	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	23637	1	1

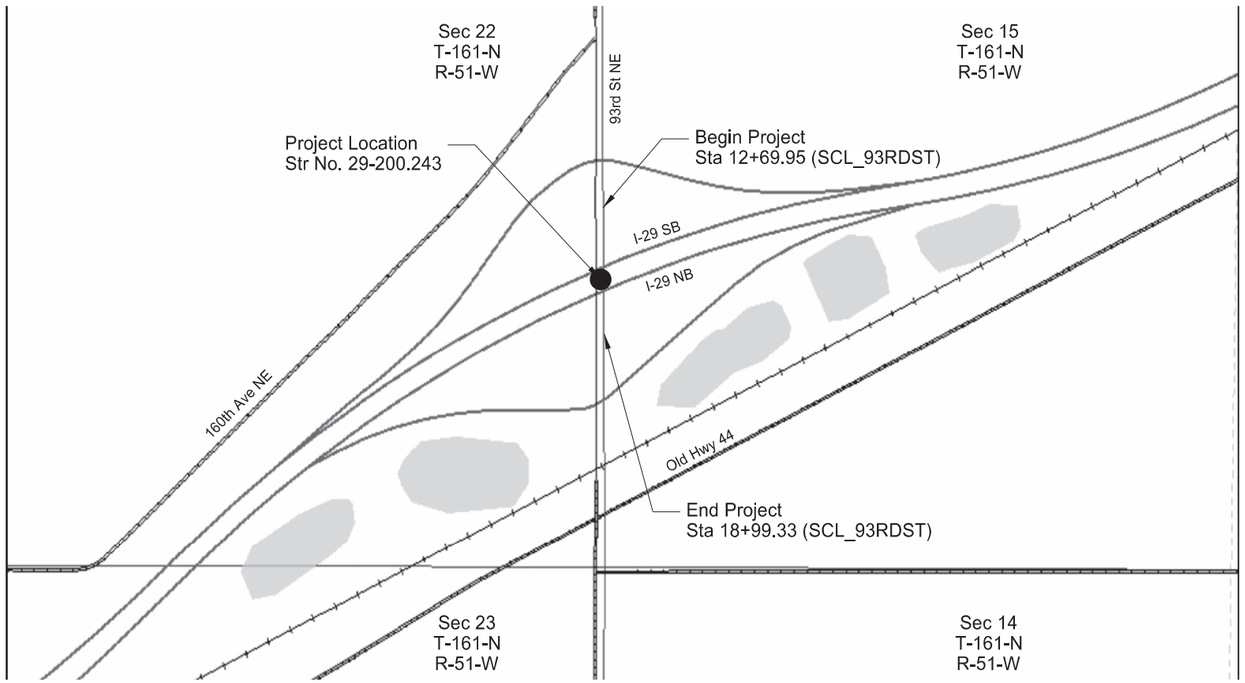
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

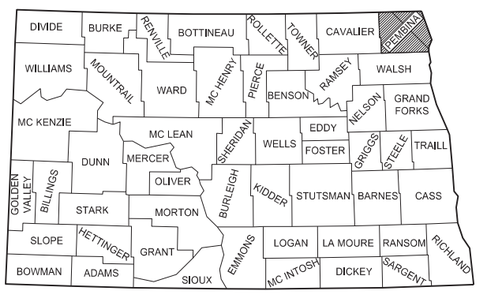
IM-6-029(165)200

Pembina County
Carlisle Overpass Structure Rehabilitation
Interstate 29
Structure Repairs, Bridge Deck Overlay, Removals, Guardrail, Guardrail Embankment, Paving

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-6-029(165)200	.12	.12





STATE COUNTY MAP

DESIGNER
Luke Beckermann, PE
DESIGNER
Adam Kaye, PE
DESIGNER
G. Kelby Laxdal, PE

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson
02/18/25

HOUSTON ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 02/10/25
NORTH DAKOTA

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PLAN SECTIONS

SPECIAL PROVISIONS

LIST OF STANDARD DRAWINGS

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N

5+00

10+00

15+00

20+00

25+00

26+13.45

I-29 Southbound

I-29 Northbound

Sec 15
T-161-N
R-51-W

Sec 14
T-161-N
R-51-W

Remove Inlet, Plug Pipe
Remove/Replace Approach Curb & Gutter
Remove Existing Guardrail
Install New Guardrail System
Guardrail Paving, Embankment

93rd St NE

Rehabilitate Structure
Str No. 29-200.243
See Section 170 for Details

BNSF Railroad (Active)

Sec 22
T-161-N
R-51-W

Sec 23
T-161-N
R-51-W

Str #029-200.243
N 659065.86 E 2761584.53
N 659076.86 E 2761842.92
Overall Length 266'
Clr Roadway 16.67' NB, 17.00' SB
Prestressed Conc Stringer

Structure Rehabilitation
*Deck Overlay
*Barrier
*Pier Spall Repairs
*Erosion Repair
*Foam Fill

Scope of Work

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
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DATE 01/10/2025
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NOTES

100-P01 PUBLIC NOTIFICATION: Provide written notices to each property and business adjacent to the perimeter of the project limits a minimum of 7 days in advance of work. Include proposed start/end date of construction, description of construction activities (closures, removals, etc.), and general schedule of activities for the project from start to end. Prior to delivering notices, submit notice to Project Engineer for approval.

Notify Ted Juhl, Joliette Township Board Chairman, 701-520-1614, a minimum of 3 business days in advance of road closures and work activity/intersection mobility changes.

105-110 PAVEMENT SWEEPING: Sweep paved areas that were used by construction traffic before opening these areas to public traffic.

Sweep all newly constructed pavement no more than 24 hours before a scheduled final inspection.

Use a vacuum or pick-up type sweeper to perform this work.

105-P01 UTILITIES: No utility relocations or adjustments are planned. All utilities on the project need to be protected and remain in their existing location.

107-300 CONSTRUCTION TRAFFIC ACCESS: Access areas within the right of way only at interchanges. The Engineer may allow temporary access at other locations.

To obtain temporary access, provide an access plan containing the following information:

- A traffic control plan;
- A traffic impact analysis;
- A safety analysis;
- A COA; and
- An environmental impact analysis.

To be considered for approval, the following minimum conditions must be met in the access plan:

- Construction traffic will not be allowed to cross the interstate median or lanes of traffic being used by the public at grade;
- The access plan must show that there will be methods in place, at all times, to prevent public traffic from using the access;
- A plan to restore the area disturbed by the access, including right of way fences, to pre-existing or better condition.

All work necessary to provide the access plan, comply with the plan, and to restore the area to its pre-exiting condition must be completed at no additional cost to the Department.

107-P01 CONSTRUCTION TRAFFIC ACCESS: Construction traffic will be allowed to access the closed crossroad roadway the following ways:

1) Using the exit ramps of the interchange. Construction traffic will not be permitted to travel the wrong direction on interchange ramps used by the public.
2) Using the NB and SB inside lanes of I-29 to access the median pier while those lanes are under a single lane closure and protected by precast concrete median barriers.
3) Using the NB and SB outside lanes of I-29 to access the outer piers and slope protection areas while those lanes are under a single lane closure and protected by precast concrete median barriers.

202-P01 REMOVAL OF INLETS: Remove the castings, rings, barrel sections, and bases, designated for removal in the plans. Backfill and compact the excavation in accordance with 203.04.G.2, Compaction Control, Type A. Backfill material and compaction to be included in the contract unit price for “Removal of Inlets”.

203-P01 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment calculations for Guardrail Embankment and Topsoil. Do not compact the top 6” of topsoil.

203-P02 GUARDRAIL EMBANKMENT: Utilize hydraulic mulch as identified in 253.04.B to cover seeded areas.

251-P01 SEEDING CLASS II: Seeding Class II, Temporary Cover Crop and Hydraulic Mulch to be paid for by plan quantity.

260-P01 REMOVE SILT FENCE SUPPORTED: Prior to final stabilization, remove all temporary supported silt fence and posts, repair any soil disturbances or installation slits, and stabilize the affected area in the same manner as adjacent guardrail embankment work. Include the cost for the removal of the silt fence supported in the contract unit price for “Silt Fence Supported”.

430-P01 PAVEMENT PATCHING ON RAMPS: A quantity of 200 tons of Commercial Grade Hot Mix Asphalt has been provided for patching ramps before using ramp detours at locations determined by the Engineer.

704-100 TRAFFIC CONTROL SUPERVISOR: Provide a Traffic Control Supervisor.

704-200 STATE FURNISHED MEDIAN BARRIER: Obtain (80) 2.5’ x 10’ concrete barriers. They can be picked up and returned to the Casselton yard at 15482 37th St SE in Casselton ND 58012. The hardware can be picked up and returned to the Fargo District yard at 503 38th St S in Fargo ND 58103. Contact the Fargo District office at 701-239-8900 to facilitate the exchanges.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

If returning barriers with connection components, coordinate the delivery location for the connecting components with the Engineer. Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department.

Include all costs associated with median barriers in the contract unit price for “State Furnished Median Barrier”.

704-P01 TEMPORARY TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using traffic control sign layouts (shown in Section 100 of the plans) and Standard Drawings listed below:

D-704-15, Layout Type A, for temporary road closures.

D-704-18 for Interstate System one lane closure

D-704-21, Layout Type I, for detour layouts

D-704-26 Miscellaneous Sign Layouts

704-P02 TRAFFIC CONTROL PHASING: The traffic control details, as indicated in the plans, have been developed based on the premise that this project will be constructed as follows.

If electing to utilize a different phasing plan, submit a detailed traffic control plan to the Engineer for approval a minimum of 14 days prior to installing traffic control devices.

The construction phasing plan is listed below:

Phase 1A: Setup detour signing to route traffic around the interchange in preparation for the crossroad closure.

- Install signs and devices in accordance with Standard Drawing D-704-21 and as shown on the traffic control layout sheets.

Phase 1B: Close outside lanes on northbound and southbound I-29 at the Carlisle Interchange.

- Install signs and devices in accordance with Standard Drawing D-704-18.

Phase 1C: Close inside lanes on northbound and southbound I-29 at the Carlisle Interchange.

- Install signs and devices in accordance with Standard Drawing D-704-18.

Either Phase 1B or 1C can be utilized at any time, but they cannot be used concurrently.

Phase 1D: Close 93rd Street NE between the interchange intersections.

- Install signs and devices in accordance with Standard Drawing D-704-15 and the modifications shown on the traffic control layout sheets.

Phase 2A: Close northbound and southbound I-29 and 93rd Street NE between the interchange entrance and exit ramp intersections and utilize the ramps for northbound and southbound through traffic.

- Install signs and devices in accordance with Sheet 100-4 of the traffic control layout sheets.

704-P03 MAINLINE TRAFFIC DETOUR: Use of a ramp detour during bridge deck removal, barrier removal, and canopy placement and removal over a mainline roadway is restricted to 10 calendar days for the mainline roadway closure in that direction of travel at the structure.

Liquidated damages for failure to meet the requirements of this note will be in accordance with Section 108.07. Work will be stopped if the detour ramp traffic exceeds 10 calendar days without written approval from the Engineer.

714-P01 PLUG PIPE ALL TYPES AND SIZES: Plug the existing pipes designated to be abandoned in the plans. Dewater the existing pipe prior to installing plug. Construct the plug of controlled density backfill to fully fill the entire pipe remaining. Ensure that Engineer-approved means (of identifying that the pipe is completely full) are in place prior to placement of controlled density backfill.

Provide controlled density backfill containing a blend of cement, water, pozzolanic materials, and fillers meeting the following requirements:

1) Fluid on placement.
2) Support normal loads after 6 hours.
3) 28-day compressive strength of 75 psi to 125 psi.
4) Easy removal with a tractor backhoe.

No additional testing is required if the following mix design is used. The mix design yields approximately one cubic yard of flowable mortar.

Mix Design	
Cement	70 Lbs
Flyash	125 Lbs
Fine Aggregate	2,600 Lbs
Water	50 Gals

Place controlled density backfill as shown in the plans. Mix the material continuously during pumping or placement to keep the solution from separating.

Include all labor, materials, and equipment necessary to perform this work in the contract unit price for "Plug Pipe-All Types & Sizes".

REGISTERED PROFESSIONAL ENGINEER
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PE-9476
DATE 01/10/2025
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	8	1

PCN 23476 (TIED)

Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	IM-6-029(165)200				TOTAL
103	0100	CONTRACT BOND	L SUM	0.2				0.2
202	0129	REMOVAL OF CURB	LF	520				520
202	0130	REMOVAL OF CURB & GUTTER	LF	162				162
202	0230	REMOVAL OF INLETS	EA	4				4
203	0109	TOPSOIL	CY	44				44
203	0218	GUARDRAIL EMBANKMENT	EA	4				4
216	0100	WATER	M GAL	42				42
251	0200	SEEDING CLASS II	ACRE	0.04				0.04
251	2000	TEMPORARY COVER CROP	ACRE	0.04				0.04
253	0201	HYDRAULIC MULCH	ACRE	0.08				0.08
260	0200	SILT FENCE SUPPORTED	LF	1112				1112
261	0112	FIBER ROLLS 12IN	LF	3900				3900
302	0120	AGGREGATE BASE COURSE CL 5	TON	183				183
401	0050	TACK COAT	GAL	1				1
401	0060	PRIME COAT	GAL	111				111
430	0145	RAP - SUPERPAVE FAA 45	TON	55				55
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	200				200
430	5818	PG 58H-34 ASPHALT CEMENT	TON	2.8				2.8
602	0130	CLASS AAE-3 CONCRETE	CY	81				81
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	752				752
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	18032				18032
650	0704	OVERLAY CONCRETE	CY	64				64
650	0707	DECK CONCRETE	CY	3				3
650	0710	CLASS 1-H REMOVAL	SY	694				694
650	0720	CLASS 1 REMOVAL	SY	694				694
650	0723	CLASS 3 REMOVAL	SY	21				21
650	0724	CLASS 4 REMOVAL	SY	7				7
702	0100	MOBILIZATION	L SUM	0.2				0.2
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4468				4468
704	1045	ATTENUATION DEVICE-TYPE B-75	EA	2				2
704	1052	TYPE III BARRICADE	EA	12				12
704	1060	DELINEATOR DRUMS	EA	128				128
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2				2
704	1095	TYPE B FLASHERS	EA	6				6
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	405				405
704	3511	STATE FURNISHED MEDIAN BARRIER	LF	800				800
706	0400	FIELD OFFICE	EA	0.2				0.2
706	0500	AGGREGATE LABORATORY	EA	0.2				0.2
706	0550	BITUMINOUS LABORATORY	EA	0.2				0.2
706	0600	CONTRACTOR'S LABORATORY	EA	0.2				0.2
714	9680	PLUG PIPE-ALL TYPES & SIZES	EA	4				4
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	60				60
762	0420	SHORT TERM 4IN LINE-TYPE R	LF	8450				8450
762	0426	SHORT TERM 24IN LINE-TYPE R	LF	24				24
764	0131	W-BEAM GUARDRAIL	LF	233				233
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	4				4
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	433				433

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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PCN 23476 (TIED)

Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	IM-6-029(165)200				TOTAL
764	2081	REMOVE END TREATMENT & TRANSITION	EA	4				4
930	3000	BRIDGE BENCH MARKS	SET	1				1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	49				49
930	7012	ROADWAY CANOPY	L SUM	1				1
930	9612	SPALL REPAIR	SF	21				21

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BASIS OF ESTIMATE

MATERIALS
Aggregate Base Course Cl 5 @ 1.875 TON/CY
Tack Coat @ 0.075 GAL/SY
Prime Coat @ 0.25 GAL/SY
RAP - Superpave FAA 45 @ 2 TON/CY
PG 58H-34 Asphalt Cement @ 5.2%

		Guardrail Paving - 93rd St NE Crossroad				
Material	**Unit**	**Area (SY)**	**Depth (IN)**	**Width (FT)**	**Total Quantity**	**Unit**
Aggregate Base Course Cl 5 @ 1.875 TON/CY	TON	585	6	-	183	TON
Prime Coat @ 0.25 GAL/SY	GAL	425	-	-	107	GAL
RAP - Superpave FAA 45 @ 2 TON/CY	TON	425	2	-	49	TON
PG 58H-34 Asphalt Cement @ 5.2%	TON	-	-	-	2.5	TON
		Pavement Adjacent to Curb & Gutter – 93rd St NE Crossroad				
Tack Coat @ 0.075 GAL/SY	GAL	14	-	-	1	GAL
Prime Coat @ 0.25 GAL/SY	GAL	14	-	-	4	GAL
RAP - Superpave FAA 45 @ 2 TON/CY	TON	14	7	-	6	TON
PG 58H-34 Asphalt Cement @ 5.2%	TON	14	7	-	0.3	TON
		Summary Total				
		Aggregate Base Course Cl 5			183	TON
		Tack Coat			1	GAL
		Prime Coat			111	GAL
		RAP - Superpave FAA 45			55	TON
		PG 58H-34 Asphalt Cement			2.8	TON

WATER
25 MGAL/MILE for Dust Palliative
20 GAL/TON for Aggregate Base Course
10 GAL/CY for Embankment

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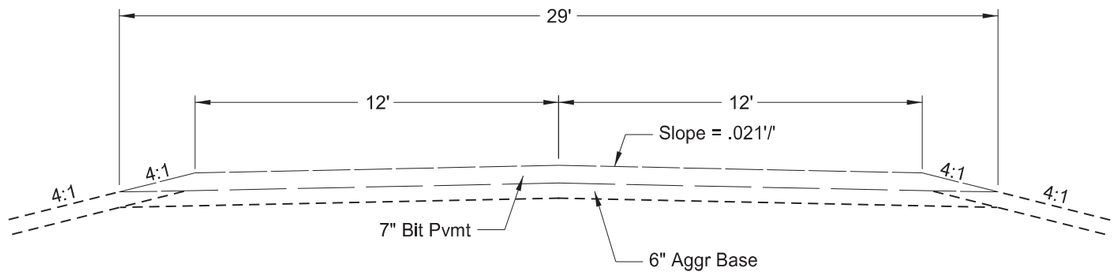
	ND	IM-6-029(165)200	30	1



Existing Typical Section
93rd St NE
Sta 6+26.10 to Sta 14+47.63 (Align: SCL_93RDST)
Sta 17+07.46 to Sta 22+91.17 (Align: SCL_93RDST)

Existing Typical Sections

Structure Repairs
Carlisle Interchange
Interstate 29

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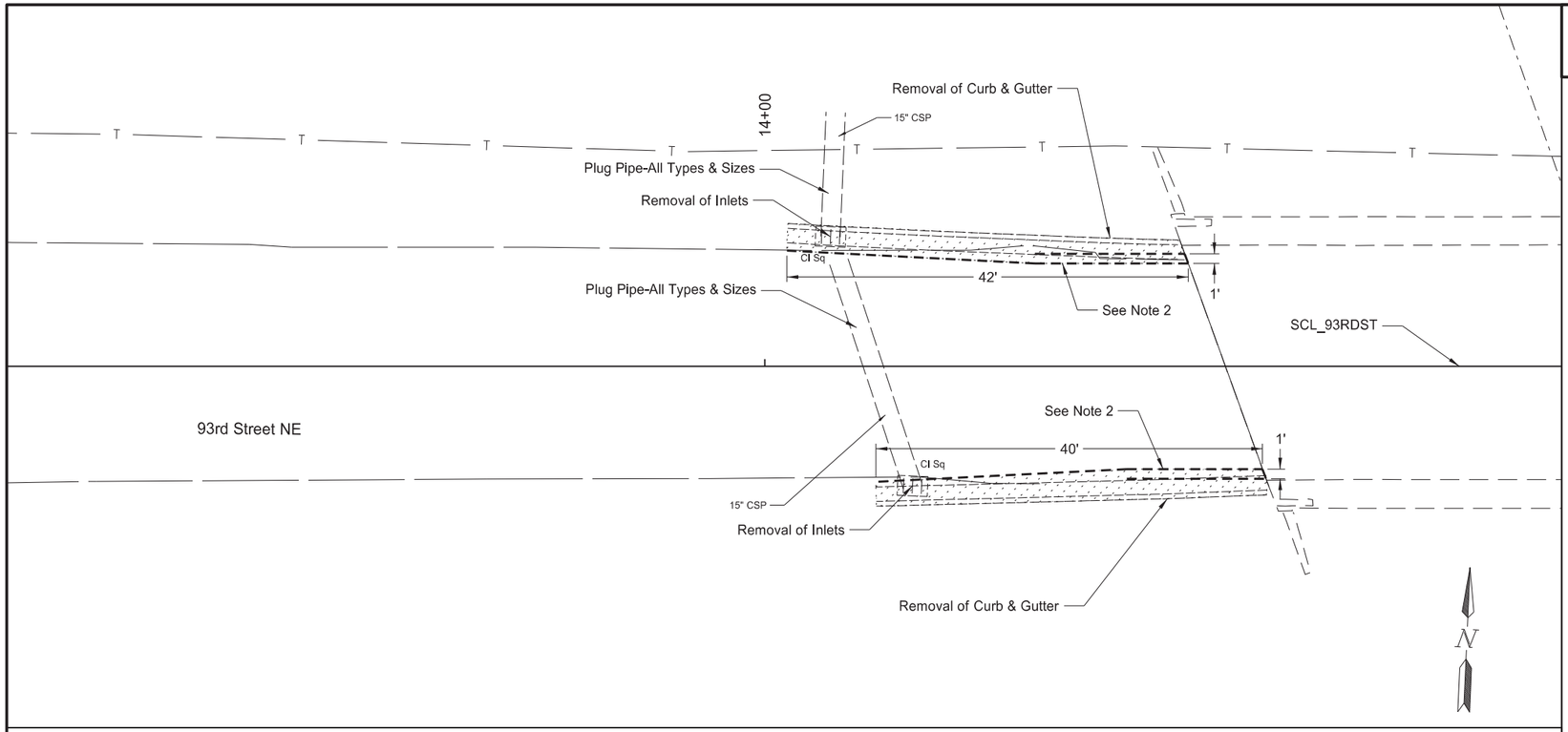

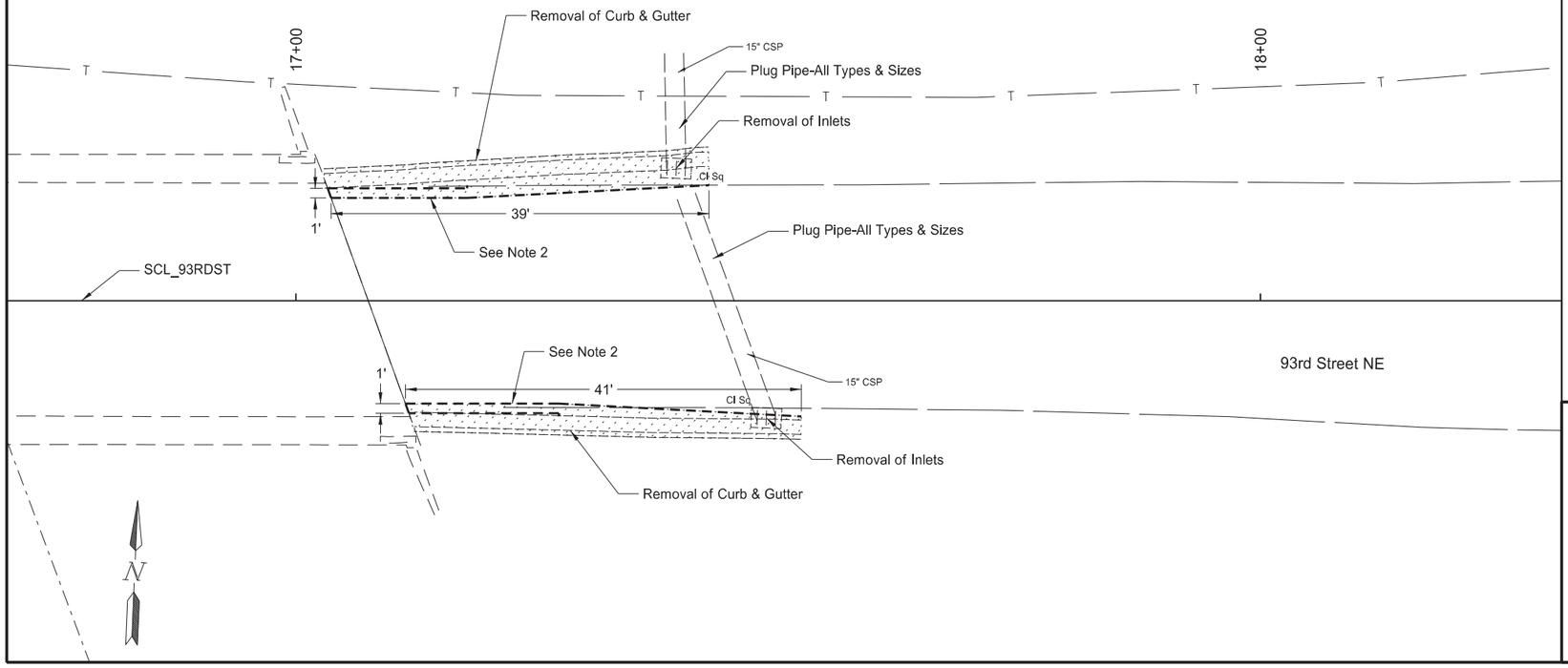

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC	CODE	BID ITEM	QTY	UNIT
202	0130	REMOVAL OF CURB & GUTTER		
		Sta 14+02 to Sta 14+43 Lt	41	LF
		Sta 14+12 to Sta 14+53 Rt	41	LF
		Sta 17+03 to Sta 17+43 Lt	40	LF
		Sta 17+12 to Sta 17+52 Rt	40	LF
202	0230	REMOVAL OF INLETS		
		Sta 14+07 Lt	1	EA
		Sta 14+15 Rt	1	EA
		Sta 17+39 Lt	1	EA
		Sta 17+49 Rt	1	EA
714	9680	PLUG PIPE-ALL TYPES & SIZES		
		Sta 14+07 Lt - 13 LF	1	EA
		Sta 14+11 - 27 LF	1	EA
		Sta 17+39 Lt - 12 LF	1	EA
		Sta 17+44 - 28 LF	1	EA

Legend

Removal of Curb & Gutter

Sawcut

Note:
1. All Stationing based on SCL_93RDST Alignment
2. Include the removal of asphalt pavement overlaid on curb and gutter and that to be removed to facilitate new curb and gutter installation with the REMOVAL OF CURB & GUTTER bid item.

93rd Street NE Crossroad
Removals

Structure Repairs
Carlisle Interchange
Interstate 29

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DATE 01/10/2025
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Wetland Impact Table

Wetland Number	Location	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)		USFWS Easement Impacts Acre(s)		Wetland Mitigation						
								Mitigation Required			USACE/11990 Bank		11990 Bank	
				Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)
1a	Sec.22, T161N, R51W	Created	Yes						Y					
1b	Sec.22, T161N, R51W	Created	Yes						Y					
1c	Sec.22, T161N, R51W	Created	Yes											
1d	Sec.22, T161N, R51W	Created	Yes											
2a	Sec.22, T161N, R51W	Created	Yes						Y					
2b, c, d, e	Sec.22, T161N, R51W	Created	Yes						Y					
3	Sec.22, T161N, R51W	Created	Yes											
4a	Sec.15, T161N, R51W	Created	Yes						Y					
4b, c, d, e	Sec.15, T161N, R51W	Created	Yes						Y					
5a	Sec.15, T161N, R51W	Created	Yes						Y					
5b	Sec.15, T161N, R51W	Created	Yes											
5c	Sec.15, T161N, R51W	Created	Yes						Y					
				0	**0**							**0**		

1 A preliminary wetland Jurisdictional Determination was issued by the USACE on 2/9/2024; NWO-2019-02031-BIS.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0	**Temporary JD**	0
Natural/Non-JD	0	**Non-JD Temporary**	0
Artificial/JD	0	**Permanent JD > 0.10**	0
Artificial /Non-JD	0	**Permanent OW**	0
Total	**0**	**Temporary OW**	0

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only	-	-		-	
EO 11990 Only	-	-	-		
USACE/11990	Kirkeby-Schuster	-		0	
USFWS	0				0
	Total	**0**	**0**	**0**	**0**

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Wetlands Mitigation and Environmental

Structure Repairs
Carlisle Interchange
Interstate 29

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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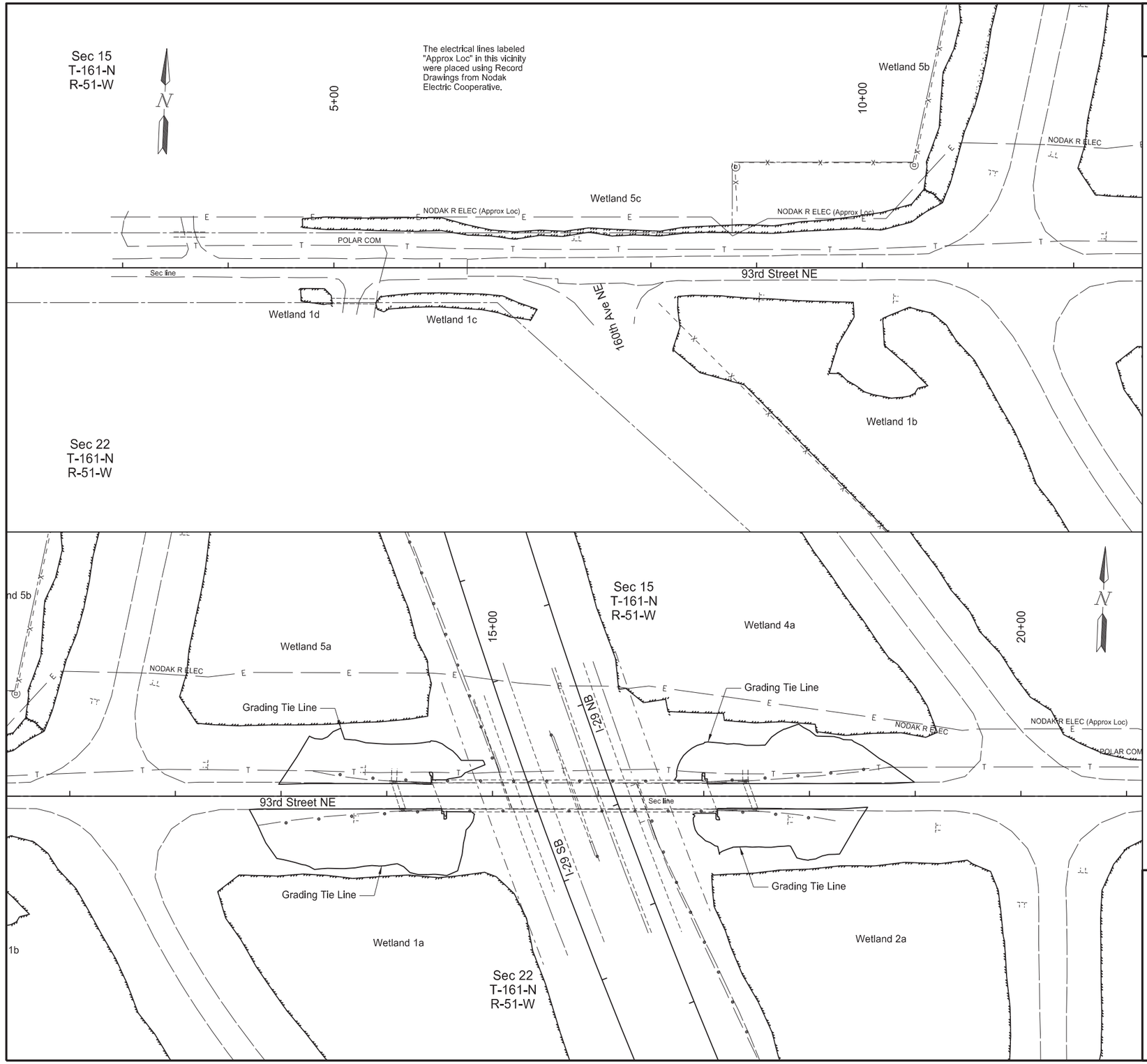

Wetland, Mitigation, & Environmental Impacts

Structure Repairs
Carlisle Interchange
Interstate 29

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DATE 01/10/2025
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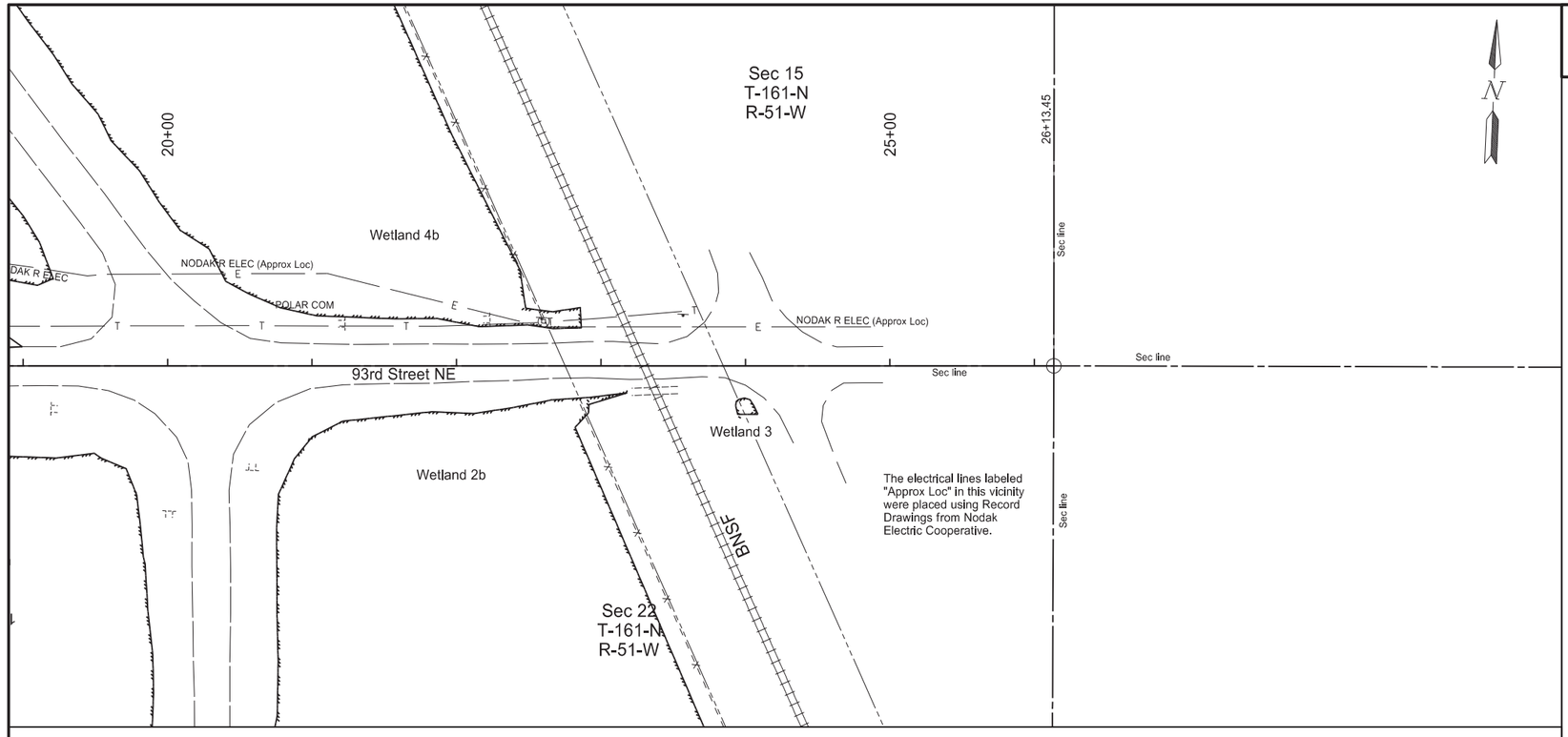

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	75	3

Wetland, Mitigation, &
Environmental Impacts

Structure Repairs
Carlisle Interchange
Interstate 29

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	76	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 14+49 to Sta 14+69	0.02	ACRE
		Sta 16+84 to Sta 17+05	0.02	ACRE
253	0201	HYDRAULIC MULCH		
		Sta 14+49 to Sta 14+69	0.02	ACRE
		Sta 16+84 to Sta 17+05	0.02	ACRE
260	0200	SILT FENCE SUPPORTED		
		Sta 12+00 to Sta 14+48 Lt	250	LF
		Sta 12+32 to Sta 15+05 Rt	274	LF
		Sta 16+21 to Sta 19+29 Lt	312	LF
		Sta 16+95 to Sta 19+70 Rt	276	LF
261	0112	FIBER ROLLS 12IN		
		Sta 12+98 to Sta 14+93 Lt	457	LF
		Sta 12+69 to Sta 14+83 Rt	524	LF
		Sta 16+72 to Sta 18+99 Lt	505	LF
		Sta 16+65 to Sta 18+55 Rt	412	LF

Legend

- Temporary Cover Crop & Hydraulic Mulch
- Guardrail Embankment Temporary Cover Crop & Hydraulic Mulch
- Temporary Fiber Rolls
- SF — Temporary Silt Fence Supported
- Flow Direction

Temporary Erosion Control

Structure Repairs
Carlisle Interchange
Interstate 29

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NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	77	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 12+78 to Sta 15+10	0.02	ACRE
		Sta 16+46 to Sta 18+77	0.02	ACRE
253	0201	HYDRAULIC MULCH		
		Sta 12+78 to Sta 15+10	0.02	ACRE
		Sta 16+46 to Sta 18+77	0.02	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 12+98 to Sta 14+93 Lt	457	LF
		Sta 12+69 to Sta 14+83 Rt	524	LF
		Sta 16+72 to Sta 18+99 Lt	505	LF
		Sta 16+65 to Sta 18+55 Rt	412	LF

Legend

Seeding Class II & Hydraulic Mulch

Guardrail Embankment Seeding Class II & Hydraulic Mulch

Fiber Rolls

Flow Direction

Permanent Erosion Control

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

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PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I29, 3 Miles South of ND 5

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
93rd St NE (Chain: SCL_93RDST)			
Beg/Rec 1/4 Cor	0+00.00	659,002.68	2,760,137.65
Station Equation 93rd St NE (SCL_93RDST) at SW Ramp (SW Ramp)			
93rd St NE	11+16.68	659,051.17	2,761,253.27
SW Ramp	125+00.00	659,051.17	2,761,253.27
Station Equation 93rd St NE (SCL_93RDST) at NW Ramp (NW Ramp)			
93rd St NE	11+26.19	659,051.58	2,761,262.77
NW Ramp	62+80.42	659,051.58	2,761,262.77
Station Equation 93rd St NE (SCL_93RDST) at I29 SB (OCL_I29SB)			
93rd St NE	15+38.06	659,069.46	2,761,674.25
I29 SB	10573+51.73 BK	659,069.46	2,761,674.25
I29 SB	10573+14.20 AH	659,069.46	2,761,674.25
SCL_I29NB	16+16.10	659,072.85	2,761,752.23
Station Equation 93rd St NE (SCL_93RDST) at SE Ramp (SE Ramp)			
93rd St NE	20+36.98	659,091.13	2,762,172.70
SE Ramp	111+75.10	659,091.13	2,762,172.70
Station Equation 93rd St NE (SCL_93RDST) at NE Ramp (NE Ramp)			
93rd St NE	20+38.97	659,091.21	2,762,174.70
NE Ramp	75+00.00	659,091.21	2,762,174.70
End/Rec Sec Cor	26+13.45	659,116.16	2,762,748.63

Alignment - NW Ramp			
Beg/93rd St NE	50+00.00	660,320.53	2,761,296.16
PC	52+18.19	660,105.32	2,761,332.09
PI	55+33.46	659,794.36	2,761,383.99
PT	58+43.08	659,483.21	2,761,333.21
End/93rd St NE	62+80.42	659,051.58	2,761,262.77

CURVE DATA

ARC DEFINITION

Alignment - NW Ramp

PI STA = 55+33.46

Delta = 18°44'42" (RT)

Da = 03°00'00"

R = 1,910.08'

T = 315.26'

L = 624.89'

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-161-N R-51W			
NW Cor Sec 15	7-E	664,288.23	2,757,237.88
E Qtr Cor Sec 16	7-F	661,668.10	2,757,389.01
NE Cor Sec 21	7-G	658,889.05	2,757,526.62
E Qtr Cor Sec 21	7-H	656,221.36	2,757,645.71
SE Cor Sec 21	7-J	653,553.65	2,757,764.48
N Qtr Cor Sec 15	8-E	664,329.80	2,759,882.84
S Qtr Cor Sec 15	8-G	659,002.68	2,760,137.65
NE Cor Sec 15	9-E	664,430.89	2,762,527.99
E Qtr Cor Sec 15	9-F	661,765.62	2,762,636.69
SE Cor Sec 15	9-G	659,116.16	2,762,748.63
E Cor Sec 22	9-H	656,462.91	2,762,853.67
NE Cor Sec 27	9-J	653,814.00	2,762,964.18
N Qtr Cor Sec 23	10-G	659,224.73	2,765,404.80
N Qtr Cor Sec 26	10-J	653,923.45	2,765,617.79
NE Cor Sec 23	11-G	659,333.05	2,768,060.87
E Cor Sec 23	11-H	656,688.73	2,768,168.25
NE Cor Sec 26	11-J	654,036.88	2,768,316.28

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
PRIMARY CONTROL							
GPS 29-1	656,738.16	2,763,684.66	796.03	10542+72	250' Rt	SCL_I29NB	5/8 Rebar
GPS 29-2	661,795.88	2,761,162.32	797.01	10600+76	191' Rt	SCL_I29NB	5/8 Rebar
SECONDARY CONTROL							
RTK 50	657,096.46	2,762,761.79	795.65	10551+28	244' Lt	SCL_I29NB	5/8 Rebar
RTK 51	657,690.73	2,762,259.42	793.77	10558+82	243' Lt	SCL_I29NB	5/8 Rebar
RTK 52	658,348.33	2,761,651.89	793.84	10567+17	402' Rt	SCL_I29NB	5/8 Rebar
3491 BM	659,031.92	2,761,730.45	800.94	10572+79	36' Lt	SCL_I29NB	Chiseled Square
1000 BM	668,330.31	2,757,921.07	797.82	10673+50	192' Rt	SCL_I29NB	USC&GS Brass Disc Y58 1934
RTK 10	659,161.52	2,761,752.08	797.79	10573+97	33' Rt	SCL_I29NB	5/8 Rebar
RTK 54	660,040.02	2,761,207.89	795.16	10583+78	236' Lt	SCL_I29NB	5/8 Rebar
RTK 55	660,938.04	2,761,007.67	795.95	10593+16	244' Lt	SCL_I29NB	5/8 Rebar
RTK 53	659,143.06	2,761,182.42	795.41	10+50	95' Lt	SCL_93RDST	5/8 Rebar
RTK 13	659,044.26	2,761,469.23	814.07	13+32	16' Rt	SCL_93RDST	5/8 Rebar
3830 BM	659,051.90	2,761,593.55	821.87	14+57	14' Rt	SCL_93RDST	Chiseled Square
RTK 11	658,995.72	2,761,670.19	798.56	15+31	73' Rt	SCL_93RDST	5/8 Rebar
3490 BM	659,091.06	2,761,833.79	820.73	16+98	15' Lt	SCL_93RDST	Chiseled Square
RTK 12	659,100.75	2,761,977.34	810.93	18+42	18' Lt	SCL_93RDST	5/8 Rebar

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK NDGPS Stations (OPUS)

[X] NAVD-88 [ ] _____ [ ] GEOID12B [X] GEOID18 [ ] _____

Date Survey Completed 1/19/24

[ ] Assumed Coordinates

[X] All coordinates on this sheet are Pembina County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota North Zone Combination Factor (cf) = 0.9999640

REGISTERED LAND SURVEYOR
JAMES A. SCHLIEMAN
LS-6086
DATE
NORTH DAKOTA
11/21/2024

NOTES:
-Sheet 1 of 3.

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I29, 3 Miles South of ND 5

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	81	2

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
Alignment - NE Ramp			
Beg/93rd St NE	75+00.00	659,091.21	2,762,174.70
PC	81+78.16	659,613.78	2,761,742.46
PI	85+14.31	659,872.81	2,761,528.21
PT	88+38.52	660,200.09	2,761,451.53
End/93rd St NE	89+67.72	660,325.89	2,761,422.06
Alignment - SE Ramp			
Beg/93rd St NE	100+00.00	657,955.04	2,762,405.19
PC	100+44.69	657,994.09	2,762,383.46
PI	104+04.21	658,308.22	2,762,208.60
PT	107+50.88	658,667.36	2,762,192.13
End/93rd St NE	111+75.10	659,091.13	2,762,172.70
Alignment - SW Ramp			
Beg/93rd St NE	125+00.00	659,051.17	2,761,253.27
PC	126+43.30	658,927.25	2,761,325.25
PI	128+16.76	658,777.27	2,761,412.38
PT	129+85.16	658,675.48	2,761,552.83
PC	131+21.29	658,595.60	2,761,663.05
PI	134+26.57	658,416.45	2,761,910.25
PT	137+26.74	658,169.18	2,762,089.28
End/93rd St NE	139+66.14	657,975.27	2,762,229.68

CURVE DATA

ARC DEFINITION

Alignment - NE Ramp	
PI STA	= 85+14.31
Delta	= 26°24'32" (RT)
Da	= 03°59'57"
R	= 1,432.69'
T	= 336.15'
L	= 660.36'

Alignment - SE Ramp	
PI STA	= 104+04.21
Delta	= 26°28'41" (RT)
Da	= 03°44'56"
R	= 1,528.16'
T	= 359.52'
L	= 706.20'

Alignment - SW Ramp		Alignment - SW Ramp	
PI STA	= 128+16.76	PI STA	= 134+26.57
Delta	= 23°54'54" (LT)	Delta	= 18°09'40" (RT)
Da	= 06°59'46"	Da	= 03°00'00"
R	= 819.02'	R	= 1,910.08'
T	= 173.45'	T	= 305.28'
L	= 341.86'	L	= 605.45'

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
Alignment - SCL_I29NB			
Beg	10505+50.71	653,292.34	2,765,187.46
Sec line Xing	10512+22.00	653,893.37	2,764,888.47
PC	10534+51.71	655,889.72	2,763,895.40
1/4 line Xing	10541+47.58	656,492.43	2,763,548.45
PI	10542+56.96	656,610.69	2,763,536.76
PT	10550+51.73	657,204.88	2,762,993.28
PC	10553+09.63	657,395.18	2,762,819.22
Sec line Xing	10553+13.43	657,397.99	2,762,816.65
PI	10569+52.58	658,607.50	2,761,710.36
Sec line Xing	10573+14.20	659,072.85	2,761,752.23
Station equation I29NB (SCL_I29NB) at 93rd St NE (SCL_93RDST)			
I29NB BK	10573+08.46	659,072.85	2,761,752.23
I29NB AH	10573+14.20	659,072.85	2,761,752.23
93rd St NE	16+16.10	659,072.85	2,761,752.23
PT	10585+15.90	660,223.22	2,761,412.43
PC	10587+73.80	660,476.84	2,761,365.66
PI	10595+79.05	661,268.74	2,761,219.64
1/4 line Xing	284.52' to PT (Ahd Tan)	661,734.83	2,760,980.07
PT	10603+73.82	661,989.71	2,760,860.99
Station equation I29NB (SCL_I29NB)			
I29NB BK	10612+89.27	662,809.35	2,760,453.27
I29NB AH	10612+78.42	662,809.35	2,760,453.27
1/4 line Xing	10625+14.78	663,916.31	2,759,902.62
Sec line Xing	10629+73.37	664,326.90	2,759,698.37
Station equation I29NB (SCL_I29NB)			
I29NB BK	10665+60.37	667,538.49	2,758,100.78
I29NB AH	10665+61.06	667,538.49	2,758,100.78
End	10685+42.97	669,312.97	2,757,218.08

CURVE DATA

ARC DEFINITION

Alignment - SCL_I29NB		Alignment - SCL_I29NB	
PI STA	= 10542+56.96	PI STA	= 10595+79.05
Delta	= 16°00'00" (LT)	Delta	= 16°00'00" (LT)
Da	= 01°00'00"	Da	= 01°00'00"
R	= 5,729.65'	R	= 5,729.65'
T	= 805.25'	T	= 805.25'
L	= 1600.02'	L	= 1,600.02'

Alignment - SCL_I29NB	
PI STA	= 10569+52.58
Delta	= 32°00'00" (RT)
Da	= 01°00'00"
R	= 5,729.65'
T	= 1,642.95'
L	= 3,200.04'

NOTES: Sheet 2 of 3.

Date Survey Completed 1/19/24

☐ Assumed Coordinates

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All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88

☐ _____

☐ GEOID12B ☐ _____

☒ GEOID18

REGISTERED LAND SURVEYOR
JAMES A. SCHLIEMAN
LS-6086
DATE
NORTH DAKOTA
11/21/2024

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I29, 3 Miles South of ND 5

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	81	3

HORIZONTAL ALIGNMENT				CURVE DATA	
PNT	STATION	NORTHING	EASTING	ARC DEFINITION	
Alignment - OCL_I29SB				Alignment - OCL_I29SB	Alignment - OCL_I29SB
Beg	10506+15.23	653,290.07	2,765,074.42	PI STA = 10543+35.99	PI STA = 10594+89.81
TS	10534+57.69	655,834.75	2,763,807.86	Delta = 13°28'13" (LT)	Delta = 13°27'28" (LT)
SC	10536+57.69	656,013.27	2,763,717.70	Da = 01°00'00"	Da = 01°00'00"
PI	10543+35.99	656,621.03	2,763,416.50	R = 5,729.65'	R = 5,729.65'
CS	10550+04.74	657,124.87	2,762,962.37	L = 1,347.05'	L = 1,345.80'
ST	10552+04.74	657,274.44	2,762,829.59	Ls = 200.00'	Ls = 200.00'
PC	10553+05.94	657,383.21	2,762,731.89	Sc = 01°00'00"	Sc = 01°00'00"
PI	10569+63.52	658,582.88	2,761,654.31	Ts = 878.30'	Ts = 877.66'
Station equation I29 SB (OCL_I29SB) at 93rd St NE (SCL_93RDST)				Alignment - OCL_I29SB	
I29NB BK	10573+51.73	659,069.46	2,761,674.25	PI STA = 10569+63.52	
I29NB AH	10573+14.20	659,069.46	2,761,674.25	Delta = 30°56'21" (RT)	
93rd St NE	15+38.06	659,069.46	2,761,674.25	Da = 00°59'00"	
PT	10584+60.29	660,165.87	2,761,346.84	R = 5,826.76'	
TS	10586+12.16	660,314.94	2,761,317.89	T = 1,612.57'	
SC	10588+12.16	660,511.05	2,761,278.61	L = 3,146.39'	
PI	10594+89.81	661,176.50	2,761,150.54		
CS	10601+57.95	661,782.71	2,760,847.66		
ST	10603+57.95	661,962.29	2,760,759.62		
Station equation I29SB (OCL_I29SB)					
I29NB BK	10612+52.80	662,763.47	2,760,361.05		
I29NB AH	10612+78.42	662,763.47	2,760,361.05		
End	10683+51.46	669,096.14	2,757,210.62		

HORIZONTAL ALIGNMENT				CURVE DATA
PNT	STATION	NORTHING	EASTING	ARC DEFINITION

NOTES: Sheet 3 of 3.

Date Survey Completed 1/19/24

☐ Assumed Coordinates

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They are derived from the NAD83(2011) reference frame; North Dakota North Zone Combination Factor (cf) = 0.9999640

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88

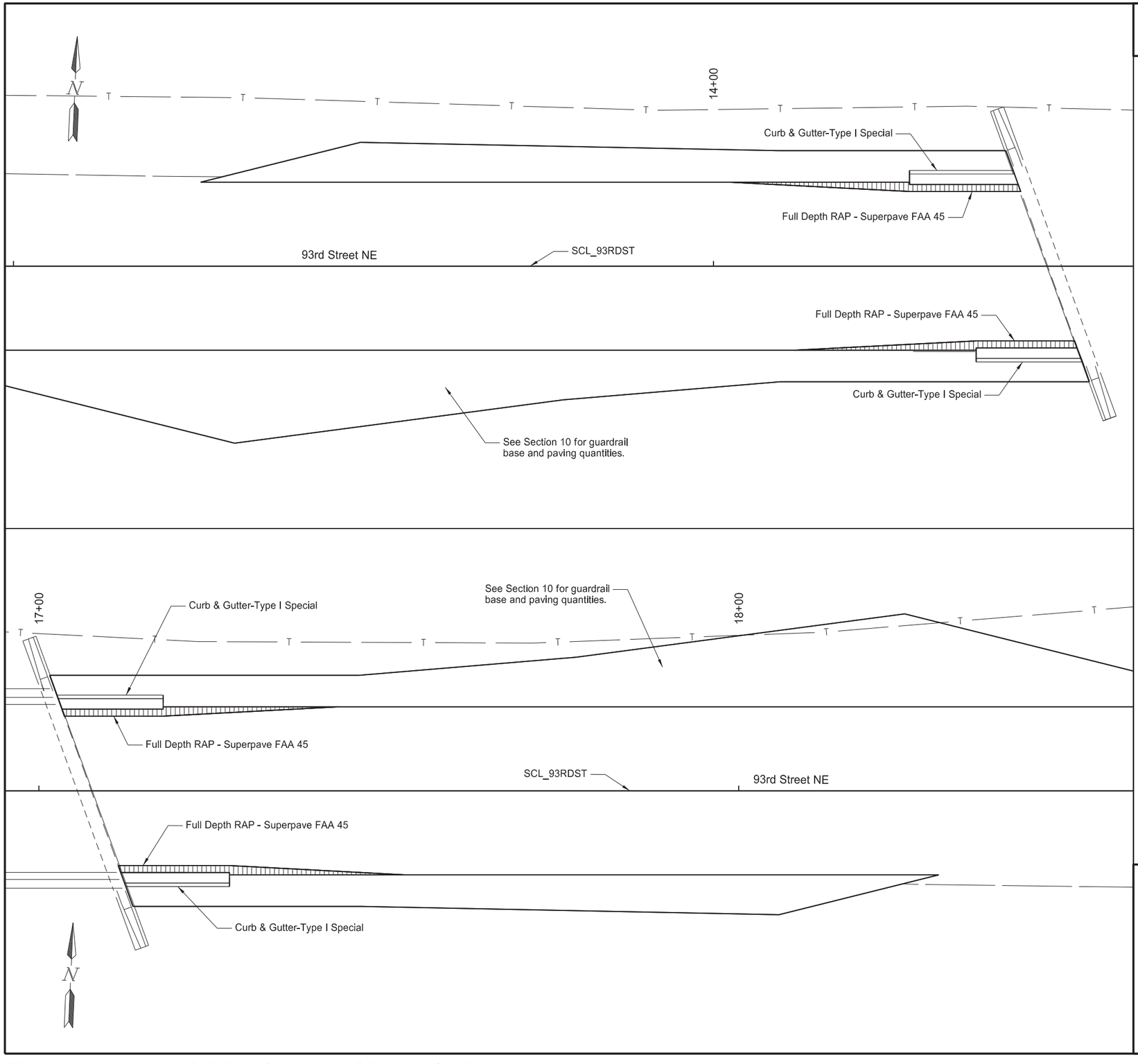
☐ _____

☐ GEOID12B ☐ _____

☒ GEOID18

REGISTERED LAND SURVEYOR
JAMES A. SCHLIEMAN
LS-6086
DATE
NORTH DAKOTA
11/21/2024

11/20/2024 11:45:30 AM cmcgough H:\JBN\3900\3950\3950_0349 - Carlisle Bridge Replacement\CAD\60029165.200\Survey\081CD_003.dgn



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	90	1

SPEC	CODE	BID ITEM	QTY	UNIT
430	0145	RAP - SUPERPAVE FAA 45		
		Sta 14+02 to Sta 14+44 Lt	1.5	TON
		Sta 14+12 to Sta 14+52 Rt	1.5	TON
		Sta 17+03 to Sta 17+43 Lt	1.5	TON
		Sta 17+11 to Sta 17+53 Rt	1.5	TON
748	0141	CURB & GUTTER-TYPE I SPECIAL		
		Sta 14+28 to Sta 14+43 Lt	15	LF
		Sta 14+38 to Sta 14+53 Rt	15	LF
		Sta 17+03 to Sta 17+18 Lt	15	LF
		Sta 17+12 to Sta 17+27 Rt	15	LF

Note:
1. All Stationing based on SCL_93RDST Alignment

93rd Street NE Crossroad
Paving Layout

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

1/9/2025 11:30:19 AM cmcgough H:\JBN\3900\3950\3950_0349 - Carlisle Bridge Replacement\CAD\60029165.200\dgn\Sheets\090PL.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE					35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES					28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)					18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**8**			**8**	**26**	**208**
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					43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW					36	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**8**	**2**		**8**	**59**	**472**
M1-1-36	**36"x36"**	**INTERSTATE ROUTE MARKER (Post and installation only)**	**10**	**8**		**10**	**11**	**110**
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)**	**1**			**1**	**7**	**7**
M3-2-24	**24"x12"**	**EAST (Mounted on route marker post)**	**1**			**1**	**7**	**7**
M3-3-24	**24"x12"**	**SOUTH (Mounted on route marker post)**	**1**			**1**	**7**	**7**
M3-4-24	**24"x12"**	**WEST (Mounted on route marker post)**	**1**			**1**	**7**	**7**
M4-8-24	**24"x12"**	**DETOUR (Mounted on route marker post)**	**4**			**4**	**7**	**28**
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)**	**2**	**4**		**4**	**7**	**28**
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)					7	
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)**		**4**		**4**	**7**	**28**
R1-1-48	**48"x48"**	**STOP**		**4**		**4**	**32**	**128**
R1-2-60	60"x60"	YIELD					29	
R2-1-36	36"x48"	SPEED LIMIT __ (Portable only)					30	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**16**	**6**		**16**	**39**	**624**
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**8**	**6**		**8**	**10**	**80**
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)**	**2**	**6**		**6**	**12**	**72**
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	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT					35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT					35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT					35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW					26	
W3-1-48	**48"x48"**	**STOP AHEAD**		**2**		**2**	**35**	**70**
W3-3-48	48"x48"	SIGNAL AHEAD					35	
W3-4-48	48"x48"	BE PREPARED TO STOP					35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**8**	**2**		**8**	**35**	**280**
W4-2-48	**48"x48"**	**LANE ENDS RIGHT or LEFT**	**8**	**2**		**8**	**35**	**280**
W5-1-48	48"x48"	ROAD NARROWS					35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE					35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW					35	
W6-3-48	48"x48"	TWO WAY TRAFFIC					35	
W8-1-48	48"x48"	BUMP					35	
W8-3-48	48"x48"	PAVEMENT ENDS					35	
W8-7-48	48"x48"	LOOSE GRAVEL					35	
W8-11-48	48"x48"	UNEVEN LANES					35	
W8-12-48	48"x48"	NO CENTER LINE					35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL					35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY					35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE					35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE					35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY					35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL					35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)					14	
W14-3-64	64"x48"	NO PASSING ZONE					28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)					10	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**10**			**10**	**35**	**350**
W20-2-48	**48"x48"**	**DETOUR AHEAD or __ FT or _ MILE**		**2**		**2**	**35**	**70**
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					35	
W20-5-48	**48"x48"**	**RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE**	**8**	**2**		**8**	**35**	**280**
W20-7-48	48"x48"	FLAGGER					35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back					5	
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	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-6-48	48"x48"	SURVEY CREW					35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT					35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY					35	
W21-52-48	48"x48"	PAVEMENT BREAKS					35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD					35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK					35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE					35	
M1-4-36	36"x36"	U.S. ROUTE MARKER (Post and installation only)					10	
M1-5-36	36"x36"	STATE ROUTE MARKER (Post and installation only)					10	
M3-1-36	36"x18"	NORTH (Mounted on route marker post)					10	
M3-2-36	**36"x18"**	**EAST (Mounted on route marker post)**	**7**			**7**	**10**	**70**
M3-3-36	**36"x18"**	**SOUTH (Mounted on route marker post)**	**5**			**5**	**10**	**50**
M3-4-36	**36"x18"**	**WEST (Mounted on route marker post)**	**7**			**7**	**10**	**70**
M1-1-24	**24"x24"**	**INTERSTATE ROUTE MARKER (Post and installation only)**	**2**			**2**	**10**	**20**
M3-1(I)-24	24"x12"	NORTH (Mounted on route marker post)					7	
M3-1(I)-36	**36"x18"**	**NORTH (Mounted on route marker post)**	**5**	**8**		**8**	**10**	**80**
M3-3(I)-24	24"x12"	SOUTH (Mounted on route marker post)					7	
M3-3(I)-36	36"x18"	SOUTH (Mounted on route marker post)					10	
M4-8-36	**36"x18"**	**DETOUR (Mounted on route marker post)**	**24**	**8**		**24**	**10**	**240**
M5-1(I)-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)					9	
M6-1(I)-21	**21"x15"**	**DIRECTIONAL ARROW RT or LT (Mounted on route marker post)**	**4**			**4**	**7**	**28**
M6-1(I)-30	**30"x21"**	**DIRECTIONAL ARROW RT or LT (Mounted on route marker post)**	**10**			**10**	**9**	**90**
M6-2(I)-30	**30"x21"**	**DIRECTIONAL ARROW DIAGONAL RT or LT (Mounted on route marker post)**	**6**	**4**		**6**	**9**	**54**
M6-3(I)-30	**30"x21"**	**DIRECTIONAL ARROW UP (Mounted on route marker post)**	**8**			**8**	**9**	**72**
M1-6-24	24"x 24"	COUNTY ROUTE MARKER (Post and installation only)					10	
M1-6-36	36"x36"	COUNTY ROUTE MARKER (Post and installation only)					11	

SPECIAL SIGNS

ConSign 1	**102"x72"**	**EXIT 200 WESTBOUND CLOSED USE EXIT 203**	**1**			**1**	**87**	**87**
ConSign 2	**102"x72"**	**EXIT 200 EASTBOUND CLOSED USE EXIT 196**	**1**			**1**	**87**	**87**
ConSign 3	**54"x18"**	**93RD St NE**	**16**			**16**	**24**	**384**

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS 4468**

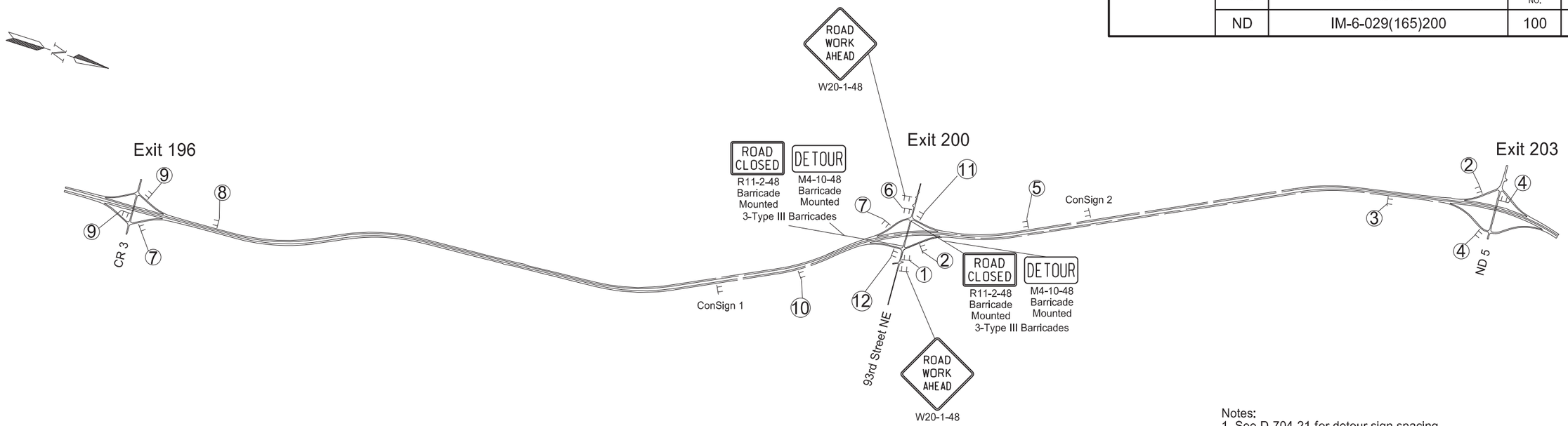
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY BY PHASE NO. 1	2		TOTAL QUANTITY
704-0100	FLAGGING	MHR				
704-1045	**ATTENUATION DEVICE-TYPE B-75**	EACH	**2**			**2**
704-1048	PORTABLE RUMBLE STRIPS	EACH				
704-1050	TYPE I BARRICADES	EACH				
704-1052	**TYPE III BARRICADES**	EACH	**6**	**12**		**12**
704-1060	**DELINEATOR DRUMS**	EACH	**128**	**80**		**128**
704-1065	TRAFFIC CONES	EACH				
704-1067	TUBULAR MARKERS	EACH				
704-1070	DELINEATOR	EACH				
704-1072	FLEXIBLE DELINEATORS	EACH				
704-1080	STACKABLE VERTICAL PANELS	EACH				
704-1081	VERTICAL PANELS - BACK TO BACK	EACH				
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH				
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH				
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	EACH	**2**	**2**		**2**
704-1095	**TYPE B FLASHERS**	EACH		**6**		**6**
704-1500	**OBLITERATION OF PVMT MK**	SF		**405**		**405**
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF				
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH				
704-3511	**STATE FURNISHED MEDIAN BARRIER**	LF	**800**			**800**
762-0200	RAISED PAVEMENT MARKERS	EACH				
762-0420	**SHORT TERM 4IN LINE - TYPE R**	LF	**8020**	**430**		**8450**
762-0424	SHORT TERM 8IN LINE-TYPE R	LF				
762-0426	**SHORT TERM 24IN LINE-TYPE R**	LF		**24**		**24**
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF				
762-0436	SHORT TERM 24IN LINE-TYPE NR	LF				
762-0440	SHORT TERM MESSAGE-TYPE R	SF				

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/

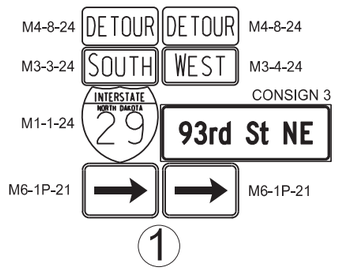
REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

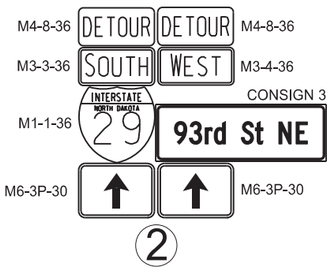
Traffic Control Devices List

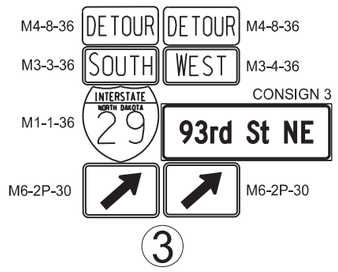
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	100	2

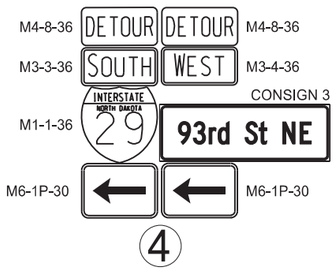


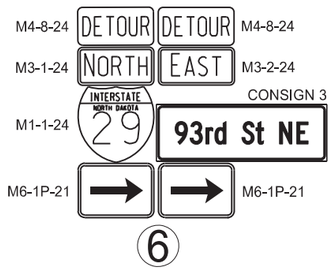
Notes:
1. See D-704-21 for detour sign spacing.
2. All signs post mounted unless otherwise noted.

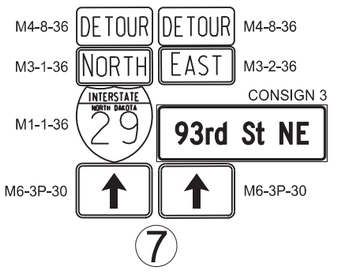


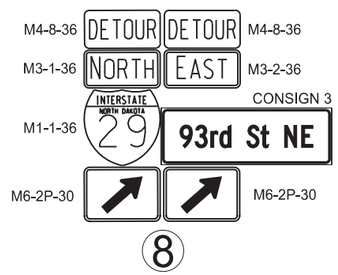


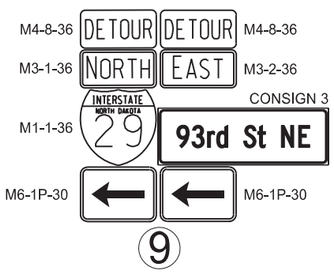


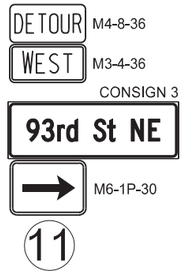












EXIT 200 WESTBOUND CLOSED USE EXIT 203

CONSIGN 1

EXIT 200 EASTBOUND CLOSED USE EXIT 196

CONSIGN 2

Detour Route

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

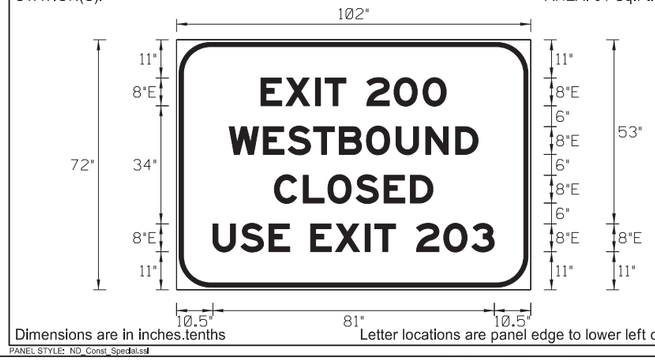
1/10/2025 12:01:20 PM cmcgough H:\JBN\3900\3950\3950_0349 - Carlisle Bridge Replacement\CAD\60029165,200\dgn\Sheets\100WZ_ConSign Phase 1, 2, 3 detours.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	100	3

SIGN NUMBER	Consign 1
WIDTH X HEIGHT	8'-6" x 6'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): AREA: 51 Sq.Ft.



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

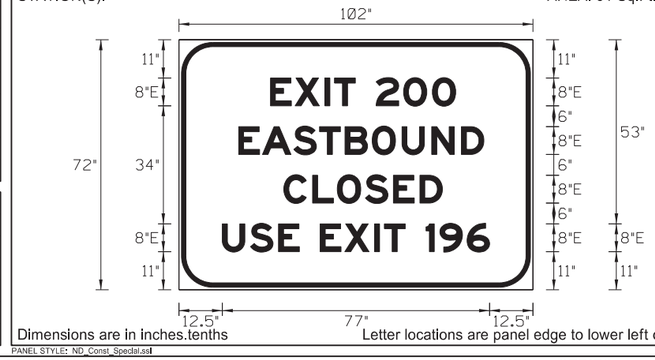
PANEL STYLE: ND_Const_SpecialLsd

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
E	X	I	T	2	0	0													53.36	8	E 2000
24.32	31.44	40	42.8	54.8	62.64	70.96															
W	E	S	T	B	O	U	N	D											71.68	8	E 2000
15.16	25	32.12	39.48	46.84	54.68	63.24	71.8	80.36													
C	L	O	S	E	D														45.68	8	E 2000
28.16	36.48	43.6	51.68	59.76	67.36																
U	S	E	E	X	I	T	2	0	3										81.04	8	E 2000
10.48	18.56	26.64	38.64	45.76	54.32	57.12	69.12	76.96	85.04												

SIGN NUMBER	Consign 2
WIDTH X HEIGHT	8'-6" x 6'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): AREA: 51 Sq.Ft.



Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Const_SpecialLsd

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
E	X	I	T	2	0	0													53.36	8	E 2000
26.36	33.48	42.04	44.84	56.84	64.68	73															
E	A	S	T	B	O	U	N	D											70.64	8	E 2000
17.2	24.08	33.12	40.48	47.84	55.68	64.24	72.8	81.36													
C	L	O	S	E	D														45.68	8	E 2000
30.2	38.52	45.64	53.72	61.8	69.4																
U	S	E	E	X	I	T	1	9	6										76.96	8	E 2000
12.52	20.6	28.68	40.68	47.8	56.36	59.16	71.16	75.16	83												

SIGN NUMBER	Consign 3
WIDTH X HEIGHT	4'-6" x 1'-6"
BORDER WIDTH	0.63" (inset 0.38")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): AREA: 6.75 Sq.Ft.

Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Const_SpecialLsd

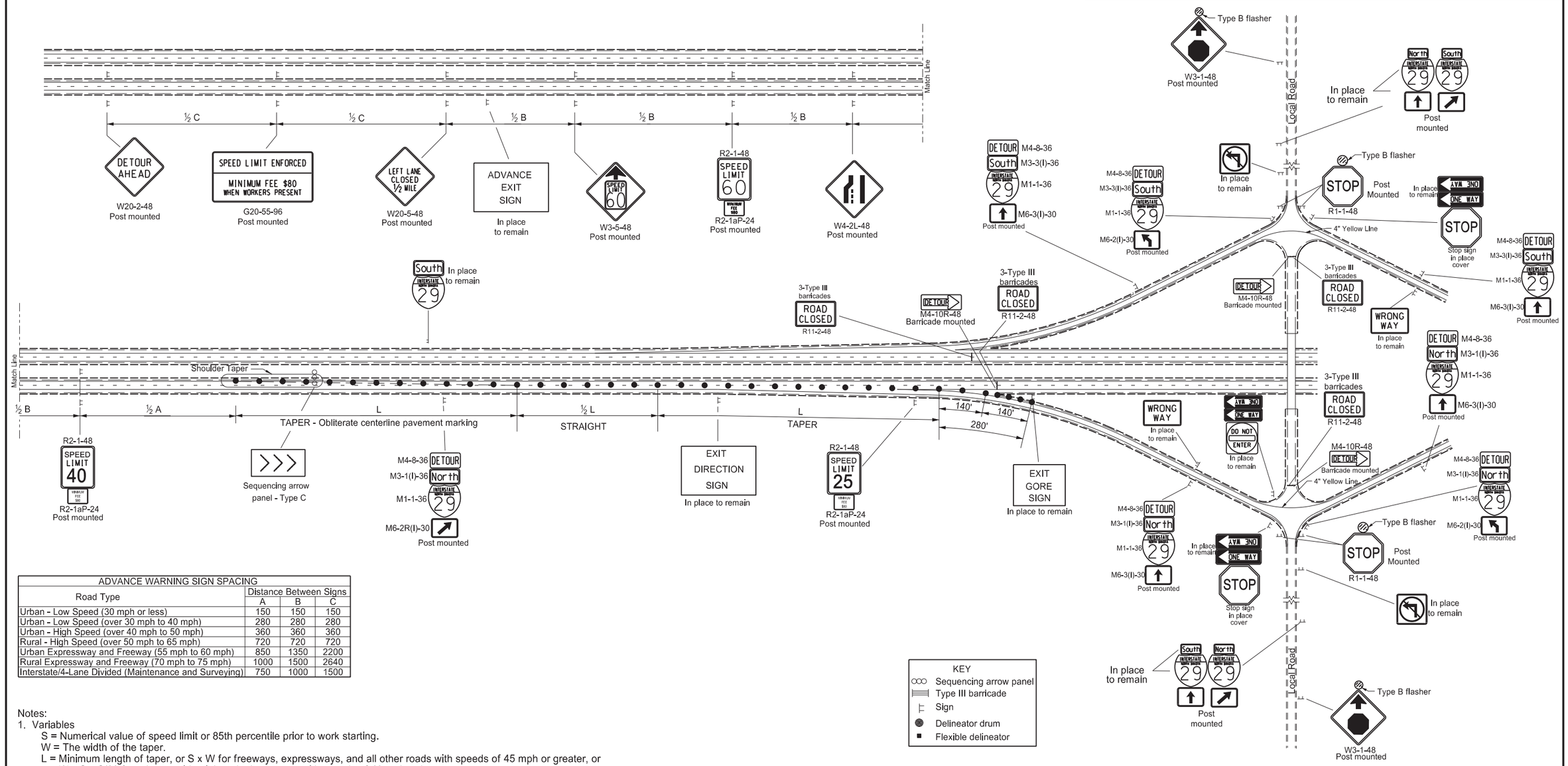
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
9	3	r	d	S	t	N	E												42.13	7/5.25	C 2000
5.93	10.69	15.66	18.53	27.11	31.52	39.04	44.5														

Temporary Traffic Control
Construction Sign Details

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	100	4



ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 mph 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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Notes:
1. Variables
   S = Numerical value of speed limit or 85th percentile prior to work starting.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S x S/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums used for tapering traffic at dimension "S" and space delineator drums used for tangents at two times "S".
3. Sequencing Arrow Panels
   Place panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface.
4. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
5. Cover existing speed limit signs within a reduced speed zone.
6. Furnish 0.40" aluminum panels large enough to cover the existing legend with green background and white legend Type IV reflective sheeting to change sign messages.
7. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign.

STOP AHEAD SIGN PLACEMENT DISTANCE	
POSTED OR 85th PERCENTILE SPEED	STOP CONDITION Min. (FT)
35 mph	100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
65 mph	475 ft

KEY
- Sequencing arrow panel
- Type III barricade
- Sign
- Delineator drum
- Flexible delineator

TYPE B FLASHERS 6 EA

TYPE III BARRICADES 12 EA

DELINEATOR DRUMS 80 EA

OBLITERATION OF PAVEMENT MARKING 405 SF

SHORT TERM 4IN LINE-TYPE R
Yellow Edge Line 430 LF

SHORT TERM 24IN LINE-TYPE R
Stop Bars 24 LF

Temporary Traffic Control
Interstate Mainline Closure Using Ramps With Crossroad Closed and Mainline Detour Provided

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	130	1

(A) Thrie beam double rail section (12 gauge)

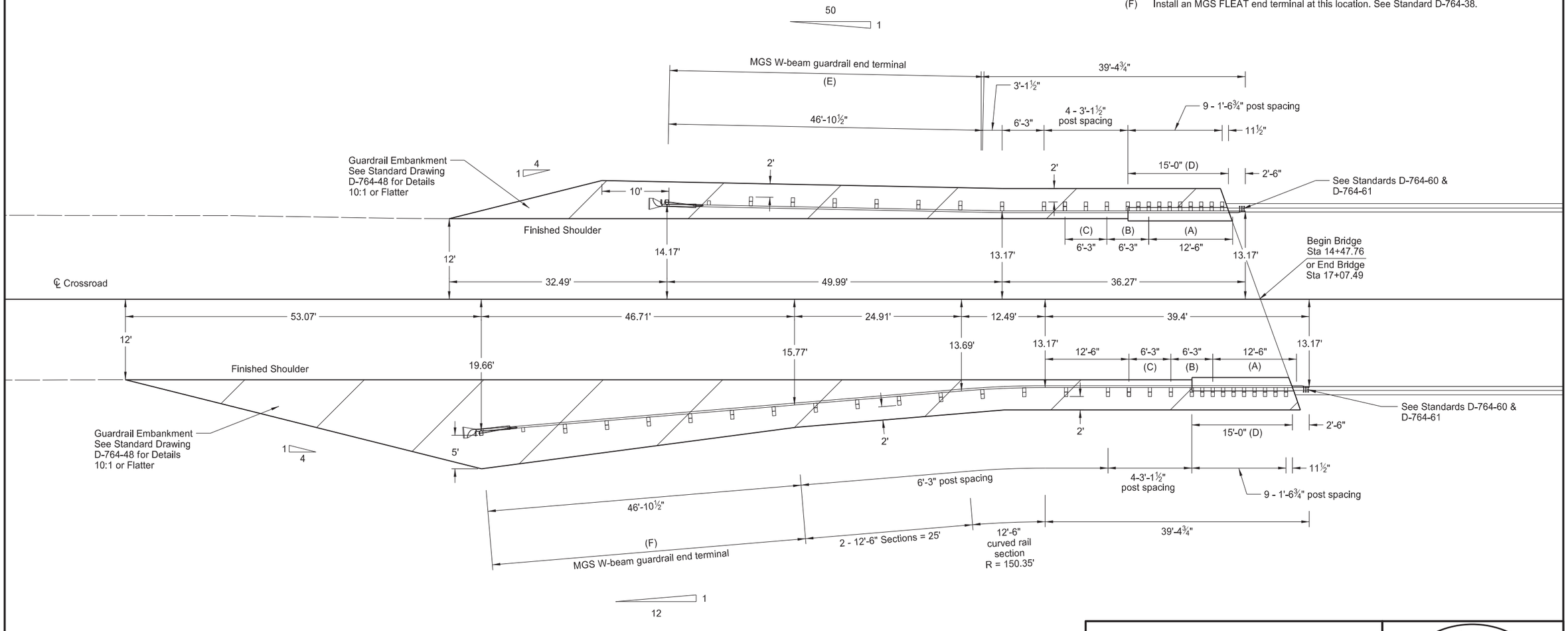
(B) Thrie beam (12 gauge)

(C) Non-symmetrical thrie beam to w-beam transition (10 gauge)

(D) Curb & Gutter - Type 1 Special. Install in accordance with Standard Drawing D-748-1, except for transitions on each end as shown on Standard Drawing D-764-60.

(E) Install a MASH Sequential Kinking Terminal (SKT) at this location. See Standard Drawing D-764-51 for MASH SKT.

(F) Install an MGS FLEAT end terminal at this location. See Standard D-764-38.



Carlisle Interchange Crossroad
Thrie/MGS W-Beam Guardrail Layout
At Both Ends of Bridge
RP 200.243

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	130	2

MGS W-BEAM GUARDRAIL SUMMARY OF QUANTITIES
THRIE/MGS W-BEAM GUARDRAIL AT BRIDGE ENDS

LOCATION	(A) THRIE-BEAM TERMINAL CONNECTOR	(A) SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE	(A) 7/8" DIA X 15" LONG HEAVY HEX HEAD BOLT	(A) 12'-6" THRIE BEAM DOUBLE RAIL SECTION	(A) 6'-3" THRIE BEAM SECTION	(A) 6'-3" NON-SYMMETRICAL TRANSITION TO W-BEAM	(A) 5/8" DIA X 2" BUTTON HEAD SPLICE BOLTS	(A) 5/8" DIA X 1-1/4" BUTTON HEAD SPLICE BOLTS	(A) 6" X 8" X 7-0' TIMBER POST	(A) 6" X 8" X 19" WOOD OFFSET BLOCK	(A) 6" X 8" X 6-0' TIMBER POST	(A) 6" X 8" X 14" WOOD OFFSET BLOCK	(A) 5/8" DIA X 18" LONG GUARDRAIL POST BOLT	(A) 12'-6" STRAIGHT RAIL SECTION	(A) 12'-6" CURVED RAIL SECTION	(A) 5/8" DIA X 1-1/4" LONG GUARDRAIL BOLT	(A) REFLECTORIZED PLATES	(B) EMBANKMENT
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 14+06.12 to 14+45.51 Lt	1	1	5	1	1	1	36	8	6	12	9	3	26	1	0	8	5	339
Sta 13+78.25 to 14+55.05 Rt	1	1	5	1	1	1	36	8	6	12	15	9	32	3	1	32	7	1037
Sta 17+00.25 to 17+77.07 Lt	1	1	5	1	1	1	36	8	6	12	15	9	32	3	1	32	7	596
Sta 17+09.75 to 17+49.14 Rt	1	1	5	1	1	1	36	8	6	12	9	3	26	1	0	8	5	283
Total	4	4	20	4	4	4	144	32	24	48	48	24	116	8	2	80	24	2255

Note:
(A) Include these items in the price bid for "W-Beam Guardrail".
(B) Include in the price bid for "Guardrail Embankment".

SPEC	CODE	BID ITEM	QTY	UNIT
203	0218	GUARDRAIL EMBANKMENT		
		Sta 12+97.80 to 14+92.94 Lt	1	EA
		Sta 12+69.95 to 14+83.15 Rt	1	EA
		Sta 16+72.40 to 18+99.33 Lt	1	EA
		Sta 16+89.47 to 18+54.95 Rt	1	EA
		Total	4	EA
748	0141	CURB & GUTTER - TYPE 1 SPECIAL		
		Sta 14+28.01 to 14+43.01 Lt	15	LF
		Sta 14+37.55 to 14+52.55 Rt	15	LF
		Sta 17+02.75 to 17+17.75 Lt	15	LF
		Sta 17+12.25 to 17+27.25 Rt	15	LF
		Total	60	LF
764	0131	W-BEAM GUARDRAIL		
		Sta 14+06.12 to 14+45.51 Lt	39.4	LF
		Sta 13+78.25 to 14+55.05 Rt	76.9	LF
		Sta 17+00.25 to 17+77.05 Lt	76.9	LF
		Sta 17+09.75 to 17+49.14 Rt	39.4	LF
		Total	232.6	LF
764	0145	W-BEAM GUARDRAIL END TERMINAL		
		Sta 13+59.25 to 14+06.12 Lt	1	EA
		Sta 13+31.54 to 13+78.25 Rt	1	EA
		Sta 17+77.05 to 18+23.76 Lt	1	EA
		Sta 17+49.14 to 17+96.00 Rt	1	EA
		Total	4	EA
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 13+67.38 to 14+44.18 Lt	76.9	LF
		Sta 13+14.69 to 14+53.81 Rt	139.4	LF
		Sta 17+01.14 to 18+40.26 Lt	139.4	LF
		Sta 17+10.77 to 17+87.57 Rt	76.9	LF
		Total	432.6	LF
764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 13+30.58 to 13+67.38 Lt	1	EA
		Sta 12+77.89 to 13+14.69 Rt	1	EA
		Sta 18+40.26 to 18+77.06 Lt	1	EA
		Sta 17+87.57 to 18+24.37 Rt	1	EA
		Total	4	EA

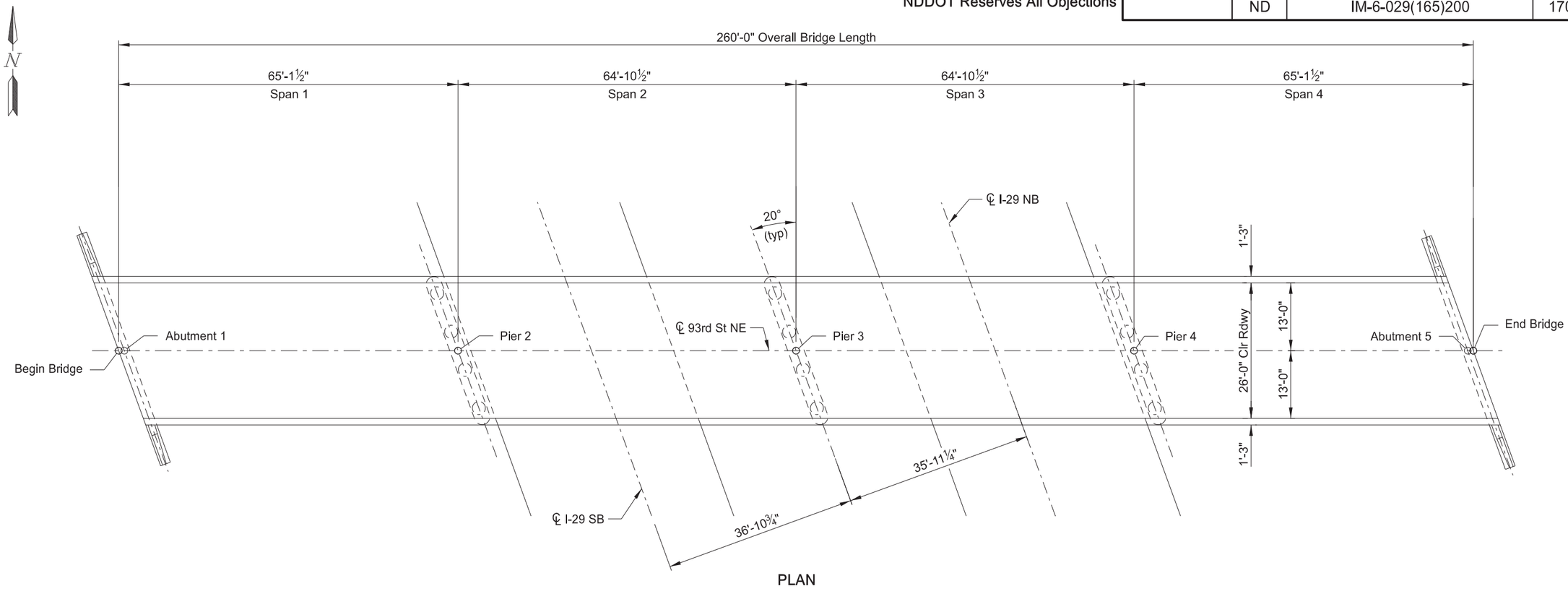
Carlisle Interchange Crossroad
Thrie/MGS W-Beam Guardrail Quantities
At Both Ends of Bridge
RP 200.243

Structure Repairs
Carlisle Interchange
Interstate 29

REGISTERED PROFESSIONAL ENGINEER
G. KELBY LAXDAL
PE-9476
DATE 01/10/2025
NORTH DAKOTA

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	1



PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0129	REMOVAL OF CURB	LF	520
203	0109	TOPSOIL	CY	44
602	0130	CLASS AAE-3 CONCRETE	CY	81
602	1250	PENETRATING WATER REPELLANT TREATMENT	SY	752
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	18,032
650	0704	OVERLAY CONCRETE	CY	64
650	0707	DECK CONCRETE	CY	3
650	0710	CLASS 1-H REMOVAL	SY	694
650	0720	CLASS 1 REMOVAL	SY	694
650	0723	CLASS 3 REMOVAL	SY	21
650	0724	CLASS 4 REMOVAL	SY	7
930	3000	BRIDGE BENCH MARKS	SET	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	49
930	7012	ROADWAY CANOPY	L SUM	1
930	9612	SPALL REPAIR	SF	21

SPECIAL PROVISIONS	
SP 176(24)	CONCRETE SPALL REPAIR
SP 190(24)	ARCHITECTURAL FORM LINER
SP 191(24)	HYDRODEMOLITION AND OVERLAY OF CONCRETE BRIDGE DECKS

STANDARD DRAWINGS
D-900-1

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

CARLISLE INTERCHANGE
PEMBINA COUNTY

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION
Jason Thorenson
02/18/25

DRAWING NO. 29-200.243-1

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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100 SCOPE OF WORK: This project consists of removing the existing concrete curbs, constructing new deck overhangs with single-slope barriers, placing a deck overlay, spall repairs, erosion repairs, and void filling behind and beneath the abutments.

100 GENERAL: Include the cost of furnishing and placing form liner, waterproof membrane, silicone sealant, rebar couplers, and other miscellaneous items in the price bid for AAE-3 concrete.

100 EROSION REPAIR: Localized erosion is exhibited along the abutment wing walls and in front of the abutment stem walls at the top of the west and east embankments. Limits are approximate and will be determined by the Engineer in the field. Fill the eroded areas with topsoil to reshape the embankments to their original slopes as shown in the plans.

105 CONSTRUCTION SEQUENCE: Remove the existing curb and deck overhangs and construct the deck overhangs and single slope barriers prior to milling the deck surface for the overlay.

203 TOPSOIL: Acquire all topsoil needed for the erosion repairs from the guardrail paving footprints. The topsoil quantity is based on the following:

1. West embankment: 22 CY
2. East embankment: 22 CY

Compact the topsoil according to Compaction Control, Type C, but leave the upper 6” uncompacted to promote seed establishment. The Engineer will measure and pay for the topsoil placed.

602 REMOVAL OF FORMS: Deck slab forms may be removed 1 day after completion of the curing period if the bridge deck concrete has reached 70 percent of the required design strength.

602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02D, a cold-water pressure washer that provides a minimum nozzle pressure of 3000 psi may be used.

602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the driving surface of the bridge deck. Apply penetrating water repellent solution prior to sealing any bridge deck cracks. Do not allow traffic until the solution has completely penetrated and the entire working surface is dry.

602 BARRIERS: Construct V-grooves that are ¾ inch wide and ¾ inch deep in all faces, excluding the form liner areas, of the barriers at the piers and at equal spaces between the piers and abutments at approximately 10-foot spacing.

602 SPECIAL SURFACE FINISH: Clean the surfaces that are to receive the Tex-Cote surface finish using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the areas listed below. Apply the surface finish in accordance with the manufacturer’s recommended application procedures to attain a dry film thickness of 15 mils. Do not apply Tex-Cote special surface finish to any form liner areas.

- Outside edges of the bridge deck
- Underside of the bridge deck overhang
- Outside and bottom surfaces of the exterior beams
- All bridge barrier surfaces (except form liner areas)

Apply the surface finish in accordance with the manufacturer’s recommended application procedures to attain a dry film thickness of 15 mils. Do not apply Tex-Cote special surface finish to any form liner areas.

Finish the surface with a uniform texture, color, and appearance free from fins, projections, cavities, and porous areas. Use a medium textured finish. Use gray surface finish color number 36424 meeting AMS-STD-595 for the inside and top surfaces of the bridge barriers. Use a color matching the lightest shade of brown used in the Architectural Surface Finish, as it looks applied to the barrier form liner areas, for all other surfaces. Submit to the Engineer a 1’ x 1’ sample of the brown surface finish.

Include all special surface finish costs in the price bid for Class AAE-3 Concrete.

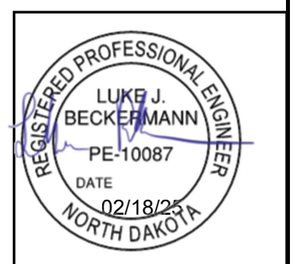
650 OVERLAY CONCRETE: An additional ½” depth of overlay concrete was included in the overlay concrete quantities to account for the irregular surface profile from the hydrodemolition.

650 OVERLAY CONCRETE CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck to determine the need for crack sealing.

Mark and repair all visible cracks on the top surface measuring 0.02” or greater in width at its widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of the crack, including those portions that are narrower than 0.02” wide. The epoxy sealer may be Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all work and materials associated in the deck overlay crack sealing the bid item “Overlay Concrete.”



NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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930 BRIDGE BENCH MARKS: Install and establish elevations of new bridge bench marks and record elevations of all substructures prior to concrete removals. Install elevation checkpoints in the top of the new concrete barriers. 10 carriage bolts required. Bridge Bench Marks to be installed in accordance with Standard Drawing D-900-1. Complete SFN 13420 “Report of Bridge Bench Marks and Check Points,” after installation.

930 ROADWAY CANOPY: Construct a canopy above the traveled roadway under the existing structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review. Provide a canopy with a minimum vertical clearance of 15'-6" above the traveled roadway. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 5'-0" beyond the edge of the driving lanes beneath the structure.

The canopy must be in place before installing formwork for the new deck overhangs and remain in place until after the construction of the new barriers is complete. The canopy may be supported from the ground or suspended from the girders. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public. Remove the canopy after work on the bridge superstructure is completed.

Include all costs for construction, maintenance, and removal of the canopy system in the contract unit price for “Roadway Canopy.”

930 SPALL REPAIR: The structure has areas of spalling and concrete deterioration on the cap of Pier 2. Follow the repair procedures in accordance with SP 176(24) Spall Repair.

The extents of the repairs as shown in the plans are approximations. The actual limits and repair locations will be determined by the Engineer in the field.

A minimum area of 1 SF will be paid at each spall repair location. Include all labor, equipment, and materials needed to repair the pier cap in the bid item “Spall Repair.”

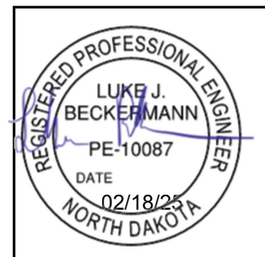
930 HIGH EXPANSION POLYURETHANE FOAM: The asphalt approaches are settling at the ends of the bridge. Fill the voids below the asphalt paving surface along the length of the abutments using polyurethane foam by drilling injection holes and injecting the polymer. Expansive foam insulation must consist of a high expansion hydrophobic polyurethane foam that is nontoxic, nonflammable, and meets the following requirements below.

Test	Requirement	Method
Tensile Strength	50 psi	ASTM D 638
Compressive Strength	90 psi	ASTM D 1621
Shear Strength	25 psi	ASTM D 732
Water Absorption	< 2% by volume	ASTM D 2842

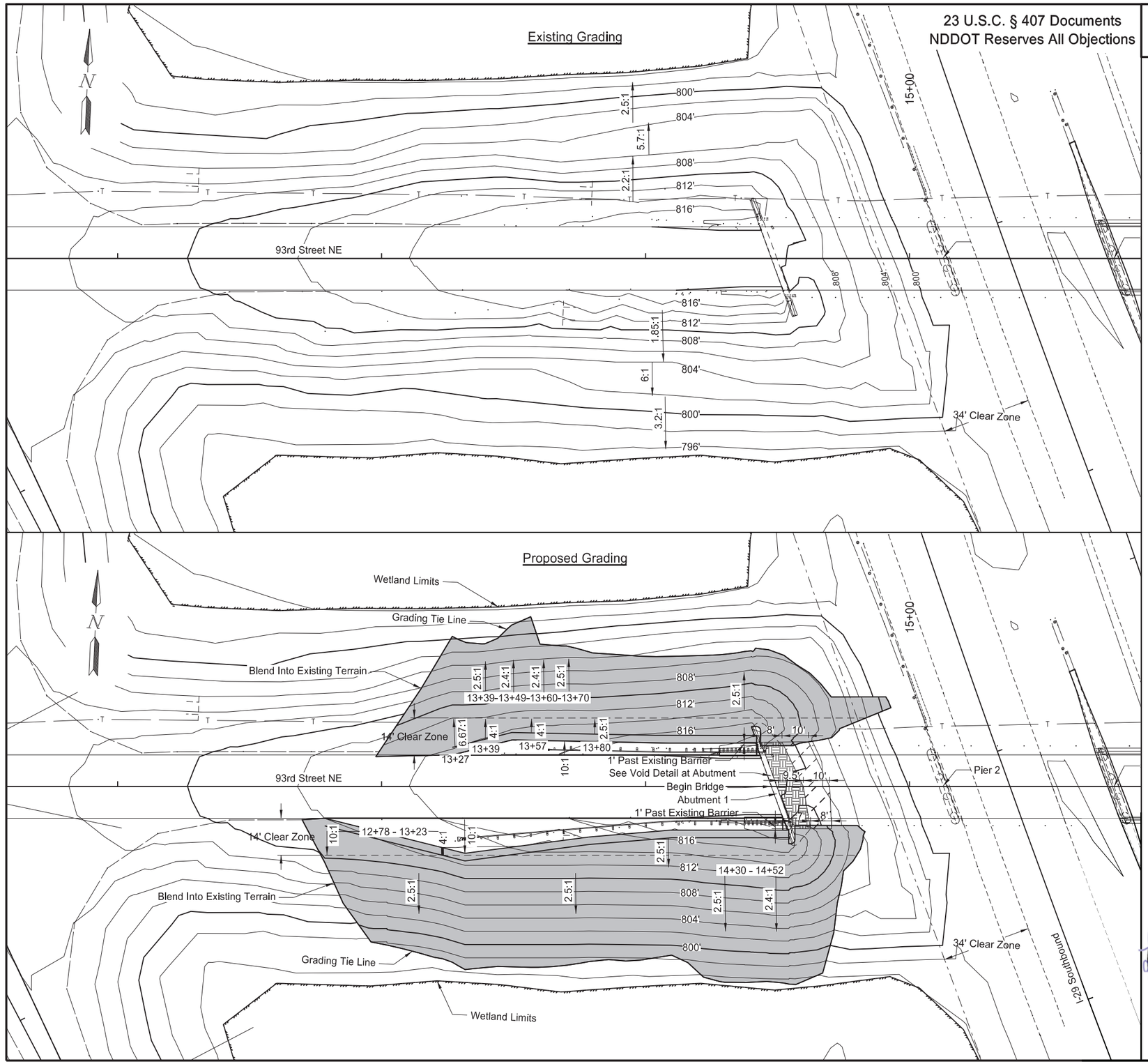
Drill a series of 5/8 inch holes at the locations required for filling the voids below the asphalt paving surface and along the back face of the abutments. Determine the exact locations and spacing required. Calibrate the pumping unit daily, or at the Engineer’s request, to ensure consistent accuracy of injected material. When the nozzle is removed from the hole, remove any excessive polyurethane material from the area and seal the hole with an approved asphalt patching material. Dispose of all removed material in an environmentally acceptable manner conforming to Federal, State, and local regulations. The Contractor is responsible for any pavement blowouts or excessive pavement lifting which may result from the process and will repair the damaged area to the satisfaction of the Engineer without additional cost.

Include the costs for all labor, equipment, and materials needed to place the polyurethane foam to fill the voids located behind the abutments in the price bid for “High Expansion Polyurethane Foam.”

It is estimated that 49 gallons of foam (prior to expansion) will be required to fill the voids, assuming a 16x expansion rate. Do not exceed the estimated quantity of foam without the permission of the Engineer.



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	4



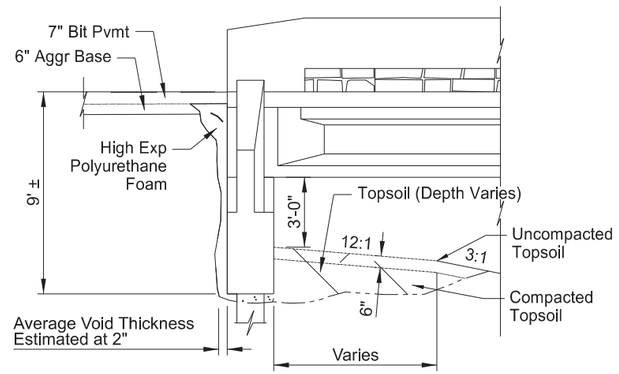
Earthwork Grading

Hatched area indicates 3:1 grading

Hatched area indicates 12:1 grading

Guardrail Embankment

Hatched area indicates Variable grading



VOID DETAIL AT ABUTMENT

QUANTITIES	
HIGH EXPANSION POLYURETHANE FOAM	24 GAL
TOPSOIL	22 CY

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

CARLISLE INTERCHANGE
PEMBINA COUNTY

ABUTMENT
GRADING DETAILS

DRAWING NO. 29-200.243-4

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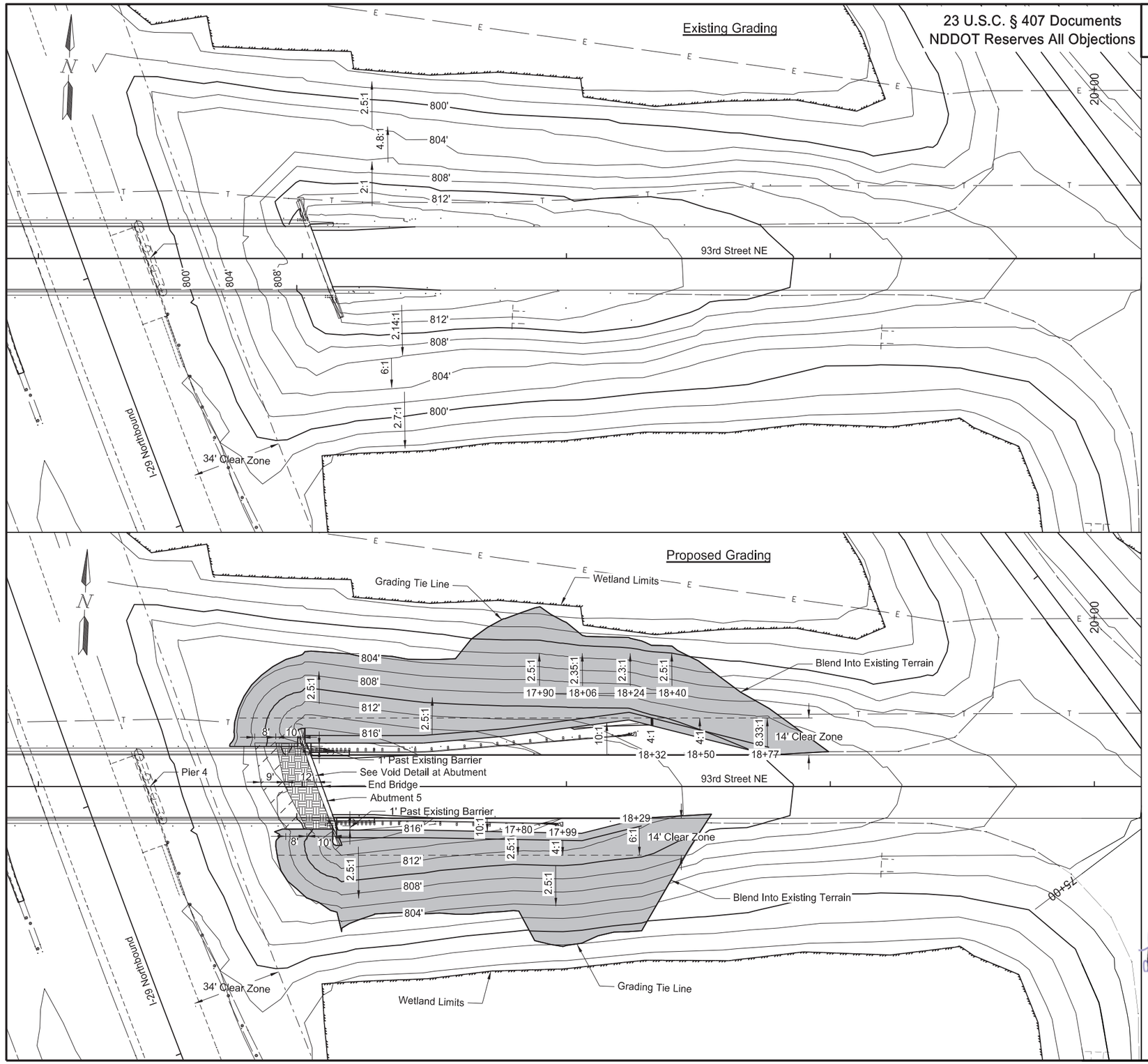
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	5



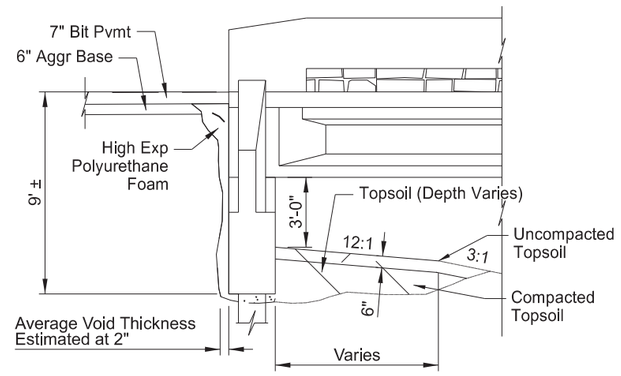
Earthwork Grading

Hatched area indicates 3:1 grading

Hatched area indicates 12:1 grading

Guardrail Embankment

Hatched area indicates Variable grading



VOID DETAIL AT ABUTMENT

QUANTITIES	
HIGH EXPANSION POLYURETHANE FOAM	25 GAL
TOPSOIL	22 CY

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

CARLISLE INTERCHANGE
PEMBINA COUNTY

ABUTMENT
GRADING DETAILS

DRAWING NO. 29-200.243-5

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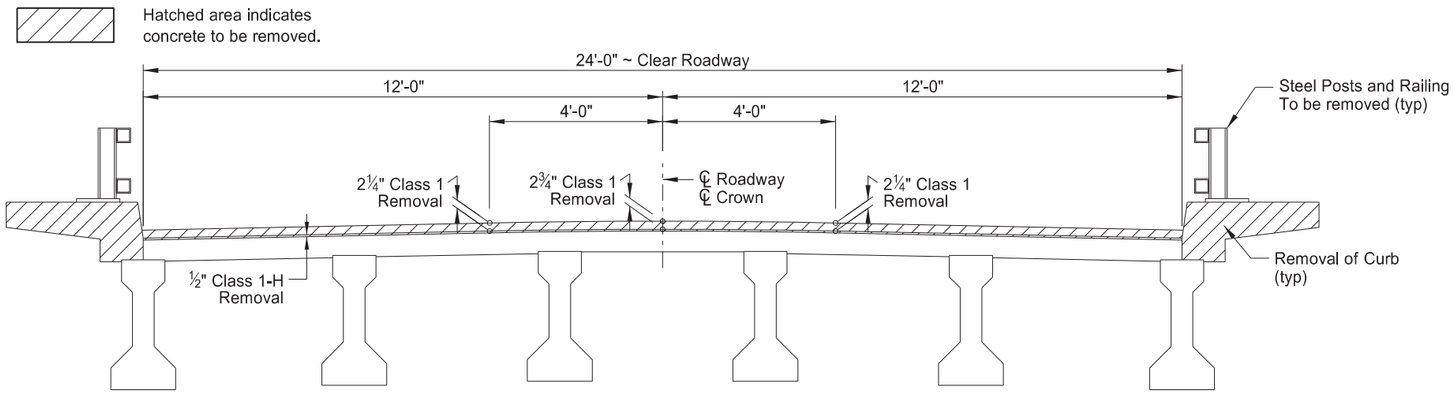
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	6



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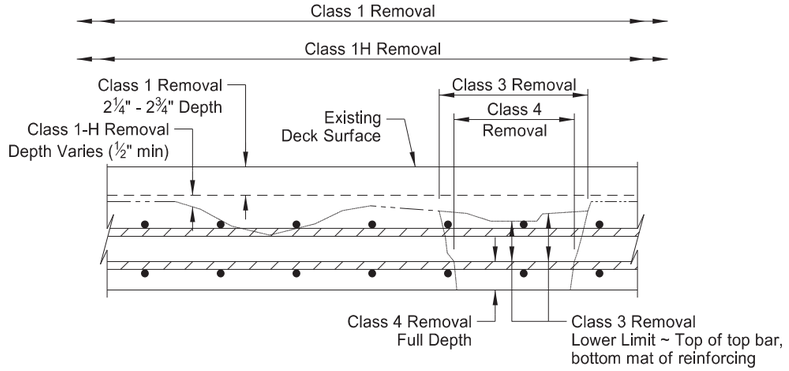
TYPICAL DECK SECTION



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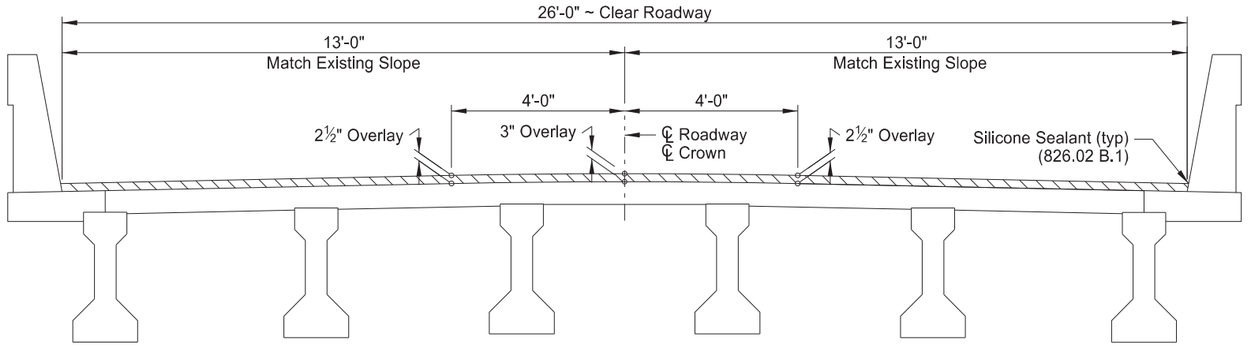
EXISTING BRIDGE DECK SECTION



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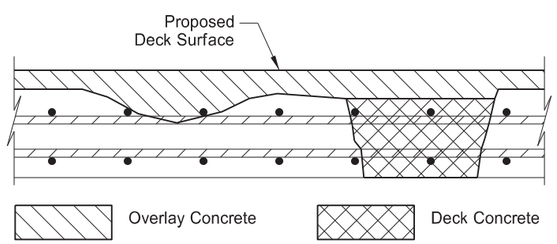
TYPICAL DECK SECTION



(SHOWING DECK & OVERLAY CONCRETE)

PROPOSED BRIDGE DECK SECTION

QUANTITIES	
REMOVAL OF CURB	520 LF
OVERLAY CONCRETE	64 CY
DECK CONCRETE	3 CY
CLASS 1H REMOVAL	694 SY
CLASS 1 REMOVAL	694 SY
CLASS 3 REMOVAL	21 SY
CLASS 4 REMOVAL	7 SY

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

CARLISLE INTERCHANGE
PEMBINA COUNTY

DECK OVERLAY

DRAWING NO. 29-200.243-6

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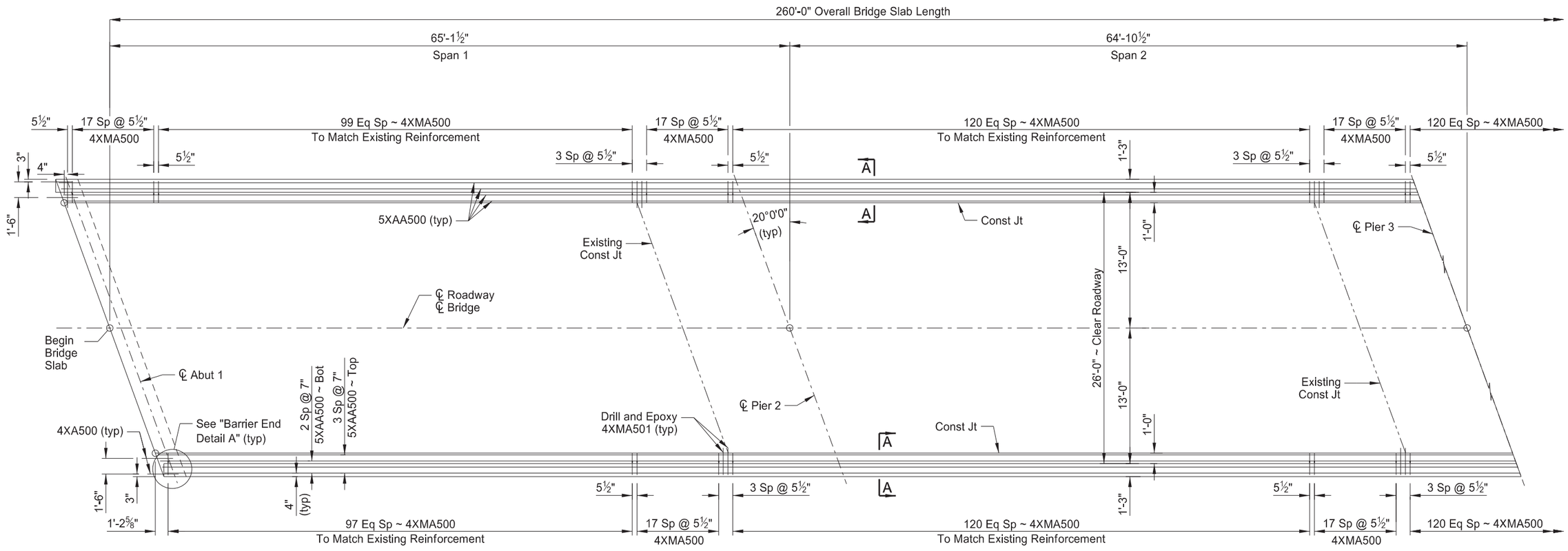
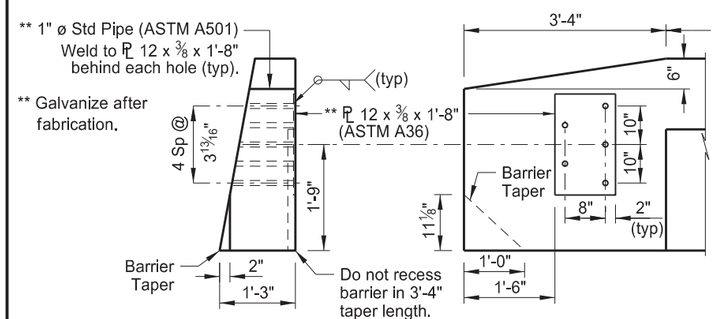
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	7



HALF PLAN



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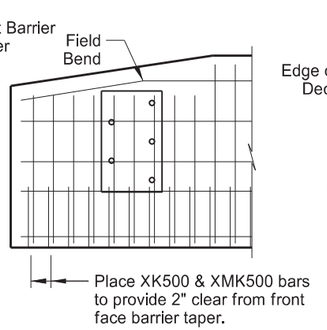

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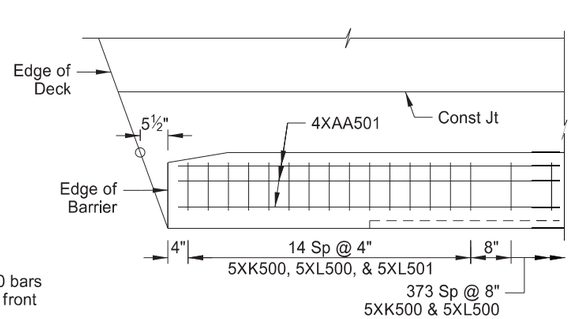
CONNECTION PLATE DETAILS



PLAN

BARRIER END DETAIL A

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

QUANTITIES

SEE DWG 29-200.243-11

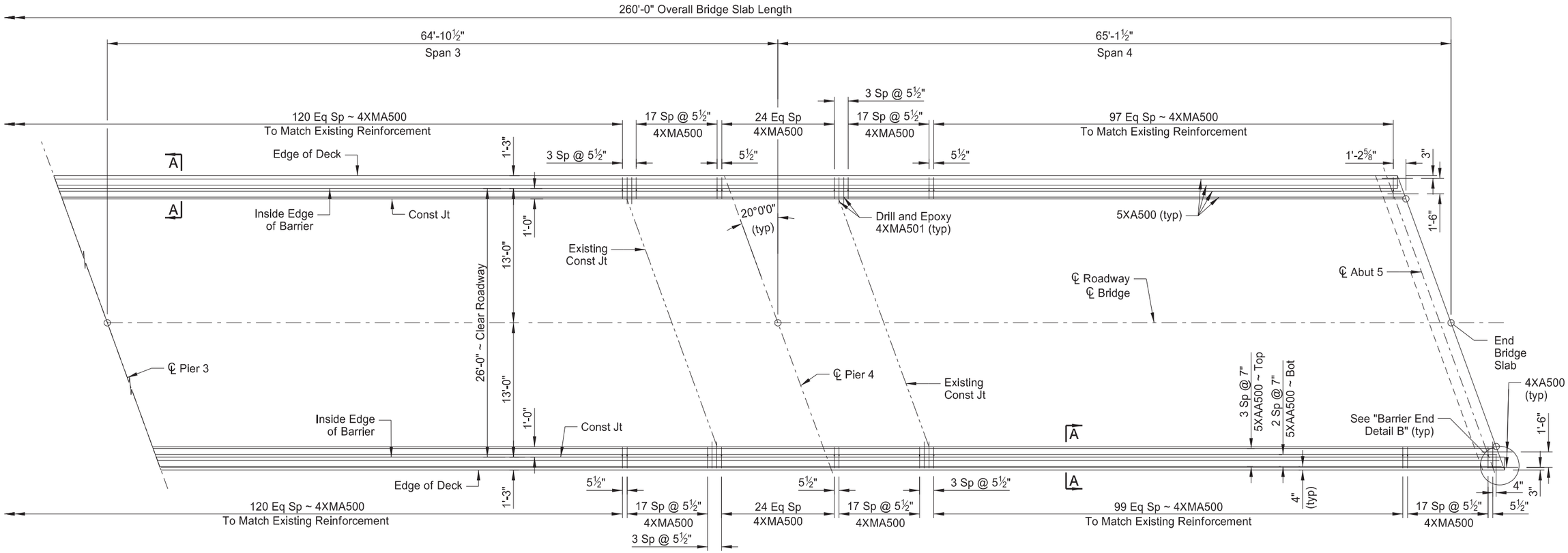
CARLISLE INTERCHANGE
PEMBINA COUNTY

SLAB LAYOUT

DRAWING NO. 29-200.243-7

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	8



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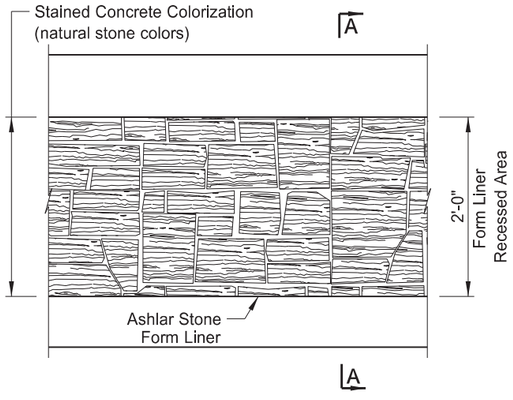

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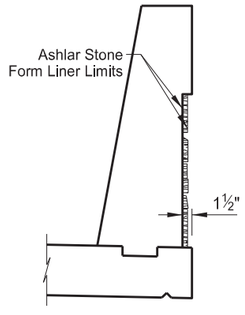
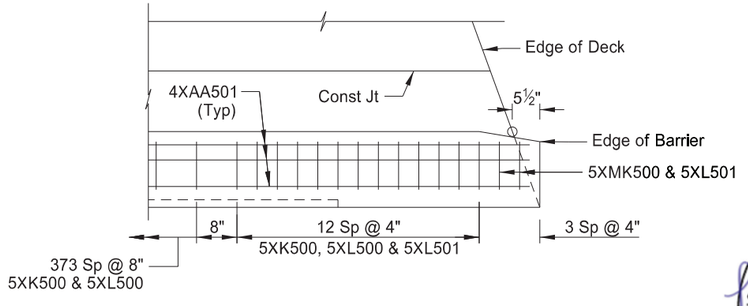
BARRIER ELEVATION



A-A



PLAN

BARRIER END DETAIL B

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

QUANTITIES

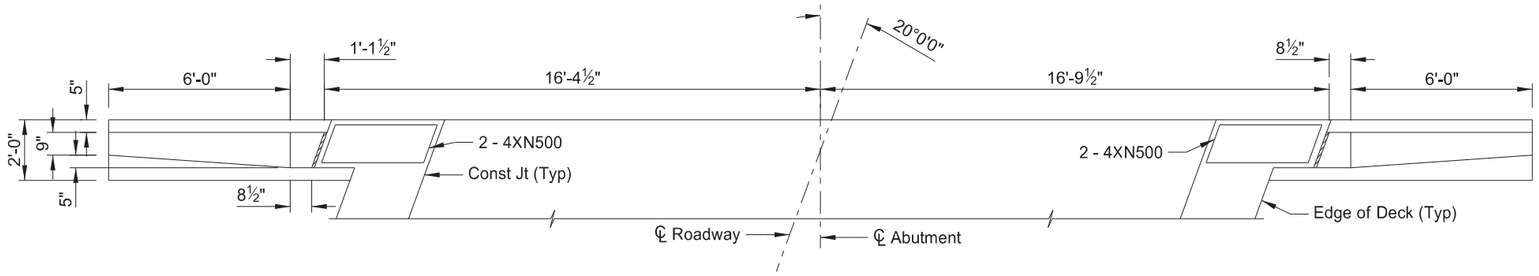
SEE DWG 29-200.243-11

CARLISLE INTERCHANGE
PEMBINA COUNTY

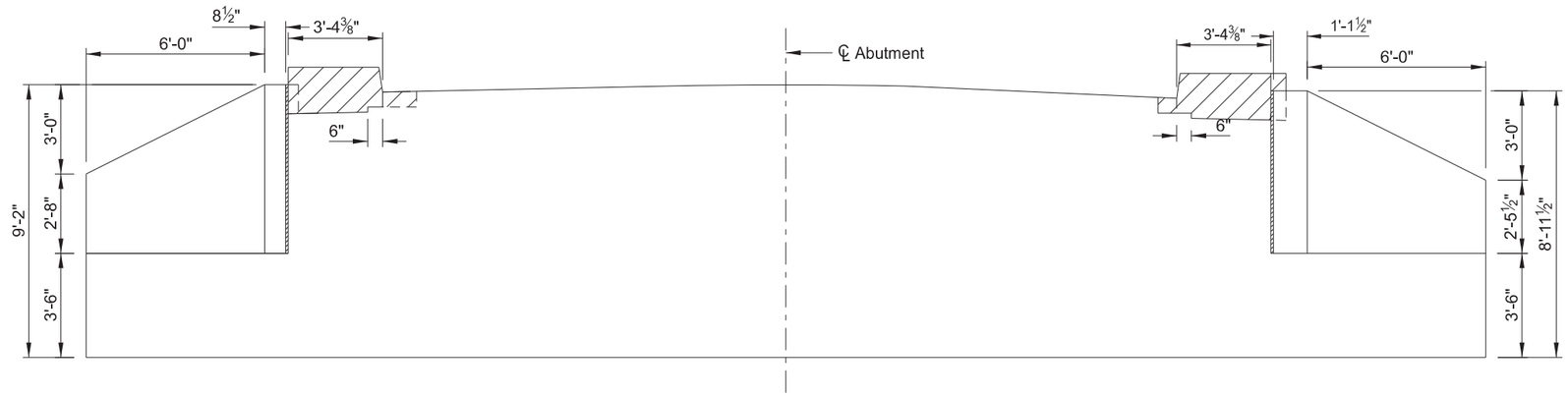
SLAB LAYOUT

DRAWING NO. 29-200.243-8

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	9



TOP PLAN



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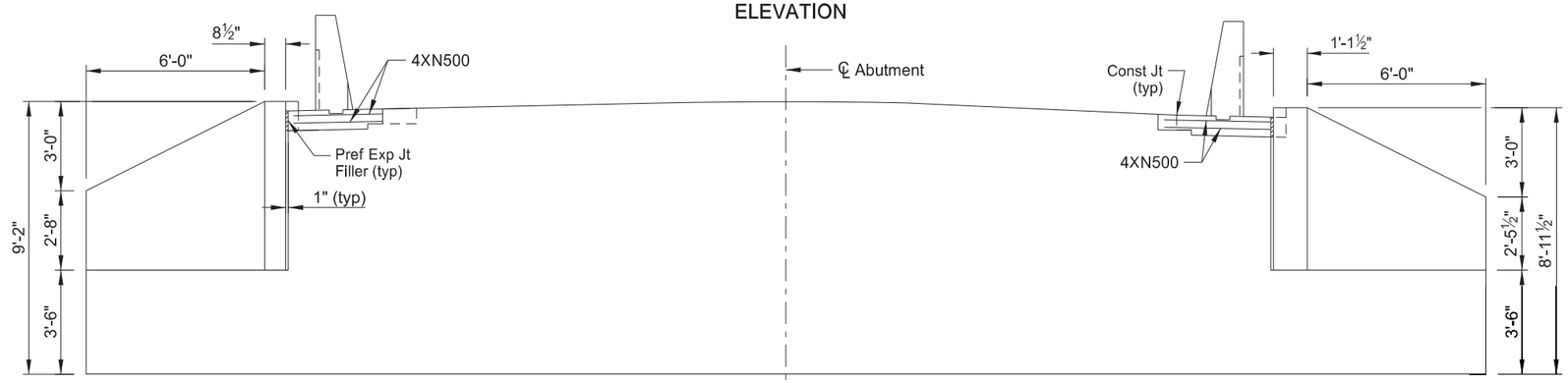
ELEVATION



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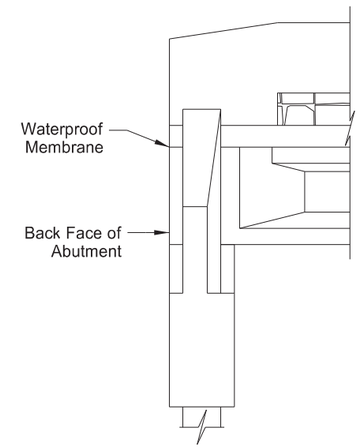
ELEVATION



END SECTION

NOTES:

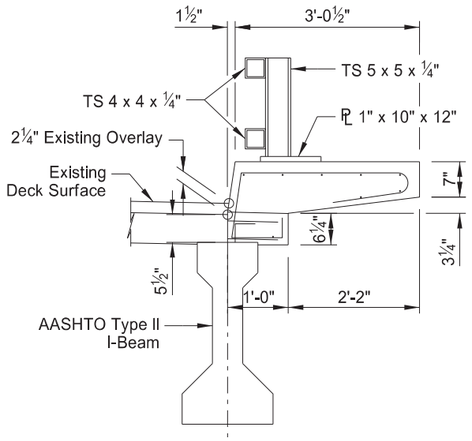
Existing abutment reinforcement within the proposed concrete limits is to remain in place. Remove exposed reinforcing bars a minimum ⅜" using a torch or other approved method. Do not damage the surrounding concrete.

Use waterproof membrane that meets the requirements of Section 602.03 B. Center the waterproof membrane (1'-0" minimum width) on the joint.

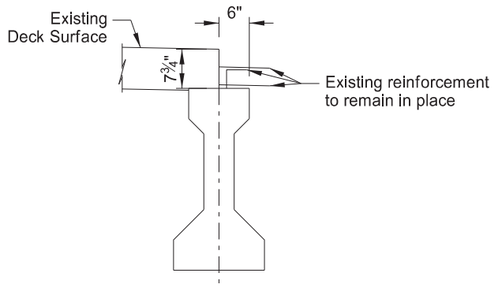
QUANTITIES
SEE DWG 29-200.243-11
CARLISLE INTERCHANGE PEMBINA COUNTY
ABUTMENT DETAILS
DRAWING NO. 29-200.243-9

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	10

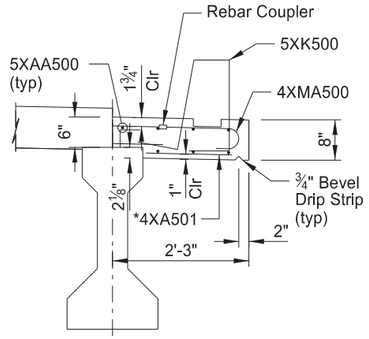


EXISTING



(CURB REMOVAL)

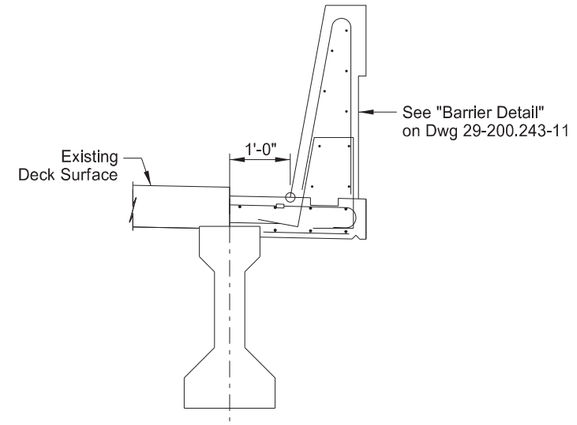
PHASE I



* Place tie bars at 2'-0" max spacing.

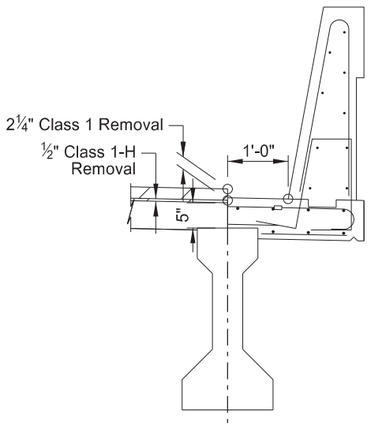
(DECK OVERHANG)

PHASE 2



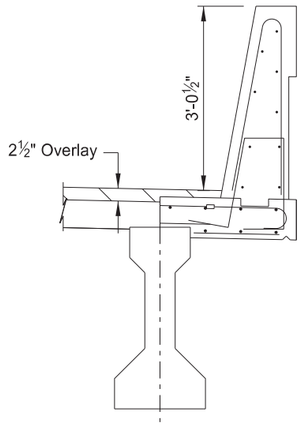
(SINGLE SLOPE BARRIER)

PHASE 3



(OVERLAY REMOVALS)

PHASE 4



(OVERLAY)

PHASE 5

NOTES:

Sawcut the perimeter of the removal areas to a depth of 1". Remove all unsound concrete with a 15 pound maximum size chipping hammer. Remove the concrete in a manner that prevents damage to the parts of the structure to remain.

Include the removal of the double box beam rail retrofit, deck overhang, and concrete curb in the pay item "Removal of Curb".

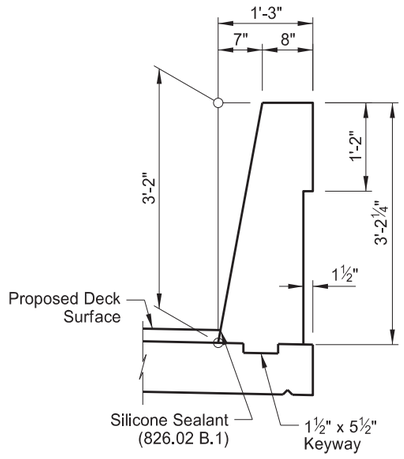
REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE
02/18/25
NORTH DAKOTA

QUANTITIES
SEE DWG 29-200.243-11
CARLISLE INTERCHANGE PEMBINA COUNTY
CONSTRUCTION SEQUENCE
DRAWING NO. 29-200.243-10

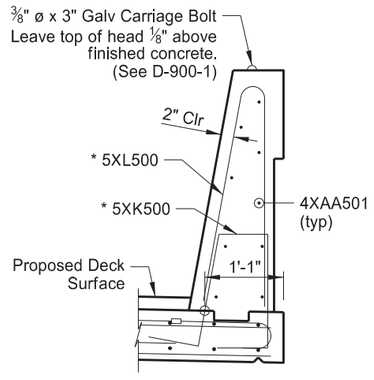
BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS								
					a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	4	XA500	8	3'-0"	3'-0"								
	4	XA501	262	1'-5"	1'-5"								
	5	XK500	804	4'-11"	1'-6"	7"			10"		8"	2.2	12
	5	XL500	772	5'-11"	9"	2'-9"	5"			1.25"		2.2	12
	5	XL501	36	5'-3"	9"	2'-5"	5"			1.25"		2.2	12
	4	XN500	8	10'-1"	3'-4"	1'-4"	4.5"					4.4	12
	5	XAA500	14	274'-8"		60'-0"	3'-9"	34'-8"	4		259'-8"		
	4	XAA501	18	271'-8"		60'-0"	3'-0"	31'-8"	4		259'-8"		
	4	XMA500	1110	1'-9"		1'-3"							
	4	XMA501	18	3'-1"		2'-7"							
	5	XMK500	4	4'-5"	1'-2"	7"			10"		4"	2.2	12



SHOWING DIMENSIONS



* Provide a 2" clearance from the front face to the barrier reinforcing.

SHOWING REINFORCING

BARRIER DETAIL

NOTES:

1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
4. The "f" dimension indicates the inside radius unless otherwise noted.
5. An "X" preceding a bar designation indicates an epoxy coated bar.
6. Embed the 4XMA501 bars into the concrete with a mechanical adhesive system. The "b" dimension of the 4XMA501 bar is based on a 6" minimum embedment. The actual "b" dimension will be based on embedment according to the chemical adhesive manufacturer's recommendations.
7. Use approved epoxy coated mechanical connectors for the rebar couplers capable of developing 125% of the reinforcing steel specified yield strength.

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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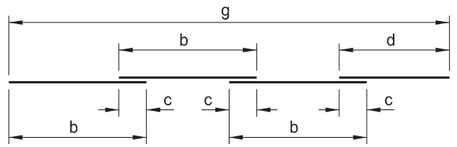
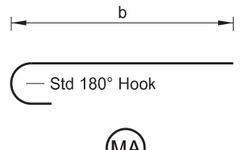
ND	IM-6-029(165)200	170	11

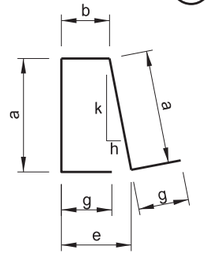


c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

AA



MA



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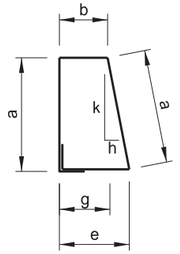

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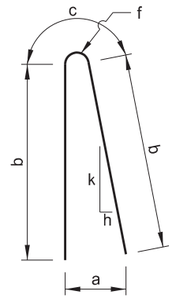

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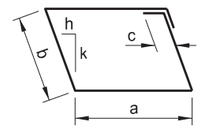
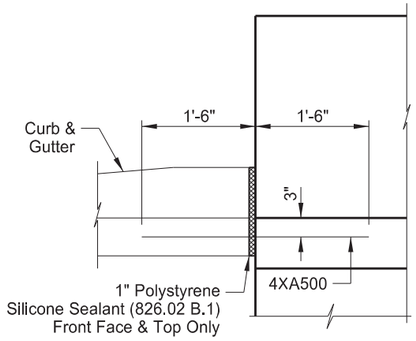


N

BENT BAR DETAILS



DETAIL "C"

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

QUANTITIES	
CLASS AAE-3 CONCRETE	81 CY
REINFORCING STEEL (EPOXY)	18,032 LBS

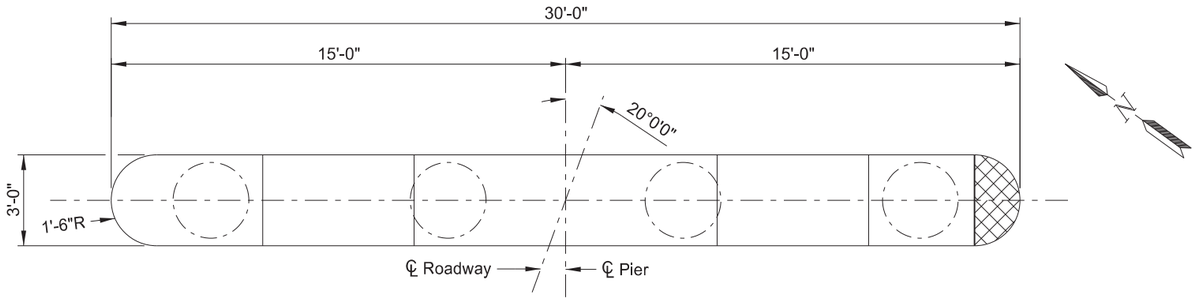
CARLISLE INTERCHANGE
PEMBINA COUNTY

BARRIER DETAILS

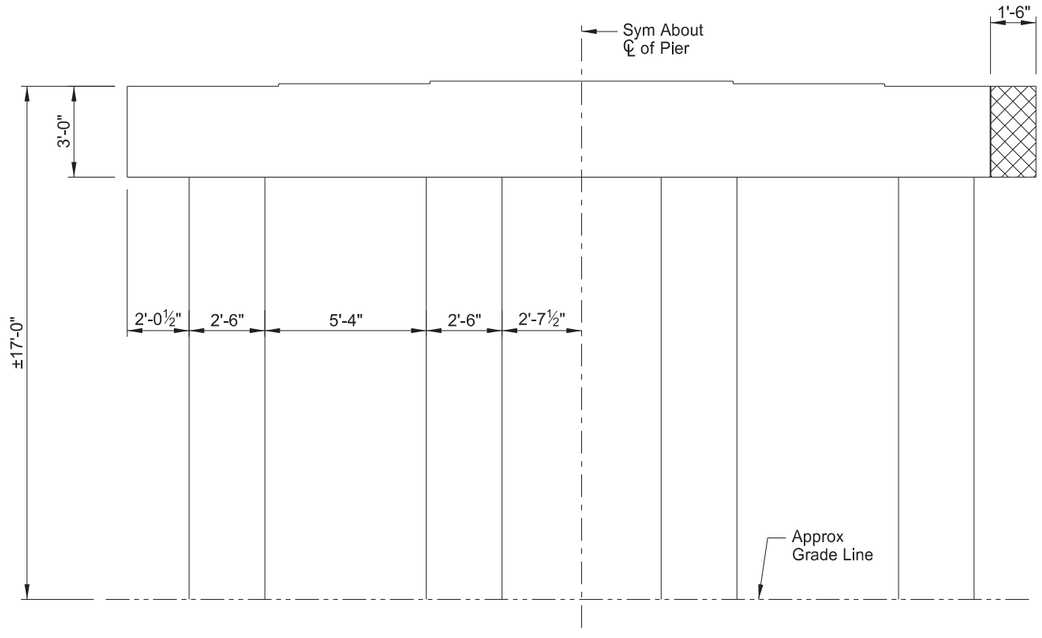
DRAWING NO. 29-200.243-11

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

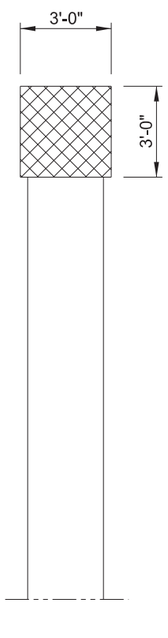
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-6-029(165)200	170	12



TOP PLAN



(WEST FACE)
ELEVATION



(SOUTH FACE)
END SECTION

Indicates spall repair area.

NOTE:

All areas to be verified by the Engineer in the field prior to removal.

REGISTERED PROFESSIONAL ENGINEER
LUKE J. BECKERMANN
PE-10087
DATE 02/18/25
NORTH DAKOTA

QUANTITIES	
SPALL REPAIR	21 SF

CARLISLE INTERCHANGE
PEMBINA COUNTY

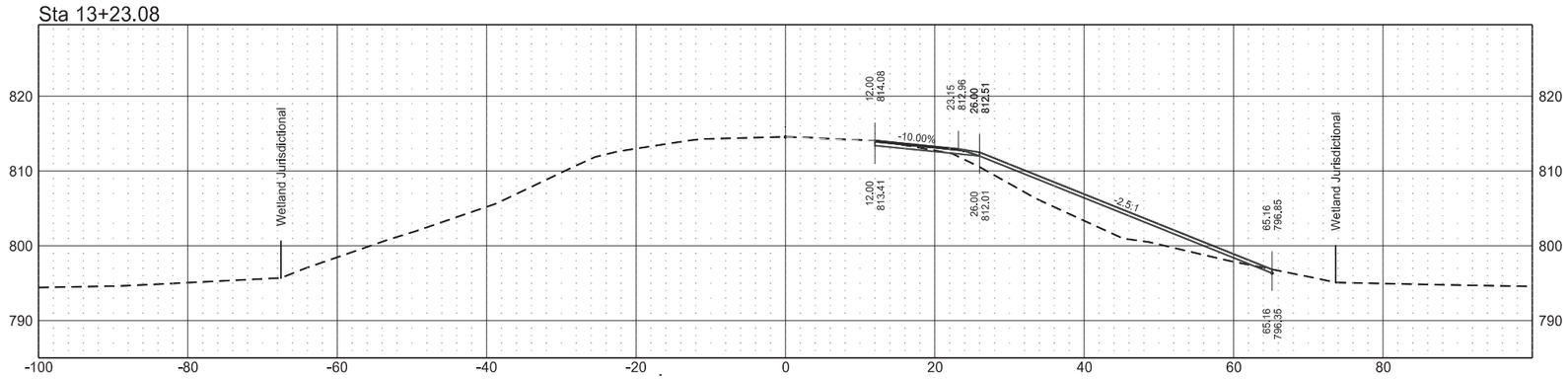
PIER 2 REPAIRS

DRAWING NO. 29-200.243-12

93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	200	1

Sta 13+23.08



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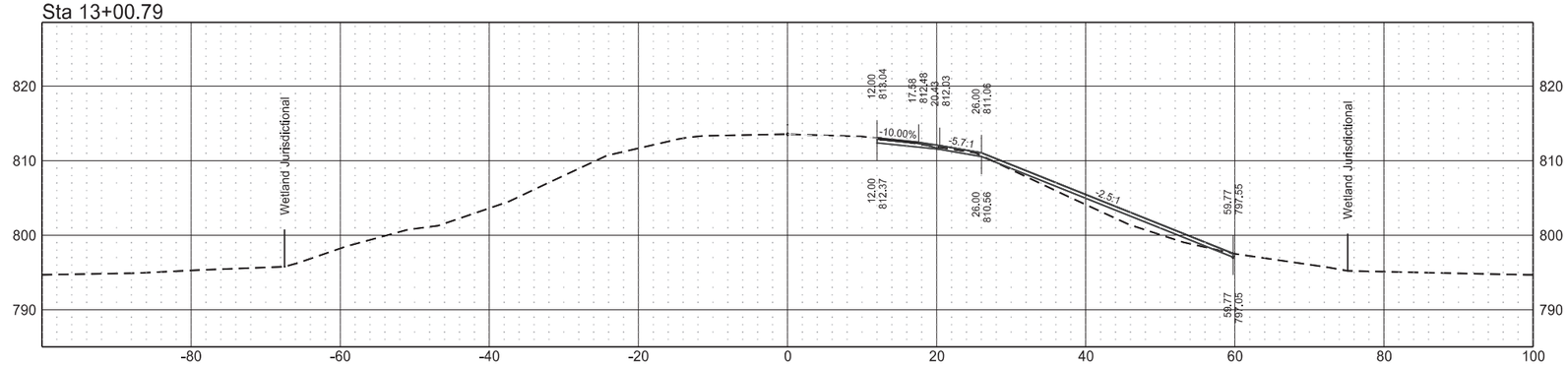

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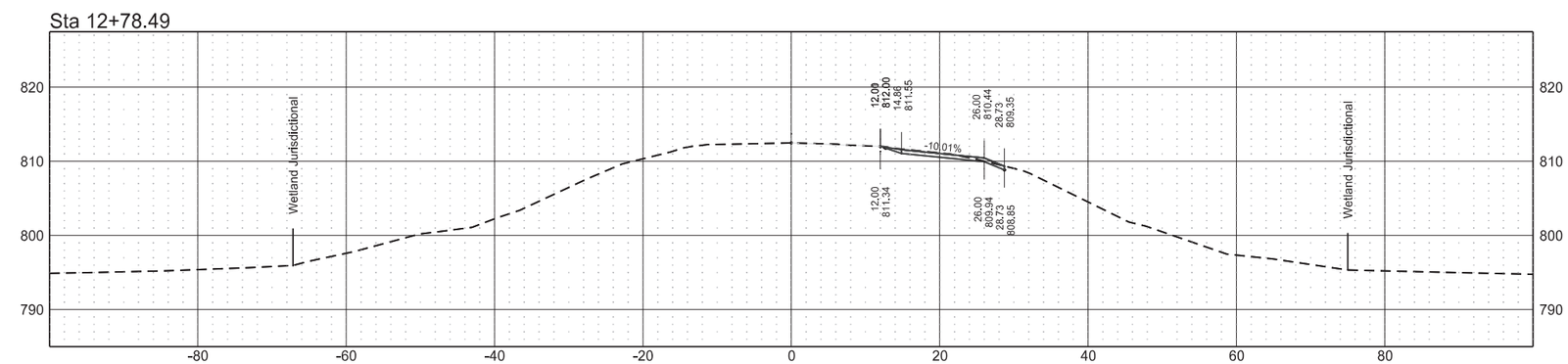
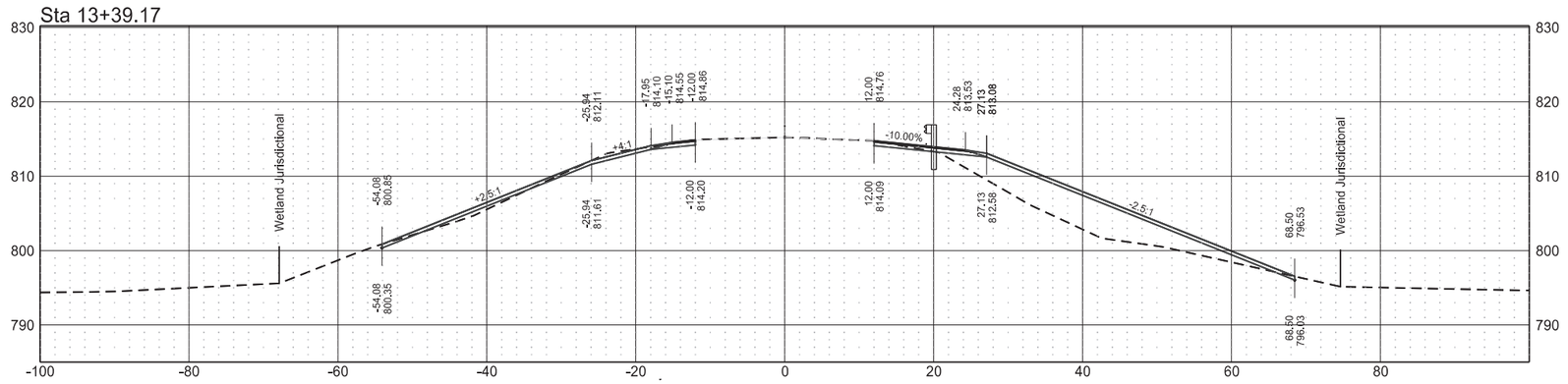


93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	200	2

Sta 13+39.17



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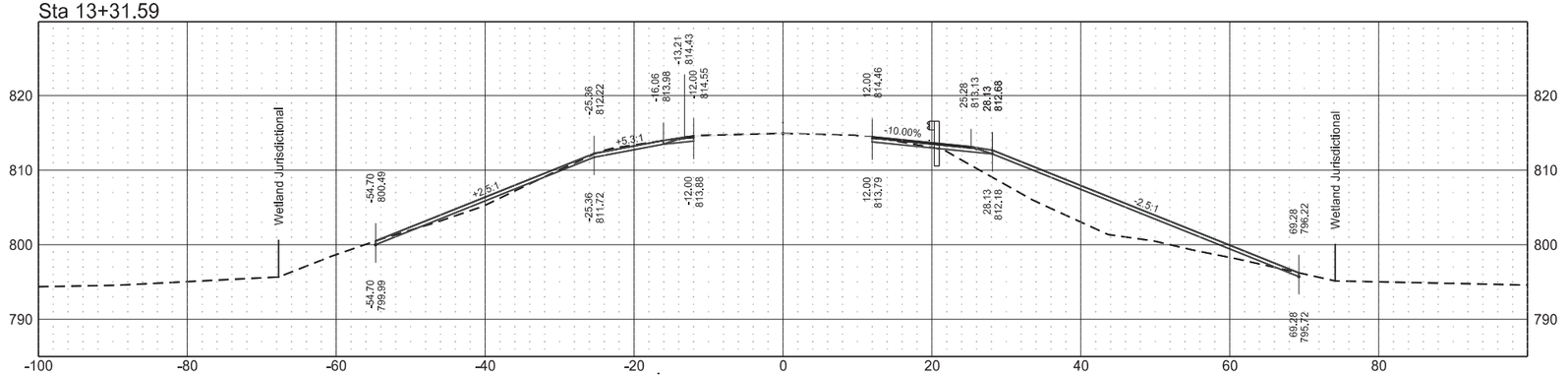

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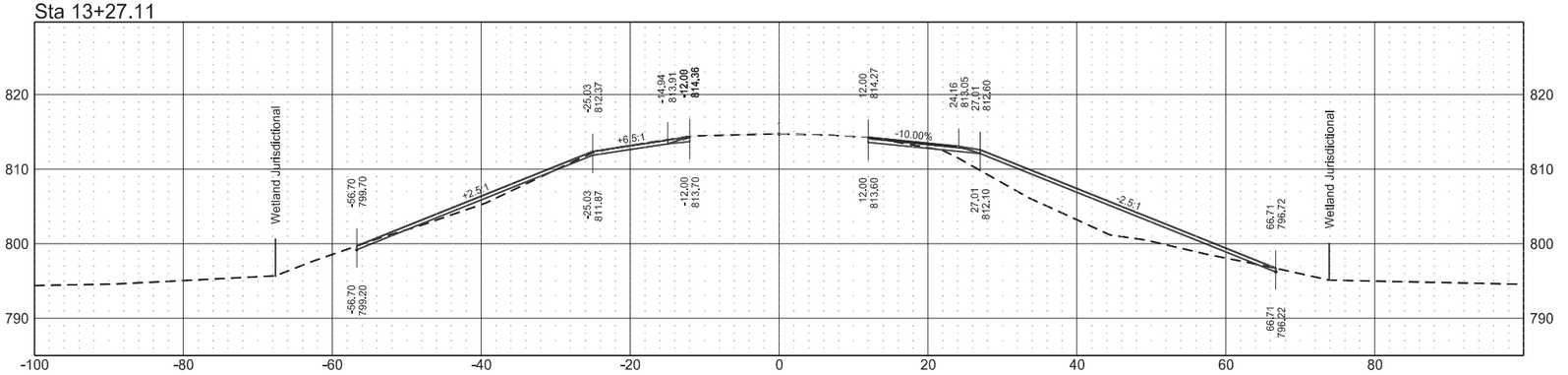

93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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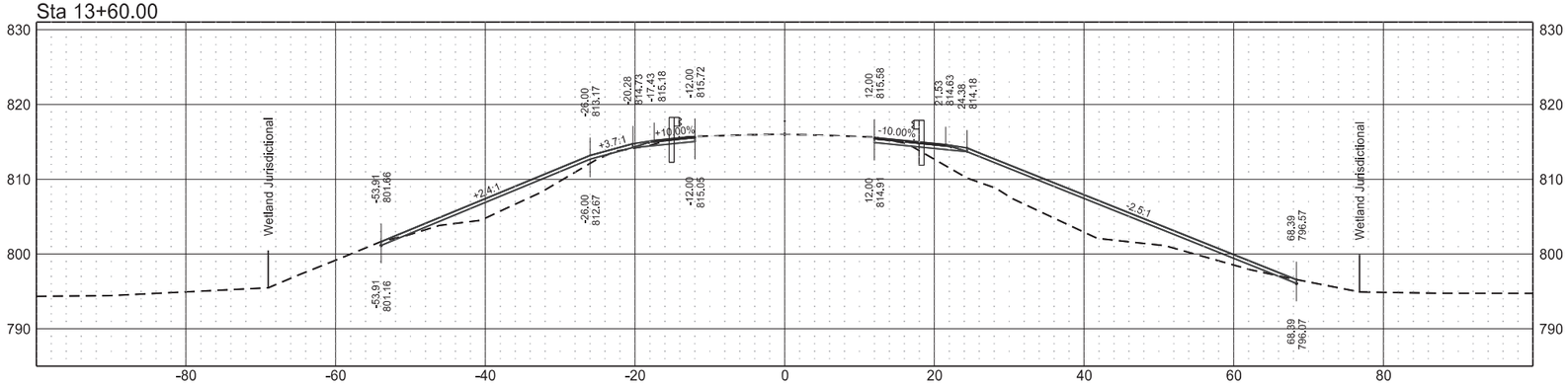
Sta 13+60.00



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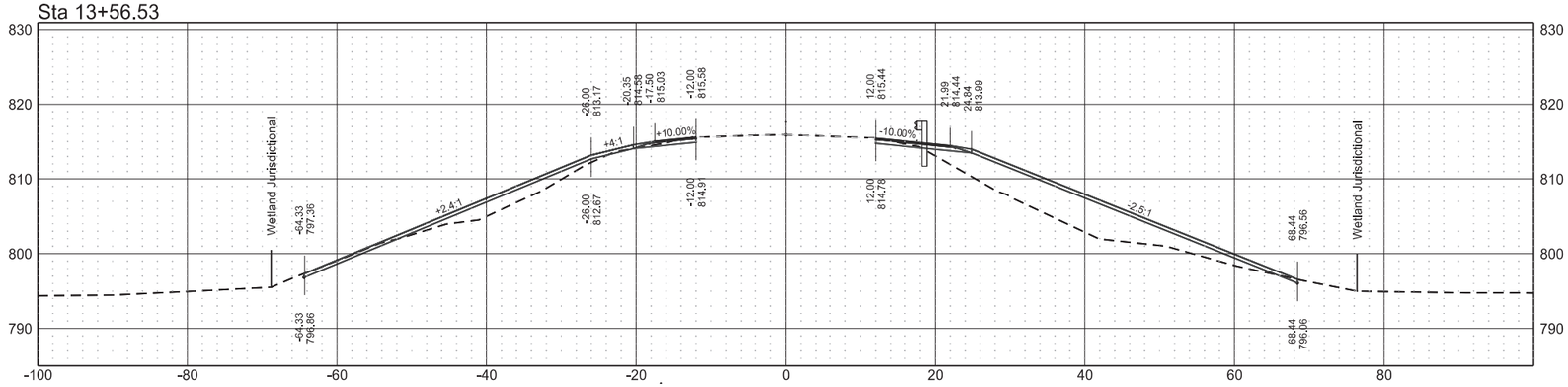

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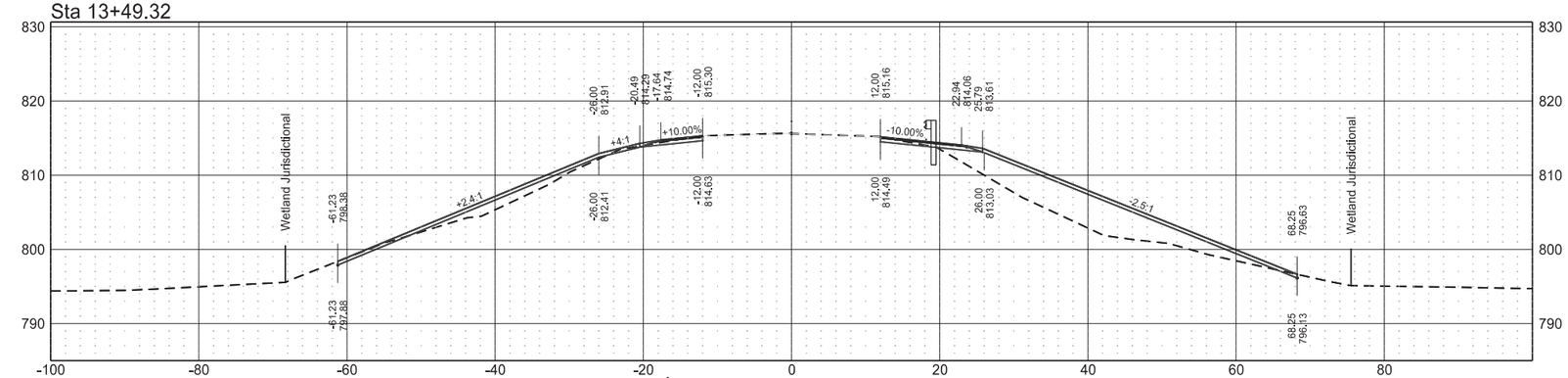

93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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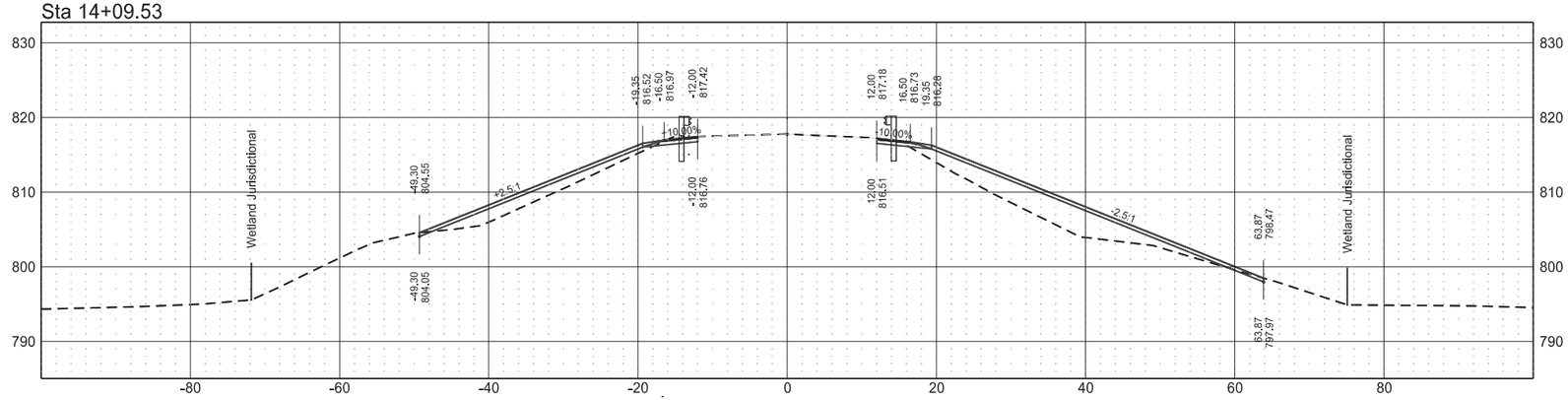

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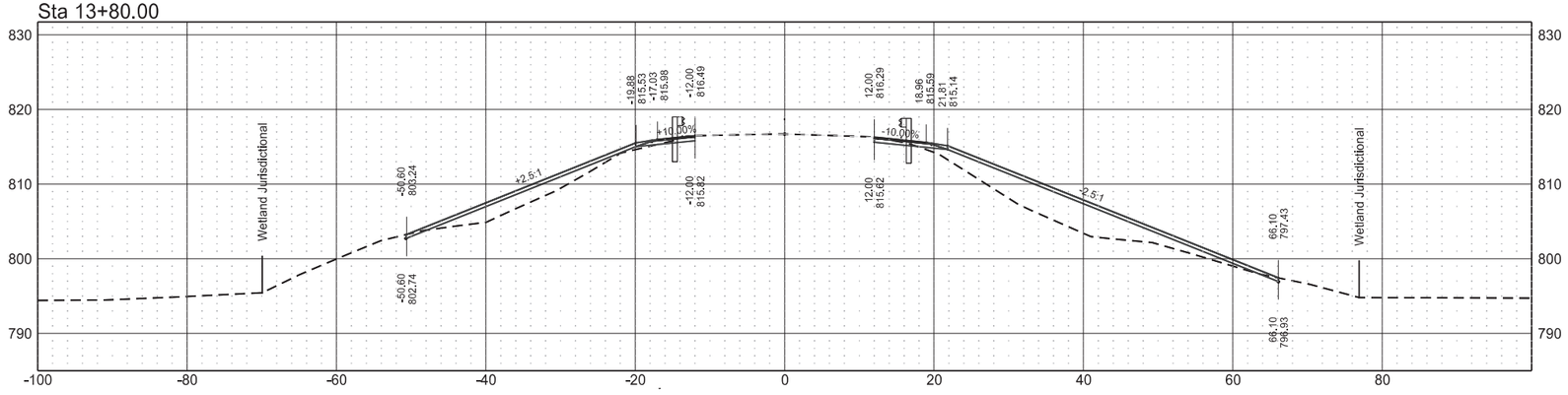

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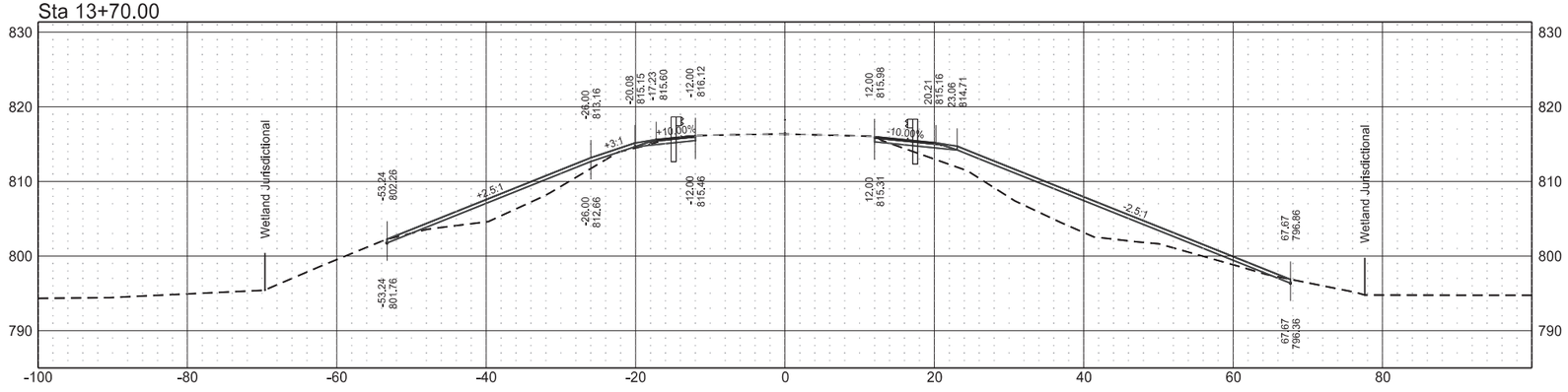

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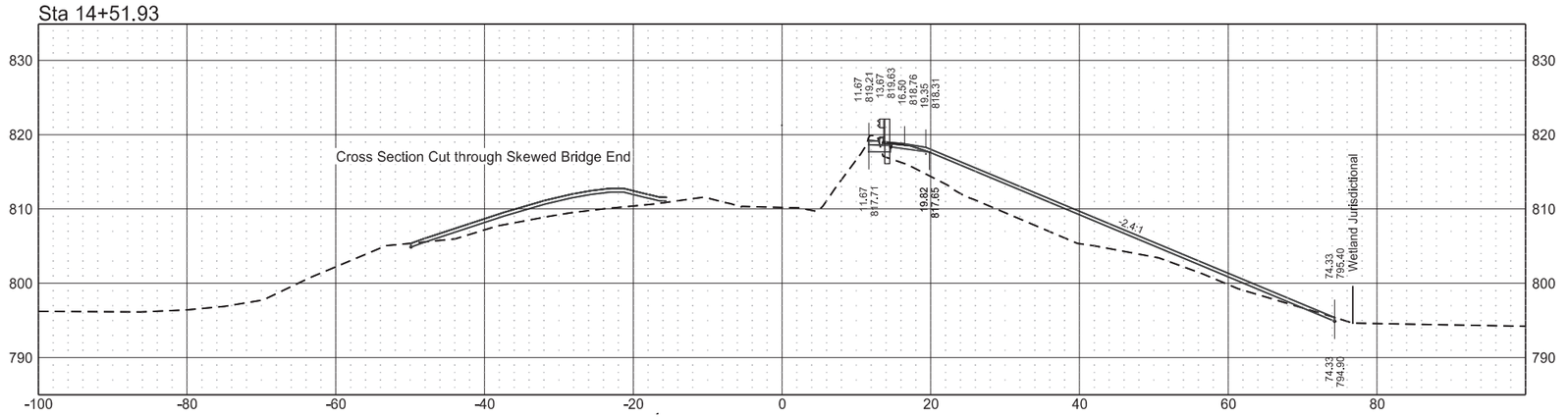
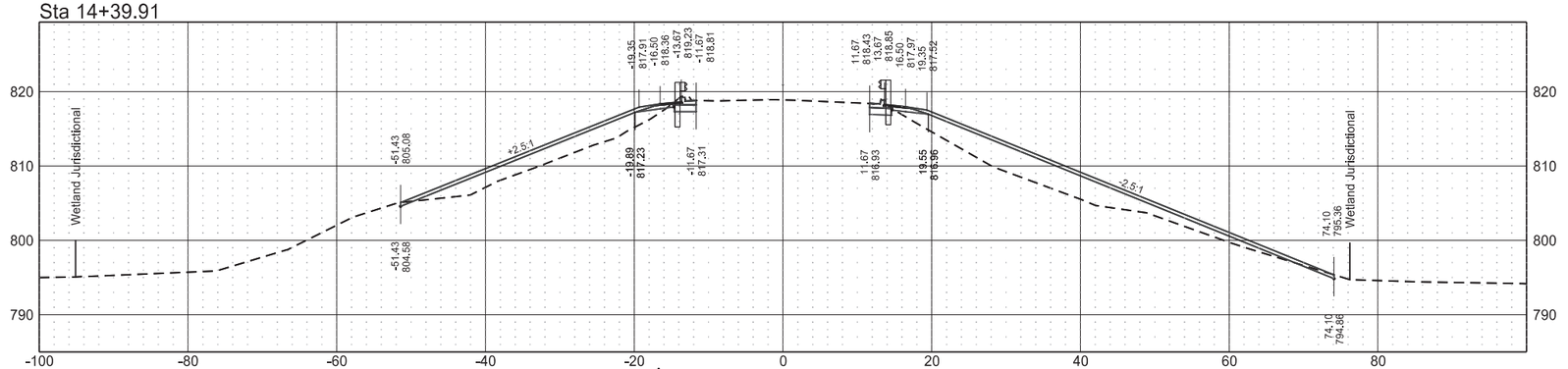
Sta 14+51.93



Sta 14+39.91



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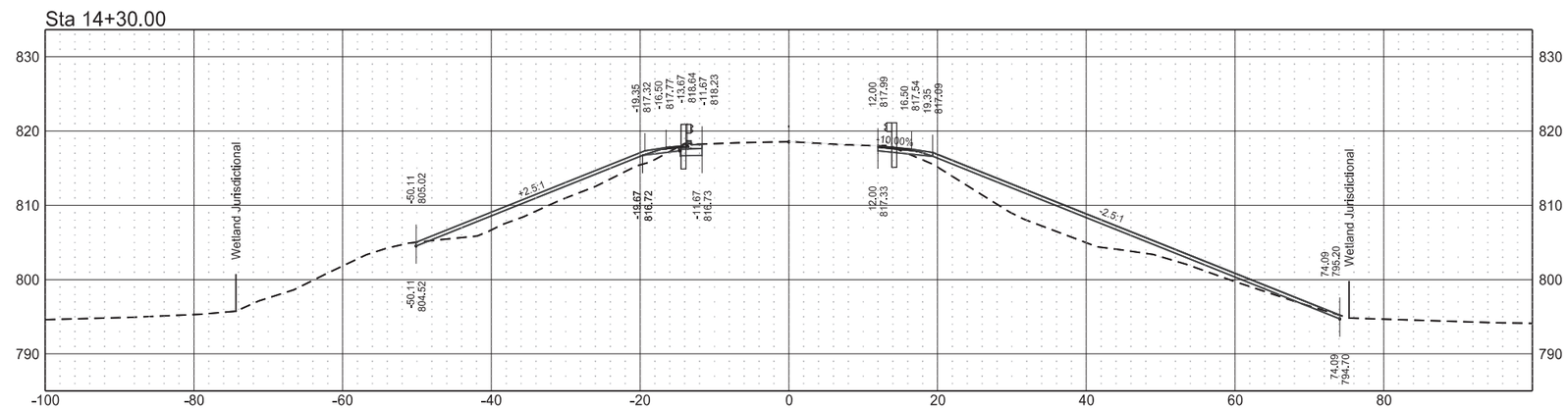
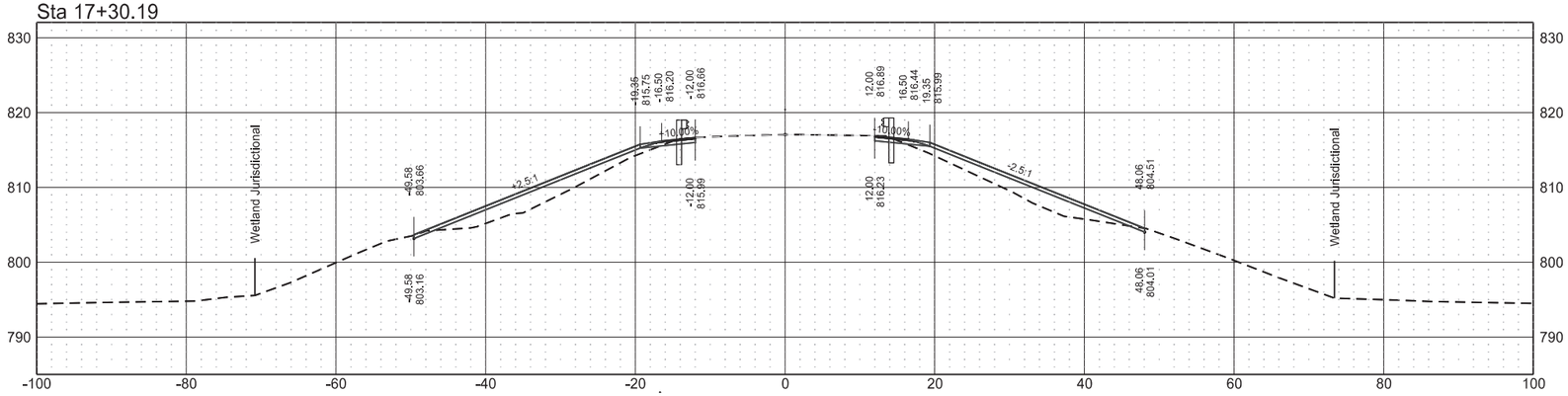


93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	200	6

Sta 17+30.19



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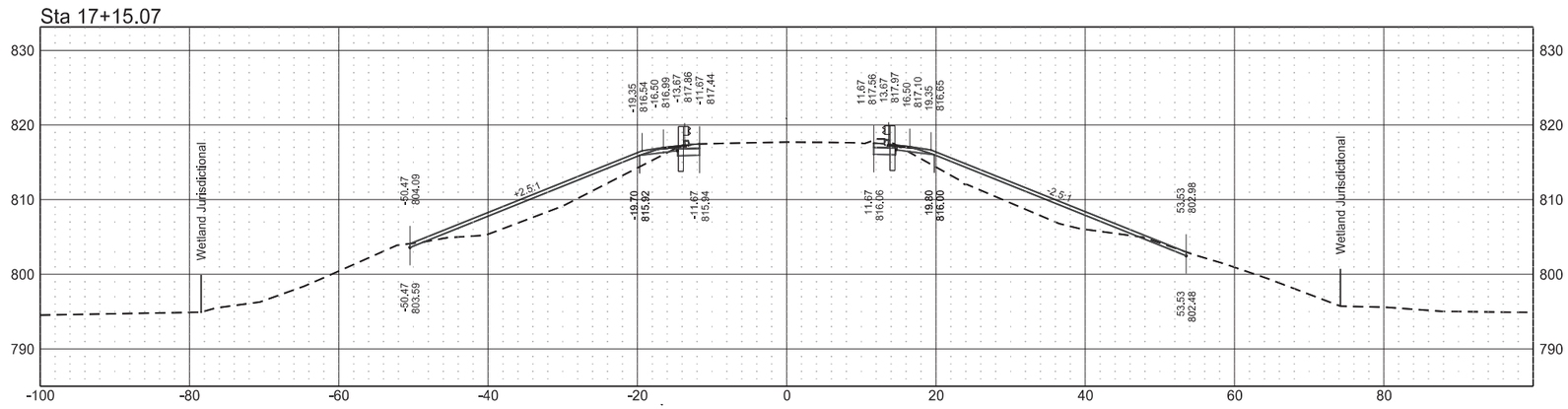
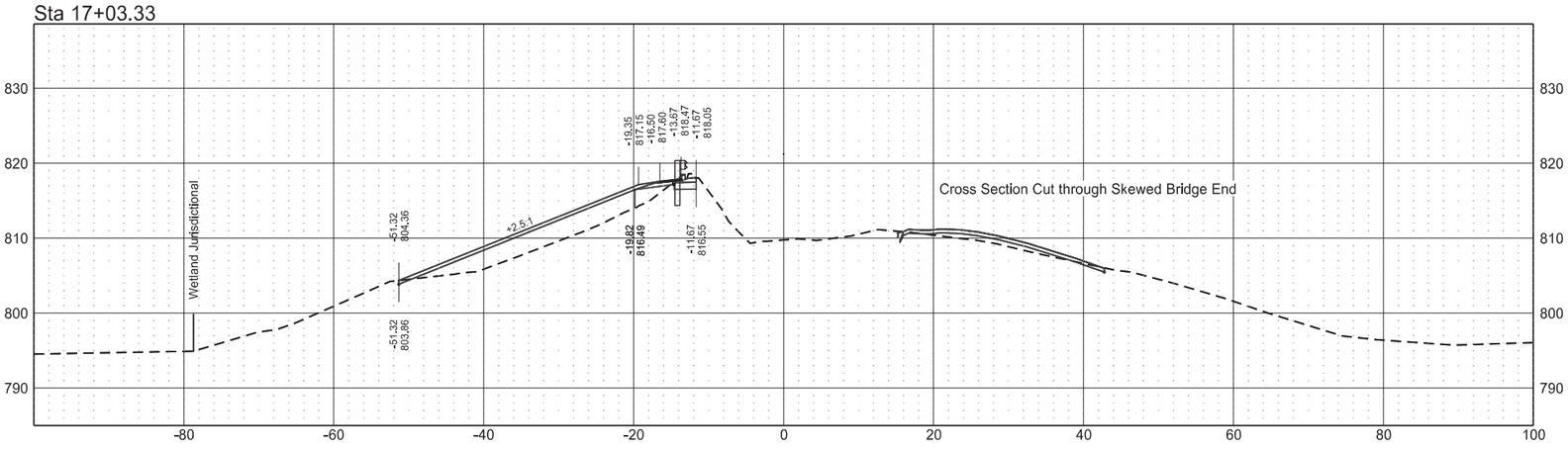


Sta 17+03.33



93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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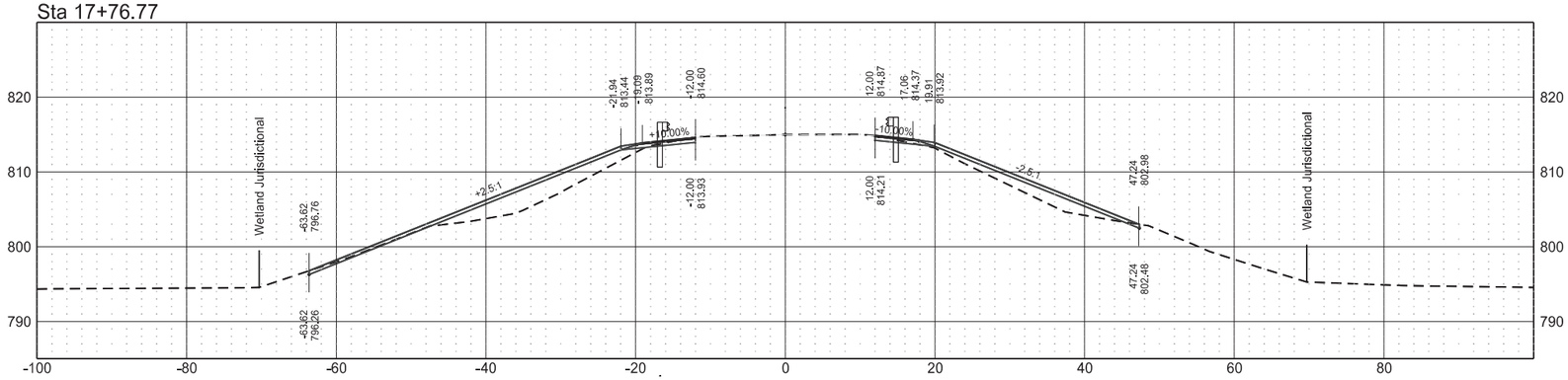
Sta 17+76.77



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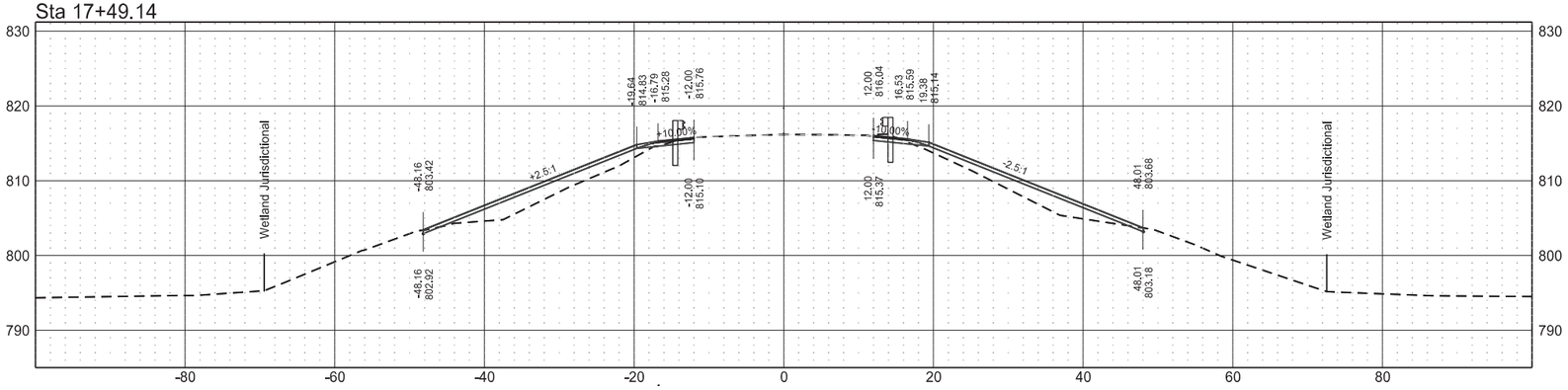

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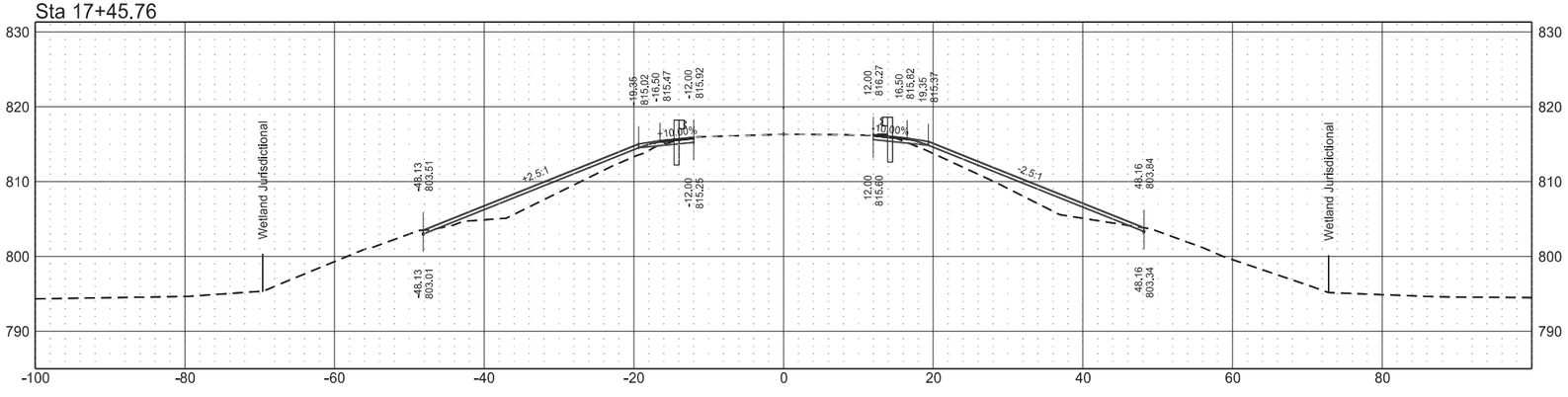

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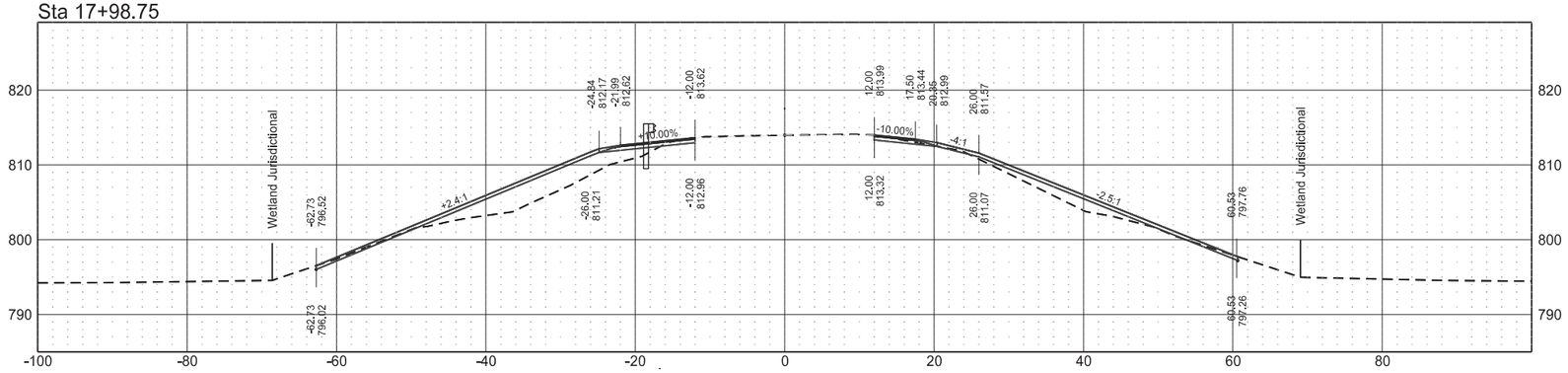
Sta 17+98.75



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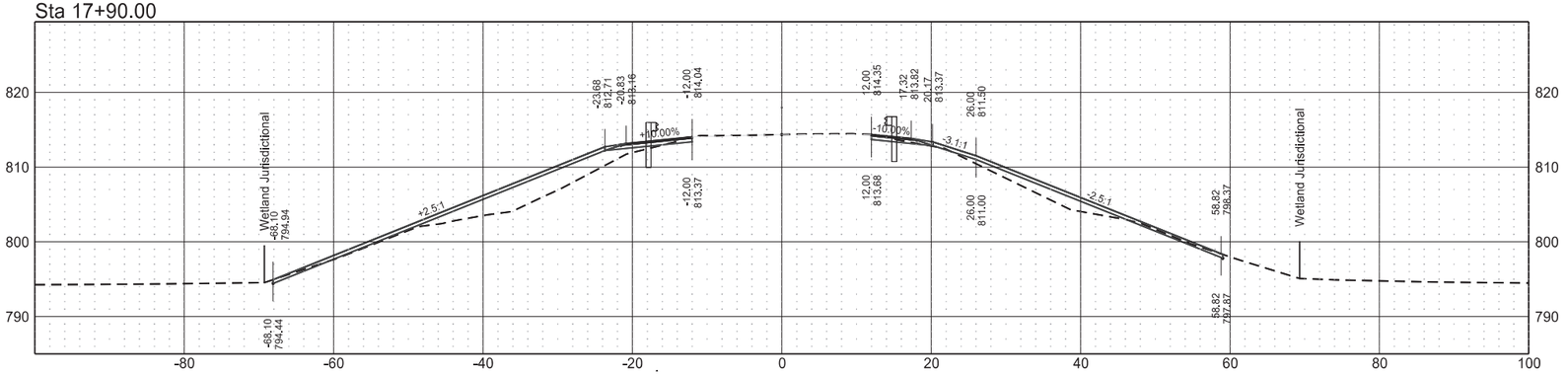

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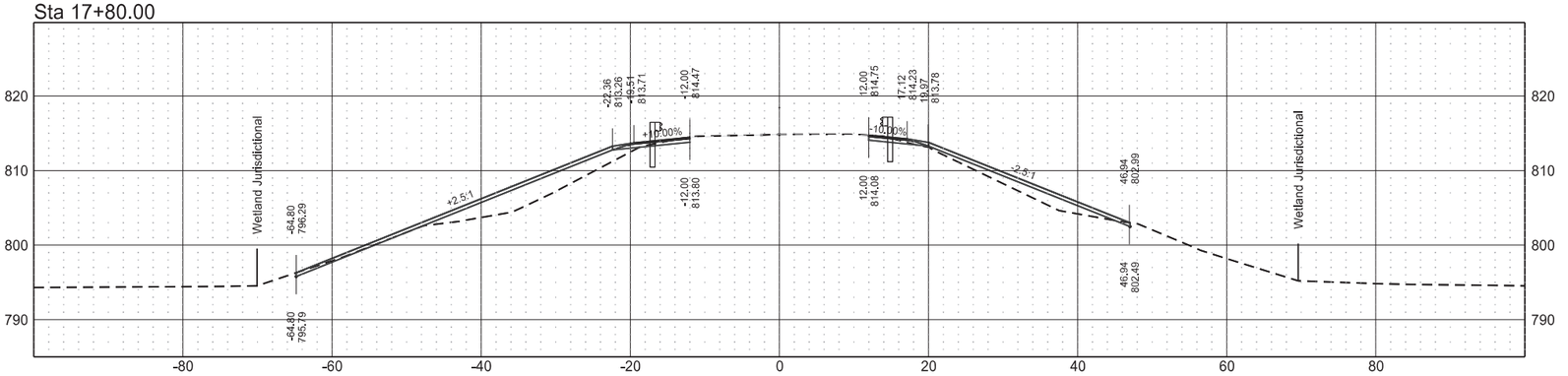
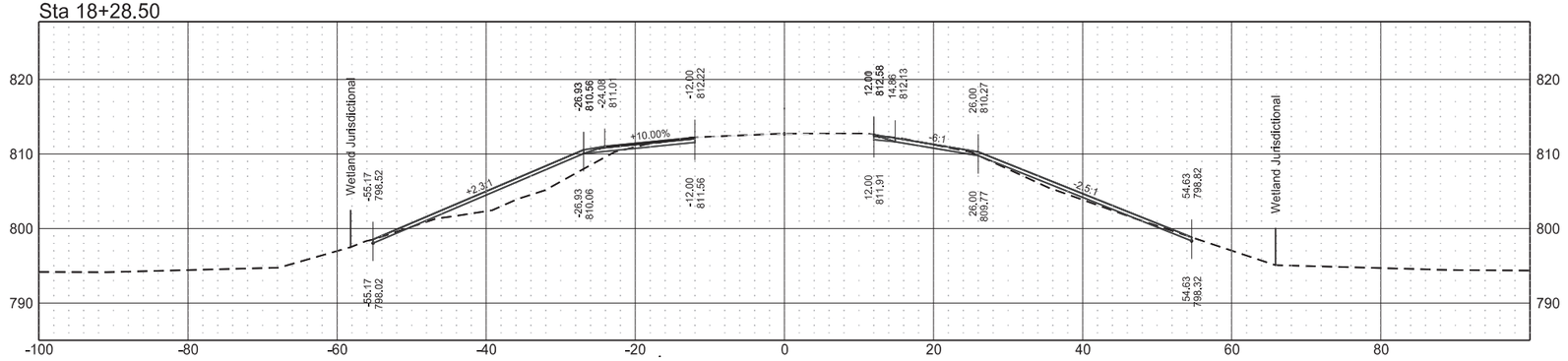


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	200	9

Sta 18+28.50



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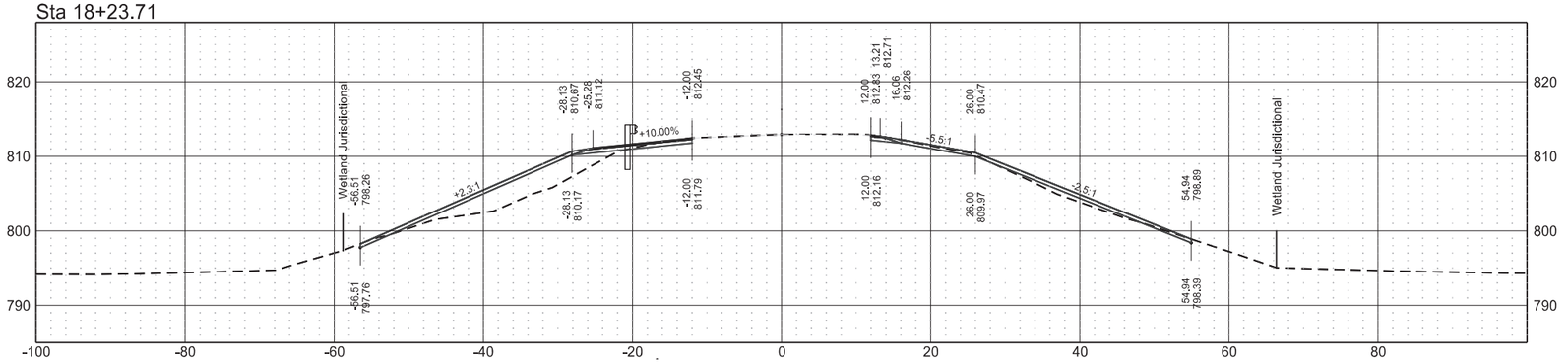

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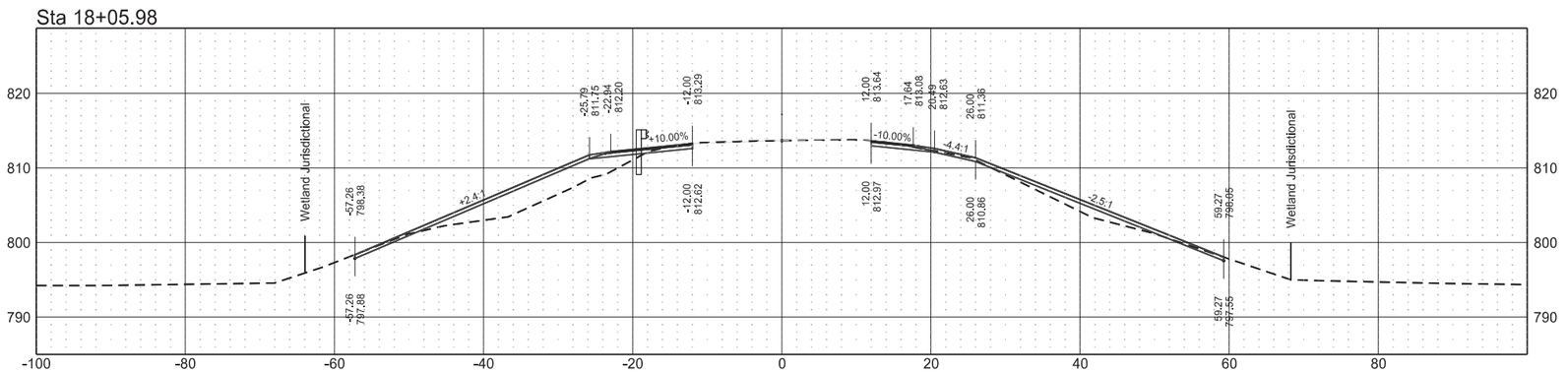
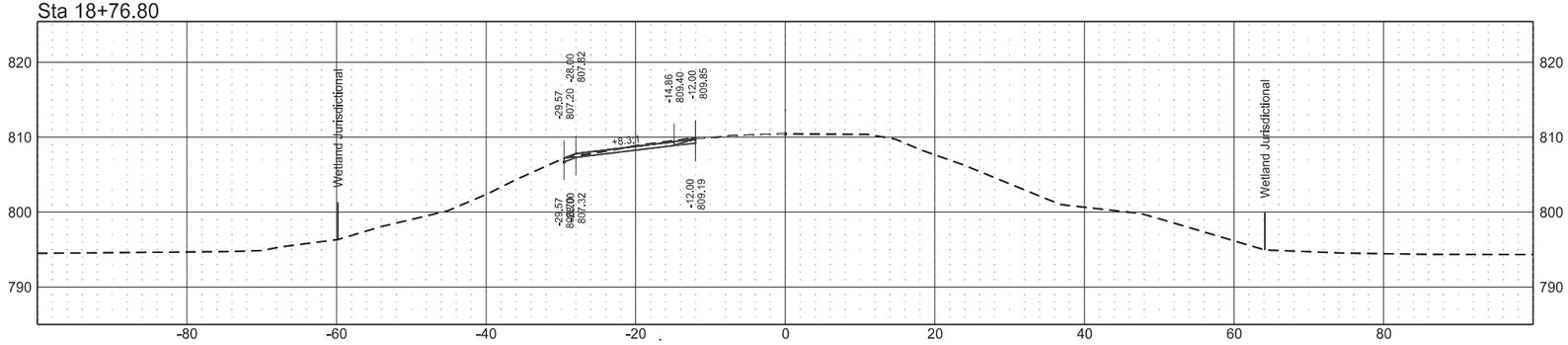


93rd St NE

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-6-029(165)200	200	10

Sta 18+76.80



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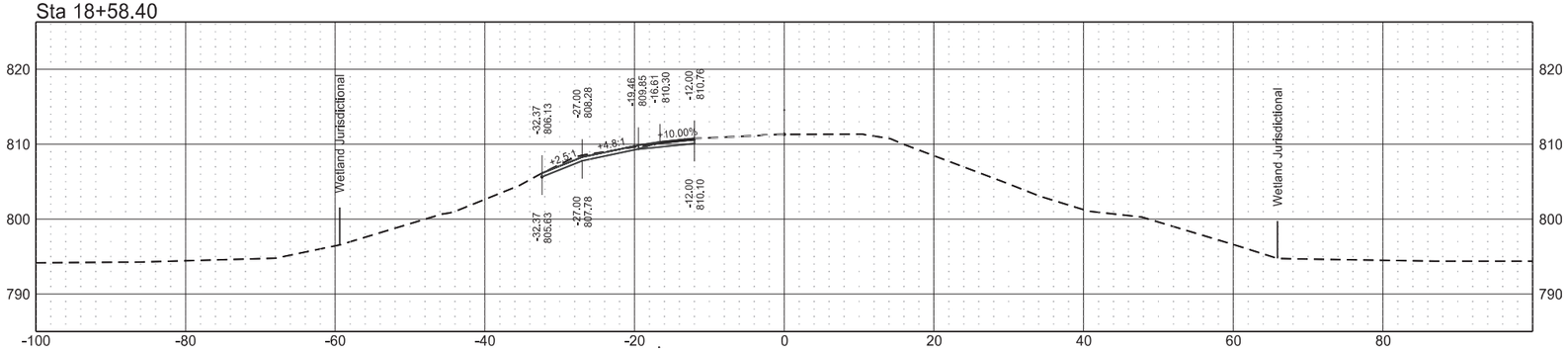

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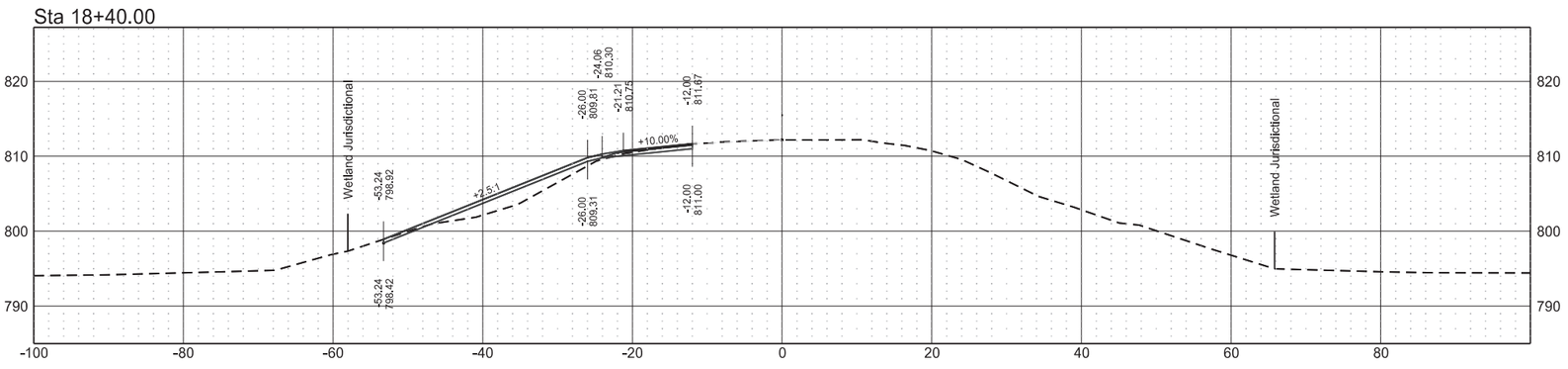

NDDOT ABBREVIATIONS

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

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NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Gov	government
Grd	graded/grade
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ht	height
Hel	helical
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
HTCG	high tension cable guardrail
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IP	iron pipe
Jt	joint
Jct	junction
Ln	lane
Lg	large
Lat	latitude
Lt	left
Lens	lenses
Lvl	level
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Liq	liquid
LL	liquid limit
Loc	location
Long.	longitude
Lp	loop
LD	loop detector
Lum	luminaire
Mb	mailbox
ML	main line
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
Meas	measure
Mdn	median
MD	median drain
MC	medium curing
MGS	Midwest Guardrail System
MM	mile marker
MP	mile post
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Neop	neoprene
Ntwk	network
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Ocpd	occupied
Ocpy	occupy
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
Perm	permanent
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl or ℙ	plate
Pt	point
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd or Pref	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
RCTES	reinforced concrete traversable end section
Reinf	reinforcement
Res	reservation
Res	residence
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	roadway weather information system
Rk	rock
Rt	route

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NDDOT ABBREVIATIONS

Salv	salvage(d)
San	sanitary sewer line
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
SD	sight distance
SN	sign number
Sig	signal
Sgl	single
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical

Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	thinwall tube sample
Ts	topsoil
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VCP	vitrified clay pipe
Vol	volume
VSFS	vehicle speed feedback sign
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
Wrng	wearing
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner

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NDDOT ABBREVIATIONS

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
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
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
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
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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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

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

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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) (void — void — void — v)
- 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 (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — 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 (S — S)
- Silt Fence (SF — SF)
- 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 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions

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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

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

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

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

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SYMBOLS

D-101-31

- Flexible Delineator
- Flexible Delineator Type A (Exst, Ppsd)
- Flexible Delineator Type B (Exst, Ppsd)
- Flexible Delineator Type C (Exst, Ppsd)
- Flexible Delineator Type D (Exst, Ppsd)
- Flexible Delineator Type E (Exst, Ppsd)
- Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type C (Exst, Ppsd, Diamond Grade)
- Delineator Type D (Exst, Ppsd, Diamond Grade)
- Delineator Type E (Exst, Ppsd, Diamond Grade)
- Barricade (Type I, Type II, Type III}
- Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)
- Attenuation Device
- Truck Mounted Attenuator
- Delineator Drums
- Flagger
- Tubular Marker
- Traffic Cone
- Back to Back Vertical Panel Sign

- Highway Sign (Exst, Ppsd)
- Mile Post Type A (Exst-Ppsd-Reset)
- Mile Post Type B (Exst, Ppsd)
- Mile Post Type C (Exst, Ppsd)
- Object Marker Type I (Exst, Ppsd)
- Object Marker Type II (Exst, Ppsd)
- Object Marker Type III (Exst, Ppsd)
- Existing Reference Marker
- Road Closure Gate 18 Ft (Exst, Ppsd)
- Road Closure Gate 28 Ft (Exst, Ppsd)
- Road Closure Gate 40 Ft (Exst, Ppsd)
- Existing Railroad Battery Box
- Existing RR Profile Spot
- Existing Railroad Crossbuck
- Existing Railroad Frog
- Existing Mailbox (Private, Federal)

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

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SYMBOLS

D-101-32

- Existing Luminaire
- Luminaire LED
- Existing Light Standard Luminaire
- Relocate Light Standard
- Light Standard Light LED Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Emergency Vehicle Detector
- Video Detection Camera

- High Mast Light Standard 3 Luminaire (Exst, Ppsd)
- High Mast Light Standard 4 Luminaire (Exst, Ppsd)
- High Mast Light Standard 5 Luminaire (Exst, Ppsd)
- High Mast Light Standard 6 Luminaire (Exst, Ppsd)
- High Mast Light Standard 7 Luminaire (Exst, Ppsd)
- High Mast Light Standard 8 Luminaire (Exst, Ppsd)
- High Mast Light Standard 9 Luminaire (Exst, Ppsd)
- High Mast Light Standard 10 Luminaire (Exst, Ppsd)
- Overhead Sign Structure Load Center (Exst, Ppsd)
- Traffic Signal Controller (Exst, Ppsd)
- Pad Mounted Traffic Signal Controller (Exst, Ppsd)
- Flashing Beacon (Exst, Ppsd)
- Concrete Foundation (Exst, Ppsd)
- Pipe Mounted Flasher (Exst, Ppsd)
- Pad Mounted Feed Point (Exst, Ppsd)
- Pipe Mounted Feed Point with Pad (Exst, Ppsd)
- Pole Mounted Feed Point (Exst, Ppsd)
- Junction Box (Exst, Ppsd)
- Existing Pedestrian Head with Number
- Existing Signal Head
- Pole Mounted Head
- Existing Lighting Standard Pole

- Existing Traffic Signal Standard
- Pull Box (Exst-Ppsd-Undefined)
- Intelligent Transportation Pull Box (Exst, Ppsd)
- Transformer (Exst, Ppsd)
- Power Pole (Exst-Ppsd-with Transformer)
- Wood Pole (Exst, Ppsd)
- Pedestrian Push Button Post (Exst, Ppsd)
- Existing Pole
- Existing Telephone Pole
- Existing Post
- Connection Conductor (Ground, Neutral, Phase 1, Phase 2)

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

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SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)

Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)

Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)

Force Main Storm Drain Manhole (Exst, Exst with Valve)

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

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 Vegitation Barrier, Ppsd Double with Vegitation Barrier)

Cap or Stub
Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water

Existing Pedestal
Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined

Existing Pipe Vent
Gas, Fuel, Sanitary, Storm Drain, Water, Undefined

Valve
Exst Gas, Exst Water, Ppsd Water, Exst Undefined

Pump
Sanitary, Storm Drain, Exst Water

Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

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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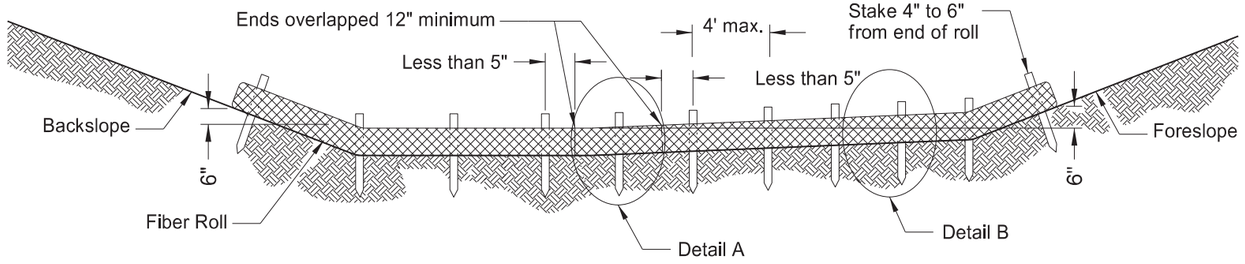
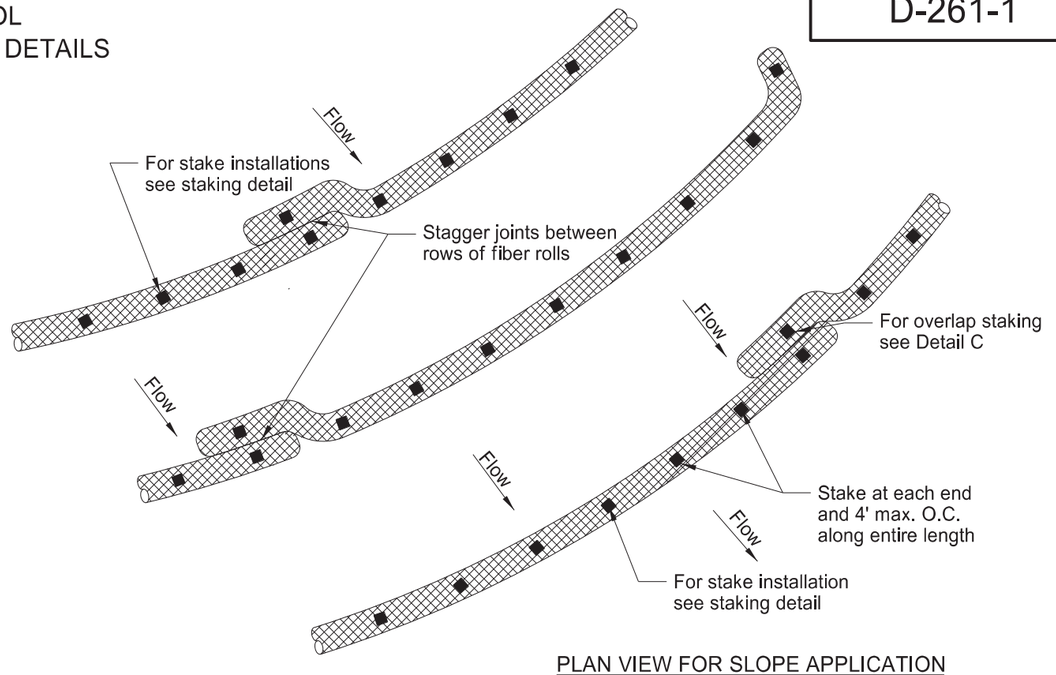
12 18 2020

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

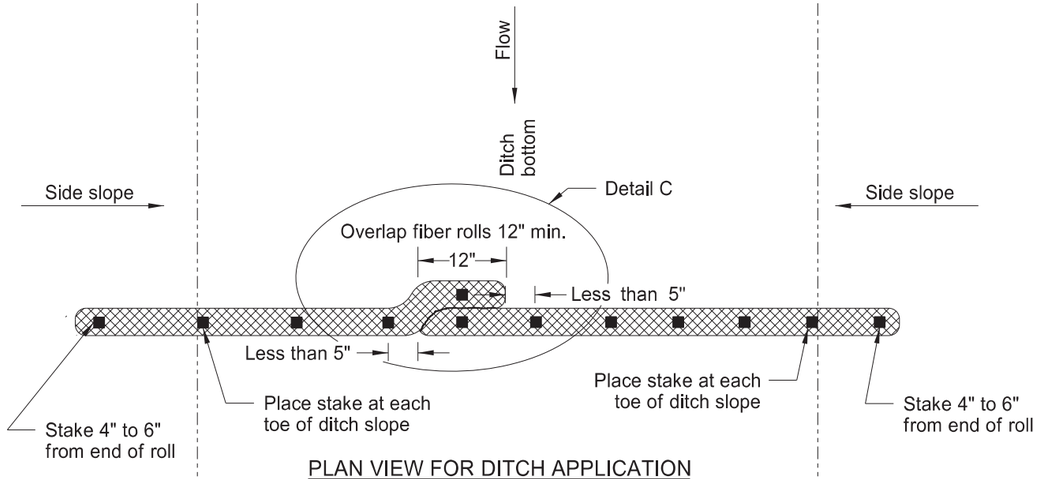


12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



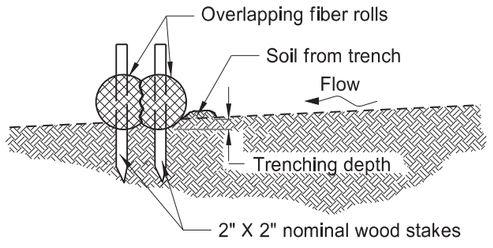
PLAN VIEW FOR SLOPE APPLICATION

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



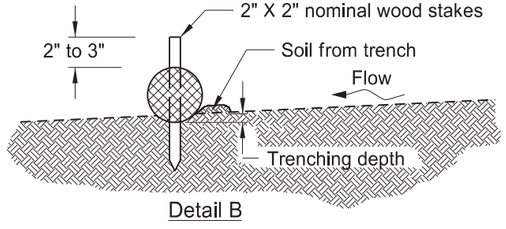
PLAN VIEW FOR DITCH APPLICATION

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

NOTE: Runoff must not be allowed to run under or around roll.

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.

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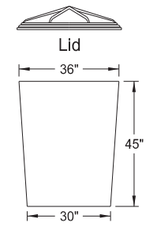
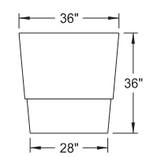
04/22/24

ATTENUATION DEVICE

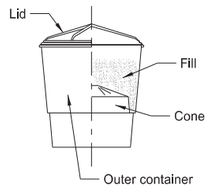
D-704-1





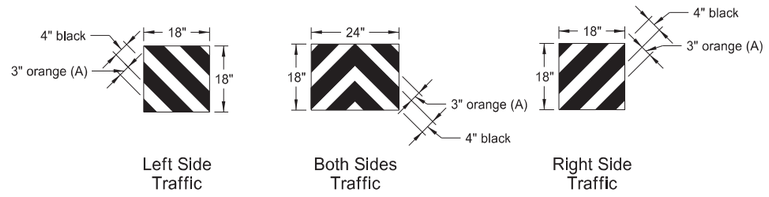
Outer Containers

Cones



Typical Assembly

Typical Module
Construction Detail

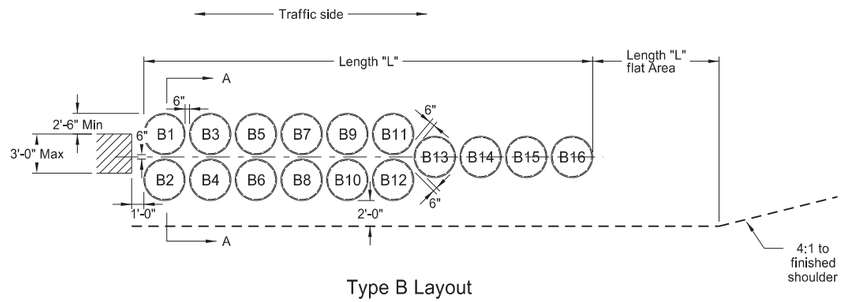


Reflective Sheet Detail

Note:
Apply Type IV reflective sheeting (as specified in the NDDOT Standard Specifications) directly to the outer container of the last attenuation device facing traffic, following the details above. Or apply the sheet to a metallic sheet and attach it to the container with approved fasteners.

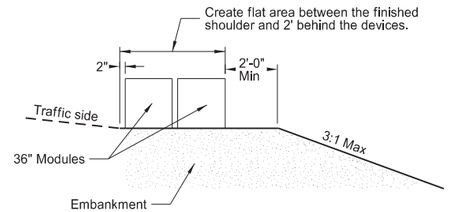
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

Fill Chart					
	Module Weights (LBS)				
	200	400	700	1400	2100
Distance from top edge	8½"	5"	4"	3"	0"



Type B Layout

Note:
Angle attenuation devices 10 degrees towards traffic when placed at piers offset from roadway.



Section A-A
(Type B Layout)

Type B Attenuation Device											
Module Number	Dash Number										
	75	70	65	60	55	50	45	40	35	30	25
	Module Weights (LBS)										
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'
Module Weights (LBS)	Replacement Module										
2100	1	1	1	1	1	1	1	1	1		
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

1. Materials
   A) Use modules manufactured from frangible polyethylene material which shatters upon impact.
   B) Fill modules with class 43 aggregate meeting NDDOT Standard Specifications aggregate requirements. Use fill with a unit weight of at least 100 pounds per cubic foot. Use fill with a moisture content of 2% or less when left over winter.

2. Modules
   Provide modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.
   A) Provide three components for 2, 4, or 7 cubic foot module containers:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
      3) A variable cone-shaped supporting insert capable of supporting 200, 400, or 700 pounds of sand mass to allow for three sizes of modules. Place cone inserts inside the 14 cubic foot container.
   B) Provide two components for the 14 cubic foot module container:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
   C) Provide two components for the 21 cubic foot module container:
      1) A 36" height X 36" width yellow outer container.
      2) A black lid which locks securely over the top of the container.

3. For temporary installations use Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal modules. As an option, place attenuation devices on 3½" maximum thickness pallets to facilitate maintenance.

4. For permanent installations use Barrel Attenuation Device consisting of one-piece outer sand container modules with separate detachable lid. Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal meet these requirements.

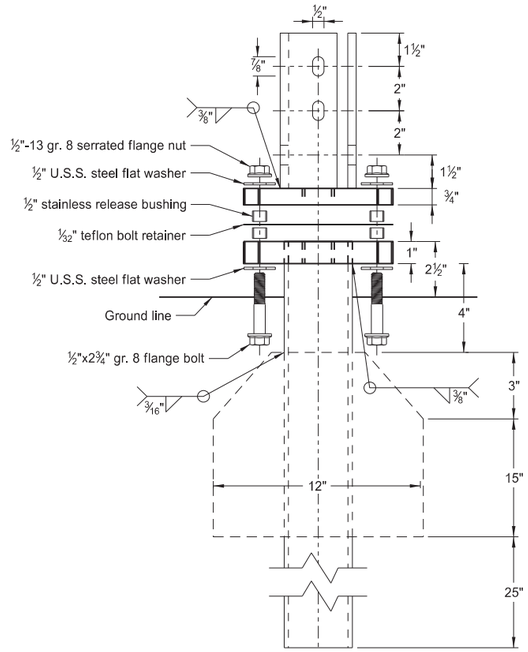
5. The Typical Module Construction Detail and Type B Layout are based on the Energite Crash Cushion manufactured by Energy Absorption. Provide any required layouts and details from other sand filled attenuation module manufacturers which differ from those shown here.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail
9-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

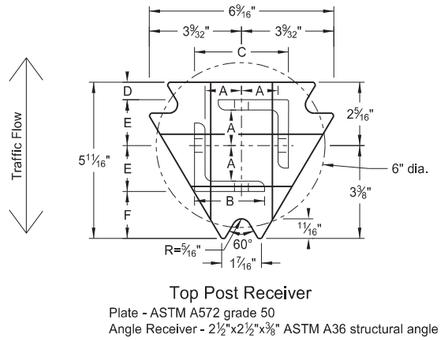
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

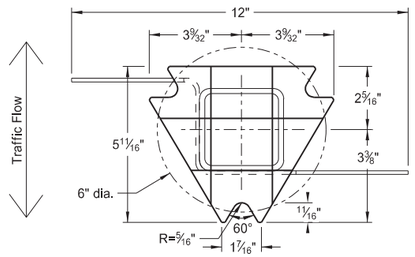


Multi-Directional
Slip Base Assembly

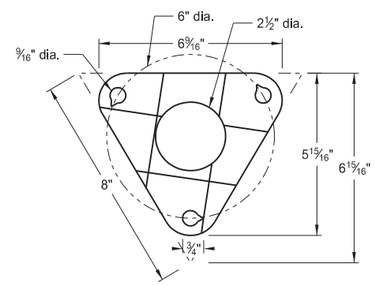
Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



Bolt Retainer for Base Connection
Bolt Retainer- 1/32" Reprocessed Teflon

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.

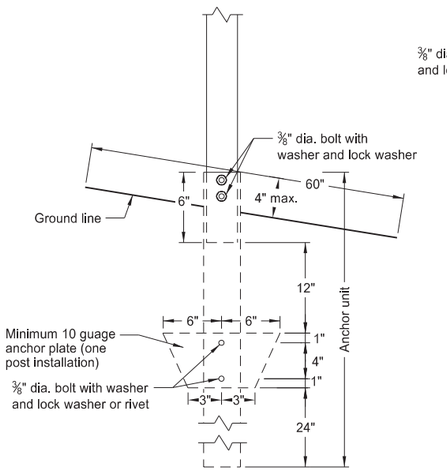
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³/16	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
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³/16 x 2³/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

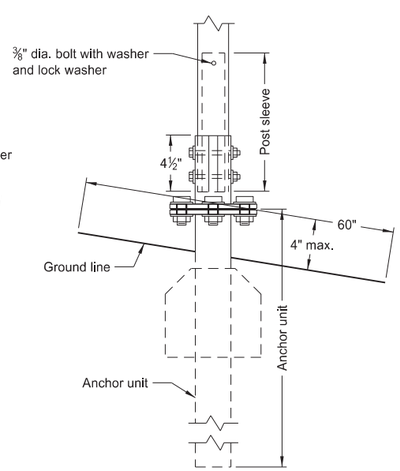
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

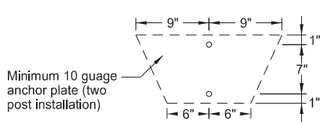
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



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

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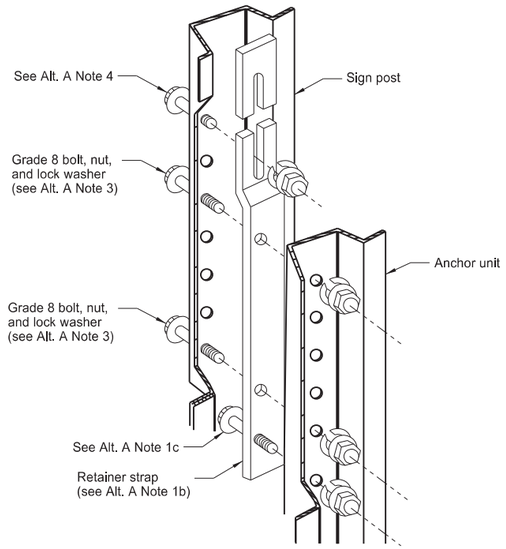
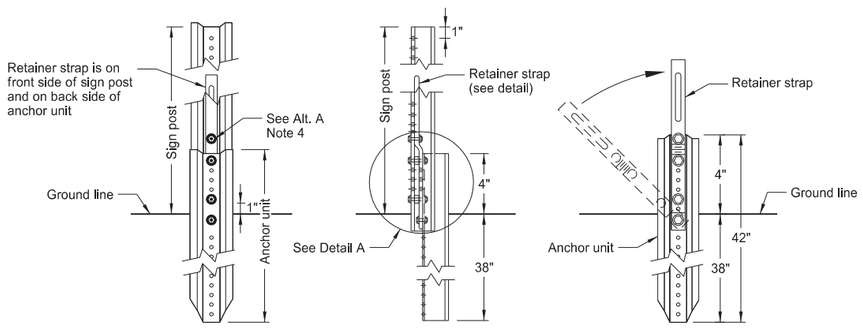
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



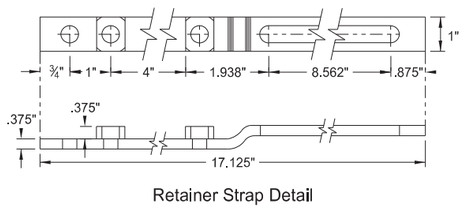
Detail A



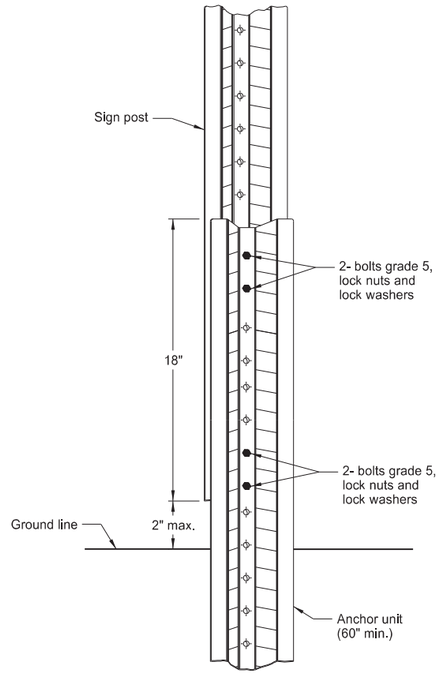
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.

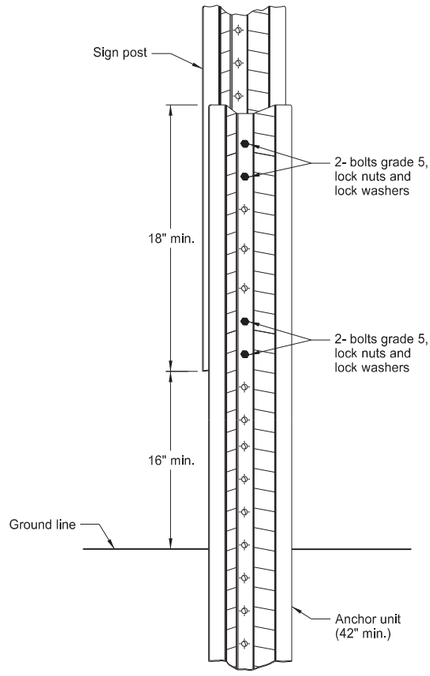


Retainer Strap Detail



Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
   c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
   d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
   b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
   b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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

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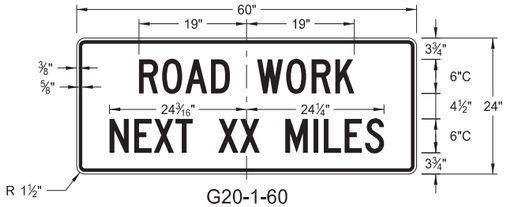
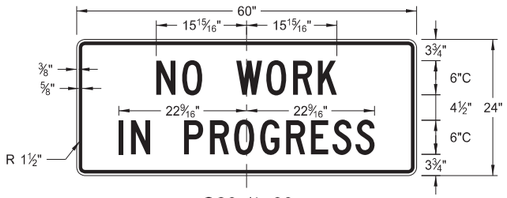
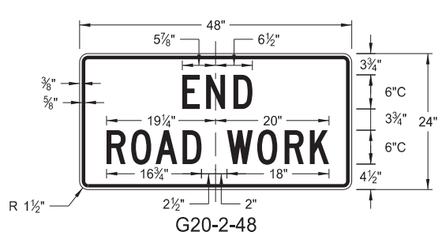
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



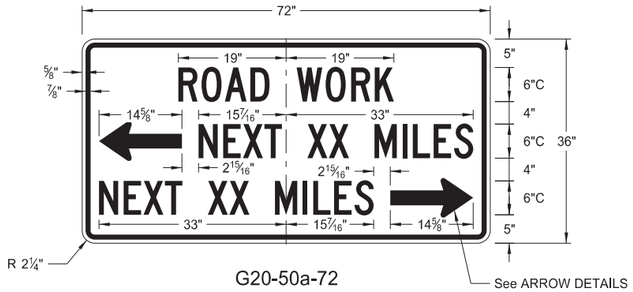
G20-1-60
Legend: black (non-refl)
Background: orange



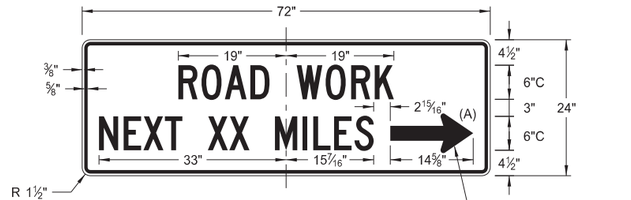
G20-1b-60
Legend: black (non-refl)
Background: orange



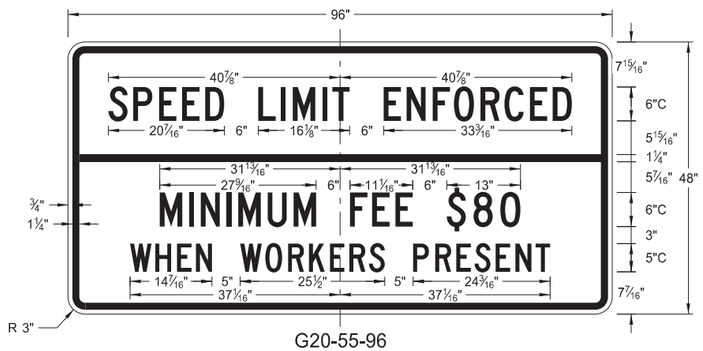
G20-2-48
Legend: black (non-refl)
Background: orange



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



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



G20-55-96
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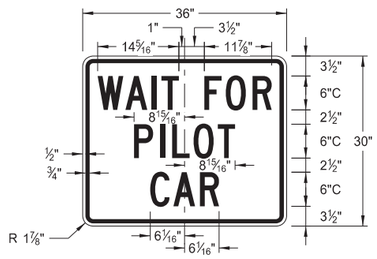
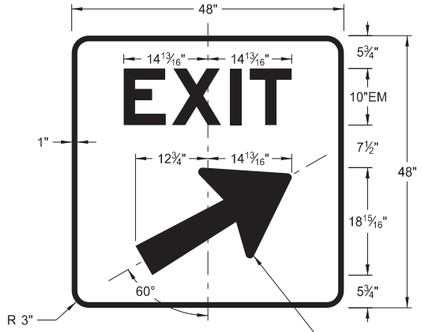
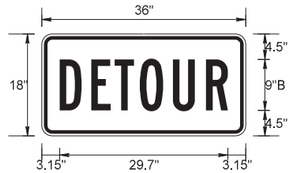
Background: orange



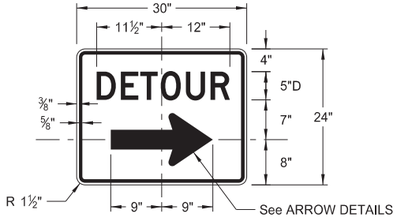
G20-4b-36
Legend: black (non-refl)
Background: orange



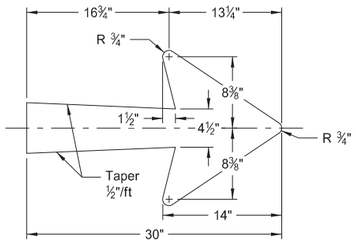
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



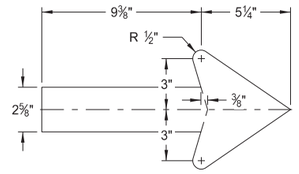
M4-8-36
Legend: black (non-refl)
Background: orange



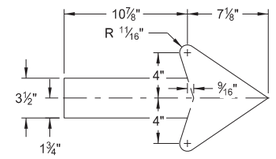
M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



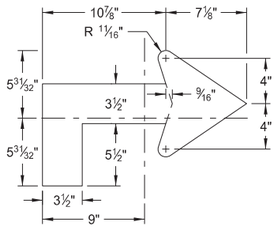
E5-1-48



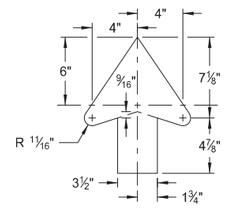
G20-50a-72
G20-52a-72



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
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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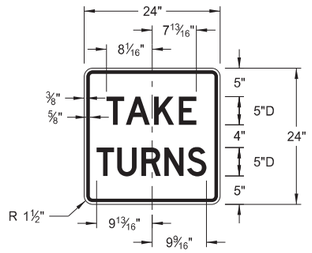
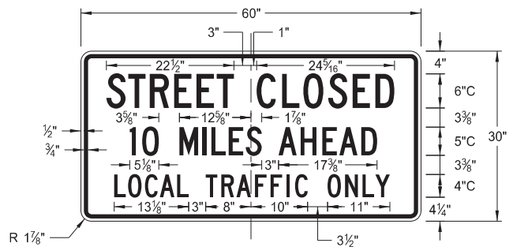
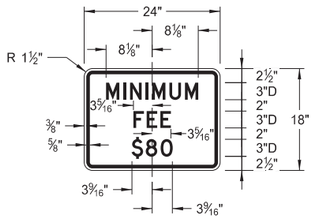
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50P-24
Legend: black (non-refl)
Background: white



R11-3c-60
Legend: black (non-refl)
Background: white



R2-1aP-24
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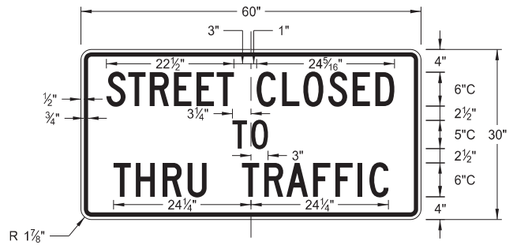
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white

R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

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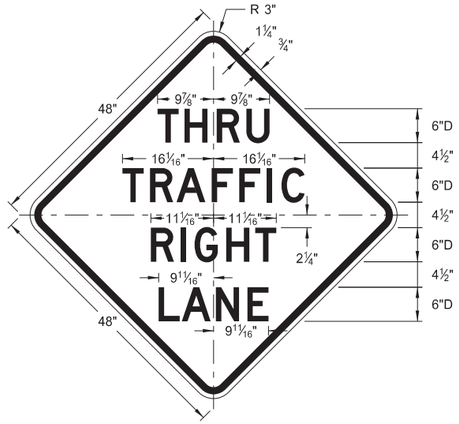
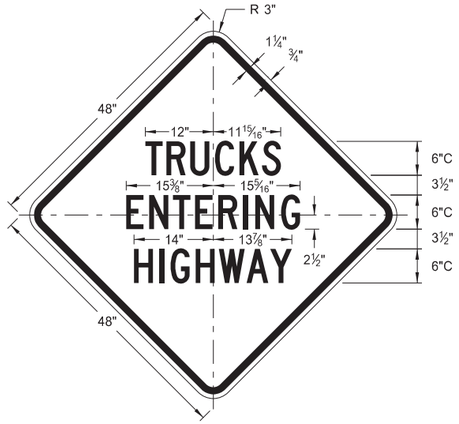
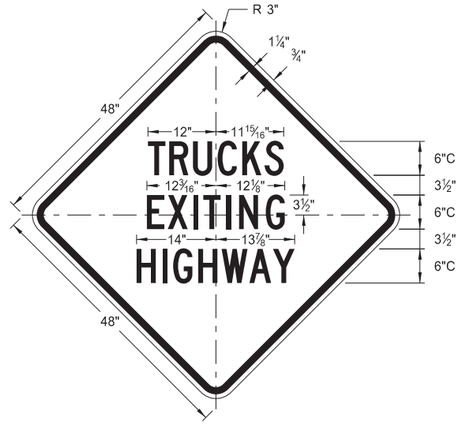
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



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



W8-56-48
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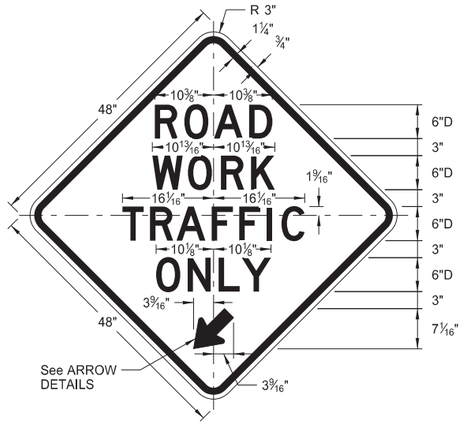
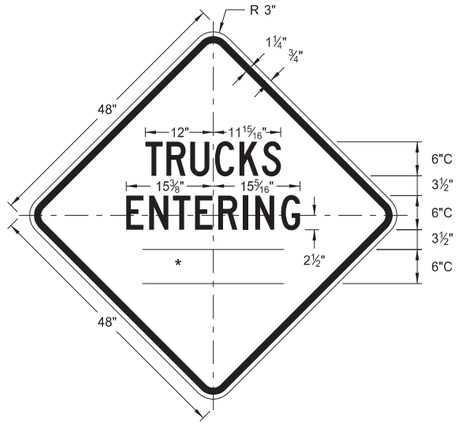
Background: orange



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



W8-54-48
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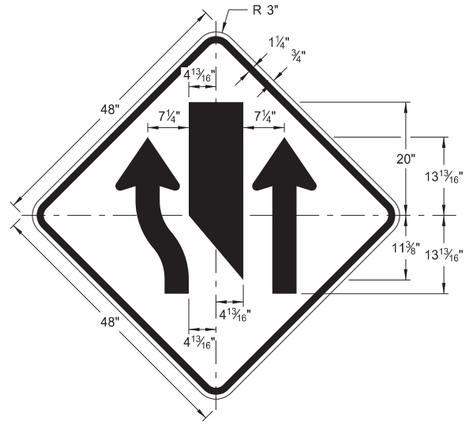
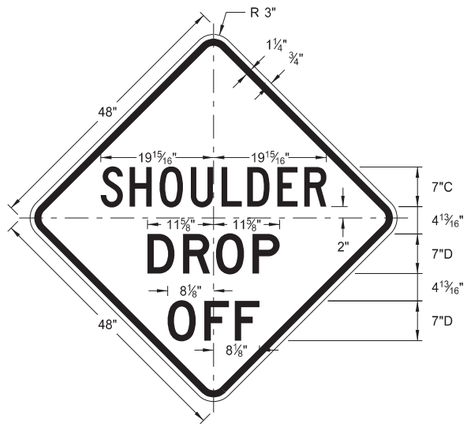
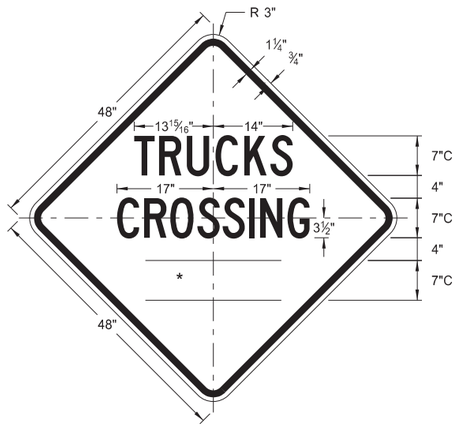


W9-3a-48
Legend: black (non-refl)
Background: orange



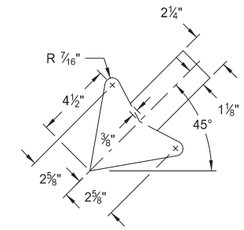
W8-9a-48
Legend: black (non-refl)
Background: orange



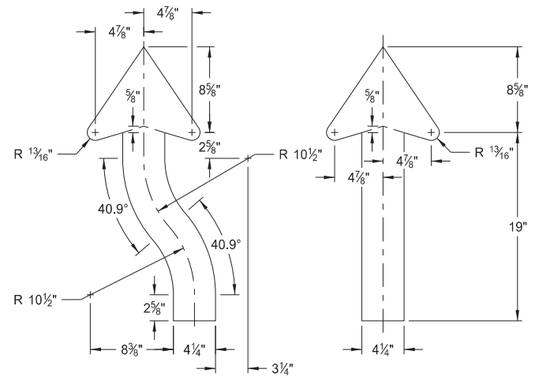
W8-55-48
Legend: black (non-refl)
Background: orange

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



W5-9-48



W9-3a-48

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

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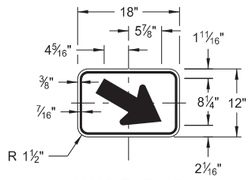
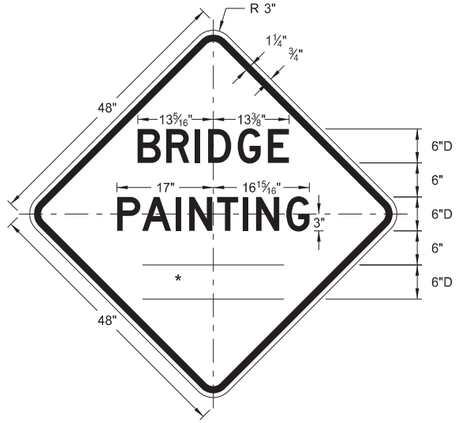
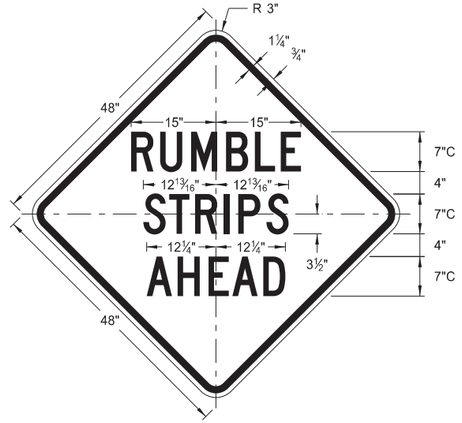
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



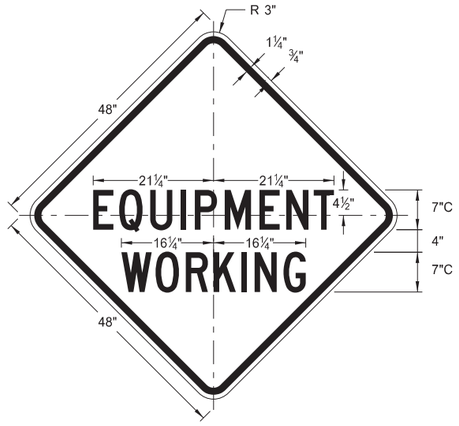
W21-50-48
Legend: black (non-refl)
Background: orange



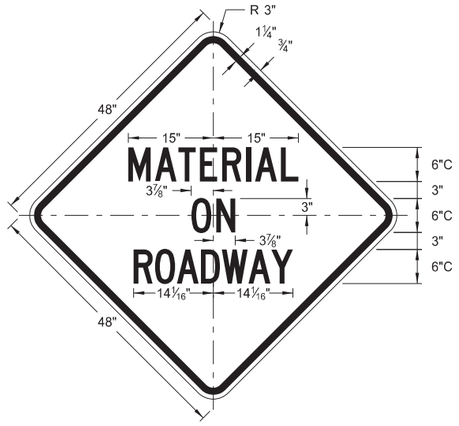
W21-53-48
Legend: black (non-refl)
Background: orange

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

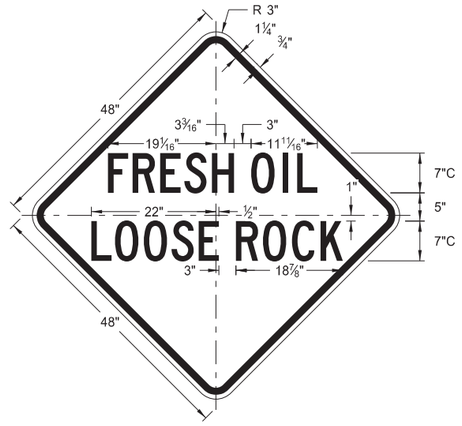
* DISTANCE MESSAGES



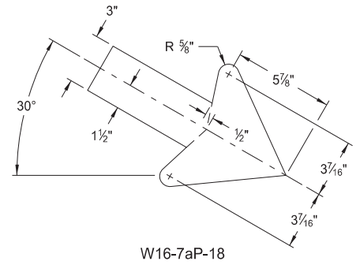
W20-51-48
Legend: black (non-refl)
Background: orange



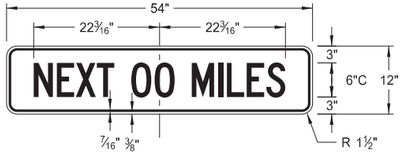
W21-51-48
Legend: black (non-refl)
Background: orange



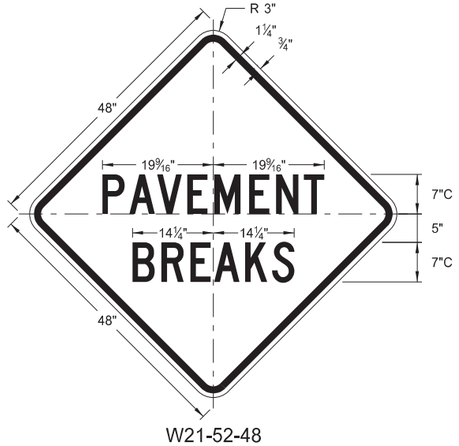
W22-8-48
Legend: black (non-refl)
Background: orange



W16-7aP-18



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



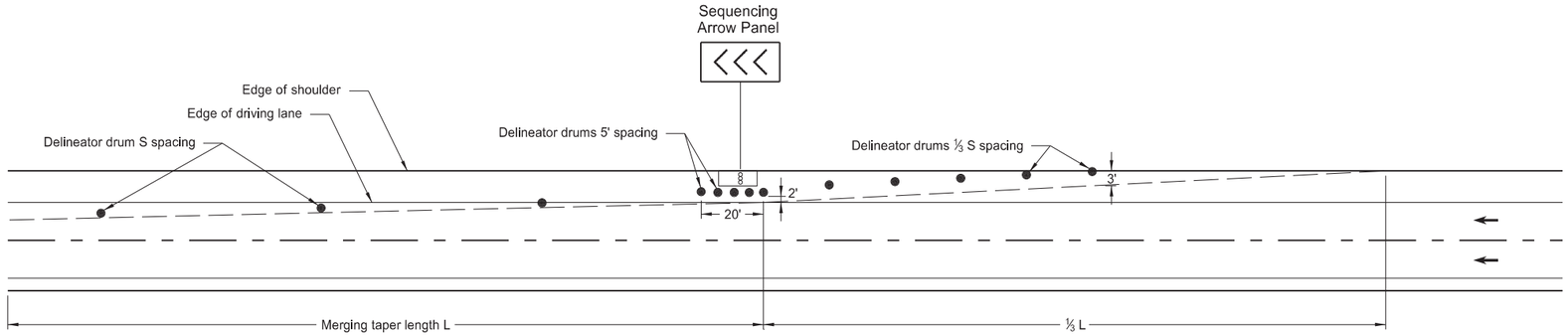
W21-52-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.

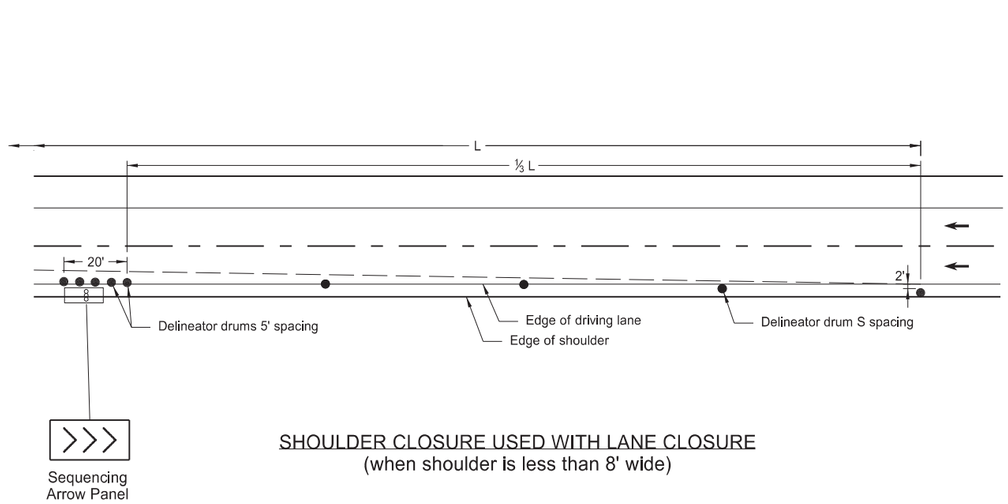
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURE TAPERS

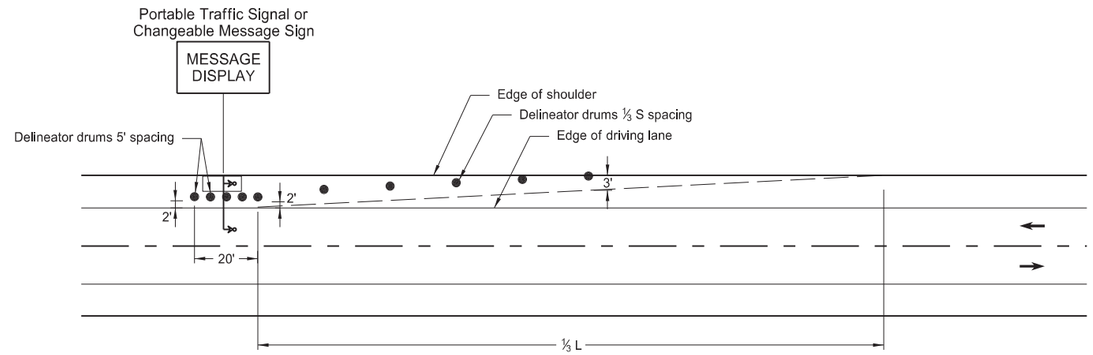
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

● Delineator Drum	∞ Sequencing Arrow Panel
° Message Display	Portable Traffic Signal

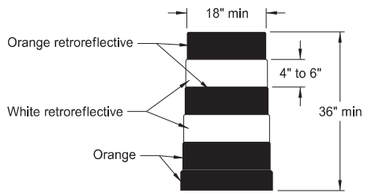
Notes:

1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail

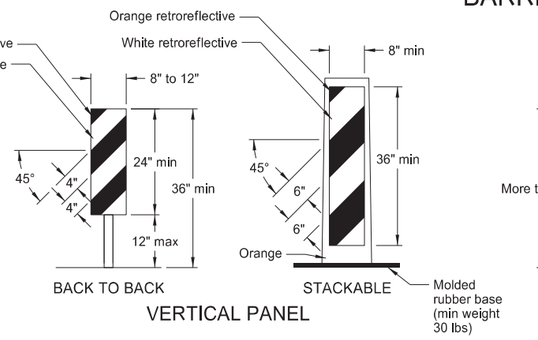
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



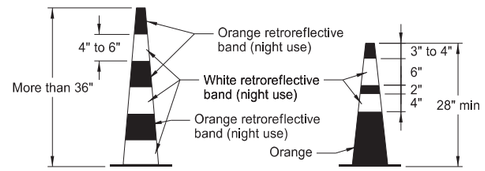
DELINEATOR DRUM

Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectorized spaces between the horizontal orange and white stripes. Avoid placement of stripes on drum ribs or indentations. Use closed top drums that will not allow collection of debris. Do not place ballast on the top of drum.



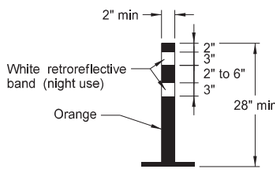
VERTICAL PANEL

Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, use a stripe width of 6 inches.



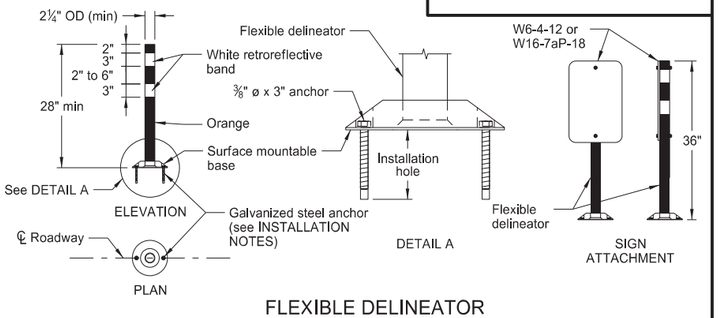
TRAFFIC CONE

Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectorized space between the orange and white stripes.



TUBULAR MARKER

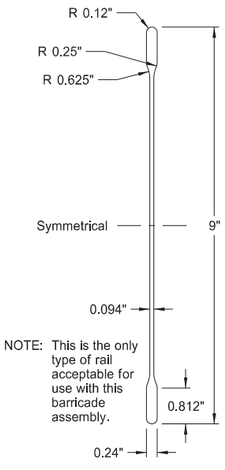
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



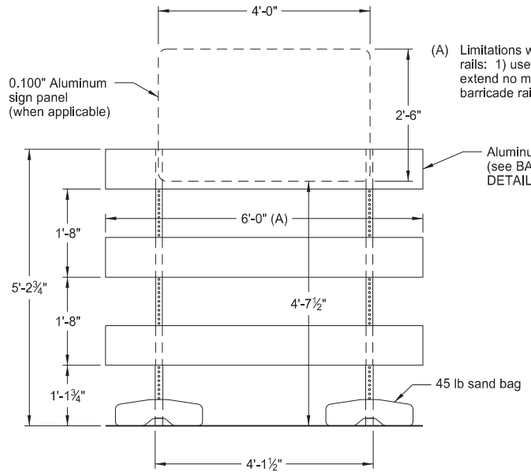
FLEXIBLE DELINEATOR

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.

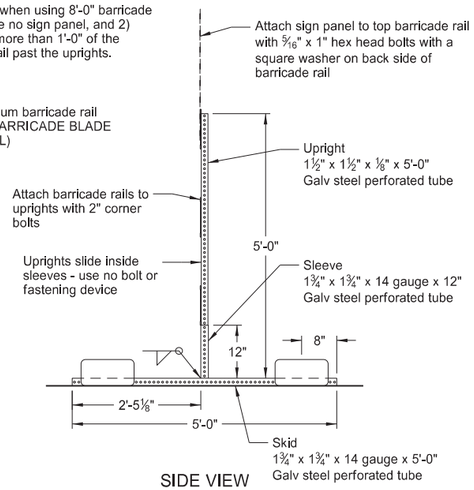


BARRICADE BLADE DETAIL



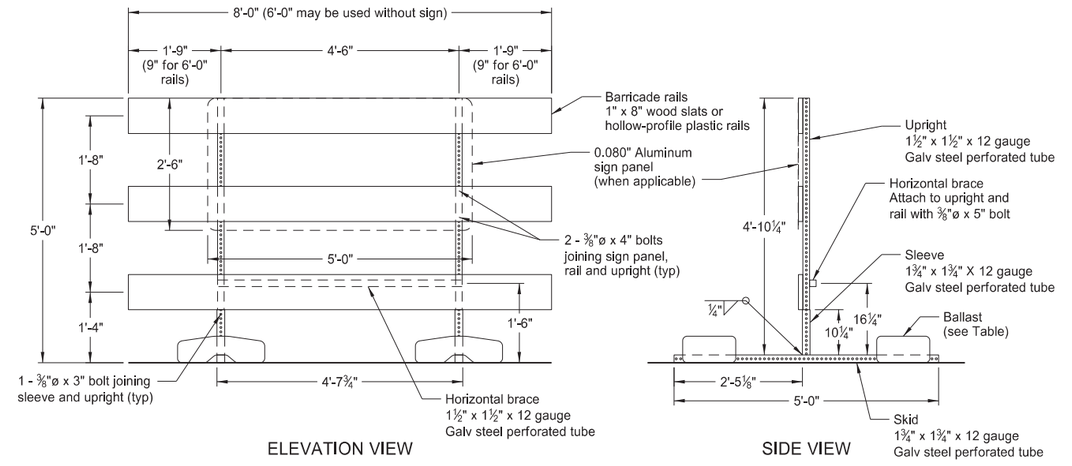
ELEVATION VIEW

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.



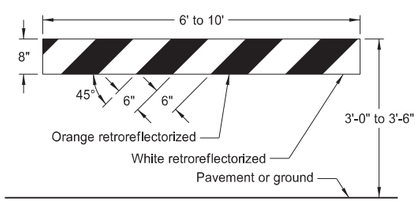
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

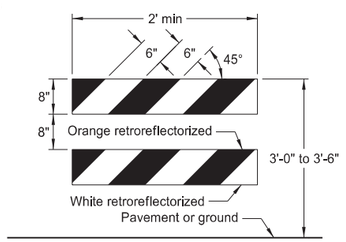


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

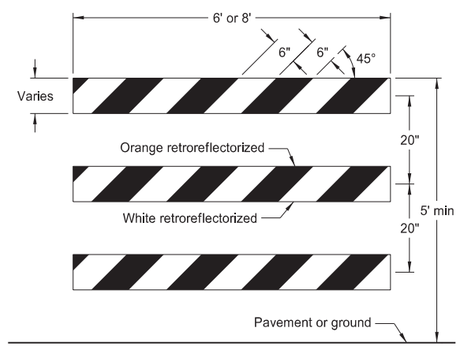
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", use a rail stripe width of 4".



TYPE I BARRICADE

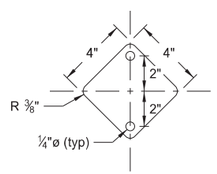


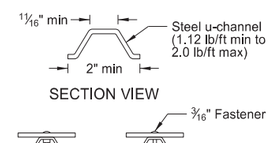
TYPE II BARRICADE

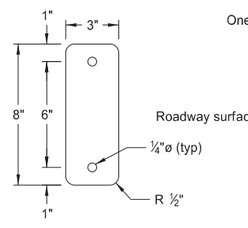


TYPE III BARRICADE

BARRICADE RAIL DETAILS







REFLECTOR DETAIL ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

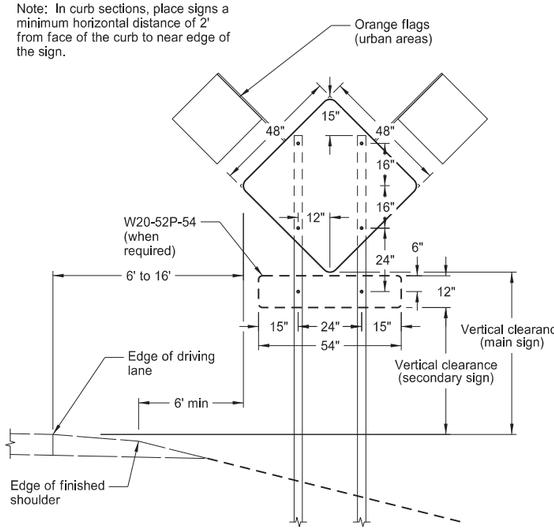
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

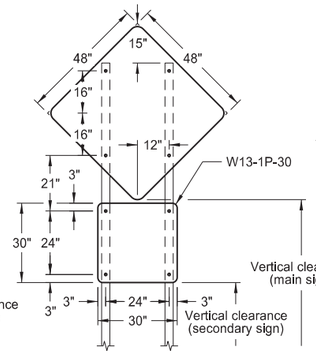
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

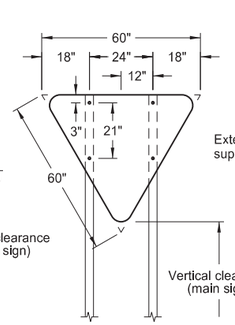
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



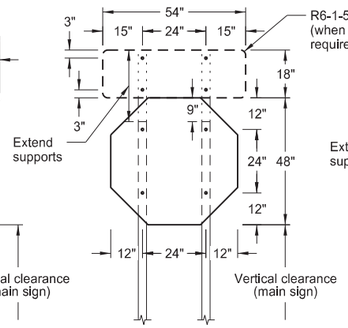
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



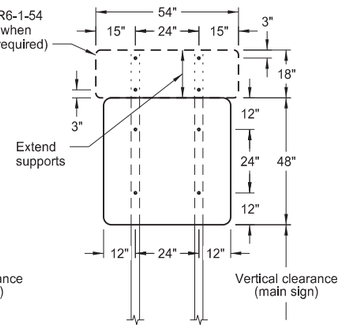
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



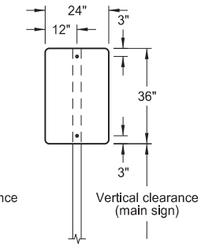
R1-2-60 - YIELD SIGN



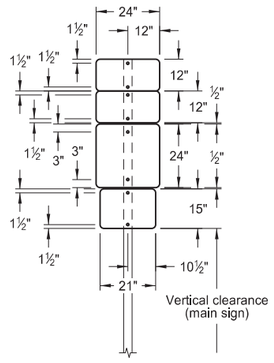
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



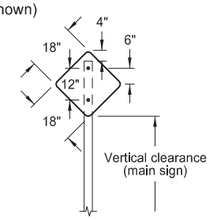
48" x 48" SIGN
(with R6-1-54 sign as required)



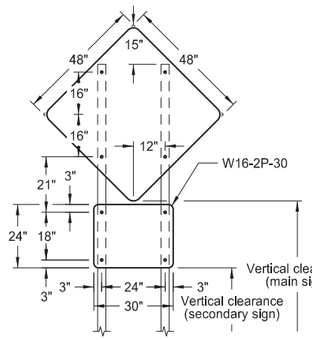
24" x 36" SIGN



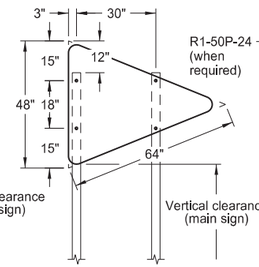
24" x 24"
ROUTE MARKER
ASSEMBLY



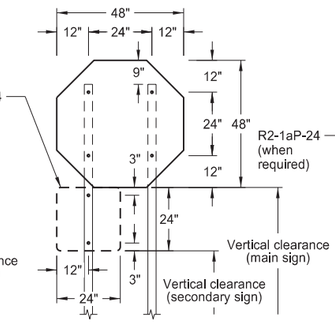
18" x 18"
DIAMOND SIGN



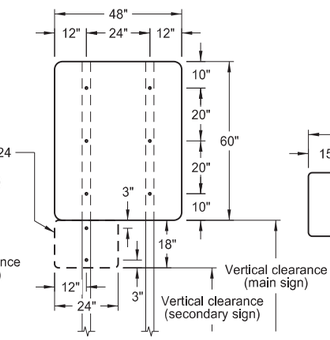
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



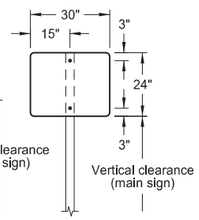
W14-3-64 - PENNANT SIGN



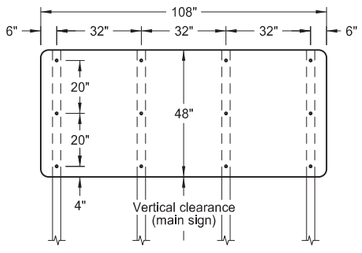
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



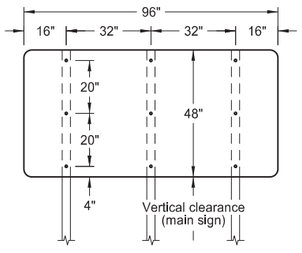
48" x 48" SIGN
(with R2-1aP-24 sign as required)



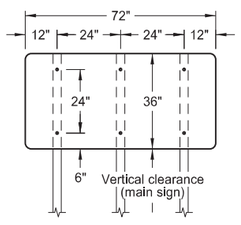
30" x 24" SIGN



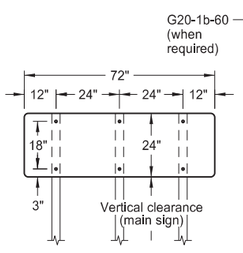
108" x 48" SIGN



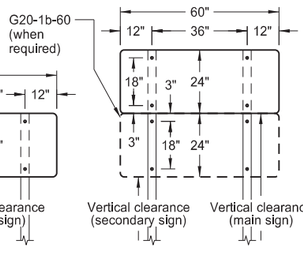
96" x 48" SIGN



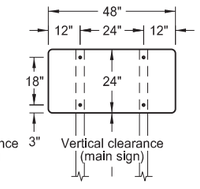
72" x 36" SIGN



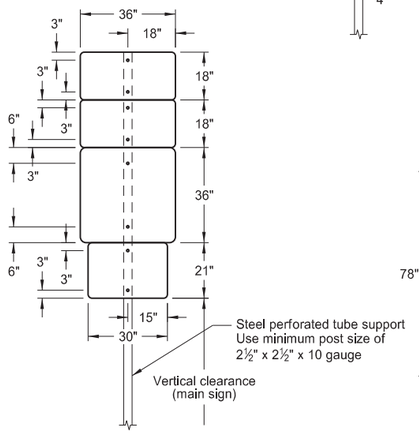
72" x 24" SIGN



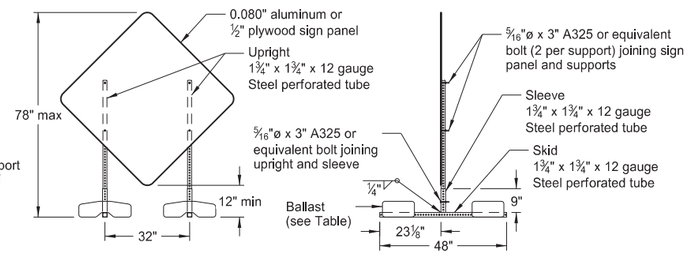
60" x 24" SIGN



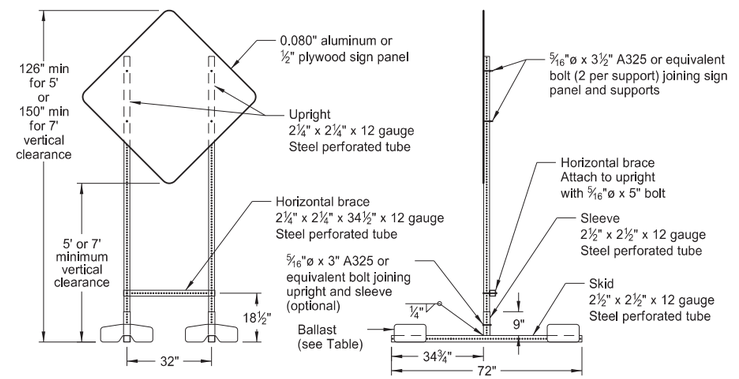
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



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 2½" x 2½" 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, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" 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 unforseen 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

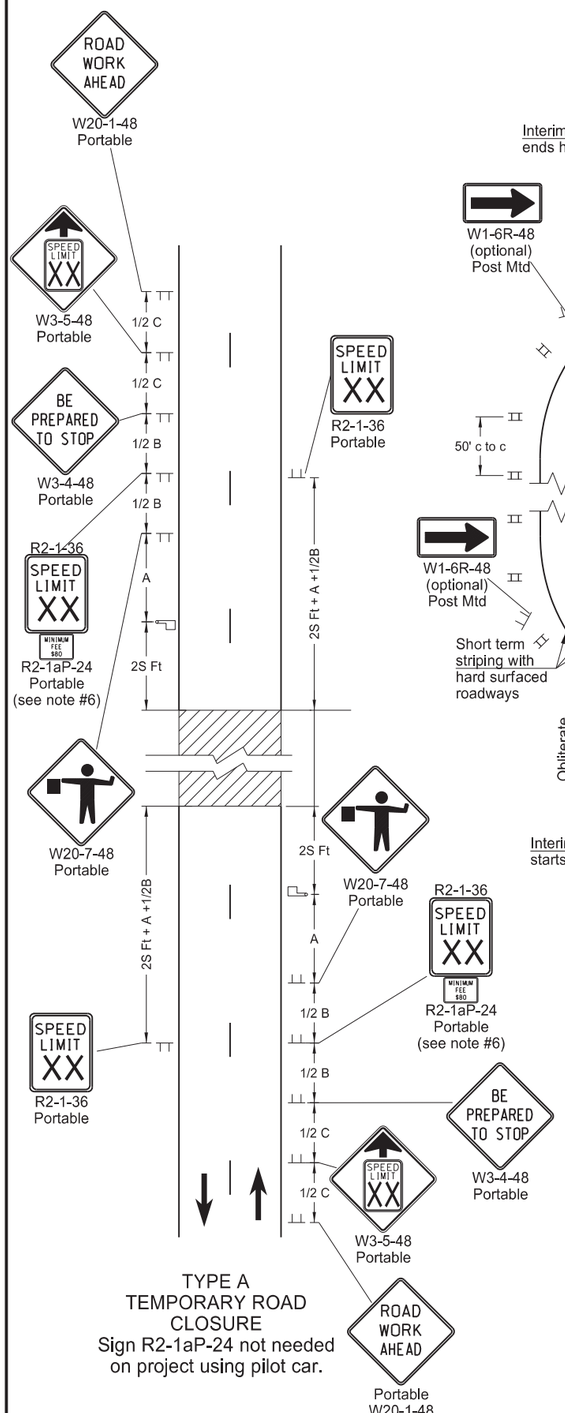
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

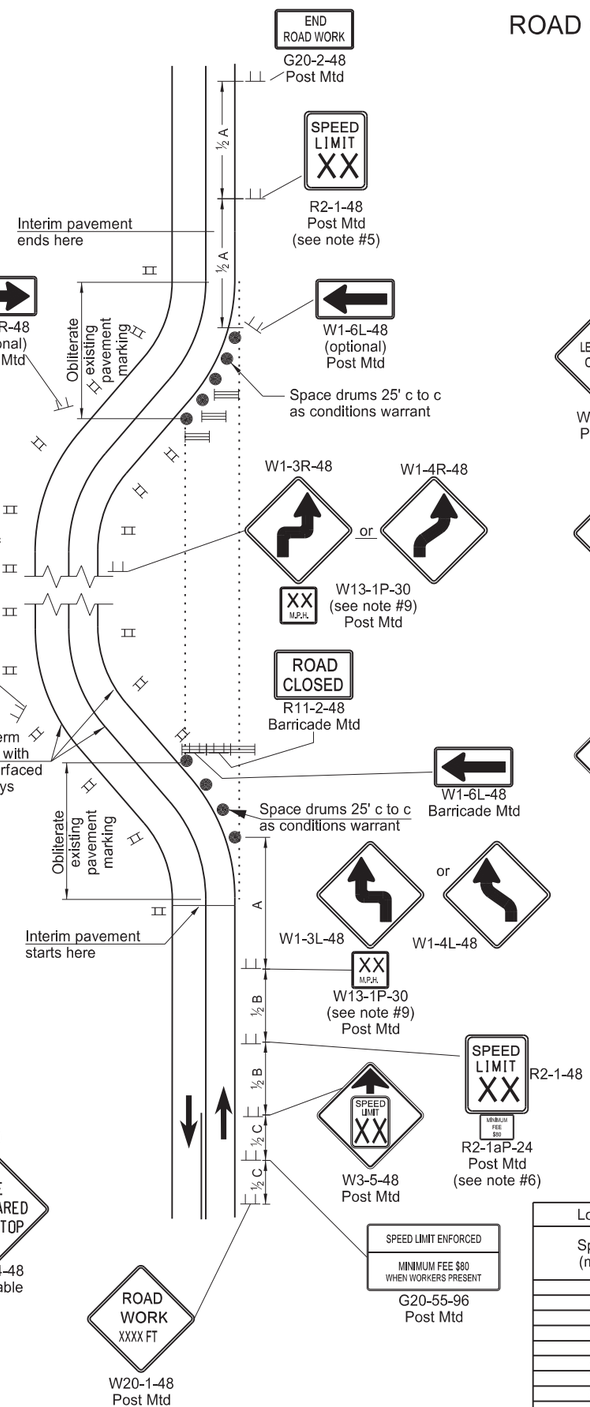
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

ROAD CLOSURE LAYOUTS

D-704-15



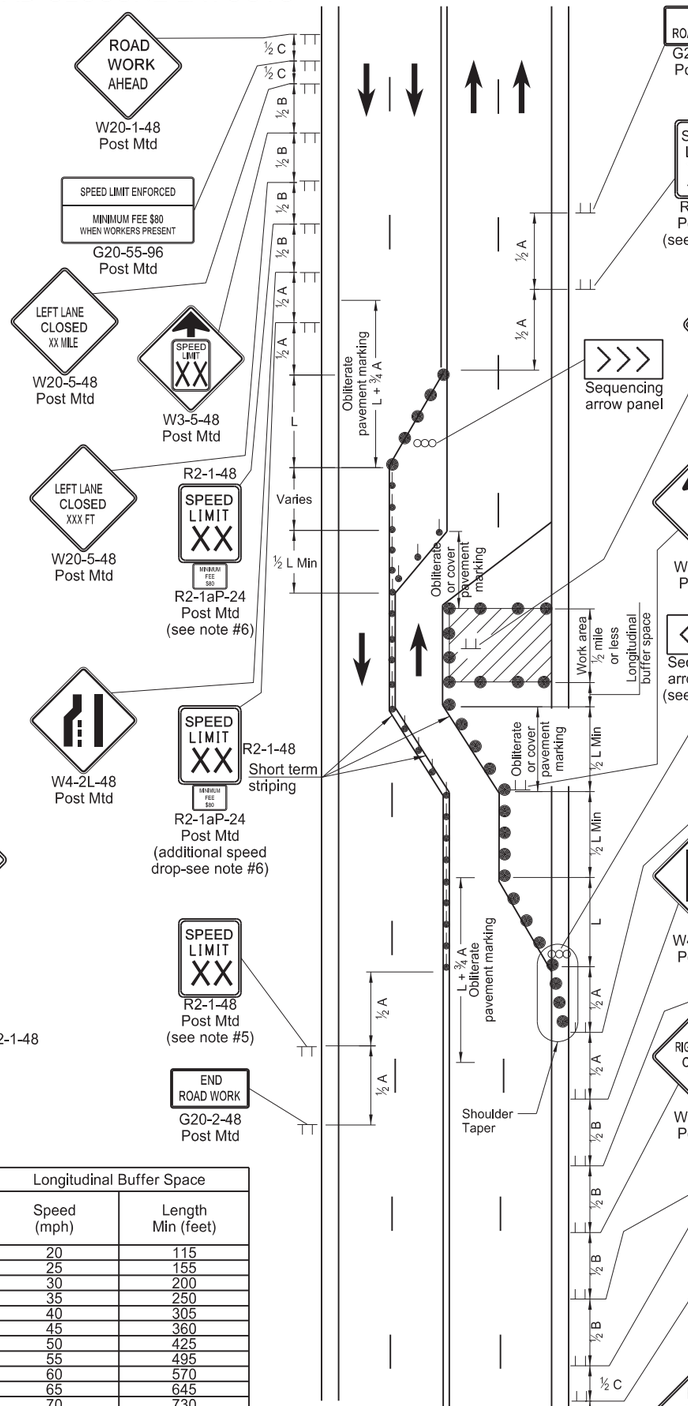
TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



TYPE B
ROAD CLOSURE WITH A DIVERSION

Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with ½ mile or less closure.

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



TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY
4 lane undivided highway with half the roadway closed.

Notes:
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the 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 ½ B.
7. 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.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

- Type III barricade
- Sign
- Delineator drum
- Tubular markers
- Work area
- Flagger
- Sequencing arrow panel
- Vertical panels back to back

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

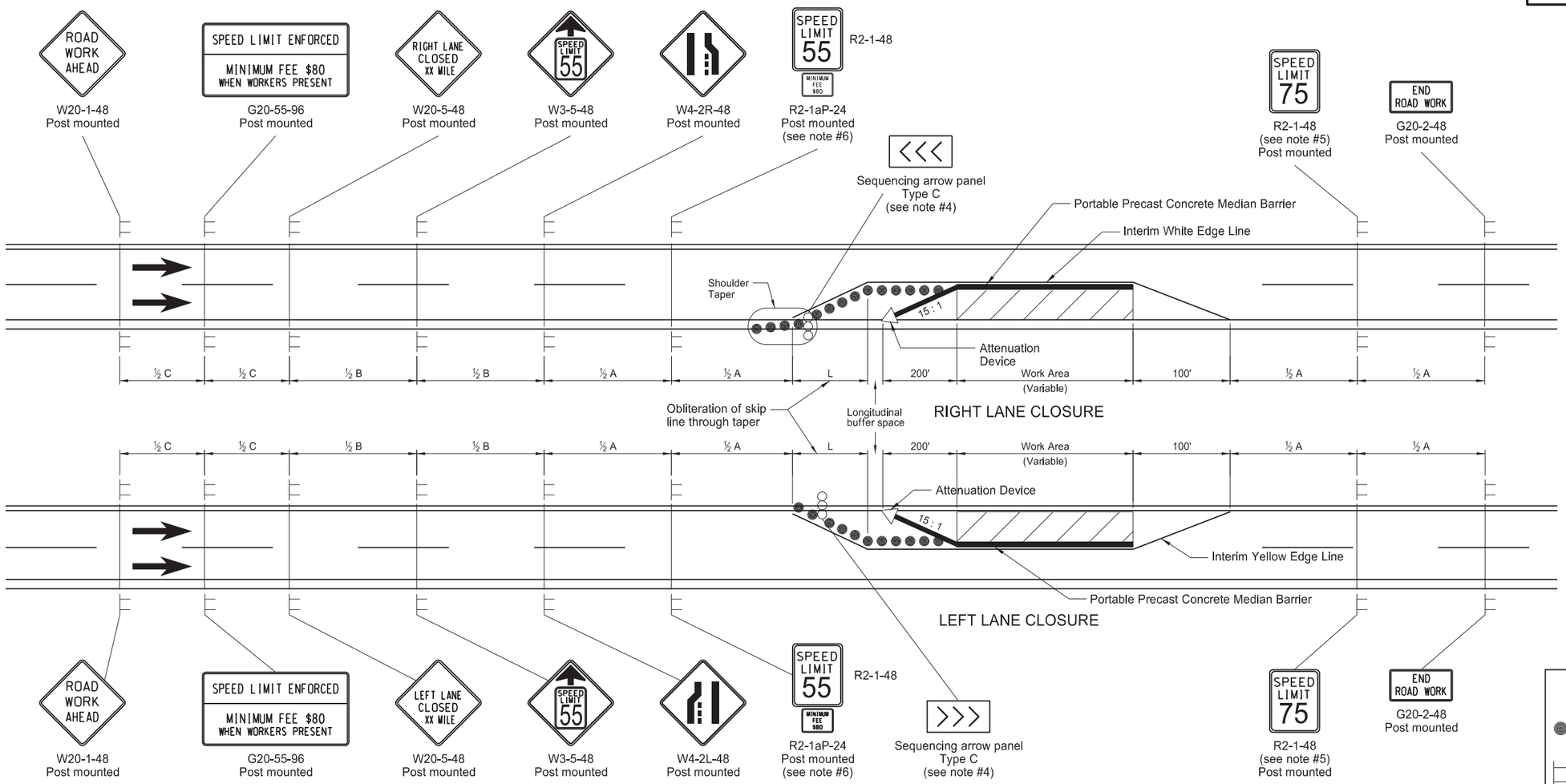
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pvmt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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

11/29/22

SIGN LAYOUT FOR INTERSTATE SYSTEM ONE LANE CLOSURE

D-704-18



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

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

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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Notes:

1. Variables
   S = Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W = The width of offset in feet.
   L = Minimum taper length in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or
   W x S^2 /60 for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Space delineator drums used for tapering traffic and on tangent at dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface. See Shoulder Closure Standard Drawing. Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
5. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the 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 ½ B.
7. 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.
8. Cover existing speed limit signs within a reduced speed zone.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
10. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
11. Reduce speed limit further, if location and conditions dictate.

KEY

- Delineator Drum
- Sign
- Attenuation Device
- Sequencing Arrow Panel
- Work Area

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
01-13-16	Changed to Interim yellow edge line
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Updated notes & sign numbers
11-01-19	Note, sign #, & pvmt oblit change
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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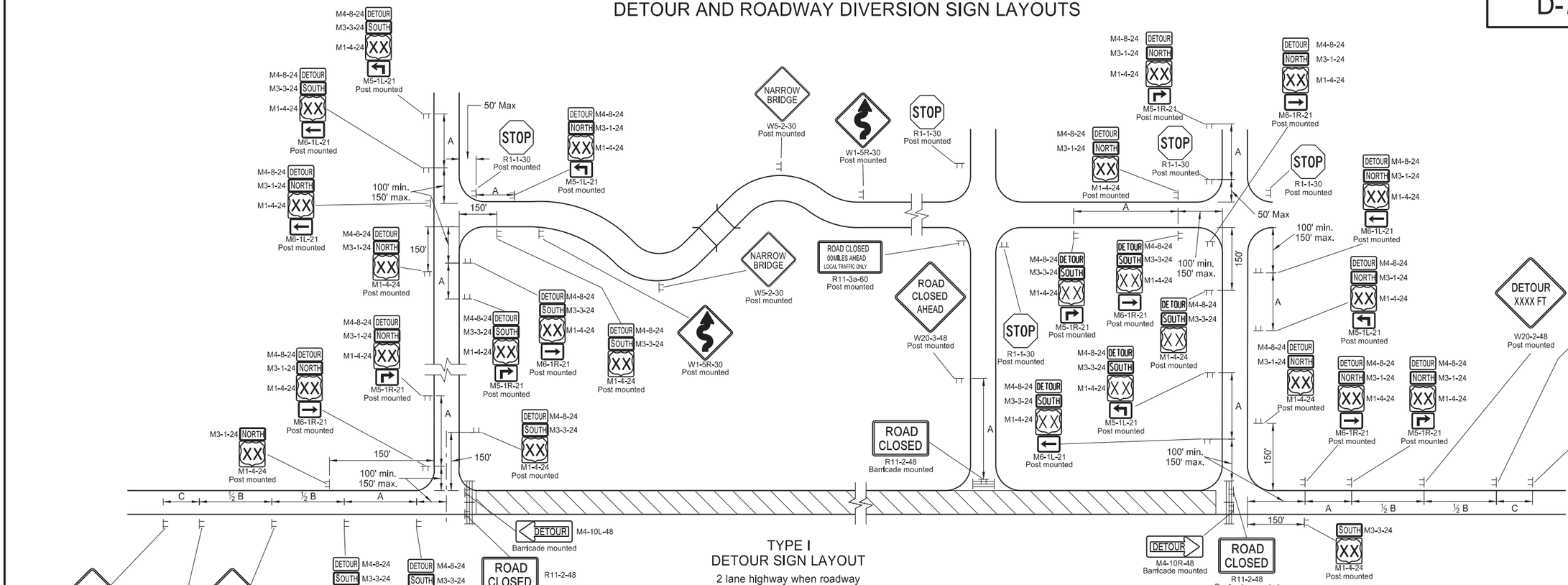
11/29/22

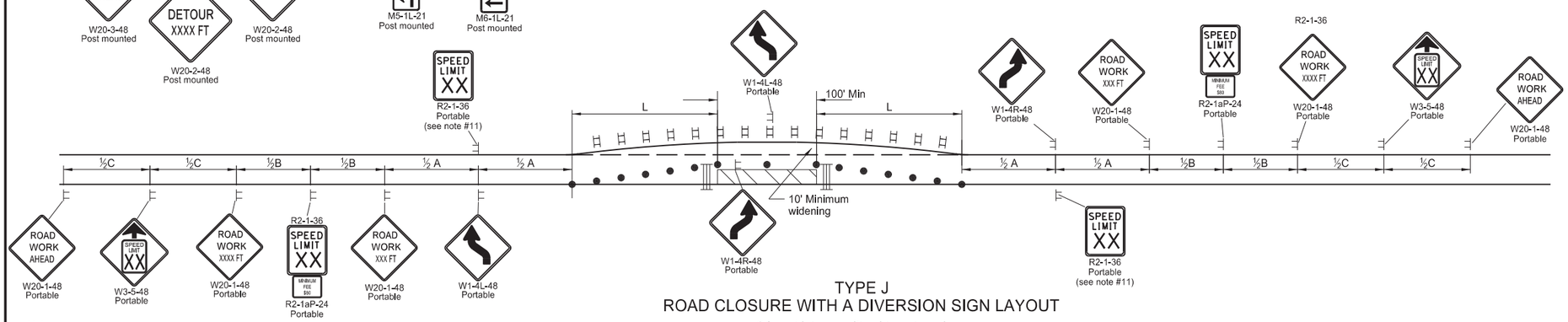
DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



TYPE I
DETOUR SIGN LAYOUT

2 lane highway when roadway is closed and detour provided



TYPE J
ROAD CLOSURE WITH A DIVERSION SIGN LAYOUT

2 lane highway with widened section, traffic maintained in both directions.

Use layout when work is less than 5 days or is within a project.

KEY

- Type III barricade
- Work area
- Sign
- Vertical panels back to back
- Delineator drum

Notes:

1. Variables
   S=Numerical value of speed limit or 85th percentile. W=The width of taper.
   L=Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 / 60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when on roadway.
3. Space delineator drums and vertical panels at dimension "S" for tapering traffic. Space delineator drums, tubular markers and vertical panels at 2 times "S" for tangents.
4. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limits 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 ½ B.
5. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches 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.
6. Cover existing speed limit signs within a reduced speed limit zone.
7. Covered (when approved by engineer) or obliterated payment marking measured as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. If the tangent between tapers is less than 600', as an option, use sign W24-1-48 in place of double reverse curve signs.
10. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
11. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.

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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

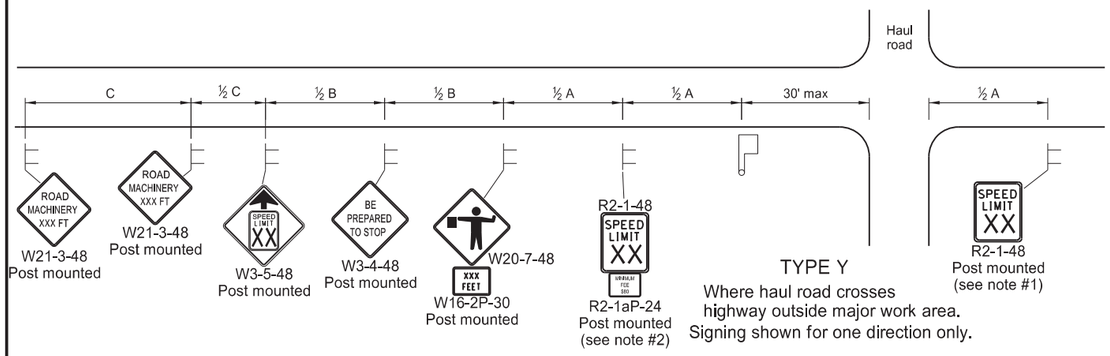
REVISIONS

DATE	CHANGE
08-17-17	Updated notes & added spd limit
11-01-19	Revised sign #s and note 8
12-08-21	Added Dollars At Work sign
11-29-22	Removed Dollars At Work

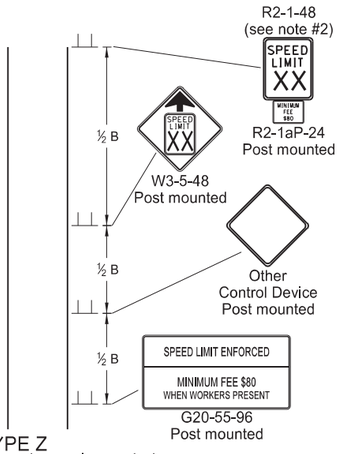
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

11/29/22

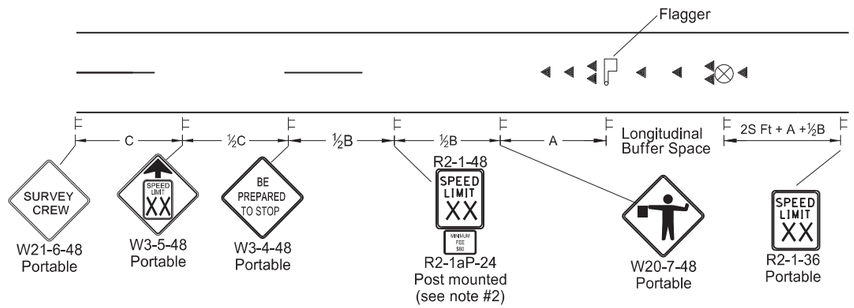
MISCELLANEOUS SIGN LAYOUTS



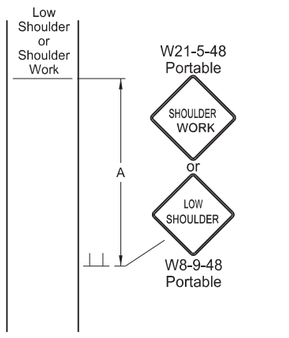
TYPE Y
Where haul road crosses highway outside major work area.
Signing shown for one direction only.



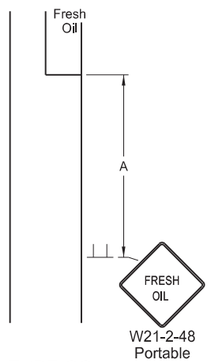
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



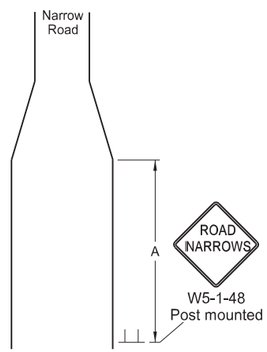
TYPE AA
Where survey crew is used
Signing shown for one direction only.



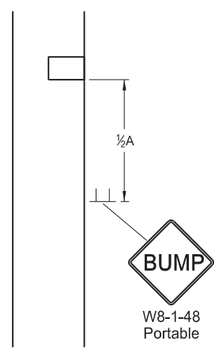
TYPE BB
Within major work area where sign conditions exist



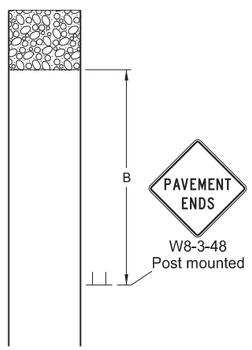
TYPE CC
Where sign conditions exist



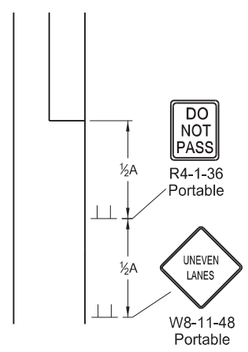
TYPE DD
Where sign conditions exist



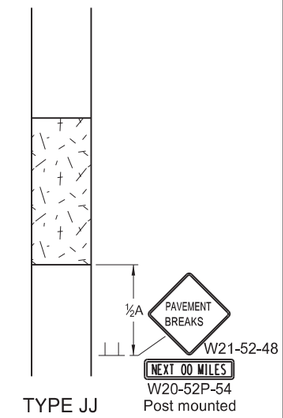
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

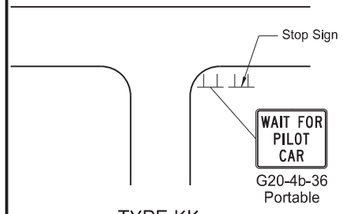


TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.
Signing shown for one direction only.

KEY

Flagger	Sign
Cones	Survey Equipment

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



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 ½B.
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 75 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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers.
11-01-19	Revised note 5 & sign numbers.
2-23-23	Revised distance & removed signs.

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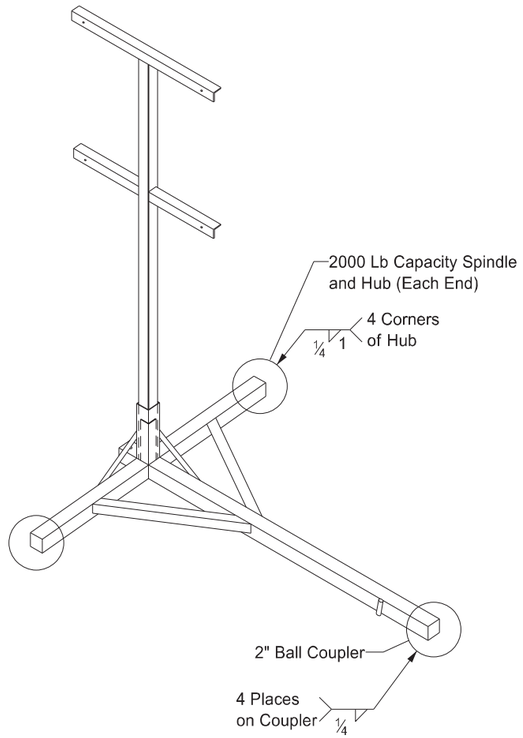
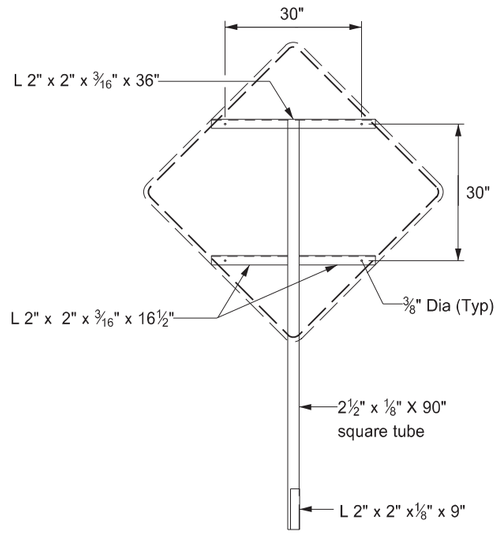
ENGINEER
NORTH DAKOTA

02/23/23

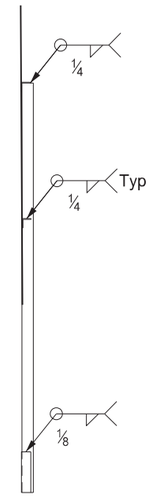
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

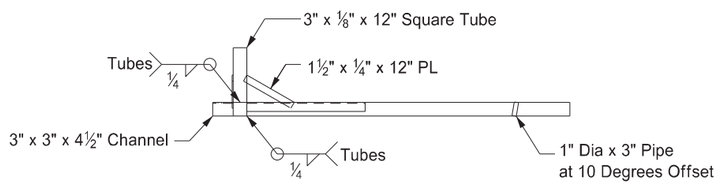


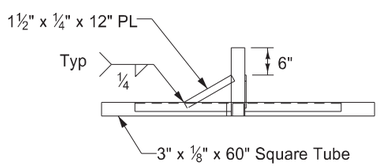
RIGHT

SIGN SUPPORT

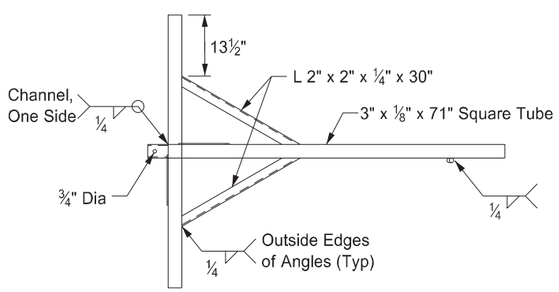
Notes:

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.





RIGHT



TOP

TRAILER

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

KIRK J. HOFF
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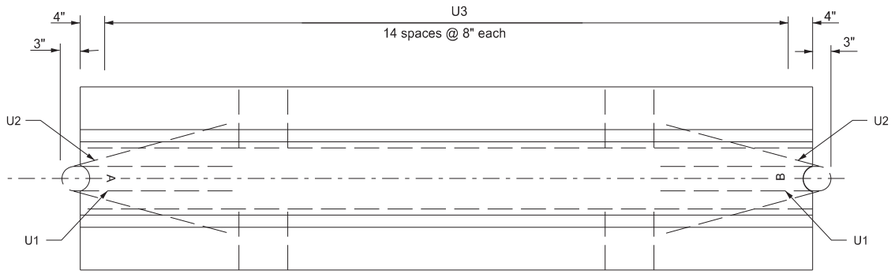
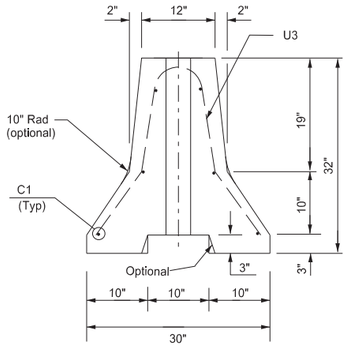
NORTH DAKOTA
12 02 2020

PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

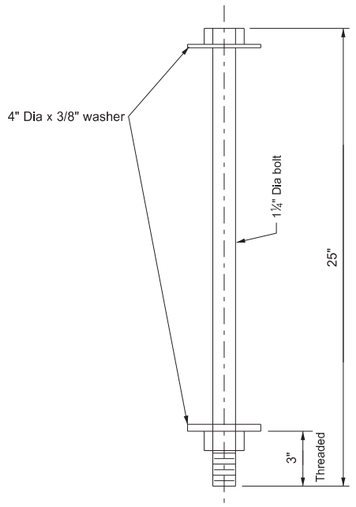
D-704-51



Plan View



End View

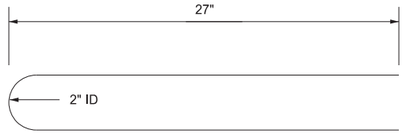


Connecting Bolt Detail

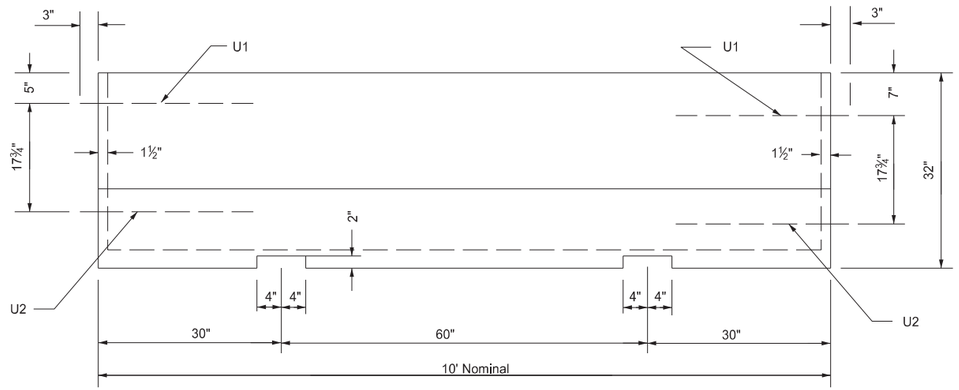
(One per 10 Ft section)

Notes:

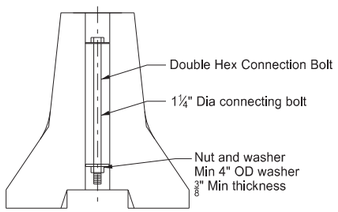
1. Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
2. Use AAE-3 Concrete.
3. Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
4. Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
5. Place barrier markers at the center of the barrier at 20' centers.
6. Connect barrier sections with 1 ¼" Dia A-307 double hex connecting bolt. Maintain bottom nut and washer connection for duration of barrier installation.
7. Place barrier to minimize openings between individual sections.



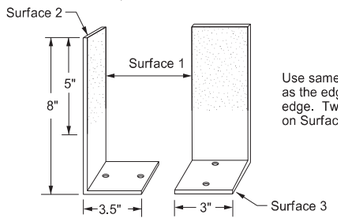
U1 Bar Detail



Side View

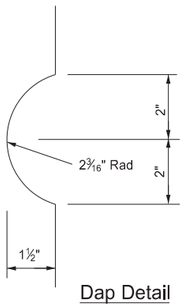


Bolt Connection Detail

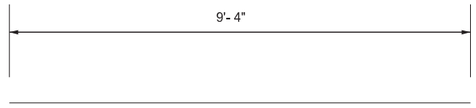


Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

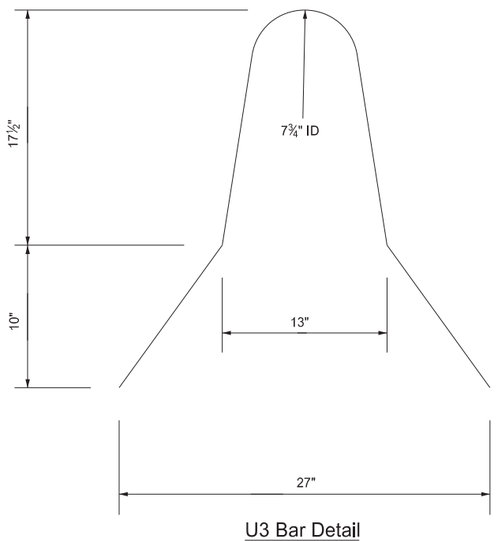
Barrier Marker Detail



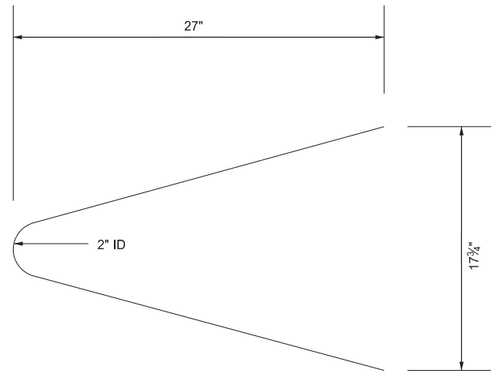
Dap Detail



C1 Bar Detail



U3 Bar Detail



U2 Bar Detail

Marker Body
Use high impact,weatherable engineering thermo-plastic material conforming to the following:

Property	Result	ASTM Test Method
Thickness (min)	.090"	——
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI ¼" @ 73°F	8,000	D790
Flexural modulus, PSI ¼" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

Reflective Tape
Use retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower for the reflector:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

Adhesive
Use factory applied solid butyl rubber ⅛" thick, 2" wide on 2¼" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

Bar List

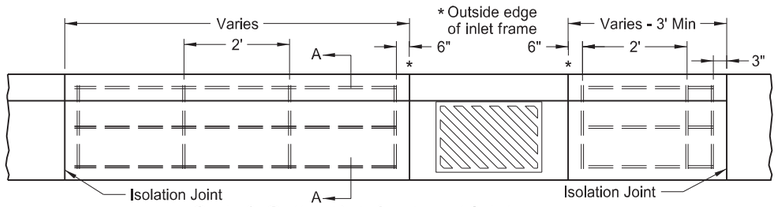
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10¼"	Bent
U3	4	15	5'- 4"	Bent

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	New Design Engr PE Stamp

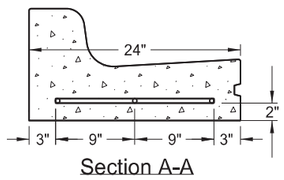
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

Curb & Gutter and Valley Gutter

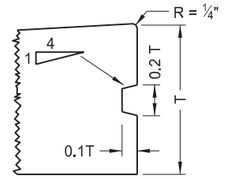
D-748-1



Curb & Gutter Reinforcing at Inlets



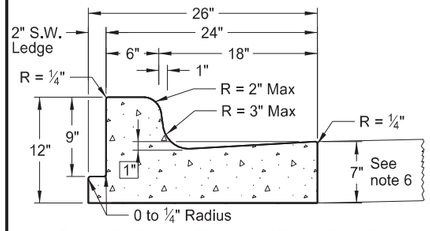
Section A-A



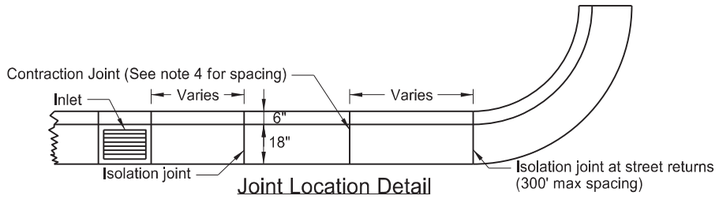
Keyway Detail for Curb & Gutter

(To be used with PCC Pavement and Drives)

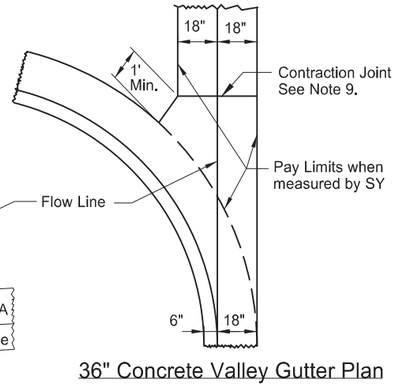
T= Thickness of pavement unless otherwise noted on plans.



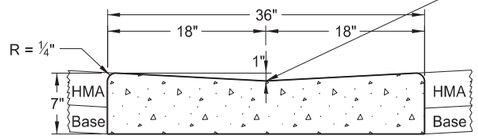
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot. (Sec. A shown. See Sec B for additional details.)



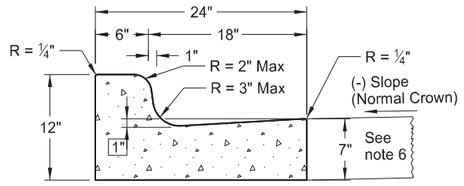
Joint Location Detail



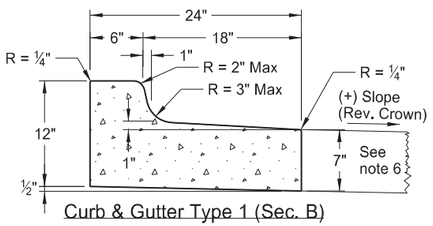
36" Concrete Valley Gutter Plan



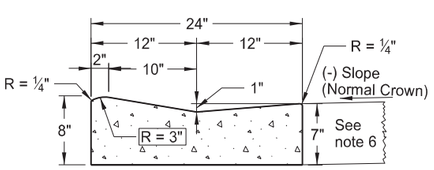
36" Concrete Valley Gutter Detail



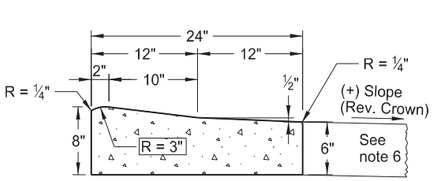
Curb & Gutter Type 1 (Sec. A)



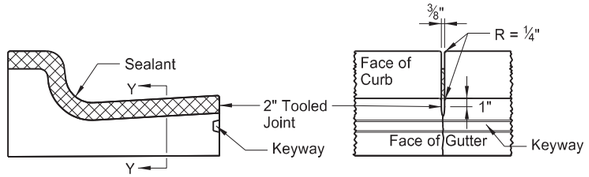
Curb & Gutter Type 1 (Sec. B)



Mountable Curb & Gutter Type 1 (Sec. A)



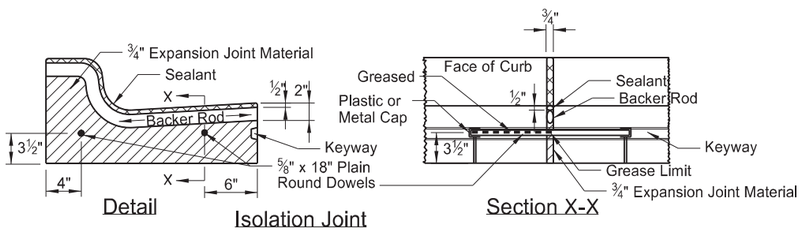
Mountable Curb & Gutter Type 1 (Sec. B)



Detail
(10' Max Spacing)

Contraction Joint

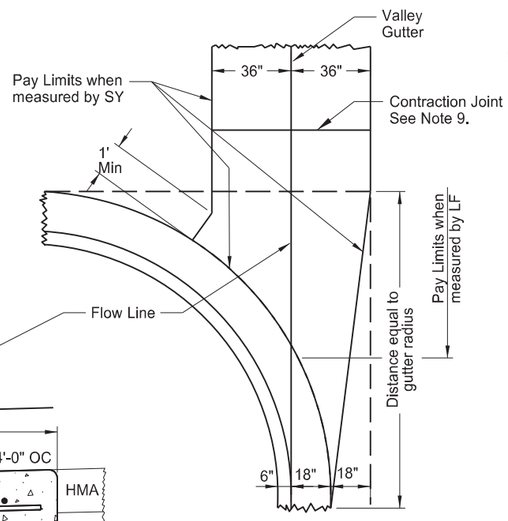
Section Y-Y



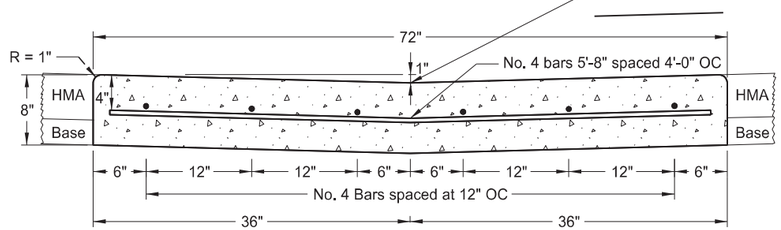
Detail

Isolation Joint

Section X-X



72" Concrete Valley Gutter Plan



72" Concrete Valley Gutter Detail

NOTES:

1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use ¾" expansion joint material for isolation joints. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot mix asphalt pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: For contraction joint, use joint sealant that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Curb & Gutter-Pavement Interface: For hot mix asphalt pavement use gutter depth shown. For PCC pavements, either match gutter depth to adjacent pavement depth or construct gutter depth shown.
7. Tie curb and gutter to abutting PCC pavement with No. 4 bars, 2'-0" in length, spaced at 3'-9" centers for 15' joint spacing (maximum spacing of 4' centers).
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint (the same shape as the curb and gutter just ahead of the taper) with an 18" plain round bar across the joint.
9. Valley Gutter Joints: Form, saw, or score ⅛" min. to ⅜" max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.
10. Reinforcing at Inlets: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlets (even inlets located on radii) in the price bid for "Curb & Gutter - Type 1" or "Curb & Gutter Mountable - Type 1." Extend reinforcement to the second joint (with rebar placed through the first joint) in cases where the 3' minimum panel length can't be obtained.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-7-2013

REVISIONS

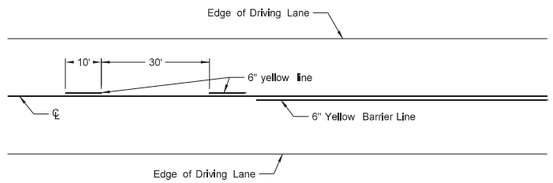
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.
10-30-24	Revised bar size & notes.

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

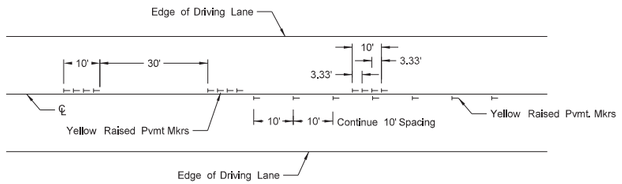
10/30/24

SHORT-TERM PAVEMENT MARKING

D-762-11

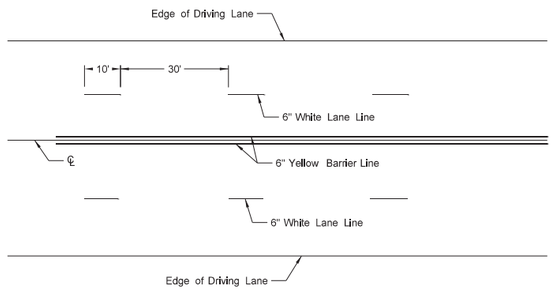


Painted or Tape Lines

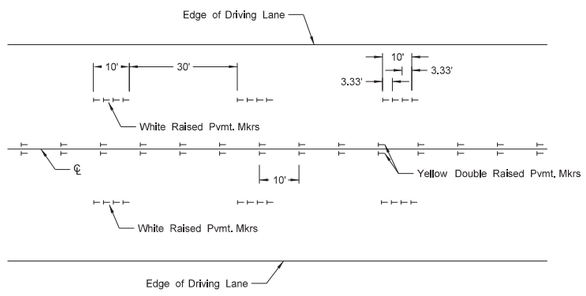


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

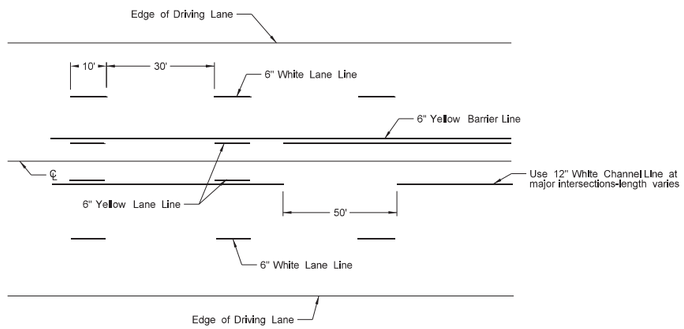


Painted or Tape Lines

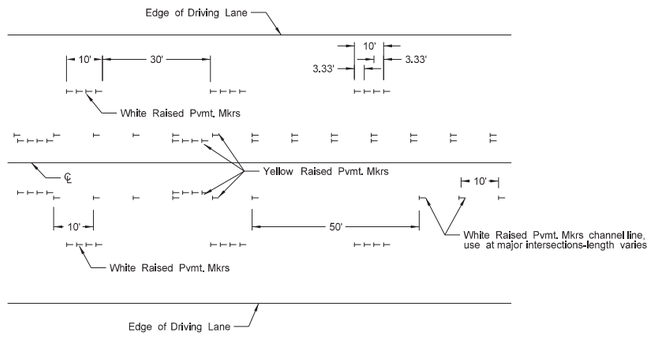


Raised Pavement Markers

FOUR LANE ROADWAY

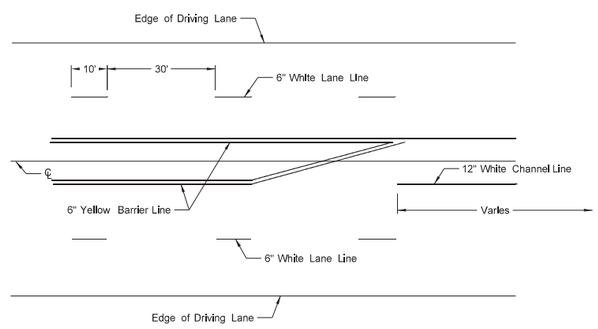


Painted or Tape Lines

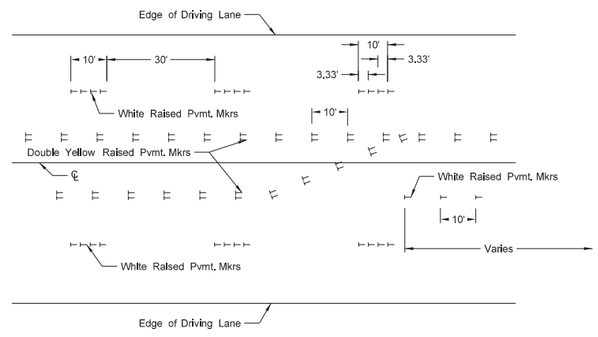


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

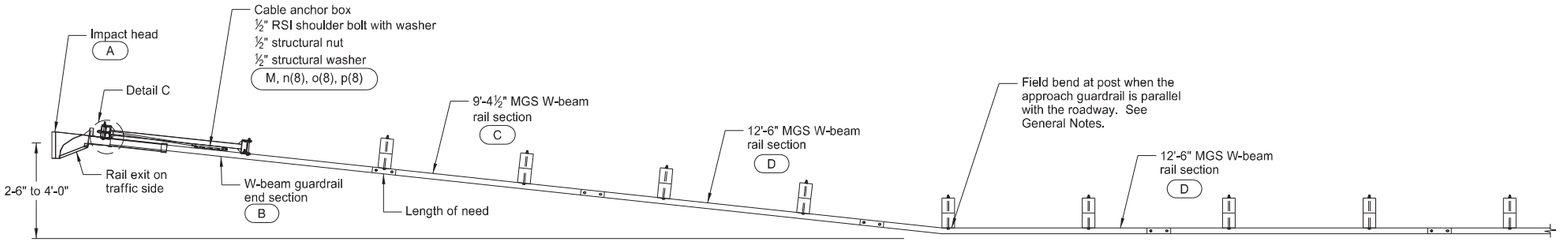
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt marking width.

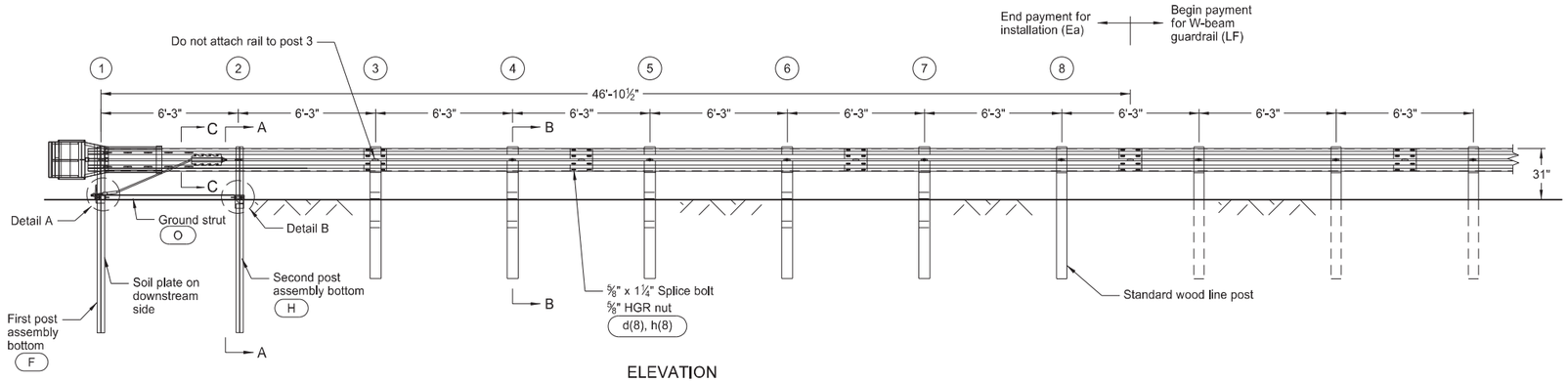
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

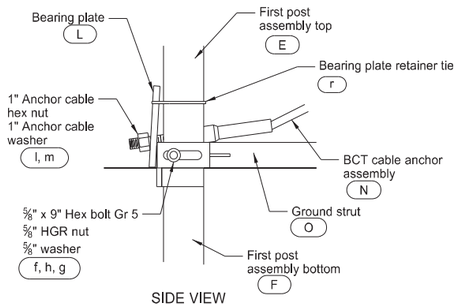
D-764-38



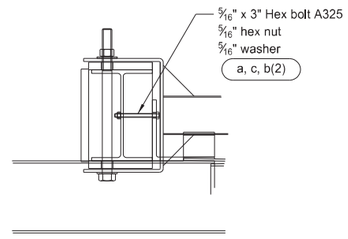
PLAN



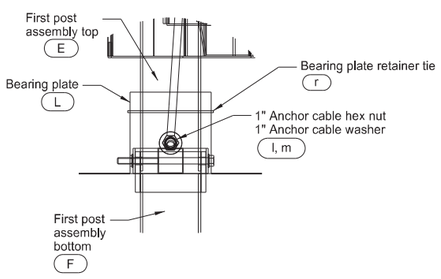
ELEVATION



SIDE VIEW

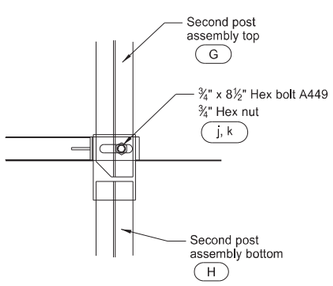


DETAIL C
Post 1 (Impact Head connection)

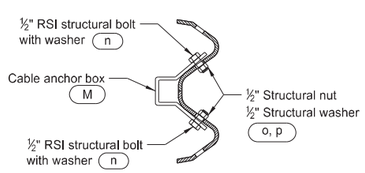


FRONT VIEW

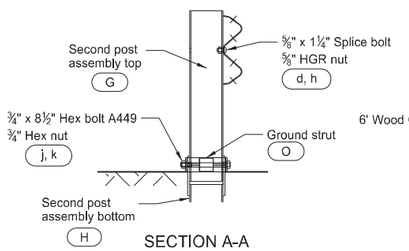
DETAIL A
Post 1



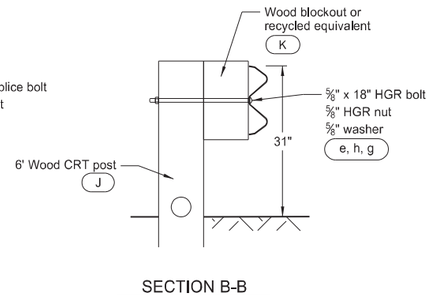
DETAIL B
Post 2



SECTION C-C



SECTION A-A
Post 2



SECTION B-B
Posts 3 through 7

ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	F3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4½" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	UHP1A	FIRST POST ASSEMBLY TOP	1
F	HP1B	FIRST POST ASSEMBLY BOTTOM	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
J	UP671	WOOD CRT POST	5
K	P675	WOOD BLOCKOUT OR RECYCLE EQUIVALENT	5
L	E750	BEARING PLATE	1
M	S760	CABLE ANCHOR BOX	1
N	E770	BCT CABLE ANCHOR ASSEMBLY	1
O	S785	GROUND STRUT HINGED POST	1
		HARDWARE	
a	B5160304A	5/16" x 3" HEX BOLT A325	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	⅝" Dia x 1¼" SPLICE BOLT	33
e	B581802	⅝" Dia X 18" HGR BOLT	5
f	B580904A	⅝" Dia x 9" HEX BOLT GRD 5	1
g	W050	⅝" WASHER	7
h	N050	⅝" Dia HGR NUT	39
j	B340854A	¾" Dia x 8½" HEX BOLT GRD A449	1
k	N030	¾" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	½" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	½" STRUCTURAL NUT	8
p	W012A	½" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

NOTE: Standard wood line post, block, and associated hardware not included in Bill of Materials Table.

GENERAL NOTES:

1. Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
2. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, ensure the Flared Energy Absorbing Terminal has only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, ensure the Flared Energy Absorbing Terminal is turned parallel to the roadway.
4. Site grade as necessary to ensure the lower sections of the posts do not protrude more than 4" above the ground (measured along a 5' cord).
5. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
6. Install the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails to prevent them from turning when the wood shrinks.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

KIRK J. HOFF
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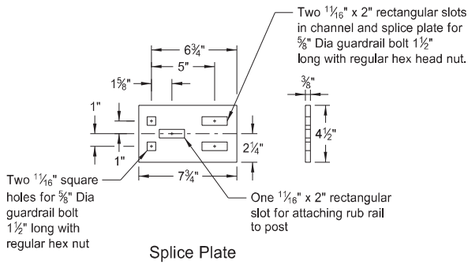
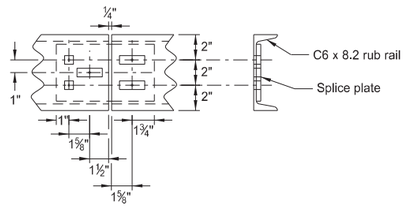
12 02 2020

MGS W-BEAM GUARDRAIL GENERAL DETAILS

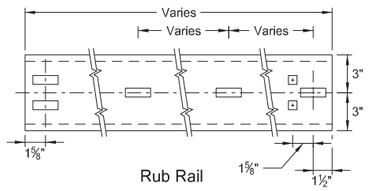
D-764-40



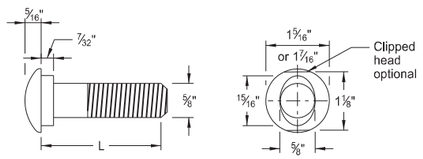
Splice Plate



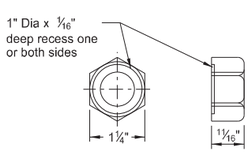
Splice Detail



C6x8.2 RUB RAIL AND SPLICE PLATE

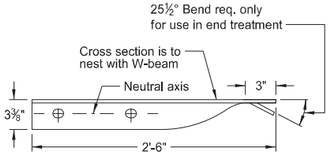


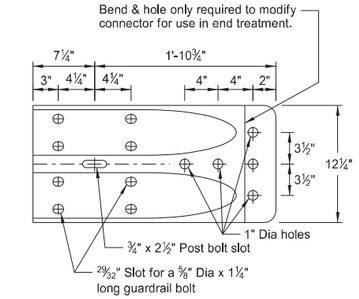
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



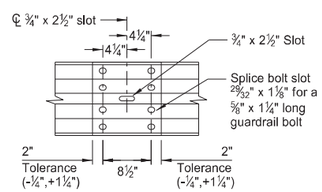
5/8" Dia recess nut

5/8" GUARDRAIL BOLT & RECESS NUT



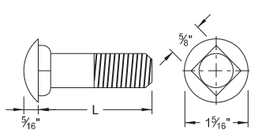


W BEAM TERMINAL CONNECTOR



SPLICE DETAIL

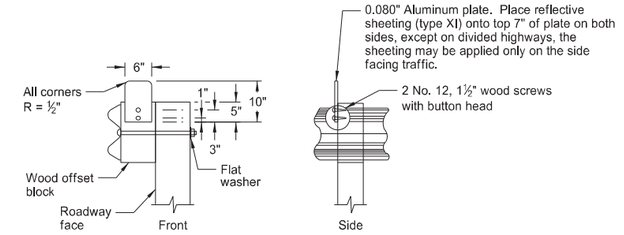
NOTE: Do not install center bolt in the 3/4" x 2 1/2" slot at mid span splices.



5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length

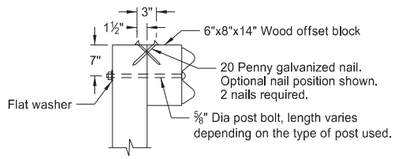
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

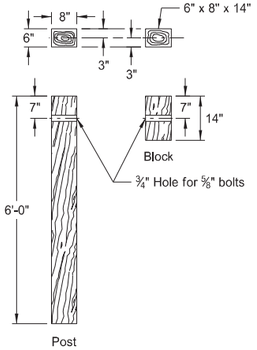


REFLECTORIZED PLATE DETAIL

NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.

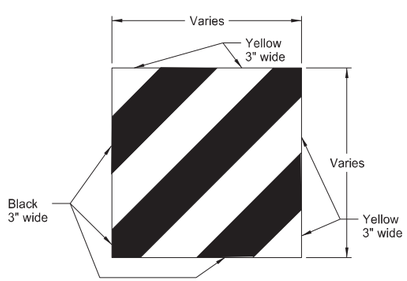


TYPICAL WOOD POST ATTACHMENT DETAIL

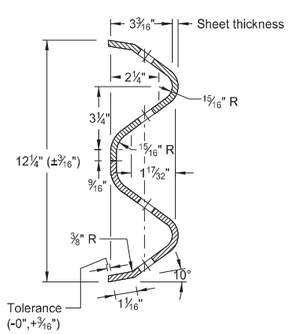


6" x 8" WOOD POST & BLOCK

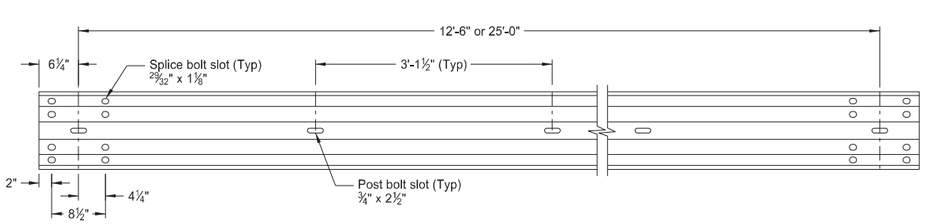
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



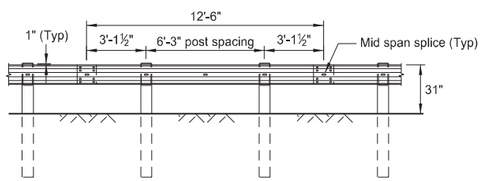
IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION



STANDARD MGS GUARDRAIL PANEL



STANDARD MGS GUARDRAIL SYSTEM

NOTES:

1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material at guardrail post: Dispose all excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. Fit the Object Marker within the vertical edges of the Impact Plate. Provide type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply the sheeting to 0.100 Aluminum sheeting meeting the requirements of Section 894.01.A. Attach the Object Marker to the Impact Head Plate with rivets or other attachment device. Ensure the rivets or attachment device are non-rust. Slope the stripes downward toward the roadway side.
4. Guardrail installation height tolerance = ±1".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-14-17

REVISIONS

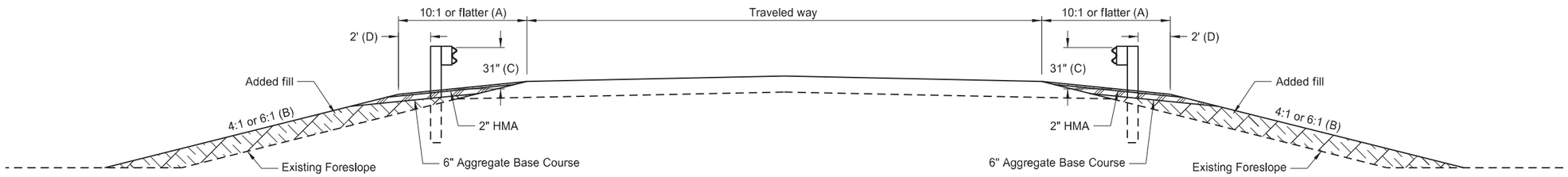
DATE	CHANGE
12-02-20	Updated clipped head to optional

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

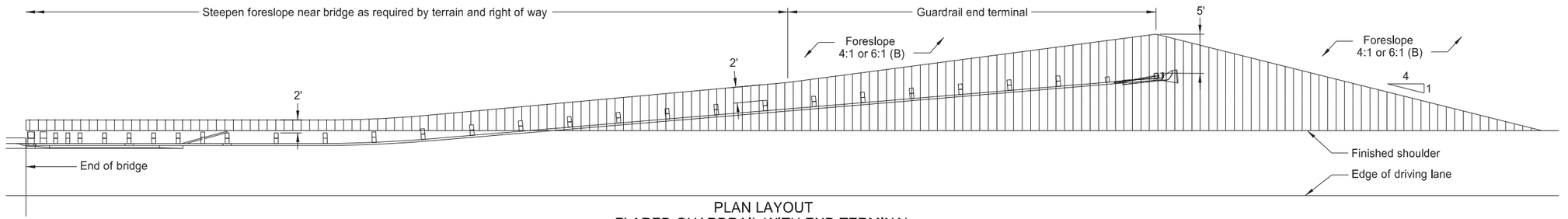
12 02 2020

D-764-48

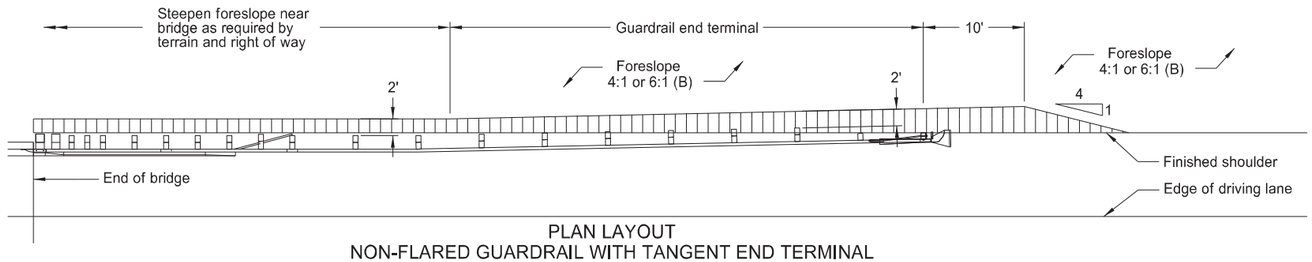
TYPICAL GRADING AT BRIDGE ENDS WITH MGS W-BEAM GUARDRAIL



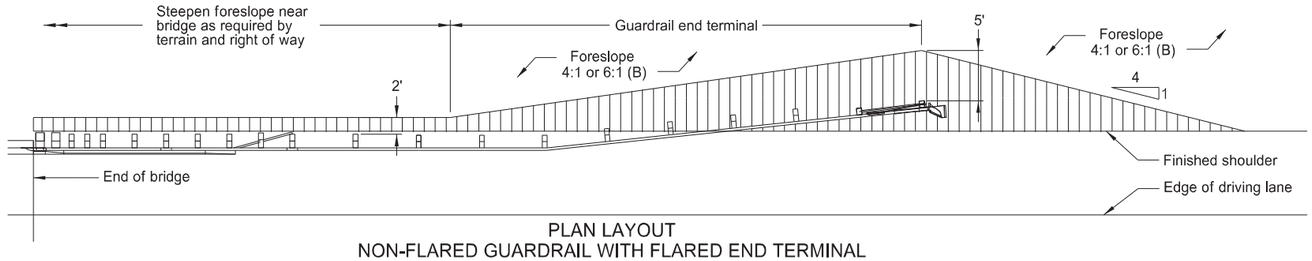
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

(A) Use slope flatter than 10:1 when required to provide proper guardrail height.

(B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.

(C) Measure from top of guardrail to top of surfacing at front face of guardrail.

(D) Vary dimension at end terminals per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12/02/20	Updated notes to active voice.

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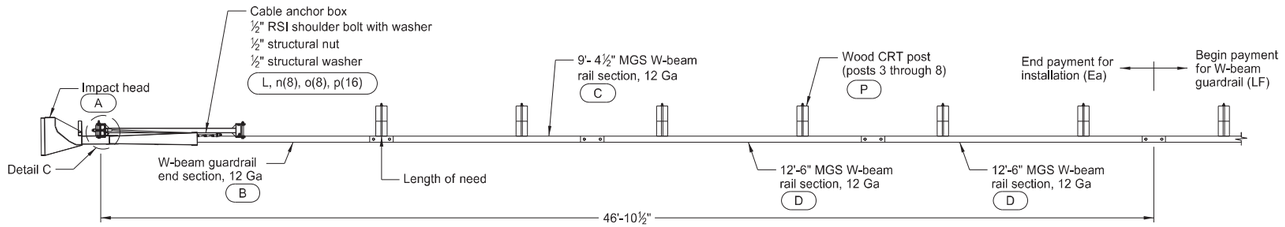
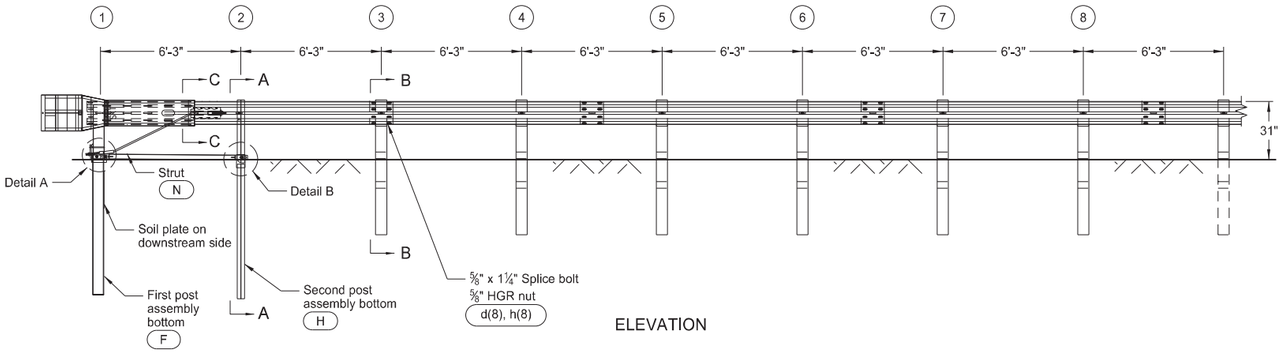
12 02 2020

MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

D-764-51



PLAN

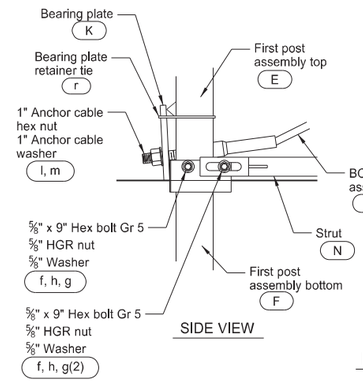


ELEVATION

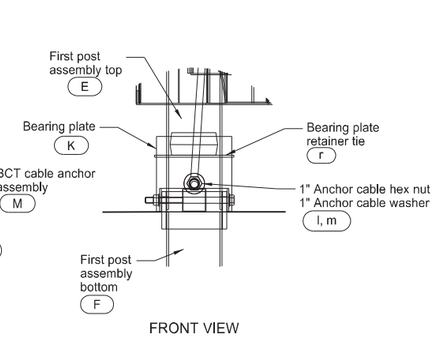
GENERAL NOTES:

1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
2. Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
3. Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the ground (measured along a 5' cord).
4. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
5. Install breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
6. "Toe nail" the wood blockouts to the rectangular wood posts at post 3 through post 8 with two 20 penny galvanized nails to prevent them from turning when the wood warps.

ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	MS3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4½" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	MTPHP1A	FIRST POST ASSEMBLY TOP (6" X 6" X⅛" Tube)	1
F	MTPHP1B	FIRST POST ASSEMBLY BOTTOM (6' W6X15)	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
K	E750	BEARING PLATE	1
L	S760	CABLE ANCHOR BOX	1
M	E770	BCT CABLE ANCHOR ASSEMBLY	1
N	MS785	STRUT	1
P	UP671	6' WOOD CRT POST	6
R	P675	WOOD BLOCKOUT OR RECYCLED EQUIVALENT	6
		HARDWARE	
a	B5160104A	5/16" x 1" HEX BOLT GR 5	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	⅝" Dia x 1¼" SPLICE BOLT	33
e	B581802	⅝" Dia x 18" HGR BOLT (POSTS 3 THRU 8)	6
f	B580904A	⅝" x 9" HEX BOLT GR 5	2
g	W050	⅝" WASHER	9
h	N050	⅝" Dia HGR NUT	35
j	B340854A	¾" Dia x 8½" HEX BOLT GRD A449	1
k	N030	¾" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	½" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	½" STRUCTURAL NUT	8
p	W012A	½" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

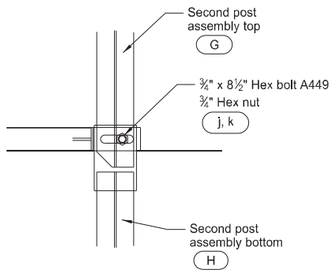


SIDE VIEW



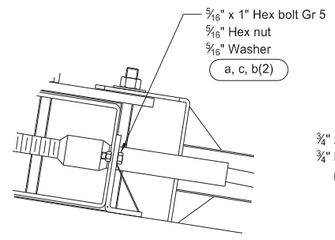
FRONT VIEW

DETAIL A
Post 1

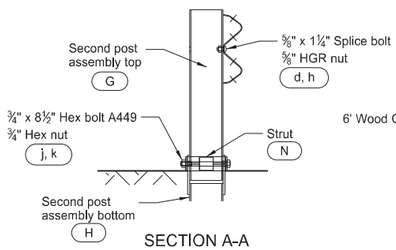


SIDE VIEW

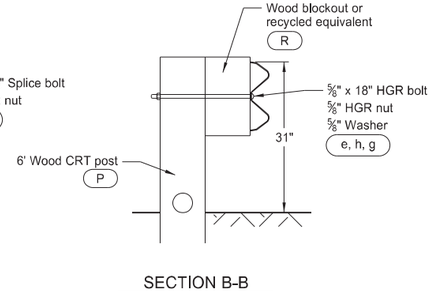
DETAIL B
Post 2



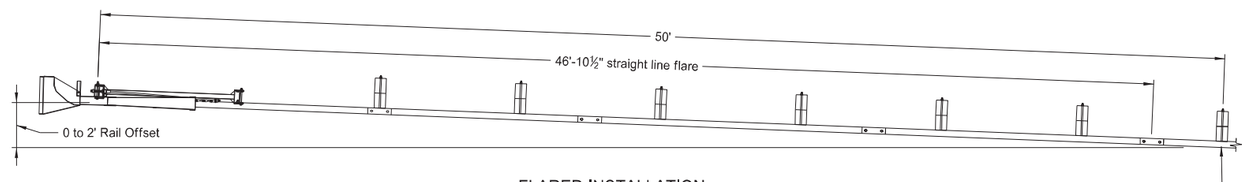
DETAIL C
Post 1 (Impact Head connection)



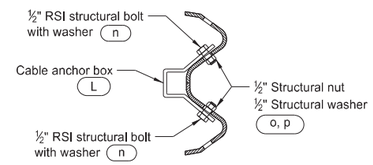
SECTION A-A
Post 2



SECTION B-B
Posts 3 through 8



FLARED INSTALLATION
25:1 maximum flare rate



SECTION C-C

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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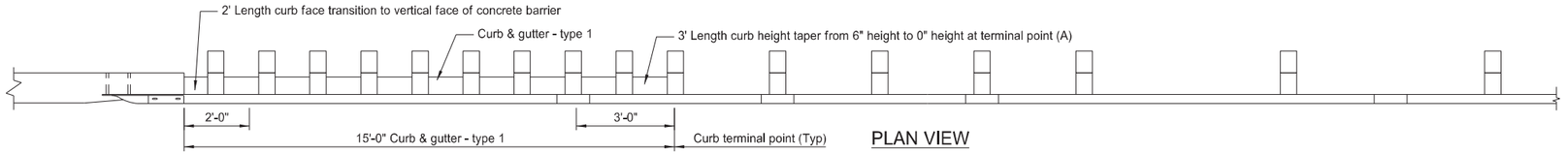
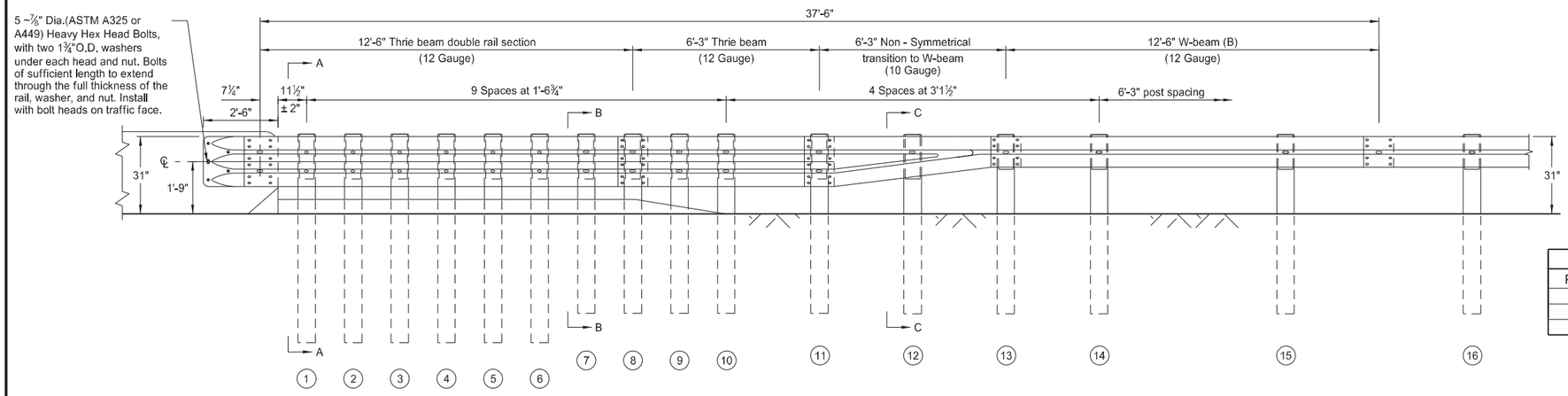
12 02 2020

MGS W-BEAM TRANSITION WITH APPROACH CURB TO CONCRETE SINGLE SLOPE OR JERSEY BARRIER

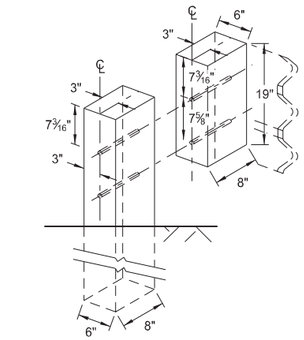
D-764-60



PLAN VIEW

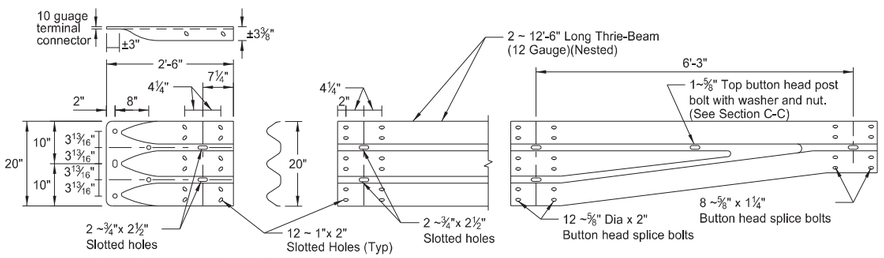


ELEVATION VIEW



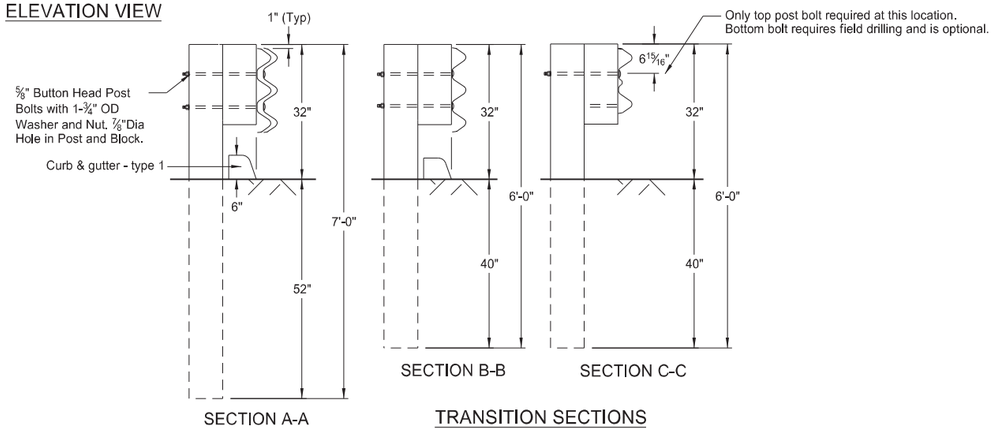
WOOD BLOCK
TO RECTANGULAR WOOD POST
(At posts 1 to 11)

TRANSITION POST AND TIMBER BLOCKOUT SIZING		
POST NO.	POST SIZE	BLOCKOUT SIZE
1-6	6" X 8" X 7'-0" long	6" X 8" X 19"
7-12	6" X 8" X 6'-0" long	6" X 8" X 19"
13-16	6" X 8" X 6'-0" long	6" X 8" X 14"



THRIE-BEAM TERMINAL CONNECTION

NON - SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)

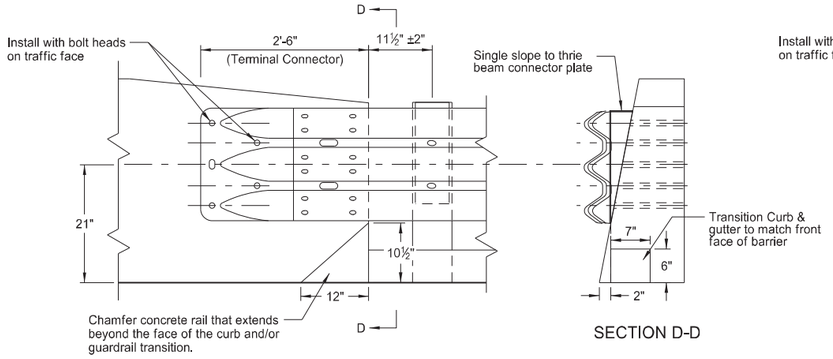


SECTION A-A

SECTION B-B

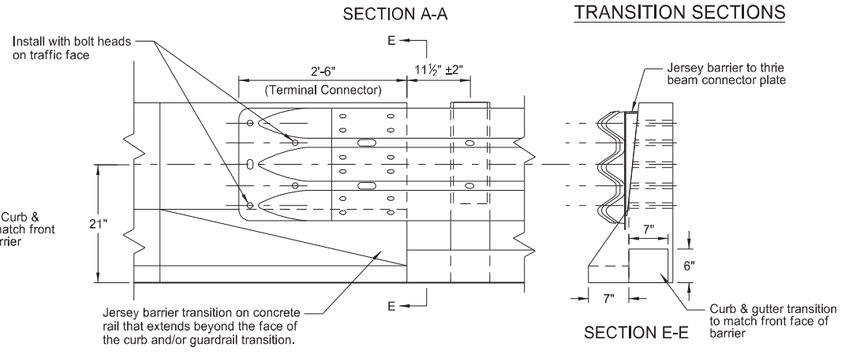
SECTION C-C

TRANSITION SECTIONS



SECTION D-D

CONNECTION TO CONCRETE SINGLE SLOPE BRIDGE RAIL AND TRAFFIC BARRIERS



SECTION E-E

CONNECTION TO CONCRETE JERSEY BARRIER BRIDGE RAIL AND TRAFFIC BARRIERS

(A) Where curb is required to continue past 15' length, taper the curb down to 3" height at the terminal point shown above, instead of 0" height. Use 3" height curb between posts 10 and 16.

(B) Install 12'-6" length W-beam double rail section at location where curb extends past 15' length.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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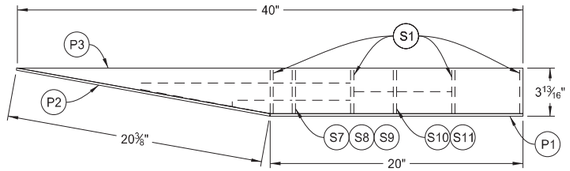
12 02 2020

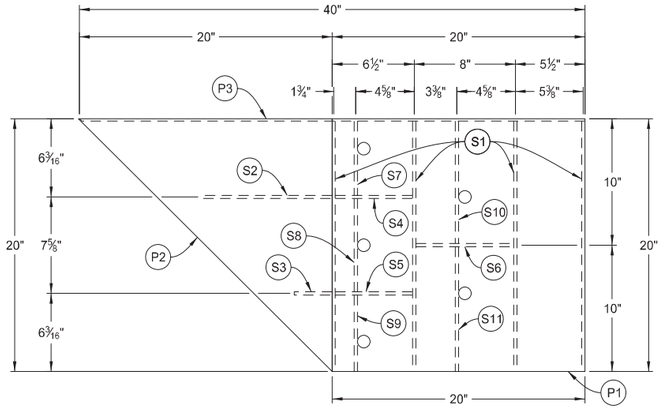
SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-61

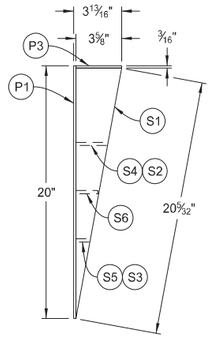


PLAN

NOTE: Assembly Detail is shown for guardrail installation on right hand side of entrance end of bridge barrier. Mirror for opposite side installation.

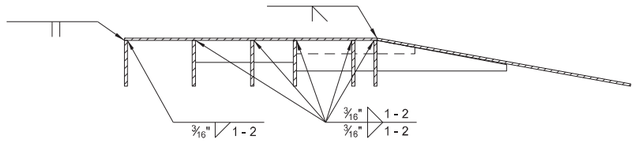


ELEVATION

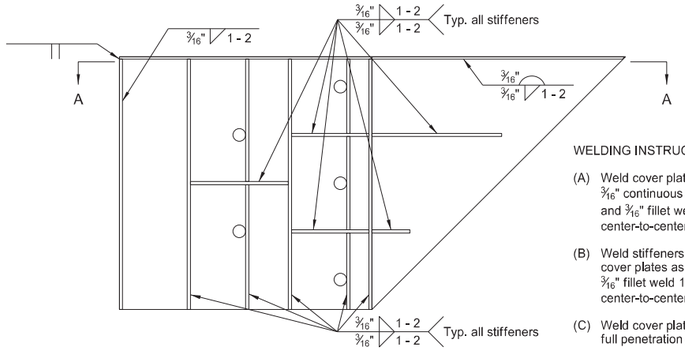


END

ASSEMBLY DETAIL
(Front View)

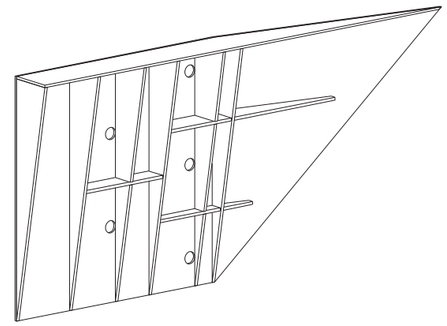


SECTION A-A



ELEVATION

WELDING DETAIL
(Back View)



PICTORIAL DRAWING
(Showing Back of Connector Plate)

WELDING INSTRUCTIONS:

(A) Weld cover plate P3 as follows: 3/16" continuous back weld on exterior sides and 3/16" fillet weld 1" long spaced at 2" center-to-center on interior sides.

(B) Weld stiffeners located on the inside of the cover plates as follows: 3/16" fillet weld 1" long spaced at 2" center-to-center.

(C) Weld cover plates P1 and P2 together with full penetration groove weld.

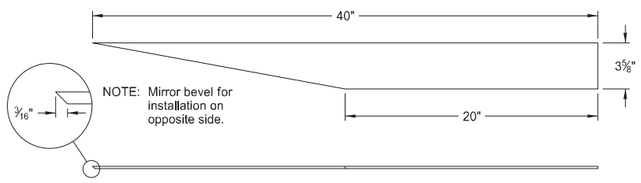


PLATE P3
Quantity: 1

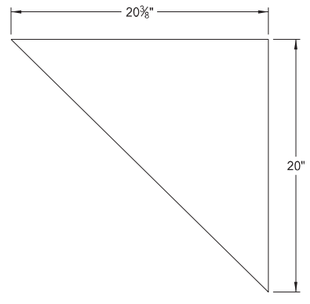


PLATE P2
Quantity: 1

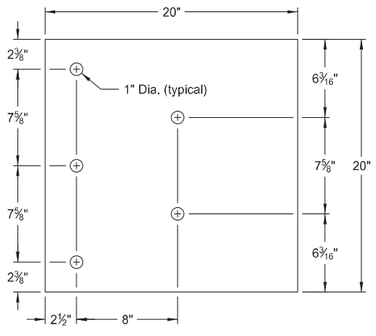
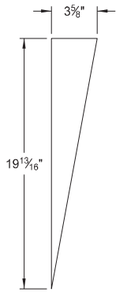
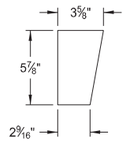


PLATE P1
Quantity: 1

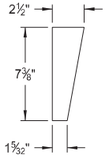
COVER PLATES



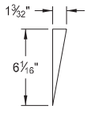
TYPE S1
Quantity: 4



TYPE S7
Quantity: 1

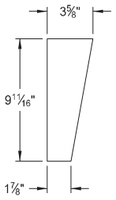


TYPE S8
Quantity: 1

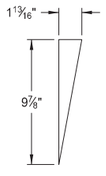


TYPE S9
Quantity: 1

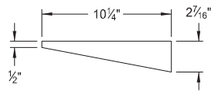
VERTICAL PLATES



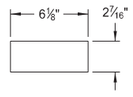
TYPE S10
Quantity: 1



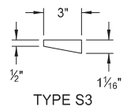
TYPE S11
Quantity: 1



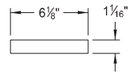
TYPE S2
Quantity: 1



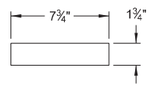
TYPE S4
Quantity: 1



TYPE S3
Quantity: 1



TYPE S5
Quantity: 1



TYPE S6
Quantity: 1

HORIZONTAL PLATES

STIFFENER PLATES

NOTES:

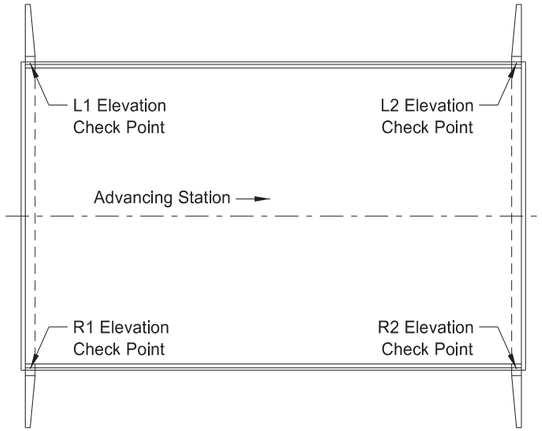
1. Fabricate cover plates P1, P2, and P3 from 3/16" thick ASTM A36 Grade structural steel.
2. Fabricate stiffener plates from 1/4" thick ASTM A36 Grade structural steel.
3. Galvanize connector plate in accordance with AASHTO M111.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

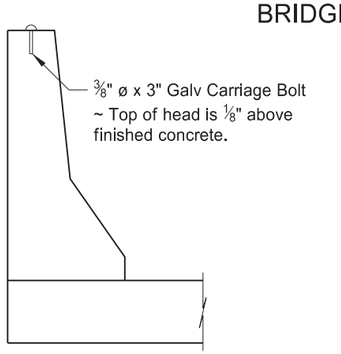
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

BRIDGE BENCH MARKS

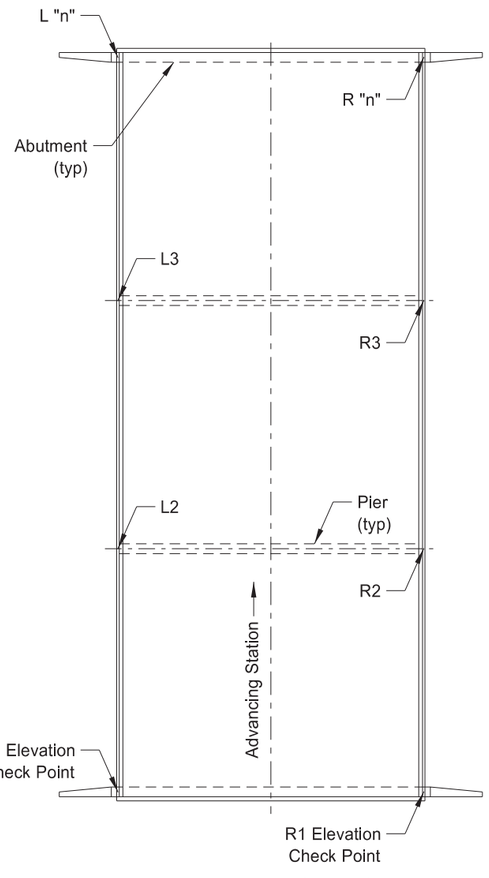
D-900-1



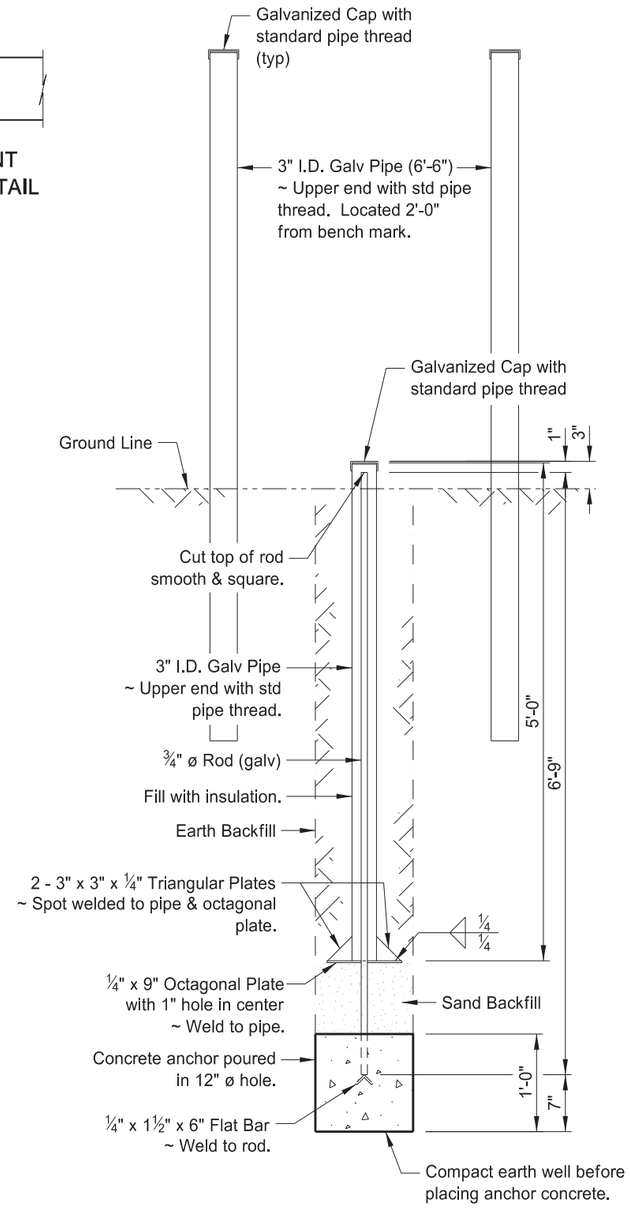
GENERAL LAYOUT FOR
SINGLE SPAN



CHECK POINT
LOCATION DETAIL



GENERAL LAYOUT FOR
MULTIPLE SPAN



BENCH MARK DETAIL

NOTES:

Install elevation check points in the top of the concrete barriers at the locations shown in the General Layout view. Install the checkpoints in the barriers over each substructure unit at each bridge location. Use 3/8" diameter x 3" long galvanized carriage bolts set with the top of the bolt head projected 1/8" above the top of the finished concrete.

Set two bench marks as shown in the Bench Mark Detail at each bridge location. Locate the bench marks diagonally from one another at opposite corners of each bridge. Set the bench marks near the Right of Way line at least 300 feet from the nearest point of the structure. Extend two of the galvanized steel pipes 4'-0" above ground and paint with white paint suitable for painting over galvanized steel surfaces.

The Project Engineer will run a set of levels to determine the elevation of the bridge bench marks and elevation check points immediately after completion of the bridge. List the elevation of Bench Mark #1 as elevation 1,000, or as the actual surveyed elevation. The Project Engineer will record the information of SFN 13420 and submit to the Bridge Engineer.

Galvanize all metal parts per Section 854 after fabrication.

At the time of installation, coat the threads with synthetic grease containing teflon. Screw the cap to a snug fit.

Include the cost of furnishing and installing two bridge bench marks and the number of elevation check points required for one structure in the price bid for each set of Bridge Bench Marks.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE
09/03/19	UPDATED SIGNATURE
02/23/24	Updated Signature Revised notes & updated to active voice

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
02/23/24
NORTH DAKOTA