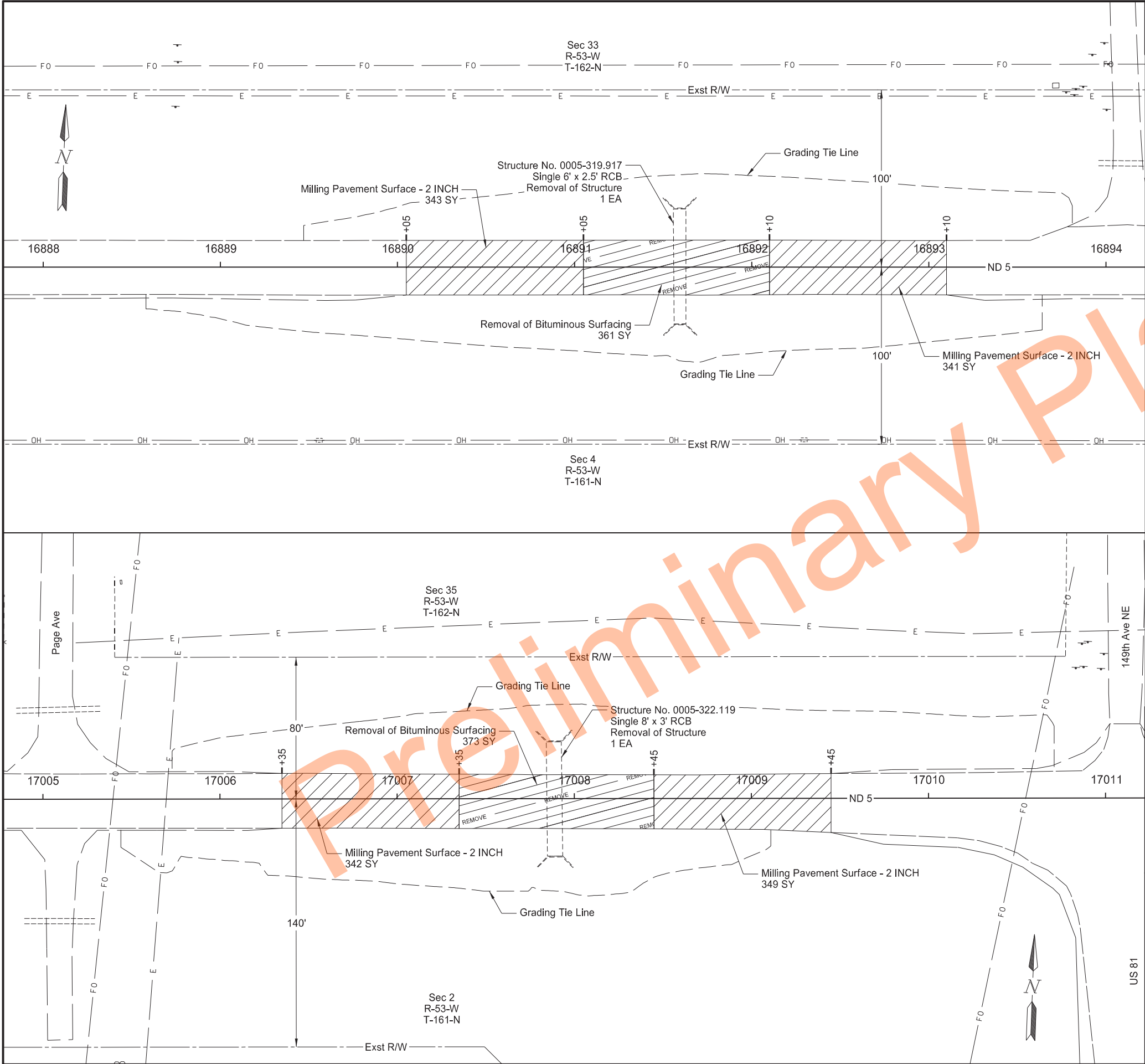
Notes:

- (1) Structure 0005-319.917 left shoulder = 3.3'
Structure 0005-322.119 left shoulder = 2.0'
- (2) Structure 0005-319.917 right shoulder = 3.8'
Structure 0005-322.119 right shoulder = 5.4'
- (3) Structure 0005-319.917 Commercial Grade Hot Mix Asphalt area = 18.13 SF
Structure 0005-322.119 Commercial Grade Hot Mix Asphalt area = 18.29 SF
- (4) Structure 0005-319.917 Aggregate Base Course CL 5 area = 51.62 SF
Structure 0005-322.119 Aggregate Base Course CL 5 area = 52.00 SF
- (5) See Section 20 - Sheet 3 Pipe Backfill Detail for Embankment in Pipe Areas



ND 5 Structure Replacements
Proposed Typical Sections
All Structures





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	NH-6-005(055)319	40	1
SPEC	CODE	BID ITEM	QTY	UNIT	
202	0104	REMOVAL OF STRUCTURE			
		Sta 16891+60 ∇	1	EA	
		Sta 17007+89 ∇	1	EA	
202	0132	REMOVAL OF BITUMINOUS SURFACING			
		Sta 16891+05 to Sta 16892+10	361	SY	
		Sta 17007+35 to Sta 17008+45	373	SY	
411	0114	MILLING PAVEMENT SURFACE - 2 INCH			
		Sta 16890+05 to Sta 16891+05	343	SY	
		Sta 16892+10 to Sta 16893+10	341	SY	
		Sta 17006+35 to Sta 17007+35	342	SY	
		Sta 17008+45 to Sta 17009+45	349	SY	
LEGEND					
Removal of Bituminous Surfacing Milling Pavement Surface - 2 INCH					
ND 5 Structure Replacements					
Removals					
Structure 0005-319.917 Sta 16888+00 to Sta 16894+00					
Structure 0005-322.119 Sta 17005+00 to Sta 17011+00					
REGISTERED PROFESSIONAL ENGINEER Jonathon Backe PE-40302 DATE 10/10/25 NORTH DAKOTA					

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	50	1

HYDRAULIC DATA FOR NH-6-005(055)319 PCN 24604 (A)									
STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
16891+59	6'x2.5' RCB	Trpl 42"	1336.1	161.3	3.90	6.46	834.80	232.8	836.20
17007+89	8'x3' RCB	Trpl 48"	1548.8	166.9	3.65	5.85	823.45	241.5	824.43
(A) Hydraulic data provided is for smooth-walled (Manning's n=0.012) type conduits.									

Culvert Hydraulic Data

Highway 5
3 Miles West of Hamilton to Hamilton

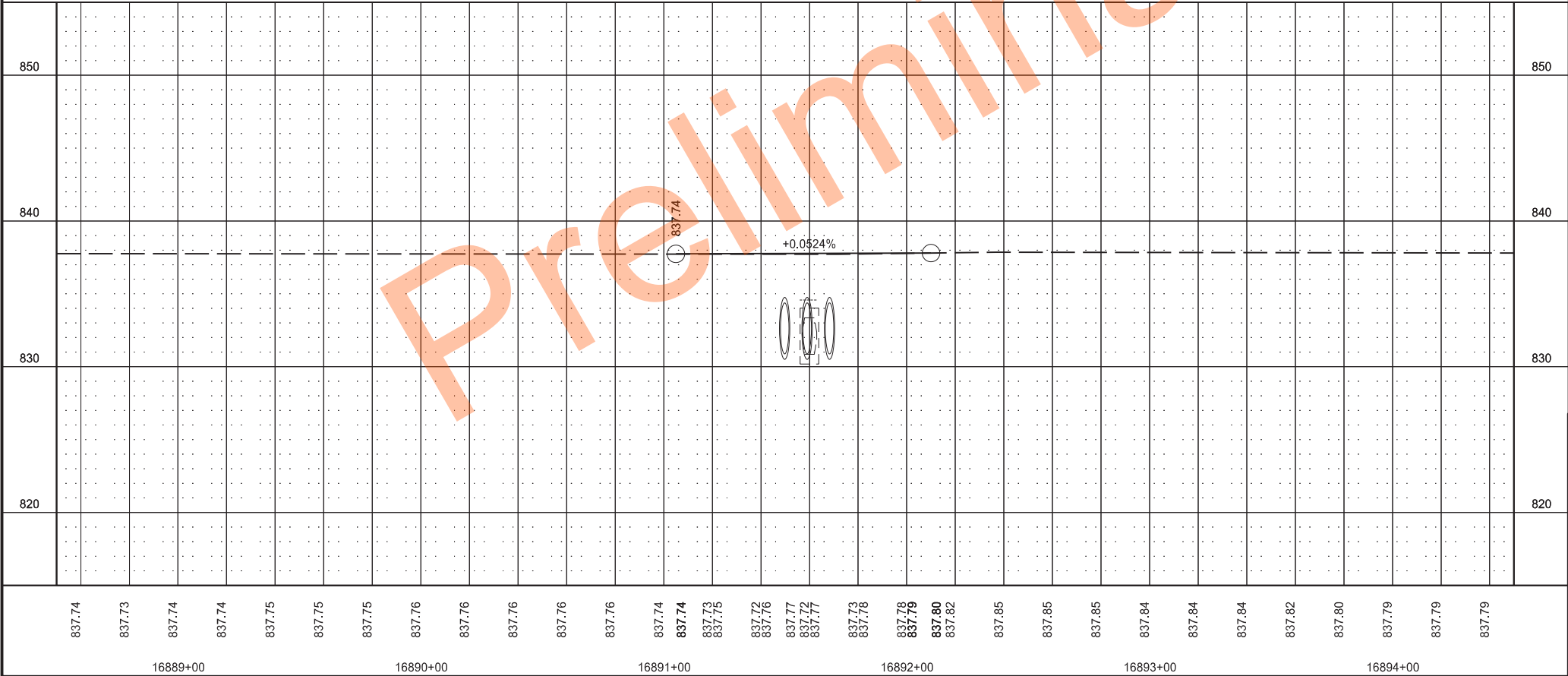
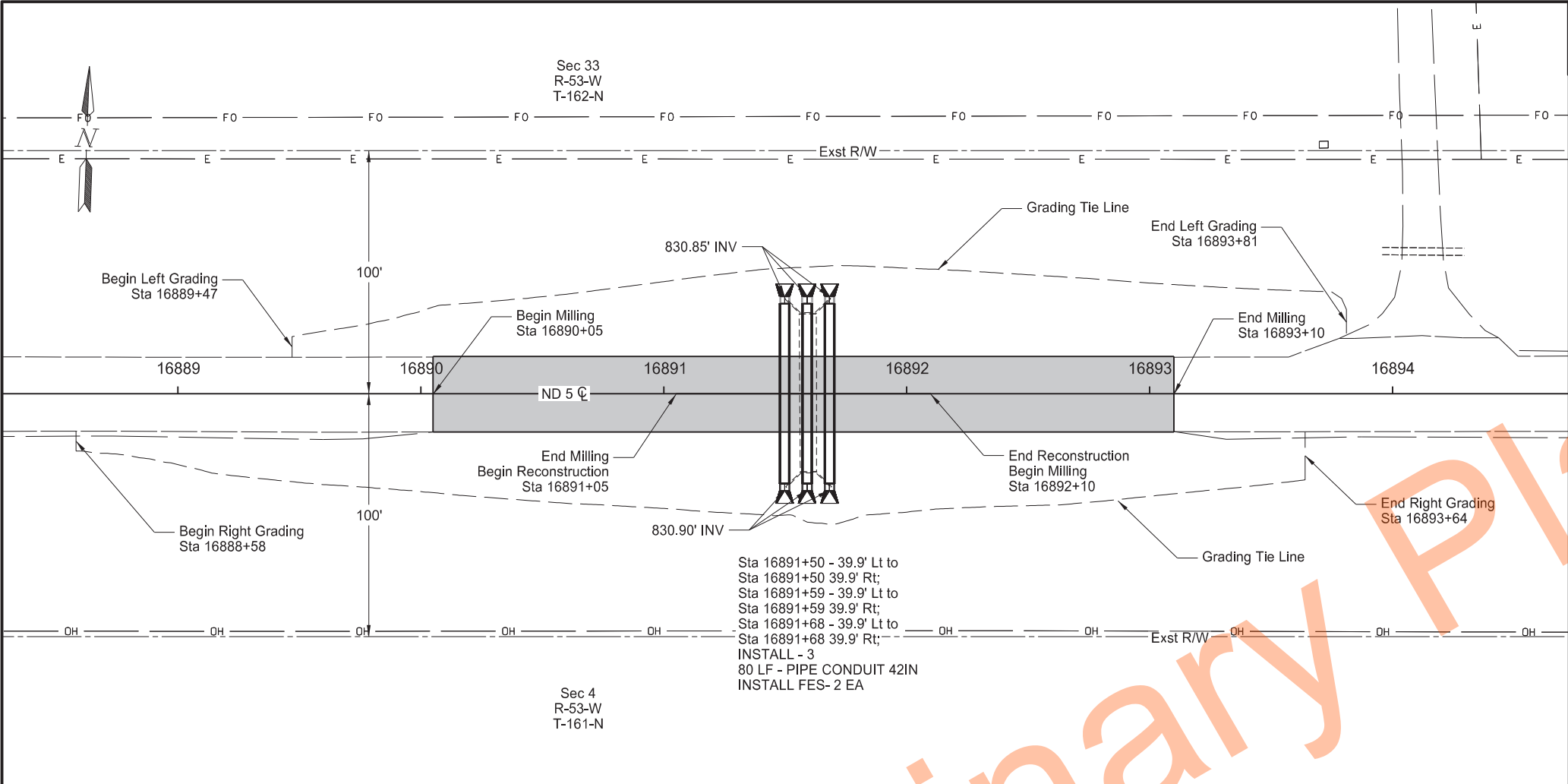


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	51	1

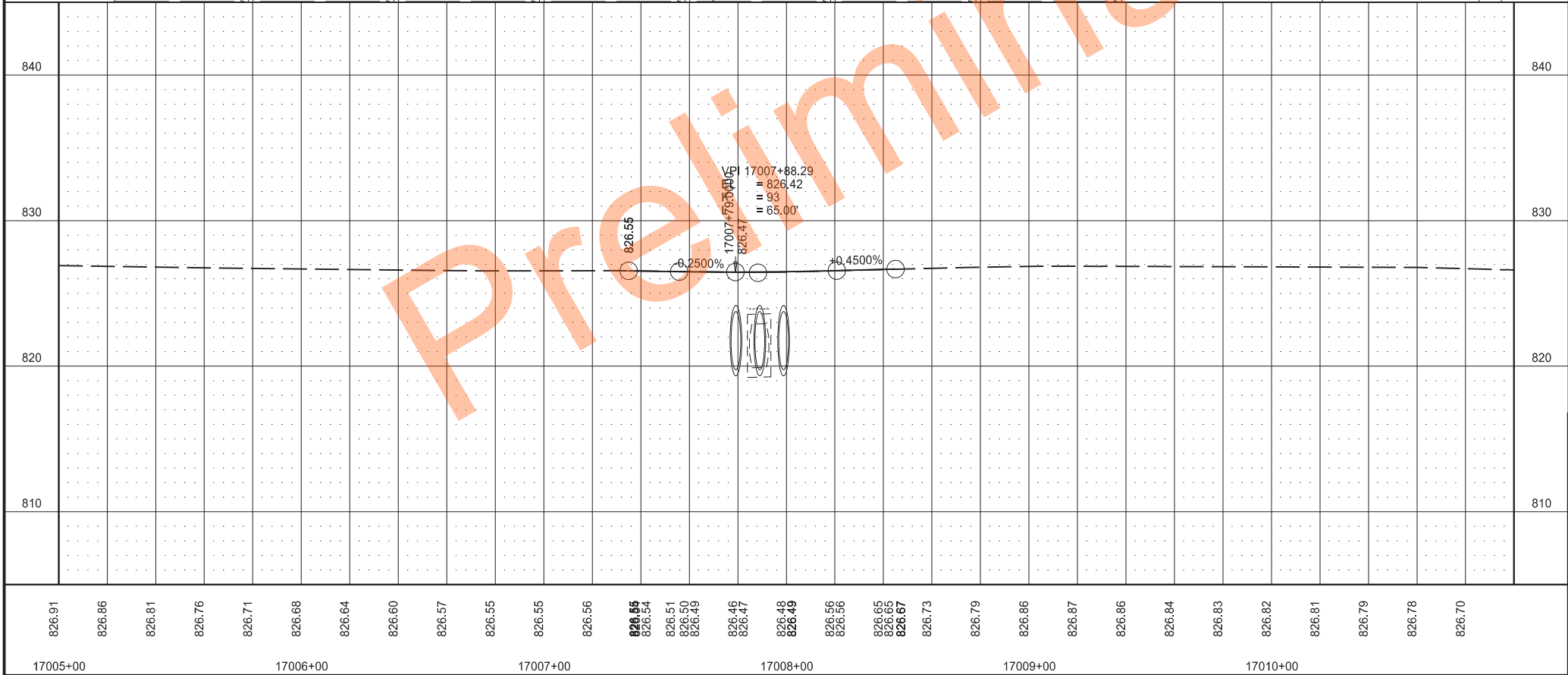
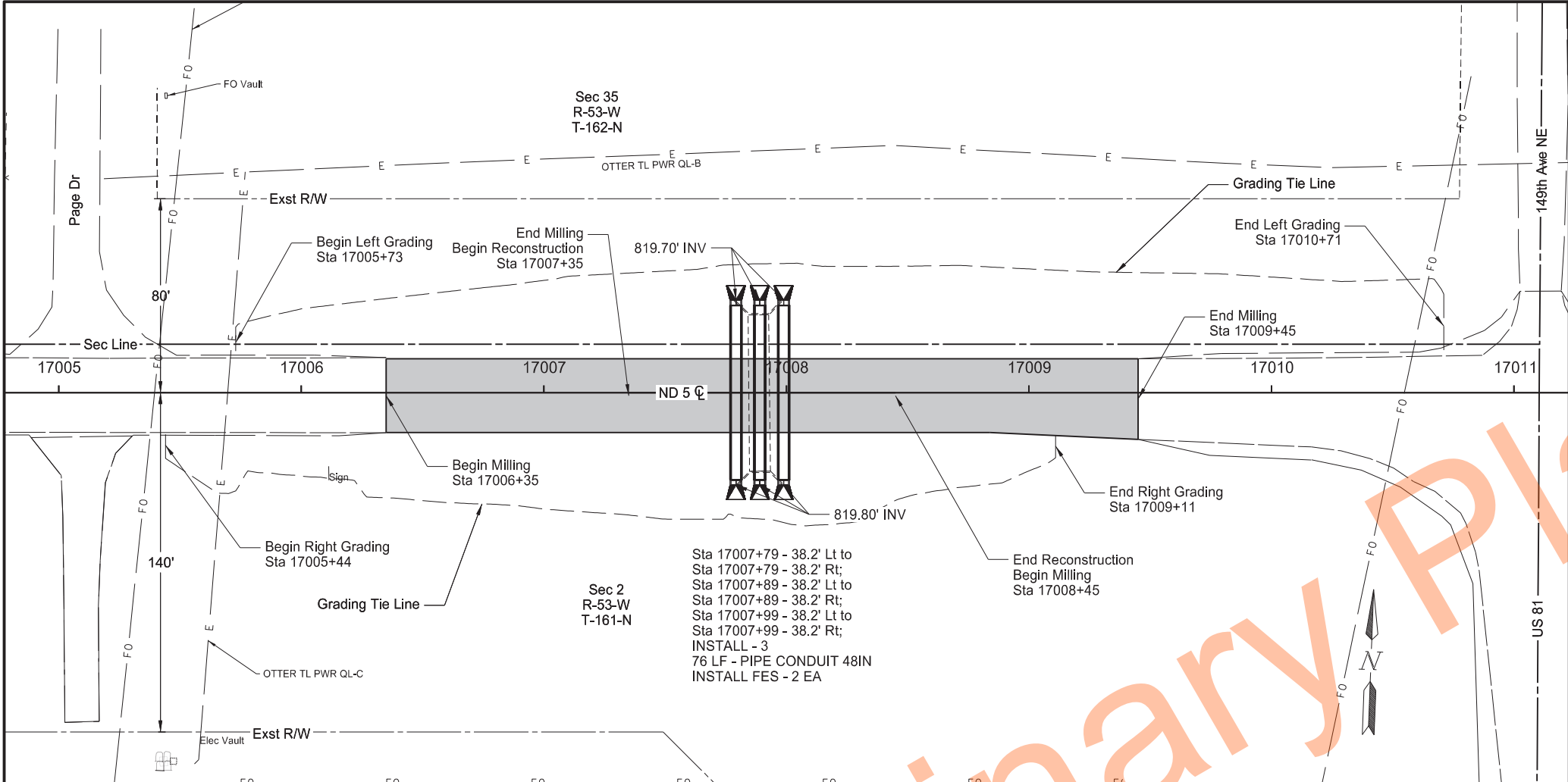
Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	Geosynthetic Material - Type G (Pay Item)	(*) End Sections		Applicable Backfill
				In	Bid Item	LF							Begin	End	
								In	Type		In	SY	EA	EA	
16891+50	39.9' Lt	16891+50	39.9' Rt	42	Pipe Conduit 42IN	80	Reinforced Concrete Pipe - Class II (barrel length = 74 LF)	42	-	-	-	254	FES	FES	Section 20 - Sheet 3
16891+59	39.9' Lt	16891+59	39.9' Rt	42	Pipe Conduit 42IN	80	Reinforced Concrete Pipe - Class II (barrel length = 74 LF)	42	-	-	-		FES	FES	Section 20 - Sheet 3
16891+68	39.9' Lt	16891+68	39.9' Rt	42	Pipe Conduit 42IN	80	Reinforced Concrete Pipe - Class II (barrel length = 74 LF)	42	-	-	-		FES	FES	Section 20 - Sheet 3
17007+79	38.2' Lt	17007+79	38.2' Rt	48	Pipe Conduit 48IN	76	Reinforced Concrete Pipe - Class II (barrel length = 72 LF)	48	-	-	-	226	FES	FES	Section 20 - Sheet 3
17007+89	38.2' Lt	17007+89	38.2' Rt	48	Pipe Conduit 48IN	76	Reinforced Concrete Pipe - Class II (barrel length = 72 LF)	48	-	-	-		FES	FES	Section 20 - Sheet 3
17007+99	38.2' Lt	17007+99	38.2' Rt	48	Pipe Conduit 48IN	76	Reinforced Concrete Pipe - Class II (barrel length = 72 LF)	48	-	-	-		FES	FES	Section 20 - Sheet 3

ND 5 Structure Replacements
Allowable Pipe List
All Structures





STATE		PROJECT NO.	SECTION NO.	SHEET NO.
ND		NH-6-005(055)319	60	1
SPEC	CODE	BID ITEM	QTY	UNIT
714	4120	PIPE CONDUIT 42IN		
		Sta 16891+50 ¢	80	LF
		Sta 16891+59 ¢	80	LF
		Sta 16891+68 ¢	80	LF
ND 5 Structure Replacements				
Plan & Profile				
Structure 0005-319.917				
Sta 16889+00 to Sta 16894+00 (SCL5)				
REGISTERED PROFESSIONAL ENGINEER Jonathon Backe PE-40302 DATE 10/10/25 NORTH DAKOTA				



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	60	2

SPEC	CODE	BID ITEM	QTY	UNIT
714	4125	PIPE CONDUIT 48IN		
		Sta 17007+79 º	76	LF
		Sta 17007+89 º	76	LF
		Sta 17007+99 º	76	LF

ND 5 Structure Replacements

Plan & Profile

Structure 0005-322.119

Sta 17005+00 to Sta 17011+00 (SCL5)

REGISTERED PROFESSIONAL ENGINEER

Jonathon Backe

PE-40302

DATE 10/10/25

NORTH DAKOTA

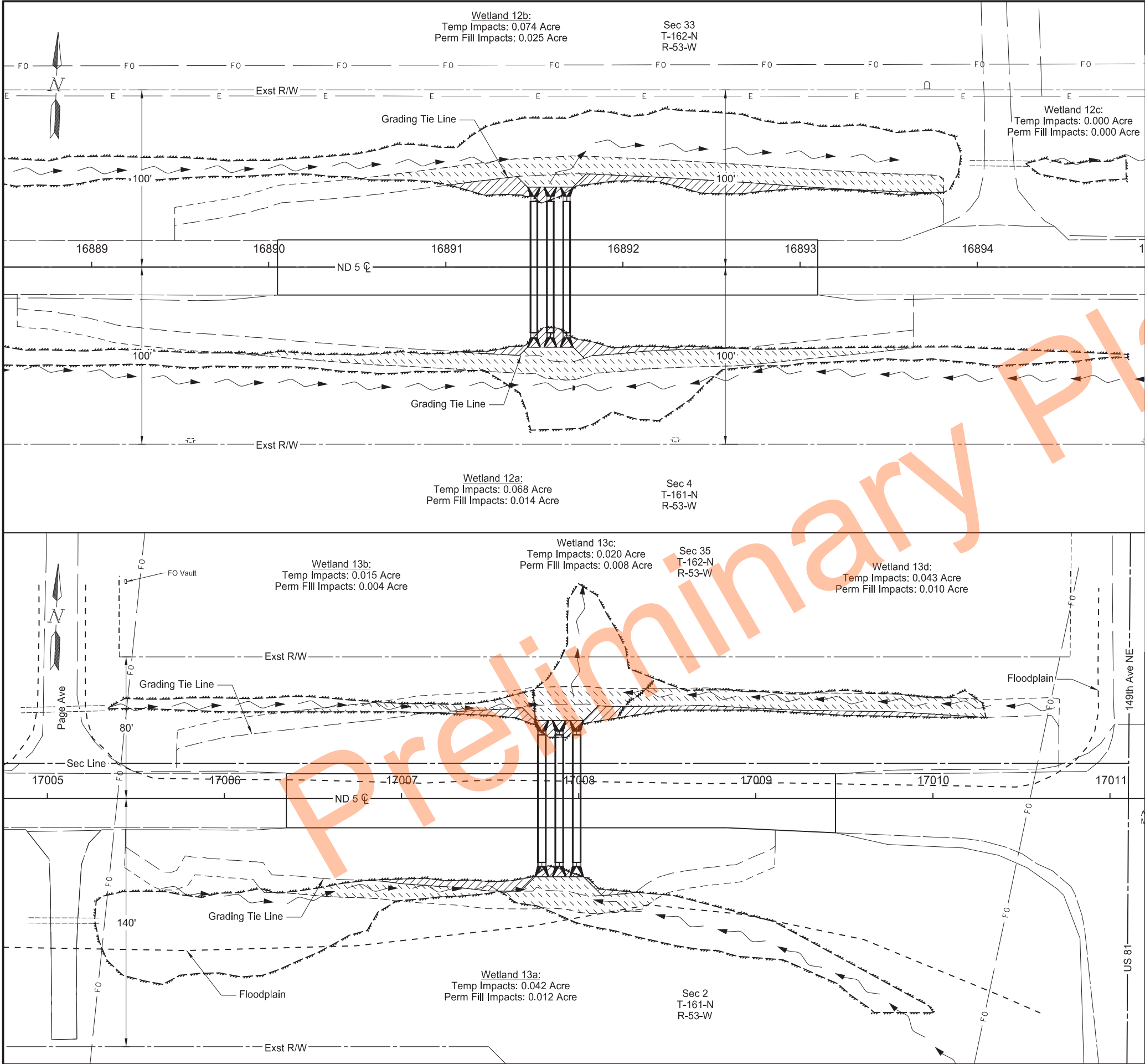
Wetland Impact Table																						
Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands	Wetland Impact				Wetland Mitigation													
					Wetland Impacts Acre(s)		USFWS Easement Impacts Acre(s)		Mitigation Proposed			USACE/11990 Bank		11990 Bank		USFWS Bank		Onsite Mitigation Method			Onsite Constructed Location	
					Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Ditch Shift Acre(s)	Onsite Acre(s)	Onsite Constructed Site #	Onsite Constructed Size Acre(s)
12a	Sec 4, T-161-N, R-53-W	Ditch	Created	Y	0.068	0.014			N	N												
12b	Sec 33, T-162-N, R-53-W	Ditch	Created	Y	0.074	0.025			N	N												
12c	Sec 33, T-162-N, R-53-W	Ditch	Created	Y																		
13a	Sec 2, T-161-N, R-53-W	Ditch	Created	Y	0.042	0.012			N	N												
13b	Sec 35, T-162-N, R-53-W	Ditch	Created	Y	0.015	0.004			N	N												
13c	Sec 35, T-162-N, R-53-W	Basin	Natural	Y	0.020	0.008			Y	N			Anderson Bank	0.008								
13d	Sec 35, T-162-N, R-53-W	Ditch	Created	Y	0.043	0.010			N	N												
Totals					0.262	0.073							0.000		0.008			0.000	0.000		0.000	

Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total Acre(s)	WaterType	Total Acre(s)
Natural/JD (Fill/Drain)	0.008	Temporary Wetland JD	0.262
Natural/Non-JD (Fill/Drain)	0.000	Non-JD Wetland Temporary	0.000
Artificial/JD (Fill/Drain)	0.065		
Artificial/Non-JD (Fill/Drain)	0.000	Permanent OW	0.000
Total	0.073	Temporary OW	0.000

Mitigation Summary Table						
	Location	Ditch Shift Acre(s)	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only						
EO 11990 Only	Anderson Bank			0.008		
USACE/11990						
USFWS						
	Total	0	0	0.008	0	0

ND 5 Structure Replacements
Wetlands, Mitigation, and Environmental
Wetland Impact Table
All Structures





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	75	2

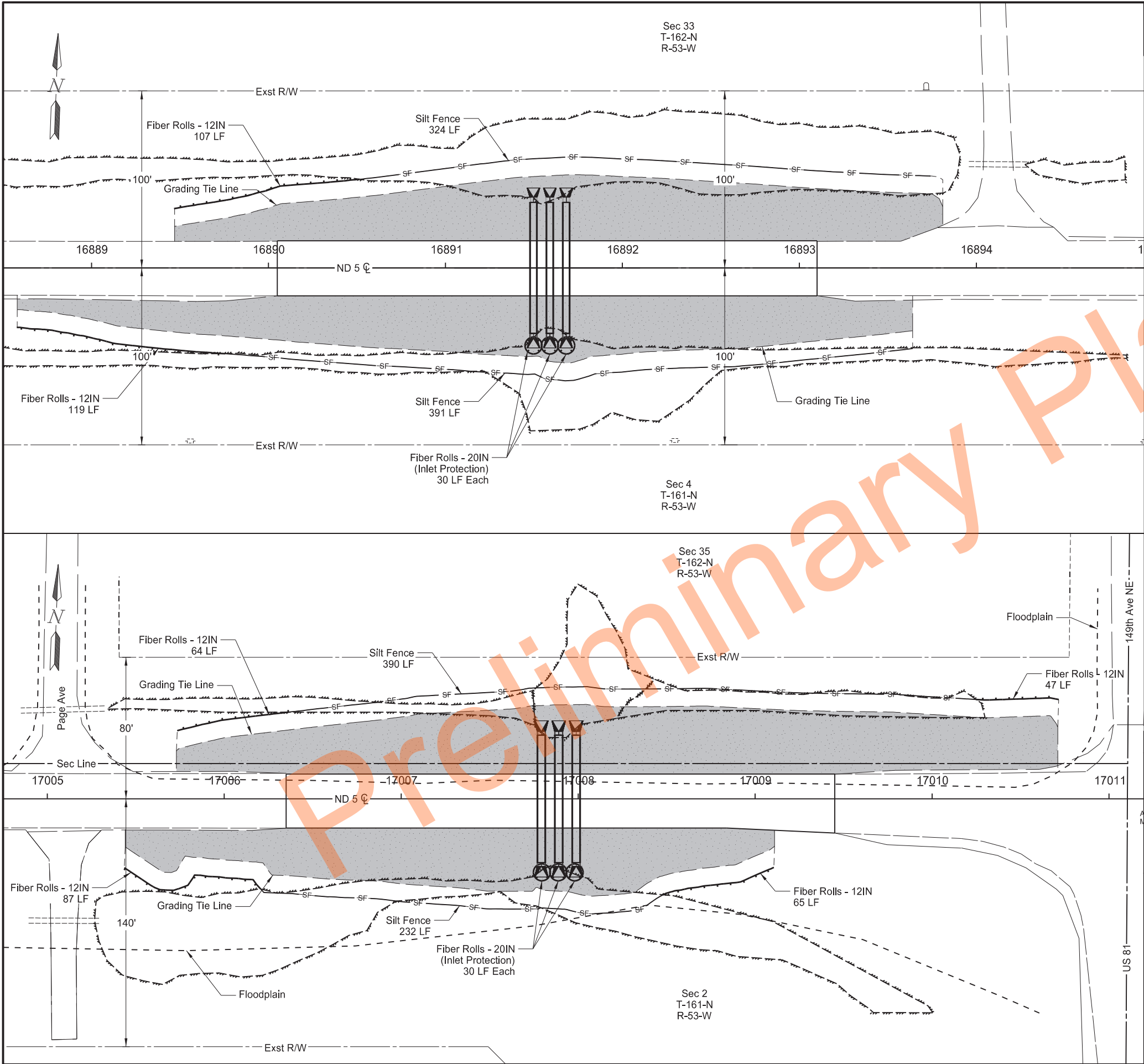
LEGEND			
	Wetland Impact Permanent		Grading Tie Line (Cut)
	Wetland Impact Temporary		Grading Tie Line (Fill)
	Other Water Impacts Temporary		Existing Delineated Wetland
	Other Water Impacts Permanent		Existing Other Waters

ND 5 Structure Replacements
Wetlands, Mitigation, and Environmental

Structure 0005-319.917
Sta 16889+00 to 16895+00 (SCL5)

Structure 0005-322.119
Sta 17005+00 to 17011+00 (SCL5)





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	NH-6-005(055)319	76	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Str 0005-319.917	0.6	ACRE
		Str 0005-322.119	0.6	ACRE
253	0101	STRAW MULCH		
		Str 0005-319.917	0.6	ACRE
		Str 0005-322.119	0.6	ACRE
260	0300	SILT FENCE		
		Str 0005-319.917	715	LF
		Str 0005-322.119	622	LF
260	0301	REMOVE SILT FENCE		
		Str 0005-319.917	715	LF
		Str 0005-322.119	622	LF
261	0112	FIBER ROLLS 12IN		
		Str 0005-319.917	226	LF
		Str 0005-322.119	263	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Str 0005-319.917	226	LF
		Str 0005-322.119	263	LF
261	0120	FIBER ROLLS 20IN		
		Str 0005-319.917	90	LF
		Str 0005-322.119	90	LF
261	0121	REMOVE FIBER ROLLS 20IN		
		Str 0005-319.917	90	LF
		Str 0005-322.119	90	LF

For ditch grades encountered in the field not listed, use the following spacing:
Spacing= { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
<0.5%	200	 Temporary Cover Crop & Straw Mulch
1%	85	
2%	40	 Fiber Rolls 12IN
3%	30	 SF Silt Fence
4%	20	

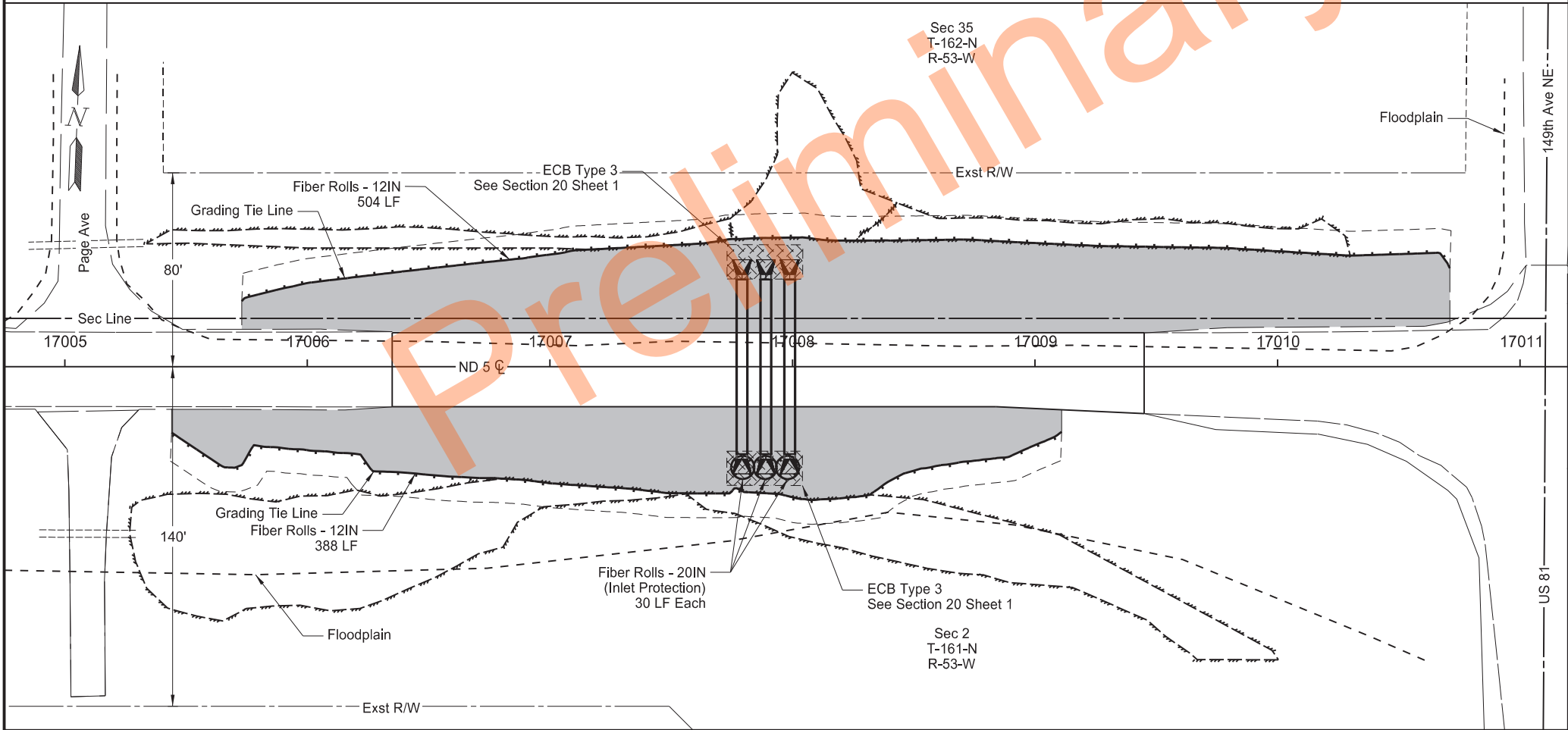
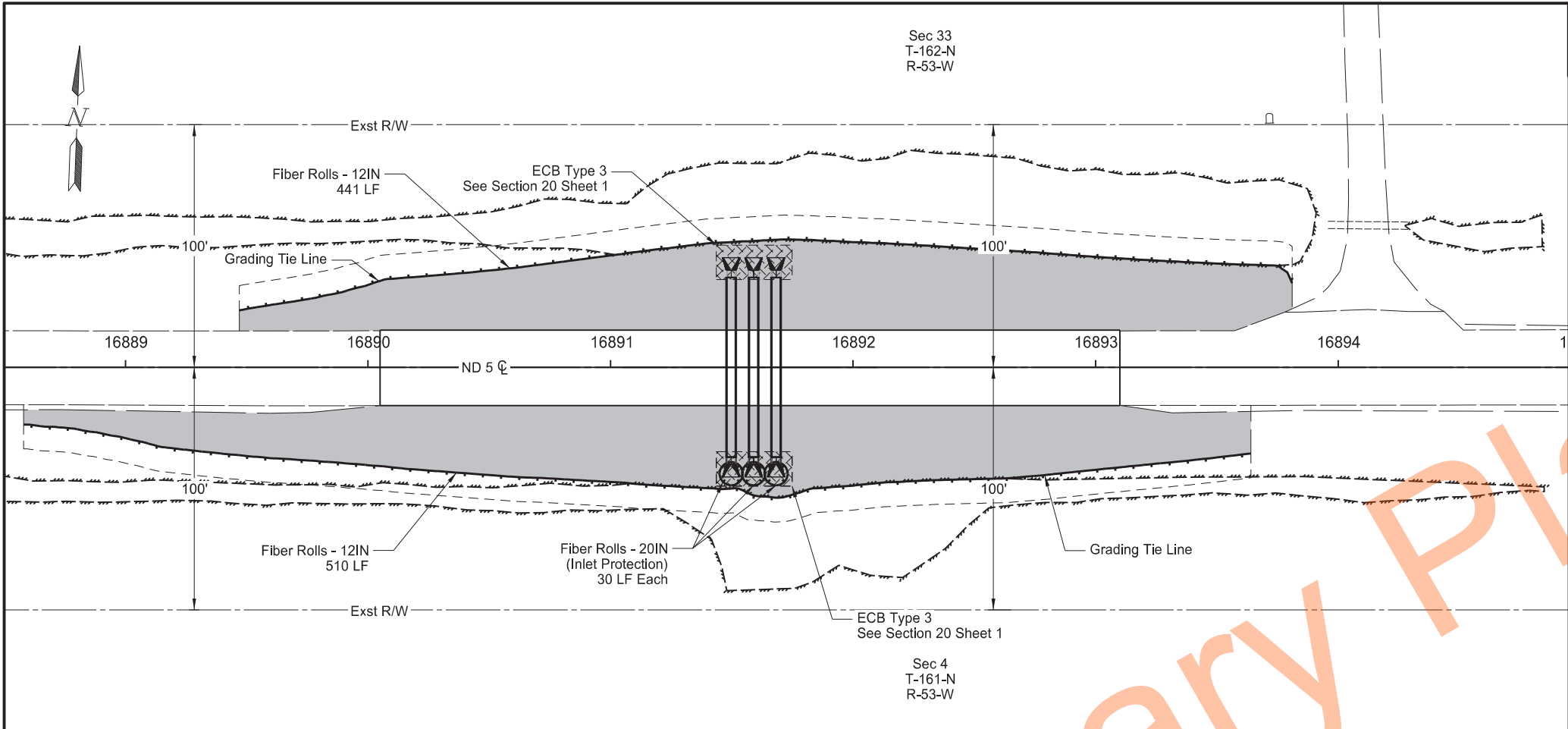
ND 5 Structure Replacements

Temporary Sediment and Erosion Control

Structure 0005-319.917
Sta 16889+00 to 16895+00 (SCL5)

Structure 0005-322.119
Sta 17005+00 to 17011+00 (SCL5)





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	NH-6-005(055)319	77	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Str 0005-319.917	0.6	ACRE
		Str 0005-322.119	0.6	ACRE
253	0101	STRAW MULCH		
		Str 0005-319.917	0.6	ACRE
		Str 0005-322.119	0.6	ACRE
261	0112	FIBER ROLLS 12IN		
		Str 0005-319.917	951	LF
		Str 0005-322.119	892	LF
261	0120	FIBER ROLLS 20IN		
		Str 0005-319.917	90	LF
		Str 0005-322.119	90	LF

For ditch grades encountered in the field not listed, use the following spacing:
Spacing= { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

DITCH FIBER SPACING		LEGEND	
Ditch Grade	Spacing (ft)		
<0.5%	200		Seeding Class II & Straw Mulch
1%	85		Fiber Rolls 12IN
2%	40		Inlet Protection - Fiber Roll 20IN
3%	30		
4%	20		

ND 5 Structure Replacements

Permanent Sediment and Erosion Control

Structure 0005-319.917
Sta 16889+00 to 16895+00 (SCL5)

Structure 0005-322.119
Sta 17005+00 to 17011+00 (SCL5)

REGISTERED PROFESSIONAL ENGINEER

Jonathon Backe

PE-40302

DATE 10/10/25

NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED					TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL	
			BY PHASE NO.								
			O	1	2	T					
E5-1-48	48"x48"	EXIT GORE								35	
G20-1-60	60"x24"	ROAD WORK NEXT _____ MILES	2			2		2	28	56	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)							18		
G20-2-48	48"x24"	END ROAD WORK	2	2	2	6		6	26	156	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)							18		
G20-4b-36	36"x30"	WAIT FOR PILOT CAR							18		
G20-50a-72	72"x36"	ROAD WORK NEXT _____ MILES RT & LT ARROWS	4			4		4	43	172	
G20-52a-72	72"x24"	ROAD WORK NEXT _____ MILES RT or LT ARROW	4			4		4	36	144	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$150 WHEN WORKERS PRESENT	2	2	2	6		6	59	354	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)							11		
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)							10		
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)							10		
M3-1-24	24"x12"	NORTH (Mounted on route marker post)							7		
M3-2-24	24"x12"	EAST (Mounted on route marker post)							7		
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)							7		
M3-4-24	24"x12"	WEST (Mounted on route marker post)							7		
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)							7		
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT							15		
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)							7		
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)							9		
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)							9		
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)							7		
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)							9		
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)							7		
R1-1-48	48"x48"	STOP							32		
R1-2-60	60"x60"	YIELD							29		
R2-1-36	36"x48"	SPEED LIMIT ____ (Portable only)							30		
R2-1-48	48"x60"	SPEED LIMIT ____	1	4	4	9		9	39	351	
R2-1aP-24	24"x18"	MINIMUM FEE \$150 (Mounted on Speed Limit post)	1	2	2	5		5	10	50	
R3-2-48	48"x48"	NO LEFT TURN							35		
R4-1-48	48"x60"	DO NOT PASS							39		
R4-7-48	48"x60"	KEEP RIGHT							39		
R5-1-48	48"x48"	DO NOT ENTER							35		
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)							14		
R7-1-12	12"x18"	NO PARKING ANY TIME							11		
R10-6-24	24"x36"	STOP HERE ON RED							16		
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)							12		
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)							12		
R11-3a-60	60"x30"	ROAD CLOSED _____ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)							15		
R11-3c-60	60"x30"	STREET CLOSED _____ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)							15		
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)							15		
W 1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT							35		
W 1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT							35		
W 1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT							35		
W 1-6-48	48"x24"	ONE DIRECTION LARGE ARROW							26		
W 3-1-48	48"x48"	STOP AHEAD							35		
W 3-3-48	48"x48"	SIGNAL AHEAD							35		
W 3-4-48	48"x48"	BE PREPARED TO STOP	1	2	2	5		5	35	175	
W 3-5-48	48"x48"	SPEED REDUCTION AHEAD	1	2	2	5		5	35	175	
W 4-2-48	48"x48"	LANE ENDS RIGHT or LEFT							35		
W 5-1-48	48"x48"	ROAD NARROWS							35		
W 5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE							35		
W 5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW							35		
W 6-3-48	48"x48"	TWO WAY TRAFFIC							35		
W 8-1-48	48"x48"	BUMP							35		
W 8-3-48	48"x48"	PAVEMENT ENDS							35		
W 8-7-48	48"x48"	LOOSE GRAVEL							35		
W 8-11-48	48"x48"	UNEVEN LANES							35		
W 8-12-48	48"x48"	NO CENTER LINE							35		
W 8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL							35		
W 8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY							35		
W 8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ____ FT or ____ MILE							35		
W 8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ____ FT or ____ MILE							35		
W 8-56-48	48"x48"	TRUCKS EXITING HIGHWAY							35		
W 9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL							35		
W 13-1P-30	30"x30"	____ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)							14		
W 14-3-64	64"x48"	NO PASSING ZONE							28		
W16-2P-30	30"x24"	____ FEET PLAQUE (Mounted on warning sign post)		2	2	4		4	10	40	
W20-1-48	48"x48"	ROAD WORK AHEAD or ____ FT or ____ MILE	2	1	1	4		4	35	140	
W20-2-48	48"x48"	DETOUR AHEAD or ____ FT or ____ MILE							35		
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ____ FT or ____ MILE							35		
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or ____ FT or ____ MILE		2	2	4		4	35	140	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or ____ FT or ____ MILE							35		
W20-7-48	48"x48"	FLAGGER	1	2	2	5		5	35	175	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back	1	2	2	5		5	5	25	
W20-52P-54	54"x12"	NEXT _____ MILES (Mounted on warning sign post)							12		
W21-1-48	48"x48"	WORKERS							35		
W21-2-48	48"x48"	FRESH OIL							35		
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ____ FT or ____ MILE							35		
W21-5-48	48"x48"	SHOULDER WORK							35		
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED							35		
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or ____ FT or ____ MILE							35		

[illegible][illegible]

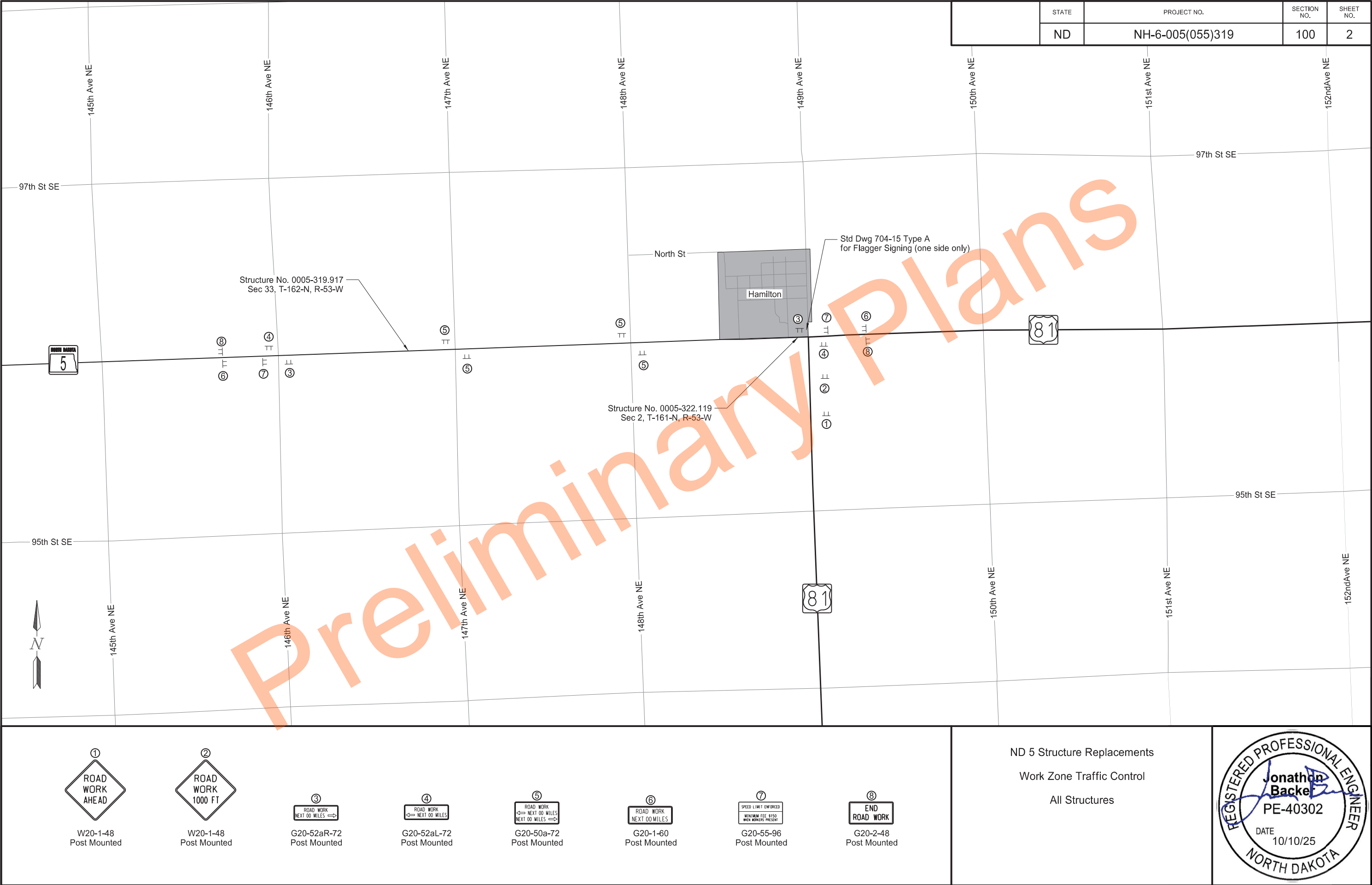
SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2293

[illegible]

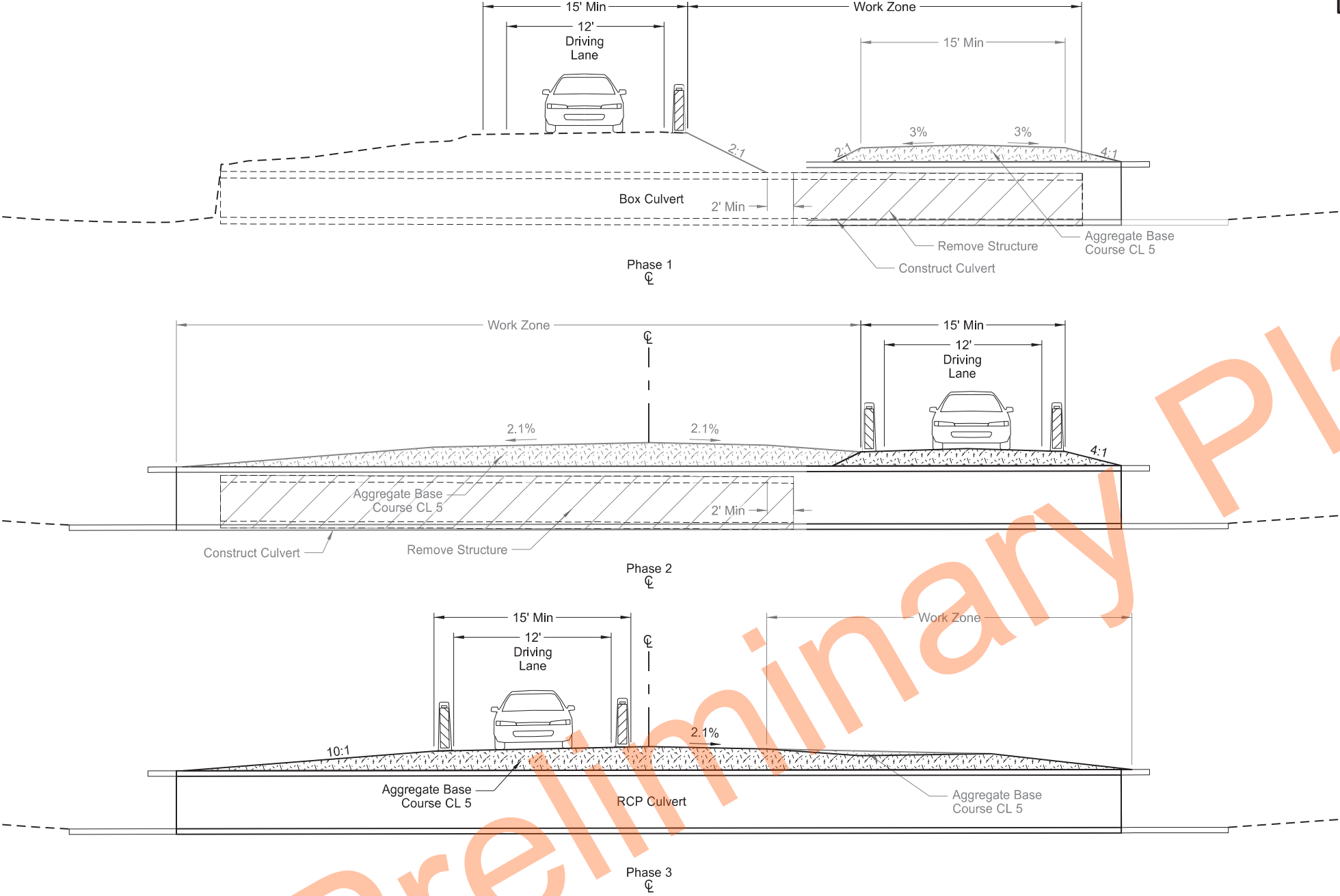
NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
<http://www.dot.nd.gov/>



Traffic Control Devices List
ND 5 Structure Replacements
Work Zone Traffic Control
All Structures



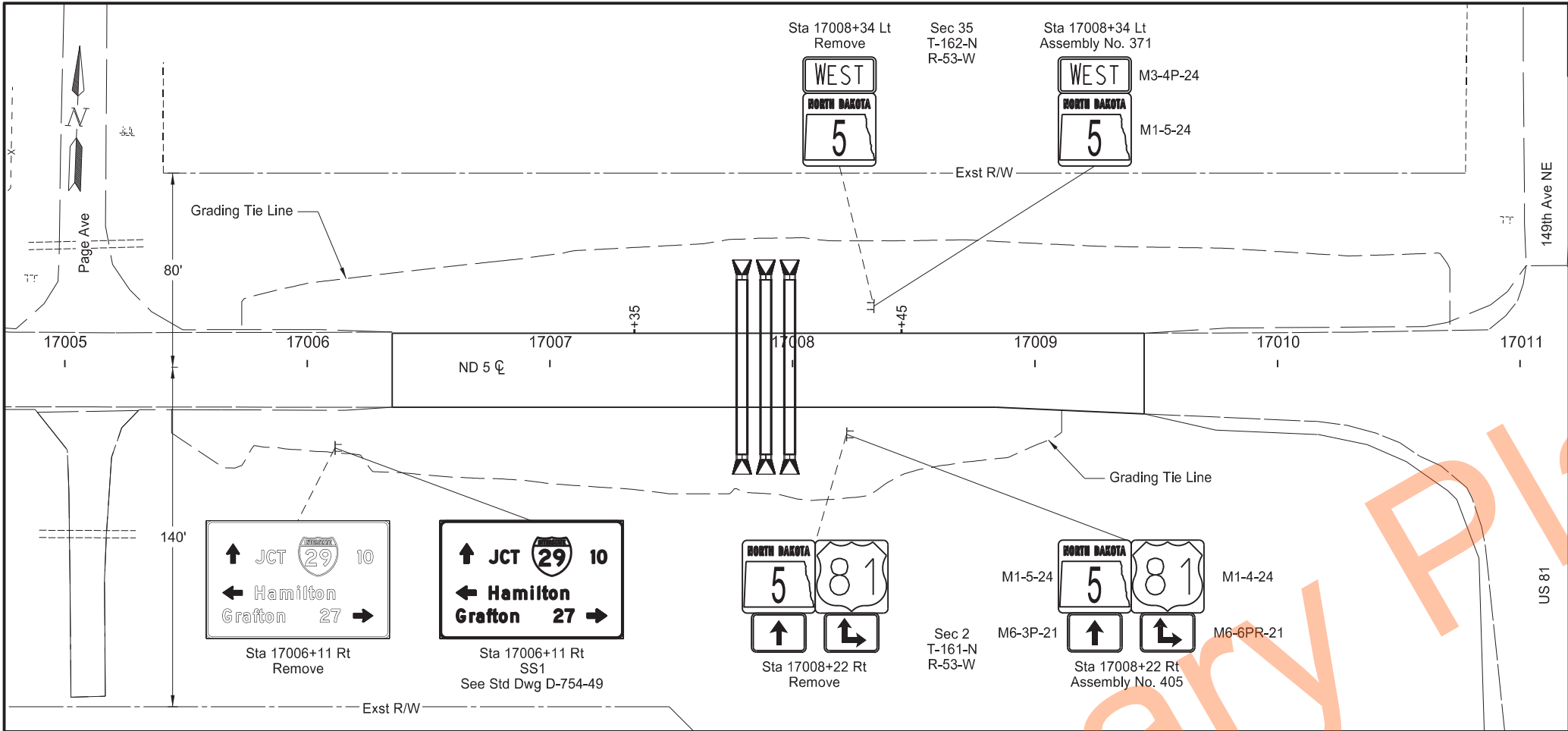
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	100	3



Note:
1) See Section 6 Note 704-P02 for Traffic Control Phasing.

ND 5 Structure Replacements
Work Zone Traffic Control
Structure Replacement Phasing
All Structures





View Intentionally Left Blank

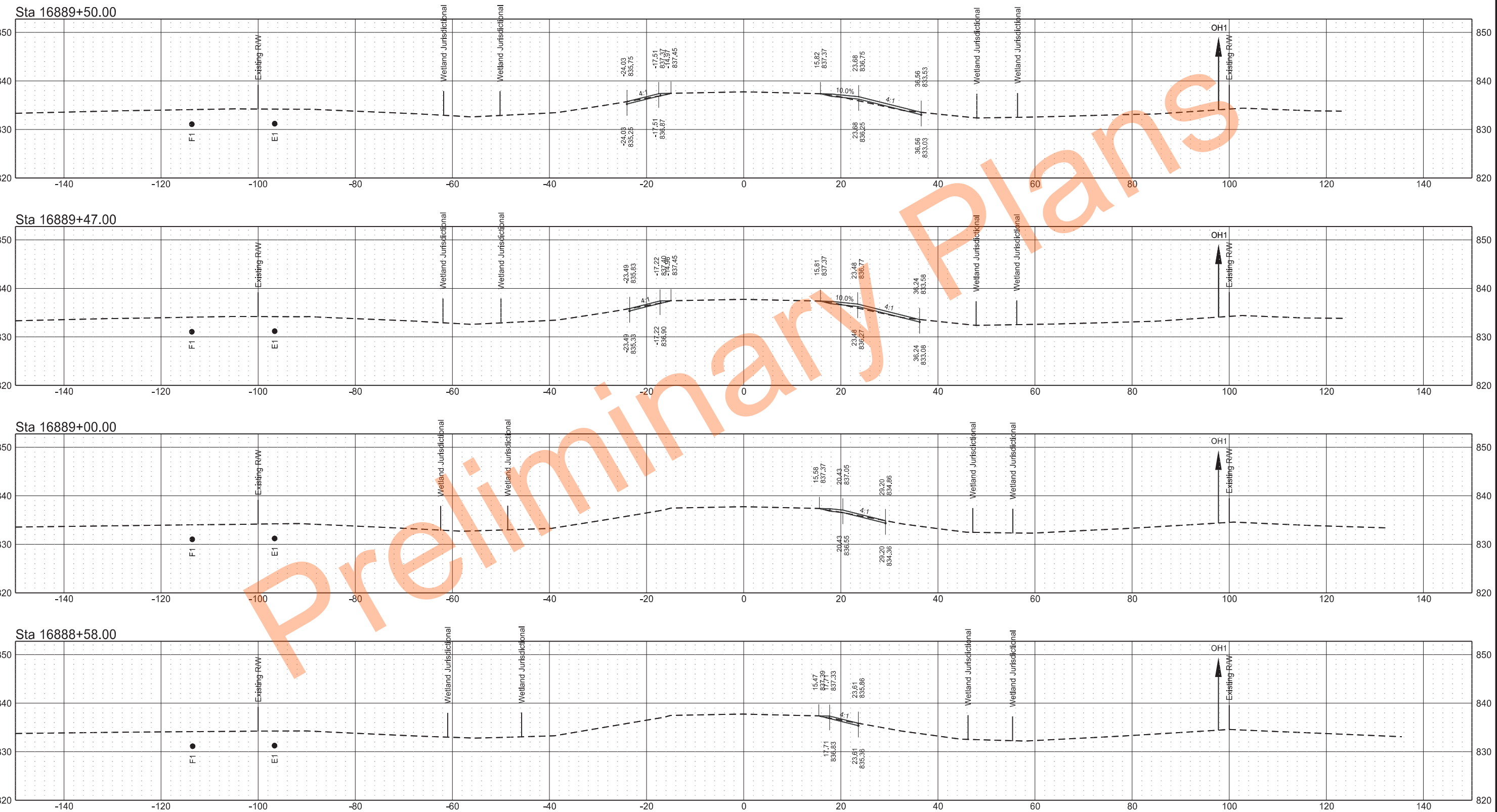
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(055)319	110	2

LEGEND	
	Proposed Sign Leader
	Existing Sign Leader
	Proposed Sign Assembly
	Existing Sign Assembly

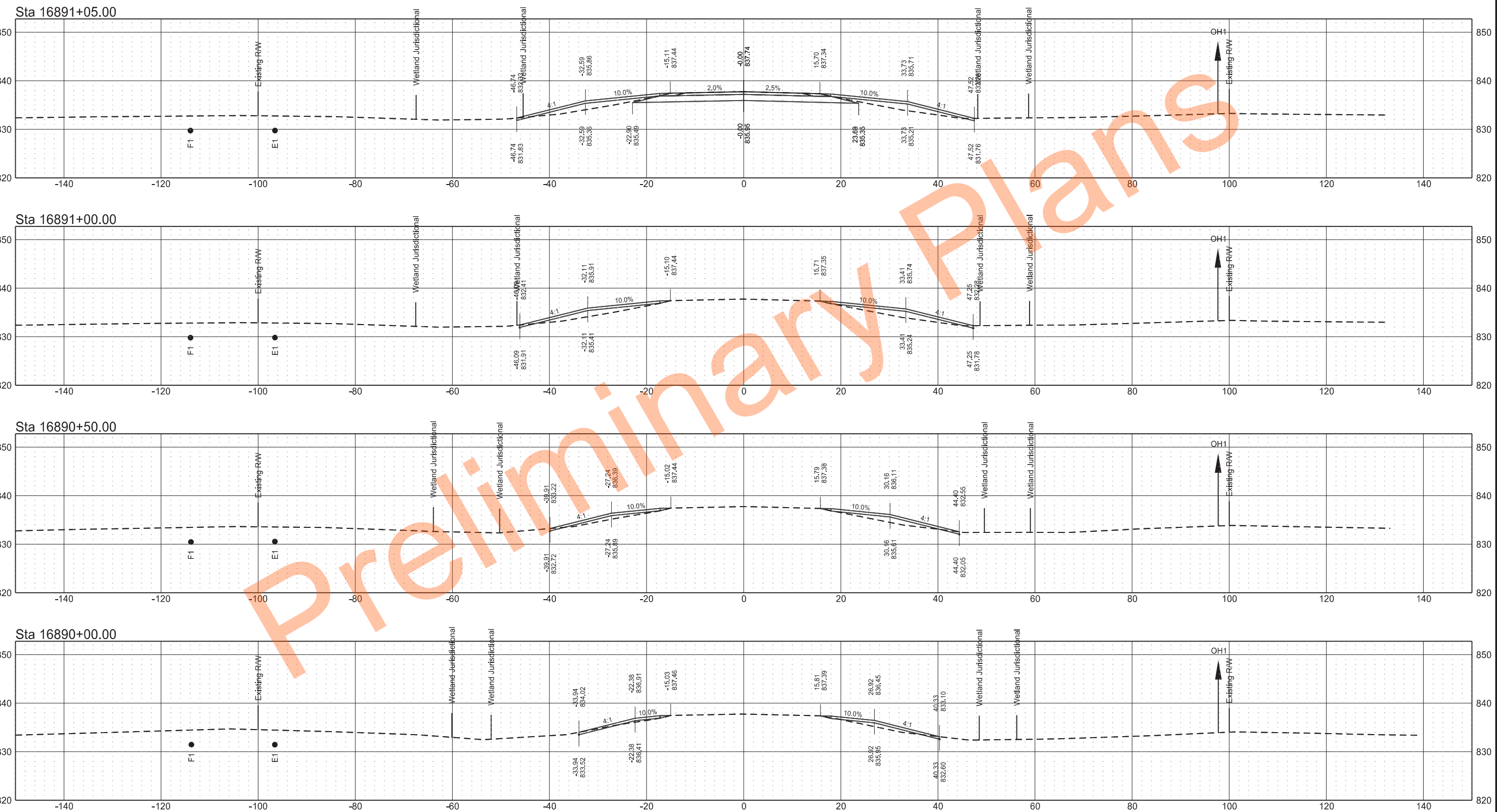
ND 5 Structure Replacements
Permanent Signing
Structure 0005-322.119
Sta 17005+00 to 17011+00 (SCL5)



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	1



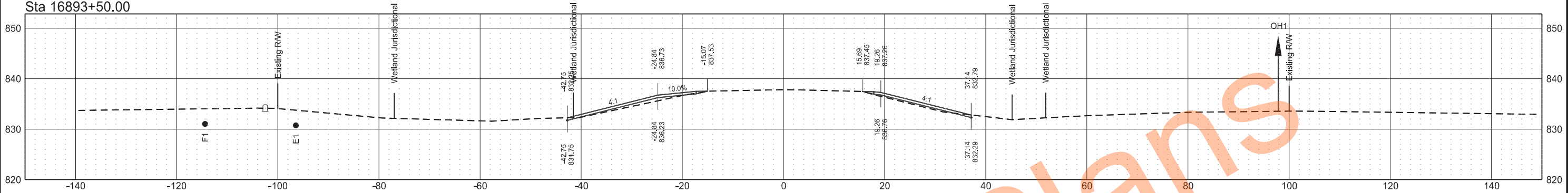
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	2



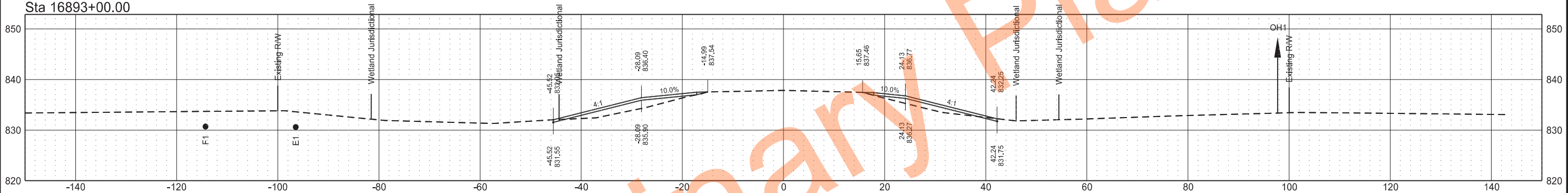
The image displays four cross-section diagrams of a proposed roadway, showing the existing ground profile, the proposed roadway profile, and the wetland jurisdictional line. The diagrams are labeled with stationing: Sta 16892+00.00, Sta 16891+68.25, Sta 16891+59.00, and Sta 16891+49.75. Each diagram includes a grid with stationing on the x-axis (ranging from -140 to 140) and elevation on the y-axis (ranging from 820 to 850). The diagrams show the existing ground profile (dashed line), the proposed roadway profile (solid line), and the wetland jurisdictional line (dashed line). Key features include the 'Existing RW' (Right of Way) line, 'Wetland Jurisdictional' line, and various elevation points (e.g., -51.61, -34.57, -15.30, 0.00, 15.90, 33.86, 48.80, 53.75, 59.90). The diagrams also show the 'F1' (Footprint 1) and 'E1' (Elevation 1) points, and the 'OH1' (Overhead 1) point. A large 'Preliminary Plans' watermark is visible across the diagrams.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	4

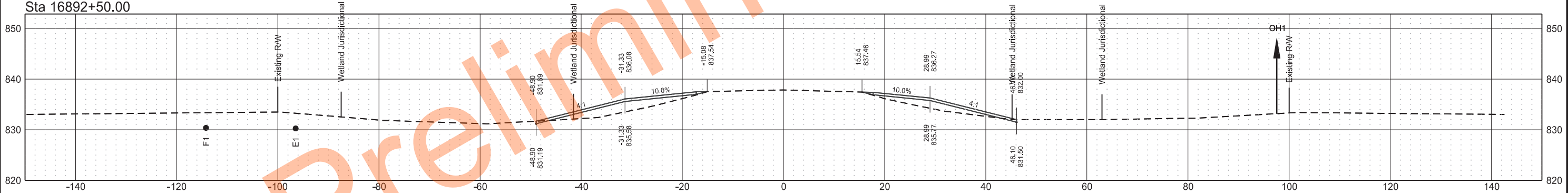
Sta 16893+50.00



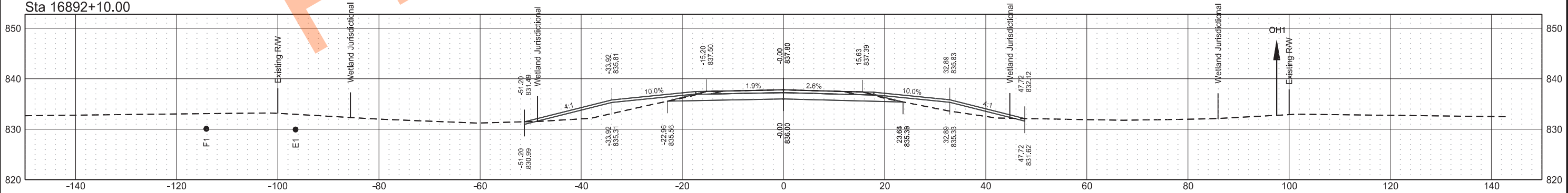
Sta 16893+00.00



Sta 16892+50.00



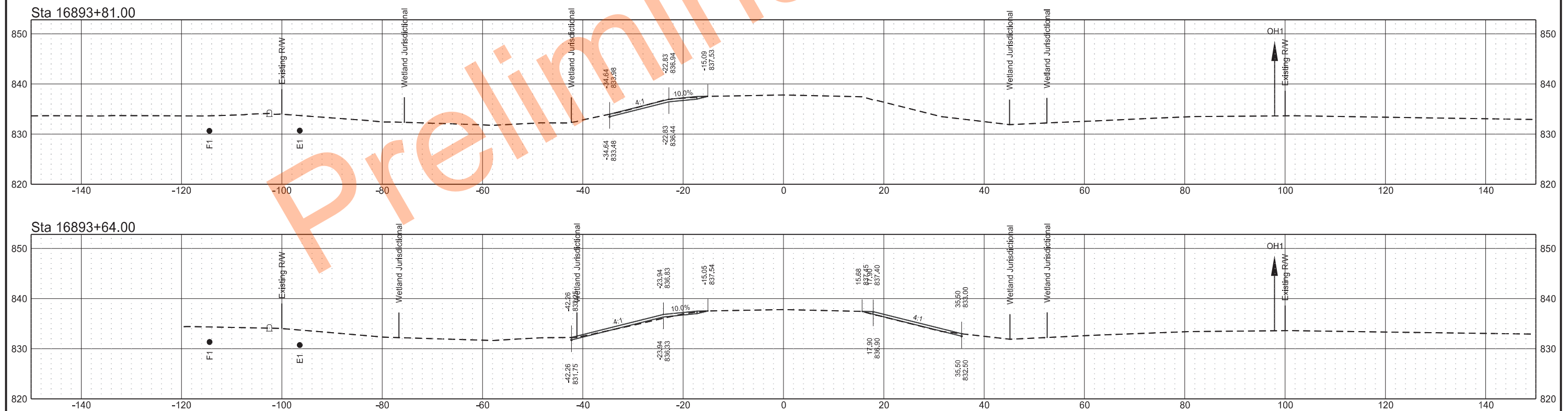
Sta 16892+10.00



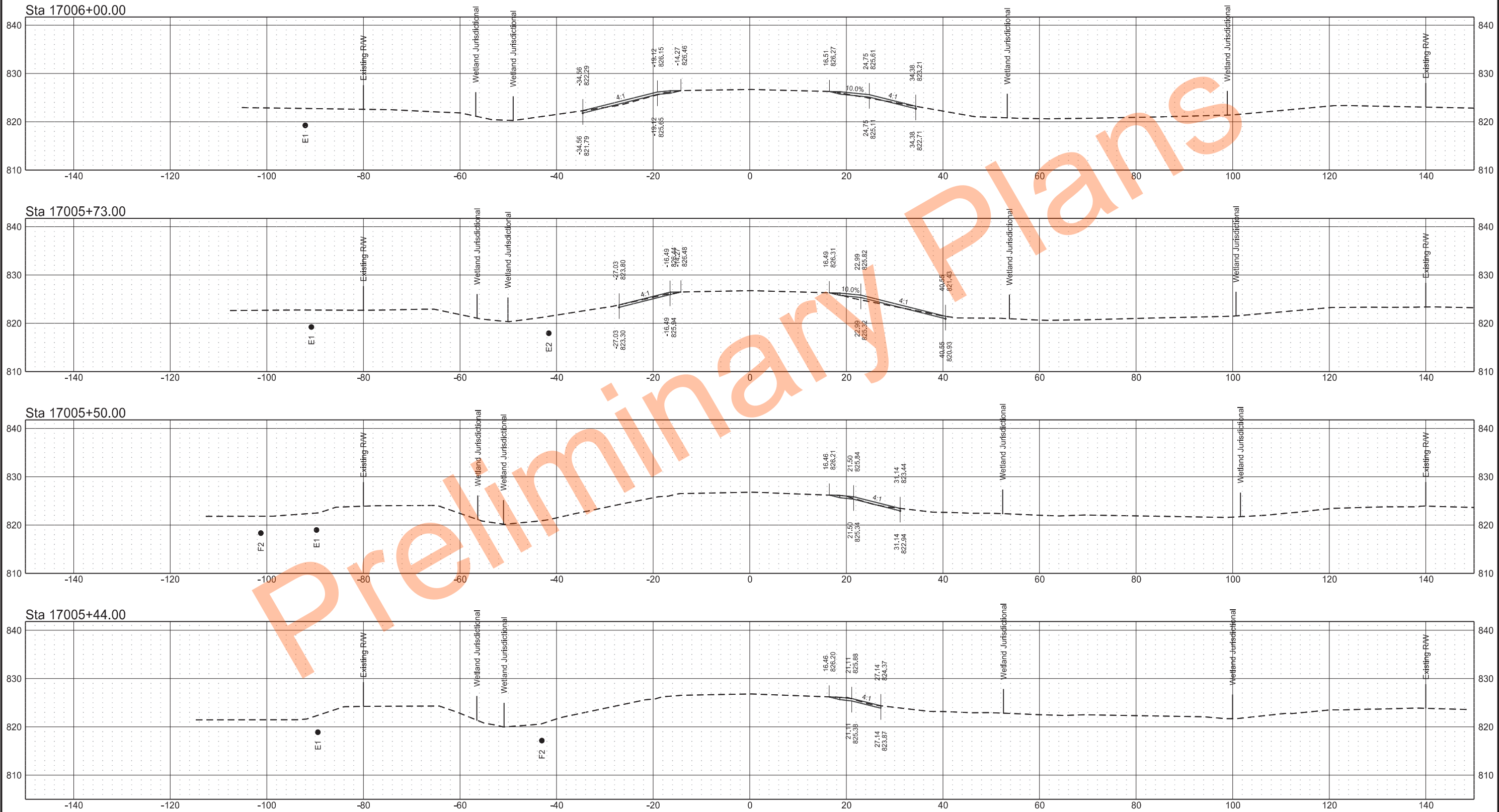
Pembina County
Chain SCL5

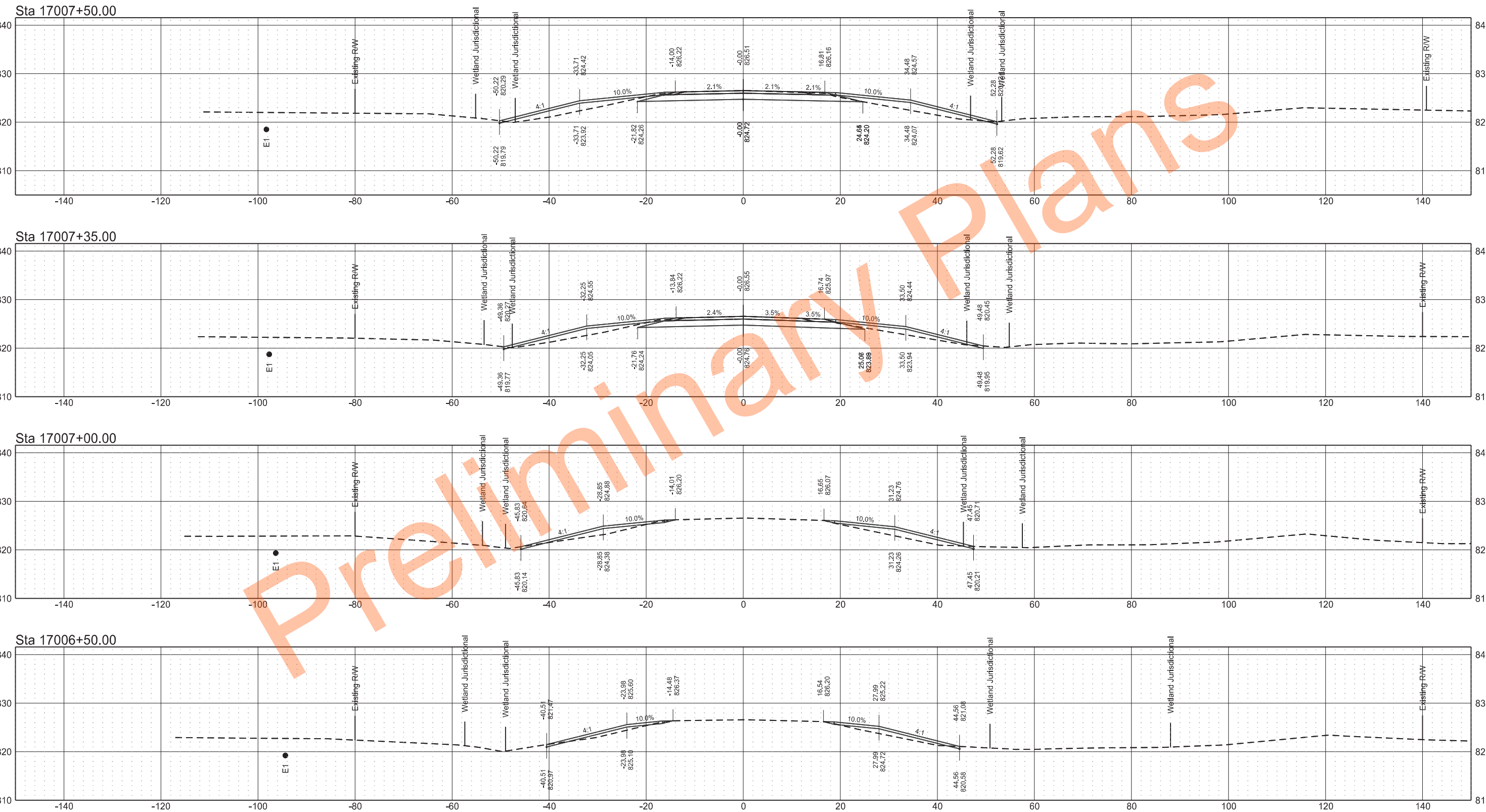
ND 5 Structure Replacements
Structure 0005-319.917

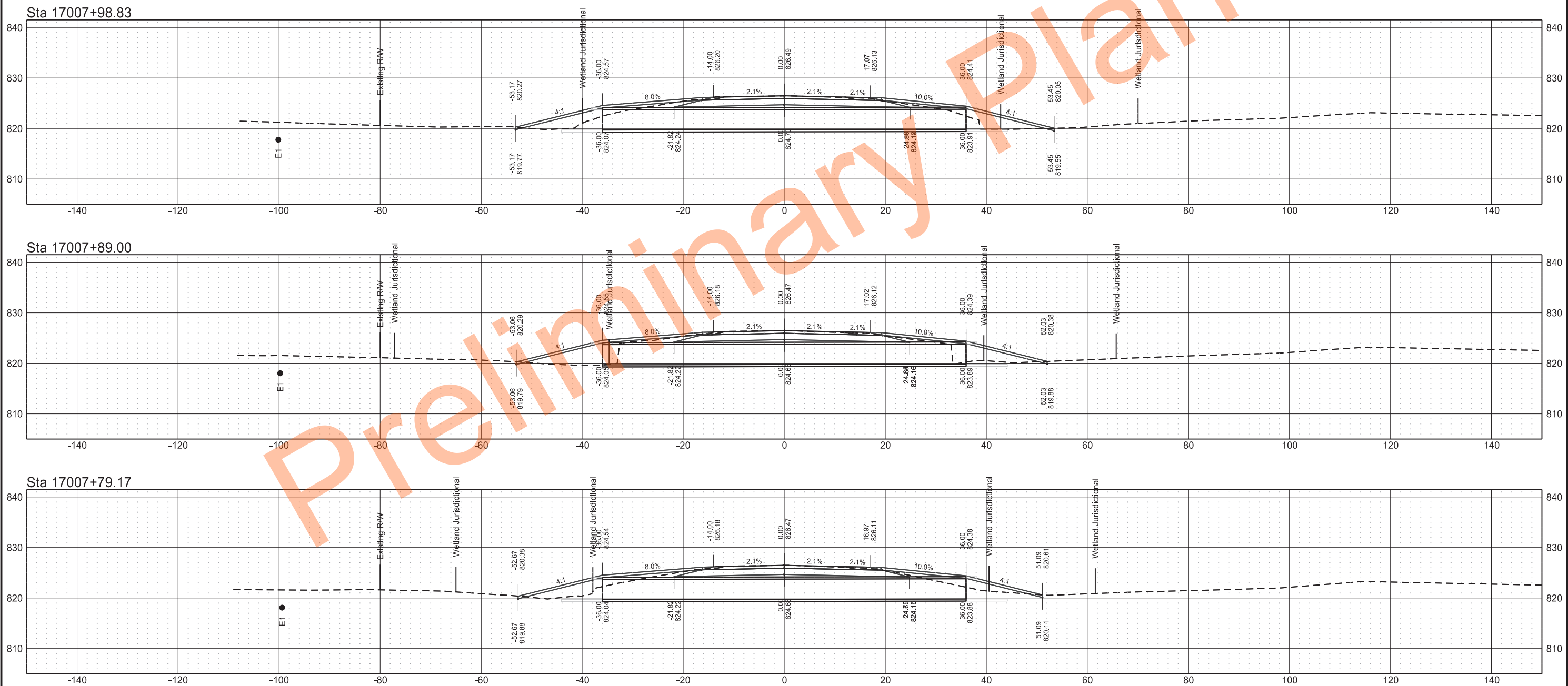
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	ND	NH-6-005(055)319	200	5



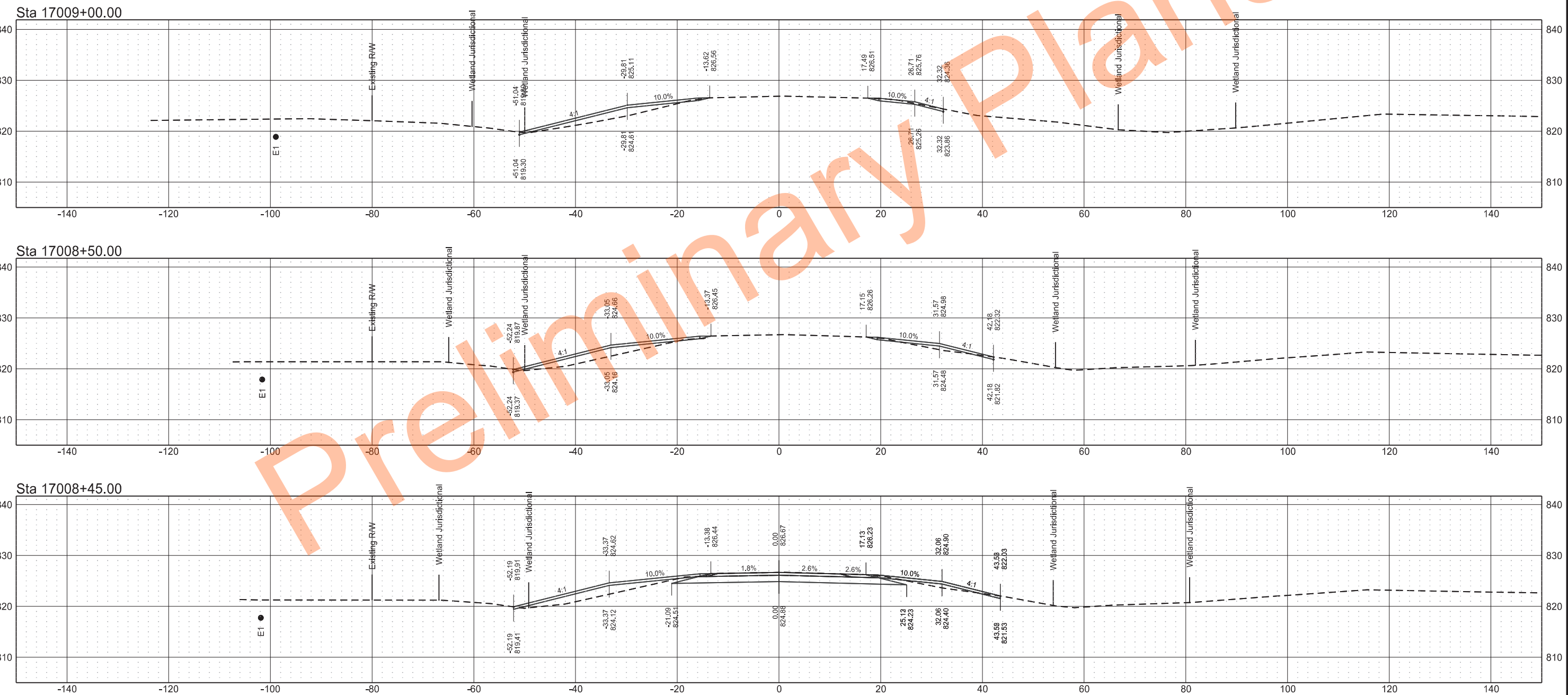
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	6

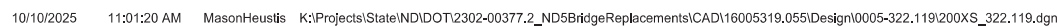




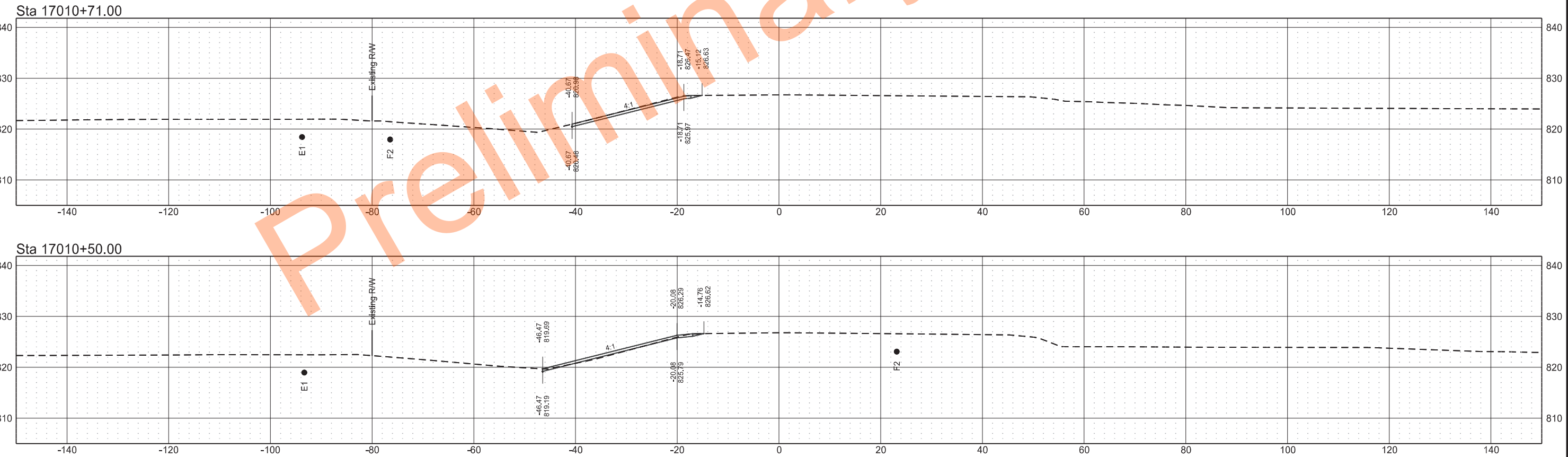


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	9





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(055)319	200	11



NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.	C Gdrl	cable guardrail	Culv	culvert	FOS	factor of safety
Abn	abandoned	Calc	calculate	C&G	curb & gutter	Fed	Federal
Abut	abutment	CIP	cast iron pipe	CI	curb inlet	FP	feed point
Adj	adjusted	CB	catch basin	CR	curb ramp	Fn	fence
Aggr	aggregate	CRS	cationic rapid setting	C	cut	Fn P	fence post
Ahd	ahead	C Gd	cattle guard	Dd Ld	dead load	FO	fiber optic
ARV	air release valve	C To C	center to center	Defl	deflection	FD	field drive
Align	alignment	CL or $\varnothing$	centerline	Defm	deformed	F	fill
Al	alley	Ch	chain	DInt	delineate	FAA	fine aggregate angularity
Alt	alternate	Chnlk	chain-link	DIntr	delineator	FH	fire hydrant
Alum	aluminum	Ch Blk	channel block	Depr	depression	FI	flange
ADA	Americans with Disabilities Act	Ch Ch	channel change	Desc	description	FIRD	flared
&	and	Chk	check	Det	detail	FES	flared end section
Appr	approach	Chsld	chiseled	DWP	detectable warning panel	F Bcn	flashing beacon
Approx	approximate	Cir	circle	Dtr	detour	FA	flight auger sample
ACP	asbestos cement pipe	Cl	class	Dia or $\varnothing$	diameter	FL	flow line
Asph	asphalt	Clnt	clean-out	Dir	direction	Ftg	footing
AC	asphalt cement	Clr	clear	Dist	distance	FM	force main
Assmd	assumed	Cl&gr	clearing & grubbing	DM	disturbed material	Fnd	found
@	at	Comb.	combination	DB	ditch block	Fdn	foundation
Atten	attenuation	Coml	commercial	DG	ditch grade	Frac	fractional
ATR	automatic traffic recorder	Compr	compression	Dbl	double	Frwy	freeway
Ave	Avenue	CADD	computer aided drafting & design	Dn	down	Frt	front
Avg	average	Conc	concrete	Dwg	drawing	FF	front face
ADT	average daily traffic	CECB	concrete erosion control blanket	Dr	drive	F Disp	fuel dispenser
		Cond	conductor	Drwy	driveway	FFP	fuel filler pipes
		Const	construction	DI	drop inlet	FLS	fuel leak sensor
		Cont	continuous	D	dry density	Furn	furnish/ed
		CSB	continuous split barrel sample				
		Contr	contraction				
		Contr	contractor				
Bk	back	CP	control point	Ea	each		
BF	back face	Coord	coordinate	Esmt	easement		
Balc	balcony	Cor	corner	E	East		
B Wire	barbed wire	Corr	corrected	EB	Eastbound		
Barr	barricade	CAES	corrugated aluminum end section	Elast	elastomeric		
Btry	battery	CAP	corrugated aluminum pipe	EL	electric locker		
BI	beehive inlet	CMES	corrugated metal end section	E Mtr	electric meter		
Beg	begin	CMP	corrugated metal pipe	EVSE	electric vehicle supply equipment		
BG	below grade	CPVCP	corrugated poly-vinyl chloride pipe	Elec	electric/al		
BM	bench mark	CSES	corrugated steel end section	EDM	electronic distance meter		
Bkwy	bikeway	CSFES	corrugated steel flared end section	Elev or El	elevation		
Bit	bituminous	CSP	corrugated steel pipe	Ellipt	elliptical		
Blk	block	CSTES	corrugated steel traversable end section	Emb	embankment		
BH	bore hole	Co	County	Emuls	emulsion/emulsified		
Bot	bottom	Crse	course	ES	end section		
Blvd	Boulevard	Ct	Court	Engr	engineer		
Bndry	boundary	Xarm	cross arm	ESS	environmental sensor station		
Brkwy	breakaway	Xbuck	cross buck	Eq	equal		
Br	bridge	Xsec	cross sections	Evgr	evergreen		
Bldg	building	Xing	crossing	Exc	excavation		
Bus.	business	Xrd	crossroad	Exst	existing		
BV	butterfly valve	Crn	crown	Exp	expansion		
Byp	bypass			Expy	Expressway		
				E	external of curve		
				Extru	extruded		

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09-20-18	General Revisions
12-16-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions



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12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions

NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	Southeast	TERO	tribal employment rights ordinance
SW	Southwest	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental		
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

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NDDOT ABBREVIATIONS

D-101-4

MEASUREMENTS

ac	acres
A	ampere
Bd Ft	board feet
Cd	candela
cm	centimeter
C	coulomb
CF	cubic feet
m3	cubic meter
m3/s	cubic meters per second
CY	cubic yard
CY/mi	cubic yards per mile
D or Deg	degree
F	Fahrenheit
F	farad
ft	feet/foot
Gal	gallon
G	giga
Ha	hectare
H	henry
Hz	hertz
hr	hour(s)
in.	inch
J	joule
K	kelvin
kN	kilo newton
kPa	kilo pascal
kg	kilogram
kg/m3	kilogram per cubic meter
km	kilometer
K	Kip(s)
LF	linear foot
L	litre
Lm	lumen
L sum	lump sum
Lx	lux
M Hr	man hour
M	mega
m	meter
m/s	meters per second
mi	mile
mL	milliliter
mm	millimeter
mm/hr	millimeters per hour
n	nano
N	newton
Pa	pascal
lb	pounds
sec	seconds
S	siemens
SF	square feet
km2	square kilometer
m2	square meter
SY	square yard
Sta Yd	station yards
SI	Systems International

T	tesla
T/mi	tons per mile
V	volt
W	watt
Wb	weber

SURVEY DESCRIPTIONS

Az	azimuth
Bs	backsight
Brg	bearing
BP Cap	blue plastic cap
BS	both sides
BC	brass cap
CC	closing corner
CS	curve to spiral
Eq	equation
E	external of curve
FS	far side
FB	field book
Fs	foresight
Geod	geodetic
GIS	Geographical Information System
GPS	Global Positioning System
HI	height of instrument
IM	iron monument
I Pn	iron pin
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
L	length of curve
LC	long chord
LB	level book
MC	meander corner
Mer	meridian
M	mid ordinate of curve
NGS	National Geodetic Survey
NS	near side
Obsn	observation
Off Loc	office location
OP Cap	orange plastic cap
PK	Parker-Kalon nail
P Cap	plastic cap
PP Cap	pink plastic cap
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature
PT	point of tangent
POC	point on curve
POT	point on tangent
RTP	random traverse point
Rge	range
RP Cap	red plastic cap
SC	spiral to curve
SC	standard corner
ST	spiral to tangent
Sta	station
SE	superelevation
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Twp	township
TB	transit book
TP	traverse point
TP	turning point
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
VC	vertical curve
WC	witness corner
WGS	World Geodetic System
YP Cap	yellow plastic cap
Z	zenith

SOIL TYPES

Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Co S	coal slack
C Gr	coarse gravel
CS	coarse sand
FS	fine sand
Gr	gravel
Lig Co	lignite coal
Lig Sl	lignite slack
Lm	loam
Rk	rock
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
Sc	scoria
Sh	shale
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam

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4-14-25	- Continued from D-101-3 General Revisions



NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications	GTR RAMSEY WD	Greater Ramsey Water District	RED RIV COMM	Red River Communications
ACCENT	Accent Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users District	HALS TEL	Halstad Telephone Company	ROBRTS TEL	Roberts Company Telephone
AGC	Associated General Contractors of America	IDEA1	Idea1	R-RIDER ELEC	Roughrider Electric Cooperative
ALL PL	Alliance Pipeline	INT-COMM TEL	Inter-Community Telephone Company	RRVW	Red River Valley & Western Railroad
ALL SEAS WU	All Seasons Water Users District	KANEB PL	Kaneb Pipeline Company	S CENT REG WD	South Central Regional Water District
AMOCO PI	Amoco Pipeline Company	KEM ELEC	Kem Electric Cooperative Incorporated	SE W U	Southeast Water Users Incorporated
AMRDA HESS	Amerada Hess Corporation	KOCH GATH SYS	Koch Gathering Systems Incorporated	SCOTT CABLE	Scott Cable Television Dickinson
AT&T	AT&T Corporation	LKHD PL	Lakehead Pipeline Company	SHERDN ELEC	Sheridan Electric Cooperative
B PAW	Bear Paw Energy Incorporated	LWR YELL R ELEC	Lower Yellowstone Rural Electric	SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
BAKER ELEC	Baker Electric	LUMEN	Lumen Technologies Incorporated	SKYTECH	Skyland Technologies Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated	MCKNZ CON	McKenzie Consolidated Telcom	SLOPE ELEC	Slope Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative	MCKNZ ELEC	McKenzie Electric Cooperative	SOURIS RIV TELCOM	Souris River Telecommunications
BELLE PL	Belle Fourche Pipeline Company	MCKNZ WRD	McKenzie County Water Resource District	ST WAT COMM	State Water Commission
BLM	Bureau of Land Management	MCLEOD	McLeod USA	STATE LN WATER	State Line Water Cooperative
BNSF	Burlington Northern Santa Fe Railway	MCLN ELEC	McLean Electric Cooperative	STER ENG	Sterling Energy
BOEING	Boeing	MCLN-SHRDN R WAT	McLean-Sheridan Rural Water District	STUT RWD	Stutsman Rural Water District
BRNS RWD	Barnes Rural Water District	MDU	Montana-dakota Utilities	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDCO	MidContinent Communications	SWWA	Southwest Water Authority
BURL WRD	Burleigh County Water Resource District	MIDSTATE TEL	Midstate Telephone Company	SUNOCO	Sunoco LP
CABLE ONE	Cable One	MINOT CABLE	Minot Cable Television	T M C	Turtle Mountain Communications
CABLE SERV	Cable Services	MINOT TEL	Minot Telephone Company	TCI	TCI of North Dakota
CAP ELEC	Capital Electric Cooperative Incorporated	MISS VALL COMM	Missouri Valley Communications Incorporated	TESORO GHG PLNS PL	Tesoro High Plains Pipeline
CASS CO ELEC	Cass County Electric Cooperative	MISS W W S	Missouri West Water System	TRI-CNTY WU	Tri-County Water Users Incorporated
CASS RWU	Cass Rural Water Users District	MNKOTA PWR	Minnkota Power	TRL CO WRD	Traill County Water Resource District
CAV ELEC	Cavalier Rural Electric Cooperative	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UNTD TEL	United Telephone
CBLCOM	Cablecom Of Fargo	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	UPPR SOUR WD	Upper Souris Water District
CENEX PL	Cenex Pipeline	MLGC	Moore & Liberty - Griggs County	US SPRINT	U.S. Sprint
CENT PL WATER DIST	Central Pipe Line Water District	MUNICIPAL	City Water And Sewer	USAF MSL CABLE	U.S.A.F. Missile Cable
CENT PWR ELEC	Central Power Electric Cooperative	MUNICIPAL	City Of '.....'	USFWS	US Fish and Wildlife Service
CENTURYLINK	CenturyLink	N CENT ELEC	North Central Electric Cooperative	USW COMM	U.S. West Communications
COE	Corps of Engineers	N PRAIR REG WD	North Prairie Regional Water District	VRNDRY ELEC	Verendrye Electric Cooperative
CONS COMM	Consolidated Communications	ND PKS & REC	North Dakota Parks And Recreation	W RIV TEL	West River Telephone Incorporated
CONS TELCOM	Consolidated Telcom	ND TEL	North Dakota Telephone Company	WAPA	Western Area Power Administration
CONT RES	Continental Resource Inc	NDDOT	North Dakota Department of Transportation	WAWSA	Western Area Water Supply Authority
CPR	Canadian Pacific Railway	NE REG WD	Northeast Regional Water District	WEB	W. E. B. Water Development Association
D O E	Department Of Energy	NDSU SOIL SCI DEPT	NDSU Soil Science Department	WILLI WRD	Williams County Water Resource District
DAK CARR	Dakota Carrier Network	NEMONT TEL	Nemont Telephone	WILSTN BAS PL	Williston Basin Interstate Pipeline Company
DAK CENT TEL	Dakota Central Telephone	NODAK R ELEC	Nodak Rural Electric Cooperative	WLSH RWD	Walsh Water Rural Water District
DAK RWD	Dakota Rural Water District	NOON FRMS TEL	Noonan Farmers Telephone Company	WOLVRTN TEL	Wolverton Telephone
DGC	Dakota Gasification Company	NPR	Northern Plains Railroad	XLENER	Xcel Energy
DICKEY R NET	Dickey Rural Networks	NSP	Northern States Power	YSVR	Yellowstone Valley Railroad
DICKEY WRD	Dickey County Water Resource District	NTHN BRDR PL	Northern Border Pipeline		
DICKEY TEL	Dickey Telephone	NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated		
DNRR	Dakota Northern Railroad	NTHWSTRN REF	Northwestern Refinery Company		
DOME PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	NWRWD	Northwest Rural Water District		
DVMW	Dakota, Missouri Valley & Western	ONEOK	Oneok gas		
E CENT REG WD	East Central Water District	OSHA	Occupational Safety and Health Administration		
ENBRDG	Enbridge Pipelines Incorporated	OTTR TL PWR	Otter Tail Power Company		
ENVENTIS	Enventis Telephone	PAAP	Plains All American Pipeline		
EQUINOR	Equinor Pipeline	P L E M	Prairielands Energy Marketing		
FALK MNG	Falkirk Mining Company	POLAR COM	Polar Communications		
FHWA	Federal Highway Administration	PVT ELEC	Private Electric		
G FKS-TRL WD	Grand Forks-traill Water District	QWEST	Qwest Communications		
GETTY TRD & TRAN	Getty Trading & Transportation	R&T REG WD	R & T Water District		
GLDN W ELEC	Golden West Electric Cooperative				

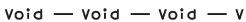
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions

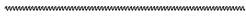
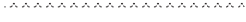


LINE STYLES

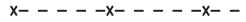
D-101-20

Existing Topography

	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable
	Existing Guardrail Metal
	Existing Edge of Water
	Existing Fence
	Existing Railroad
	Existing Field Line
	Exst Flow
	Existing Curb
	Existing Valley Gutter
	Existing Driveway Gutter
	Existing Curb and Gutter
	Existing Mountable Curb and Gutter

	Existing 3-Cable w Posts
	Site Boundary
	Existing Berm, Dike, Pit, or Earth Dam
	Existing Ditch Block
	Existing Tree Boundary
	Existing Brush or Shrub Boundary
	Existing Retaining Wall
	Existing Planter or Wall
	Existing W-Beam Guardrail with Posts
	Existing Railroad Switch
	Gravel Pit - Borrow Area
	Existing Wet Area-Vegetation Break
	Existing High Tension Cable Guardrail
	Existing High Tension Cable Guardrail with Posts

Proposed Topography

	3-Cable w Posts
	Flow
	Fence
	Remove Line
	Wall
	Retaining Wall (Plan View)
	W-Beam w Posts
	High Tension Cable Guardrail with Posts

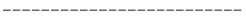
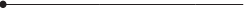
Existing Utilities

	Existing Electrical
	Existing Fiber Optic Line
	Existing TV Fiber Optic
	Existing Gas Pipe
	Existing Overhead Utility Line
	Existing Power
	Existing Fuel Pipeline
	Existing Undefined Above Ground Pipe Line
	Existing Sanitary Sewer
	Existing Sanitary Force Main
	Existing Storm Drain
	Existing Storm Drain Force Main
	Existing Culvert
	Existing Telephone Line
	Existing TV Line
	Existing Water or Steam Line
	Existing Under Drain
	Existing Slotted Drain
	Existing Conduit
	Existing Conductor
	Existing Down Guy Wire Down Guy
	Existing Underground Vault or Lift Station

Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain

Traffic Utilities

	Conductor
	Fiber Optic
	Existing Loop Detector
	Existing Double Micro Loop Detector
	Micro Loop Detector Double
	Existing Micro Loop Detector
	Micro Loop Detector
	Signal Head with Mast Arm
	Existing Signal Head with Mast Arm

Sign Structures

	Existing Overhead Sign Structure
	Existing Overhead Sign Structure Cantilever
	Overhead Sign Structure Cantilever

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09-23-16	Added and Revised Items, Organized by Functional Groups
12-18-20	General Revisions



12 18 2020

LINE STYLES

D-101-21

Right Of Way

	Easement
	Existing Easement
	Right of Way
	Existing Right of Way
	Existing Right of Way Railroad
	Existing Right of Way Not State Owned
	Existing Government Lot Line
	Existing Adjacent Block Lines
	Existing Adjacent Lot Lines
	Existing Adjacent Property Line
	Existing Adjacent Subdivision Lines
	Sight Distance Triangle Line
	Dimension Leader

Boundary Control

	Existing City Corporate Limits or Reservation Boundary
	Existing State or International Line
	Existing Township
	Existing County
	Existing Section Line
	Existing Quarter Section Line
	Existing Sixteenth Section Line
	Existing Centerline
	Tangent Line

Cross Sections and Typicals

	Existing Ground
	Existing Topsoil (Cross Section View)
	Existing Ground Void (Not Surveyed)
	Existing Concrete
	Existing Aggregate (Cross Section View)
	Existing Curb and Gutter (Cross Section View)
	Existing Asphalt (Cross Section View)
	Existing Reinforcement Rebar

Geotechnical

	Geotextile Fabric Type D
	Geogrid
	Geotextile Fabric Type R
	Geotextile Fabric Type R1
	Geotextile Fabric Type RR
	Geotextile Fabric Type S

	Subgrade Reinforcement
	Failure Line

Countours

	Depression Contours
	Supplemental Contour

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile

Striping

	Centerline Pavement Marking
	Barrier with Centerline Pavement Marking
	Barrier Pavement Marking
	Stripe 4 IN Dotted Extension White
	Stripe 8 IN Dotted Extension White
	Stripe 8 IN Lane Drop

Pavement Joints

	Doweled Joint
	Tie Bar 30 Inch 4 Foot Center to Center
	Tie Bar 18 Inch 3 Foot Center to Center
	Tie Bar at Random Spacing

Bridge Details

	Small Hidden Object
	Large Hidden Object
	Phantom Object
	Existing Conditions Object
	Centerline Main
	Centerline Secondary
	Excavation Limits
	Proposed Ground
	Sheet Piling

Erosion Control

	Limits of Const Transition Line
	Bale Check
	Rock Check
	Floating Silt Curtain
	Silt Fence
	Excavation Limits
	Fiber Rolls

Environmental

	Wetland Mitigation
	Existing Wetland Easement USFWS
	Existing Wetland Jurisdictional
	Existing Wetland
	Tree Row

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups General Revisions
12-18-20	

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NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30

	North Arrow (Half Scale)		Existing Bush or Shrub		Continuous Split Barrel Sample
	Alignment Data Point		Existing Large Evergreen Tree		Flight Auger Sample
	Alignment Monument		Existing Small Evergreen Tree		Split Barrel Sample
	Spot Elevation		Existing Large Tree		Thinwall Tube Sample
	Existing Miscellaneous Spot		Existing Small Tree		Standard Penetration Test
	Existing Access Control Arrow		Existing Tree Trunk		Inclinometer Tube
	Existing Benchmark		Cairn or Stone Circle		Excavation Unit
	Reset USGS Marker		Existing Artifact		Existing Ground Water Well Bore Hole
	Iron Monument Found		Existing Satellite Dish		
	Iron Pin R/W Monument		Existing Weather Station		
	Property Corner		Existing Windmill or Tower		
	Iron Pin Reference Monument		Reinforced Pavement		
	Right of Way Marker (Exst, Ppsd, Reset)				
	Existing Federal Reference Corner				
	Existing Section Corner (Full, Quarter, Sixteenth, Meander)				
	Existing Witness Corner				
	Existing Control Point (CP, GPS-RTK, TRI)				
	Existing Traverse PI Aerial Panel				
	Existing Reference Marker Point NGS				
	Existing EFB Misc				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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12 18 2020

SYMBOLS

D-101-31

	Flexible Delineator		Highway Sign (Exst, Ppsd)
	Flexible Delineator Type A (Exst, Ppsd)		Mile Post Type A (Exst-Ppsd-Reset)
	Flexible Delineator Type B (Exst, Ppsd)		Mile Post Type B (Exst, Ppsd)
	Flexible Delineator Type C (Exst, Ppsd)		Mile Post Type C (Exst, Ppsd)
	Flexible Delineator Type D (Exst, Ppsd)		Object Marker Type I (Exst, Ppsd)
	Flexible Delineator Type E (Exst, Ppsd)		Object Marker Type II (Exst, Ppsd)
	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)		Object Marker Type III (Exst, Ppsd)
	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)		Existing Reference Marker
	Delineator Type C (Exst, Ppsd, Diamond Grade)		Road Closure Gate 18 Ft (Exst, Ppsd)
	Delineator Type D (Exst, Ppsd, Diamond Grade)		Road Closure Gate 28 Ft (Exst, Ppsd)
	Delineator Type E (Exst, Ppsd, Diamond Grade)		Road Closure Gate 40 Ft (Exst, Ppsd)
	Barricade (Type I, Type II, Type III)		Existing Railroad Battery Box
	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)		Existing RR Profile Spot
	Attenuation Device		Existing Railroad Crossbuck
	Truck Mounted Attenuator		Existing Railroad Frog
	Delineator Drums		Existing Mailbox (Private, Federal)
	Flagger		
	Tubular Marker		
	Traffic Cone		
	Back to Back Vertical Panel Sign		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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SYMBOLS

D-101-32

	Existing Luminaire			High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard
	Luminaire LED			High Mast Light Standard 4 Luminaire (Exst, Ppsd)		Pull Box (Exst-Ppsd-Undefined)
	Existing Light Standard Luminaire			High Mast Light Standard 5 Luminaire (Exst, Ppsd)		Intelligent Transportation Pull Box (Exst, Ppsd)
	Relocate Light Standard			High Mast Light Standard 6 Luminaire (Exst, Ppsd)		Transformer (Exst, Ppsd)
	Light Standard Light LED Luminaire			High Mast Light Standard 7 Luminaire (Exst, Ppsd)		Power Pole (Exst-Ppsd-with Transformer)
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 8 Luminaire (Exst, Ppsd)		Wood Pole (Exst, Ppsd)
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 9 Luminaire (Exst, Ppsd)		Pedestrian Push Button Post (Exst, Ppsd)
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 10 Luminaire (Exst, Ppsd)		Existing Pole
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire			Overhead Sign Structure Load Center (Exst, Ppsd)		Existing Telephone Pole
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire			Traffic Signal Controller (Exst, Ppsd)		Existing Post
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Traffic Signal Controller (Exst, Ppsd)		Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire			Flashing Beacon (Exst, Ppsd)		
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire			Concrete Foundation (Exst, Ppsd)		
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Flasher (Exst, Ppsd)		
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Feed Point (Exst, Ppsd)		
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Feed Point with Pad (Exst, Ppsd)		
	Emergency Vehicle Detector			Pole Mounted Feed Point (Exst, Ppsd)		
	Video Detection Camera			Junction Box (Exst, Ppsd)		
				Existing Pedestrian Head with Number		
				Existing Signal Head		
				Pole Mounted Head		
				Existing Lighting Standard Pole		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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DATE	CHANGE
12-18-20	General Revisions



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		
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DATE	CHANGE	
12-18-20	General Revisions	12 18 2020

SYMBOLS

D-101-33

			Existing Manhole (Electrical, Gas, Telephone)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)		Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
			Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)		Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
			Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)		Pump Sanitary, Storm Drain, Exst Water
			Force Main Storm Drain Manhole (Exst, Exst with Valve)		Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)		Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Water Appurtenance		Existing Utility Marker
			Sprinkler Head (Exst, Ppsd)		Existing Meter
			Fire Hydrant (Exst, Ppsd)		Existing Fuel Dispensers
			Cleanout (Exst Sanitary, Underdrain)		Existing Fuel Filler Pipes
			Existing Catch Basin Inlet (Round, Square)		Existing Fuel Leak Sensors
			Existing Curb Inlet (Round, Square)		
			Existing Slotted Reinforced Concrete Pipe		
			Catch Basin (Riser 30 Inch, Beehive, Type A)		
			Inlet Mountable Curb (Type A, Type B)		
			Inlet Saddle Base (Type 1, Type 2)		
			Inlet Special (Catch Basin, Type 1, Type A)		
			Inlet (Tee, Type 1, Type 2, Type 2 Double)		
			Median Drain		
			Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

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12 18 2020

Cross Section Legend

D-101-40

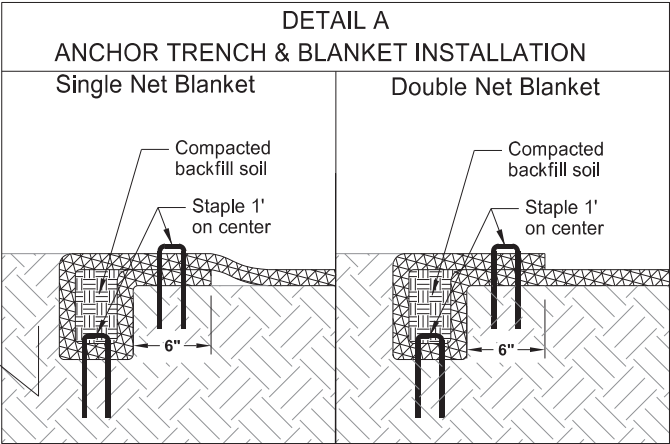
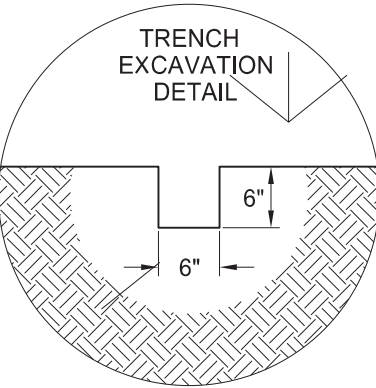


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

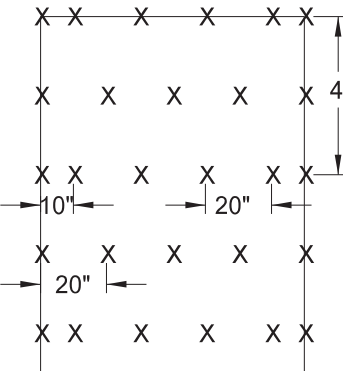
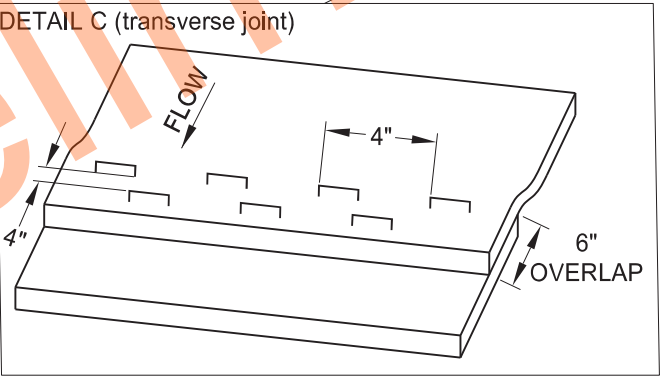
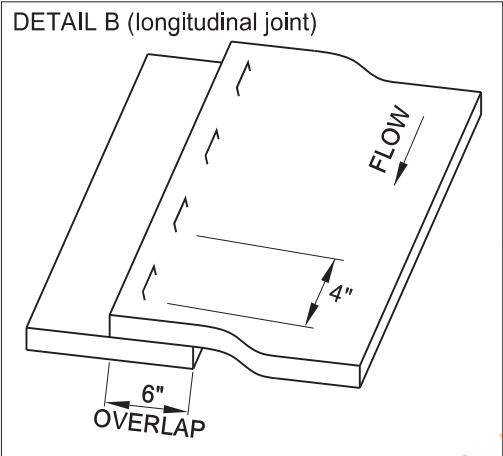
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06/14/23

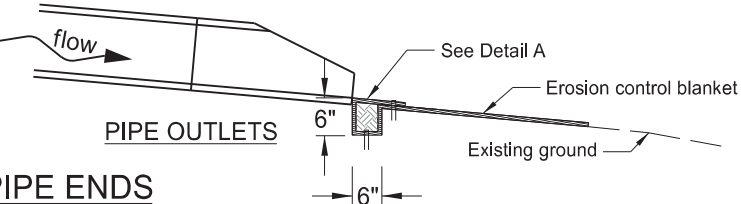
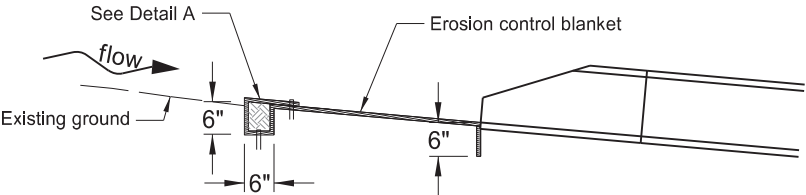
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



NOTE:
If a Single Net Blanket is used, the side with the netting should be on the top once the blanket is installed.



STAPLE PATTERN
(3.8 staples per square yard)



INSTALLATION AT PIPE ENDS

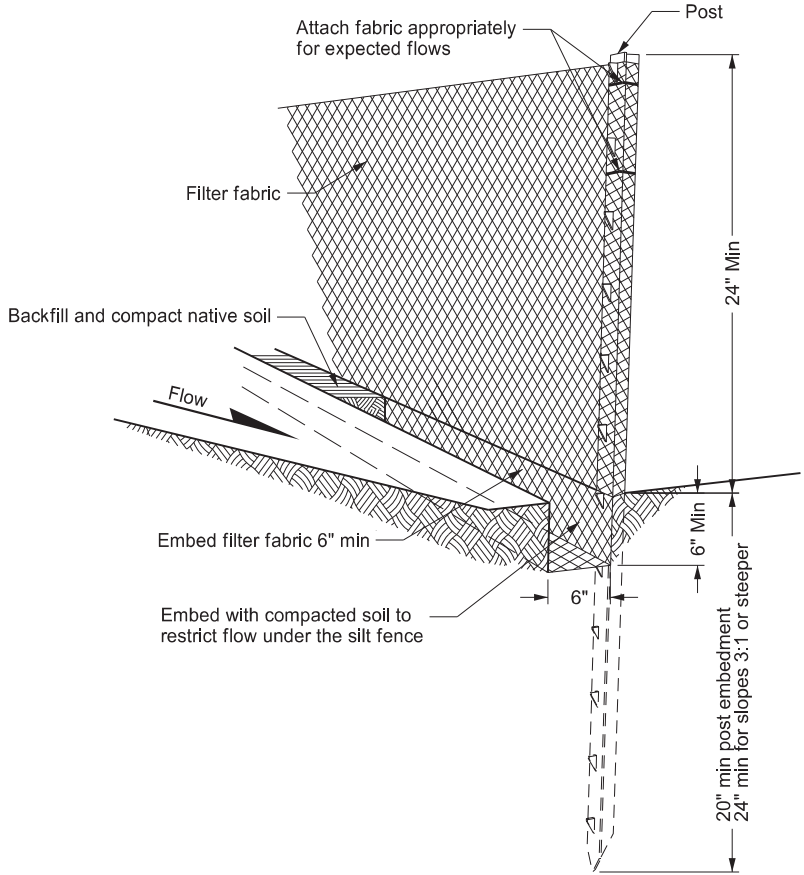
BLANKET LAYOUT
CHANNEL INSTALLATION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-6 to D-255-2
07-27-15	Changed installation details such as trench depth and overlap dimensions
08-27-19	New Design Engineer PE Stamp
08-27-25	Revised minor details for clarity

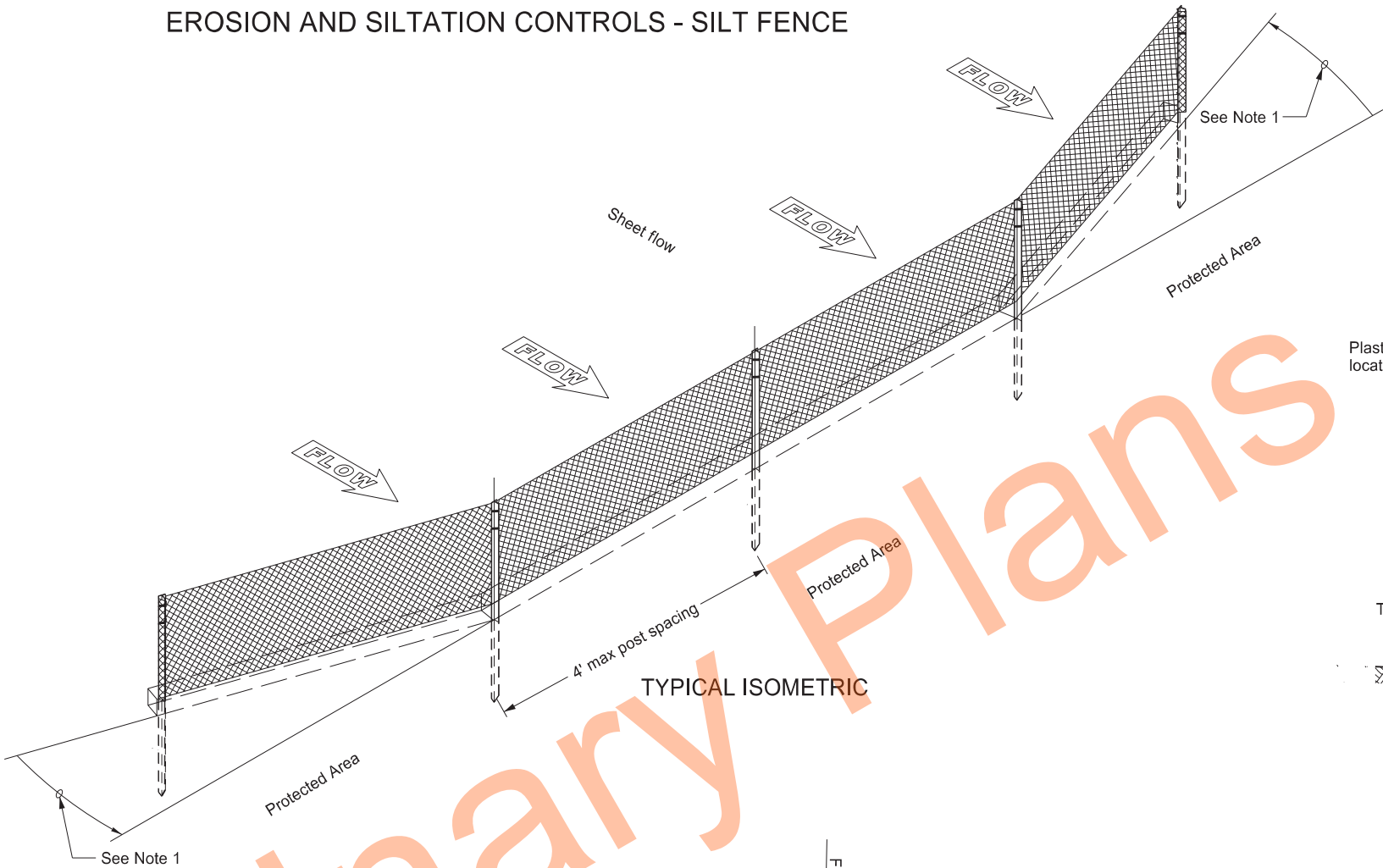


08/27/25

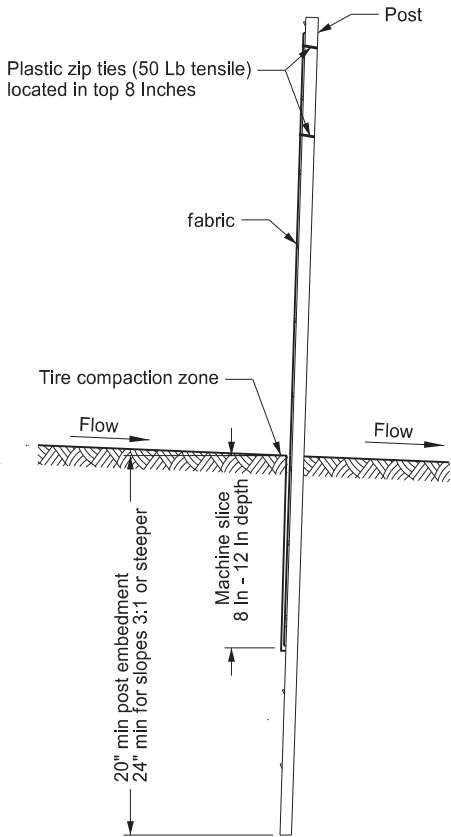
EROSION AND SILTATION CONTROLS - SILT FENCE



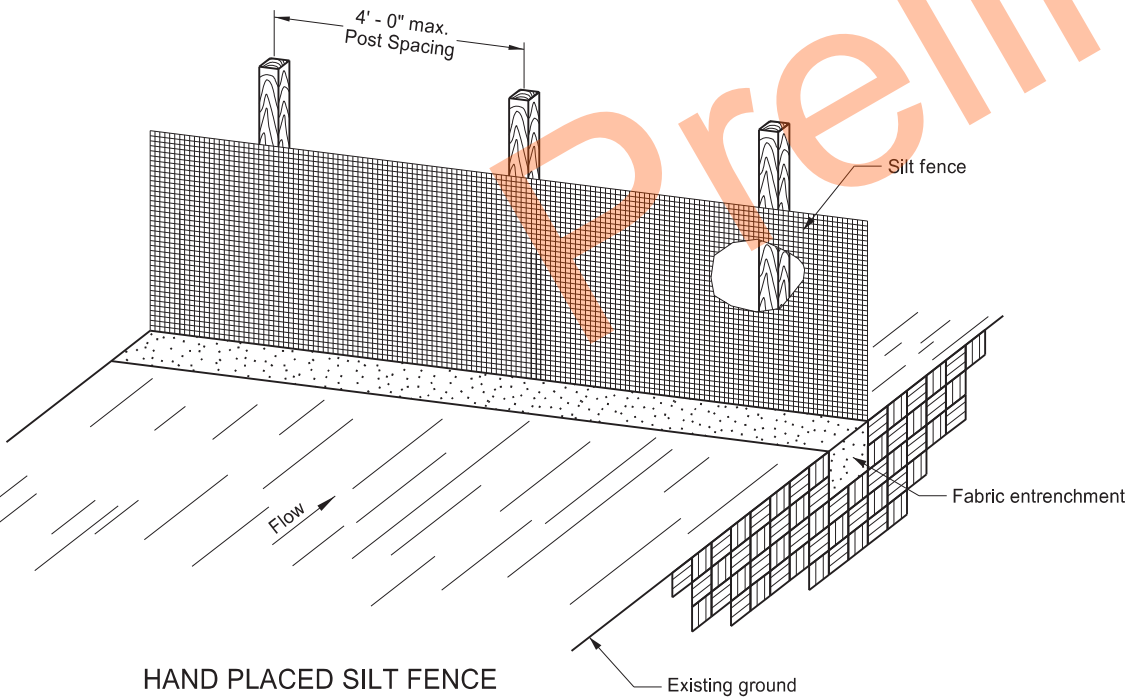
HAND PLACED INSTALLATION DETAIL
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



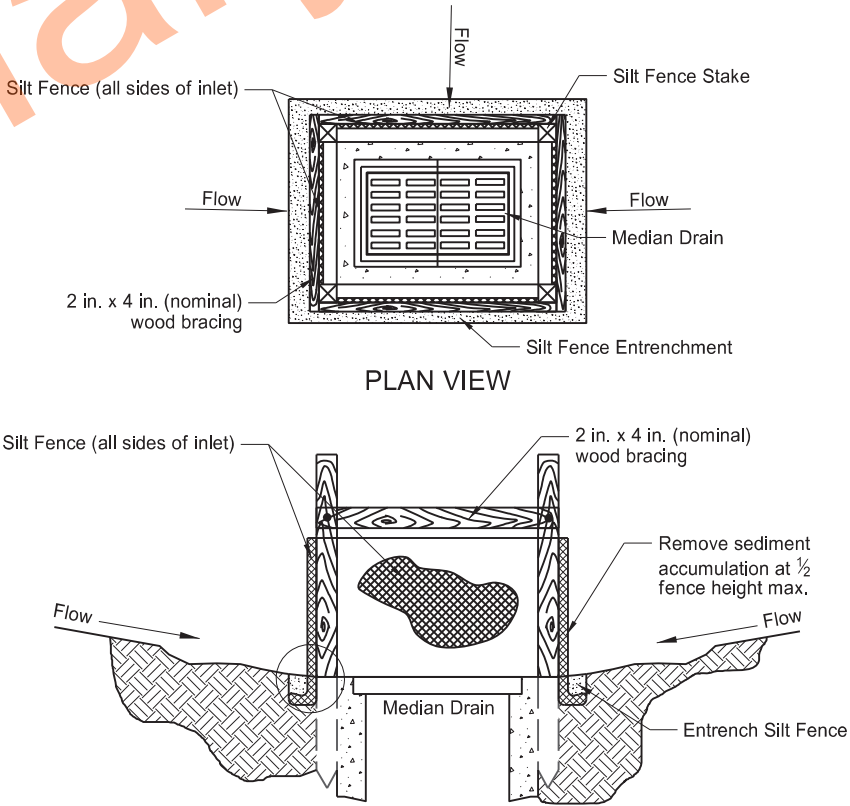
TYPICAL ISOMETRIC



MACHINE SLICED INSTALLATION DETAIL



HAND PLACED SILT FENCE



PLAN VIEW

PROFILE VIEW

SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)

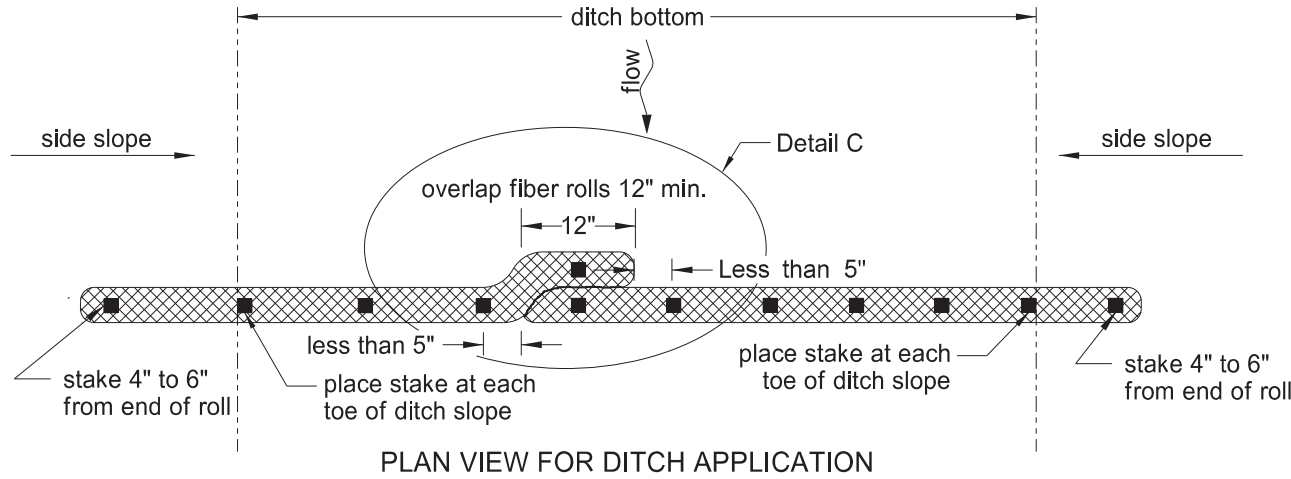
- NOTES:
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
 2. Place splices outside low spots.
 3. Do not embed silt fence placed in standing water.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2
06-27-16	Revised details & added new ones
08-27-19	New Design Engineer PE Stamp
07-22-25	Matched revised silt fence specs
09-04-25	Added median-ditch inlet protection

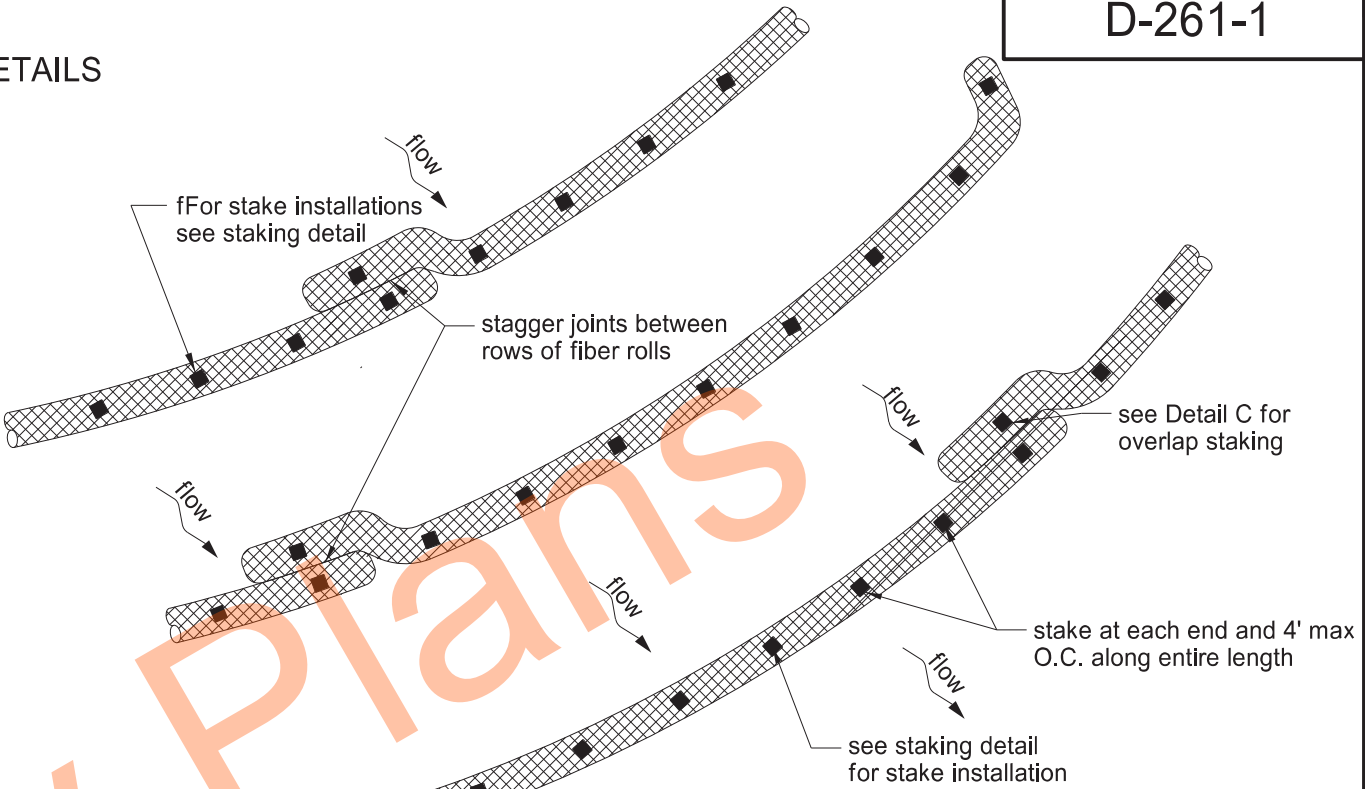


09/04/25

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

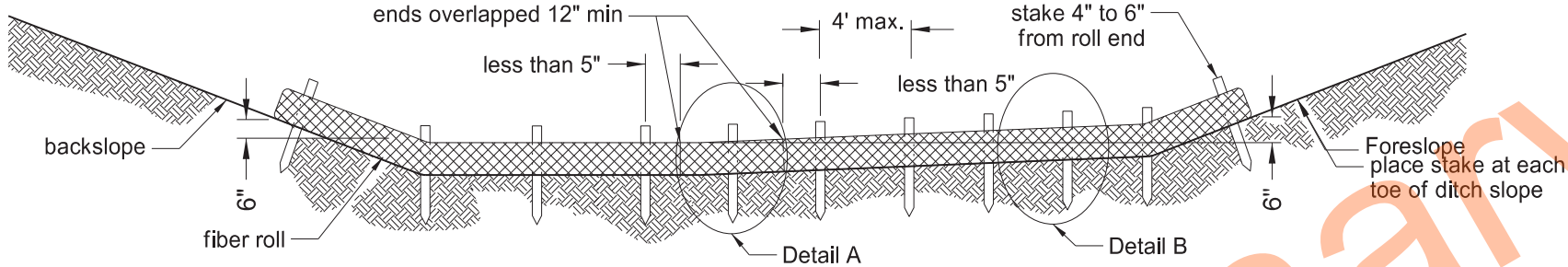


PLAN VIEW FOR DITCH APPLICATION

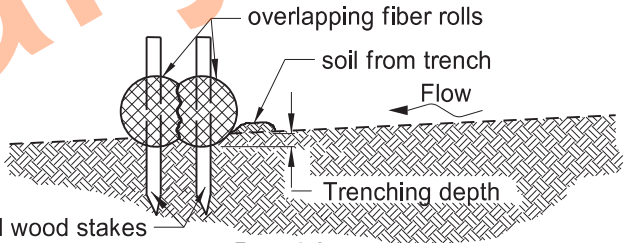


PLAN VIEW FOR SLOPE APPLICATION

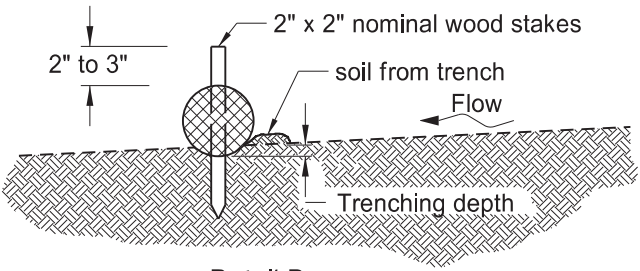
Ensure fiber rolls are placed along the contours of the slope.



12 OR 20 INCH FIBER ROLL - DITCH BOTTOM

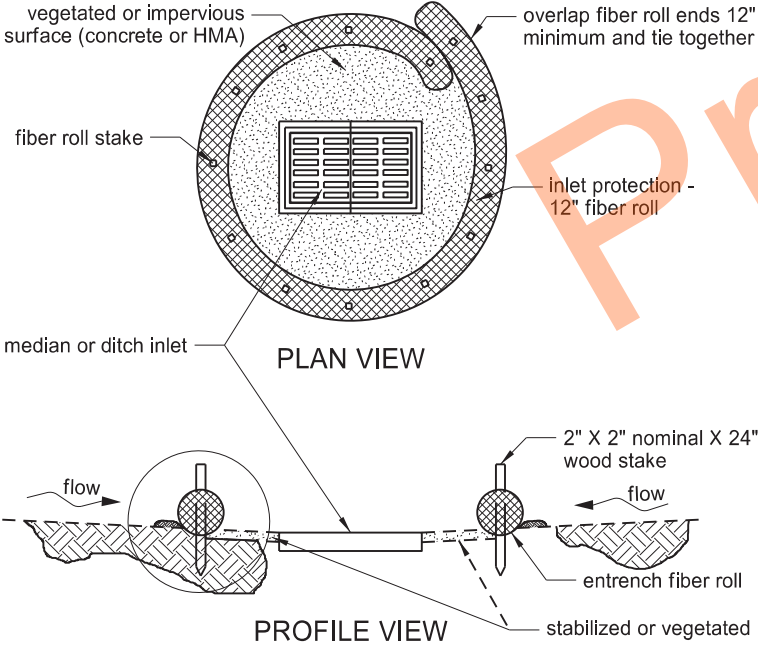


Detail A
FIBER ROLL OVERLAPPING STAKING DETAIL

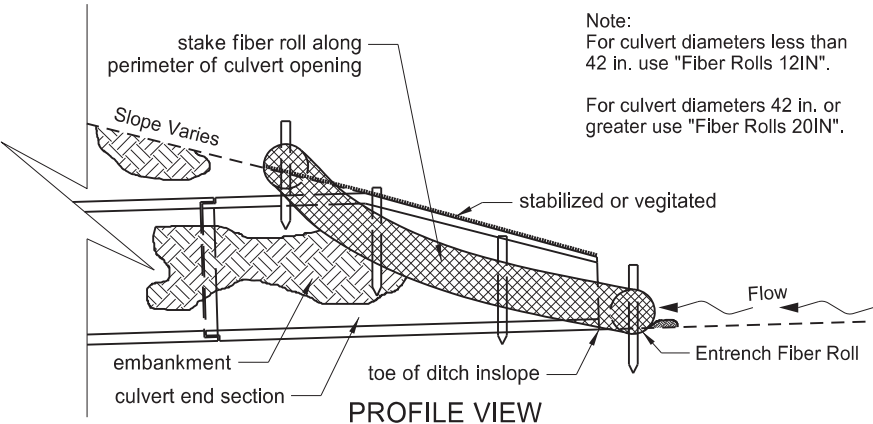


Detail B
FIBER ROLL STAKING DETAIL

NOTE: Do not allow runoff to run under or around roll.

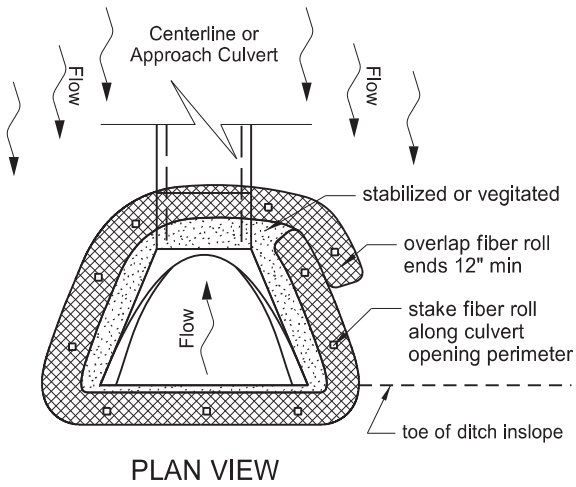


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



FIBER ROLL PROTECTION (INLET OF CULVERT)

Note:
For culvert diameters less than 42 in. use "Fiber Rolls 12IN".
For culvert diameters 42 in. or greater use "Fiber Rolls 20IN".



PLAN VIEW

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	TRENCH DEPTH	
			MINIMUM	MAXIMUM
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

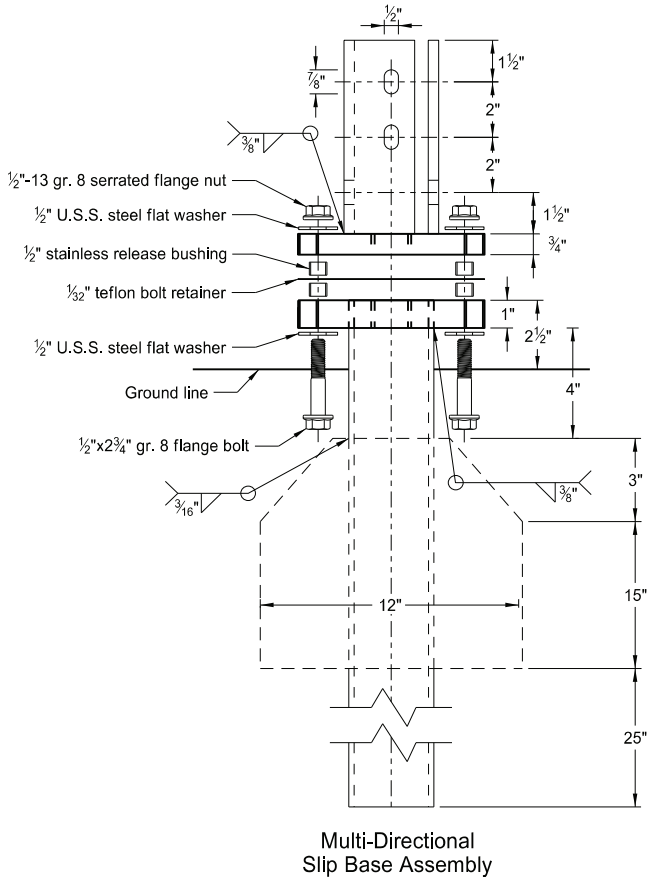
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp.
04-22-24	Slope Plan View-overlap change.
03-13-25	Added D-708-6 Culvert Inlet detail.
09-02-25	Added D-708-6 Inlet detail.



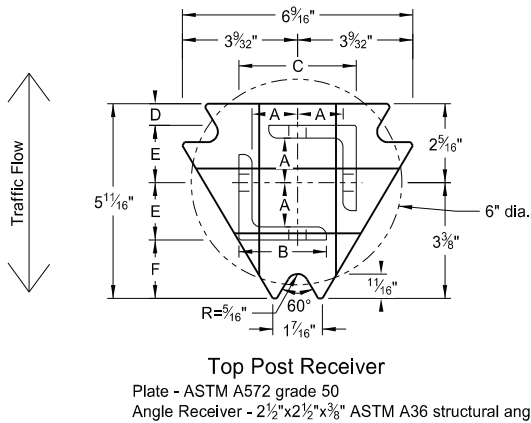
09/02/25

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7



Perforated Tube



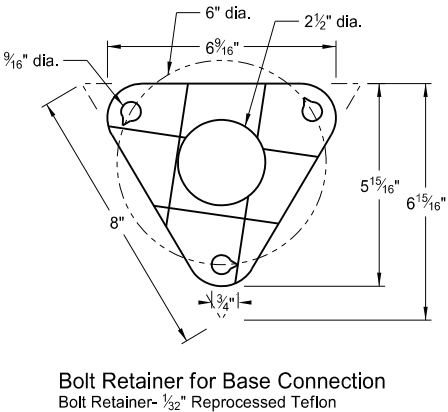
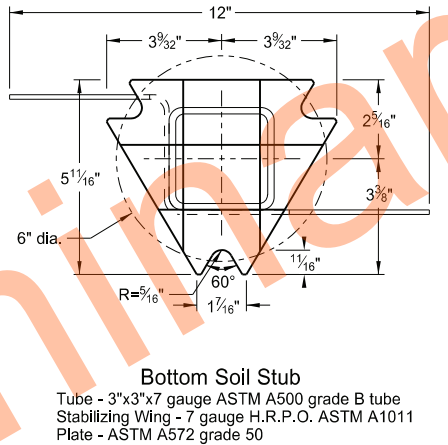
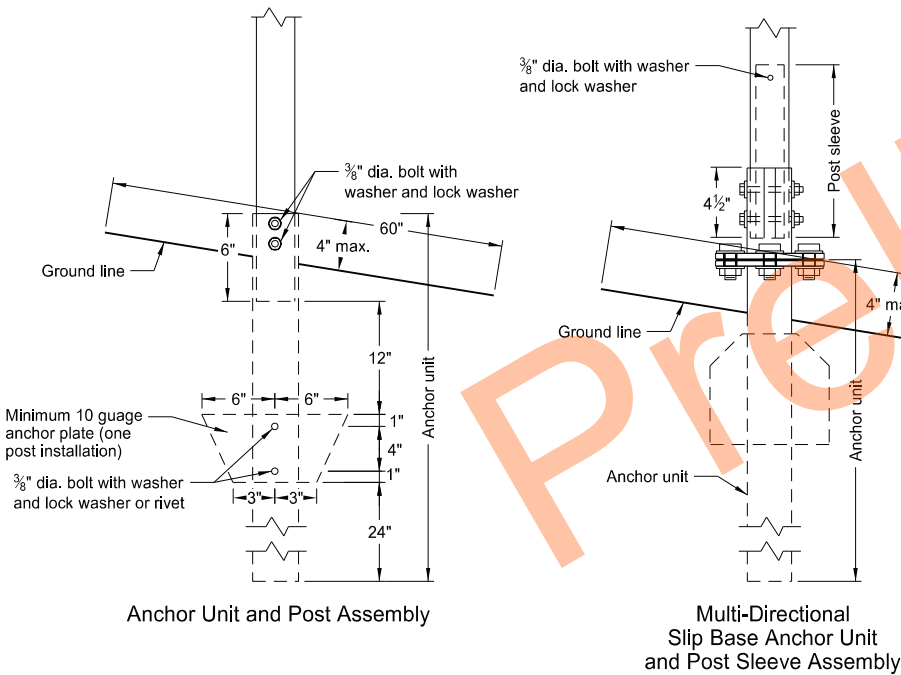
- Notes:
1. Torque slip base bolts as specified by manufacturer.
 2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
 3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
 4. In concrete sidewalk, use same anchor without wings.
 5. Provide more than 7' between the first and fourth posts of a four post sign.

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 5/8"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
- (B) For additional wind load, insert the 2 3/16"x10 ga. into 2 1/2"x10 ga.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

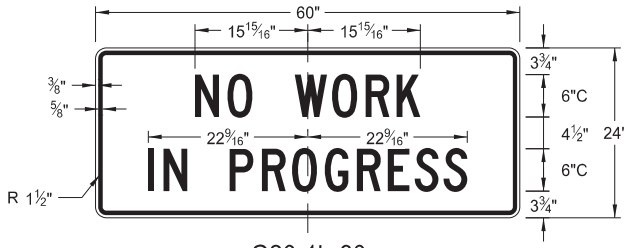


08/01/24

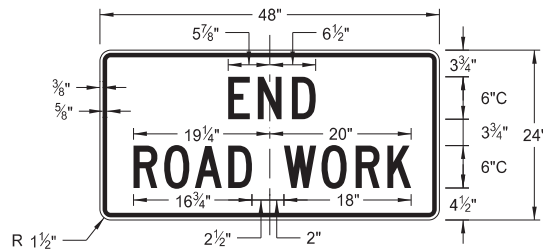
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
Legend: black (non-refl)
Background: orange



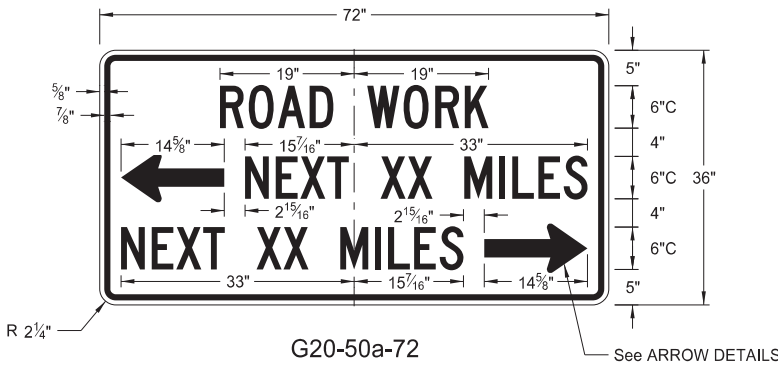
G20-1b-60
Legend: black (non-refl)
Background: orange



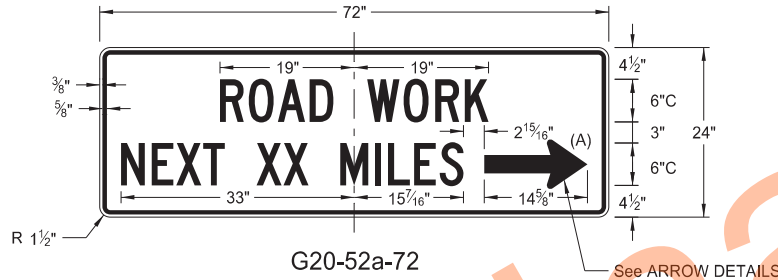
G20-2-48
Legend: black (non-refl)
Background: orange



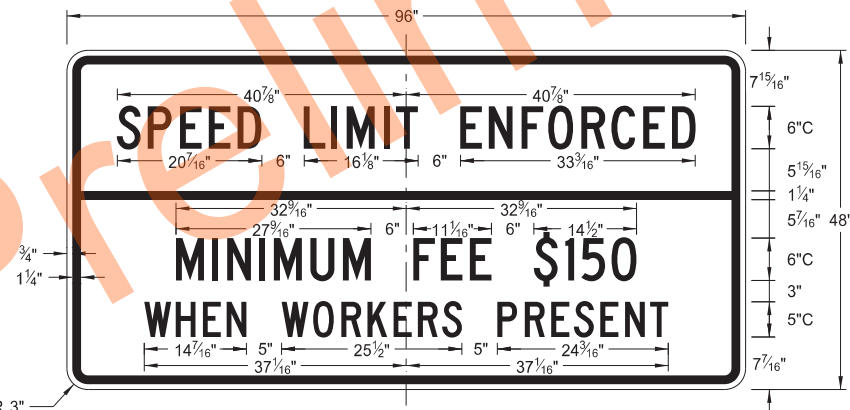
G20-4b-36
Legend: black (non-refl)
Background: orange



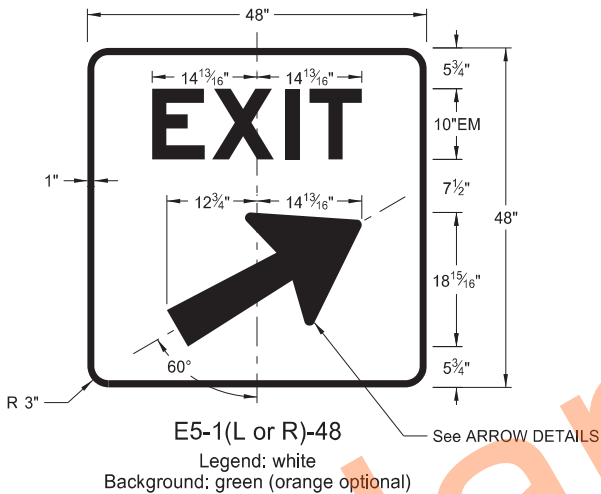
G20-50a-72
Legend: black (non-refl)
Background: orange



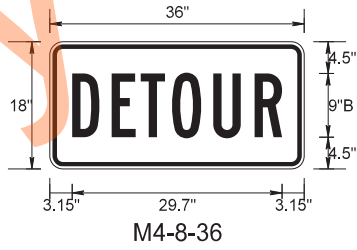
G20-52a-72
Legend: black (non-refl)
Background: orange



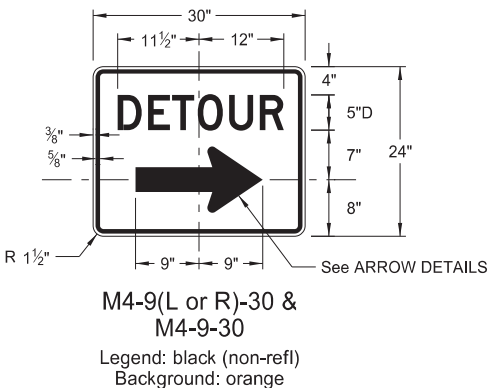
G20-55-96
Legend: black (non-refl)
Background: orange



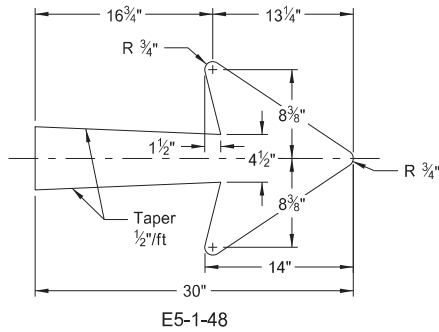
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



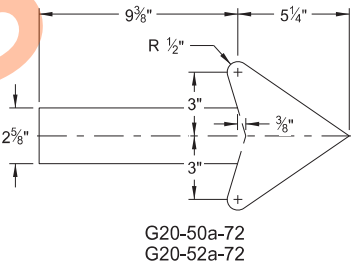
M4-8-36
Legend: black (non-refl)
Background: orange



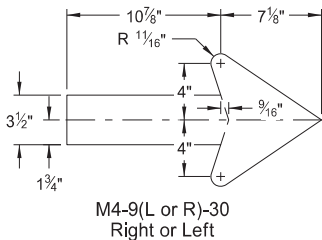
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



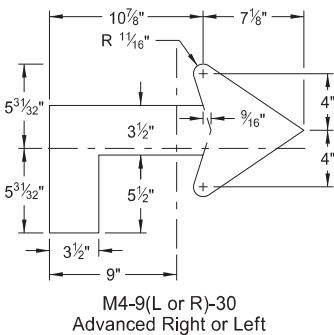
E5-1-48



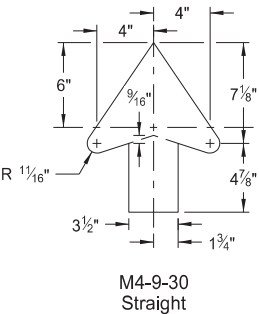
G20-50a-72
G20-52a-72



M4-9(L or R)-30
Right or Left



M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight

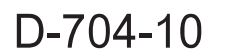
ARROW DETAILS

NOTES:

(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

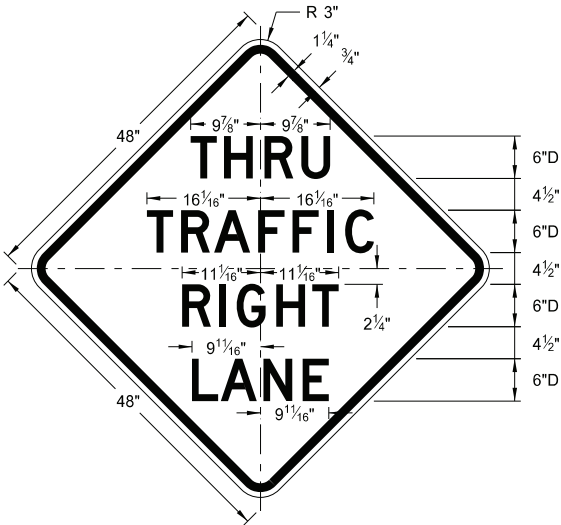




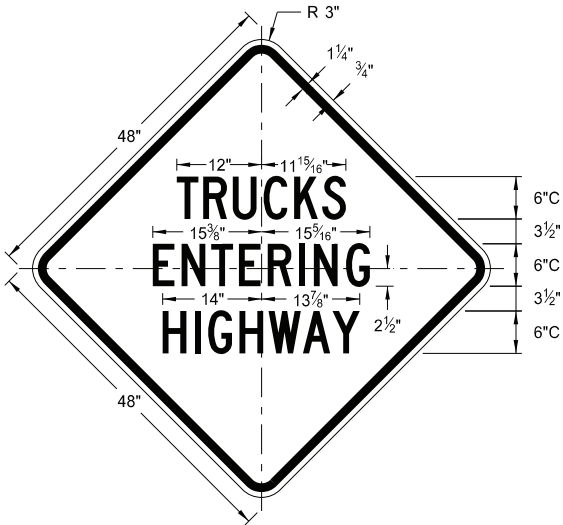
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

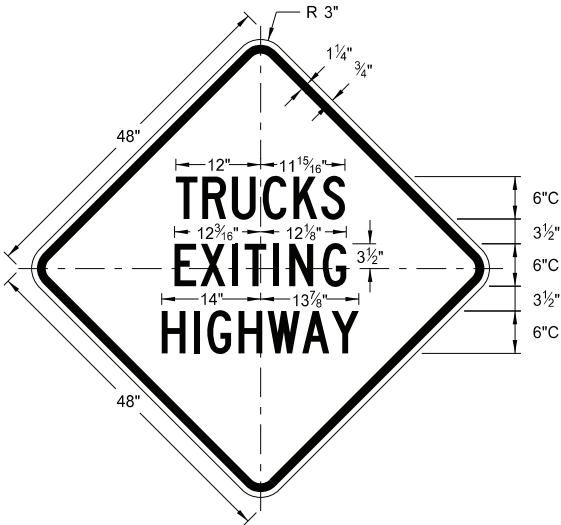
* DISTANCE MESSAGES



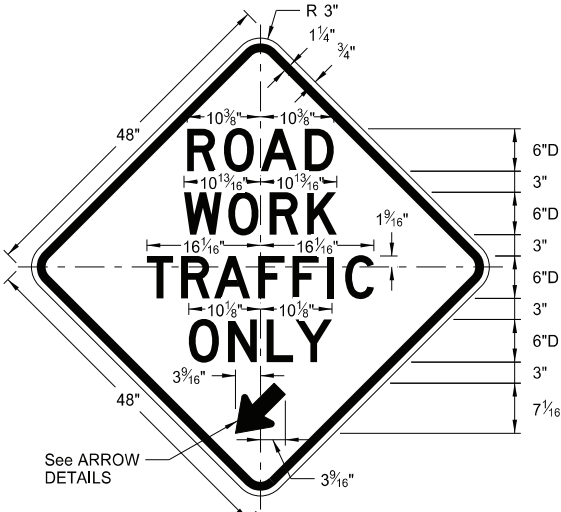
W5-8-48
Legend: black (non-refl)
Background: orange



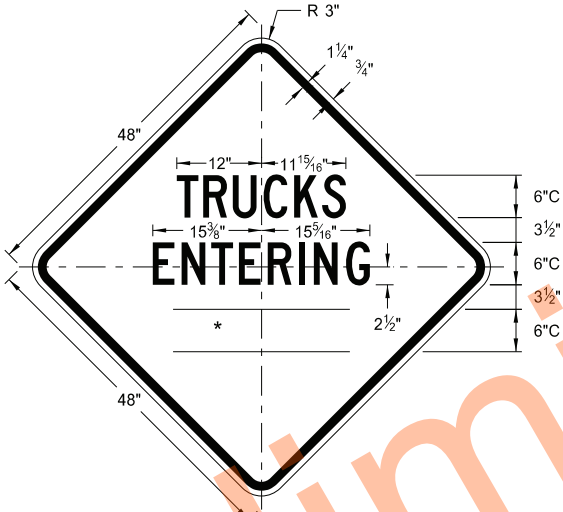
W8-53-48
Legend: black (non-refl)
Background: orange



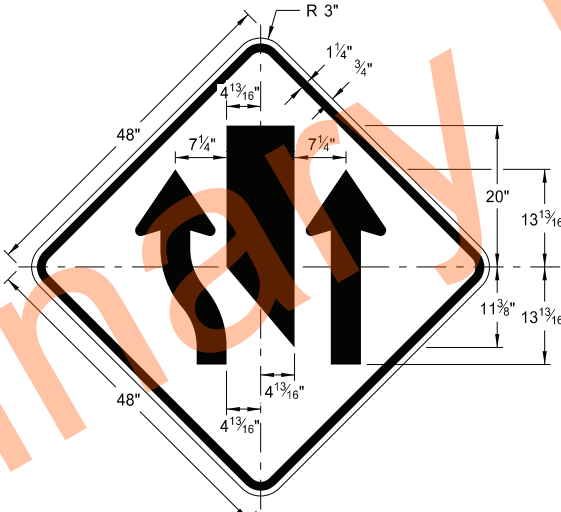
W8-56-48
Legend: black (non-refl)
Background: orange



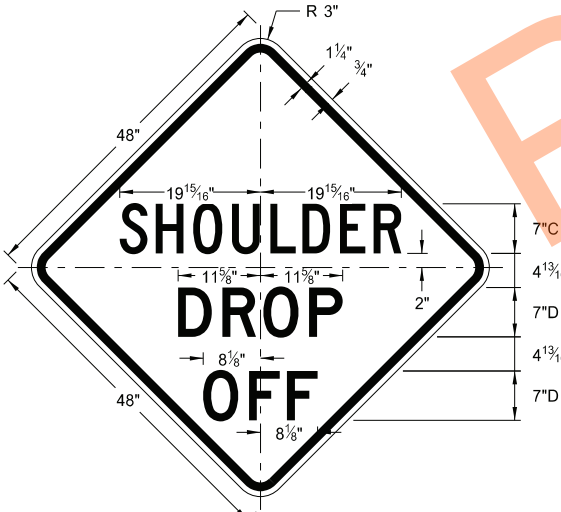
W5-9-48
Legend: black (non-refl)
Background: orange



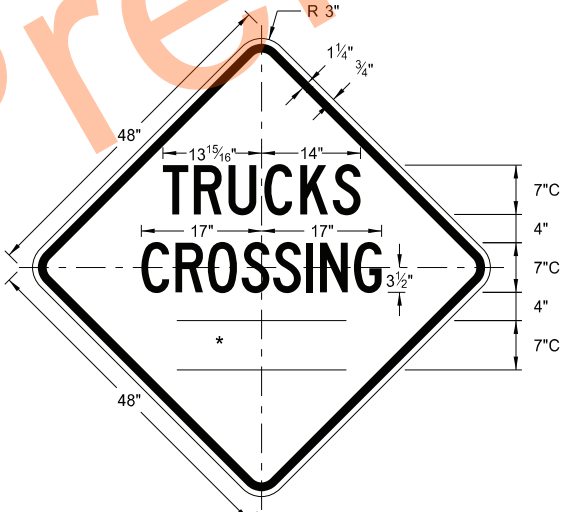
W8-54-48
Legend: black (non-refl)
Background: orange



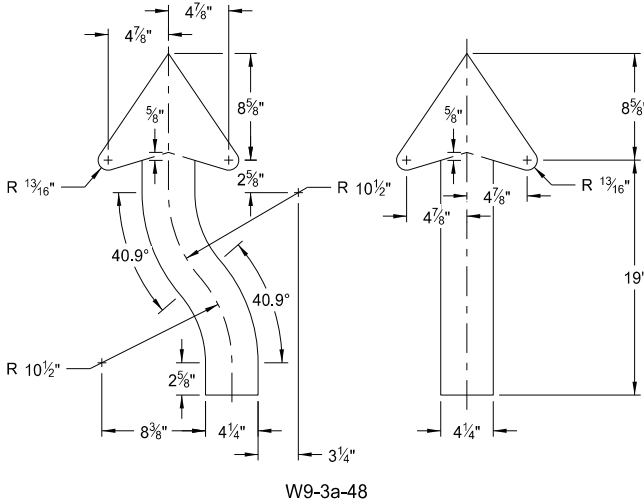
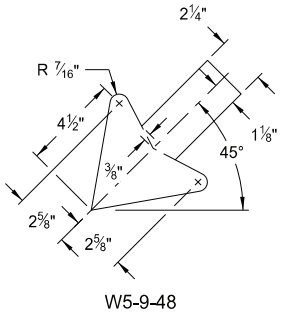
W9-3a-48
Legend: black (non-refl)
Background: orange



W8-9a-48
Legend: black (non-refl)
Background: orange



W8-55-48
Legend: black (non-refl)
Background: orange



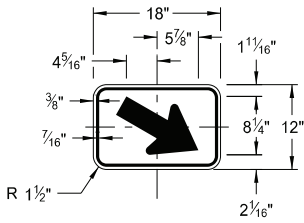
ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp
8-01-24	Electronic Stamp/Signature

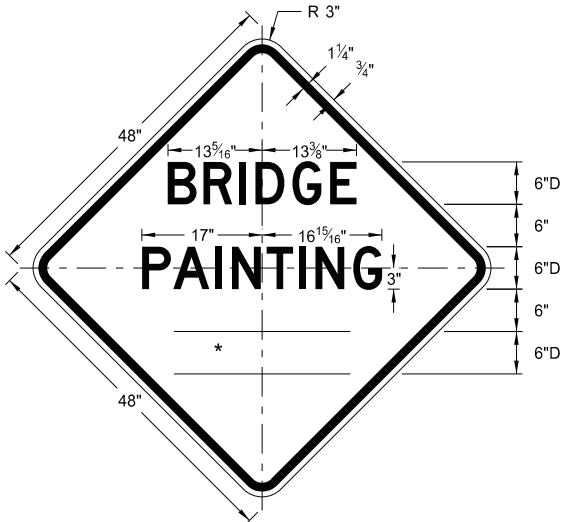


08/01/24

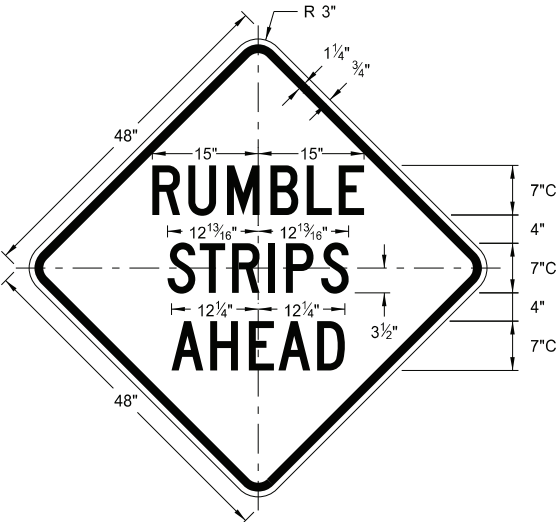
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



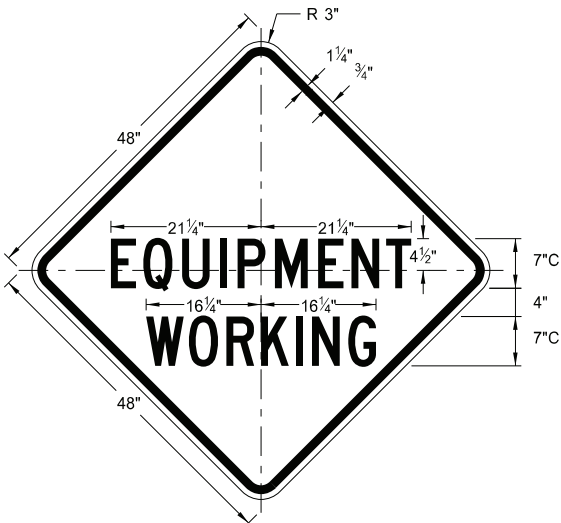
W16-7aP-18
Legend: black (non-refl)
Background: orange



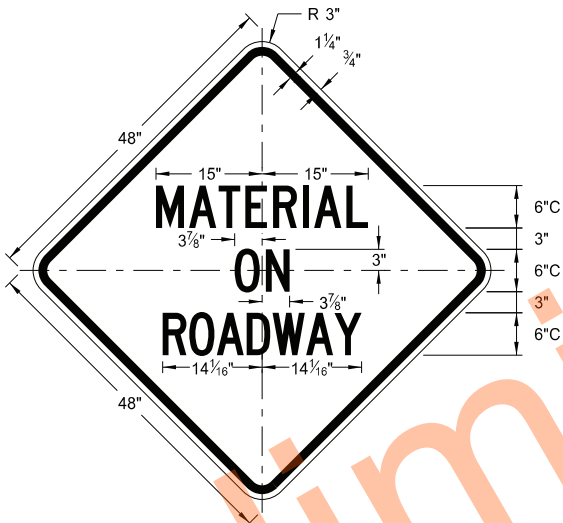
W21-50-48
Legend: black (non-refl)
Background: orange



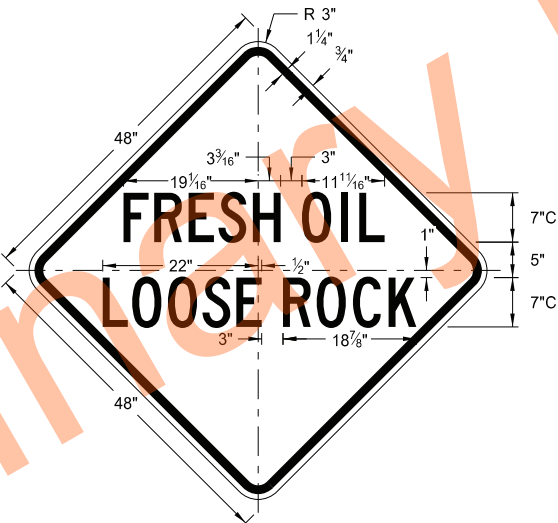
W21-53-48
Legend: black (non-refl)
Background: orange



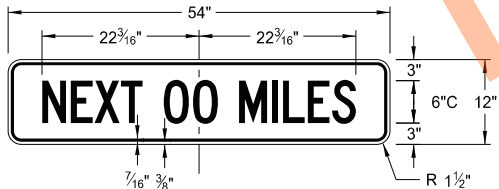
W20-51-48
Legend: black (non-refl)
Background: orange



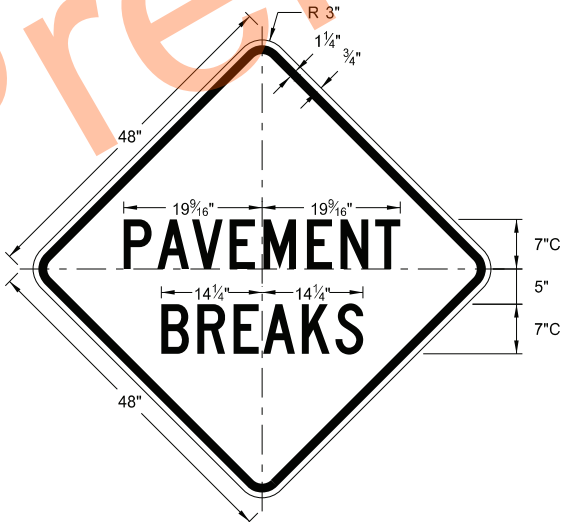
W21-51-48
Legend: black (non-refl)
Background: orange



W22-8-48
Legend: black (non-refl)
Background: orange



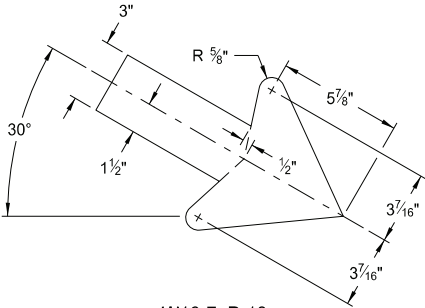
W20-52P-54
Legend: black (non-refl)
Background: orange



W21-52-48
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES

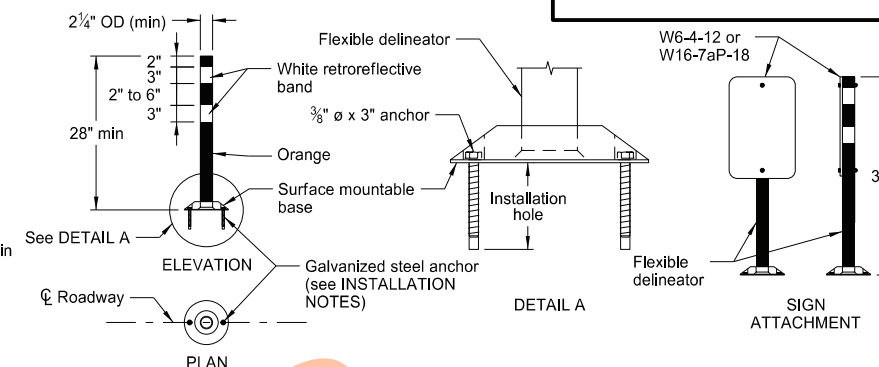


W16-7aP-18

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.
8-01-24	Electronic Stamp/Signature.



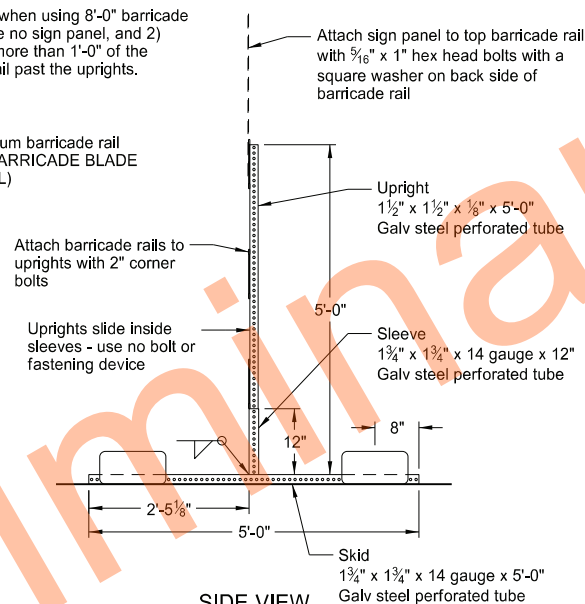
08/01/24



FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close as possible to pavement surface.

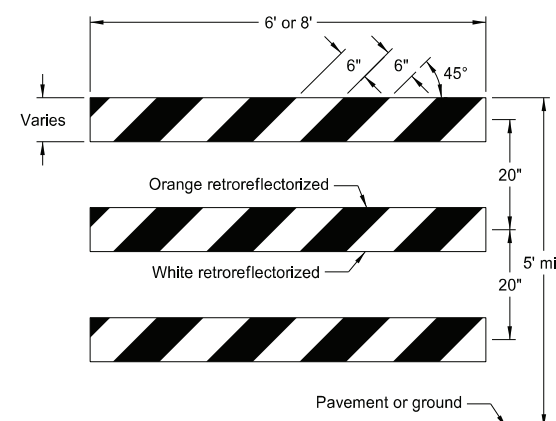


BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

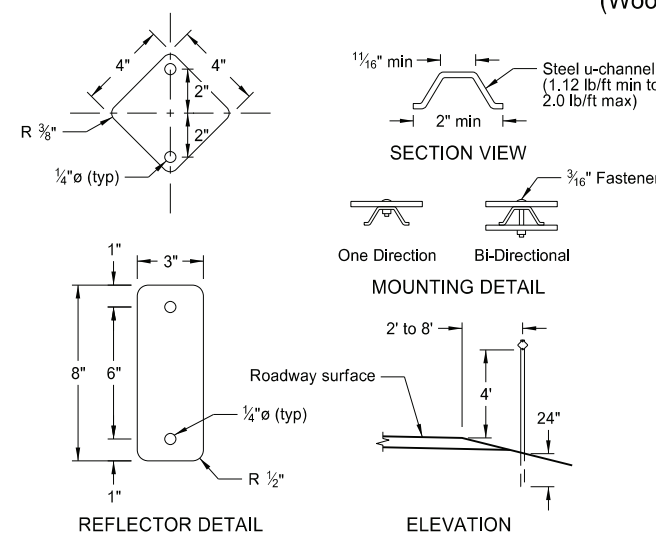
Diagram illustrating the dimensions and materials for a standard traffic warning sign:

- Overall width: 6' to 10'
- Overall height: 8"
- Sign face height: 3'-0" to 3'-6"
- Sign face width: 6"
- Sign face height: 6"
- Sign face material: Orange retroreflectorized
- Sign face material: White retroreflectorized
- Sign face material: Pavement or ground
- Sign face material: 45°

BARRICADE RAIL DETAILS



TYPE III BARRICADE



BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

SIDE VIEW

MINIMUM BALLAST

(For each side of barricade support)

Without Sign	4 - 25 lb sandbag
With Sign	6 - 25 lb sandbag

Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the sklds.

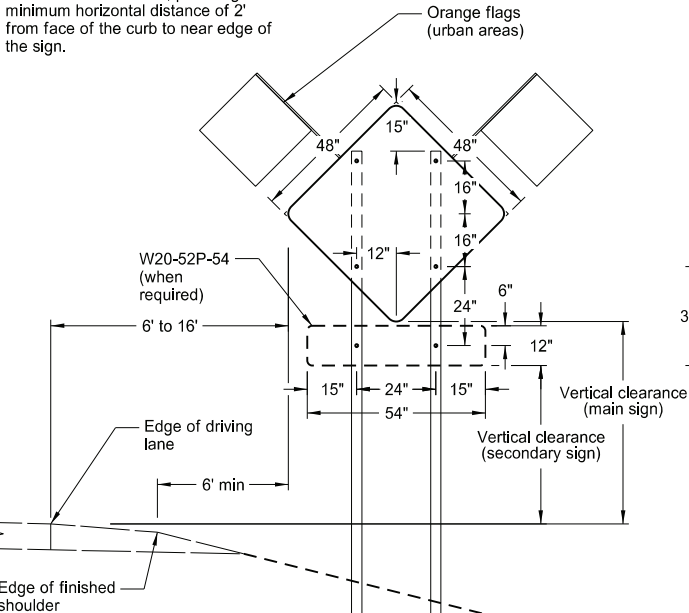
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	Revised details for Flexible Delineator
8-01-24	Electronic Stamp/Signature



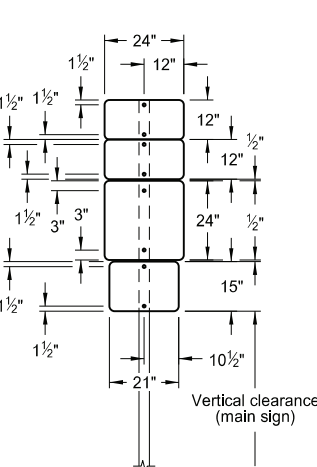
08/01/24

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

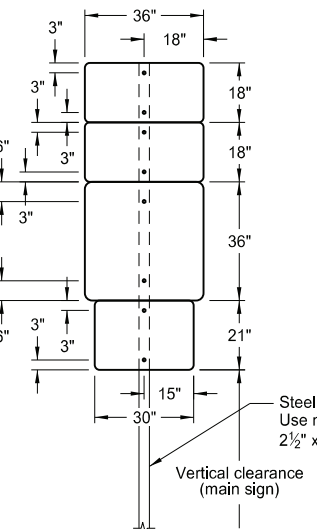
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



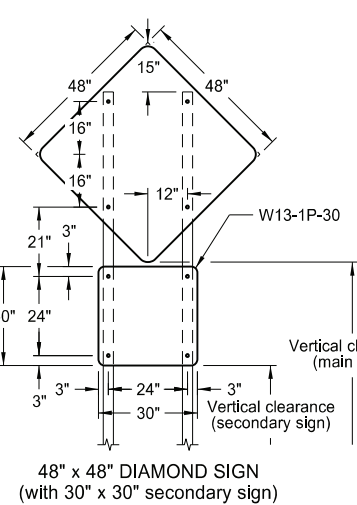
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



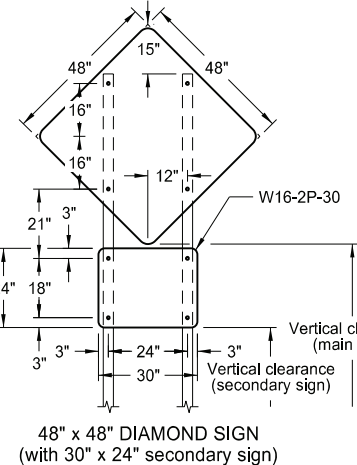
24" x 24"
ROUTE MARKER
ASSEMBLY



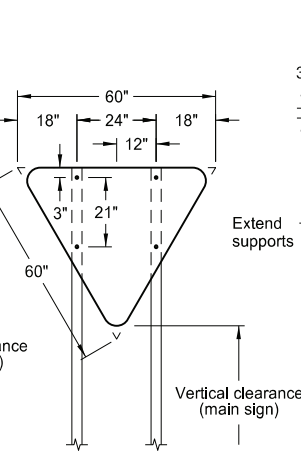
36" x 36"
ROUTE MARKER
ASSEMBLY



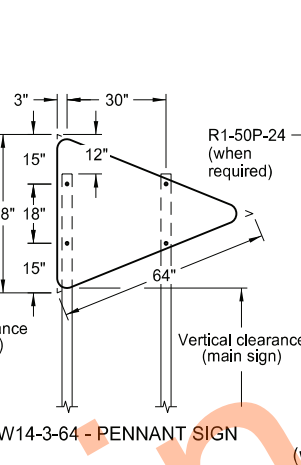
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



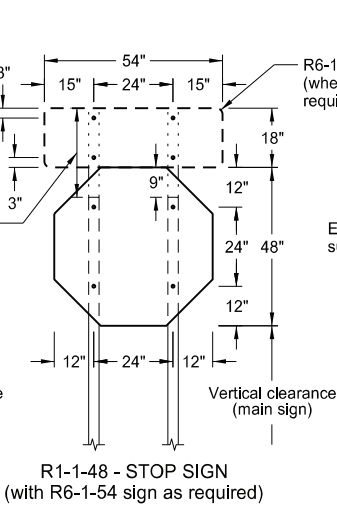
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



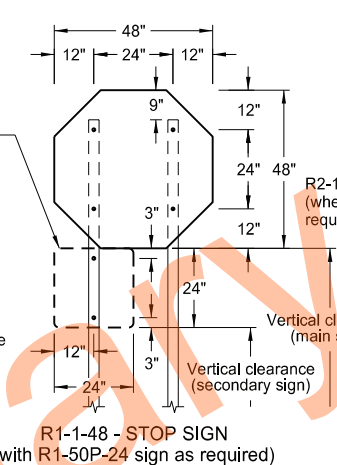
R1-2-60 - YIELD SIGN



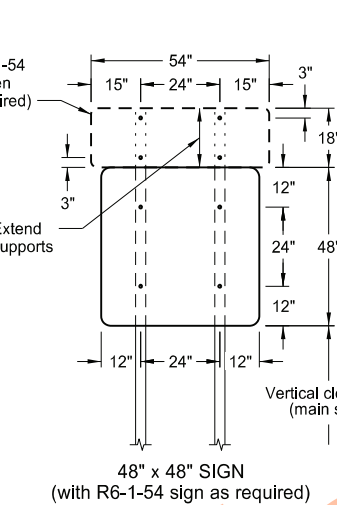
W14-3-64 - PENNANT SIGN



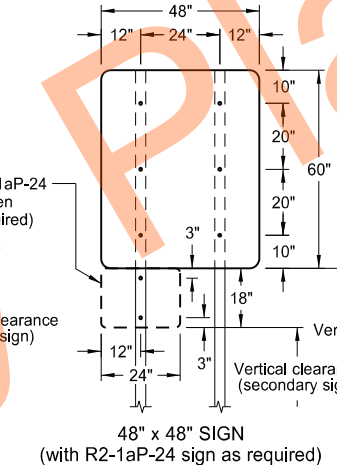
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



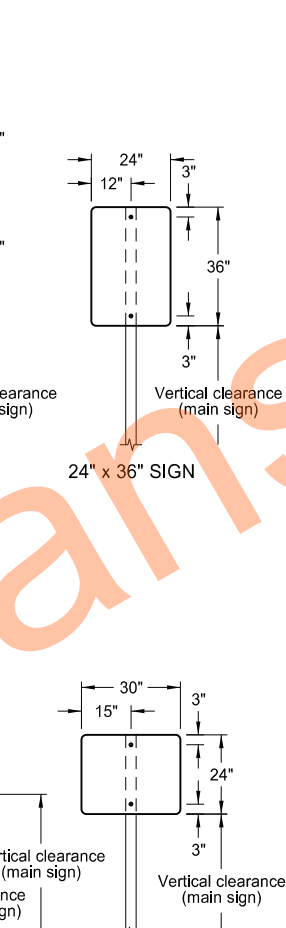
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



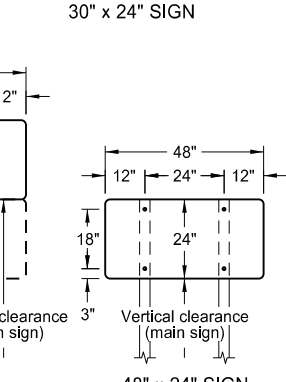
48" x 48" SIGN
(with R6-1-54 sign as required)



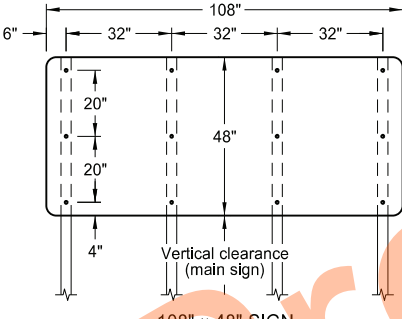
48" x 48" SIGN
(with R2-1aP-24 sign as required)



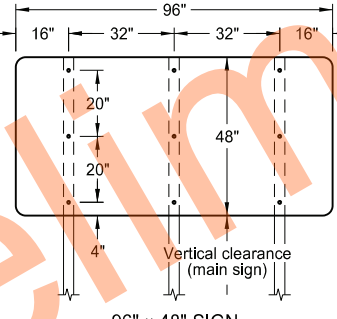
24" x 36" SIGN



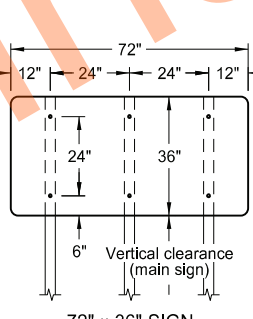
30" x 24" SIGN



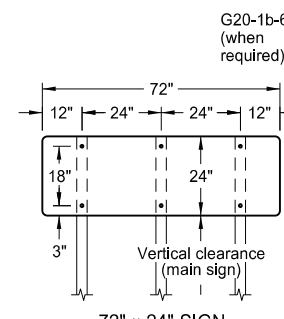
108" x 48" SIGN



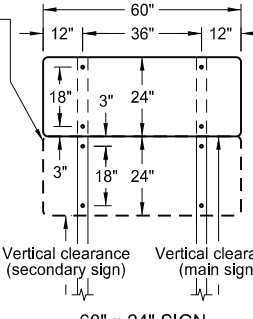
96" x 48" SIGN



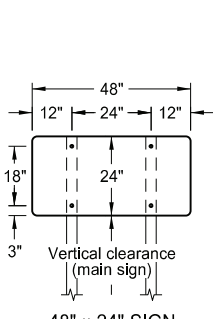
72" x 36" SIGN



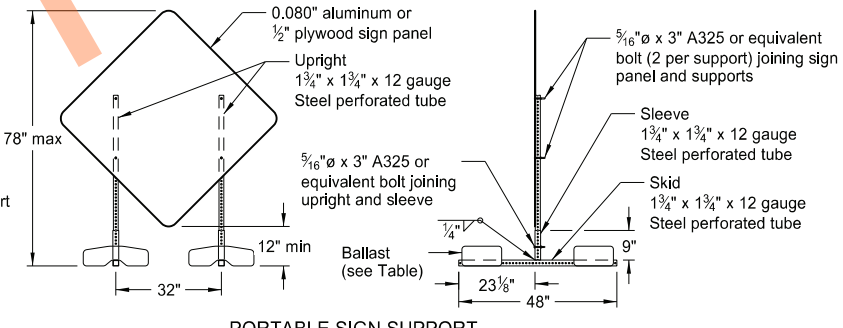
72" x 24" SIGN



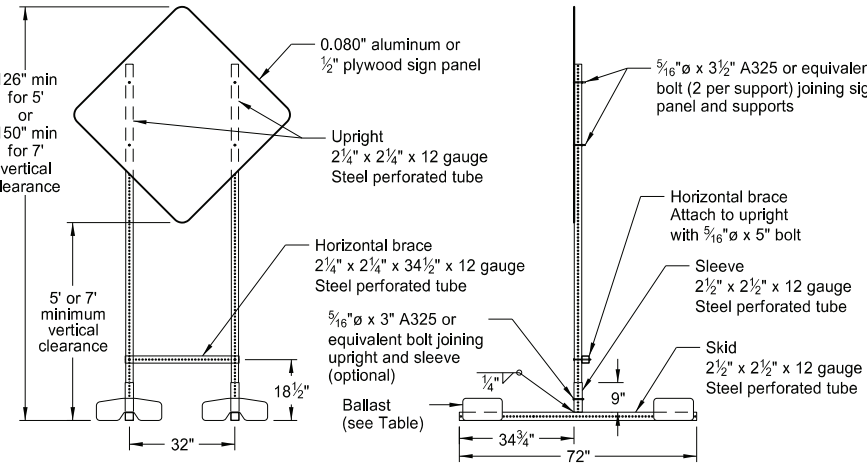
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

Place signs over 50 square feet on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 3/8" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance stated above.

Provide a minimum clearance of 7'-0" from the ground at the post for signs with an area exceeding 50 square feet.

6. Portable Signs: Provide portable signs that meet the vertical clearance stated above when it is necessary to place signs within the pavement surface.

Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

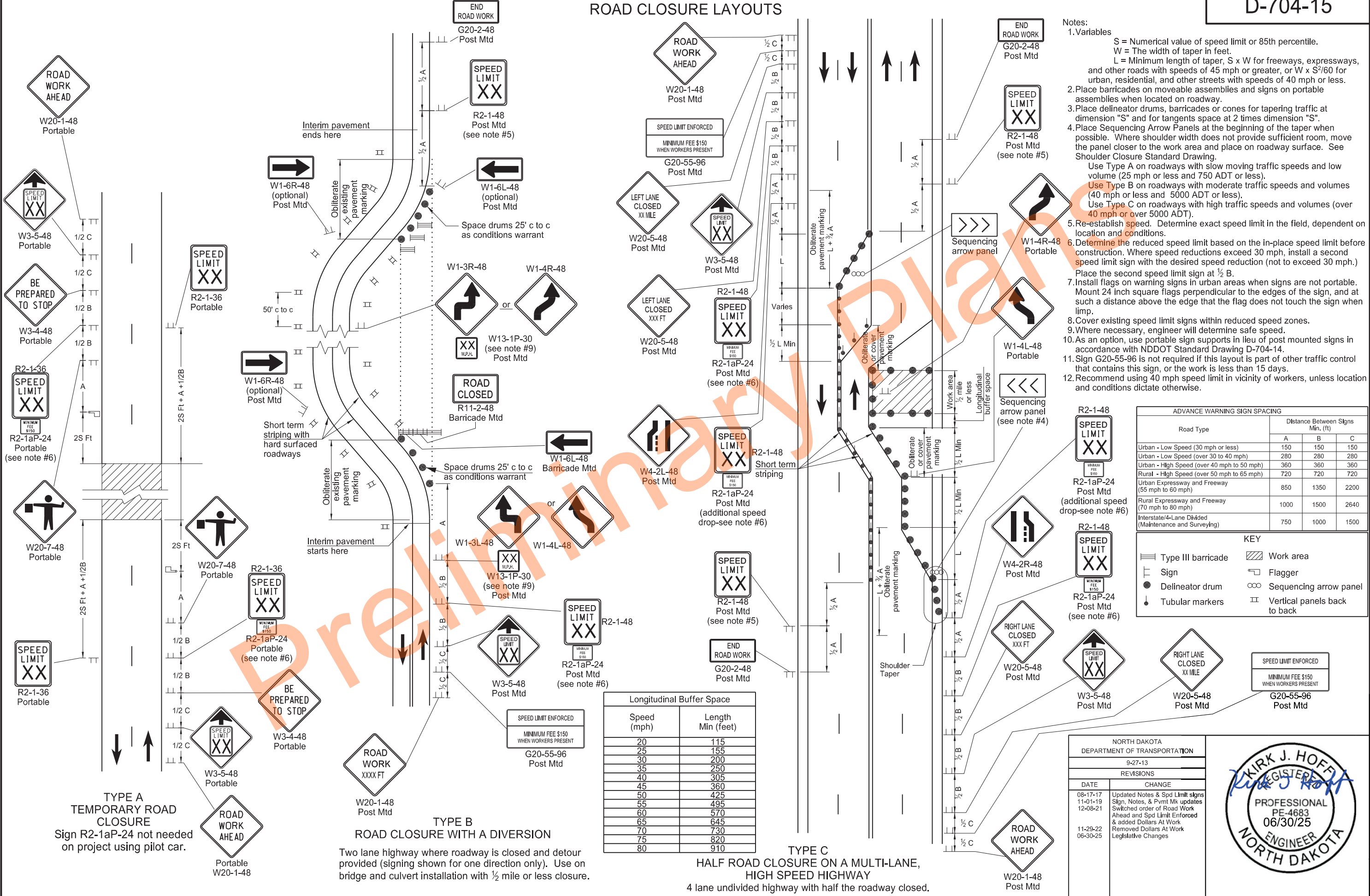
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature



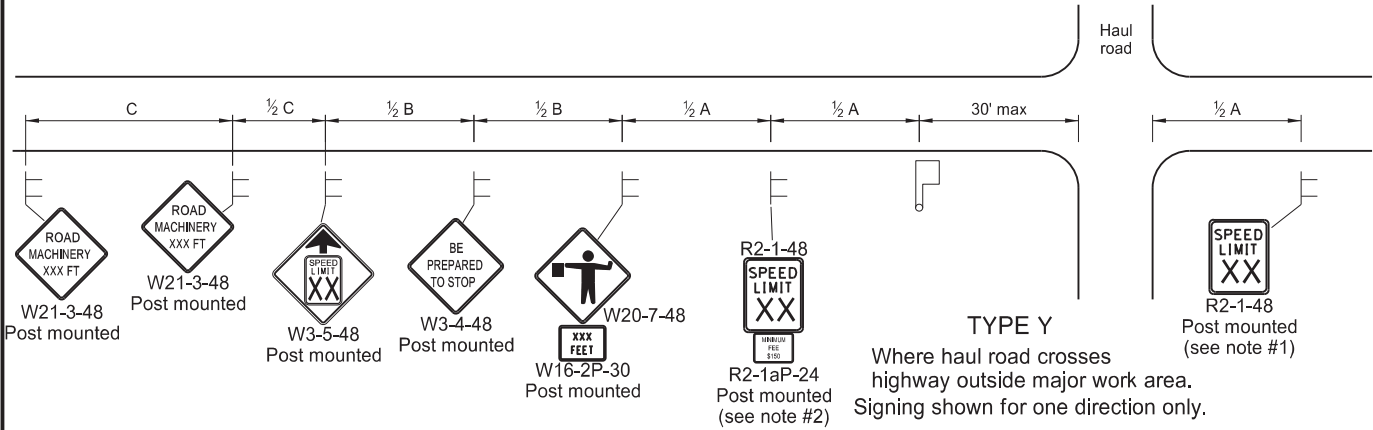
ROAD CLOSURE LAYOUTS

D-704-15

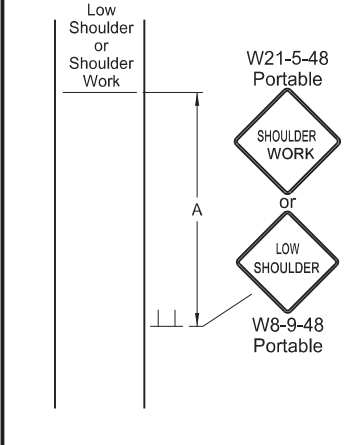
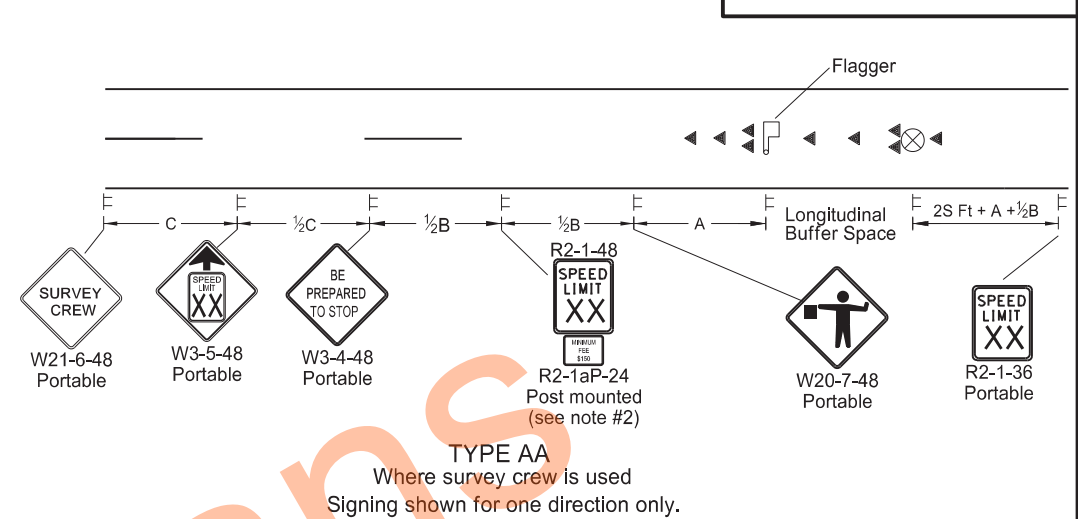


MISCELLANEOUS SIGN LAYOUTS

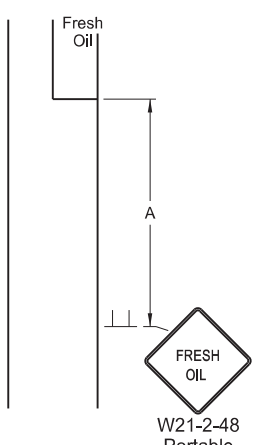
D-704-26



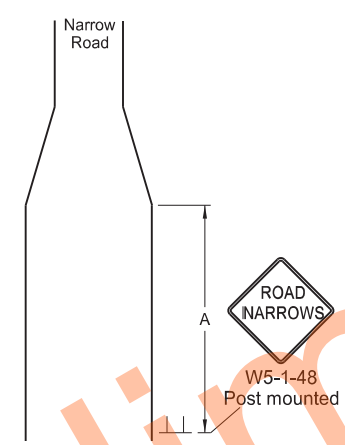
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



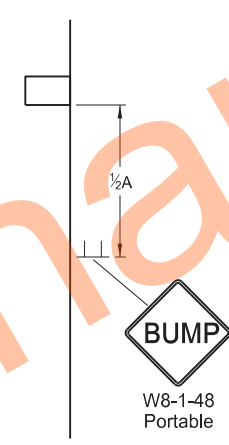
TYPE BB
Within major work area
where sign conditions exist



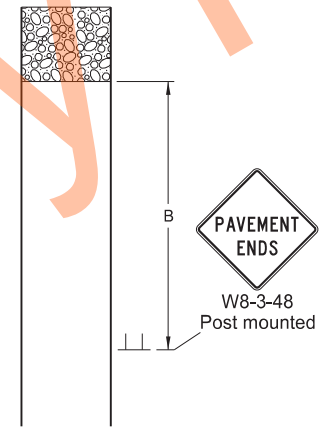
TYPE CC
Where sign conditions exist



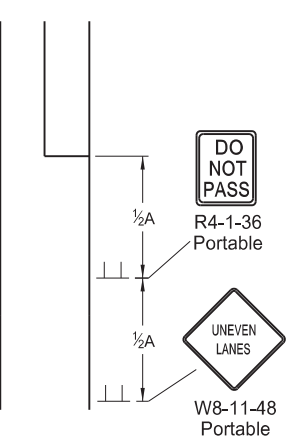
TYPE DD
Where sign conditions exist



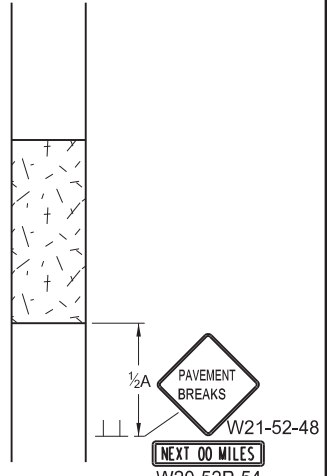
TYPE EE
Where sign conditions exist



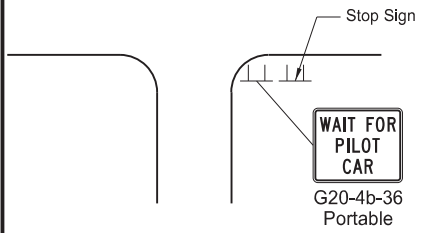
TYPE FF
Where sign conditions exist
Signing shown for one direction only.



TYPE GG
Where elevation difference
exists between lanes



TYPE JJ
For break in pavement.
Install signs when conditions exist
and remove when not applicable.
Signing shown for one direction only.



TYPE KK
At major intersections
within pilot car control area

- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 4. Cover existing speed limit signs within reduced speed zones.
 5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
 7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
 8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 9. Layouts shown for one direction only.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 80 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

KEY

Flagger

Sign

Cones

Survey Equipment

S = Numerical value of speed limit or 85th percentile.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers
02-23-23	Revised distance & removed signs
06-30-25	Legislative Changes



Two-Lane Roadway Portable Rumble Strips

D-704-33

Work area

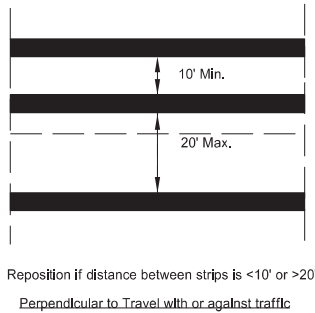
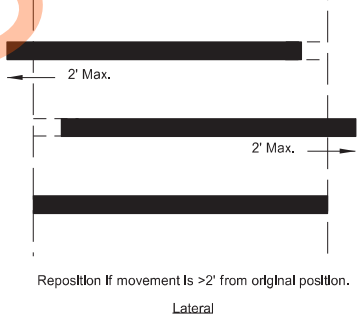
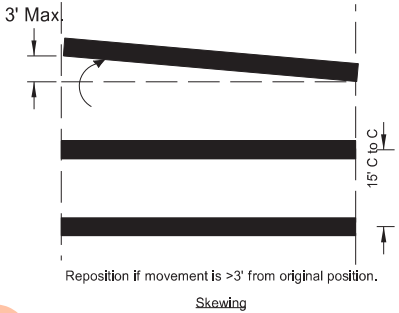
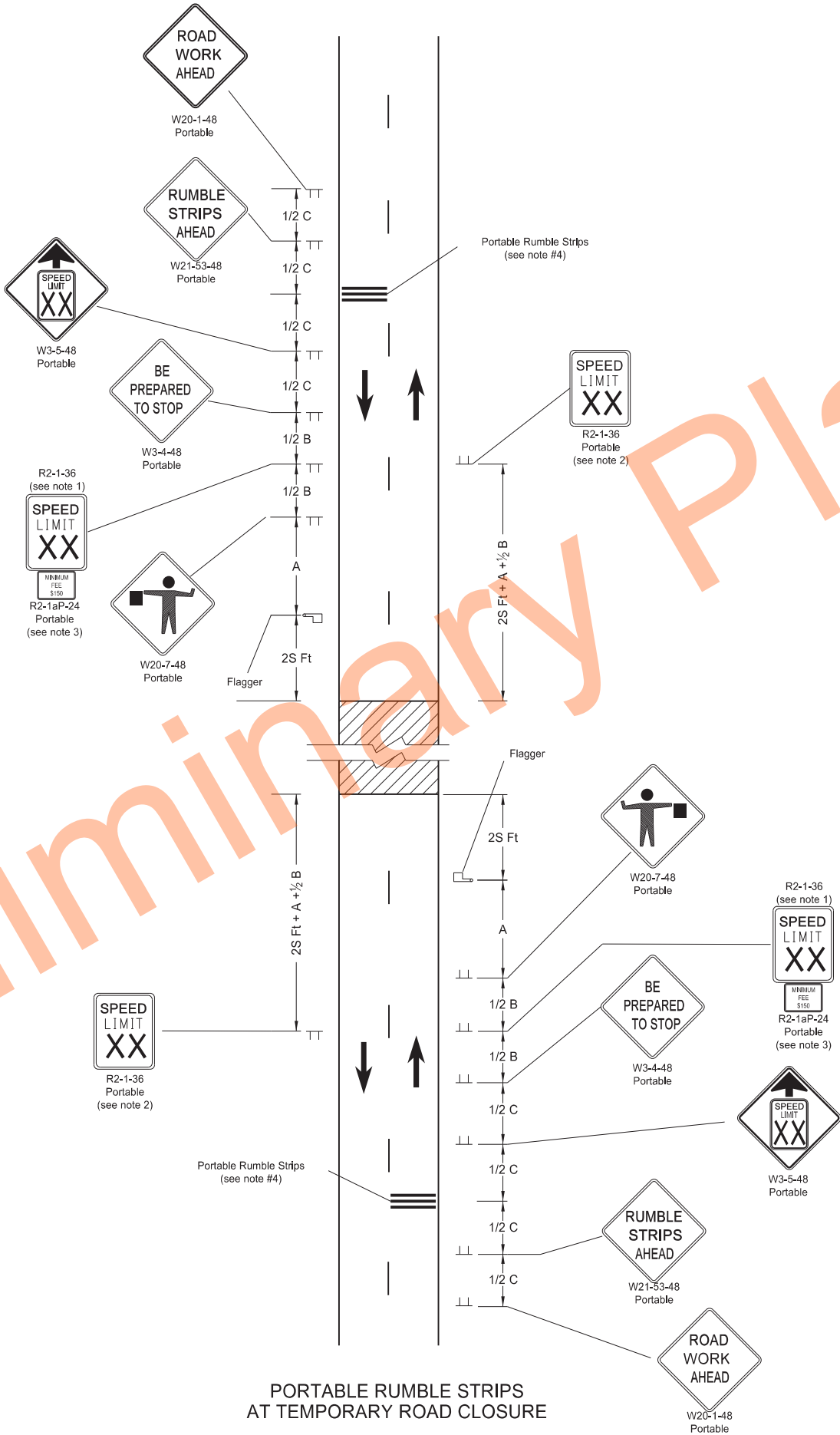
Flagger

Sign

KEY

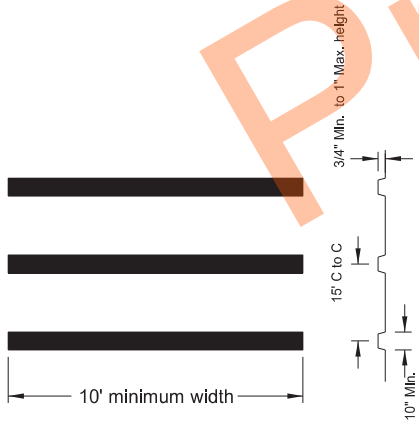
S = Numerical value of speed limit or 85th percentile.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

- Notes:
- Determine speed in the field based on location and conditions.
 - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 - Sign R2-1aP-24 is not required when pilot car operation is used.
 - Do not use rumble strips on a non paved surface or in a pre-construction speed zone of 45 mph or less.



PORTABLE RUMBLE STRIPS ARRAY DETAIL

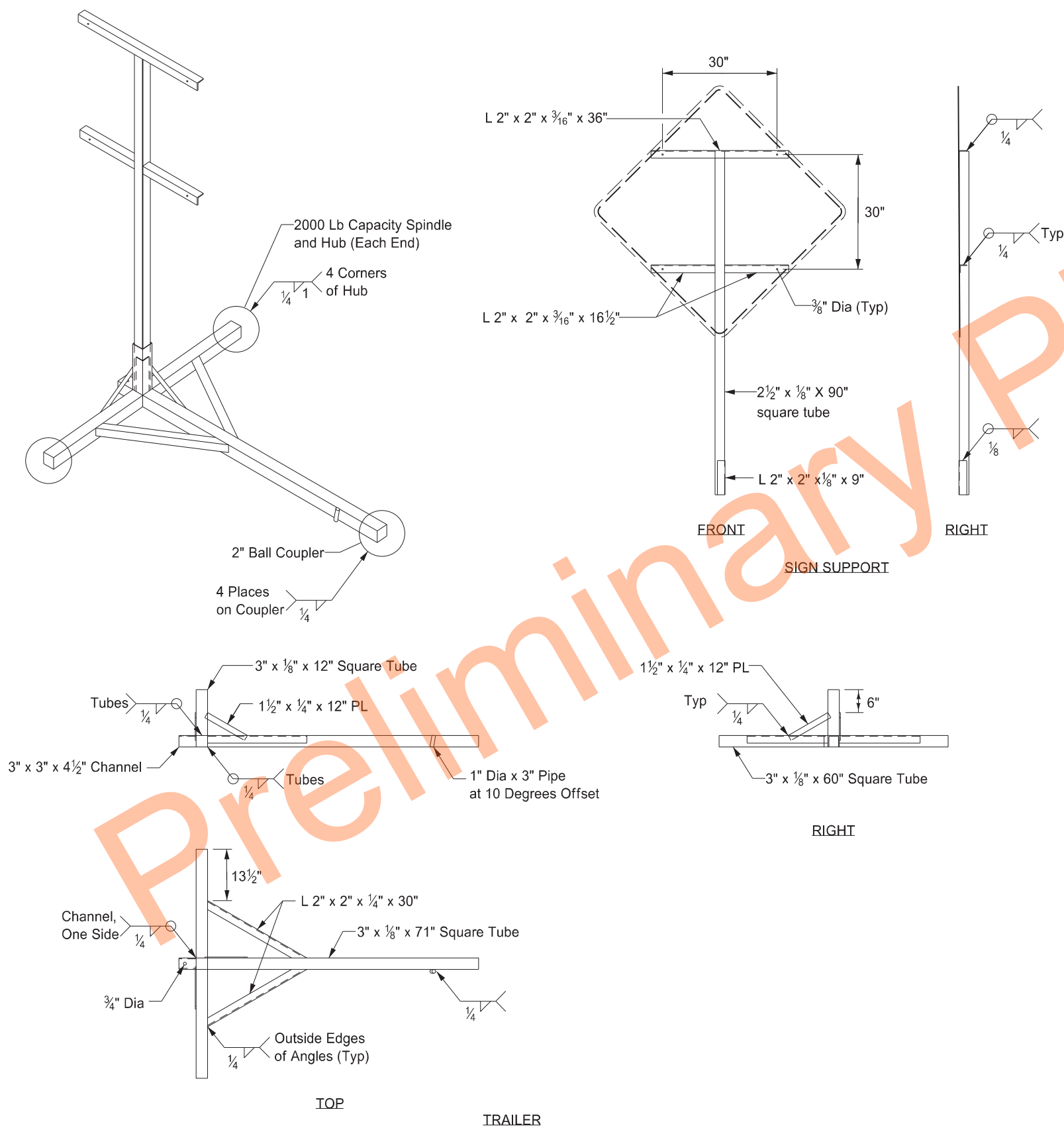
PORTABLE RUMBLE STRIPS
AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
02-22-22	
REVISIONS	
DATE	CHANGE
03-07-23 06-30-25	Use changed to min 45 mph Legislative Changes



PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50

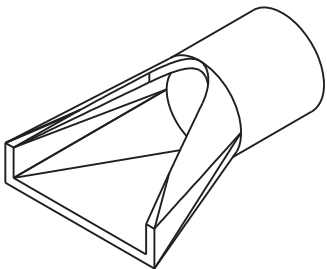


- Notes:
- 1. Maximum 250 pound weight of assembly.
 - 2. Use a 14" wheel and tire.
 - 3. Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
 - 4. Other NCHRP 350 or MASH crash tested assemblies are acceptable.

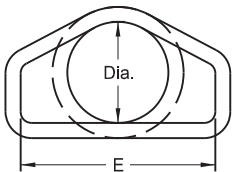
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2 ¹ / ₄ "
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2 ¹ / ₂ "
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2 ³ / ₄ "
24	0'-9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	3"
27	0'-10 ¹ / ₂ "	4'-0"	2'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	4'-6"	3 ¹ / ₂ "
30	1'-0"	4'-6"	1'-7 ³ / ₄ "	6'-1 ³ / ₄ "	5'-0"	3 ¹ / ₂ "
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4 ¹ / ₂ "
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9 ¹ / ₂ "	8'-2 ¹ / ₄ "	7'-6"	5 ¹ / ₂ "
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5 ¹ / ₂ "
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6 ¹ / ₂ "
84	3'-0"	7'-6 ¹ / ₂ "	1'-9"	9'-3 ¹ / ₂ "	10'-0"	6 ¹ / ₂ "
90	3'-5"	7'-3 ¹ / ₂ "	2'-0"	9'-3 ¹ / ₄ "	11'-0"	6 ¹ / ₂ "

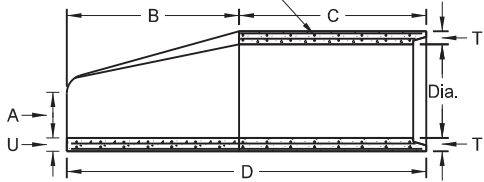


PERSPECTIVE

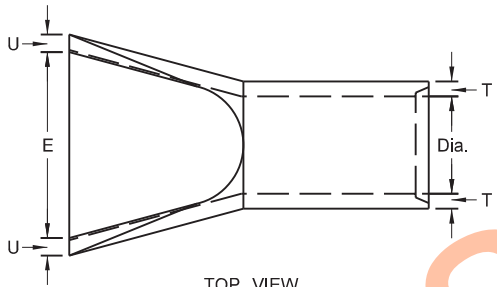


END VIEW

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170



SIDE VIEW

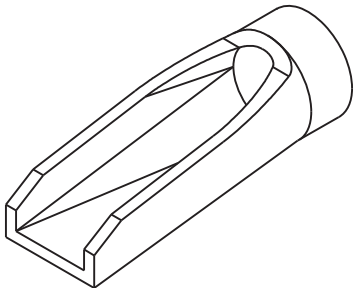


TOP VIEW

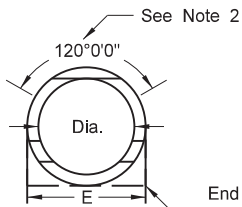
NOTES:

1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

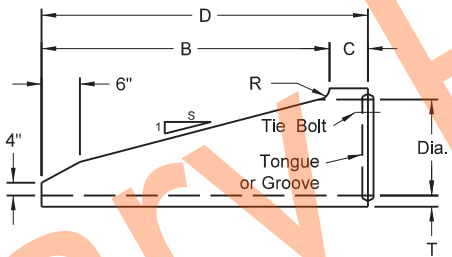
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7 ¹ / ₂ "	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3 ¹ / ₂ "	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



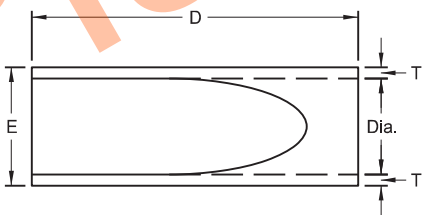
PERSPECTIVE



END VIEW



SIDE VIEW

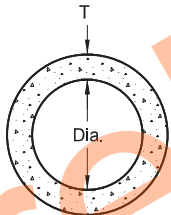


TOP VIEW

NOTES (Traversable End Section):

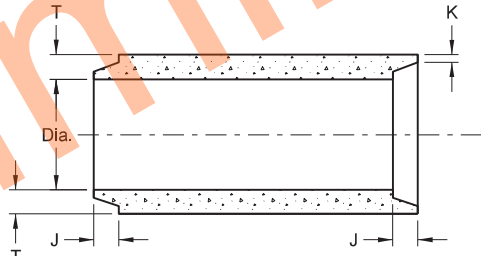
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

All Classifications of Round Concrete Pipe						
Internal Dia. of pipe in Inches	Cross-Sectional Water Area	Weight per Lin. Foot of pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue Min.	Minimum Wall Thickness (T)	
Dia	Sq. ft.	Lbs.	In.	In.	In.	
12	0.79	92	1 ⁵ / ₈ -2 ³ / ₈	3/4	2	
15	1.23	127	1 ³ / ₄ -2 ¹ / ₄	7/8	2 ¹ / ₄	
18	1.77	168	1 ¹ / ₂ -2 ¹ / ₂	1	2 ¹ / ₂	
21	2.40	214	1 ¹ / ₂ -3 ¹ / ₈	1 ¹ / ₈	2 ³ / ₄	
24	3.14	265	2 ³ / ₄ -3 ¹ / ₄	1 ¹ / ₈	3	
27	3.98	322	2 ³ / ₄ -4	1 ¹ / ₄	3 ¹ / ₄	
30	4.91	384	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₄	3 ¹ / ₂	
33	5.94	452	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	3 ³ / ₄	
36	7.07	524	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	4	
42	9.62	685	3 ¹ / ₄ -4 ¹ / ₄	1 ³ / ₄	4 ¹ / ₂	
48	12.57	685	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	5	
54	15.90	1070	4 ¹ / ₈ -5 ¹ / ₄	2	5 ¹ / ₂	
60	19.63	1296	4 ¹ / ₂ -5 ¹ / ₂	2 ¹ / ₄	6	
66	23.76	1542	5-6	2 ³ / ₈	6 ¹ / ₂	
72	28.27	1810	5 ⁵ / ₈ -6 ³ / ₄	2 ³ / ₈	7	
78	33.18	2098	6 ¹ / ₄ -7 ¹ / ₄	2 ³ / ₈	7 ¹ / ₂	
84	38.48	2410	5 ⁵ / ₈ -7 ¹ / ₄	3 ³ / ₈	8	
90	44.18	2793	6 ³ / ₄ -8 ¹ / ₂	3 ³ / ₈	8 ¹ / ₂	
96	50.27	3092	7-8 ¹ / ₄	3 ¹ / ₂	9	
102	56.75	3466	7-8 ¹ / ₄	3 ¹ / ₂	9 ¹ / ₂	
108	63.62	3864	7 ¹ / ₄ -8 ¹ / ₂	3 ³ / ₄	10	

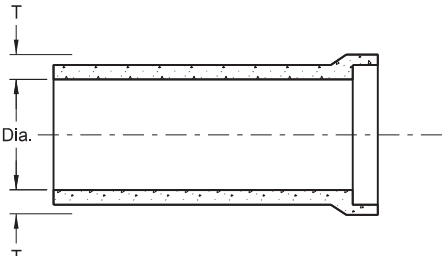


END VIEW

CIRCULAR PIPE

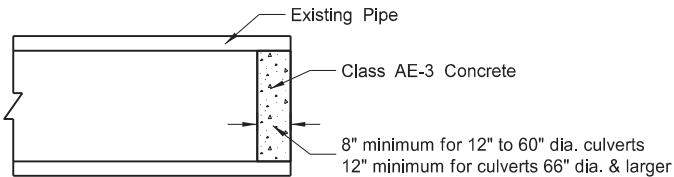


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



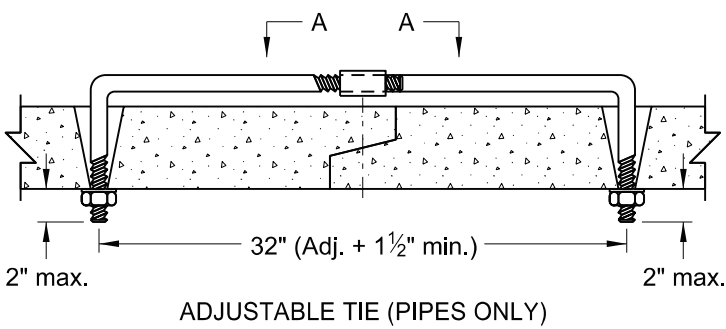
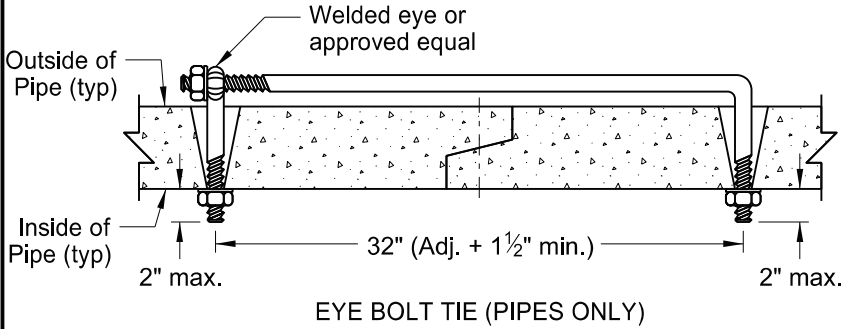
CONCRETE PIPE PLUG

SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5
11-21-16	Revised End Section Dimensions
09-18-19	Updated Perspective View Details

This document was originally issued and sealed by
Jon Ketterling
Registration Number
PE- 4684,
on 9/18/19 and the original document is stored at the
North Dakota Department
of Transportation

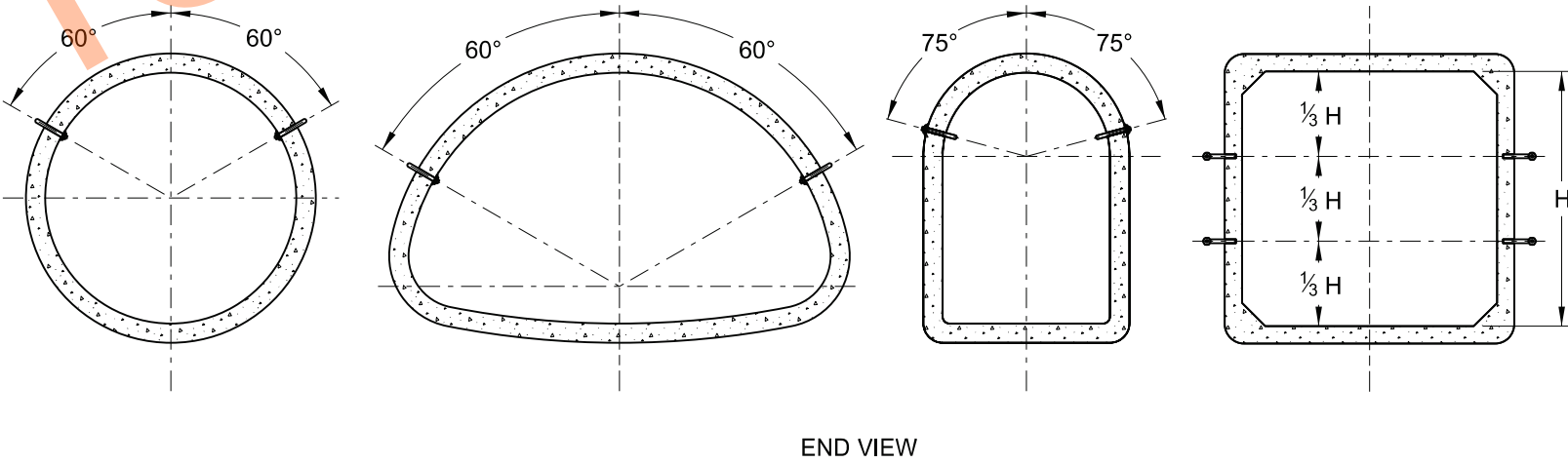
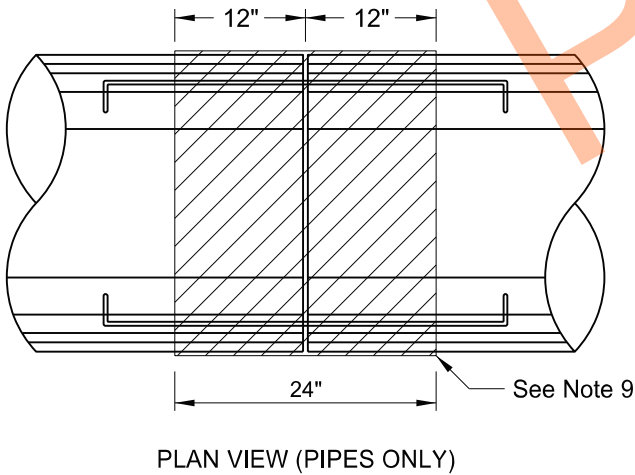
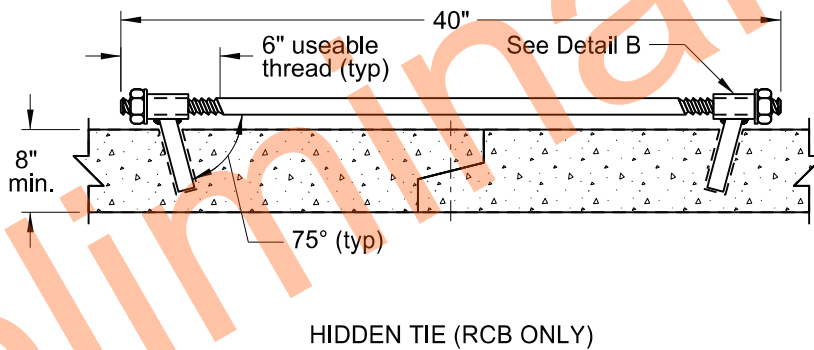
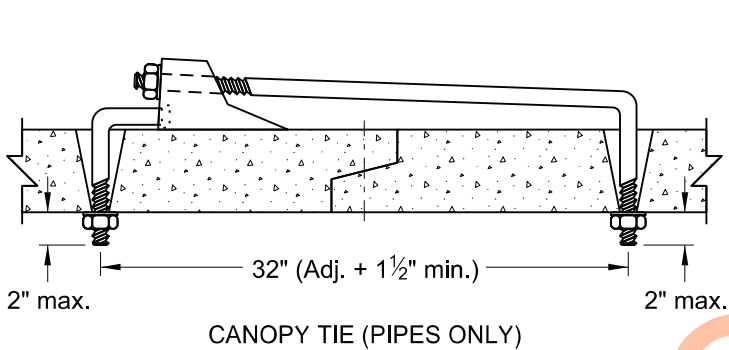
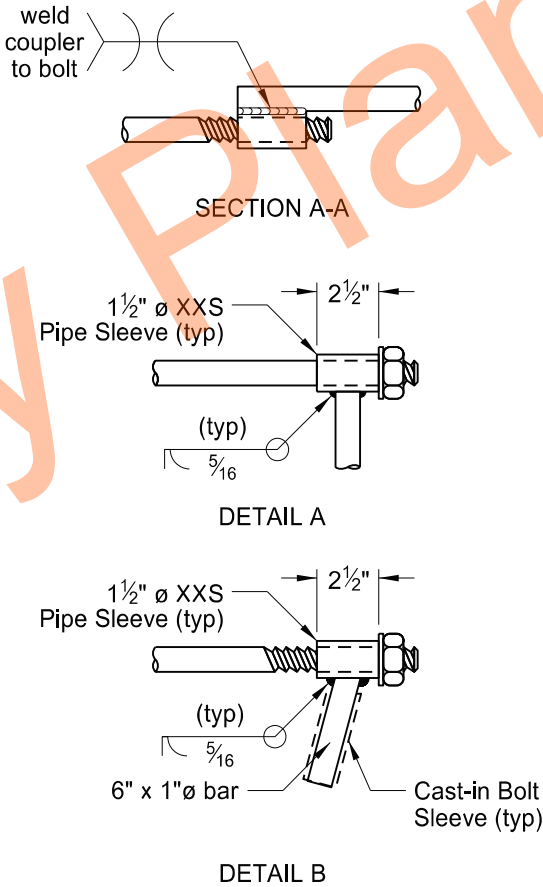
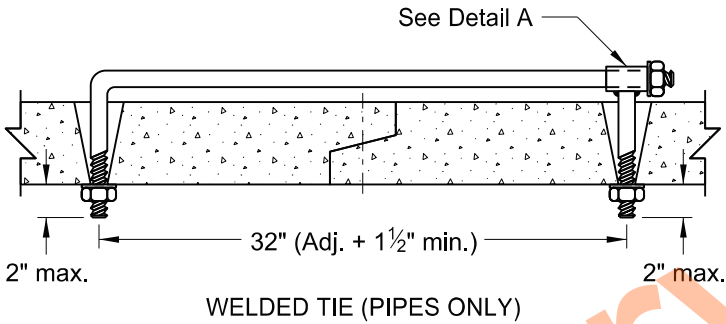
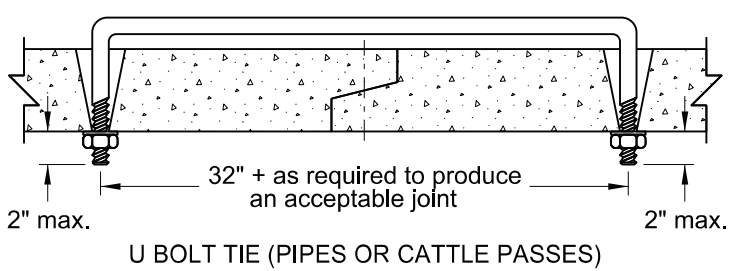
CONCRETE PIPE, CATTLE PASS, OR
PRECAST CONCRETE BOX CULVERT TIES



REQUIRED SIZE OF TIE BOLTS		
PIPE SIZE	THREAD Ø	XXS PIPE SLEEVE INNER Ø
18" - 24"	5/8"	3/4"
30" - 66"	3/4"	1"
72" - 120"	1"	1 1/4"
RCB/CATTLE PASS	1"	1 1/4"

NOTES:

- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
- Insert pipe ties from the inside of the pipes and grout into place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
- Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Insert and grout tie bars into place where nuts and washers are not used.
- Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
- Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
- Holes in pipes to accommodate tie bolts will be precast. Tapered holes are permitted. Use holes that have a diameter 1/4" larger than the diameter of the thread. In precast RCB's, use holes that contain cast-in bolt sleeves with an inside diameter of 1 1/4".
- Include the cost of precasting the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
- Tie all centerline and approach RCP culvert joints. Tie all joints including the end sections of all free ends of storm drain systems. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
- Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, use Type S2 geotextile fabric and overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C990. Provide a membrane that is a minimum of 12" wide and center it at the joint. Provide a minimum overlap of 2.5" at the seams.
- Use tie bolts that conform to ASTM A 36. Use heavy hex nuts that conform to ASTM A 563. Use washers that conform to ASTM F 436, Type 1. Use welded pipe sleeves and cast-in bolt sleeves that conform to ASTM A 53, Grade B.
- Provide lock washers or burr threads of concrete box ties after installation and tightening to prevent nut rotation.
- Tie RCB's as noted in the plans.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11 Table, Title, Labels
8-11-21	Notes 2-12 Table, Label
01-17-25	Notes 9-13 Table, Labels Section A-A, End View

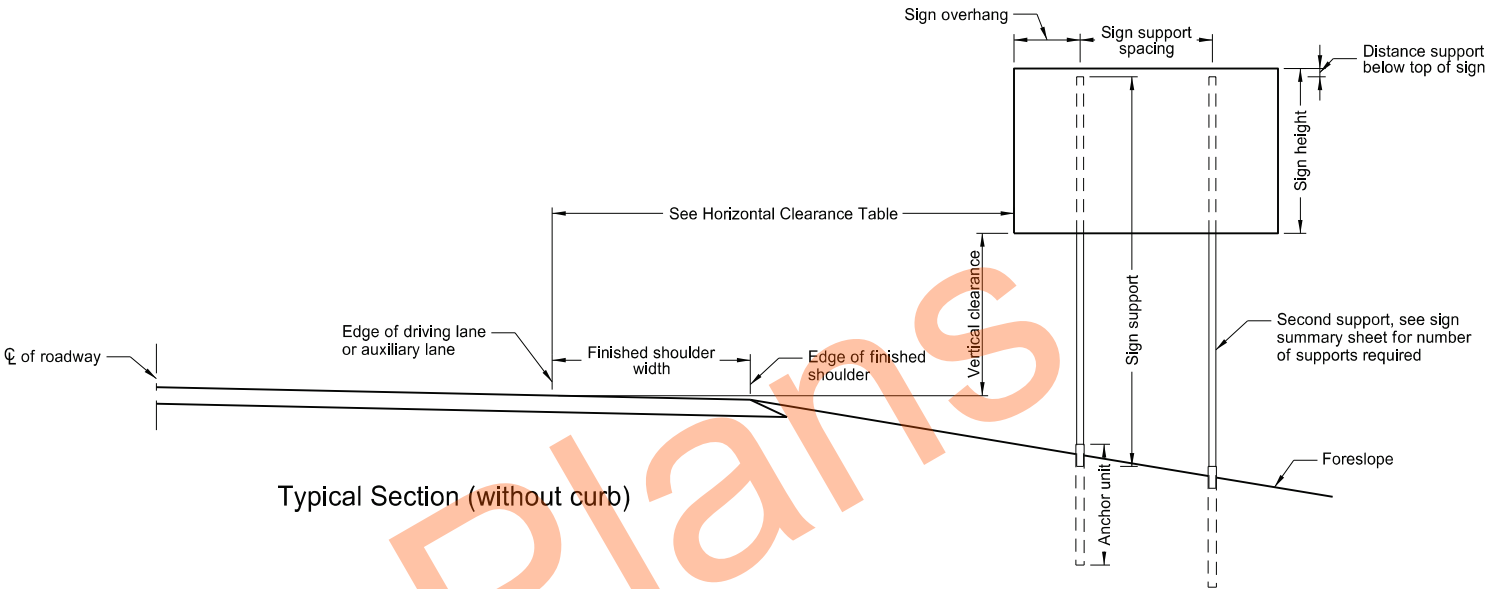


PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

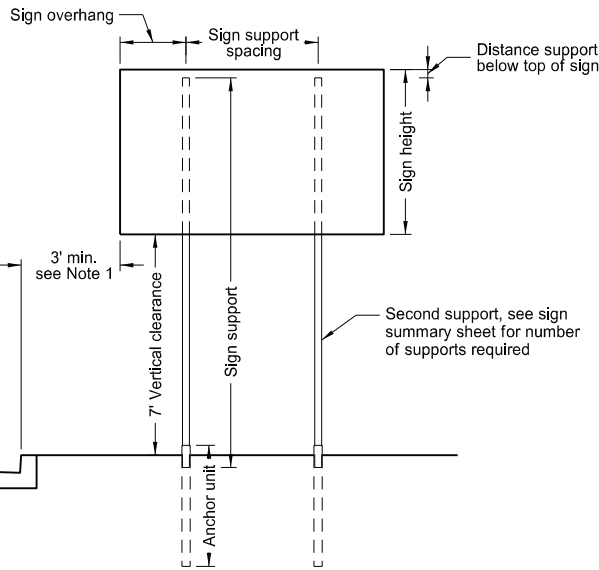
Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.
- Install signs on expressways a minimum height of 7'.
- Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.
- Maximum vertical clearance is 6" greater than the minimum vertical clearance.
3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.

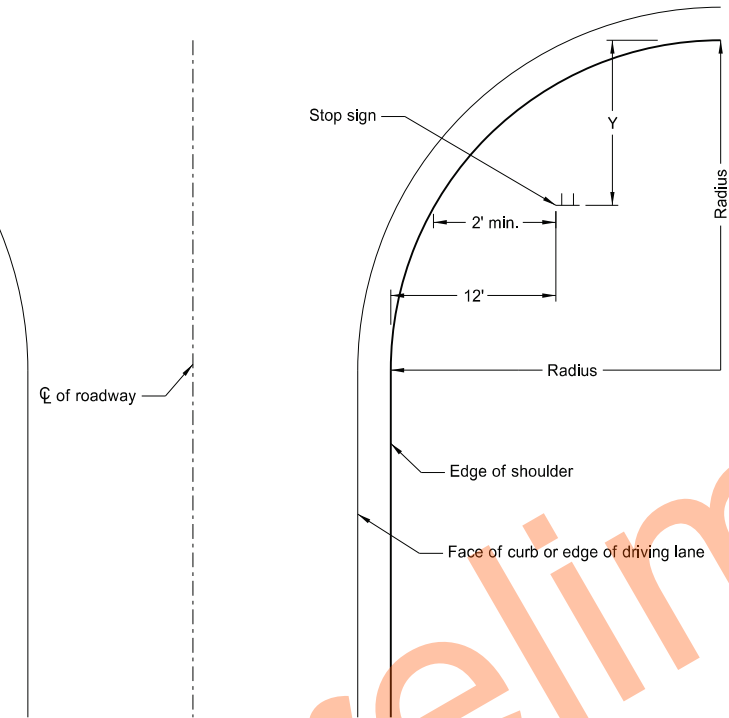


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24

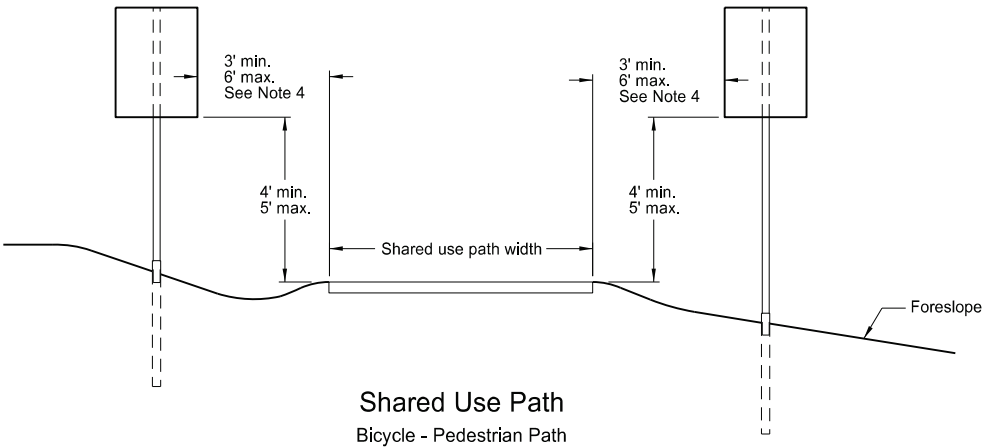


Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection
Use layout for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



Shared Use Path
Bicycle - Pedestrian Path

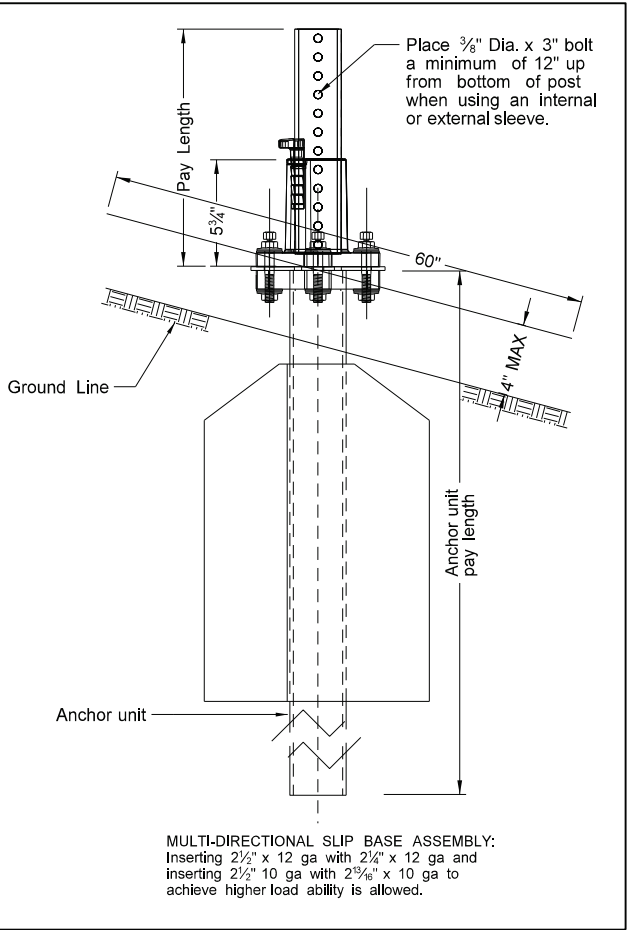
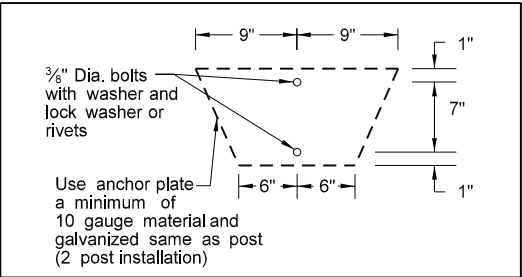
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



08/05/24

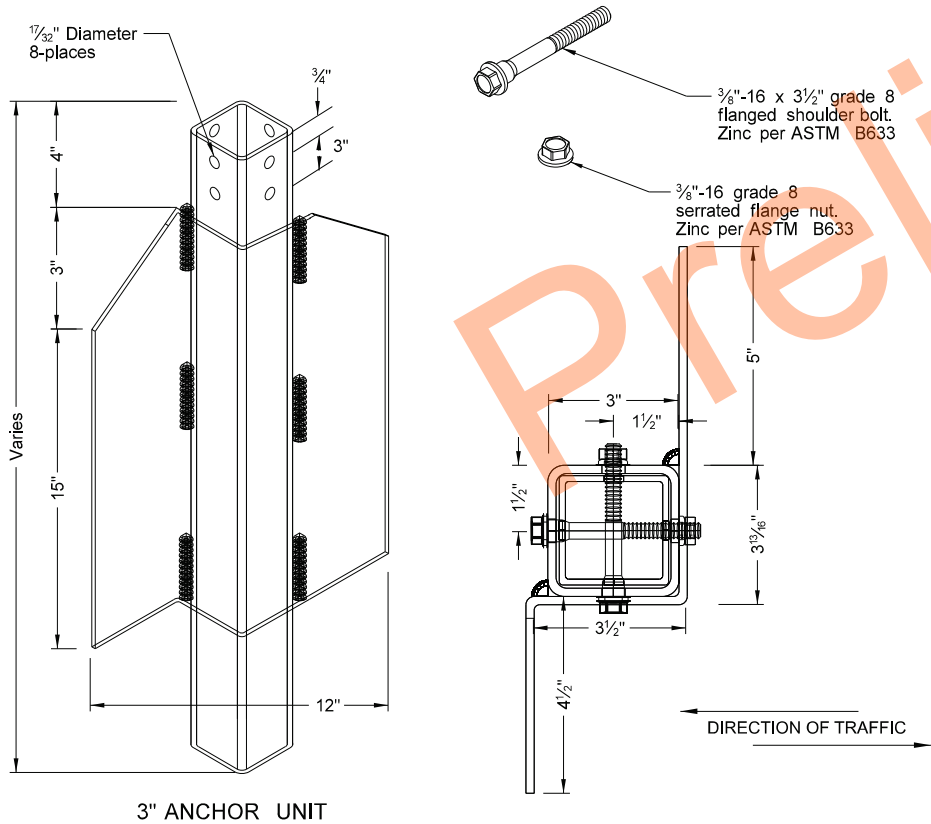
Telescoping Perforated Tube						
Number of Posts	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(B)	3(C)
1	2 1/2	10			Yes	7
1	2 1/4	12	2 1/2(D)	12	Yes	7
1	2 1/2	12	2 1/4	12	Yes	7
2	2 1/2	10			Yes	7
2	2 1/4	12	2 1/2(D)	12	Yes	7
2	2 1/2	12	2 1/4	12	Yes	7
3 & 4	2 1/2	12			Yes	7
3 & 4	2 1/2	10			Yes	7
3 & 4	2 1/2	12	2 1/4	12	Yes	7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes	7
3 & 4	2 1/2	10	2 3/8	10	Yes	7

(B) - Provide a shim as specified by the manufacturer when placing 2 1/2" 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

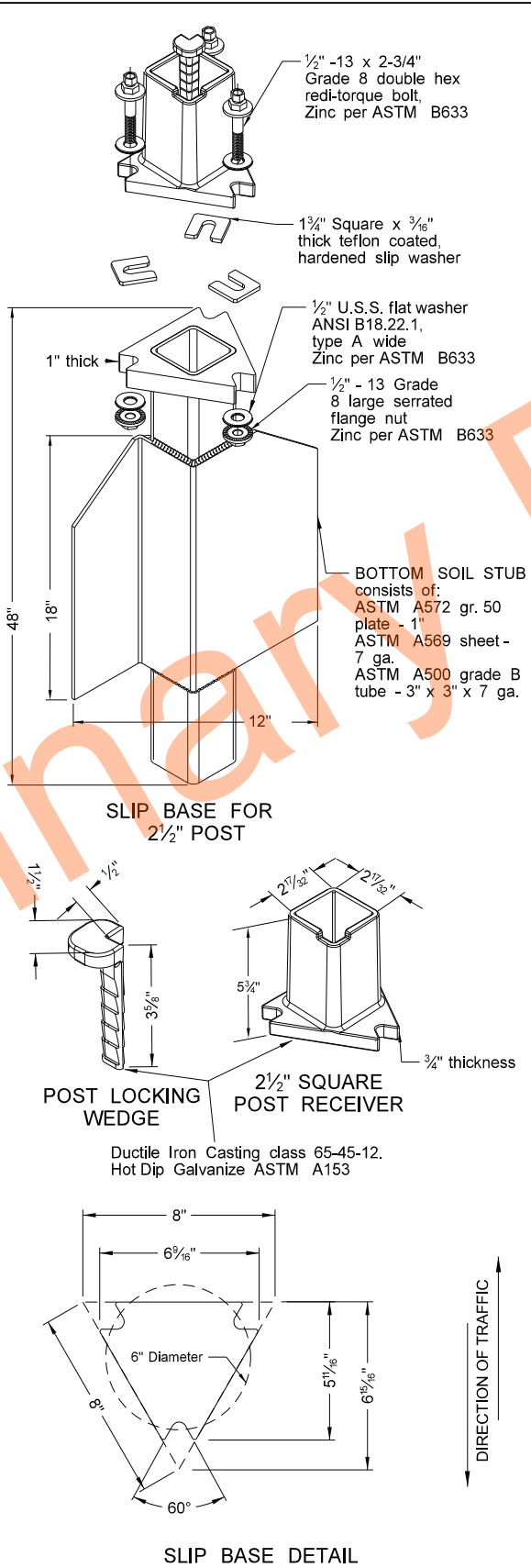


SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post.
(use standard 3/8" diameter grade 8 bolt with proper shim)

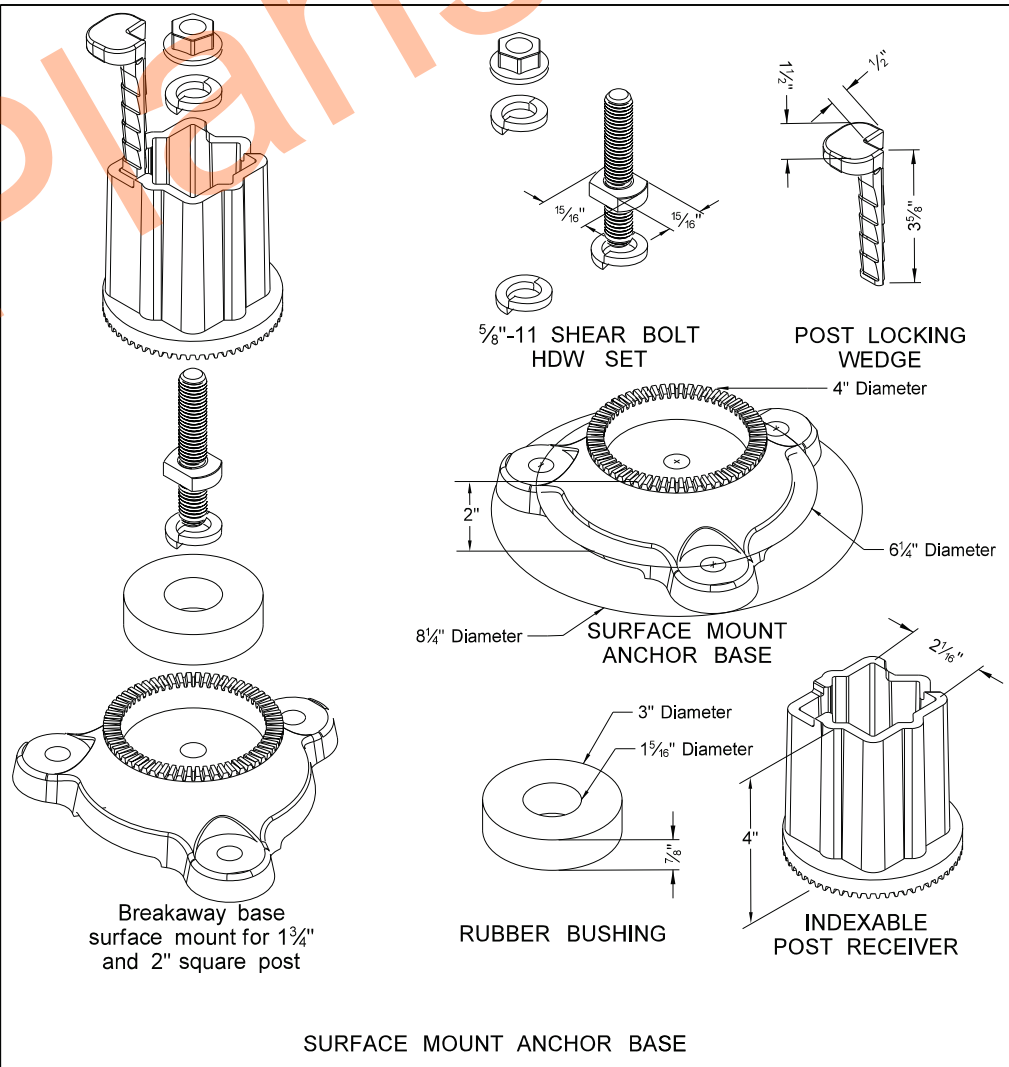


Mounting Details Perforated Tube



Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.



NOTE:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
- Provide 7 gauge HRPO commercial quality ASTM A569 and 3" x 3" x 7" gauge ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
- Eliminate wings when anchor is used in concrete sidewalk.
- Provide a minimum 8" distance between the first and fourth post on four post signs.
- Install in accordance with manufacturers recommendation.
- Use a minimum 1/2" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



08/05/24

Breakaway Coupler System
for Perforated Tubes

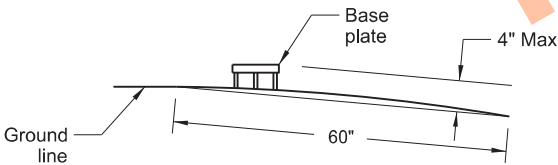
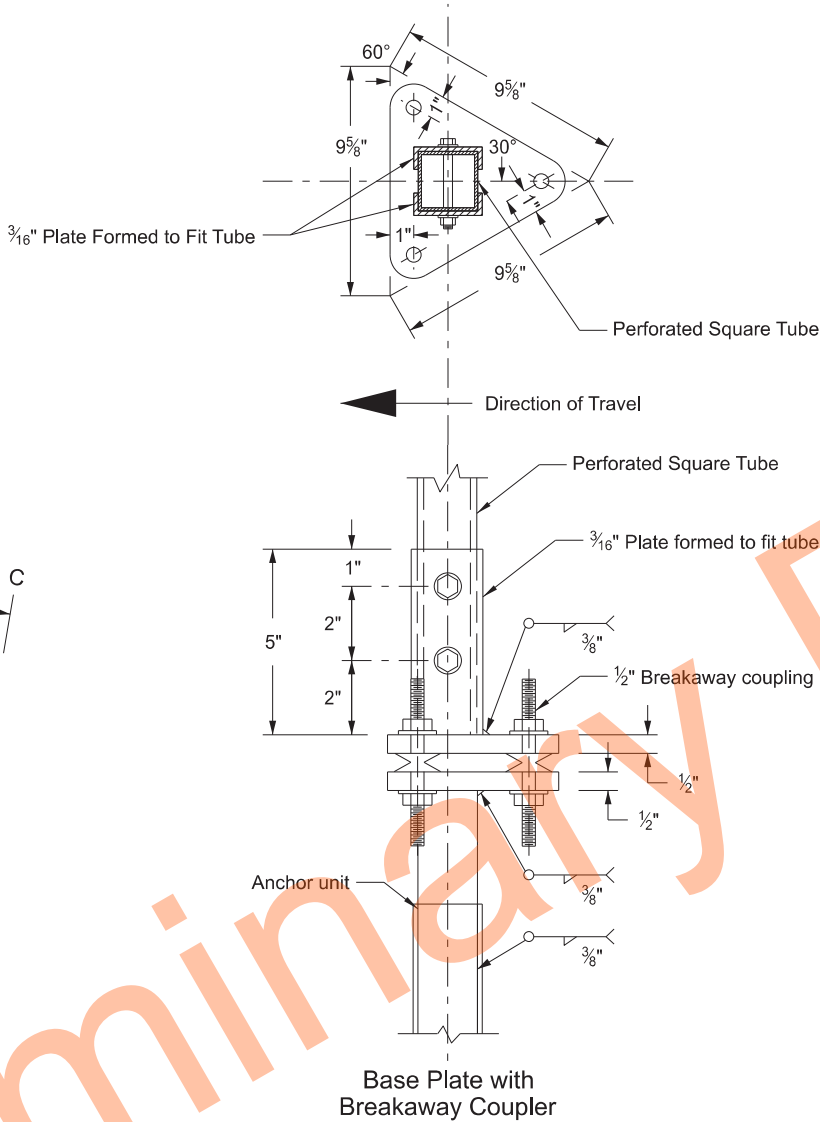
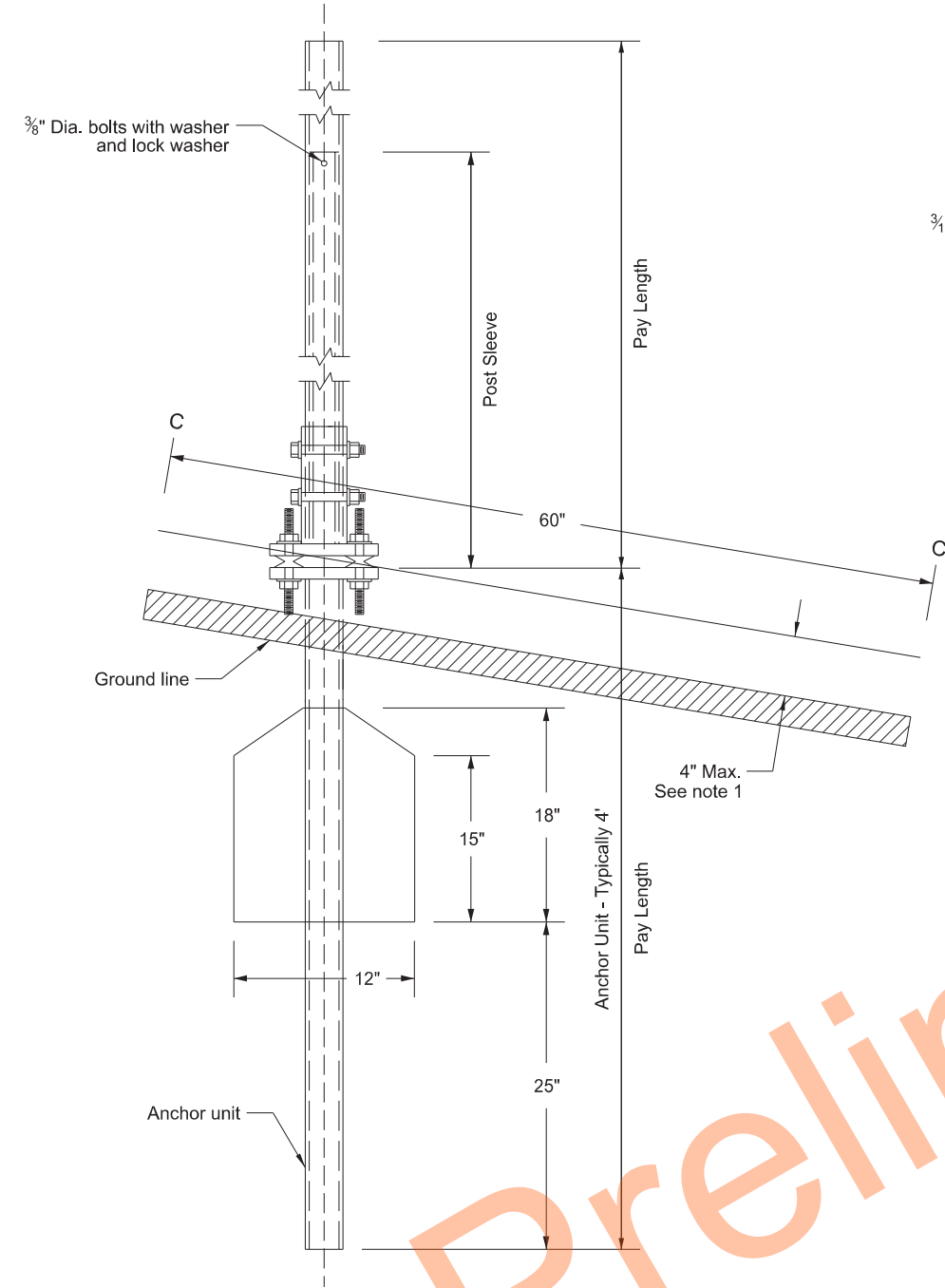
Notes:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
- Use anchor unit of the same size and specification as the post.
- Provide a minimum 8' distance between the first and fourth post on four post signs.
- Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2¾	10	Yes		7

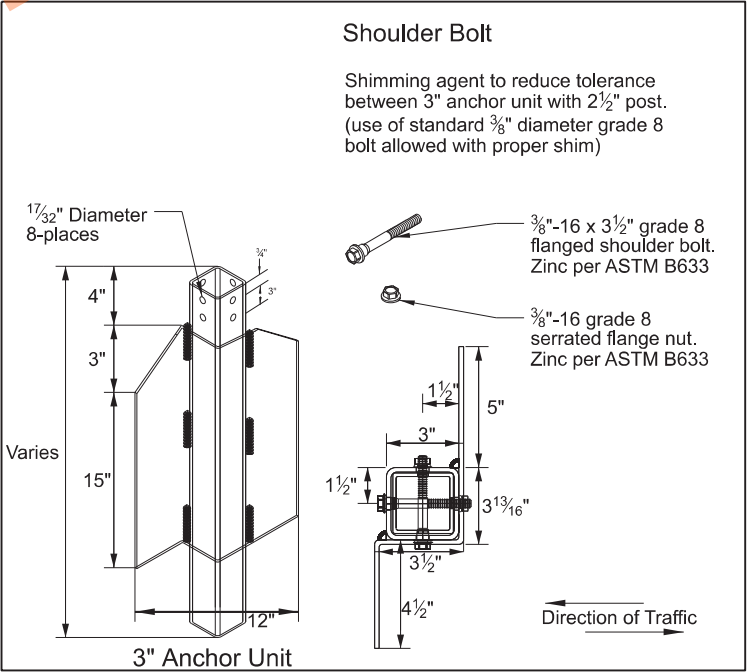
(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit



Section C-C

Max projection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.

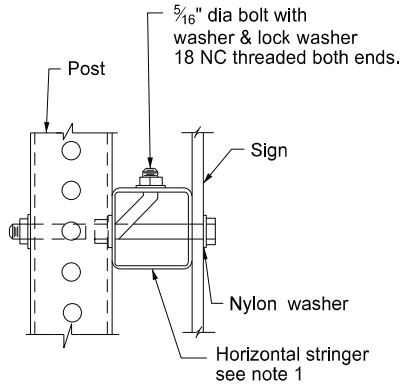


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
08-30-18	Updated notes to active voice.
08-30-19	New Design Engr PE Stamp.
08-05-24	Electronic Stamp/Signature.
07-22-25	Corrected "typo" in C-C note.

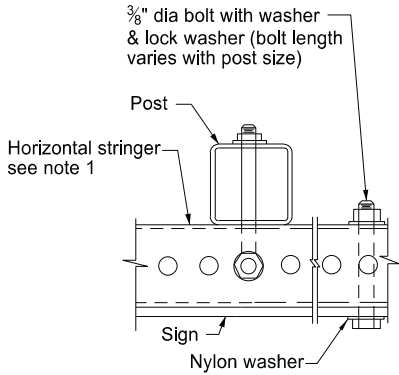


07/22/25

Mounting Details Perforated Tube

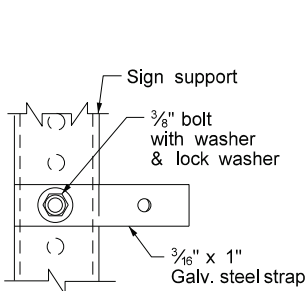


Side View

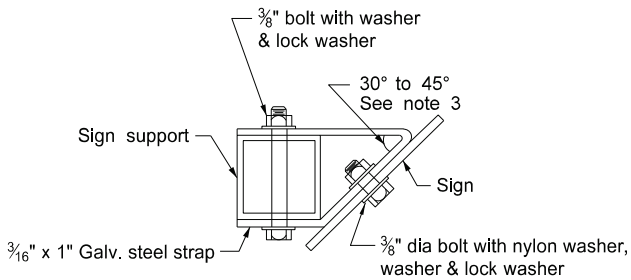


Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

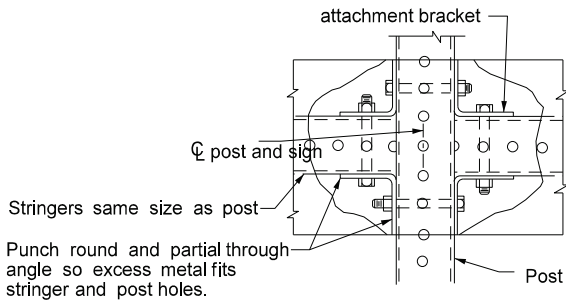


Side View



Top View

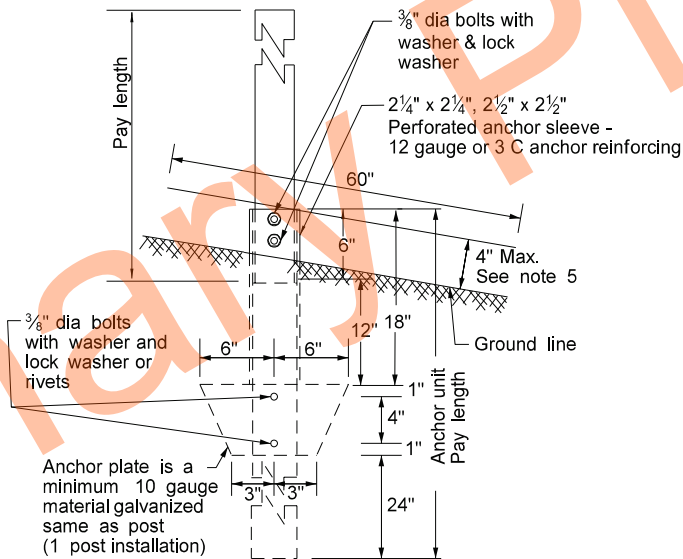
STRAP DETAIL



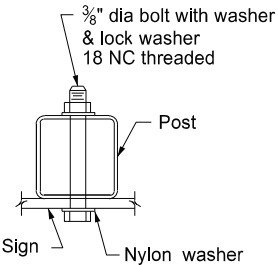
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

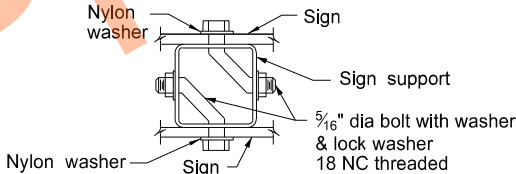
1. Horizontal stringers - Use perforated tubes or 1 3/4" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 5/16" ± 1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.



ANCHOR UNIT AND POST ASSEMBLY

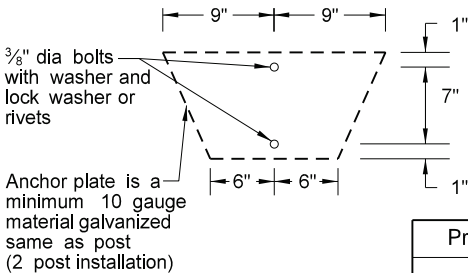


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

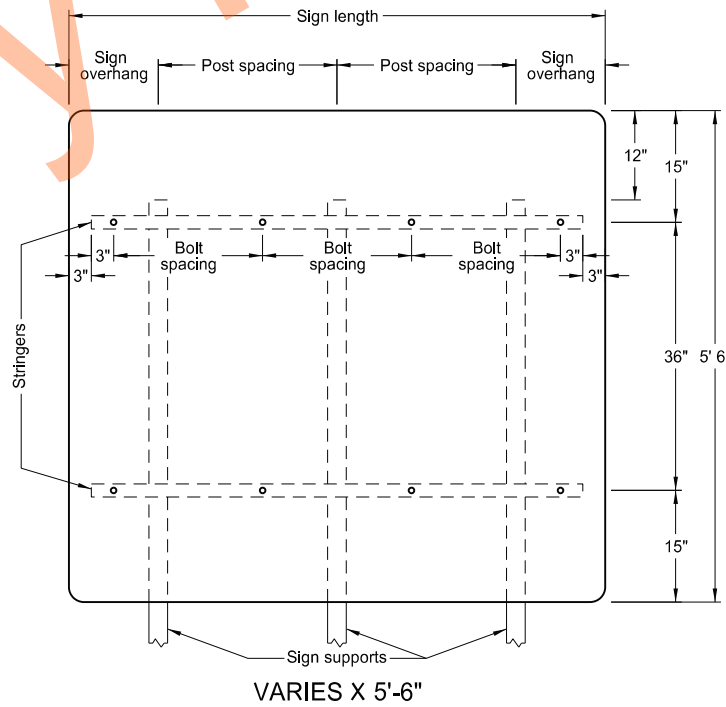
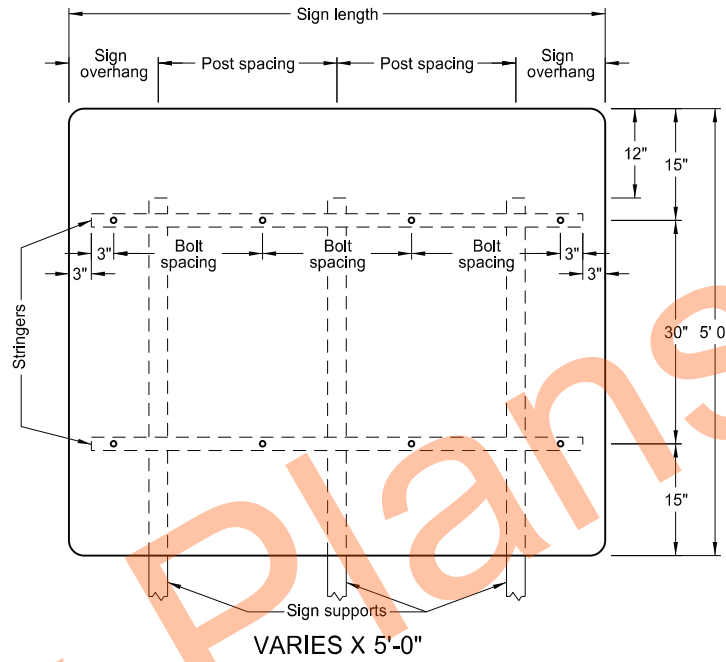
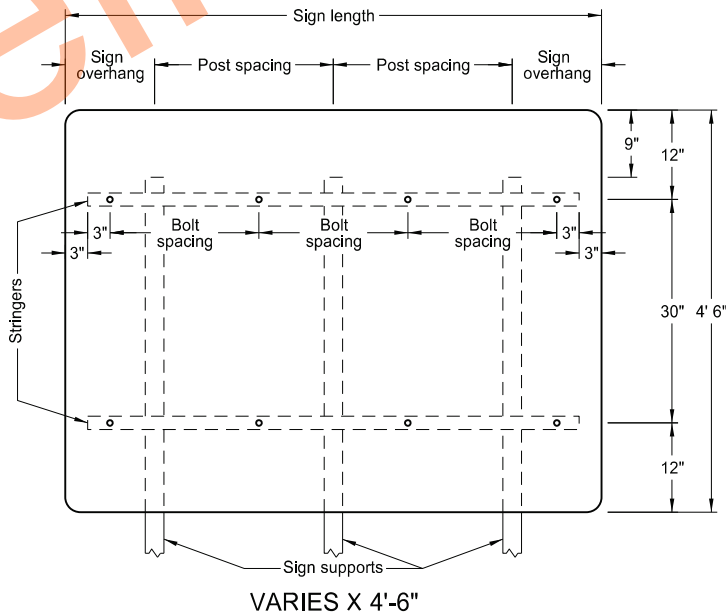
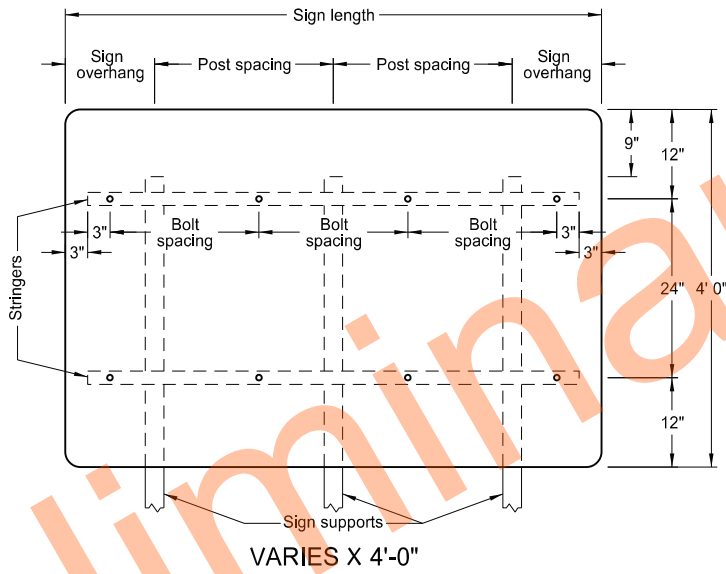
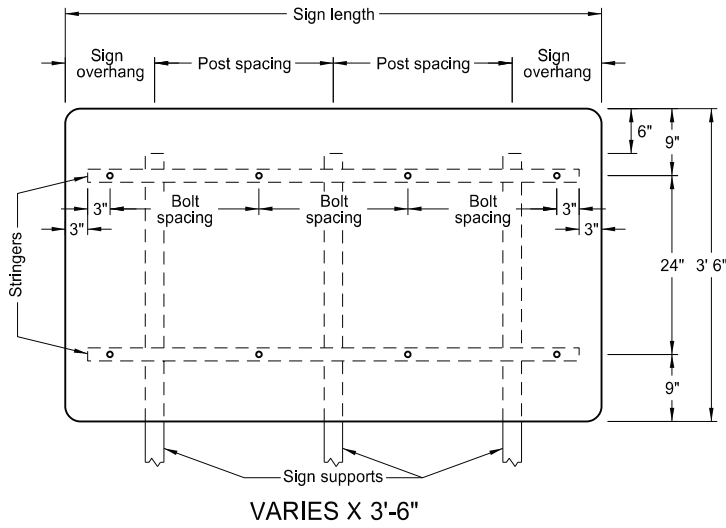
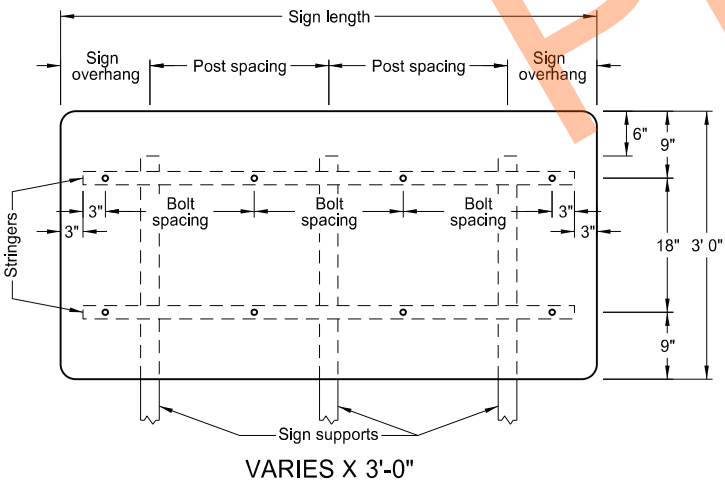
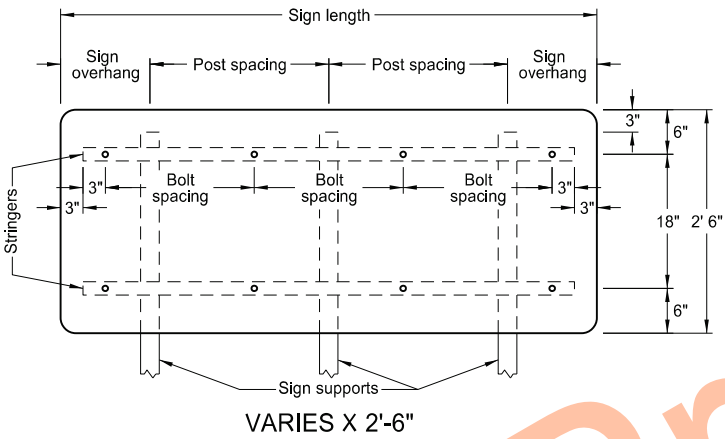
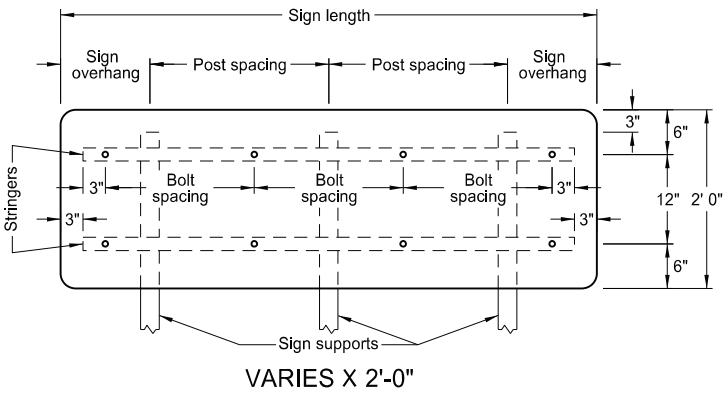
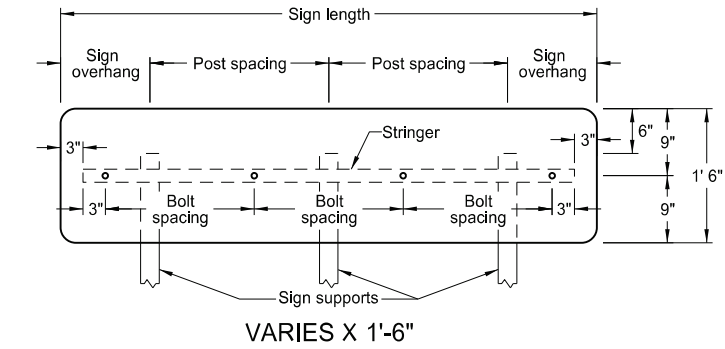
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/16	10	Yes		7

(B) - When placing 2 1/2", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.



SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
FOR VARIABLE LENGTH SIGNS



3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0"	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-8"	8-23" & 2-22"

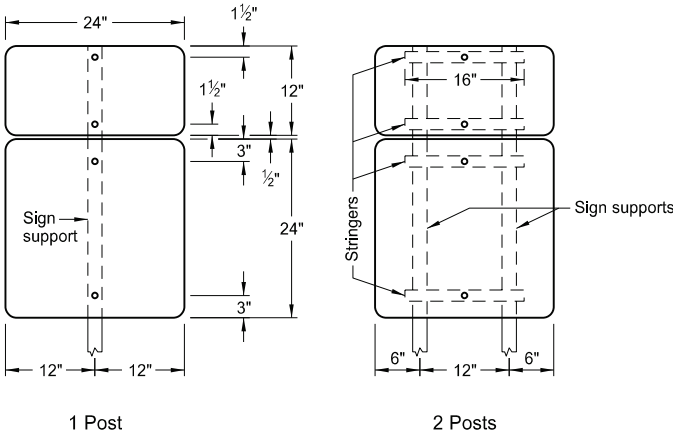
- Notes:
1. Use 0.100 minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voices.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.

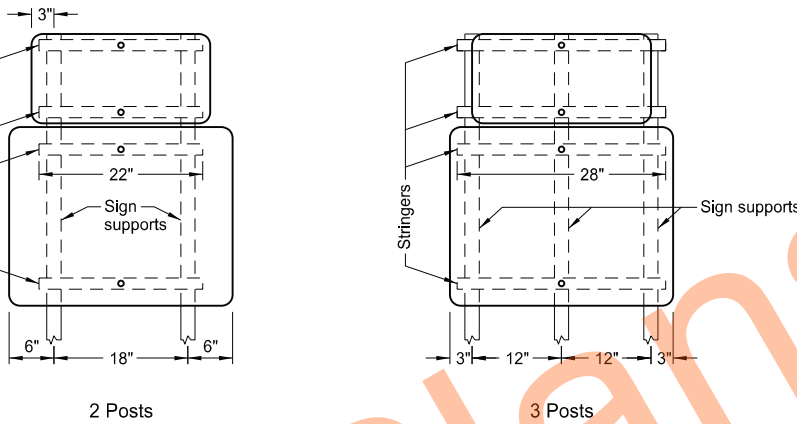
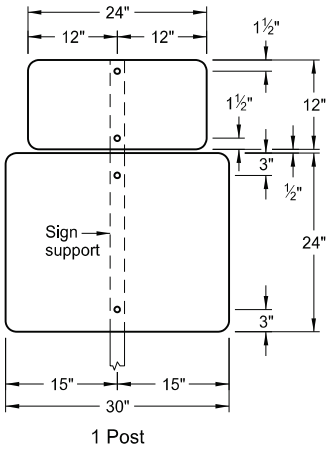


SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-51

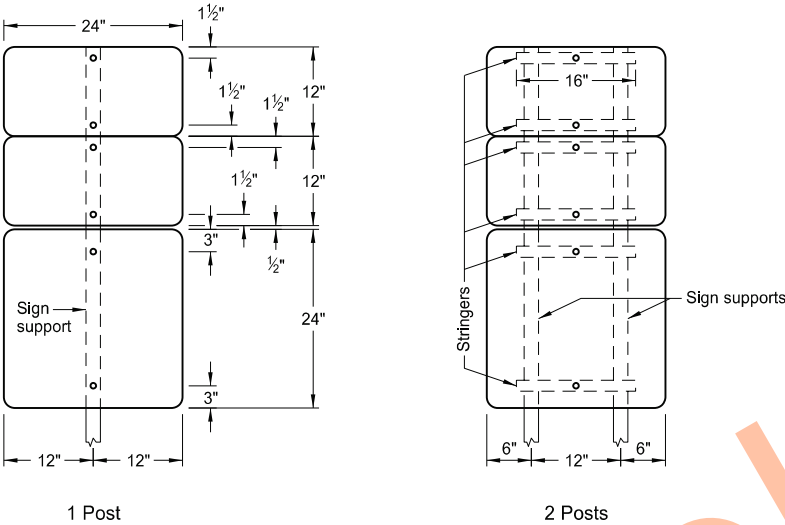


ASSEMBLY NO. 371

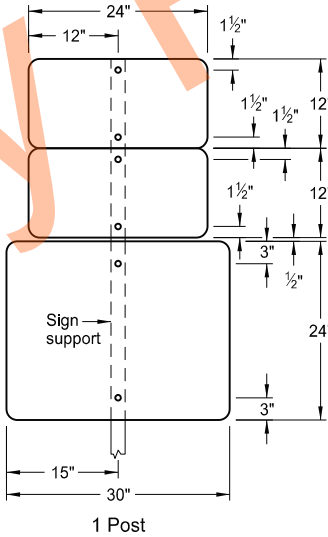
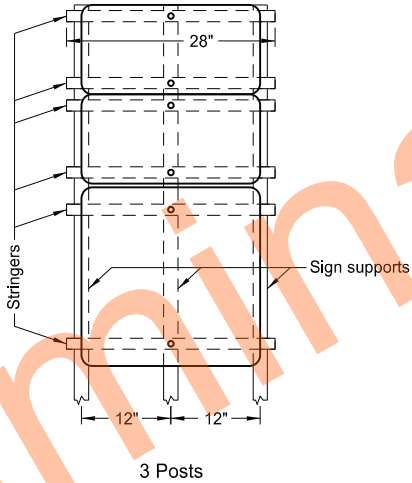


ASSEMBLY NO. 372

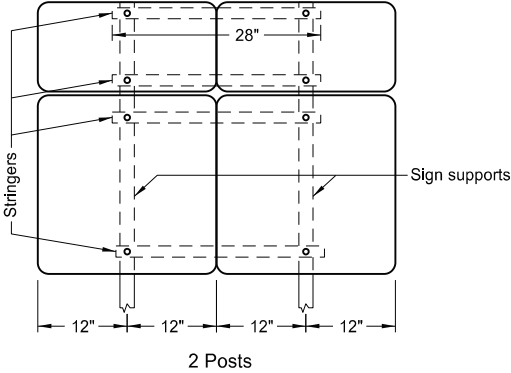
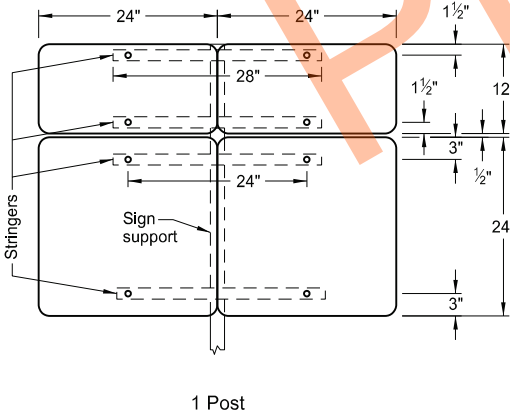
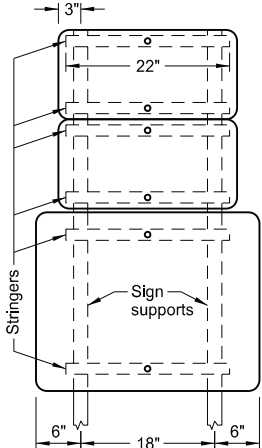
- Notes:
- 1. Use 0.100 inch minimum thickness sign backing material.
 - 2. Use 1 1/2"x1 1/2" perforated square tube stringers.
 - 3. Punch holes round for 3/8" bolt.



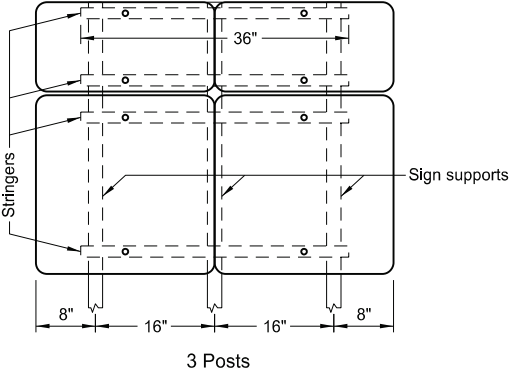
ASSEMBLY NO. 373



ASSEMBLY NO. 374



ASSEMBLY NO. 375

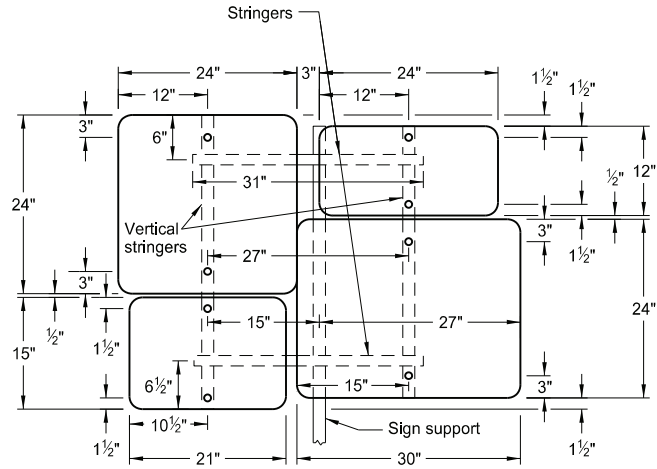


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.

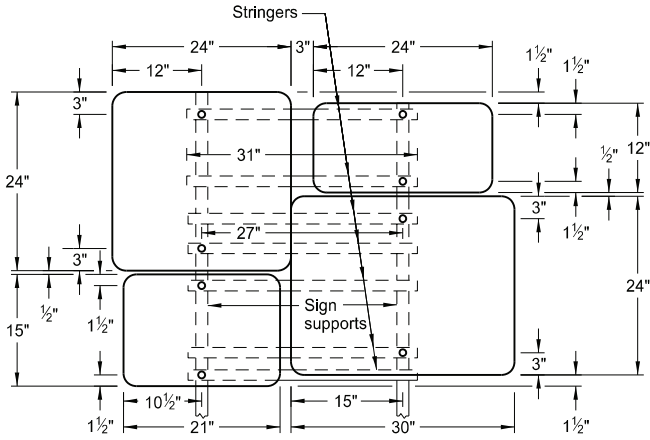
08/07/24

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-60

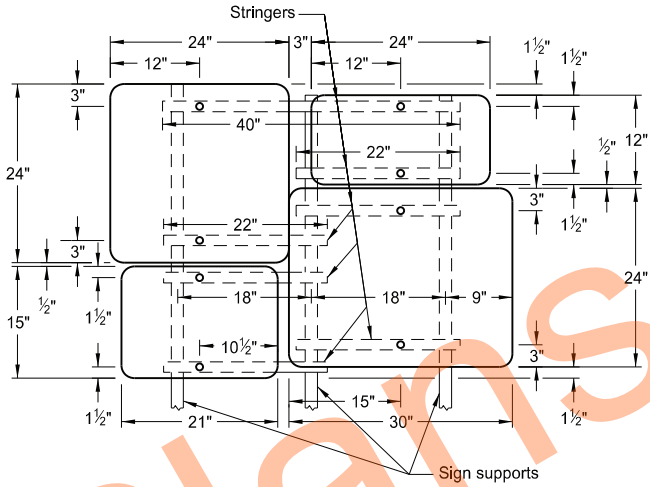


1 Post



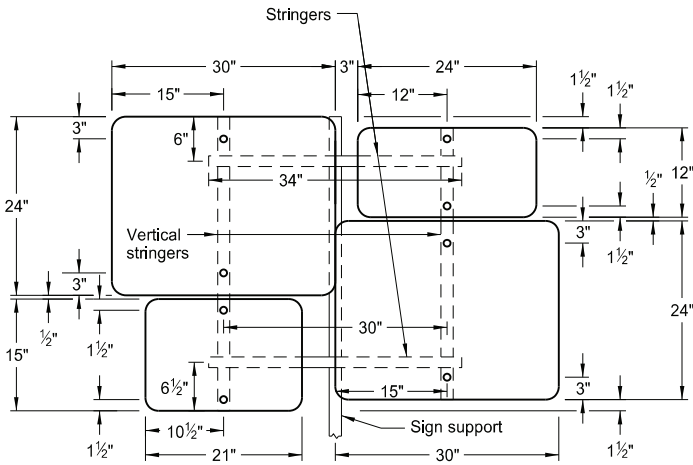
2 Posts

ASSEMBLY NO. 403

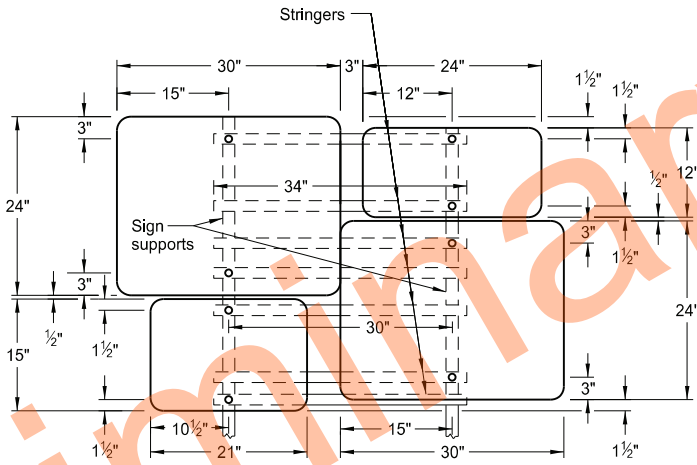


3 Posts

- Notes:
- 1. Use 0.100 inch minimum thickness sign backing material.
 - 2. Use 1 1/2"x1 1/2" perforated square tube stringers.
 - 3. Punch holes round for 3/8" bolt.

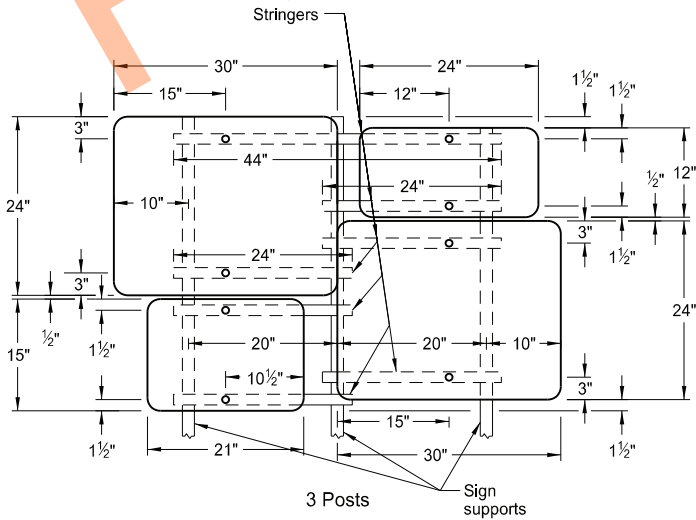


1 Post

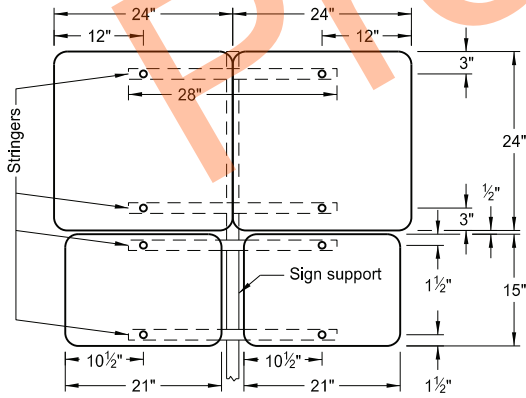


2 Posts

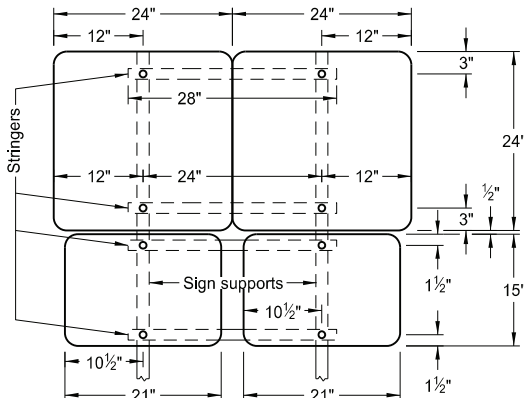
ASSEMBLY NO. 404



3 Posts

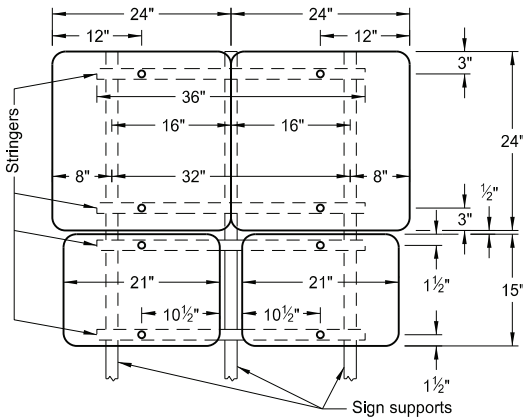


1 Post



2 Posts

ASSEMBLY NO. 405



3 Posts

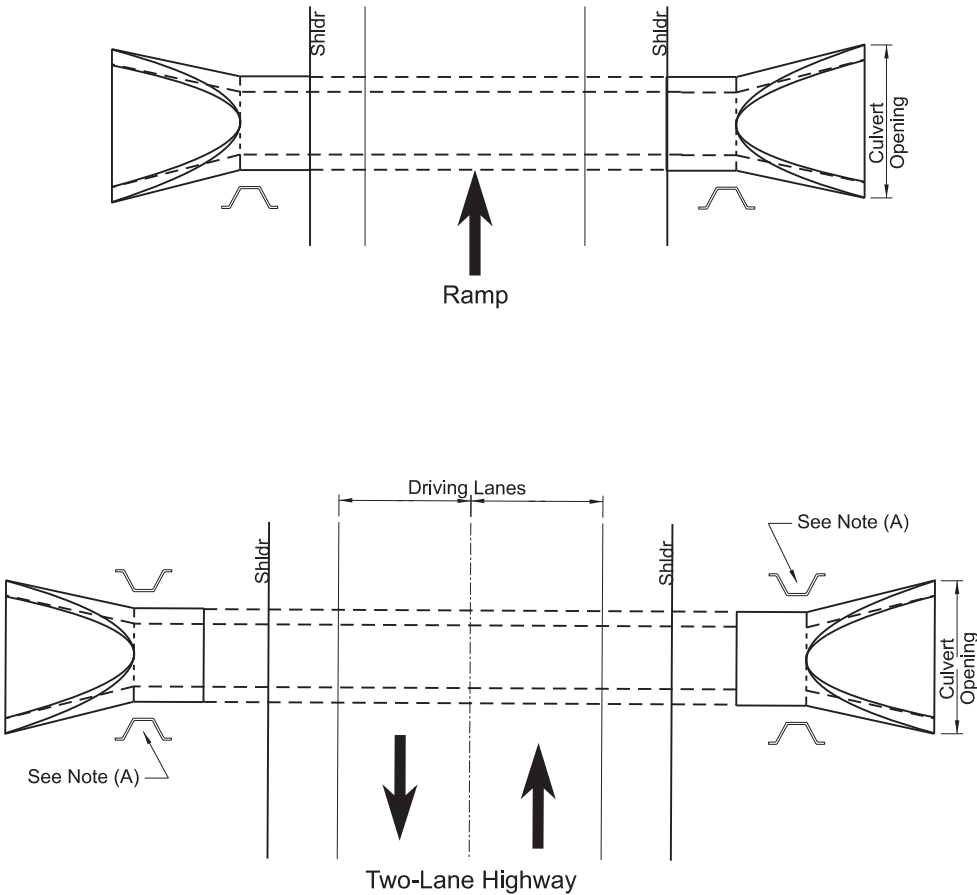
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.



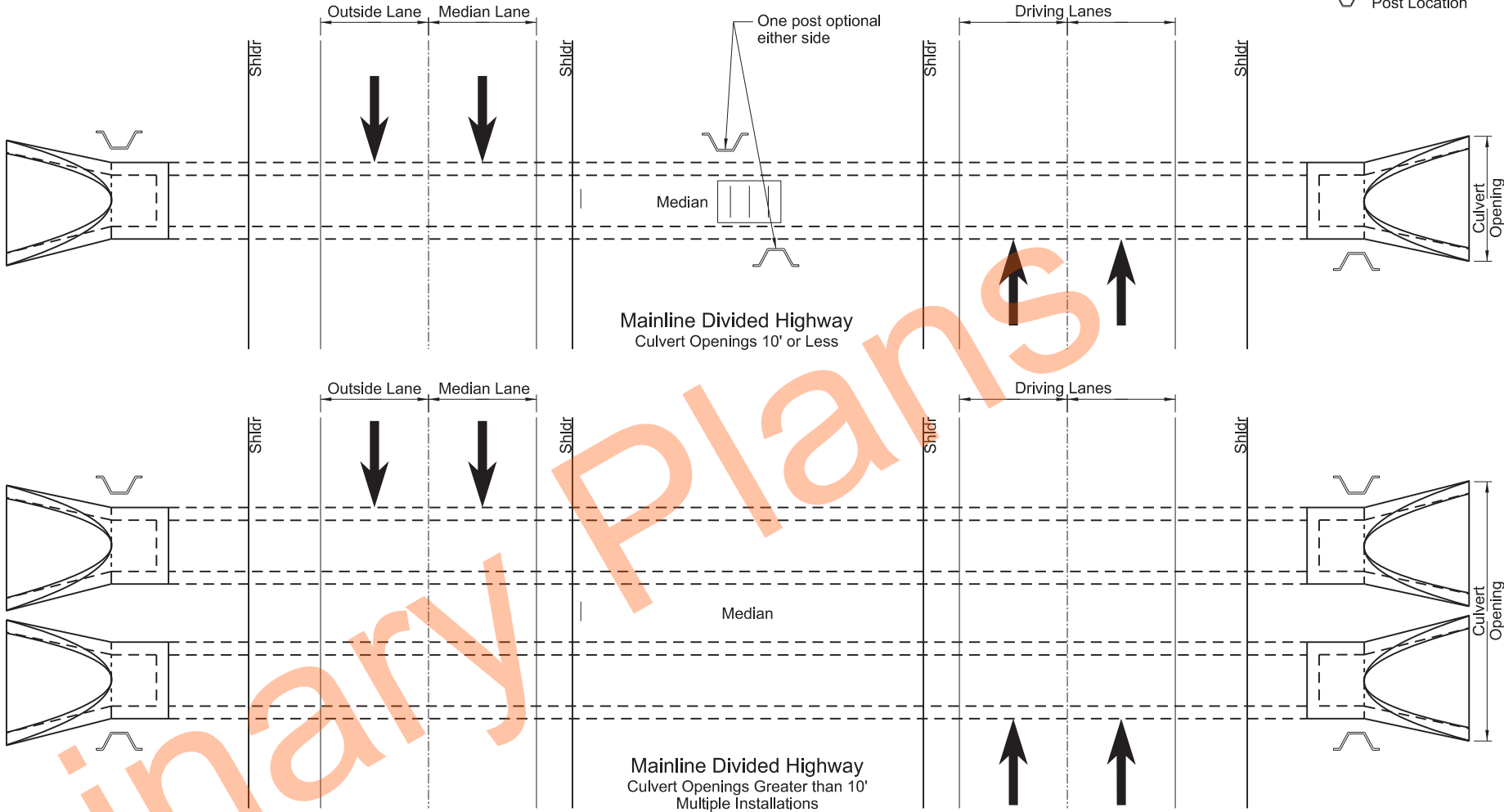
08/07/24

OBJECT MARKERS - CULVERTS

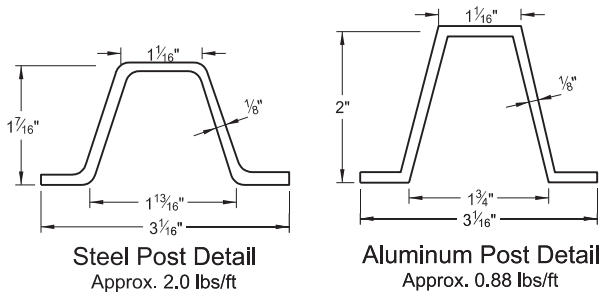
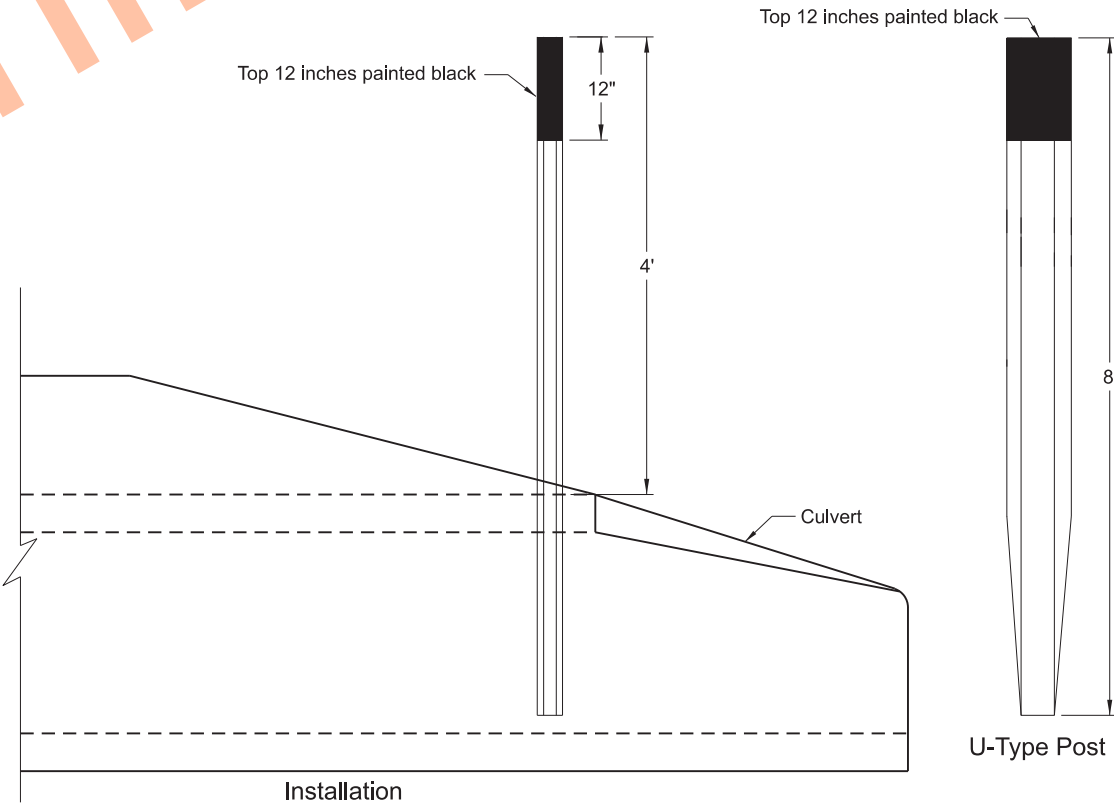
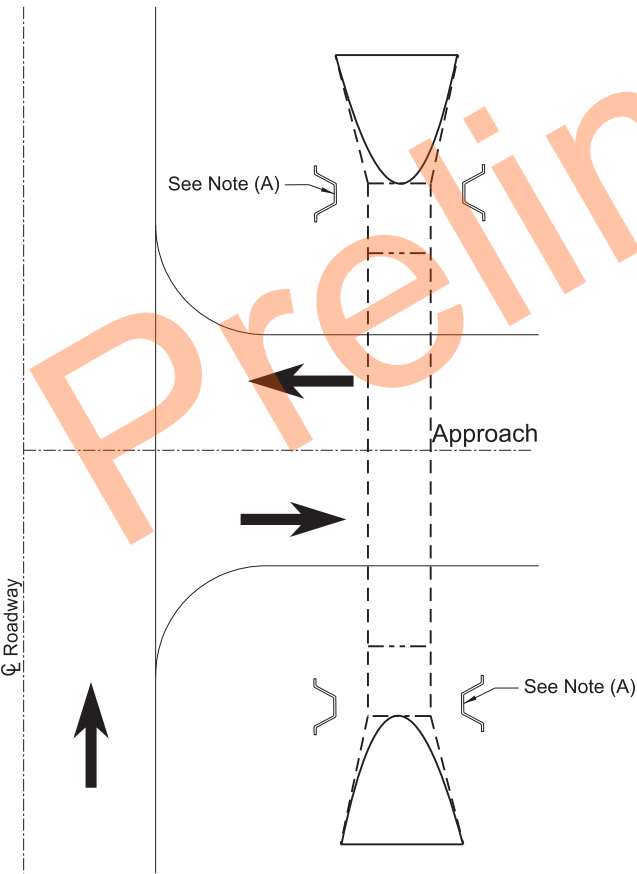
D-754-83



(A) Install additional marker where multiple pipe installations have a width greater than 10'.



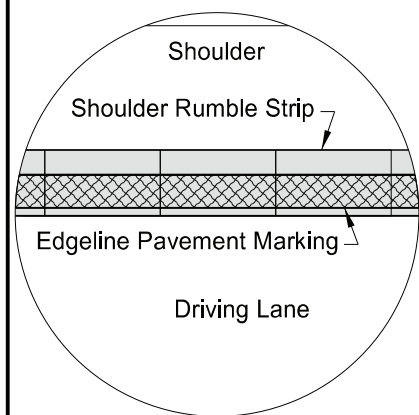
Note:
Mark each end of culverts within the right-of-way with a post. Install posts in front of culvert in direction of travel along the side of culvert and one foot from culvert opening unless shown otherwise in plans.



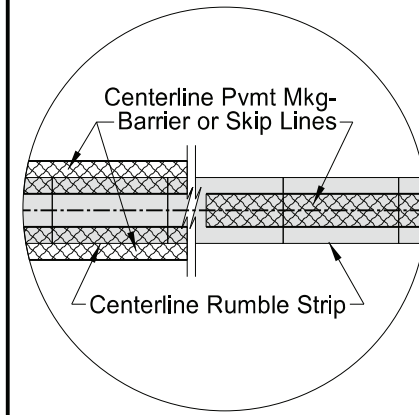
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.
3-13-25	Added Approach Pipe Detail.



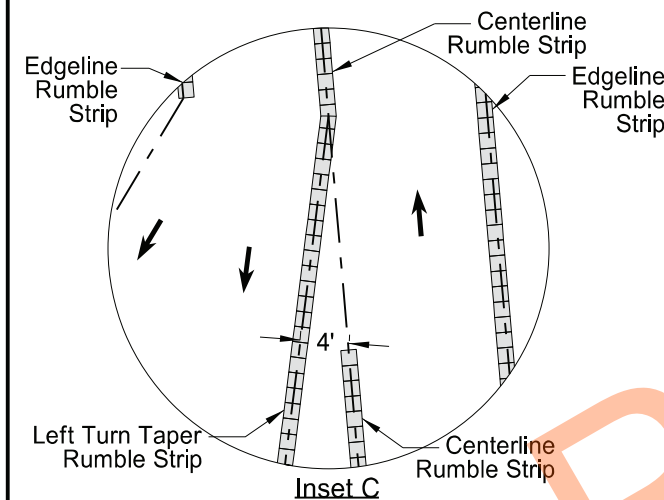
03/13/25



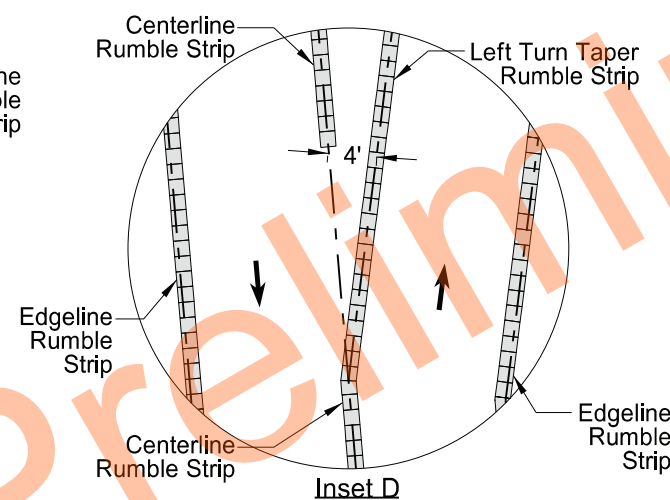
Inset A - Edgeline Rumble Strip
(Layout for opposite shoulder reversed)



Inset B - Centerline Rumble Strip



Inset C



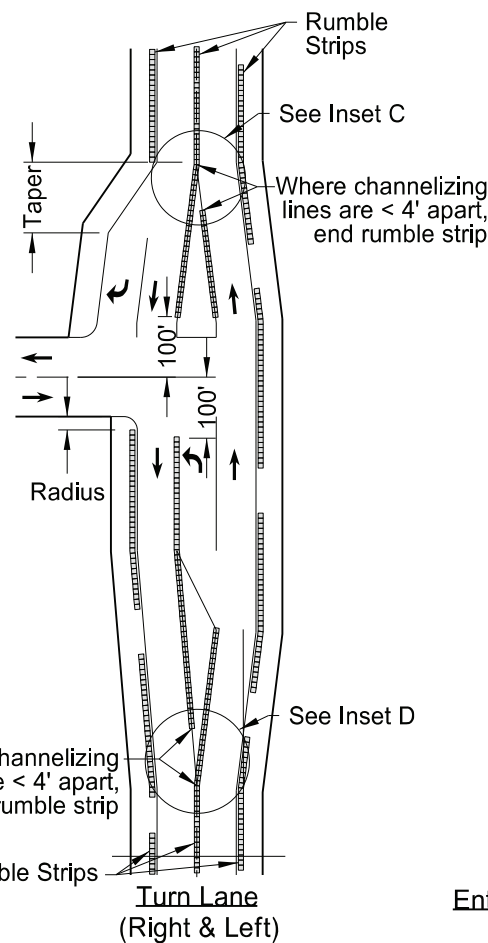
Inset D

NOTES:

1) Discontinue shoulder rumble strips through the entire length of right turn lanes and tapers, and at the radius of paved or gravel highways, section line approaches, or private drives.

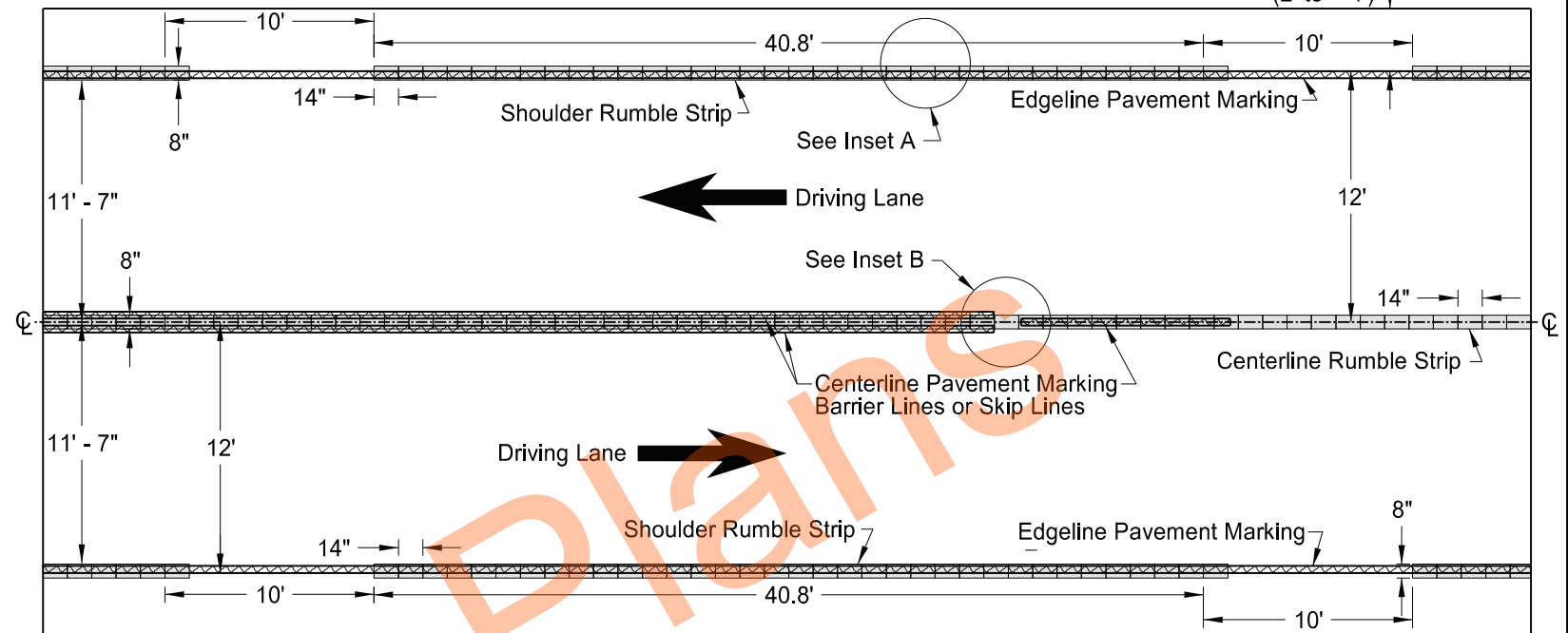
2) Discontinue centerline rumble strips 100' before and after paved or gravel highways, section line approaches, or private drives. Place rumble strips at left turn lanes as shown below.

3) No additional quantity provided for centerline rumble strips on left turn tapers. Include all costs for centerline rumble strips on left turn tapers in the price bid for "Sinusoidal Rumble Strip - Asphalt Centerline" or "Sinusoidal Rumble Strip - Concrete Centerline".

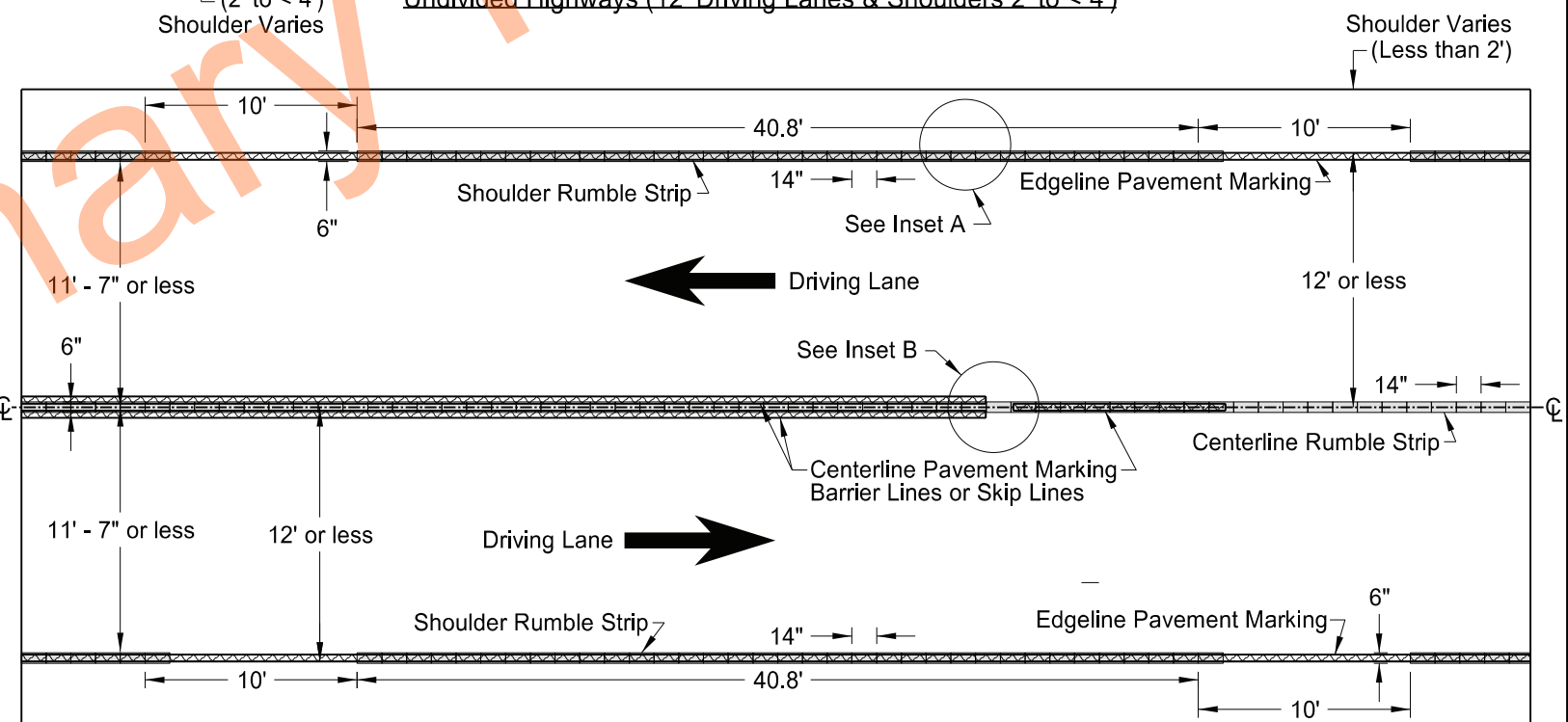


Entrance Roadways

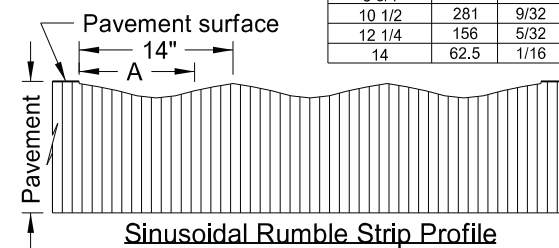
RUMBLE STRIPS UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')



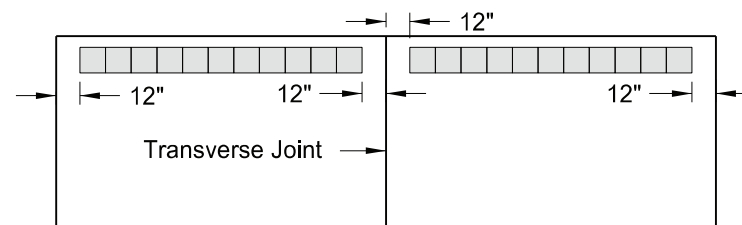
Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')



Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')



Milling Depths		
Location A (in)	MIL	Depth in
0	62.5	1/16
1 3/4	156	5/32
3 1/2	281	9/32
5 1/4	438	7/16
7	500	1/2
8 3/4	438	7/16
10 1/2	281	9/32
12 1/4	156	5/32
14	62.5	1/16



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint

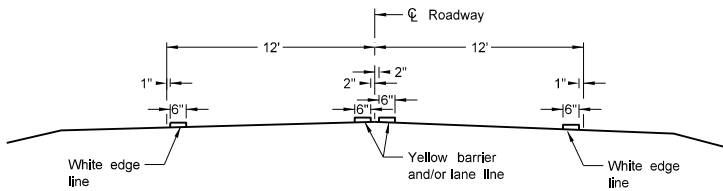
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-4.
1-26-12	Revised details for rumble strip widths and dimensions.
10-25-19	Added missing dimensions.
11-16-21	Revised turn lane rumble layout.
3-07-23	Added Note 3.
5-26-23	Rumble Strips made Sinusoidal.



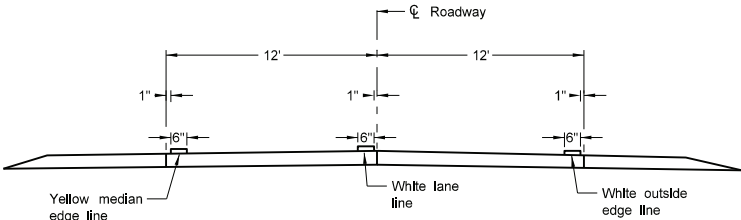
05/26/23

PAVEMENT MARKING

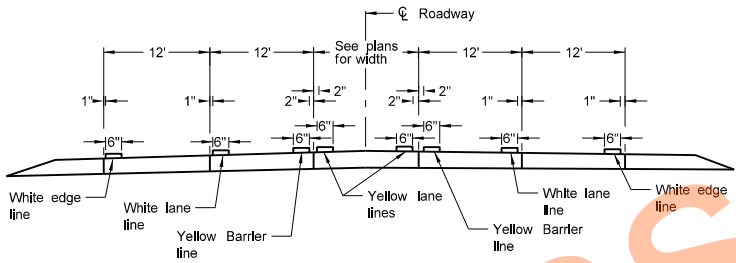
D-762-4



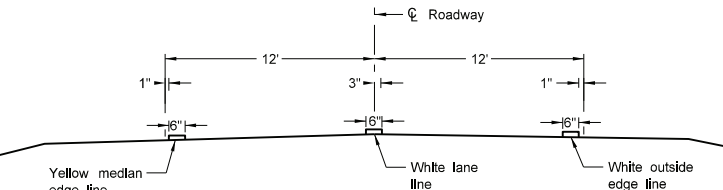
Two Lane Two Way
RURAL ROADWAY



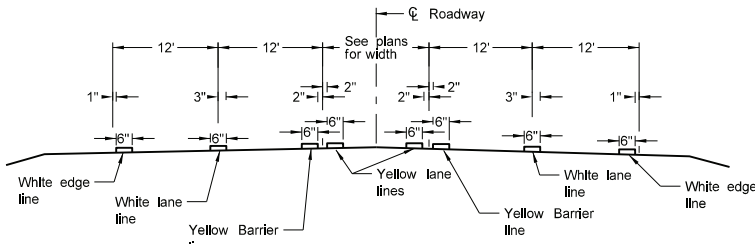
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



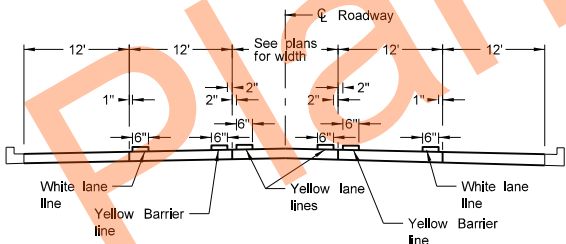
RURAL FIVE LANE ROADWAY
Concrete Section



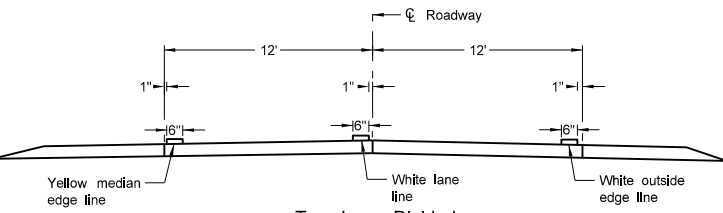
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



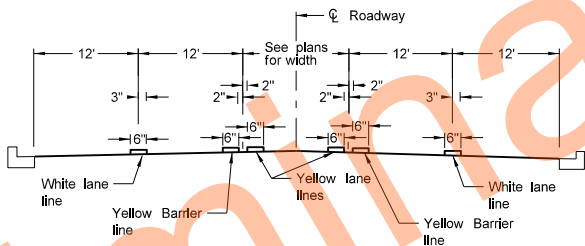
RURAL FIVE LANE ROADWAY
Asphalt Section



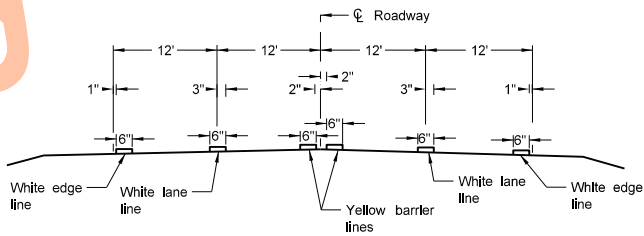
URBAN FIVE LANE SECTION
Concrete Section



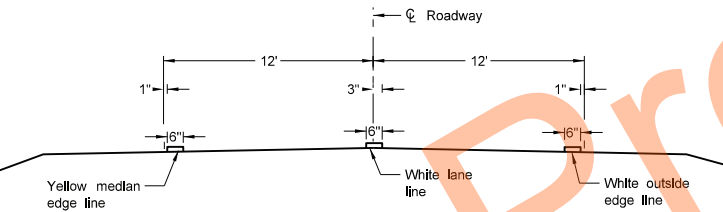
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



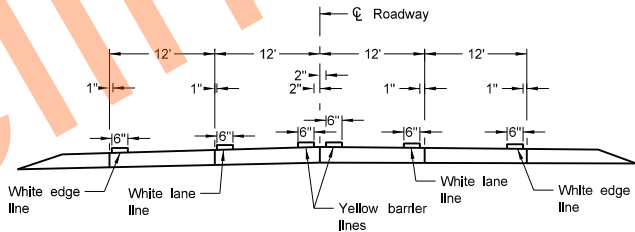
URBAN FIVE LANE SECTION
Asphalt Section



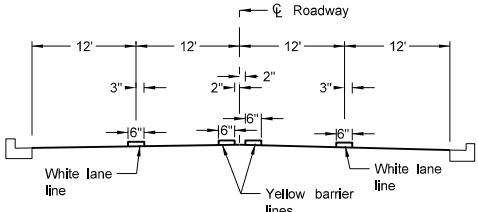
RURAL FOUR LANE ROADWAY
Asphalt Section



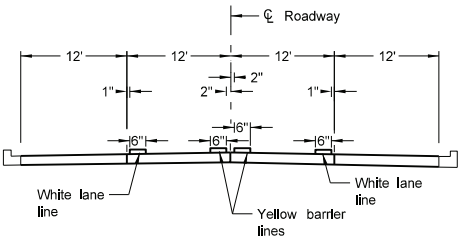
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



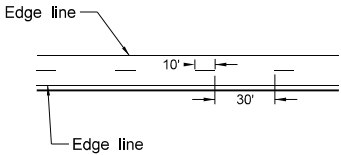
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

- NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.
 2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
 3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

