

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	23011	1	1

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

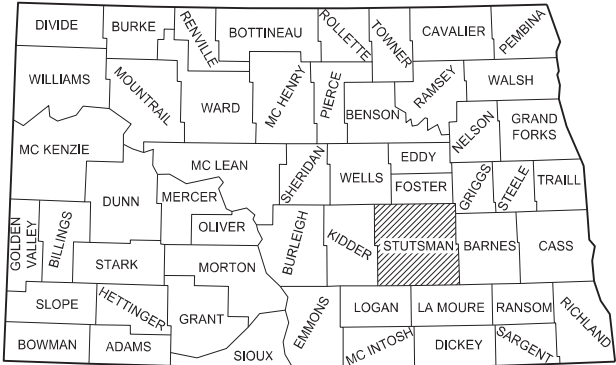
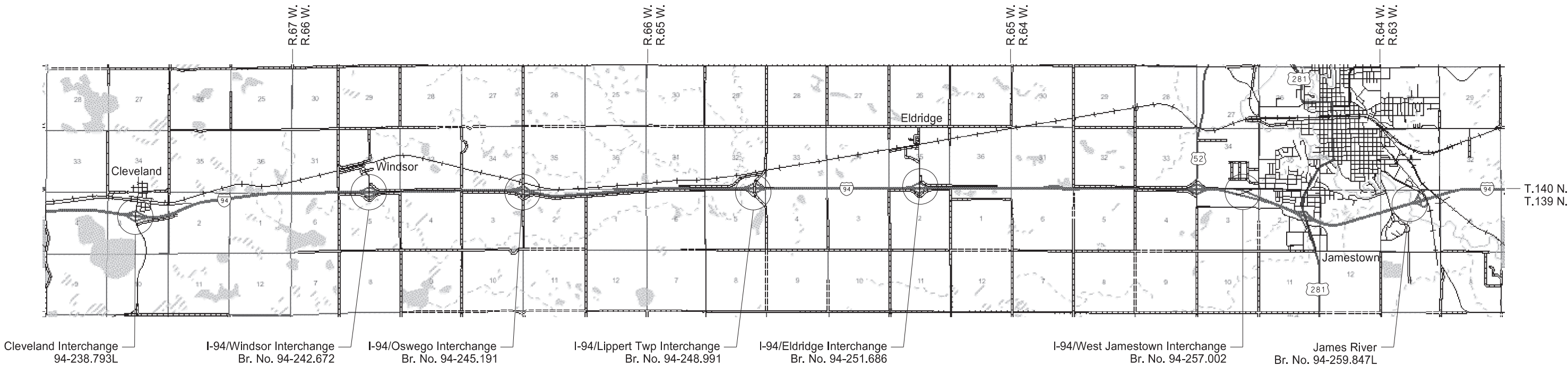
IM-2-094(178)238

Stutsman County
Cleveland Int - Jamestown Int

Bridge Deck Overlay, Approach Slab Repair,
Spall Repairs, Abutment Repair &
Joint Repair

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	10/1/2020
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-2-094(178)238	na	na



STATE COUNTY MAP

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jonathan Ketterling

Ketterling, Jonathan
03/18/22

DocuSign

BRIDGE DIVISION



Ketterling, Jonathan
03/18/22

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SPECIAL PROVISIONS									
Number	Description								
PSP 137(20)	Permits and Environmental Considerations								
SP 14(22)	Commercial Grade Asphalt								

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NOTES

- 107-P01 NOTICE TO LANDOWNERS: The contractor will be responsible to notify NuStar Energy a minimum of 30 days prior to beginning work on Bridge 0094-248.991.
- 202-P01 REMOVAL OF INLETS: Remove the two existing inlets located within the approach slab at the west end of Bridge 0094-257.002.
- Remove the outlet pipe end sections, cap them with concrete, and cover them with earth. Remove the drain frames, grates, and risers and cap the corrugated steel pipe ends with concrete. Backfill the remaining hole with earth in 6-inch layers. Compact the earth using a mechanical tamper with an appropriately sized tamping head. Construct concrete caps to have a minimum thickness of 9 inches. The contractor will retain removed drain frames, grates, risers, and pipe end sections.
- Include all costs for labor, equipment, and materials required to remove the inlets in the price bid for "Removal of Inlets."
- 704-450 LANE CLOSURE - SIGNAL CONTROL/FLAGGING CONTROL: Install either the signal controlled lane closure on Standard D-704-16 or the flagging controlled lane closure on Standard D-704-17.
- Obtain an electrical source for traffic signals. Solar powered signals may be used. Place generators a minimum of 60 feet from the roadway centerline, unless the generator and signal are part of a trailer mounted unit.
- Place utility poles and equipment a minimum of 60 feet from the roadway centerline and place power conductors a minimum of 6 inches below the ground surface. Remove poles after they are no longer necessary.
- The Engineer will measure individual traffic control devices, other than the signal system and flaggers, shown on the standards. Payment will be made at the respective contract unit price.
- Include the cost of either a traffic signal system or flaggers in the contract unit price for "Lane Closure – Signal Control/Flagging Control".
- 704-P01 BRIDGE DETOUR RESTRICTIONS: Do not close Bridge 0094-245.191 while either Bridge 0094-242.672 or Bridge 0094-248.991 are closed.

- 704-P02 TRAFFIC CONTROL: Traffic control device quantities are based on the list below. Provide additional devices at no additional cost to the Department.
1. Standard D-704-16 at bridge 0094-251.686;
 2. Standard D-704-18 at bridges 0094-238.793 and 0094-259.847;
 3. Standard D-704-19, layout E at bridges 0094-242.672, 0094-245.191, and 0094-248.991.



NOTES

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SECTION 130

748-P01 CURB & GUTTER – TYPE 1 SPECIAL: Install curb and gutter at the entrance end of the West Jamestown Interchange Crossroad, RP 257.002 and the James River Bridge, RP 259.847L, accordance with Standard Drawing D-748-1, except for the transitions at each end, as shown on Standard Drawing D-764-60.

Include all costs for constructing the curb and gutter as described above in the contract unit price bid for “Curb & Gutter – Type 1 Special.”



ENVIRONMENTAL NOTES

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

EN-1 THREATENED AND ENDANGERED SPECIES: The project is located near/within suitable habitat for the species listed in the following table

SPECIES	HABITAT	PRESENCE
Northern Long-Eared Bat	Forested/Wooded Areas/Bridges/Box Culverts/Caves/Mines	Active Season: April 1 - September 30* Inactive Season: October 1 - March 31*

*Time frames can differ slightly, depending on the year

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



ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
202	0111	REMOVAL OF CONCRETE	L SUM	1	1
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	527	527
202	0230	REMOVAL OF INLETS	EA	2	2
210	0099	CLASS 1 EXCAVATION	L SUM	1	1
302	0120	AGGREGATE BASE COURSE CL 5	TON	212	212
411	0105	MILLING PAVEMENT SURFACE	SY	320	320
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	80	80
602	0130	CLASS AAE-3 CONCRETE	CY	11	11
602	1130	CLASS AE-3 CONCRETE	CY	11.2	11.2
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	278.9	278.9
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	6,353	6,353
602	1260	BRIDGE DECK CRACK SEALING	LF	3,714	3,714
612	0115	REINFORCING STEEL-GRADE 60	LBS	1,663	1,663
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	1,018	1,018
624	3001	DOUBLE BOX BEAM RAIL RETROFIT-FREE STANDING	LF	9	9
650	0704	OVERLAY CONCRETE	CY	96	96
650	0707	DECK CONCRETE	CY	20	20
650	0710	CLASS 1-H REMOVAL	SY	1,198	1,198
650	0711	CLASS 2-H REMOVAL	SY	239	239
650	0712	CLASS 3-H REMOVAL	SY	12	12
650	0720	CLASS 1 REMOVAL	SY	506	506
650	0721	CLASS 2 REMOVAL	SY	101	101
650	0722	CLASS 2-A REMOVAL	LF	182	182
650	0723	CLASS 3 REMOVAL	SY	25	25
650	0724	CLASS 4 REMOVAL	SY	5	5
650	0805	DECK SPALL REPAIR	SF	319	319
702	0100	MOBILIZATION	L SUM	1	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4,827	4,827
704	1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EA	1	1
704	1037	ATTENUATION DEVICE-TYPE B-35	EA	2	2
704	1045	ATTENUATION DEVICE-TYPE B-75	EA	2	2
704	1052	TYPE III BARRICADE	EA	17	17

ESTIMATE NUMBER: 22291 ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 03/24/2022 TIME: 08:29:16

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
704	1060	DELINEATOR DRUMS	EA	123	123
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	478	478
704	3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	126	126
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	60	60
762	0113	EPOXY PVMT MK 4IN LINE	LF	14,660	14,660
762	0420	SHORT TERM 4IN LINE-TYPE R	LF	5,885	5,885
762	0426	SHORT TERM 24IN LINE-TYPE R	LF	24	24
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	1,630	1,630
762	1104	PVMT MK PAINTED 4IN LINE	LF	14,660	14,660
764	0131	W-BEAM GUARDRAIL	LF	871	871
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	4	4
764	0150	REMOVE & RESET GUARDRAIL	LF	266	266
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	921	921
764	1990	REMOVE CONCRETE SAFETY SHAPE TRANSITION	EA	2	2
764	2081	REMOVE END TREATMENT & TRANSITION	EA	4	4
930	8665	3IN EXPANSION JOINT STRIP SEAL	LF	38	38
930	8850	POLYURETHANE FOAM JOINT SEAL	LF	49	49
930	9612	SPALL REPAIR	SF	950	950
930	9694	GIRDER PATCHING	L SUM	1	1

ESTIMATED QUANTITIES FOR BRIDGE TRANSITIONS SURFACING						
Spec	Code	Bid Item	UNIT	Width (ft)	Quantity at location	Total
411	105	MILLING	SY	24	80	320
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	24	4.5	18
*	*	TACK COAT @ 0.05 Gal/SY	GAL	24	4	16
*	*	PG 58S-28 ASPHALT CEMENT @ 6%	TON	-	0.3	1.2

* Not a pay item. Included in the contract unit price bid for 430 0500 Commercial Grade Hot Mix Asphalt.

ESTIMATED QUANTITIES FOR GUARDRAIL EMBANKMENT SURFACING								
				W Jamestown Int RP 257.002		WB James River RP 259.847		
				Begin Bridge		End Bridge		
Spec	Code	Bid Item	UNIT	RT	LT	LT Mdn	LT	Total
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	146	261	0	120	527
		2" Bituminous with 6" Aggregate Base	-	-	-	-	-	-
302	0120	AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	TON	62	96	0	54	212
*	*	TACK COAT @ 0.05 Gal/SY	GAL	8	14	0	7.1	29
*	*	PRIME COAT @ 0.25 Gal/SY	GAL	42	70	0	35	147
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	17	30	0	15	62
*	*	PG 58S-28 ASPHALT CEMENT @ 6%	TON	1	1.8	0	0.9	3.7

* Not a pay item. Included in the contract unit price bid for 430 0500 Commercial Grade Hot Mix Asphalt.
See Section 130 and Standard Drawing D-764-48 for details

Short Term 4IN - Type NR		
Location	Basis	Quantity (LF)
Bridge 0094-238.793	Centerline Skips	486
Bridge 0094-245.191	Centerline Skips	73
Bridge 0094-248.991	Centerline Skips	70
Bridge 0094-251.686	Centerline Skips	435
Bridge 0094-257.002	Centerline Skips	53
Bridge 0094-259.847	Centerline Skips	513

Short Term 4IN - Type R		
Location	Basis	Quantity (LF)
Bridge 0094-238.793	Barrier Stripe	1570
Bridge 0094-251.686	Barrier Stripe	2640
Bridge 0094-259.847	Barrier Stripe	1675

Permanent Pavement Marking		
Location	Basis	Quantity (LF)
Bridge 0094-238.793	Centerline Skips	486
	Edge Line	3890
Bridge 0094-245.191	Centerline Skips	73
	Edge Line	580
Bridge 0094-248.991	Centerline Skips	70
	Edge Line	560
Bridge 0094-251.686	Centerline Skips	435
	Edge Line	3480
Bridge 0094-257.002	Centerline Skips	53
	Edge Line	420
Bridge 0094-259.847	Centerline Skips	513
	Edge Line	4100

Obliteration of Pavement Marking		
Location	Length (LF)	Total (SF)
Bridge 0094-238.793	486	162
Bridge 0094-251.686	435	145
Bridge 0094-259.847	513	171

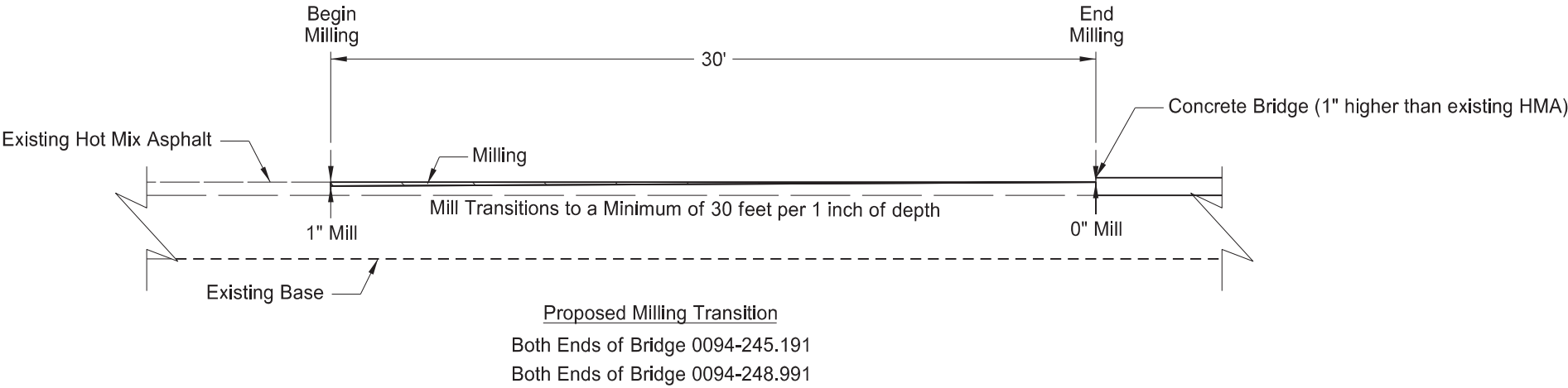


Basis of Estimate

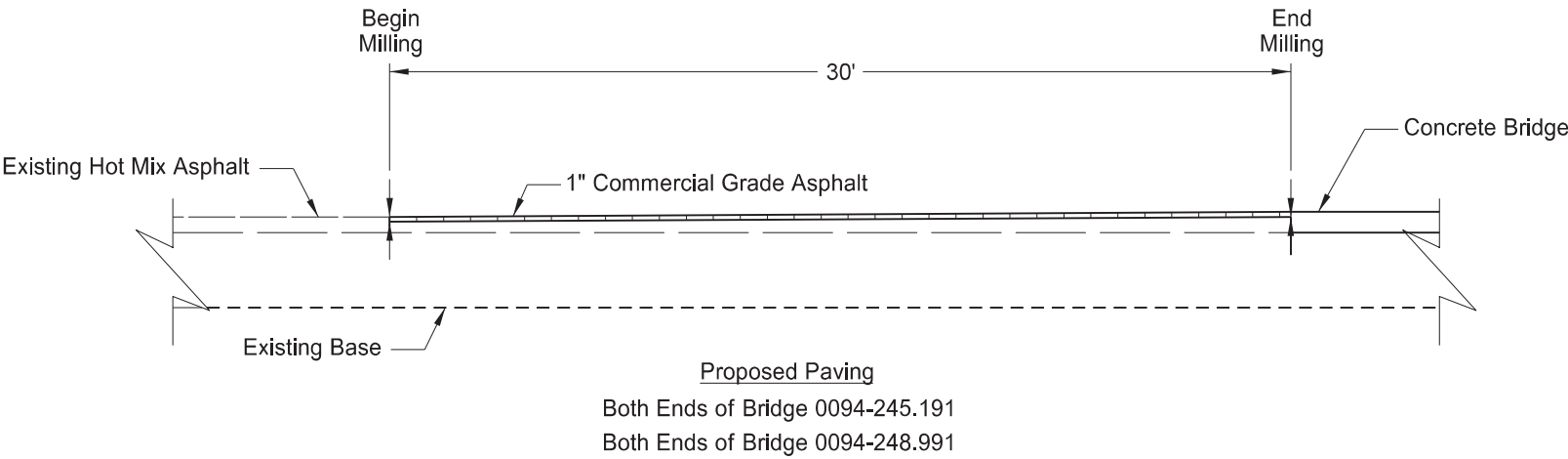
Bridge Deck Overlay

Cleveland Int - Jamestown Int

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Drawing is not to scale



Milling and Paving End Transitions

Bridge Deck Overlay

Cleveland Int - Jamestown Int

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SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
CON 1	156"x60"	DETOUR EXIT 242 NORTHBOUND CLOSED USE EXIT 245	1	103	103
CON 2	156"x60"	DETOUR EXIT 242 SOUTHBOUND CLOSED USE EXIT 238	1	103	103
CON 3	156"x60"	DETOUR EXIT 245 NORTHBOUND CLOSED USE EXIT 248	1	103	103
CON 4	156"x60"	DETOUR EXIT 245 SOUTHBOUND CLOSED USE EXIT 242	1	103	103
CON 5	156"x60"	DETOUR EXIT 248 NORTHBOUND CLOSED USE EXIT 251	1	103	103
CON 6	156"x60"	DETOUR EXIT 248 SOUTHBOUND CLOSED USE EXIT 245	1	103	103
CON 7	108"x60"	EXIT 257 CLOSED USE EXIT 258	2	80	160
CON 8	132"x60"	DETOUR EXIT 242 SOUTHBOUND	2	46	92
CON 9	102"x60"	DETOUR EXIT 242 SOUTHBOUND	2	41	82
CON 10	102"x60"	DETOUR EXIT 242 SOUTHBOUND	1	41	41
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	6	26	156
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		70	
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	6	59	354
I2-5-96	96"x48"	YOUR HIGHWAY DOLLARS AT WORK	4	59	236
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)	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)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	36"x48"	SPEED LIMIT _____ (Portable only)		30	
R2-1-48	48"x60"	SPEED LIMIT _____	12	39	468
R2-1aP-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)	6	10	60
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	2	16	32
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)	5	12	60
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	1	35	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		35	
W3-3-48	48"x48"	SIGNAL AHEAD	2	35	70
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	6	35	210
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT	4	35	140
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	4	35	140
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	6	35	210
W20-2-48	48"x48"	DETOUR AHEAD or _____ FT or _____ MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or _____ FT or _____ MILE	10	35	350

[illegible]

SPECIAL SIGNS

CON 11	132"x60"	DETOUR EXIT 242 NORTHBOUND	2	46	92
CON 12	102"x60"	DETOUR EXIT 242 NORTHBOUND	2	41	82
CON 13	102"x60"	DETOUR EXIT 242 NORTHBOUND	1	41	41
CON 14	132"x60"	DETOUR EXIT 245 SOUTHBOUND	2	46	92
CON 15	102"x60"	DETOUR EXIT 245 SOUTHBOUND	2	41	82
CON 16	102"x60"	DETOUR EXIT 245 SOUTHBOUND	1	41	41
CON 17	132"x60"	DETOUR EXIT 245 NORTHBOUND	2	46	92
CON 18	102"x60"	DETOUR EXIT 245 NORTHBOUND	2	41	82
CON 19	102"x60"	DETOUR EXIT 245 NORTHBOUND	1	41	41
CON 20	132"x60"	DETOUR EXIT 248 SOUTHBOUND	2	46	92
CON 21	102"x60"	DETOUR EXIT 248 SOUTHBOUND	2	41	82
CON 22	102"x60"	DETOUR EXIT 248 SOUTHBOUND	1	41	41
CON 23	132"x60"	DETOUR EXIT 248 NORTHBOUND	2	46	92
CON 24	102"x60"	DETOUR EXIT 248 NORTHBOUND	2	41	82
CON 25	102"x60"	DETOUR EXIT 248 NORTHBOUND	1	41	41

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	4827
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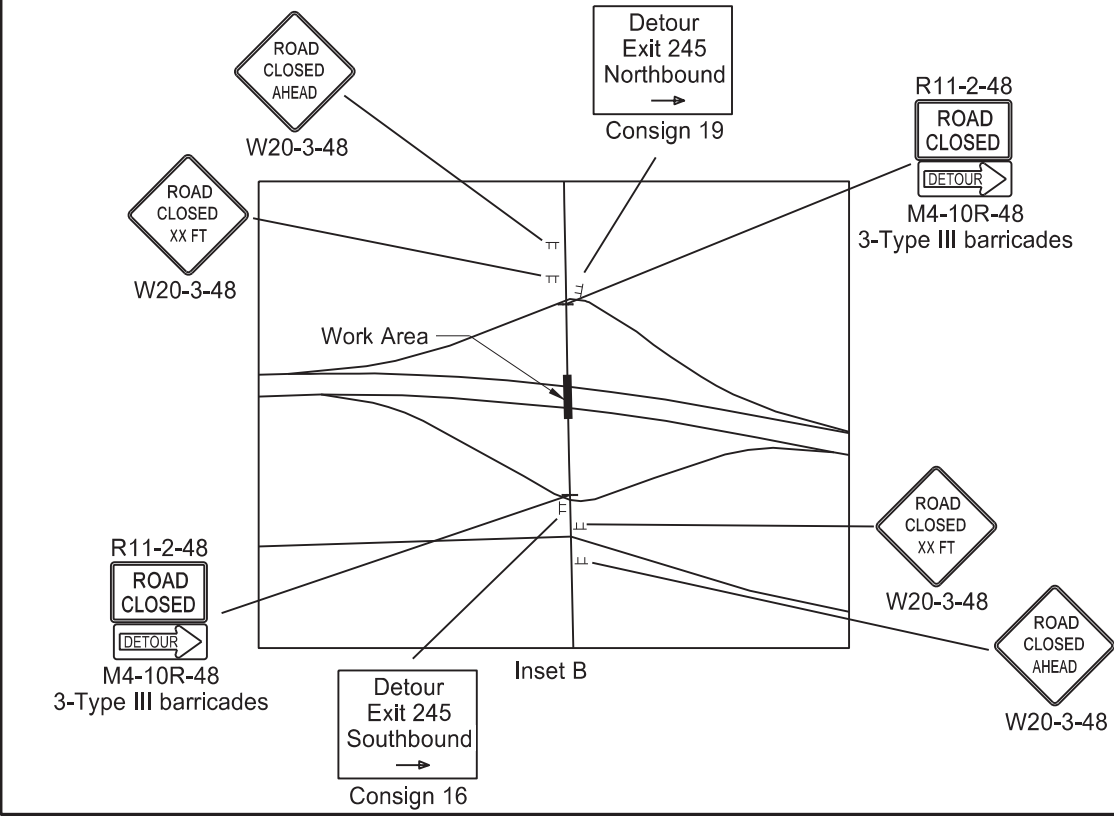
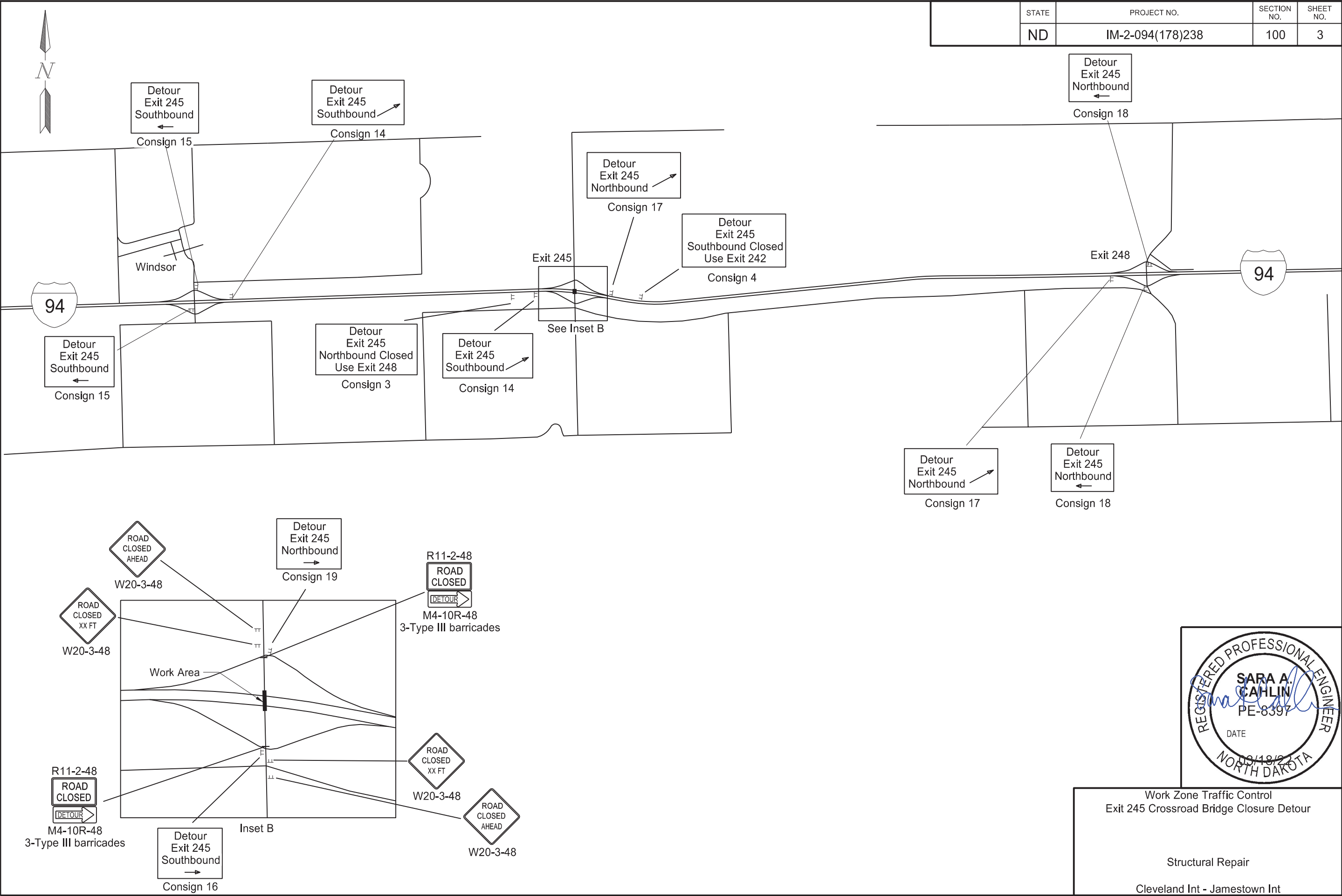
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EACH	1
704-1037	ATTENUATION DEVICE-TYPE B-35	EACH	2
704-1045	ATTENUATION DEVICE-TYPE B-75	EACH	2
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	20
704-1060	DELINEATOR DRUMS	EACH	123
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
704-1500	OBLITERATION OF PVMT MK	SF	481
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	1260
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	5885
762-0426	SHORT TERM 24IN LINE-TYPE R	LF	24
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	1630

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



Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	100	3

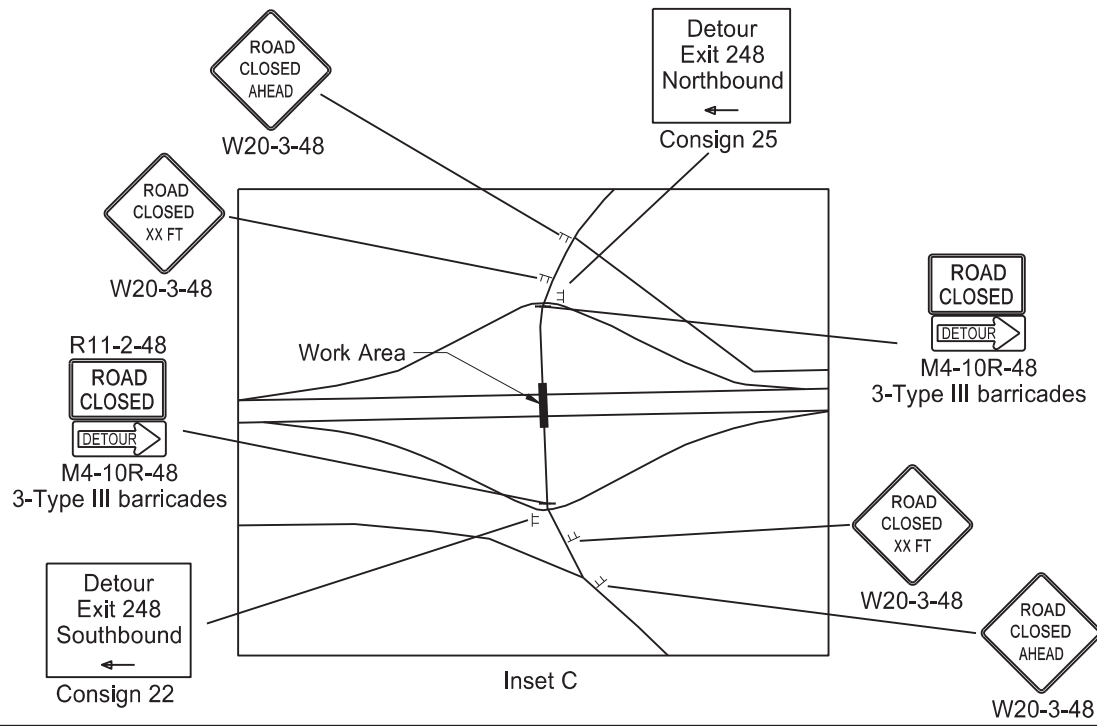
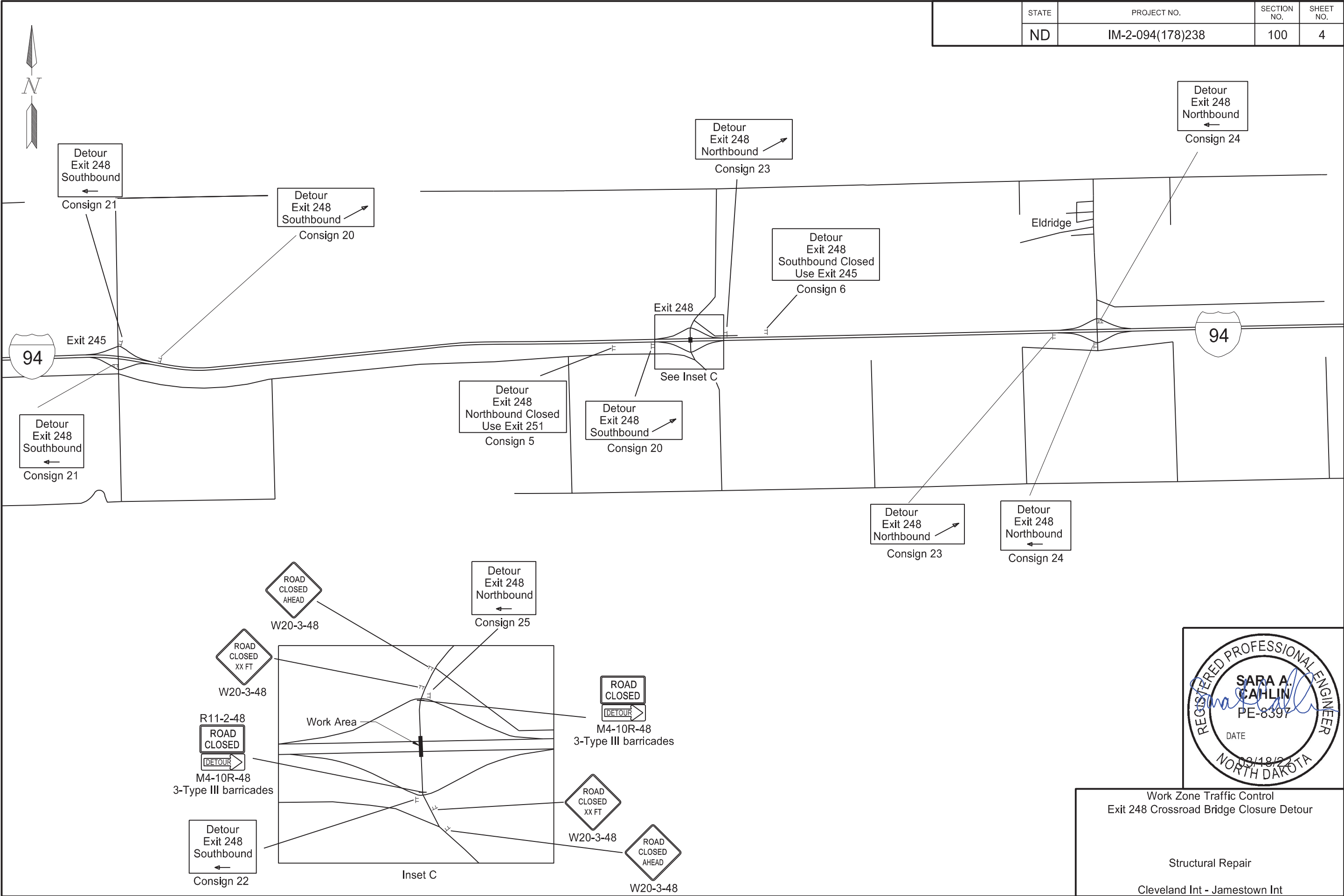


Work Zone Traffic Control
Exit 245 Crossroad Bridge Closure Detour

Structural Repair

Cleveland Int - Jamestown Int

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	100	4

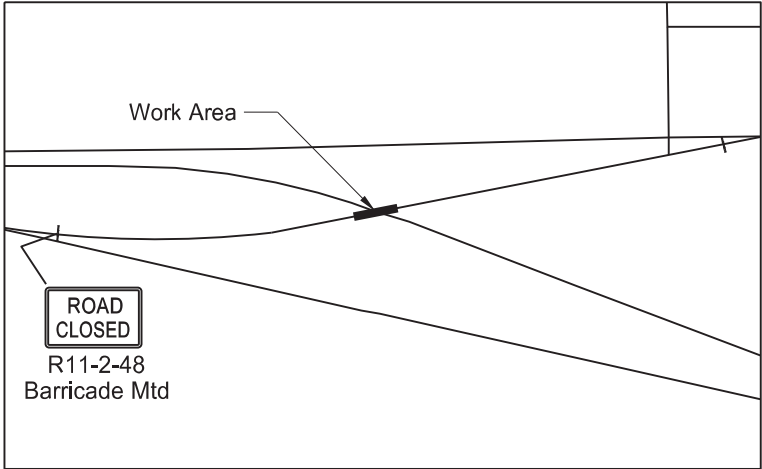


Work Zone Traffic Control
Exit 248 Crossroad Bridge Closure Detour

Structural Repair

Cleveland Int - Jamestown Int

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	100	5



Inset D



Work Zone Traffic Control
 West Jamestown Crossroad Bridge Closure Detour

Structural Repair

Cleveland Int - Jamestown Int

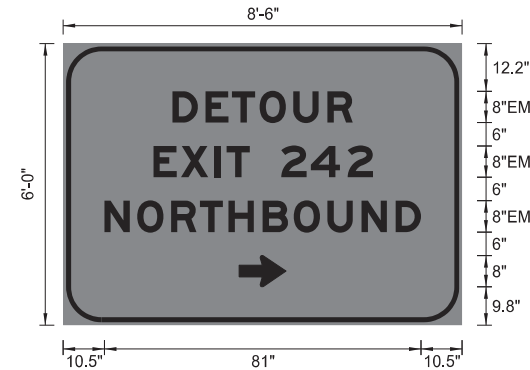
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	100	10

SIGN NUMBER	ConSign 13
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
ND_6N_TYPED	45	9.8	8	12	270

STATION(S):

AREA: 51.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

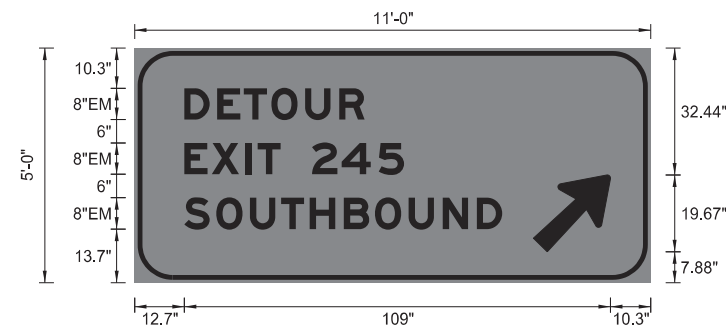
[illegible]

SIGN NUMBER	ConSign 14
WIDTH X HEIGHT	11'-0" x 5'-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
ND_8N_TYPE A	102	7.9	15.1	25	315

STATION(S):

AREA: 55.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

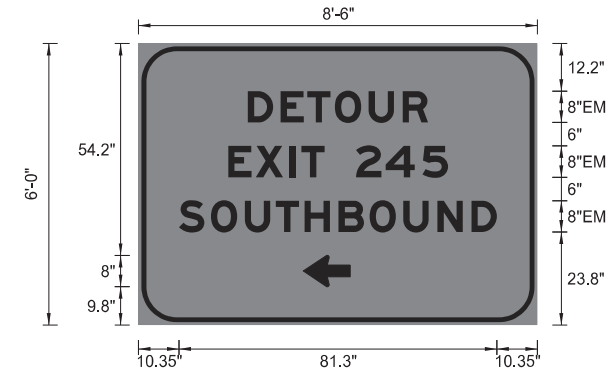
[illegible]

SIGN NUMBER	ConSign 15
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	ANGL
ND_BN_TYPED	42.1	9.8	8	12	90

STATION(S):

AREA: 51.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

[illegible]

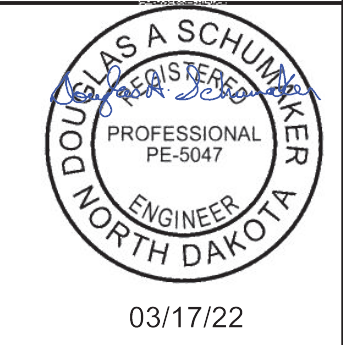
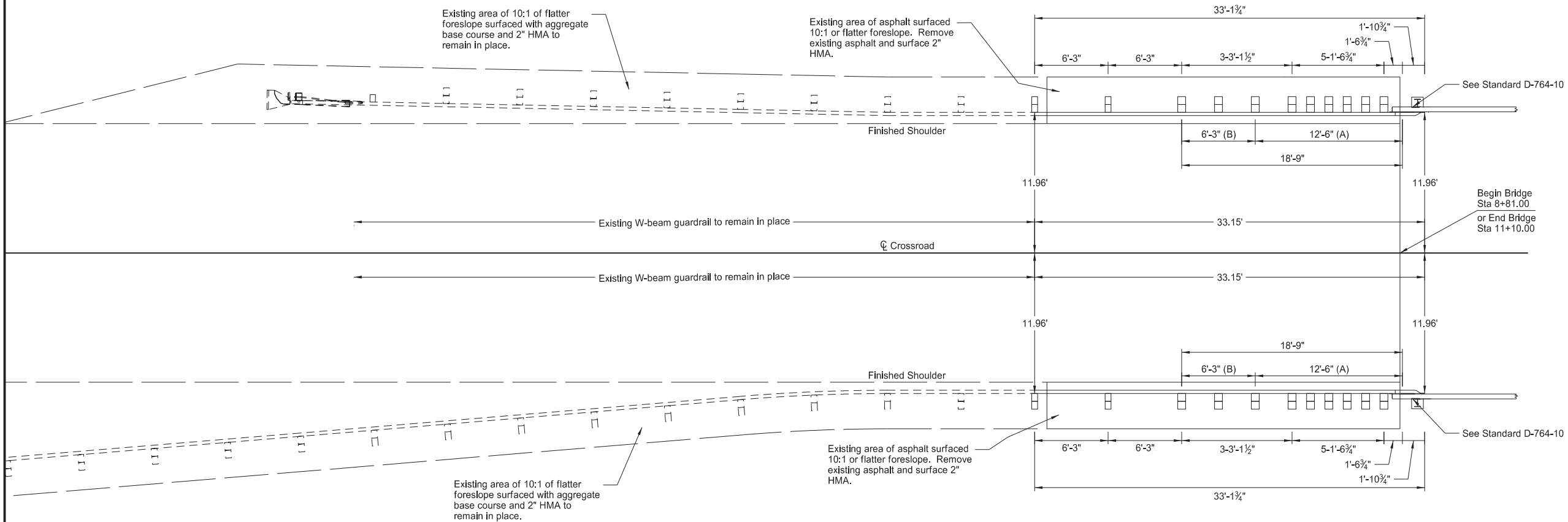
Construction Sign Details

Cleveland Int - Jamestown Int
Structural Repair

I-94

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	130	1



SPEC	CODE	BID ITEM	QTY	UNIT
764	0150	REMOVE & RESET GUARDRAIL		
		Sta 8+49.95 to 8+83.10 Rt	33.2	LF
		Sta 8+49.95 to 8+83.10 Lt	33.2	LF
		Sta 11+07.90 to 11+41.05 Rt	33.2	LF
		Sta 11+07.90 to 11+41.05 Lt	33.2	LF
		Total	132.8	LF

- (A) Thrie beam rail section (double thickness)
- (B) W-Thrie beam transition section (double thickness)

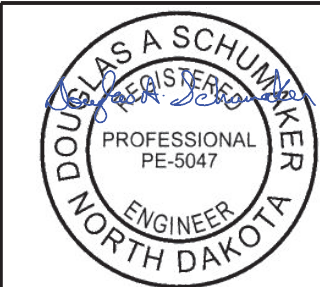
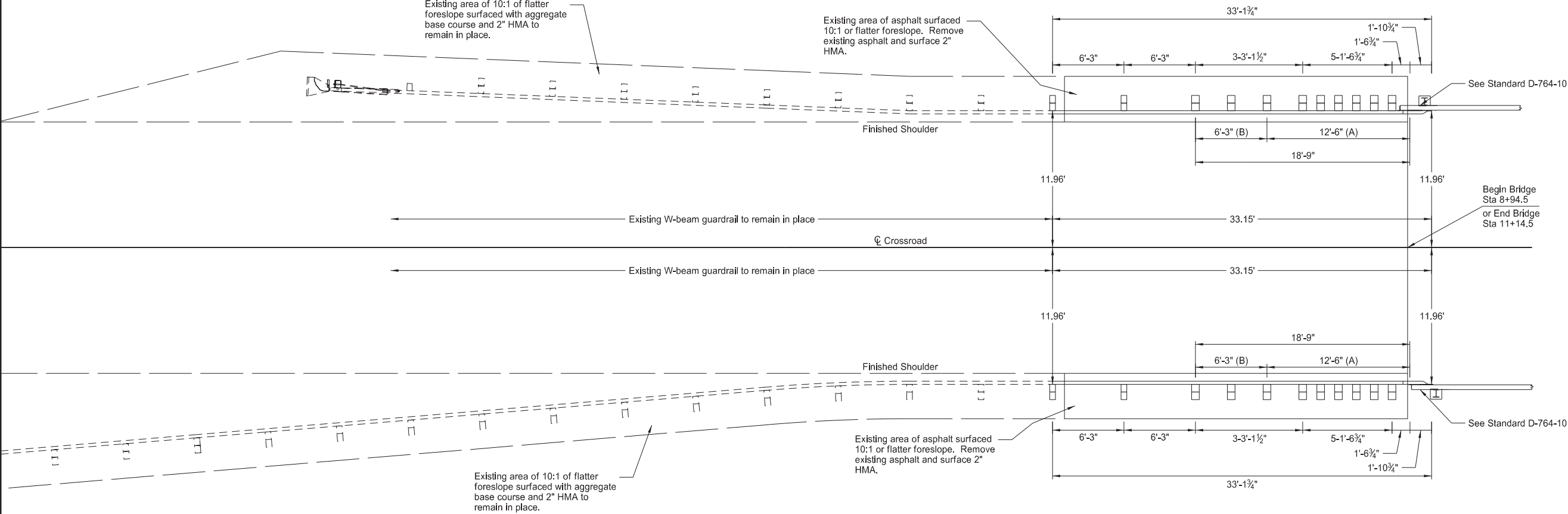
Thrie/W-Beam Guardrail Layout
At Both Ends of Bridge

Oswego Interchange Crossroad
RP 245.191

I-94

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	130	2



03/17/22

SPEC	CODE	BID ITEM	QTY	UNIT
764	0150	REMOVE & RESET GUARDRAIL		
		Sta 8+63.45 to 8+96.60 Rt	33.2	LF
		Sta 8+63.45 to 8+96.60 Lt	33.2	LF
		Sta 11+12.40 to 11+45.55 Rt	33.2	LF
		Sta 11+12.40 to 11+45.55 Lt	33.2	LF
		Total	132.8	LF

- (A) Thrie beam rail section (double thickness)
(B) W-Thrie beam transition section (double thickness)

Thrie/W-Beam Guardrail Layout
At Both Ends of Bridge

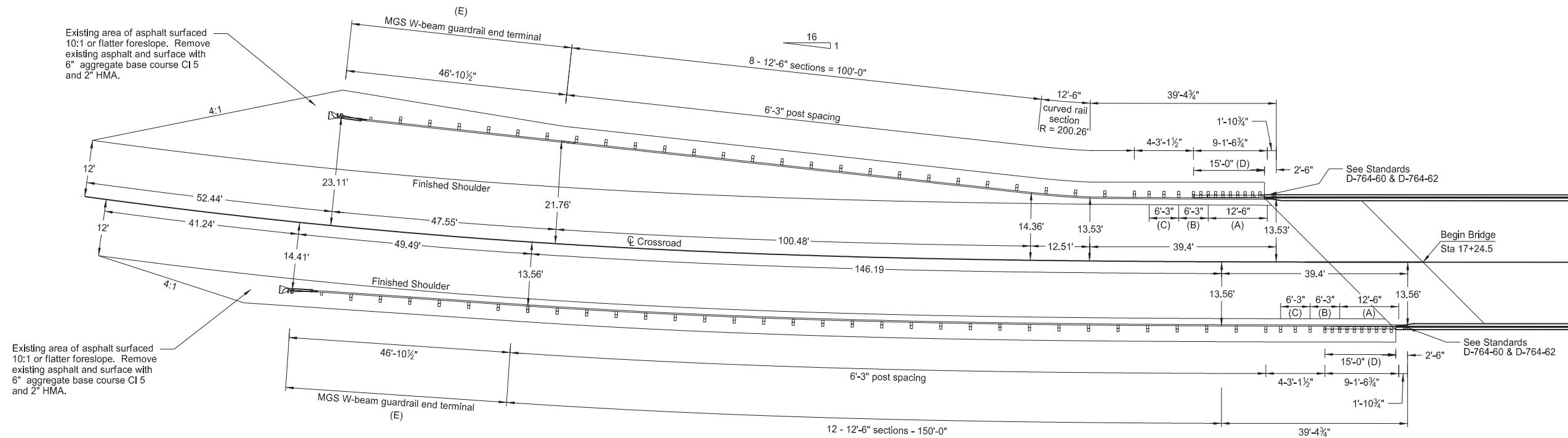
Lippert Township Interchange Crossroad
RP 248.991

I-94



23 USC § 409 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	130	3



- (A) Thrie beam rail section (double thickness)
- (B) Thrie beam rail section
- (C) Asymmetrical W-Thrie beam transition section
- (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 FLEAT end terminal at this location. See Standard D-764-38.



03/17/22

Thrie/MGS W-Beam Guardrail Layout
West Jamestown Interchange Crossroad
RP 257.002
Westbound Roadway

I-94

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	130	4

MGS W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

THRIE/MGS W-BEAM GUARDRAIL AT BRIDGE END

LOCATION	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
	5/8" Ø x 18" LONG GUARD- RAIL BOLT	6" x 8" x 6'-0" TIMBER POST	6" x 8" x 14" TIMBER BLOCK	5/8" Ø x 1 1/4" LONG GUARD- RAIL BOLT	12'- 6" STRAIGHT W-BEAM RAIL SECTION	12'- 6" CURVED W-BEAM RAIL SECTION	REFL- ECTOR- IZED PLATES	6" x 8" x 7' WOOD POST	6" x 8" x 19" WOOD OFF- SET BLOCK	6'-3" W-THRIE BEAM TRANS- ITION SECTION	6'-3" THRIE BEAM SECTION	12'-6" DOUBLE THRIE BEAM SECTION	2'-6" THRIE BEAM TERM- INAL CON- NECTOR	7/8" Ø x 15" LONG HEX HEAD BOLT	JERSEY BARRIER TO THRIE BEAM CONN- ECTOR PLATE
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH
Sta 15+32.56 to 17+21.25 Rt	50	33	27	148	13		10	6	12	1	1	1	1	5	1
Sta 15+41.03 to 16+93.42 Lt	44	27	21	124	9	1	11	6	12	1	1	1	1	5	1
TOTAL	94	60	48	272	22	1	21	12	24	2	2	2	2	10	2

(A) Include these items in the contract unit price bid for "W-Beam Guardrail".

SPEC	CODE	BID ITEM	QTY	UNIT	SPEC	CODE	BID ITEM	QTY	UNIT
748	0141	CURB & GUTTER - TYPE 1 SPECIAL			764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 17+04.26 to 17+19.26 Rt	15	LF			Sta 15+54.64 to 17+31.16 Rt	176.9	LF
		Sta 16+77.10 to 16+92.10 Lt	15	LF			Sta 15+28.65 to 17+05.17 Lt	176.9	LF
		Total	30	LF			Total	353.8	LF
764	0131	W-BEAM GUARDRAIL			764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 15+32.56 to 17+21.25 Rt	151.9	LF			Sta 15+17.84 to 15+54.64 Rt	1	Ea
		Sta 15+41.03 to 16+93.42 Lt	189.4	LF			Sta 14+91.85 to 15+28.65 Lt	1	Ea
		Total	341.3	LF			Total	2	Ea
764	0145	W-BEAM GUARDRAIL END TERMINAL							
		Sta 14+86.16 to 15+32.56 Rt	1	Ea					
		Sta 14+93.48 to 15+41.03 Lt	1	Ea					
		Total	2	Ea					



03/17/22

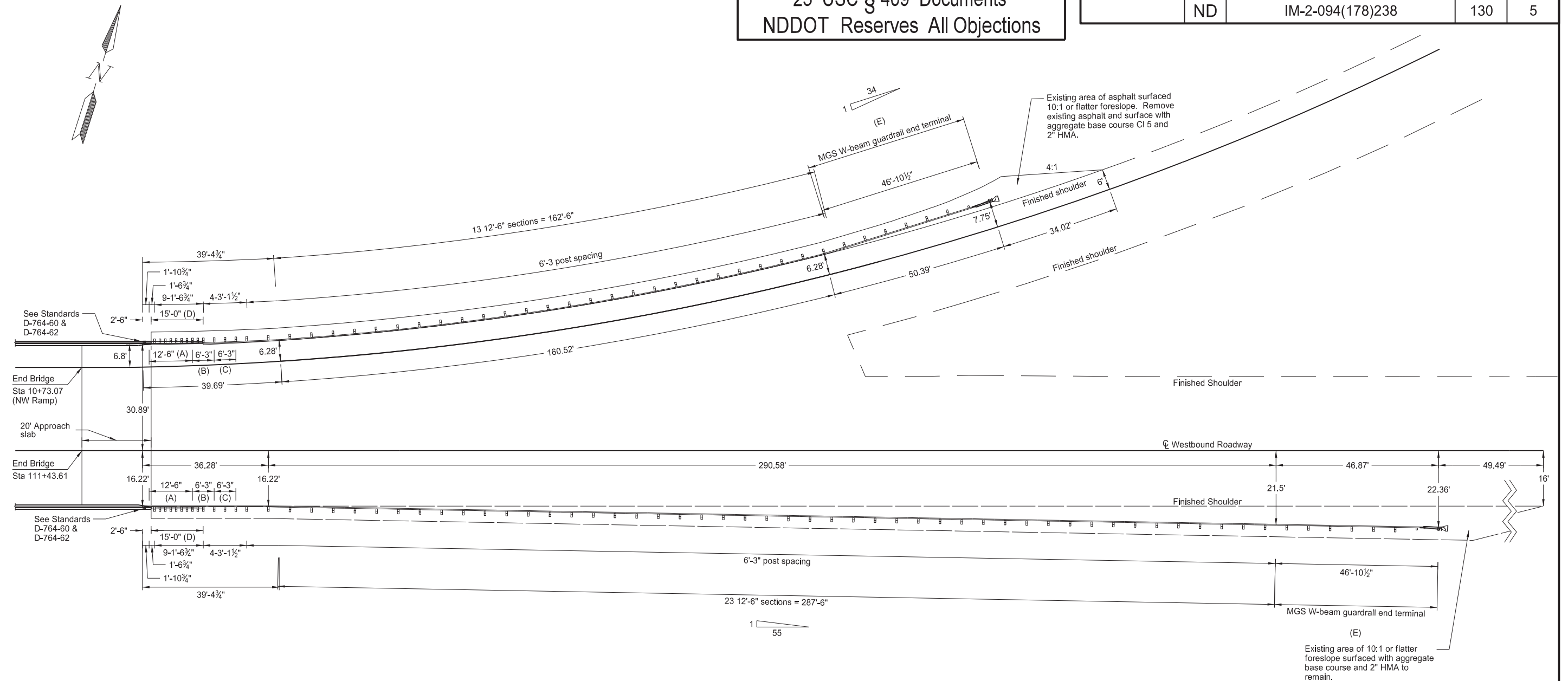
Thrie/MGS W-Beam Guardrail Quantities

**West Jamestown Interchange Crossroad
RP 257.002
Westbound Roadway**

I-94

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	130	5



03/17/22

Thrie/MGS W-Beam Guardrail Layout

James River Bridge
RP 259.847
Westbound Roadway

1-94

- (A) Thrie beam rail section (double thickness)
- (B) Thrie beam rail section
- (C) Asymmetrical W-Thrie beam transition section
- (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 SKT end terminal at this location. See Standard D-764-51.

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	130	6

MGS W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

THRIE/MGS W-BEAM GUARDRAIL AT BRIDGE ENDS

LOCATION	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
	5/8" Ø x 18" LONG GUARD- RAIL BOLT	6" x 8" x 6'-0" TIMBER POST	6" x 8" x 14" TIMBER BLOCK	5/8" Ø x 1 1/4" LONG GUARD- RAIL BOLT	12'- 6" STRAIGHT W-BEAM RAIL SECTION	12'- 6" CURVED W-BEAM RAIL SECTION	REFL- ECTOR- IZED PLATES	6" x 8" x 7' WOOD POST	6" x 8" x 19" WOOD OFF- SET BLOCK	6'-3" W-THRIE BEAM TRANS- ITION SECTION	6'-3" THRIE BEAM SECTION	12'-6" DOUBLE THRIE BEAM SECTION	2'-6" THRIE BEAM TERM- INAL CON- NECTOR	7/8" Ø x 15" LONG HEX HEAD BOLT	JERSEY BARRIER TO THRIE BEAM CONN- ECTOR PLATE
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH
Sta 111+61.11 to 114+87.97 Lt Mdn	72	55	49	236	24		9	6	12	1	1	1	1	5	1
Sta 10+90.57 to 12+93.93 Lt NW Ramp	52	35	29	156	14		11	6	12	1	1	1	1	5	1
TOTAL	124	90	78	392	38		20	12	24	2	2	2	2	10	2

(A) Include these items in the contract unit price bid for "W-Beam Guardrail".

SPEC	CODE	BID ITEM	QTY	UNIT	SPEC	CODE	BID ITEM	QTY	UNIT
748	0141	CURB & GUTTER - TYPE 1 SPECIAL			764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 111+63.61 to 111+78.61 Lt Mdn	15	LF			Sta 111+52.26 to 114+91.61 Lt Mdn	339.4	LF
		Sta 10+93.07 to 11+08.07 Lt NW Ramp	15	LF			Sta 10+80.57 to 13+07.47 Lt NW Ramp	226.9	LF
		Total	30	LF			Total	566.3	LF
764	0131	W-BEAM GUARDRAIL			764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 111+61.11 to 114+87.97 Lt Mdn	326.9	LF			Sta 114+91.61 to 115+41.60 Lt Mdn	1	Ea
		Sta 10+90.57 to 12+93.93 Lt NW Ramp	201.9	LF			Sta 13+07.47 to 13+44.69 Lt NW Ramp	1	Ea
		Total	528.8	LF			Total	2	Ea
764	0145	W-BEAM GUARDRAIL END TERMINAL							
		Sta 114+87.97 to 115+34.84 Lt Mdn	1	Ea					
		Sta 12+93.93 to 13+41.17 Lt NW Ramp	1	Ea					
		Total	2	Ea					



03/17/22

Thrie/MGS W-Beam Guardrail Quantities

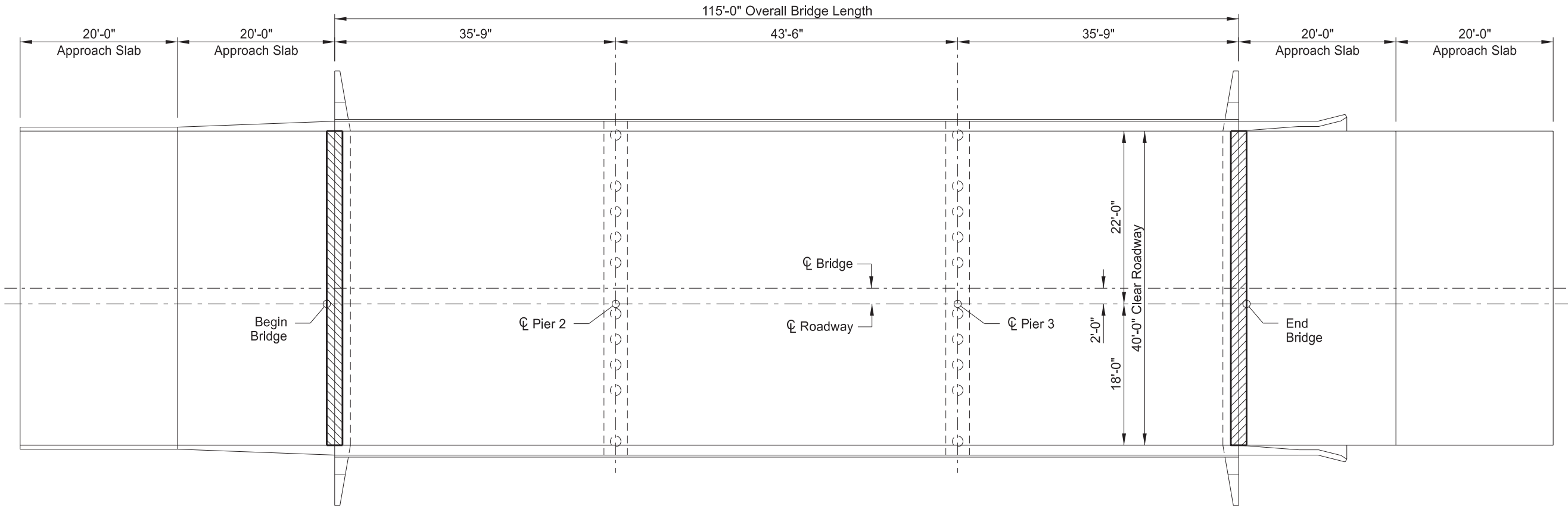
**James River Bridge
RP 259.847
Westbound Roadway**

I-94



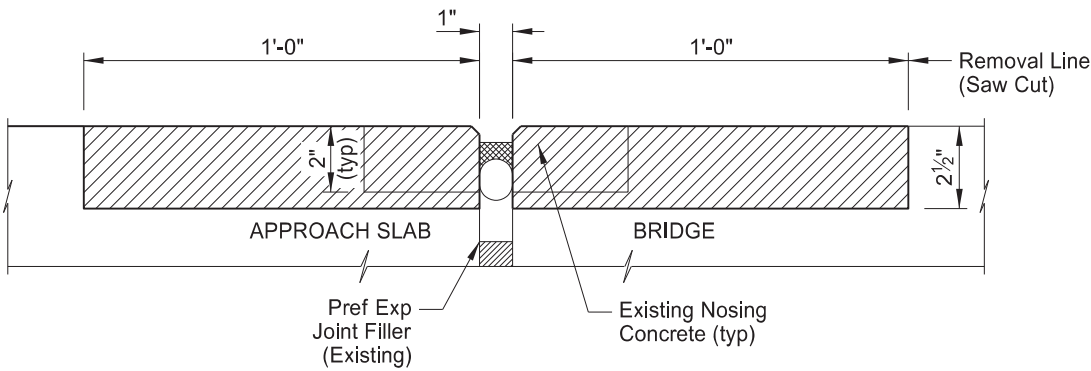
23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	1

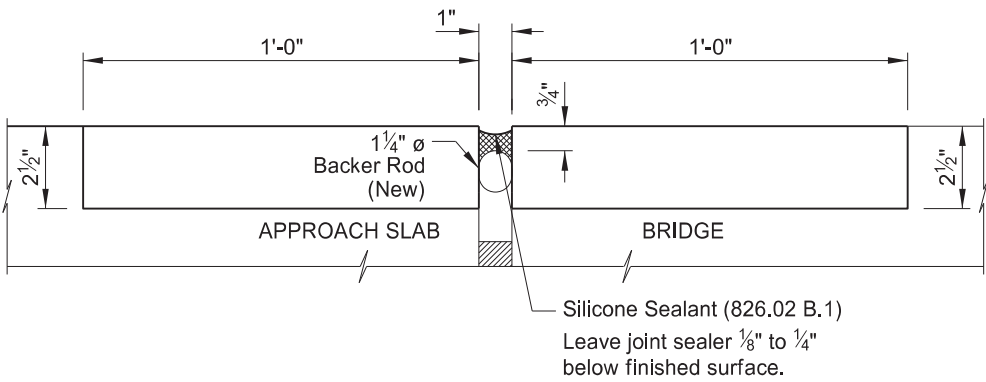


PLAN

Hatched area indicates
concrete to be removed.



(SHOWING NOSING CONCRETE REMOVAL)
EXISTING JOINT DETAIL



(SHOWING CONCRETE)
NEW JOINT DETAIL

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	966
650	0805	DECK SPALL REPAIR	SF	206
930	9694	GIRDER PATCHING	L SUM	0.5



CLEVELAND INTERCHANGE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION
Ketterling, Jonathan
03/28/22
DocuSign

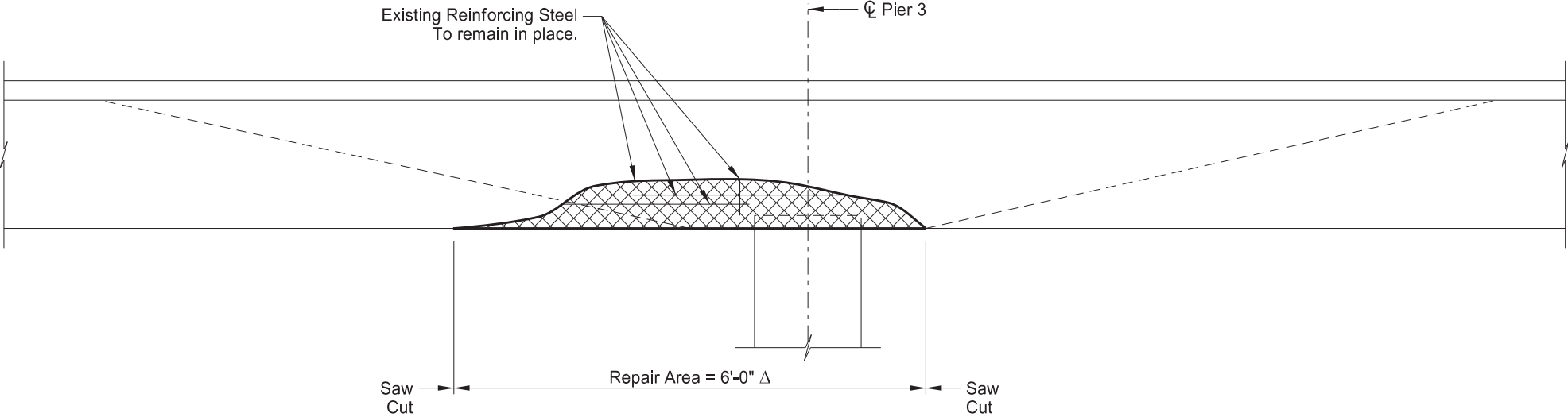
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	2

NOTES

- 100 SCOPE OF WORK: Work at this site consists of spall repairs to deck, approach slabs, and beams.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the barriers, approach slabs and driving surface of the bridge deck. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.
- 650 DECK SPALL REPAIR: The approach slabs and deck have surface spall areas as shown. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. The actual limits of the surface spall areas to be repaired will be determined by the Engineer in the field by sounding.
- Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the approach slab spall areas in the bid item "Deck Spall Repair."
- 930 GIRDER PATCHING CONSTRUCTION SEQUENCE:
1. Use a 15 pound maximum size chipping hammer to remove any unsound concrete. For the edges of the repair area produce sharp neat lines, one inch deep, by saw cutting. Use care in the removal process so that no damage is done to the reinforcing steel.
2. After all unsound concrete is removed, clean the existing surface by light sand blasting. After the surface has dried and just before the patch material is placed, coat the surface with an epoxy bonding agent.
3. Restore the beam to its original cross section with a two component, polymer-modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a corrosion inhibitor. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. It is important to minimize the shrinkage in the patch material, therefore cure the material as recommended by the manufacturer.
4. Include all labor, equipment and materials required to remove all unsound concrete and patch the damaged areas in the bid item "Girder Patching."



STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	3

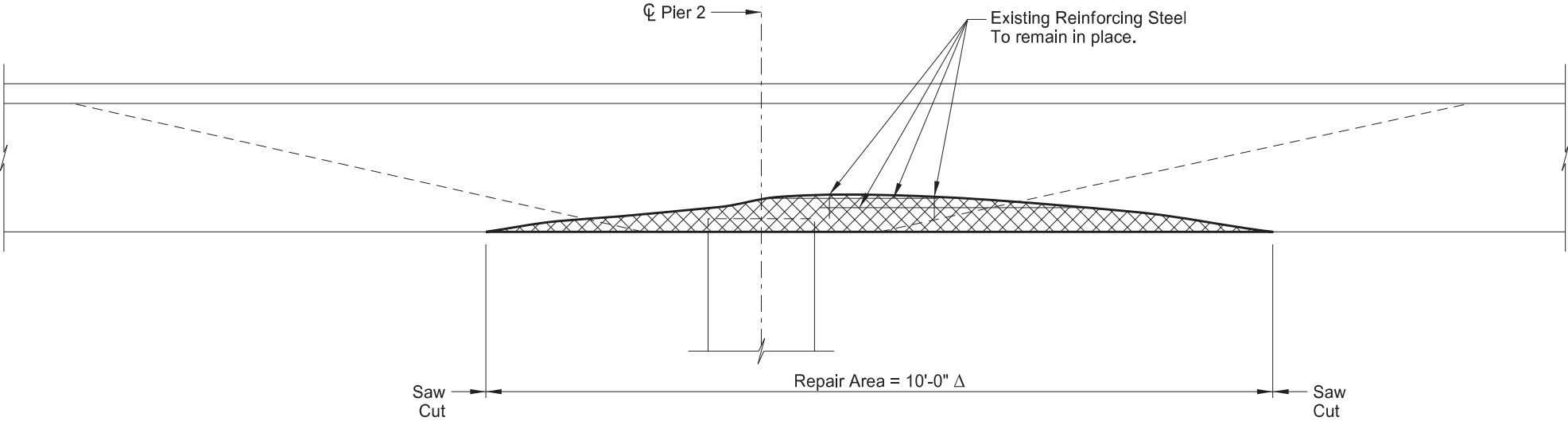


(PIER 3 ~ LOOKING NORTH)

BEAM 14 ELEVATION ~ OVER 63½ AVE



Indicates spall
repair area.



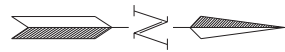
(PIER 2 ~ LOOKING NORTH)

BEAM 14 ELEVATION ~ OVER 63½ AVE

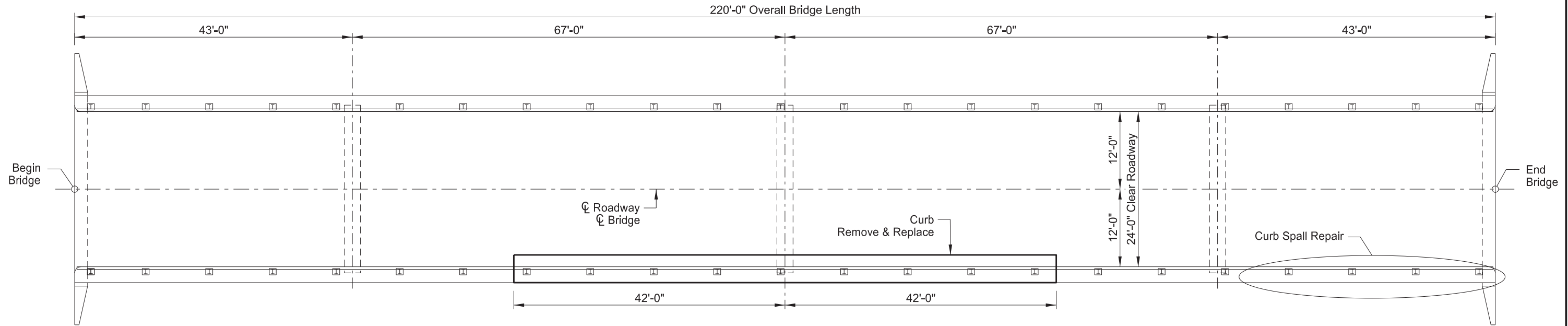
Δ Actual limits to be repaired will be determined by the Engineer in the field.



CLEVELAND INTERCHANGE
(PATCH AT PIERS 2 & 3)
GIRDER PATCHING DETAILS



	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	170	4



PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	0130	CLASS AAE-3 CONCRETE	CY	11.0
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	737
602	1260	BRIDGE DECK CRACK SEALING	LF	25
612	0115	REINFORCING STEEL-GRADE 60	LBS	938
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	520
650	0805	DECK SPALL REPAIR	SF	9.0
930	9694	GIRDER PATCHING	L SUM	0.5



I-94/WINDSOR INTERCHANGE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

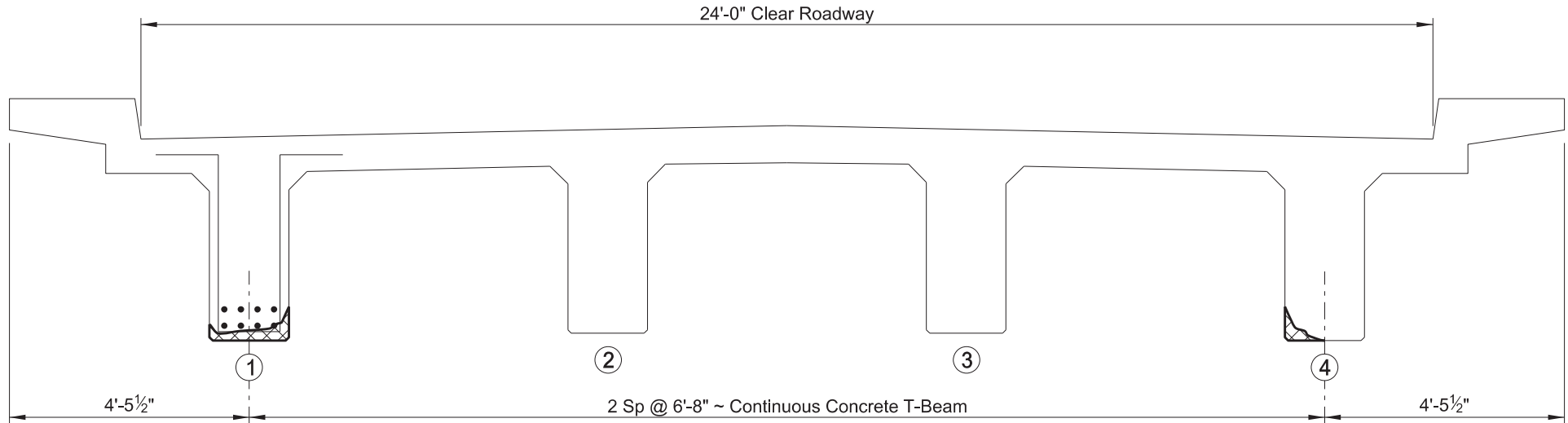
Ketterling, Jonathan
03/28/22

DocuSign

		23 U.S.C. 409 NDDOT Reserves All Objections	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
			ND	IM-2-094(178)238	170	5
NOTES						
100	SCOPE OF WORK: Work at this site consists of curb and soffit repair, deck spall repair and girder patching.	exposed rebar to obtain a minimum clearance around the bar of ¼" plus the dimension of the maximum size aggregate of the repair material. Take care not to damage existing reinforcing.				
602	<p>PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the barriers, approach slabs and driving surface of the bridge deck. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.</p> <p>If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.</p>	<p>Sand blast clean the existing concrete, and exposed reinforcing steel. Repair any damaged epoxy coating on the reinforcing steel according to Section 612.04 E. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.</p> <p>Restore the curb to their original cross sections with a two component, polymer-modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a corrosion inhibitor. This material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. Place and cure the material as recommended by the manufacturer.</p> <p>Seal vertical curb joints in the curb repair area with silicone sealant in accordance with Section 826.02 B.1.</p> <p>The curb repair quantity is based on the assumption that the areas to be repaired are to the dimensions shown in the plans. The actual limits of the repair are to be determined by the Engineer in the field. It is assumed that the curb repair areas are approximately 3" deep.</p> <p>Include all labor, equipment and materials needed to repair the damaged curb and deck areas in the bid item "Spall Repair."</p>				
602	<p>CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the curb and soffit repair to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" or greater in width at its widest segment or as directed by the Engineer.</p> <p>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 crack, including those portions that are narrower than 0.007" wide. Use 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.</p> <p>Pay for the materials and work associated with crack sealing for curb and soffit repair with the bid item "Bridge Deck Crack Sealing."</p>					
624	DOUBLE BOX BEAM RAIL RETROFIT – FREE STANDING: Remove and reset the double box beam rail retrofit posts and rail at the full-depth curb repair locations. After the full-depth curb repair concrete compressive strength reaches 4,000 psi reinstall the double box beam rail retrofit posts and rail in accordance with Section 624. Provide new anchor bolts and nuts for the post installations. The price bid for one linear foot of Double Box Beam Rail Retrofit – Free Standing will include all costs to remove and reset one rail retrofit post and its associated railing.	930 GIRDER PATCHING CONSTRUCTION SEQUENCE:				
650	<p>DECK SPALL REPAIR: The approach slabs have surface spall areas as shown. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. The actual limits of the surface spall areas to be repaired will be determined by the Engineer in the field by sounding.</p> <p>Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the approach slab spall areas in the bid item "Deck Spall Repair."</p>	<p>1. Use a 15 pound maximum size chipping hammer to remove any unsound concrete. For the edges of the repair area produce sharp neat lines, one inch deep, by saw cutting. Use care in the removal process so that no damage is done to the prestressing steel or reinforcing steel.</p> <p>2. After all unsound concrete is removed, clean the existing surface by light sand blasting. After the surface has dried and just before the patch material is placed, coat the surface with an epoxy bonding agent.</p> <p>3. Restore the beam to its original cross section with a two component, polymer-modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a corrosion inhibitor. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. It is important to minimize the shrinkage in the patch material, therefore cure the material as recommended by the manufacturer.</p> <p>4. Include all labor, equipment and materials required to remove all unsound concrete and patch the damaged areas in the bid item "Girder Patching."</p>				
930	<p>SPALL REPAIR: The curb has an area of deterioration to repair. The Engineer will sound and mark out the area of unsound concrete.</p> <p>Saw cut the perimeter of the repair area to a depth of 1". Remove all unsound concrete with a 15 pound maximum size chipping hammer. Remove concrete around the periphery of any</p>					

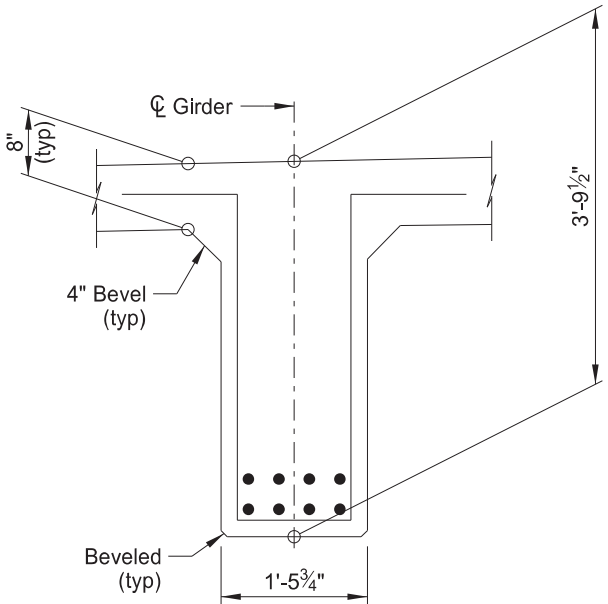


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ND	IM-2-094(178)238	170	6



(SPAN OVER WESTBOUND I-94 ~ LOOKING NORTH)

TYPICAL DECK SECTION



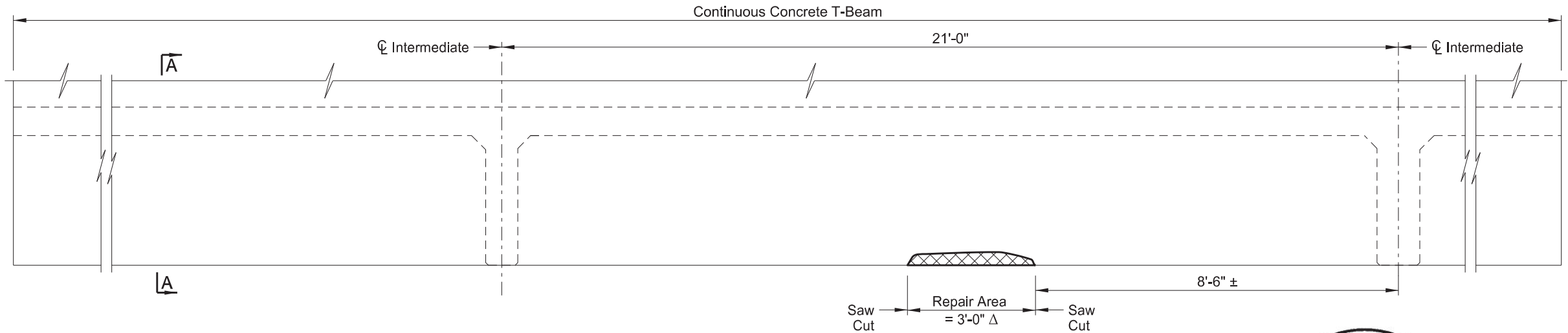
(SHOWING DIMENSIONS)

A-A



Hatched area indicates
girder patching.

Δ Actual limits to be repaired will be determined by the Engineer in the field.



(LOOKING WEST)

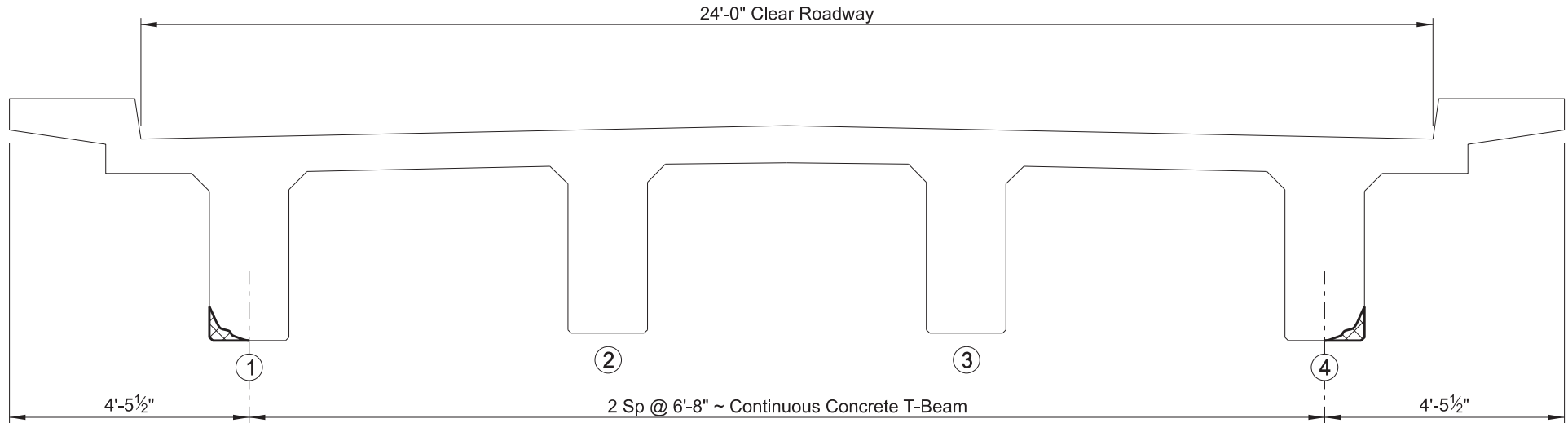
BEAM 1 ELEVATION ~ SPAN OVER WESTBOUND I-94



I-94/WINDSOR INTERCHANGE

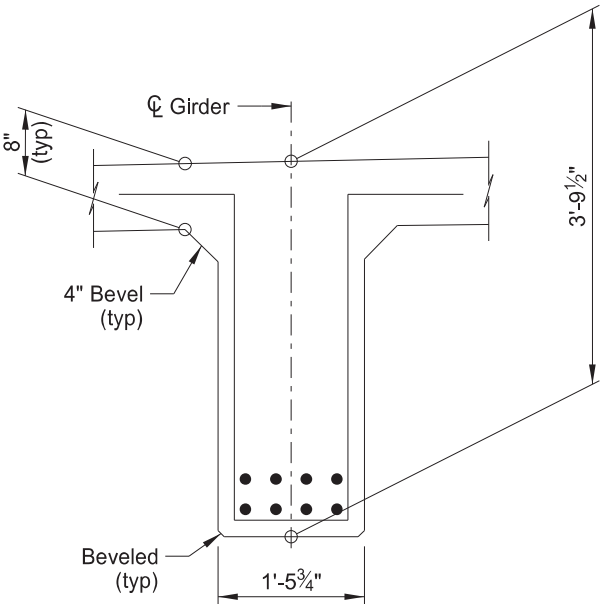
GIRDER PATCHING DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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(SPAN OVER EASTBOUND I-94 ~ LOOKING NORTH)

TYPICAL DECK SECTION

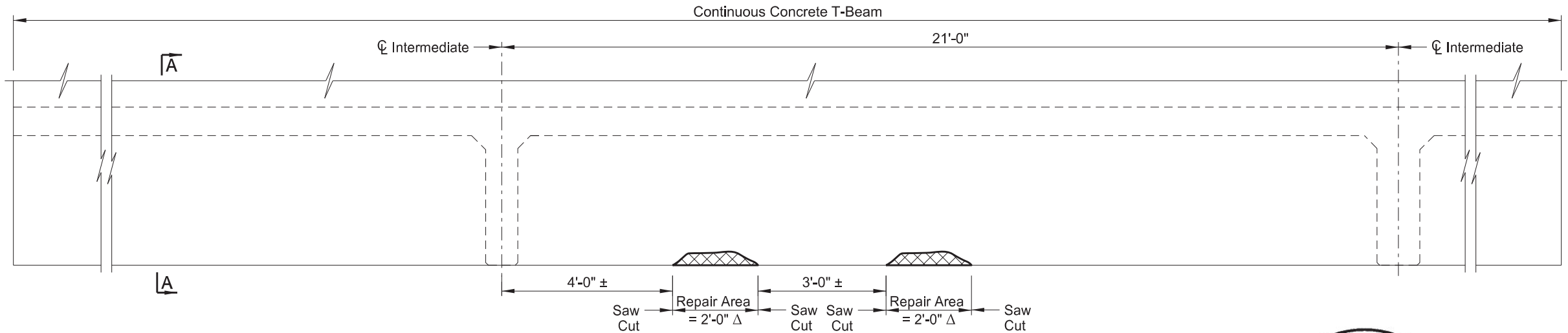


(SHOWING DIMENSIONS)
A-A



Hatched area indicates
girder patching.

Δ Actual limits to be repaired will be determined by the Engineer in the field.



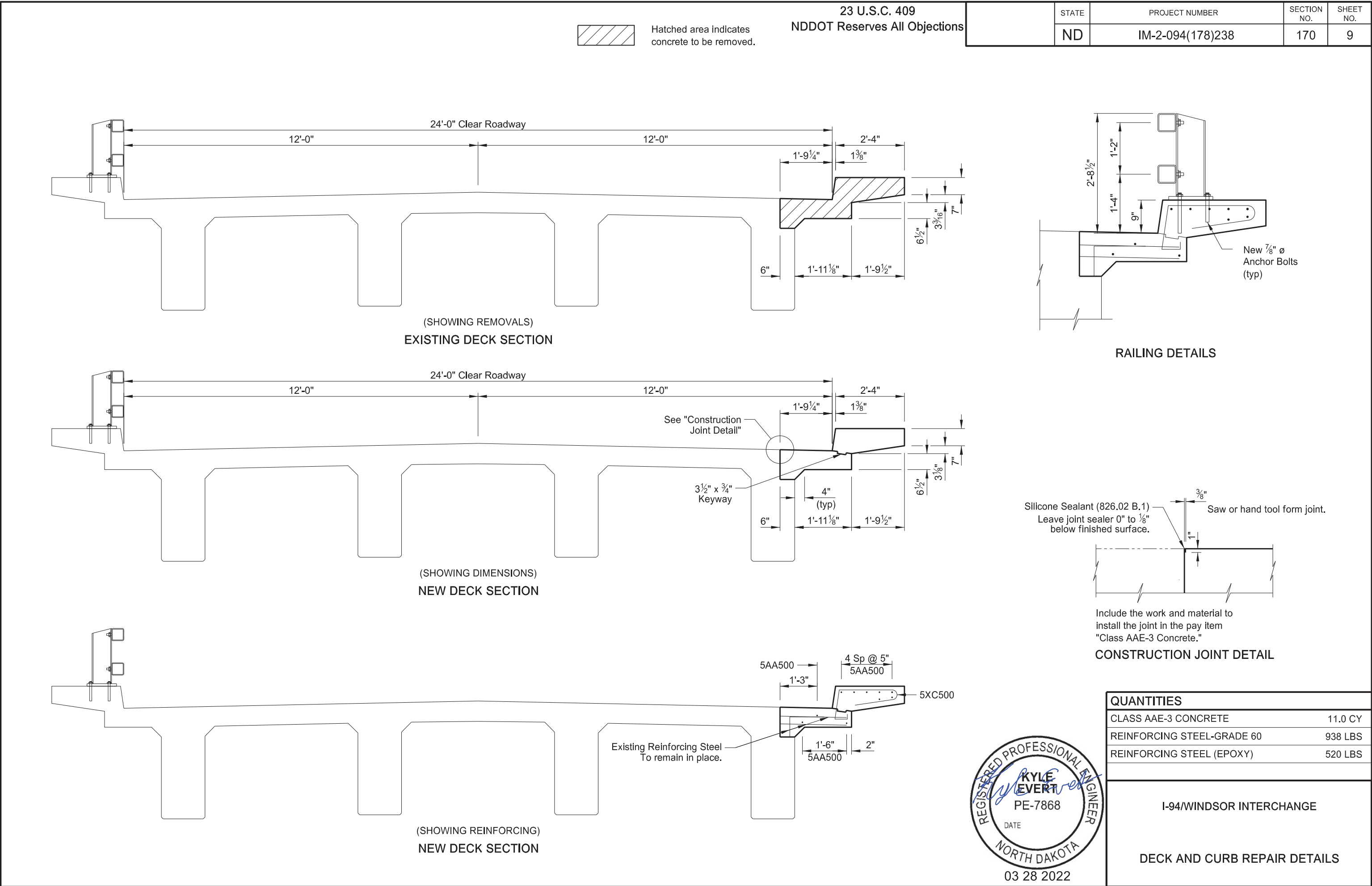
(LOOKING EAST)

BEAM 1 ELEVATION ~ SPAN OVER EASTBOUND I-94

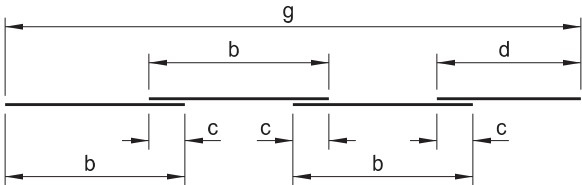


I-94/WINDSOR INTERCHANGE

GIRDER PATCHING DETAILS

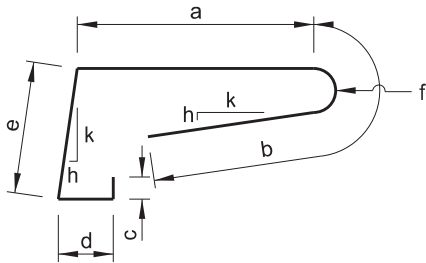


BILL OF REINFORCING STEEL, GRADE 60													
LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS													
LOCA-TION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS								
					a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	REGULAR	5	AA500	10	89'-11"		60'-0"	3'-3"	26'-11"	1		83'-8"	
		5	XC500	95	5'-3"	1'-9½"	1'-10½"	2"	5"	1'-0"	2"		1.75



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

AA



C

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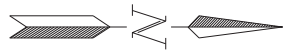
NOTES:

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. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
5. The "f" dimension indicates the inside radius unless otherwise noted.
6. An "X" preceding a bar designation indicates an epoxy coated bar.

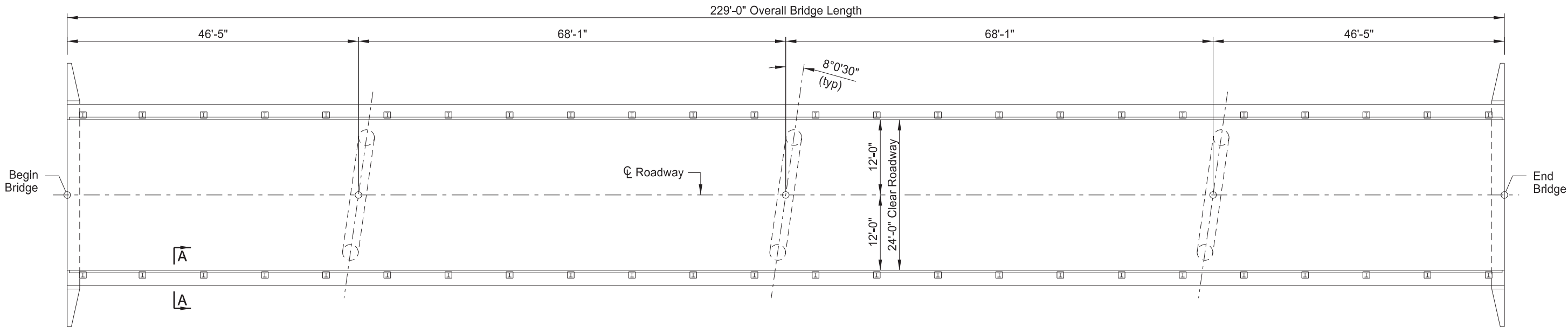


I-94/WINDSOR INTERCHANGE

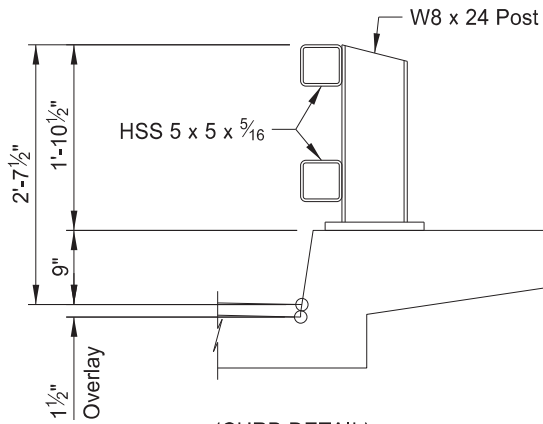
REINFORCING BAR LIST &DETAILS



STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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PLAN



(CURB DETAIL)
A-A

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	768
602	1260	BRIDGE DECK CRACK SEALING	LF	25
650	0704	OVERLAY CONCRETE	CY	31.1
650	0707	DECK CONCRETE	CY	7.1
650	0710	CLASS 1-H REMOVAL	SY	611
650	0711	CLASS 2-H REMOVAL	SY	122
650	0712	CLASS 3-H REMOVAL	SY	6
930	9612	SPALL REPAIR	SF	346



I-94/OSWEGO INTERCHANGE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

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ND	IM-2-094(178)238	170	12

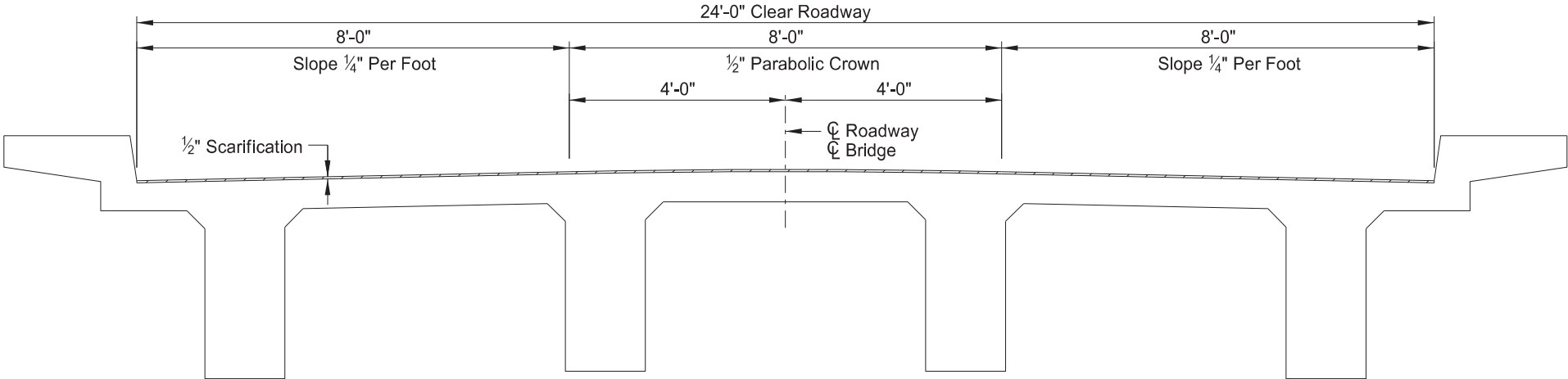
NOTES

- 100 SCOPE OF WORK: This project consists of placing a deck overlay and curb spall repair.
- 602 PENETRATING WATER REPELLENT TREATMENT: In addition to the top of bridge deck, apply the penetrating water repellent solution to the curbs. Do not apply pavement marking or allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck, approach slabs, and barriers to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" 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 crack, including those portions that are narrower than 0.007" wide. Use 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.
- Only pay for the materials and work associated with crack sealing for the curb with the bid item "Bridge Deck Crack Sealing." The materials and work associated with cracks on the bridge deck overlay are included in the bid item "Overlay Concrete".
- 650 OVERLAY CONCRETE: The plan quantity of overlay concrete will be used for measurement and payment.
- 930 SPALL REPAIR: Repair the spalled curb concrete after the deck scarification is complete, but prior to the placement of the overlay concrete.
- Remove all unsound concrete and replace it with new concrete material. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove enough concrete to expose the vertical post reinforcing so the patch material fully envelopes it. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.
- Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.
- Use a concrete material that is specifically intended for patching concrete. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.
- The extents of repairs shown on the Spall Repair details are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field.

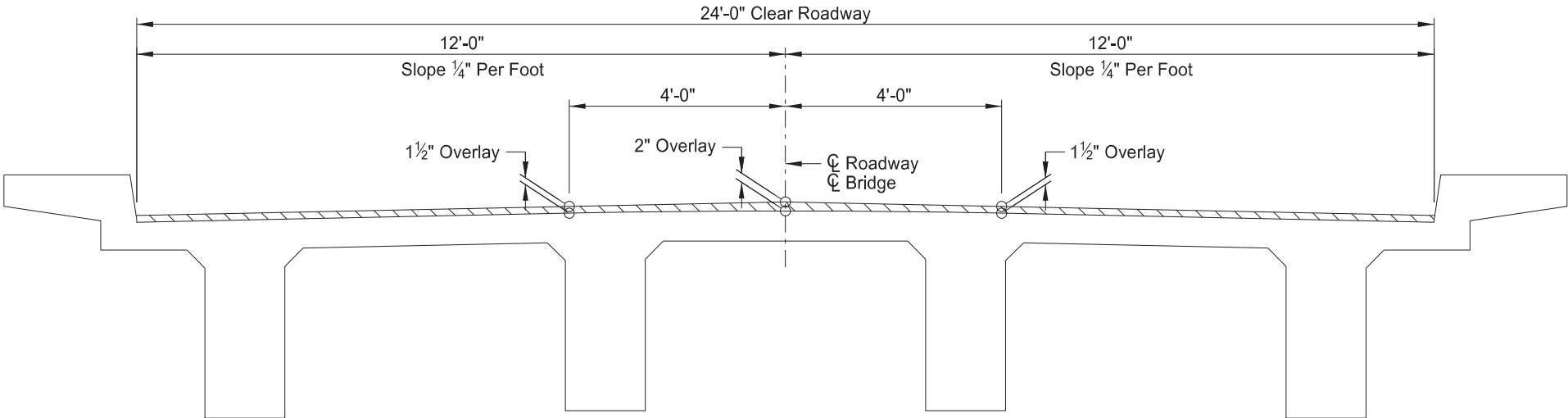
Include all labor, equipment and materials needed to repair one barrier spall area in the per each bid item "Spall Repair."



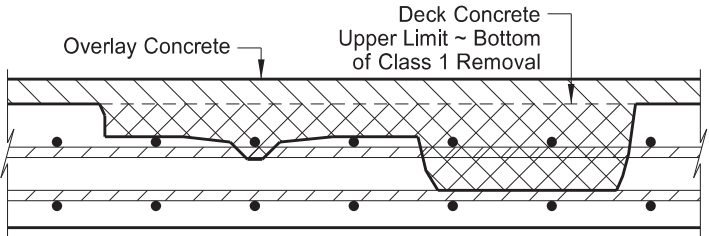
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	IM-2-094(178)238	170	13



(SHOWING REMOVAL)
TYPICAL DECK SECTION



(SHOWING OVERLAY)
TYPICAL DECK SECTION



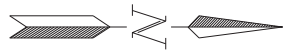
(DECK CONCRETE)
BRIDGE DECK SECTION

QUANTITIES	
OVERLAY CONCRETE	31.1 CY
DECK CONCRETE	7 CY
CLASS 1H REMOVAL	611 SY
CLASS 2H REMOVAL	122 SY
CLASS 3H REMOVAL	6 SY

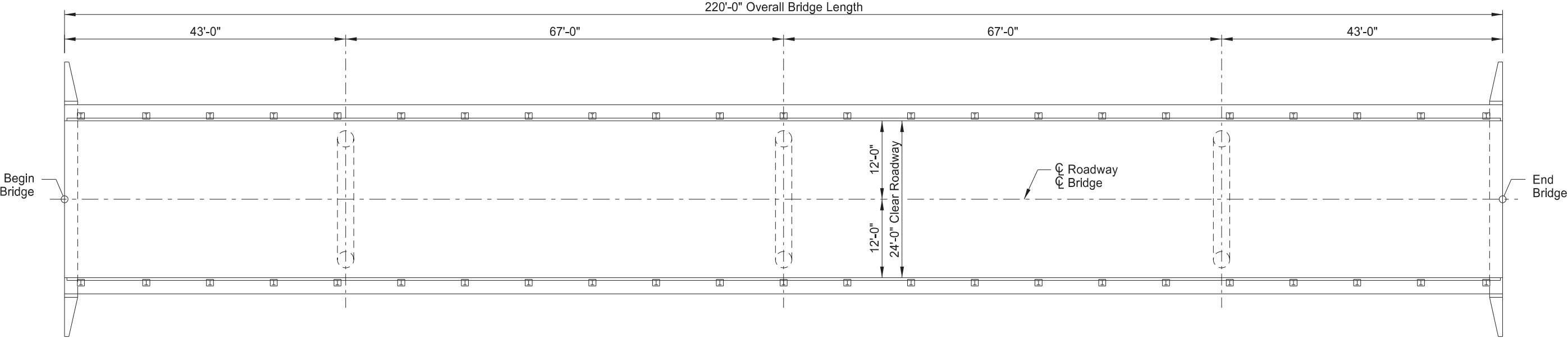
I-94/OSWEGO INTERCHANGE

DECK OVERLAY DETAILS





	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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PLAN

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	737.0
602	1260	BRIDGE DECK CRACK SEALING	LF	96
650	0704	OVERLAY CONCRETE	CY	29.9
650	0707	DECK CONCRETE	CY	6.8
650	0710	CLASS 1-H REMOVAL	SY	587
650	0711	CLASS 2-H REMOVAL	SY	117
650	0712	CLASS 3-H REMOVAL	SY	6
930	9612	SPALL REPAIR	SF	50



I-94/LIPPERT TWP INTERCHANGE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Ketterling, Jonathan
03/28/22

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NOTES

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NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	15

- 100 SCOPE OF WORK: This project consists of placing a deck overlay and curb spall repair.
- 602 PENETRATING WATER REPELLENT TREATMENT: In addition to the top of bridge deck, apply the penetrating water repellent solution to the front face and top of curb. Apply penetrating water repellent solution prior to sealing any bridge deck overlay cracks. Do not apply pavement marking or allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and curb to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" 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 crack, including those portions that are narrower than 0.007" wide. Use 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.

Only pay for the materials and work associated with crack sealing for the curb with the bid item "Bridge Deck Crack Sealing." The materials and work associated with cracks on the bridge deck overlay are included in the bid item "Overlay Concrete".
- 650 OVERLAY CONCRETE: The plan quantity of overlay concrete will be used for measurement and payment.
- 930 SPALL REPAIR: Repair the spalled curb concrete after the deck scarification is complete, but prior to the placement of the overlay concrete.

Remove all unsound concrete and replace it with new concrete material. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove enough concrete to expose the vertical post reinforcing so the patch material fully envelopes it. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

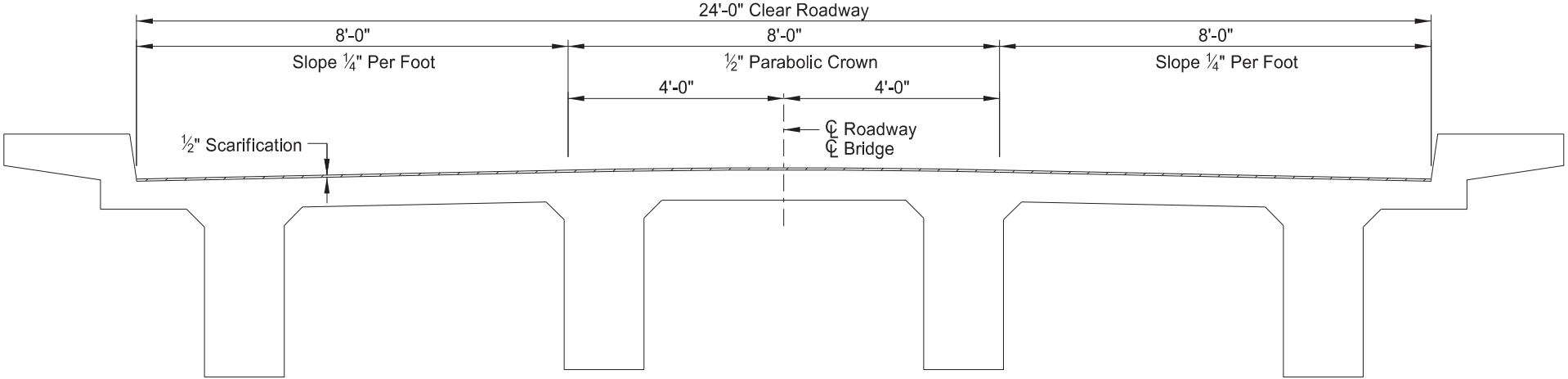
Use a concrete material that is specifically intended for patching concrete. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.

The extents of repairs shown on the Spall Repair details are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field.

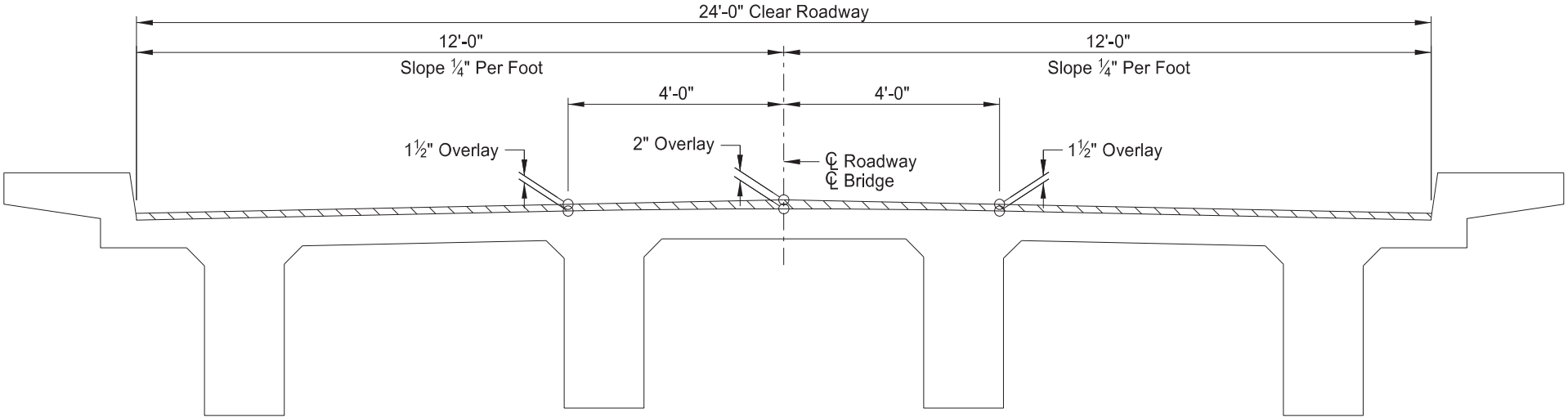
Include all labor, equipment and materials needed to repair one barrier spall area in the per each bid item "Spall Repair."



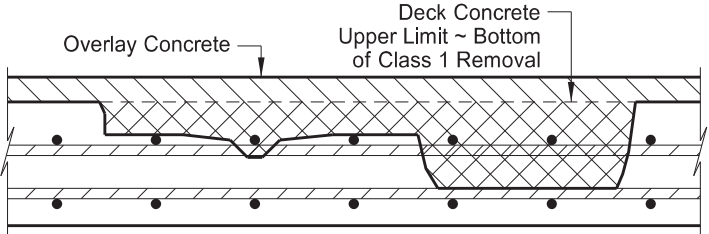
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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(SHOWING REMOVAL)
TYPICAL DECK SECTION



(SHOWING OVERLAY)
TYPICAL DECK SECTION



(DECK CONCRETE)
BRIDGE DECK SECTION

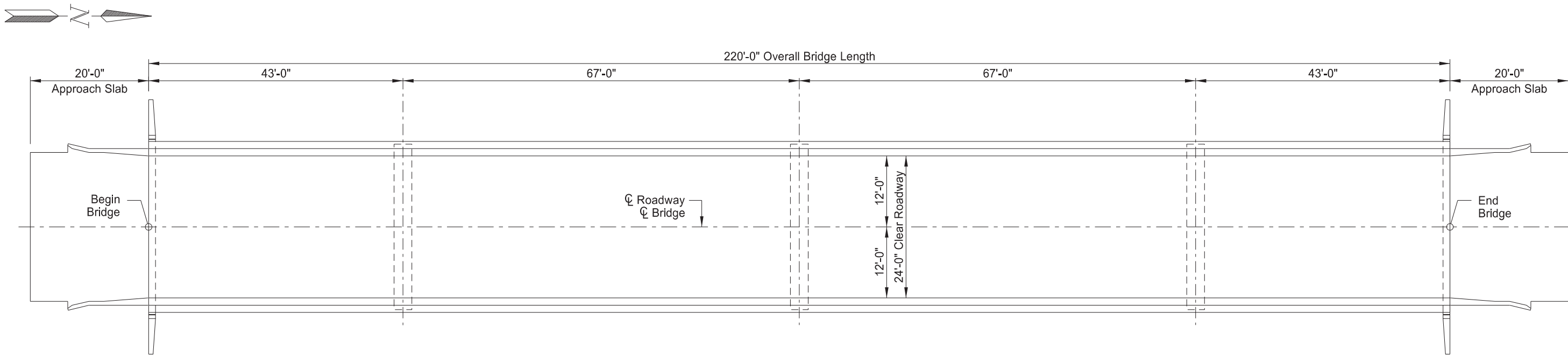
QUANTITIES	
OVERLAY CONCRETE	29.9 CY
DECK CONCRETE	6.8 CY
CLASS 1H REMOVAL	587 SY
CLASS 2H REMOVAL	117 SY
CLASS 3H REMOVAL	6 SY

I-94/LIPPERT TWP INTERCHANGE

DECK OVERLAY DETAILS



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PLAN

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	864
602	1260	BRIDGE DECK CRACK SEALING	LF	2,825
650	0805	DECK SPALL REPAIR	SF	41
930	9612	SPALL REPAIR	SF	170



ELDRIDGE TWP INTERCHANGE

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jonathan Ketterling
Ketterling, Jonathan
03/28/22

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ND	IM-2-094(178)238	170	18

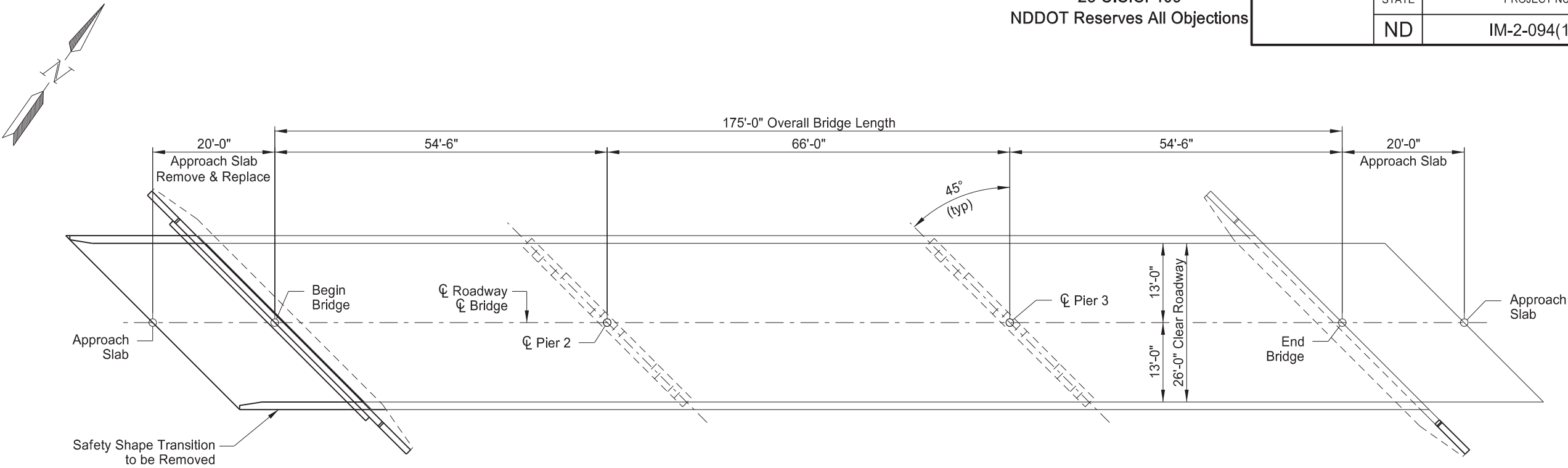
NOTES

- 100 SCOPE OF WORK: Work at this site consists of spall repairs to deck, approach slabs, and barriers.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck, top of approach slabs, and the front face and top of barriers after the deck spall repair 5 day curing period. Apply penetrating water repellent solution prior to sealing any bridge deck, approach slab and barrier cracks. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the deck, approach slabs, and barriers to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" 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 crack, including those portions that are narrower than 0.007" wide. Use 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.
- Only pay for the materials and work associated with crack sealing for the deck, approach slabs, and barriers with the bid item "Bridge Deck Crack Sealing."
- 650 DECK SPALL REPAIR: The approach slabs and deck have surface spall areas. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. The actual limits of the surface spall areas to be repaired will be determined by the Engineer in the field by sounding.
- Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the approach slab spall areas in the bid item "Deck Spall Repair."
- 930 SPALL REPAIR: Repair the spalled barrier concrete after the deck scarification is complete, but prior to the placement of the overlay concrete.
- Remove all unsound concrete and replace it with new concrete material. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove enough concrete to expose the vertical post reinforcing so the patch material fully envelopes it. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.
- Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

Use a concrete material that is specifically intended for patching concrete. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.

The extents of repairs shown on the Spall Repair details are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. Include all labor, equipment and materials needed to repair one barrier spall area in the per each bid item "Spall Repair."





PLAN

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0111	REMOVAL OF CONCRETE	L SUM	1
210	0099	CLASS 1 EXCAVATION	L SUM	1
602	1130	CLASS AE-3 CONCRETE	CY	11.2
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	63.3
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	769
602	1260	BRIDGE DECK CRACK SEALING	LF	59
612	0115	REINFORCING STEEL-GRADE 60	LBS	725
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	498
650	0704	OVERLAY CONCRETE	CY	35.1
650	0707	DECK CONCRETE	CY	5.8
650	0720	CLASS 1 REMOVAL	SY	506
650	0721	CLASS 2 REMOVAL	SY	101
650	0722	CLASS 2-A REMOVAL	LF	182
650	0723	CLASS 3 REMOVAL	SY	25
650	0724	CLASS 4 REMOVAL	SY	5
764	1990	REMOVE CONCRETE SAFETY SHAPE TRANSITION	EA	2
930	8665	3IN EXPANSION JOINT STRIP SEAL	LF	38.2
930	9612	SPALL REPAIR	SF	380



I-94/WEST JAMESTOWN INT

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Ketterling, Jonathan
03/28/22

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		23 U.S.C. 409 NDDOT Reserves All Objections	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

100

SCOPE OF WORK: This project consists of removing and replacing the south abutment backwall and south approach slab. This project will also consist of a bridge deck overlay, spall repair and expansion joint repair.

100

GENERAL: Include the cost of furnishing and placing preformed expansion joint filler, concrete inserts, rebar couplers, silicone sealant, waterproof membrane, and other miscellaneous items in the price bid for Class AE-3.

202

REMOVAL OF CONCRETE: Remove the concrete in a manner that prevents damage to the remaining structure. Include the superstructure concrete removal in the contract unit price for "Removal of Concrete."

210

EXCAVATION: Include the excavation costs at the abutment in the lump sum bid item, "Class 1 Excavation."

602

BRIDGE APPROACH SLABS: Mechanically finish approach slabs as specified in Section 602.04 D, "Deck Finishing."

602

PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the barriers, approach slabs and 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 driving surface is dry.

If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.

602

CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck, approach slabs, and barriers to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" 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 crack, including those portions that are narrower than 0.007" wide. Use 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.

Only pay for the materials and work associated with crack sealing for the barriers and existing approach slab with the bid item "Bridge Deck Crack Sealing." The materials and work associated with cracks on the bridge deck overlay and new approach slab are included in the bid item "Overlay Concrete".

930

ABUTMENT REPAIR: The north abutment east wing has a spall on it. Remove all unsound concrete and replace it with new concrete to the original constructed section. Use a 15 pound maximum size chipping hammer on any unsound concrete. Provide

sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting.

Sand blast clean any rust scale found on the exposed reinforcing steel. Clean the existing concrete surface by light sand blasting or high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

The actual limits of the repair are to be determined by the Engineer in the field. Include all labor, equipment, and materials need for the repair of the spall areas in the bid item "Abutment Repair."

930

SPALL REPAIR: Repair the spalled barrier concrete after the deck scarification is complete, but prior to the placement of the overlay concrete.

Remove all unsound concrete and replace it with new concrete material. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove enough concrete to expose the vertical post reinforcing so the patch material fully envelopes it. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

Use a concrete material that is specifically intended for patching concrete. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.

The extents of repairs shown on the Spall Repair details are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. Include all labor, equipment and materials needed to repair one barrier spall area in the per each bid item "Spall Repair."

REGISTERED PROFESSIONAL ENGINEER

KYLE EVERETT

PE-7868

DATE

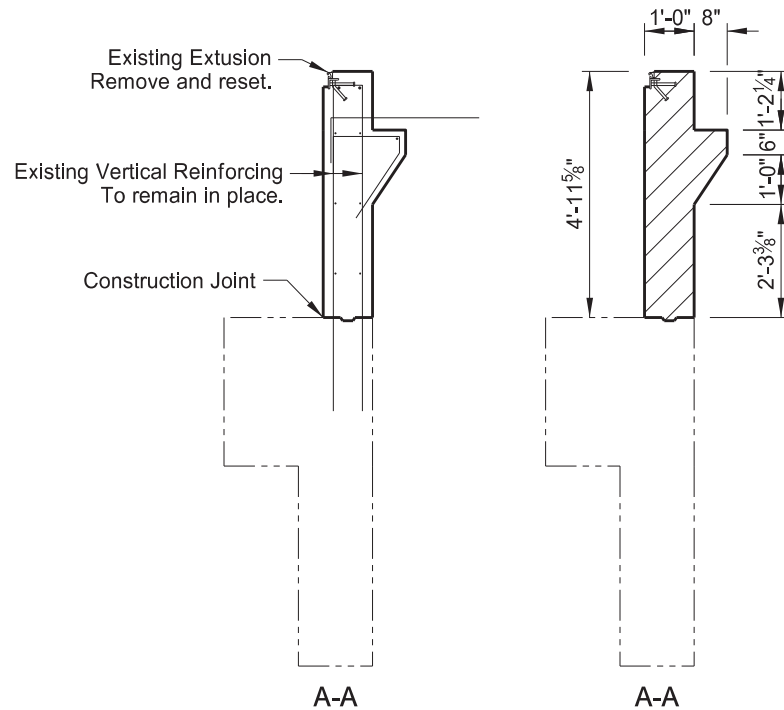
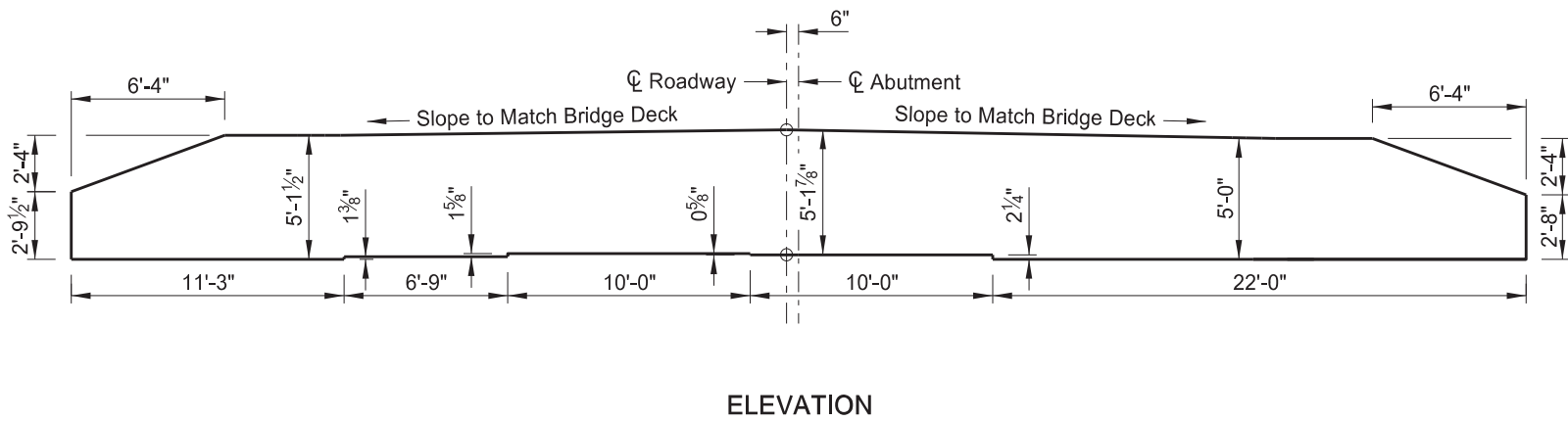
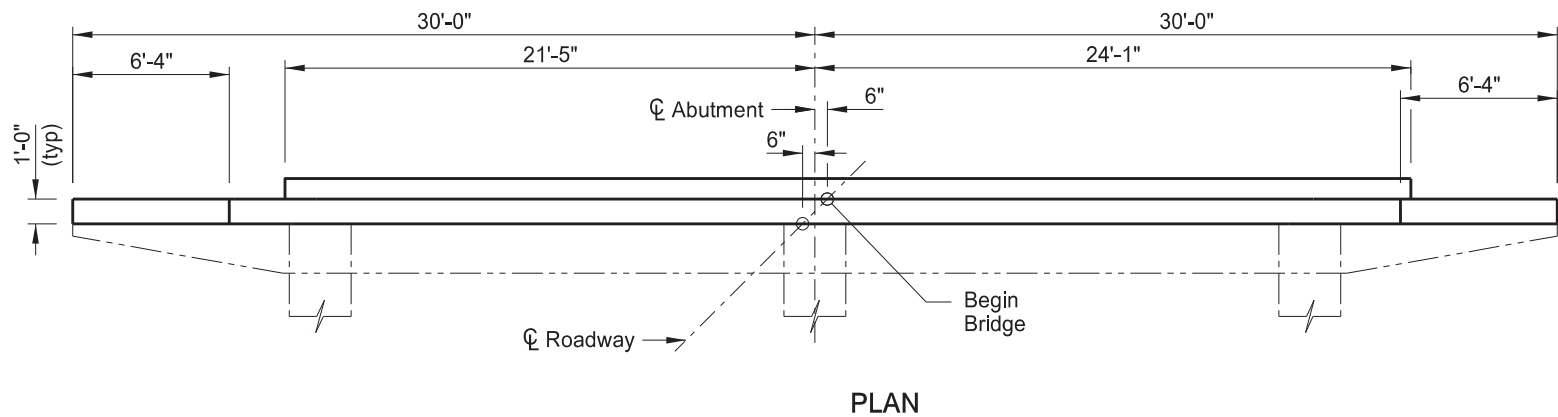
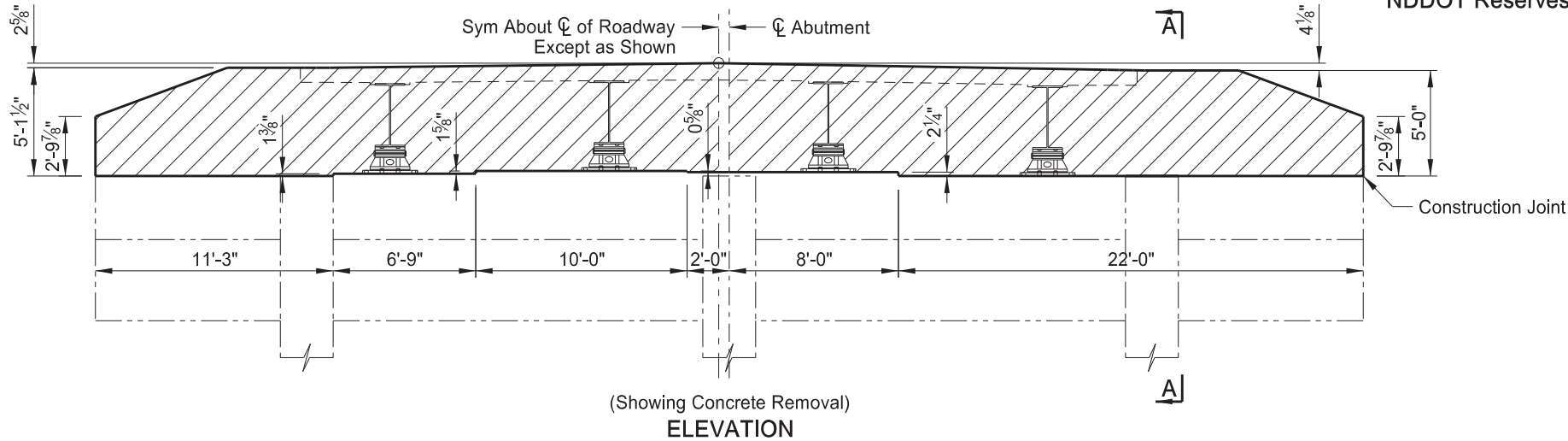
NORTH DAKOTA

03 28 2022

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94-257.002-2

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	21



Hatched area indicates concrete to be removed
Care shall be taken to ensure no damage is done
to parts of the structure to remain.

Any rust scale found on the exposed existing
reinforcing steel shall be thoroughly sandblast
cleaned.



QUANTITIES
SEE DWG 94-257.002-4
I-94/WEST JAMESTOWN INTERCHANGE
SOUTH ABUTMENT
ABUTMENT DETAILS

23 U.S.C. 409
NDDOT Reserves All Objections

STATE

PROJECT NUMBER

SECTION NO.

SHEET NO.

ND

IM-2-094(178)238

170

22

2'-11³/₈"

3"

28 Eq Sp ~ 5XB100 & 5XA101

45 Sp @ 1'-0" ~ 5XP100

3"

2'-11³/₈"

5XA100

2-5XA100

5A103, 5A102, 5A101 & 3-5A100

Existing Vertical Reinforcing to Remain (typ)

PLAN

6'-4" (typ)

5XB100 (typ)

5XP100 (typ)

2-5A103

2-5A102

2-5A101

2-5D100 (typ)

Existing Vertical Reinforcing to Remain (typ)

Construction Joint

2-5A100

2'-9¹/₂" (typ)

2'-4" (typ)

A

A

ELEVATION

5A103

5XB100

5A102

5A101

2 Sp @ 1'-0" 5A100

1'-0"

1'-2"

10"

6"

* Rebar Coupler

5XA101

5XA100

5XP100

Existing Vertical Reinforcing to Remain (typ)

Construction Joint

A-A

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. Turn adjacent "AA" bars end for end so that the splice locations are staggered.

5. The "f" dimension indicates the inside radius unless otherwise noted.

6. An "X" preceding a bar designation indicates an epoxy coated bar.

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

LOCA-TION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS								
					a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	REGULAR	5	A100	6	59'-8"	59'-8"							
		5	A101	2	54'-10"	54'-10"							
		5	A102	2	49'-5"	49'-5"							
		5	A103	2	47'-0"	47'-0"							
		5	D100	4	8'-8"	2'-2"	6'-6"					12	4.4
		5	XA100	3	45'-2"	45'-2"							
		5	XA101	29	3'-0"	3'-0"							
		5	XB100	29	1'-8"	10"	10"						
		5	XP100	46	4'-6"	5"	1'-6"	1'-9"		1.25"	10"	12	6.6

a

b

b

A

c

c

B

b

k

h

c

D

a

b

f

h

k

c

P

a

b

f

h

k

g

d

e

K

a

d

b

k

h

c

L

2 1/2"

10"

1 1/2" Clr

8"

1 1/2"

1" Clr

1 1/2" Clr

5 1/2"

5XP100

APPROACH LIP DETAIL

QUANTITIES

CLASS AE-3 CONCRETE	10.9 CY
REINFORCING STEEL	725 LBS
REINFORCING STEEL (EPOXY)	498 LBS

I-94/WEST JAMESTOWN INTERCHANGE
(SOUTH ABUTMENT)
ABUTMENT REPAIR DETAILS

REGISTERED PROFESSIONAL ENGINEER
KYLE EVERT
PE-7868
DATE
NORTH DAKOTA
03 28 2022

3/28/2022

1:27:04 PM

eajohnson

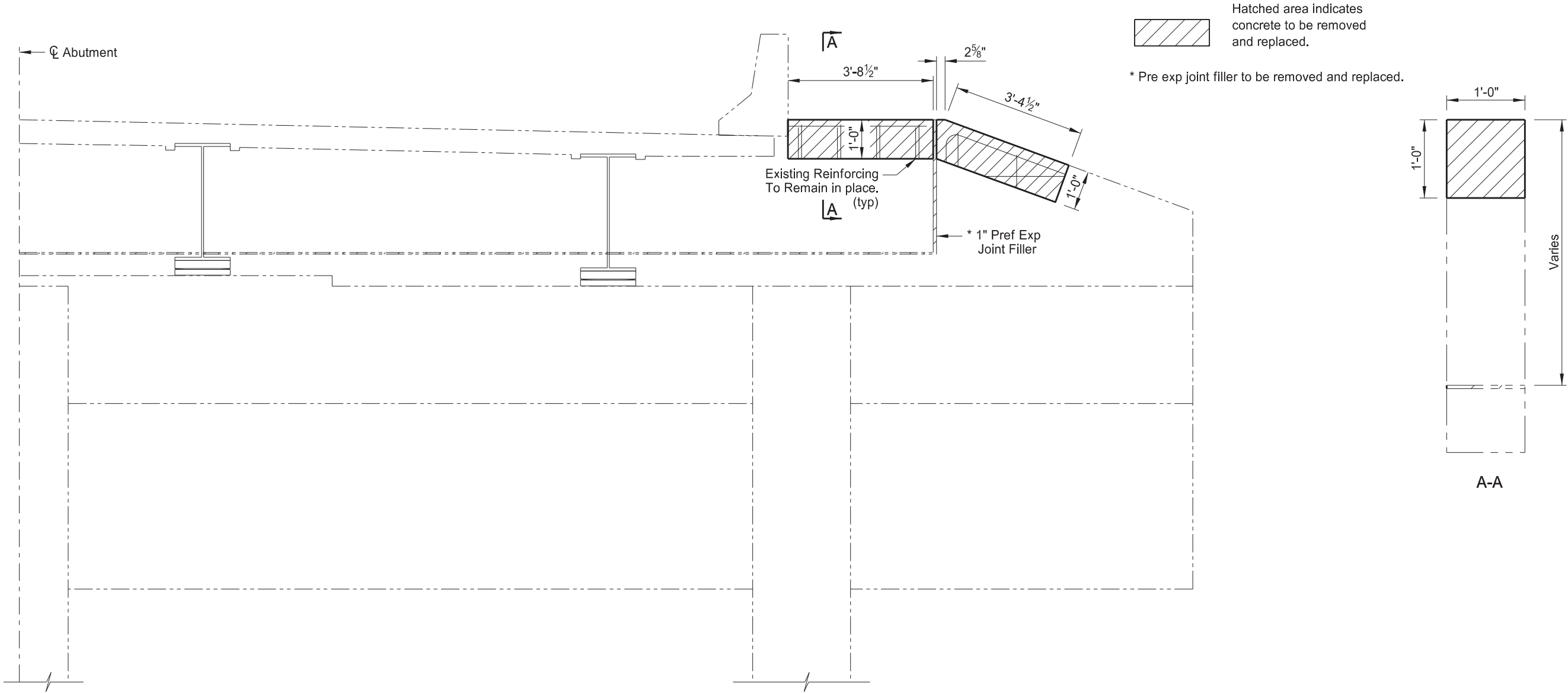
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ATC

KFE

94-257.002-4

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	23

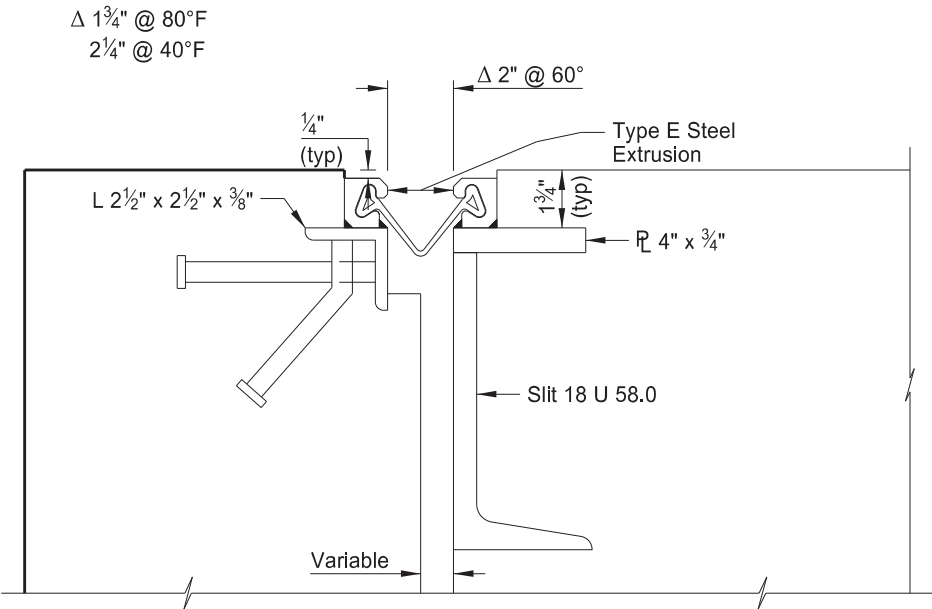


(Showing Concrete Removal & Replacement)
NORTH ABUTMENT ELEVATION

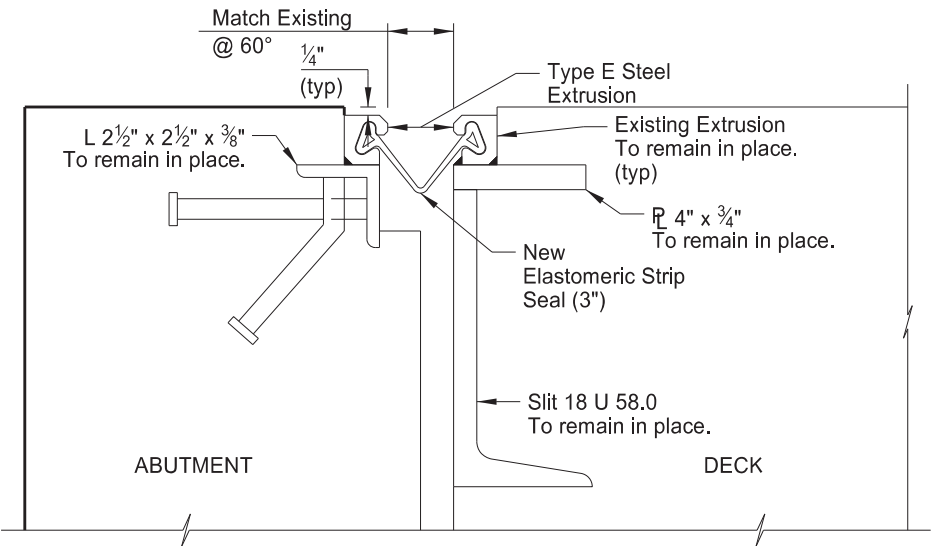


QUANTITIES	
CLASS AE-3 CONCRETE	0.3 CY
I-94 WEST JAMESTOWN INTERCHANGE (NORTH ABUTMENT) NORTH ABUTMENT REPAIR DETAILS	

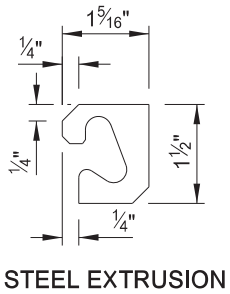
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	24



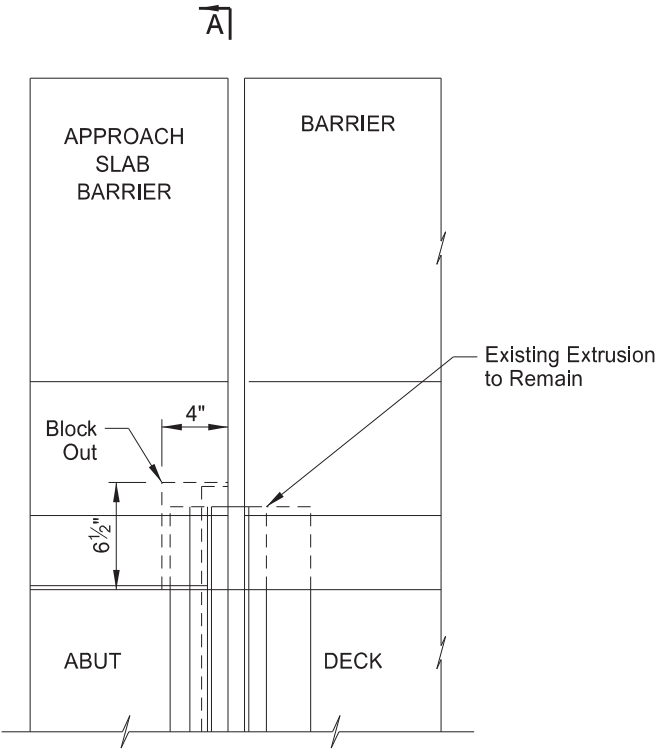
EXISTING EXPANSION JOINT



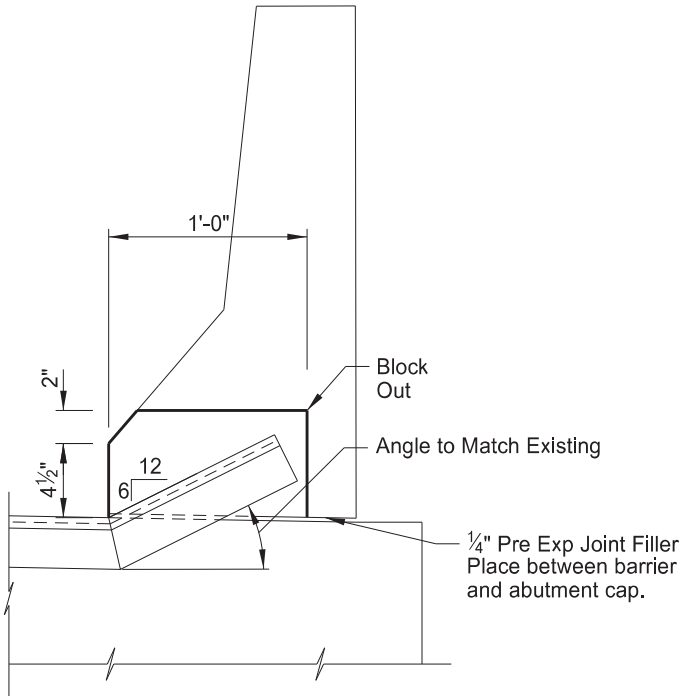
(B-B)
NEW STRIP SEAL



STEEL EXTRUSION



(SOUTH ABUTMENT)
CURB EXPANSION AT STRIP SEAL

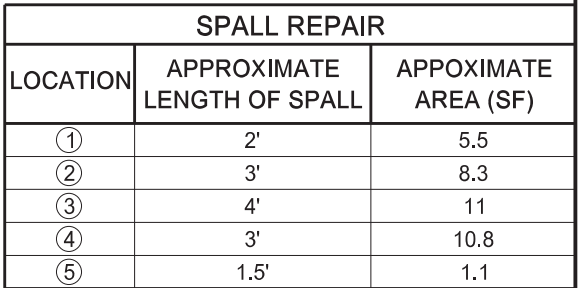


(SHOWING BLOCKOUT APPROACH SLAB BARRIER)
A-A



I-94 WEST JAMESTOWN INTERCHANGE

EXPANSION JOINT DETAILS



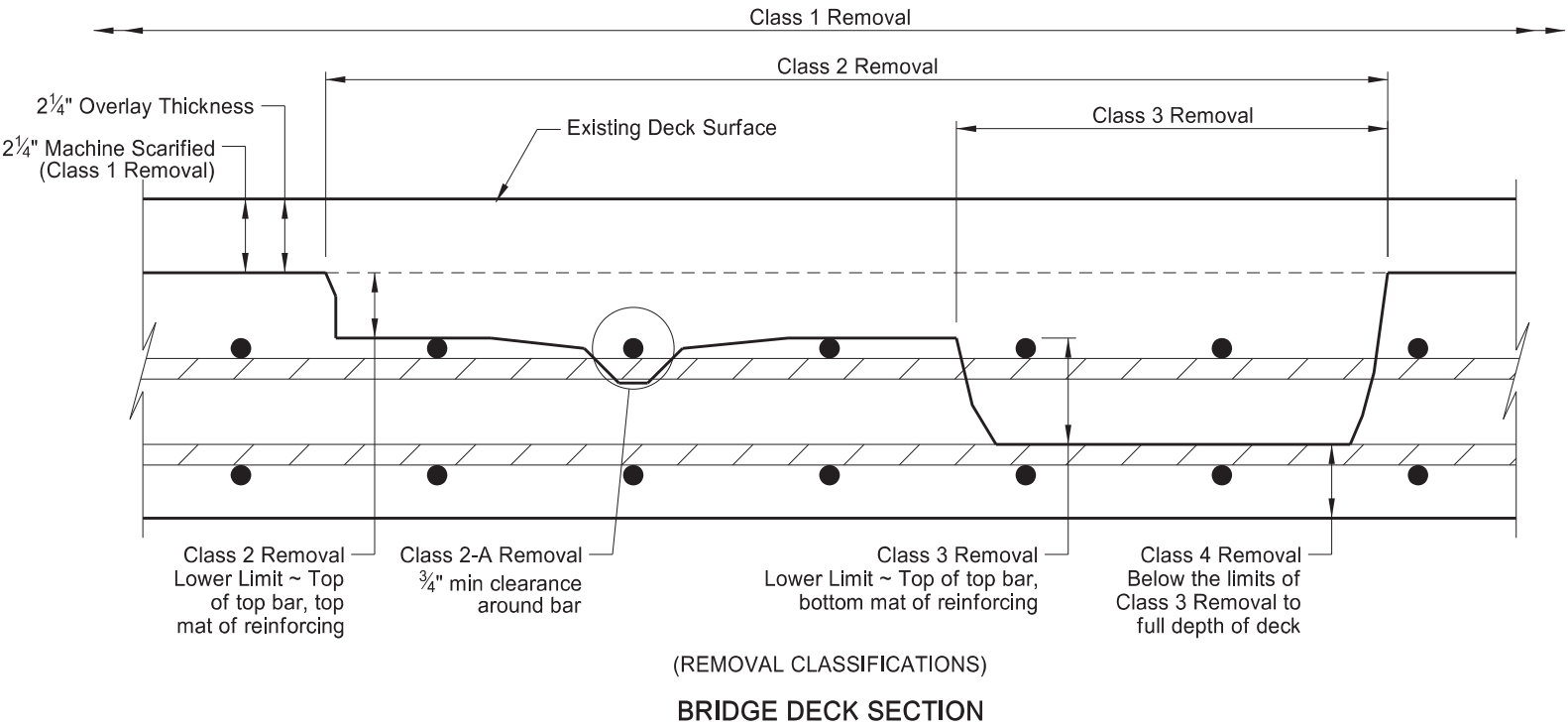
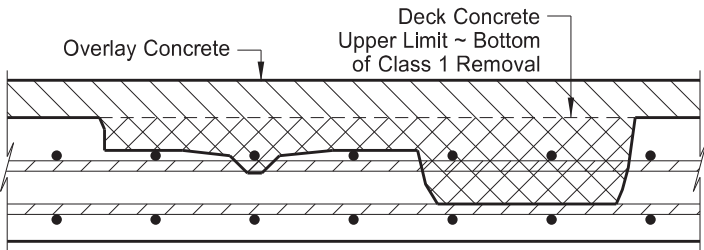
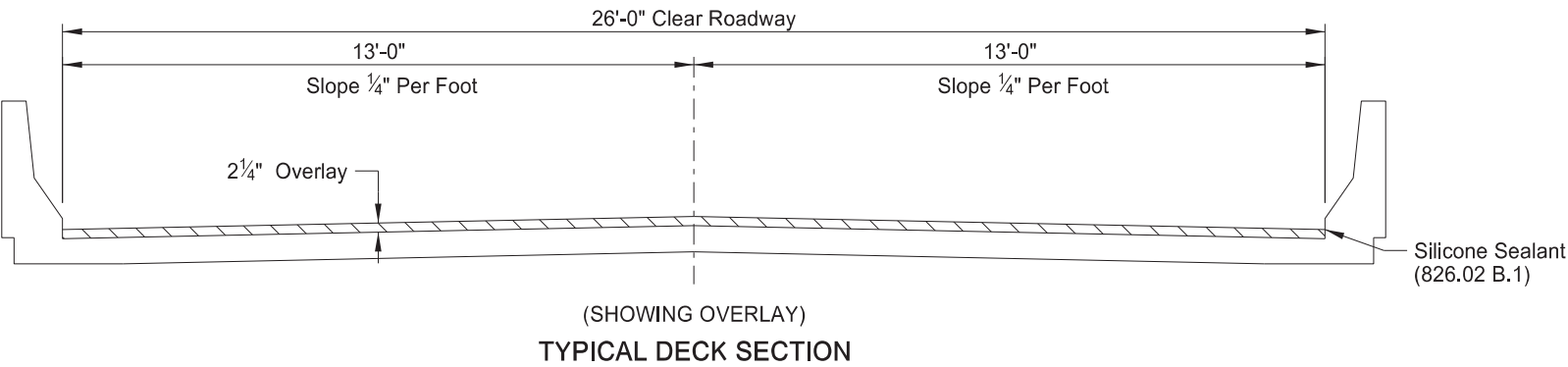
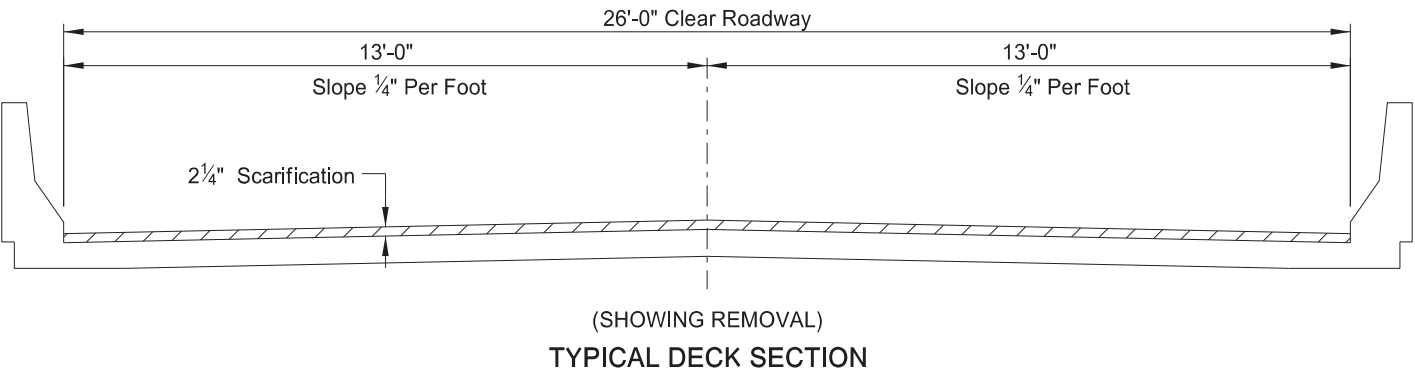
(SHOWING CONCRETE INTERMEDIATE DIAPHRAGM LAYOUT)

PARTIAL PLAN



QUANTITIES	
SPALL REPAIR	37 SF
I-94/WEST JAMESTOWN INTERCHANGE	
SPALL REPAIR	

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	26

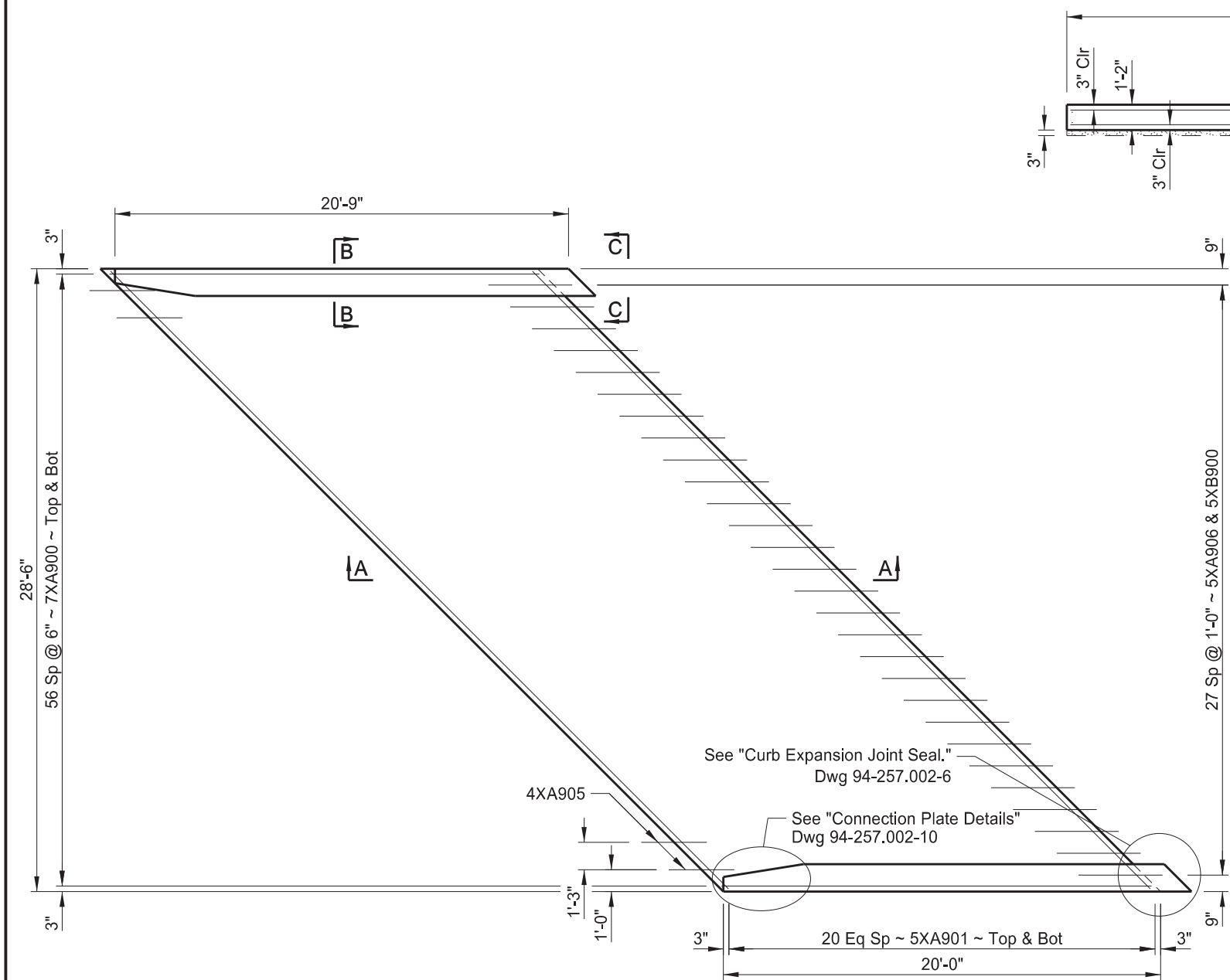


QUANTITIES	
OVERLAY CONCRETE	35.1 CY
DECK CONCRETE	5.8 CY
CLASS 1 REMOVAL	506 SY
CLASS 2 REMOVAL	101 SY
CLASS 2-A REMOVAL	182 LF
CLASS 3 REMOVAL	25 SY
CLASS 4 REMOVAL	5 SY

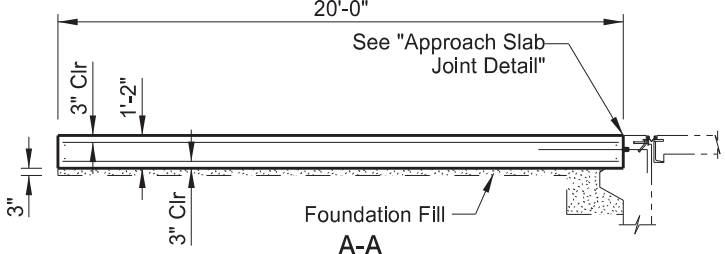
I-94/WEST JAMESTOWN INTERCHANGE
DECK OVERLAY



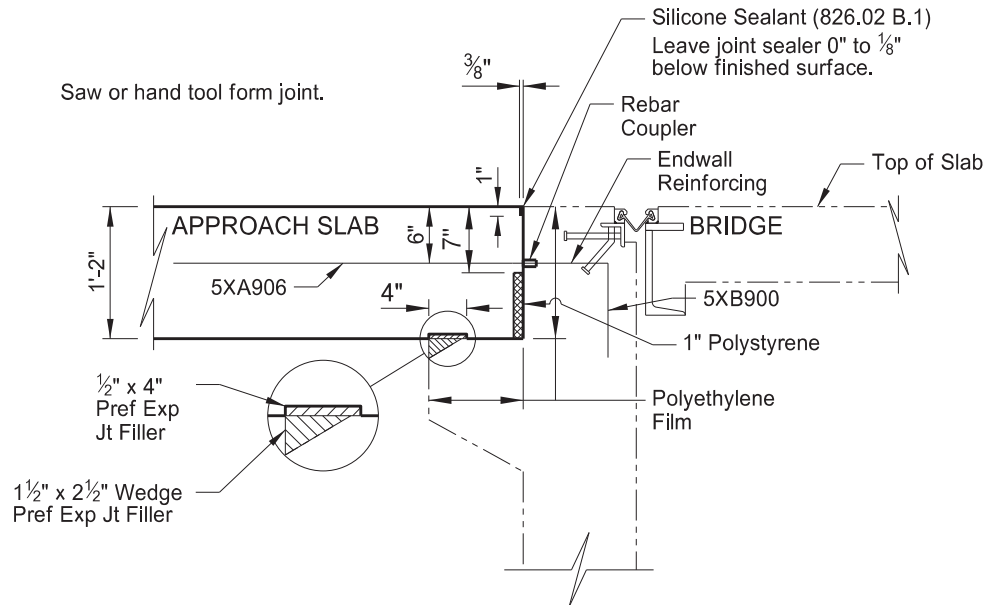
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	27



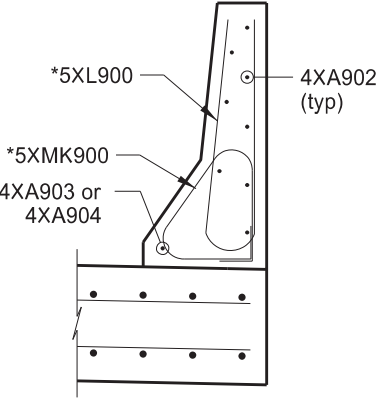
PLAN



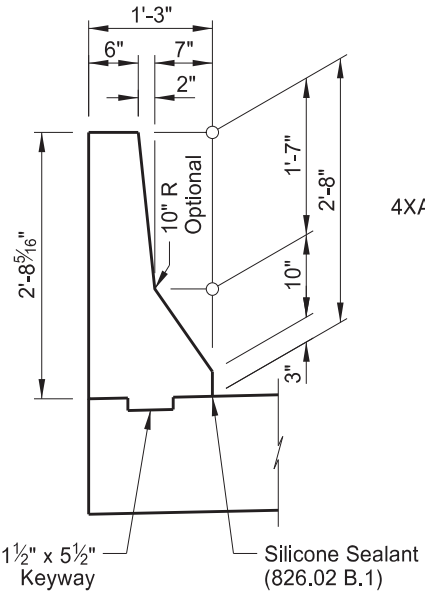
A-A



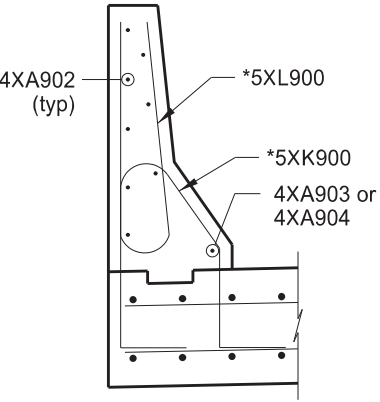
APPROACH SLAB JOINT DETAIL



C-C

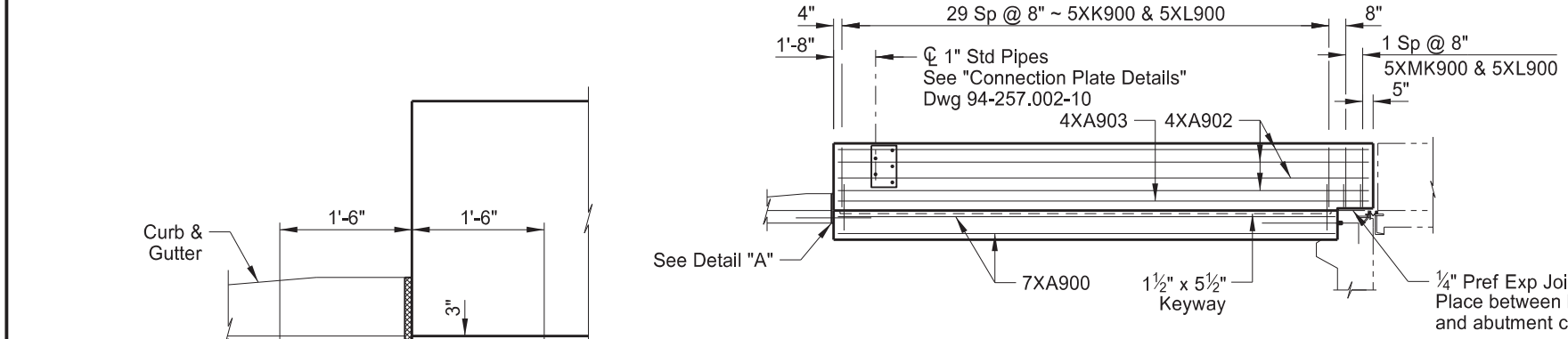


SHOWING DIMENSIONS



SHOWING REINFORCING

B-B



ELEVATION



QUANTITIES
SEE DWG 94-257.002-10
I-94/WEST JAMESTOWN INTERCHANGE
APPROACH SLAB DETAILS

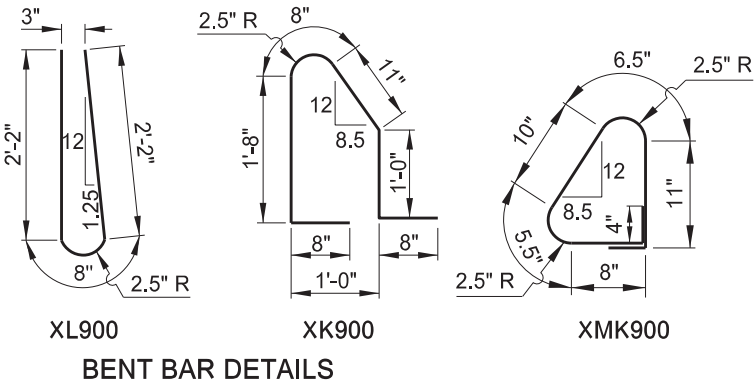
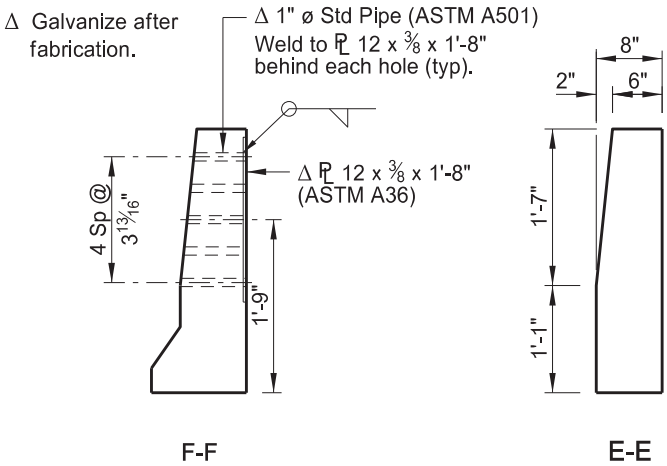
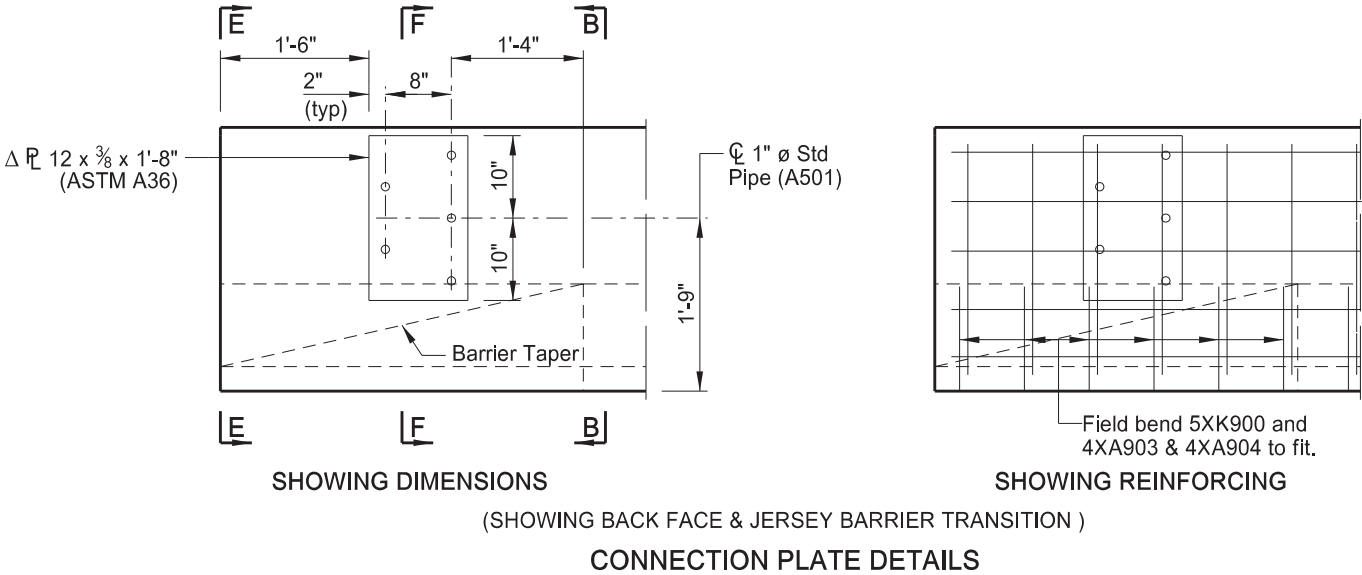
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	28

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, foundation fill, connection plates and pipes, and labor required to build the approach slabs and barriers in the pay item "Bridge Approach Slab-Remove & Replace." Use Class AE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

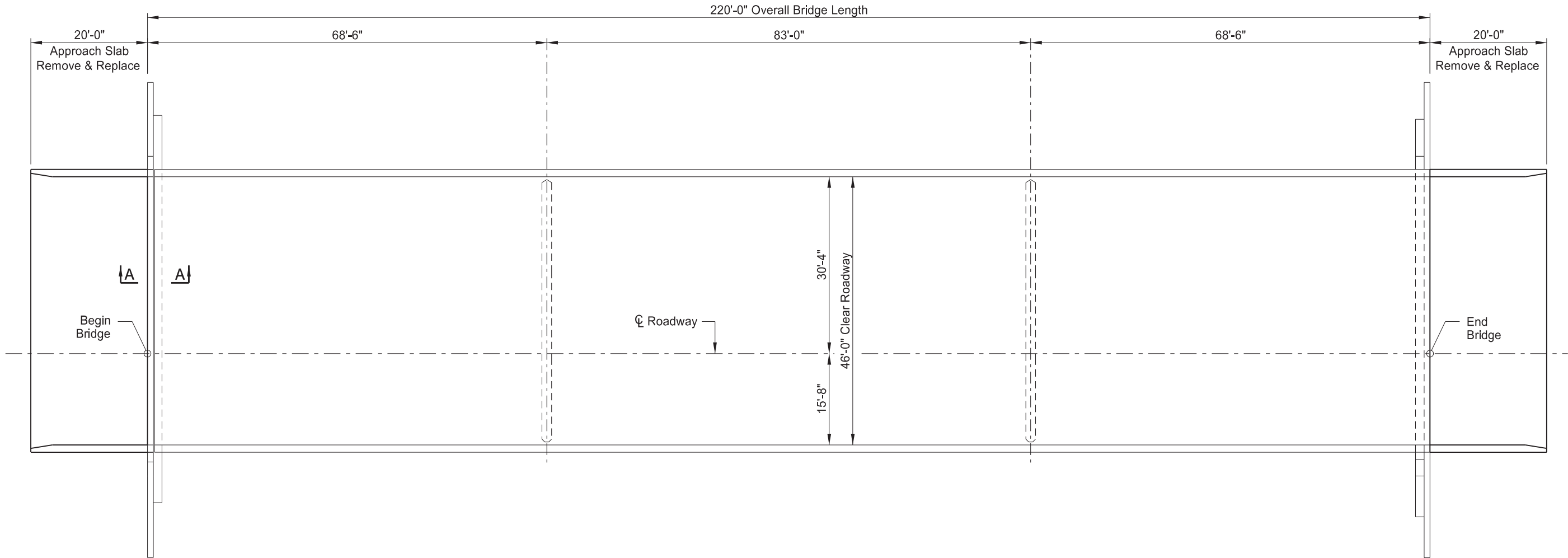
The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out.

SKEW ANGLE = 45°			
BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
7	XA900	114	19'-8"
5	XA901	42	39'-11"
4	XA902	16	20'-0"
4	XA903	1	21'-6"
4	XA904	1	21'-6"
4	XA905	4	3'-0"
5	XA906	28	3'-0"
5	XB900	28	1'-8"
5	XK900	60	5'-7"
5	XL900	64	5'-0"
5	XMK900	4	4'-1"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
7,423		27.8	

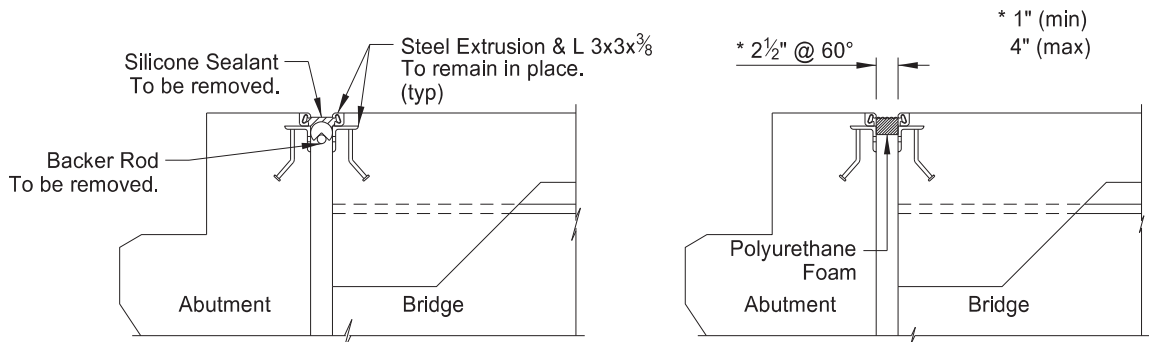


QUANTITIES	(SOUTH END)
APPROACH SLAB	63.3 SY
I-94/WEST JAMESTOWN INTERCHANGE	
APPROACH SLAB DETAILS	

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	29



PLAN



(A-A)
EXISTING JOINT DETAIL

(A-A)
POLYURETHANE FOAM JOINT SEAL

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	215.6
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,512
602	1260	BRIDGE DECK CRACK SEALING	LF	564
650	0805	DECK SPALL REPAIR	SF	63
930	8850	POLYURETHANE FOAM JOINT SEAL	LF	49
930	9612	SPALL REPAIR	SF	4



JAMES RIVER

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Ketterling, Jonathan
03/28/22

DocuSign

		23 U.S.C. 409 NDDOT Reserves All Objections	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
			ND	IM-2-094(178)238	170	30

NOTES

100

SCOPE OF WORK: Work at this site consists of remove and replace approach slabs, spall repairs to deck and barriers.

602

BRIDGE APPROACH SLABS: Mechanically finish approach slabs as specified in Section 602.04 D, "Deck Finishing."

602

PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the barriers, approach slabs and 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 driving surface is dry.

If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.

602

CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck, approach slabs, and barriers to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" 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 crack, including those portions that are narrower than 0.007" wide. Use 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.

Only pay for the materials and work associated with crack sealing for the deck, barriers and existing approach slab with the bid item "Bridge Deck Crack Sealing."

650

DECK SPALL REPAIR: The deck has surface spall areas as shown. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. The actual limits of the surface spall areas to be repaired will be determined by the Engineer in the field by sounding.

Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the approach slab spall areas in the bid item "Deck Spall Repair."

930

SPALL REPAIR: Repair the spalled barrier concrete after the deck scarification is complete, but prior to the placement of the overlay concrete.

Remove all unsound concrete and replace it with new concrete material. Use a 15 pound maximum size chipping hammer on any unsound concrete. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

Use a concrete material that is specifically intended for patching concrete. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.

The extents of repairs shown on the Spall Repair details are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. Include all labor, equipment and materials needed to repair one barrier spall area in the per SF bid item "Spall Repair."

930

POLYURETHANE FOAM JOINT SEAL: Remove all existing expansion joint and foreign material from the bridge/approach slab joint and sand blast clean. Use a pre-compressed polymer impregnated polyurethane foam expansion joint seal coated with a highway-grade silicone surface providing a permanent weather tight seal. Use a compatible two-component epoxy adhesive on the expansion joint seal for bonding.

The joint seal may be Wabo FS Bridge Seal (Watson Bowman Acme); BEJS Bridge Expansion Joint System (Emseal); Iso-Flex Silfast XL (LymTal International), or an approved equal. Prepare existing joint opening and install the joint seal according to the manufacturer's recommendations. The quantity of expansion joint modification includes an additional 6 inches of joint seal at each end to be turned up vertically matching the inside face of the barrier. Include all work and materials associated with the expansion joint seal installation in the bid item "Polyurethane Foam Joint Seal."

REGISTERED PROFESSIONAL ENGINEER

KYLE EVERT

PE-7868

DATE

NORTH DAKOTA

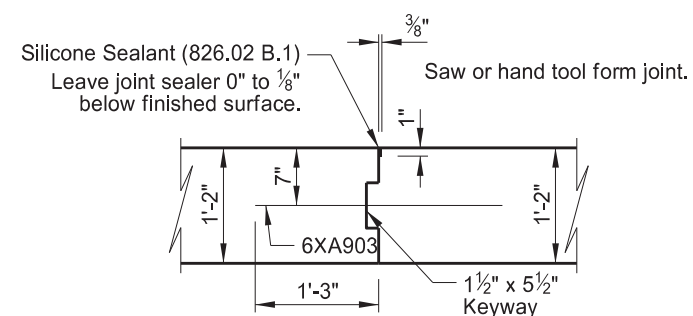
03 28 2022



Install 5XA904 bars according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout) and that meets the requirements of Section 806.02. Provide a minimum anchorage length of 9 inches.

SKEW ANGLE = 0°			
BAR LIST - NORTH SLAB			
SIZE	MARK	NO.	LENGTH
7	XA900	196	19'-8"
5	XA901	84	23'-11"
4	XA902	18	20'-8"
6	XA903	10	2'-6"
5	XA904	48	**3'-9"
5	XK900	60	5'-7"
5	XL900	64	5'-11"
5	XMK900	4	4'-1"

ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
11,210	45.1



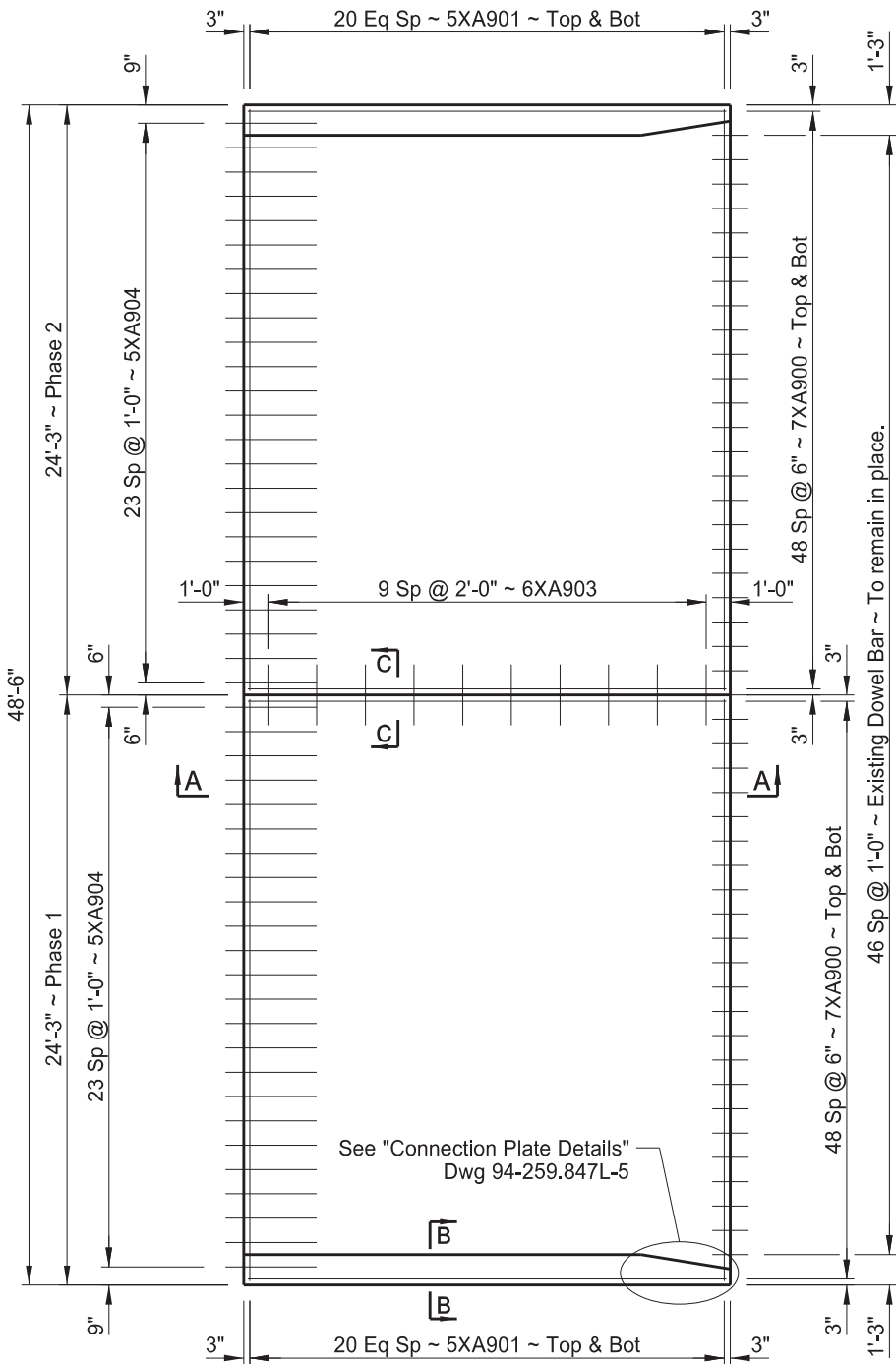
C-C

QUANTITIES	(North Slab)
APPROACH SLAB	107.8 SY

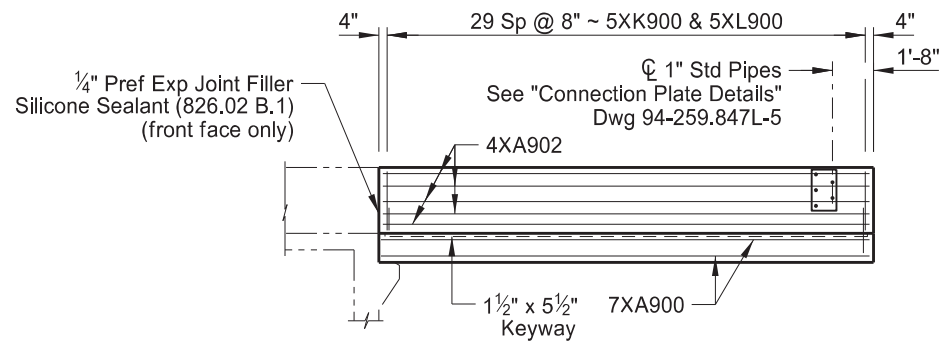
JAMES RIVER
(WEST END)
APPROACH SLAB DETAILS



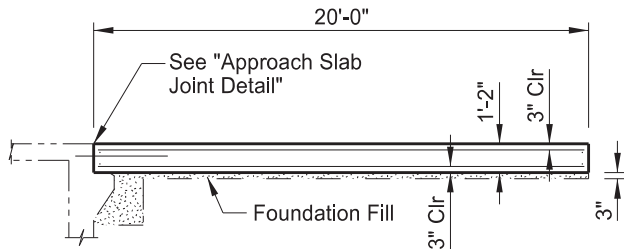
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	IM-2-094(178)238	170	32



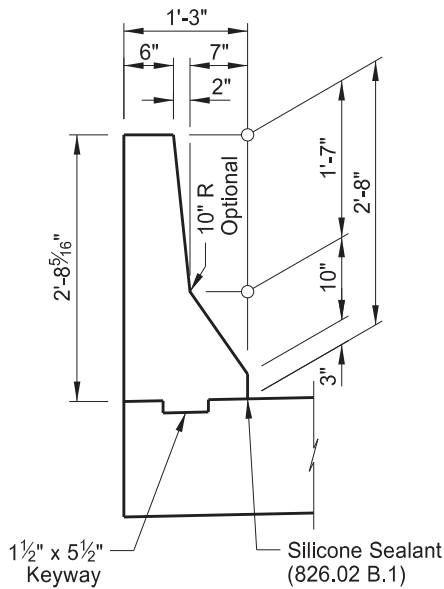
PLAN



ELEVATION

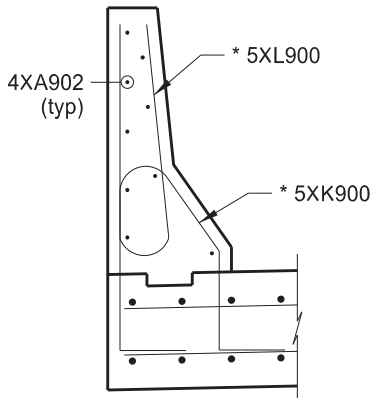


A-A

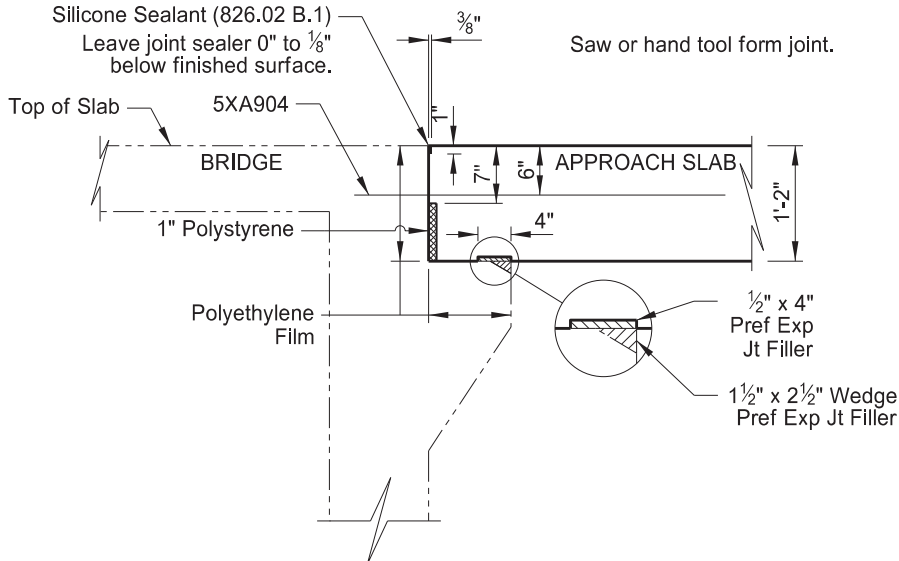


SHOWING DIMENSIONS

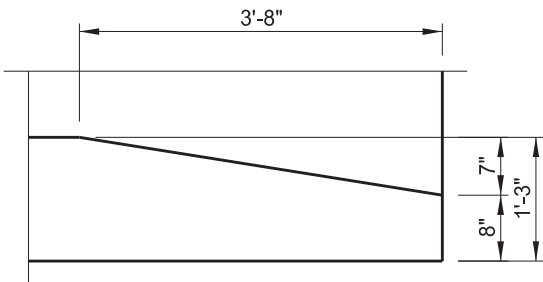
B-B



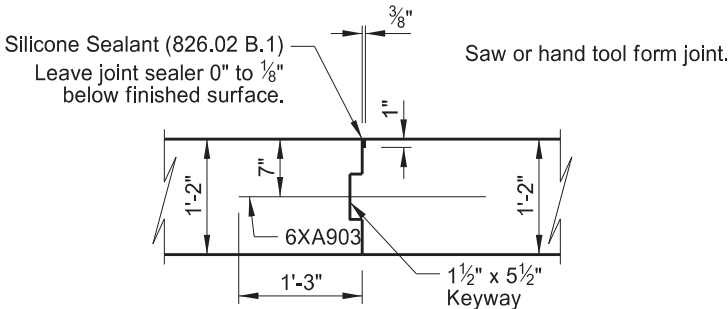
SHOWING REINFORCING



APPROACH SLAB JOINT DETAIL



BARRIER TAPER DETAIL



C-C



QUANTITIES
SEE DWG 94-259.847L-5
JAMES RIVER (EAST END) APPROACH SLAB DETAILS

NDDOT ABBREVIATIONS

D-101-1

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

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NDDOT ABBREVIATIONS

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

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

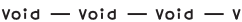






















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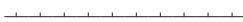



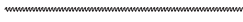
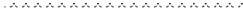







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12 18 2020

LINE STYLES



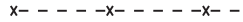





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Existing Topography









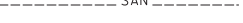













	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable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

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




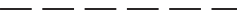
Proposed Topography

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



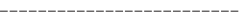






Existing Utilities

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




Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain


Traffic Utilities

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

Sign Structures

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

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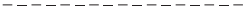









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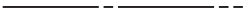




LINE STYLES

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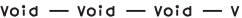





Right Of Way

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







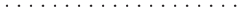
Boundary Control

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

Cross Sections and Typicals



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

Geotechnical



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

	Failure Line
--	--------------







Countours

	Depression Contours
	Supplemental Contour




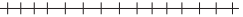
Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile










Striping

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








Pavement Joints

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






Bridge Details


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

Erosion Control

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

Environmental

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

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SYMBOLS

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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

Continuous Split Barrel Sample

Flight Auger Sample

Split Barrel Sample

Thinwall Tube Sample

Standard Penetration Test

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


12 18 2020

SYMBOLS

D-101-31

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

















































































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



12 18 2020


SYMBOLS

D-101-32


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

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

KIRK J. HOFF
REGISTERED
PROFESSIONAL



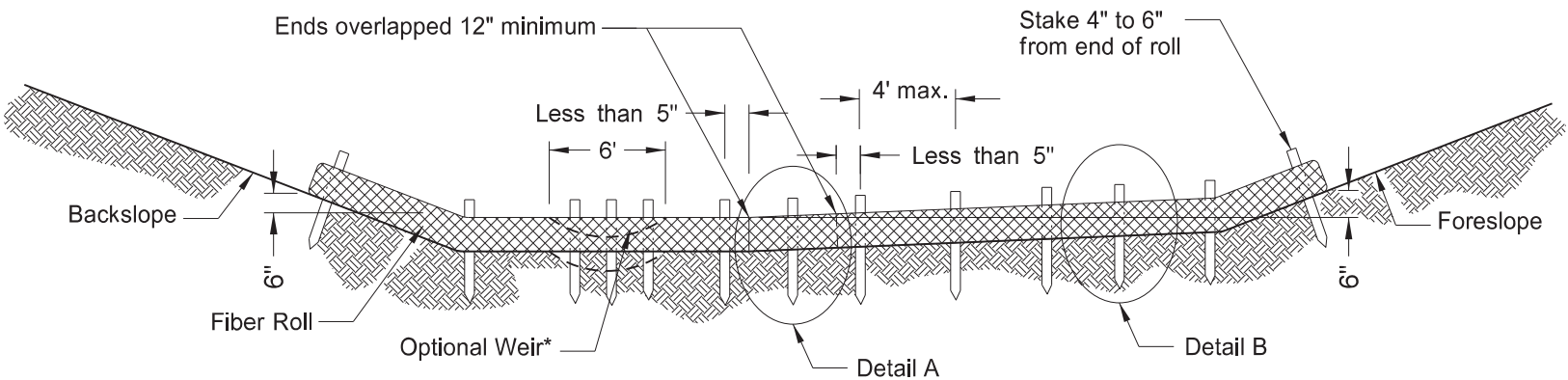
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14 REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



12 18 2020

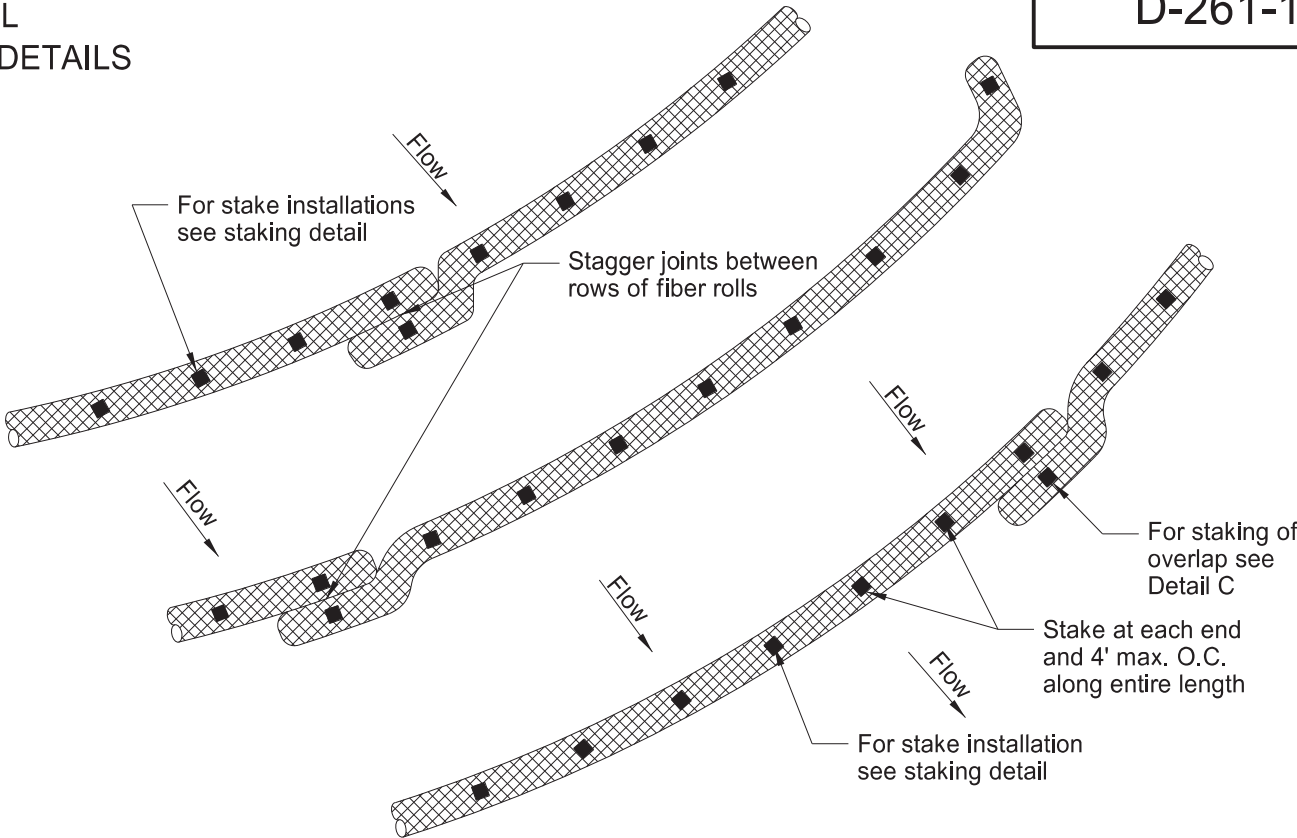
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

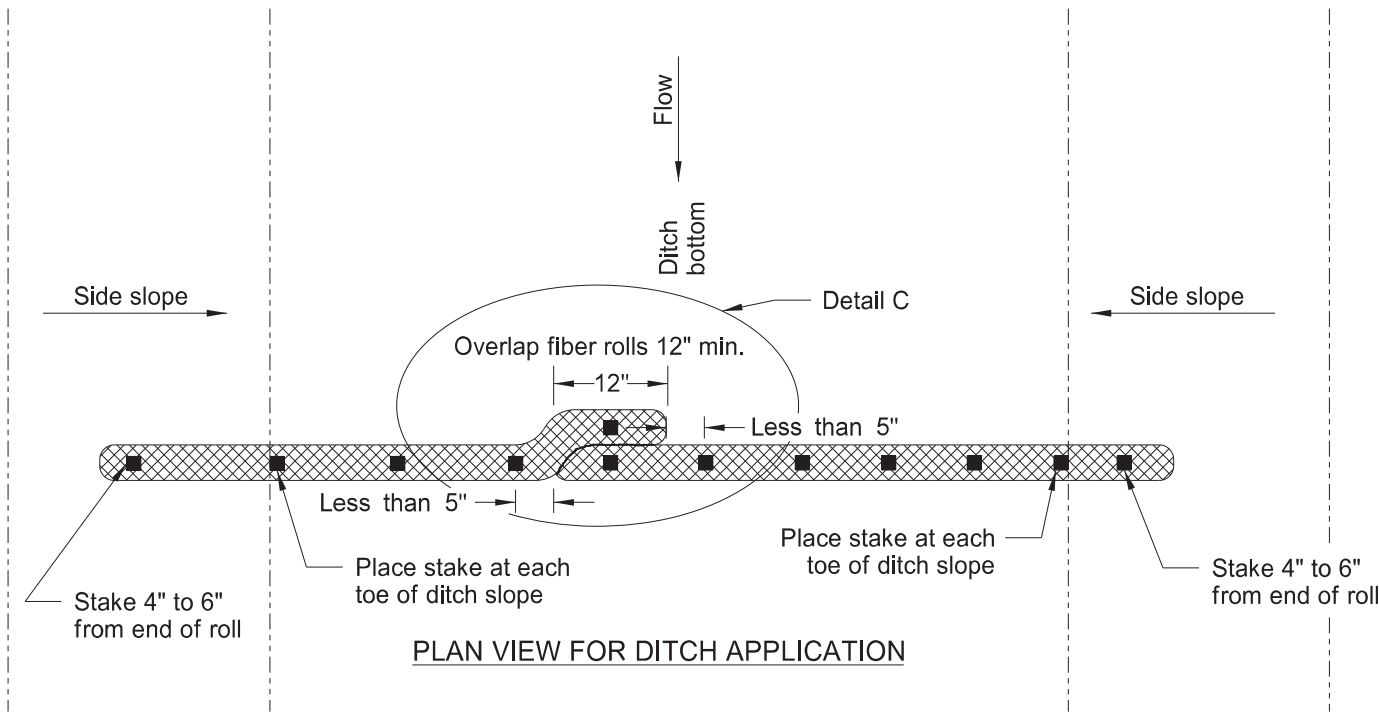


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

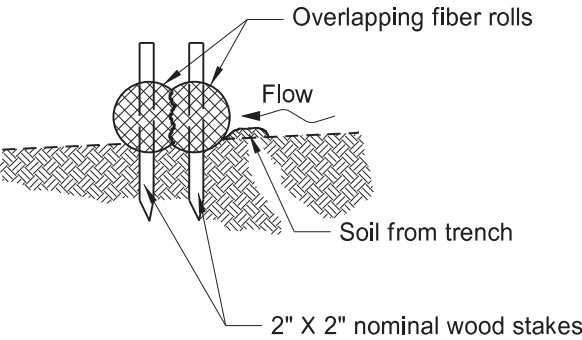
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



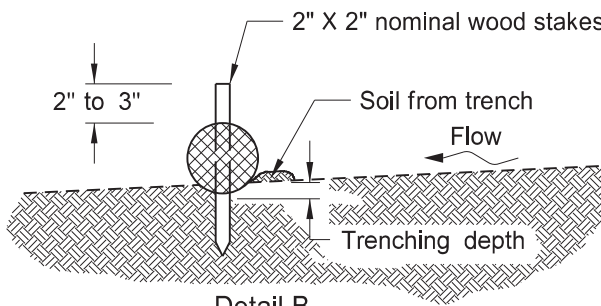
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

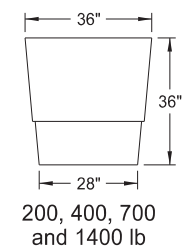
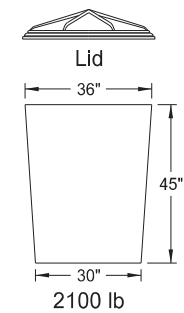
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 08/27/19 and the original document is stored at the
North Dakota Department
of Transportation

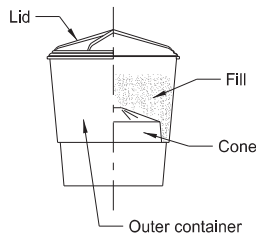
ATTENUATION DEVICE



Outer Containers

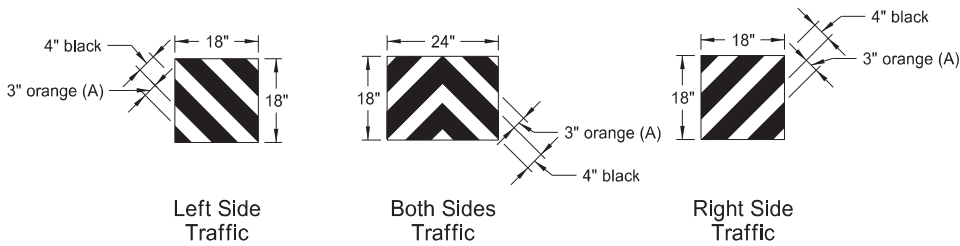


Cones



Typical Assembly

Typical Module Construction Detail

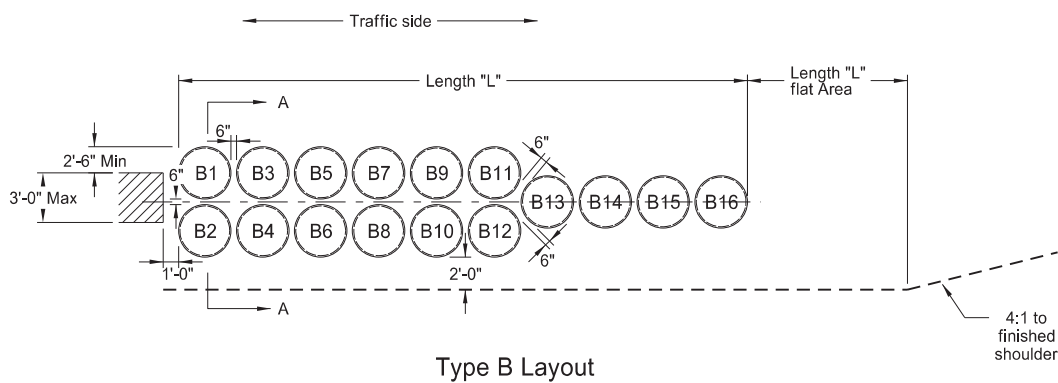


Reflective Sheet Detail

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.

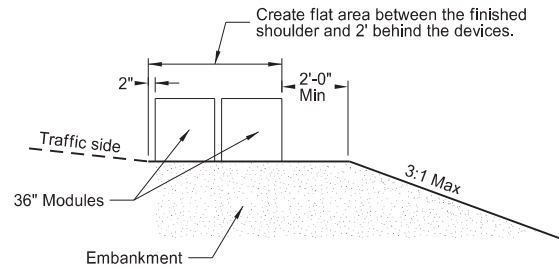
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

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		
	1400	1	1	1	1	1	1	1	1	1	1
	700	2	2	2	2	2	2	2	2	2	2
	400	1	1	1	1	1	1	1	1	1	1
	200	2	2	2	1	1	1	1	1	1	1

Notes:

- Materials
 - Use modules manufactured from frangible polyethylene material which shatters upon impact.
 - 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.
- Modules
 - Provide modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.
 - Provide three components for 2, 4, or 7 cubic foot module containers:
 - A 14 C.F., yellow outer container.
 - A black lid securely locking over the top lip of the container.
 - 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.
 - Provide two components for the 14 cubic foot module container:
 - A 14 C.F., yellow outer container.
 - A black lid securely locking over the top lip of the container.
 - Provide two components for the 21 cubic foot module container:
 - A 36" height X 36" width yellow outer container.
 - A black lid which locks securely over the top of the container.
- 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.
- 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.
- 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

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.

Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D		B	Y					69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7							
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E		91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96				
Y	O	U	R		T	O	W	N	,		N	D						64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2								

Advance Warning Sign Spacing (A)			
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. Post mount sign a distance of ½A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)
 2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)
 3. Do not place sign in urban areas or within city limits.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14 9-27-17 8-30-18 10-03-19	Revise sheeting to type IV. Updated to active voice. Updated sign number in note 1. New Design Engineer 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

D-704-6

(A)
FUNDING SOURCE MESSAGE VARIATIONS
FEDERAL
STATE
FEDERAL - STATE
FEDERAL - LOCAL
FEDERAL - STATE - LOCAL
STATE - LOCAL

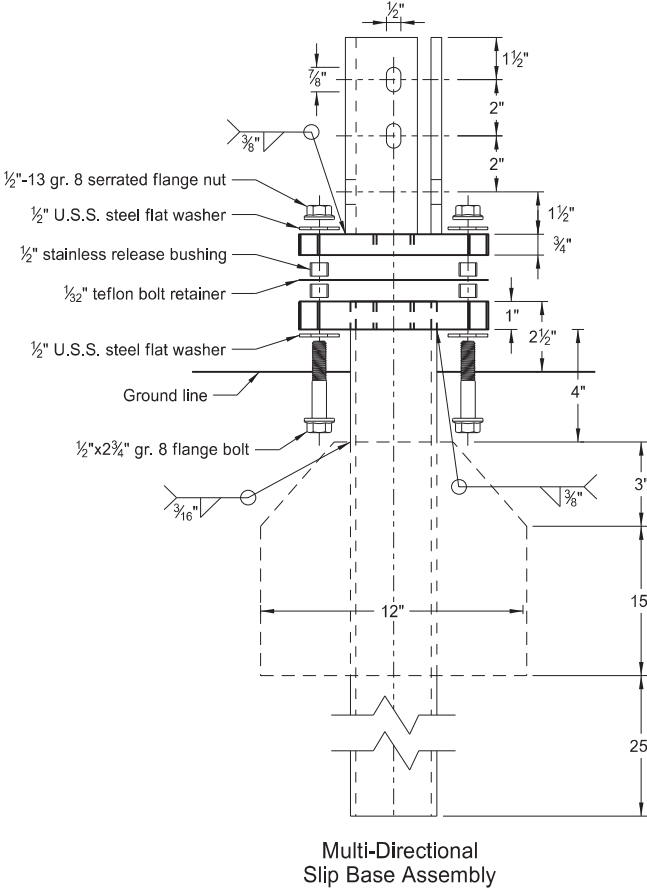
Use a horizontal spacing of 3" between words and hyphens. Center message horizontally in sign panel.

- Notes:
- 1) Contact the Communications Division of the NDDOT to obtain a copy of the image for the NDDOT Logo.
 - 2) Contact Project Engineer for funding source message.

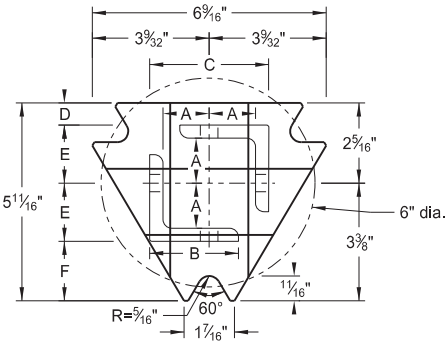
NORTH DAKOTA		
DEPARTMENT OF TRANSPORTATION		
12-08-21		
REVISIONS		
DATE	CHANGE	
		12/08/21

Perforated Tube

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

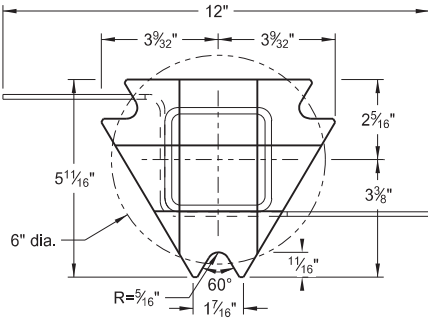


Traffic Flow



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle

Traffic Flow



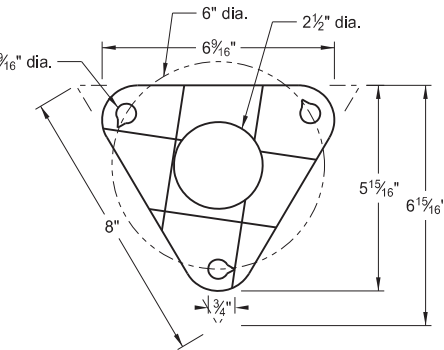
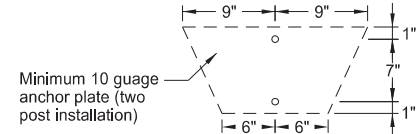
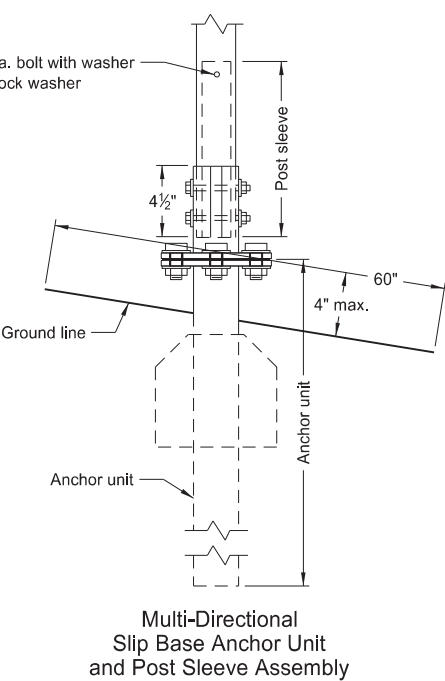
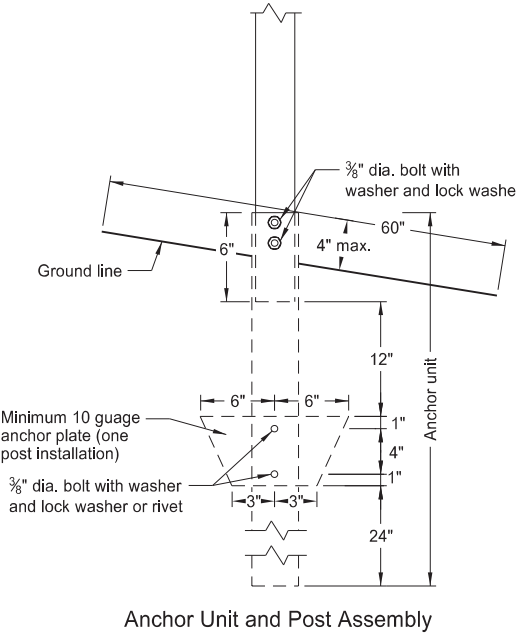
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

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

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

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

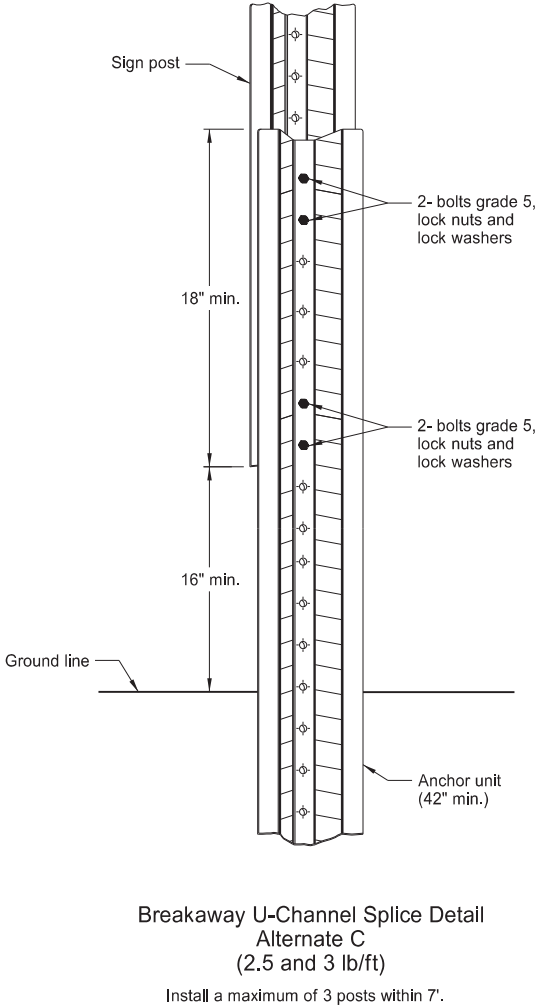
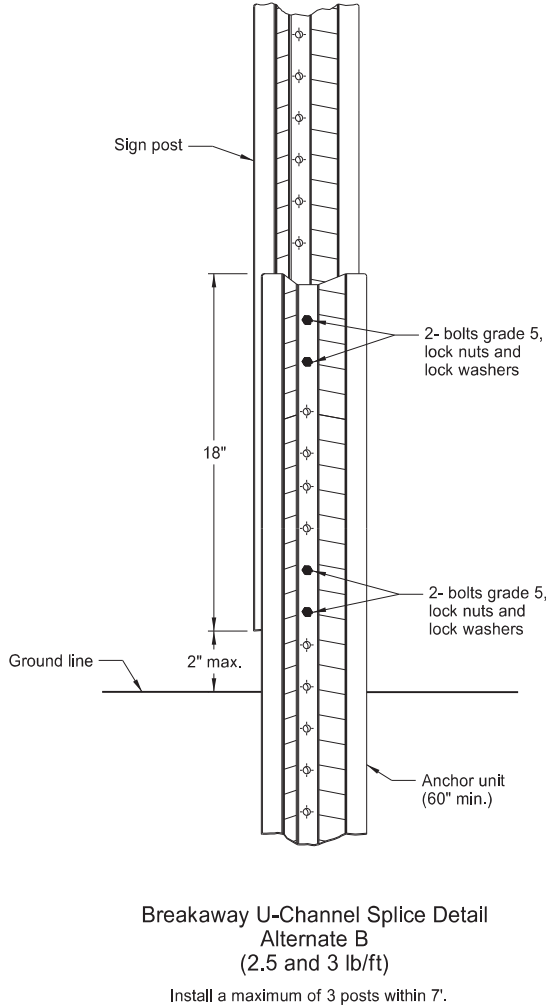
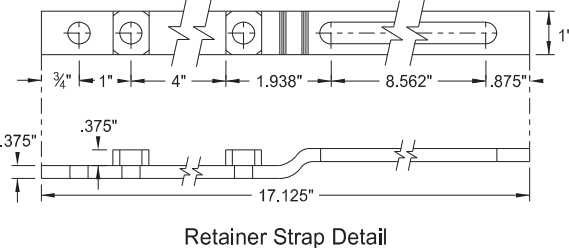
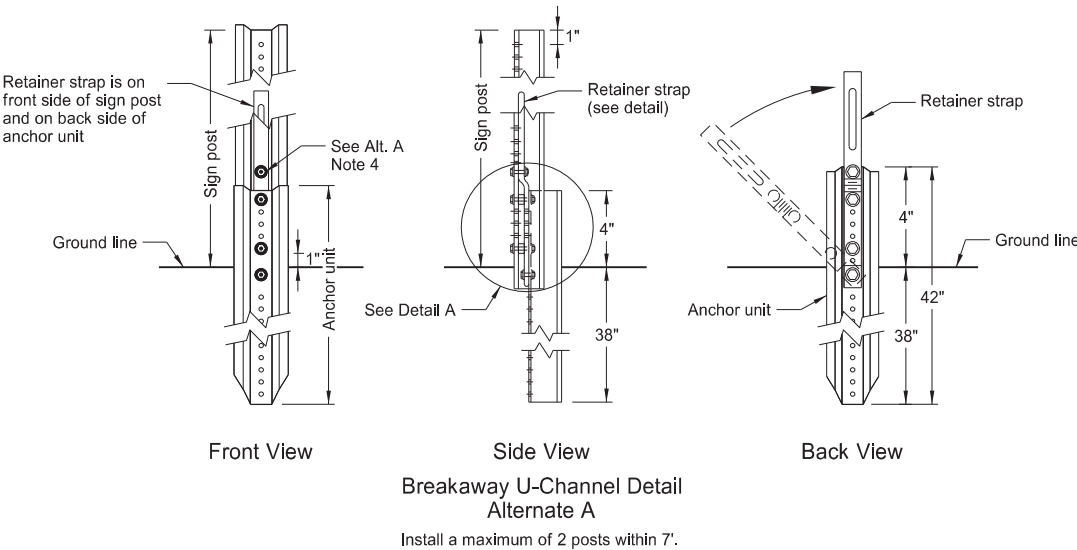
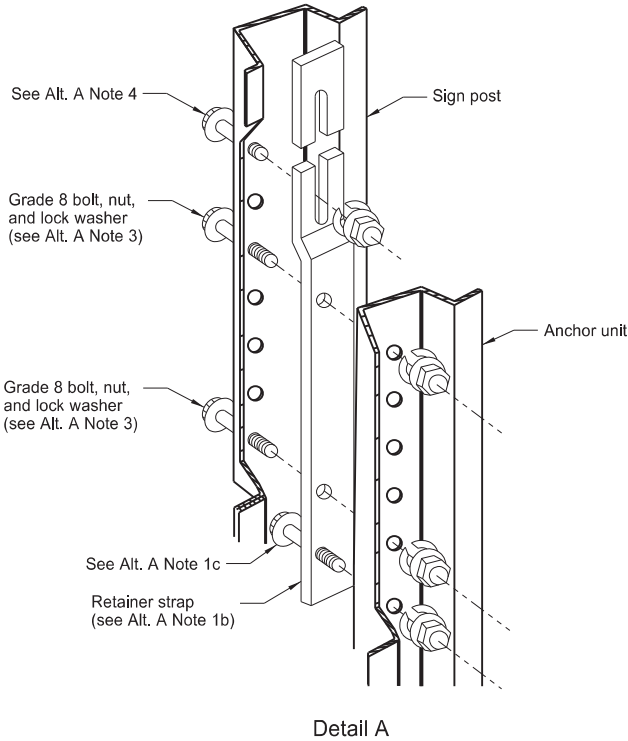
- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
- (B) For additional wind load, insert the 2 3/8"x10 ga. into 2 1/2"x10 ga.



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

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

U-Channel Post



Alternate A Steps of Installation:

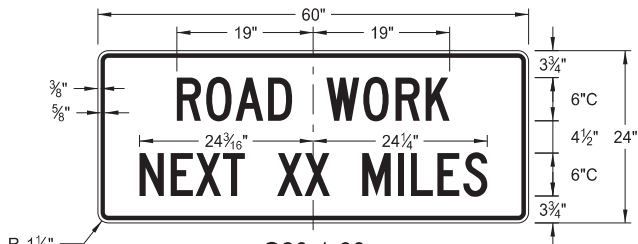
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
- 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.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- 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 10-03-19	Updated to active voice New Design Engr PE Stamp

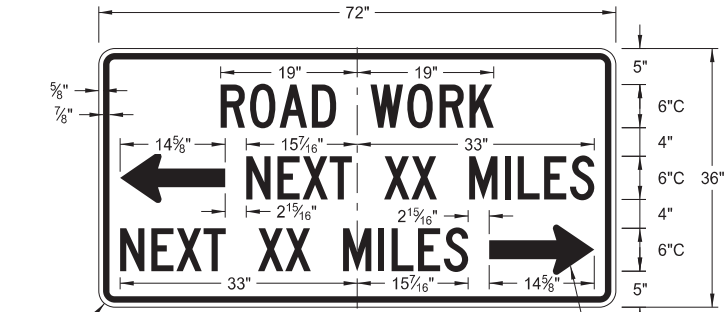
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

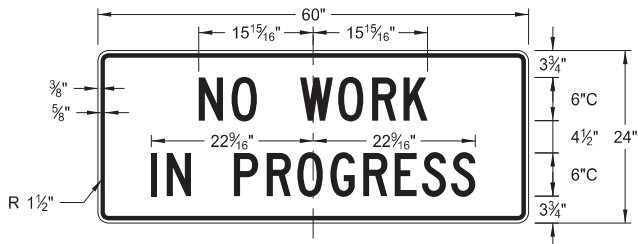
D-704-9



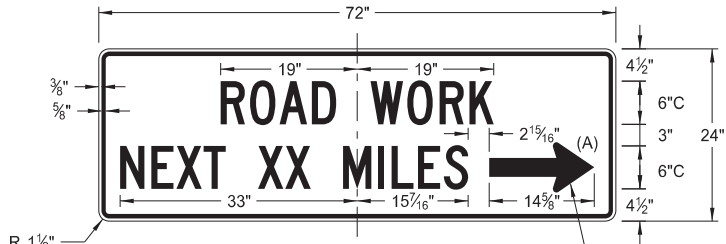
G20-1-60
Legend: black (non-refl)
Background: orange



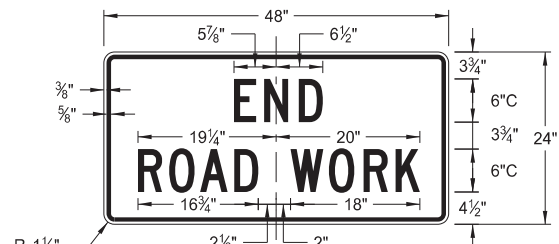
G20-50a-72
Legend: black (non-refl)
Background: orange



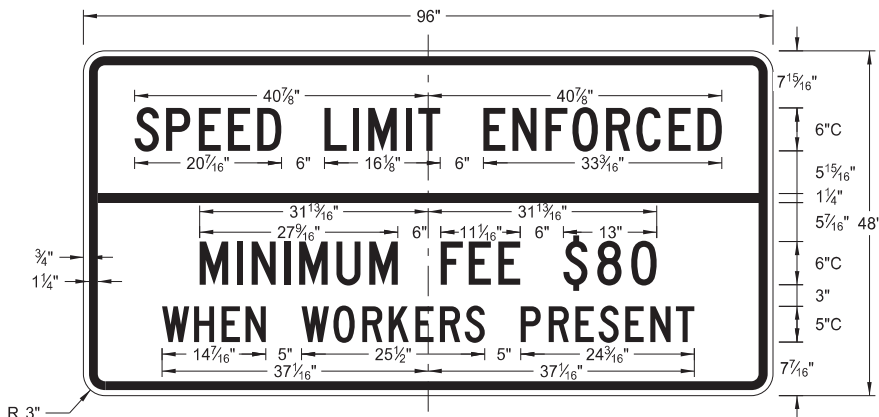
G20-1b-60
Legend: black (non-refl)
Background: orange



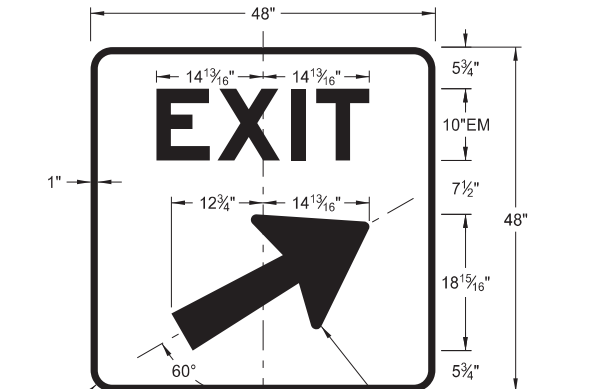
G20-52a-72
Legend: black (non-refl)
Background: orange



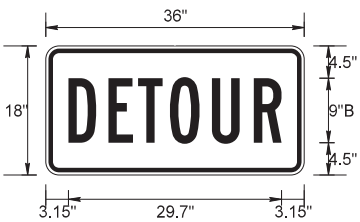
G20-2-48
Legend: black (non-refl)
Background: orange



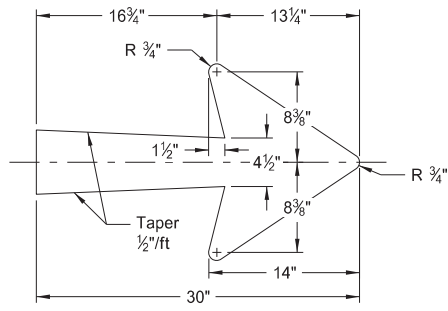
G20-55-96
Legend: black (non-refl)
Background: orange



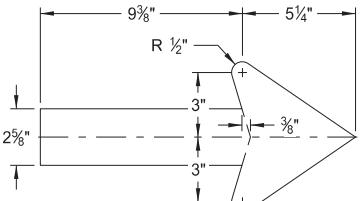
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



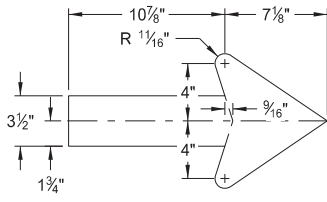
M4-8-36
Legend: black (non-refl)
Background: orange



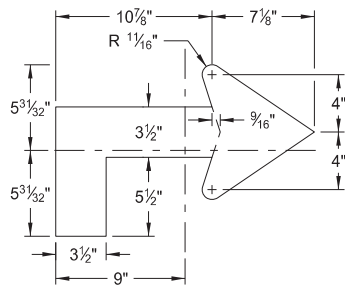
E5-1-48



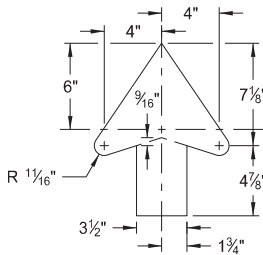
G20-50a-72
G20-52a-72



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



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



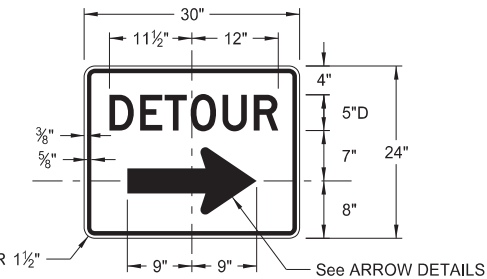
M4-9-30
Straight

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

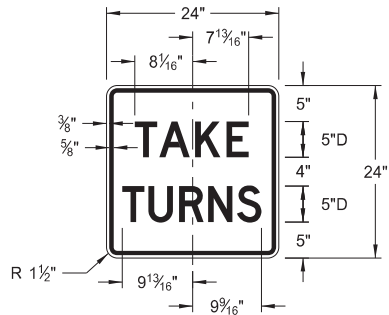
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M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

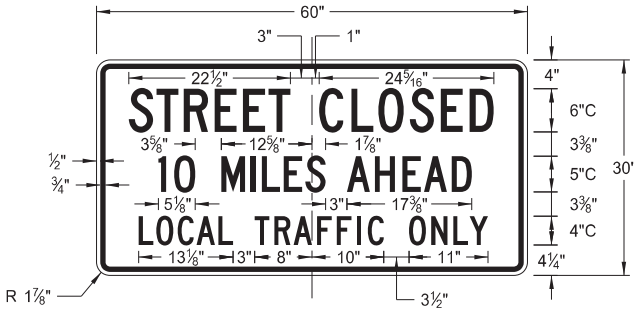
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



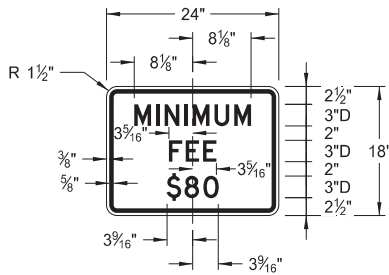
R1-50P-24

Legend: black (non-refl)
Background: white



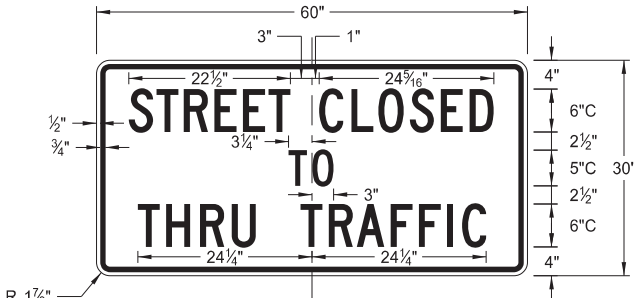
R11-3c-60

Legend: black (non-refl)
Background: white



R2-1aP-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



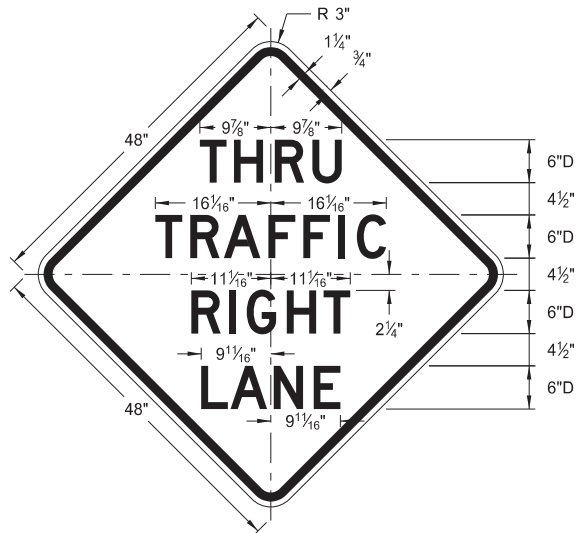
R11-2a-48

Legend: black (non-refl)
Background: white

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8-13-13		
REVISIONS		
DATE	CHANGE	
8-17-17 10-03-19	Revised sign number New Design Engineer PE Stamp	

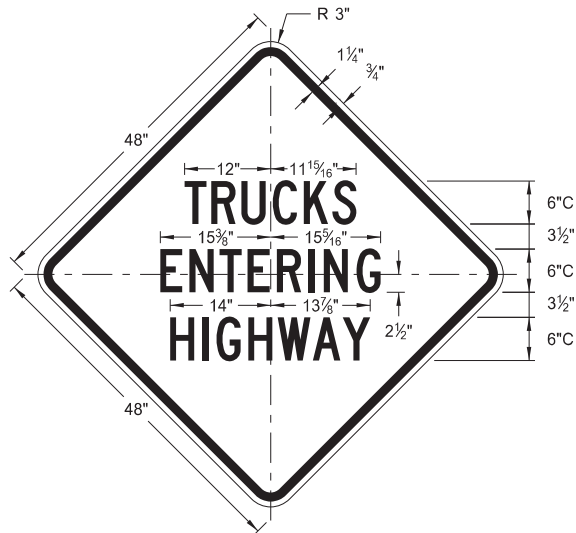
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



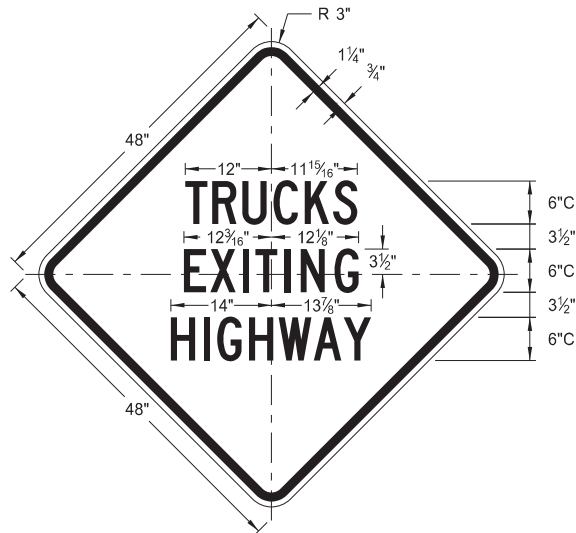
W5-8-48

Legend: black (non-refl)
Background: orange



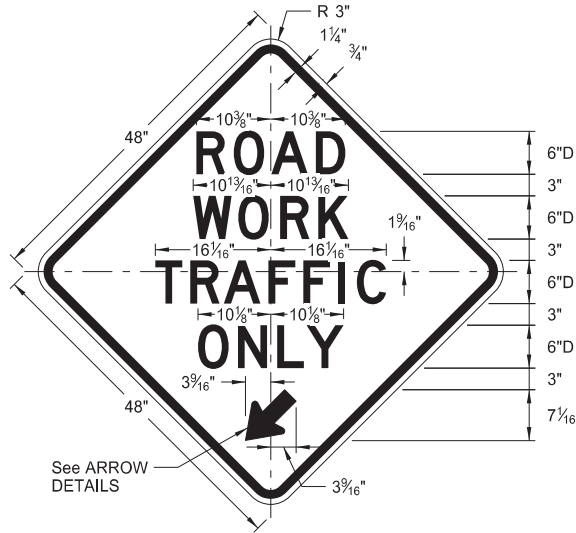
W8-53-48

Legend: black (non-refl)
Background: orange



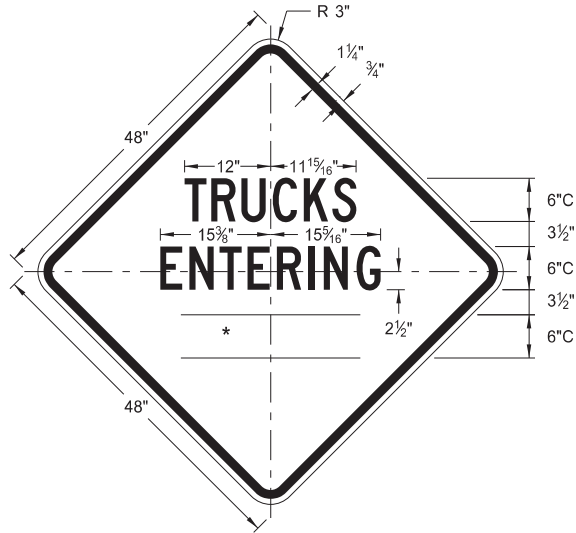
W8-56-48

Legend: black (non-refl)
Background: orange



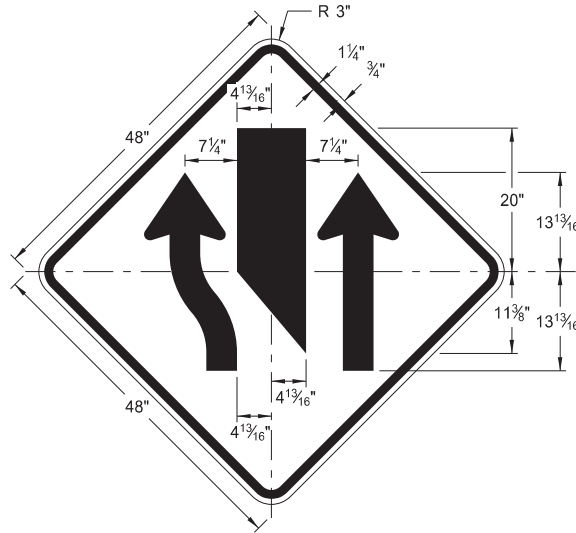
W5-9-48

Legend: black (non-refl)
Background: orange



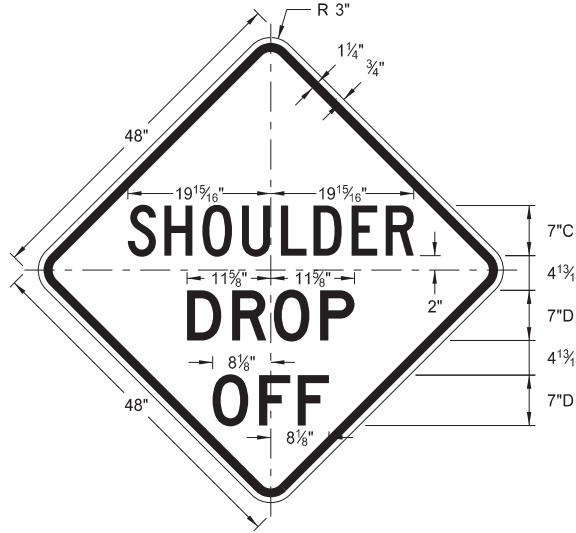
W8-54-48

Legend: black (non-refl)
Background: orange



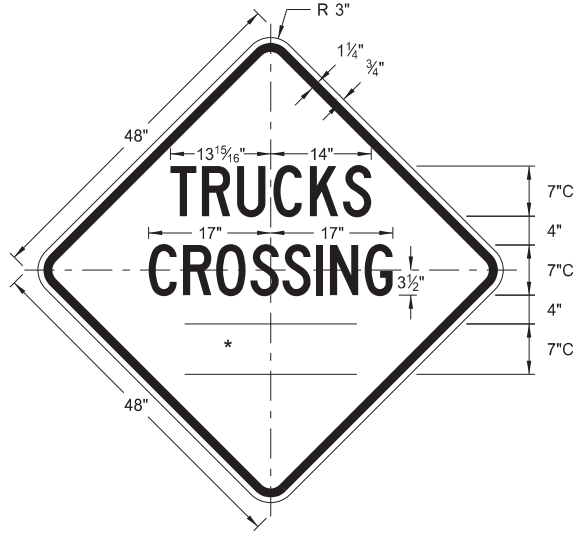
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

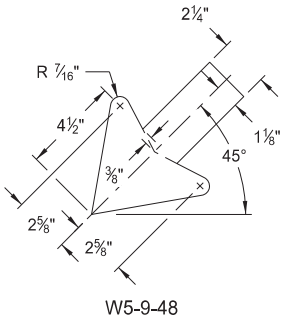


W8-55-48

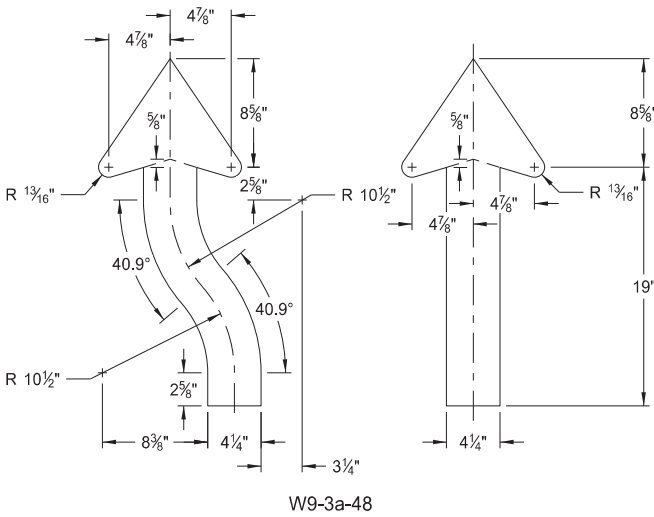
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

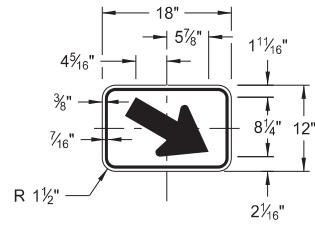
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

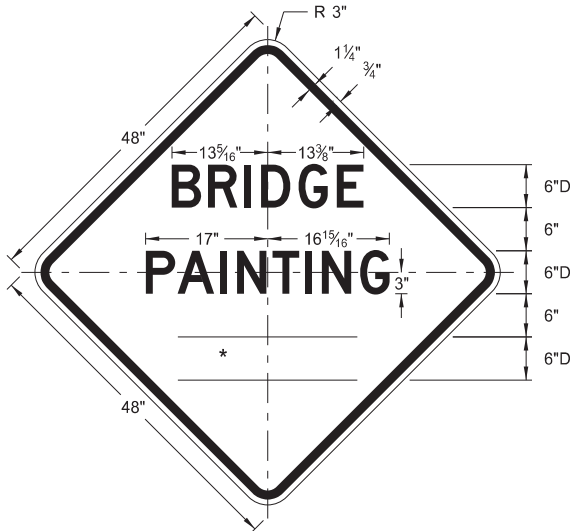
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



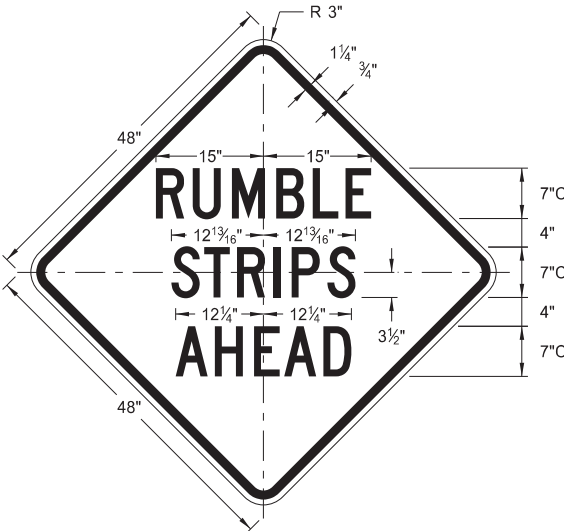
W16-7aP-18

Legend: black (non-refl)
Background: orange



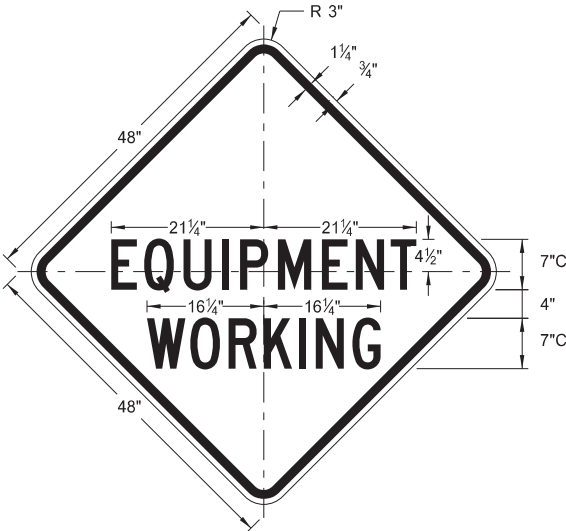
W21-50-48

Legend: black (non-refl)
Background: orange



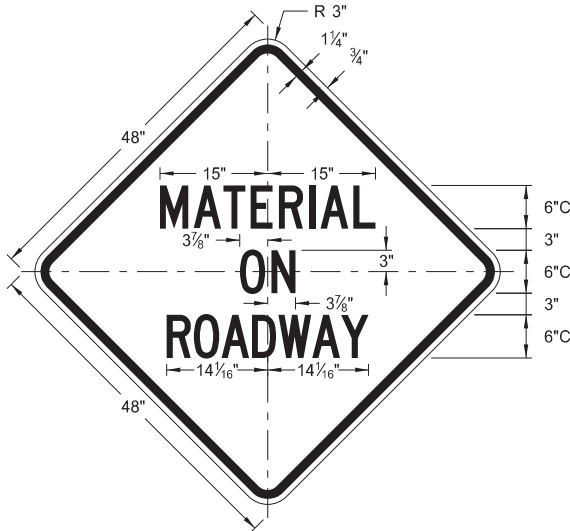
W21-53-48

Legend: black (non-refl)
Background: orange



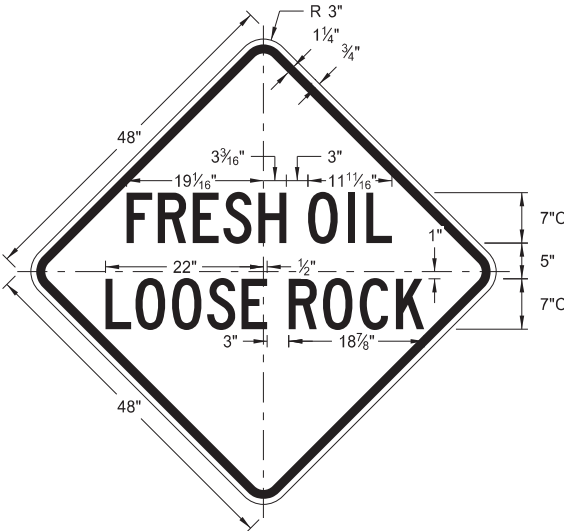
W20-51-48

Legend: black (non-refl)
Background: orange



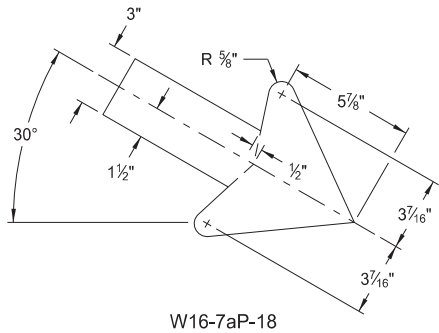
W21-51-48

Legend: black (non-refl)
Background: orange

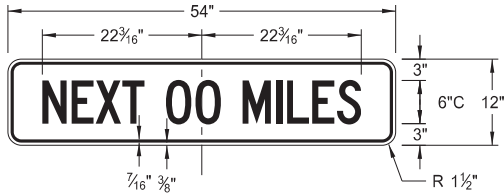


W22-8-48

Legend: black (non-refl)
Background: orange

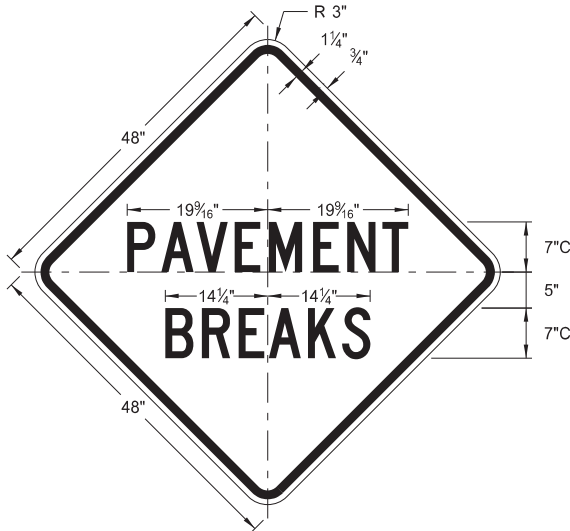


W16-7aP-18



W20-52P-54

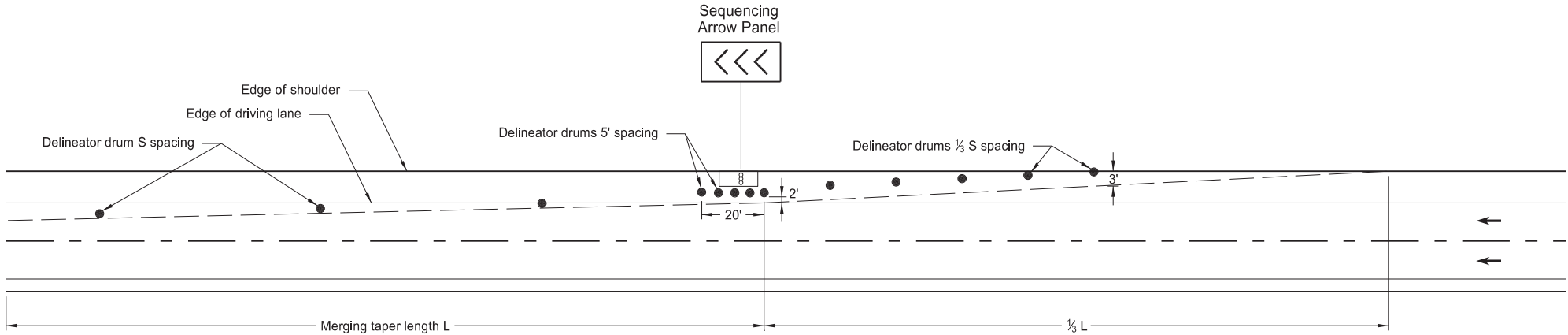
Legend: black (non-refl)
Background: orange



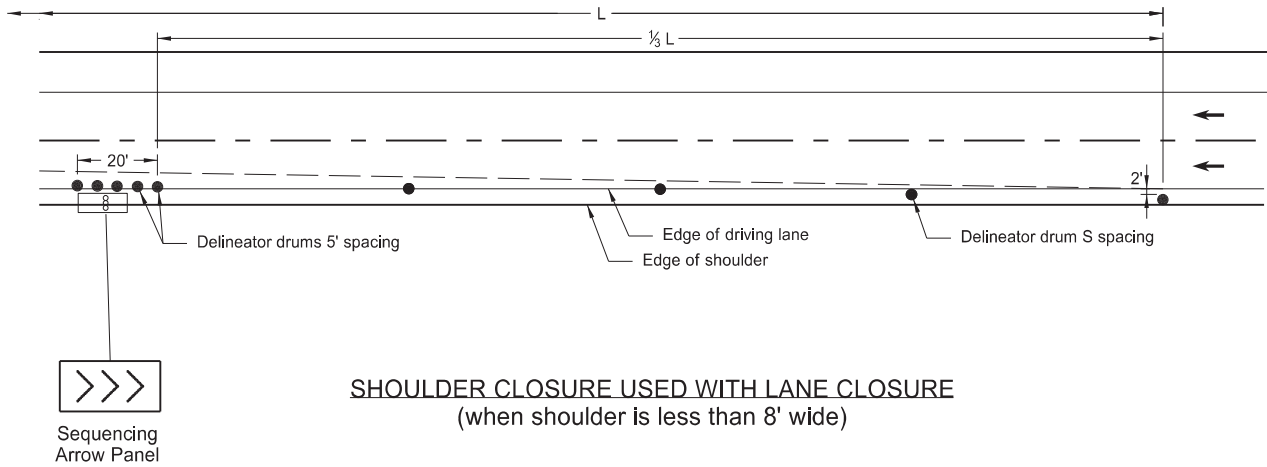
W21-52-48

Legend: black (non-refl)
Background: orange

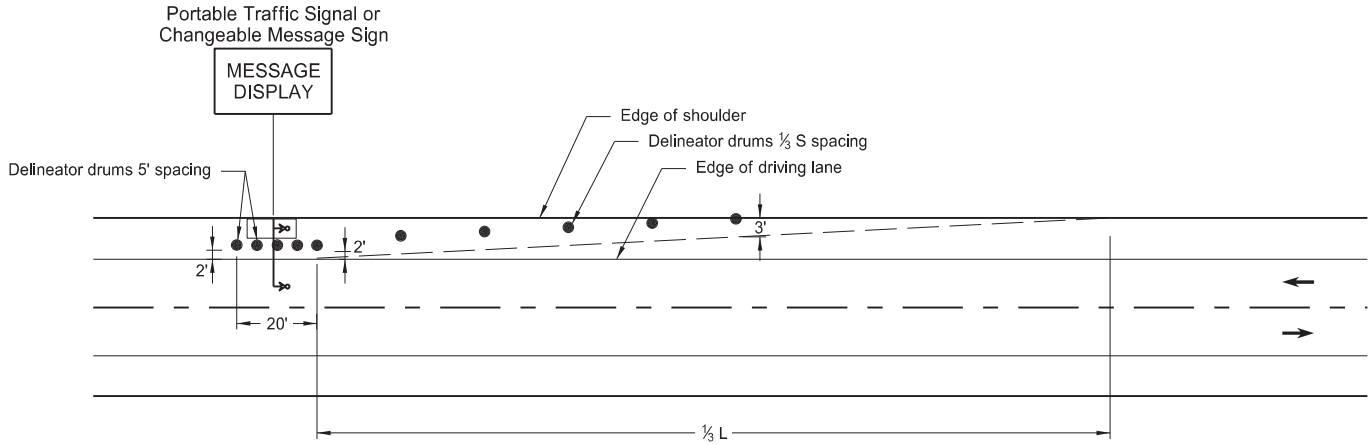
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation
5-31-18		
REVISIONS		
DATE	CHANGE	
11-01-19	Added details for sign W16-7aP-18.	



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
- Message Display
- ∞ Sequencing Arrow Panel
- LT Portable Traffic Signal

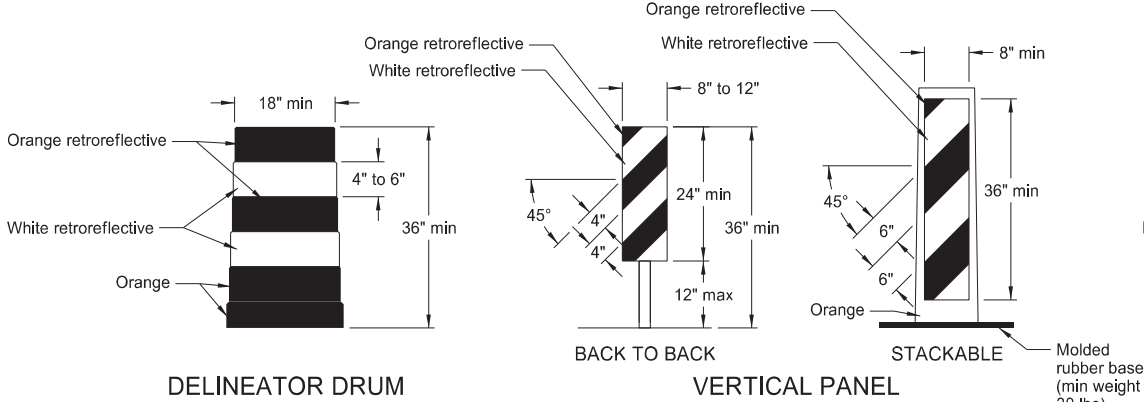
Notes:

- 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)
- If a shoulder taper is used, use a length of approximately $\frac{1}{3}L$. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
- 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

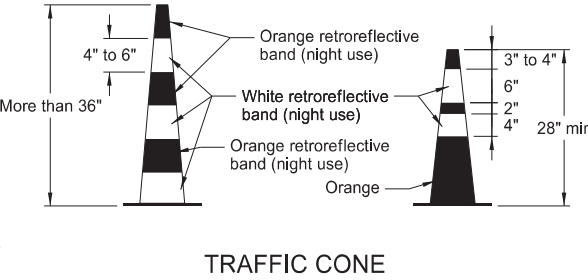
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BARRICADE AND CHANNELIZING DEVICE DETAILS

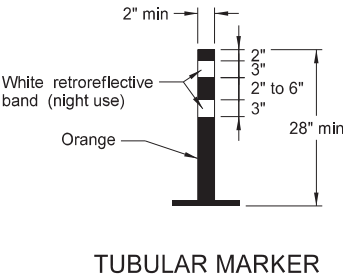


Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectorized spaces between the horizontal orange and 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.

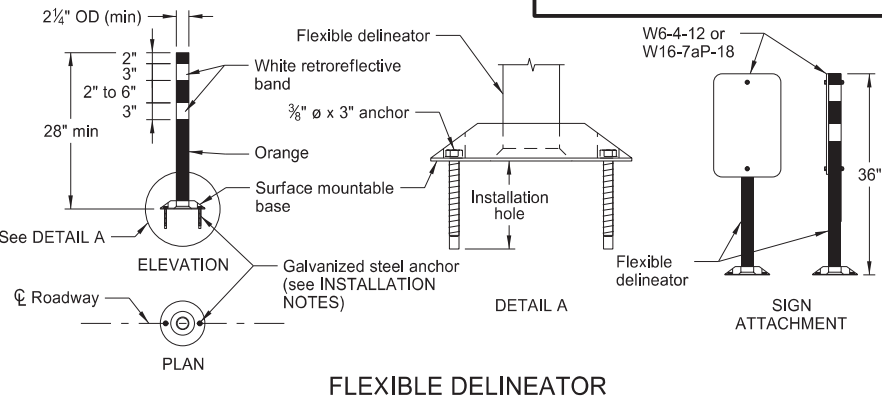
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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



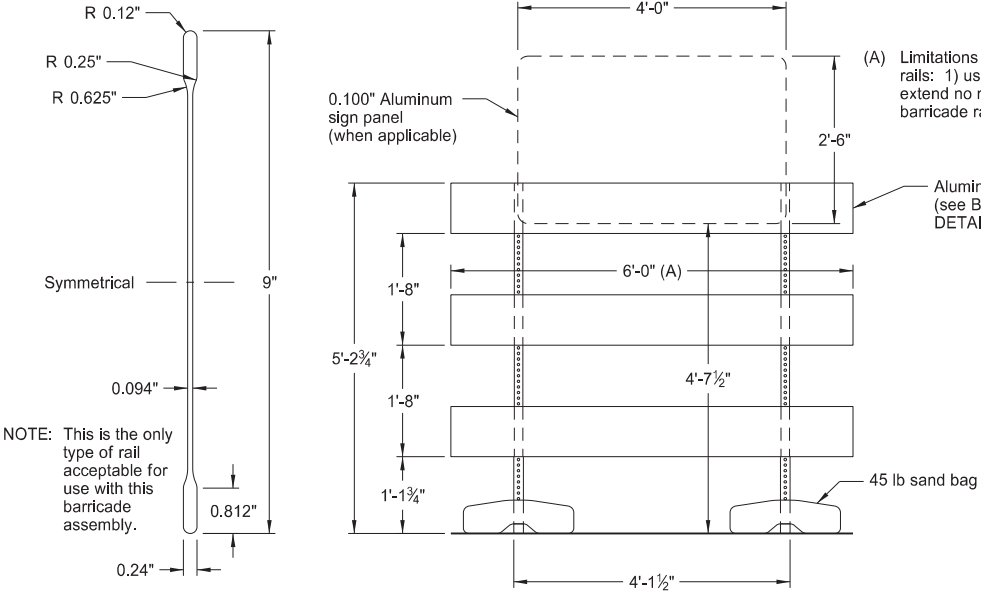
Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectorized space between the orange and white stripes.



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.



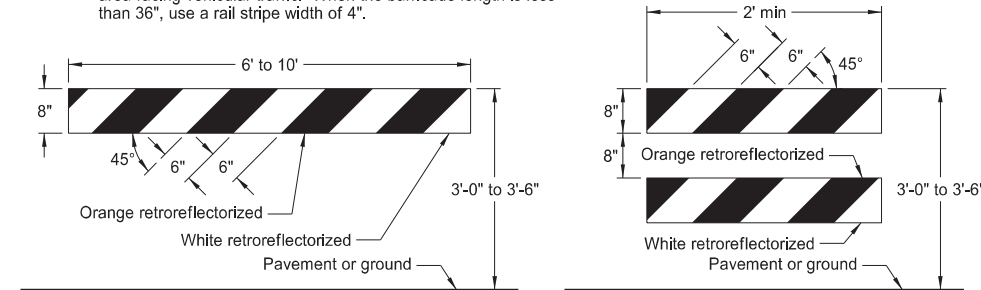
- INSTALLATION NOTES:
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl.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



BARRICADE BLADE DETAIL

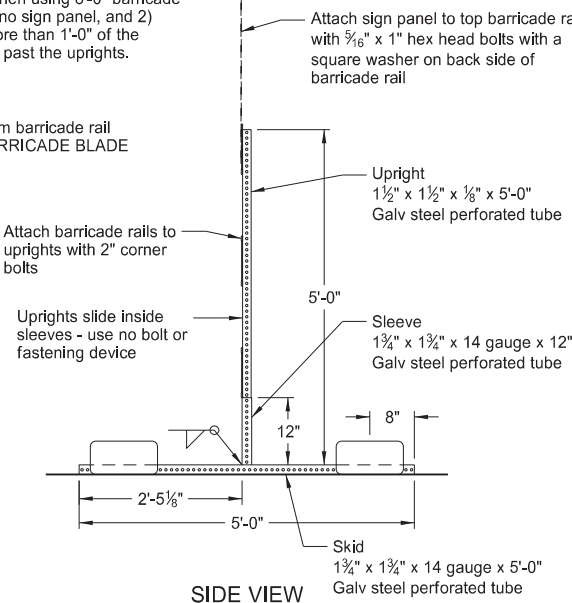
BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

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".

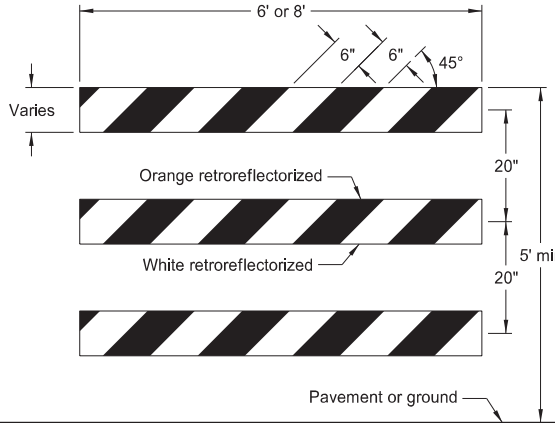


TYPE I BARRICADE

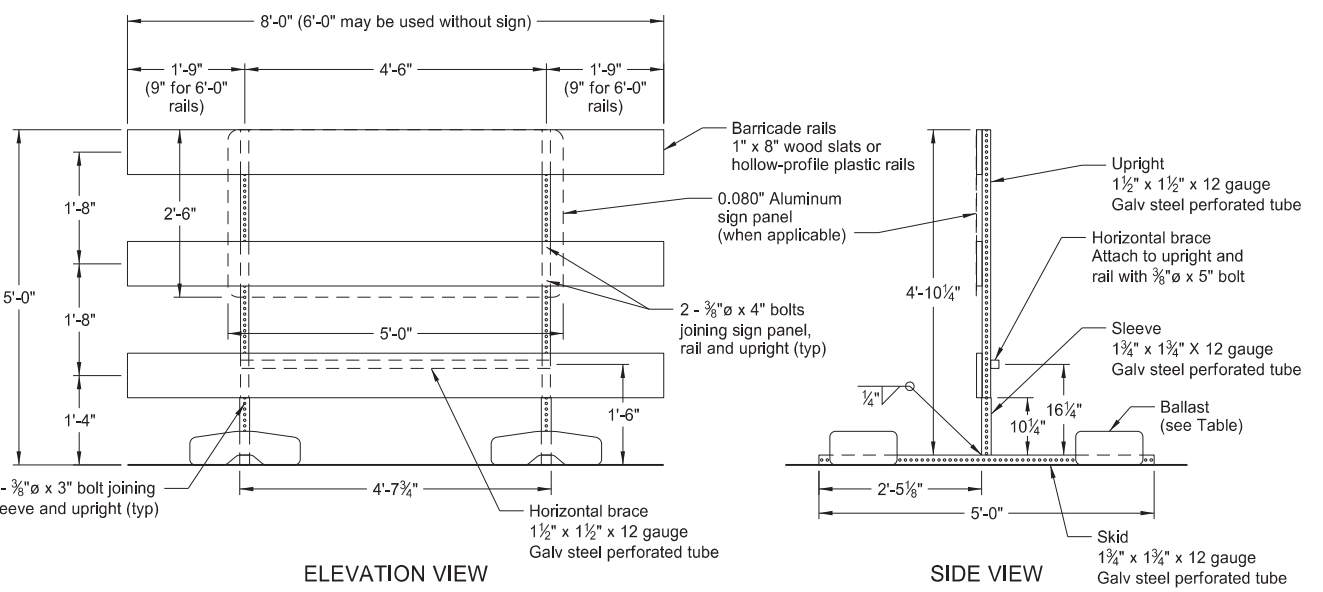
TYPE II BARRICADE
BARRICADE RAIL DETAILS



SIDE VIEW



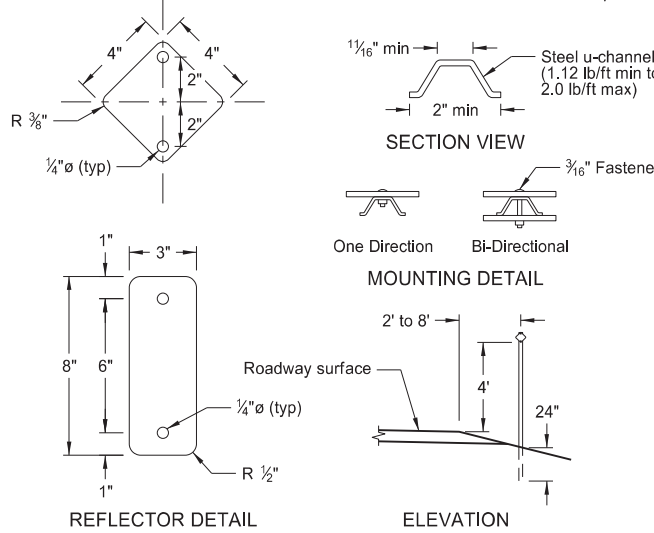
TYPE III BARRICADE



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

SIDE VIEW



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

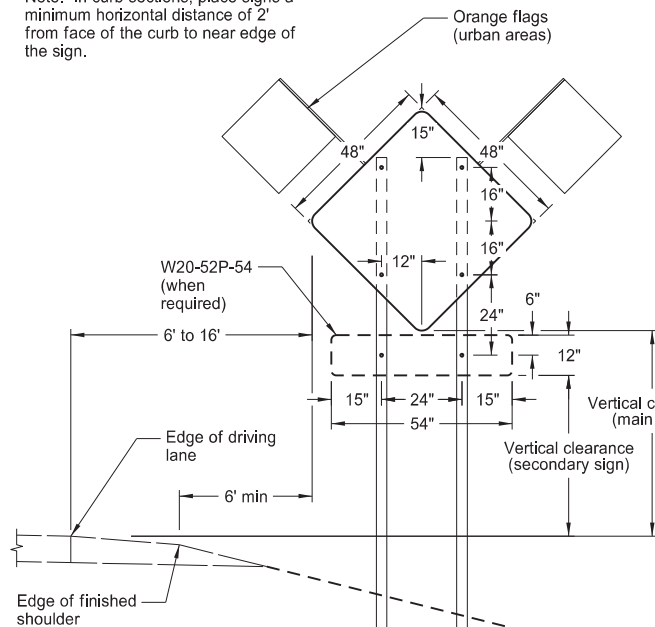
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

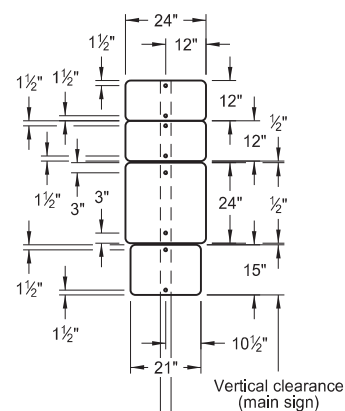
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on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

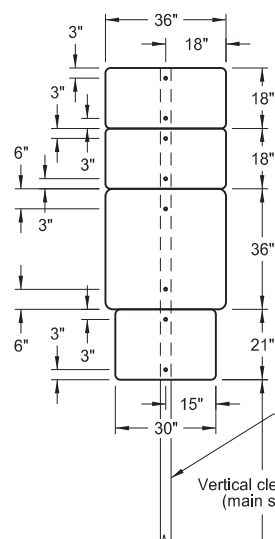
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



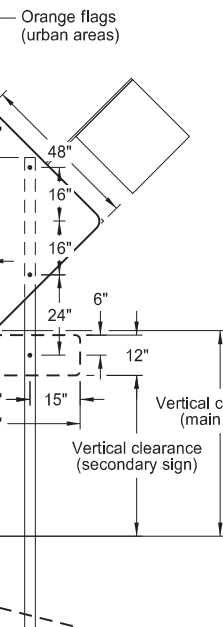
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



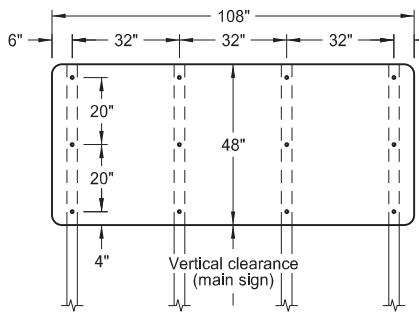
24" x 24"
ROUTE MARKER
ASSEMBLY



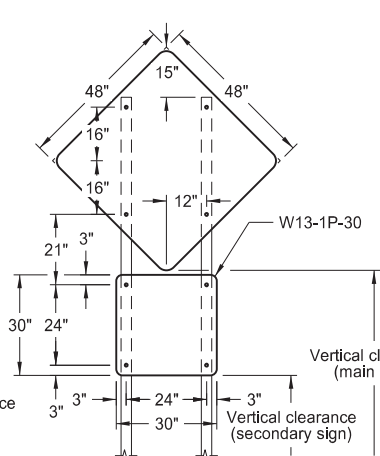
36" x 36"
ROUTE MARKER
ASSEMBLY



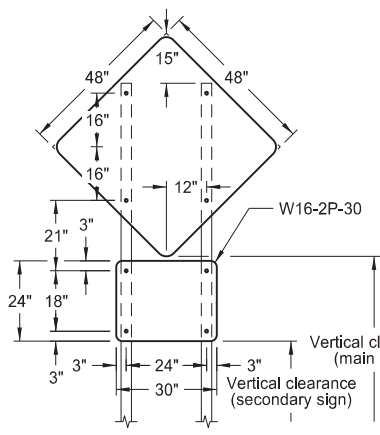
18" x 18"
DIAMOND SIGN



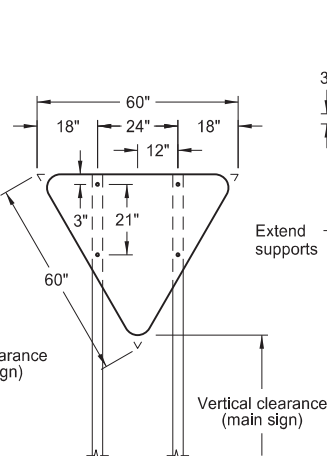
108" x 48" SIGN



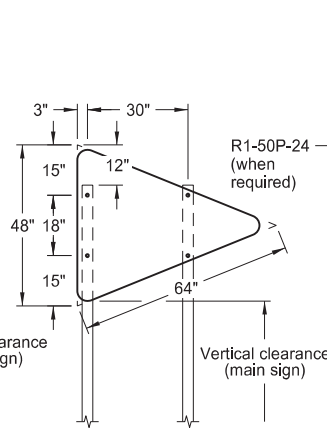
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



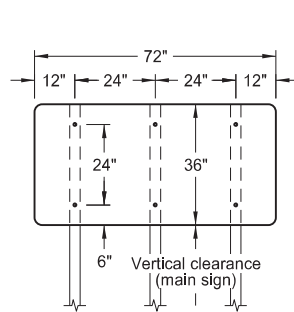
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



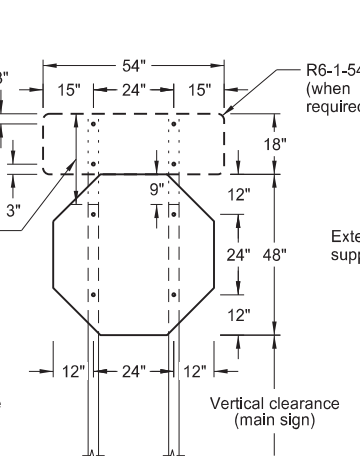
R1-2-60 - YIELD SIGN



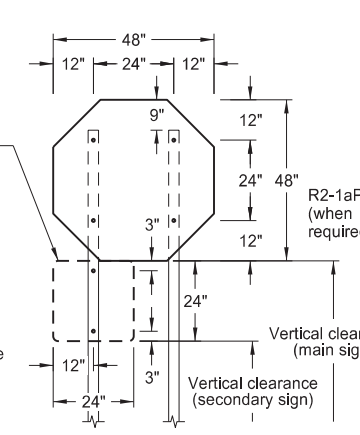
W14-3-64 - PENNANT SIGN



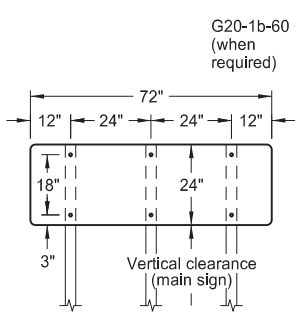
72" x 36" SIGN



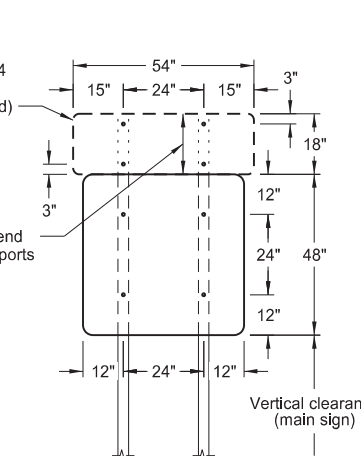
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



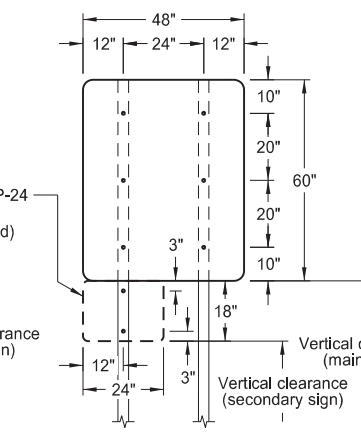
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



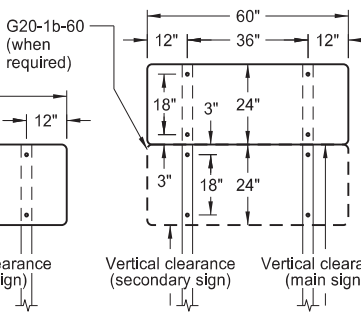
72" x 24" SIGN



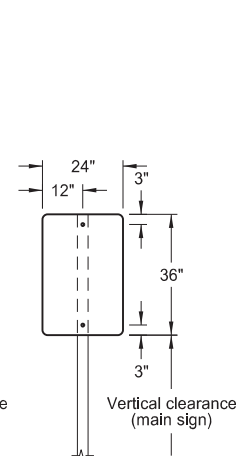
48" x 48" SIGN
(with R6-1-54 sign as required)



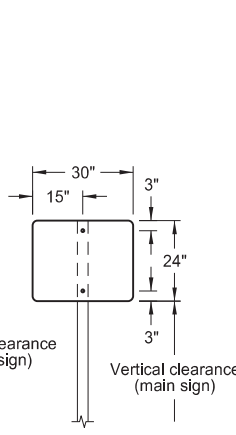
48" x 48" SIGN
(with R2-1aP-24 sign as required)



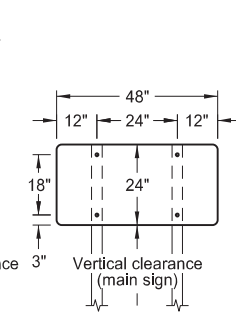
60" x 24" SIGN



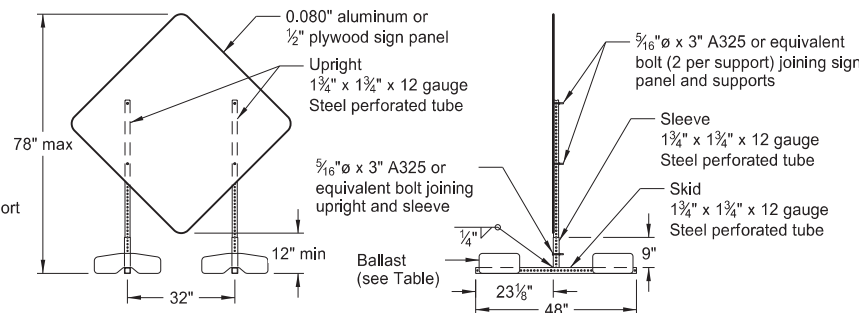
24" x 36" SIGN



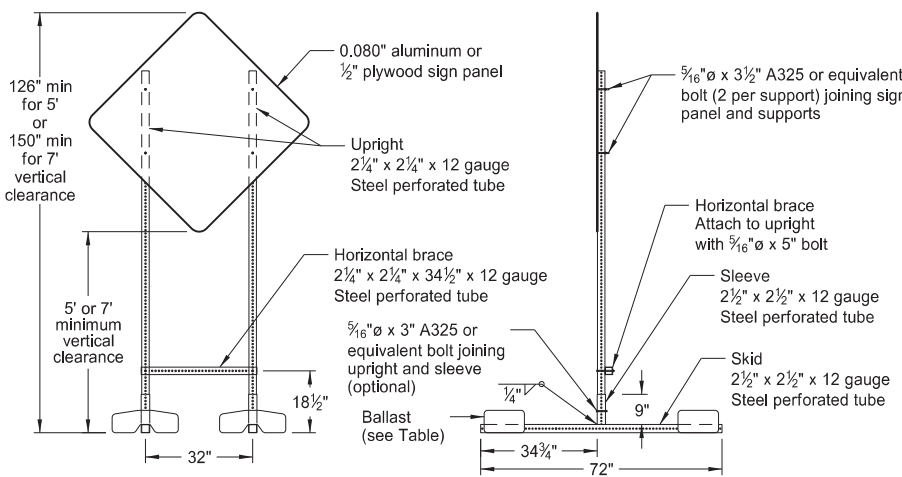
30" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

Place signs over 50 square feet on 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 ⅝" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

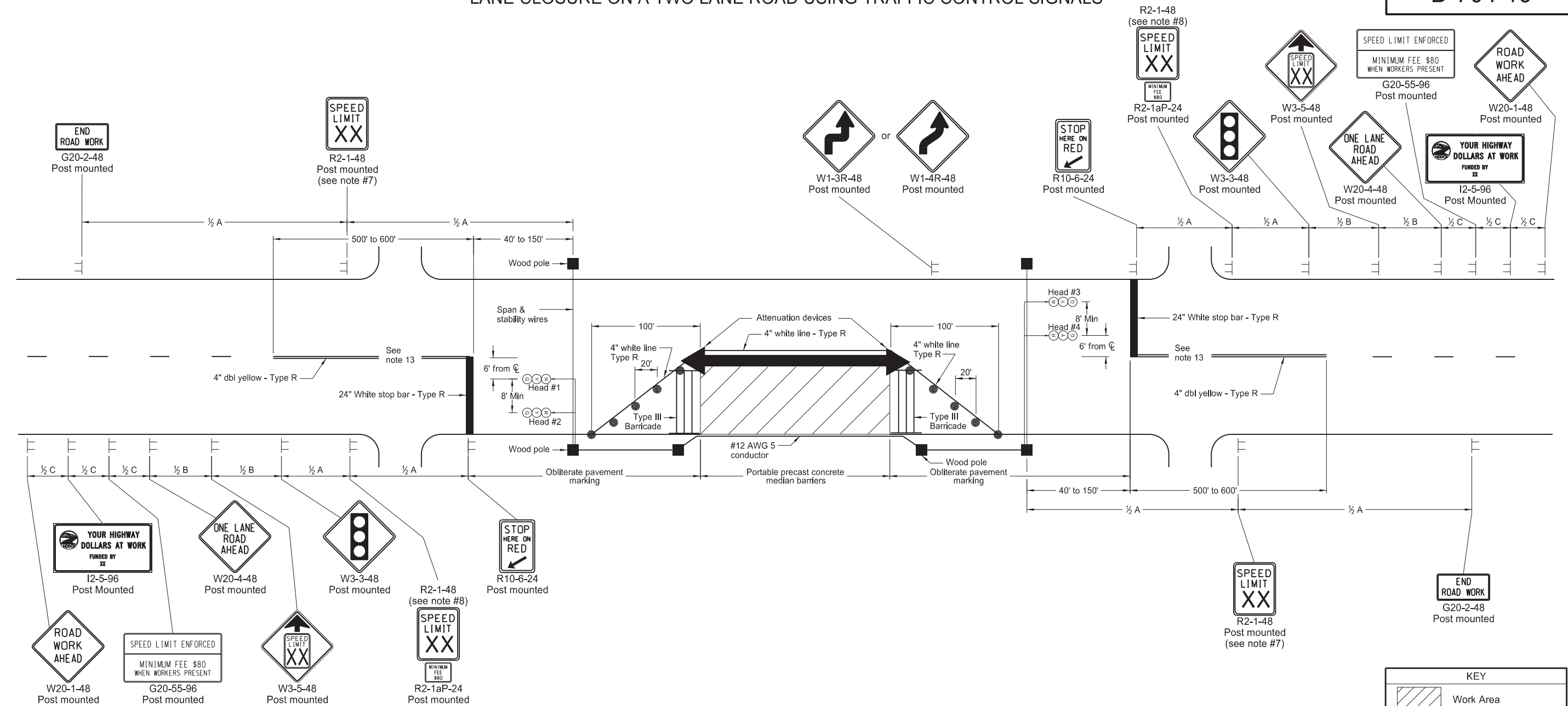
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

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

LANE CLOSURE ON A TWO LANE ROAD USING TRAFFIC CONTROL SIGNALS

D-704-16



Notes:

- Span conductor overhead between poles except on bridges, where it may alternately be attached and supported by the bridge structure. When conductor is supported by the bridge structure, attach conductor to avoid interference with bridge construction. Attach conductor on either side of bridge as determined by field personnel.
- Locate controller on a wood pole in the cable run between signal heads for through traffic movements.
- The timing schedule is suggested trial setting. Check signals in operation frequently to obtain the most efficient timing schedule.
- Place wood poles a minimum of 16 feet from edge of driving lane. Provide a minimum 16 to 19 feet clearance from the center line of the roadway to the bottom of traffic signal heads suspended over the roadway.
- Place traffic signal heads with 12 inch red, yellow and green lenses and 5 inch louvered backplates.
- See standard drawing "Span Wire Mounted Traffic Signals" for interim traffic construction details.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- 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 1/2 B.
- 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.
- Cover existing speed limit signs within a reduced speed zone.
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Continue double yellow centerline thru private drives.
- Sign G20-55-96 is not required this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
- As an option, use solar powered signals instead of wood pole signal system.
- Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

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

SUGGESTED TIMING AND SIGNAL SEQUENCE						
Heads 1 & 2	Green	Yellow	Red			
Heads 3 & 4	Red		Green	Yellow	Red	
Time						
Cycle = 90 seconds	18.0	4.5	22.5	18.0	4.5	22.5
Percent of Cycle	20	5	25	20	5	25

KEY	
	Work Area
	Type III Barricade
	Sign
	Delineator Drum
	Wood Pole

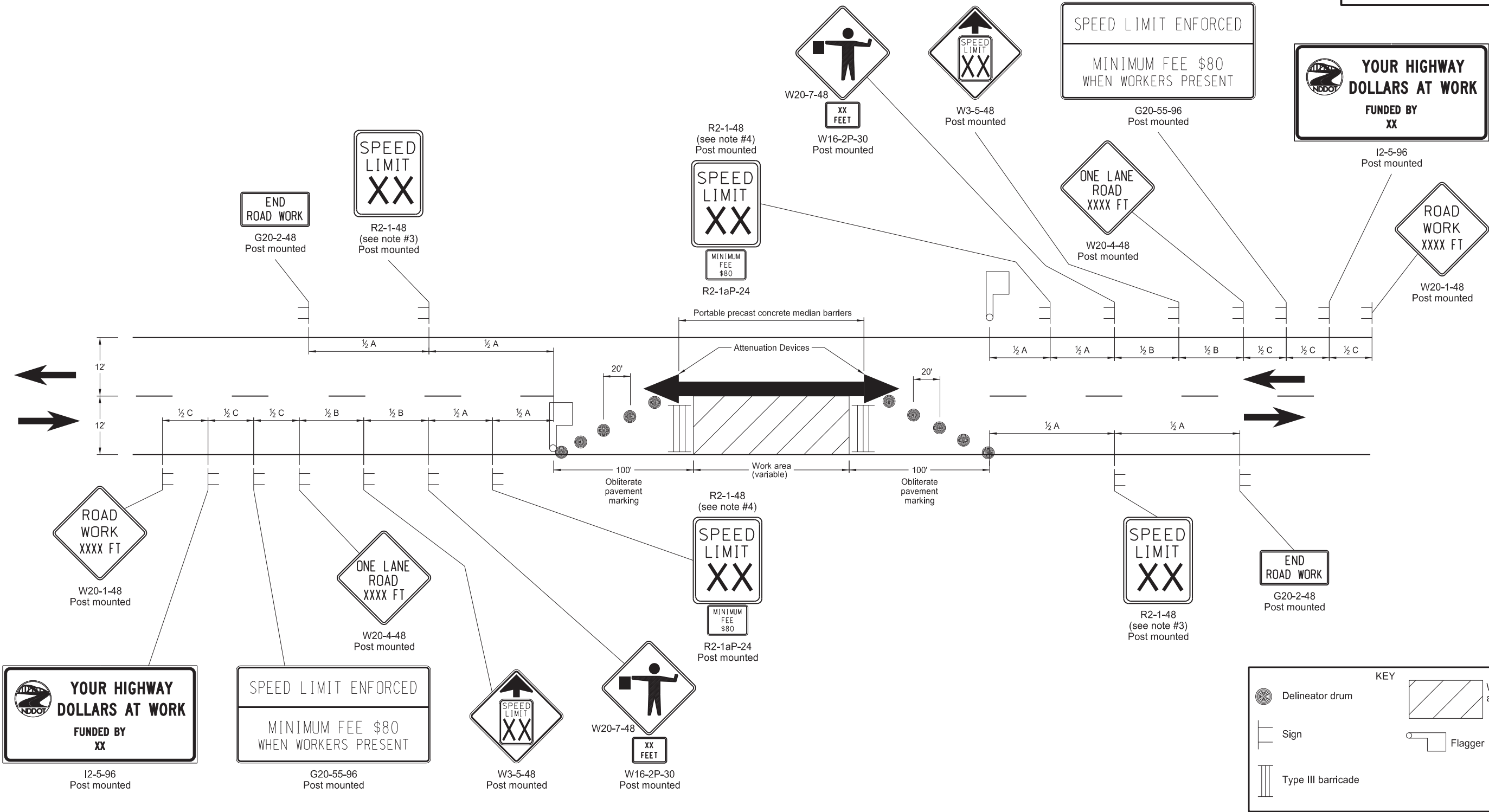
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
11-20-15	Revised Note 6 & Renumbered Minimum Fee plaque
08-17-17	Revised notes & added note
11-01-19	Revise sign #s & pvmt mk type
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work



12/08/21

SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



Notes:

1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
3. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
4. 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 1/2B.
5. 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.
6. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
7. Cover existing speed limit signs within a reduced speed zone.
8. 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.
9. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
10. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

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 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

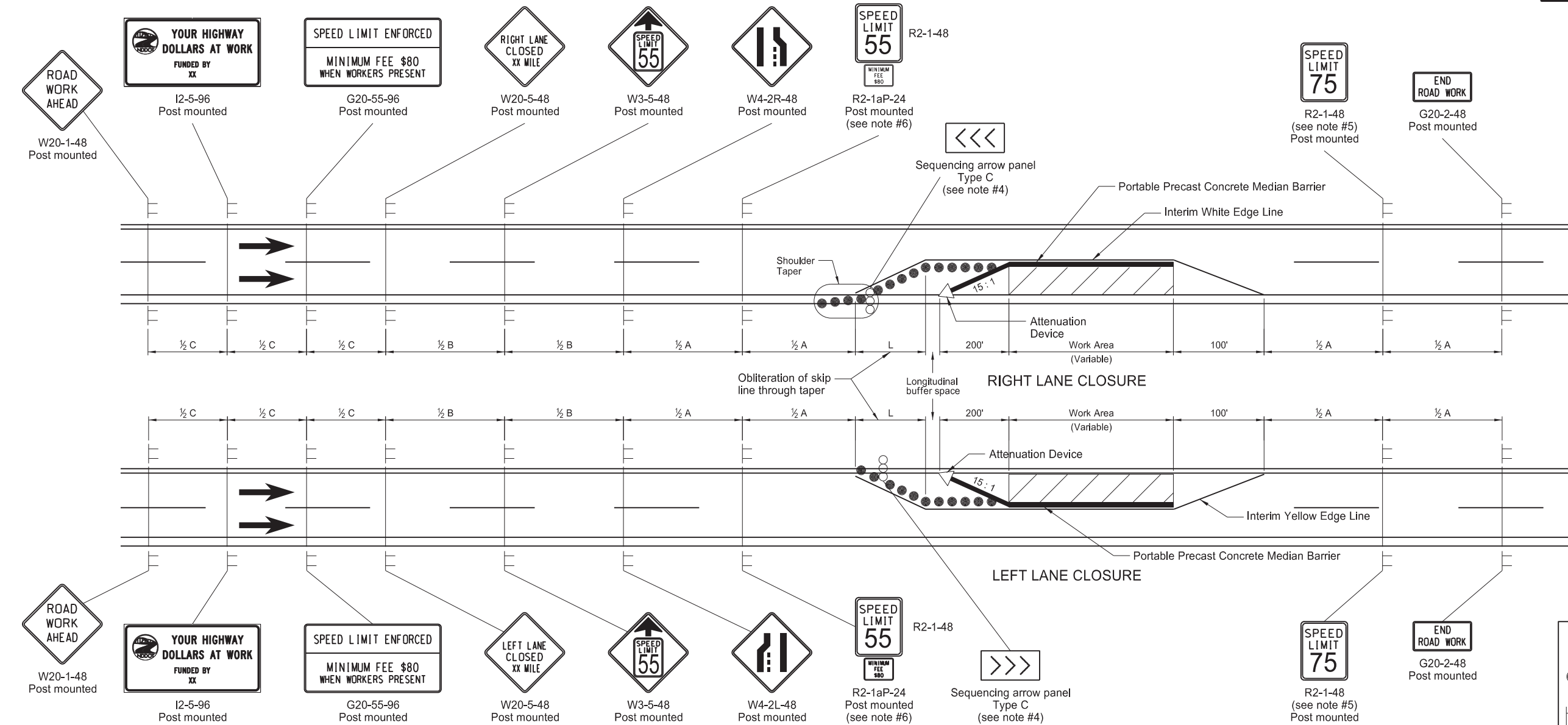
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Note update & sign numbers Removed signs & revised note Switched order of Road Work XXXX and Spd Limit Enforced & added Dollars At Work
11-01-19	
12-08-21	



12/08/21

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:
- 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 S² /60 for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Space delineator drums used for tapering traffic and on tangent at dimension "S".
 - 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).
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - 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.
 - 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.
 - Cover existing speed limit signs within a reduced speed zone.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
 - 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.
 - Reduce speed limit further, if location and conditions dictate.
 - Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

KEY

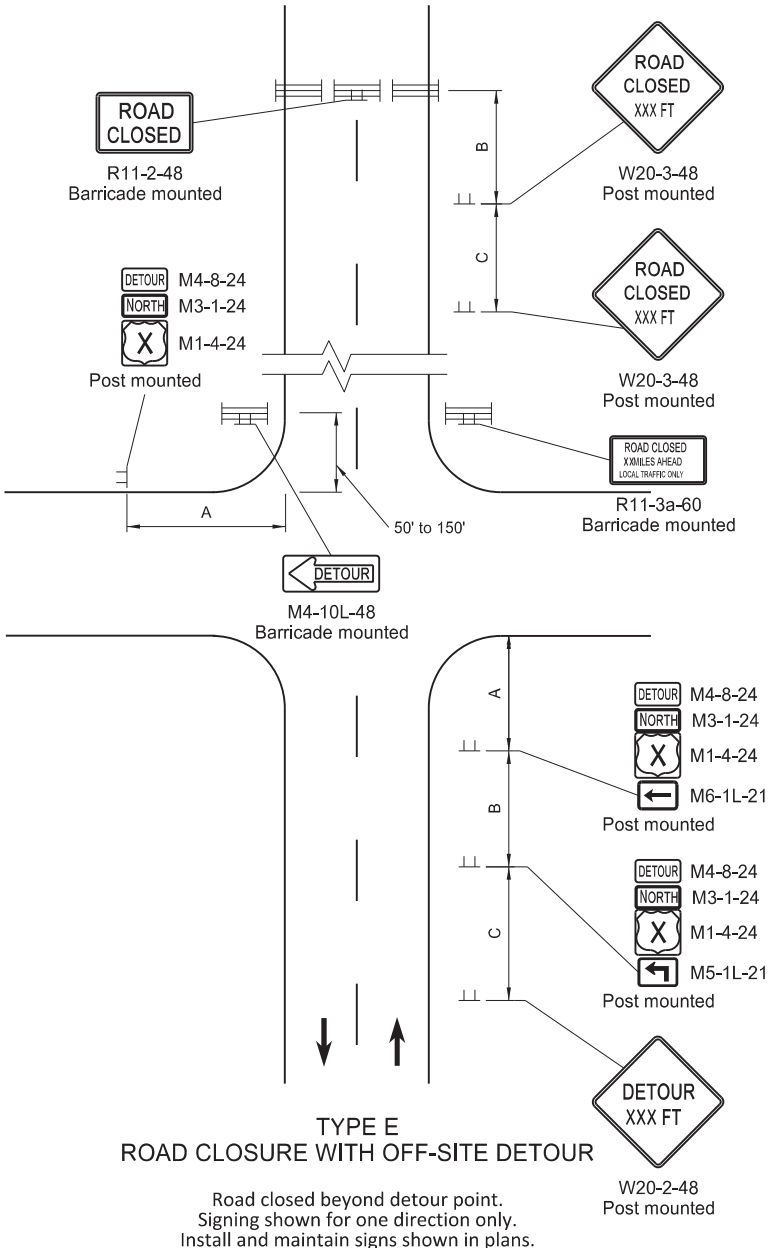
- Delineator Drum
- Sign
- Attenuation Device
- Sequencing Arrow Panel
- Work Area

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 #, & prvmt oblit change
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12/08/21

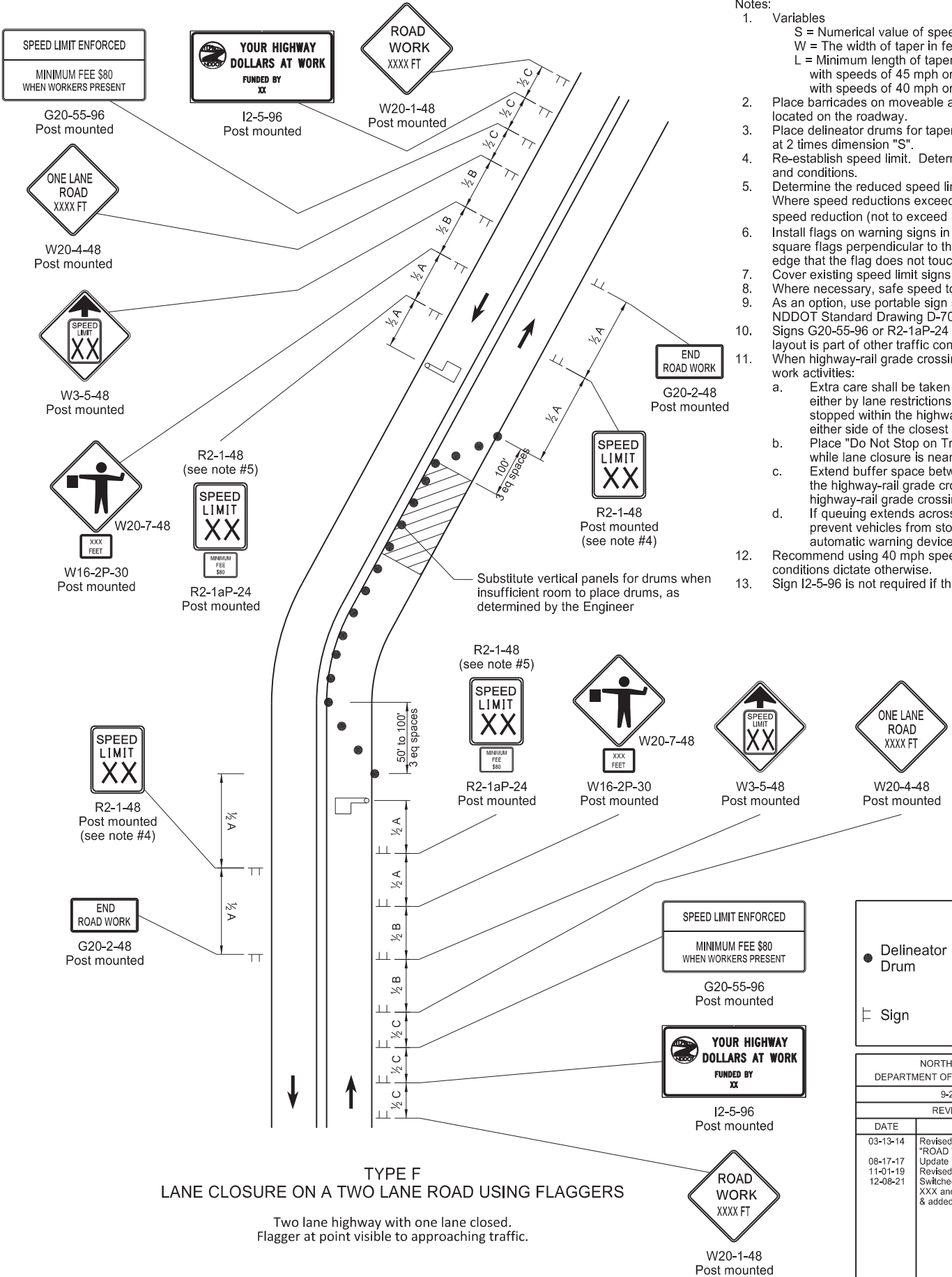
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

- Notes:
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper in feet
 - L = Minimum length of taper in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - 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 second speed limit sign at ½B.
 - 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.
 - Cover existing speed limit signs within a reduced speed zone.
 - Where necessary, safe speed to be determined by the Engineer.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.) Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
 - Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
 - If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Road closed beyond detour point.
Signing shown for one direction only.
Install and maintain signs shown in plans.



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed.
Flagger at point visible to approaching traffic.

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 40mph)	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		
Delineator Drum	Type III Barricade	Flagger
Sign	Work/Hazard Area	

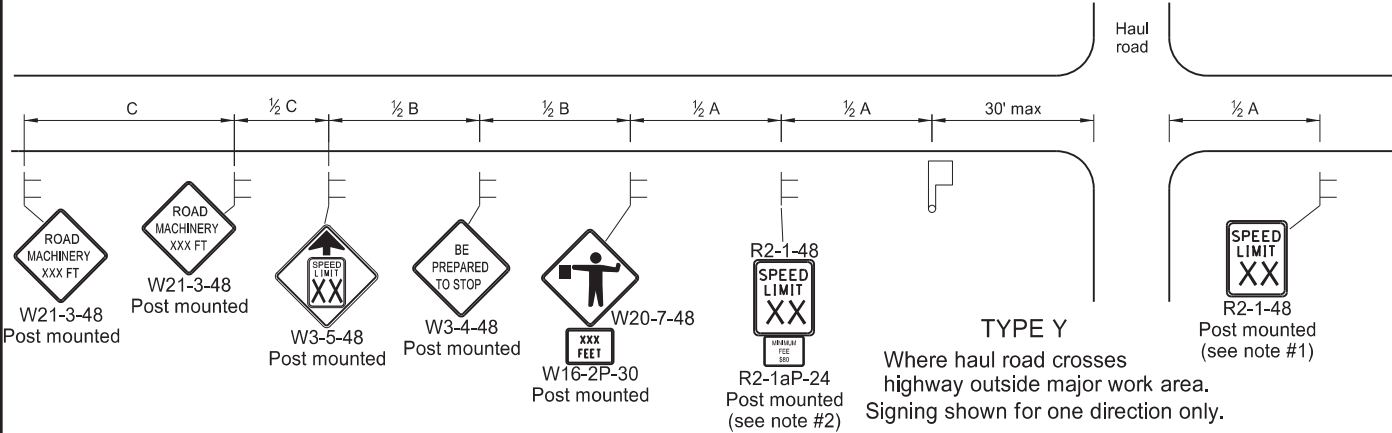
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
03-13-14	Revised Sign Call "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work



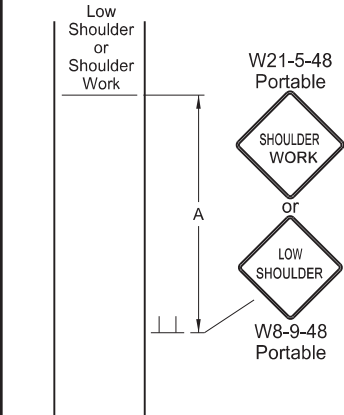
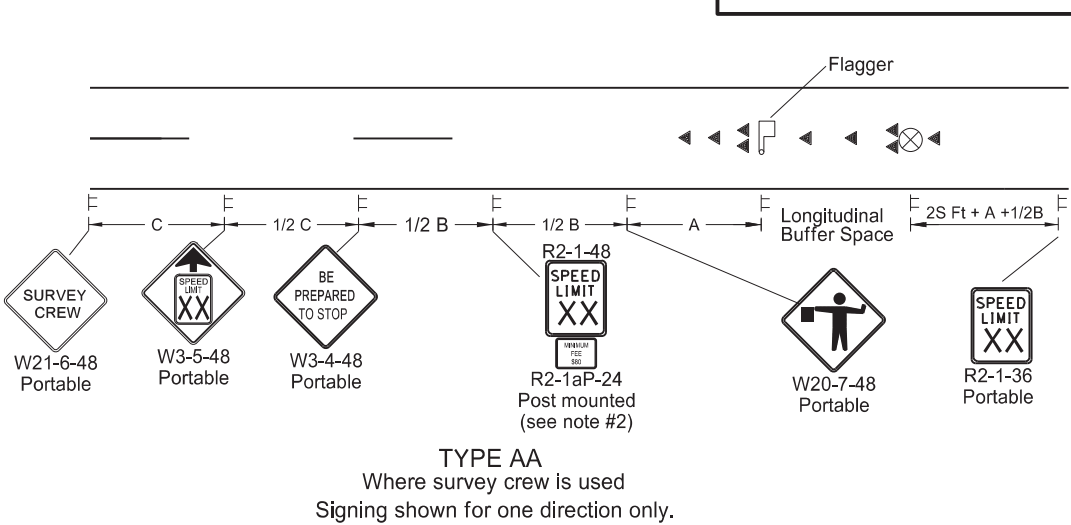
12/08/21

MISCELLANEOUS SIGN LAYOUTS

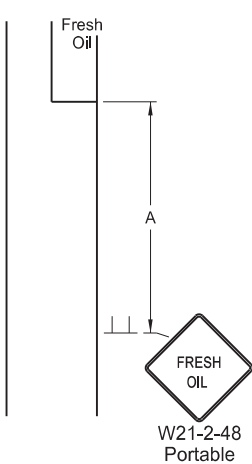
D-704-26



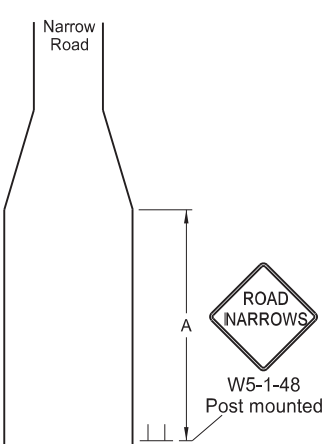
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



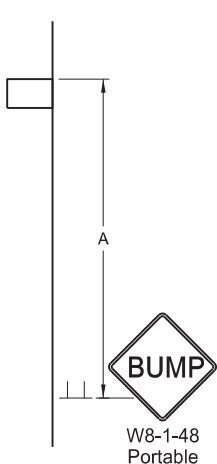
TYPE BB
Within major work area
where sign conditions exist



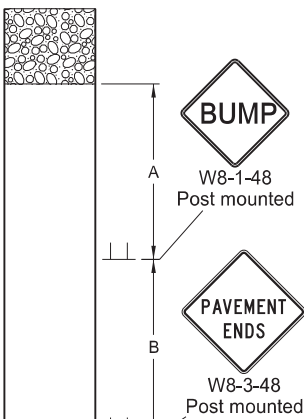
TYPE CC
Where sign conditions exist



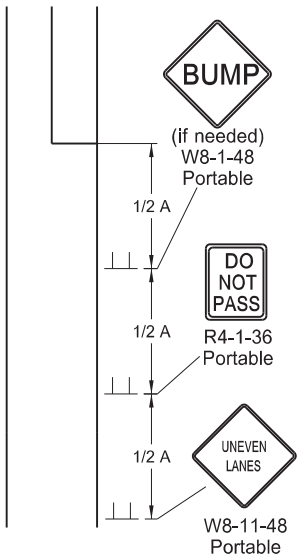
TYPE DD
Where sign conditions exist



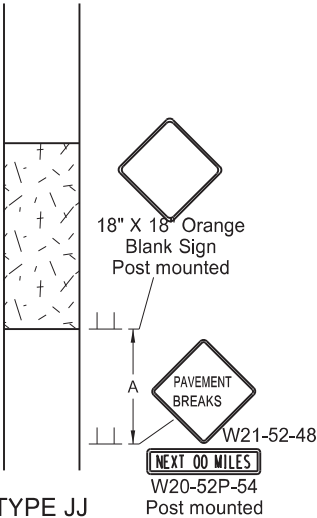
TYPE EE
Where sign conditions exist



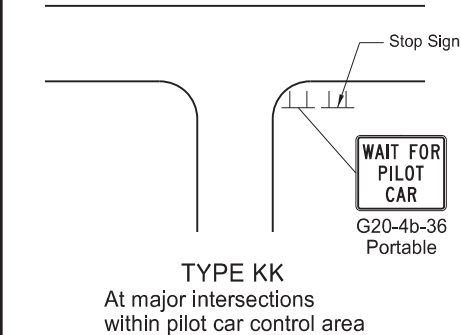
TYPE FF
Where sign conditions exist
Signing shown for one direction only.



TYPE GG
Where elevation difference
exists between lanes



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



TYPE KK
At major intersections
within pilot car control area

- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2B.
 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

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

KEY

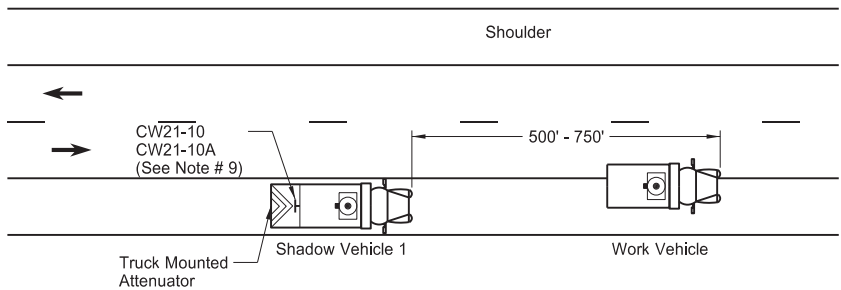
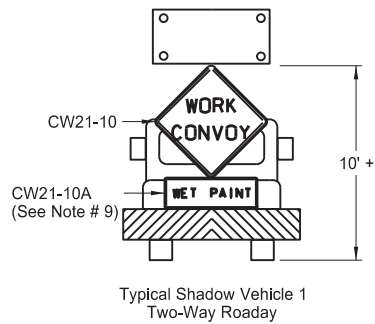
Flagger Sign

Cones Survey Equipment

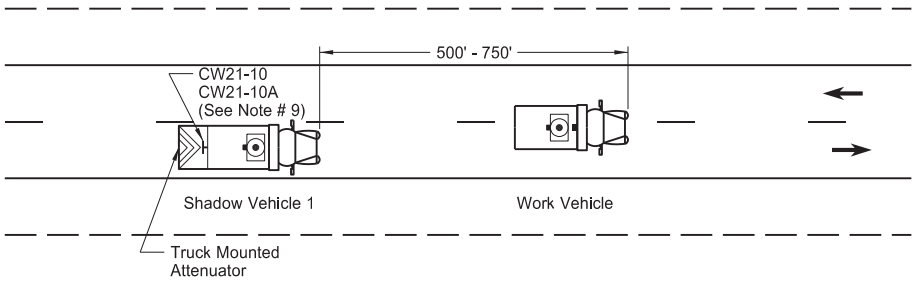
S = Numerical value of speed limit or 85th percentile.

MOBILE OPERATION
(PAVEMENT MARKING)

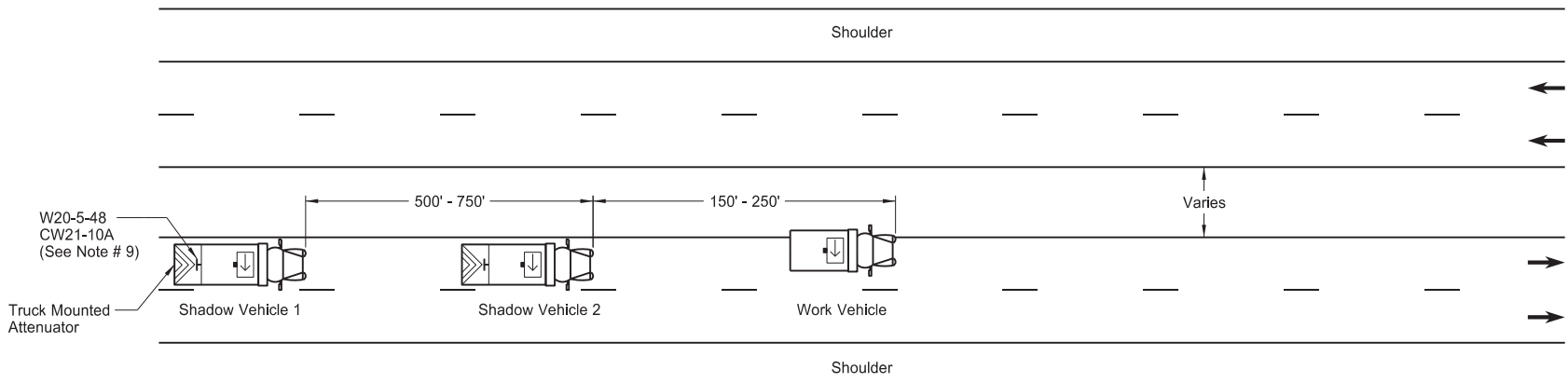
D-704-27



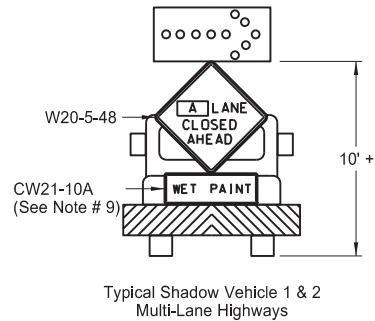
Two-Way Roadway with Paved Shoulders



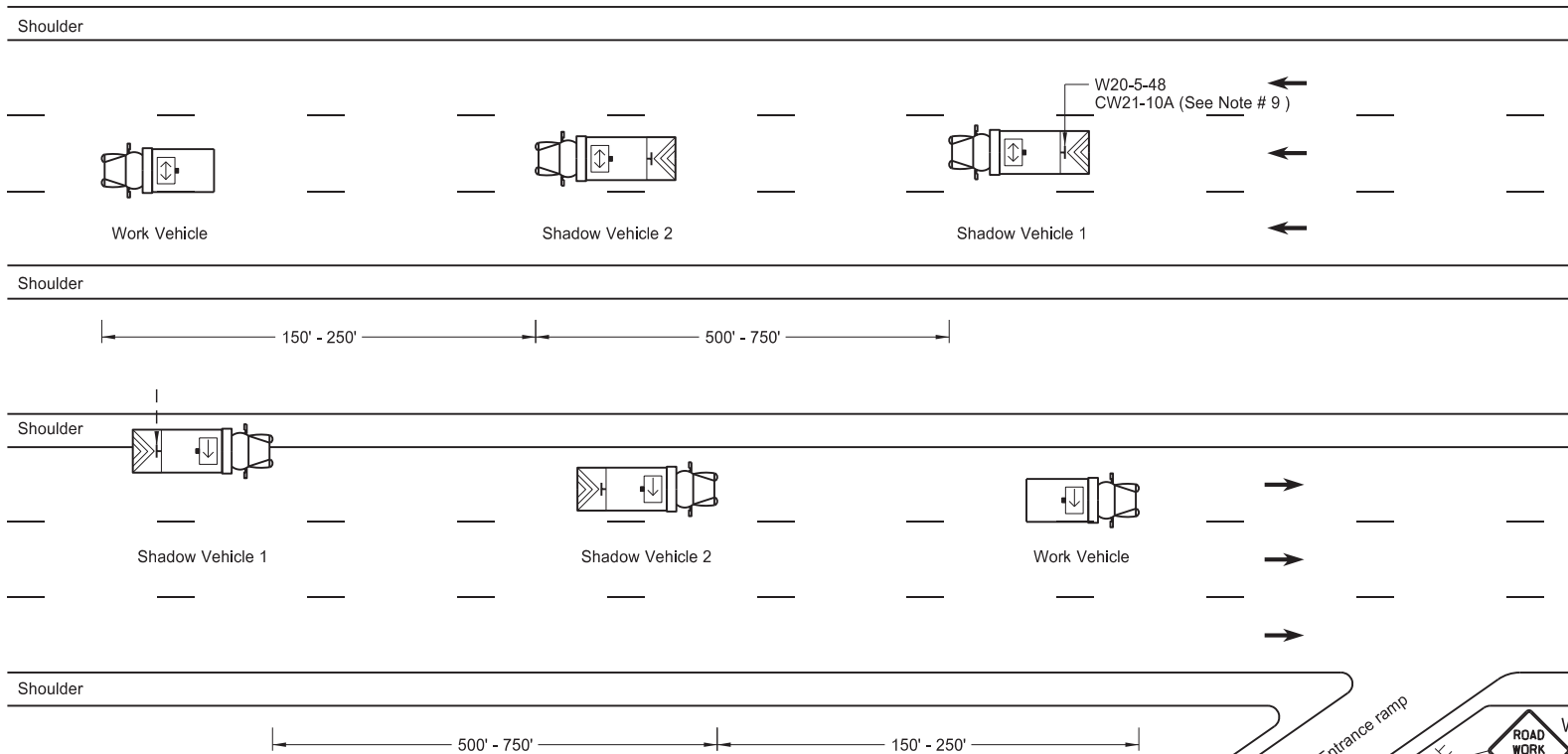
Two-Way Roadway without Paved Shoulders



Undivided Multi-Lane Roadway

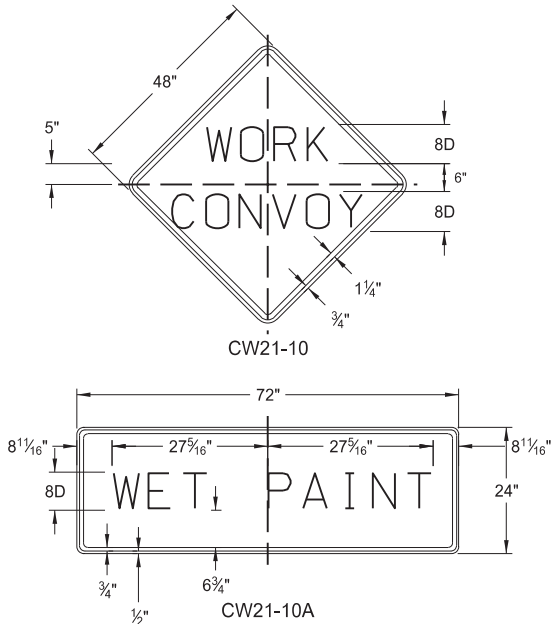


A = Left Right Center



Divided Multi-Lane Highway

Sign Details



- Notes
1. Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
 2. Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
 3. Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
 4. Provide each vehicle with two-way electronic communication capability.
 5. Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
 6. Vary vehicle spacing between shadow vehicle 1 and shadow vehicle 2 based on sight distance restrictions. Motorists approaching the work convoy need to see trail vehicle in time to slow down and/or change lanes as they approach shadow vehicle.
 7. Sign Colors
Letters = Black
Border = Black
Background = Orange
 8. As an option, use shadow vehicle 2 the paint tender vehicle.
 9. Use sign CW21-10A only during painting operation.
 10. Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.

KEY

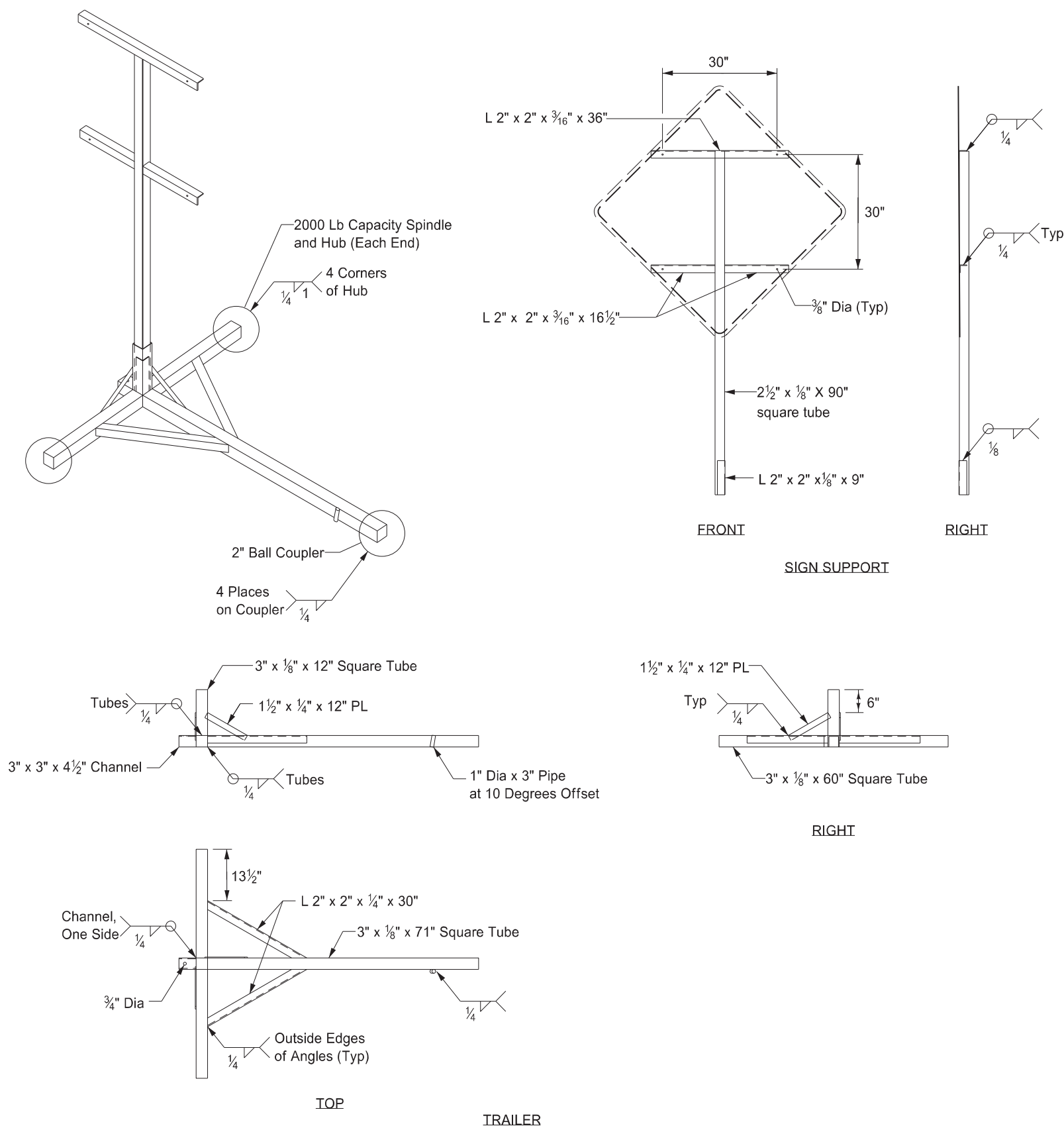
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
- Right directional
 - Left directional
 - Double arrow directional
 - Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



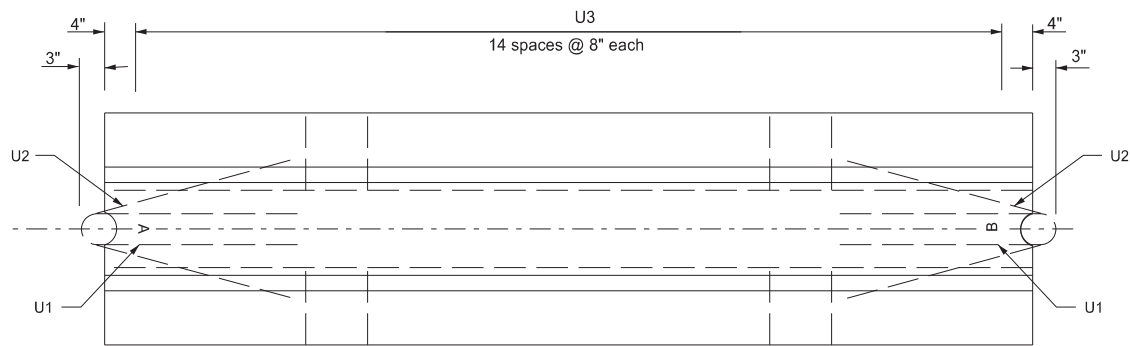
- Notes:
- 1. Maximum 250 pound weight of assembly.
 - 2. Use a 14" wheel and tire.
 - 3. Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
 - 4. Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

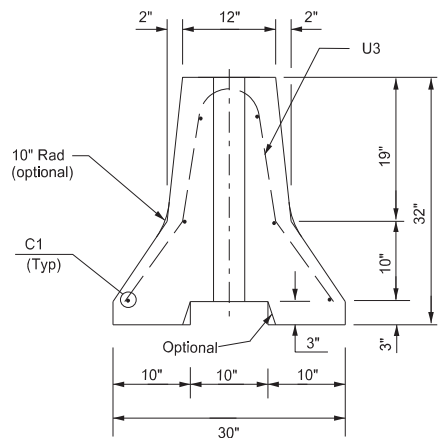
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

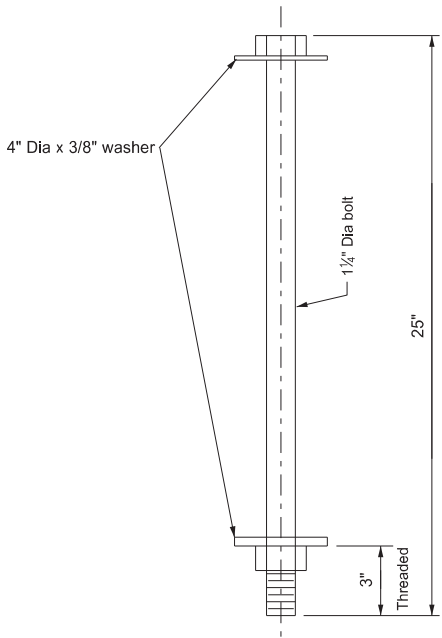
D-704-51



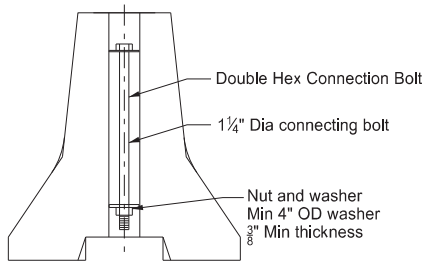
Plan View



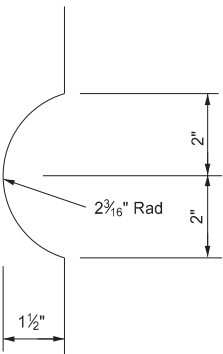
End View



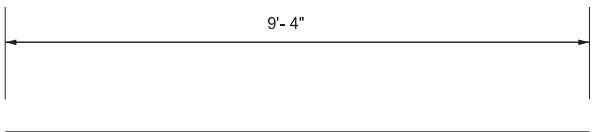
Connecting Bolt Detail
(One per 10 Ft section)



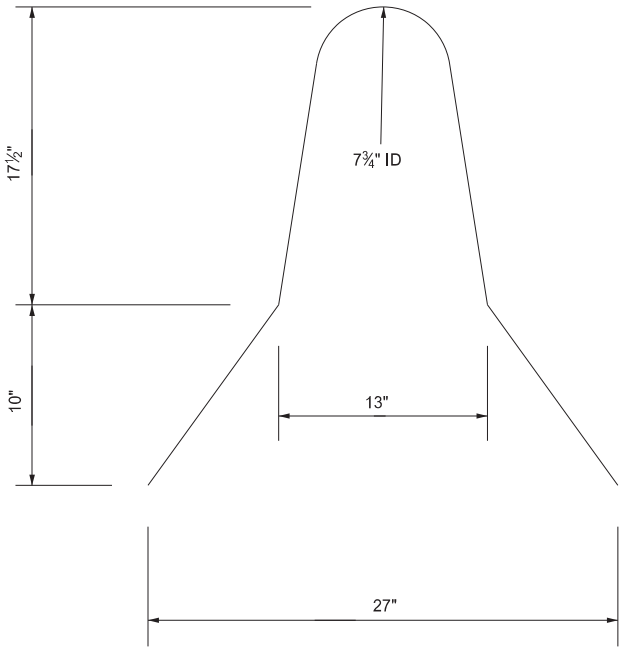
Bolt Connection Detail



Dap Detail



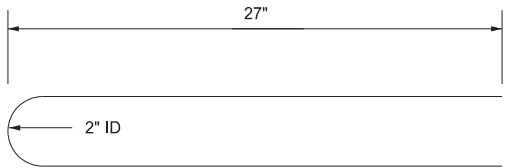
C1 Bar Detail



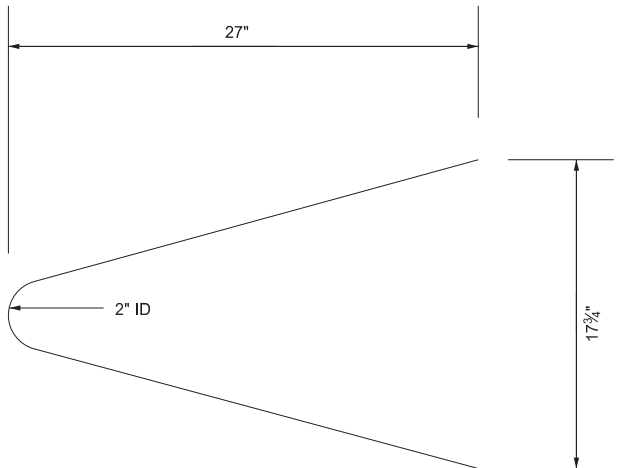
U3 Bar Detail

Notes:

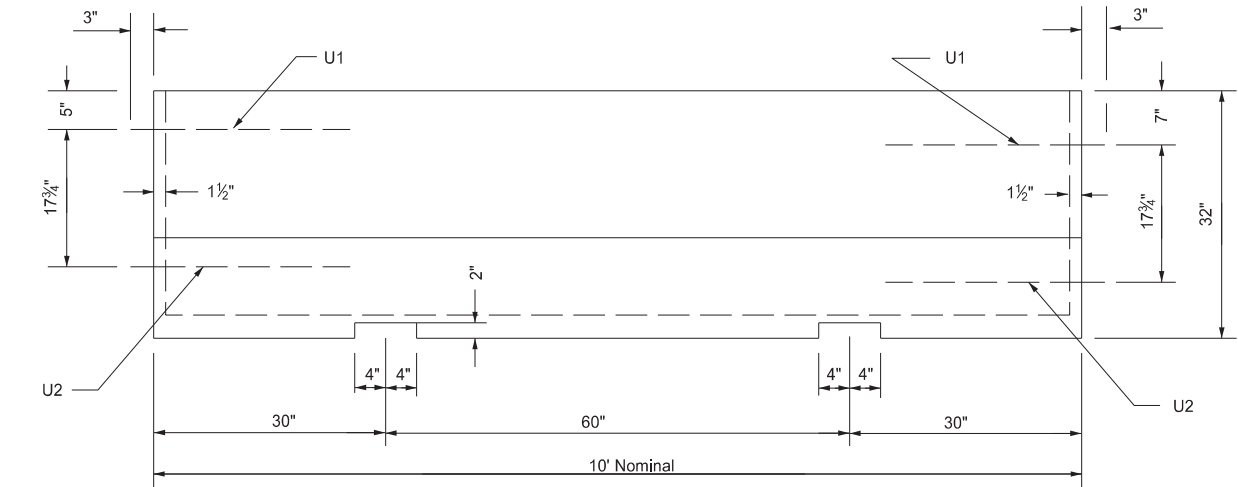
1. Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
2. Use AAE-3 Concrete.
3. Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
4. Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
5. Place barrier markers at the center of the barrier at 20' centers.
6. Connect barrier sections with 1 1/4" 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.



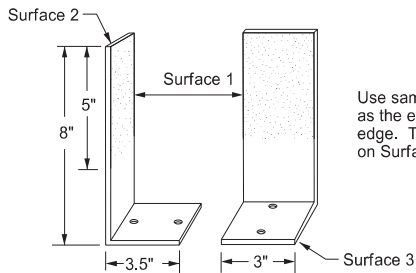
U1 Bar Detail



U2 Bar Detail



Side View



Barrier Marker Detail

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

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 1/4" @ 73°F	8,000	D790
Flexural modulus, PSI 1/4" @ 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

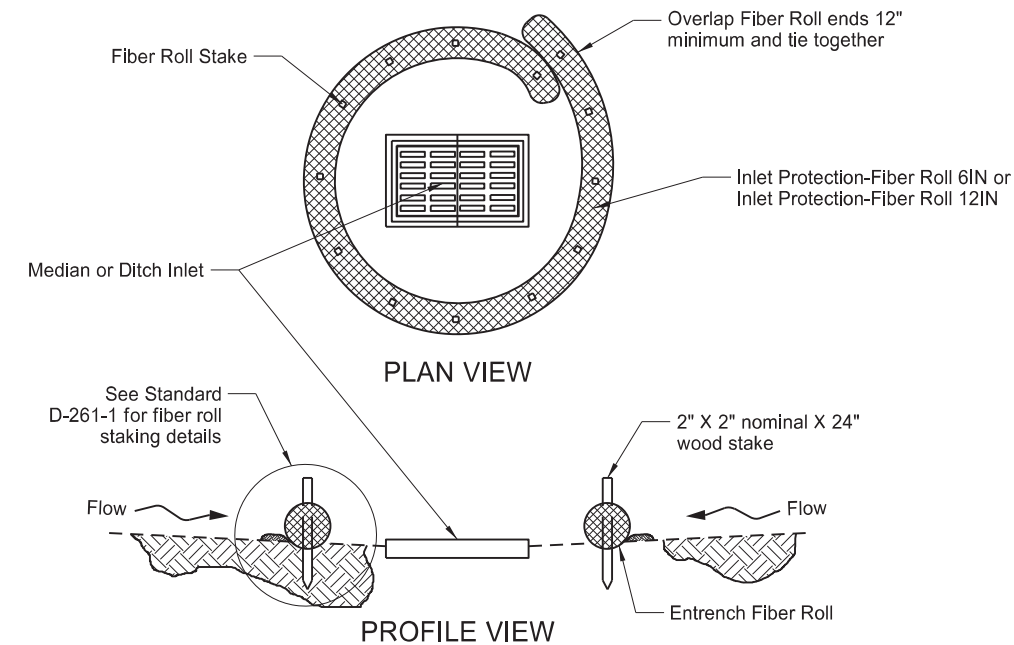
Adhesive
Use factory applied solid butyl rubber 1/8" thick, 2" wide on 2 1/4" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'-4"	Straight
U1	4	2	4'-8"	Bent
U2	4	2	4'-10 1/4"	Bent
U3	4	15	5'-4"	Bent

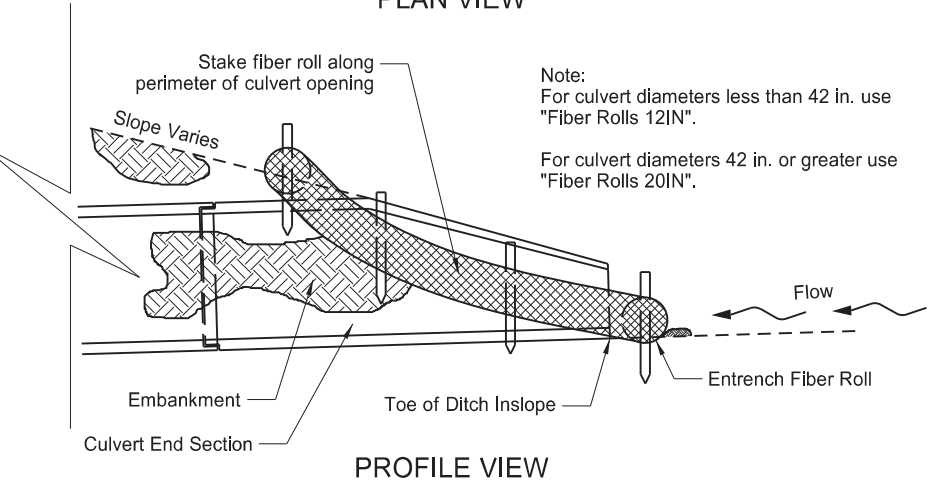
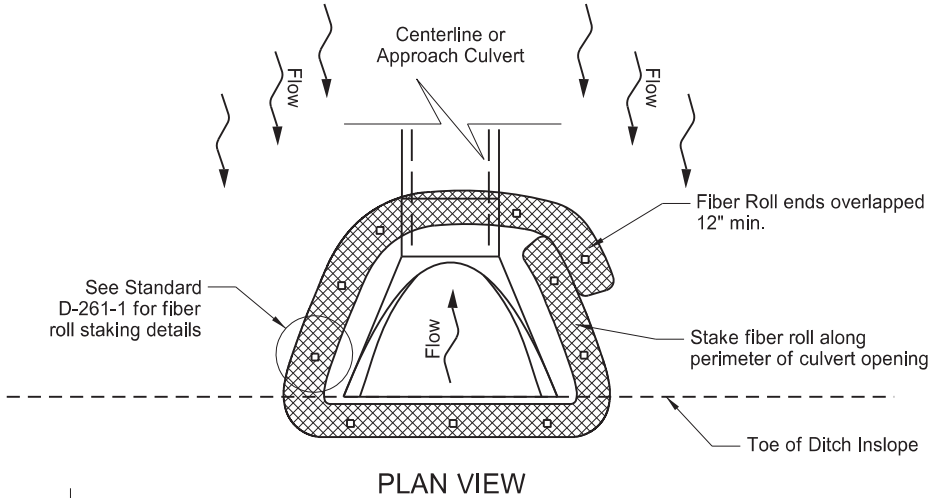
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice New Design Engr PE Stamp

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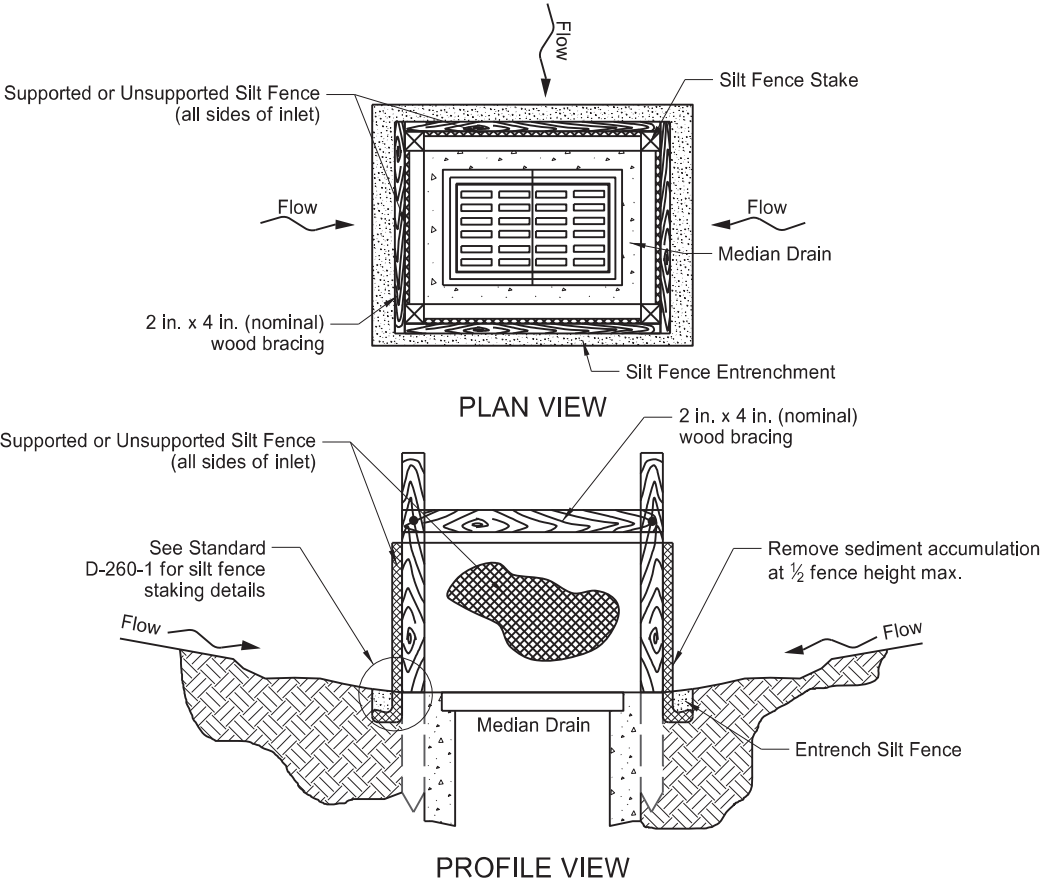
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



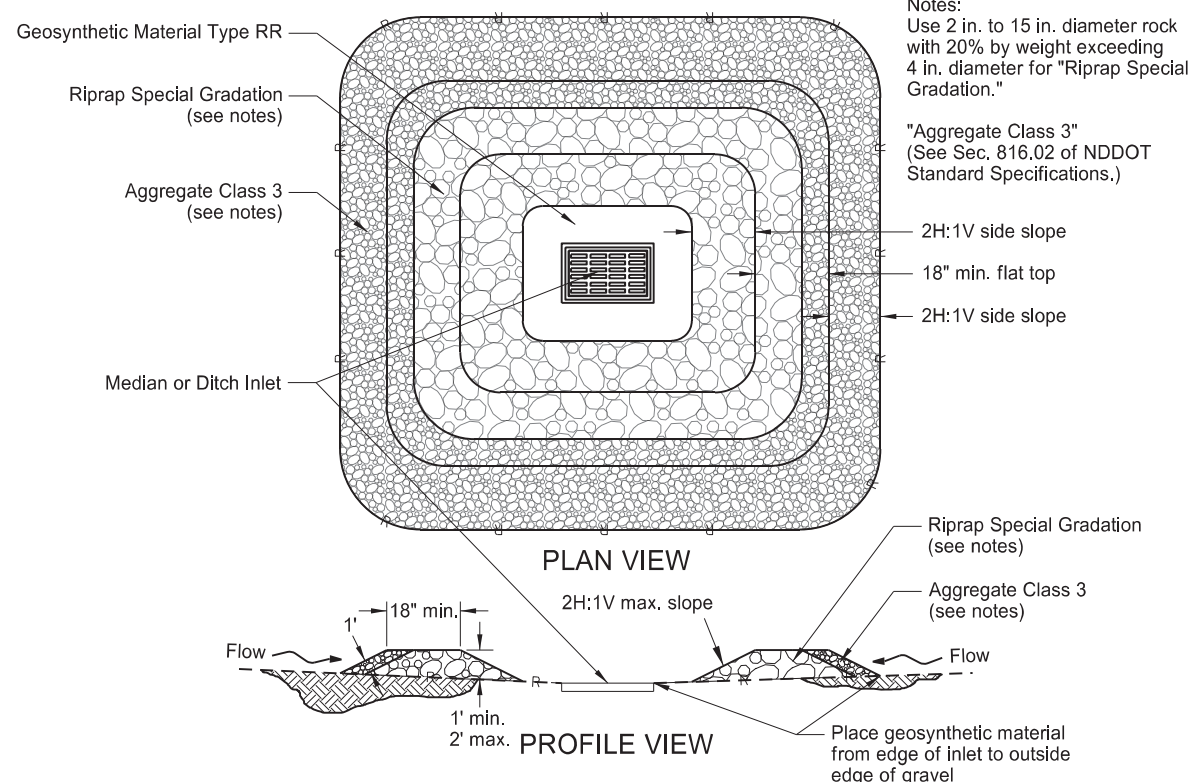
FIBER ROLL PROTECTION
(MEDIAN OR DITCH INLET)



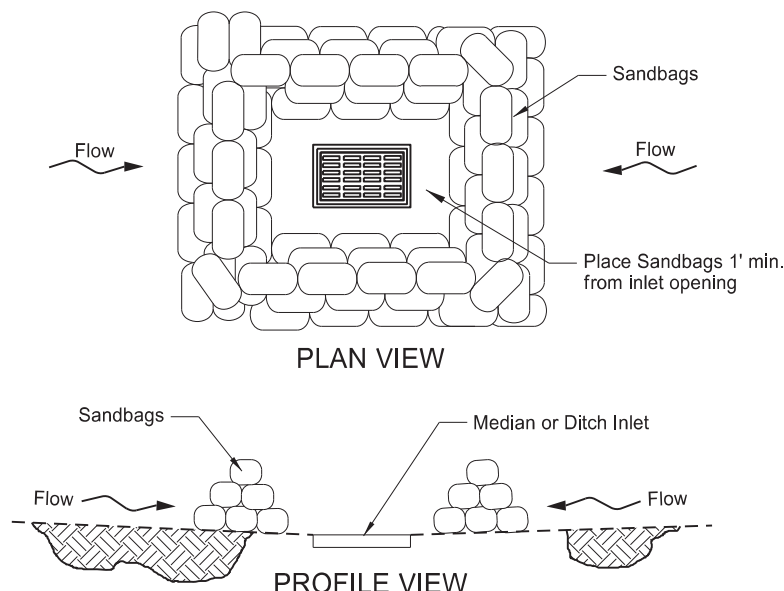
FIBER ROLL PROTECTION
(INLET OF CULVERT)



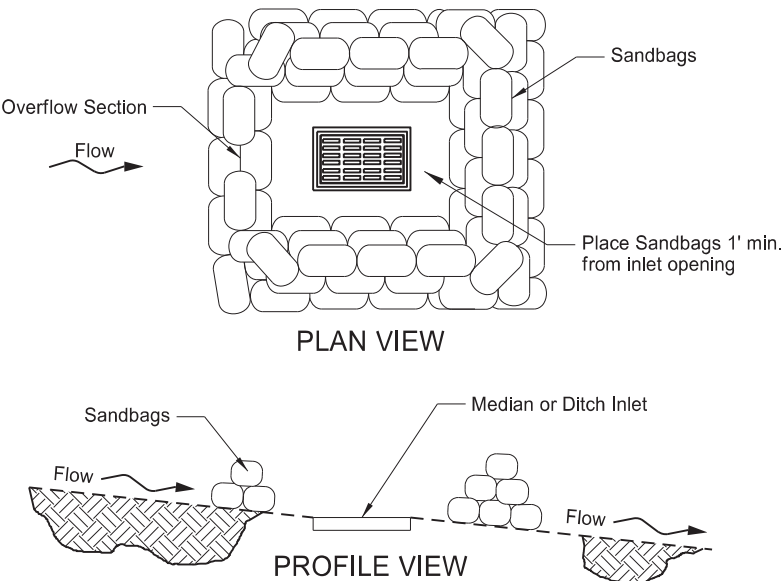
SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION
(MEDIAN OR DITCH INLET)



SANDBAG PROTECTION
(LOW POINT)

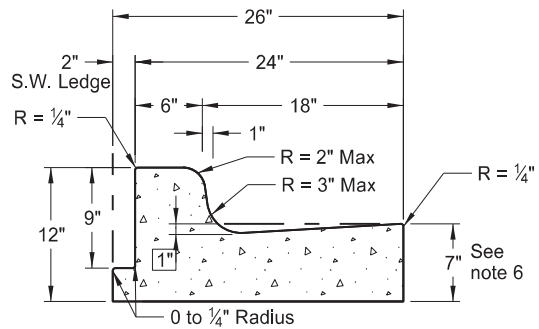


SANDBAG PROTECTION
(ON SLOPE)

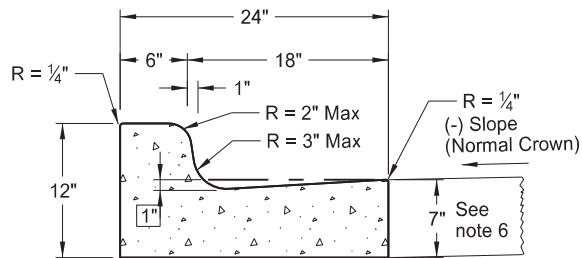
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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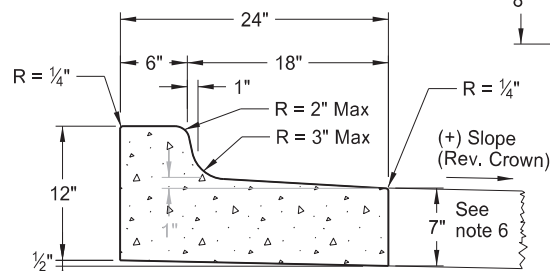
Curb & Gutter and Valley Gutter



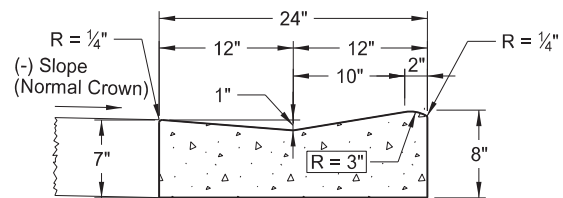
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk,
Median, or Parking Lot.
(Sec. A shown. See Sec B for
additional details.)



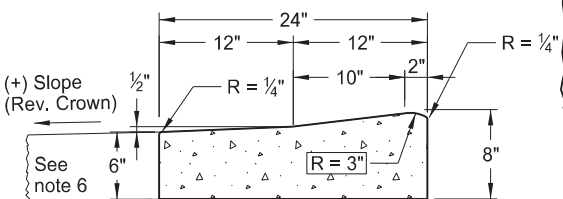
Curb & Gutter Type 1 (Sec. A)



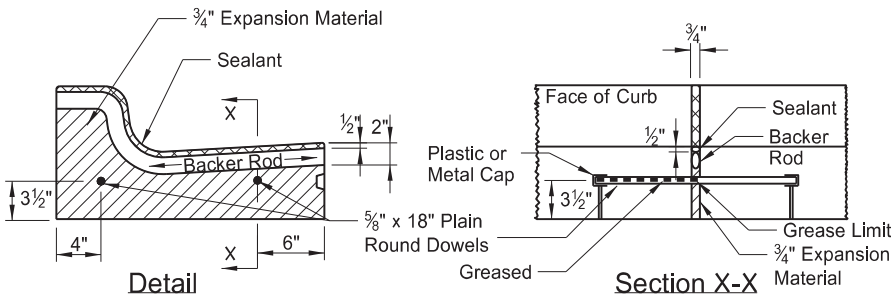
Curb & Gutter Type 1 (Sec. B)



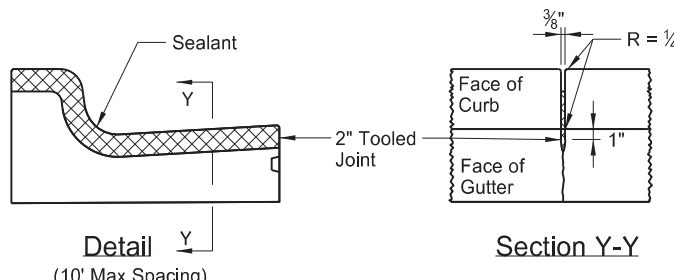
Mountable Curb & Gutter Type 1 (Sec. A)



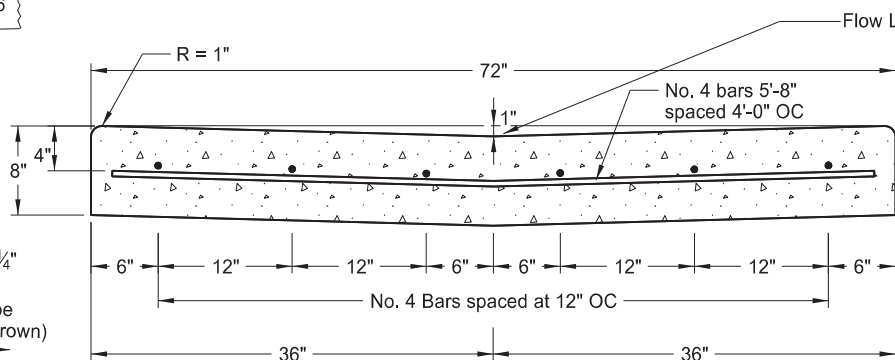
Mountable Curb & Gutter Type 1 (Sec. B)



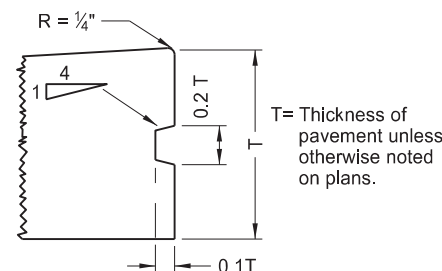
Isolation Joint



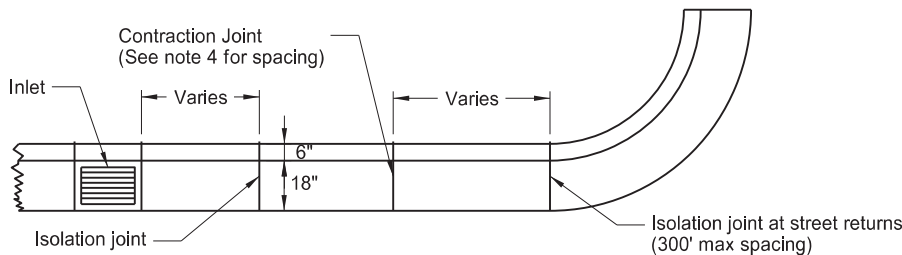
Contraction Joint



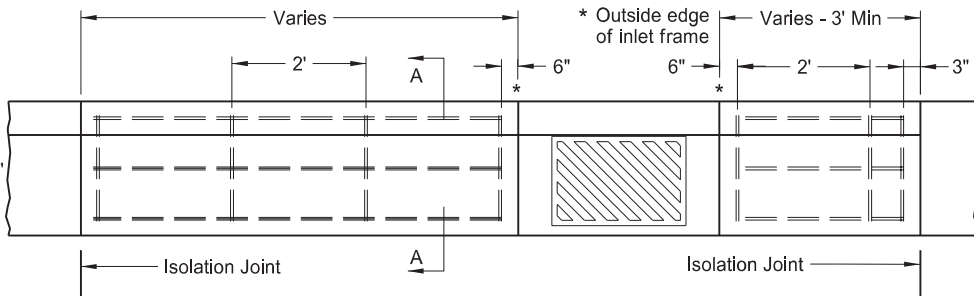
72" Concrete Valley Gutter Detail



Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)

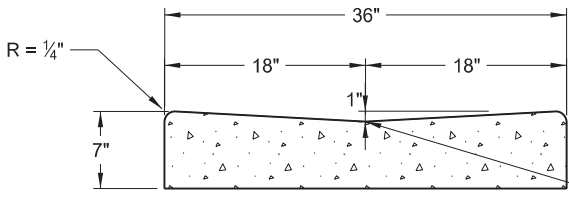


Joint Location Detail

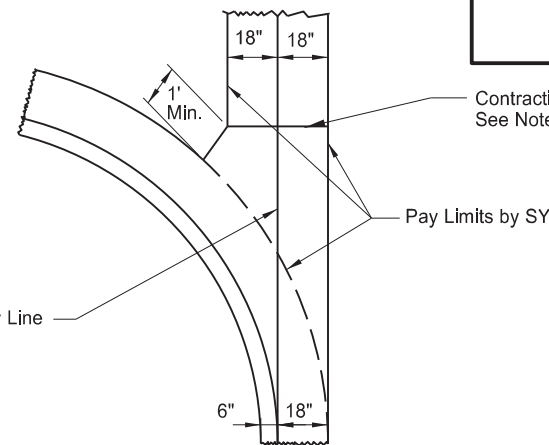


Curb & Gutter Reinforcing at Inlets

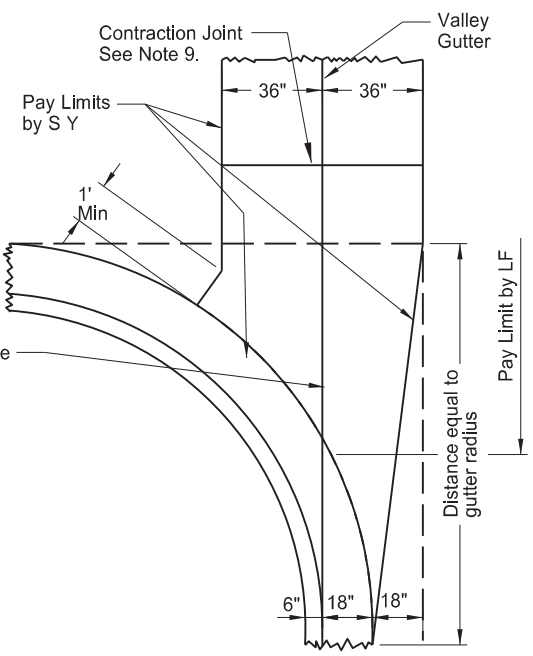
NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.



36" Concrete Valley Gutter Detail



36" Concrete Valley Gutter Plan



72" Concrete Valley Gutter Plan

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 3/4" expansion joint filler for isolation joint material. 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 bituminous 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: Seal contraction and isolation joints as shown in the details. Use joint sealant for contraction joints 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. Face of Gutter Depth: For hot bituminous pavement use 7" gutter depth as shown. For PCC pavements, match the gutter depth to the depth of adjacent PCC pavement or to construct a 7" depth as shown.
7. Tie curb and gutter to abutting PCC pavement with No. 3 bars, 1'-6" in length, spaced at 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. Install an 18" tie bar across the joint.
9. Valley Gutter Joints: Form, saw, or score 1/8" min. to 3/8" 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.

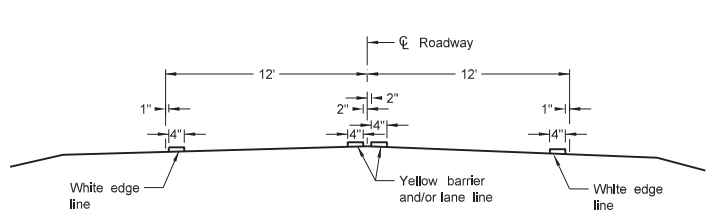
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.

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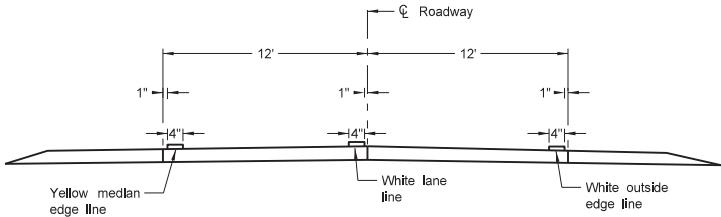
PAVEMENT MARKING

D-762-4

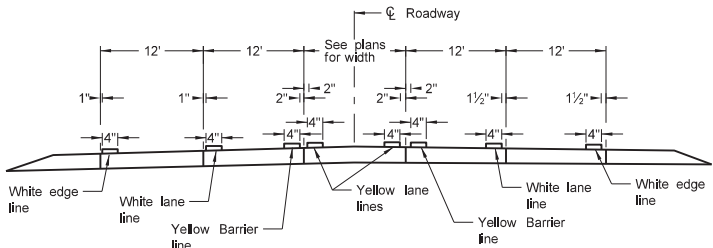
- NOTES:
- 1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



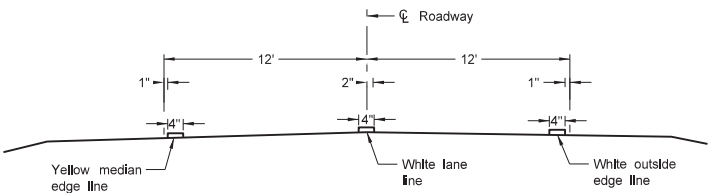
Two Lane Two Way
RURAL ROADWAY



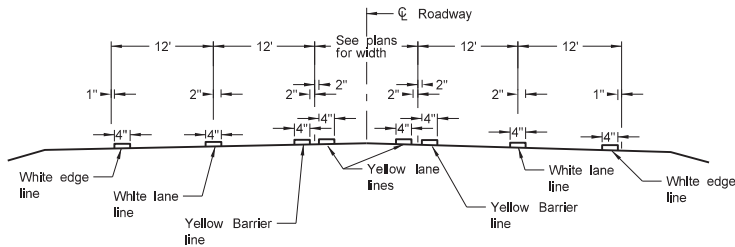
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



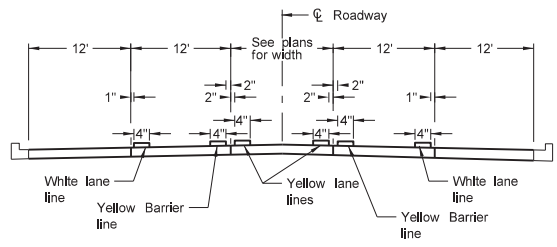
RURAL FIVE LANE ROADWAY
Concrete Section



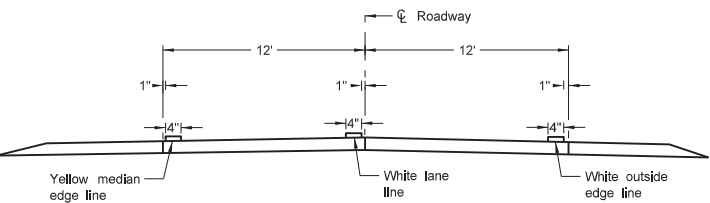
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



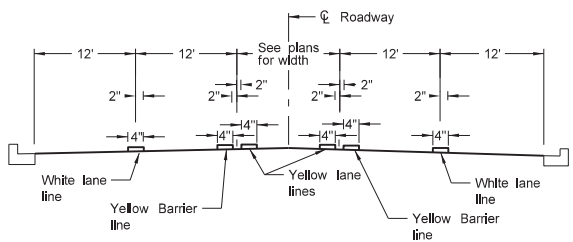
RURAL FIVE LANE ROADWAY
Asphalt Section



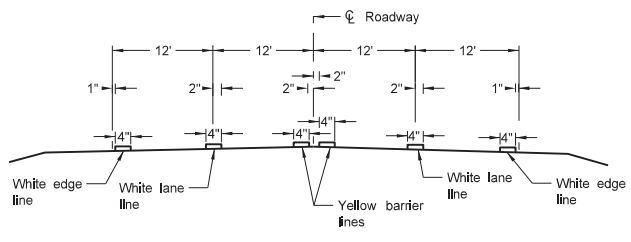
URBAN FIVE LANE SECTION
Concrete Section



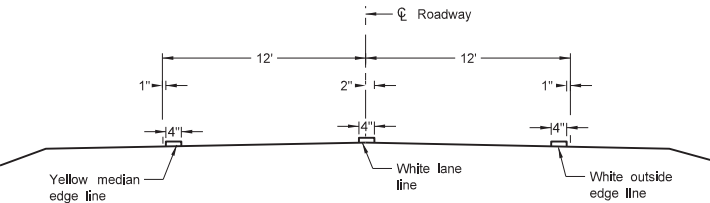
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



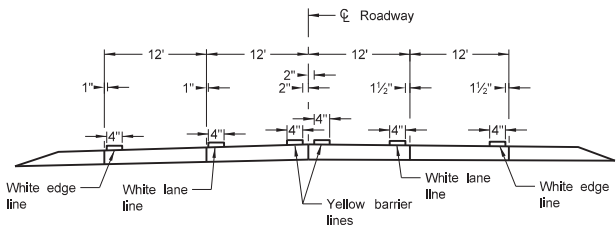
URBAN FIVE LANE SECTION
Asphalt Section



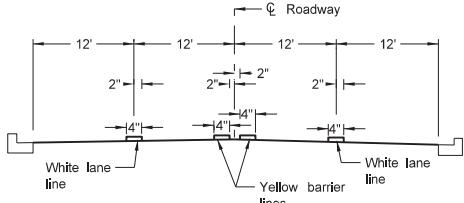
RURAL FOUR LANE ROADWAY
Asphalt Section



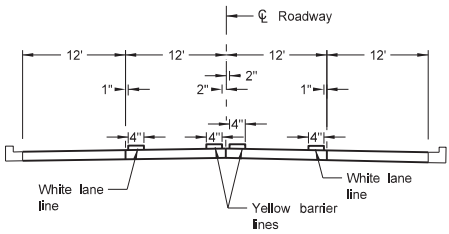
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



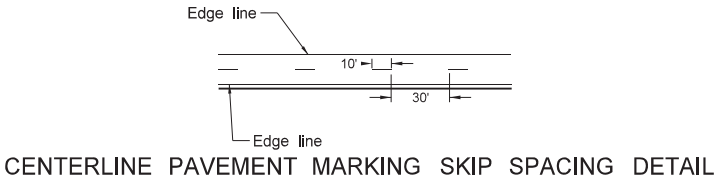
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



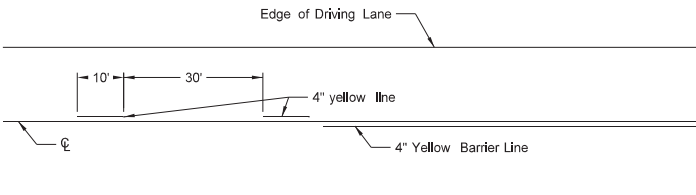
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17 08-27-19	Updated to active voice. New Design Engineer PE Stamp.

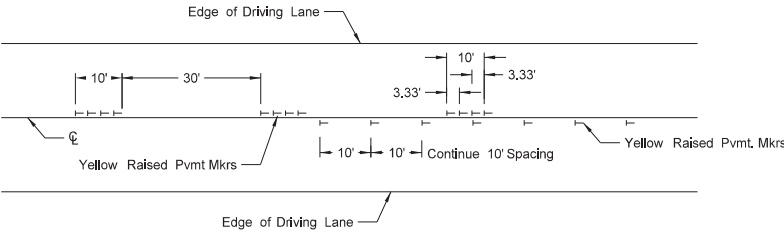
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SHORT-TERM PAVEMENT MARKING

D-762-11

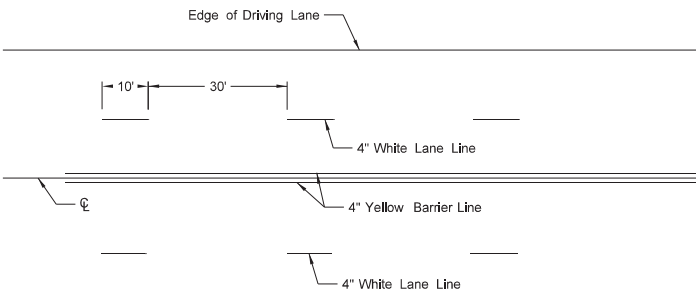


Painted or Tape Lines

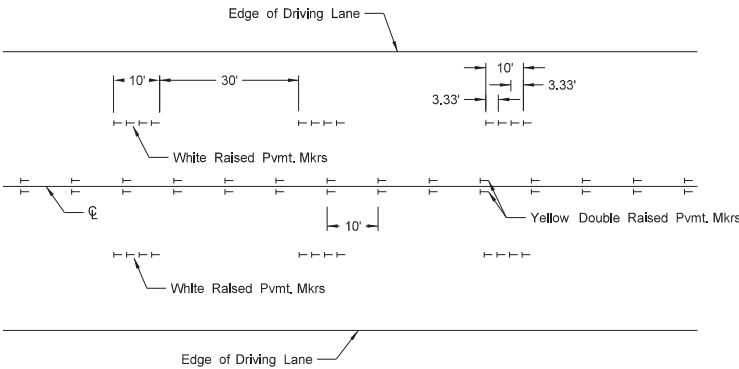


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

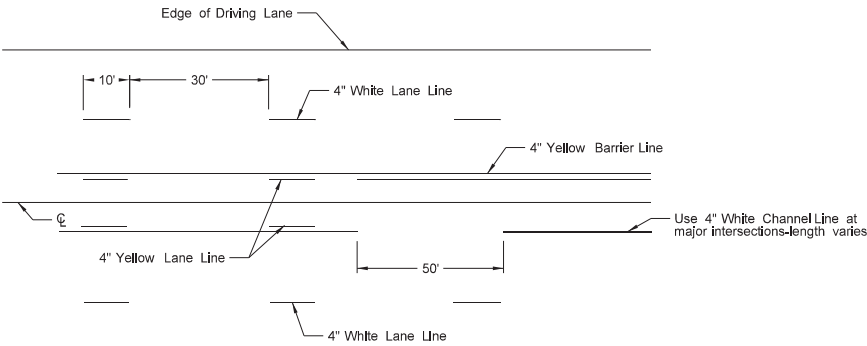


Painted or Tape Lines

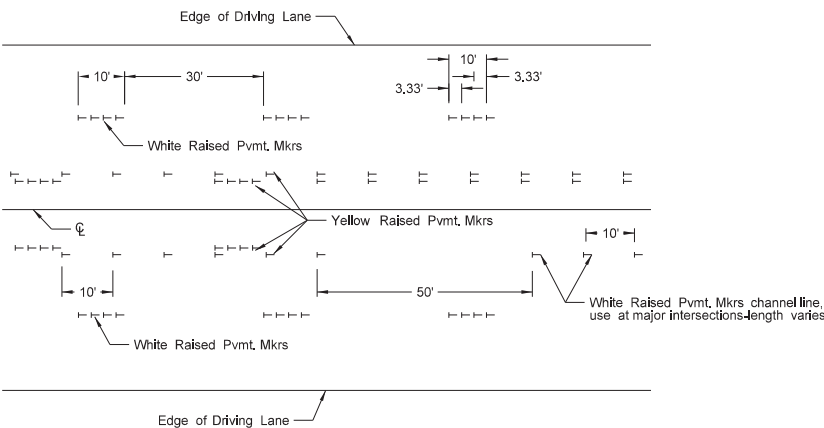


Raised Pavement Markers

FOUR LANE ROADWAY

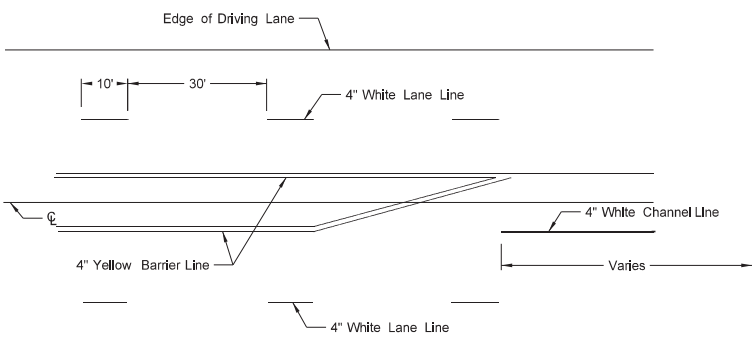


Painted or Tape Lines

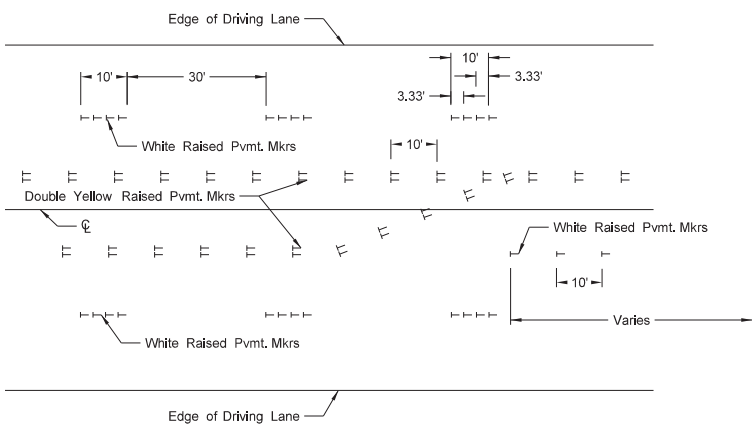


Raised Pavement Markers

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.

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.

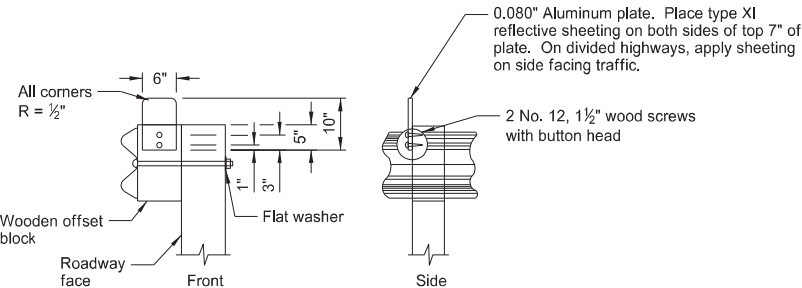
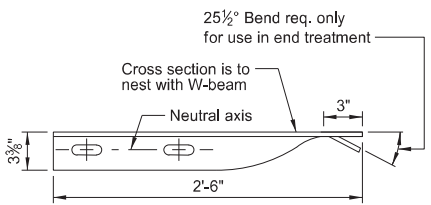
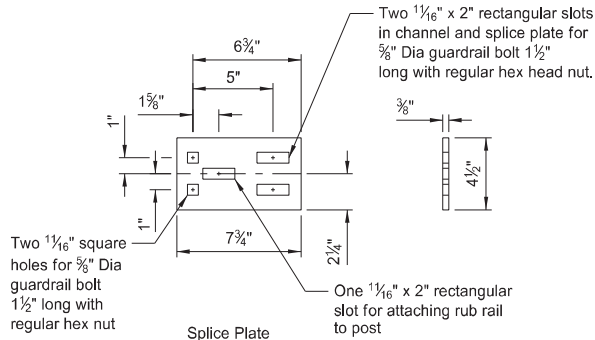
This document was originally issued and sealed by

Kirk J Hoff,
Registration Number
PE- 4683,
on 8/27/19 and the original document is stored at the
North Dakota Department
of Transportation

W-BEAM GUARDRAIL GENERAL DETAILS

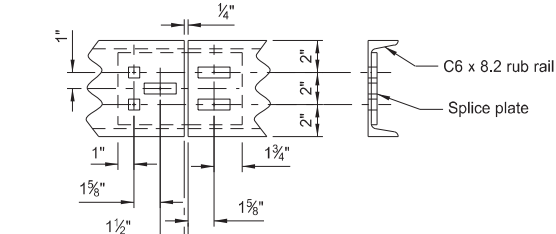
NOTES:

- Place reflector plates at the first post and spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. Use reflector the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
- Dispose of excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material where guardrail is installed after mat is placed. Include cost of excavation and replacing of bituminous material in the price bid for other items.
- Place Object Marker within the vertical edges of the Impact Plate. Use type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply sheeting to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. Attach the Object Marker to the Impact Head Plate with non-rust rivets or some other non-rust attachment device. Slope stripes downward toward the roadway side.
- Guardrail installation height tolerance = - ¼", + 1".
- Standard W-Beam rail post bolt slot spacing is 6'-3". Post bolt slot spacing of 3'-1½" is acceptable.

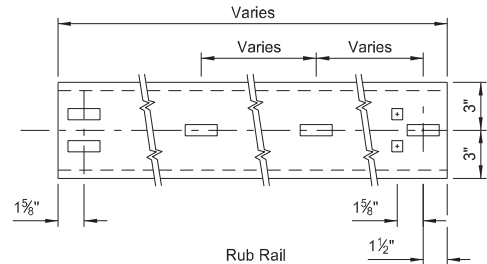


REFLECTORIZED PLATE DETAIL

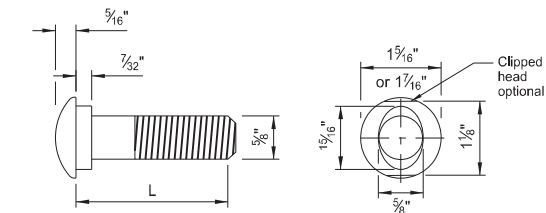
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



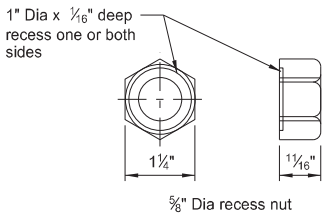
Splice Detail



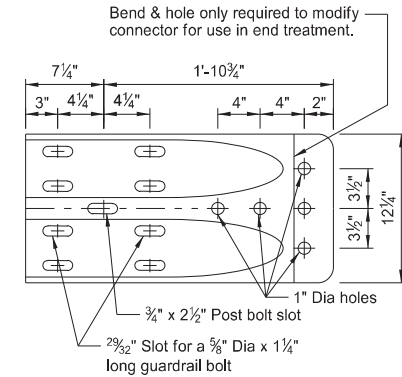
C6x8 RUB RAIL AND SPLICE PLATE



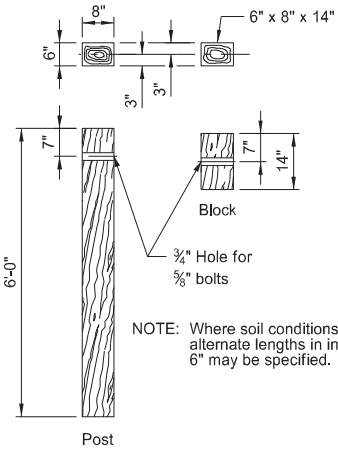
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



5/8" GUARDRAIL BOLT & RECESS NUT

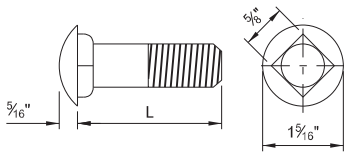


W BEAM TERMINAL CONNECTOR

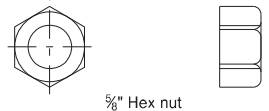


6"x8" TIMBER POST & BLOCK

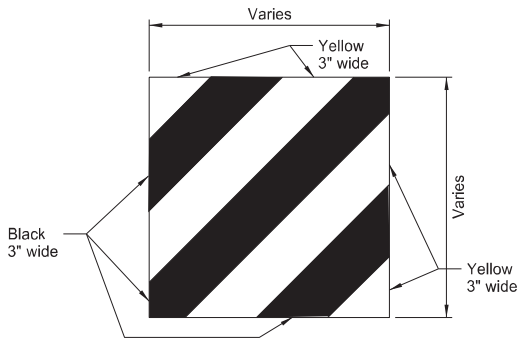
NOTE: Where soil conditions require alternate lengths in increments of 6" may be specified.



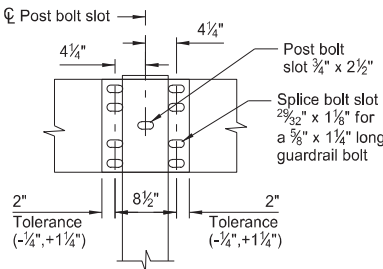
5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



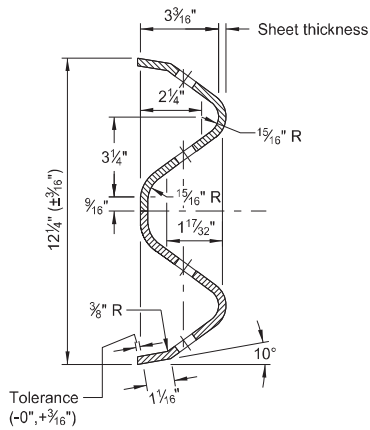
5/8" CARRIAGE BOLT & NUT



IMPACT HEAD OBJECT MARKER



SPLICE DETAIL

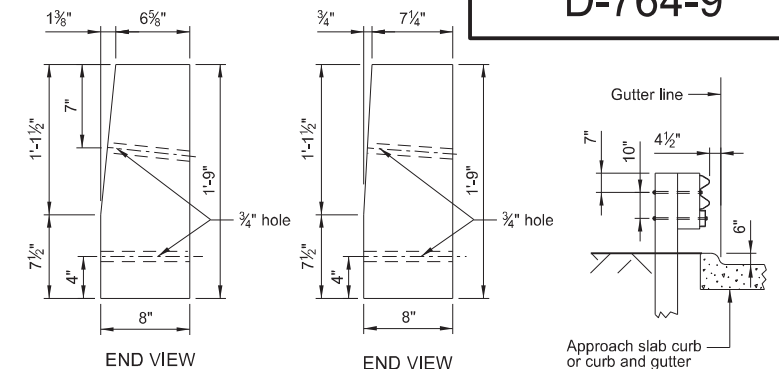


W-BEAM CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
10-25-19	Updated notes to active voice and added Note 5.
12-02-20	Updated clipped head to optional



D-764-9



SECTION B-B



TOP PLATE

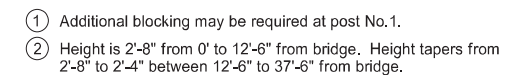


SECTION C-C



TRAFFIC SIDE ELEVATION

END VIEW

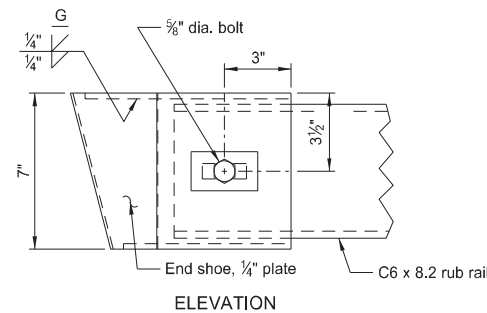


BOTTOM PLATE

ELEVATION
RUB RAIL BENT SECTION



RUB RAIL END SHOE ASSEMBLY

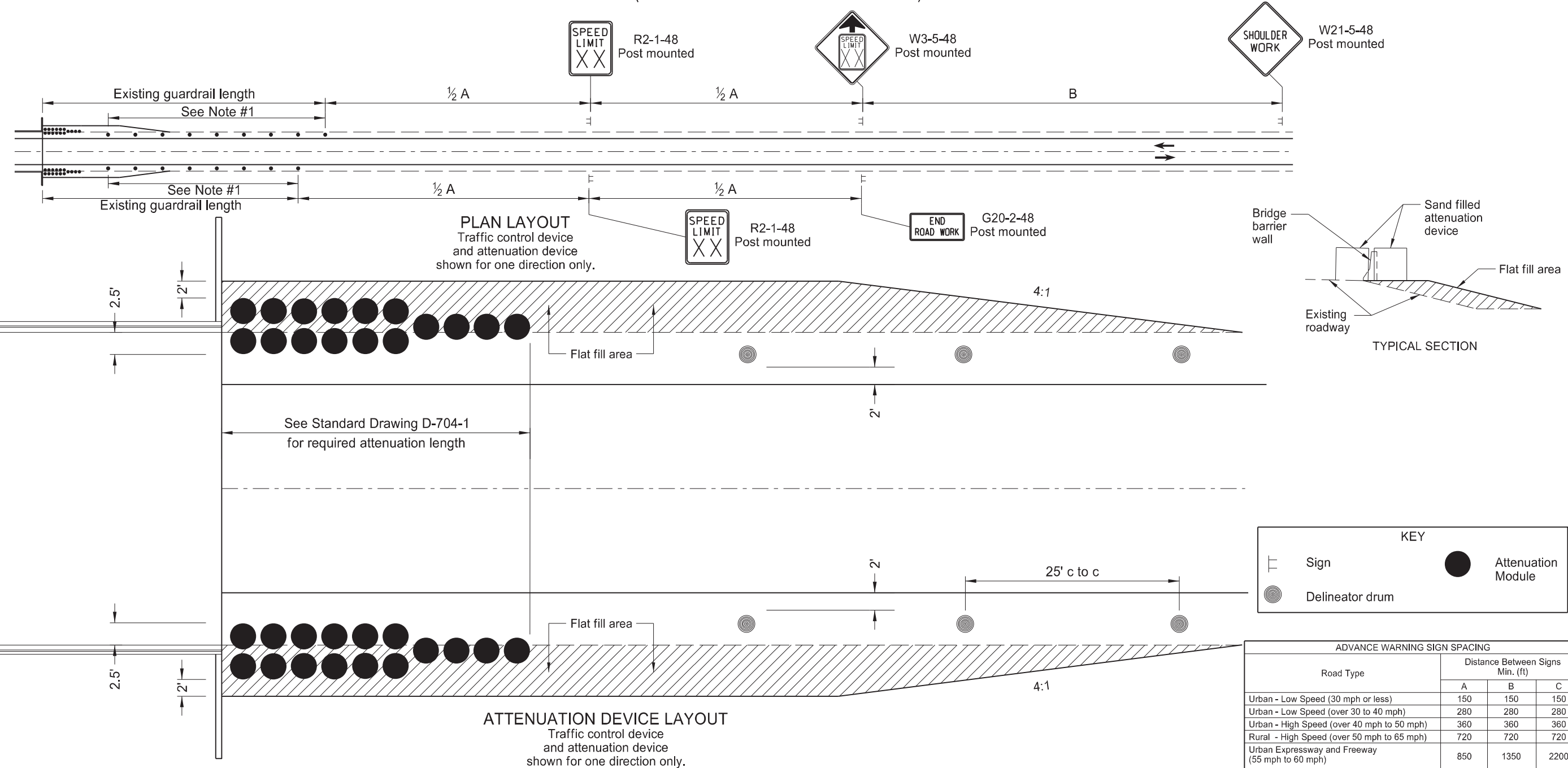


Use timber posts and blocks for the W-beam guardrail.

The seal is circular with a double-line border. The outer ring contains the text "KIRK J. HOFF" at the top and "NORTH DAKOTA" at the bottom. The inner circle contains the text "REGISTERED" at the top, "PROFESSIONAL" in the middle, and "PE-4683" at the bottom. A blue ink signature "Kirk J Hoff" is written across the center of the seal. Below the seal, the date "12 02 2020" is printed.

SHORT TERM END TREATMENT FOR BRIDGES
(ATTENUATION DEVICE METHOD)

D-764-20



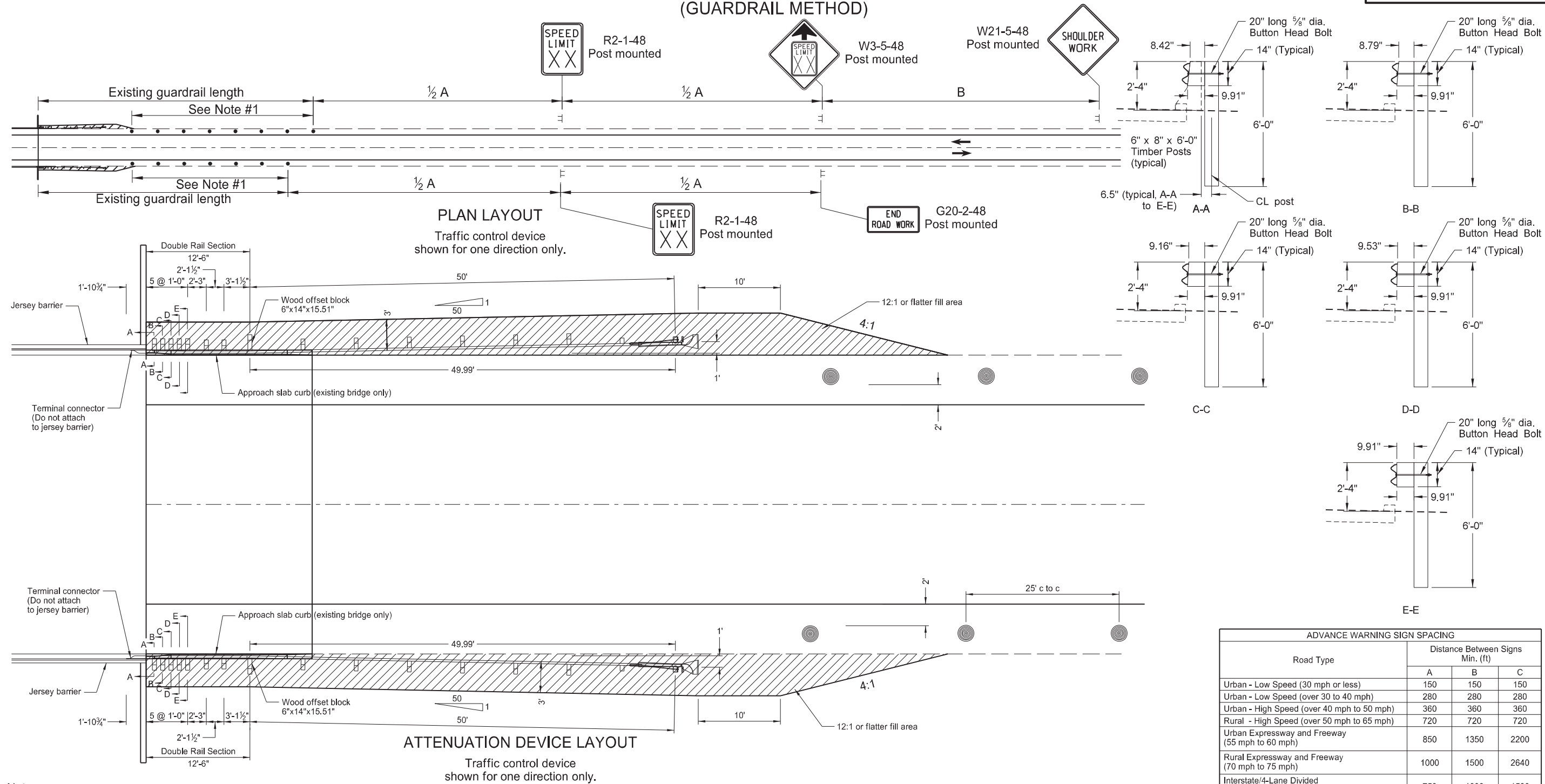
Notes

- When the shoulder width is less than 3', use vertical panels placed as far from the driving lane as possible on the finished shoulder. When there is no shoulder, place vertical panels as near as possible to the driving lane on the foreslope of the shoulder.
- When the bridge is within the construction zone signing, eliminate the reduced speed ahead sign.
- Determine the reduced speed limit dependent on the in place speed limit before construction. Where total speed reduction exceed 30 mph, reduce the speed limit in two stages with each reduction not exceeding 30 mph. Place the second speed limit sign at $\frac{1}{2}$ B.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Cover existing speed limit signs within a reduced speed zone.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



SHORT TERM END TREATMENT FOR BRIDGES (GUARDRAIL METHOD)



Notes

- If the shoulder width is less than 3', use vertical panels placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, place vertical panels as near as possible to the driving lane on the foreslope of the shoulder.
- If the bridge is within construction zone signing, eliminate the reduced speed ahead sign.
- Determine the reduced speed limit dependent on the in place speed limit before construction. Where total speed reduction exceed 30 mph, reduce the speed limit in two stages with each reduction not exceeding 30 mph. Place the second speed limit sign at 1/2 B.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Cover existing speed limit signs within a reduced speed zone.

KEY

- Sign
- Delineator drum

ADVANCE WARNING SIGN SPACING

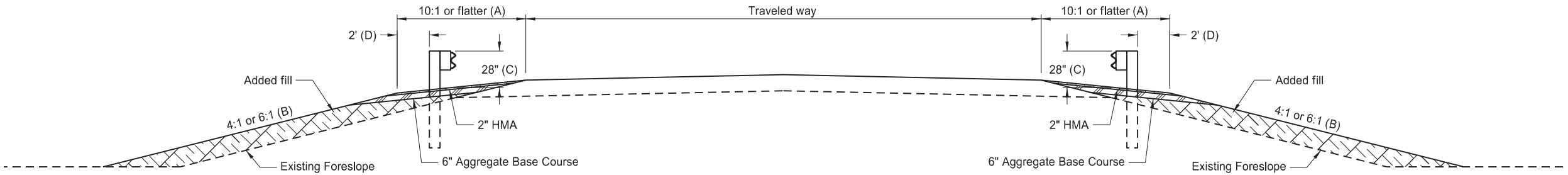
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 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
12-02-20	Updated notes to active voice.

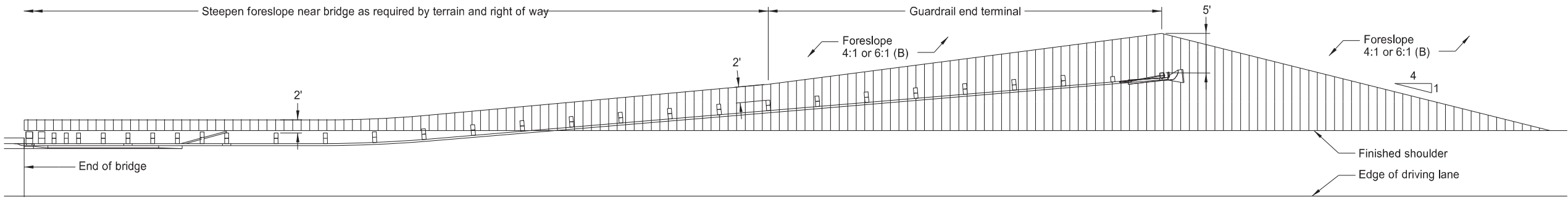


TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

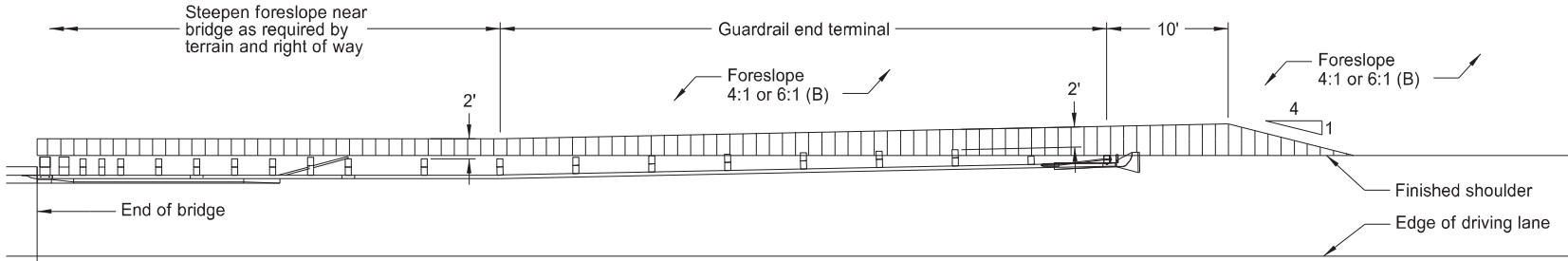
D-764-22



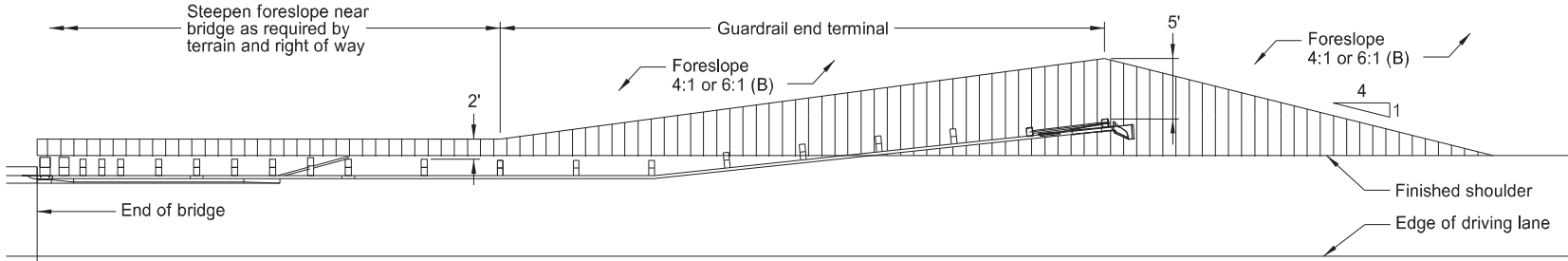
TYPICAL SECTION



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 necessary 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) Dimension at end terminals vary per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

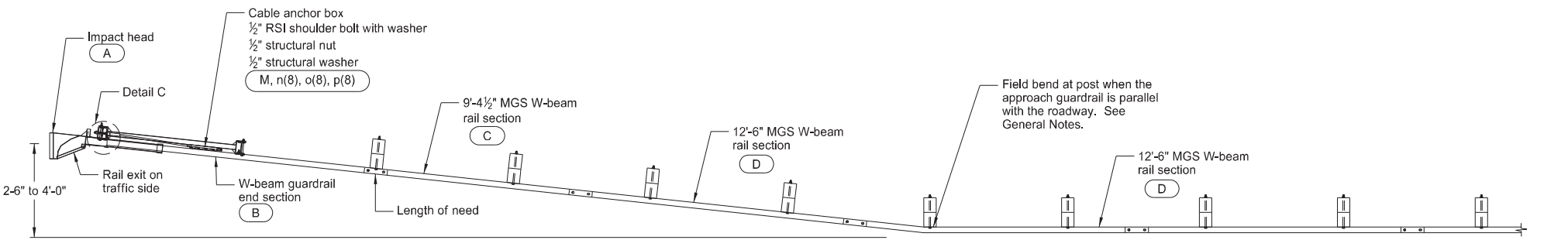
ENGINEER

NORTH DAKOTA

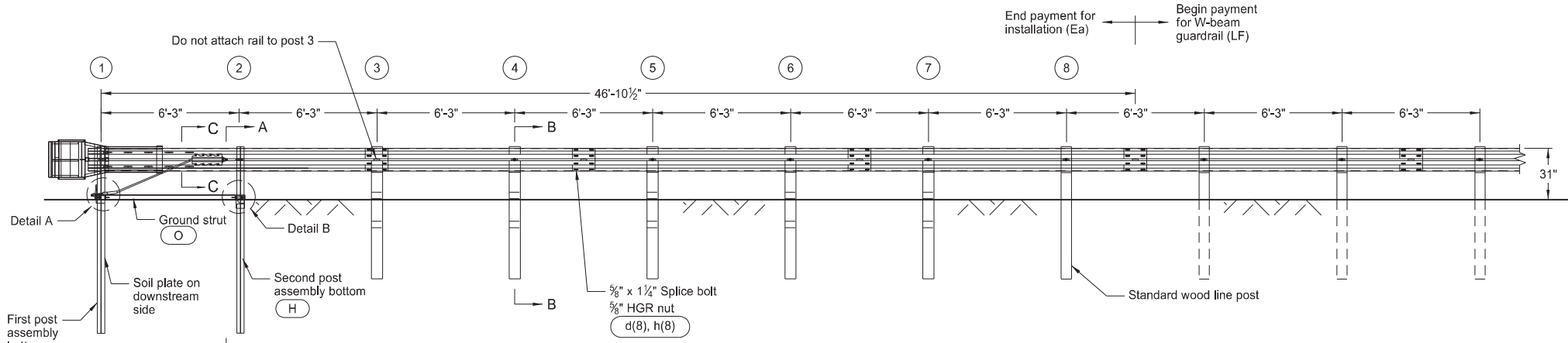
12 02 2020

MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

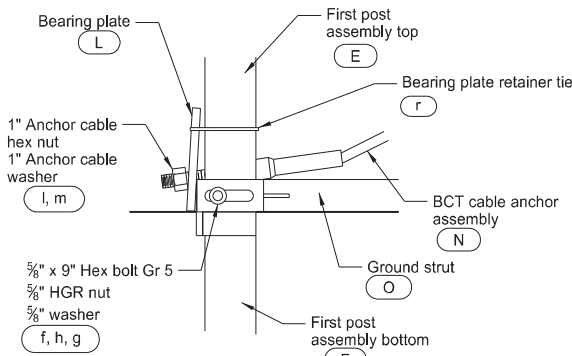
D-764-38



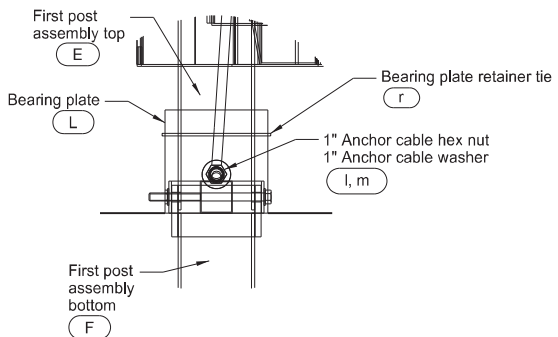
PLAN



ELEVATION

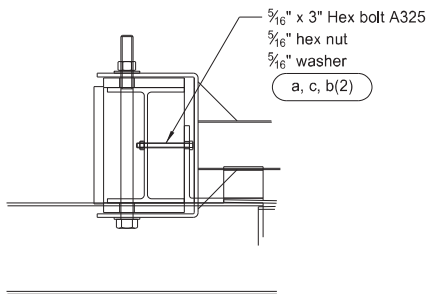


SIDE VIEW



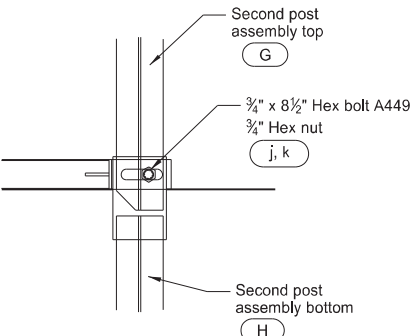
FRONT VIEW

DETAIL A
Post 1

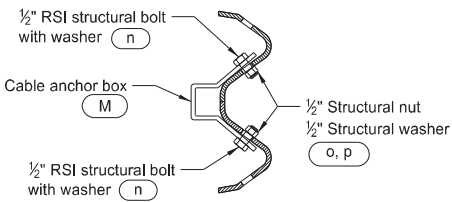


DETAIL C

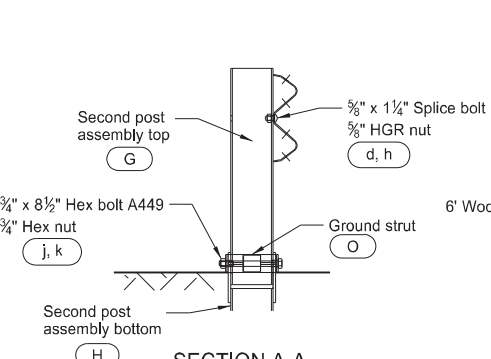
Post 1 (Impact Head connection)



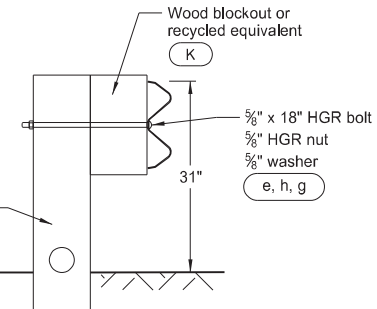
DETAIL B
Post 2



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'-4 1/2" 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	5/8" Dia x 1 1/4" SPLICE BOLT	33
e	B581802	5/8" Dia X 18" HGR BOLT	5
f	B580904A	5/8" Dia x 9" HEX BOLT GRD 5	1
g	W050	5/8" WASHER	7
h	N050	5/8" Dia HGR NUT	39
j	B340854A	3/4" Dia x 8 1/2" HEX BOLT GRD A449	1
k	N030	3/4" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	1/2" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	1/2" STRUCTURAL NUT	8
p	W012A	1/2" 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.

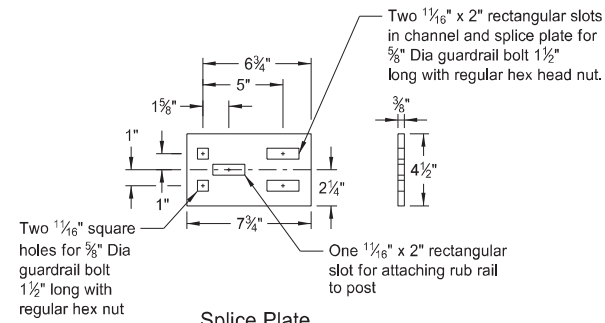
GENERAL NOTES:

- Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
- Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
- 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.
- 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).
- 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.
- Install the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
- "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.

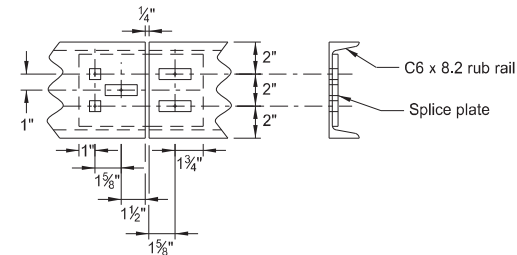
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



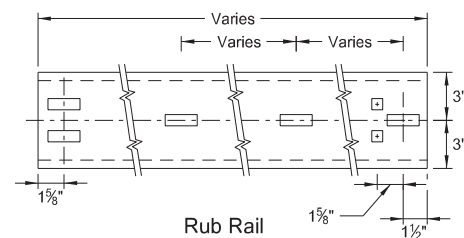
MGS W-BEAM GUARDRAIL GENERAL DETAILS



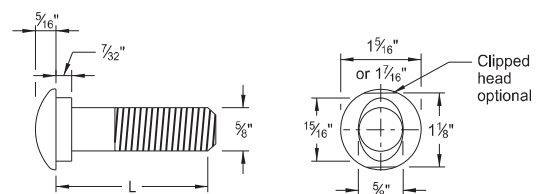
Splice Plate



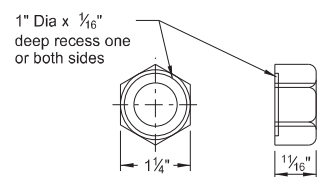
Splice Detail



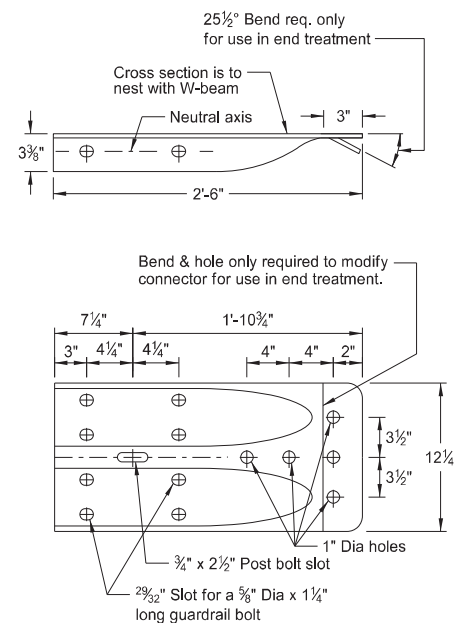
C6x8.2 RUB RAIL AND SPLICE PLATE



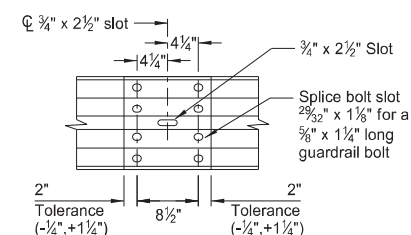
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



5/8" GUARDRAIL BOLT
& RECESS NUT

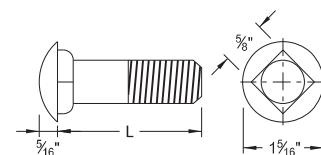


W BEAM TERMINAL CONNECTOR

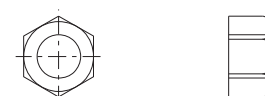


SPLICE DETAIL

NOTE: Do not install center bolt in the $\frac{3}{4}$ " x $2\frac{1}{2}$ " slot at mid span splices.

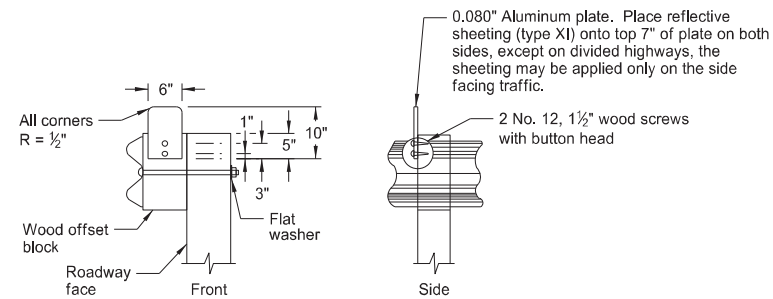


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



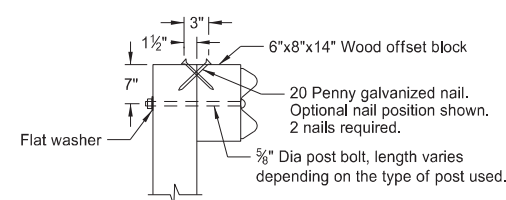
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

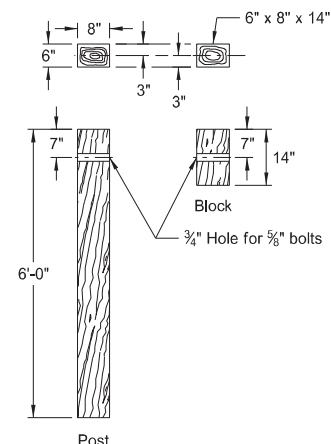


REFLECTORIZED PLATE DETAIL

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

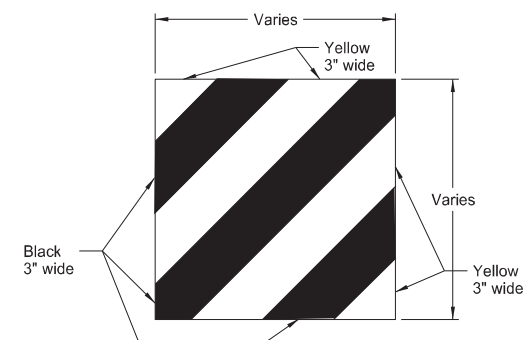


TYPICAL WOOD POST ATTACHMENT DETAIL

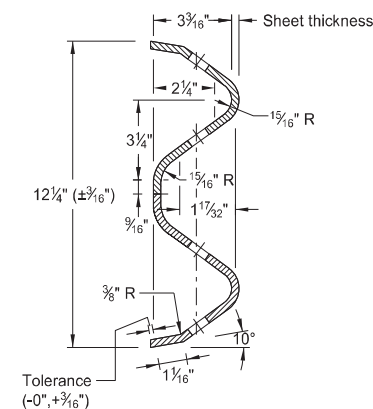


6" x 8" WOOD POST & BLOCK

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



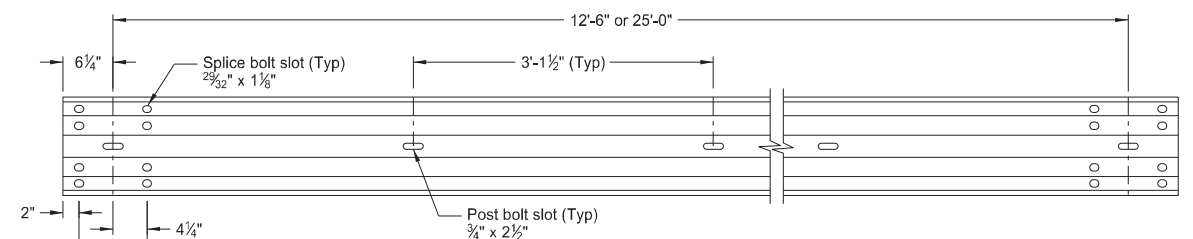
IMPACT HEAD OBJECT MARKER



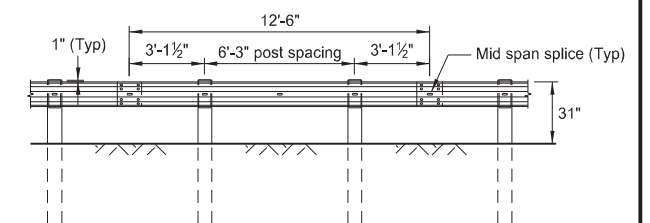
W-BEAM CROSS SECTION

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 = $\pm 1"$.



STANDARD MGS GUARDRAIL PANEL

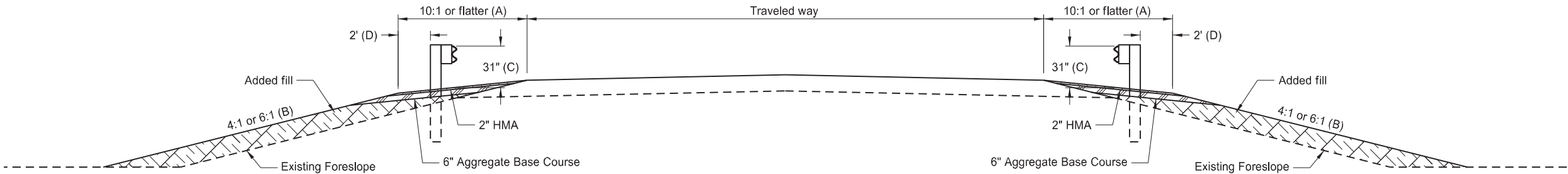


STANDARD MGS GUARDRAIL SYSTEM

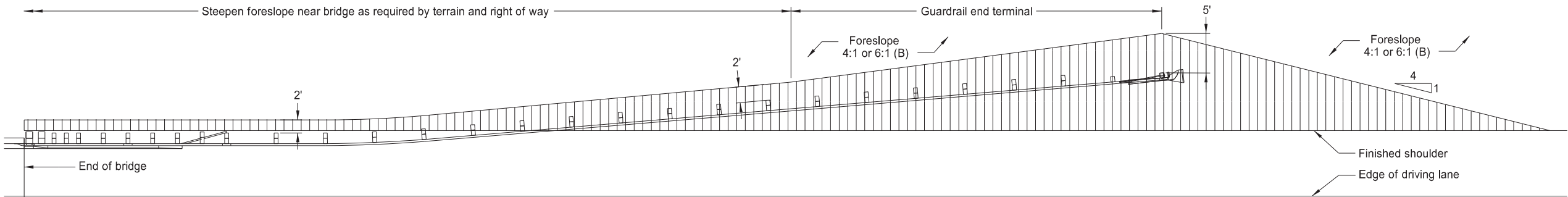
[illegible]

TYPICAL GRADING AT BRIDGE ENDS
WITH MGS W-BEAM GUARDRAIL

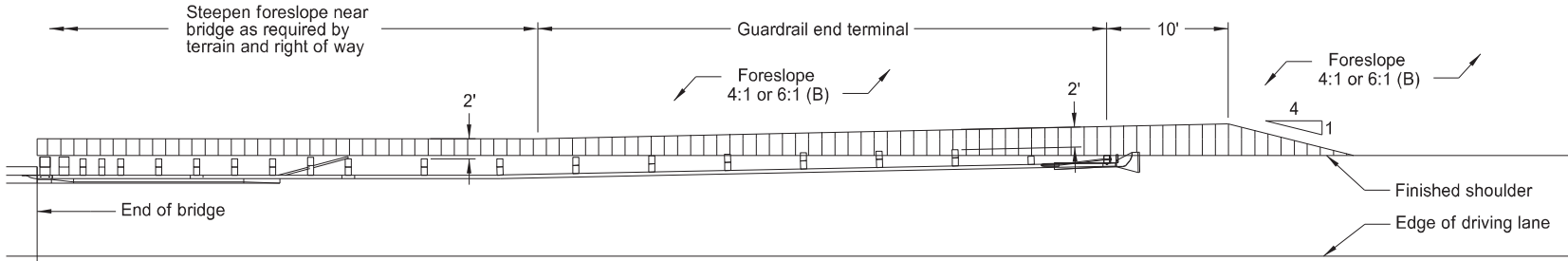
D-764-48



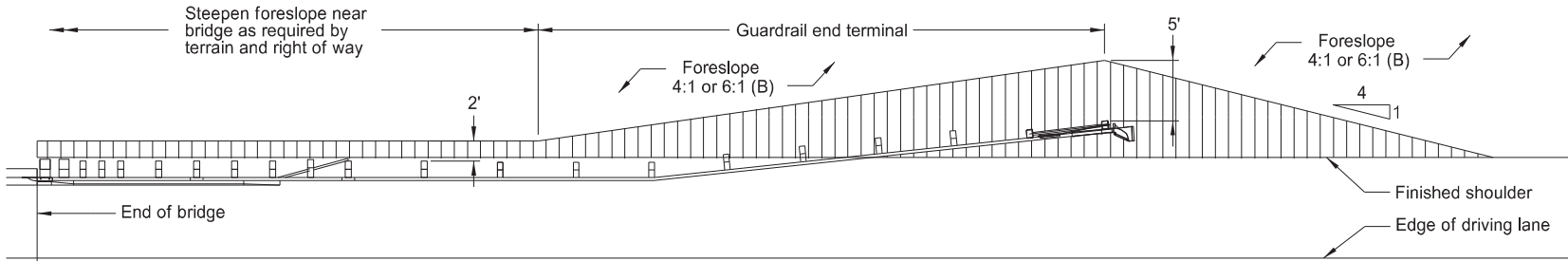
TYPICAL SECTION



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.

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12/02/20	Updated notes to active voice.

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

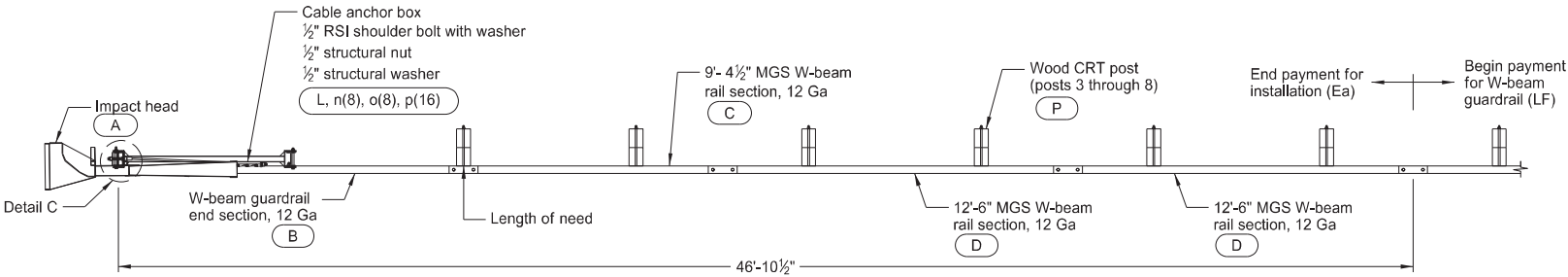
ENGINEER

NORTH DAKOTA

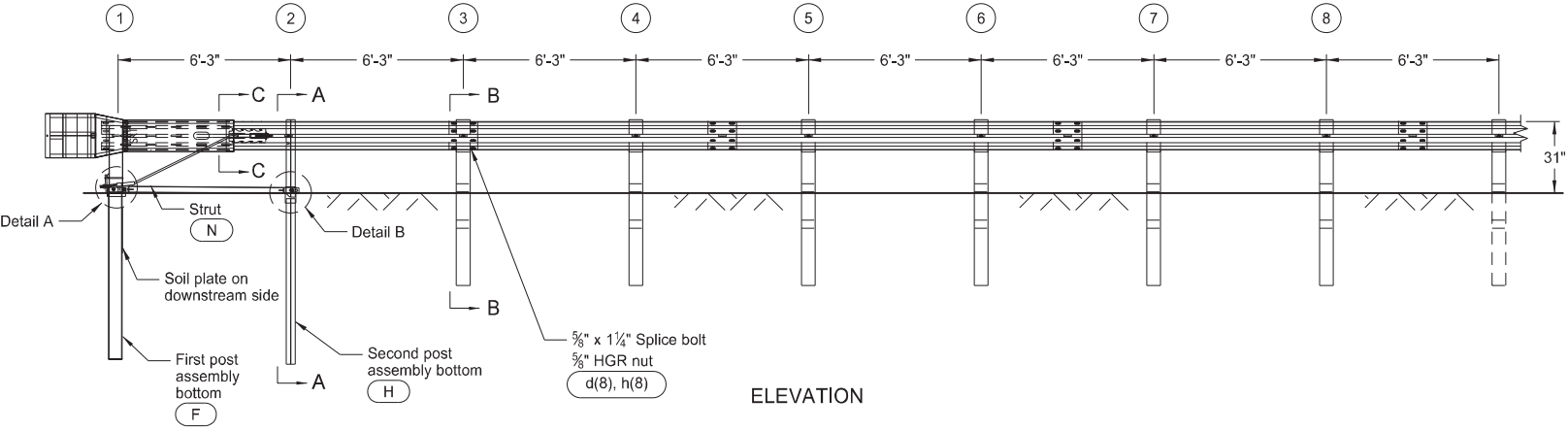
12 02 2020

MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

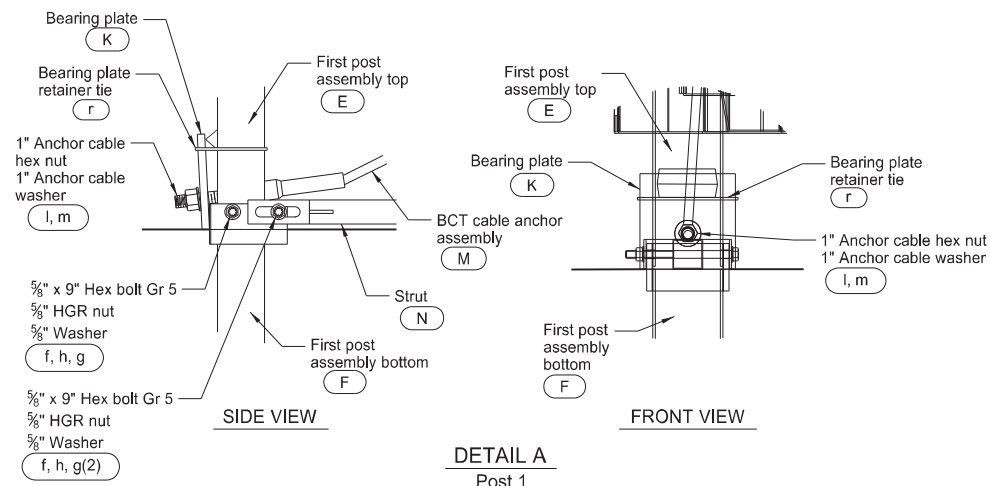
D-764-51



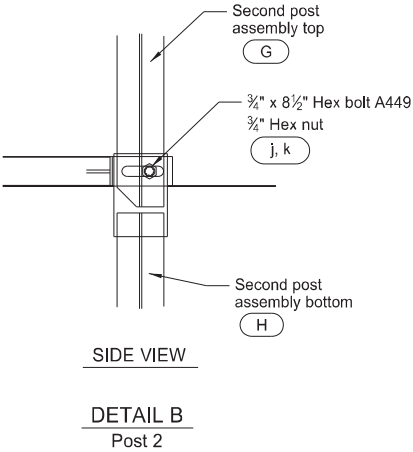
PLAN



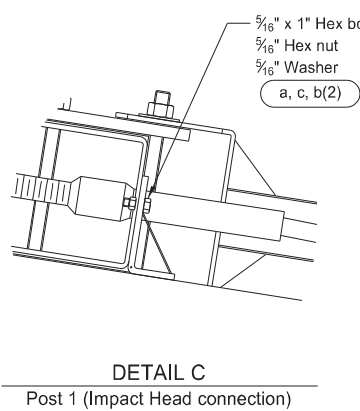
ELEVATION



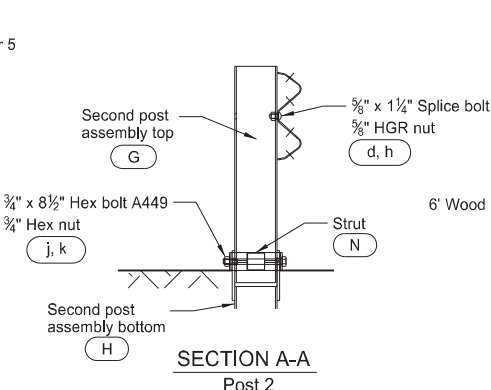
DETAIL A
Post 1



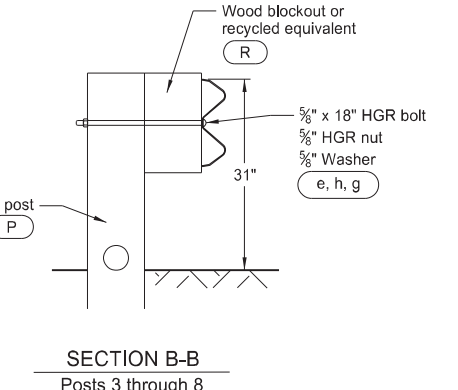
SIDE VIEW
DETAIL B
Post 2



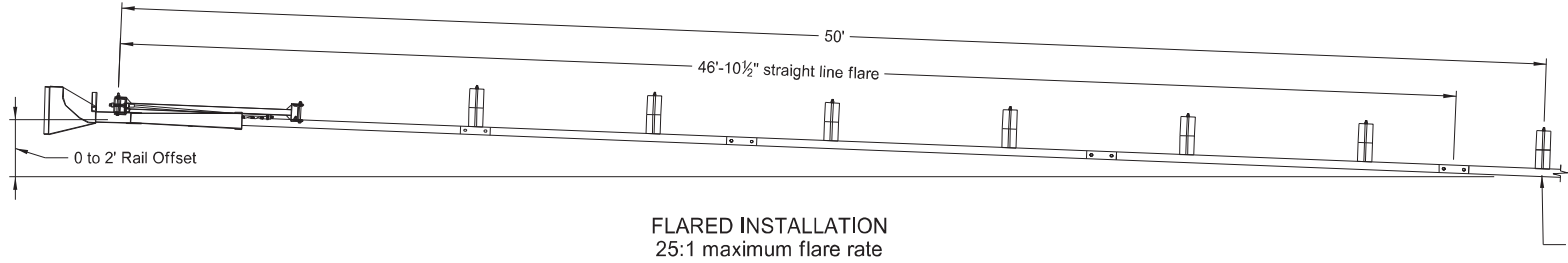
DETAIL C
Post 1 (Impact Head connection)



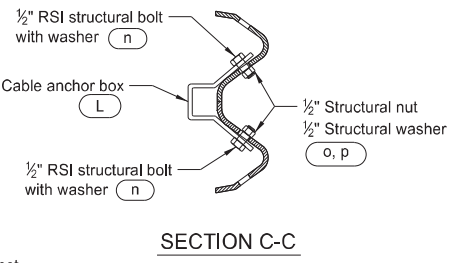
SECTION A-A
Post 2



SECTION B-B
Posts 3 through 8



FLARED INSTALLATION
25:1 maximum flare rate



SECTION C-C

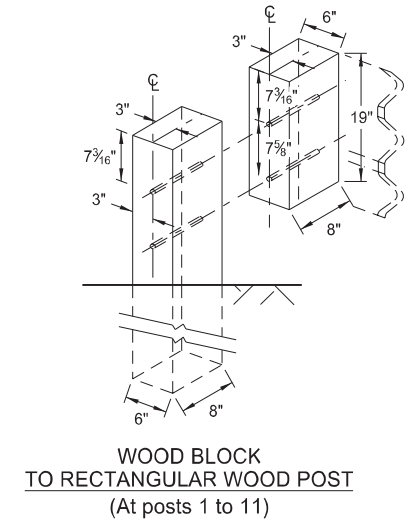
- GENERAL NOTES:
- Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
 - Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
 - Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the ground (measured along a 5' cord).
 - 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.
 - Install breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
 - "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'-4 1/2" 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" X 1/8" 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	5/8" Dia x 1 1/4" SPLICE BOLT	33
e	B581802	5/8" Dia x 18" HGR BOLT (POSTS 3 THRU 8)	6
f	B580904A	5/8" x 9" HEX BOLT GR 5	2
g	W050	5/8" WASHER	9
h	N050	5/8" Dia HGR NUT	35
j	B340854A	3/4" Dia x 8 1/2" HEX BOLT GRD A449	1
k	N030	3/4" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	1/2" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	1/2" STRUCTURAL NUT	8
p	W012A	1/2" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

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12-02-20	Updated notes to active voice.



D-764-60



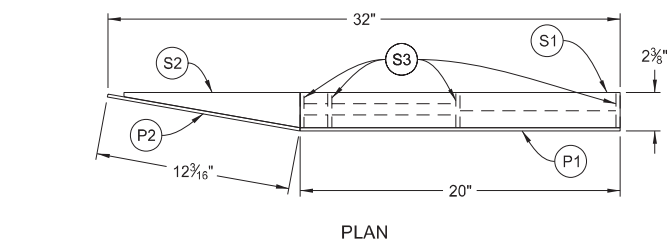
- (A) Where curb is required to continue past 15' length, taper the curb down to 3" height at the terminal point shown above, instead of 0" height. Use 3" height curb between posts 10 and 16.
- (B) Install 12'-6" length W-beam double rail section at location where curb extends past 15' length.

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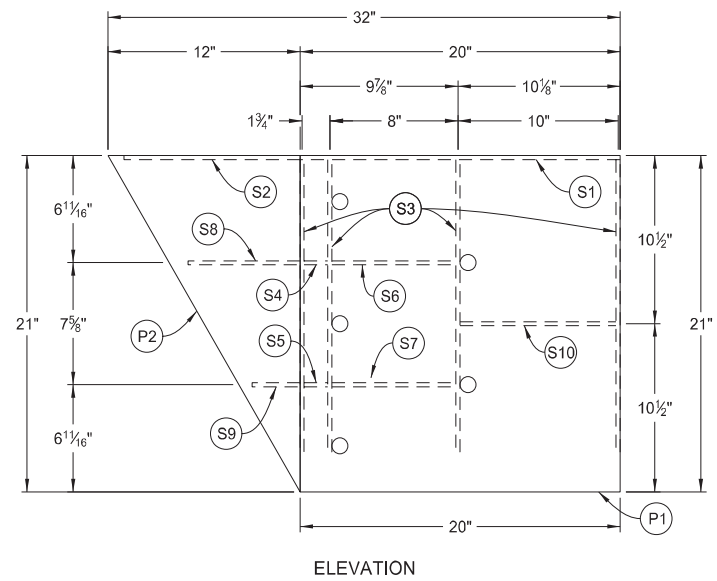


JERSEY BARRIER TO THRIE BEAM CONNECTOR PLATE DETAILS

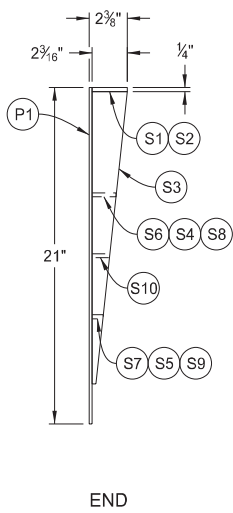
D-764-62



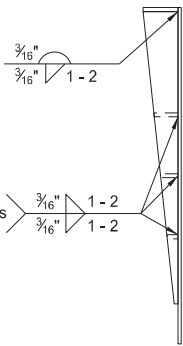
NOTE: Assembly Detail is shown for guardrail installation on right hand side of entrance end of bridge barrier. Mirror for opposite side installation.



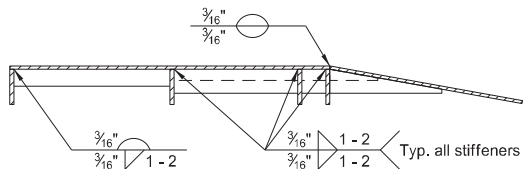
ASSEMBLY DETAIL
(Front View)



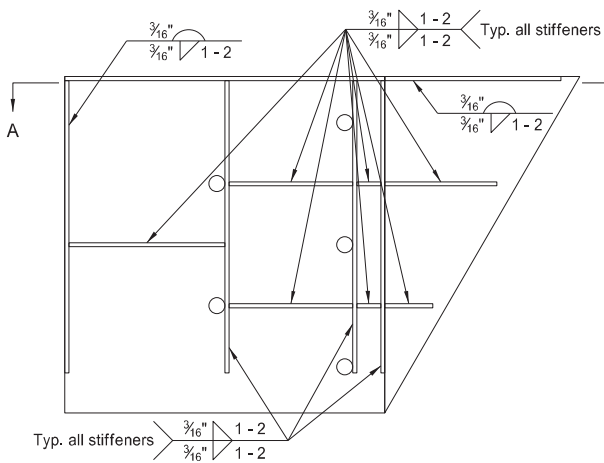
END



END

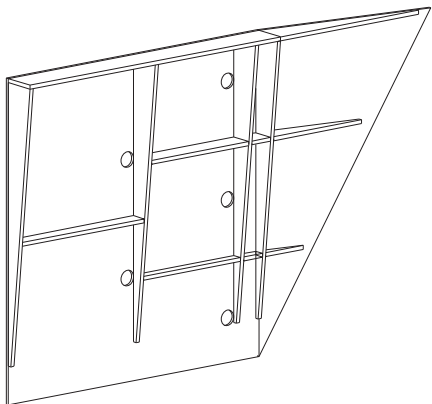


SECTION A-A



ELEVATION

WELDING DETAIL
(Back View)



PICTORIAL DRAWING
(Showing Back of Connector Plate)

WELDING INSTRUCTIONS:

- (A) Weld stiffeners located on the outside edges of the cover plates as follows:
 $\frac{3}{16}$ " continuous back weld on exterior sides and $\frac{3}{16}$ " 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:
 $\frac{3}{16}$ " fillet weld 1" long spaced at 2" center-to-center.
- (C) Weld cover plates P1 and P2 together with a $\frac{3}{16}$ " continuous back weld on both sides.
- (D) Weld components with E60 rod.

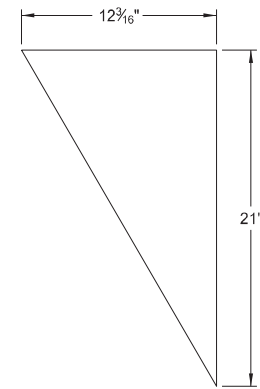


PLATE P2
Quantity: 1

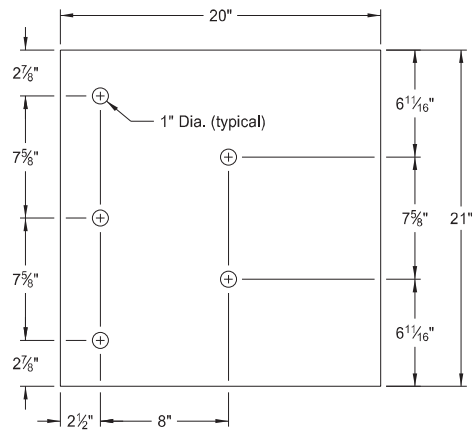
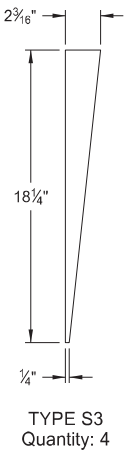


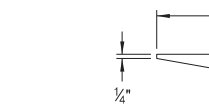
PLATE P1
Quantity: 1

COVER PLATES

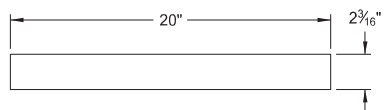


TYPE S3
Quantity: 4

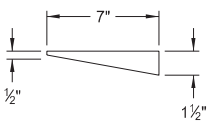
VERTICAL PLATES



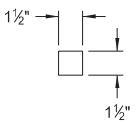
TYPE S2
Quantity: 1



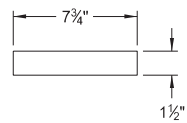
TYPE S1
Quantity: 1



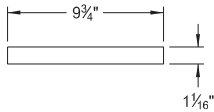
TYPE S8
Quantity: 1



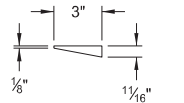
TYPE S4
Quantity: 1



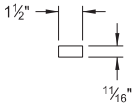
TYPE S6
Quantity: 1



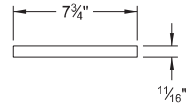
TYPE S10
Quantity: 1



TYPE S9
Quantity: 1



TYPE S5
Quantity: 1



TYPE S7
Quantity: 1

HORIZONTAL PLATES

STIFFENER PLATES

NOTES:

- 1. Fabricate cover plates P1 and P2 from $\frac{3}{16}$ " thick ASTM A36 Grade structural steel.
- 2. Fabricate stiffener plates from $\frac{1}{4}$ " thick ASTM A36 Grade structural steel.
- 3. Galvanize connector plate in accordance with AASHTO M111.

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