

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	22605	1	1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

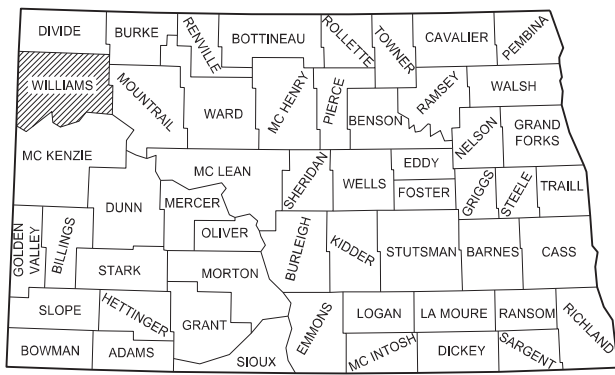
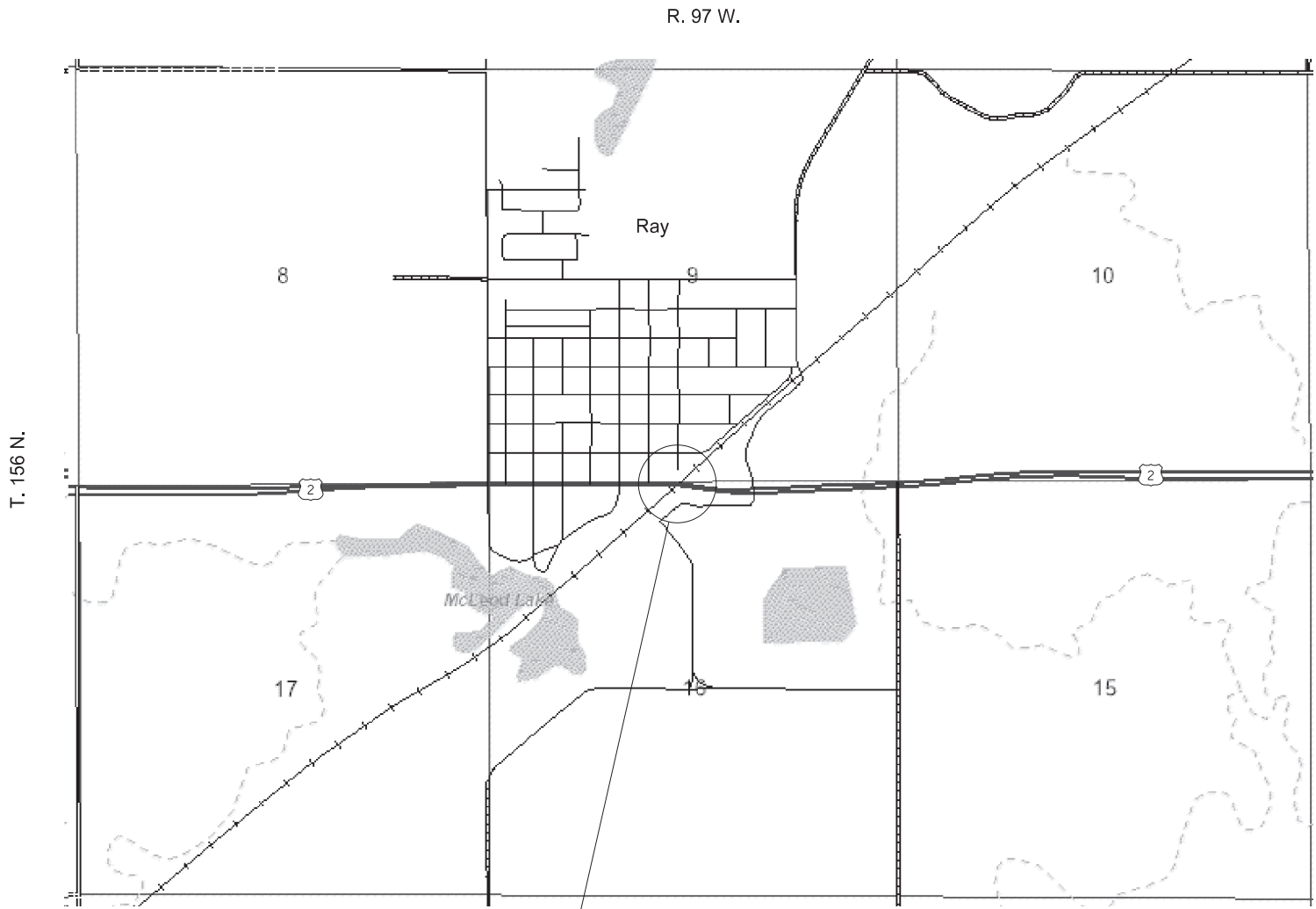
NH-7-002(172)053

Williams County
City of Ray - EB/WB

Approach Slab Repair, Spall Repairs,
Abutment Repair & Joint Repair

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	4/1/2023
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-7-002(172)053	na	na



STATE COUNTY MAP

BNSF RR Overhead
Br. No. 2-053.731L&R

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson

Thorenson, Jason R.
10/02/23



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Number	Description
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SP 257(23)	Commercial Grade Asphalt
SSP 2	Federal Migratory Bird Treaty Act

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NOTES

202-P01 REMOVAL OF TEMPORARY BYPASS: Remove the temporary bypasses from the median when no longer needed to maintain traffic. This work will consist of:

1. Returning the median to the condition, cross section, and profile existing before the start of the project (without damaging the shoulder).
2. Removal, hauling, and disposal of all materials.

203-P01 TOPSOIL: The class II seeding, mulching and erosion control required to restore the median for the temporary bypass in the existing grassed median will not be paid for separately. Include all labor, material, and equipment costs for this work in the unit price bid for "Topsoil".

302-P01 WATER: Water for compaction of aggregate will not be measured. Include all costs for water in the unit price bid for "Aggregate Base Course Class 5".

570-P01 CONCRETE PAVEMENT REPAIR: At areas of concrete pavement repair, fill any void 1" or greater in depth (in the base section) with Aggregate Base Course Class 5. Include all costs for aggregate in the unit price bid for "13 1/2" Concrete Pavement Repair – Full-Depth - Doweled".

Re-establish tie bars around the edges of the concrete pavement repairs. Include all cost in the price bid for "13 1/2" Concrete Pavement Repair – Full-Depth – Doweled".

704-301 SEQUENCING ARROW PANEL – TYPE C – CROSSOVER: Provide solar powered arrow panels that meet the requirements of the MUTCD and ITE and that are capable of operating for 20 days without a solar charge.

Include all costs for materials, equipment, labor, and incidentals in the contract unit price for "Sequencing Arrow Panel – Type C".

704-510 OBLITERATION OF PAVEMENT MARKINGS: Masking of pavement markings designated for obliteration is allowed. Choose to remove or mask marking as specified in Section 704.04 N, "Obliteration of Pavement Markings".

704-P01 TRAFFIC CONTROL: Provide traffic control consisting of temporary lane closures and flagging. The traffic control device list has been developed using the layouts shown in the plans and the following layouts shown on the Standard Drawings.

1. D-704-15 Layout Type C: For bridge and guardrail work.

704-P03 TRAFFIC CONTROL: The traffic control details, as indicated on the plans, have been developed on the basis that this project will be constructed in phases as described below. Traffic control devices and signing have been provided as shown for each phase on the traffic control layout sheets.

Phase 1: Construct both crossovers. Shift traffic to the north bridge. Complete all work on the south bridge.

Phase 2: Shift traffic to the south bridge. Complete all work on the north bridge. Remove both crossovers.

748-P01 CURB AND GUTTER – TYPE I: Place 3 inch high curb under guardrail at locations shown on the plans. Include all costs for the 3 inch curb & gutter in the price bid for "Curb & Gutter-Type I".

930-P01 3IN EXPANSION JOINT: Install expansion joints consisting of a pre-compressed polymer impregnated self-expanding polyurethane foam joint seal coated with a highway-grade silicone surface providing a permanent weather tight seal.

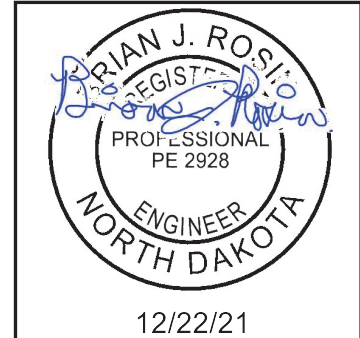
The joint seal may be:

1. Wabo FS Bridge Seal (Watson Bowman Acme);
2. BEJS Bridge Expansion Joint System (EMSEAL);
3. Sealtite 50N (Schul International);
4. Iso-Flex Silfast XL (LymTal International), or an approved equal.

Prepare the joint opening and install the joint seal according to the manufacturer's recommendations. Use a compatible two-component epoxy adhesive on the expansion joint seal for bonding for the joint sides and a splice adhesive to join the foam sections together. Install the membrane sealant material into the joint, positioning it with recess of 1/2 inch from the top surface of the joint. Apply the polyurethane splice adhesive liberally to both mitered ends of the 2 sections of membrane sealant material that will meet in the joint. Do not stretch or compress the membrane sealant material.

Fabricate and install protection armor angles on each side of the expansion joint as shown in the Sec 20 Details. Hot dip galvanize the armor angles in accordance with Section 854.01 Galvanizing. Splices are permitted. Weld together any spliced ends. Coat any field weld splices or damaged coating areas with galvanizing paint in accordance with Section 854.02 Damaged Galvanized Coatings.

Include all work and materials associated with the expansion joint seal and protection armor angles in the bid item "3 IN Expansion Joint."



NOTES

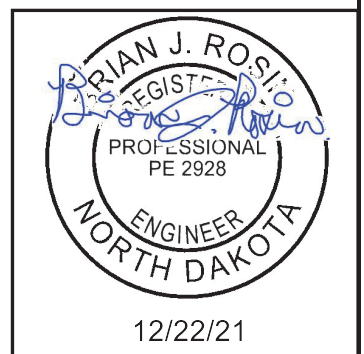
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930-P02 CONCRETE SLEEPER SLAB: This work consists of constructing a concrete sleeper slab at the location of an expansion joint in the PCC pavement. Construct with equipment in accordance with Section 155 of the Standard Specifications. Use Class AAE Concrete in accordance with 802. Finish the surface to a smooth surface. No broom finish required. Allow concrete to cure for 24 hours prior to constructing the concrete roadway section above it. Include all costs for any excavation, aggregate base, reinforcing steel, labor and equipment in the price bid for "Concrete Sleeper Slab".

930-P03 PRESSURE RELIEF JOINT: This work consists of sawing a joint with a 3" wide opening into the existing concrete curb & gutter, outside shoulder and barrier, median barrier and concrete median pavement to line up with the newly constructed 3" expansion joint on the roadways. The pressure relief joints are located (west and east of the bridges) at the locations shown in Section 20 details.

Saw the relief joint full depth of the concrete median pavement and the entire thickness of the concrete median barrier. Remove the concrete from the 3" joint opening and fill with the same 3" pre-compressed polymer impregnated self-expanding polyurethane foam joint seal as described in Note 930-P01 3IN EXPANSION JOINT. Seal the concrete curb & gutter, median pavement, barrier, median barrier and barrier slab with the expansion joint seal.

Construct the pressure relief joint in the existing barrier and median pavement concurrently with the 3" expansion joint and CPR work. Include all costs for this described work in the unit price bid for "Pressure Relief Joint".



ENVIRONMENTAL NOTES

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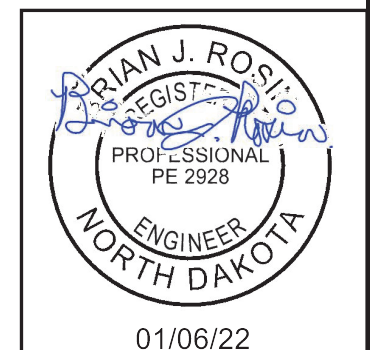
ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation and the Federal Highway Administration have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

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).



01/06/22

ESTIMATE OF QUANTITIES

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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
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103	0100 CONTRACT BOND	L SUM	0.52	0.52
107	0100 RAILWAY PROTECTION INSURANCE	L SUM	1	1
107	0140 RAILROAD COORDINATION	L SUM	1	1
202	0111 REMOVAL OF CONCRETE	L SUM	1	1
202	0114 REMOVAL OF CONCRETE PAVEMENT	SY	75	75
202	0132 REMOVAL OF BITUMINOUS SURFACING	SY	80	80
202	0350 REMOVAL OF TEMPORARY BYPASS	EA	2	2
203	0109 TOPSOIL	CY	17	17
210	0099 CLASS 1 EXCAVATION	L SUM	1	1
302	0120 AGGREGATE BASE COURSE CL 5	TON	678	678
430	0500 COMMERCIAL GRADE HOT MIX ASPHALT	TON	400	400
550	3005 CONCRETE MEDIAN PAVEMENT	SY	84	84
570	0240 DOWELED CONTRACTION JOINT ASSEMBLY	LF	192	192
570	0706 13.5IN CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED	SY	585	585
602	0130 CLASS AAE-3 CONCRETE	CY	40	40
602	1134 PILE SUPPORTED APPROACH SLAB	SY	327.8	327.8
602	1135 BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	291	291
602	1250 PENETRATING WATER REPELLENT TREATMENT	SY	3,212	3,212
602	1260 BRIDGE DECK CRACK SEALING	LF	5,100	5,100
612	0115 REINFORCING STEEL-GRADE 60	LBS	894	894
612	0116 REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	6,293	6,293
650	0805 DECK SPALL REPAIR	SF	18	18
702	0100 MOBILIZATION	L SUM	0.39	0.39
704	1000 TRAFFIC CONTROL SIGNS	UNIT	1,647	1,647
704	1052 TYPE III BARRICADE	EA	6	6
704	1060 DELINEATOR DRUMS	EA	56	56
704	1072 FLEXIBLE DELINEATORS	EA	192	192
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	2	2
704	1500 OBLITERATION OF PAVEMENT MARKING	SF	852	852
748	0120 CURB & GUTTER MOUNTABLE-TYPE I	LF	18	18
748	0140 CURB & GUTTER-TYPE I	LF	18	18
762	0110 EPOXY PVMT MK 4IN LINE-GROOVED	LF	42	42
762	0112 EPOXY PVMT MK MESSAGE	SF	208	208

ESTIMATE OF QUANTITIES

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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
762 0113	EPOXY PVMT MK 4IN LINE	LF	9,090	9,090
762 0115	EPOXY PVMT MK 8IN LINE	LF	1,468	1,468
762 0420	SHORT TERM 4IN LINE-TYPE R	LF	13,508	13,508
762 0426	SHORT TERM 24IN LINE-TYPE R	LF	130	130
764 0145	W-BEAM GUARDRAIL END TERMINAL	EA	2	2
764 0150	REMOVE & RESET GUARDRAIL	LF	129	129
930 8230	SHORING	EA	4	4
930 8644	SILICONE SEALANT	LF	1,280	1,280
930 8671	CONCRETE SLEEPER SLAB	SY	66	66
930 8700	3 IN EXPANSION JOINT	LF	112	112
930 9586	PRESSURE RELIEF JOINT	LF	48	48
930 9612	SPALL REPAIR	SF	43.3	43.3
930 9639	APPROACH SLAB LIP REPAIR	LF	85.1	85.1
930 9660	ABUTMENT REPAIR	L SUM	1	1

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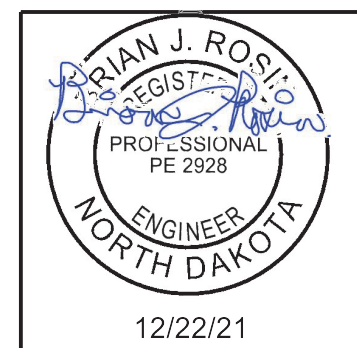
STATIONS							
STA 2843+95.59 to STA 2848+48.44				STA 2855+00 to STA 2860+00			
Median Cross Over				Median Cross Over			
Material	Unit	Width (ft)	Cross Sectional Area (SF)	Total Quantity	Width (ft)	Cross Sectional Area (SF)	Total Quantity
AGGREGATE BASE COURSE CL 5 @ 1.5 TON/CY + 25%	TON	10'	11.52	362	22'	9.09	316
COMMERCIAL GRADE HOT MIX ASPHALT @ 2 TON/CY	TON	10'	4.17	140	22'	6.77	251

Obliteration of Pavement Marking		
	STA 2820+47 to STA 2861+24	Total (SF)
Centerline Dash (LF)	1794	598
Double Lane Line Solid (LF)	208	69
Lane Line Solid (LF)	2980	993
Lane Line Solid/Dash (LF)	4150	1383
Channeling Line (LF)	1468	979
Message Turn Arrow (SF)	208	208

Short Term 4IN - R - Phase 1 - South Bridge Closure			
Location	Basis	Quantity	Unit
Centerline	Barrier Stripe (Double Yellow)	5400	LF
Centerline	Barrier Stripe (Yellow)	822	LF
Edgeline	Outside Edge (White)	1915	LF
Short Term 24IN - R - Phase 1 - South Bridge Closure			
Intersections	Stop Bar (White)	70	LF

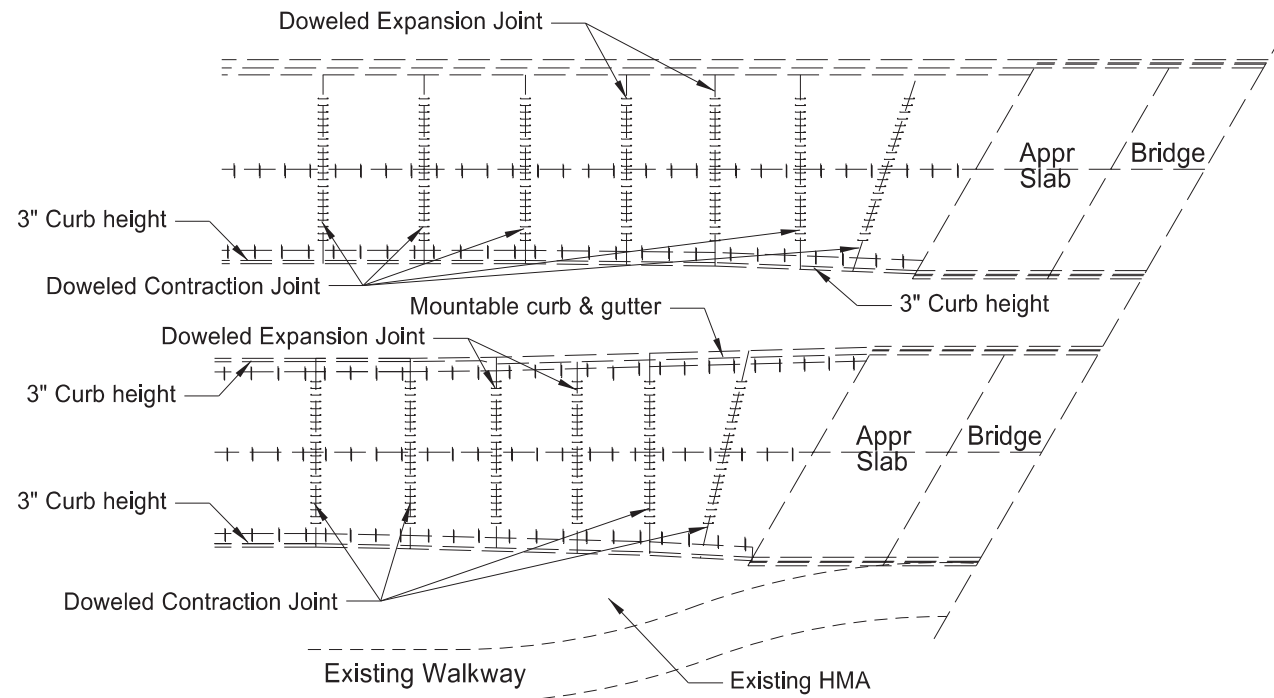
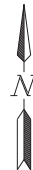
Short Term 4IN - R - Phase 2 - North Bridge Closure			
Location	Basis	Quantity	Unit
Centerline	Barrier Stripe (Double Yellow)	3436	LF
Centerline	Barrier Stripe (Yellow)	804	LF
Edgeline	Outside Edge (White)	1131	LF
Short Term 24IN - R - Phase 2 - North Bridge Closure			
Intersections	Stop Bar (White)	60	LF

Permanent Pavement Marking			
4" Epoxy Pvmt Mk Grooved	Center Skip - White 1320 LF/mile	42	LF
4" Epoxy Pvmt Mk	Edge Line - Yellow 5280 LF/mile	4124	LF
4" Epoxy Pvmt Mk	Edge Line - White 5280 LF/mile	2980	LF
4" Epoxy Pvmt Mk	Center Skip - Yellow 1320 LF/mile	234	LF
4" Epoxy Pvmt Mk	Center Skip - White 1320 LF/mile	1752	LF
8" Epoxy Pvmt Mk	Channel Line - White 5280 LF/mile	1468	LF
Pvmt Mark Message	Arrows - White 16 SF EA	208	SF

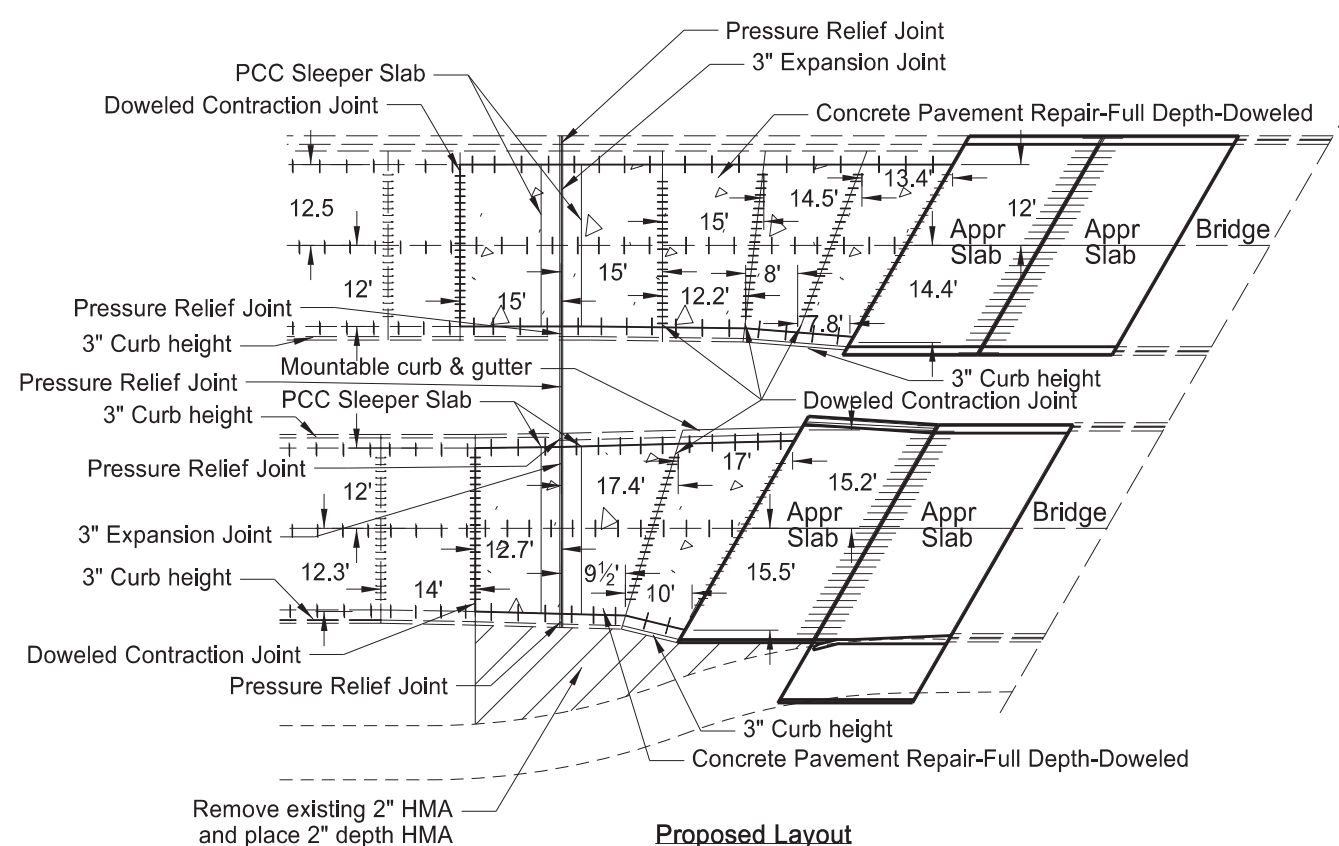


Basis of Estimate

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2



Existing Layout



Proposed Layout

Remove existing 2" HMA and place 2" depth HMA

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SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	0132	REMOVAL OF BITUMINOUS SURFACING		
		South Roadway	SY	59
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT		
		South Roadway	TON	7
570	0240	DOWELED CONTRACTION JOINT ASSEMBLY		
		North Roadway	LF	72
		South Roadway	LF	24
		Total	LF	96
570	0706	13 1/2" CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED		
		North Roadway	SY	179
		South Roadway	SY	112
		Total	SY	291
748	0120	CURB & GUTTER MOUNTABLE-TYPE I		
		South Roadway	LF	17.4
748	0140	CURB & GUTTER-TYPE 1		
		North Roadway Median	LF	15.6
		South Roadway	LF	25.3
		Total	LF	40.9
930	8671	CONCRETE SLEEPER SLAB		
		North Roadway	SY	16
		South Roadway	SY	16.6
		Total	SY	32.6
930	8700	3 IN EXPANSION JOINT		
		North Roadway (6' x 24')	LF	26
		South Roadway (6' x 25')	LF	29
		Total	LF	55
930	9586	PRESSURE RELIEF JOINT		
		North Roadway (Outside Barrier & shldr)	LF	4.3
		Median (Curb & Gutter, Median Barrier Pvmt)	LF	18
		South Roadway (Outside Curb & Gutter)	LF	2
		Total	LF	24.3



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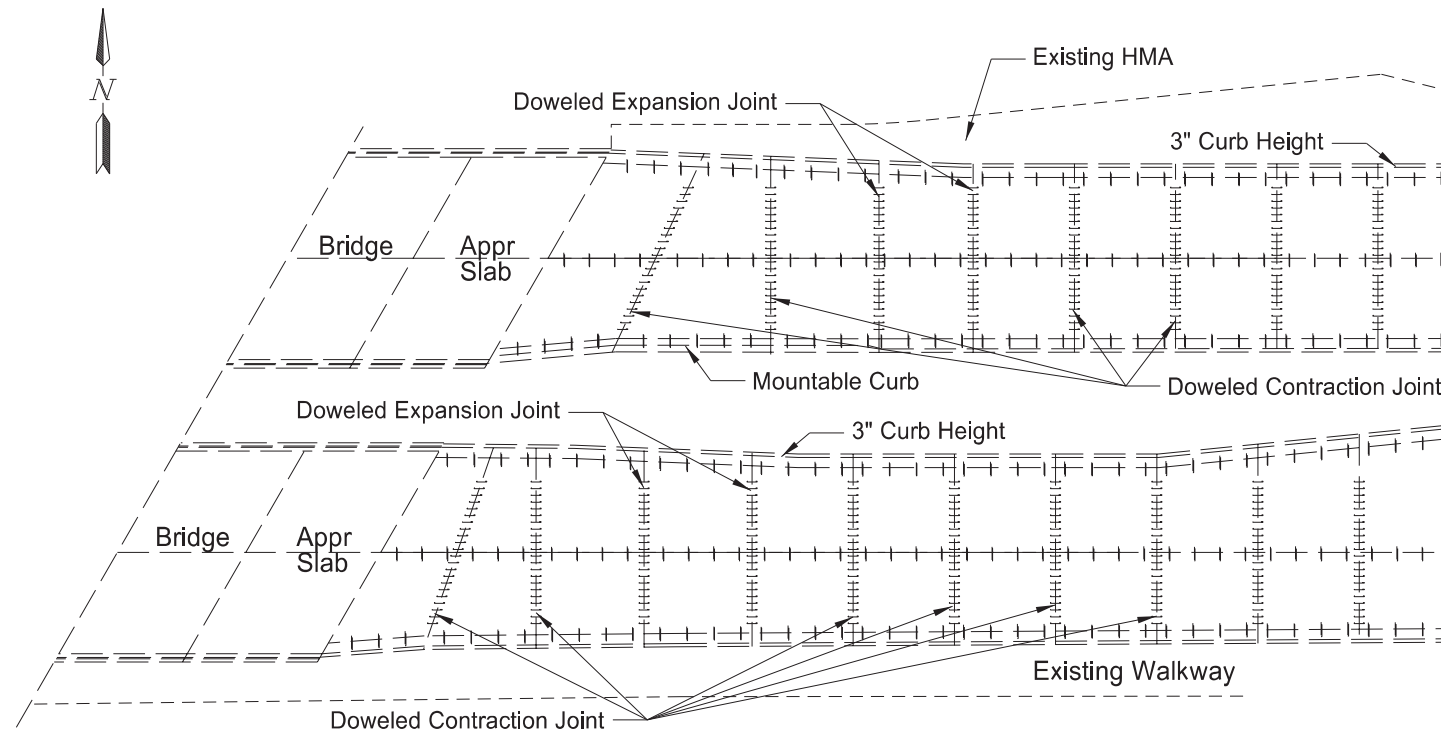
Expansion Joint Detail - West End of Structures
West End of Structures

Structure Repair

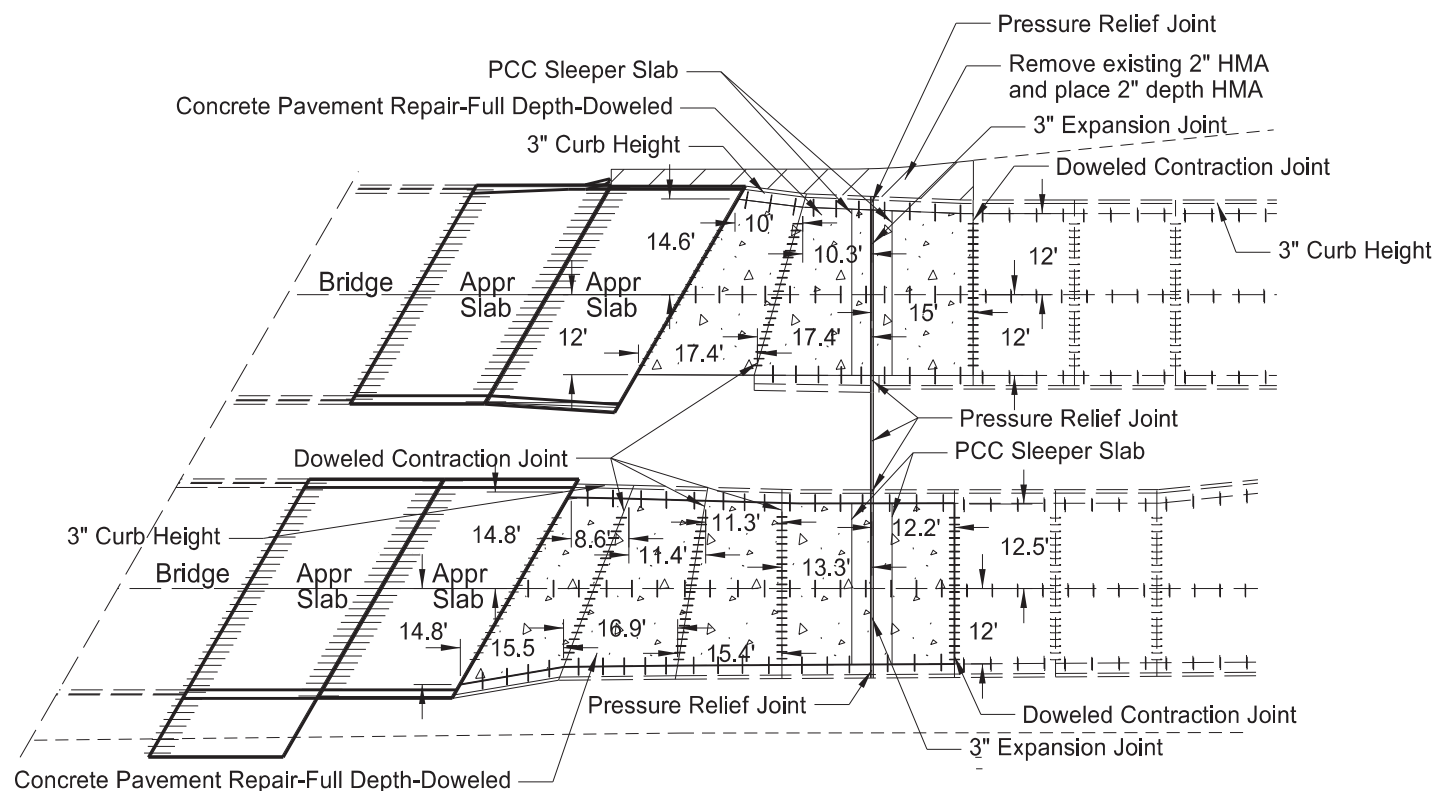
City of Ray EB & WB

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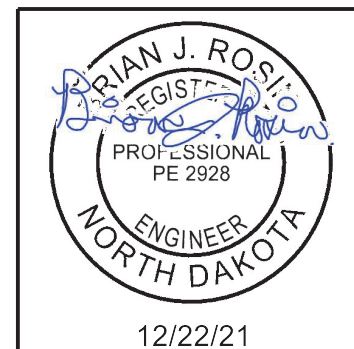
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202	0132	REMOVAL OF BITUMINOUS SURFACING		
		North Roadway	SY	21
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT		
		North Roadway	TON	2
570	0240	DOWELED CONTRACTION JOINT ASSEMBLY		
		North Roadway	LF	24
		South Roadway	LF	72
		Total	LF	96
570	0706	13 1/2" CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED		
		North Roadway	SY	117
		South Roadway	SY	177
		Total	SY	294
748	0140	CURB & GUTTER-TYPE 1		
		North Roadway	LF	9.5
		South Roadway Median	LF	24.1
		Total	LF	33.6
930	8671	CONCRETE SLEEPER SLAB		
		North Roadway (6' x 25')	SY	16.6
		South Roadway (6' x 24')	SY	16
		Total	SY	32.6
930	8700	3 IN EXPANSION JOINT		
		North Roadway	LF	29
		South Roadway	LF	28
		Total	LF	57
930	9586	PRESSURE RELIEF JOINT		
		North Roadway (Curb & Gutter)	LF	2
		Median (Curb & Gutter, Median Barrier & Pvmt)	LF	18.9
		South Roadway (Outside Curb & Gutter)	LF	2
		Total		22.9



Existing Layout



Proposed Layout

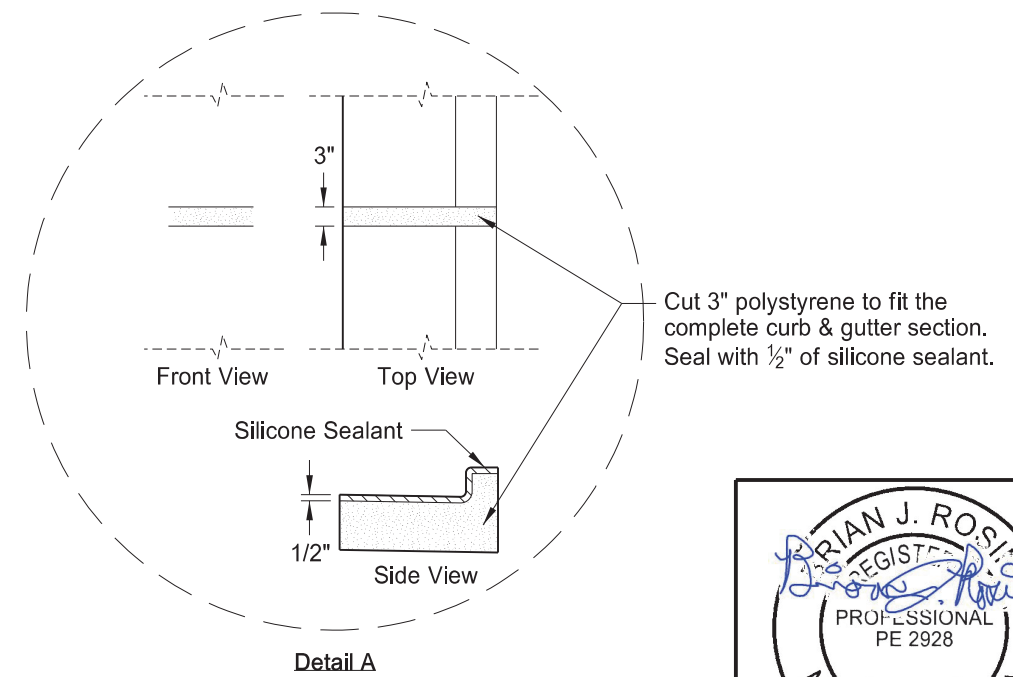
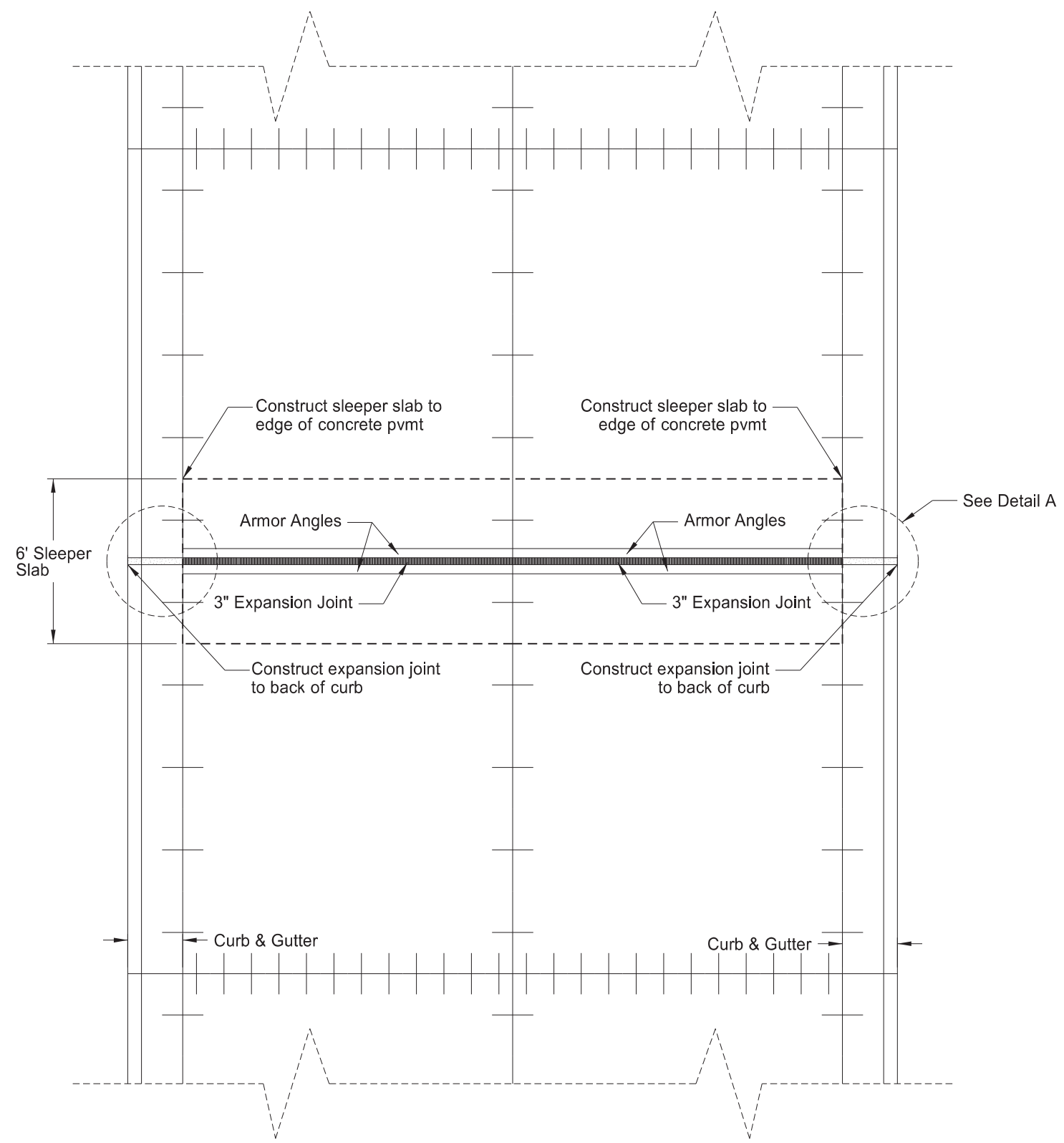


Pavement and Expansion Joint Detail
East End of Structures

Structure Repair

City of Ray EB & WB

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Top View
WB Roadway w/Curb & Gutter and Raised Median
(Section Reversed for EB Roadway)

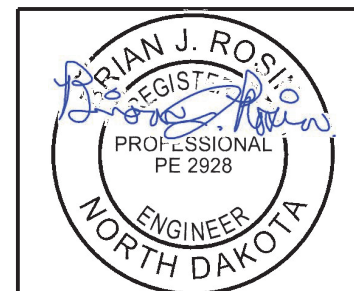
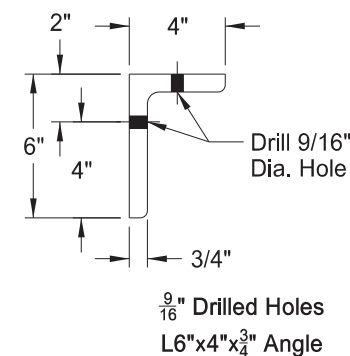
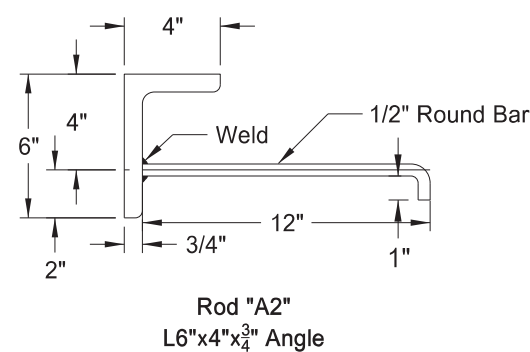
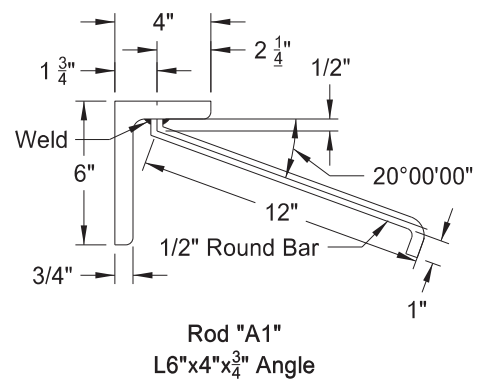
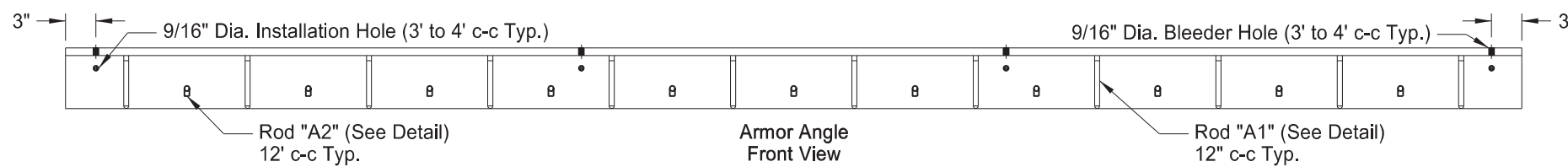
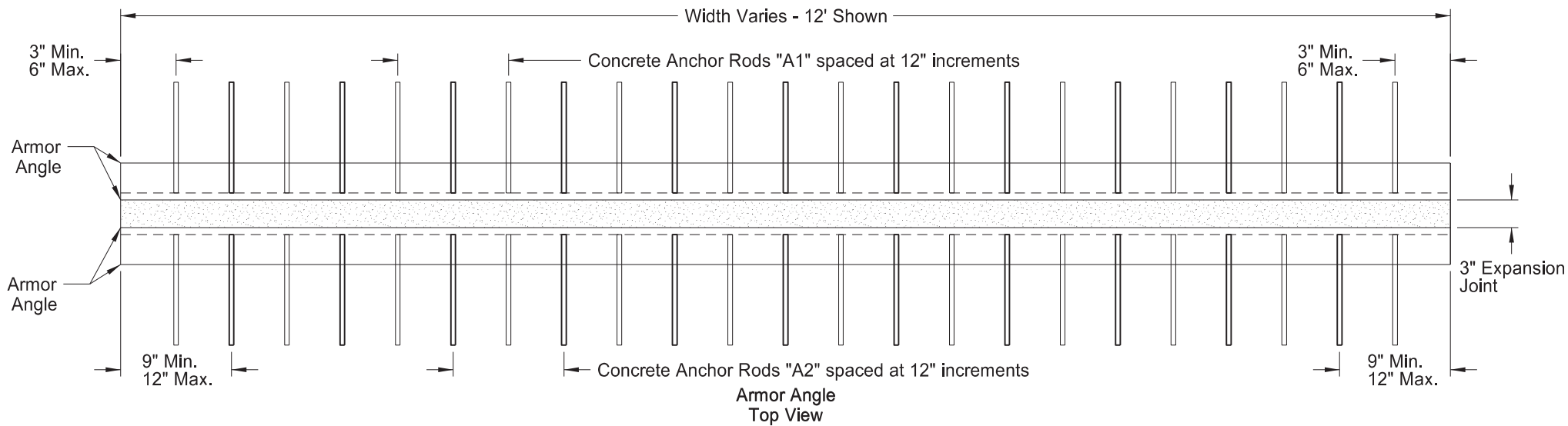
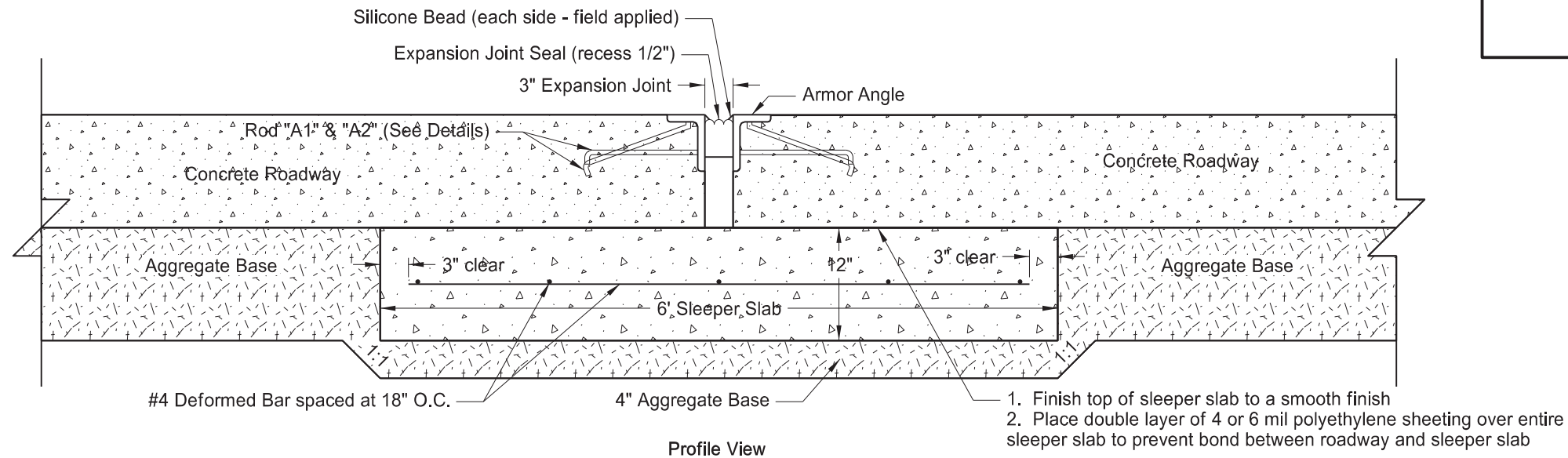


Expansion Joint Detail

Structure Repair

City of Ray EB & WB

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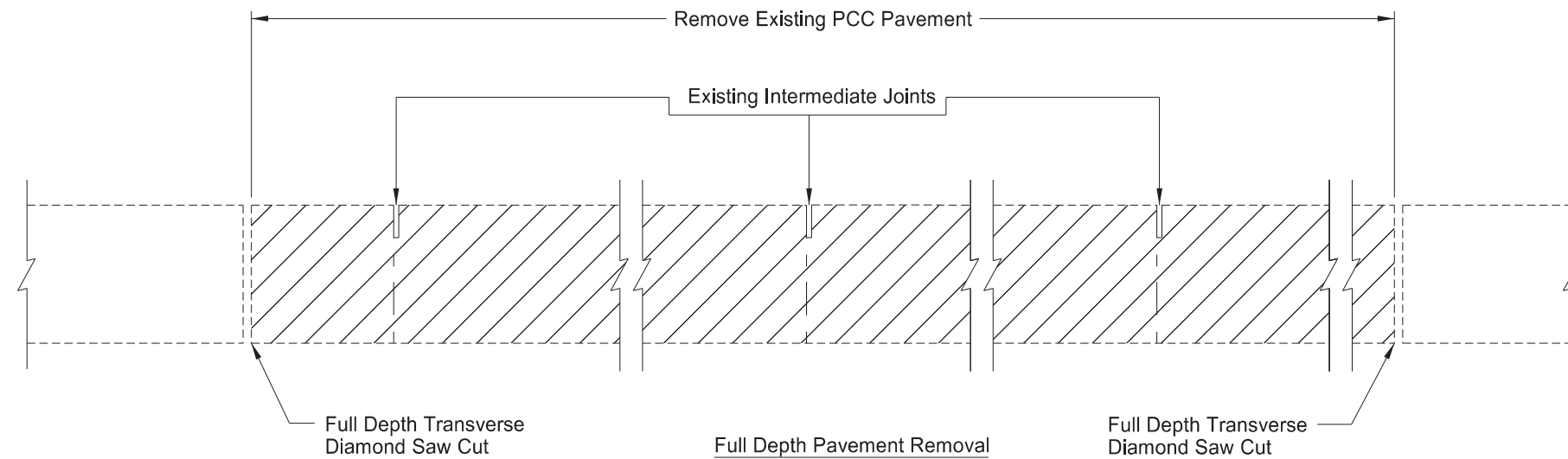
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Expansion Joint Detail

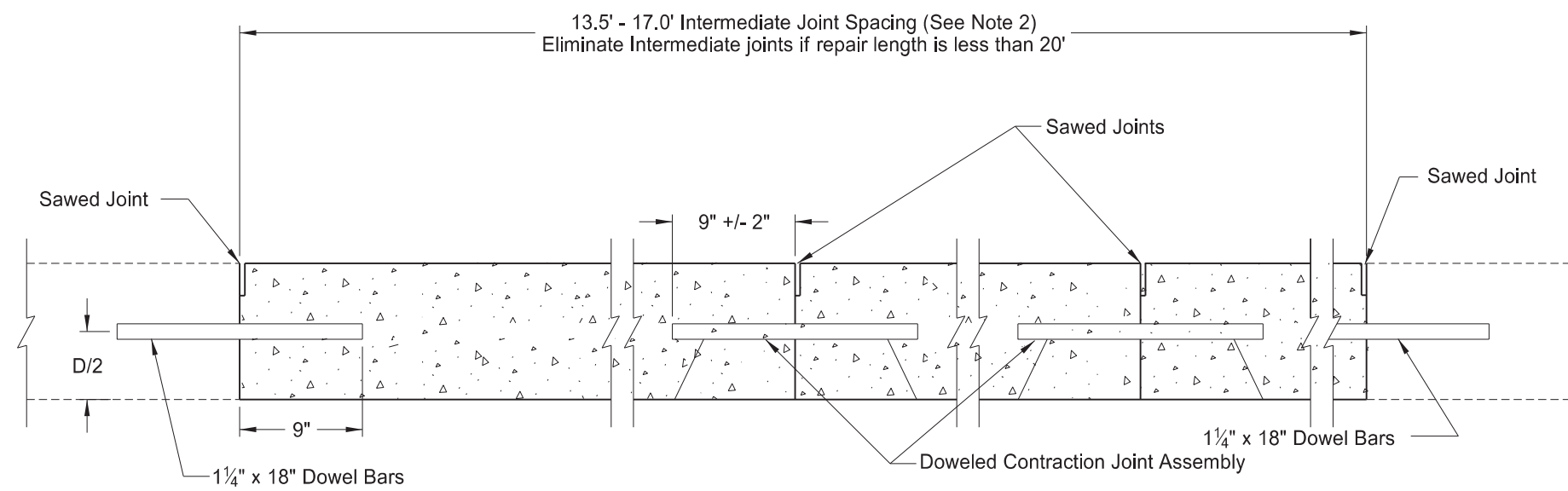
Structure Repair

City of Ray EB & WB

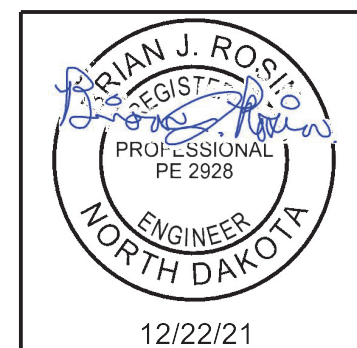
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Note:
Variables: D = Pavement Depth (13.5")



Full Depth Pavement Replacement

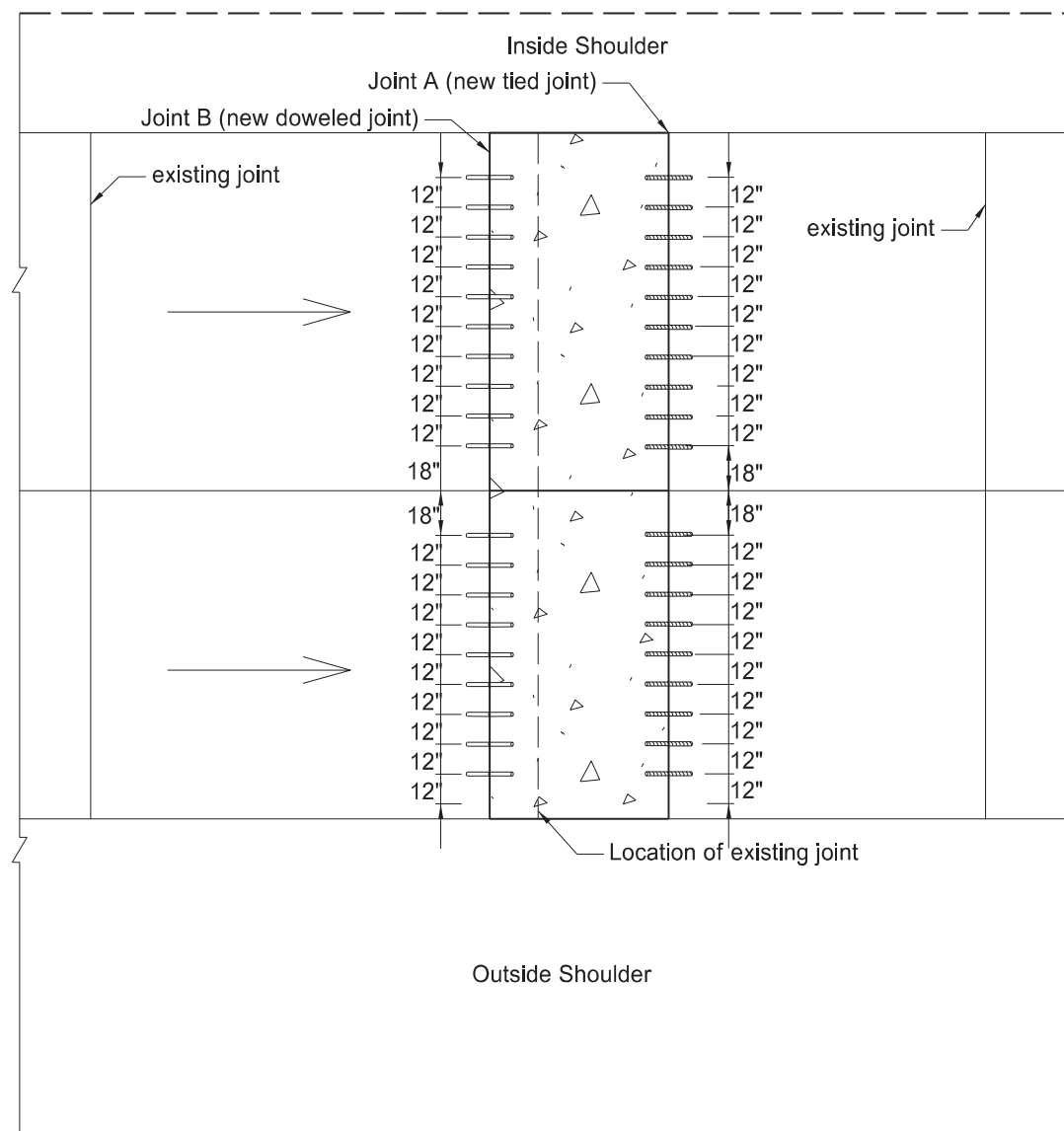


Jointed Concrete Pavement Repair
Full-Depth, Non-Reinforced PCC Pavement
(Longitudinal Length One Panel or Longer)

Structure Repair

City of Ray EB & WB

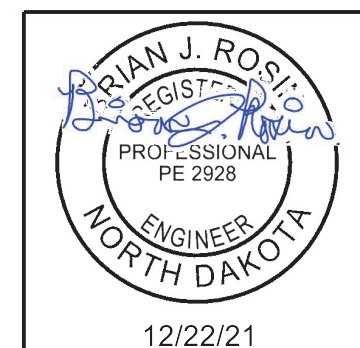
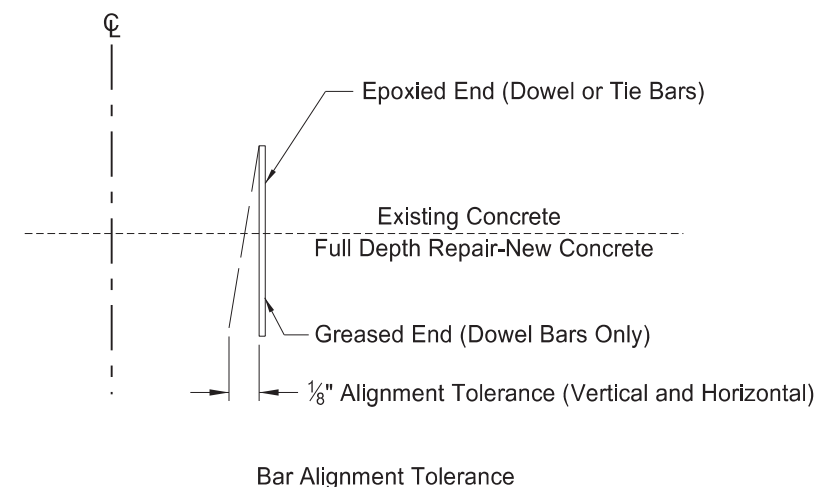
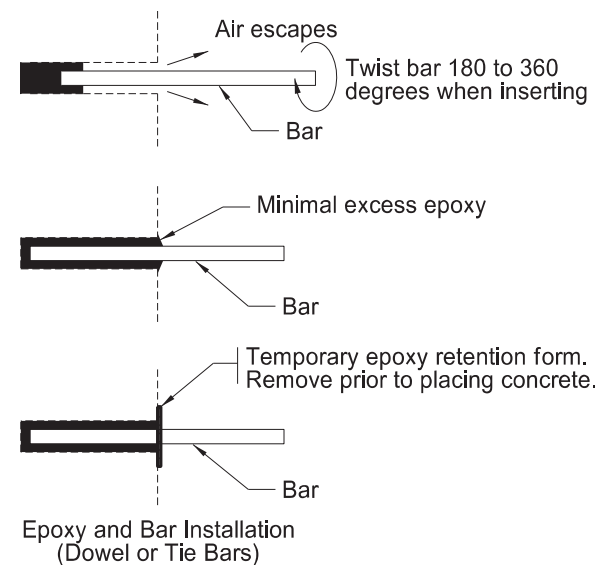
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	20	6



Perpendicular Transverse Joints

NOTES:

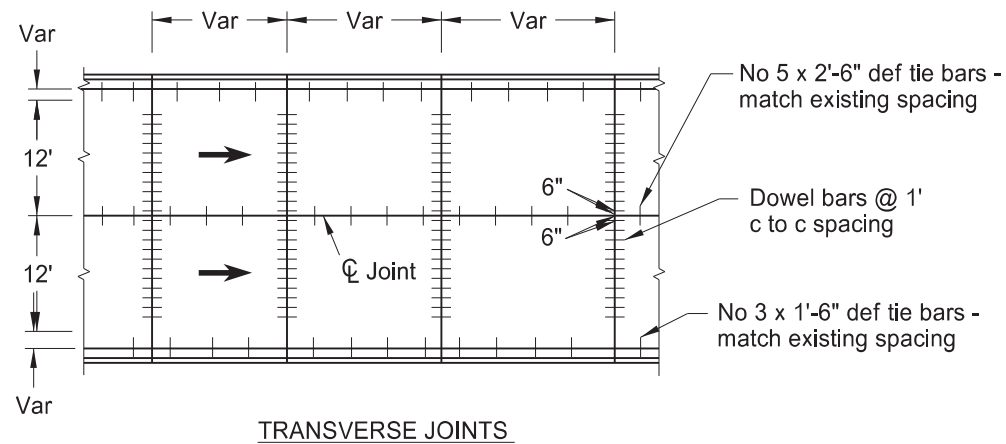
1. Align tie bars parallel to the roadway surface and perpendicular to the joint face.
2. Align dowel bars parallel to the roadway centerline and pavement surface (at vertical midpoint of slab.)
3. Existing tie bar spacing is 3'-9".
4. Place no tie bar within 15" of a transverse joint.
5. Construct Joint A (fixed joint) with the shortest distance to the next transverse joint or working random crack.
6. Construct Joint B (free joint) with the greatest distance to the next transverse joint or working random crack.
7. Construct free joint (Joint B) on the approach side of the repair when the distance to the next transverse joint or working random crack is equal for both new joints.



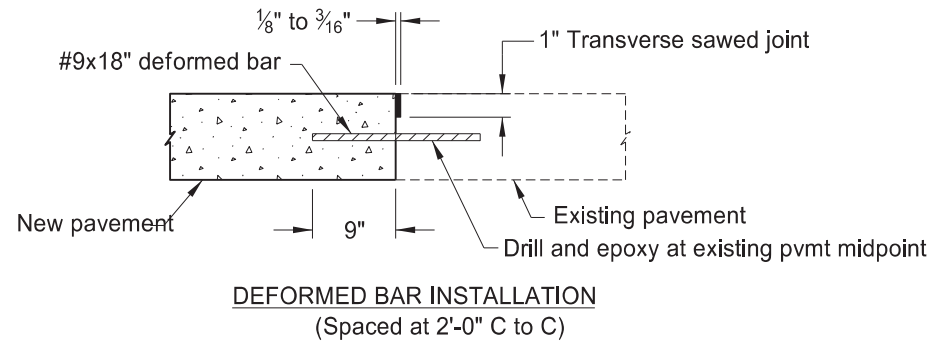
Transverse Joint Dowel and Tie Bar Placement
Full Depth Concrete Pavement Repair-Perp Jts

Structure Repair
City of Ray EB & WB

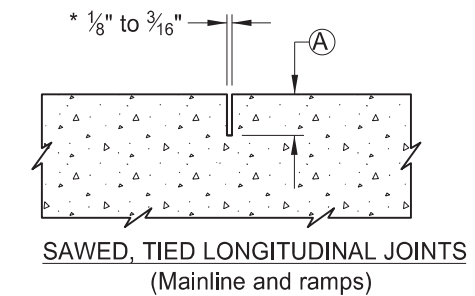
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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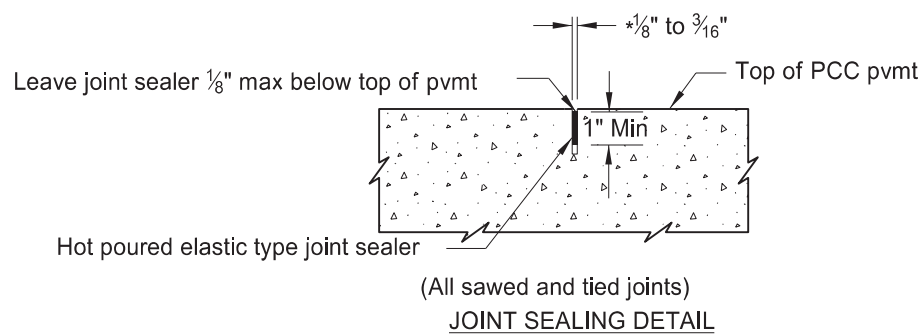
TRANSVERSE JOINTS



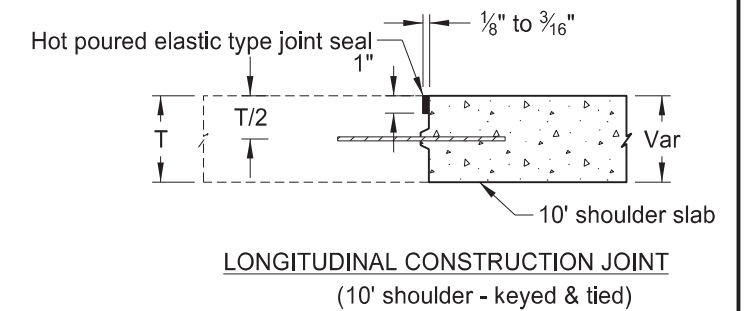
DEFORMED BAR INSTALLATION
(Spaced at 2'-0" C to C)



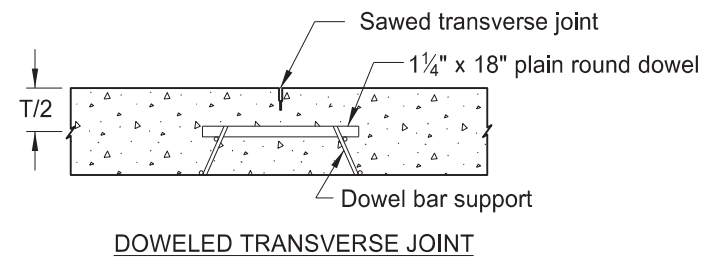
SAWED, TIED LONGITUDINAL JOINTS
(Mainline and ramps)



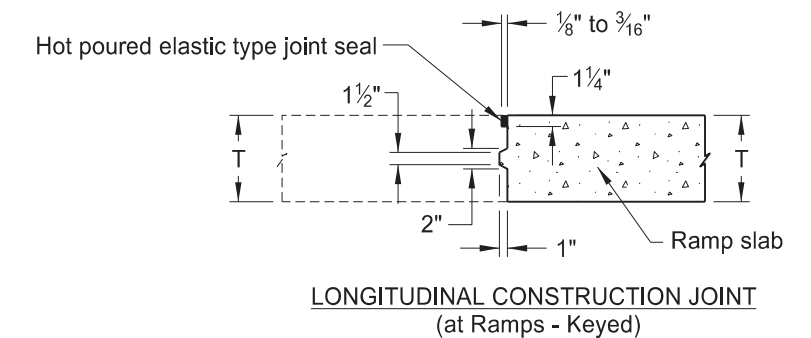
(All sawed and tied joints)
JOINT SEALING DETAIL



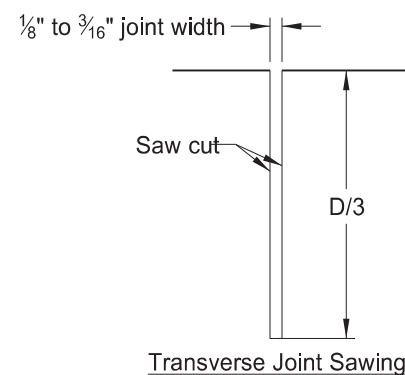
LONGITUDINAL CONSTRUCTION JOINT
(10' shoulder - keyed & tied)



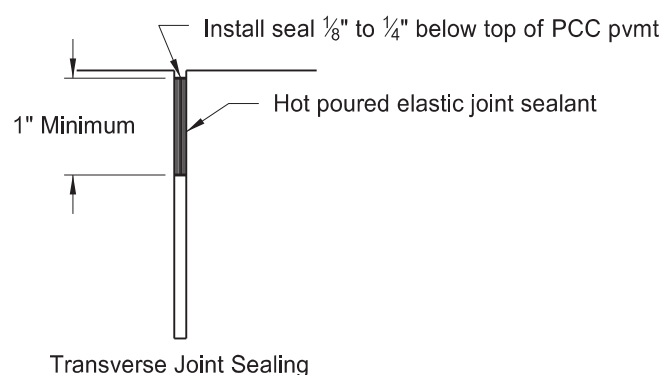
DOWELED TRANSVERSE JOINT



LONGITUDINAL CONSTRUCTION JOINT
(at Ramps - Keyed)



Transverse Joint Sawing

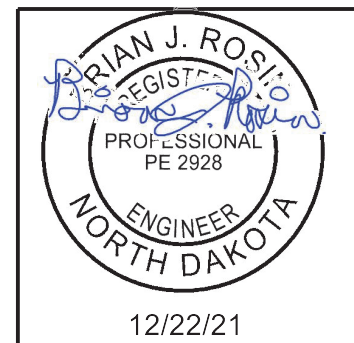


Transverse Joint Sealing

T = Thickness of PCC Pvmt

Ⓐ = One-Third thickness of PCC Pavement

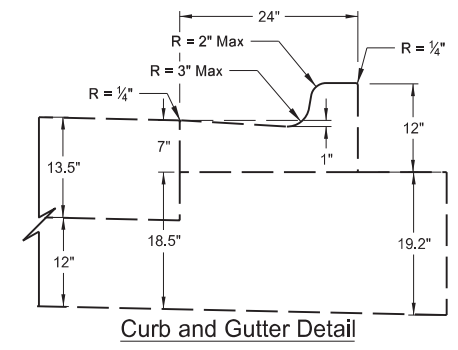
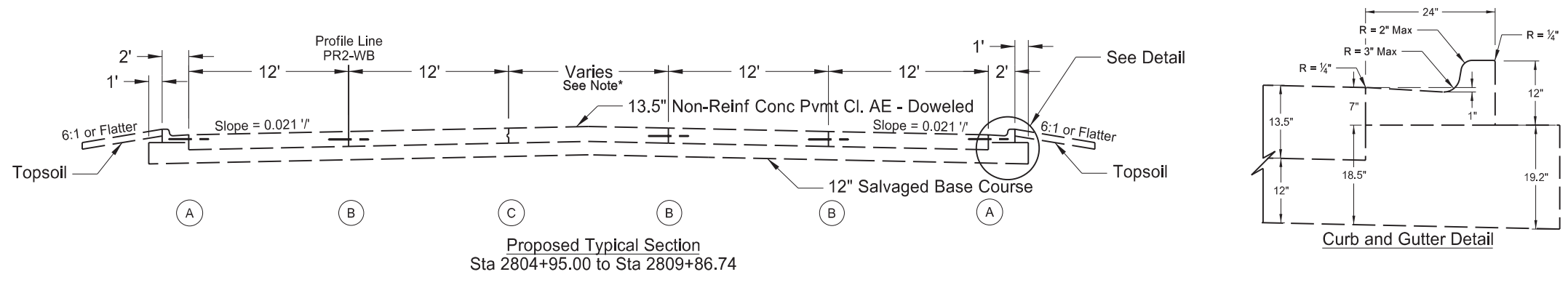
*Width requirement for top 1" only, bottom portion of sawcut may be narrower.



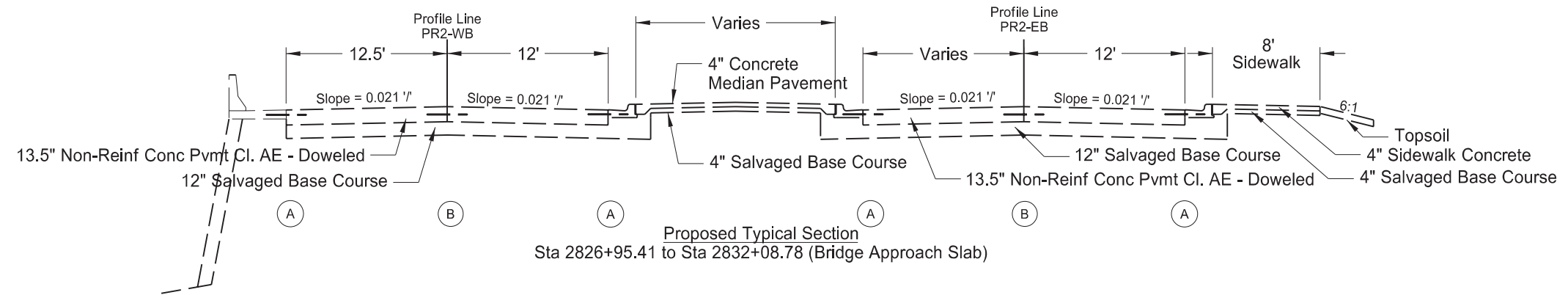
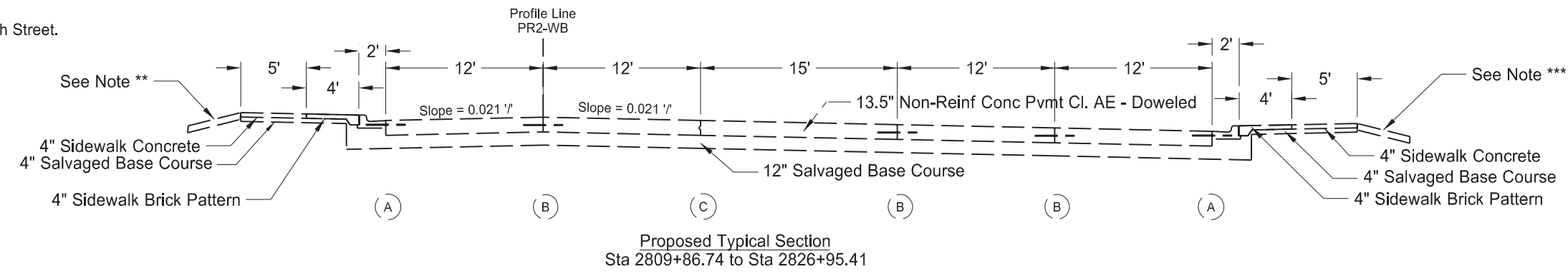
Expansion Joint Detail - West End of Structures
West End of Structures

Structure Repair
City of Ray EB & WB

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTE: North sidewalk ends at NE Church Street.

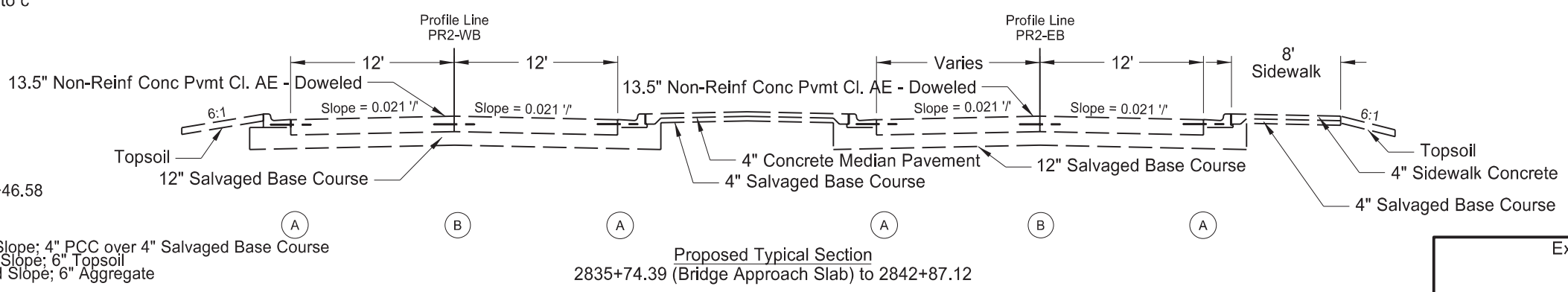


- (A) No. 3 x 18" Tie Bars @ 4' c to c
- (B) Tied Joint (Sawed)
- (C) Keyed Joint (Non-tied)

Note*
Lane width transitions from 12' at Sta 2808+79.17 to 15' at Sta 2809+46.58

Note**
Co. Rd. 17 to Lake Street - Varied Slope; 4" PCC over 4" Salvaged Base Course
Lake Street to West Street - Varied Slope; 6" Topsoil
West Street to Score Street - Varied Slope; 6" Aggregate

Note***
Co. Rd. 17 to Lake Street - 4:1 Slope; 6" Salvaged Base Course
Lake Street to Winther Street - 6:1 Slope; 6" Salvaged Base Course
Winther Street to Church Street - Varied Slope; 6" Salvaged Base Course
Church Street to West Street - Varied Slope; 6" Topsoil
West Street to Score Street - Varied Slope; 4" HBP over 4" Salvaged Base Course

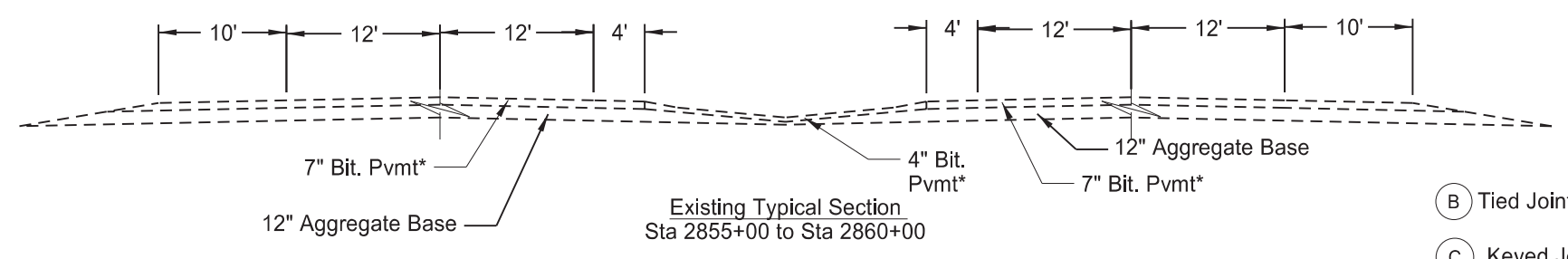
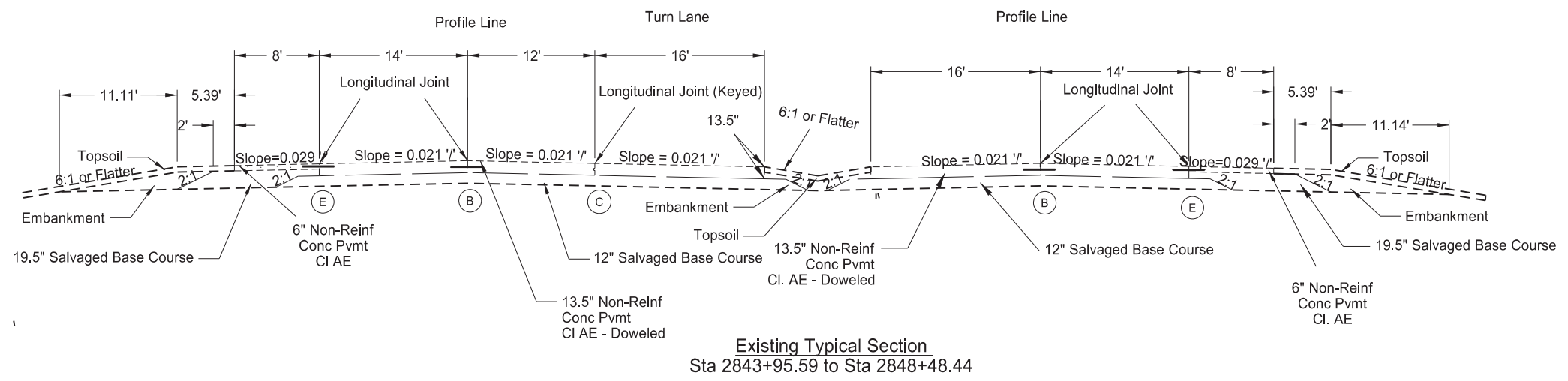


12/22/21

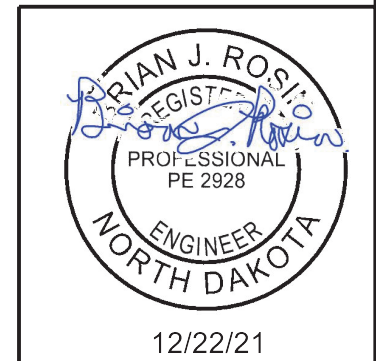
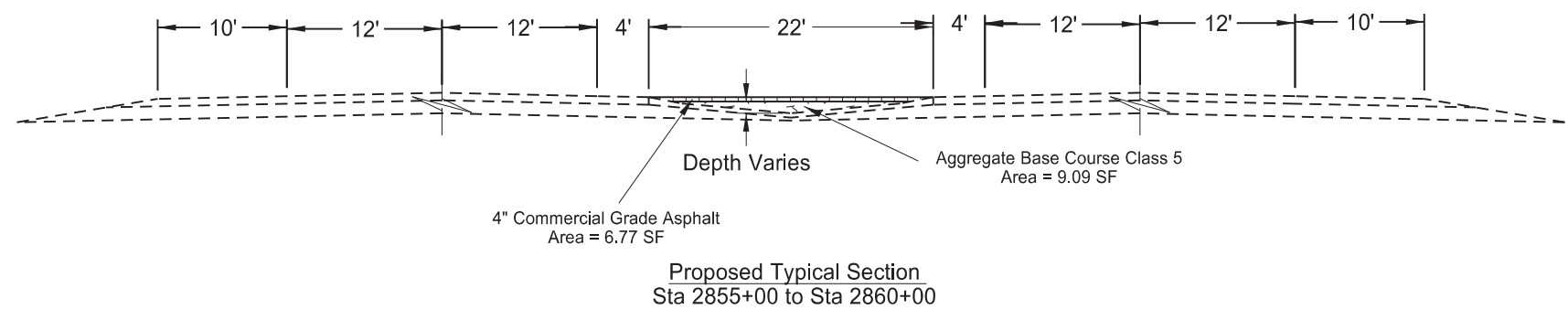
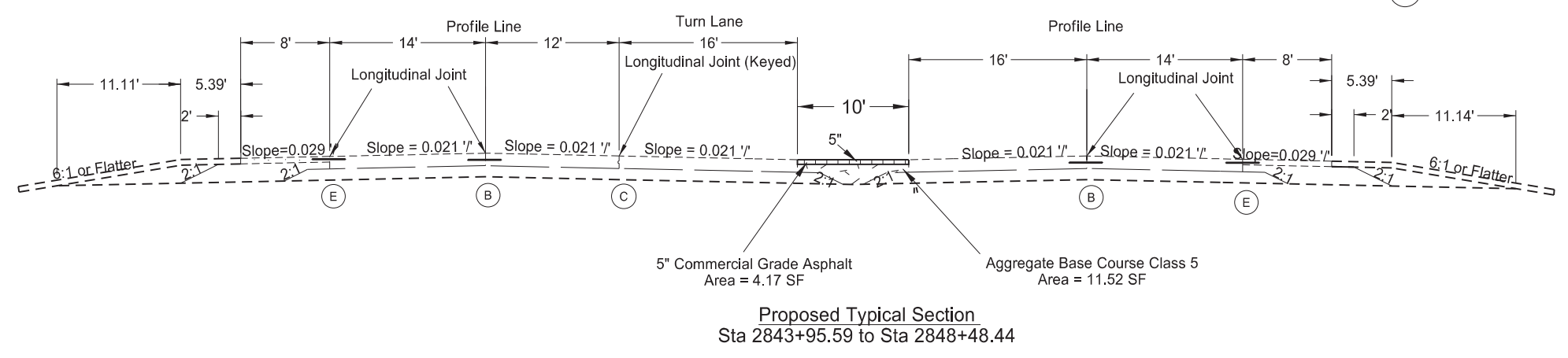
Existing Typical Sections

Structure Repair

City of Ray, EB & WB

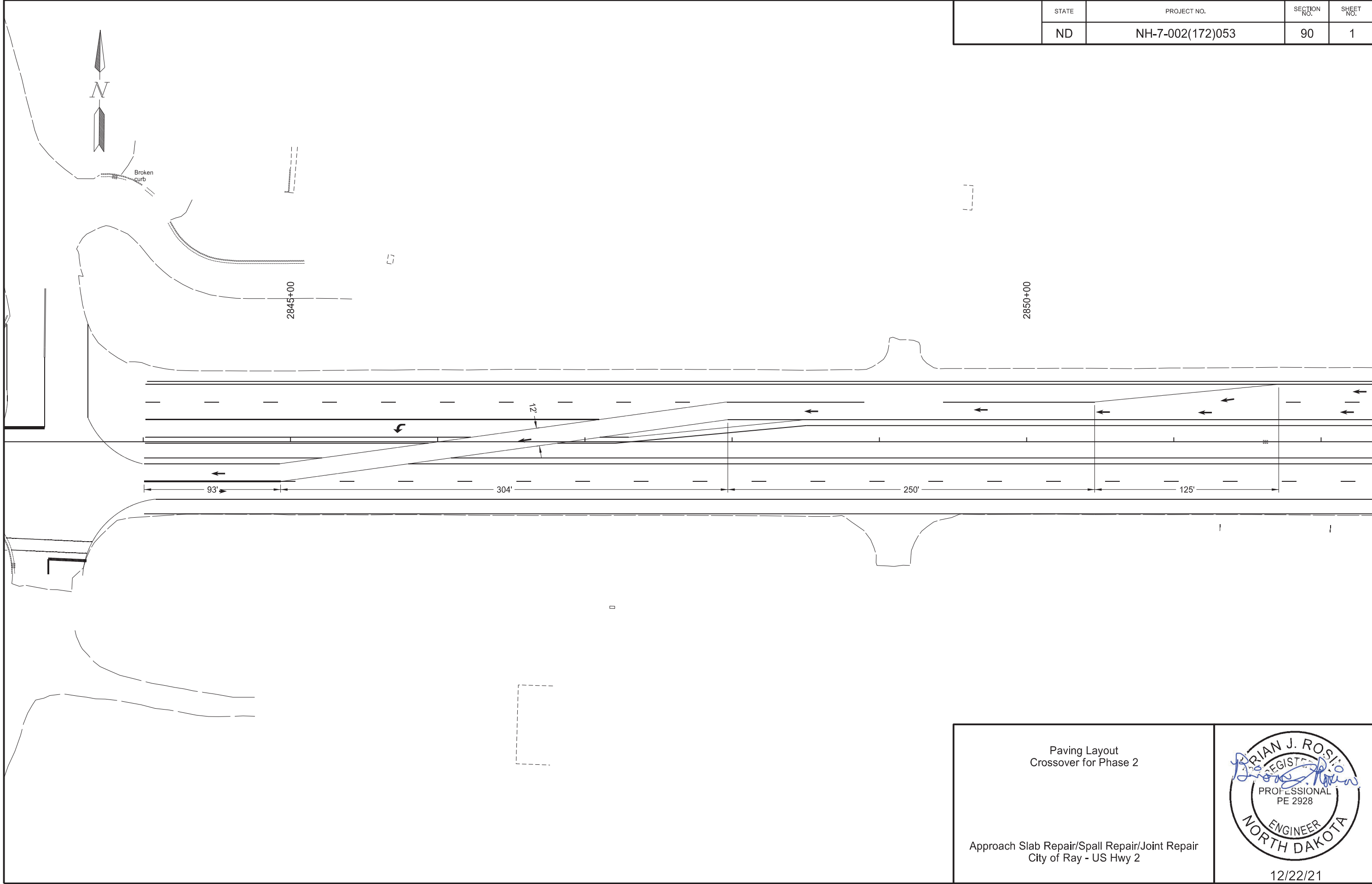


- (B) Tied Joint (Sawed)
- (C) Keyed Joint
- (E) Tied Joint



Crossover Typical Sections
 Approach Slab Repair/Spall Repair/Joint Repair
 City of Ray - US Hwy 2

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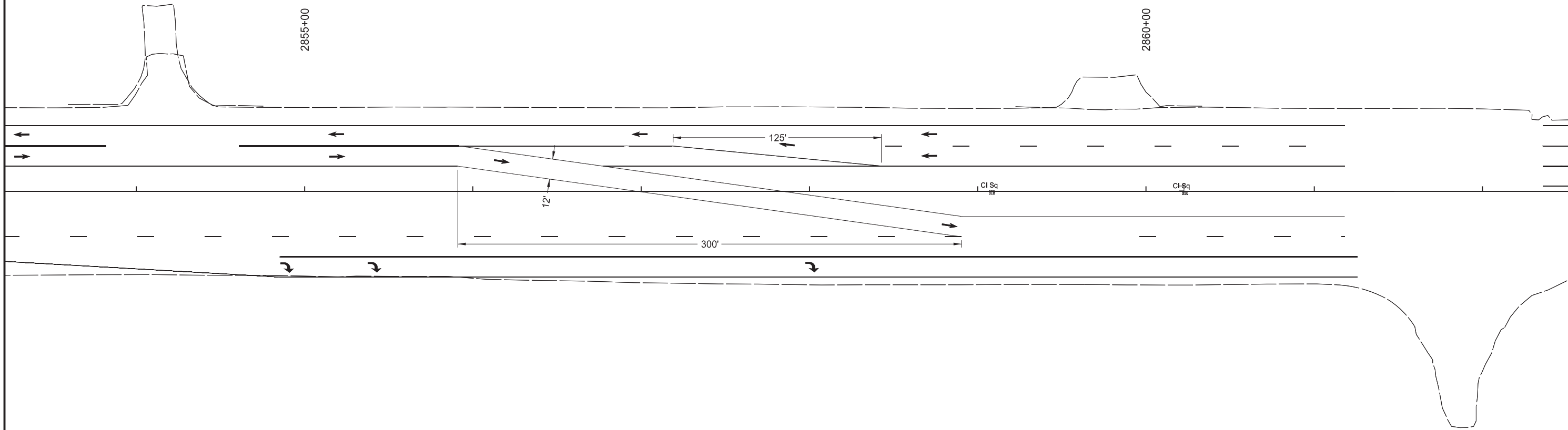
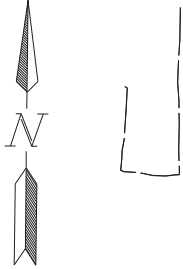
Paving Layout
Crossover for Phase 2

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2



12/22/21

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-7-002(172)053	90	2



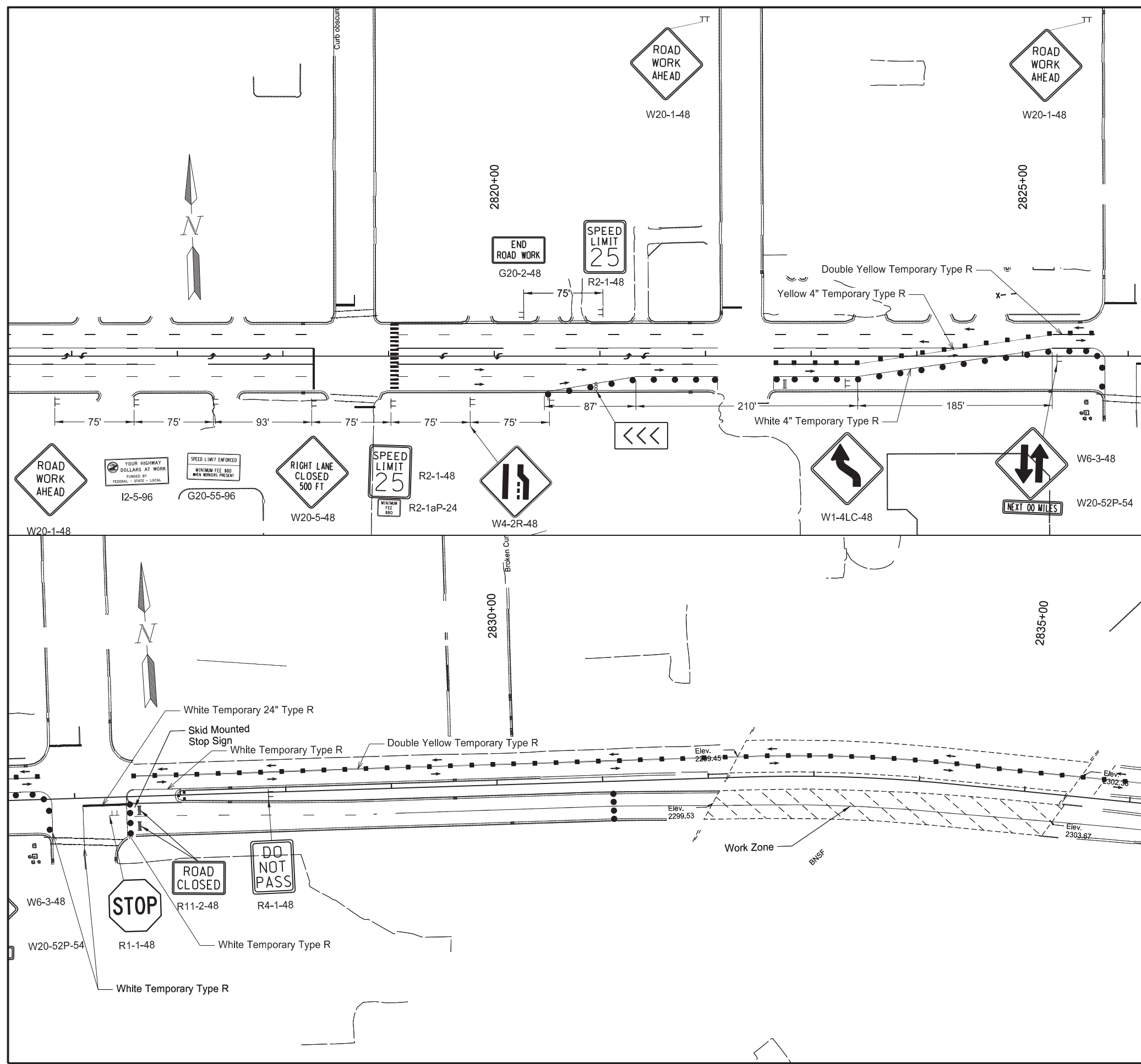
Paving Layouts
Crossover for Phase 1

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2



12/22/21

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	100	2



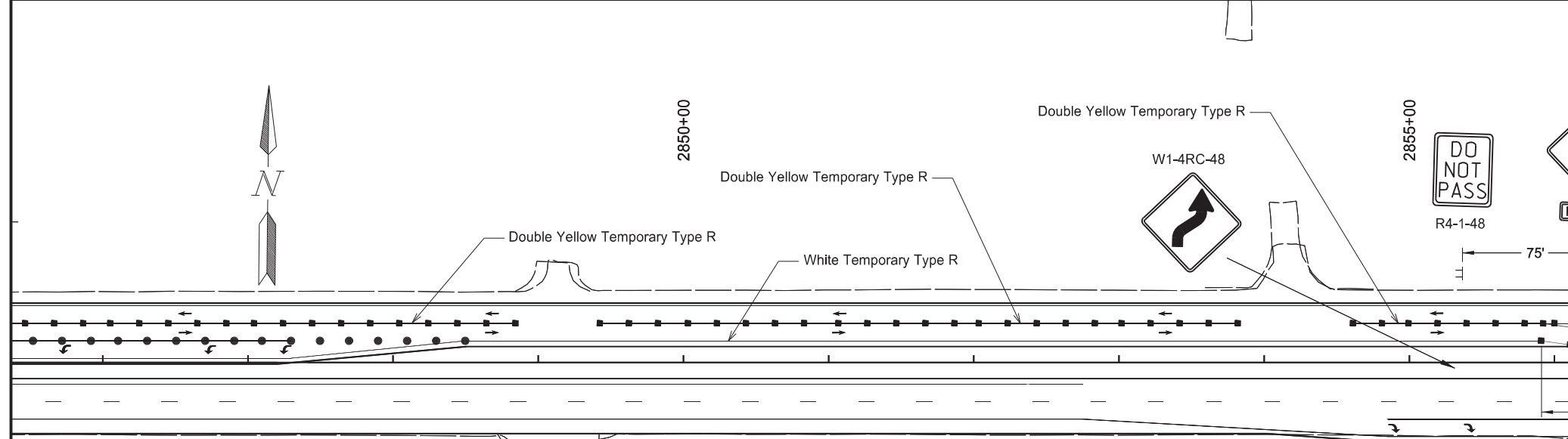
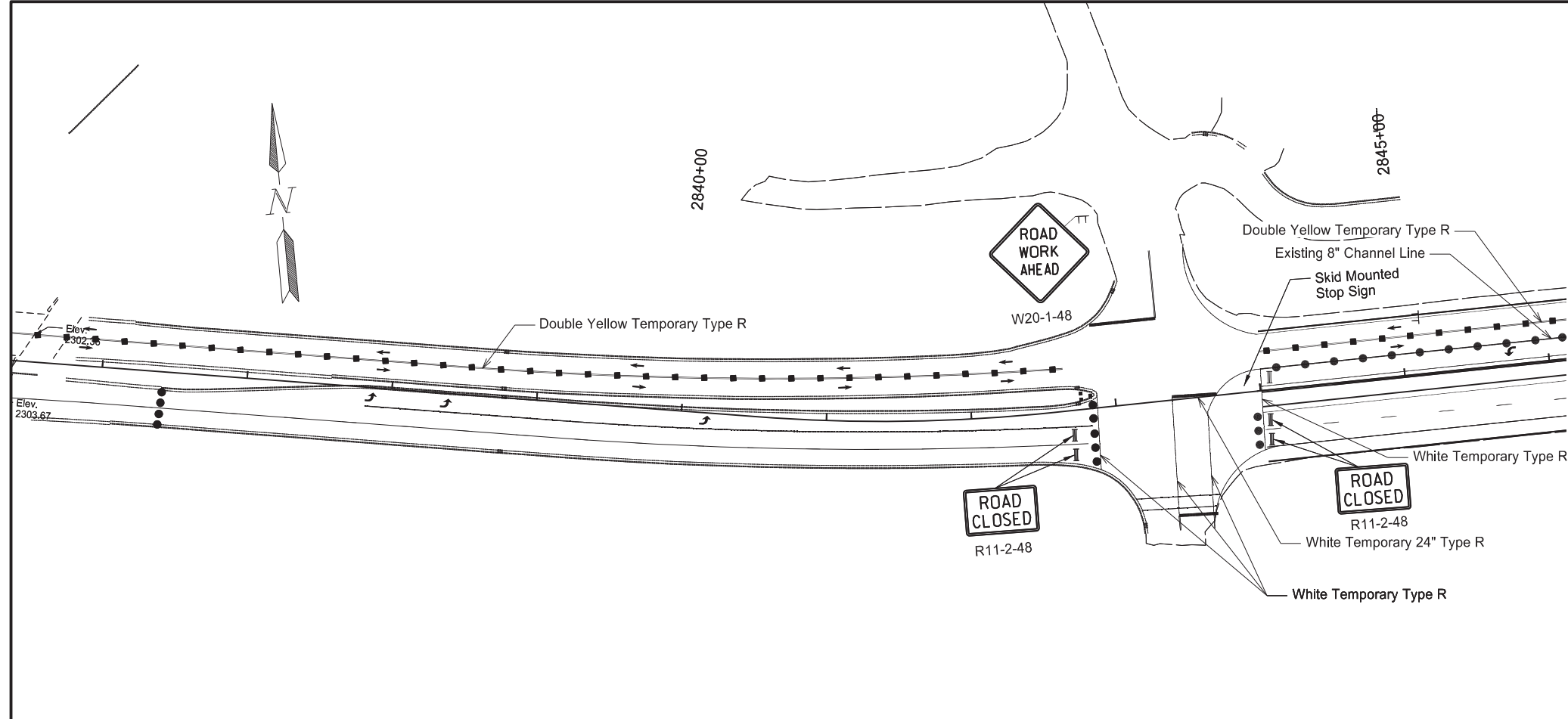
Traffic Control Layout
Phase 1

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
South Bridge Closure



01/04/22

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	100	3



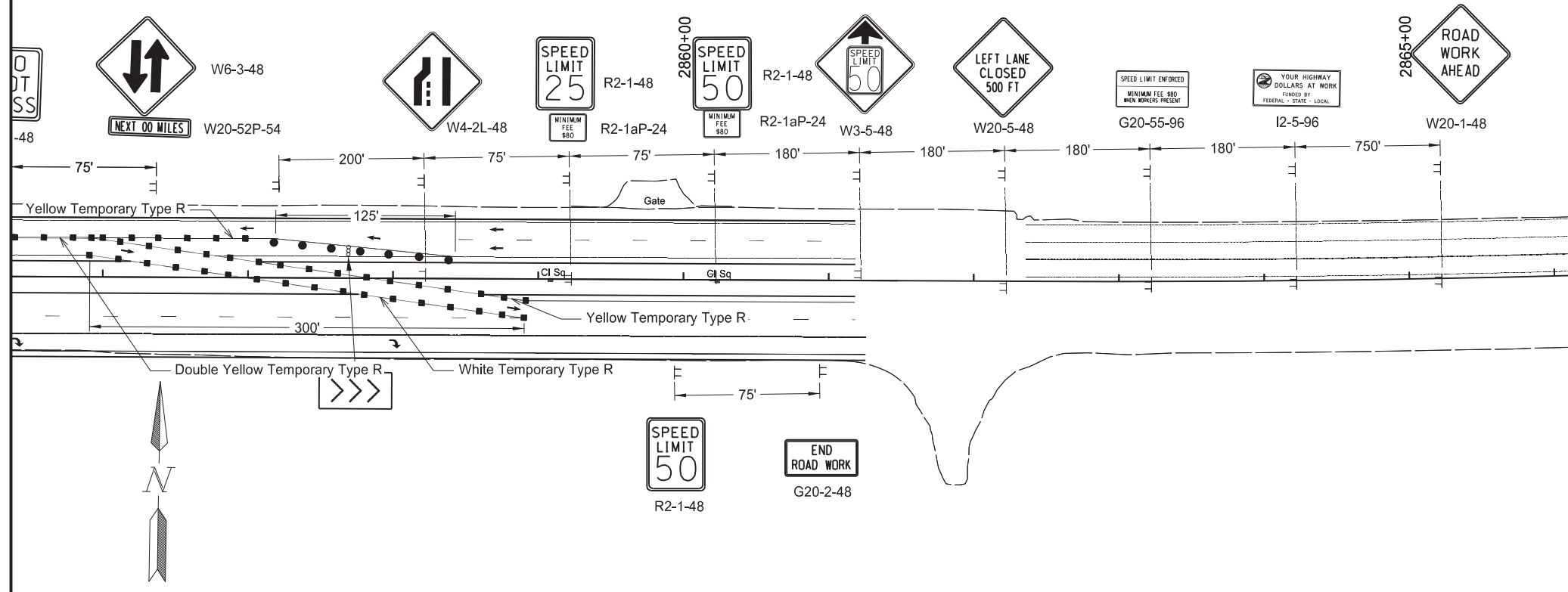
Traffic Control Layout
Phase 1

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
South Bridge Closure



01/04/22

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	100	4

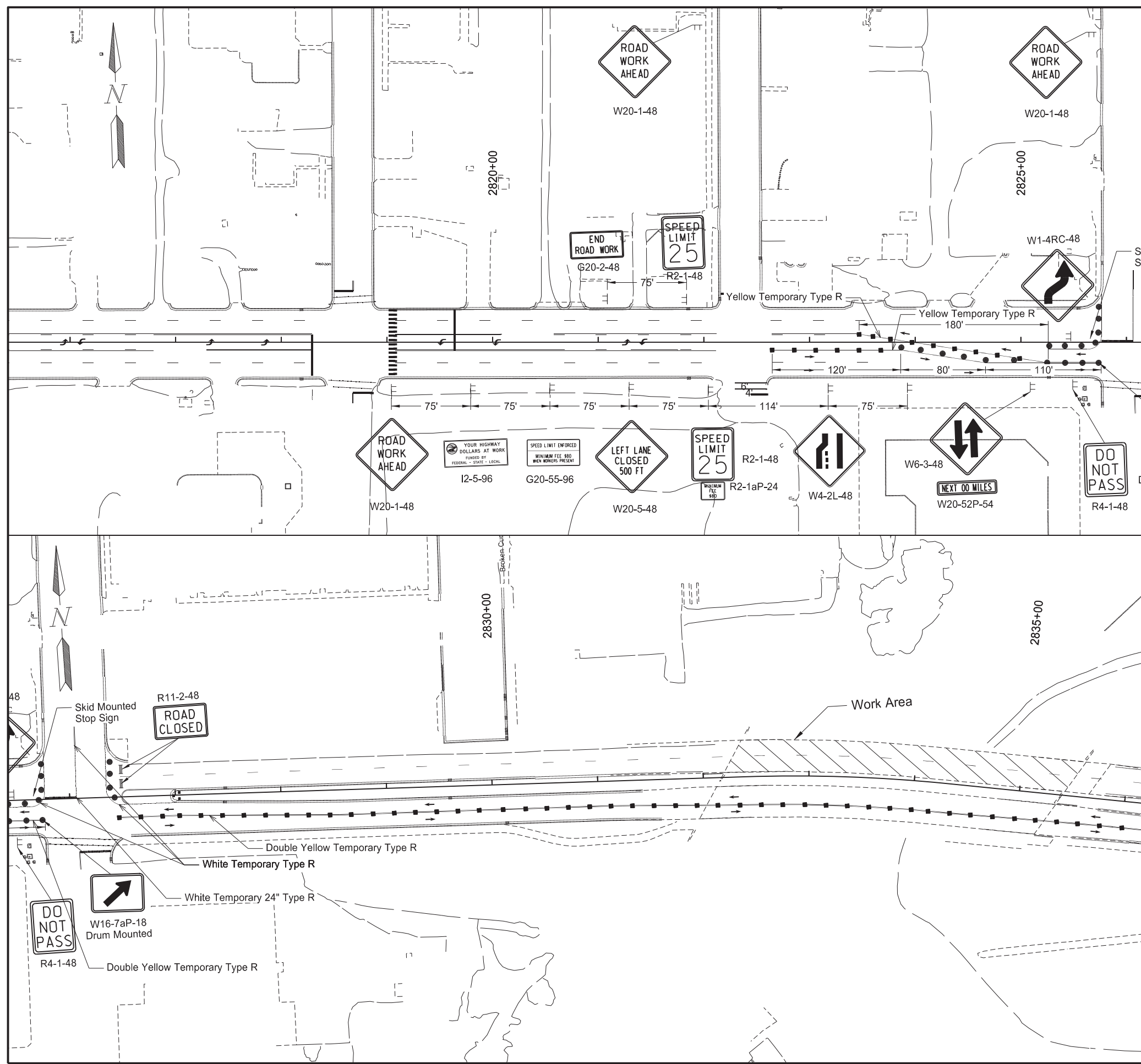


Traffic Control Layout
Phase 1

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
South Bridge CLOSURE

01/04/22

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	100	5



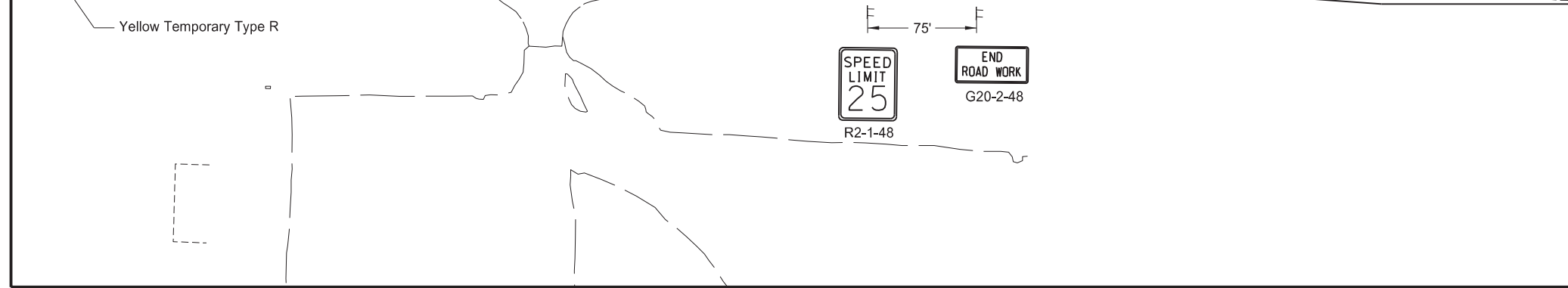
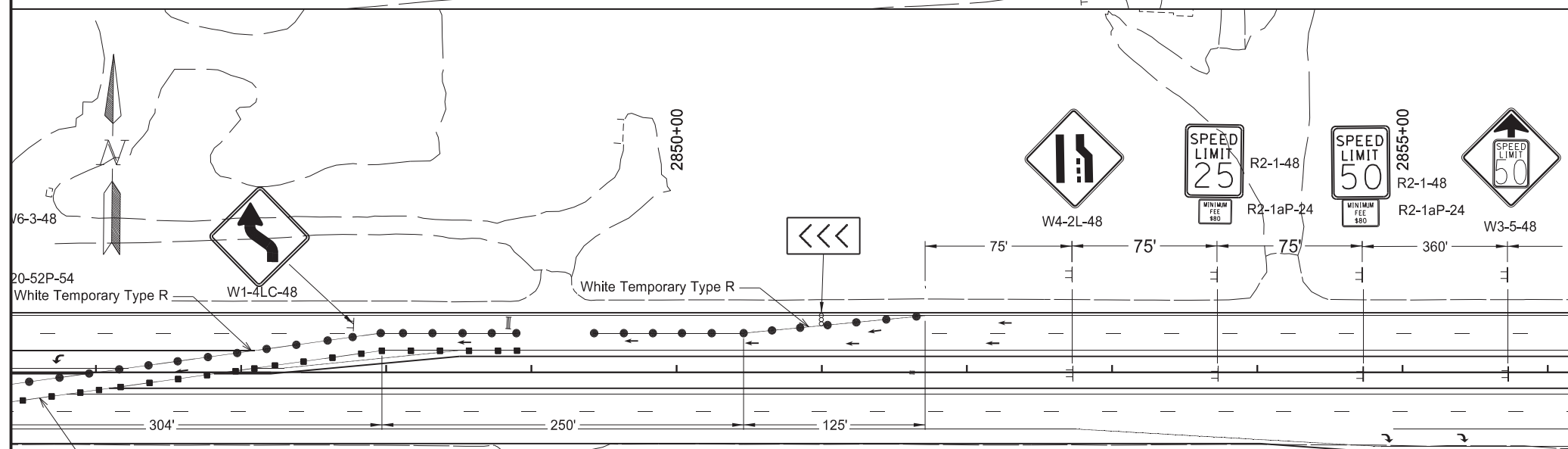
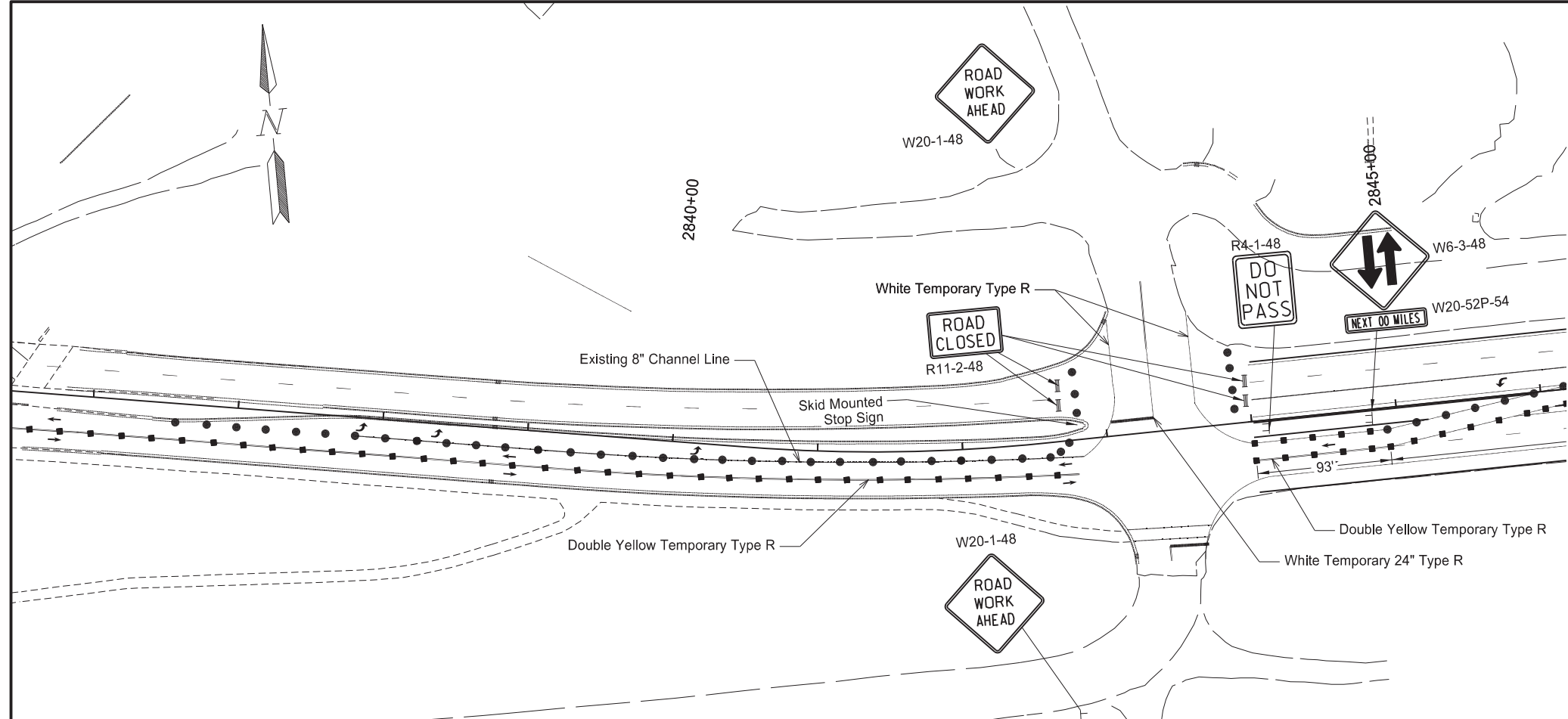
Traffic Control Layout
Phase 2

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
North Bridge Closure

ARIAN J. ROBINSON
REGISTERED PROFESSIONAL ENGINEER
NORTH DAKOTA
PE 2928

01/04/22

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ND	NH-7-002(172)053	100	6



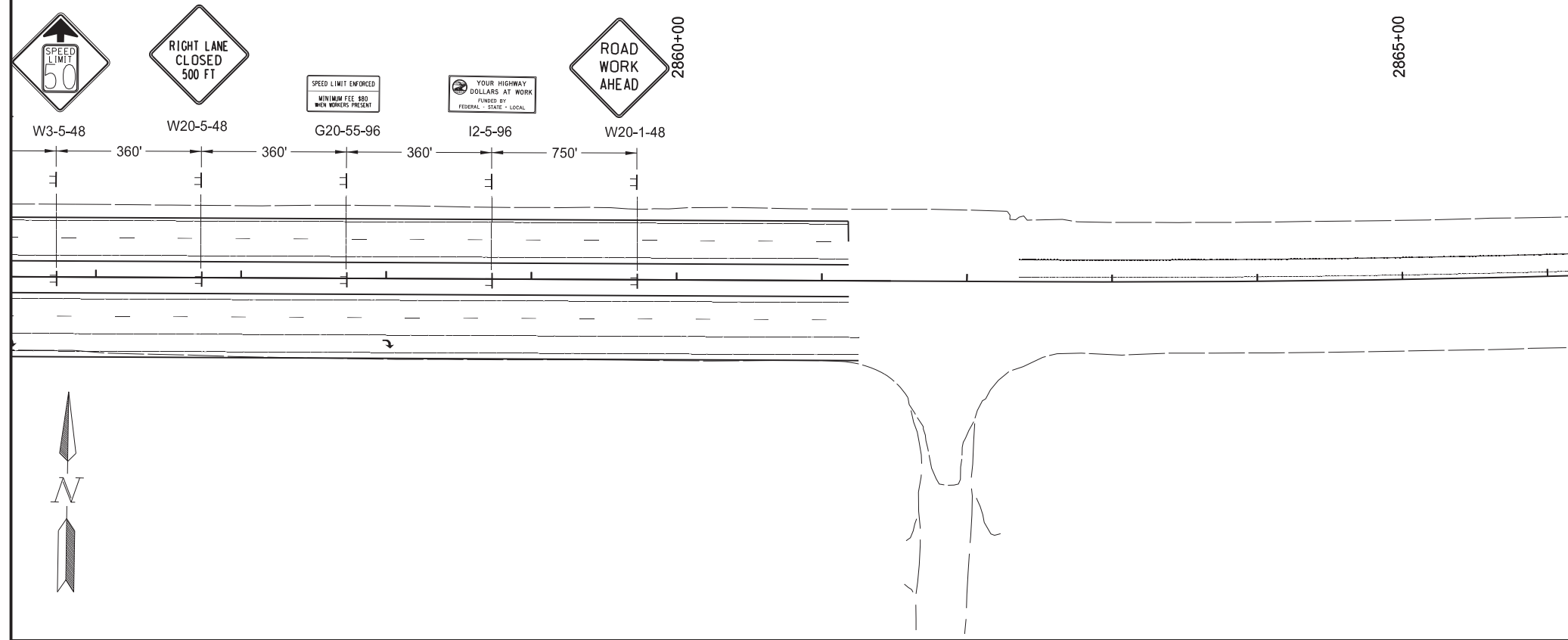
Traffic Control Layout
Phase 2

Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
North Bridge Closure



01/04/22

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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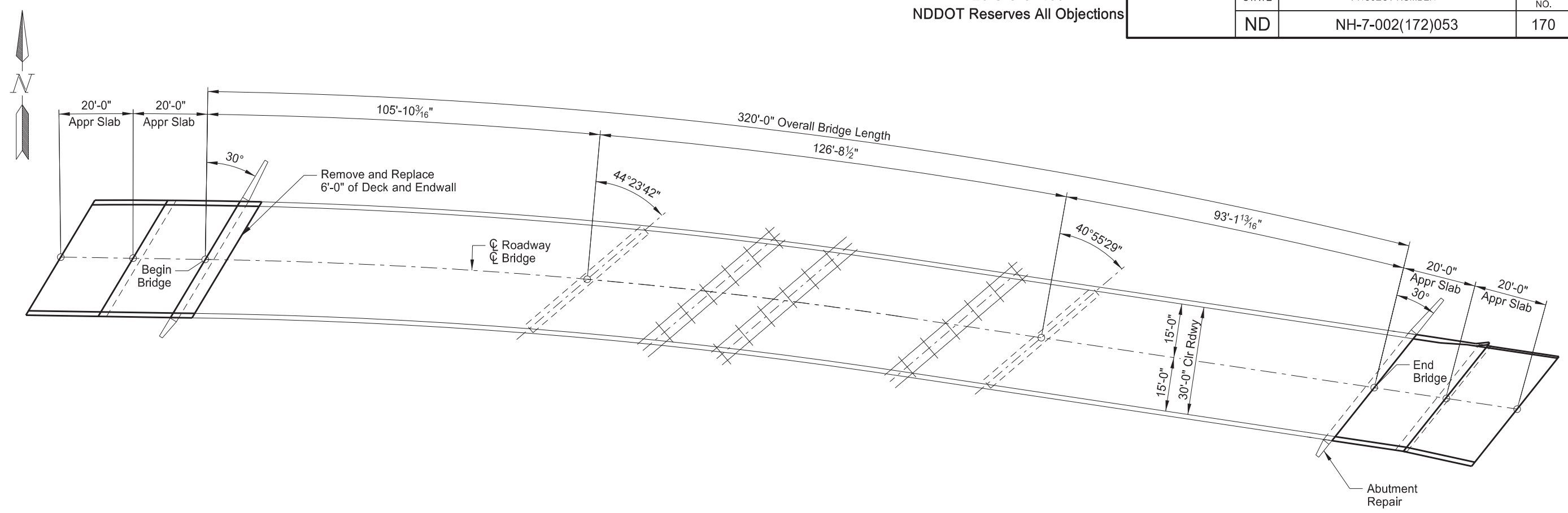


Traffic Control Layout
Phase 2

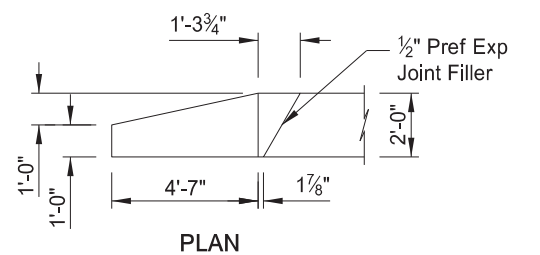
Approach Slab Repair/Spall Repair/Joint Repair
City of Ray - US Hwy 2
North Bridge Closure



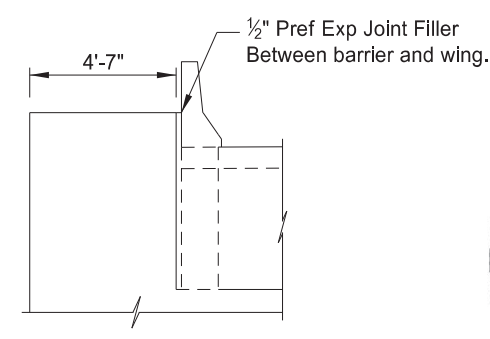
01/04/22



PLAN



PLAN



ELEVATION
ABUTMENT WING REPAIR

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0100	RAILWAY PROTECTION INSURANCE	L SUM	0.5
107	0140	RAILROAD COORDINATION	L SUM	0.5
202	0111	REMOVAL OF CONCRETE	L SUM	0.5
210	0099	CLASS 1 EXCAVATION	L SUM	0.5
602	0130	CLASS AAE-3 CONCRETE	CY	17.5
602	1134	PILE SUPPORTED APPROACH SLAB	SY	144.4
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	145.5
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,606
602	1260	BRIDGE DECK CRACK SEALING	LF	2,300
612	0115	REINFORCING STEEL-GRADE 60	LBS	394
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	2,472
930	8230	SHORING	EA	2
930	8644	SILICONE SEALANT	LF	640.0
930	9639	APPROACH SLAB LIP REPAIR	LF	37.5
930	9660	ABUTMENT REPAIR	L SUM	0.5



BURLINGTON NORTHERN OVERHEAD
RAY

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Ketterling, Jonathan
01/12/22

DocuSign

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	2

NOTES

- 100 SCOPE OF WORK: This project consists of removing and replacing the west portion of deck, west endwall, and both approach slabs.
- 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 and AAE-3 concrete.
- 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 abutments and approach slab footings 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. Include all work and materials associated with the bridge deck, approach slab, and barrier crack sealing in the price bid for the Class AAE-3 concrete and approach slab bid items.
- 602 SURFACE FINISH "D": Apply Surface Finish "D" to the inside, top and outside surfaces of the approach slab barrier and the barrier at the bridge ends. Match the existing bridge barrier texture and color.
- 900 ELEVATION CHECK POINTS: Prior to removal of the existing concrete, have the District record the elevations of the existing elevation check points at all substructures. Place four new carriage bolts on the top of the barrier at the abutments to serve as elevation check points. Include the cost for this item in the unit price bid for Class AAE-3 concrete.

- 930 ABUTMENT REPAIR: The east abutment south 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.

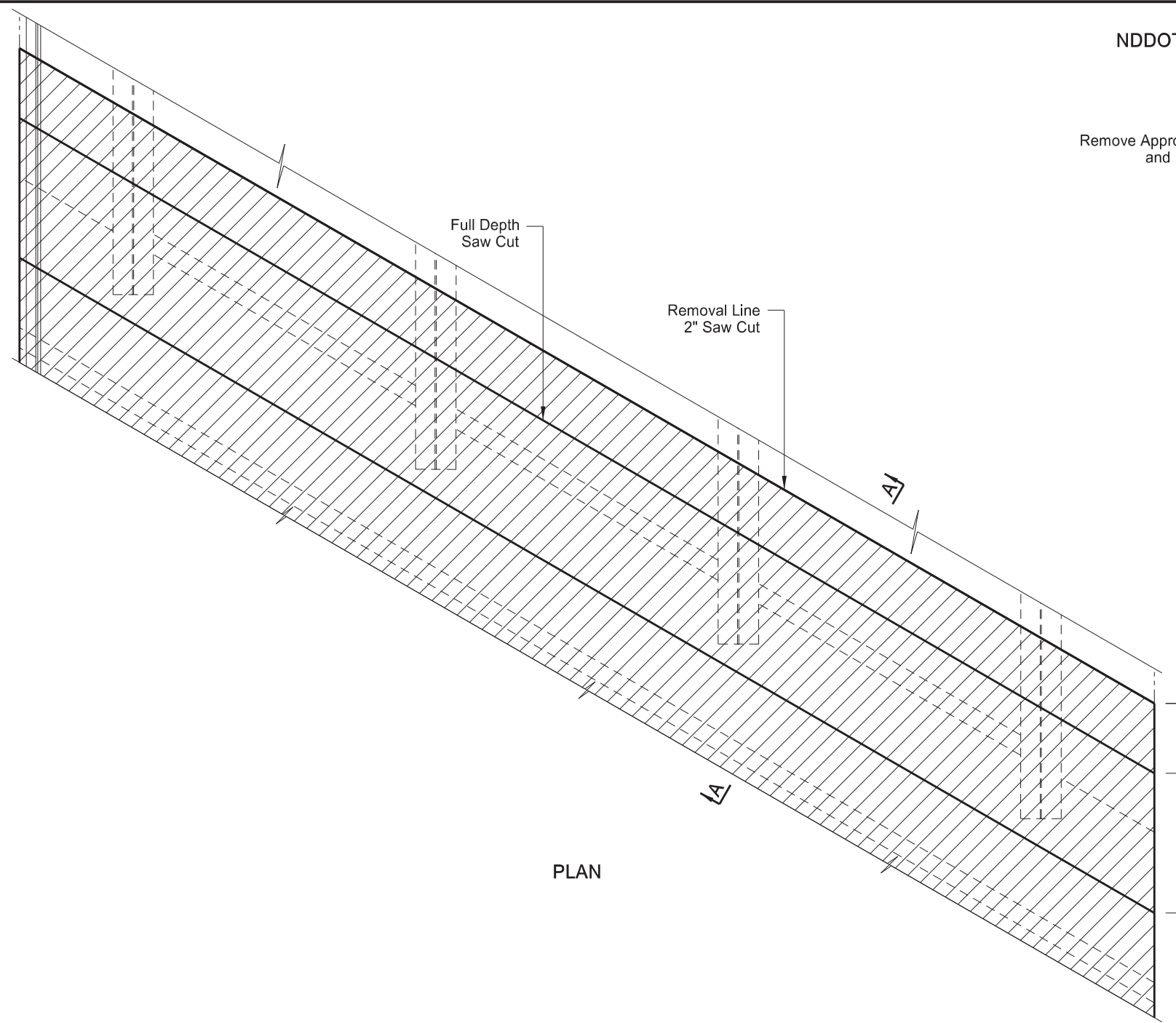
Use concrete material that is specifically intended for patching concrete. For the patching material use SikaTop 122 Plus(Sika Corporation), Tamms Industries Duraltop Gel, ThoRoc JB2 (ChemRex Incorporated), or an approved equal repair mortar. Install and cure the material as recommended by the manufacturer.

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 SHORING: A bid item for temporary shoring has been included to accommodate the removal of pile for the approach slab next to the abutment. The Contractor is responsible to design, construct, maintain, and remove temporary shoring. Include all labor, equipment and material needed in the bid item, "Shoring". A quantity of 1 EA will be paid for this work.

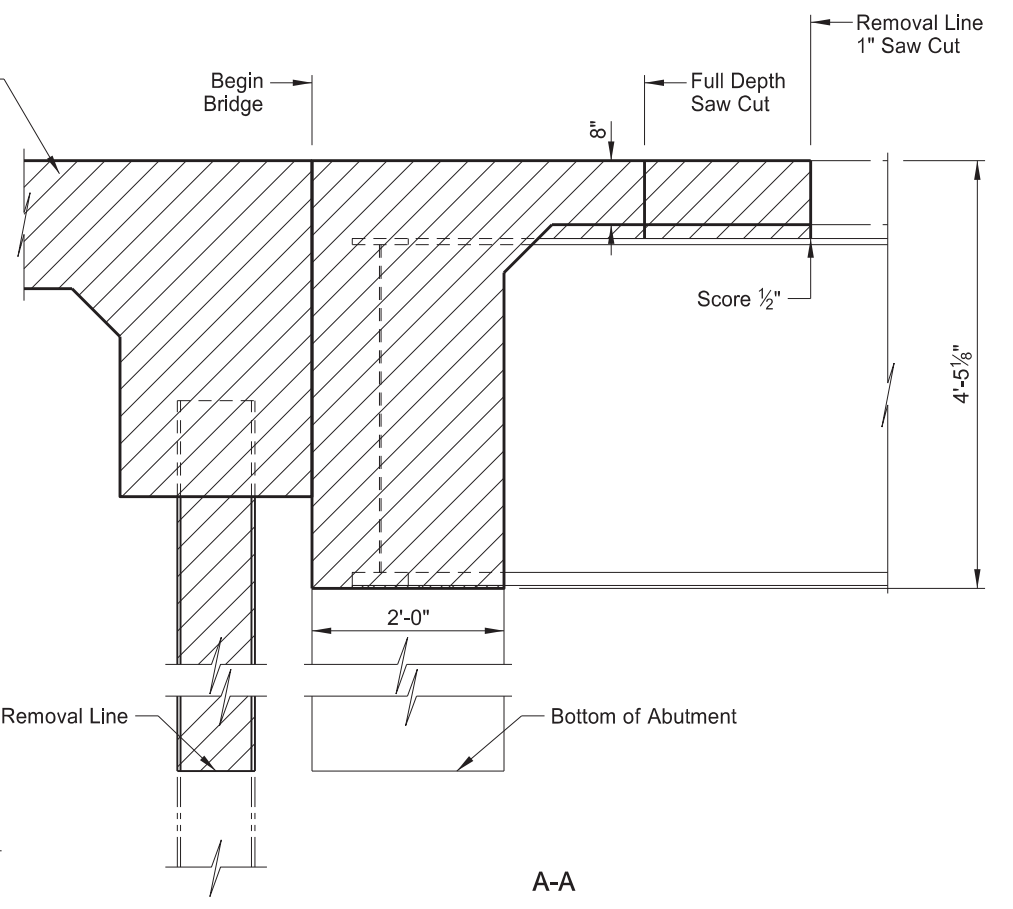


23 U.S.C. 409
 NDDOT Reserves All Objections

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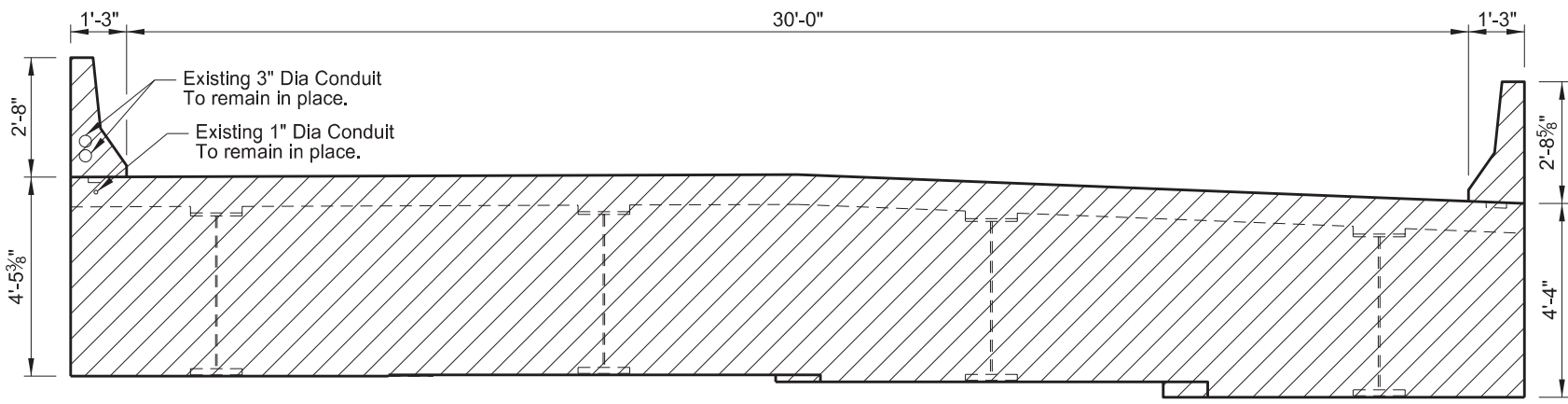
PLAN



A-A

Hatched area indicates concrete to be removed.

NOTE:
 Score 1/2" from the bottom of the deck prior to full depth saw cut. Saw cut the deck full depth at a distance of 2'-0" from the removal line. Saw cut the deck to a depth of 1" at the removal line to produce a neat line between the concrete to be removed and the concrete to remain. Saw cut existing barriers to a depth of 1" at the removal line to produce a neat line between the concrete to be removed and the concrete to remain. Carefully remove concrete to ensure no damage is done to the existing reinforcing steel that is to remain in place.

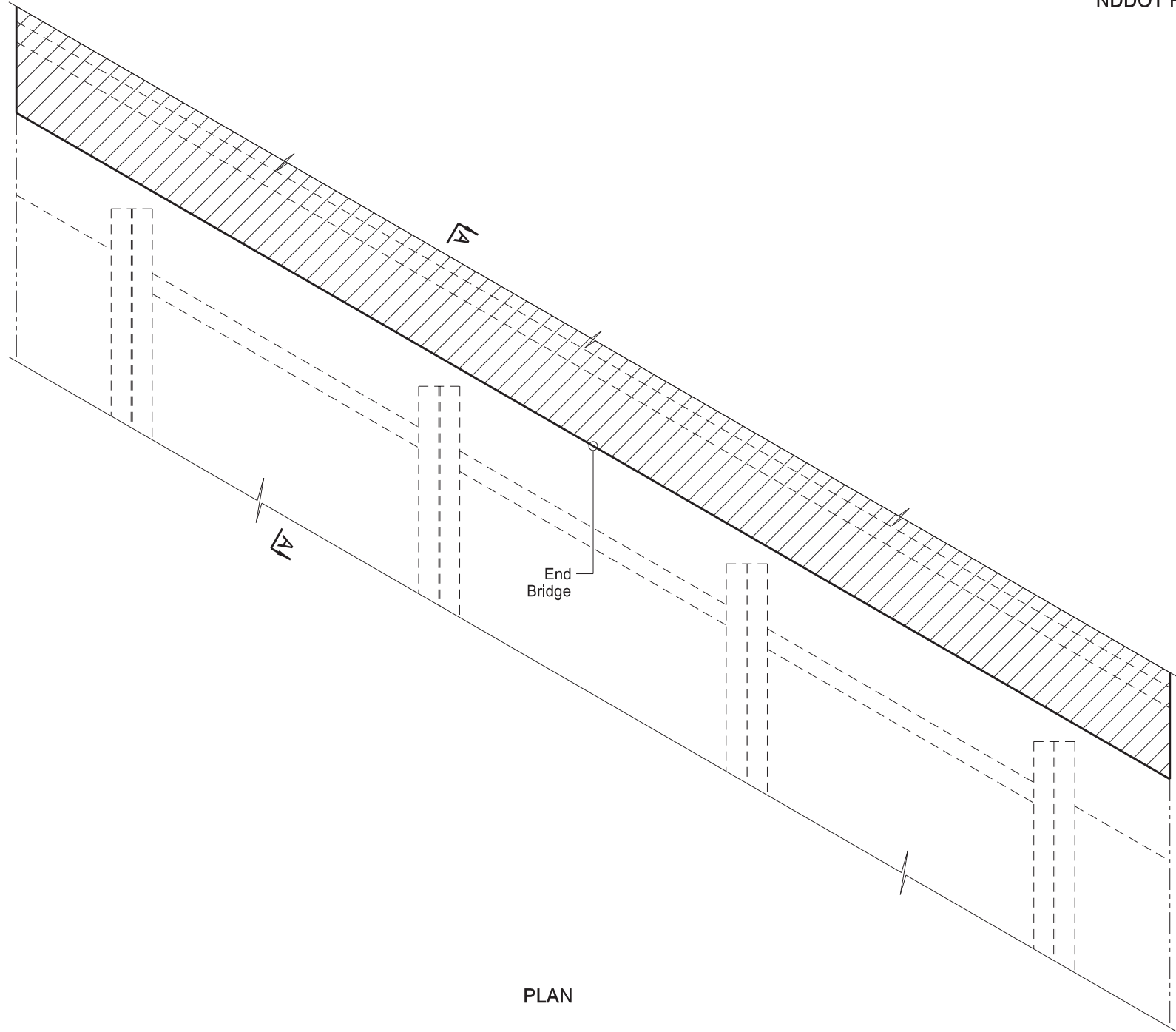


ELEVATION

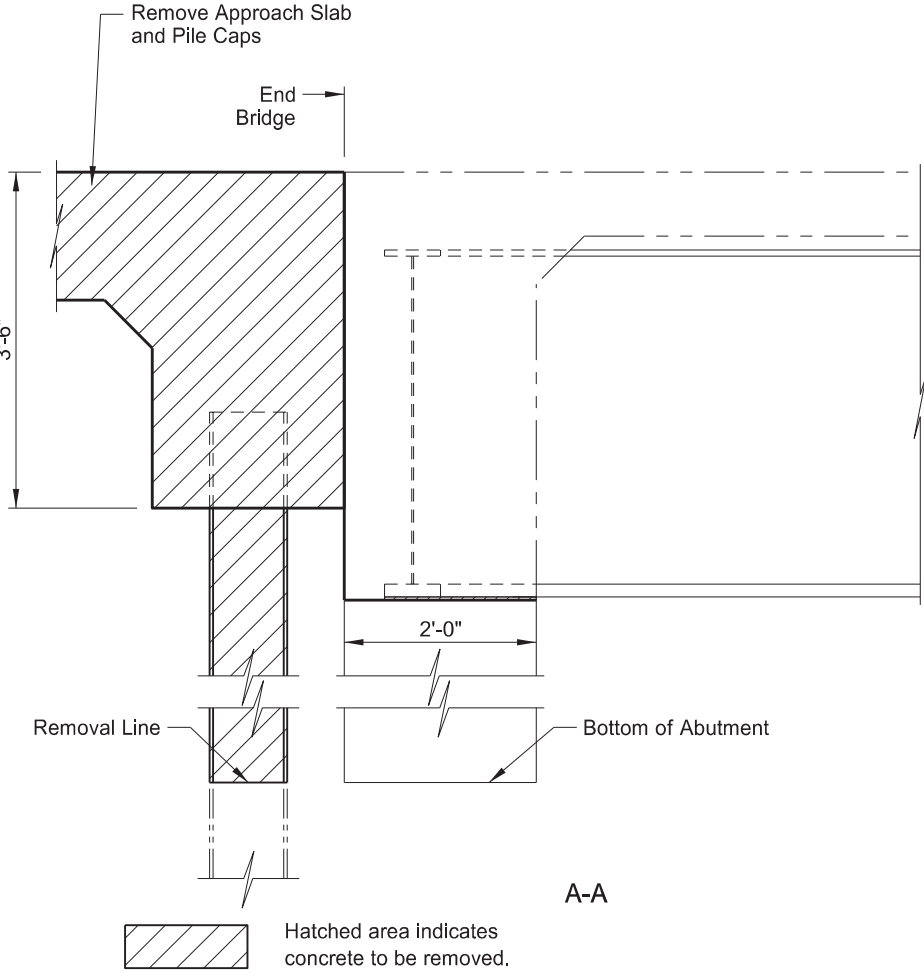


BURLINGTON NORTHERN OVERHEAD RAY
 (WEST END)
 DECK & ENDWALL REMOVAL

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	4



PLAN

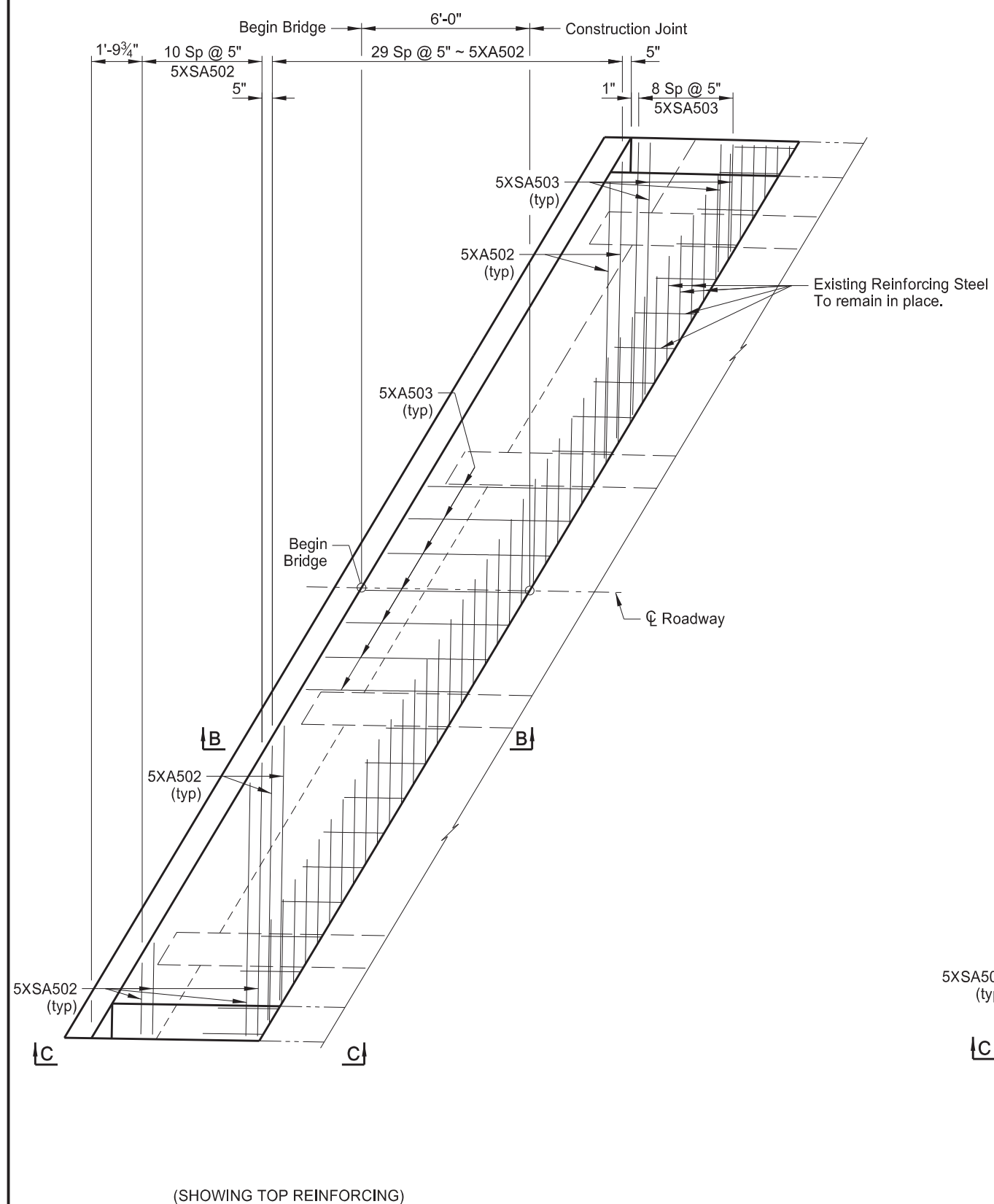


NOTE:
 Remove existing approach slab and pile caps for the entrance end of bridge. Carefully remove concrete to ensure no damage to existing bridge deck or abutment endwall that is to remain in place.



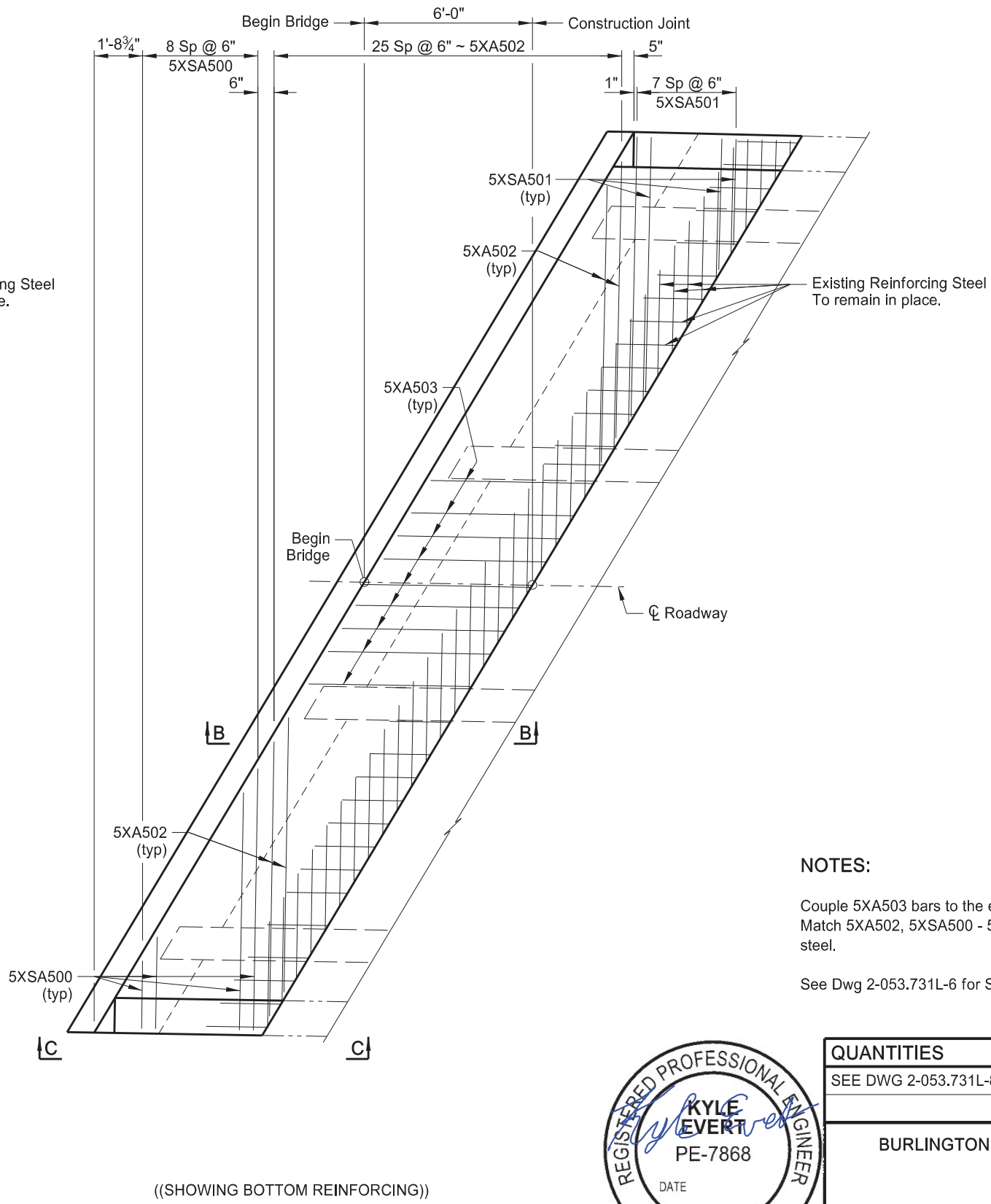
BURLINGTON NORTHERN OVERHEAD RAY
 (EAST END)
 APPROACH SLAB & PILE CAPS
 REMOVAL DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	5



(SHOWING TOP REINFORCING)

PLAN



((SHOWING BOTTOM REINFORCING))

NOTES:

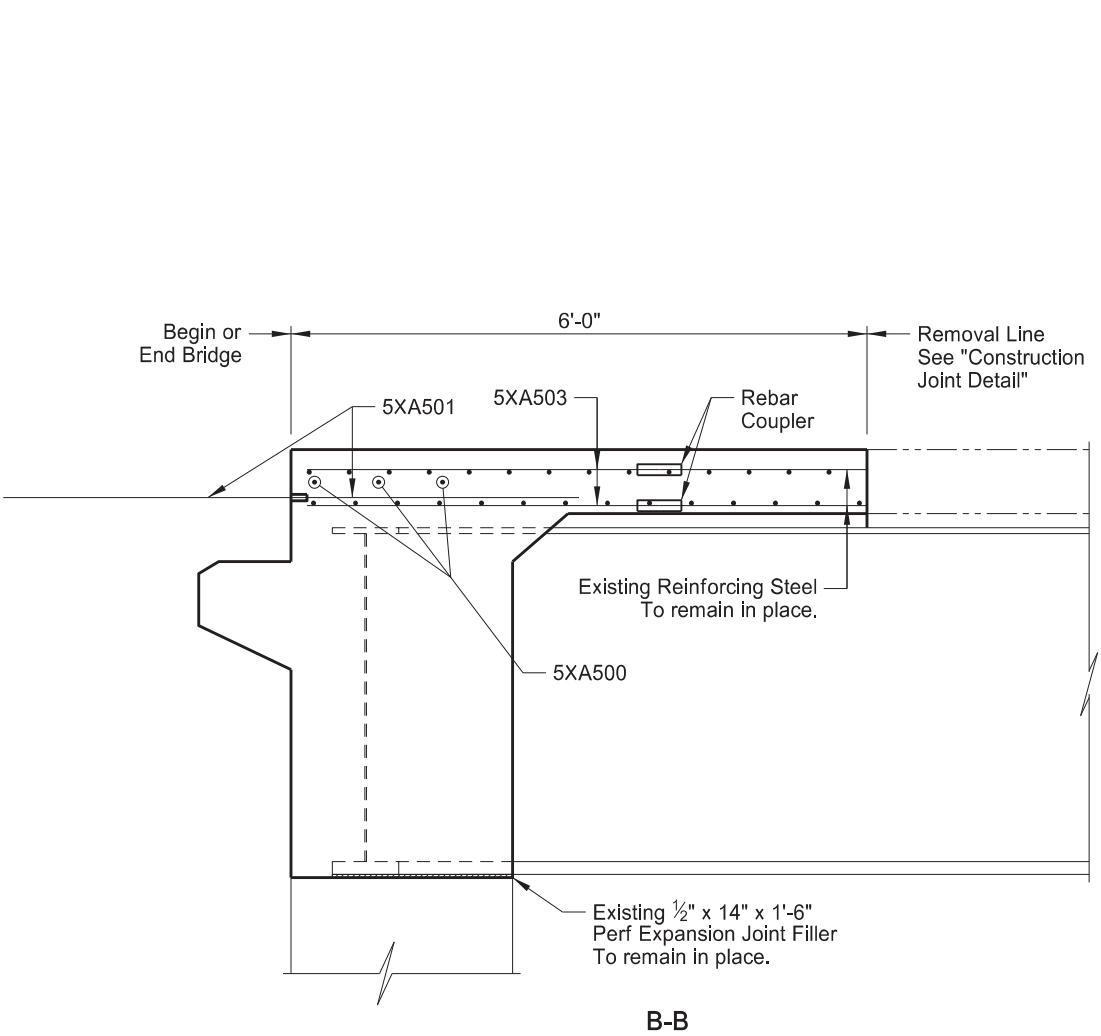
Couple 5XA503 bars to the existing reinforcing steel.
Match 5XA502, 5XSA500 - 5XSA503 to existing reinforcing steel.

See Dwg 2-053.731L-6 for Sections B-B and C-C.

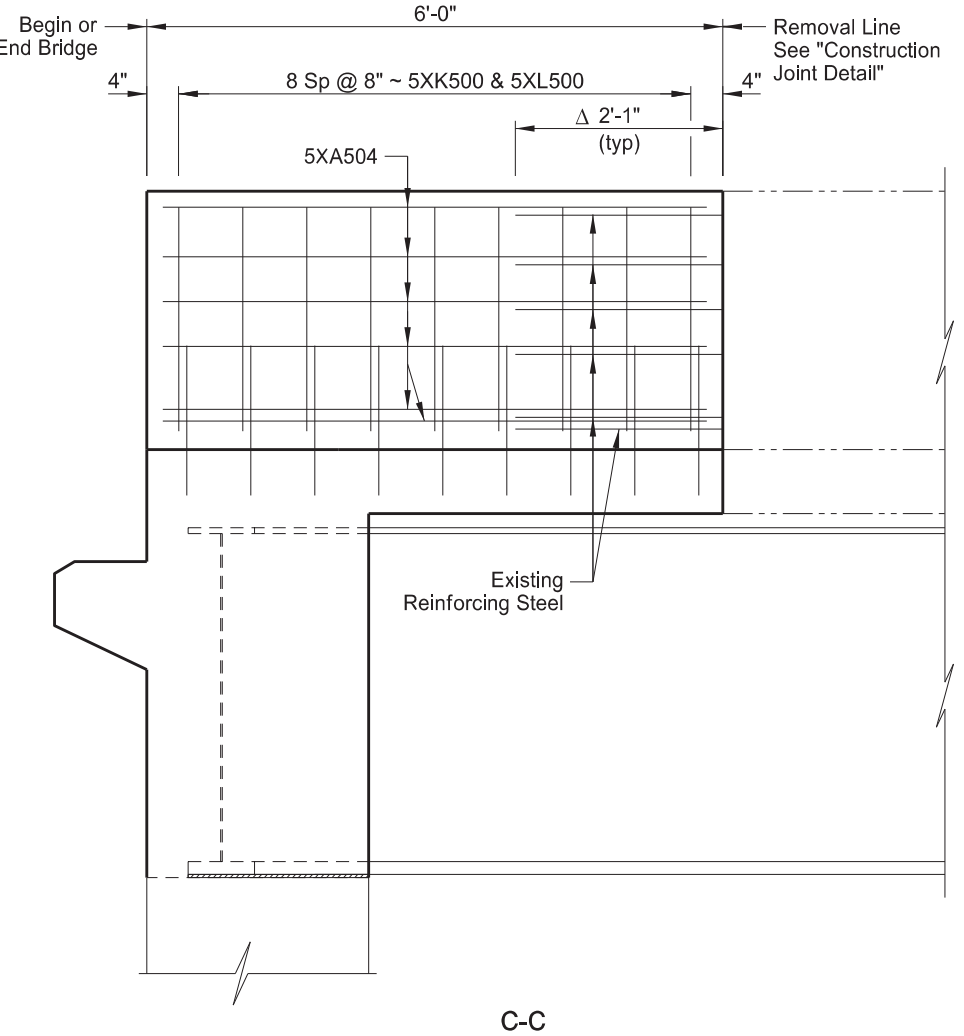


QUANTITIES
SEE DWG 2-053.731L-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
SLABLAYOUT

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Δ Cut the existing horizontal reinforcing steel protruding from the existing concrete railing and curb after removal leaving a minimum of 2'-1" exposed to the new barrier.



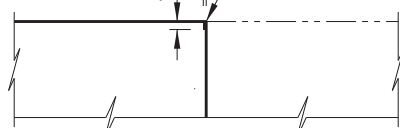
NOTES:
 Couple 5XA503 bars to the existing reinforcing steel.
 Match 5XA504 bars to existing reinforcing steel.
 See Dwg 2-053.731L-5 for locations of B-B and C-C.



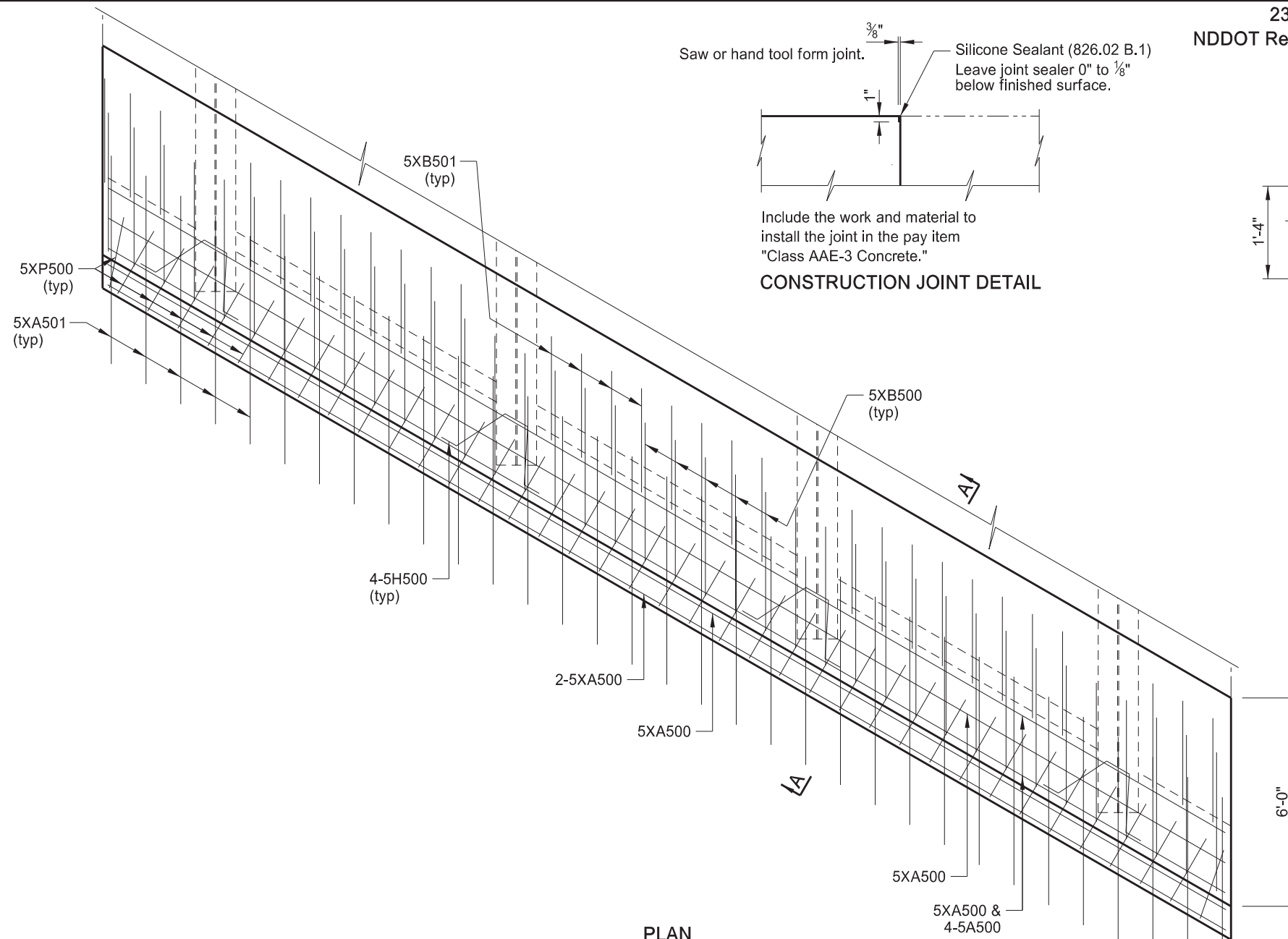
QUANTITIES
SEE DWG 2-053.731L-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
SUPERSTRUCTURE DETAILS

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ND	NH-7-002(172)053	170	7

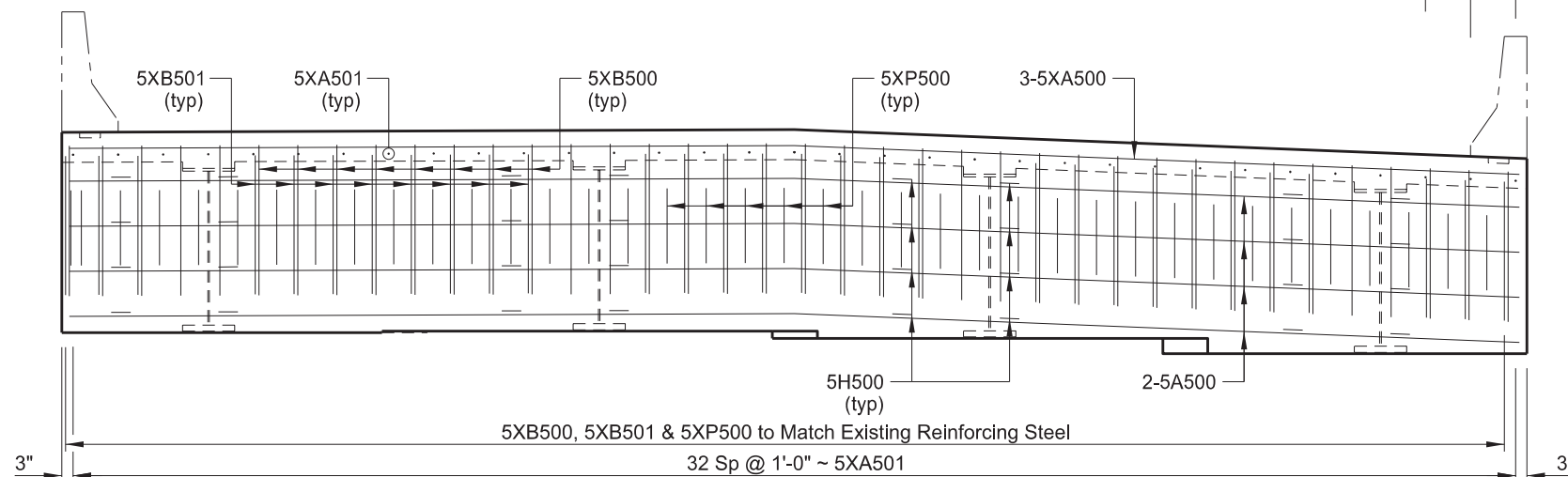
Saw or hand tool form joint.
Silicone Sealant (826.02 B.1)
Leave joint sealer 0" to 1/8" below finished surface.



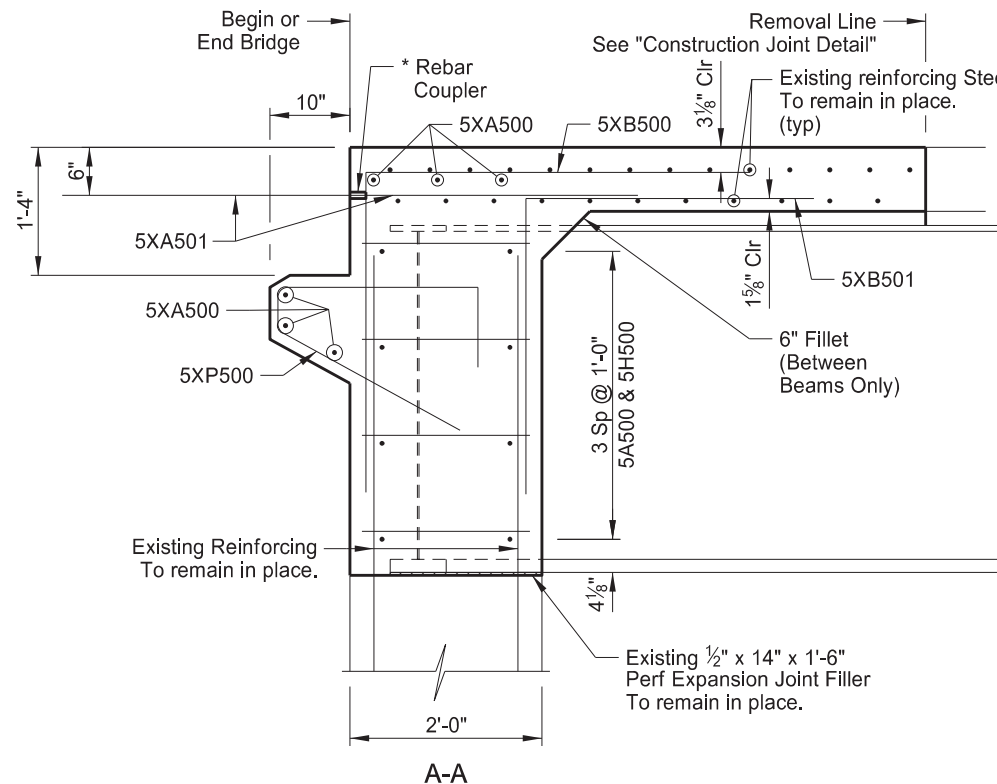
Include the work and material to install the joint in the pay item "Class AAE-3 Concrete."
CONSTRUCTION JOINT DETAIL



PLAN

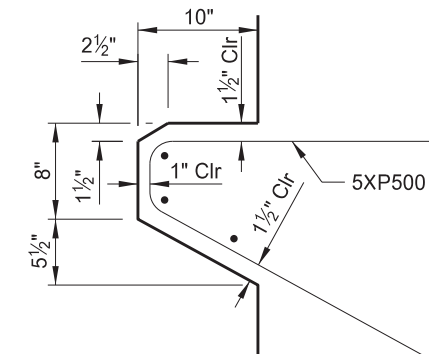


(APPROACH LIP NOT SHOWN)
ELEVATION



A-A

* Use mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.



APPROACH LIP DETAIL

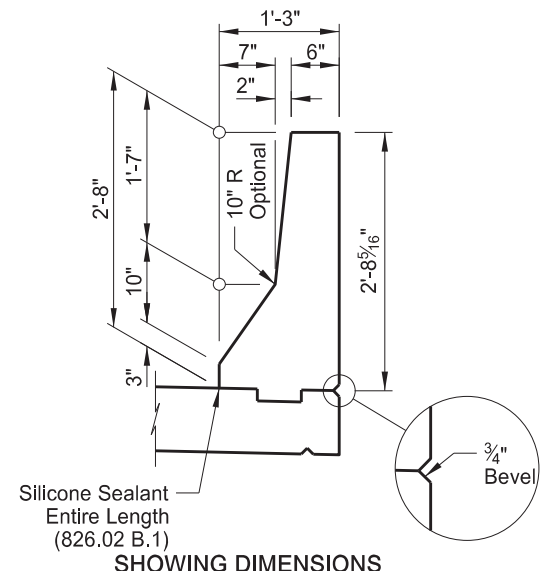
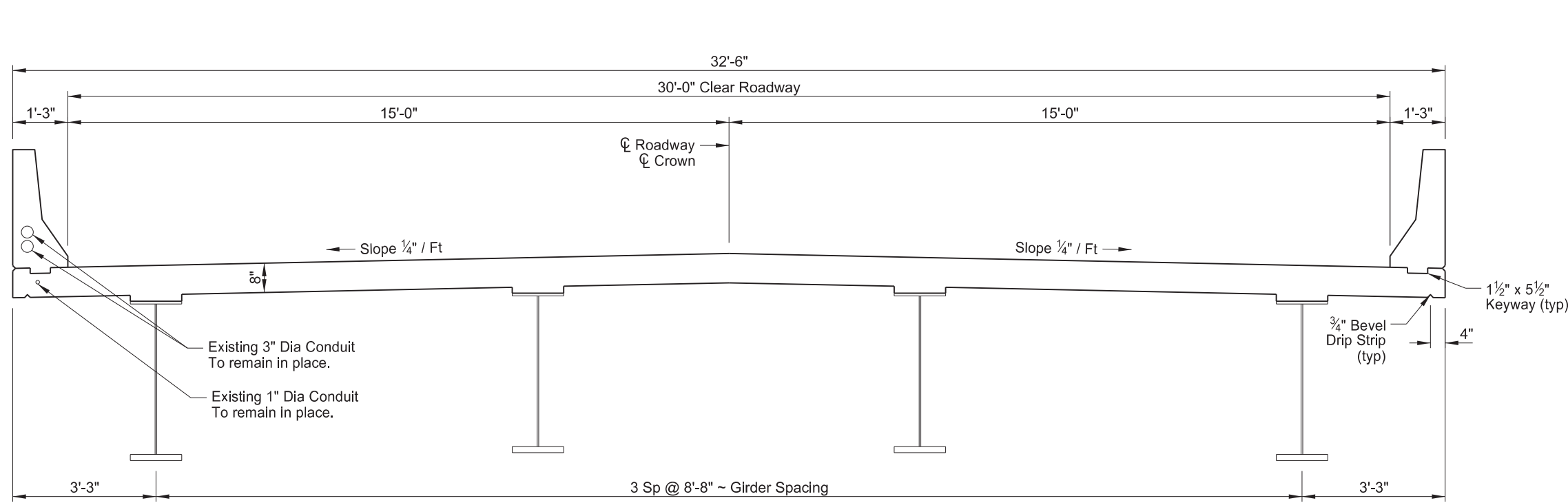
NOTE:

Do not install the 5XA501 bars into the approach slab until all of the foundation fill is in place.

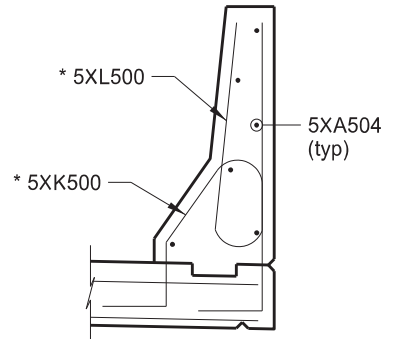
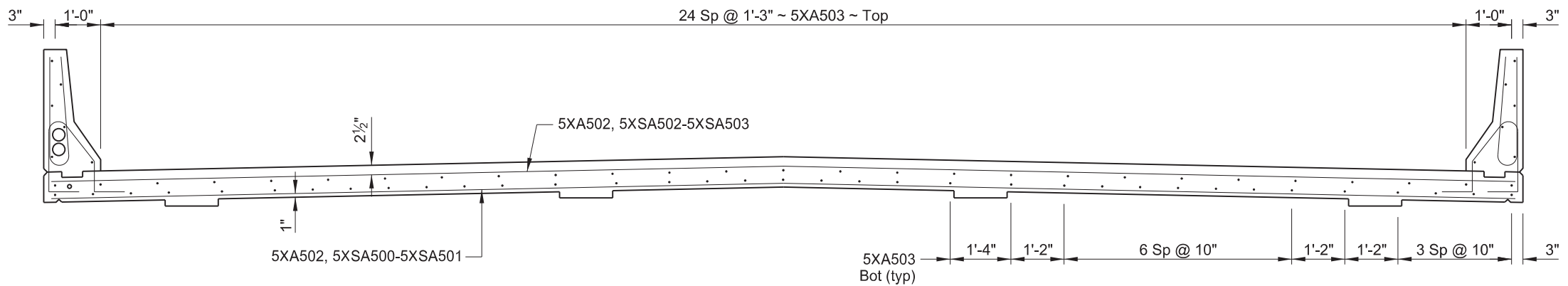


QUANTITIES
SEE DWG 2-053.731L-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
DECK REMOVAL

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	8



(SHOWING DIMENSIONS
 SLAB SECTION



* Provide a 1 1/2" clearance to the barrier reinforcing.

SHOWING REINFORCING
 BARRIER DETAIL

QUANTITIES	
CLASS AAE-3 CONCRETE	17.5 CY
REINFORCING STEEL	394 LBS
REINFORCING STEEL (EPOXY)	3,019 LBS



BURLINGTON NORTHERN OVERHEAD RAY
 (WEST END)
 SLAB SECTION

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

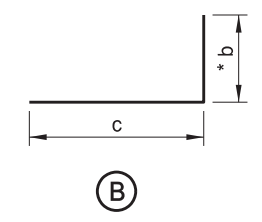
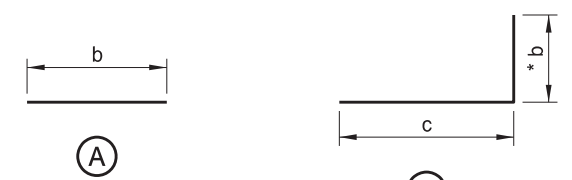
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS										
					a	b	c	d	e	f	g	h	k		
REGULAR	5	A500	8	37'-0"		37'-0"									
	5	H500	16	5'-1"	3"	1'-8"	9"					6	12		
SUPERSTRUCTURE	5	XA500	6	37'-0"		37'-0"									
	5	XA501	66	3'-0"		3'-0"									
	7	XA502	56	9'-9"		9'-9"									
	5	XA503	62	3'-7"		3'-7"									
	5	XA504	12	5'-8"		5'-8"									
	5	XB500	38	7'-4"		3'-4"	4'-0"								
	5	XB501	30	7'-1"		3'-1"	3'-0"								
	5	XK500	18	4'-11"	1'-4"	8"	11"	8"	1'-0"	2.5"	8"	8.5	12		
	5	XL500	18	5'-0"	3"	2'-2"	8"	2'-2"		2.5"		1.25	12		
	5	XP500	38	5'-6"	5"	2'-1"	2'-2"			1.25"	10"	12	6.5		
	5	XSA500	1	52'-10"	2'-5"	9'-4"									
	5	XSA501	1	55'-0"	3'-9"	10'-0"									
	5	XSA502	1	67'-4"	2'-6"	9'-9"									
5	XSA503	1	60'-4"	3'-9"	9'-8"										

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

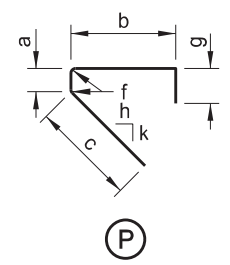
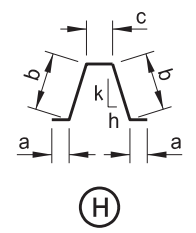
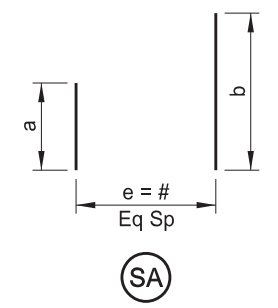
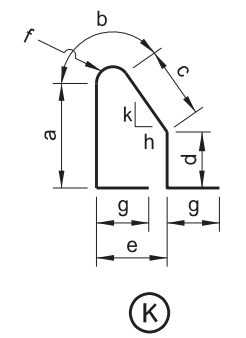
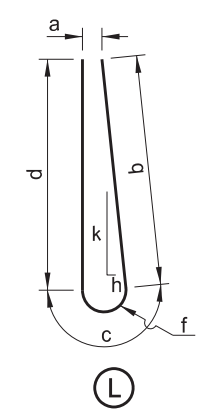
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	9

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.

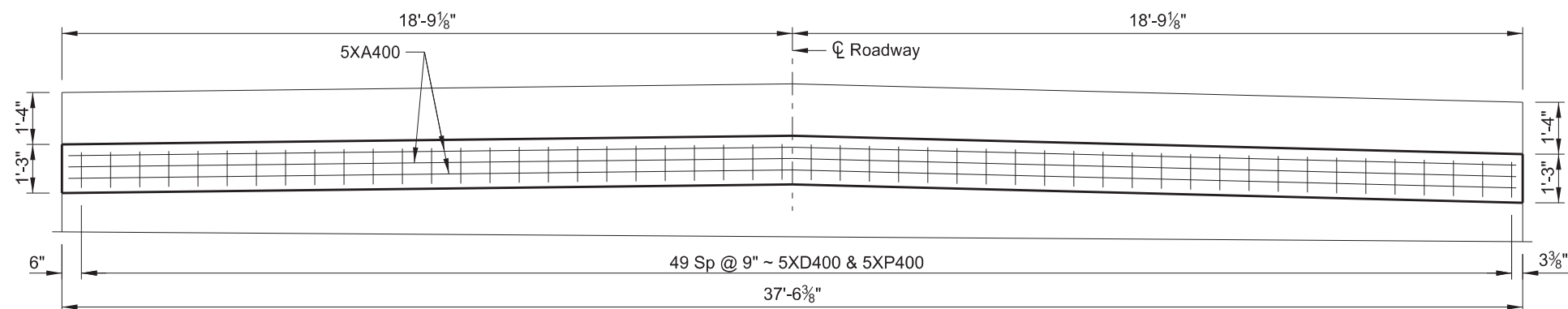


* b = Vertical Leg for XB500 and XB501



BURLINGTON NORTHERN OVERHEAD
 RAY
 REINFORCING BAR LIST & DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	10

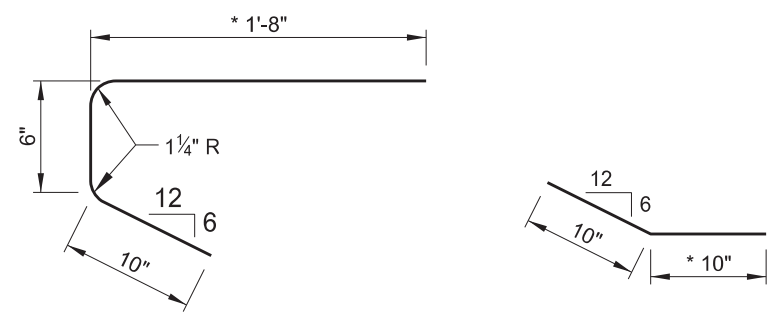


(SHOWING NEW REINFORCING)
ELEVATION

SKEW ANGLE = 0°

BAR LIST - ONE APPROACH LIP			
SIZE	MARK	NO.	LENGTH
5	XA400	3	37'-2"
5	XD400	50	*1'-8"
5	XP400	50	*3'-0"

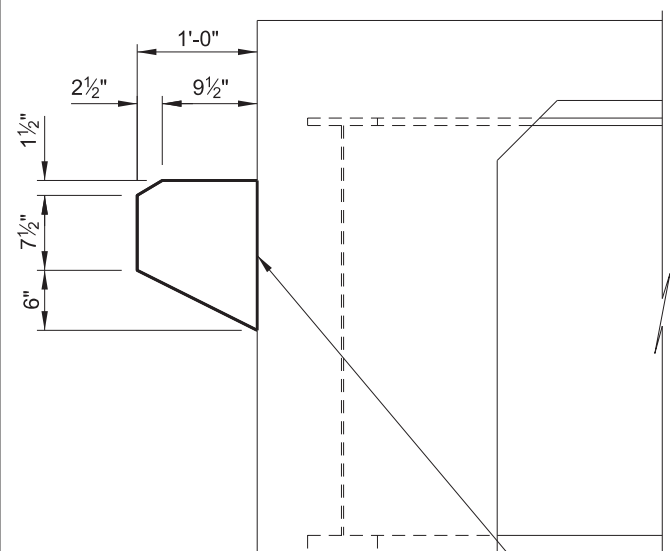
ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
360	1.4



XP400 XD400
(DIMENSIONS SHOWN ARE OUT TO OUT)
BENT BAR DETAILS

* Length may vary depending on manufacturer's recommendations for anchorage. Provide a minimum anchorage length of 9 inches.

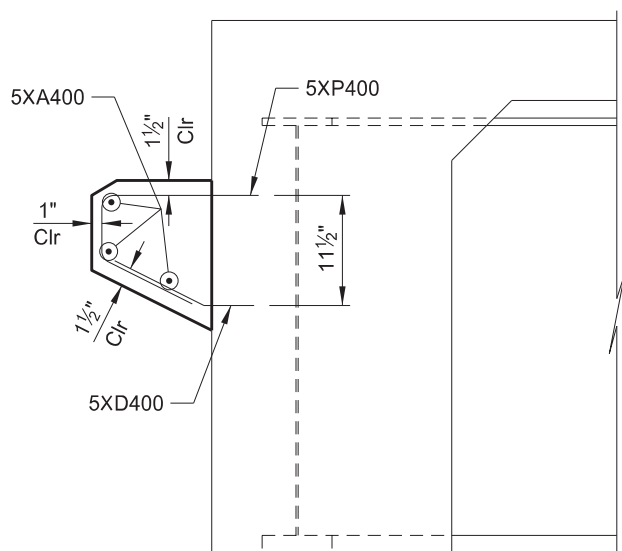
NOTE:
Provide Class AAE-3 concrete that meets Section 802 and Grade 60 reinforcing Steel that meets Section 612.
Install the 5XD400 and 5XP400 bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Sec. 806.02.
Include all excavation and backfilling, labor, equipment, and materials required to remove the existing approach lip and to build the new approach lip in the bid item "Approach Slab Lip Repair."
The bar marks beginning with an "X" indicate an epoxy coated bar.



(SHOWING DIMENSIONS)

Bush Hammer Finish: Before any concrete is placed against the existing concrete, prepare the surface with a bush hammer to produce a clean rough finish.

NEW APPROACH SLAB LIP



(SHOWING REINFORCING)

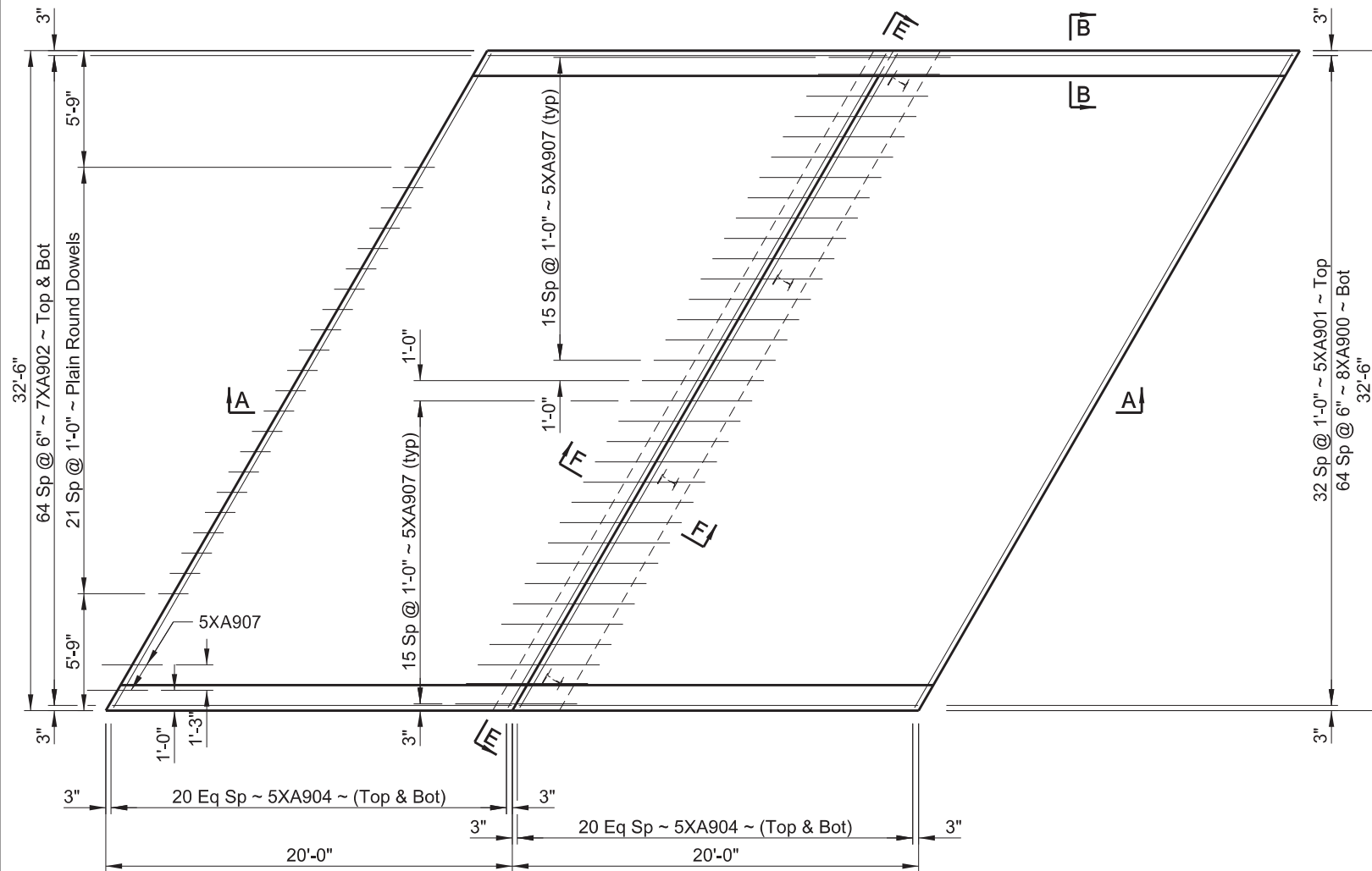


QUANTITIES (ONE APPROACH LIP)	
APPROACH SLAB LIP REPAIR	37.5 LF

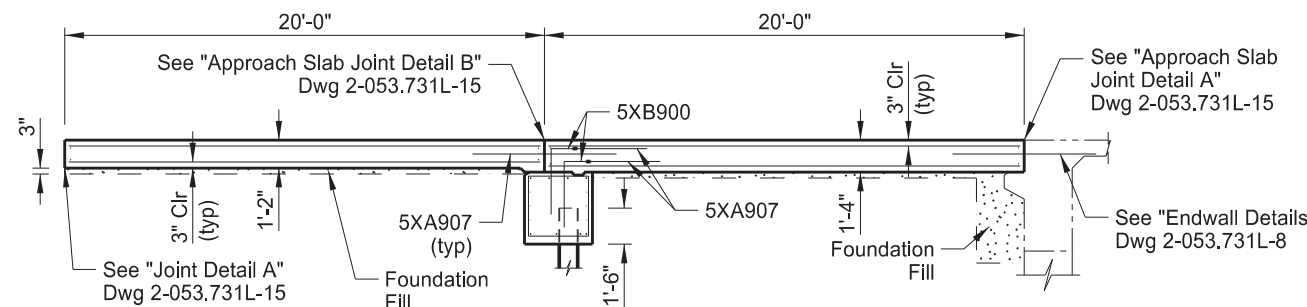
BURLINGTON NORTHERN OVERHEAD
RAY
(EAST END)
APPROACH SLAB LIP DETAILS

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

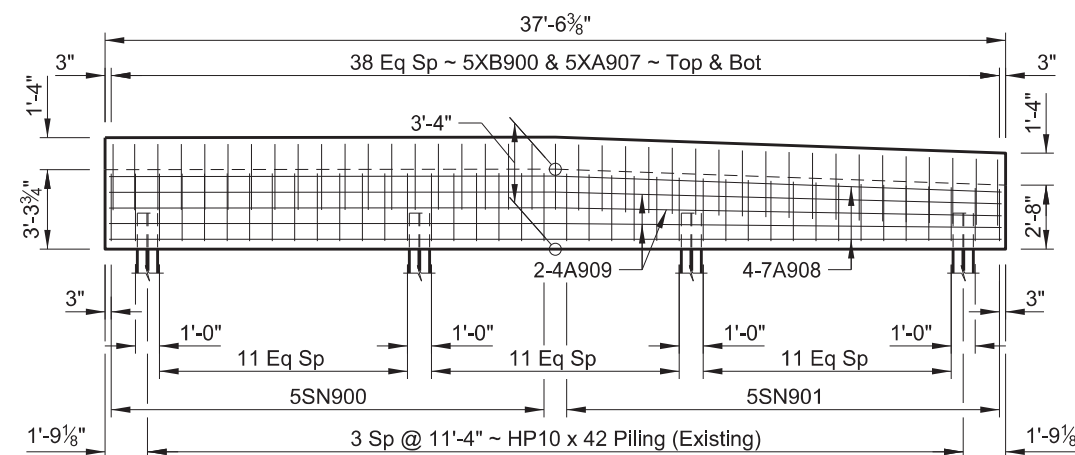
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	11



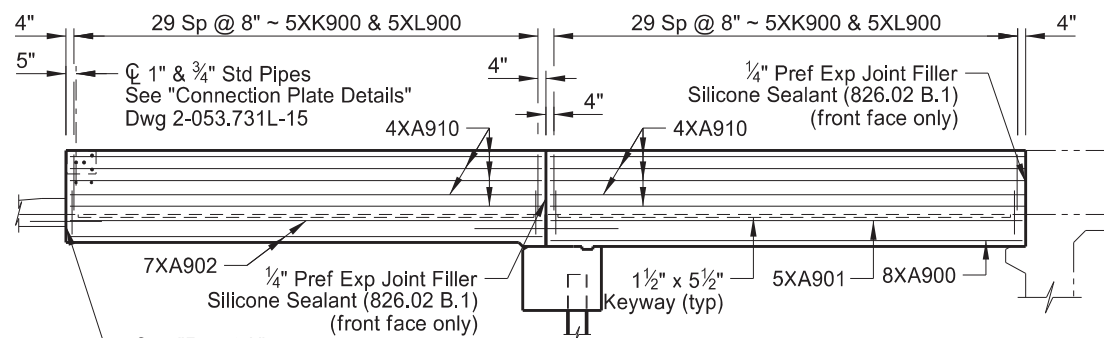
PLAN



A-A



E-E
FOOTING ELEVATION



ELEVATION

NOTES:

See Dwg 2-053.731L-14 for Sections B-B & F-F.



QUANTITIES
SEE DWG 2-053.731L-12
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
APPROACH SLAB DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	12

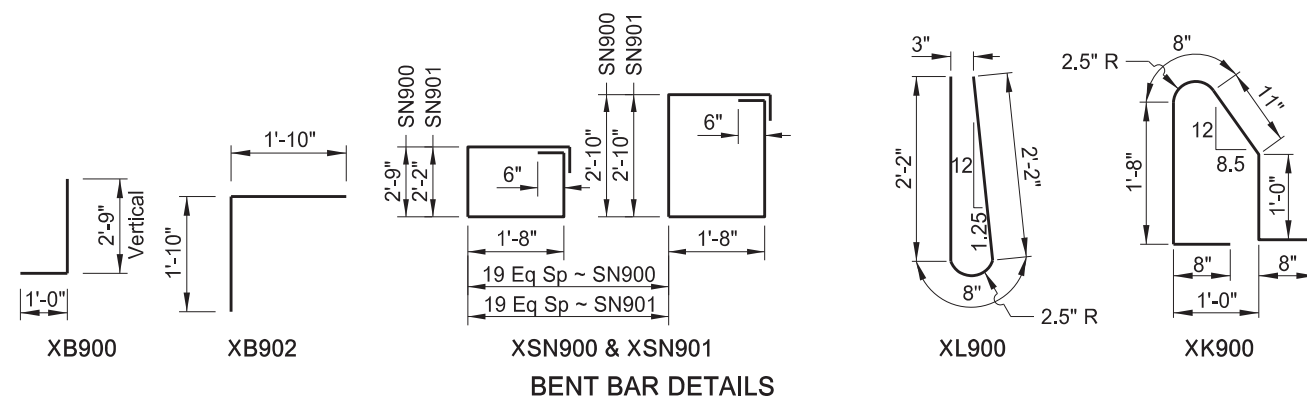
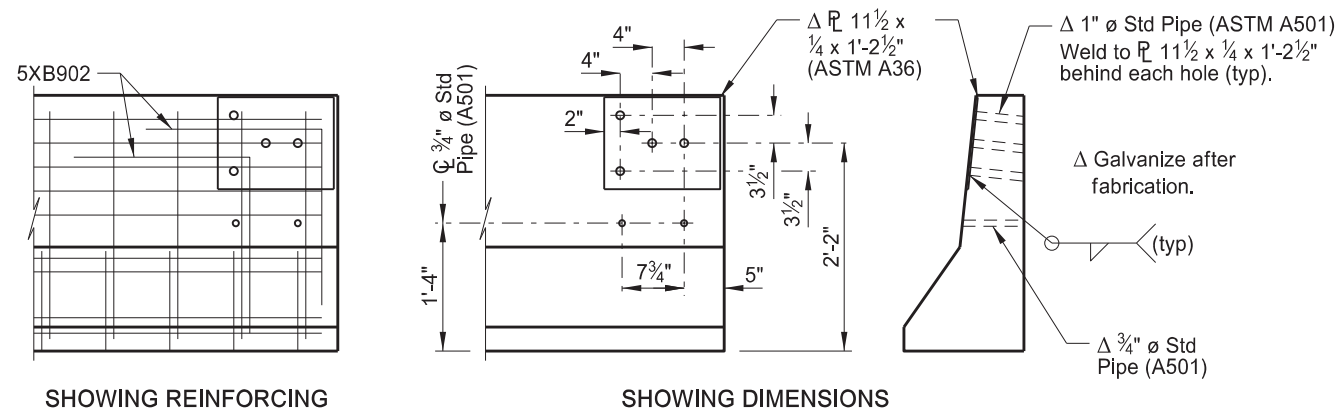
SKEW ANGLE = 0°

BAR LIST

SIZE	MARK	NO.	LENGTH
8	XA900	65	19'-8"
5	XA901	33	19'-8"
7	XA902	130	19'-8"
5	XA904	84	37'-2"
5	XA907	146	3'-0"
7	XA908	8	37'-2"
4	XA909	6	37'-2"
4	XA910	36	19'-8"
5	XB900	78	3'-9"
5	XB902	4	3'-8"
5	XK900	120	5'-7"
5	XL900	120	5'-0"
5	XSN900	1	198'-4"
5	XSN901	1	186'-8"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
16,305	79.0

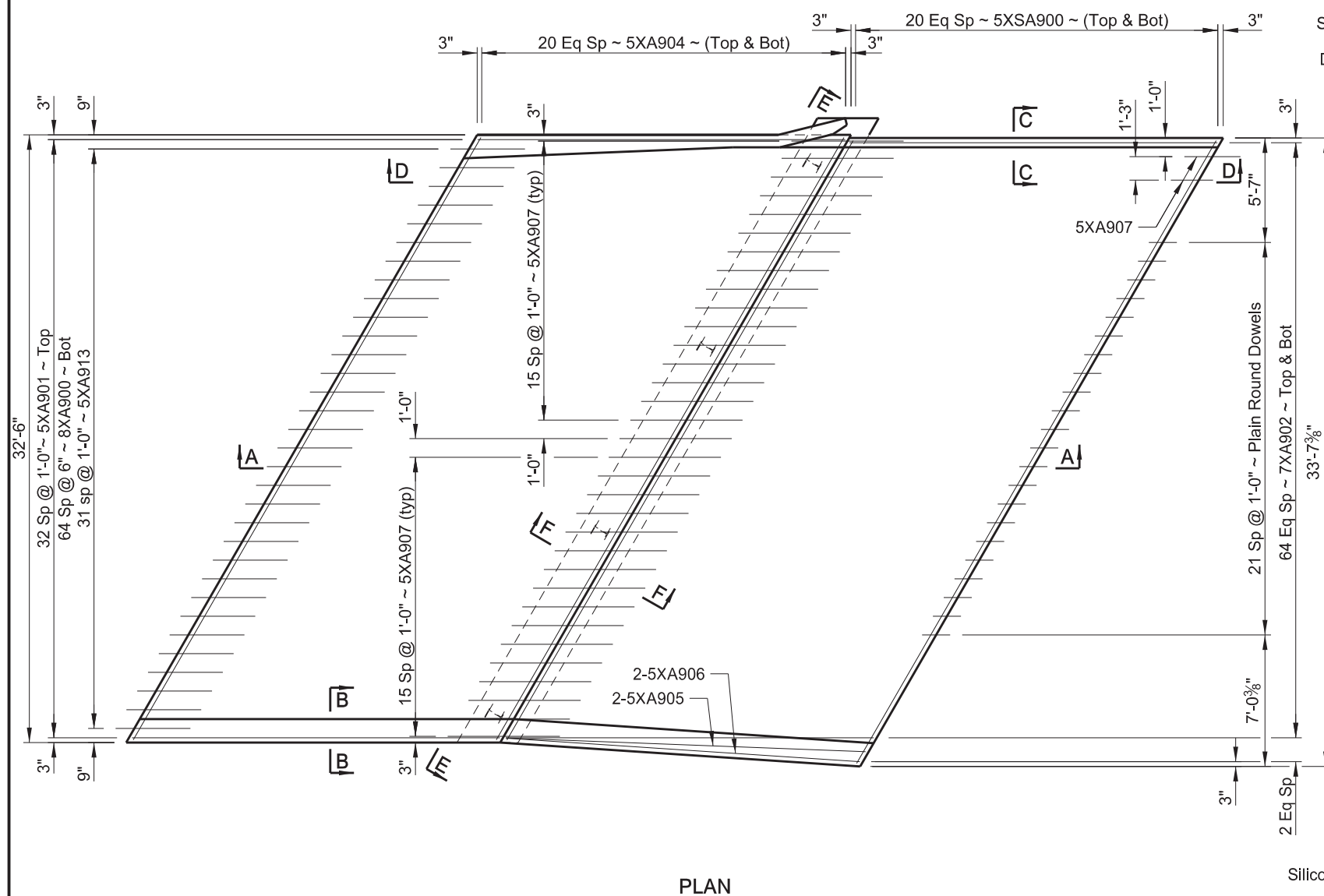


QUANTITIES

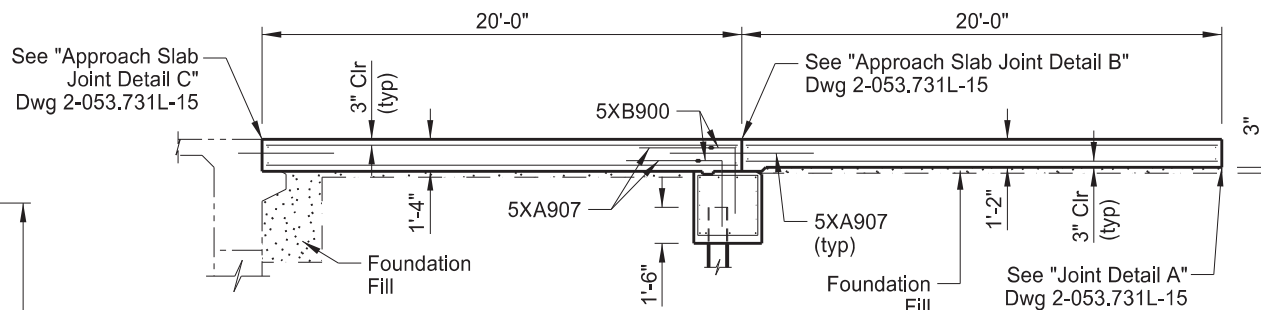
APPROACH SLAB	72.2 SY
PILE SUPPORTED APPROACH SLAB	72.2 SY

BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
APPROACH SLAB DETAILS

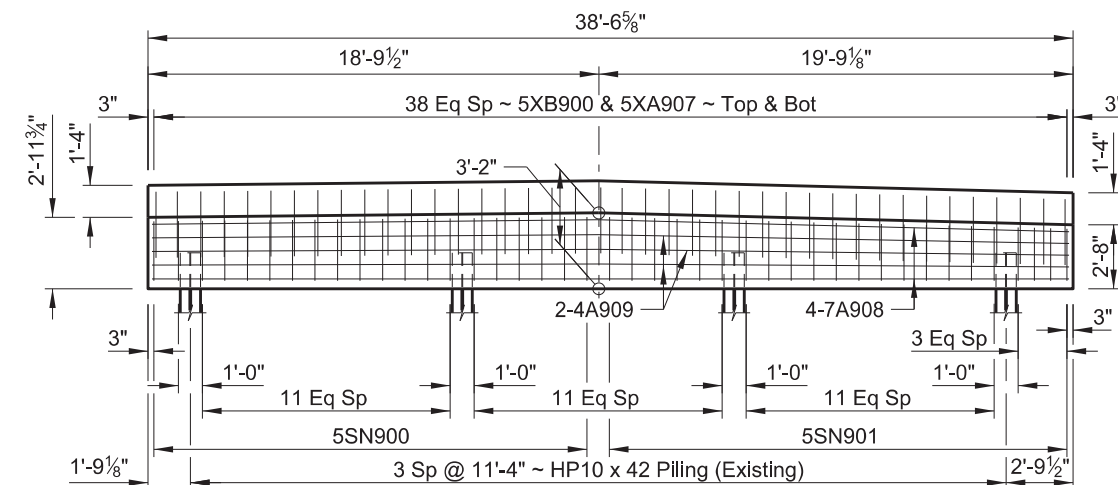
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	13



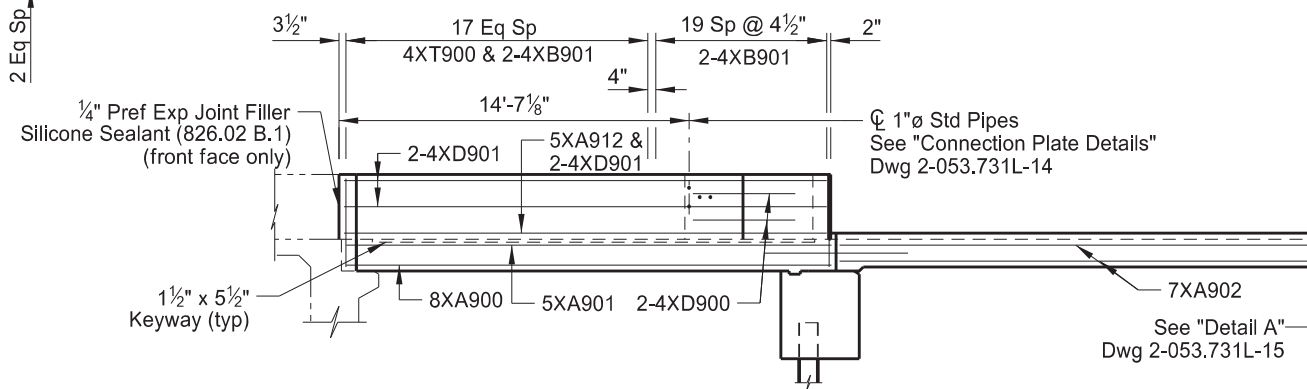
PLAN



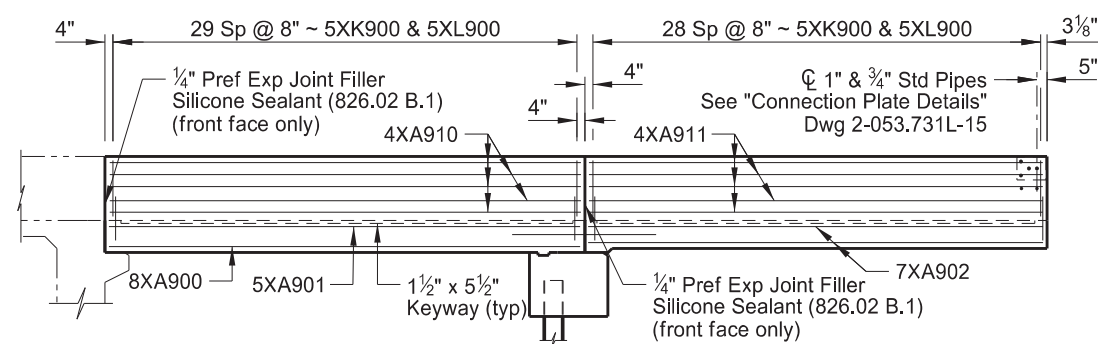
A-A



FOOTING ELEVATION



D-D



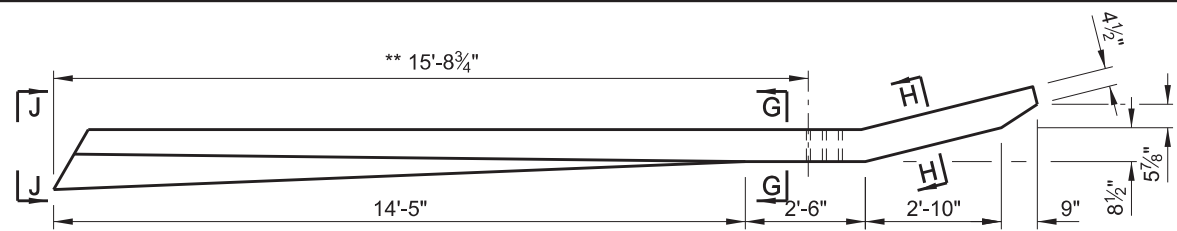
ELEVATION

NOTES:

See Dwg 2-053.731L-15 for Section B-B.
See Dwg 2-053.731L-14 for Section C-C.



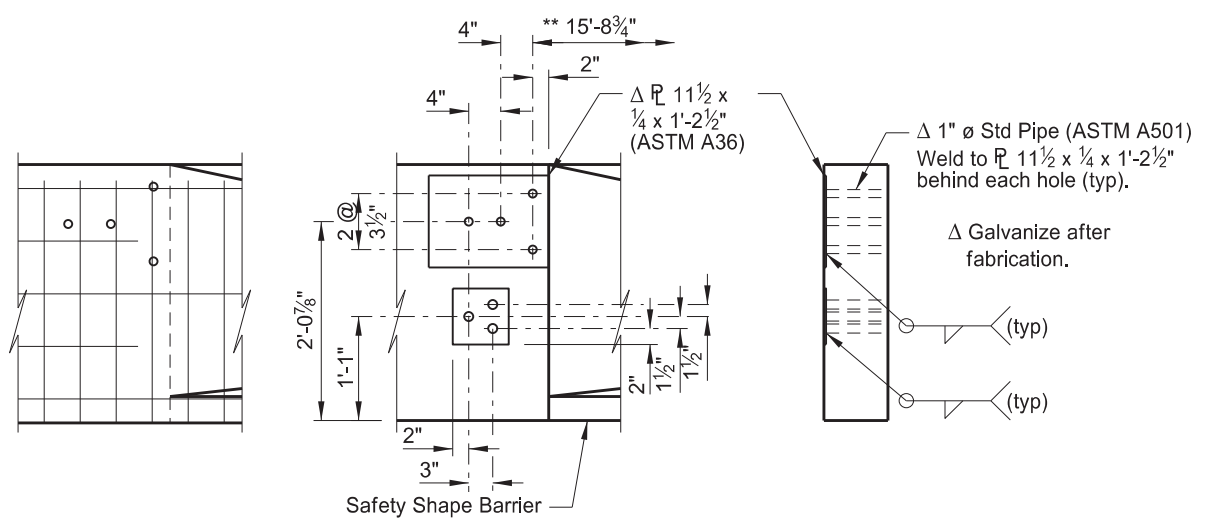
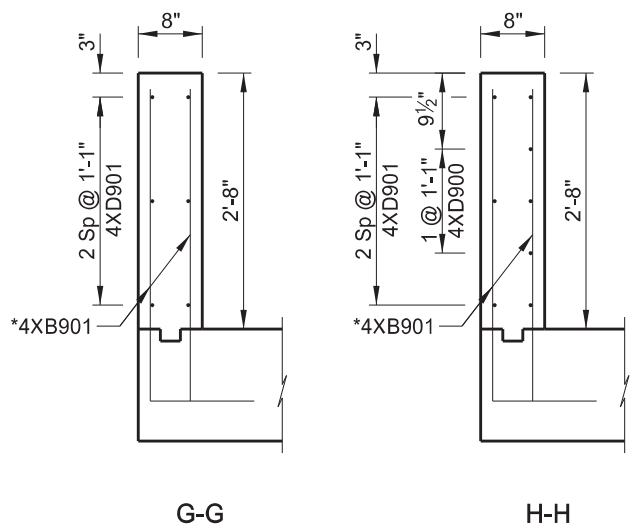
QUANTITIES
SEE DWG 2-053.731L-14
BURLINGTON NORTHERN OVERHEAD RAY
(EAST END)
APPROACH SLAB DETAILS



SAFETY SHAPE PLAN

*** Length may vary depending on manufacturer's recommendations for anchorage. Length based on 1 foot minimum anchorage length.

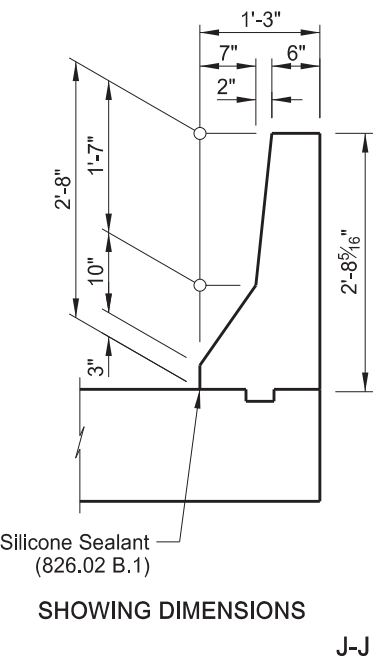
** Field verify existing guardrail connection.



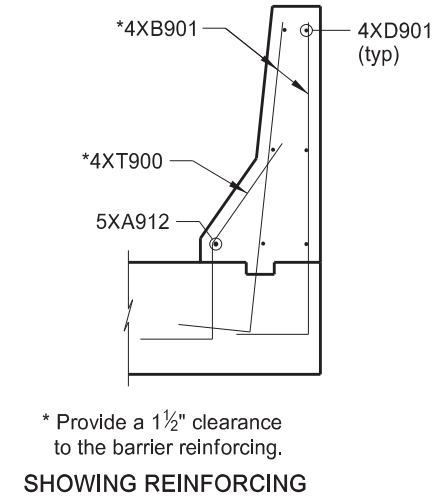
SHOWING REINFORCING

SHOWING DIMENSIONS

(SHOWING FRONT FACE)
CONNECTION PLATE DETAILS

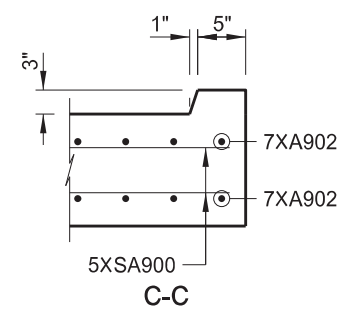


SHOWING DIMENSIONS

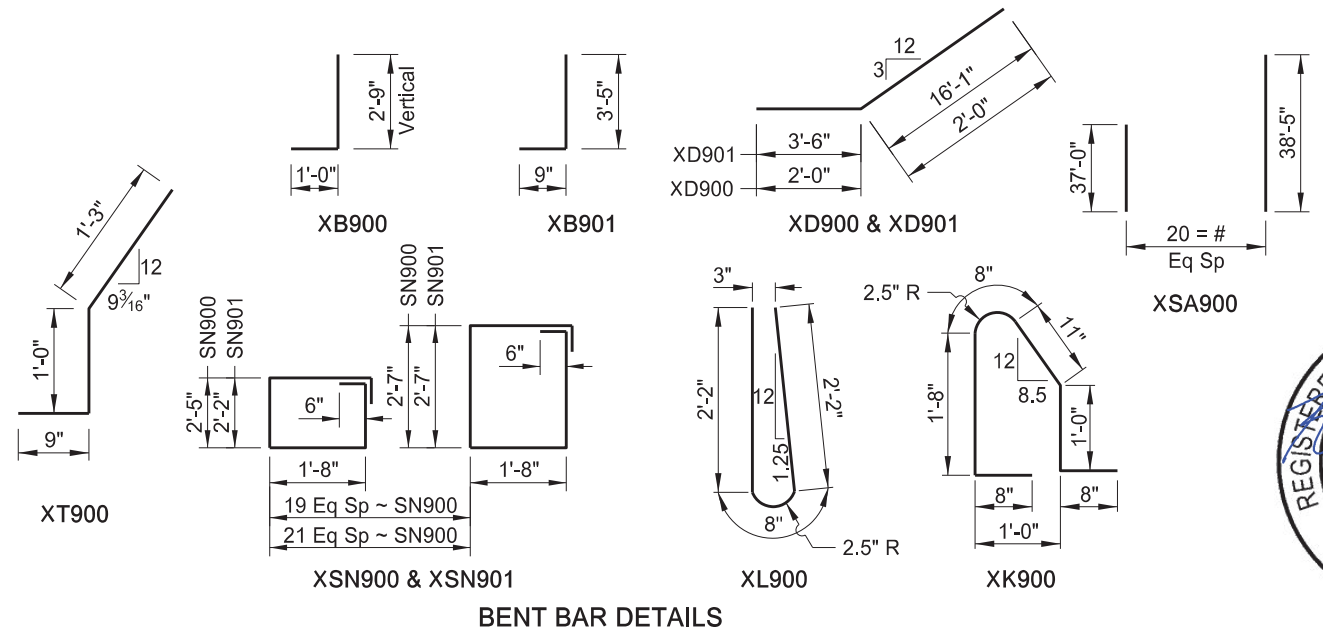


SHOWING REINFORCING

* Provide a 1/2" clearance to the barrier reinforcing.



C-C



BENT BAR DETAILS

SKEW ANGLE = 0°			
BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
8	XA900	65	19'-8"
5	XA901	33	19'-8"
7	XA902	130	19'-8"
5	XA904	42	37'-2"
7	XA905	2	19'-3"
7	XA906	2	18'-11"
5	XA907	146	3'-0"
7	XA908	8	38'-2"
4	XA909	6	38'-2"
4	XA910	9	19'-8"
4	XA911	9	18'-11"
5	XA912	1	14'-5"
5	XA913	32	*** 4'-0"
5	XB900	76	3'-9"
4	XB901	4	4'-2"
4	XD900	4	4'-0"
4	XD901	6	19'-7"
5	XK900	59	5'-7"
5	XL900	59	5'-0"
4	XT900	18	3'-0"
5	XSA900	2	791'-10"
5	XSN900	1	186'-8"
5	XSN901	1	199'-10"

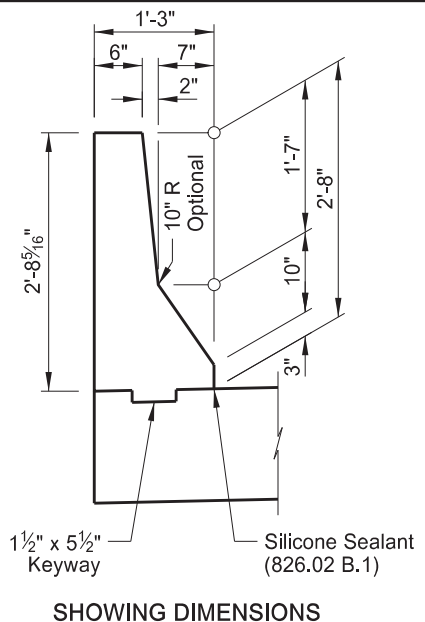
ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
16,044	77.7

QUANTITIES	
APPROACH SLAB	73.3 SY
PILE SUPPORTED APPROACH SLAB	72.2

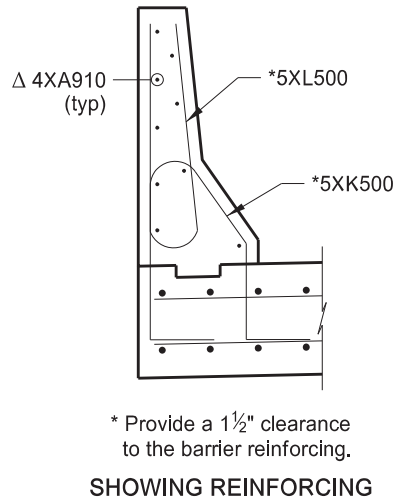


BURLINGTON NORTHERN OVERHEAD RAY
(EAST END)
APPROACH SLAB DETAILS

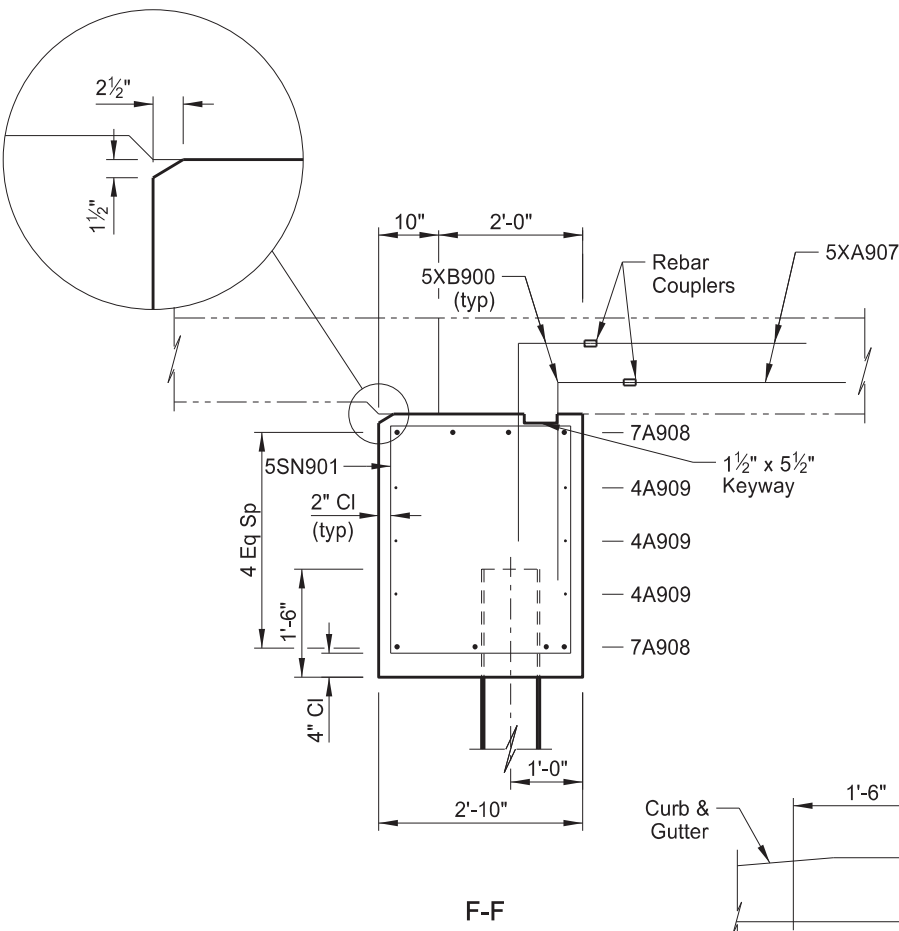
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	15



Δ Use 4XA911 for South barrier on East entrance end.



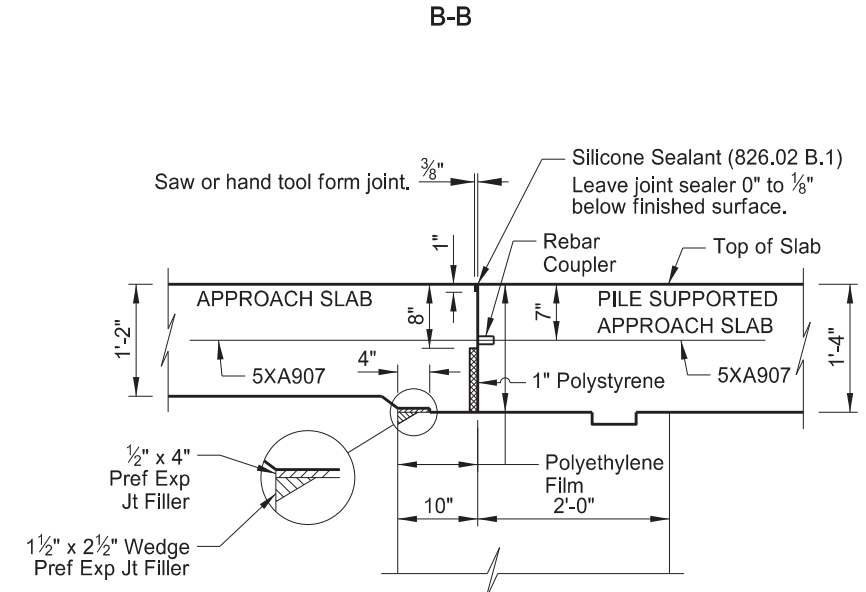
NOTES:
See Dwg 2-053.731R-11 & 13 for locations of Section B-B



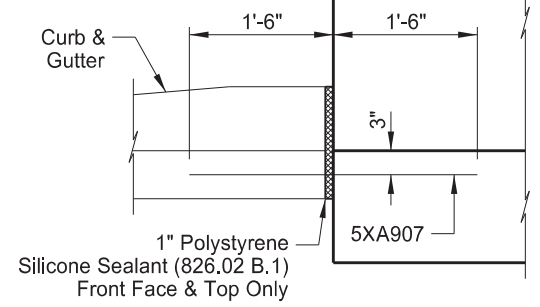
NOTES:
Couple the 5XA909 bars to the 5XB900 bars extending out of the approach slab footing. Couple the 5XA904 bars. The couplers shall be an approved mechanical connector capable of developing 125% of the specified yield strength of the reinforcing steel.

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 "Concrete Bridge Approach Slab." 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.

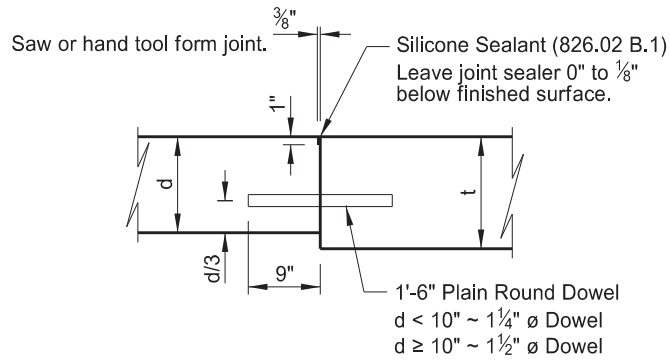
The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out.



APPROACH SLAB JOINT DETAIL B

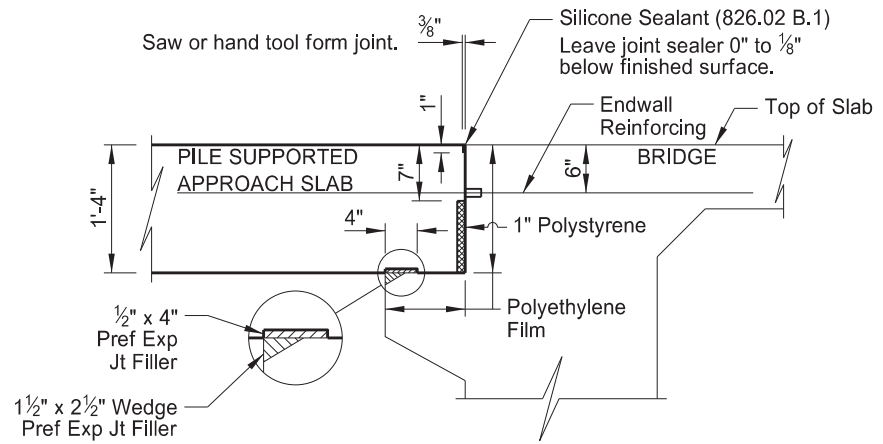


DETAIL "A"

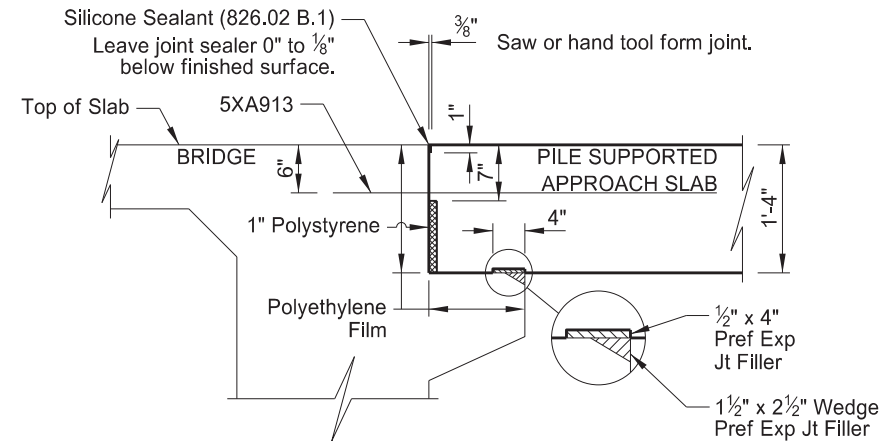


d = Pavement Thickness
t = Approach Slab Thickness

JOINT DETAIL A



APPROACH SLAB JOINT DETAIL A



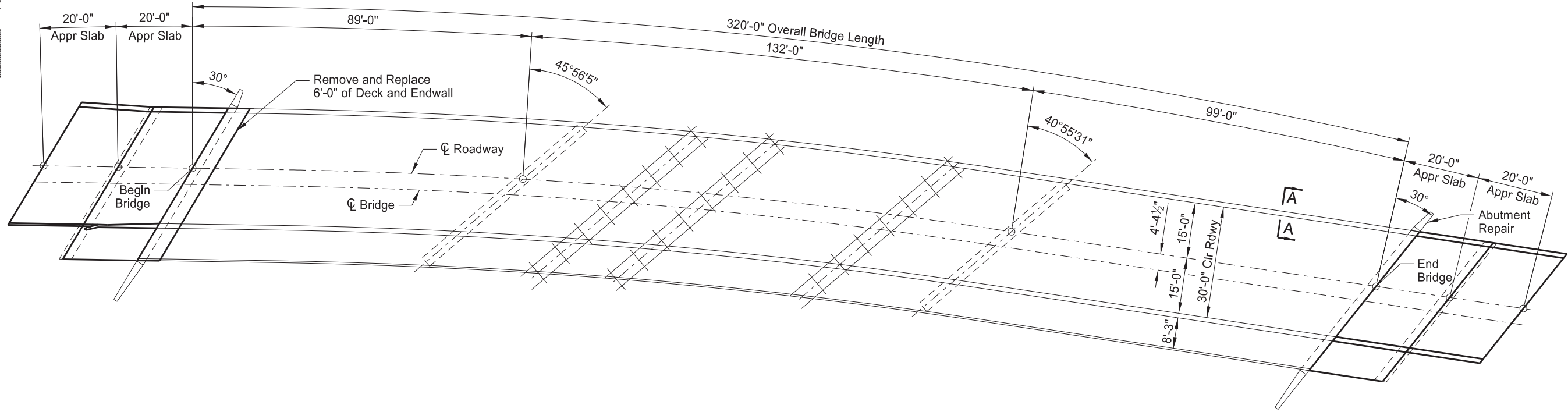
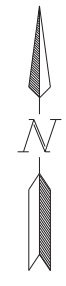
APPROACH SLAB JOINT DETAIL C



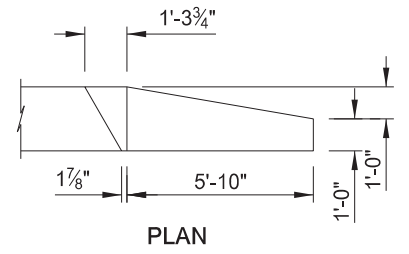
BURLINGTON NORTHERN OVERHEAD
RAY

APPROACH SLAB DETAILS

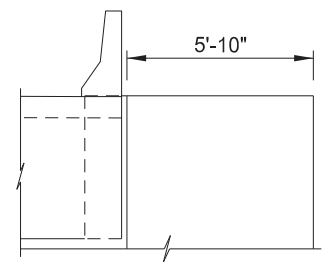
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	16



PLAN



PLAN



ELEVATION
ABUTMENT WING REPAIR

BRIDGE BID ITEMS				
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0100	RAILWAY PROTECTION INSURANCE	L SUM	0.5
107	0140	RAILROAD COORDINATION	L SUM	0.5
202	0111	REMOVAL OF CONCRETE	L SUM	0.5
210	0099	CLASS 1 EXCAVATION	L SUM	0.5
602	0130	CLASS AAE-3 CONCRETE	CY	22.5
602	1134	PILE SUPPORTED APPROACH SLAB	SY	183.4
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	145.5
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,606
602	1260	BRIDGE DECK CRACK SEALING	LF	2,800
612	0115	REINFORCING STEEL-GRADE 60	LBS	500
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	3,821
650	0805	DECK SPALL REPAIR	SF	18
930	8230	SHORING	EA	2
930	8644	SILICONE SEALANT	LF	640
930	9612	SPALL REPAIR	SF	43.3
930	9639	APPROACH SLAB LIP REPAIR	LF	47.6
930	9660	ABUTMENT REPAIR	L SUM	0.5



BURLINGTON NORTHERN OVERHEAD
RAY
(EASTBOUND)
BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Ketterling, Jonathan
01/13/22

DocuSign

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	17

NOTES

- 100 SCOPE OF WORK: This project consists of removing and replacing the west portion of deck, west endwall, and both approach slabs.
- 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 and AAE-3 concrete.
- 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 abutments and approach slab footings 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. 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. Include all work and materials associated with the bridge deck, approach slab, and barrier crack sealing in the price bid for the Class AAE-3 concrete and approach slab bid items.
- 602 SURFACE FINISH "D": Apply Surface Finish "D" to the inside, top and outside surfaces of the approach slab barrier, the barrier at the bridge ends and to the spall repair of the barrier. Match the existing bridge barrier texture and color.
- 650 DECK SPALL REPAIR: The bridge deck has spall area as shown at the east end of the bridge. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650. The actual limits of the area 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 the concrete to a minimum depth of 2½". Include the saw cutting and all material, labor and equipment

- required to remove the concrete and repair the deck spall areas in the bid item "Deck Spall Repair."
- 900 ELEVATION CHECK POINTS: Prior to removal of the existing concrete, have the District record the elevations of the existing elevation check points at all substructures. Place four new carriage bolts on the top of the barrier at the abutments to serve as elevation check points. Include the cost for this item in the unit price bid for Class AAE-3 concrete.
- 930 ABUTMENT REPAIR: The east abutment north 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.

Use concrete material that is specifically intended for patching concrete. For the patching material use SikaTop 122 Plus(Sika Corporation), Tamms Industries Duraltop Gel, ThoRoc JB2 (ChemRex Incorporated), or an approved equal repair mortar. Install and cure the material as recommended by the manufacturer.

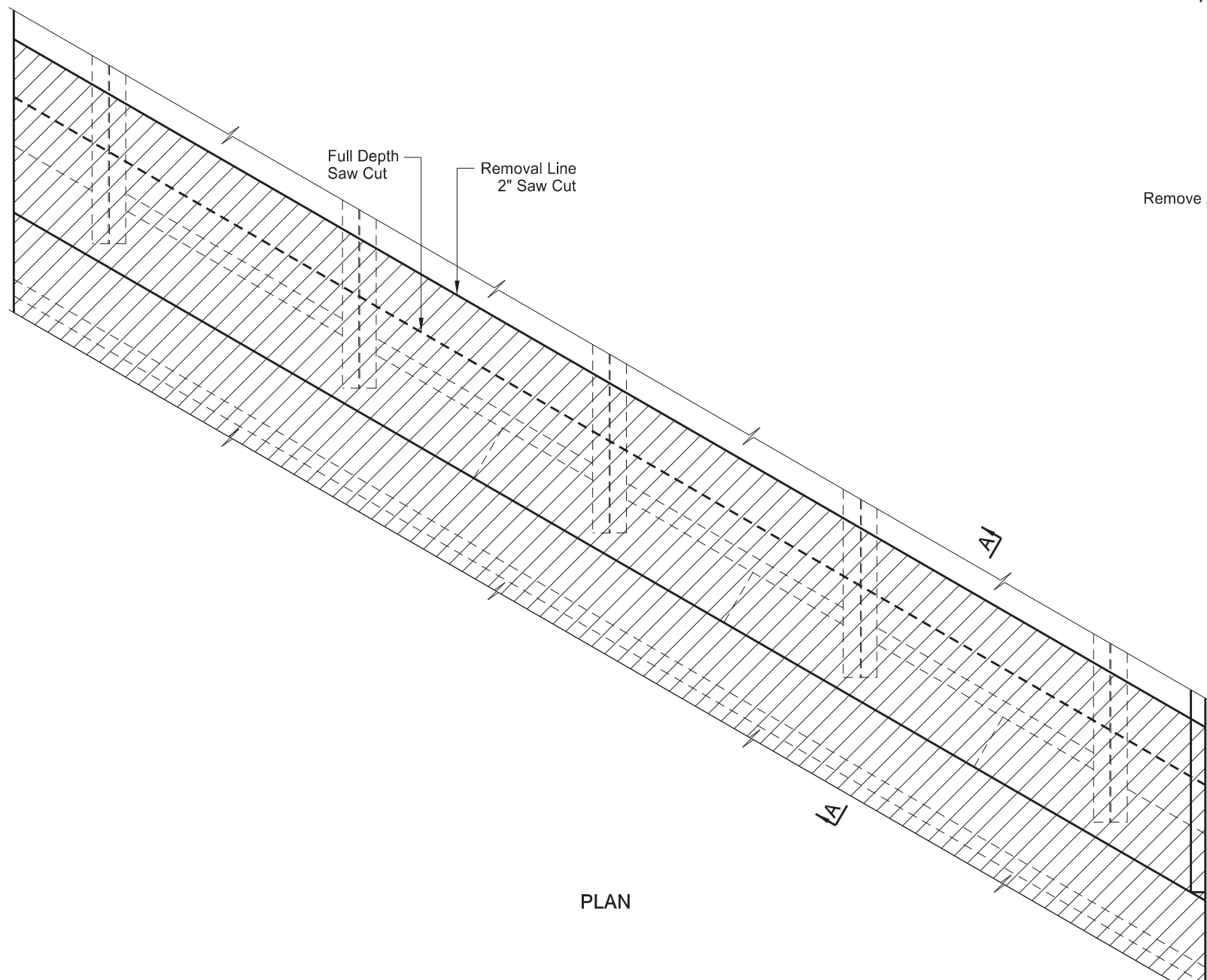
The actual limits of the repair are to be determined by the Engineer in the field. Include all labor, equipment, and materials need for the repair of the spall areas in the bid item "Abutment Repair."
- 930 SPALL REPAIR: The bottom of the northeast barrier has scaled areas. Remove all unsound concrete, shot blast the entire surface and replace it with concrete patch to the original constructed section.

Use concrete material that is specifically intended for patching concrete. For the patching material use SikaTop 122 Plus(Sika Corporation), Tamms Industries Duraltop Gel, ThoRoc JB2 (ChemRex Incorporated), or an approved equal repair mortar. Install and cure the material as recommended by the manufacturer.

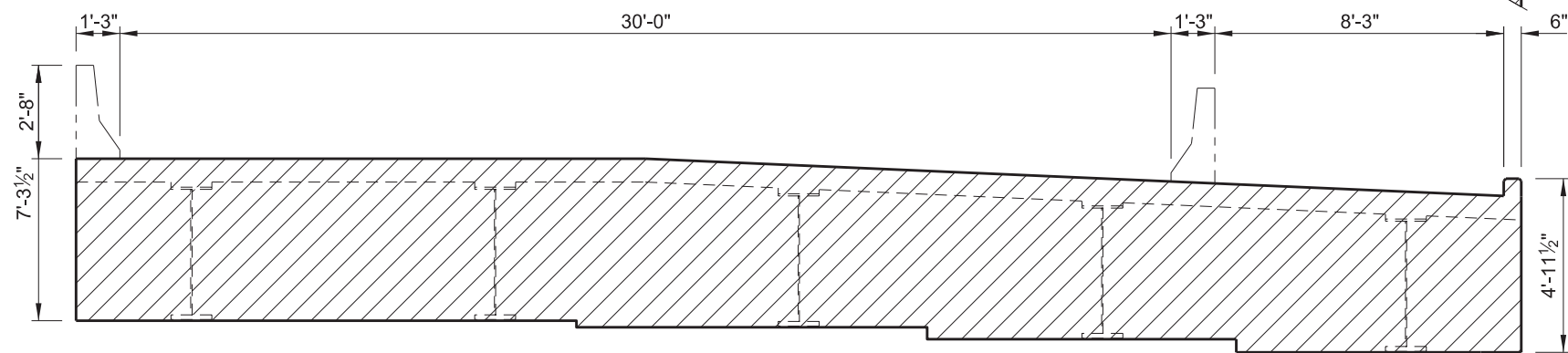
Include all labor, equipment, and materials need for the repair of the spall areas in the bid item "Spall Repair."
- 930 SHORING: A bid item for temporary shoring has been included to accommodate the removal of pile for the approach slab next to the abutment. The Contractor is responsible to design, construct, maintain, and remove temporary shoring. Include all labor, equipment and material needed in the bid item, "Shoring". A quantity of 1 EA will be paid for this work.



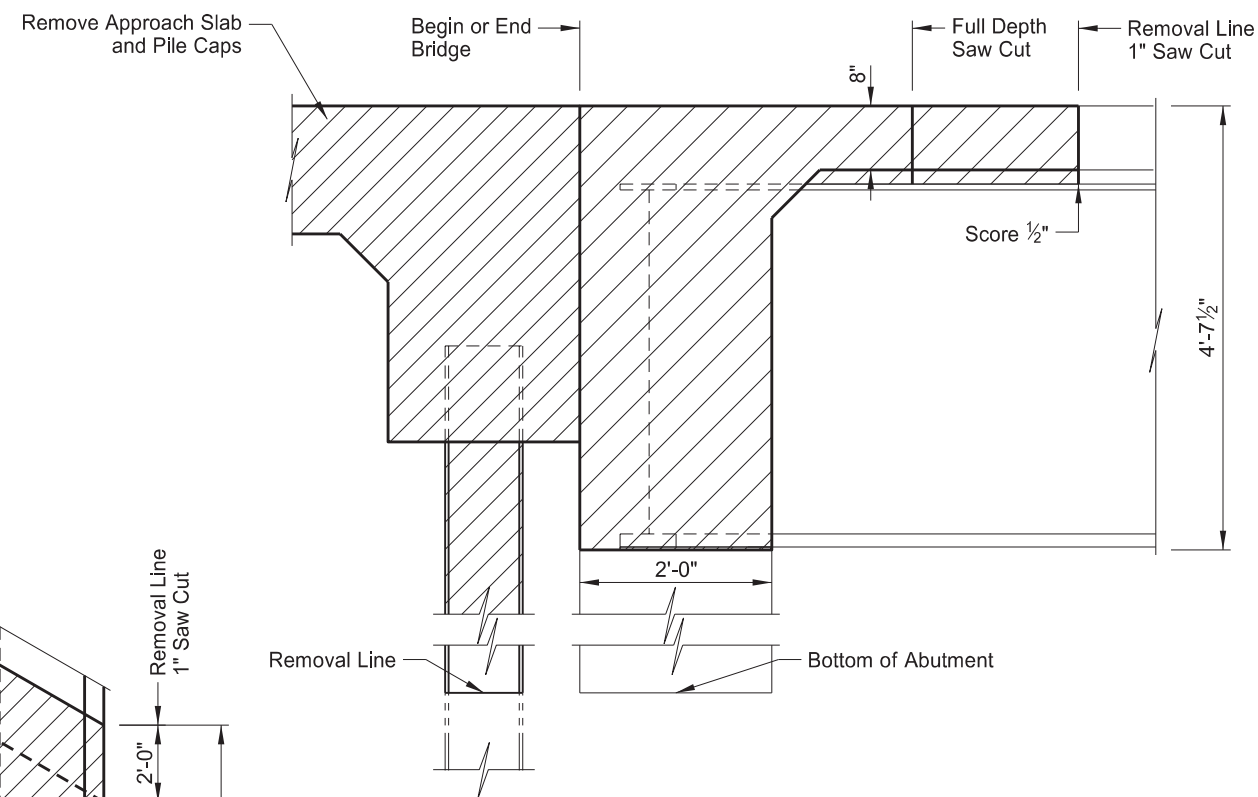
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	18



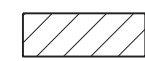
PLAN



ELEVATION



A-A

 Hatched area indicates concrete to be removed.

NOTE:

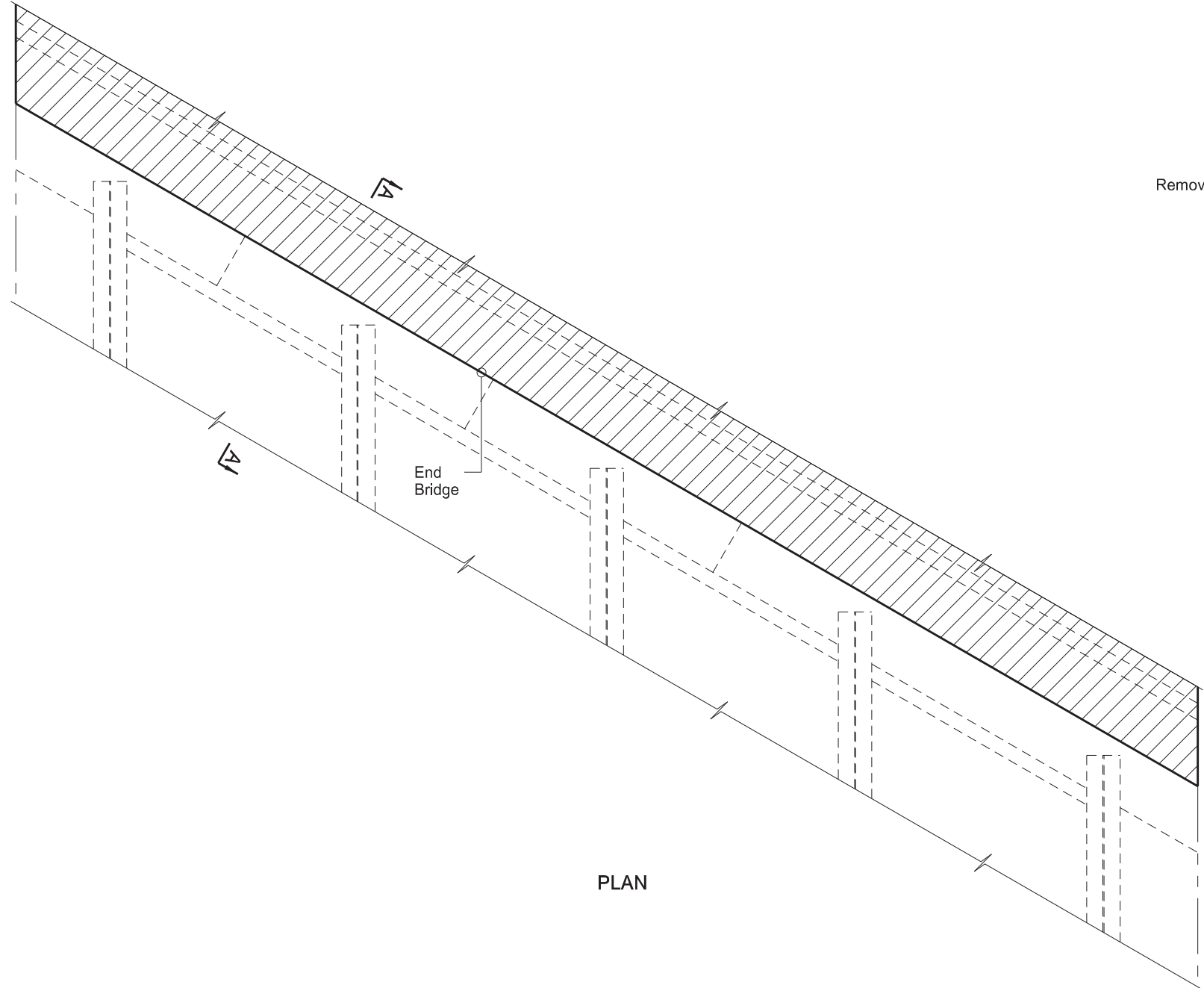
Score $\frac{1}{2}$ " from the bottom of the deck prior to full depth saw cut. Saw cut the deck full depth at a distance of 2'-0" from the removal line. Saw cut the deck to a depth of 1" at the removal line to produce a neat line between the concrete to be removed and the concrete to remain. Saw cut existing barriers to a depth of 1" at the removal line to produce a neat line between the concrete to be removed and the concrete to remain. Carefully remove concrete to ensure no damage is done to the existing reinforcing steel that is to remain in place.



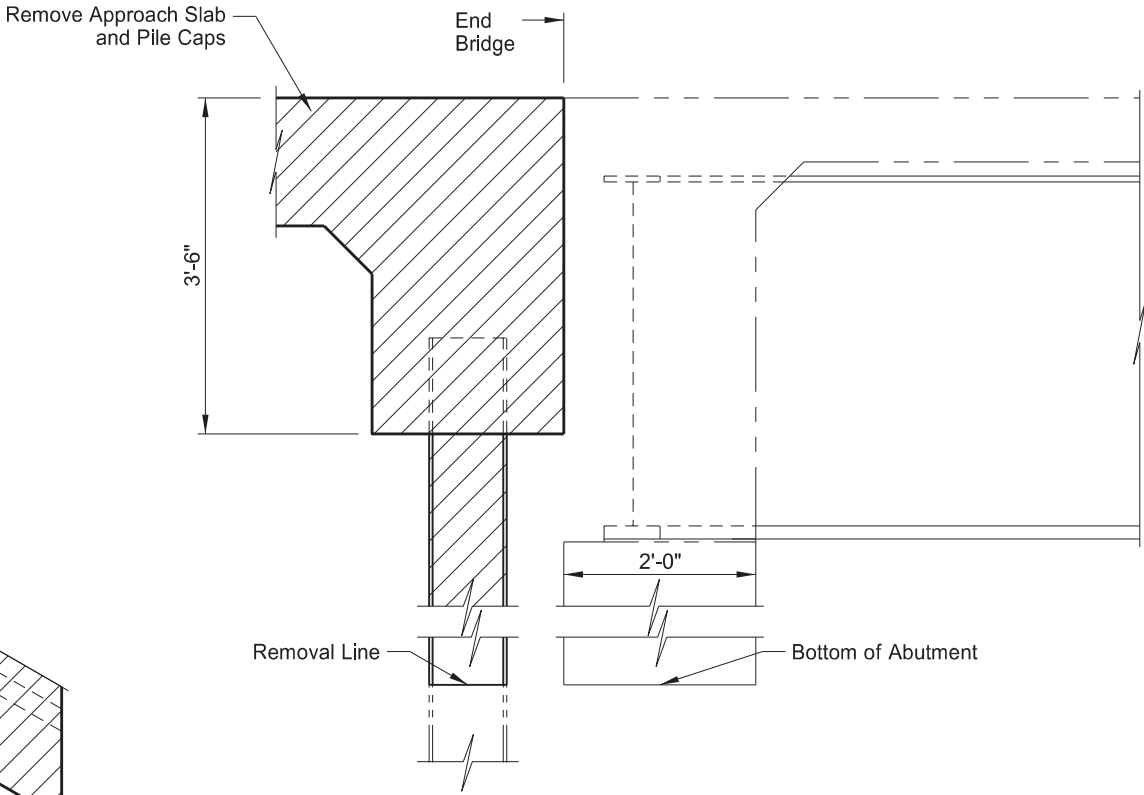
BURLINGTON NORTHERN OVERHEAD
 RAY

DECK & ENDWALL REMOVAL


STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	19



PLAN



A-A

 Hatched area indicates concrete to be removed.

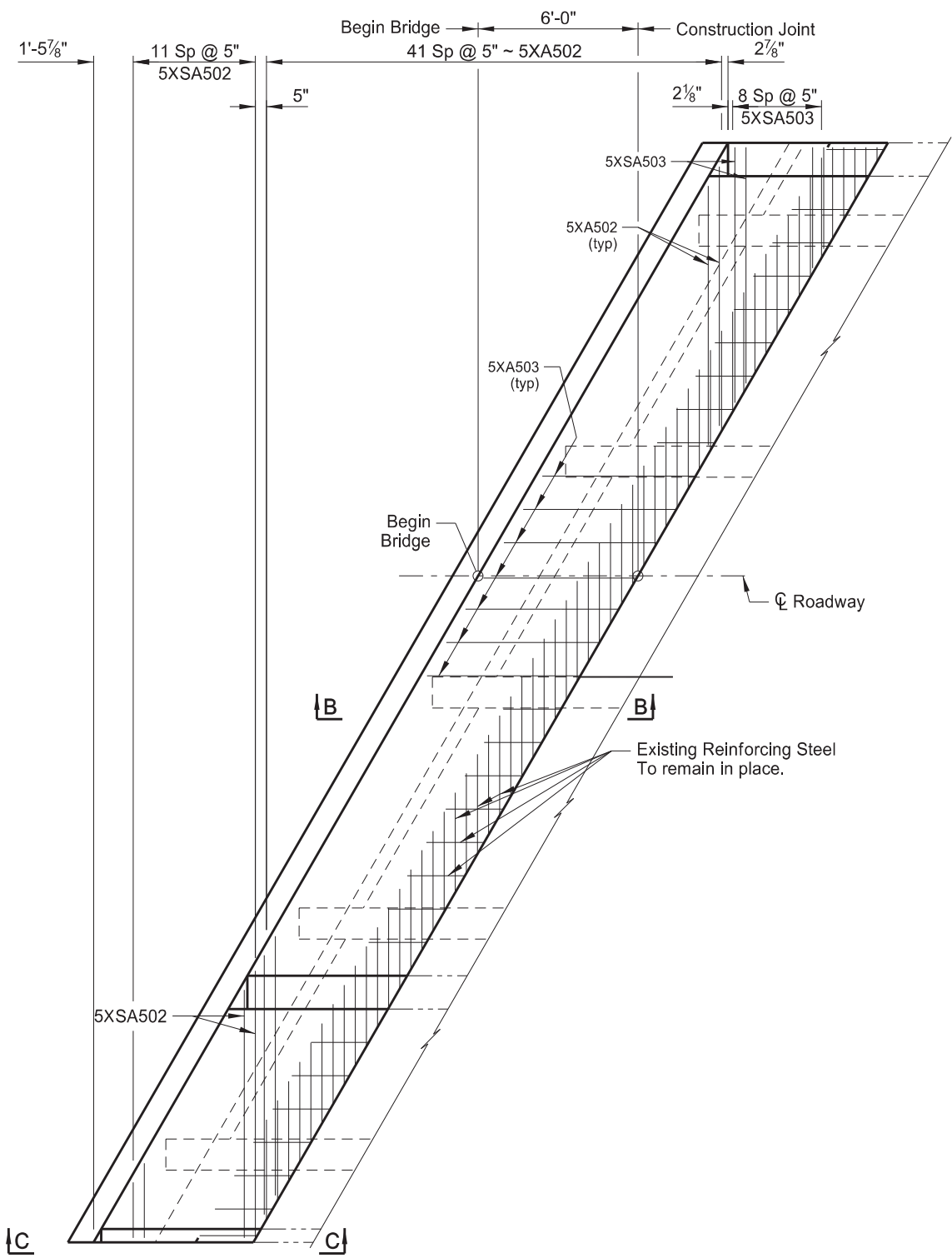
NOTE:

Remove existing approach slab and pile caps for the entrance end of bridge. Carefully remove concrete to ensure no damage to existing bridge deck or abutment endwall that is to remain in place.

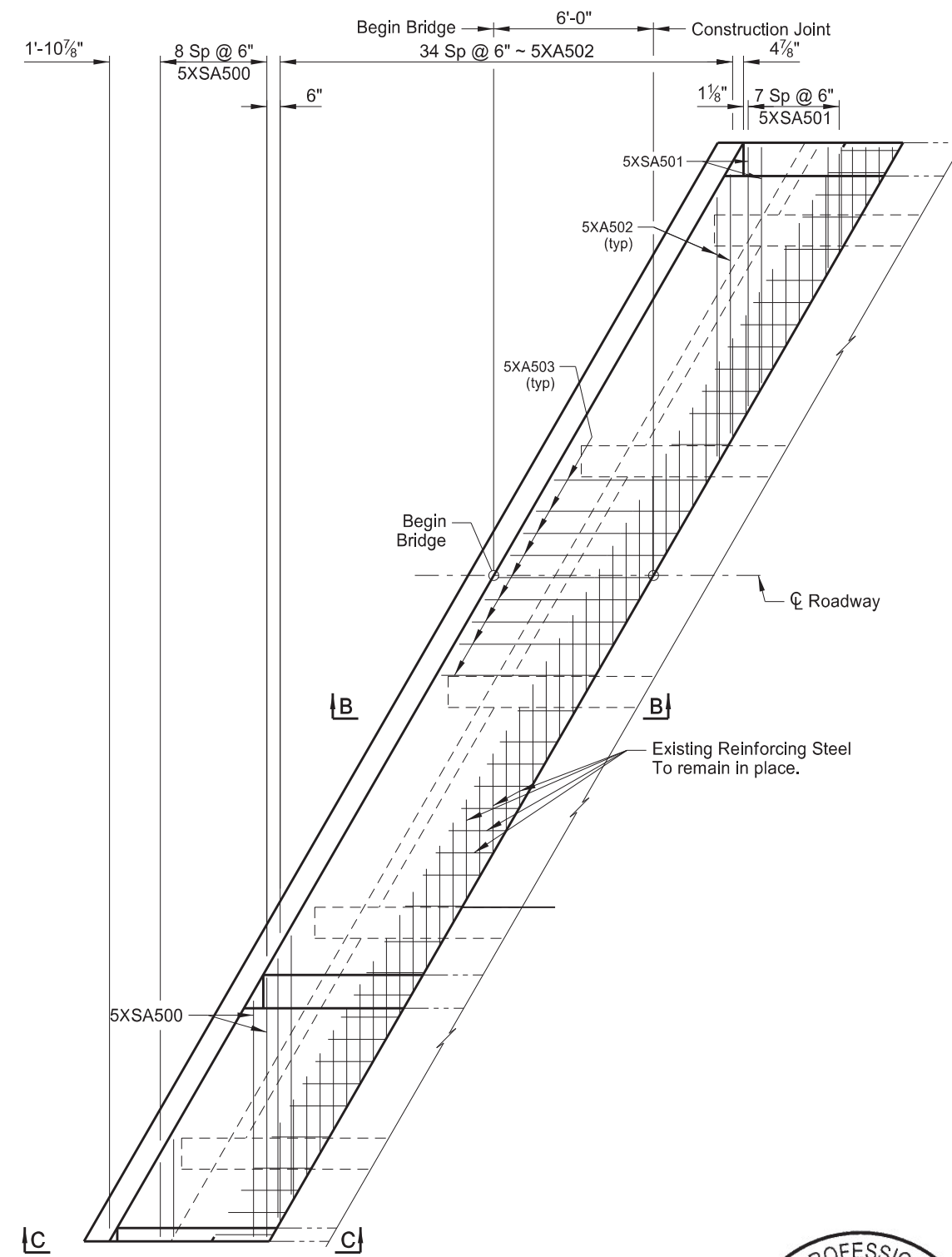


BURLINGTON NORTHERN OVERHEAD
 RAY
 DECK & ENDWALL REMOVAL

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	20



(TOP REINFORCING)



(BOTTOM REINFORCING)

PLAN

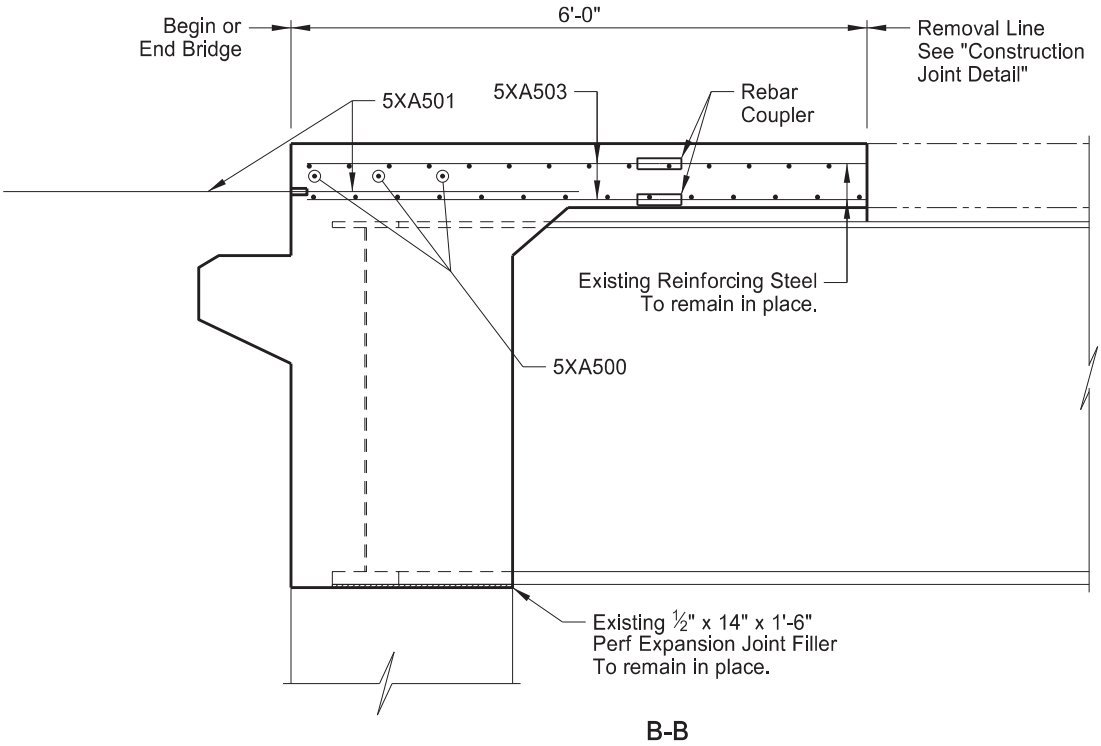
NOTES:
 Couple 5XA503 bars to the existing reinforcing steel.
 Match 5XA502, 5XSA500 - 5XSA503 to existing reinforcing steel.
 See Dwg 2-053.731L-6 for Sections B-B and C-C.

QUANTITIES
SEE DWG 2-053.731R-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
SLABLAYOUT

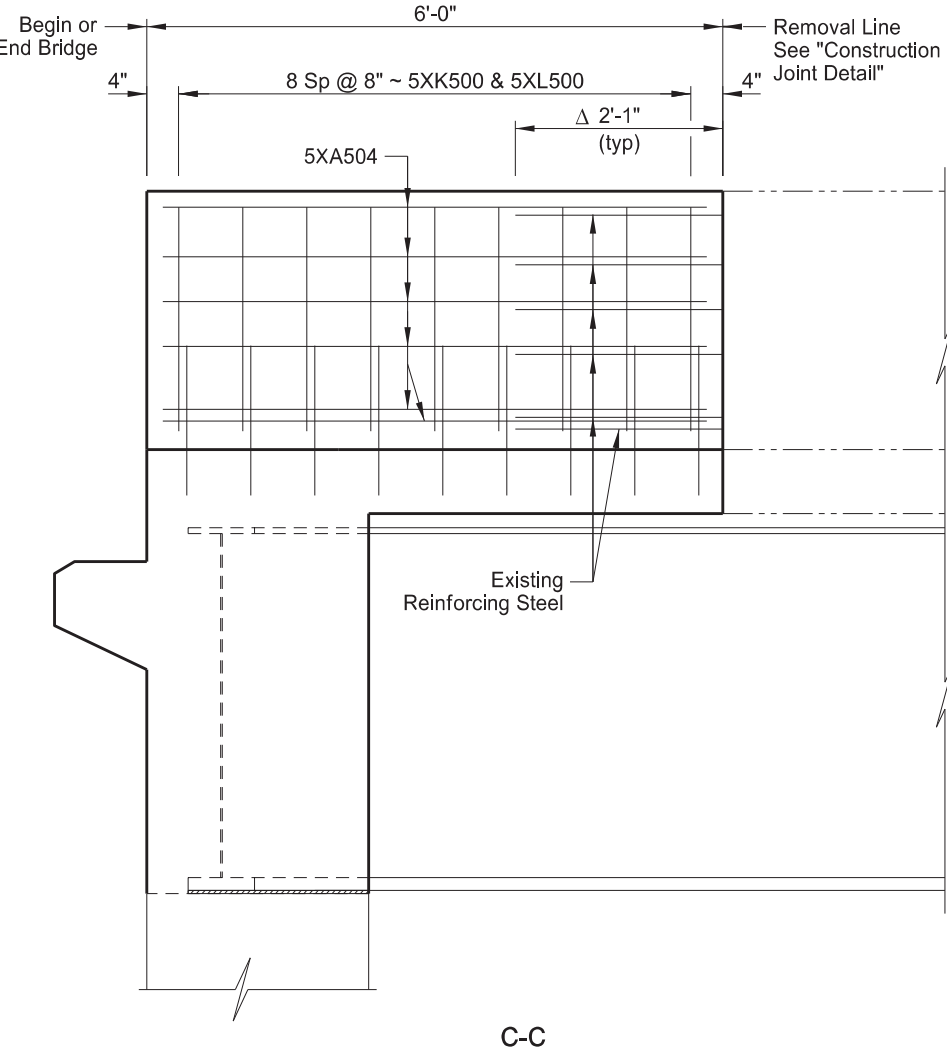


STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	21

△ Cut the existing horizontal reinforcing steel protruding from the existing concrete railing and curb after removal leaving a minimum of 2'-1" exposed to the new barrier.



B-B



C-C

NOTES:

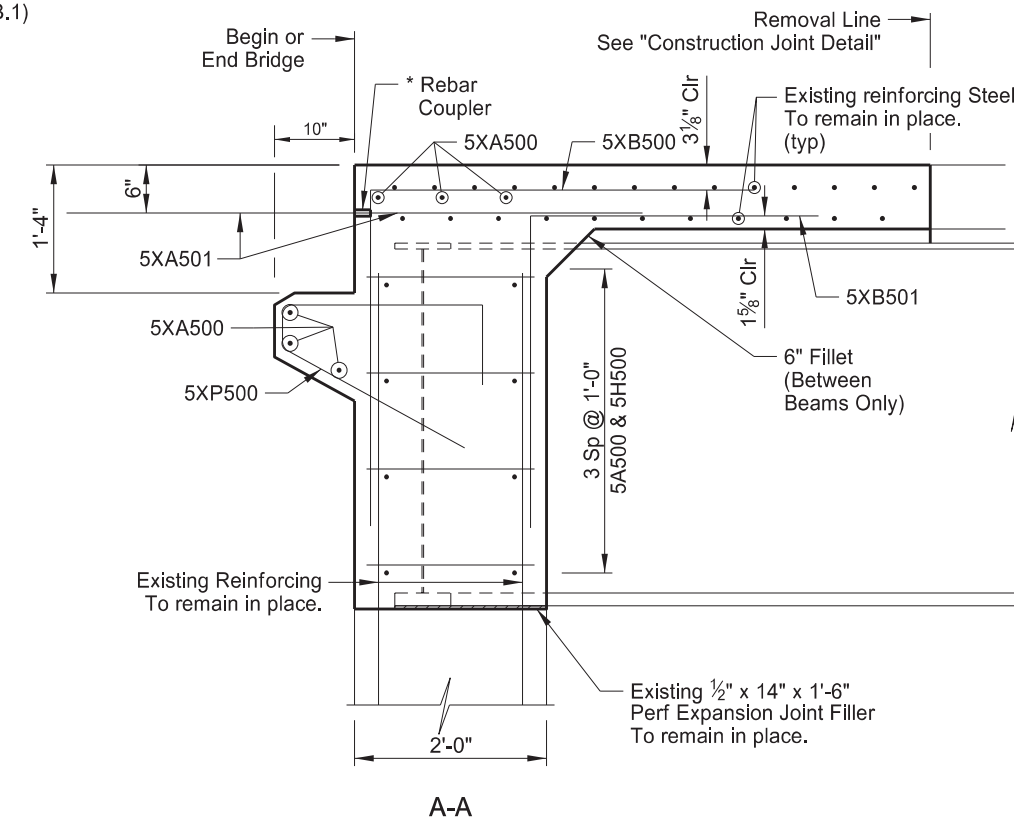
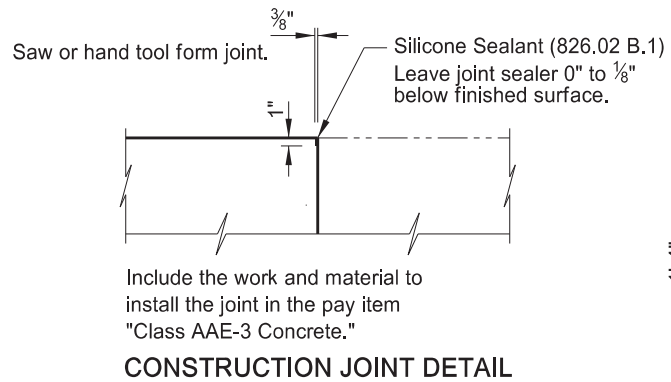
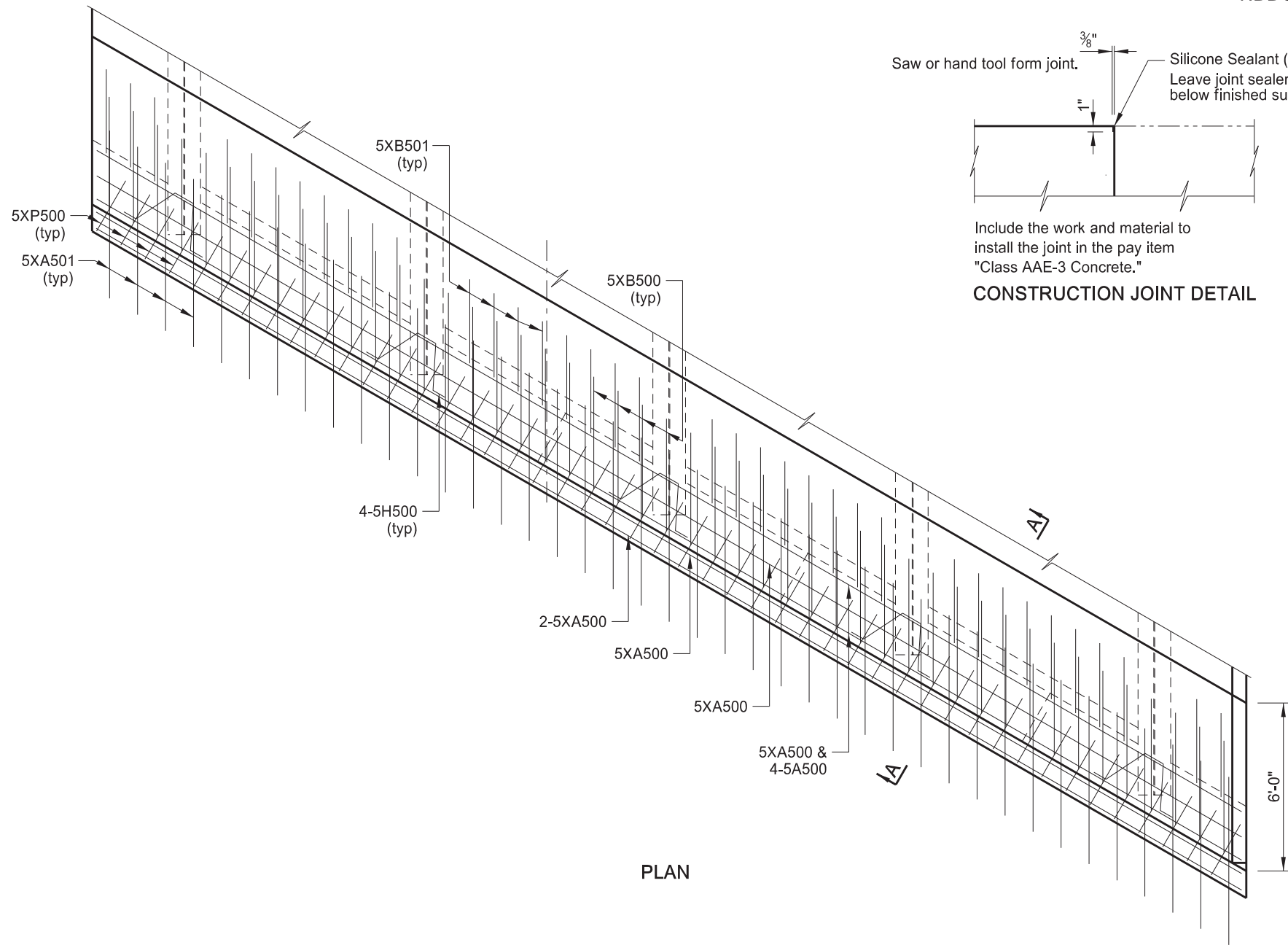
Couple 5XA503 bars to the existing reinforcing steel.
 Match 5XA504 bars to existing reinforcing steel.

See Dwg 2-053.731R-4 & 5 for locations of B-B and C-C.



QUANTITIES
SEE DWG 2-053.731R-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
SUPERSTRUCTURE DETAILS

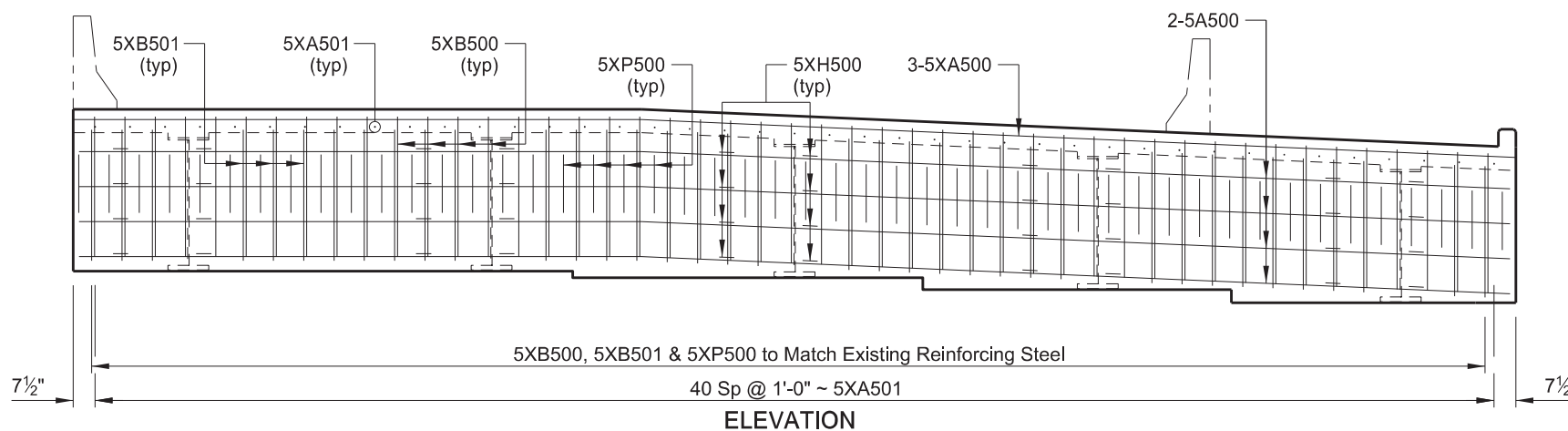
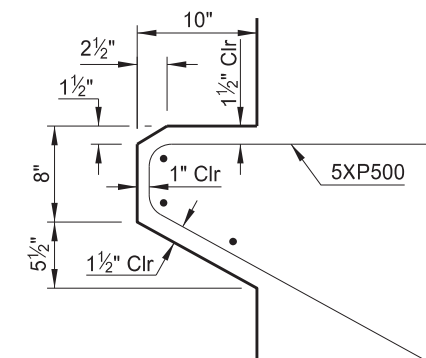
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	22



* Use mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.

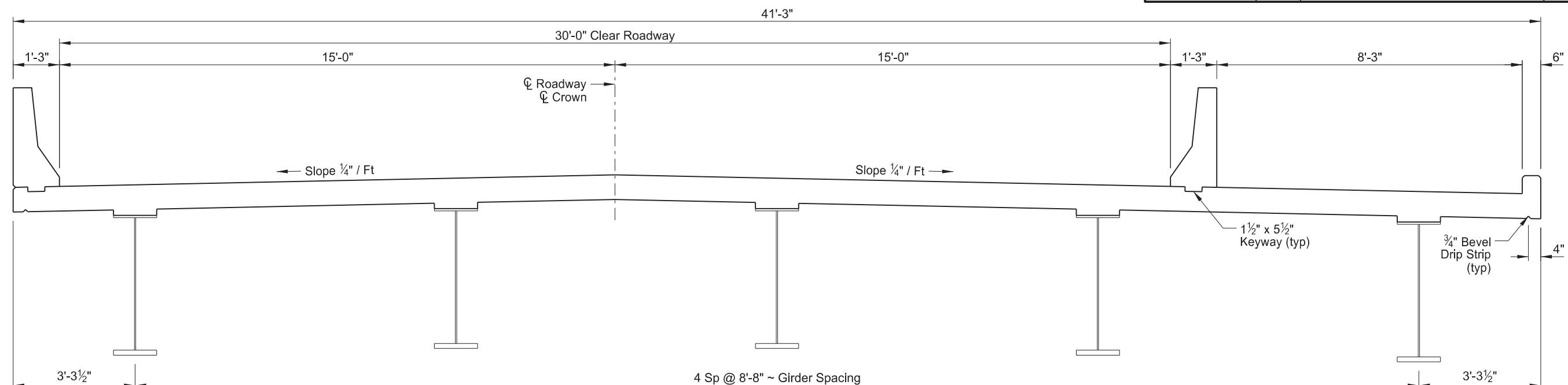
NOTE:

Do not install the 5XA501 bars into the approach slab until all of the foundation fill is in place.

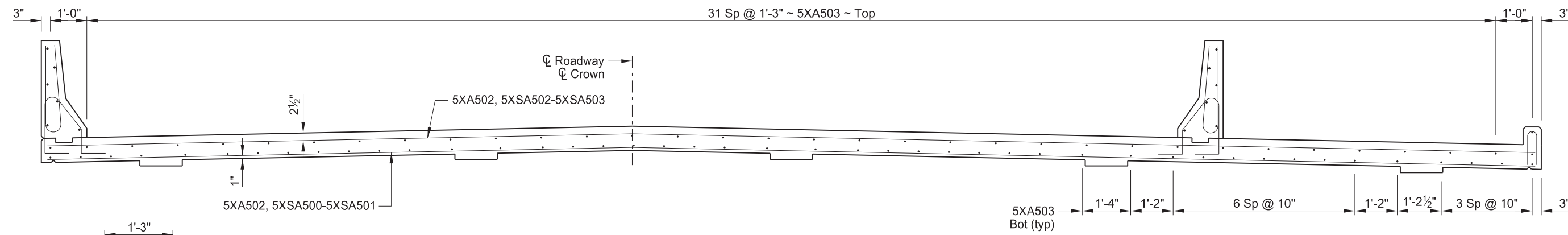


QUANTITIES
SEE DWG 2-053.731R-8
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
ENDWALL DETAILS

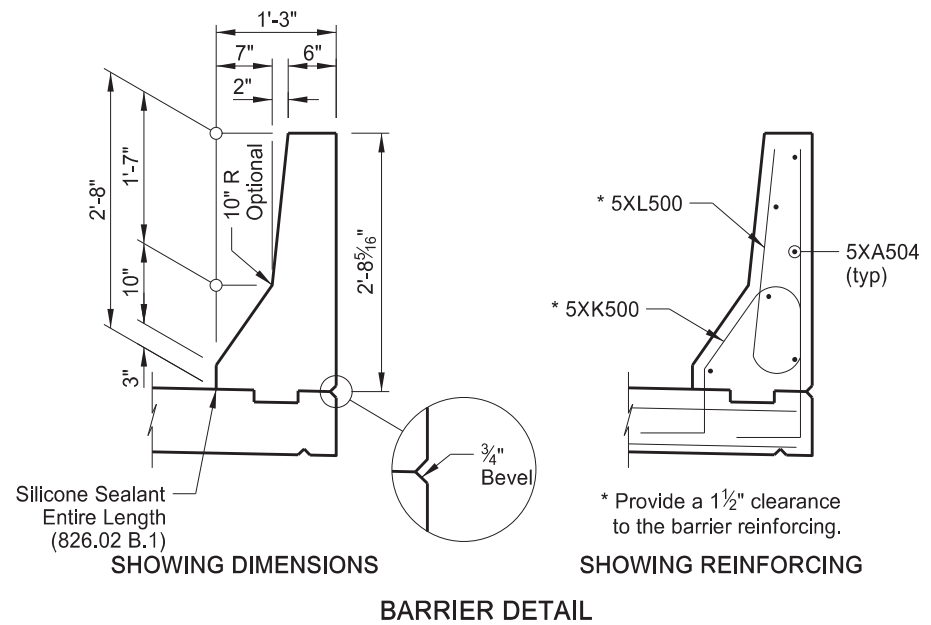
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	23



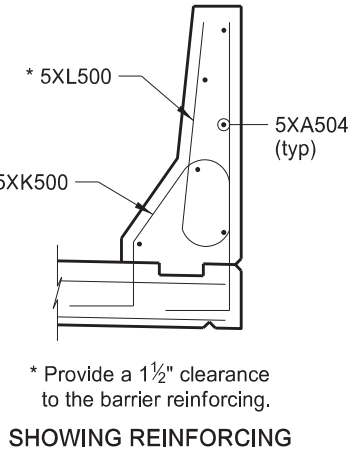
4 Sp @ 8'-8" ~ Girder Spacing
(SHOWING DIMENSIONS)
SLAB SECTION



31 Sp @ 1'-3" ~ 5XA503 ~ Top
(SHOWING REINFORCING)
SLAB SECTION



(SHOWING DIMENSIONS)
BARRIER DETAIL



(SHOWING REINFORCING)



QUANTITIES	
CLASS AAE-3 CONCRETE	22.5 CY
REINFORCING STEEL	500 LBS
REINFORCING STEEL (EPOXY)	5,324 LBS

BURLINGTON NORTHERN OVERHEAD
RAY
(WEST END)
SLAB SECTION

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

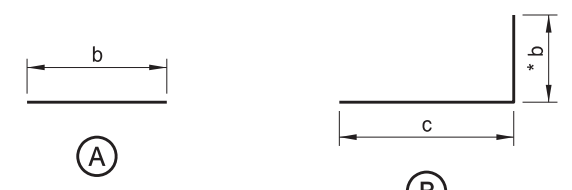
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS											
					a	b	c	d	e	f	g	h	k			
REGULAR	5	A500	8	47'-3"		47'-3"										
	5	H500	20	5'-1"	3"	1'-8"	9"					6	12			
SUPERSTRUCTURE	5	XA500	6	47'-3"		47'-3"										
	5	XA501	82	3'-0"		3'-0"										
	7	XA502	154	9'-9"		9'-9"										
	5	XA503	78	3'-7"		3'-7"										
	5	XA504	12	5'-8"		5'-8"										
	5	XB500	47	7'-4"		3'-4"	4'-0"									
	5	XB501	37	7'-1"		3'-1"	3'-0"									
	5	XK500	18	4'-11"	1'-4"	8"	11"	8"	1'-0"	2.5"	8"	8.5	12			
	5	XL500	18	5'-0"	3"	2'-2"	8"	2'-2"		2.5"		1.25	12			
	5	XP500	47	5'-6"	5"	2'-1"	2'-2"			1.25"	10"	12	6.5			
	5	XSA500	1	55'-10"	2'-9"	9'-8"								8		
	5	XSA501	1	53'-4"	3'-8"	9'-8"								7		
	5	XSA502	1	72'-6"	2'-1"	10'-0"								11		
5	XSA503	1	60'-0"	3'-9"	9'-7"								8			

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

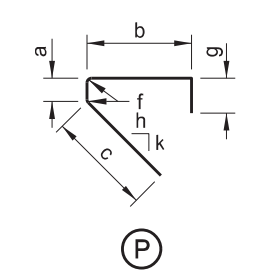
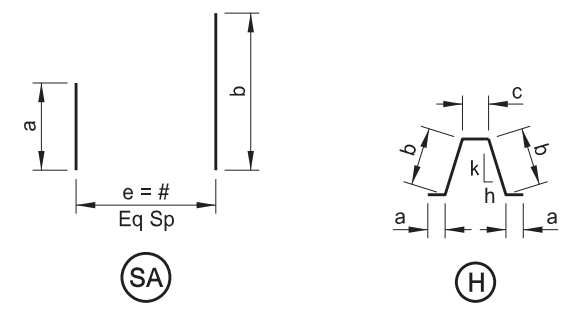
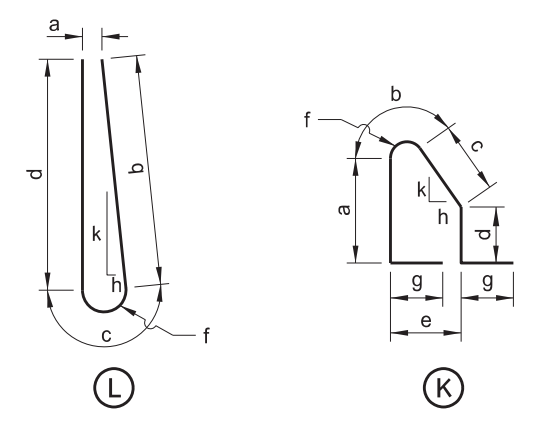
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	24

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.

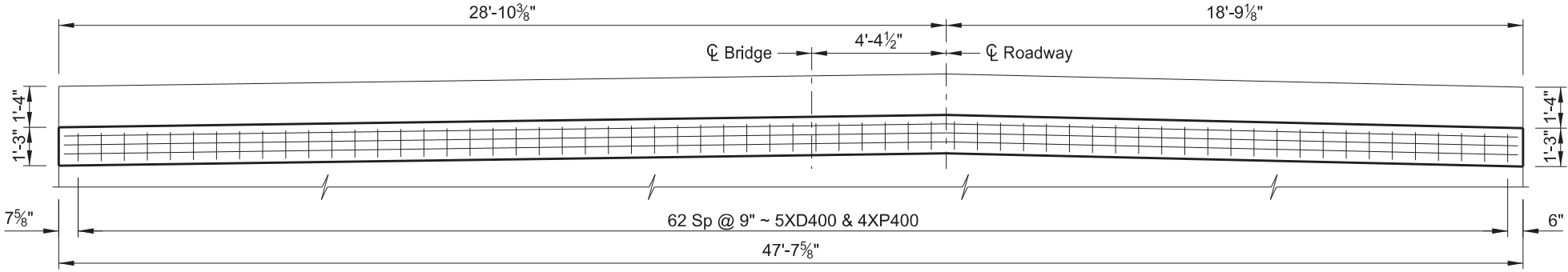


* b = Vertical Leg for XB500 and XB501



BURLINGTON NORTHERN OVERHEAD
 RAY
 REINFORCING BAR LIST & DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	25



(SHOWING REINFORCING)
ELEVATION

SKEW ANGLE = 0°			
BAR LIST - ONE APPROACH LIP			
SIZE	MARK	NO.	LENGTH
5	XA400	3	47'-2"
5	XD400	63	*1'-8"
5	XP400	63	*3'-0"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
454		1.7	

* Length may vary depending on manufacturer's recommendations for anchorage. Provide a minimum anchorage length of 9 inches.

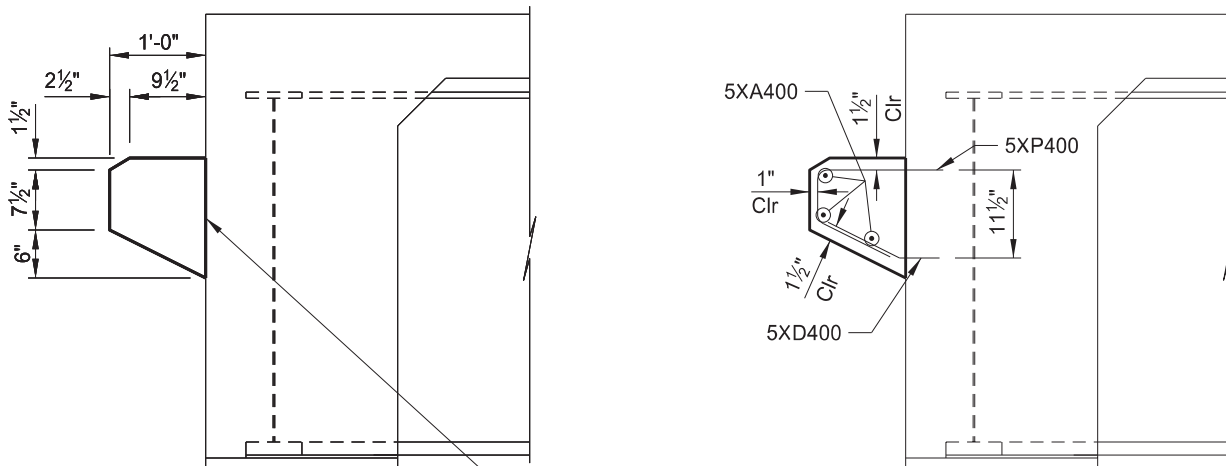
NOTES:

Provide Class AAE-3 concrete that meets Section 802 and Grade 60 reinforcing Steel that meets Section 612.

Install the 5XD900 and 5XP900 bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Sec. 806.02.

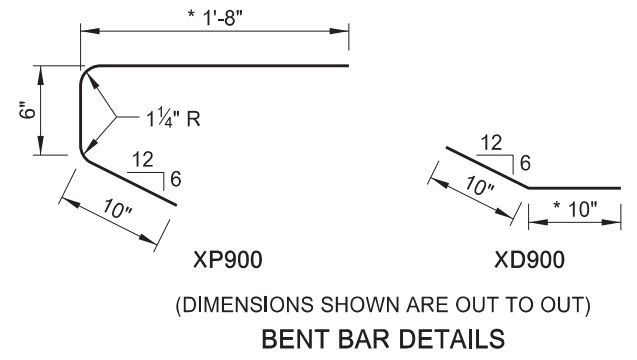
Include all excavation and backfilling, labor, equipment, and materials required to remove the existing approach lip and to build the new approach lip in the bid item "Approach Slab Lip Repair."

The bar marks beginning with an "X" indicate an epoxy coated bar.



Bush Hammer Finish: Before any concrete is placed against the existing concrete, prepare the surface with a bush hammer to produce a clean rough finish.

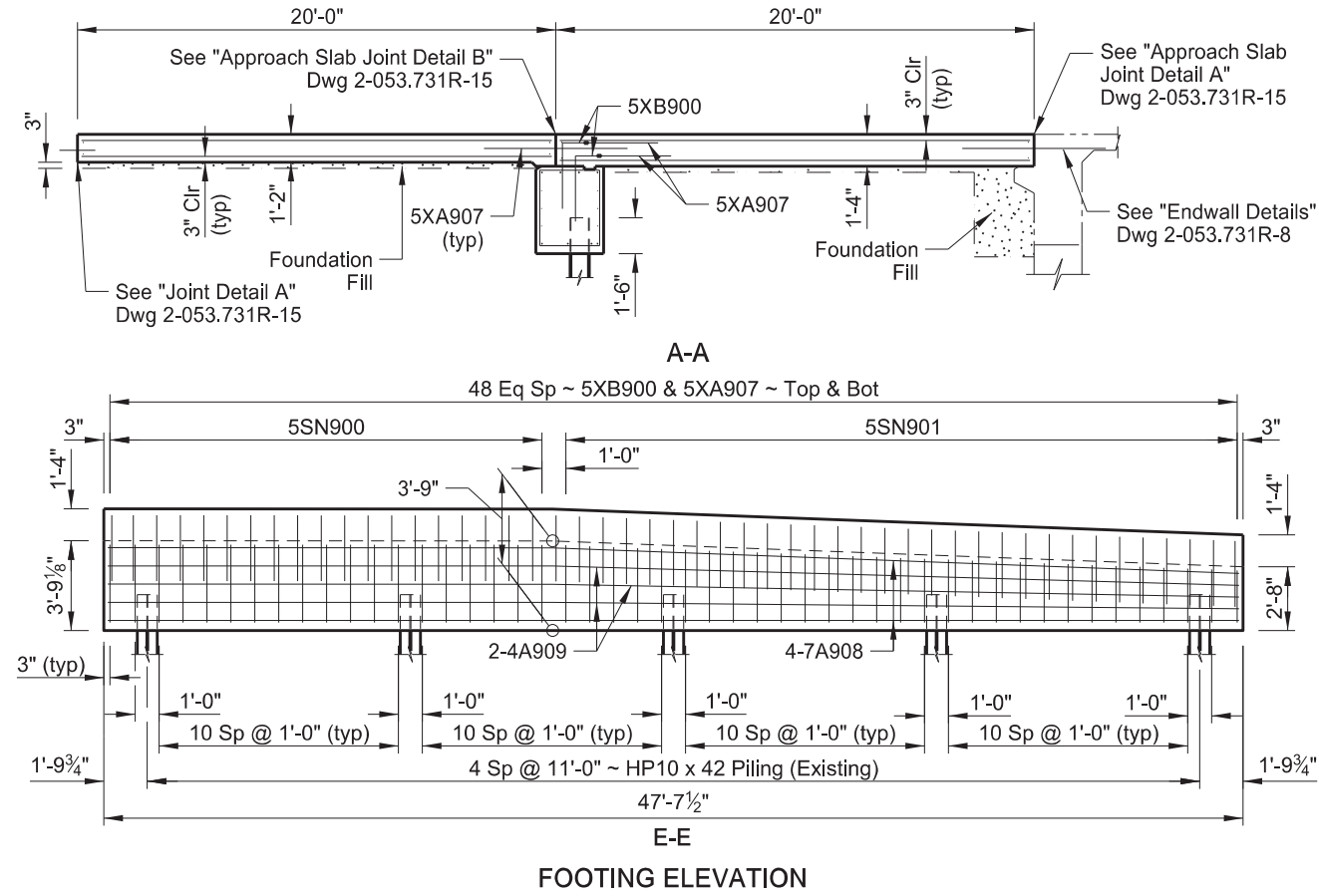
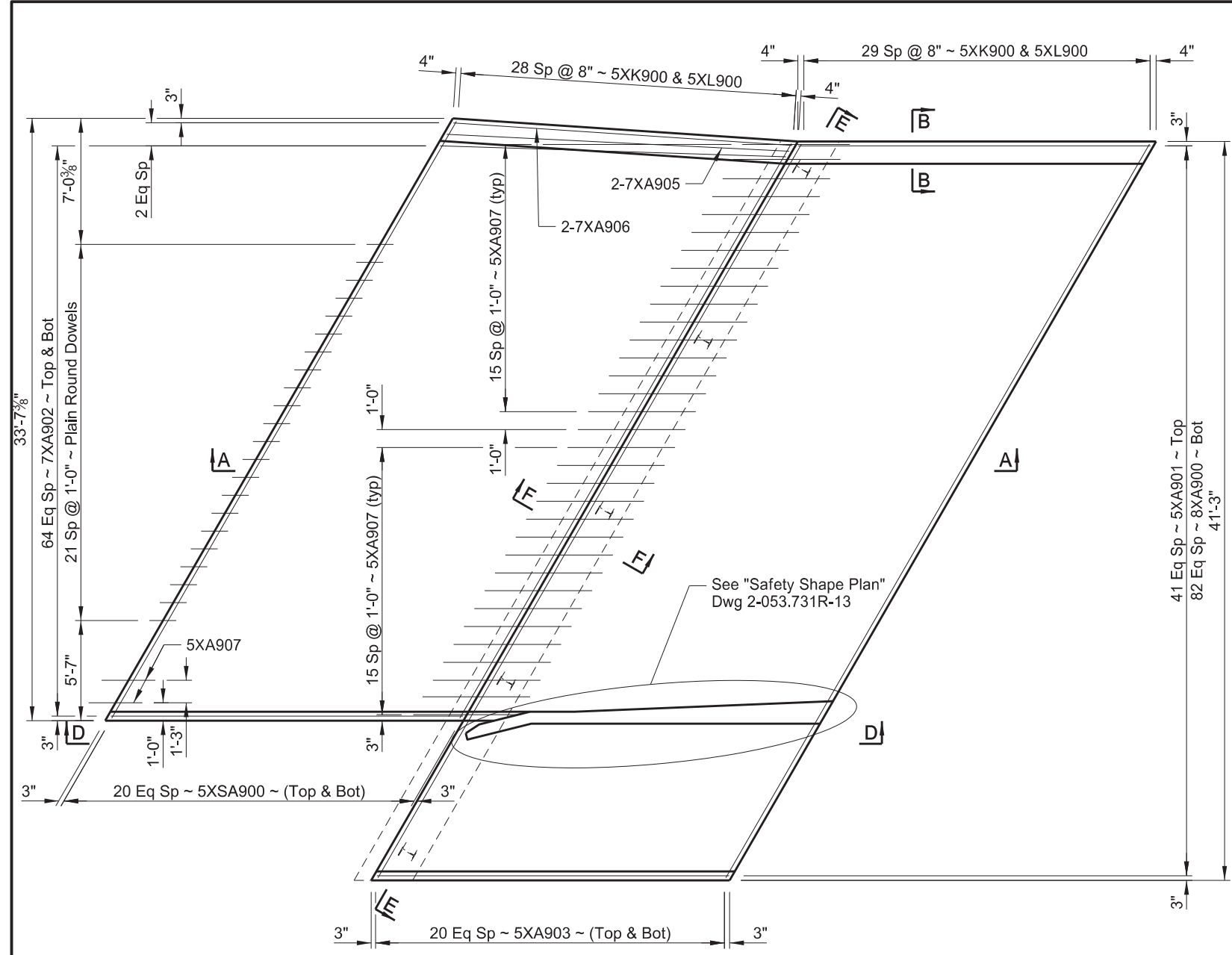
(SHOWING DIMENSIONS) **NEW APPROACH SLAB LIP** (SHOWING REINFORCING)



QUANTITIES	(ONE APPROACH LIP)
APPROACH SLAB LIP REPAIR	47.6 LF
BURLINGTON NORTHERN OVERHEAD RAY	
(EAST END)	
ENDWALL DETAILS	

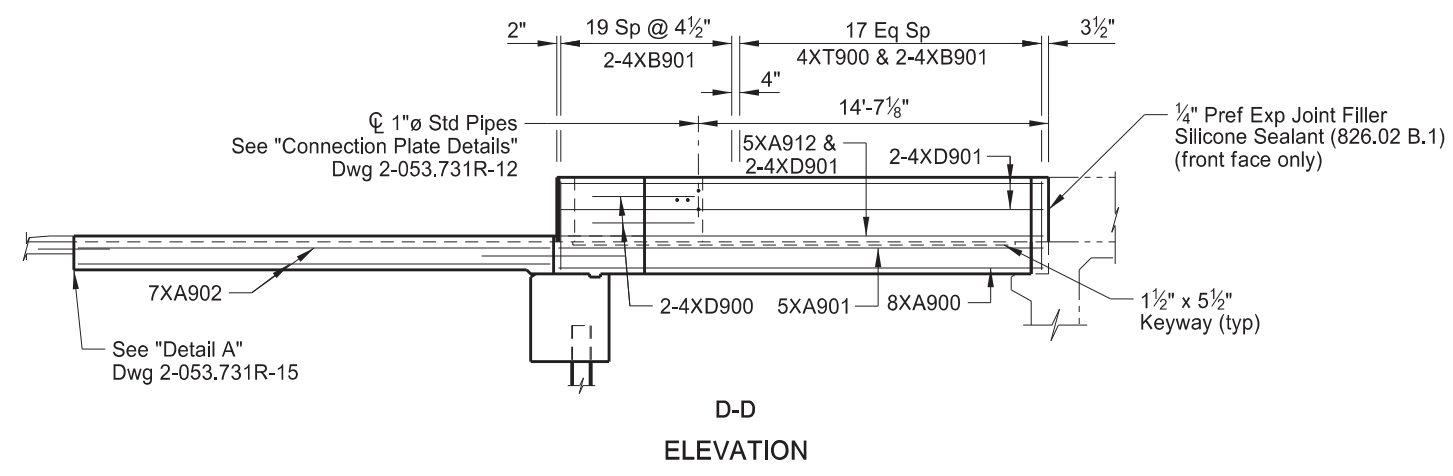
23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	26



NOTES:
See Dwg 2-053.731R-15 for Sections B-B & F-F.
See Dwg 2-053.731R-12 for Section C-C.

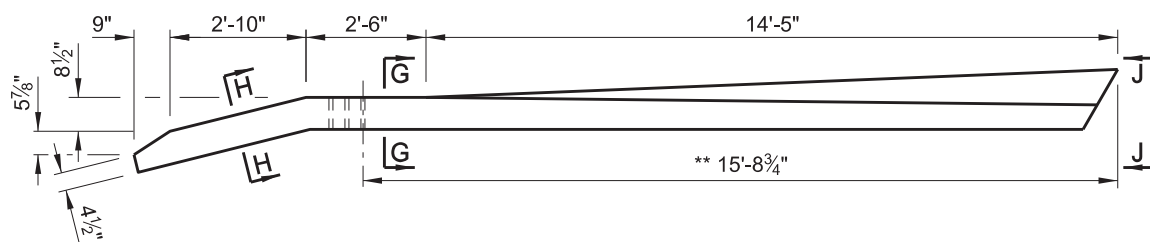
PLAN



D-D ELEVATION

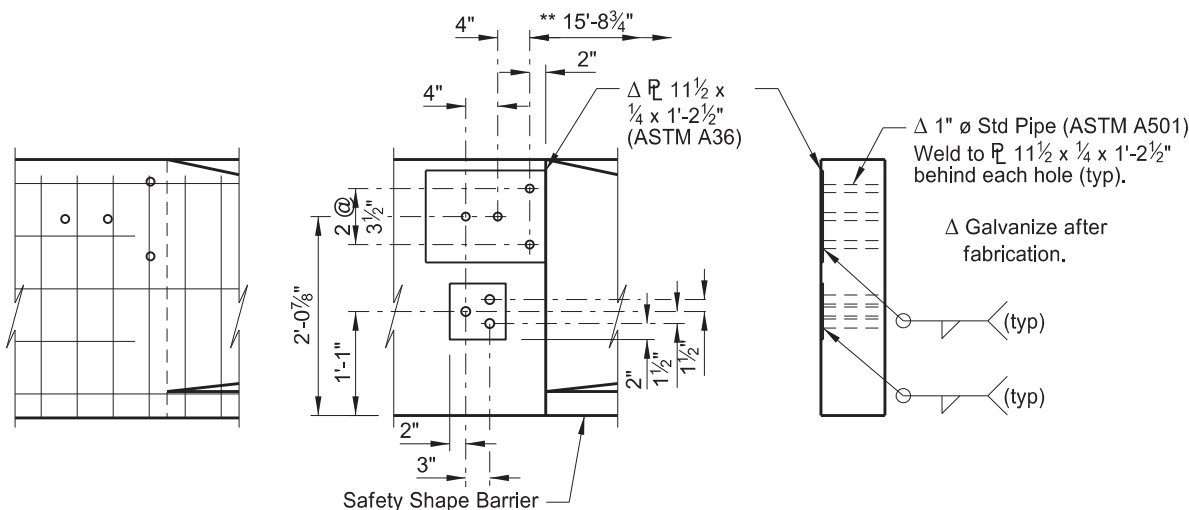
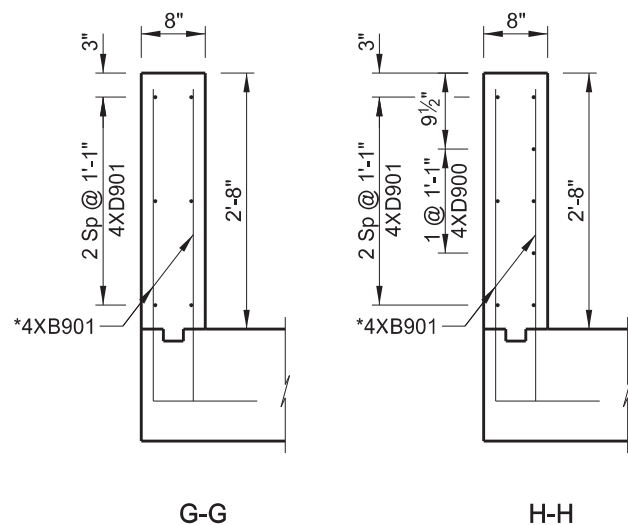


QUANTITIES
SEE DWG 2-053.731R-12
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
APPROACH SLAB DETAILS



SAFETY SHAPE PLAN

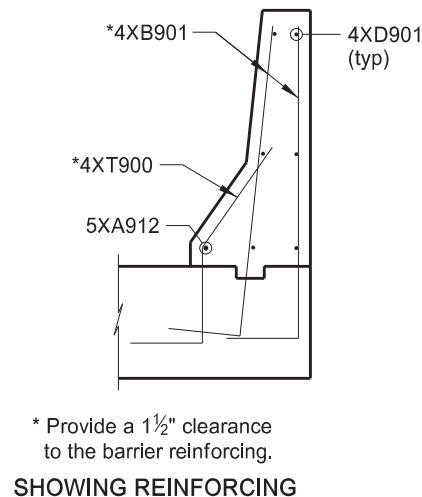
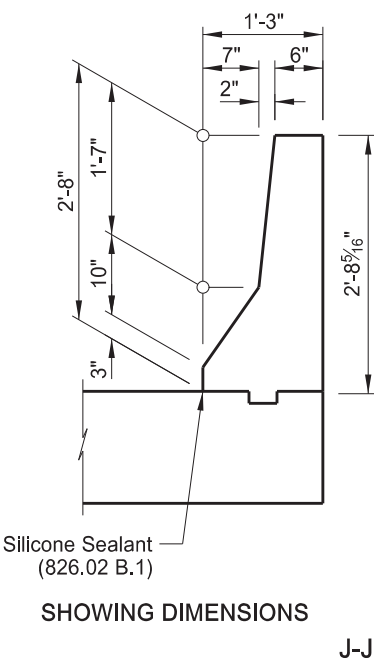
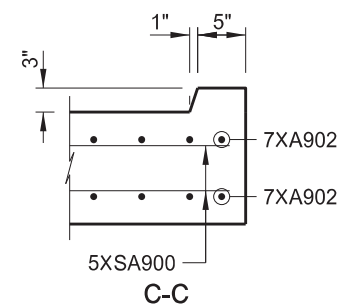
** Field verify existing guardrail connection.



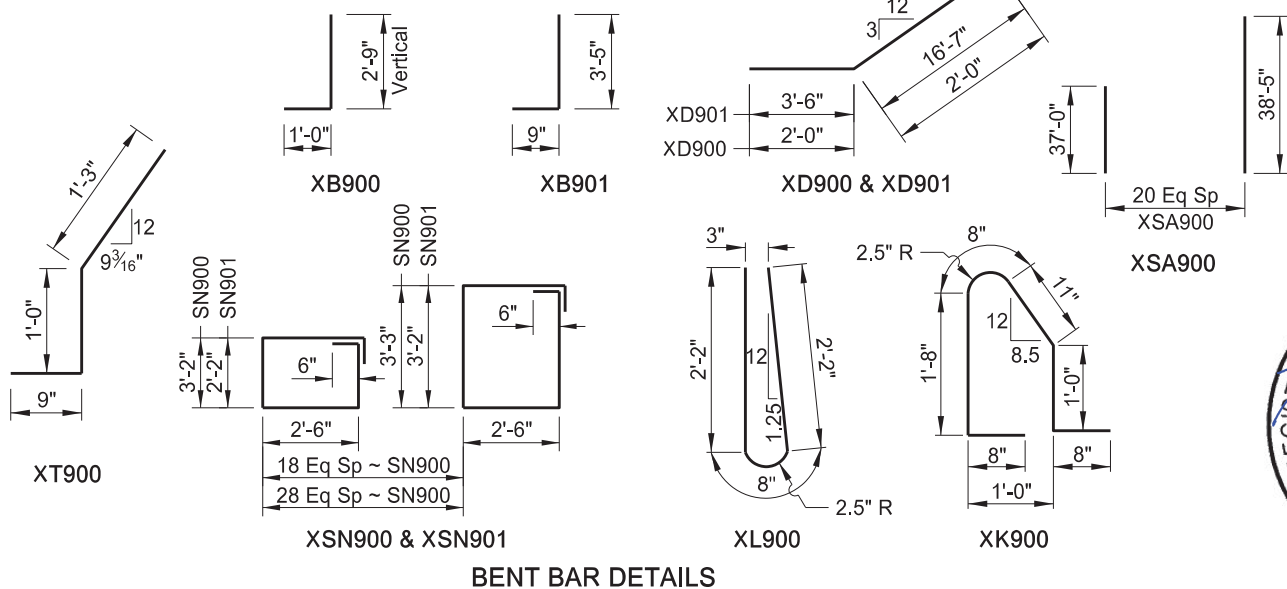
SHOWING REINFORCING

SHOWING DIMENSIONS

(SHOWING FRONT FACE)
CONNECTION PLATE DETAILS



* Provide a 1/2" clearance to the barrier reinforcing.



BENT BAR DETAILS

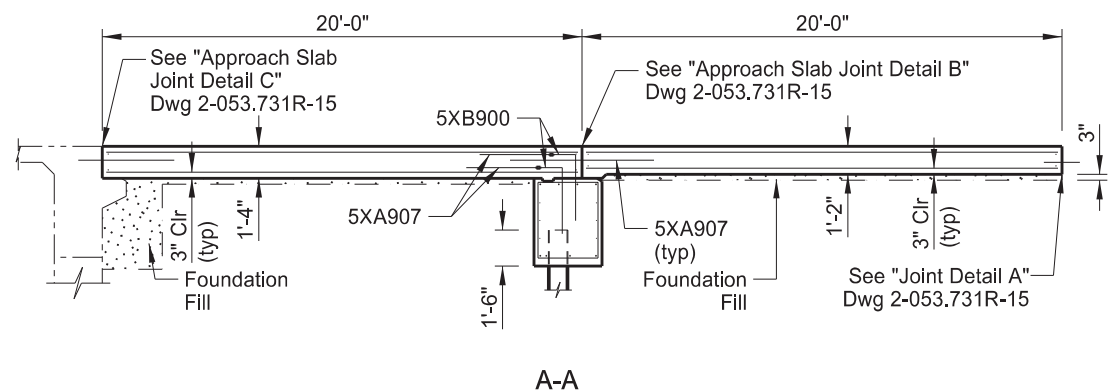
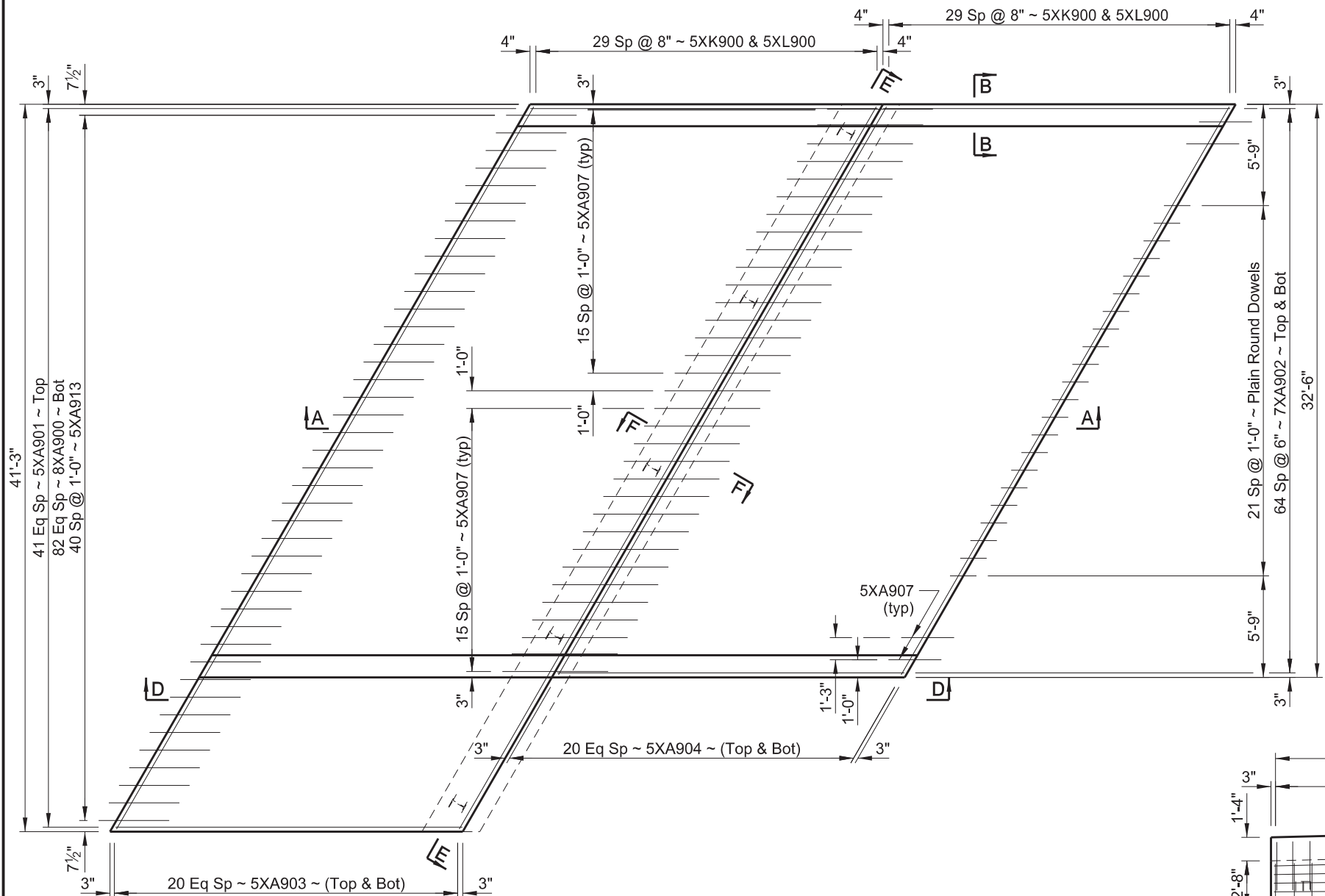
SKEW ANGLE = 0°			
BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
8	XA900	83	19'-8"
5	XA901	42	19'-8"
7	XA902	130	19'-8"
5	XA903	42	47'-3"
7	XA905	2	19'-3"
7	XA906	2	18'-11"
5	XA907	166	3'-0"
7	XA908	8	47'-3"
4	XA909	6	47'-3"
4	XA910	9	19'-8"
4	XA911	9	18'-11"
5	XA912	1	13'-11"
5	XB900	98	3'-9"
4	XB901	76	4'-2"
4	XD900	4	4'-0"
4	XD901	6	20'-1"
5	XK900	59	5'-7"
5	XL900	59	5'-0"
4	XT900	18	3'-0"
5	XSA900	2	791'-10"
5	XSN900	1	235'-11"
5	XSN901	1	328'-8"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)	CONCRETE (CY)		
18,013	89.9		

QUANTITIES	
APPROACH SLAB	73.3 SY
PILE SUPPORTED APPROACH SLAB	91.7 SY



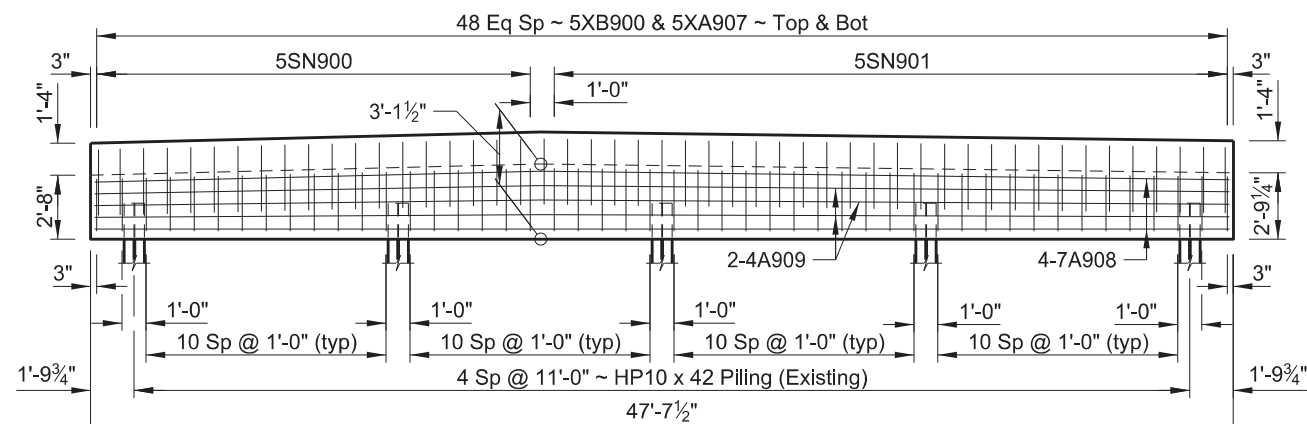
BURLINGTON NORTHERN OVERHEAD RAY
(WEST END)
APPROACH SLAB DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	28

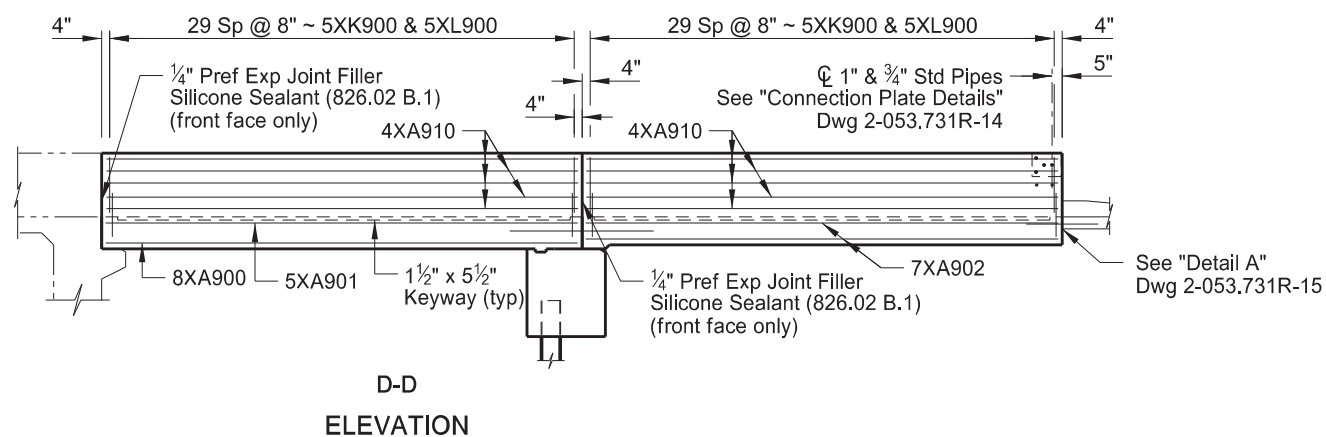


NOTES:
See Dwg 2-053.731R-15 for Sections B-B & C-C

PLAN



FOOTING ELEVATION



D-D
ELEVATION

See "Detail A"
Dwg 2-053.731R-15



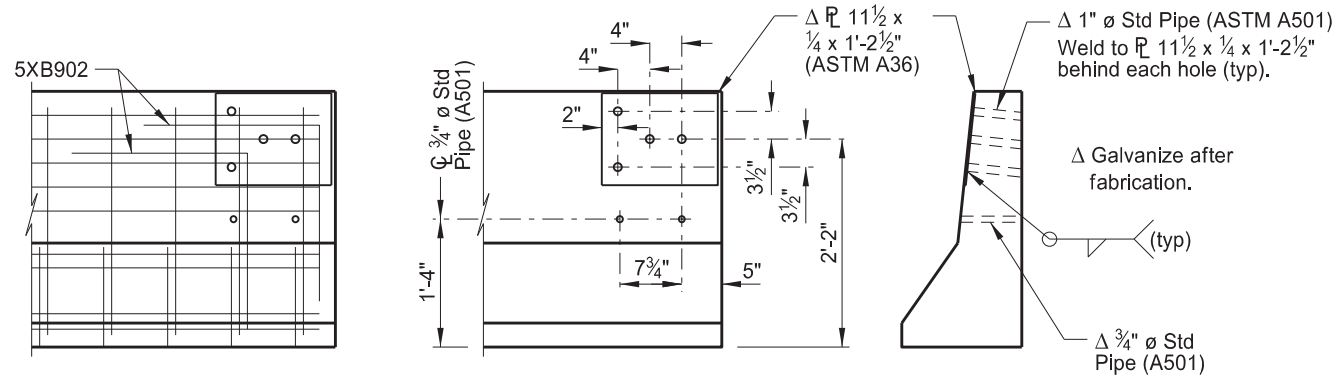
QUANTITIES
SEE DWG 2-053.731R-14
BURLINGTON NORTHERN OVERHEAD RAY
(EAST END)
APPROACH SLAB DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	29

** Length may vary depending on manufacturer's recommendations for anchorage. Length based on 1 foot minimum anchorage length.

SKEW ANGLE = 0°

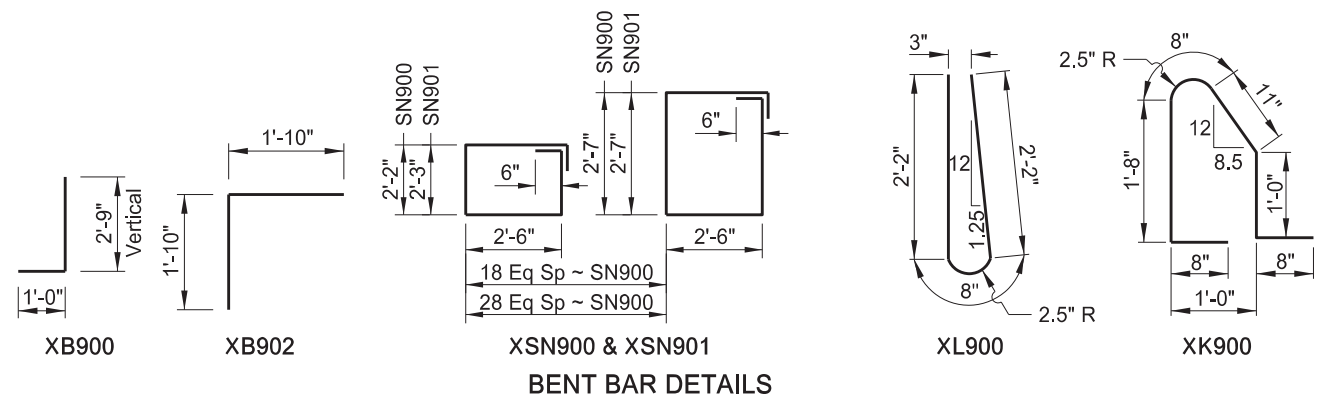
BAR LIST			
SIZE	MARK	NO.	LENGTH
8	XA900	83	19'-8"
5	XA901	42	19'-8"
7	XA902	130	19'-8"
5	XA903	42	47'-3"
5	XA904	42	37'-3"
5	XA907	168	3'-0"
7	XA908	8	47'-3"
4	XA909	6	47'-3"
4	XA910	36	19'-8"
5	XA913	41	** 4'-0"
5	XB900	98	3'-9"
5	XB902	4	3'-8"
5	XK900	120	5'-7"
5	XL900	120	5'-0"
5	XSN900	1	204'-3"
5	XSN901	1	314'-2"



SHOWING REINFORCING
SHOWING DIMENSIONS
(SHOWING FRONT FACE)
CONNECTION PLATE DETAILS

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
18,543	89.2



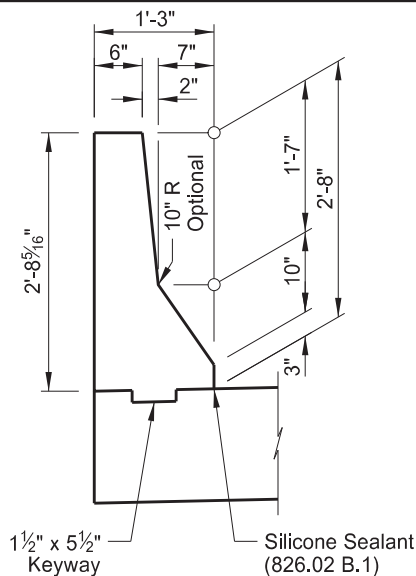
XSN900 & XSN901
BENT BAR DETAILS



QUANTITIES	
APPROACH SLAB	72.2 SY
PILE SUPPORTED APPROACH SLAB	91.7 SY

BURLINGTON NORTHERN OVERHEAD RAY
(EAST END)
APPROACH SLAB DETAILS

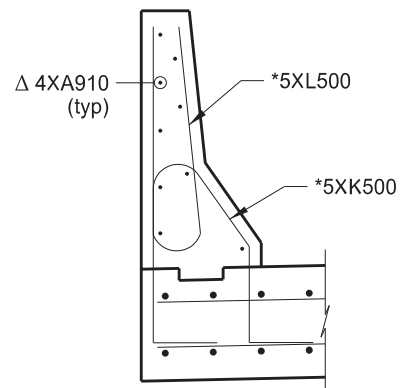
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NH-7-002(172)053	170	30



SHOWING DIMENSIONS

B-B

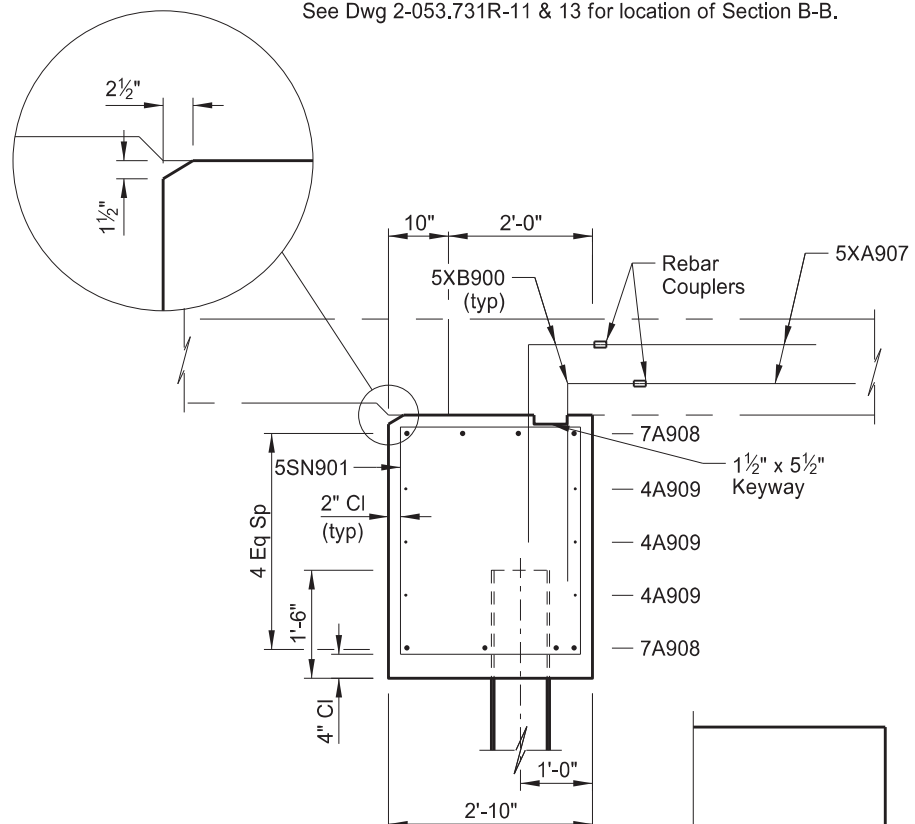
△ Use 4XA911 for north barrier on west entrance end.



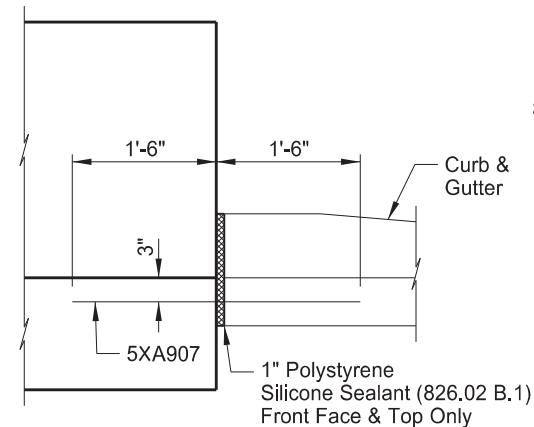
SHOWING REINFORCING

NOTES:

See Dwg 2-053.731R-11 & 13 for location of Section B-B.



F-F



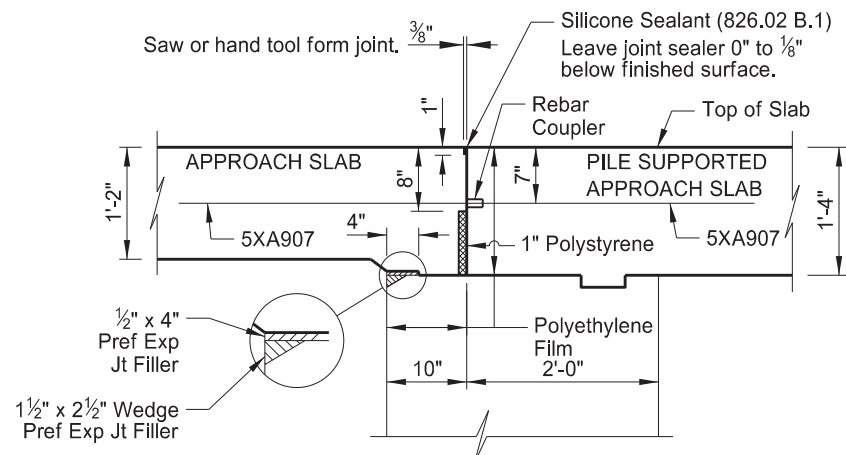
DETAIL "A"

NOTES:

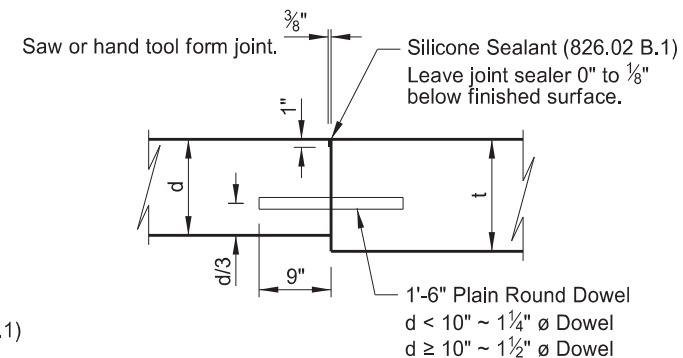
Couple the 5XA909 bars to the 5XB900 bars extending out of the approach slab footing. Couple the 5XA904 bars. The couplers shall be an approved mechanical connector capable of developing 125% of the specified yield strength of the reinforcing steel.

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, connection plates and pipes, and labor required to build the approach slabs and barriers in the pay item "Concrete Bridge Approach Slab." 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.

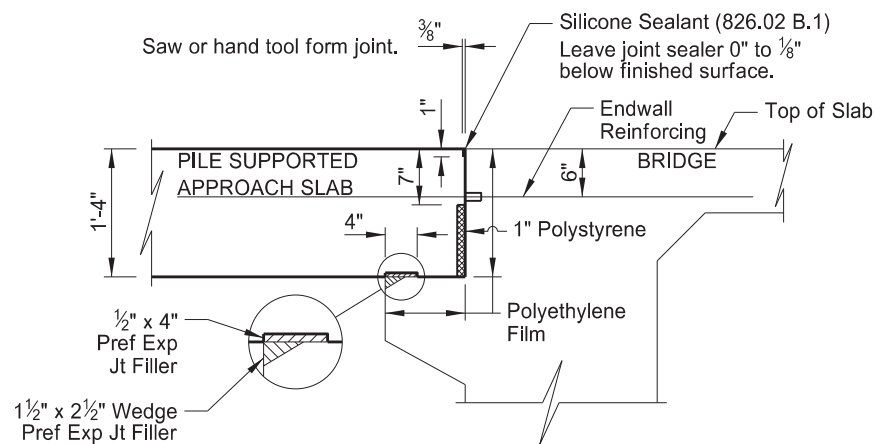


APPROACH SLAB JOINT DETAIL B

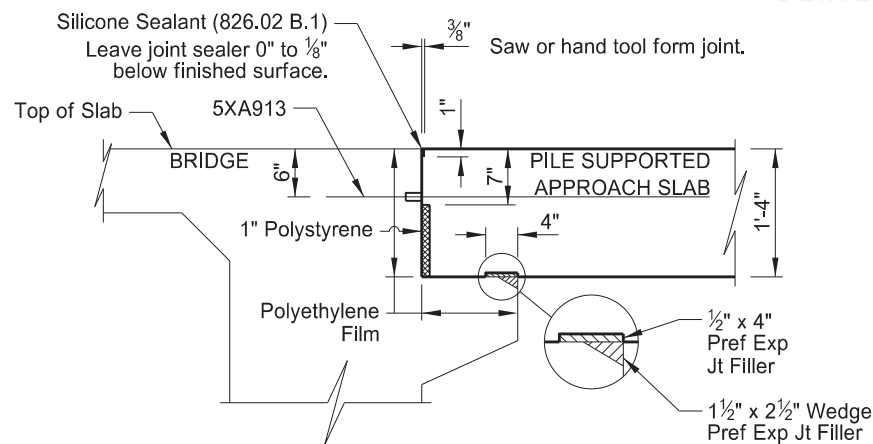


JOINT DETAIL A

d = Pavement Thickness
 t = Approach Slab Thickness



APPROACH SLAB JOINT DETAIL A



APPROACH SLAB JOINT DETAIL C



BURLINGTON NORTHERN OVERHEAD
 RAY

APPROACH SLAB DETAILS

NDDOT ABBREVIATIONS

? This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.

Abn abandoned
 Abut abutment
 Adj adjusted
 Aggr aggregate
 Ahd ahead
 ARV air release valve
 Align alignment
 Al alley
 Alt alternate
 Alum aluminum
 ADA Americans with Disabilities Act
 & and
 Appr approach
 Approx approximate
 ACP asbestos cement pipe
 Asph asphalt
 AC asphalt cement
 Assmd assumed
 @ at
 Atten attenuation
 ATR automatic traffic recorder
 Ave Avenue
 Avg average
 ADT average daily traffic

Bk back
 BF back face
 Balc balcony
 B Wire barbed wire
 Barr barricade
 Btry battery
 BI beehive inlet
 Beg begin
 BG below grade
 BM bench mark
 Bkwy bikeway
 Bit bituminous
 Blk block
 BH bore hole
 Bot bottom
 Blvd Boulevard
 Bndry boundary
 Brkwy breakaway
 Br bridge
 Bldg building
 Bus. business
 BV butterfly valve
 Byp bypass

C Gdrl cable guardrail
 Calc calculate
 CIP cast iron pipe
 CB catch basin
 CRS cationic rapid setting
 C Gd cattle guard
 C To C center to center
 CL or C centerline
 Ch chain
 Chnlk chain-link
 Ch Blk channel block
 Ch Ch channel change
 Chk check
 Chsld chiseled
 Cir circle
 Cl class
 Clnt clean-out
 Clr clear
 Cl&gr clearing & grubbing
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 CECB concrete erosion control blanket
 Cond conductor
 Const construction
 Cont continuous
 CSB continuous split barrel sample
 Contr contraction
 Contr contractor
 CP control point
 Coord coordinate
 Cor corner
 Corr corrected
 CAES corrugated aluminum end section
 CAP corrugated aluminum pipe
 CMES corrugated metal end section
 CMP corrugated metal pipe
 CPVCP corrugated poly-vinyl chloride pipe
 CSES corrugated steel end section
 CSFES corrugated steel flared end section
 CSP corrugated steel pipe
 CSTES corrugated steel traversable end section
 Co County
 Crse course
 Ct Court
 Xarm cross arm
 Xbuck cross buck
 Xsec cross sections
 Xing crossing
 Xrd crossroad
 Crn crown

Culv culvert
 C&G curb & gutter
 CI curb inlet
 CR curb ramp
 C cut
 Dd Ld dead load
 Defl deflection
 Defm deformed
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia or \emptyset diameter
 Dir direction
 Dist distance
 DM disturbed material
 DB ditch block
 DG ditch grade
 Dbl double
 Dn down
 Dwg drawing
 Dr drive
 Drwy driveway
 DI drop inlet
 D dry density
 DSDS dynamic speed display sign

Ea each
 Esmt easement
 E East
 EB Eastbound
 Elast elastomeric
 EL electric locker
 E Mtr electric meter
 Elec electric/al
 EDM electronic distance meter
 Elev or El elevation
 Ellipt elliptical
 Emb embankment
 Emuls emulsion/emulsified
 ES end section
 Engr engineer
 ESS environmental sensor station
 Eq equal
 Evgr evergreen
 Exc excavation
 Exst existing
 Exp expansion
 Expy Expressway
 E external of curve
 Extru extruded

FOS factor of safety
 Fed Federal
 FP feed point
 Fn fence
 Fn P fence post
 FO fiber optic
 FD field drive
 F fill
 FAA fine aggregate angularity
 FH fire hydrant
 Fl flange
 Flrd flared
 FES flared end section
 F Bcn flashing beacon
 FA flight auger sample
 FL flow line
 Ftg footing
 FM force main
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser
 FFP fuel filler pipes
 FLS fuel leak sensor
 Furn furnish/ed

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NDDOT ABBREVIATIONS

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	PI	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	PI or P _L	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	performed		
Intscn	intersection	Mtd	mounted	Prep	preparation		
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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KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 18 2020

NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 ALL PL Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 CABLE ONE Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporated
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 CENTURYLINK CenturyLink
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-traill Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone
 GTR RAMSEY WD Greater Ramsey Water District

GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKNZ ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MIDCO MidContinent Communications
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS VALL COMM Missouri Valley Communications
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 NWRWD Northwest Rural Water District
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R & T W SUPPLY R & T Water Supply Association

RED RIV COMM Red River Rural Communications
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Cooperative
 RRVW Red River Valley & Western Railroad
 S CENT REG WD South Central Regional Water District
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STER ENG Sterling Energy
 STUT RWU Stutsman Rural Water Users
 SW PL PRJ Southwest Pipeline Project
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TESORO HGH PLNS PL Tesoro High Plains Pipeline
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USFWS US Fish and Wildlife Service
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WAPA Western Area Power Administration
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

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LINE STYLES

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Existing Topography

- Existing Ground Void
- Existing Cemetery 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

Proposed Topography

- 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
- 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

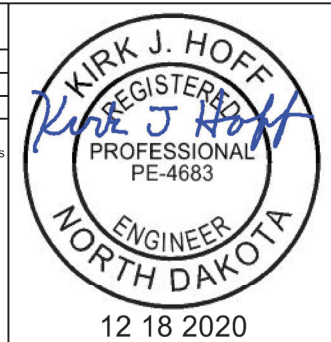
Traffic Utilities

- 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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LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typical

- Existing Ground
- Existing Topsoil (Cross Section View)
- void - void - void - v 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

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S

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

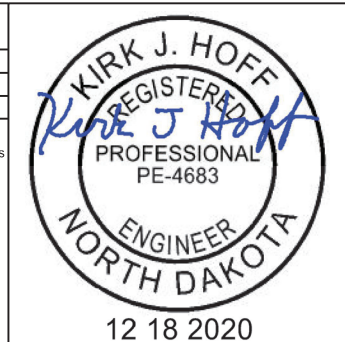
Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- s ----- s ----- Floating Silt Curtain
- SF ----- SF ----- 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



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



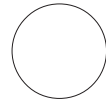
Existing Large Tree



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

KIRK J. HOFF
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 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  Luminaire LED  Existing Light Standard Luminaire  Relocate Light Standard  Light Standard Light LED Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Emergency Vehicle Detector  Video Detection Camera	  High Mast Light Standard 3 Luminaire (Exst, Ppsd)   High Mast Light Standard 4 Luminaire (Exst, Ppsd)   High Mast Light Standard 5 Luminaire (Exst, Ppsd)   High Mast Light Standard 6 Luminaire (Exst, Ppsd)   High Mast Light Standard 7 Luminaire (Exst, Ppsd)   High Mast Light Standard 8 Luminaire (Exst, Ppsd)   High Mast Light Standard 9 Luminaire (Exst, Ppsd)   High Mast Light Standard 10 Luminaire (Exst, Ppsd)   Overhead Sign Structure Load Center (Exst, Ppsd)   Traffic Signal Controller (Exst, Ppsd)   Pad Mounted Traffic Signal Controller (Exst, Ppsd)   Flashing Beacon (Exst, Ppsd)   Concrete Foundation (Exst, Ppsd)   Pipe Mounted Flasher (Exst, Ppsd)   Pad Mounted Feed Point (Exst, Ppsd)   Pipe Mounted Feed Point with Pad (Exst, Ppsd)   Pole Mounted Feed Point (Exst, Ppsd)   Junction Box (Exst, Ppsd)  Existing Pedestrian Head with Number  Existing Signal Head  Pole Mounted Head  Existing Lighting Standard Pole	 Existing Traffic Signal Standard    Pull Box (Exst-Ppsd-Undefined)   Intelligent Transportation Pull Box (Exst, Ppsd)   Transformer (Exst, Ppsd)    Power Pole (Exst-Ppsd-with Transformer)   Wood Pole (Exst, Ppsd)   Pedestrian Push Button Post (Exst, Ppsd)  Existing Pole  Existing Telephone Pole  Existing Post     Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



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

12 18 2020

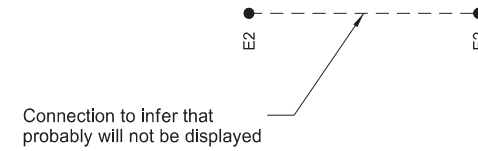
Cross Section Legend

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*	Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
	Cable Line	● CBL1		● CBL2	Overhead Power Transmission Line
Conduit Line	● CDU1	● CDU2	Overhead Line	↑ OH1	↑ OH2
Electric Line	● E1	● E2		Gas Main Line	● GM1
Fiber Optic Line	● F1	● F2	Gas Service Line	● GS1	● GS2
Gas Transmission Line	● GT1	● GT2	Gas Transmission Line	● GT1	● GT2
Fuel Pipeline	● PL1	● PL2	Sanitary Sewer Force Main	● SSF1	● SSF2
Sanitary Sewer	● SS1	● SS2	Sanitary Sewer	● SS1	● SS2
Steam Line	● STE1	● STE2	Storm Drain (Assumed Depth)	● SD1	● SD2
Telephone Line	● T1	● T2			
TV Line	● TV1	● TV2			
Water Main Line	● WM1	● WM2			
Water Service Line	● WS1	● WS2			

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.



* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.



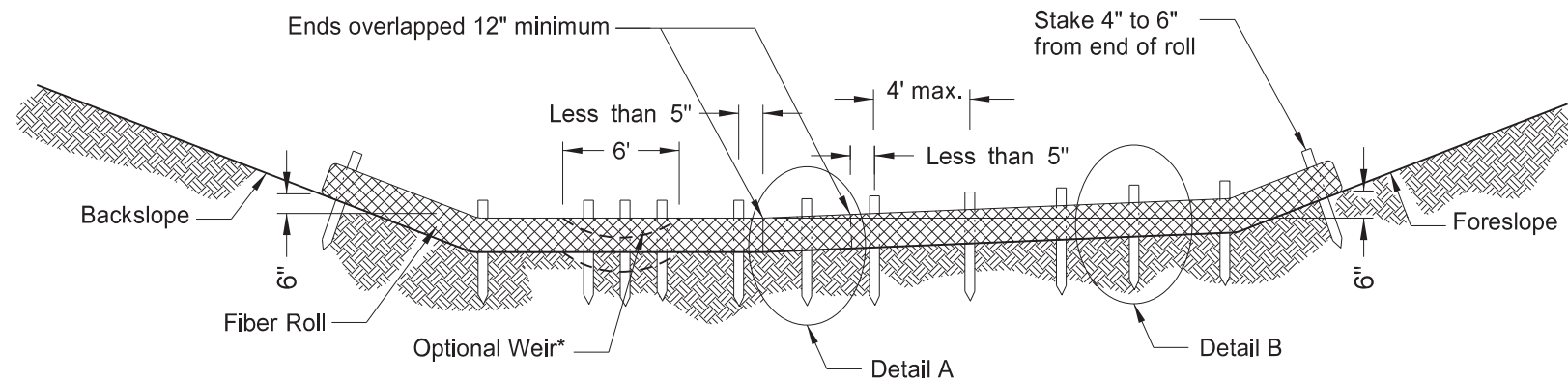
On the right side of most cross sections there is an earthwork table. The following example (values not related to project) details the earthwork table layout.

Cut Area	→	CA: 34.34 SF
Fill Area	→	FA: 0.017 SF
Cut Volume	→	CV: 64.44 CY
Fill Volume	→	FV: 0.031 CY
Mass Ordinate	→	MO: 65.13 CY

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE

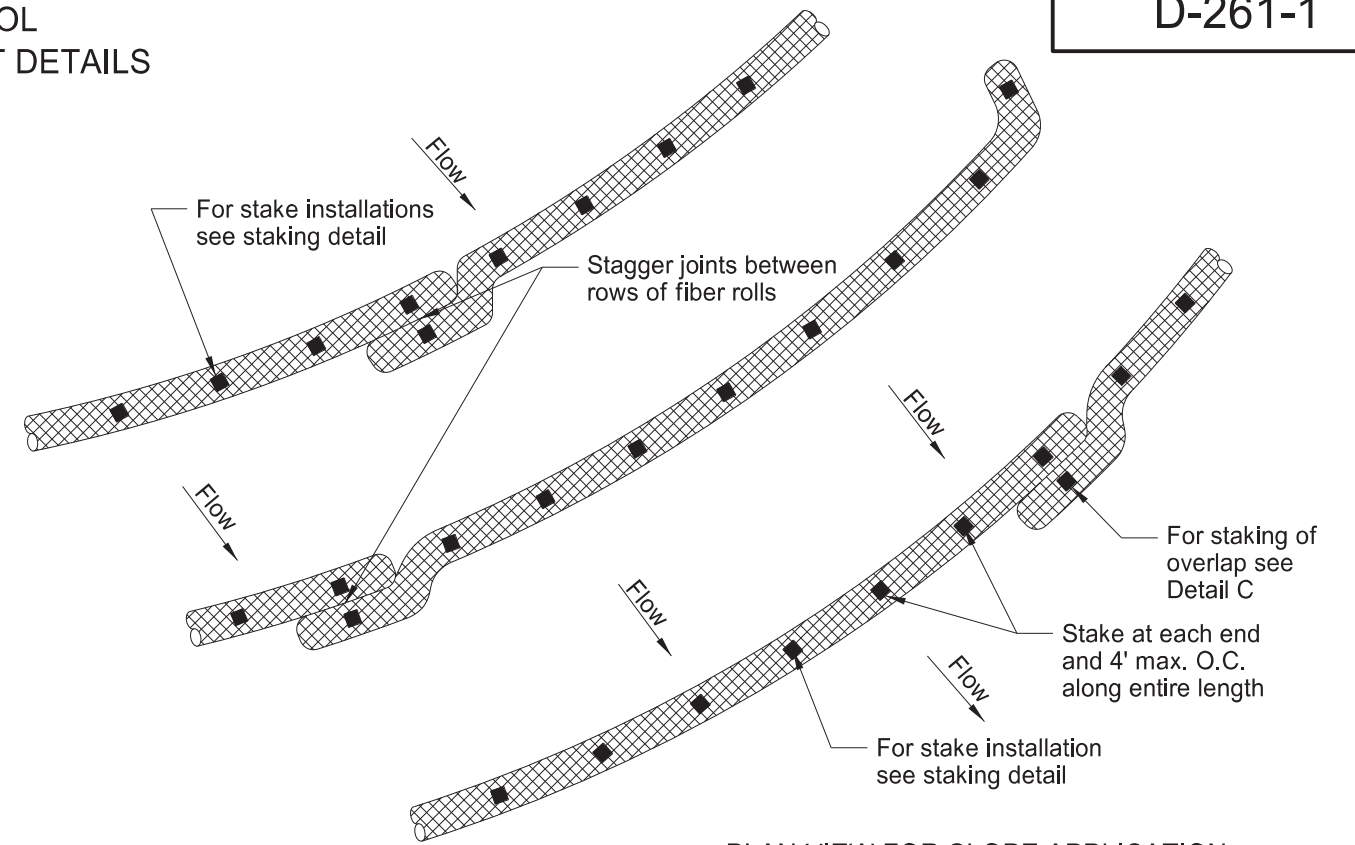
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

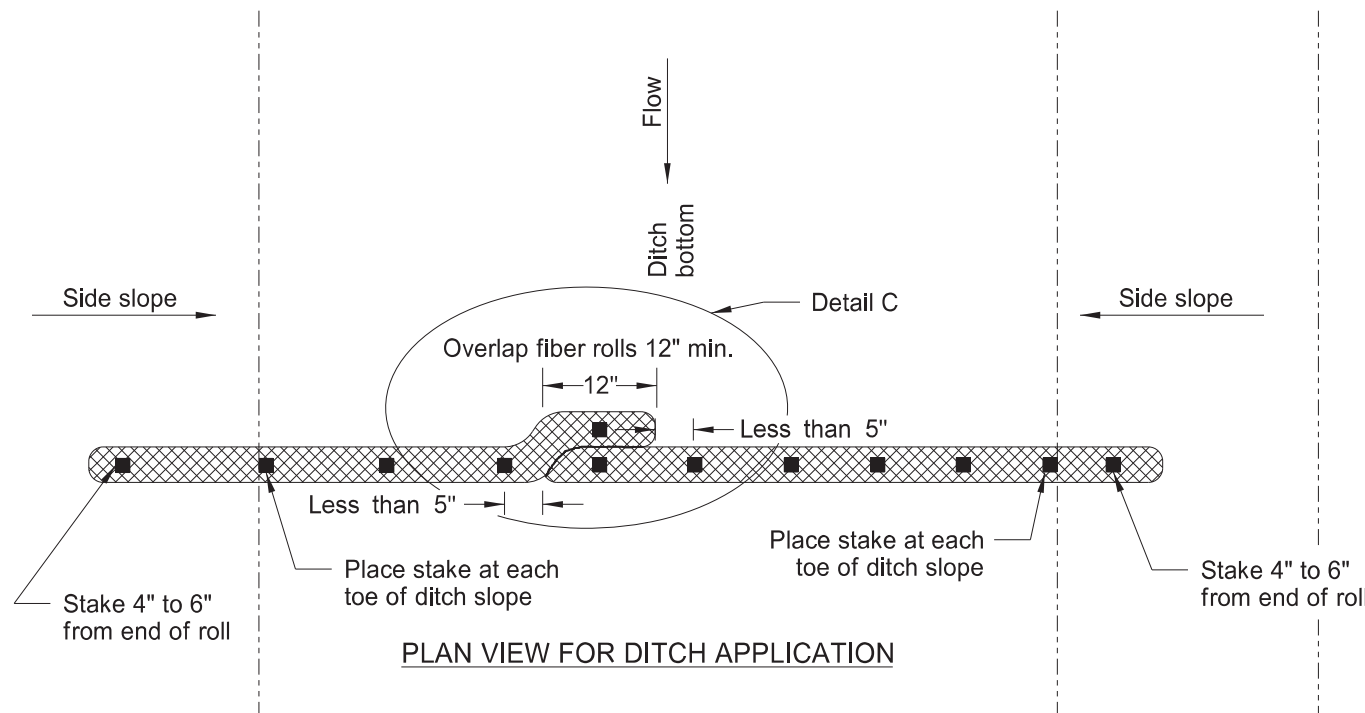


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

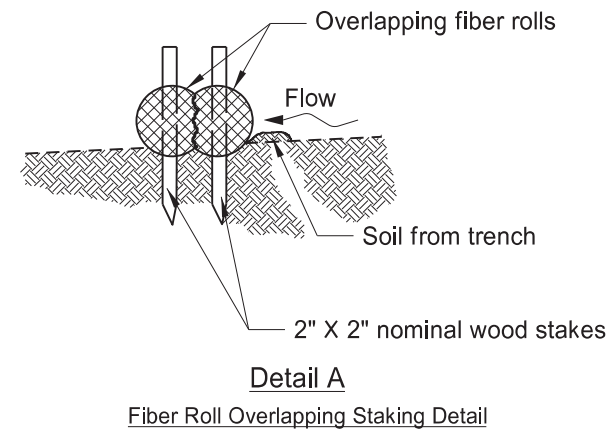
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



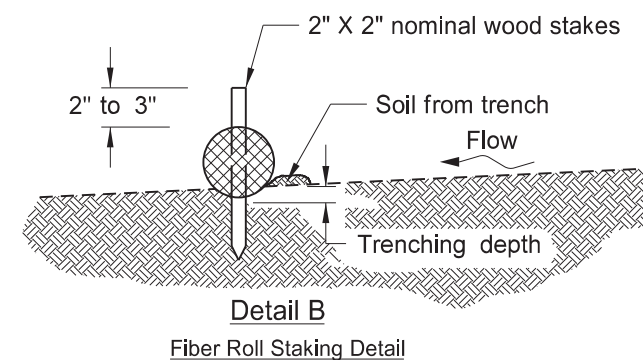
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

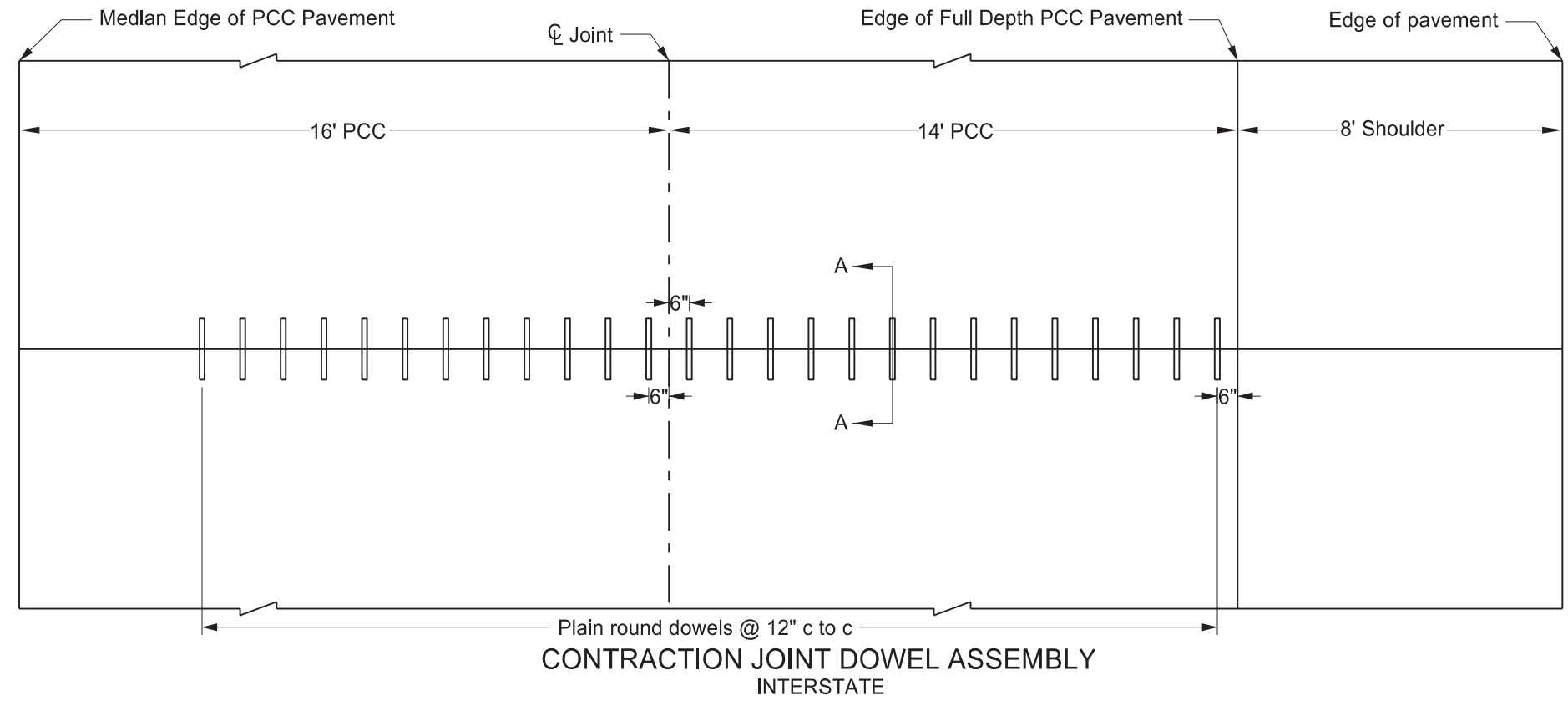
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

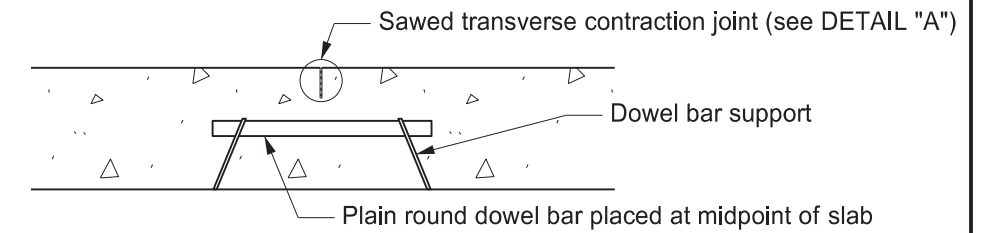
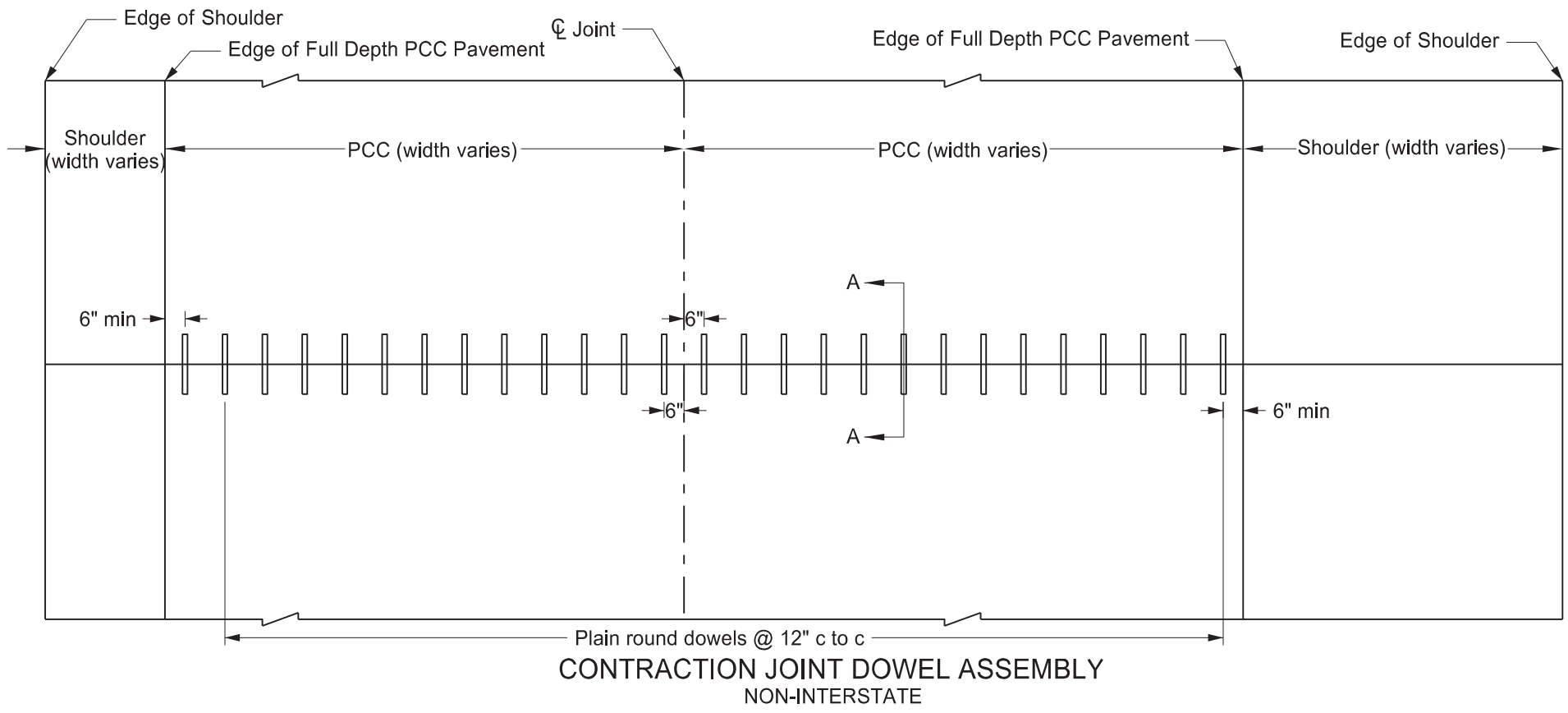
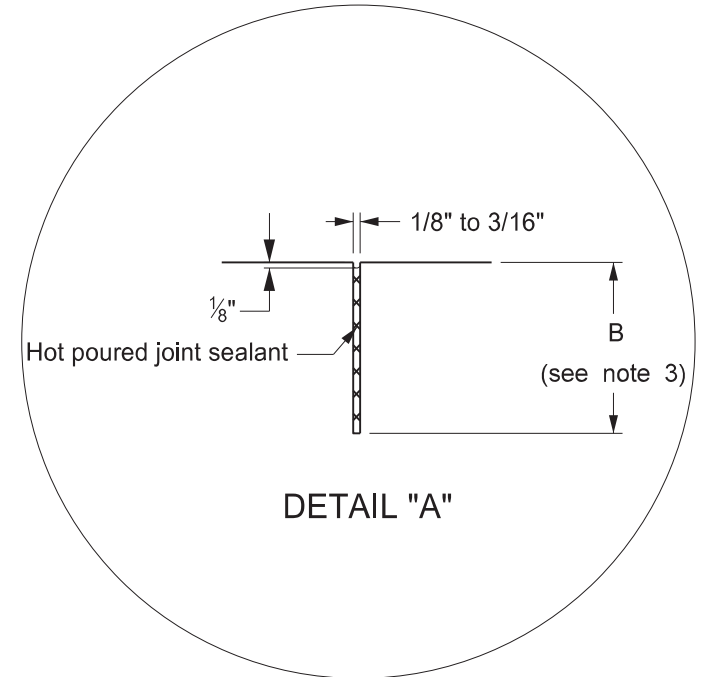
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TRANSVERSE CONTRACTION JOINT DETAILS



Notes

1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. $B = T/4 + 1/4"$ for AE or YE for non-doweled concrete pavement or $B = T/3$ for AAE or doweled concrete pavement



SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-10	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference
3/16/2016	Revised Joint Details and notes
10/25/2019	Expanded Details for clarity

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CONSTRUCTION SIGN DETAIL

D-704-5

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									

Notes:

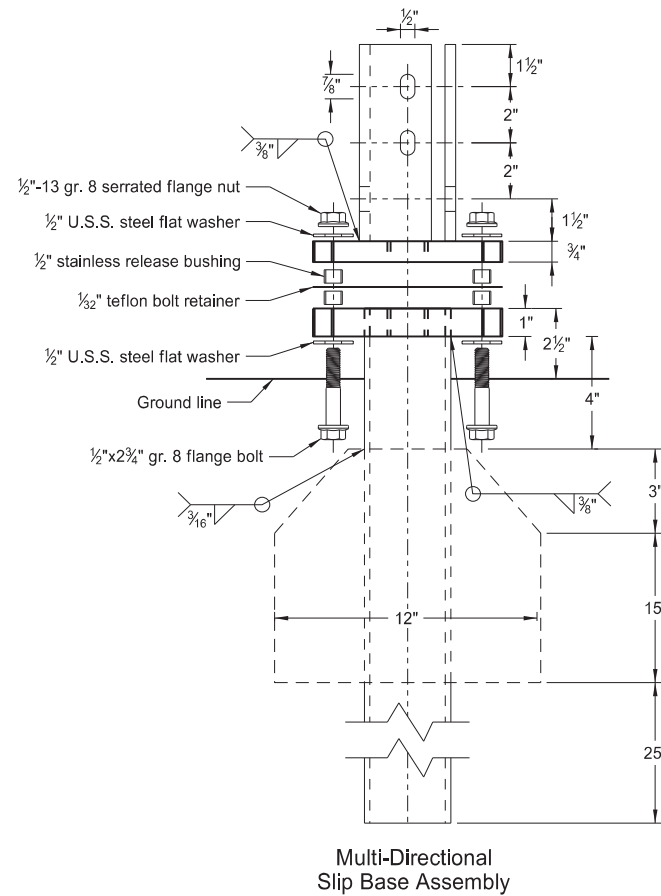
1. Post mount sign a distance of 1/2A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)
2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)
3. Do not place sign in urban areas or within city limits.

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

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
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.	

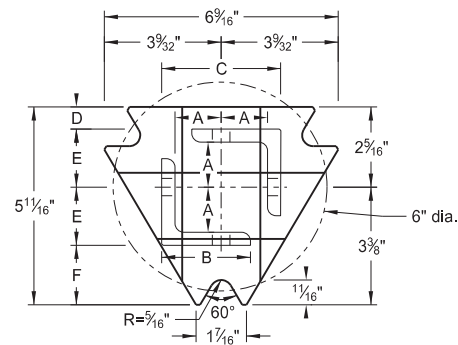
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

Perforated Tube



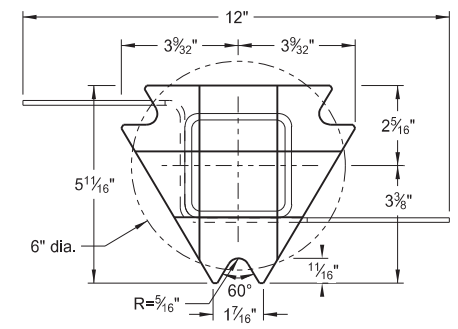
Multi-Directional Slip Base Assembly

Traffic Flow

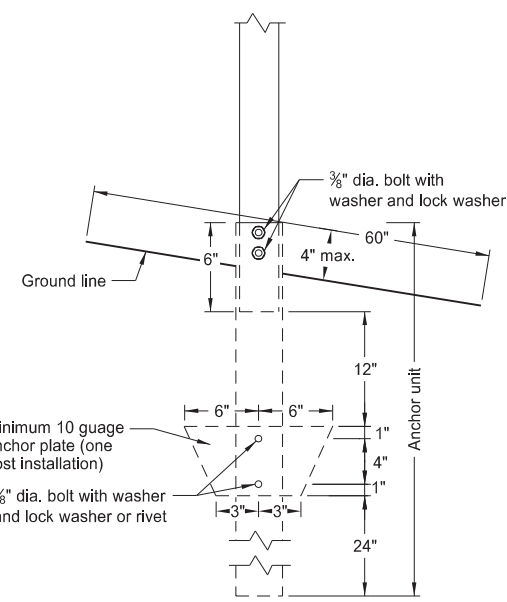


Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle

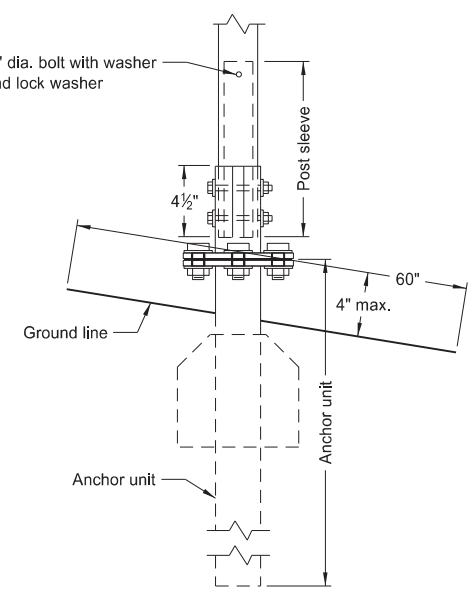
Traffic Flow



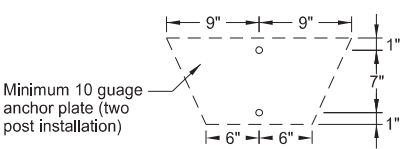
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



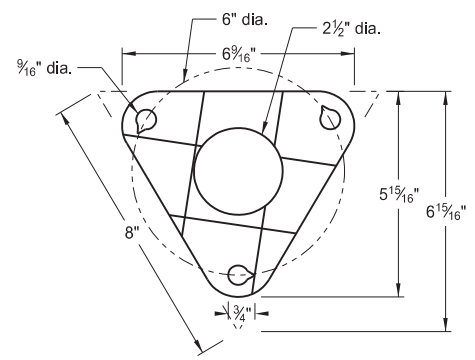
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



Minimum 10 gauge anchor plate (two post installation)



Bolt Retainer for Base Connection
Bolt Retainer - 1/2" Reprocessed Teflon

Notes:

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

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

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

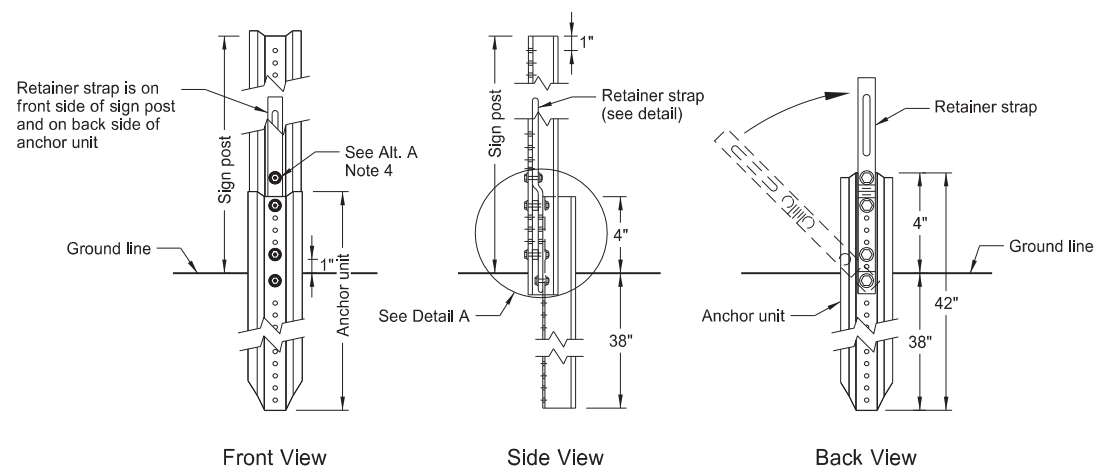
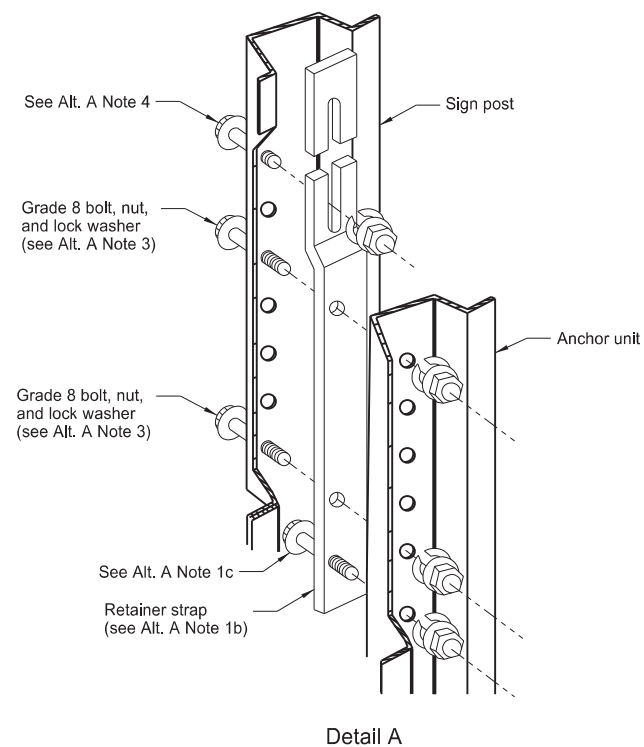
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

- (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 3/16"x10 ga. into 2 1/2"x10 ga.

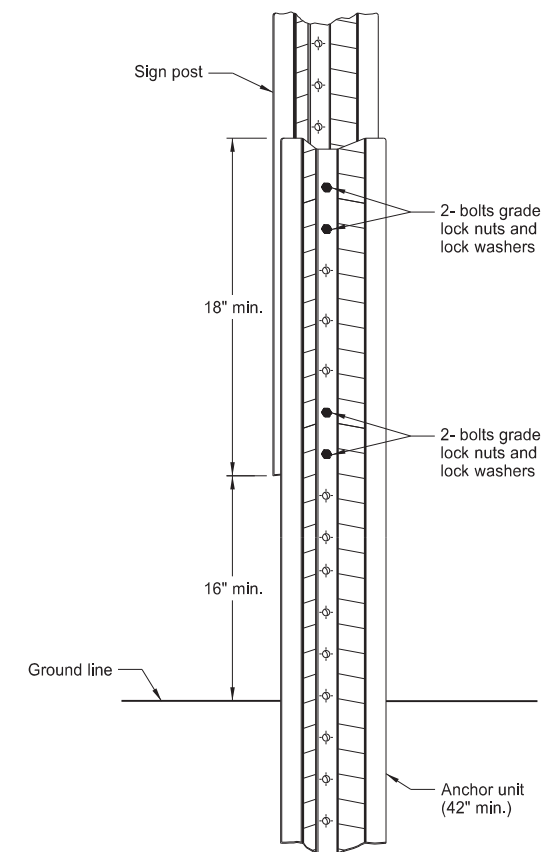
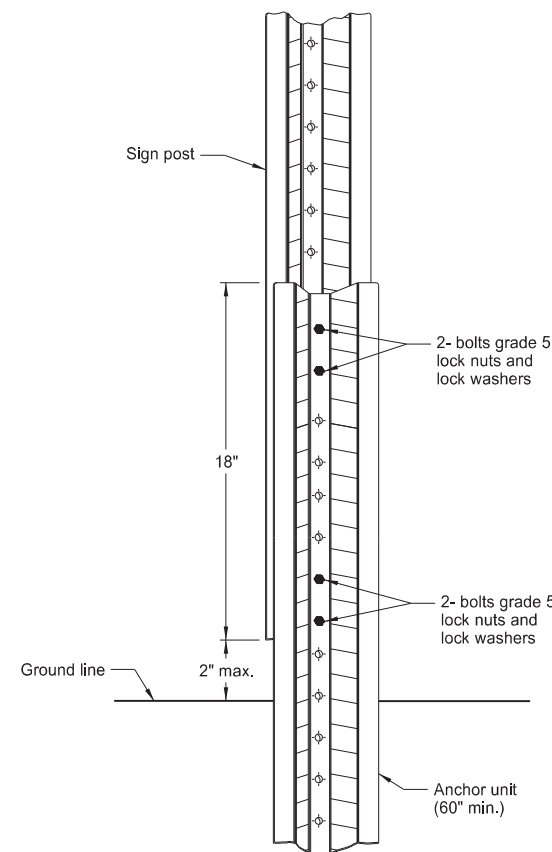
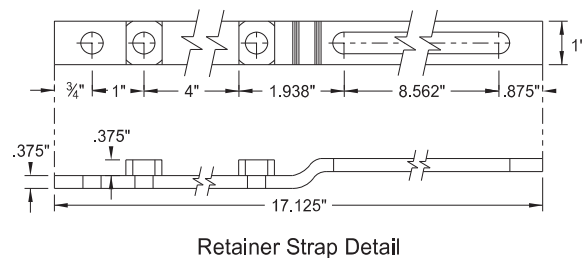
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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U-Channel Post



Breakaway U-Channel Detail
Alternate A
Install a maximum of 2 posts within 7'.



Alternate A Steps of Installation:

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

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

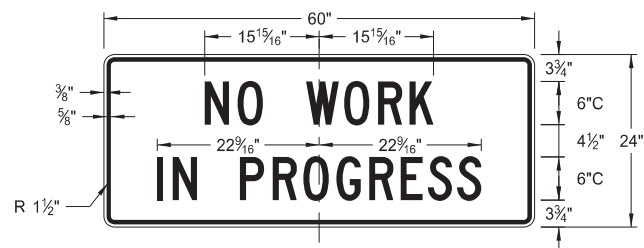
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on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

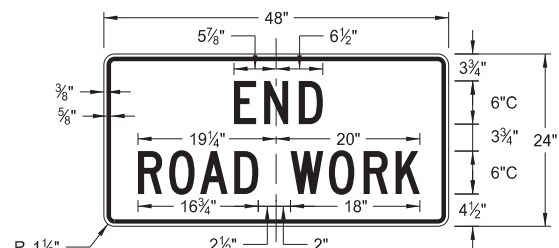
D-704-9



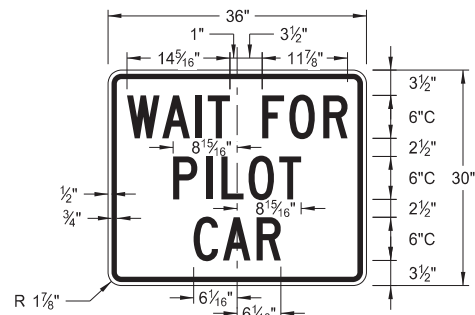
G20-1-60
Legend: black (non-refl)
Background: orange



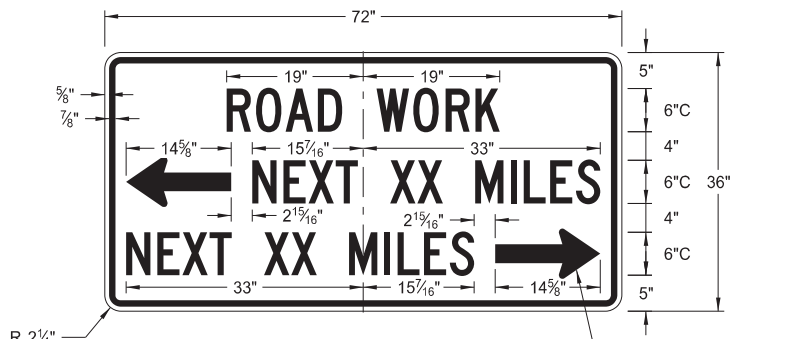
G20-1b-60
Legend: black (non-refl)
Background: orange



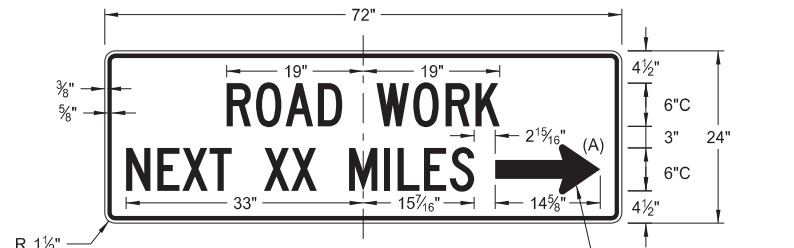
G20-2-48
Legend: black (non-refl)
Background: orange



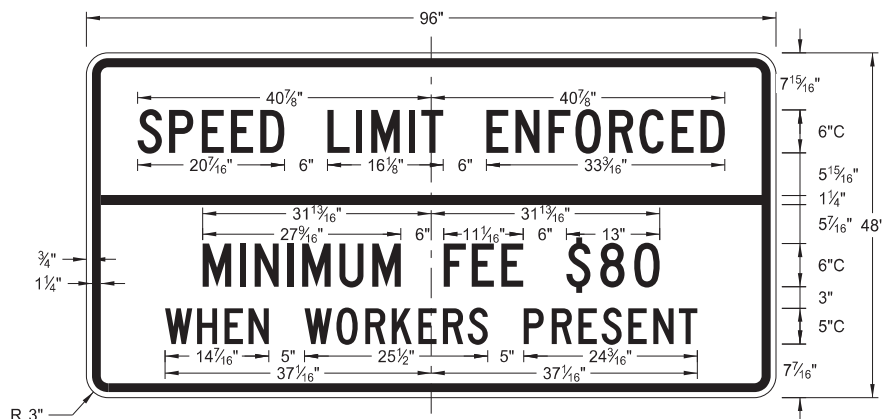
G20-4b-36
Legend: black (non-refl)
Background: orange



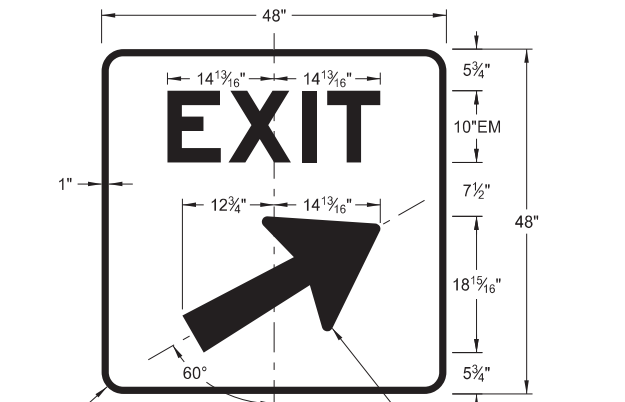
G20-50a-72
Legend: black (non-refl)
Background: orange



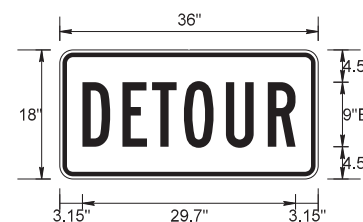
G20-52a-72
Legend: black (non-refl)
Background: orange



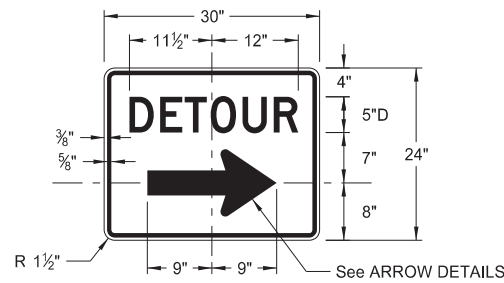
G20-55-96
Legend: black (non-refl)
Background: orange



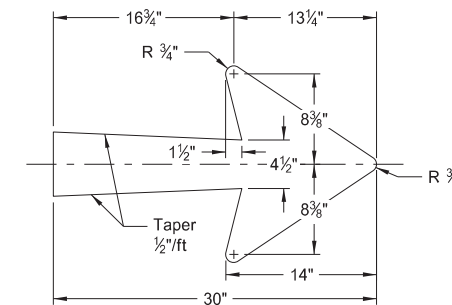
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



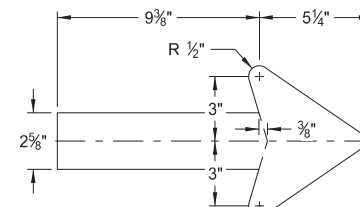
M4-8-36
Legend: black (non-refl)
Background: orange



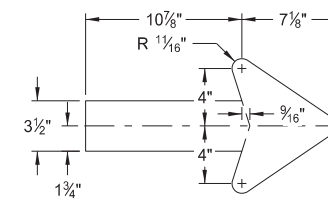
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



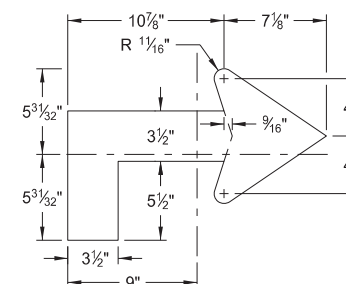
E5-1-48



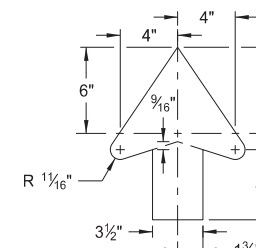
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

ARROW DETAILS

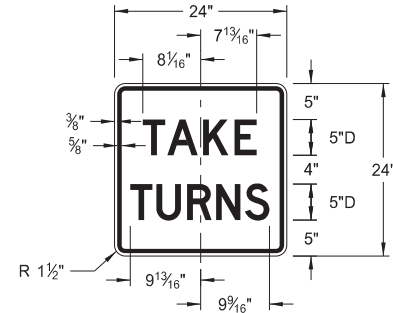
NOTES:

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

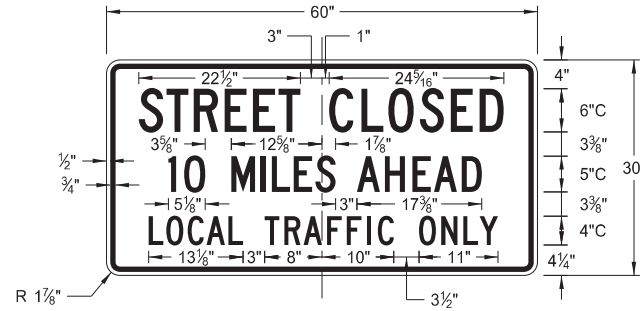
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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

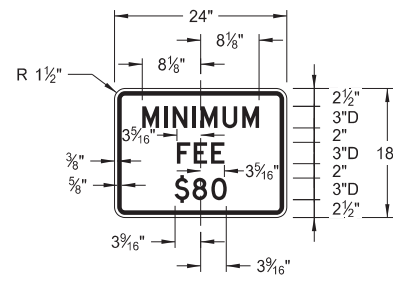
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



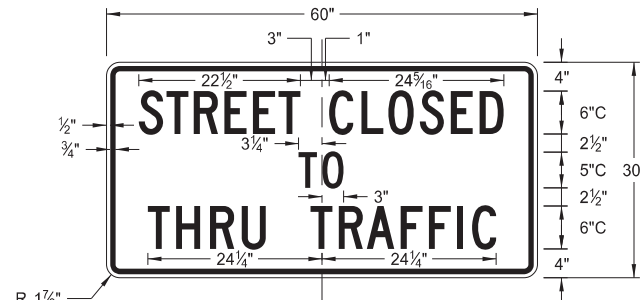
R1-50P-24
Legend: black (non-refl)
Background: white



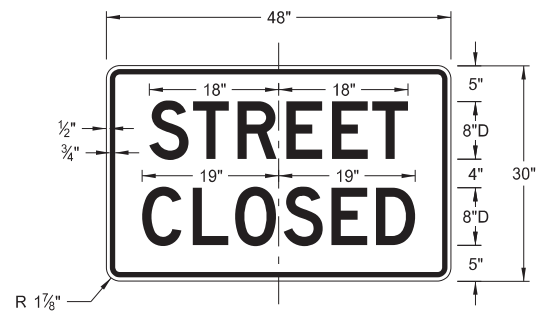
R11-3c-60
Legend: black (non-refl)
Background: white



R2-1aP-24
Legend: black (non-refl)
Background: white



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



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

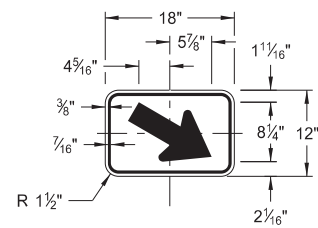
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

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Registration Number
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on 10/03/19 and the original document is stored at the
North Dakota Department
of Transportation

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

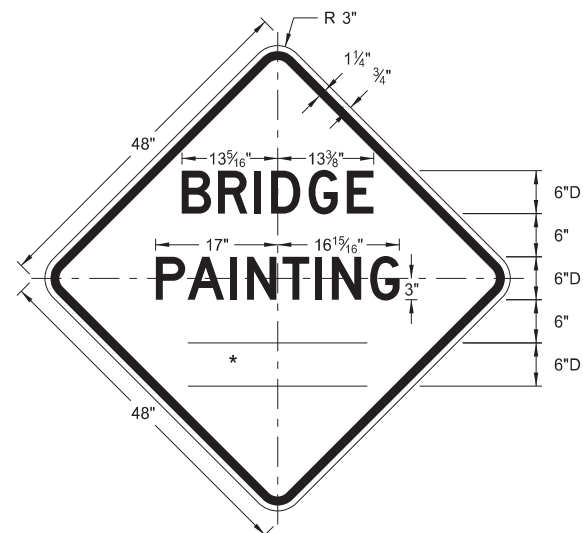
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



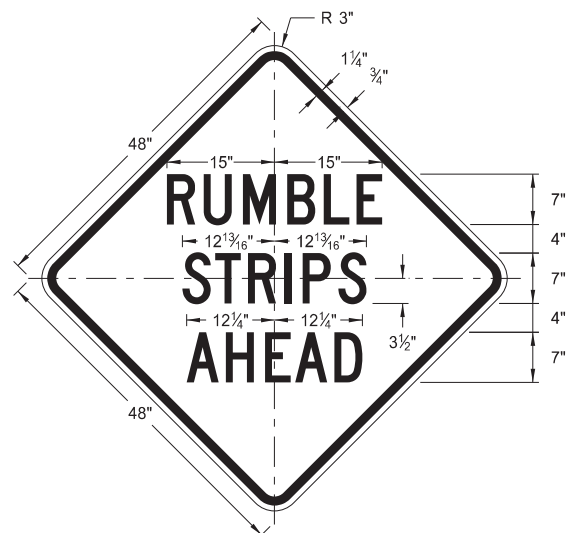
W16-7aP-18

Legend: black (non-refl)
Background: orange



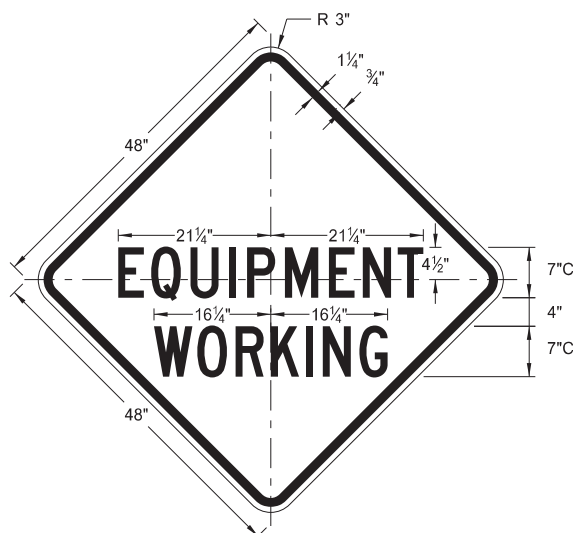
W21-50-48

Legend: black (non-refl)
Background: orange



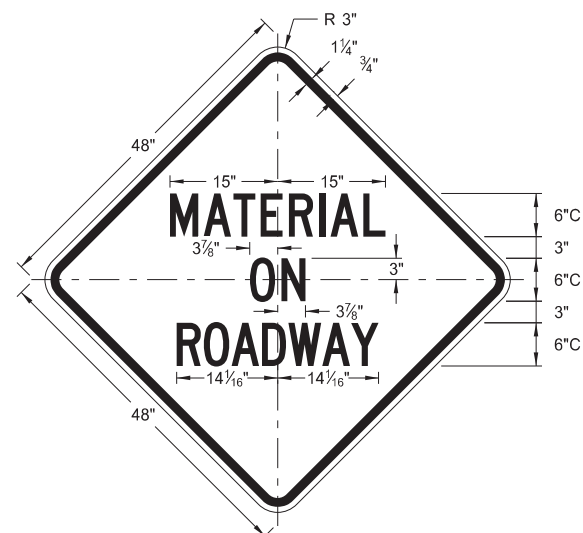
W21-53-48

Legend: black (non-refl)
Background: orange



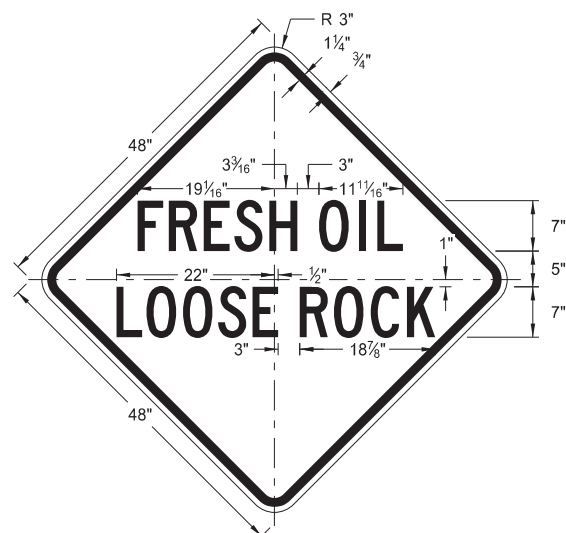
W20-51-48

Legend: black (non-refl)
Background: orange



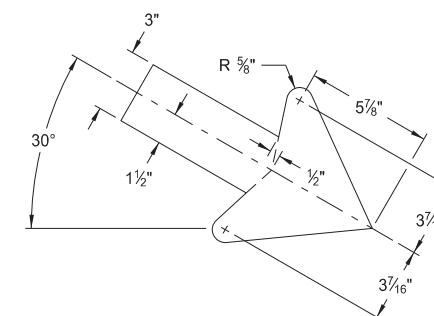
W21-51-48

Legend: black (non-refl)
Background: orange

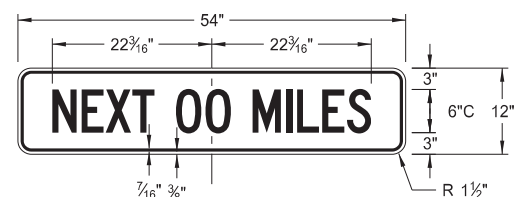


W22-8-48

Legend: black (non-refl)
Background: orange

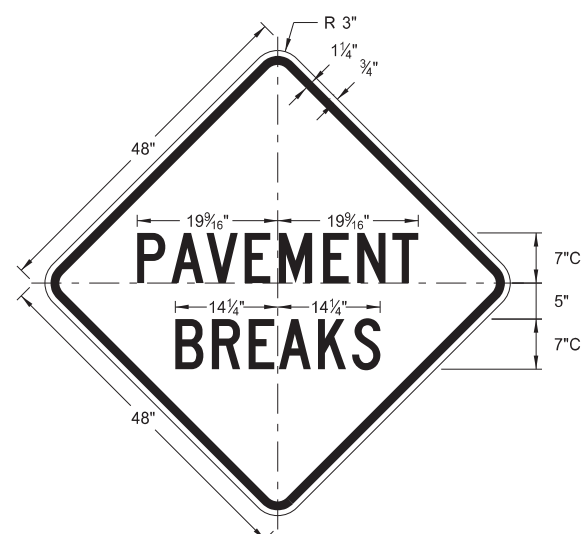


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange



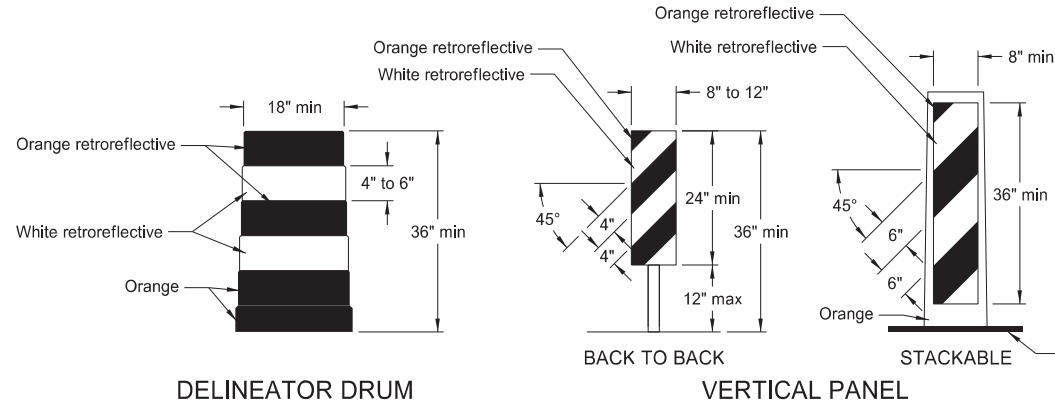
W21-52-48

Legend: black (non-refl)
Background: orange

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

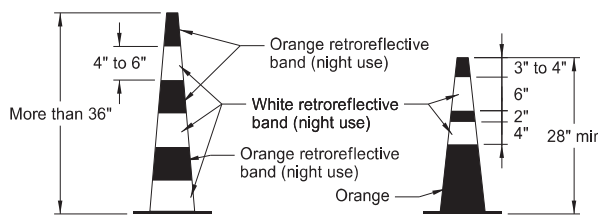
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PE- 4683,
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BARRICADE AND CHANNELIZING DEVICE DETAILS

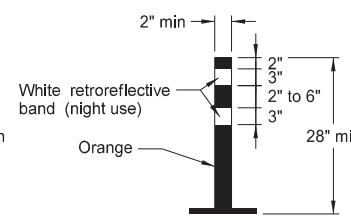


DELINEATOR DRUM

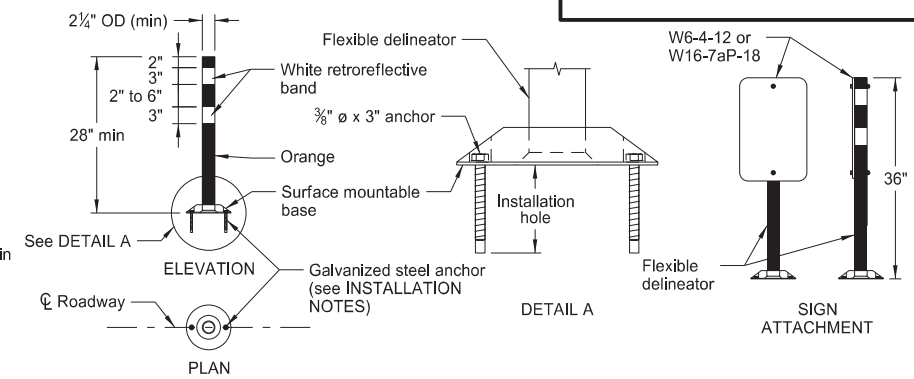
VERTICAL PANEL



TRAFFIC CONE



TUBULAR MARKER



FLEXIBLE DELINEATOR

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.

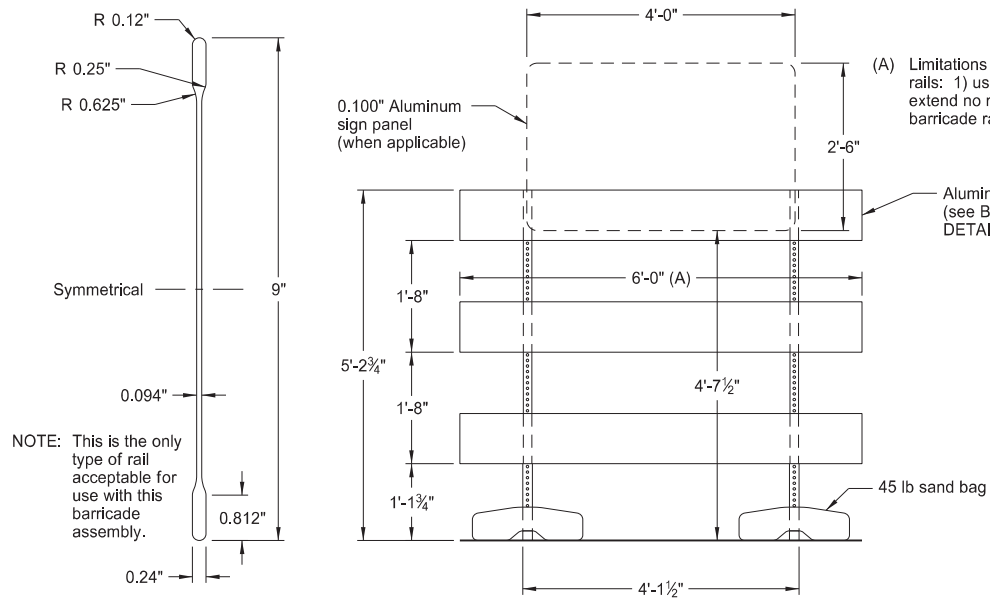
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective 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:

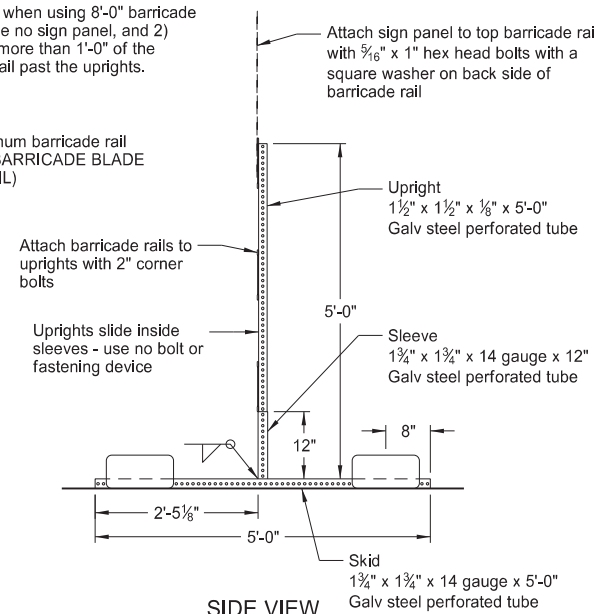
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close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



BARRICADE BLADE DETAIL

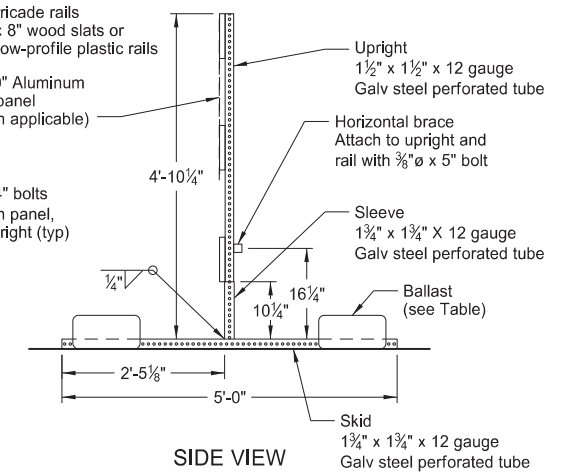
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



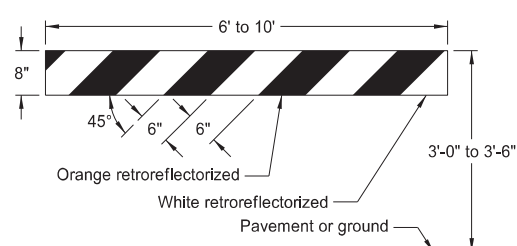
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

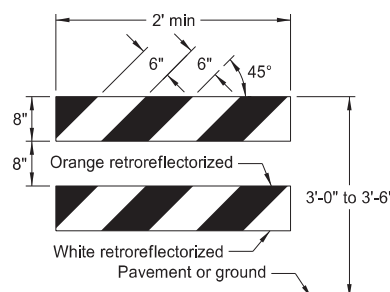


SIDE VIEW

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".

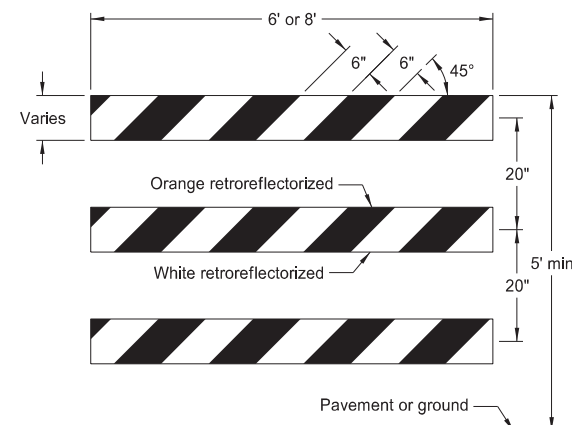


TYPE I BARRICADE

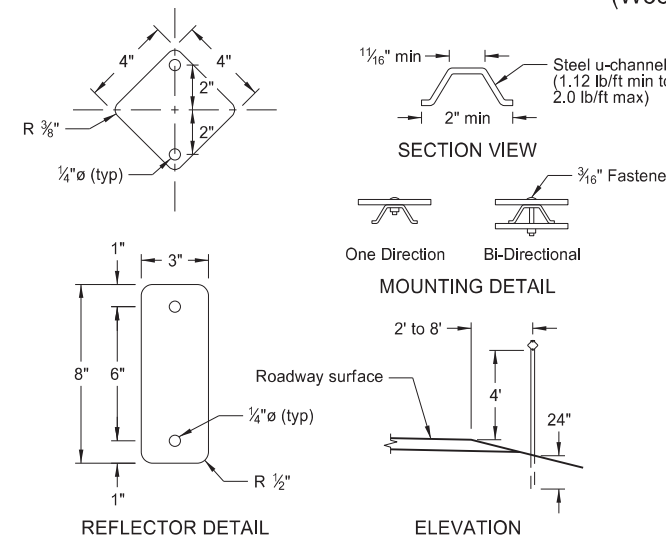


TYPE II BARRICADE

BARRICADE RAIL DETAILS



TYPE III BARRICADE



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

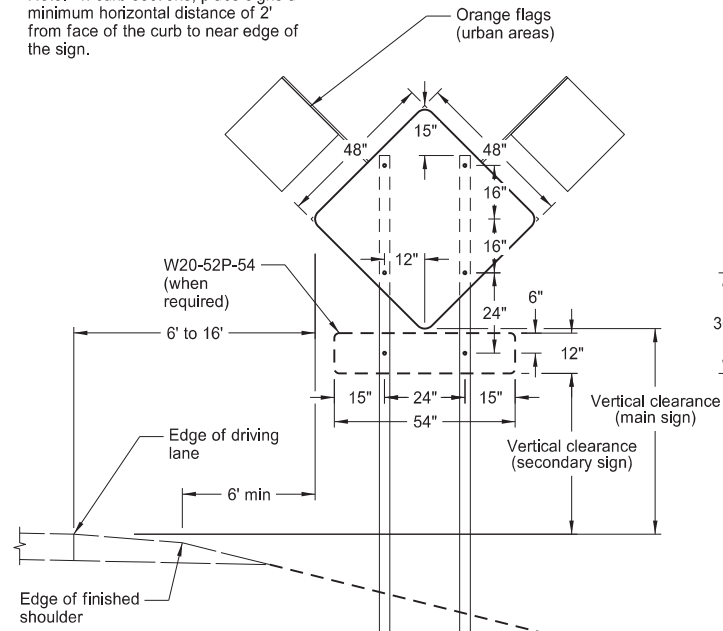
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

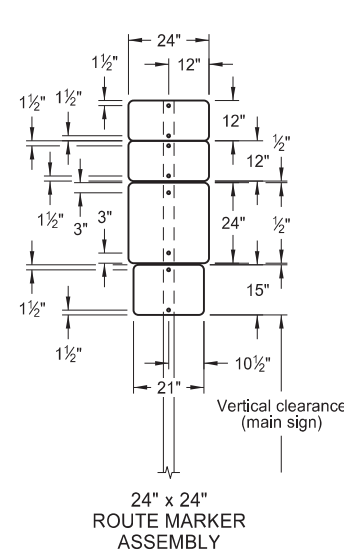
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

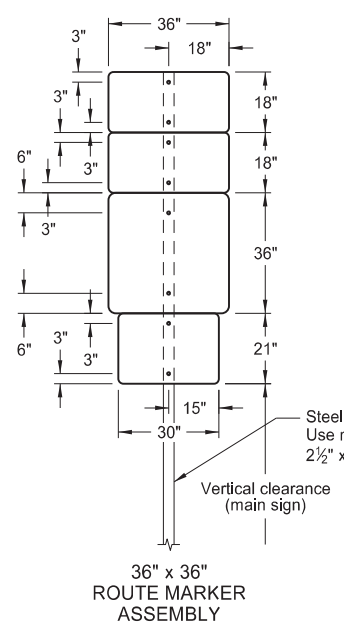
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



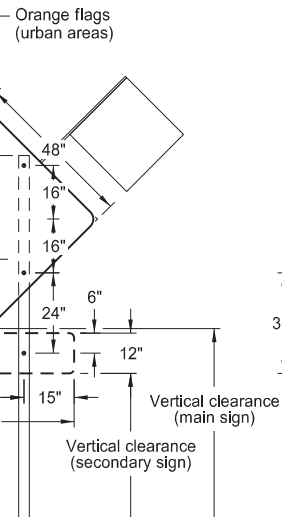
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



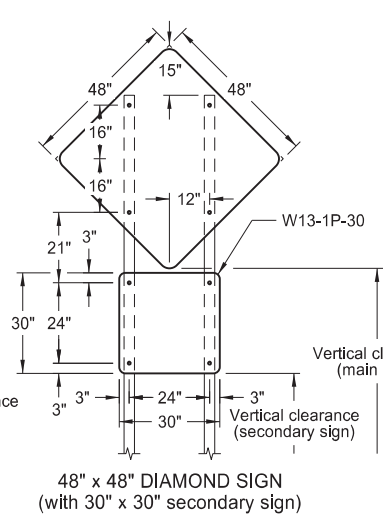
24" x 24" ROUTE MARKER ASSEMBLY



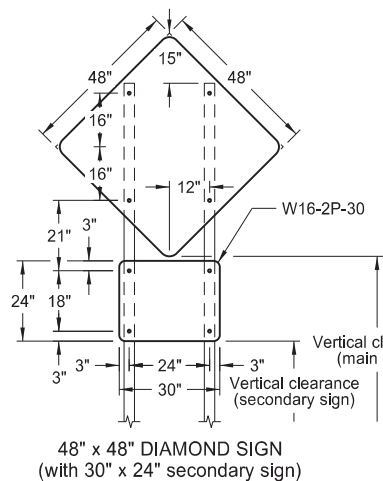
36" x 36" ROUTE MARKER ASSEMBLY



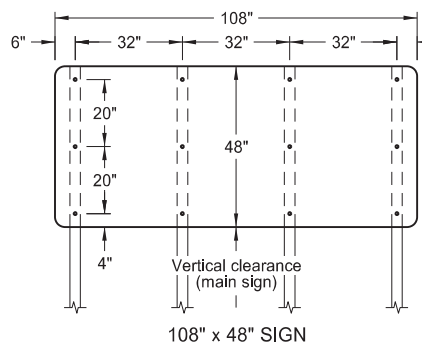
18" x 18" DIAMOND SIGN



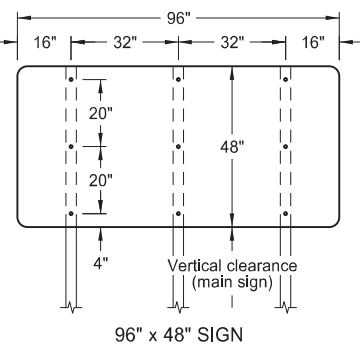
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



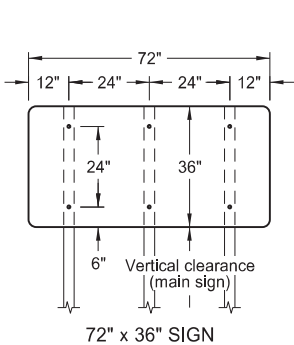
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



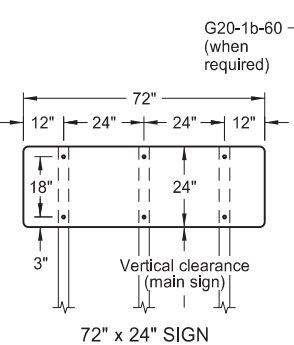
108" x 48" SIGN



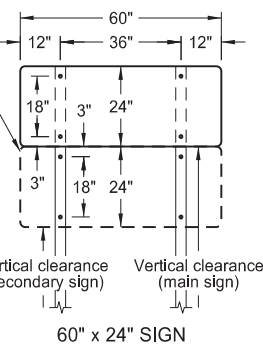
96" x 48" SIGN



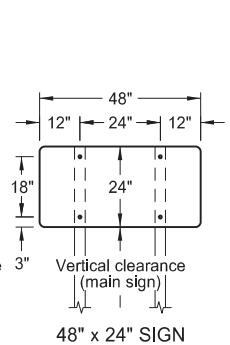
72" x 36" SIGN



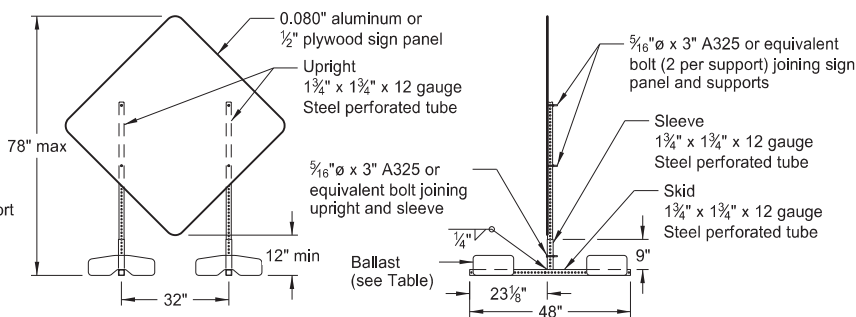
72" x 24" SIGN



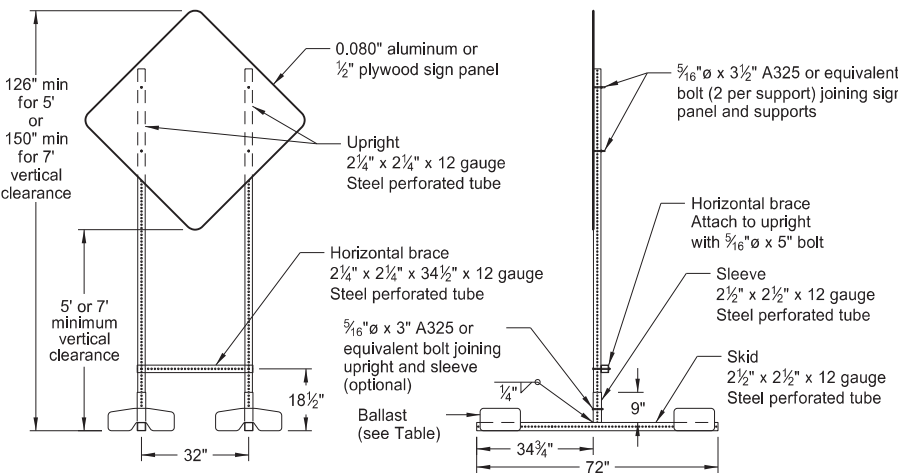
60" x 24" SIGN



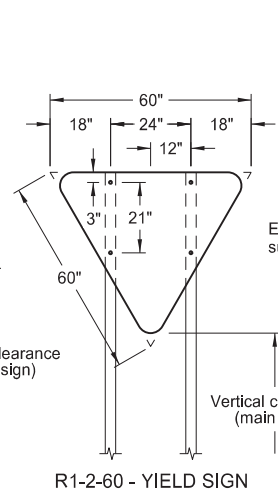
48" x 24" SIGN



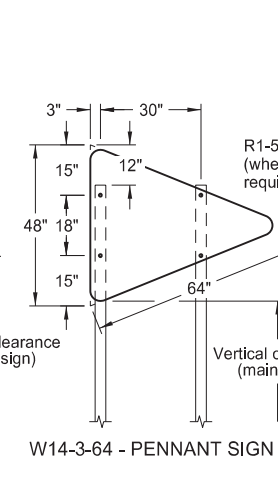
PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



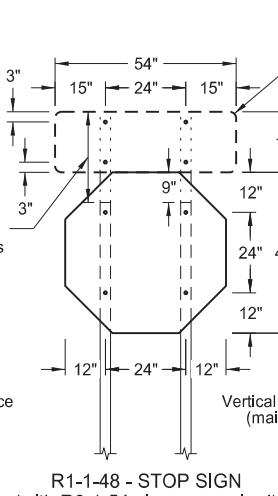
PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT



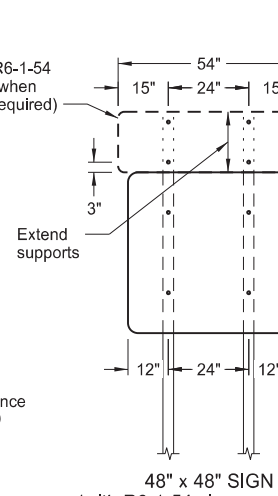
R1-2-60 - YIELD SIGN



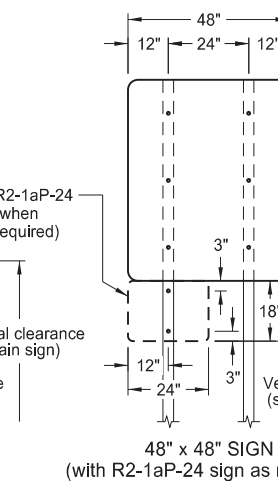
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



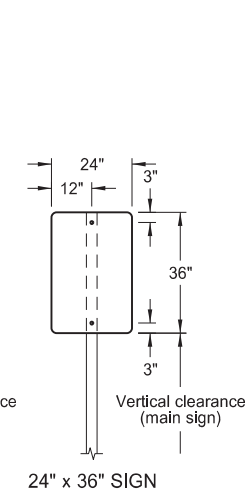
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



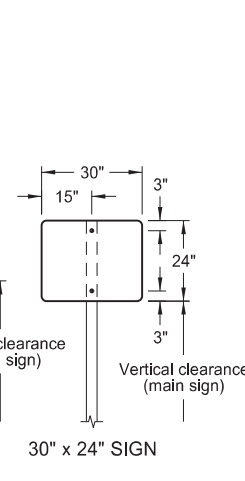
48" x 48" SIGN
(with R6-1-54 sign as required)



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



24" x 36" SIGN



30" x 24" SIGN

NOTES:

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

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

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 5/16" bolts.
- 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)
- 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

- 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.

- 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

ROAD CLOSURE LAYOUTS

Notes:
1. Variables

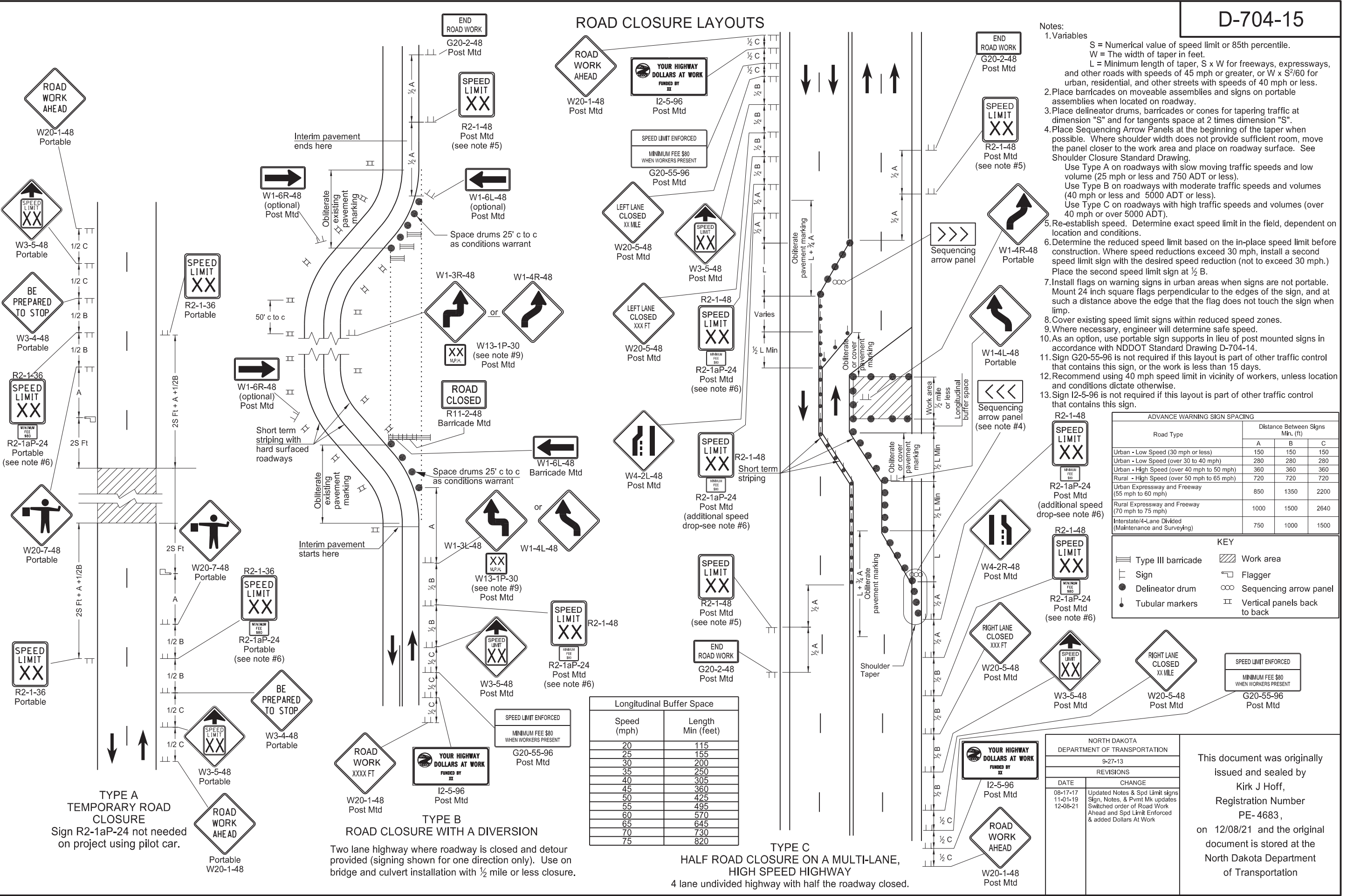
- S = Numerical value of speed limit or 85th percentile.
- W = The width of taper in feet.
- L = Minimum length of taper, $S \times W$ for freeways, expressways, and other roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
- 2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- 3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
- 4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing. Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less). Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less). Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
- 5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
- 6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
- 7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
- 8. Cover existing speed limit signs within reduced speed zones.
- 9. Where necessary, engineer will determine safe speed.
- 10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- 11. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
- 12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
- 13. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

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

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



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pmt Mt updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work

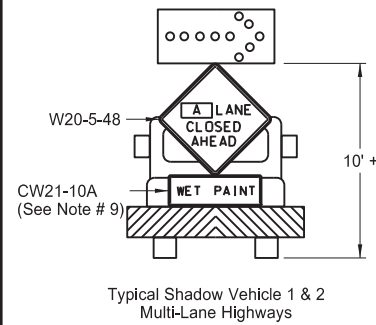
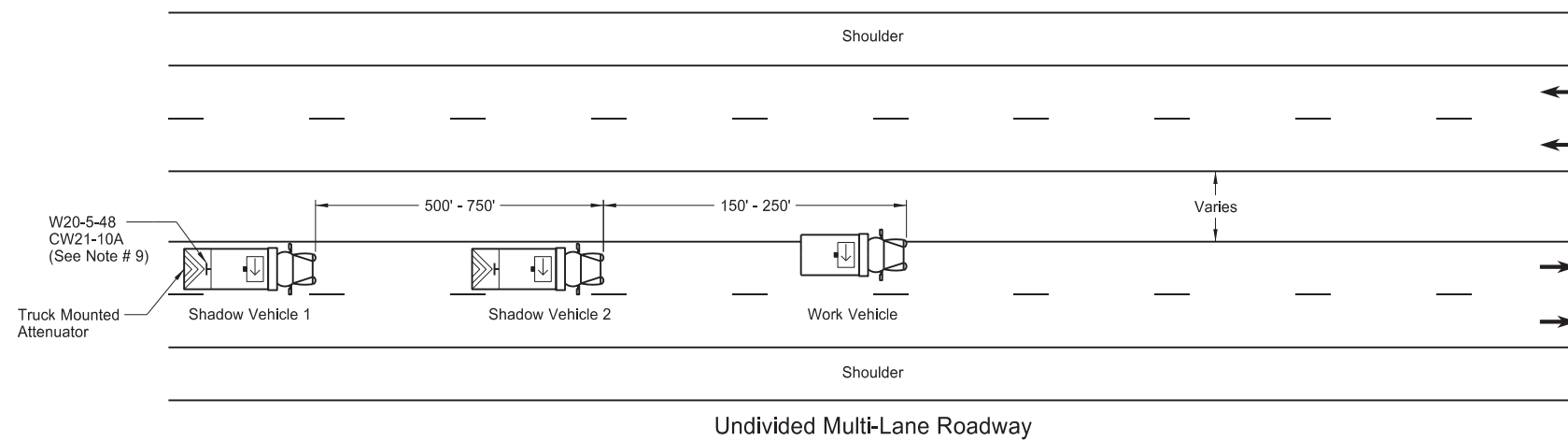
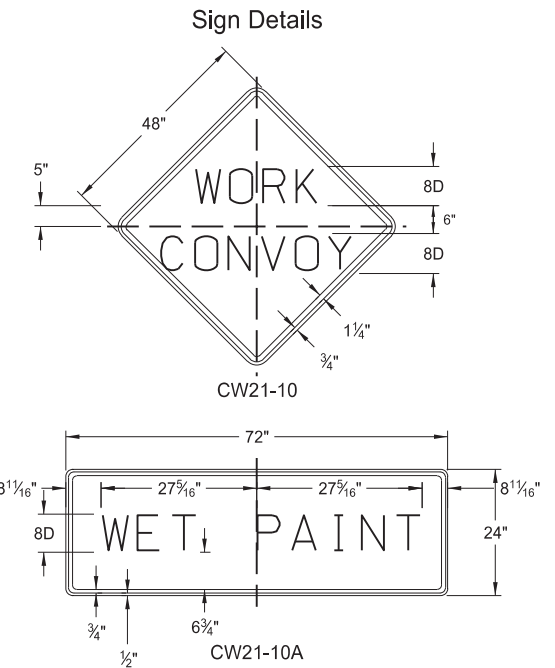
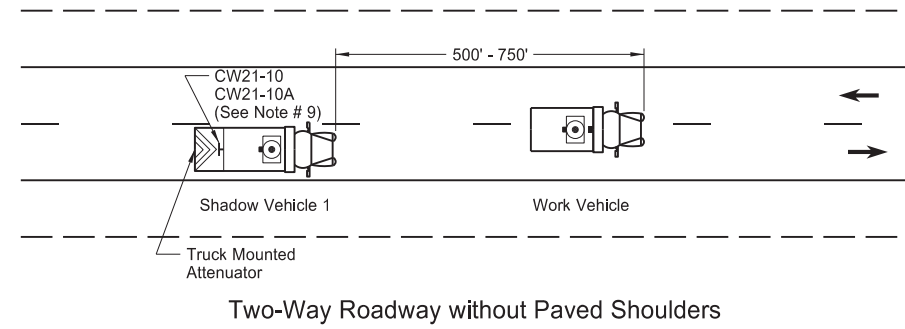
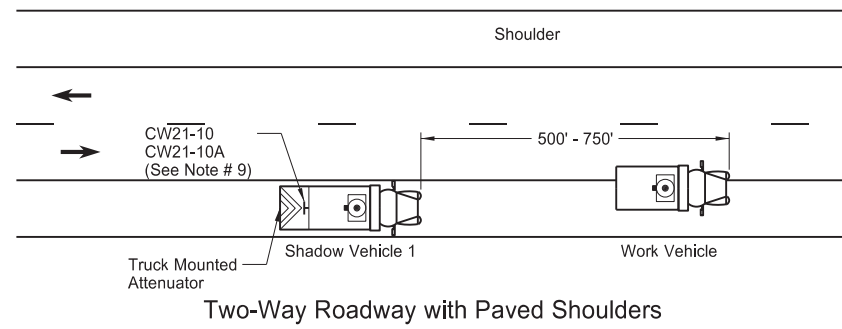
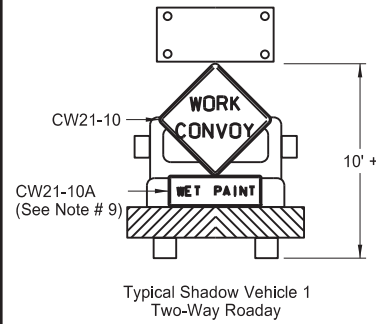
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 12/08/21 and the original document is stored at the North Dakota Department of Transportation

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

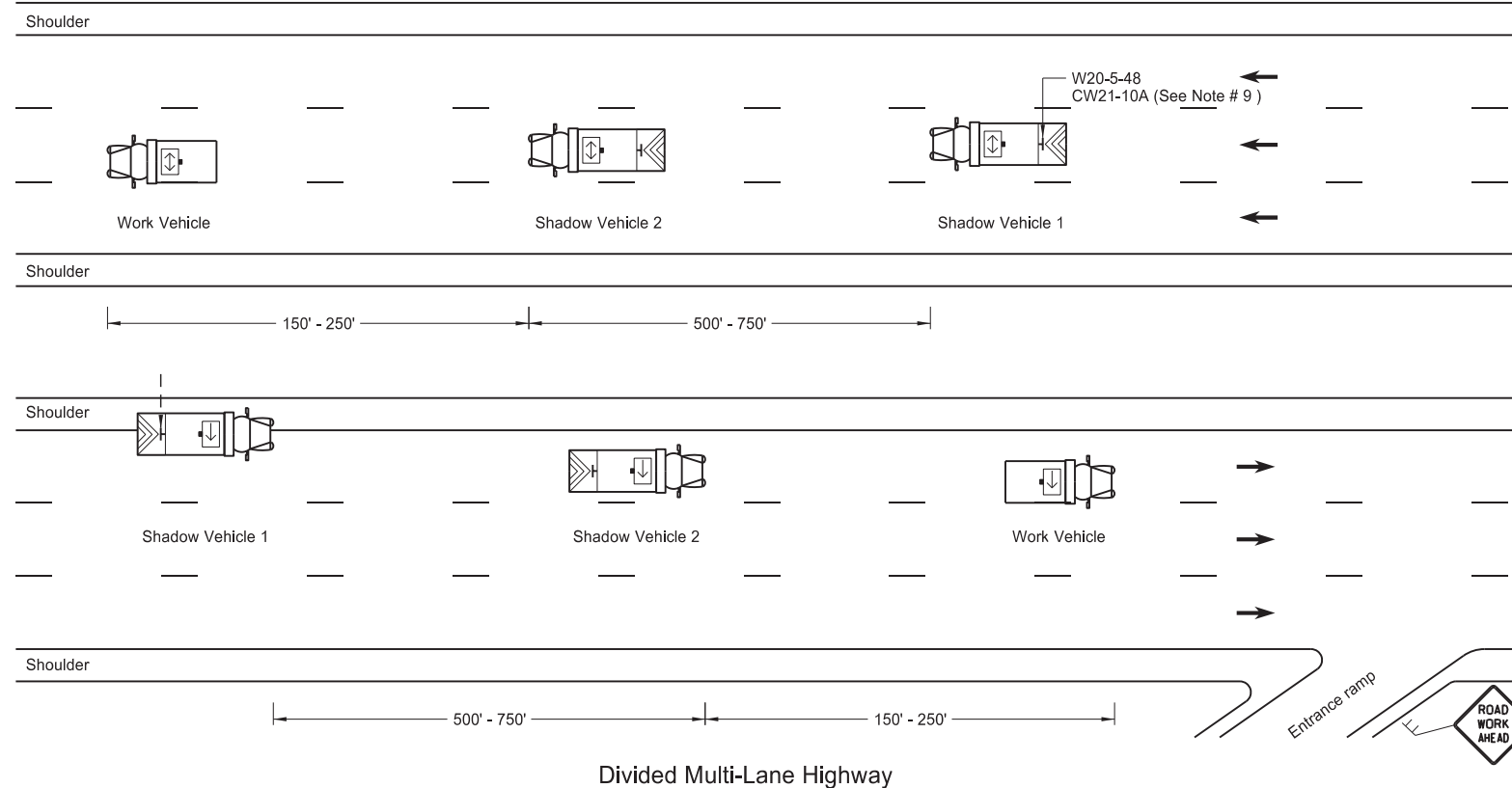
TYPE B ROAD CLOSURE WITH A DIVERSION
Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with 1/2 mile or less closure.

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

MOBILE OPERATION
(PAVEMENT MARKING)

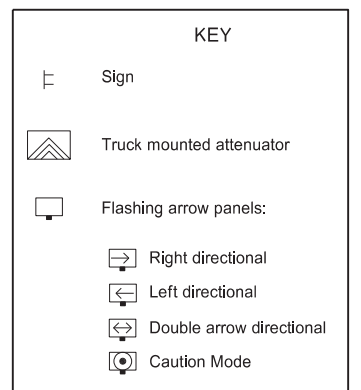


A = Left Right Center



Notes

- Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
- Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
- Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
- Provide each vehicle with two-way electronic communication capability.
- Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
- 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.
- Sign Colors
Letters = Black
Border = Black
Background = Orange
- As an option, use shadow vehicle 2 the paint tender vehicle.
- Use sign CW21-10A only during painting operation.
- Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.

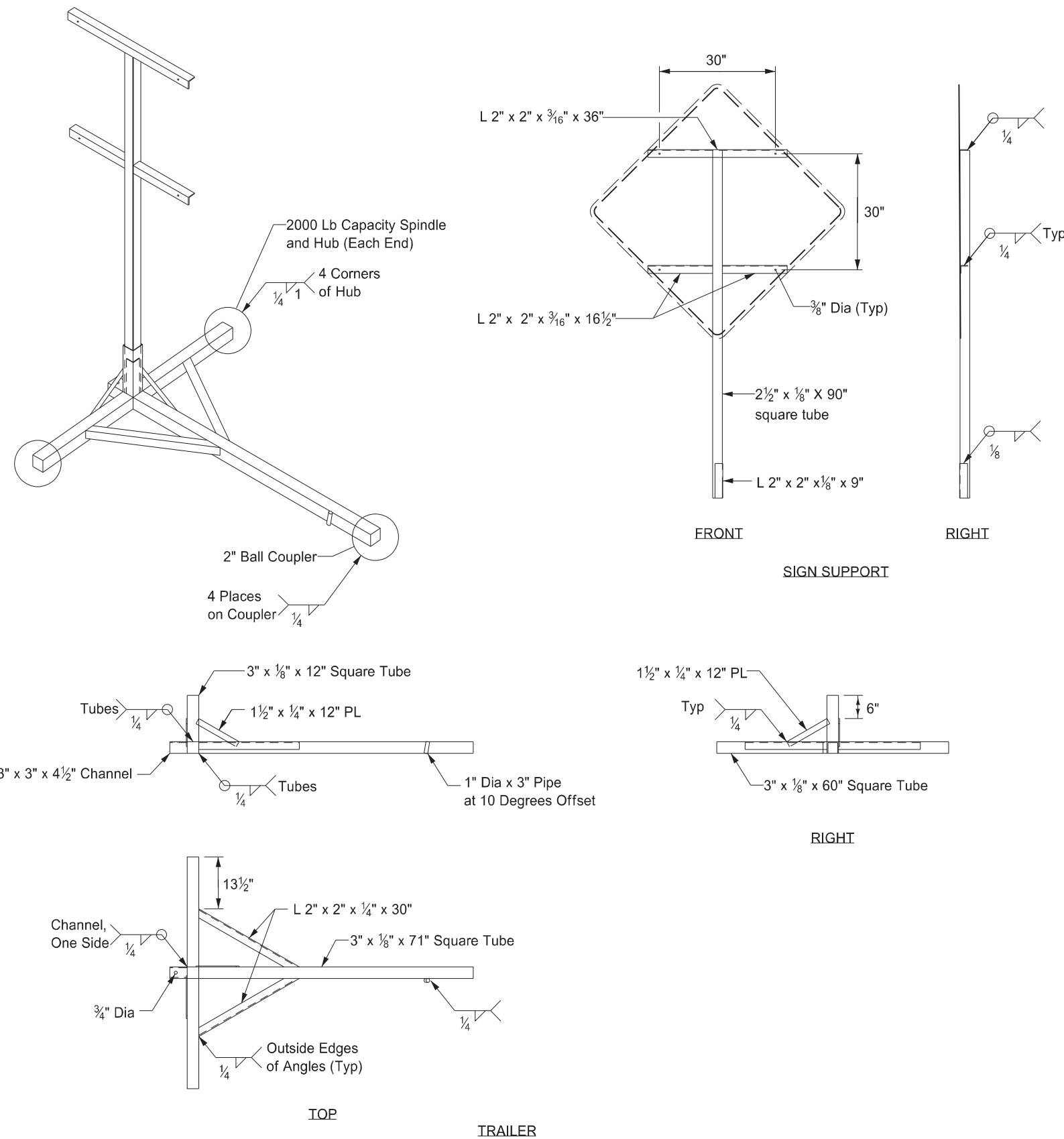


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



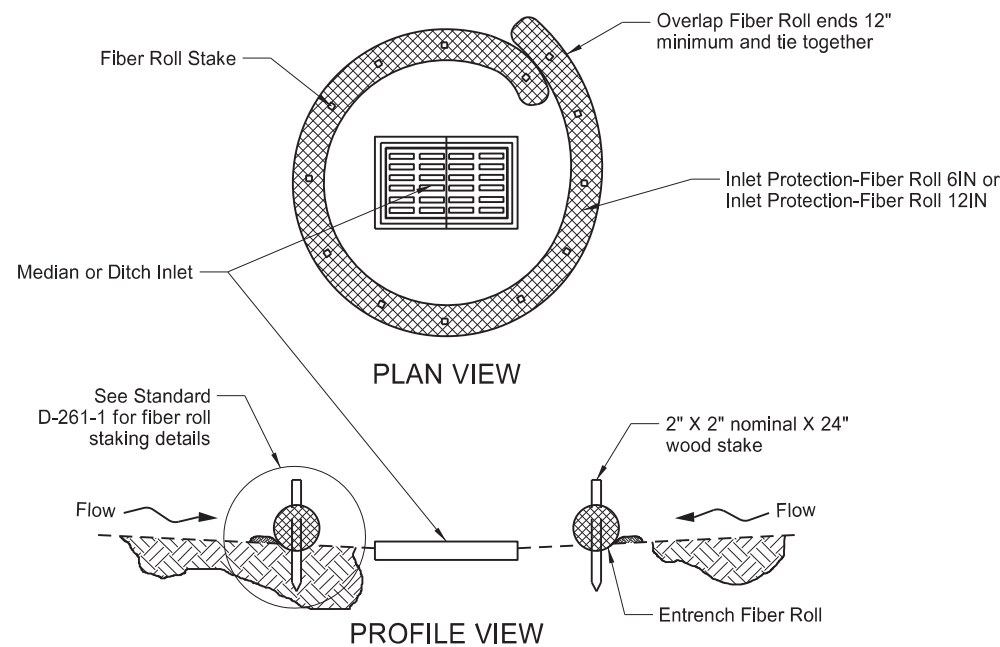
Notes:

- 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.

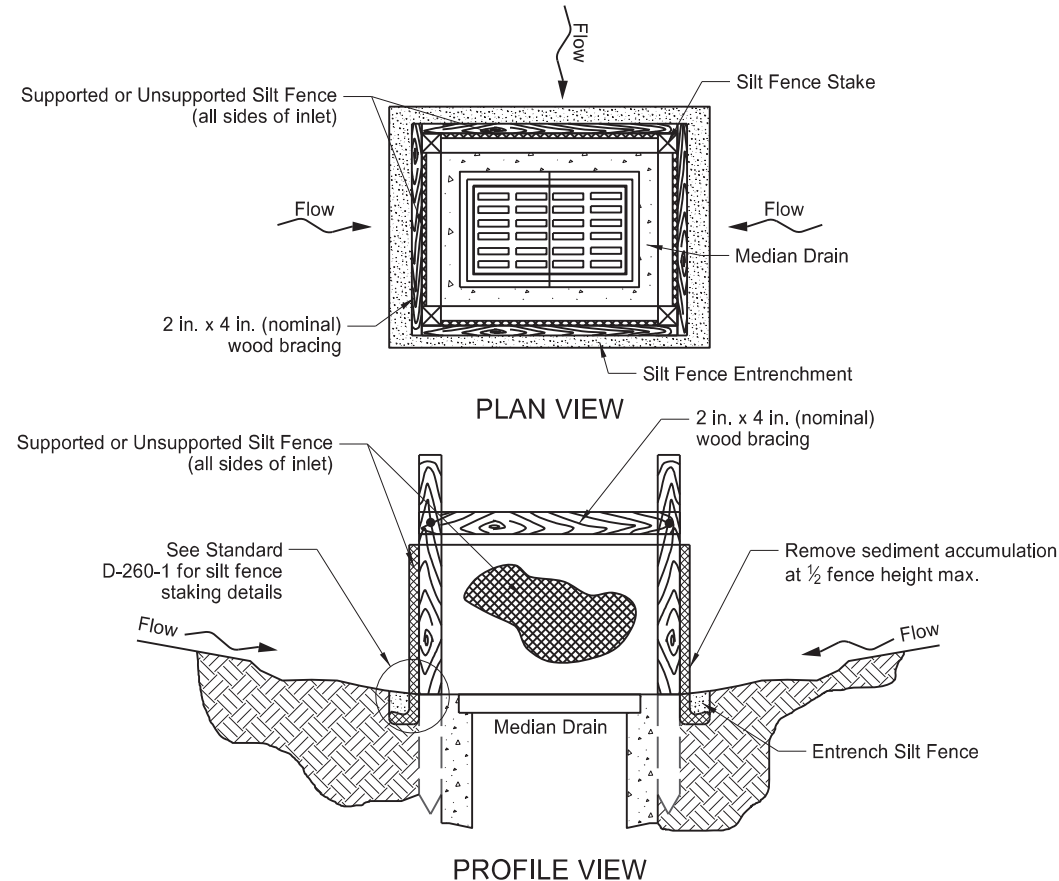
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

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

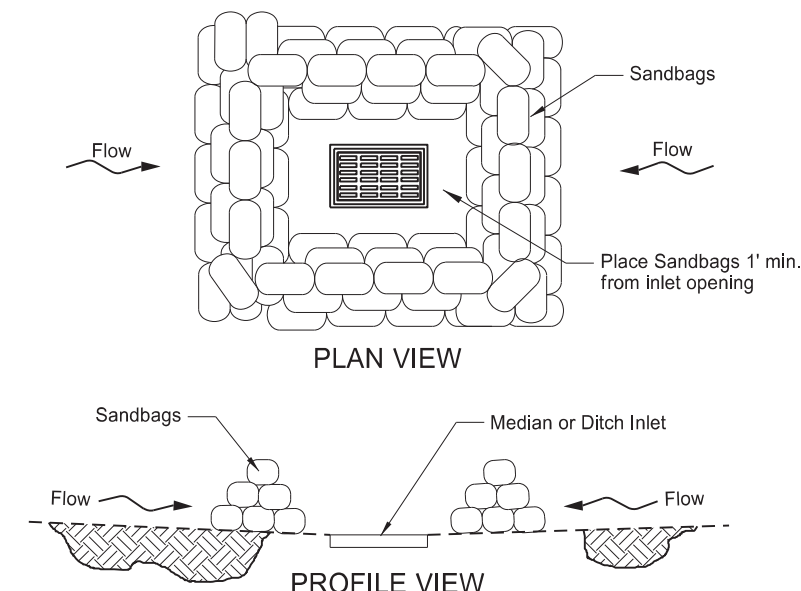
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



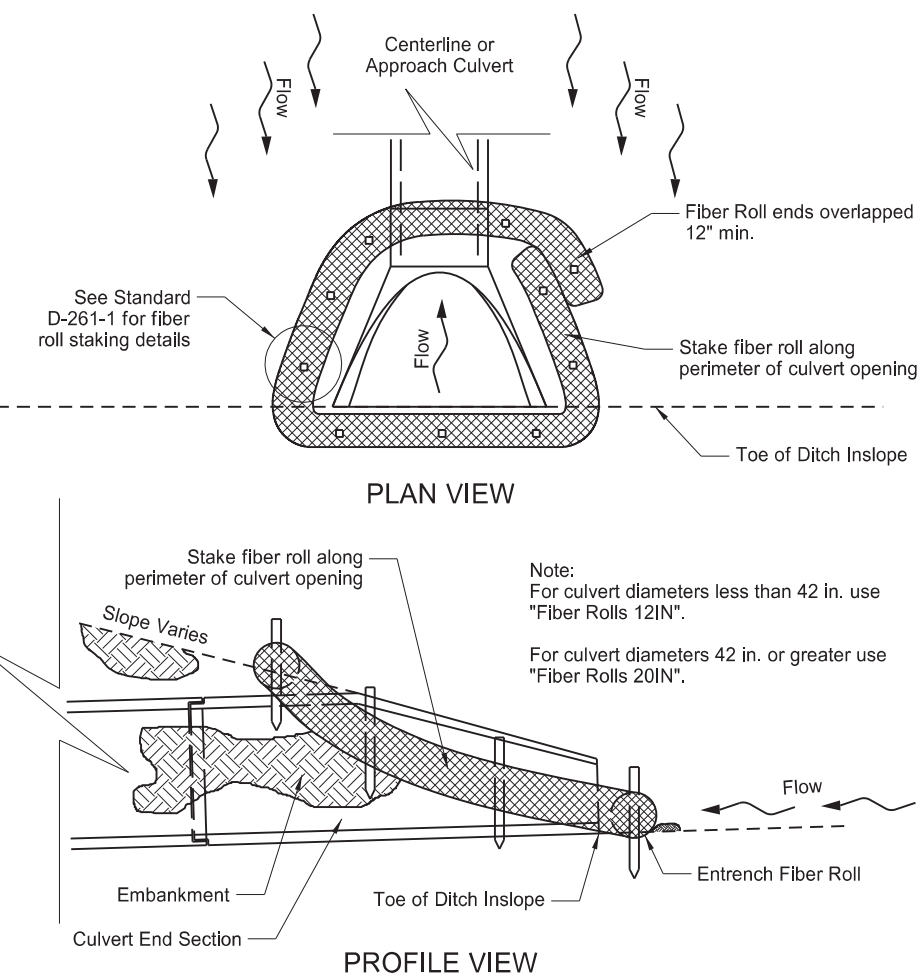
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



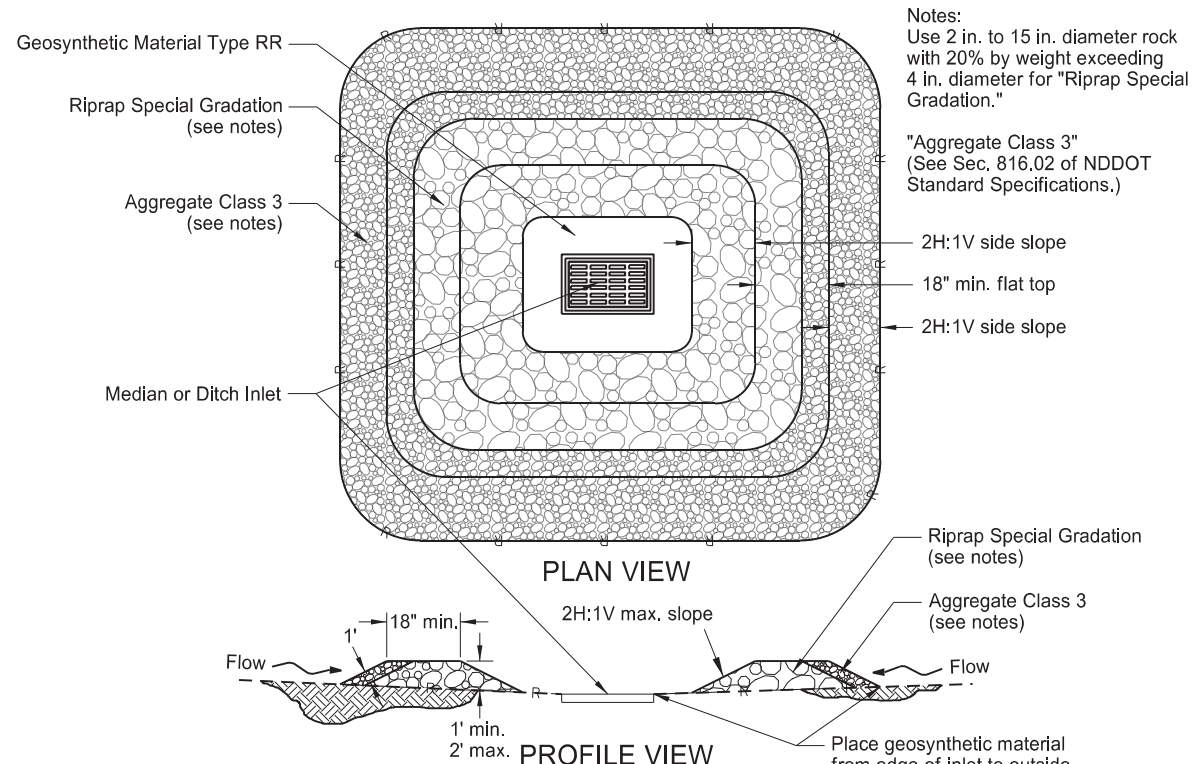
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



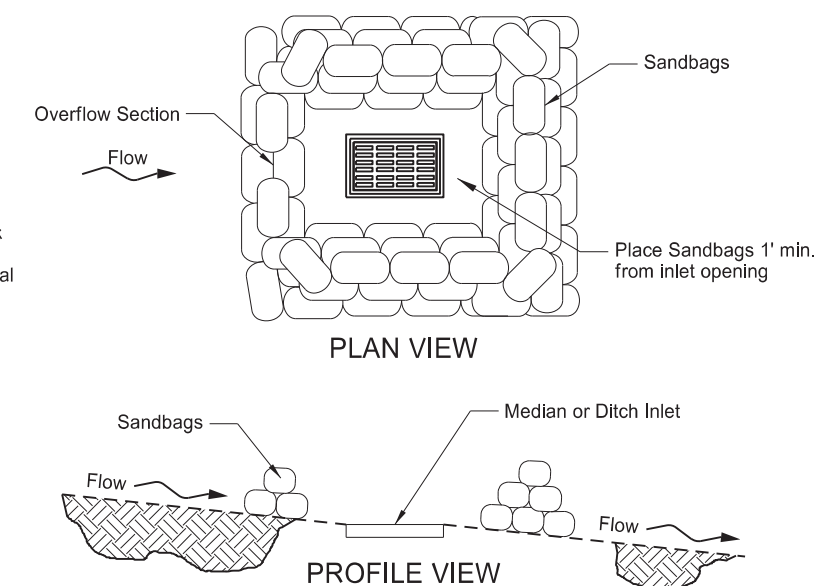
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



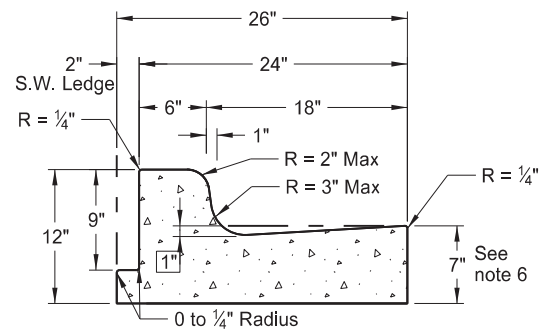
SANDBAG PROTECTION (ON SLOPE)

Notes:
 Use 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter for "Riprap Special Gradation."
 "Aggregate Class 3"
 (See Sec. 816.02 of NDDOT Standard Specifications.)

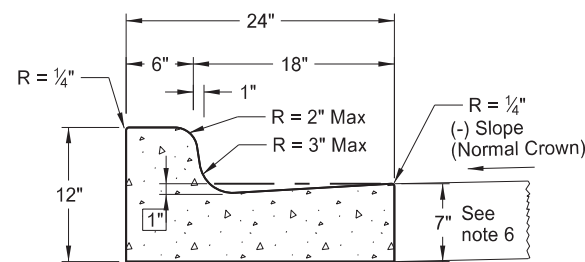
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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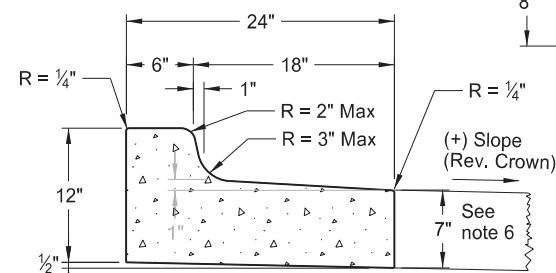
Curb & Gutter and Valley Gutter



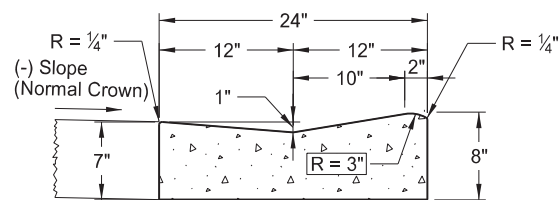
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk,
Median, or Parking Lot.
(Sec. A shown. See Sec B for
additional details.)



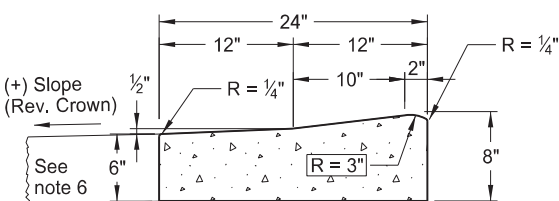
Curb & Gutter Type 1 (Sec. A)



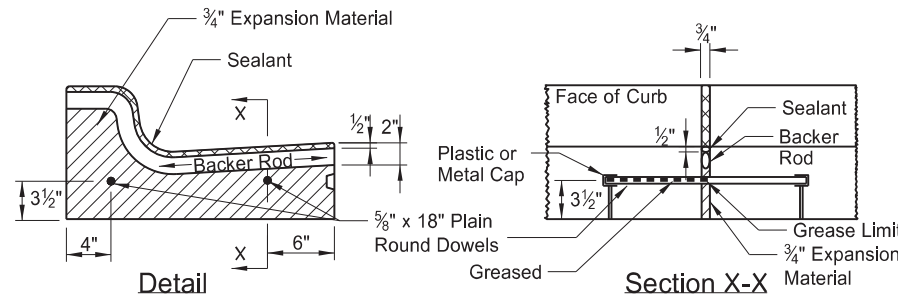
Curb & Gutter Type 1 (Sec. B)



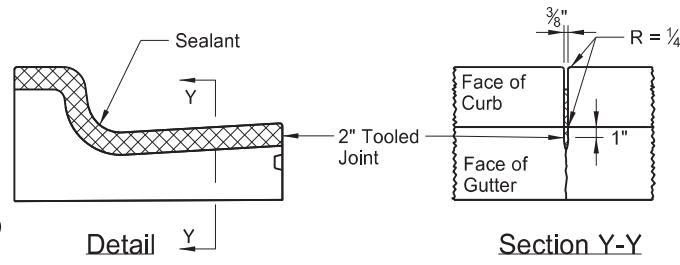
Mountable Curb & Gutter Type 1 (Sec. A)



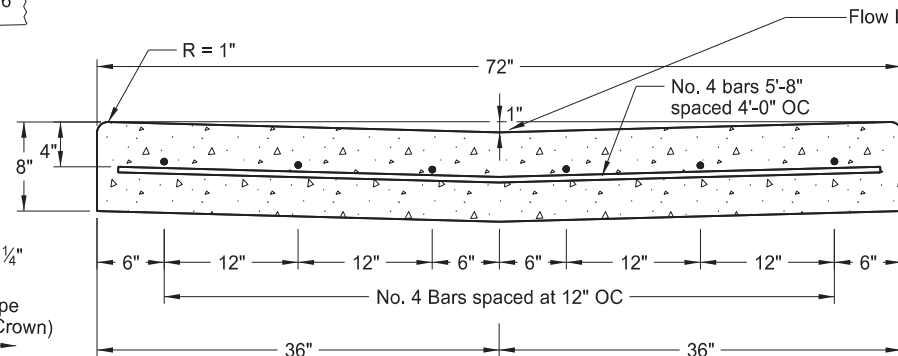
Mountable Curb & Gutter Type 1 (Sec. B)



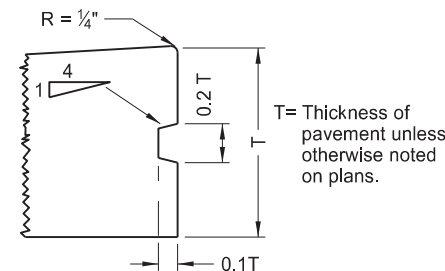
Isolation Joint



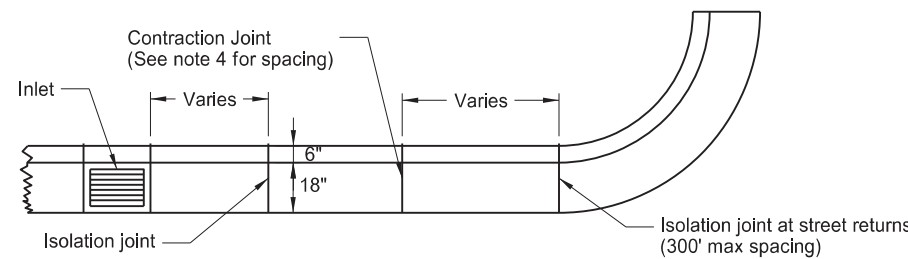
Contraction Joint
(10' Max Spacing)



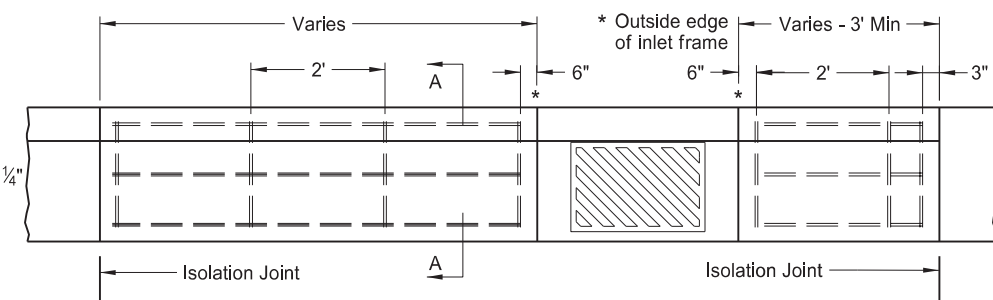
72" Concrete Valley Gutter Detail



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

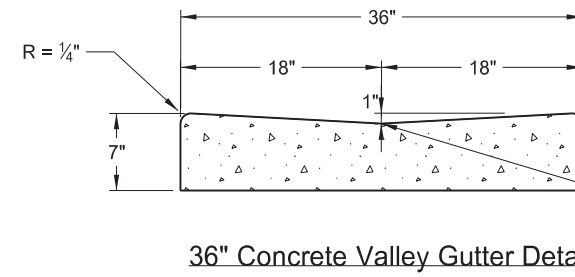


Joint Location Detail

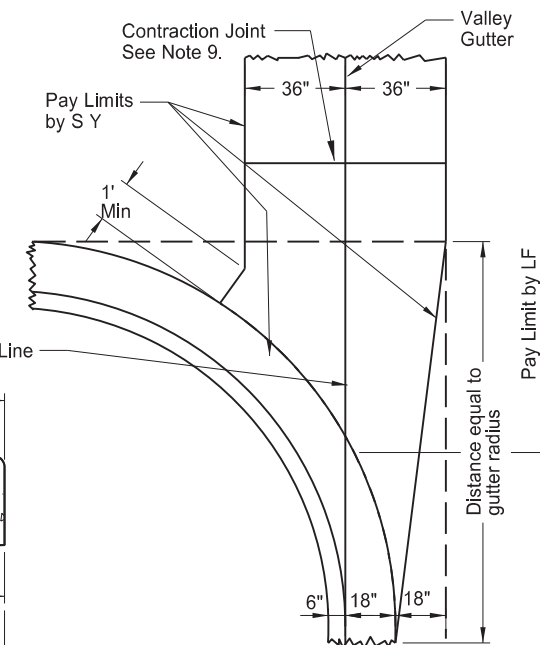


Curb & Gutter Reinforcing at Inlets

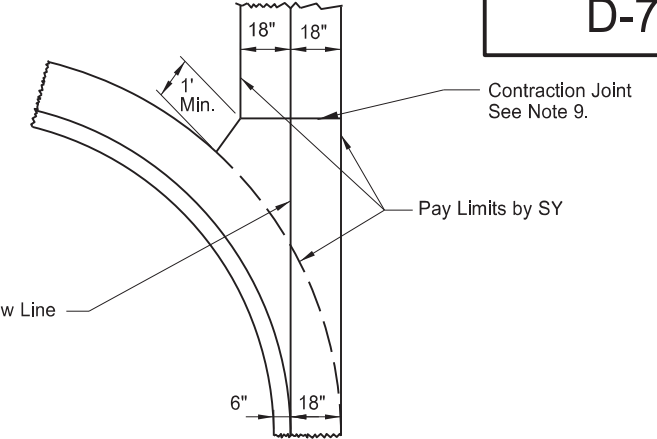
NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min.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



36" Concrete Valley Gutter Detail



72" Concrete Valley Gutter Plan



36" 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.

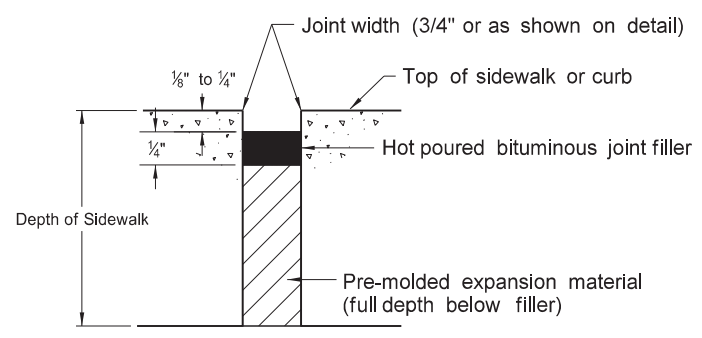
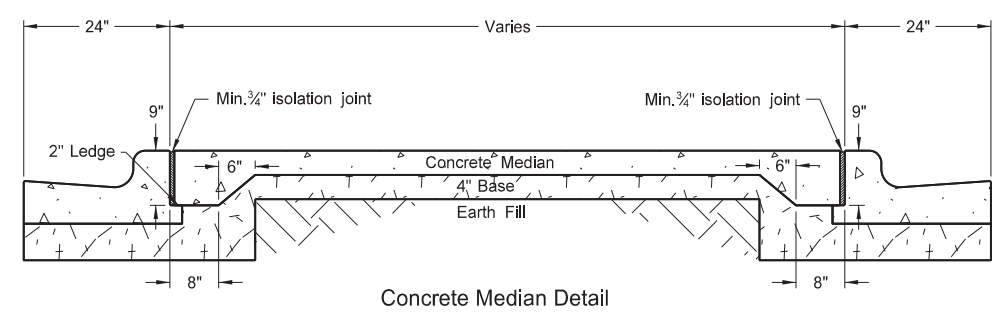
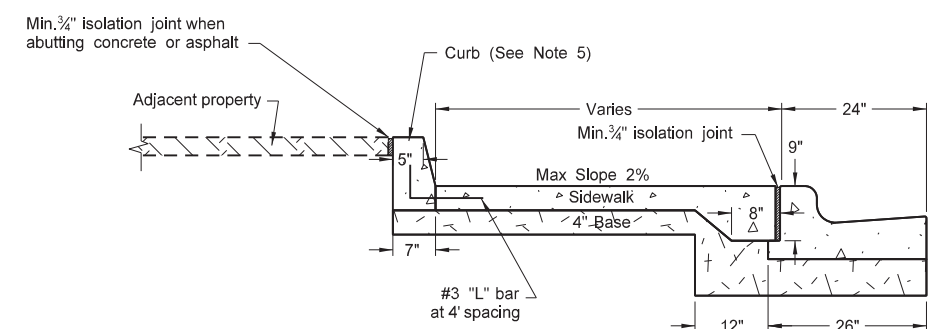
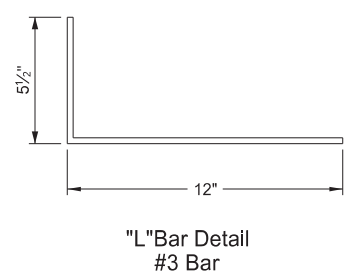
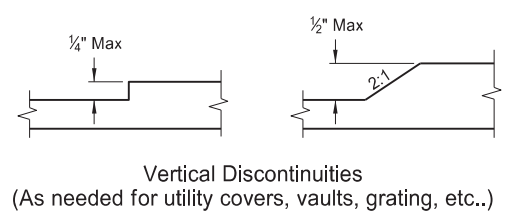
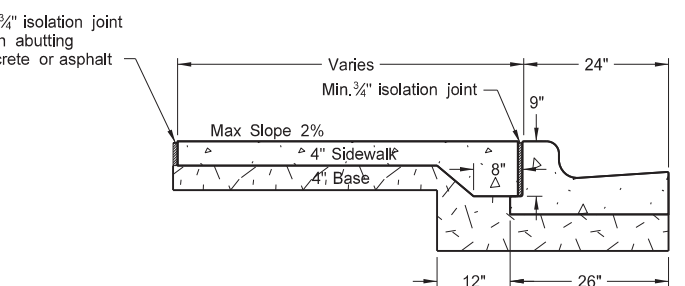
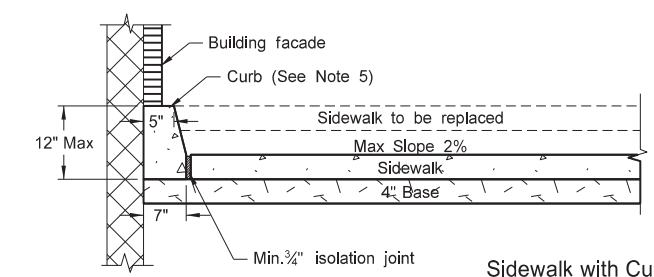
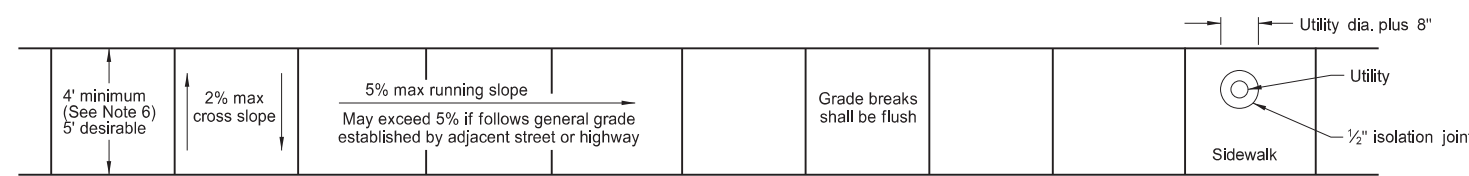
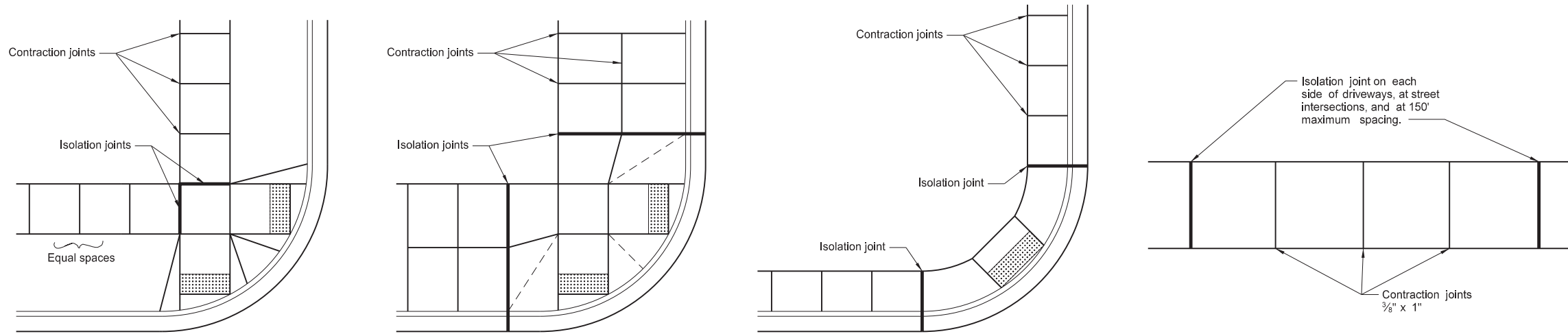
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Registration Number
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on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

SIDEWALK

D-750-2

NOTES:

1. Curb ramp and detectable warning panel layouts for informational purposes only. See Standard Drawing D-750-3 for curb ramp and detectable warning panel details.
2. Joint Spacing: Vary transverse contraction joint spacing from 4' to 6' to create approximate square panels.
Use longitudinal contraction joints when sidewalk width is 8' or greater, and space at half the sidewalk width.
Saw or groove contraction joints to a minimum depth of 1/3 the depth of the concrete.
When sidewalk is adjacent to curb & gutter, vary the sidewalk joint spacing to match curb & gutter joints.
Use isolation joints between separate concrete pours, or between old and new concrete.
3. Include all costs for labor, equipment, and material necessary to construct contraction and isolation joints in the price bid for sidewalk concrete.
4. Use 4" sidewalk concrete thickness unless otherwise specified.
5. Use 4" base material thickness unless otherwise specified. Include all costs for labor and materials necessary to place the base material in the price bid for "Salvage Base Course" or "Aggregate Base Course CL 5."
Modify existing ground slope with landscaping as needed. If not possible, such as adjacent buildings, use a vertical curb as shown in the detail below. The Engineer will measure curb at the unit price bid for "Curb - Type I" per lineal foot.
6. Sidewalk Width & Grade: Provide a continuous 4' min clear width pedestrian access route with max 2% concrete cross slope, excluding flares. The width of the curb cannot be counted as part of the pedestrian access route.
When clear width of pedestrian access routes is less than 5.0', provide passing spaces at a maximum of 200' with a minimum size of 5.0' by 5.0'.

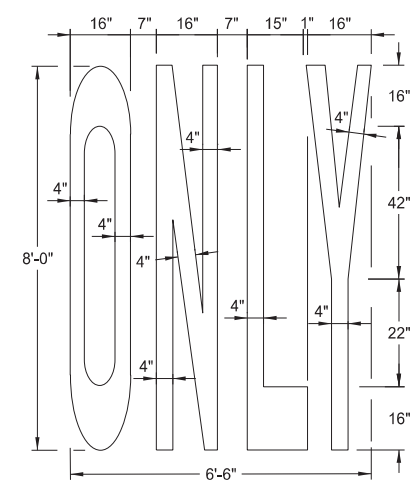


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Added sidewalk details for width and grade and passing lane requirements.
08-27-19	New Design Engineer PE Stamp.

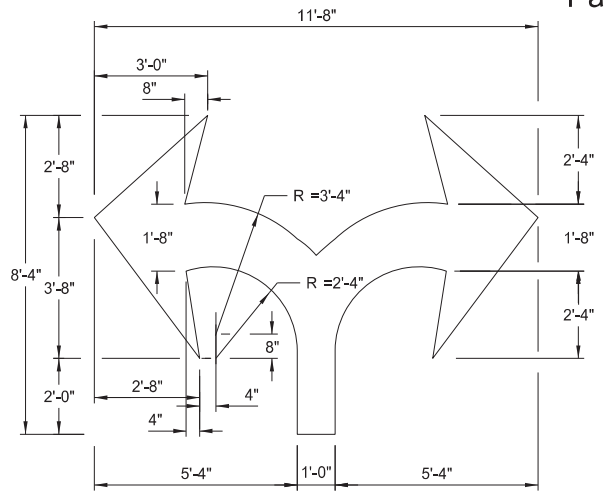
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Pavement Marking Message Details

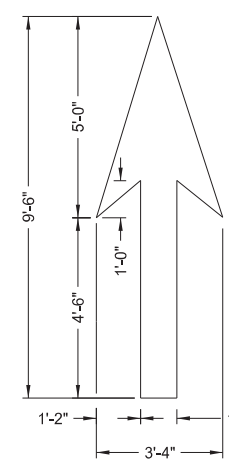
D-762-1



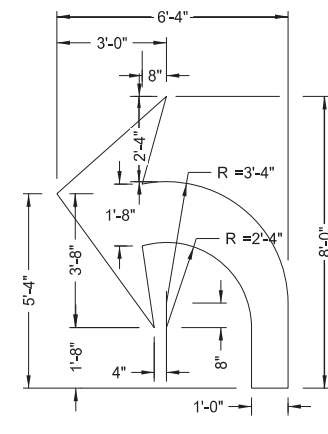
22 S. F.



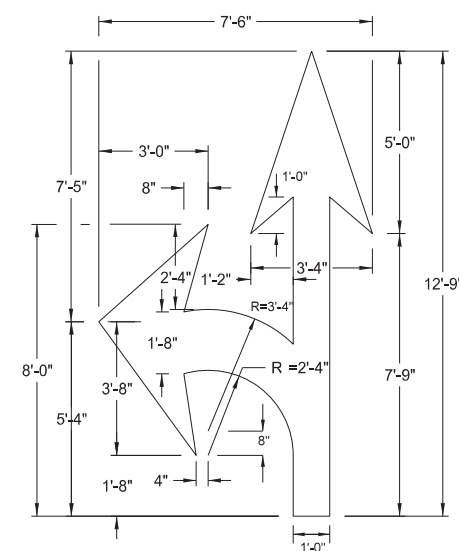
29 S. F.



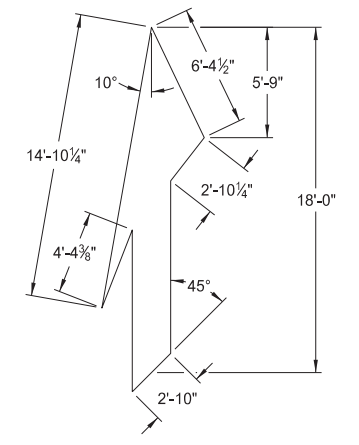
12 S. F.



16 S. F.

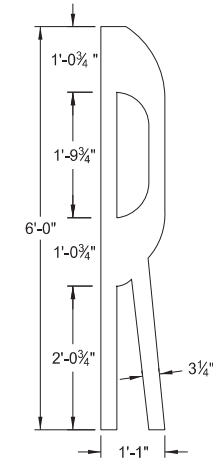


27 S. F.

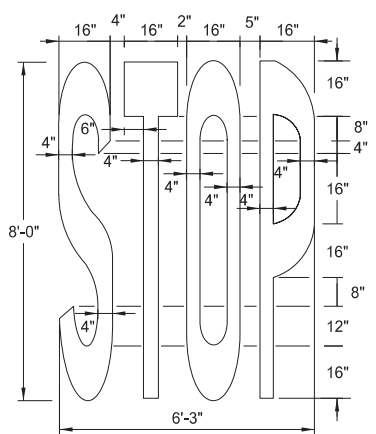


41 S. F.

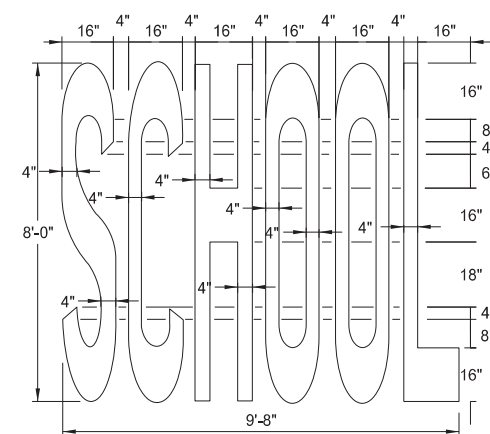
Note: Rotate merge arrow 20° from edge of roadway.



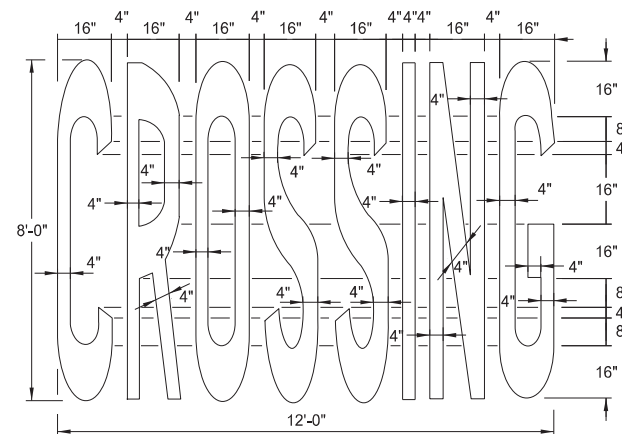
4 S. F.



22 S. F.



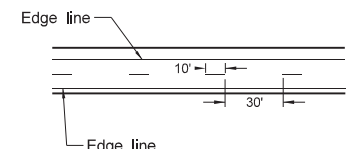
34.5 S. F.



46 S. F.

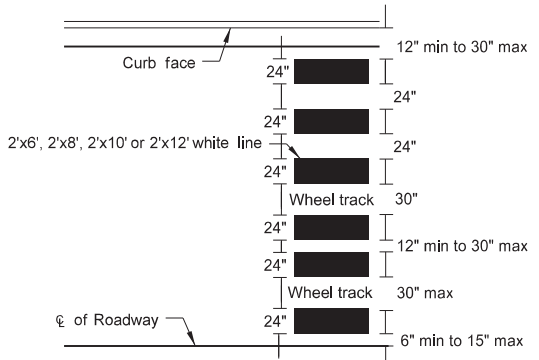
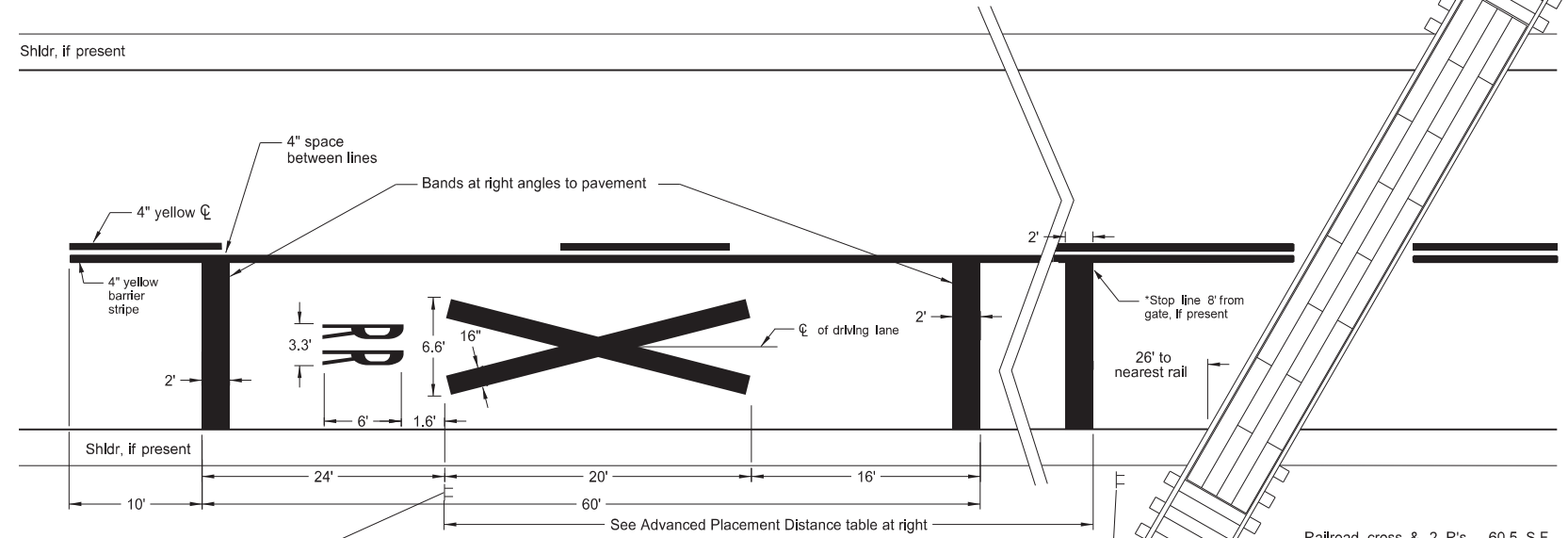
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table

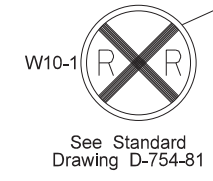


Centerline Pavement Marking Skip Spacing Detail

Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft

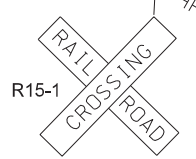


Continental Crosswalk Detail



See Standard Drawing D-754-81

Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.
See plans for correct message. Use white pavement markings unless noted otherwise.



Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

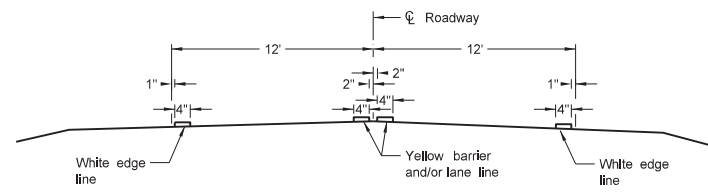
*Stop Bar nearest crossing - 8' from gate or 26' to nearest rail - Use whichever is further from tracks.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
01-28-2020	Revised min Stop Bar distance to rail.

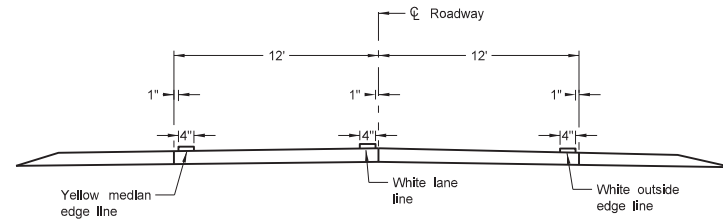
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on 1/28/2020 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

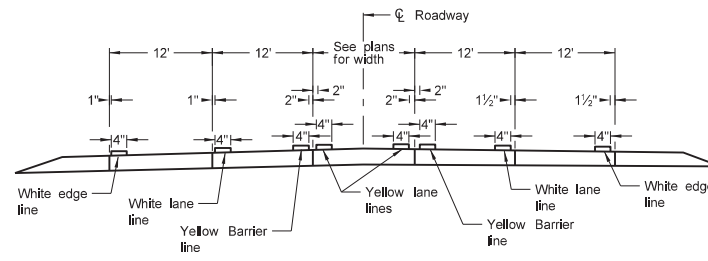
D-762-4



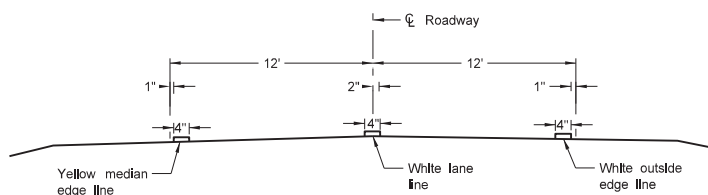
Two Lane Two Way
RURAL ROADWAY



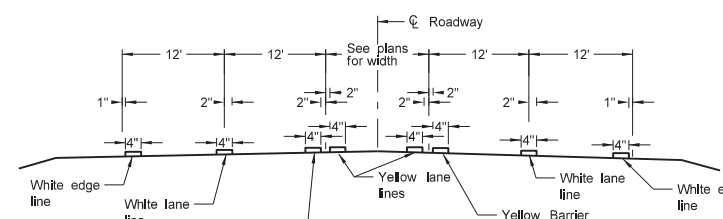
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



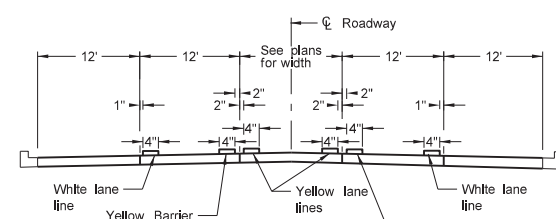
RURAL FIVE LANE ROADWAY
Concrete Section



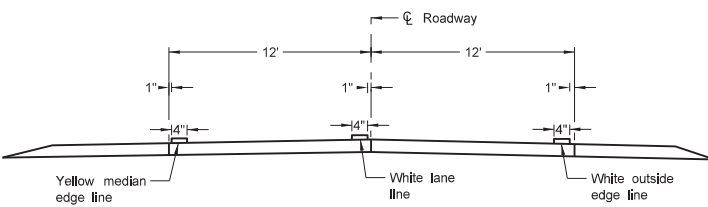
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



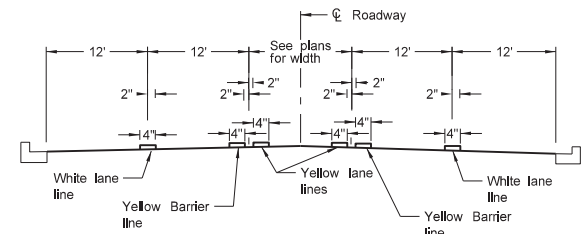
RURAL FIVE LANE ROADWAY
Asphalt Section



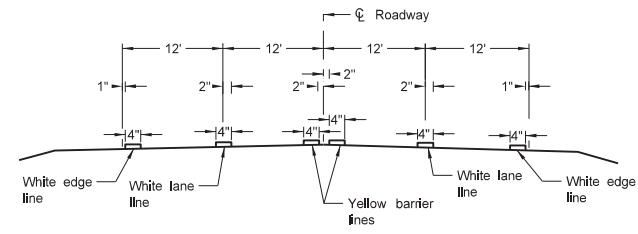
URBAN FIVE LANE SECTION
Concrete Section



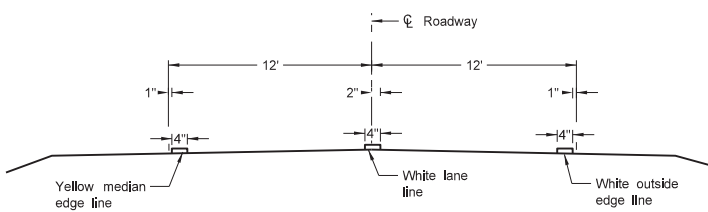
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



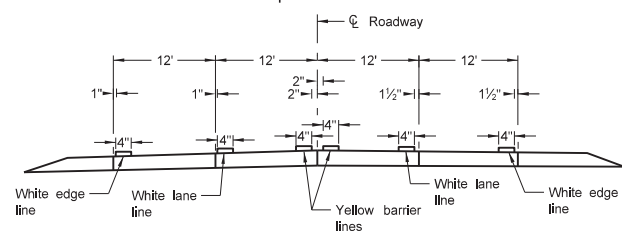
URBAN FIVE LANE SECTION
Asphalt Section



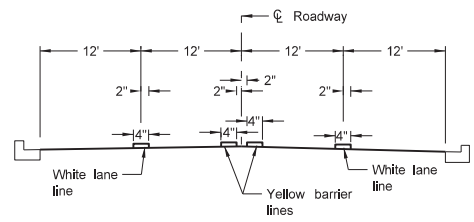
RURAL FOUR LANE ROADWAY
Asphalt Section



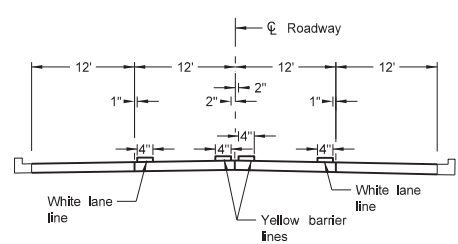
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



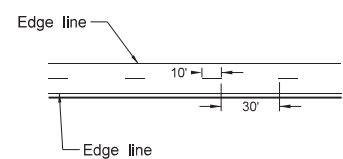
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



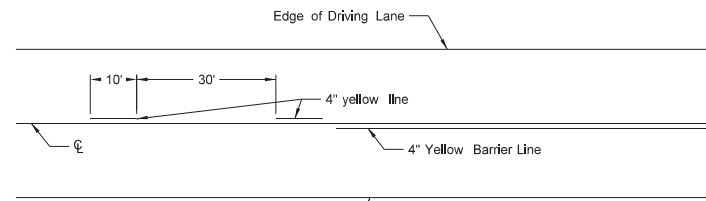
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

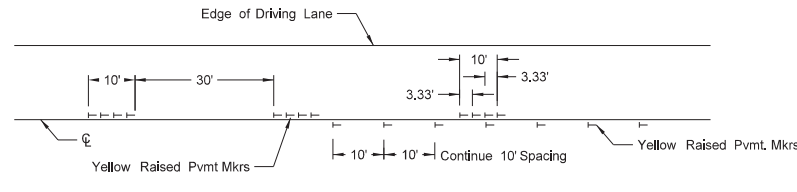
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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

SHORT-TERM PAVEMENT MARKING

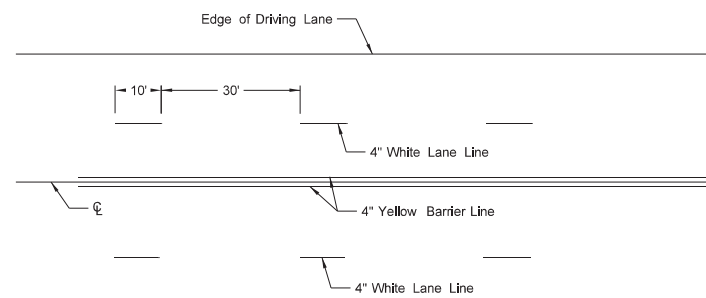


Painted or Tape Lines

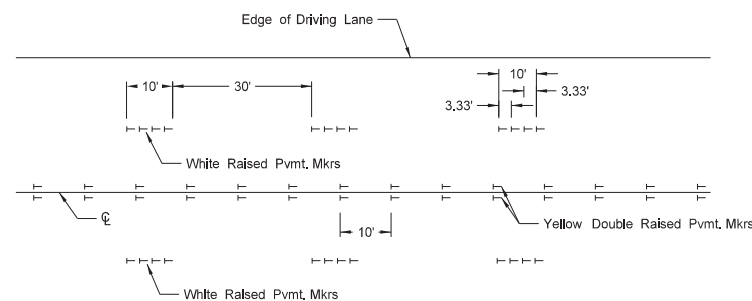


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

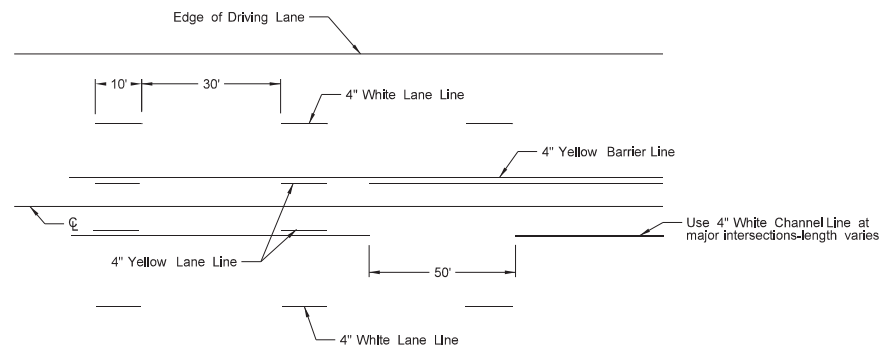


Painted or Tape Lines

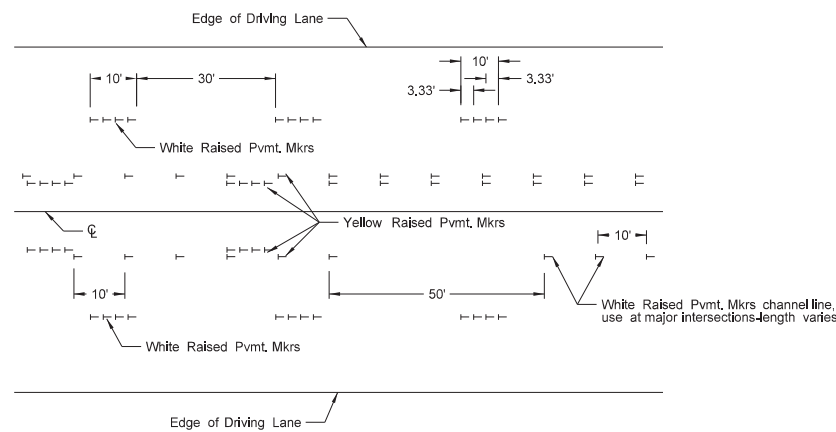


Raised Pavement Markers

FOUR LANE ROADWAY

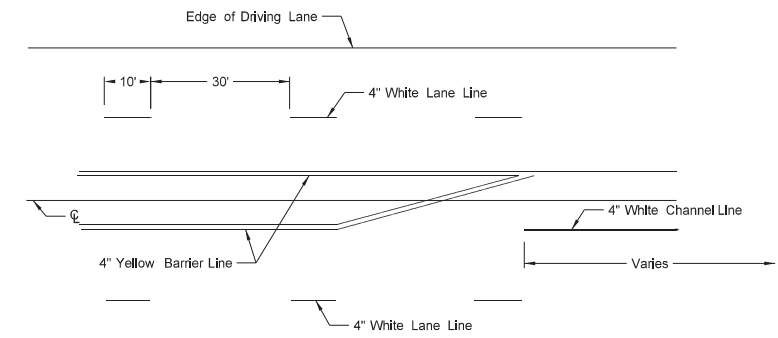


Painted or Tape Lines

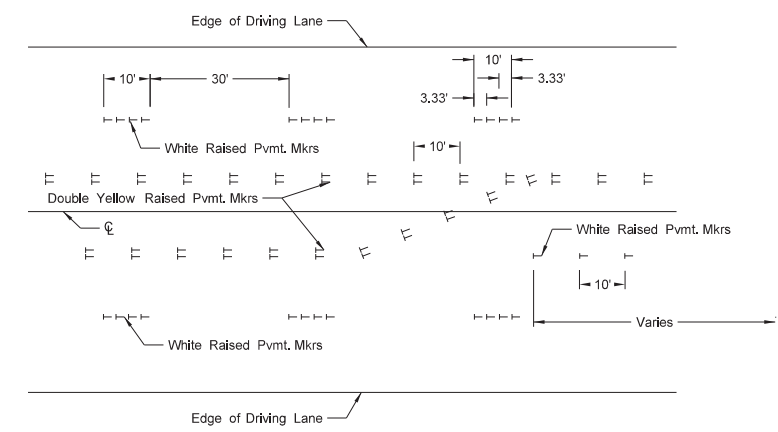


Raised Pavement Markers

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.

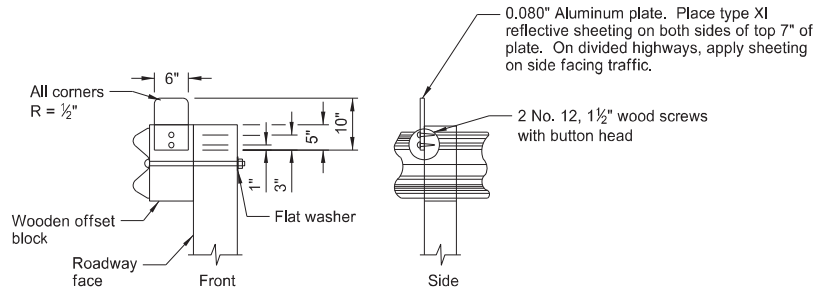
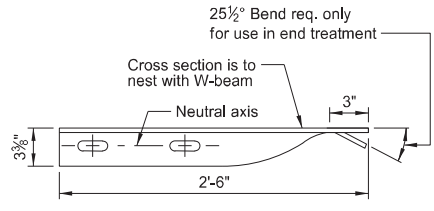
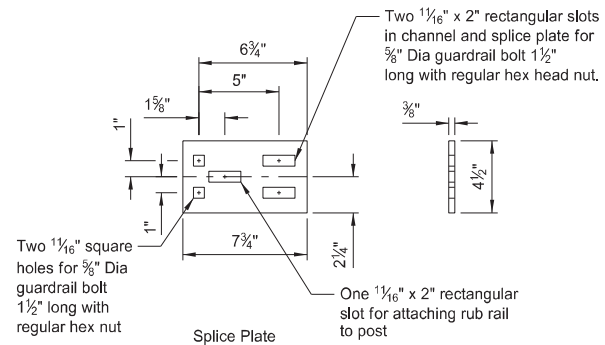
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.

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

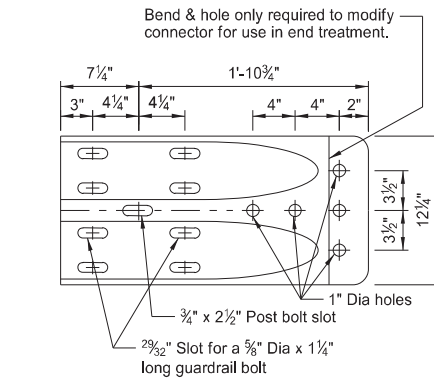
NOTES:

- 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 = $- \frac{1}{4}"$, $+ 1"$.
- Standard W-Beam rail post bolt slot spacing is 6'-3". Post bolt slot spacing of 3'-1 1/2" is acceptable.

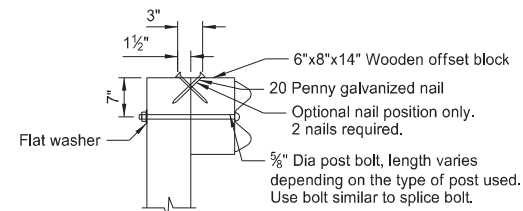


REFLECTORIZED PLATE DETAIL

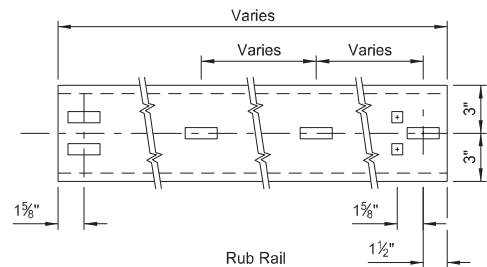
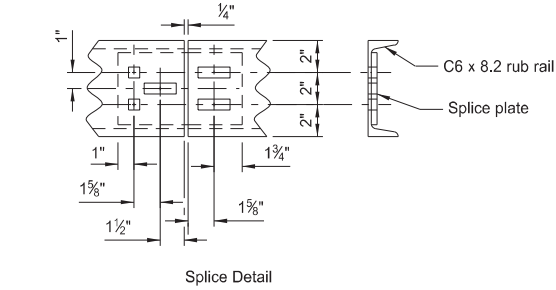
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



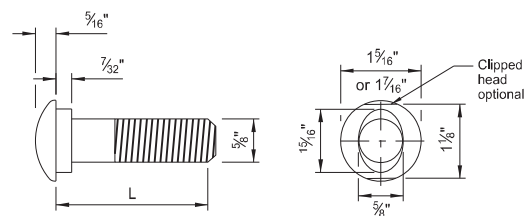
W BEAM TERMINAL CONNECTOR



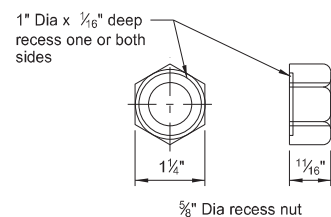
TYPICAL POST ATTACHMENT DETAIL



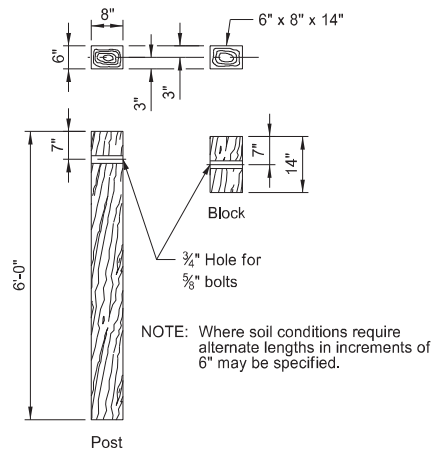
C6x8 RUB RAIL AND SPLICE PLATE



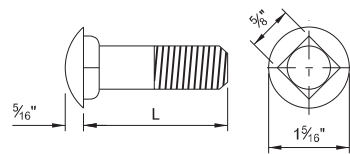
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 1/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



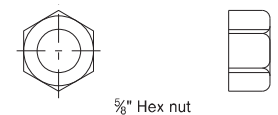
5/8" GUARDRAIL BOLT & RECESS NUT



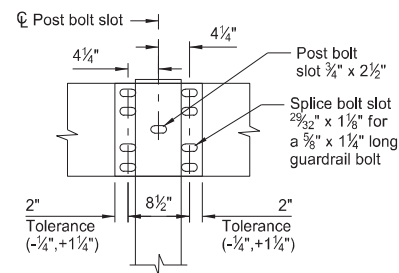
6"x8" TIMBER POST & BLOCK



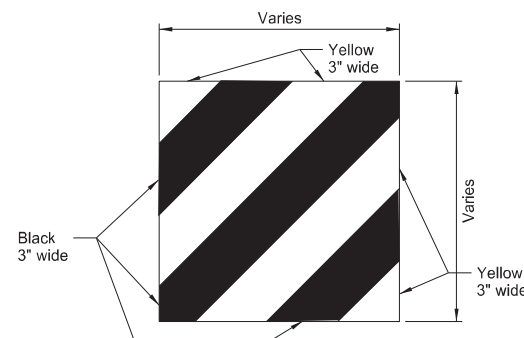
5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



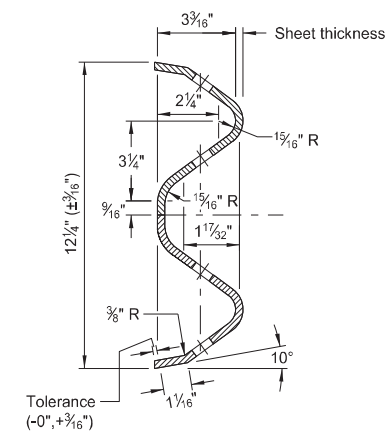
5/8" CARRIAGE BOLT & NUT



SPLICE DETAIL



IMPACT HEAD OBJECT MARKER



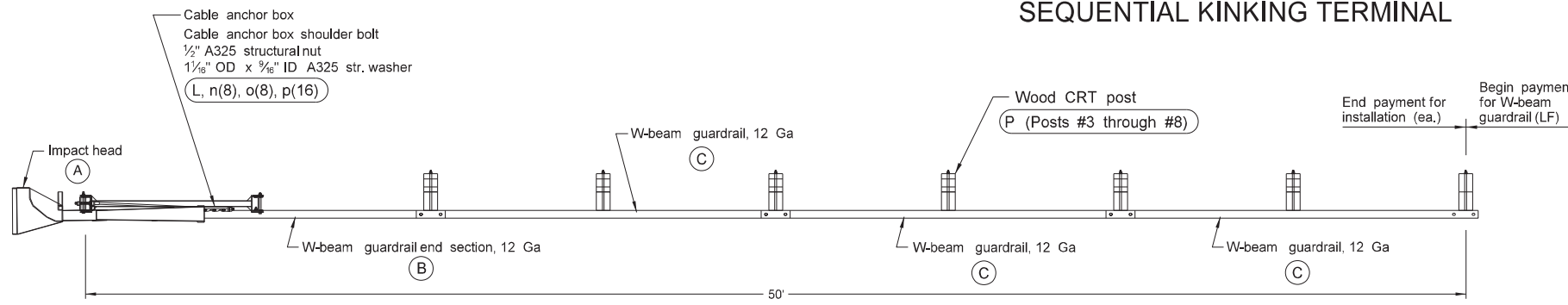
W-BEAM CROSS SECTION

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

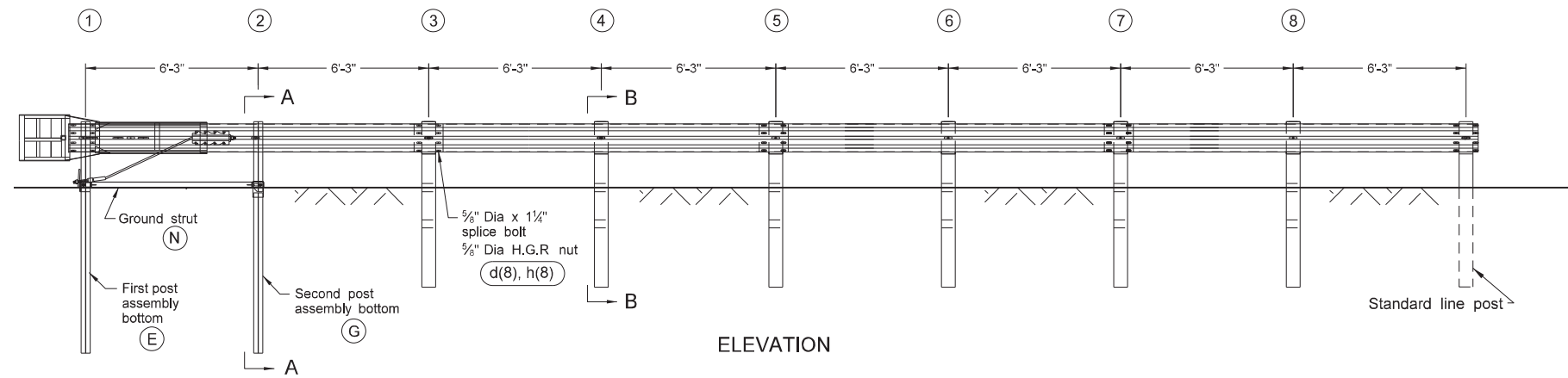
KIRK J. HOFF
REGISTERED
PROFESSIONAL
ENGINEER
NORTH DAKOTA
PE-4683
12 02 2020

SEQUENTIAL KINKING TERMINAL

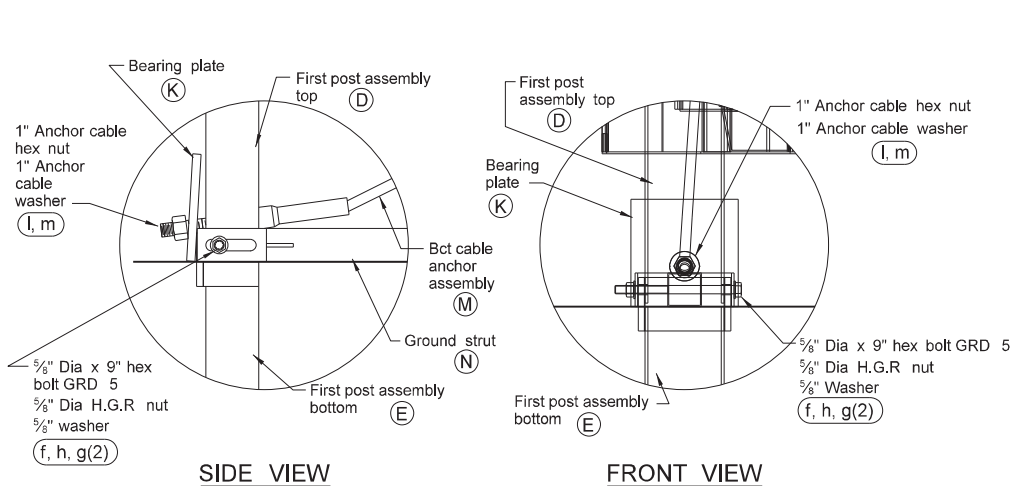
D-764-5



PLAN



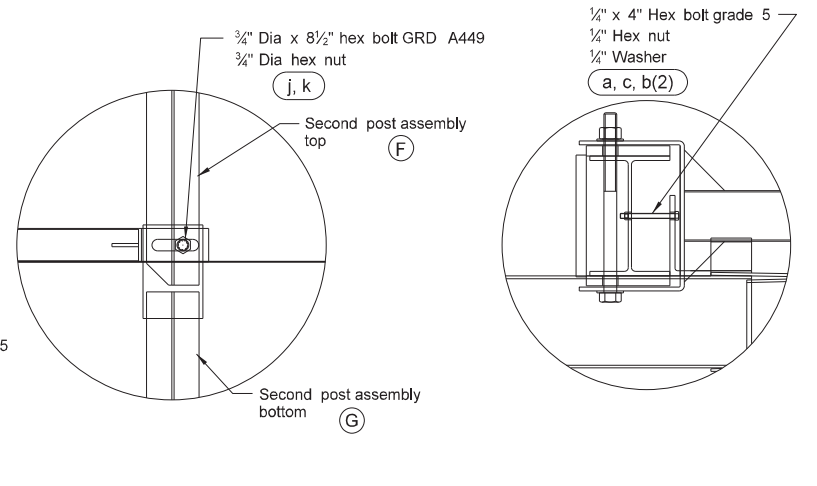
ELEVATION



SIDE VIEW

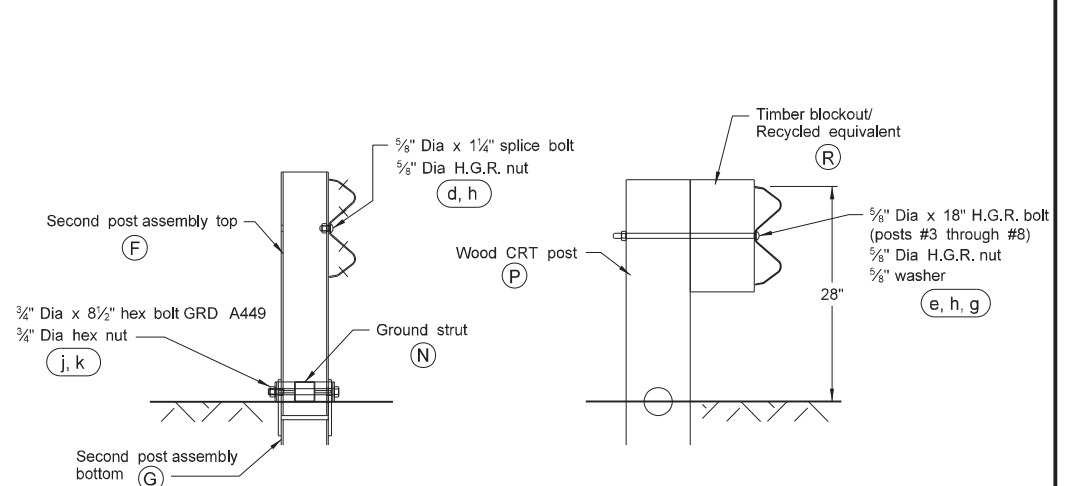
FRONT VIEW

POST #1 CONNECTION DETAILS



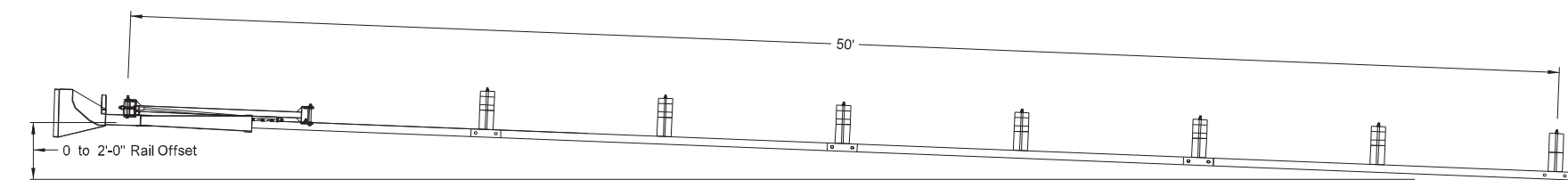
SIDE VIEW DETAIL OF POST #2

IMPACT HEAD CONNECTION DETAIL



SECTION A-A
Post #2

SECTION B-B
Posts #3 through #8



FLARED INSTALLATION
25:1 maximum flare rate

GENERAL NOTES:

- Use breakaway posts with the SKT.
- Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
- Flare the SKT at a rate of up to 25:1 to prevent shoulder encroachment by the impact head.
- Grade site as needed to prevent lower sections of the posts from protruding more than 4" above ground (measured along a 5' cord).
- Drive 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 satisfactorily to prevent settlement.
- When rock is encountered during excavation, use a 10" diameter post hole, 20" into the rock surface, if approved by the engineer. Place granular material in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Field cut posts 1 & 2 to length, place in the hole, and backfill with adequately compacted material excavated from the hole.
- Place the 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 on post #3 through post #8 with two 20 penny galvanized nails in each rectangular post, to prevent them from turning when the wood shrinks.

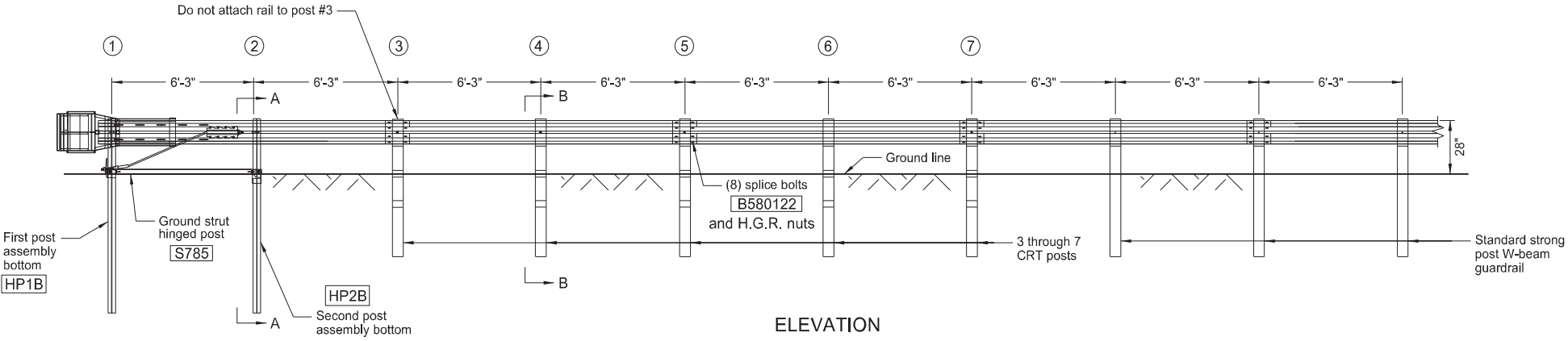
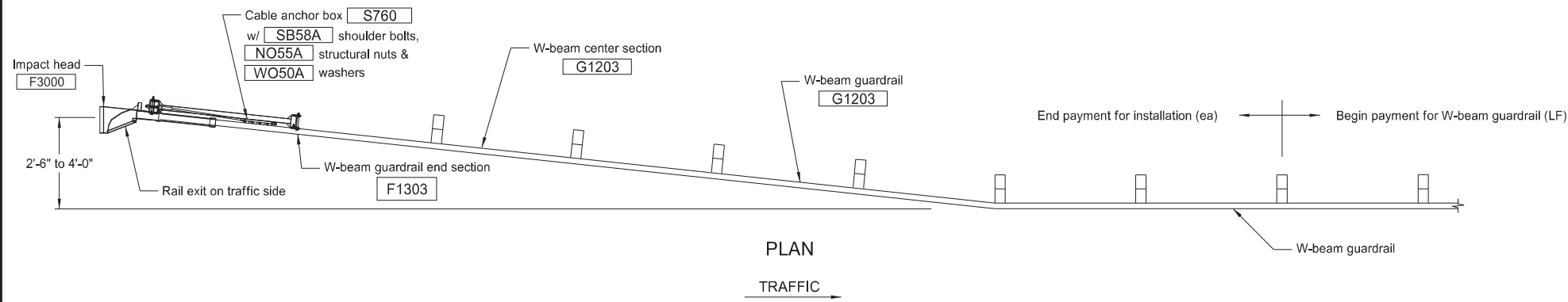
BILL OF MATERIALS		
ITEM	QTY	
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
HARDWARE		
a	2	1/4 " x 4" HEX BOLT Grade 5
b	4	1/4" WASHER
c	2	1/4" HEX NUT
d	25	5/8" Dia X 1 1/4" SPLICE BOLT, POST #2
e	6	5/8" Dia X 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	5/8" Dia X 9" HEX BOLT GRD 5
g	8	5/8" WASHER
h	32	5/8" Dia H.G.R. NUT
j	1	3/4" Dia X 8 1/2" HEX BOLT GRD A449
k	1	3/4" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	GROUND STRUT HINGED POST
o	8	1/2" A325 STRUCTURAL NUT
p	16	1 1/8" OD X 5/16" ID A325 STR. WASHER

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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

FLARED ENERGY ABSORBING TERMINAL

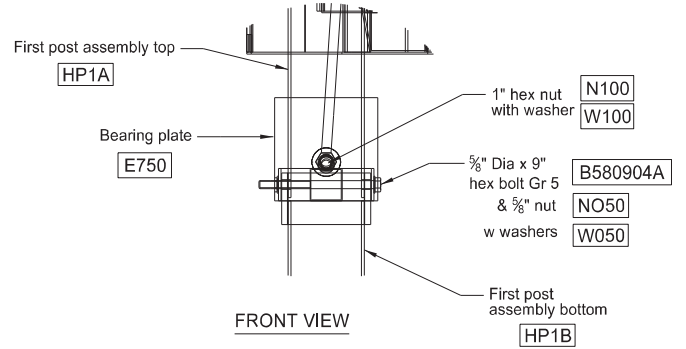
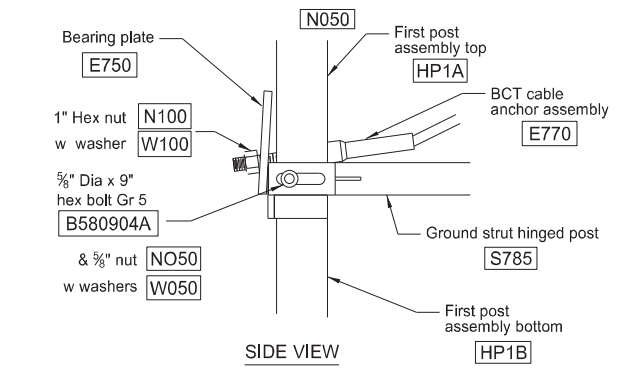
D-764-6



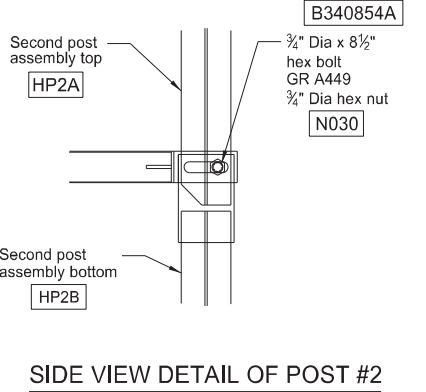
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
HARDWARE		
B140404	2	1/4" Dia x 4" HEX BOLT
WO14	4	1/4" WASHER
N014	2	1/4" HEX NUT
B580122	17	5/8" Dia x 1 1/4" SPLICE BOLT
B581802	4	5/8" Dia x 10" H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	5/8" Dia x 9" HEX BOLT GR 5
WO50	5	5/8" WASHER
N050	22	5/8" Dia H.G.R. NUT
B340854A	1	3/4" Dia x 8 1/2" HEX BOLT GR A449
NO30	1	3/4" Dia HEX NUT
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
NO55A	8	1/2" A325 STRUCTURAL NUT
WO50A	16	1 1/16" OD x 3/16" ID A325 STR. WASHER

GENERAL NOTES

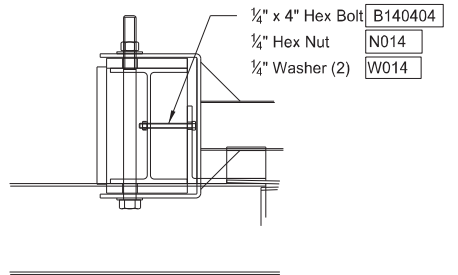
- Use wood posts with the Flared Energy Absorbing Terminal except posts #1 and #2.
- Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
- Grade site as needed to prevent lower sections of the posts from protruding more than 4 inches above the ground (measured along a 60 inch cord).
- Drive the lower section without the upper post attached. If the post is placed in a drilled hole, compact the backfill material satisfactorily to prevent settlement.
- When rock is encountered during excavation, use a 12" diameter post hole 20" into the rock surface, if approved by the Engineer. Place granular material in the bottom of hole approximately 2 1/2" deep to provide drainage. Field cut soil tubes to length, place in hole, and back fill with adequately compacted material excavated from hole.
- Place the 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 with two 20 penny galvanized nails in each post to prevent them from turning when the wood shrinks.
- 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, flare the Flared Energy Absorbing Terminal at the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, turn the Flared Energy Absorbing Terminal parallel to the roadway.



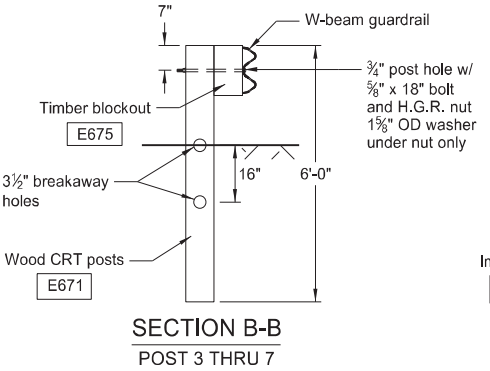
POST #1 CONNECTION DETAILS



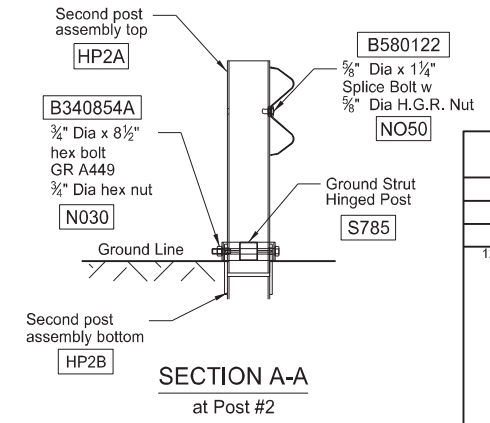
SIDE VIEW DETAIL OF POST #2



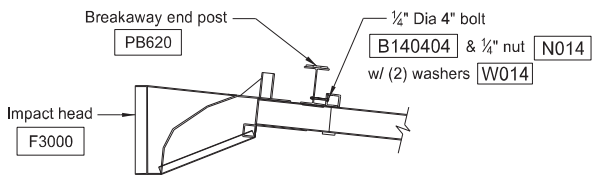
IMPACT HEAD CONNECTION DETAIL



SECTION B-B
POST 3 THRU 7



SECTION A-A
at Post #2



IMPACT HEAD CONNECTING DETAIL

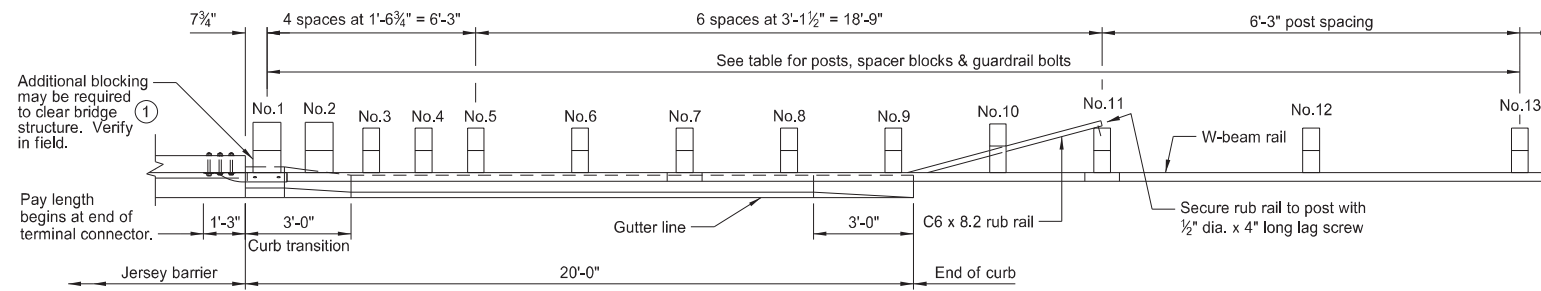
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Update notes to active voice.



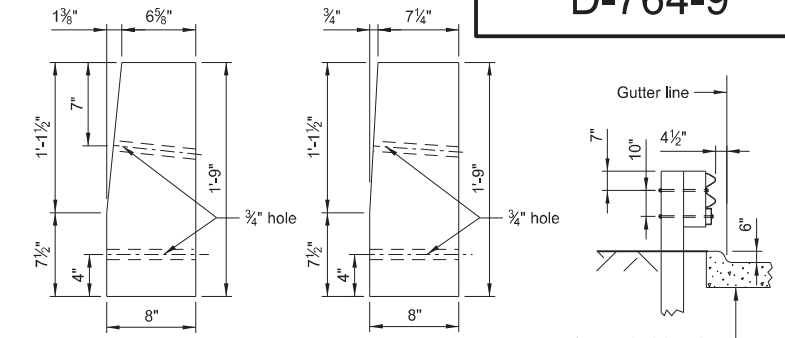
12 02 2020

W-BEAM TRANSITION TO CONCRETE JERSEY BARRIER WITH APPROACH CURB

D-764-9

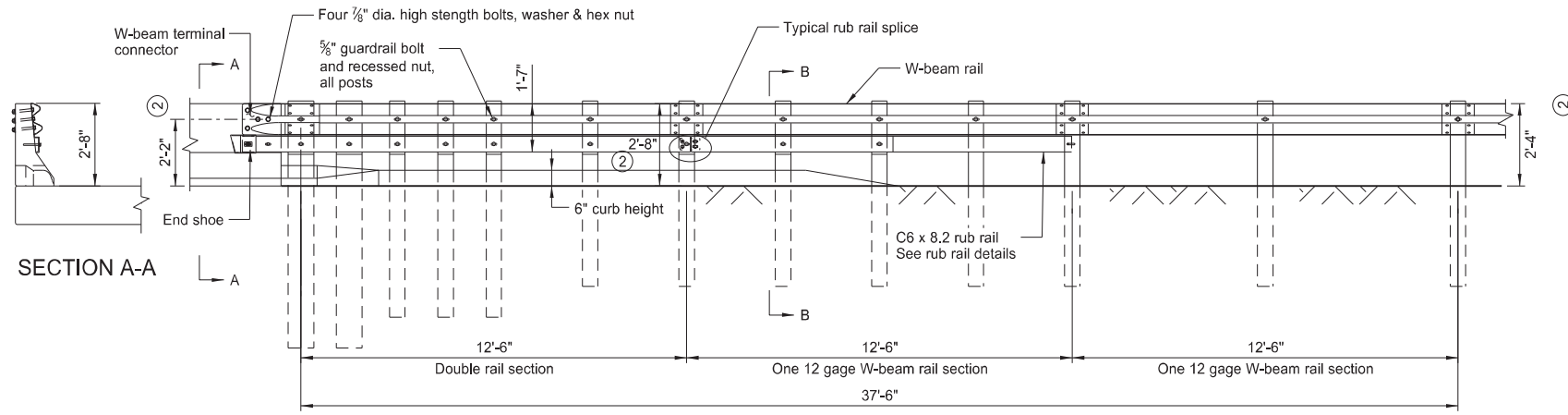


PLAN

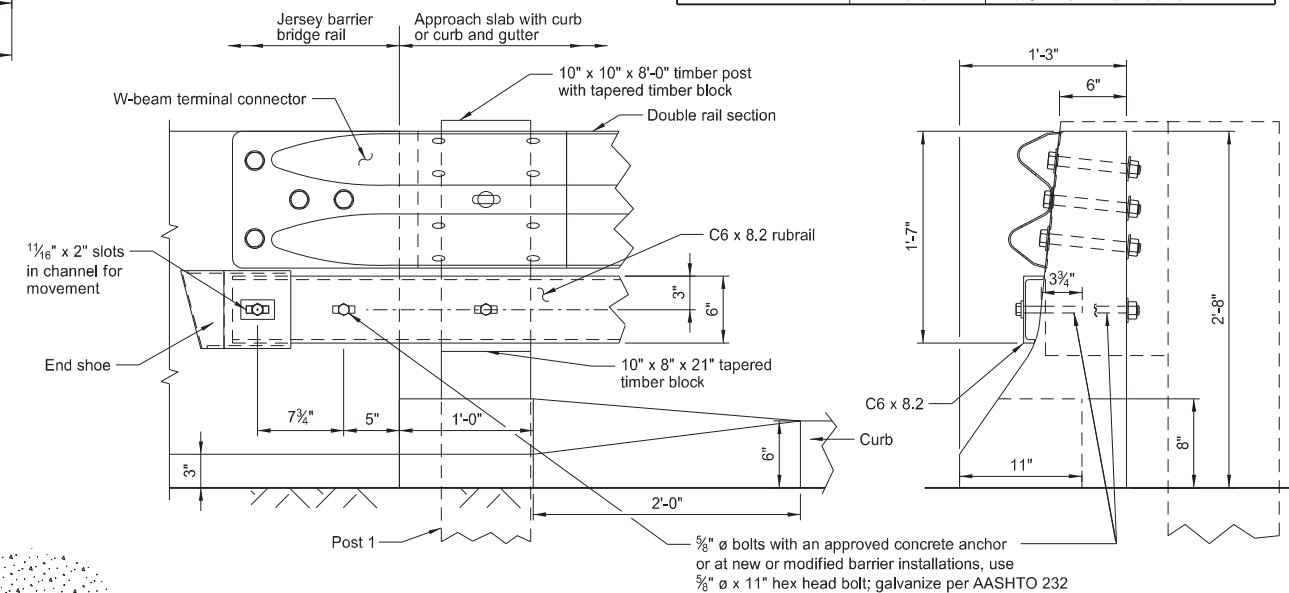


TAPERED TIMBER BLOCK DETAILS

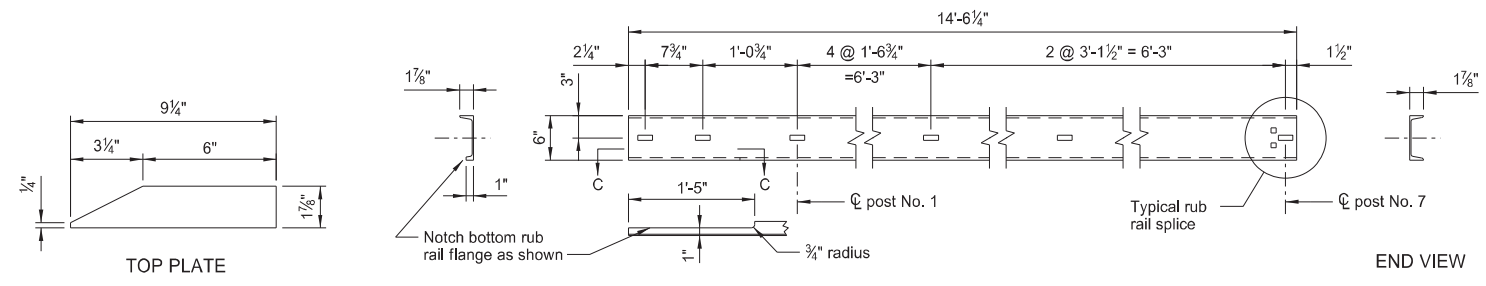
POST, TIMBER BLOCK & BOLT TABLE		
DESCRIPTION	POST NO.	SIZE
Post	1 & 2	10" X 10" X 8'-0" min long
	3-5	6" X 8" X 7'-0" min long
	6-13	6" X 8" X 6'-0" min long
Spacer block	1-2	10" X 8" X 21" tapered block
	3-9	6" X 8" X 21"
	10	6" X 9 3/4" X 14"
	11-13	6" X 8" X 14"
Guardrail bolt & recessed nut	1 & 2 & 10	5/8" Dia X 20" - guardrail
	3-9, 11-13	5/8" Dia X 18" - guardrail
	1-2	5/8" Dia X 22" - rub rail
	3-9	5/8" Dia X 20" - rub rail



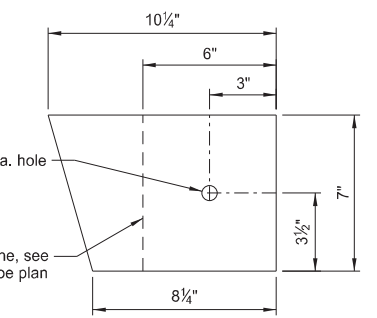
GENERAL ASSEMBLY DETAILS



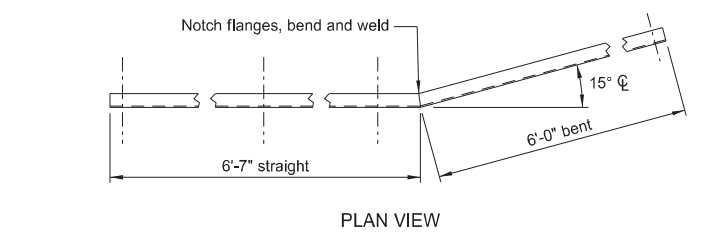
TRAFFIC SIDE ELEVATION
RAIL ATTACHMENT AND CURB DETAIL



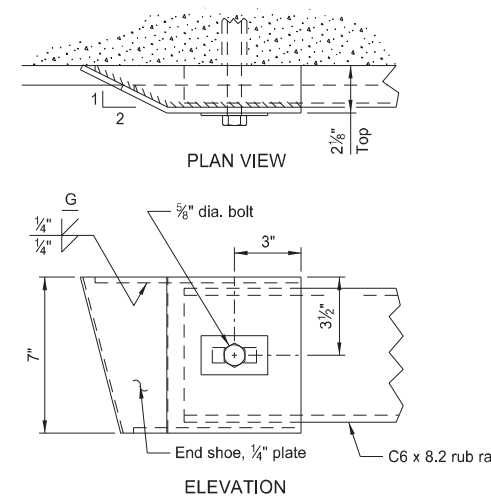
SECTION C-C
RUB RAIL STRAIGHT SECTION



END SHOE PLATE DETAILS
(1/4" plate)



ELEVATION
RUB RAIL BENT SECTION



ELEVATION
RUB RAIL END SHOE ASSEMBLY

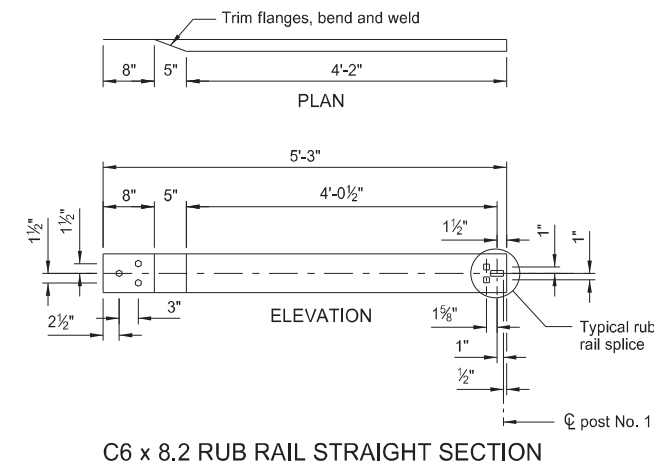
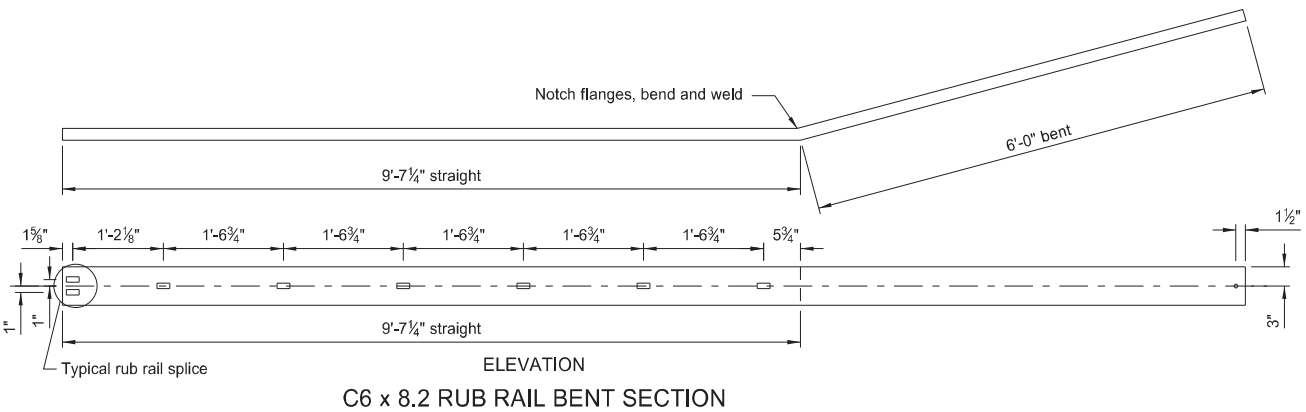
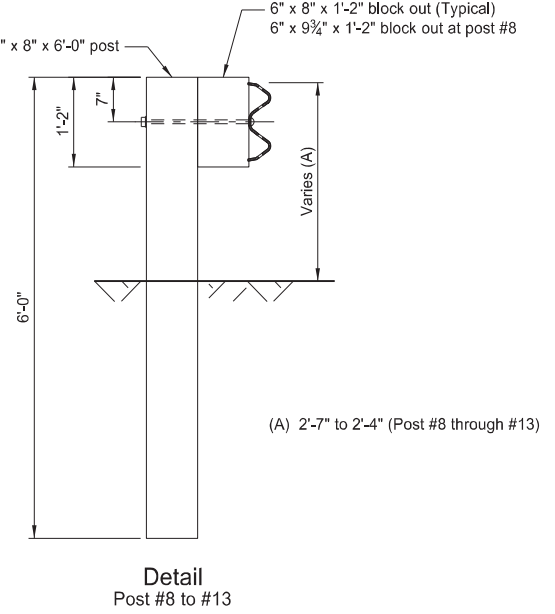
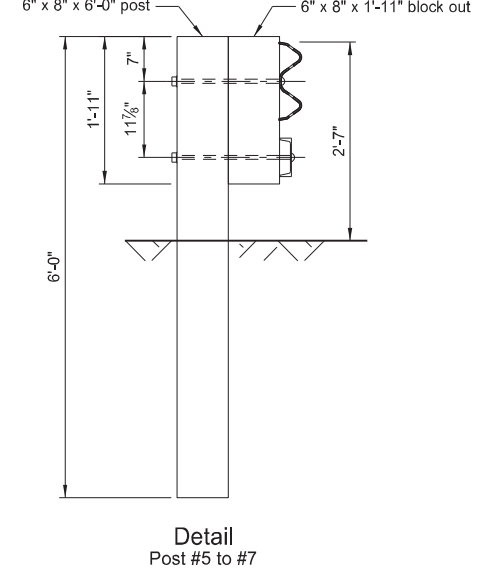
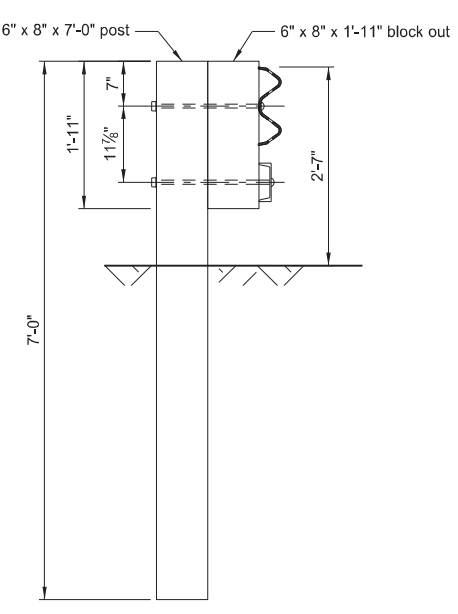
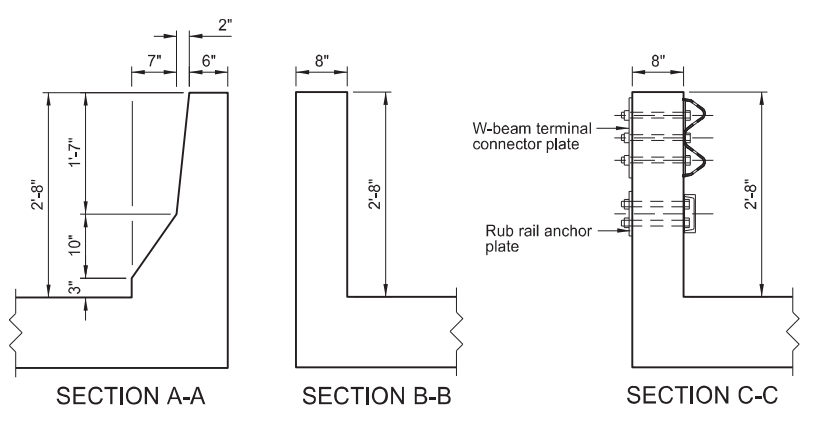
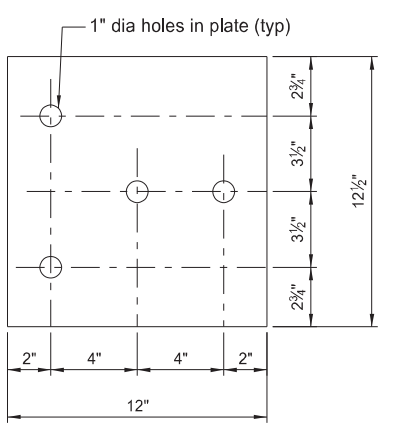
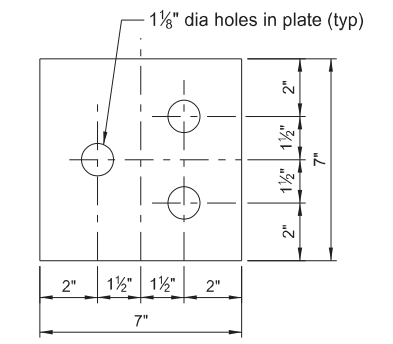
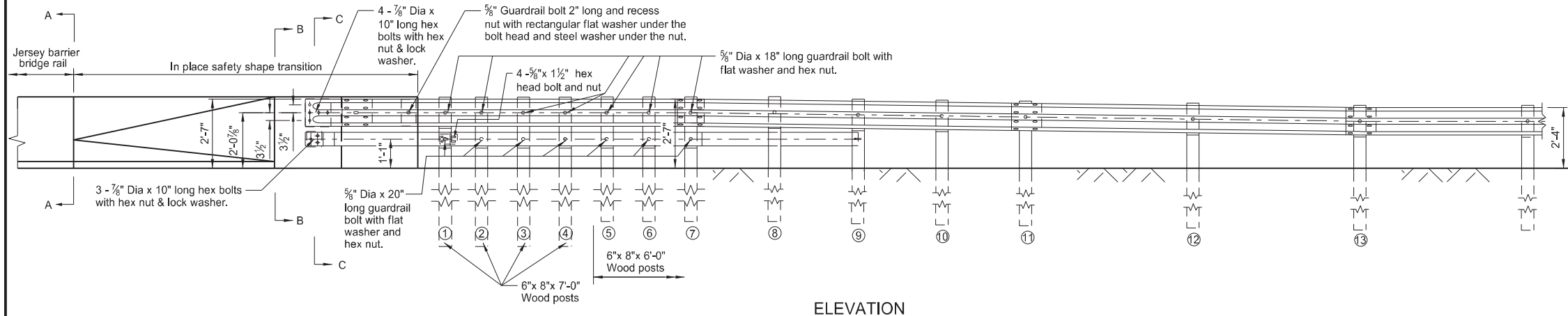
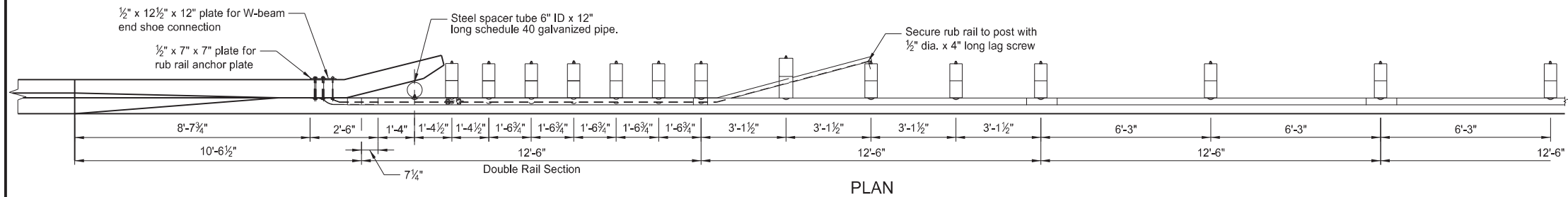
- ① Additional blocking may be required at post No.1.
- ② Height is 2'-8" from 0' to 12'-6" from bridge. Height tapers from 2'-8" to 2'-4" between 12'-6" to 37'-6" from bridge.

NOTES:
Galvanize all hardware in accordance with AASHTO M232.
Use AASHTO 270M Grade 250 C6 x 8.2 rub rail and structural steel galvanized after fabrication in accordance with AASHTO M111.
All rub rail slotted holes are 1 1/16" x 2".
All rub rail square holes are 1 1/16".
Use timber posts and blocks for the W-beam guardrail.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



W-BEAM TRANSITION TO IN PLACE CONCRETE SAFETY SHAPE TRANSITION

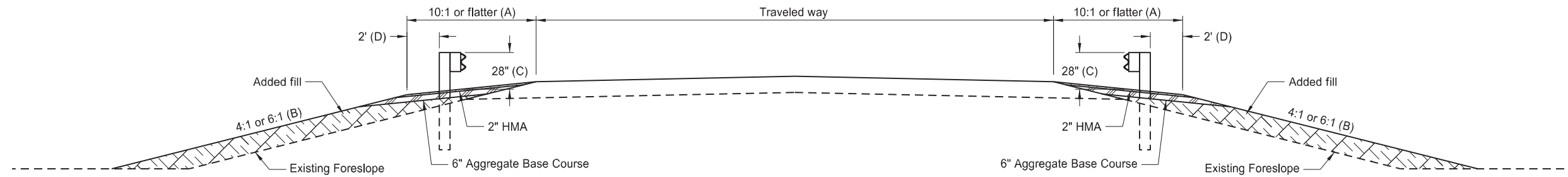


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice and corrected dimension.

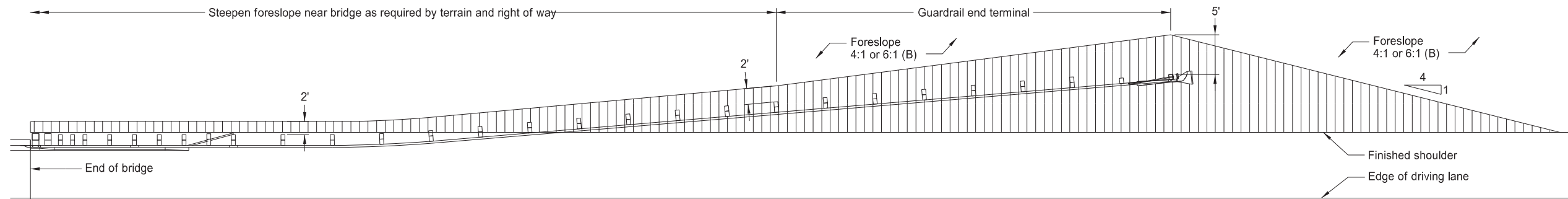
KIRK J. HOFF
REGISTERED
Kirk J Hoff
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

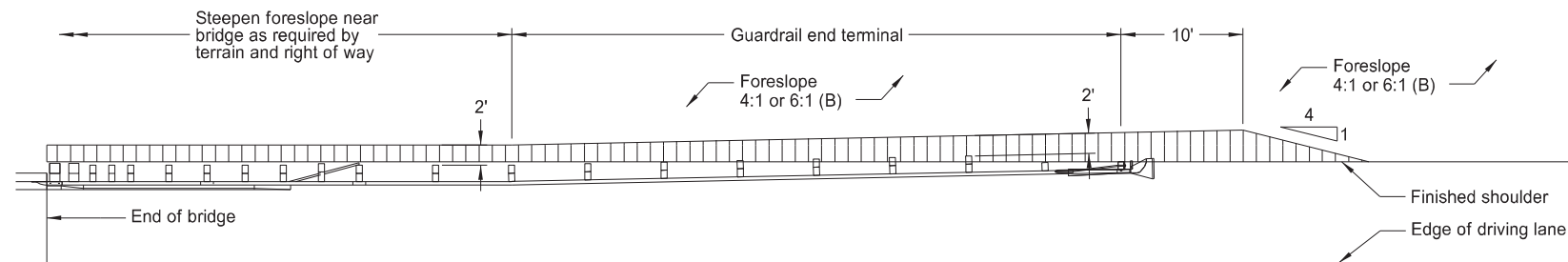
D-764-22



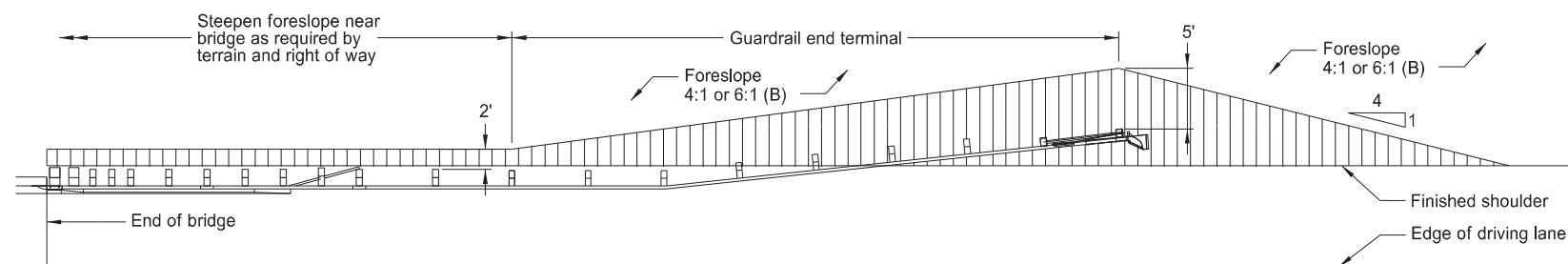
TYPICAL SECTION



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.



12 02 2020