

DESIGN DATA			
Traffic	Average Daily		
Current 2014	Pass: 335	Trucks: 60	Total: 395
Forecast 2034	Pass: 455	Trucks: 85	Total: 540
Clear Zone Distance: 26' (4:1 Slope)		Design Speed: 65	
Minimum Sight Dist. for Stopping: 645'		Bridges: NA	
Sight Dist. for No Passing Zone: 1100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way Flexible ESALs: 232,104			

**JOB # 24**  
**NORTH DAKOTA**  
**DEPARTMENT OF TRANSPORTATION**

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	20648	1	1

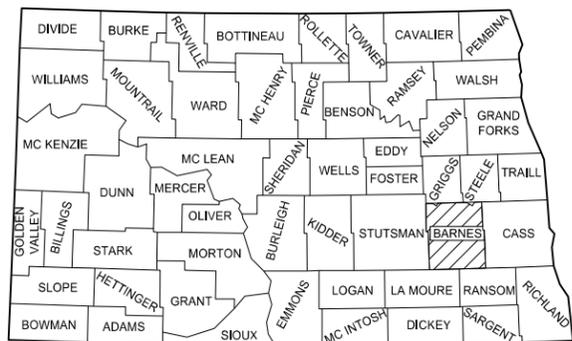
H-2-032(028)086

Barnes County  
 11 Miles North of I-94  
 Pipe Replacement, Surfacing, and Incidentals

GOVERNING SPECIFICATIONS:

2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
H-2-032(028)086	0.066	0.066



STATE COUNTY MAP

DESIGNERS  
 Lanny Paulson

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 9-18-14

James Douglas Rath  
 NDDOT DESIGN DIVISION

APPROVED DATE 9-18-14

Roger Weigel  
 OFFICE OF PROJECT DEVELOPMENT  
 ND DEPARTMENT OF TRANSPORTATION

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LIST OF STANDARD DRAWINGS

<u>Standard No.</u>	<u>Description</u>
D-101-1, 2, 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32	Symbols
D-256-1	Erosion and Siltation Controls
D-261-1	Erosion Control - Fiber Roll Placement Details
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details – Terminal and Guide Signs
D-704-10	Construction Sign Details – Regulatory Signs
D-704-11	Construction Sign Details – Warning Signs
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-17	Sign Layout for One Lane Closure Two Lane Roadway
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Traffic Control Plan For Moving Operations
D-704-31	Construction Sign Layout - Non-signalized Low Volume One Lane Closure
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation – Grinding Shoulder Rumble Strips
D-708-6	Erosion and Siltation Controls – Median or Ditch Inlet Protection
D-714-1	Reinforced Concrete Pipe Culvert and End Sections (Round Pipe)
D-714-4	Round Corrugated Steel Pipe Culverts and End Sections
D-714-22	Concrete Pipe or Precast Concrete Box Culvert Ties
D-714-25M	Transverse Mainline Pipe Excavation and Installation Detail for Multiple Pipes More than 4 Feet Below the Top of the Proposed Subgrade
D-754-83	Object Markers - Culverts
D-760-4	Rumble Strips - Undivided Highways (Shoulders Less Than 4')
D-762-4	Pavement Marking
D-762-6	Short-Term Pavement Marking

LIST OF SPECIAL PROVISIONS (SP)

<u>SP #</u>	<u>Description</u>
SP 0003(14)	Temporary Erosion and Sediment Best Management Practices
SP 5020(14)	Permits and Environmental Considerations

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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600+00

605+00

610+00

Existing ROW

Replace existing structural plate pipe with 2 lines of new pipe conduit

18" X 93' CSP (Good)  
2 CSES (Poor)

ND Highway 32

100'

100'

Existing ROW

18" X 52' CSP (Good)  
CSES (Good)

72" X 48" X 109' SPPA (Poor)

Str #32-086-605  
N 524766.76 E 2643809.77  
N 524769.57 E 2643906.34  
Single 7'x 6'x 88' Precast RCB  
Winged hdwls

End Reconstruction  
Sta 602+10, RP 86.761

Pipe Replacement  
Sta 604+00, RP 86.744

Begin Reconstruction  
Sta 605+70, RP 86.693

Legend



Reconstruction

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Scope of Work

ND Hwy 32  
11 Miles North of I-94

**NOTES**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	6	1

107-P01 HAUL ROAD RESTRICTIONS: The contractor shall contact the appropriate State, County, Township, City or Political Subdivision official(s) to determine if the proposed haul road has local load restrictions or is designated as a "No Haul Route" prior to preparing a bid for this project. Paved roads off the state system will not be designated as haul roads by the NDDOT. If the contractor chooses to use a paved road off the state system for this project, the contractor shall be responsible for all costs of the inspection, maintenance, restoration, and release of the haul road. The entire haul cycle, loaded and empty, will be considered for haul routes.

202-P01 ABUTTING PAVEMENT: Where the new pavement will abut existing pavement, a full-depth vertical saw cut shall be made along the entire length of the joint. The material to be removed shall then be removed without disturbing the material that is designated to remain. The sawed edge shall be reasonably free of frays or spalls. The new pavement shall be placed so as to match the existing pavement and so as to provide a satisfactory surface profile. Any intermediate saw cuts performed to aid in the removal of pavements shall not be paid for separately.

The areas to be sawed are shown on the removal sheets. Sawing shall be paid for as "Saw Bituminous Surfacing – Full Depth."

202-P02 REMOVAL OF BITUMINOUS SURFACING: Existing typical sections are based on old grading and paving plans. Actual thickness might vary due to previous construction methods or intermittent patching. No additional payment will be made for unforeseen pavement thickness. All bituminous pavement and aggregate base removal shall be paid for as "Removal of Bituminous Surfacing."

203-P01 MITIGATION WETLAND - EXCAVATION: There is one wetland which will be permanently impacted by the pipe replacement on Highway 32. The impacted wetland will be mitigated on-site within NDDOT Right of Way. At the proposed mitigation location (as shown in Section 75), the contractor is required to strip the existing topsoil and excavate for the newly created mitigation wetland. This excavation shall be constructed to a depth that would accommodate the placement of the wetland topsoil. The top of the created wetland shall be constructed to an elevation that is 1 foot lower than the invert elevation of the adjacent pipe.

The contractor will be required to excavate approximately an 18" depth at this location (12" of earth and 6" of topsoil). The excavated material from the mitigation wetland location may be used as wetland topsoil, or it may be placed on the adjacent roadway foreslope or ditch bottom. All costs for labor, materials, and equipment to remove the earth at the wetland mitigation site shall not be paid for separately but shall be included in price bid for "Pipe Conduit 54 IN".

203-P02 TOPSOIL – WETLAND: The Contractor shall strip a minimum of 6 inches of topsoil from the permanent wetland impact area where the outlet riprap will be installed, to be placed in the mitigation wetland area near the inlet of the pipes.

The Contractor shall place and spread a minimum of 6 inches of this wetland topsoil at the mitigation site. If the wetland topsoil has been stockpiled for more than 30 days, the Contractor shall place, spread, and seed the wetland topsoil with the Wetland Seed Mix in accordance with 251 .03 F.

The Contractor shall include all costs for removal, stockpiling, seeding, and placement of the wetland topsoil in the price bid for "Topsoil." The location and boundaries of the impacted wetland and mitigation wetland is shown in Section 75 of the plans.

302-P01 PIPE REPLACEMENT – TEMP SURFACING: In the areas designated for the pipe replacement, the roadbed shall have the existing pavement surface and aggregate removed, the required earthwork performed, and brought back to grade with suitable backfill and aggregate base.

The contractor shall be responsible for maintaining these gravel sections to a condition satisfactory for all-weather use or as accepted by the engineer in the field. An additional 200 tons of "Aggregate Base Course CI 5" has been provided for the pipe replacement locations.

302-P02 TRAFFIC SURFACE AGGREGATE: The Contractor shall provide 250 tons of Temporary Traffic Surface Aggregate to be used to maintain traffic during construction. This is sufficient quantity for a single lift, 18' wide, 3" thick for each of the 400' long temporary bypasses. The aggregate is to be used as directed by the Engineer in the field.

The Traffic Service Aggregate shall consist of existing bituminous or aggregate base that was removed and salvaged, Aggregate Base Course Class 5 or other aggregate approved by the engineer in the field. The bituminous material must proceed to pass a 2" sieve prior to placing traffic on it.

The Contractor shall make every effort to reuse Traffic Surface Aggregate throughout the life of the project. Material that is contaminated to a point where it cannot be salvaged shall be worked into the embankment. All costs for time, material, and labor required to supply, place, maintain, salvage, and reuse shall be included in the unit bid price for "Temporary Traffic Surface Aggregate".

430-P01 COMMERCIAL GRADE HOT MIX ASPHALT: The asphalt cement and tack required for the HBP pavement will not be measured for payment but shall be included in the price bid for "Commercial Grade Hot Mix Asphalt".

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ND	H-2-032(028)086	6	2

## NOTES

704-P01 TRAFFIC CONTROL DEVICES: Traffic control for the pipe replacement shall consist of a one lane closure with flagging. Traffic Control Devices shall comply with the following Standard Drawings:

D-704-7, 8, 9, 10, 11, 13, and 14 are applicable.

D-704-17: Traffic control for the pipe replacement and paving operations.

D-704-22, Layouts Type K & Type L for construction trucks entering from an aggregate source or a contractor jobsite.

D-704-27: For pavement marking operations.

D-704-31: Traffic control during non-work hours when a single lane is closed

D-704-50: Portable sign support assembly

D-704-56: For installation of rumble strips.

The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid for at the Contract Unit price for each device. Additional devices required to accommodate the Contractor's operation shall be the Contractor's responsibility.

704-P02 TRAFFIC CONTROL FOR PIPE REPLACEMENT: Traffic control for the installation of the centerline pipe conduits shall be as follows:

- Construction Sign Layout for Work Hours - Single Lane Open will be used when the pipes are being placed.
- Construction Sign Layout for Non-Work Hours - Single Lane Open will be used if the contractor is unable to complete the centerline pipe replacement work in one working day. To maintain a single lane of traffic at night, an eighteen foot wide driving surface shall be provided with 4:1 foreslopes and the use of stackable vertical panels.
- Construction Sign Layout for Non-Work Hours - Two Lanes Open will be used after the pipes are placed, two-way traffic is returned, but prior to paving.

714-P01 PIPE EARTHWORK: Additional earthwork may have to be performed by the contractor in order to maintain at least one lane of traffic when replacing the structural plate pipe with dual pipe conduit. The lane shift bypass alignment and profile is shown in Sec 60 Plan and Profile sheets. The construction sequencing typical sections are shown in Sec 100 Work Zone Traffic Control Typical sections. Any additional earthwork required for the installation of the pipe conduit will not be paid for separately but shall be included in the price bid for "Pipe Conduit 54 IN".

Due to the installation of two pipes at this location to replace the single structural plate pipe, and due to the thicker base section required for the new surfacing, there will be excess earth material available on the project. This may be wasted along the right of way or blended into the existing slopes as directed by the engineer. The excess material shall not be placed in an existing wetland.

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## ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	6	3

**ENVIRONMENTAL COMMITMENTS:** The North Dakota Department of Transportation and the Federal Highway Administration have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

**Commitment No. 1:** Unavoidable impacts to wetlands will be mitigated onsite. Approximately 0.03 acre of wetlands will be impacted temporarily, and 0.02 acre will be impacted permanently.

Action taken/required: Temporary impacts will not be mitigated.

Permanent impacts will be mitigated at created wetlands located within the project right of way.

Mitigation will be provided for impacts to natural wetlands, and 0.02 acre requires mitigation at a 1:1 ratio.

A wetland Jurisdictional Determination was issued by the USACE on 4/11/2014; NWO-2014-0700-BIS, for Wetlands 1a and 1b.

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		Wetland Mitigation				
							Temp. Ac.	Perm. Ac.	Mitigation Required			Location; Acreage; Wetland#; Ratio	Onsite Mitigation Acres
									EO 11990	USACE	USFWS		
1a	Sec.32, T142N, R56W	PEMC	Slope	0.03	Natural	Y	0.03	0.01	N	N	N		0.02
1b	Sec. 33, T142N, R56W	PEMC	Slope	0.01	Natural	Y	None	0.01	Y	N	N	Onsite 0.02 at WL 1a (1:1)	
<b>Totals</b>				<b>0.04</b>			<b>0.03</b>	<b>0.02</b>					<b>0.02</b>

\* A wetland Jurisdictional Determination was issued by the USACE on 4/11/2014; NWO-2014-0700-BIS.

**ENVIRONMENTAL COMMITMENTS**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	6	4

<b>Summary Impact Table</b>			
<b>Total Permanent Impact Summary</b>		<b>Temporary Impacts and additional information</b>	
<b>Wetland Type</b>	<b>Total (Acres)</b>	<b>Wetland Type</b>	<b>Total (Acres/Lf)</b>
Natural/JD	0.02	Temporary JD	0.03
Natural/Non-JD	0	Non-JD Temporary	0
Artificial/JD	0	Permanent JD > 0.10	0
Artificial /Non-JD	0	Permanent OW	0
<b>Total</b>	<b>0.02</b>	<b>Temporary OW</b>	<b>0</b>

<b>Compensation Requirements by Agency and Water Type</b>		
<b>Water Type</b>	<b>USACE Mitigation</b>	<b>EO 11990 Mitigation</b>
Natural/JD Wetland	> 0.1 acre	All
Natural/Non-JD Wetland	No mitigation required	All
Artificial/JD Wetland	> 0.1 acre	No mitigation required
Artificial/Non-JD Wetland	No mitigation required	No mitigation required
Deep Water (> than 6.6 feet)	No mitigation required	No mitigation required
Other Water	> 300 linear feet	No mitigation required
Preamble	No mitigation required	No mitigation required

# ESTIMATE OF QUANTITIES

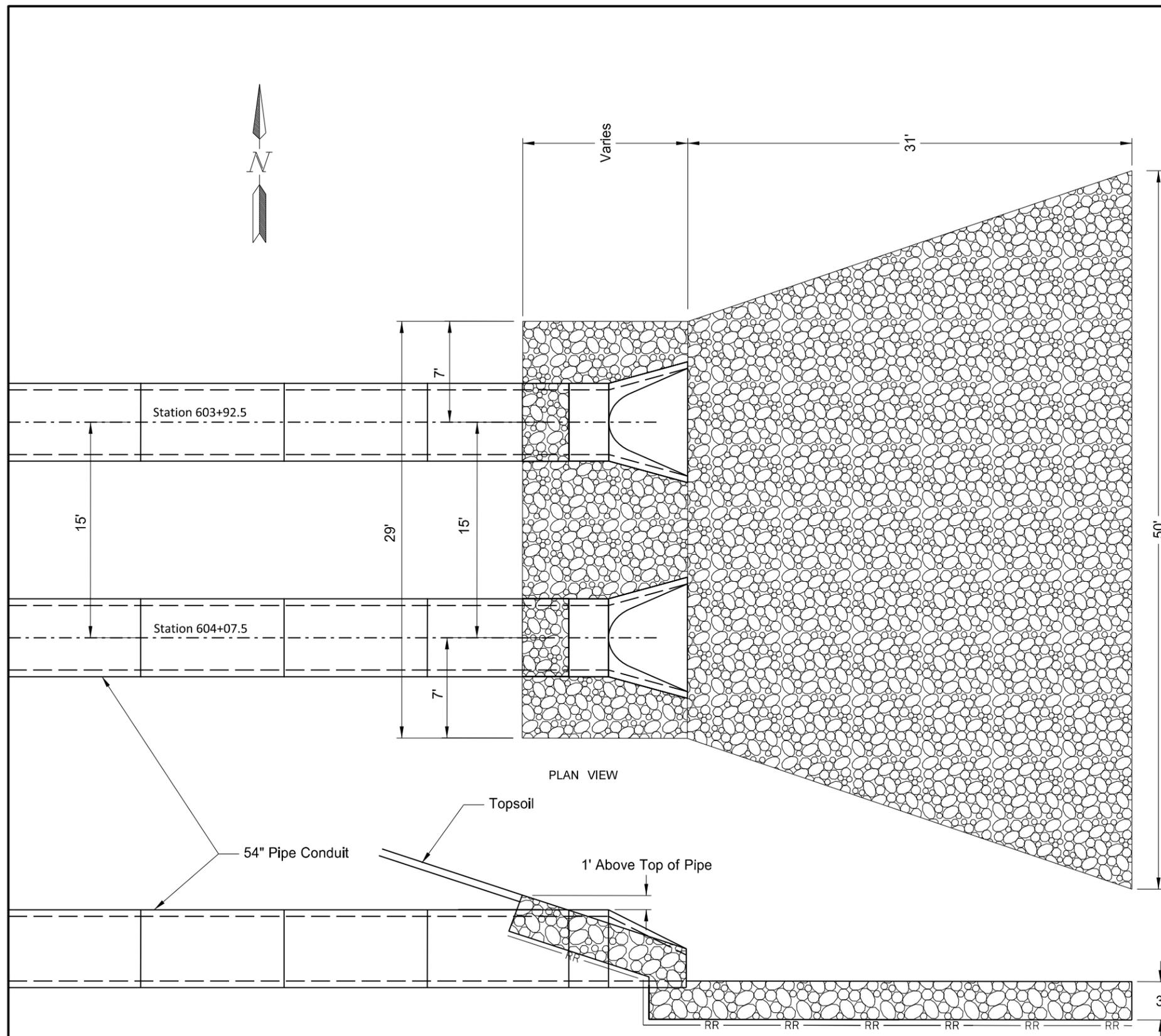
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
202	0132 REMOVAL OF BITUMINOUS SURFACING	SY	1,231	1,231
202	0153 SAW BITUMINOUS SURFACING-FULL DEPTH	LF	62	62
202	0178 REMOVE STRUCTURAL PLATE PIPE	EA	1	1
203	0109 TOPSOIL	CY	586	586
216	0100 WATER	M GAL	36	36
251	0200 SEEDING CLASS II	ACRE	1.7	1.7
251	2000 TEMPORARY COVER CROP	ACRE	1.7	1.7
253	0101 STRAW MULCH	ACRE	1.7	1.7
255	0102 ECB TYPE 2	SY	96	96
256	0200 RIPRAP GRADE II	CY	192	192
261	0112 FIBER ROLLS 12IN	LF	1,140	1,140
261	0113 REMOVE FIBER ROLLS 12IN	LF	540	540
302	0120 AGGREGATE BASE COURSE CL 5	TON	1,070	1,070
302	0314 TEMPORARY TRAFFIC SURFACE AGGREGATE	TON	250	250
430	0500 COMMERCIAL GRADE HOT MIX ASPHALT	TON	316	316
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	200	200
704	1000 TRAFFIC CONTROL SIGNS	UNIT	1,544	1,544
704	1052 TYPE III BARRICADE	EA	4	4
704	1060 DELINEATOR DRUMS	EA	12	12
704	1080 STACKABLE VERTICAL PANELS	EA	36	36
709	0151 GEOSYNTHETIC MATERIAL TYPE R1	SY	720	720
709	0155 GEOSYNTHETIC MATERIAL TYPE RR	SY	201	201
714	4130 PIPE CONDUIT 54IN	LF	216	216
754	0805 OBJECT MARKERS - CULVERTS	EA	4	4
760	0005 RUMBLE STRIPS - ASPHALT SHOULDER	MILE	0.133	0.133
760	0007 RUMBLE STRIPS - ASPHALT CENTERLINE	MILE	0.066	0.066
762	0430 SHORT TERM 4IN LINE-TYPE NR	LF	680	680
762	1104 PVMT MK PAINTED 4IN LINE	LF	3,040	3,040



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	20	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
256	0200	RIPRAP GRADE II		
		Stations 603+92.5 and 604+07.5	CY	192
709	0155	GEOSYNTHETIC MATERIAL TYPE RR		
		Stations 603+92.5 and 604+07.5	SY	201



NOTE: For the plan view location, see Section 60 and Section 75

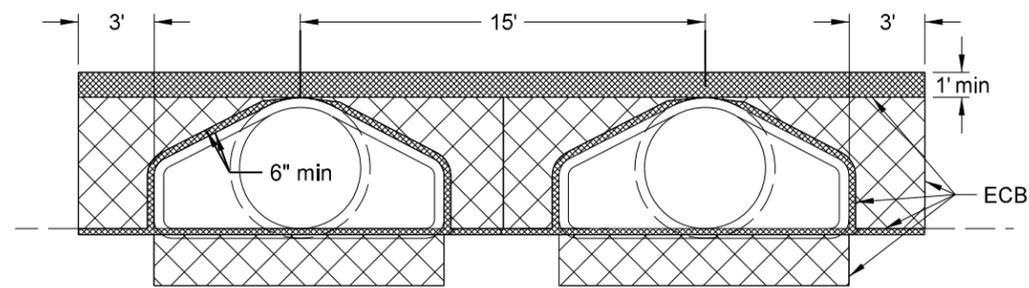
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Riprap At Pipe Outlets

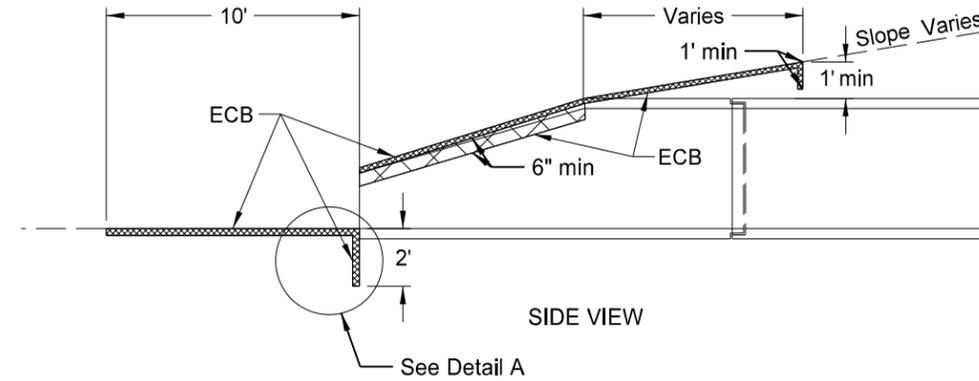
ND Hwy 32  
 11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	20	2

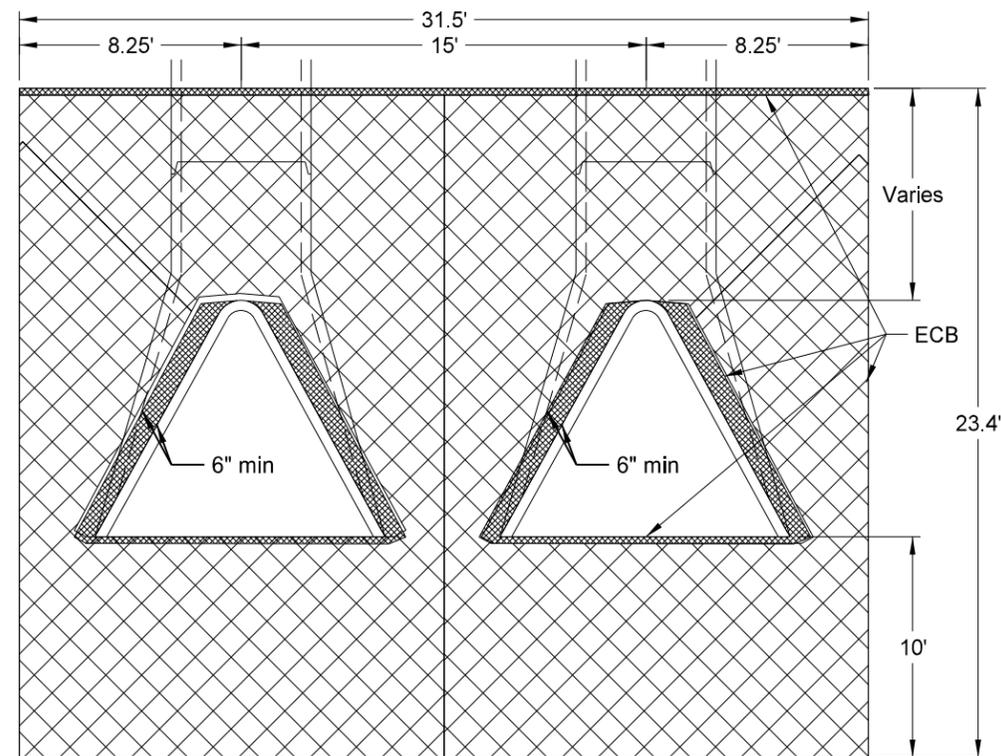
SPEC CODE	BID ITEM	UNIT	QUANTITY
255 0102	ECB TYPE 2		
	Pipe Replacement (Inlet End)	SY	96



FRONT VIEW

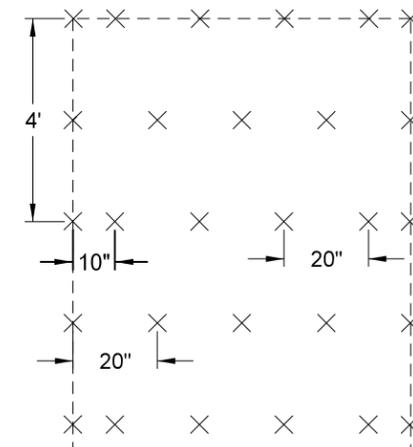


SIDE VIEW

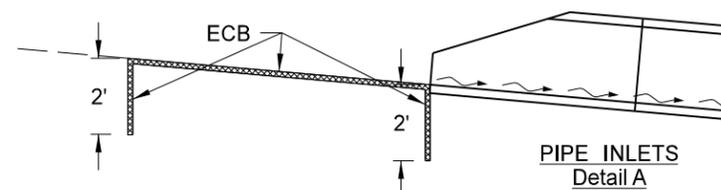


TOP VIEW

NOTE: The ECB shall be tucked a minimum of 1' into the embankment above the flared end section, a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section, and 2' into the ground at the end of the flared end section.



STAPLE PATTERN: 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples



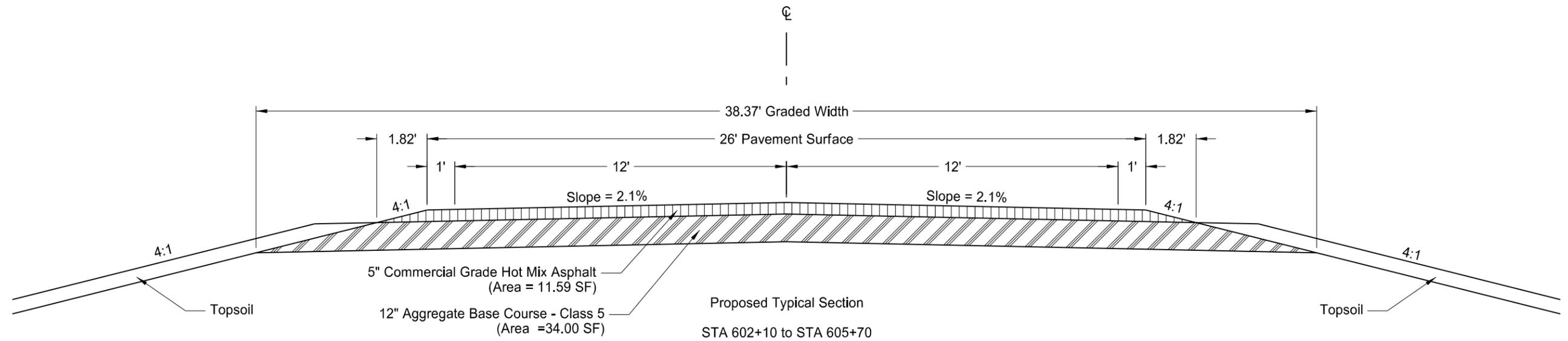
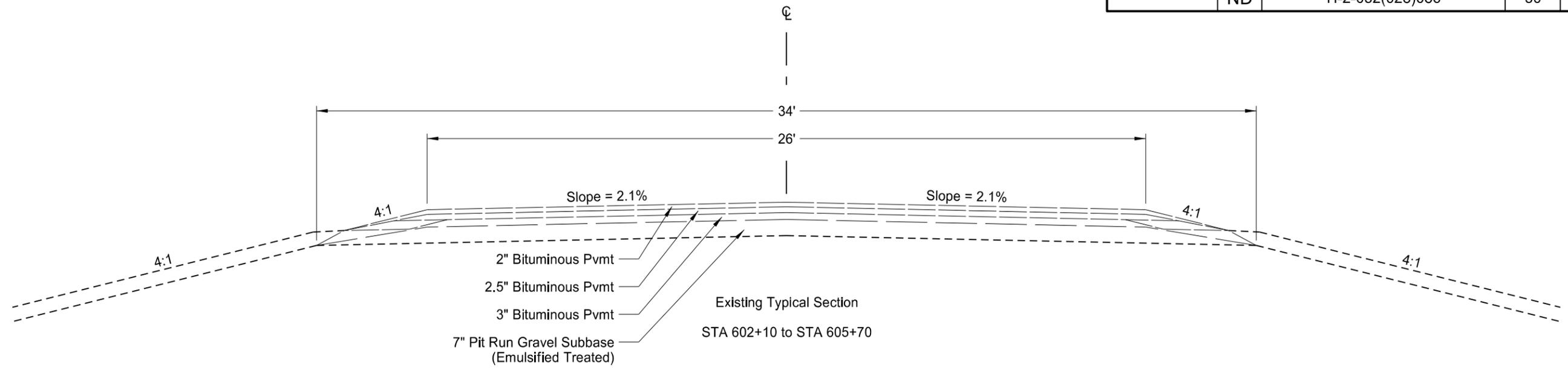
PIPE INLETS  
Detail A

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Culvert End Protection Details

ND Hwy 32  
11 Miles N of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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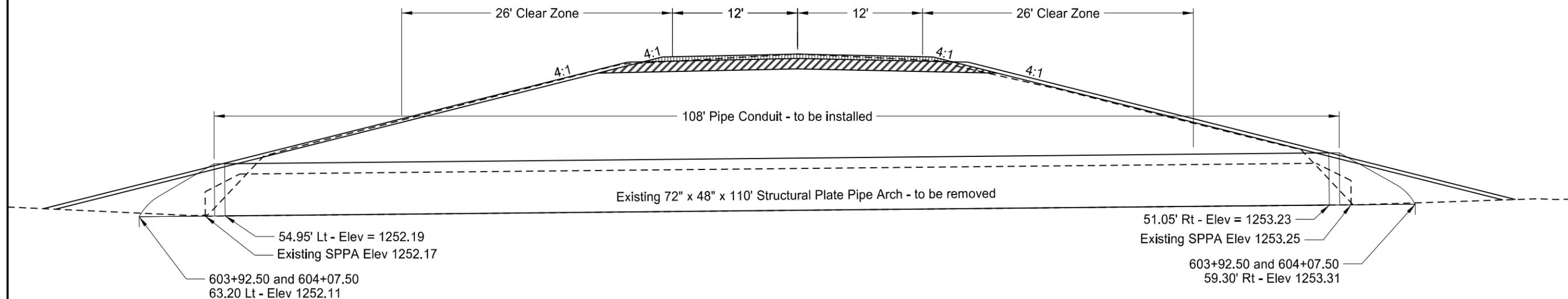
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Existing and Proposed Typical Sections

ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	30	2



Pipe Typical Section

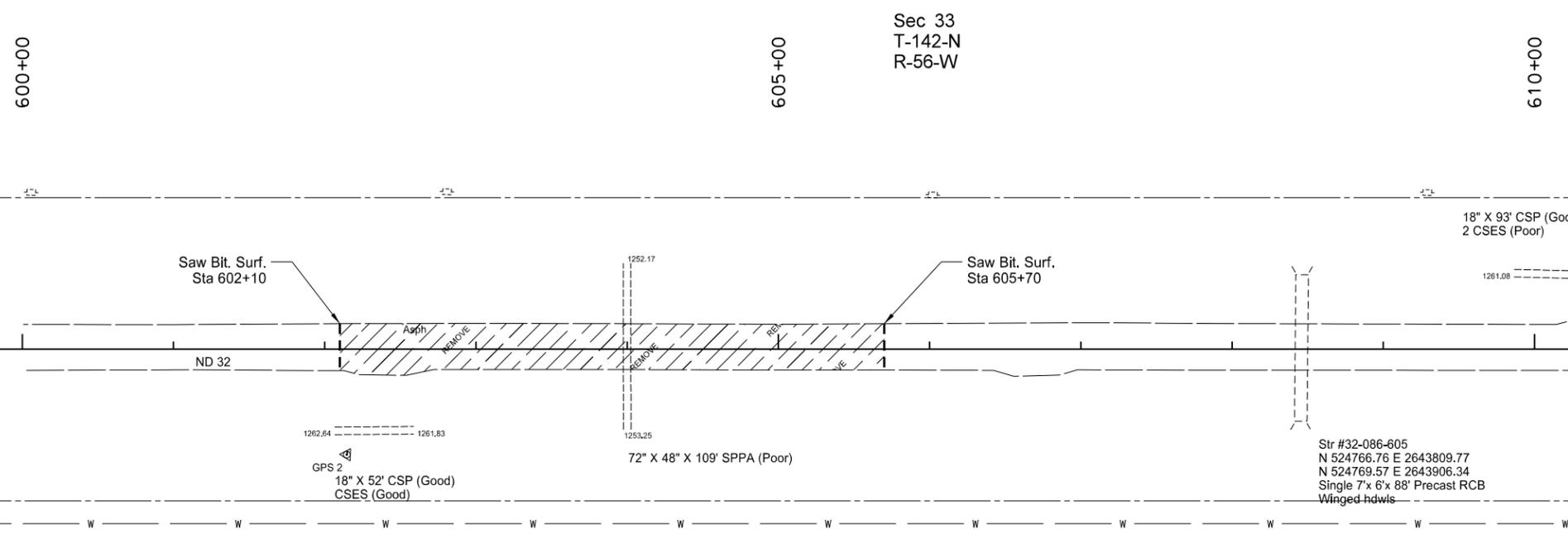
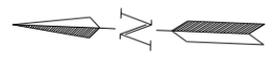
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Pipe Typical Section

ND Hwy 32  
 11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	40	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	0132	REMOVAL OF BITUMINOUS SURFACING		
		STA 602+10 to STA 605+70	SY	1,231
202	0153	SAW BITUMINOUS SURFACING - FULL DEPTH		
		STA 602+10 and STA 605+70	LF	62

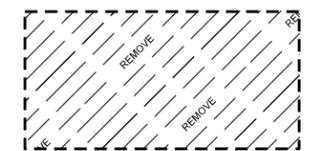


Sec 33  
T-142-N  
R-56-W

BARNES  
COUNTY

Sec 32  
T-142-N  
R-56-W

Legend



Removal of Bituminous Surfacing

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Pavement Removals  
  
ND Hwy 32  
11 Miles North of I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	H-2-032(028)086	50	1

HYDRAULIC DATA FOR PROJECTS H-2-032(028)086 (A)									
STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA (B)				100-YEAR DATA (B)	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
604+00	6'-9" X 4'-11" SPPA	Double 54"	6014.0	400.0	8.94	14.85	1262.24	705.0	1263.58

(A) Hydraulic data provided is for smooth-walled (Manning's n=0.012) type conduits.  
(B) The existing drainage patterns and drainage design allow for some of the discharge (approximately 10 cfs at the 25-year event) to overtop a field approach at STA 606+70 Rt at elevation 1262.06 NAVD 88 to flow through the RCB at STA 608+45 located 445 feet south of this location.

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Culvert Hydraulic Data  
ND 32  
11 Miles North of I-94  
Oriska Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Conduit Pay Length	Pipe Conduit Pay Size	Allowable Material	Required Diameter (or Size)	Minimum Thickness	R1 Fabric (Pay Item)	End Sections (A)		Remove Structural Plate Pipe	Applicable Backfill Detail
										Begin	End		
				LF	In		In	In	SY	EA	EA	EA	
603+92.5	54.95' Lt	603+92.5	51.05' Rt	108	54	Reinforced Concrete Pipe - Class III (barrel length = 104 LF)	54		360	1	1	1	D-714-25M
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 2-2/3" x 1/2" Corrugations	60	0.109					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3" x 1" Corrugations	60	0.064					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 5" x 1" Corrugations	60	0.064					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3/4" X 3/4" Rib @ 7-1/2"	54	0.079					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3/4" X 1" Rib @ 11-1/2"	54	0.064					
604+07.5	54.95' Lt	604+07.5	51.05' Rt	108	54	Reinforced Concrete Pipe - Class III (barrel length = 104 LF)	54		360	1	1	1	D-714-25M
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 2-2/3" x 1/2" Corrugations	60	0.109					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3" x 1" Corrugations	60	0.064					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 5" x 1" Corrugations	60	0.064					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3/4" X 3/4" Rib @ 7-1/2"	54	0.079					
						Polymeric Coated Steel (over Zinc or Aluminum Coated Steel) 3/4" X 1" Rib @ 11-1/2"	54	0.064					
<b>TOTAL</b>				216					720	2	2	1	

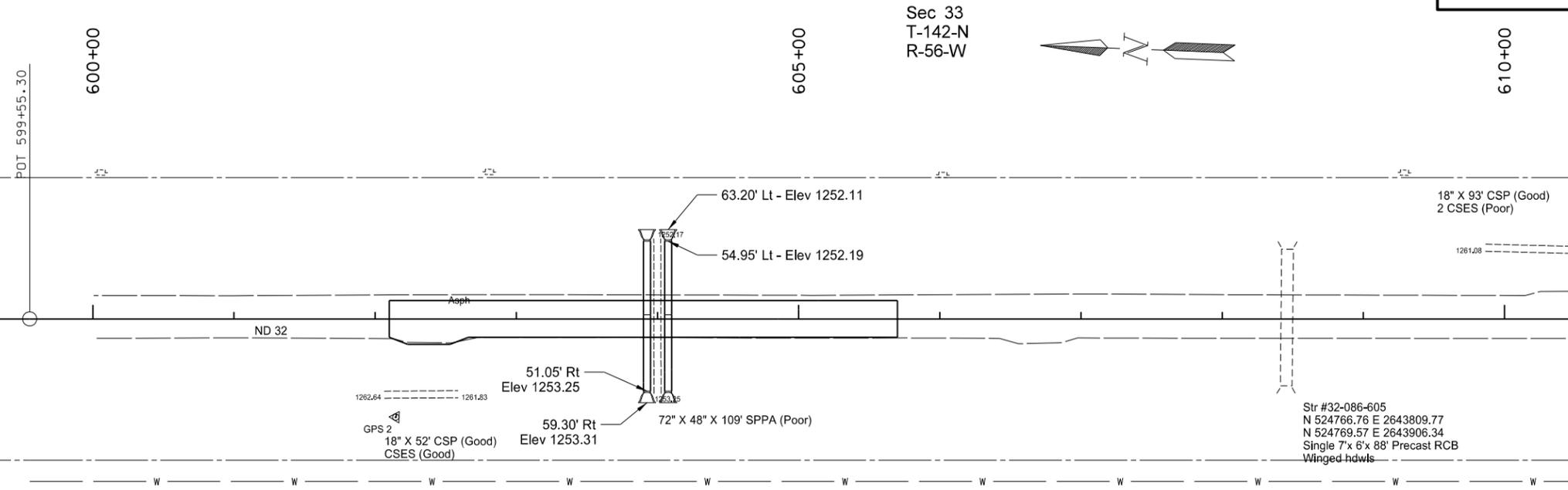
NOTE:

(A) Not paid for separately, but to be included in the price bid for Pipe Conduit

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Allowable Pipe Materials  
  
 ND Hwy 32  
 11 Miles North of I-94

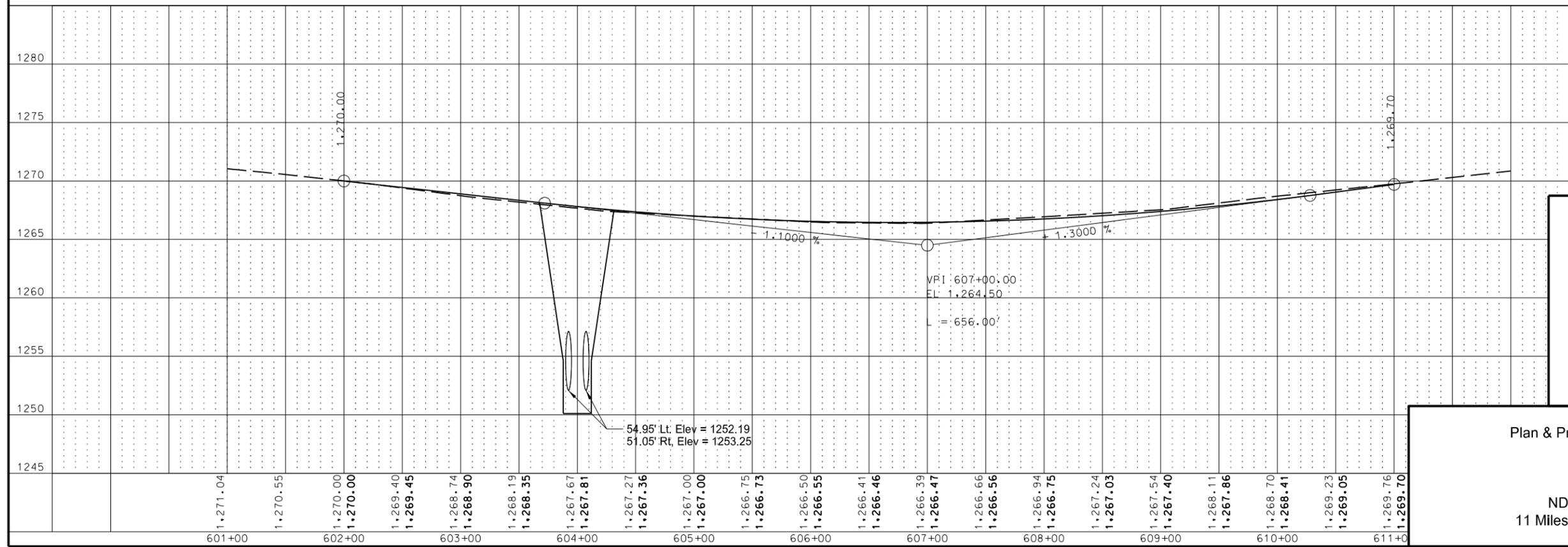
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	60	1



SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	0178	REMOVE STRUCTURAL PLATE PIPE STA 604+00	EA	1
709	0151	GEOSYNTHETIC MATERIAL TYPE R1 STA 603+92.5 and STA 604+07.5	SY	720
714	4130	PIPE CONDUIT 54 IN STA 603+92.5 and STA 604+07.5	LF	216
754	0805	OBJECT MARKERS - CULVERTS STA 603+92.5 and STA 604+07.5	EA	4

Sec 32  
T-142-N  
R-56-W

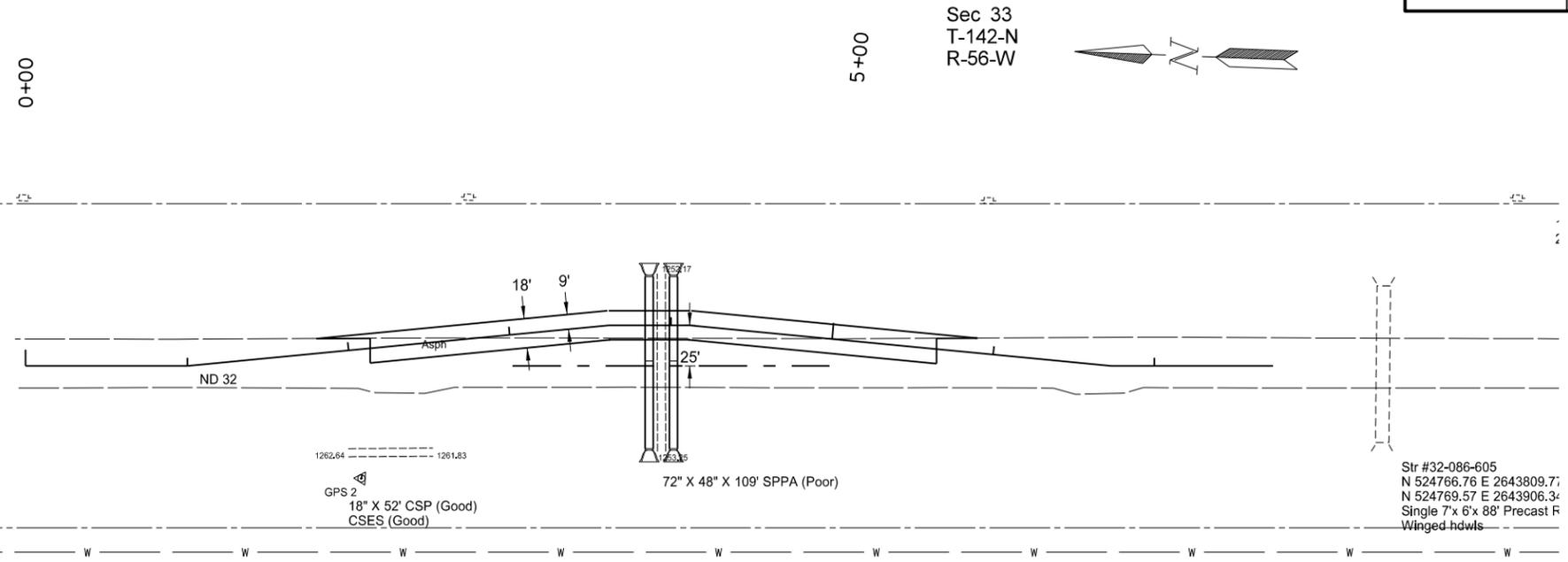
BARNES  
COUNTY



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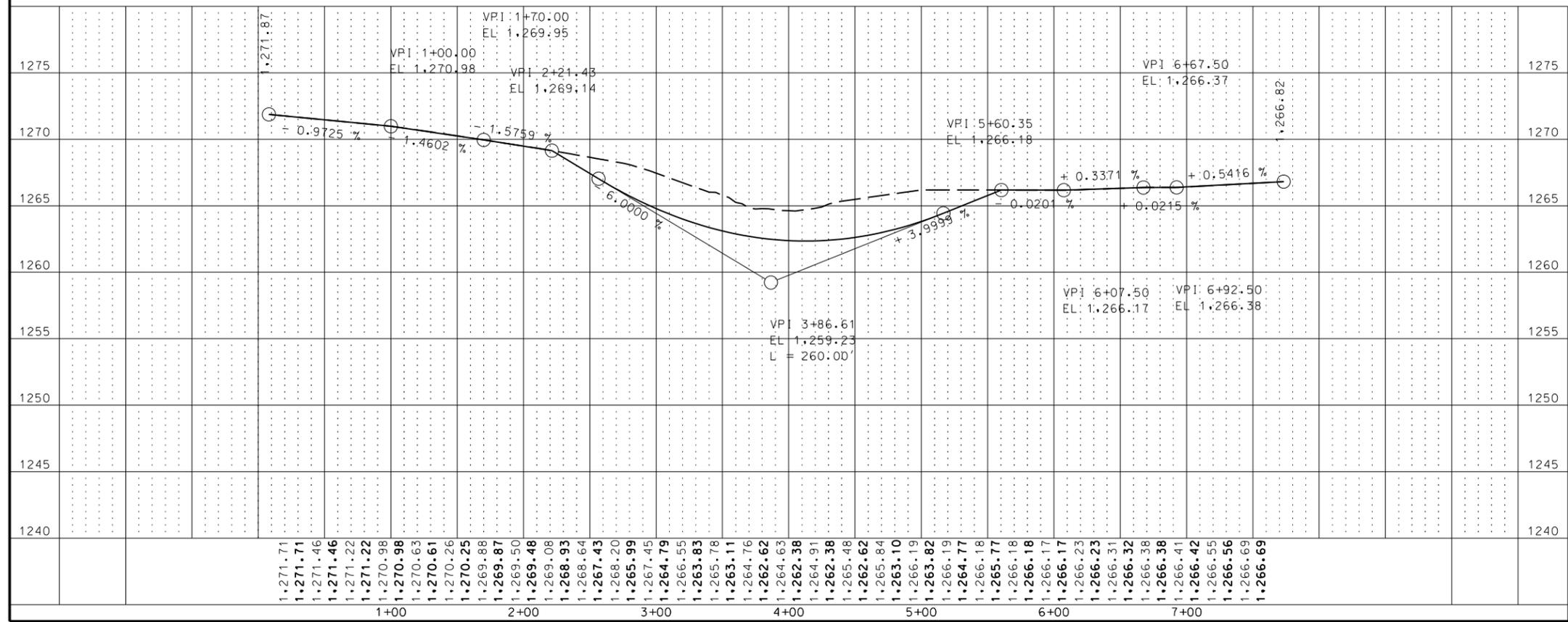
Plan & Profile - Hwy 32

ND Hwy 32  
11 Miles North of I-94



Sec 32  
T-142-N  
R-56-W

BARNES COUNTY

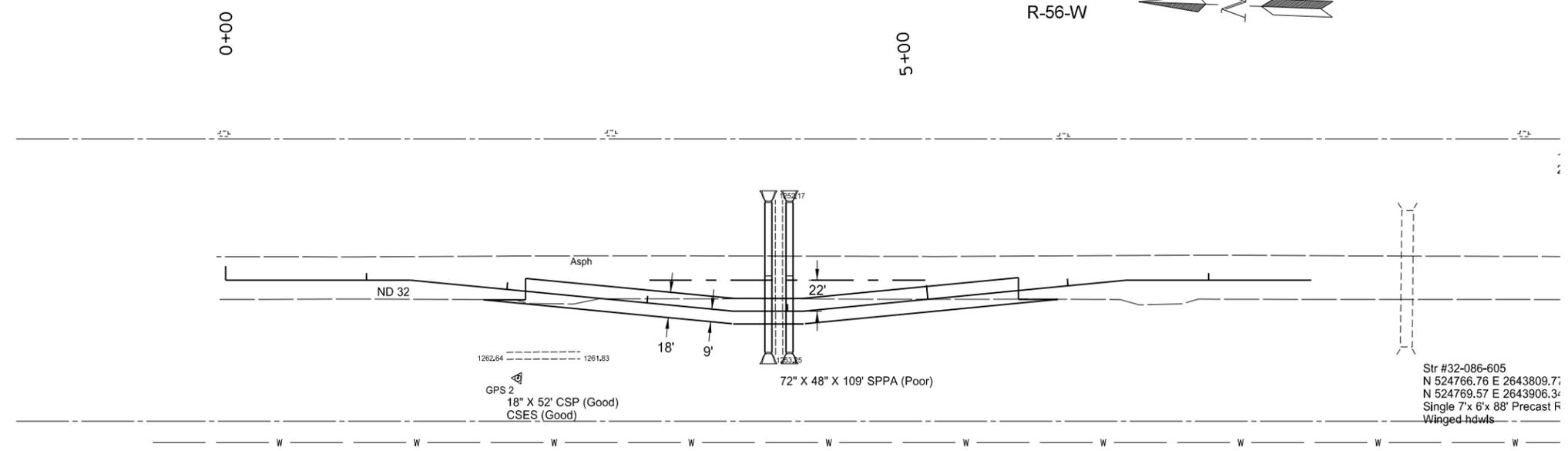


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Plan & Profile -  
East Temp Bypass

ND Hwy 32  
11 Miles North of I-94

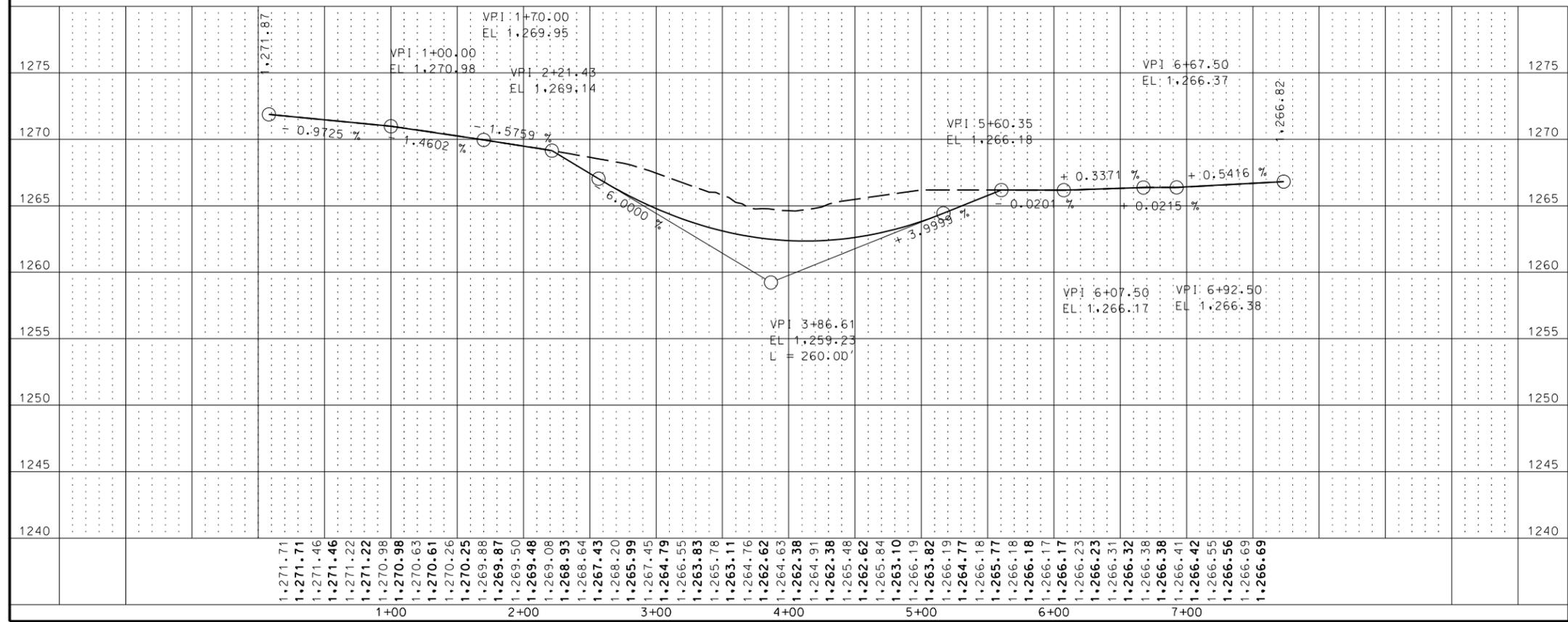
Sec 33  
T-142-N  
R-56-W



Str #32-086-605  
N 524766.76 E 2643809.7  
N 524769.57 E 2643906.3  
Single 7' x 6' x 88' Precast R  
Winged hdwls

Sec 32  
T-142-N  
R-56-W

BARNES COUNTY

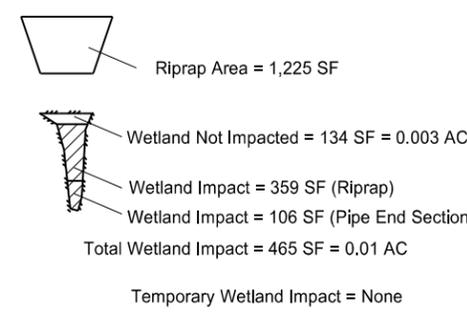
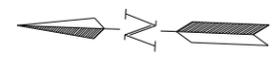


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Plan & Profile -  
West Temp Bypass

ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	75	1



600+00

Wetland #1b  
Temporary Wetland Impact = None  
Permanent Wetland Impact = 0.01 Acre

Sec 33  
T-142-N  
R-56-W

610+00

Wetland 1b - Area = 599 SF = 0.014 AC

18" X 93' CSP (C  
2 CSES (Poor)

ND 32

72" X 48" X 109' SPPA (Poor)

Wetland Mitigation = 885 SF = 0.02 AC  
(North Area = 438 SF)  
(South Area = 447 SF)

Str #32-086-605  
N 524766.76 E 2643809.77  
N 524769.57 E 2643906.34  
Single 7' x 6' x 88' Precast RCB  
Winged hdwls

GPS  
18" X 52' CSP (Good)  
CSES (Good)

Wetland 1a - Area = 1,290 SF = 0.03 AC

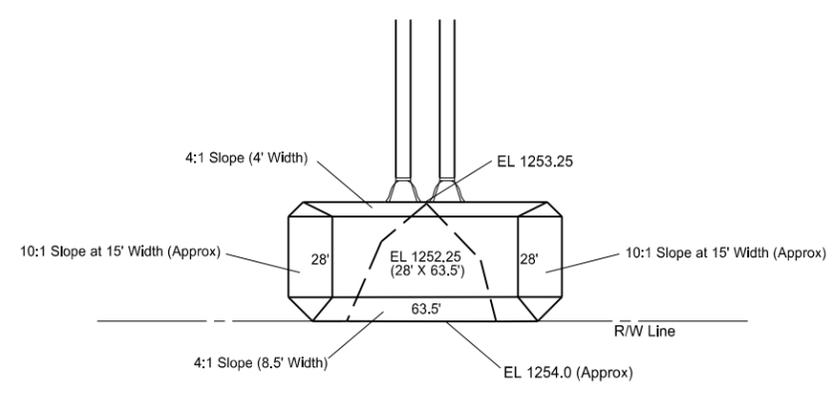
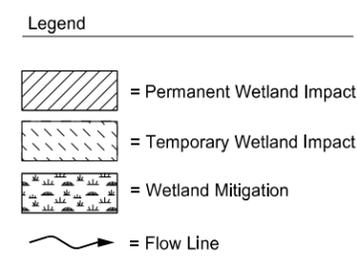
Sec 32  
T-142-N  
R-56-W

BARNES  
COUNTY

Wetland Impact = 13 SF (NE Slope)  
Wetland Impact = 407 SF (NW Slope)  
Total Wetland Impact = 420 SF = 0.01 AC  
Temporary Wetland Impact = 1,290 SF = 0.03 AC

Wetland #1a  
Temporary Wetland Impact = 0.03 Acre  
Permanent Wetland Impact = 0.01 Acre  
Wetland Mitigation = 0.02 Acre

Permanent Wetland Impact = 465 + 420 = 885 SF = 0.02 AC



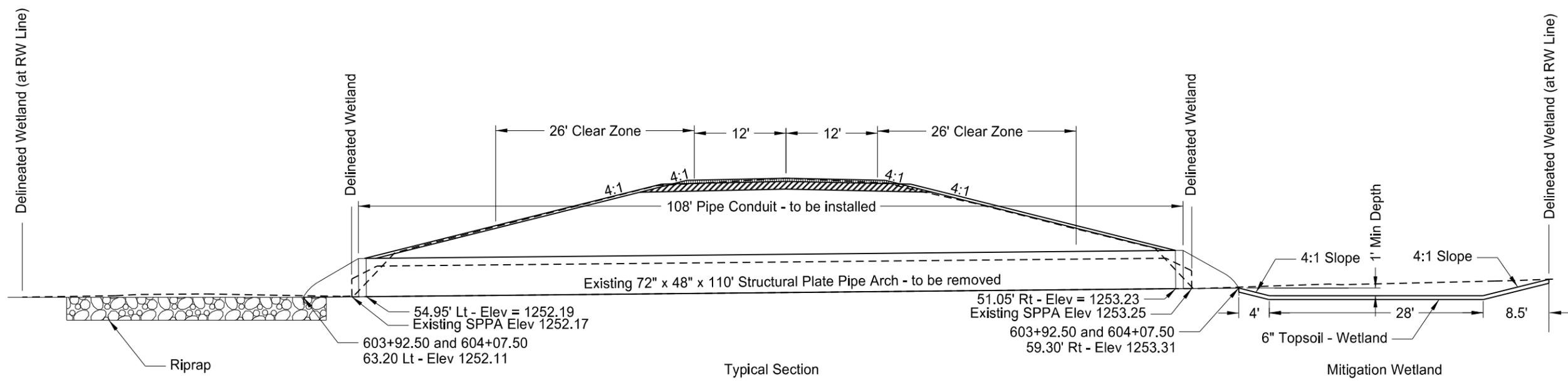
Mitigation Wetland - Excavation Layout

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Wetland Impacts and Mitigation

ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	75	2



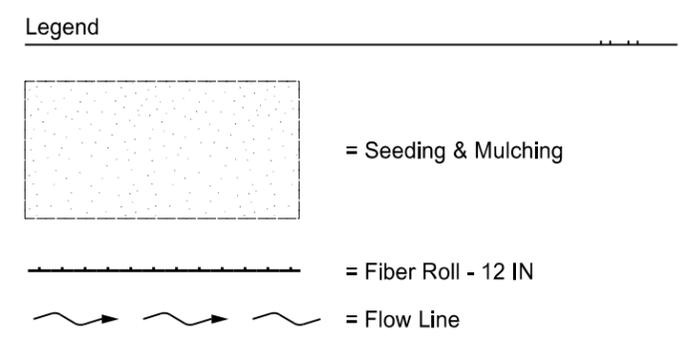
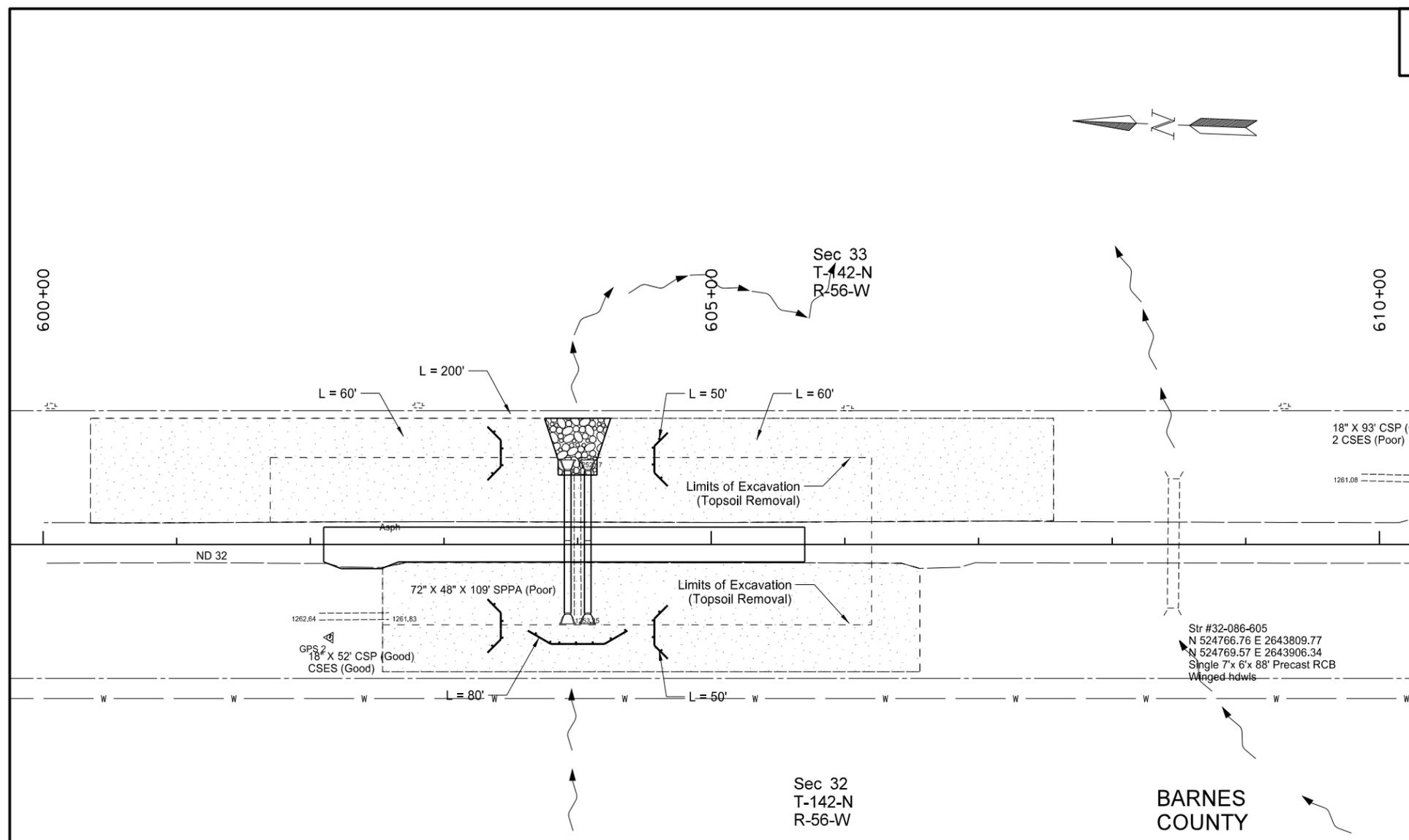
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Wetland Mitigation  
 Cross Section at 604+00  
 ND Hwy 32  
 11 Miles North of I-94



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	77	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
203 0109	TOPSOIL Pipe Replacement	CY	586
261 0112	FIBER ROLLS 12 IN 420 LF East and 180 LF West	LF	600
251 0200	SEEDING CLASS II Pipe Replacement	AC	1.7
251 2000	TEMPORARY COVER CROP Pipe Replacement	AC	1.7
253 0101	STRAW MULCH Pipe Replacement	AC	1.7

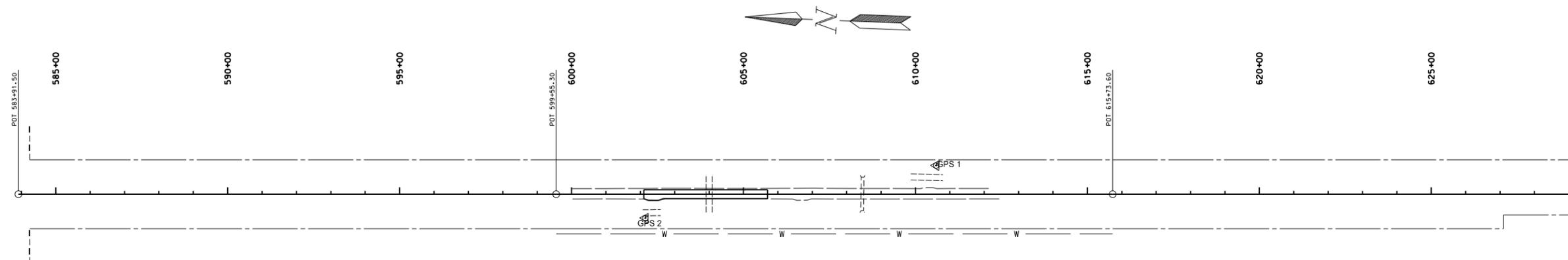


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Permanent Erosion Control  
 Topsoil, Seeding & Mulching  
 ND Hwy 32  
 11 Miles North of I-94



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	H-2-032(028)086	82	1



Chain EX 32 OL contains:  
8001 8002 8003 8004

Beginning chain EX 32 OL description

```

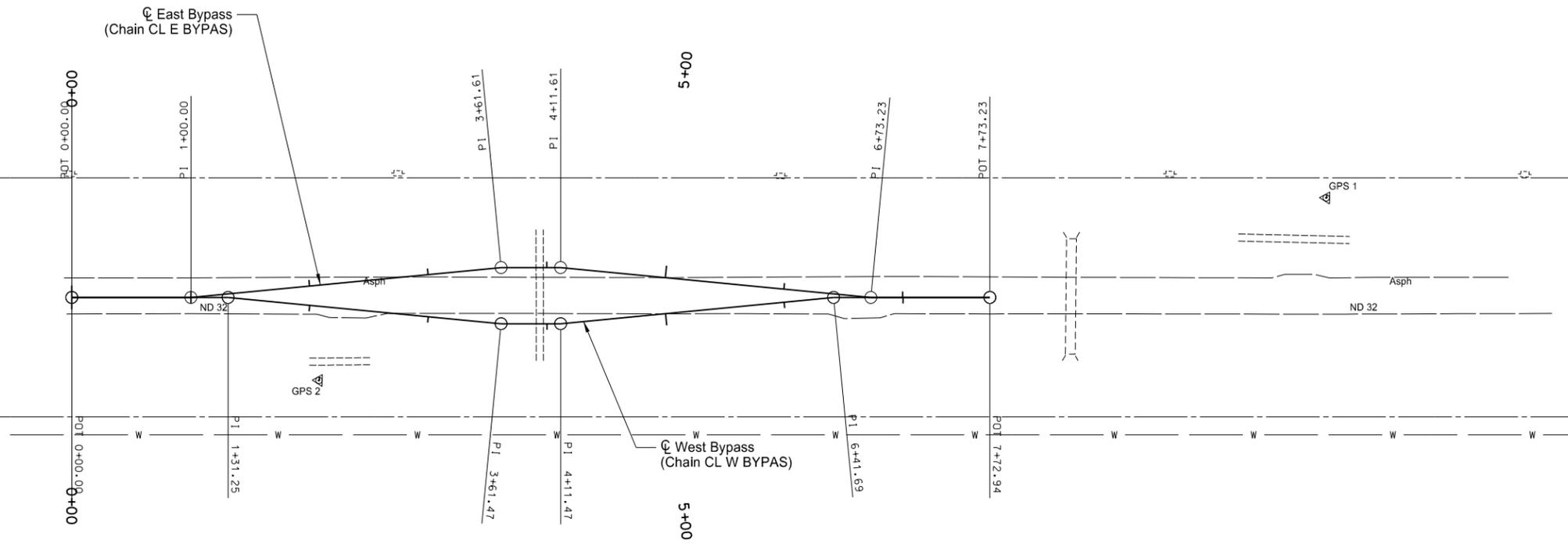
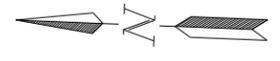
=====
Point 8001      N  527,220.6699 E  2,643,761.2368 Sta  583+91.50
Course from 8001 to 8002 S 2° 14' 28.18" E Dist 1,563.8000
Point 8002      N  525,658.0661 E  2,643,822.3902 Sta  599+55.30
Course from 8002 to 8003 S 2° 14' 28.18" E Dist 1,618.3000
Point 8003      N  524,041.0040 E  2,643,885.6749 Sta  615+73.60
Course from 8003 to 8004 S 2° 14' 28.18" E Dist 1,356.2000
Point 8004      N  522,685.8414 E  2,643,938.7099 Sta  629+29.80
=====

```

Ending chain EX 32 OL description

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Office Alignment Description - ND Hwy 32  
  
ND Hwy 32  
11 Miles North of I-94



Chain CL\_E\_BYPAS contains:  
8500 8501 8502 8503 8504 8505

Beginning chain CL\_E\_BYPAS description

```

=====
Point 8500      N   525,606.3224 E  2,643,824.4152 Sta   0+00.00
Course from 8500 to 8501 S 2° 14' 28.18" E Dist 100.0000
Point 8501      N   525,506.3989 E  2,643,828.3258 Sta   1+00.00
Course from 8501 to 8502 S 7° 43' 29.10" E Dist 261.6139
Point 8502      N   525,247.1591 E  2,643,863.4904 Sta   3+61.61
Course from 8502 to 8503 S 2° 14' 28.17" E Dist 50.0000
Point 8503      N   525,197.1973 E  2,643,865.4457 Sta   4+11.61
Course from 8503 to 8504 S 3° 14' 32.75" W Dist 261.6139
Point 8504      N   524,936.0022 E  2,643,850.6486 Sta   6+73.23
Course from 8504 to 8505 S 2° 14' 28.18" E Dist 100.0000
Point 8505      N   524,836.0787 E  2,643,854.5592 Sta   7+73.23
=====

```

Ending chain CL\_E\_BYPAS description

Chain CL\_W\_BYPAS contains:  
8510 8511 8512 8513 8514 8515

Beginning chain CL\_W\_BYPAS description

```

=====
Point 8510      N   525,606.3224 E  2,643,824.4152 Sta   0+00.00
Course from 8510 to 8511 S 2° 14' 28.18" E Dist 131.2500
Point 8511      N   525,475.1728 E  2,643,829.5478 Sta   1+31.25
Course from 8511 to 8512 S 3° 14' 32.75" W Dist 230.2202
Point 8512      N   525,245.3211 E  2,643,816.5264 Sta   3+61.47
Course from 8512 to 8513 S 2° 14' 28.18" E Dist 50.0000
Point 8513      N   525,195.3593 E  2,643,818.4817 Sta   4+11.47
Course from 8513 to 8514 S 7° 43' 29.10" E Dist 230.2202
Point 8514      N   524,967.2283 E  2,643,849.4265 Sta   6+41.69
Course from 8514 to 8515 S 2° 14' 28.18" E Dist 131.2500
Point 8515      N   524,836.0787 E  2,643,854.5592 Sta   7+72.94
=====

```

Ending chain CL\_W\_BYPAS description

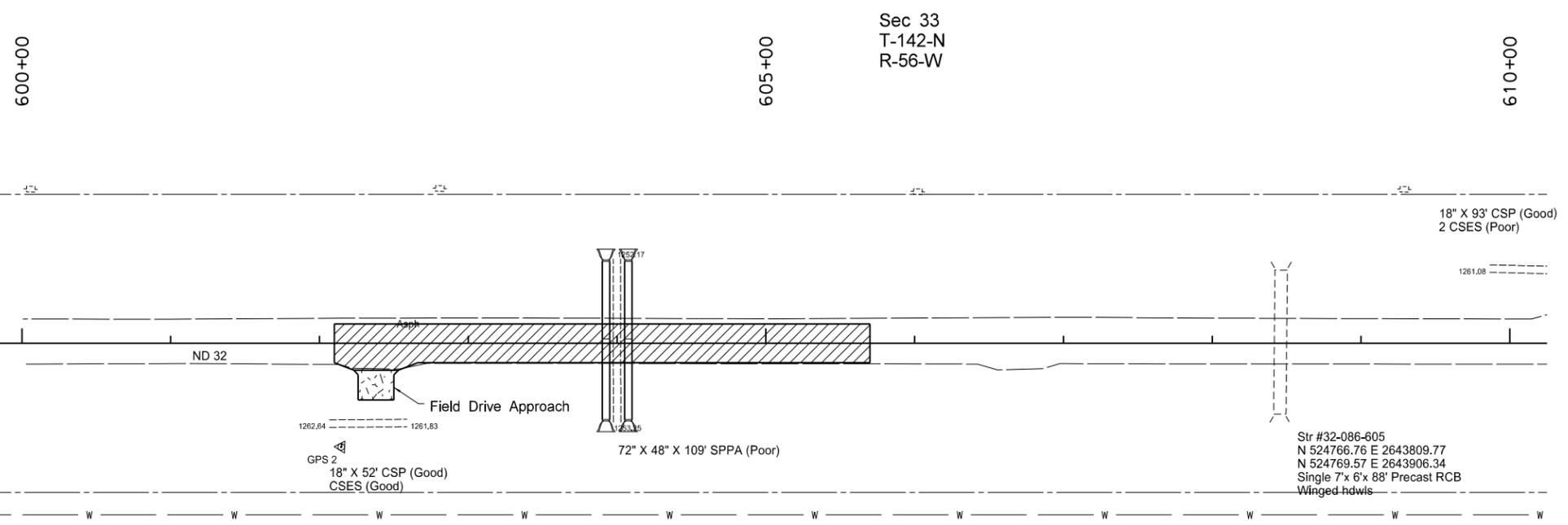
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Office Alignment Description -  
East & West Bypass Lanes

ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	90	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
302 0120	<b>AGGREGATE BASE COURSE CL 5</b>		
	STA 602+10 to STA 605+70	TON	850
	Field Drive	TON	20
430 0500	<b>COMMERCIAL GRADE HOT MIX ASPHALT</b>		
	STA 602+10 to STA 605+70	TON	309
	Field Drive	TON	7

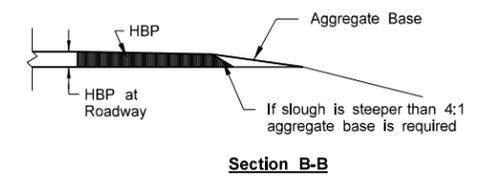
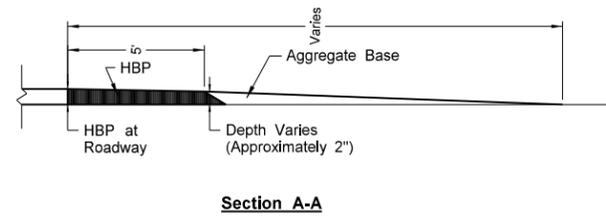
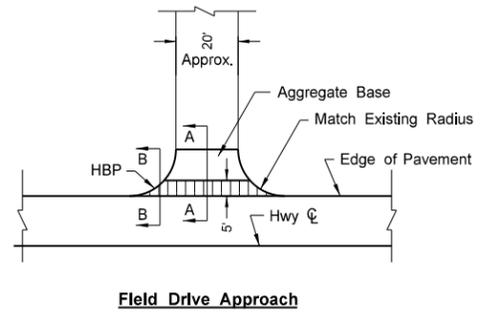
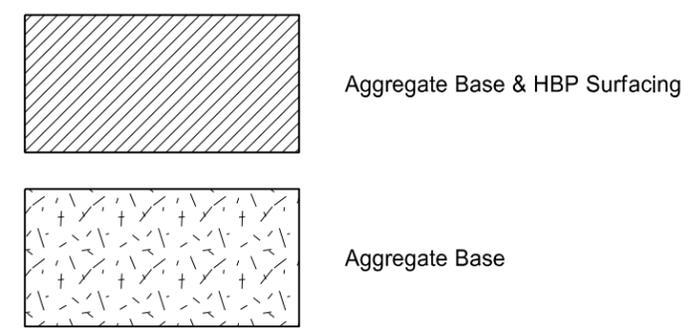


Sec 33  
T-142-N  
R-56-W

Sec 32  
T-142-N  
R-56-W

BARNES  
COUNTY

**Legend**



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Paving Layout

ND Hwy 32  
11 Miles N of I-94

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED			TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			1	2	3			
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)					6	
G20-1-60	60"x24"	ROAD WORK NEXT ___ MILES					34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)					26	
<b>G20-2-48</b>	<b>48"x24"</b>	<b>END ROAD WORK</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>19</b>	<b>38</b>
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)					18	
G20-10-108	108"x48"	CONTRACTOR SIGN					64	
G20-50a-72	72"x36"	ROAD WORK NEXT ___ MILES RT & LT ARROWS					37	
G20-52a-72	72"x24"	ROAD WORK NEXT ___ MILES RT or LT ARROW					30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT					59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)					10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)					10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)					10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)					7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)					7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)					7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)					7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)					7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT					15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT					23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT (Mounted on route marker post)					7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)					7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)					7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)					7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)					7	
<b>R1-1-48</b>	<b>48"x48"</b>	<b>STOP</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>8</b>	<b>32</b>	<b>256</b>
<b>R1-1a-18</b>	<b>18"x18"</b>	<b>STOP and SLOW PADDLE Back to Back</b>	<b>2</b>			<b>2</b>	<b>5</b>	<b>10</b>
R1-2-60	60"x60"	YIELD					29	
<b>R2-1-48</b>	<b>48"x60"</b>	<b>SPEED LIMIT ___</b>	<b>8</b>	<b>8</b>	<b>6</b>	<b>8</b>	<b>39</b>	<b>312</b>
R2-1a-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)					10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT					35	
<b>R4-1-48</b>	<b>48"x60"</b>	<b>DO NOT PASS</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>39</b>	<b>78</b>
R4-7-48	48"x60"	KEEP RIGHT SYMBOL					39	
R5-1-48	48"x48"	DO NOT ENTER					35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT					13	
R7-1-12	12"x18"	NO PARKING					11	
R10-6-24	24"x36"	STOP HERE ON RED					16	
R11-2-48	48"x30"	ROAD CLOSED					28	
R11-2a-48	48"x30"	STREET CLOSED					28	
R11-3a-60	60"x30"	ROAD CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY					31	
R11-3c-60	60"x30"	STREET CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY					31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC					31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW					35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW					35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW					35	
<b>W1-6-48</b>	<b>48"x24"</b>	<b>LARGE ARROW</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>26</b>	<b>52</b>
<b>W3-1-48</b>	<b>48"x48"</b>	<b>STOP AHEAD SYMBOL</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>35</b>	<b>70</b>
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL					35	
W3-4-48	48"x48"	BE PREPARED TO STOP					35	
<b>W3-5-48</b>	<b>48"x48"</b>	<b>SPEED REDUCTION AHEAD</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL					35	
W5-1-48	48"x48"	ROAD NARROWS					35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE					35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW					35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL					35	
<b>W8-1-48</b>	<b>48"x48"</b>	<b>BUMP</b>			<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W8-3-48	48"x48"	PAVEMENT ENDS					35	
W8-7-48	48"x48"	LOOSE GRAVEL					35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF					35	
W8-11-48	48"x48"	UNEVEN LANES					35	
W8-12-48	48"x48"	NO CENTER STRIPE					35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY					35	
<b>W8-54-48</b>	<b>48"x48"</b>	<b>TRUCKS ENTERING AHEAD or ___ FT.</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
<b>W8-55-48</b>	<b>48"x48"</b>	<b>TRUCKS CROSSING AHEAD or ___ FT.</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY					35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL					35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL					35	
W13-1-24	24"x24"	___ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)					11	
W13-4-48	48"x60"	RAMP ARROW					39	
<b>W14-3-48</b>	<b>48"x36"</b>	<b>NO PASSING ZONE</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>23</b>	<b>46</b>
<b>W16-2-30</b>	<b>24"x18"</b>	<b>XXX FEET (plaque)</b>	<b>2</b>			<b>2</b>	<b>4</b>	<b>8</b>
<b>W20-1-48</b>	<b>48"x48"</b>	<b>ROAD WORK AHEAD or ___ FT or ___ MILE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>35</b>	<b>70</b>
W20-2-48	48"x48"	DETOUR AHEAD or ___ FT					35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ___ FT.					35	
<b>W20-4-48</b>	<b>48"x48"</b>	<b>ONE LANE ROAD AHEAD or ___ FT.</b>	<b>4</b>	<b>4</b>		<b>4</b>	<b>35</b>	<b>140</b>
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or ___ FT.					35	
<b>W20-7a-48</b>	<b>48"x48"</b>	<b>FLAGGING SYMBOL</b>	<b>2</b>			<b>2</b>	<b>35</b>	<b>70</b>
W20-7k-24	24"x18"	___ FEET (Mounted on warning sign post)					10	
W20-8-48	48"x48"	STREET CLOSED					35	
W20-51-48	48"x48"	EQUIPMENT WORKING					35	
W20-52-54	54"x12"	NEXT ___ MILES (Mounted on warning sign post)					12	
W21-1a-48	48"x48"	WORKERS SYMBOL					35	
W21-2-48	48"x48"	FRESH OIL					35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED			TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			1	2	3			
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ___ FT					35	
W21-5-48	48"x48"	SHOULDER WORK					35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED					35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or ___ FT.					35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD					35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or ___ FT.					35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY					35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK					35	
	<b>24"x24"</b>	<b>TAKE TURNS (6" D letters) (Mounted on stop sign post)</b>	<b>4</b>			<b>4</b>	<b>11</b>	<b>44</b>

SPECIAL SIGNS								
CONSIGN 1	SIGN SIZE	DESCRIPTION	1	2	3	TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
Consign 1	48" x 48"	PAVEMENT BREAKS		2	2	2	35	70

SPEC & CODE								
704-1000	TRAFFIC CONTROL SIGNS						TOTAL UNITS	1544

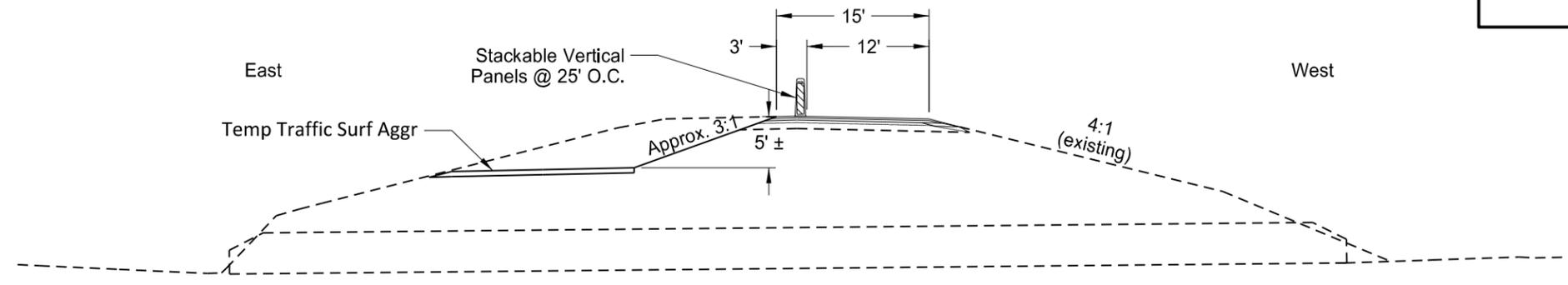
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY BY PHASE NO.			TOTAL QUANTITY
			1	2	3	
<b>704-0100</b>	<b>FLAGGING</b>	MHR	<b>200</b>			<b>200</b>
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH				
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH				
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH				
704-1050	TYPE I BARRICADES	EACH				
704-1051	TYPE II BARRICADES	EACH				
<b>704-1052</b>	<b>TYPE III BARRICADES</b>	EACH	<b>4</b>	<b>4</b>		<b>4</b>
<b>704-1060</b>	<b>DELINEATOR DRUMS</b>	EACH	<b>12</b>	<b>12</b>		<b>12</b>
704-1065	TRAFFIC CONES	EACH				
704-1067	TUBULAR MARKERS	EACH				
704-1070	DELINEATOR	EACH				
704-1072	FLEXIBLE DELINEATORS	EACH				
<b>704-1080</b>	<b>STACKABLE VERTICAL PANELS</b>	EACH	<b>36</b>	<b>36</b>	<b>30</b>	<b>36</b>
704-1081	VERTICAL PANELS - BACK TO BACK	EACH				
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH				
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH				
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH				
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH				
704-1095	TYPE B FLASHERS	EACH				
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF				
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH				
762-0200	RAISED PAVEMENT MARKERS	EACH				
762-0420	SHORT TERM 4IN LINE - TYPE R	LF				
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF				
762-1500	OBLITERATION OF PVMT MK	SF				
772-2110	FLASHING BEACON - POST MOUNTED	EACH				

NOTE:  
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.  
<http://www.dot.nd.gov/>

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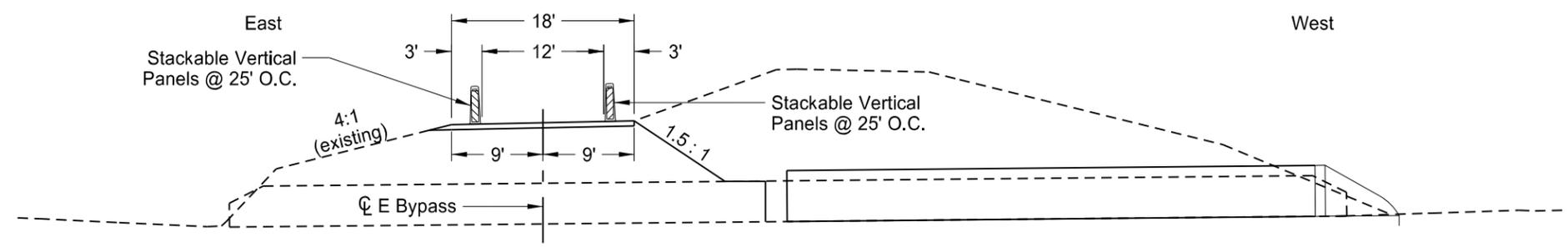
Traffic Control Devices List  
  
ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	100	2



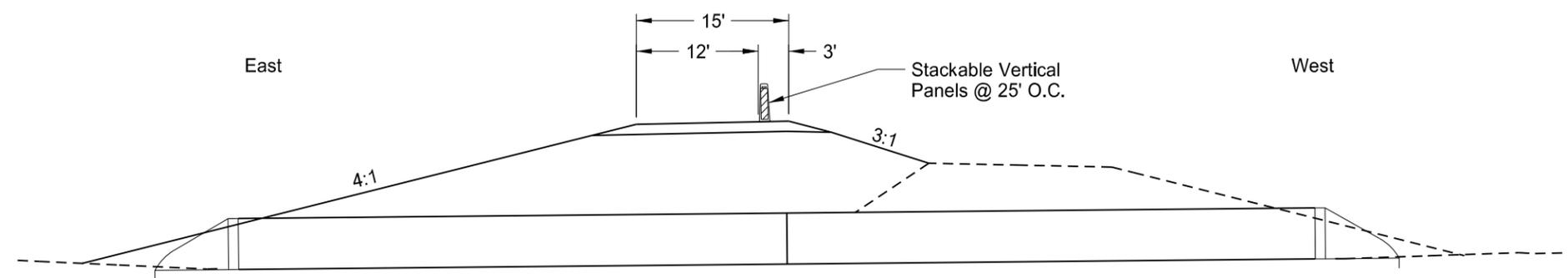
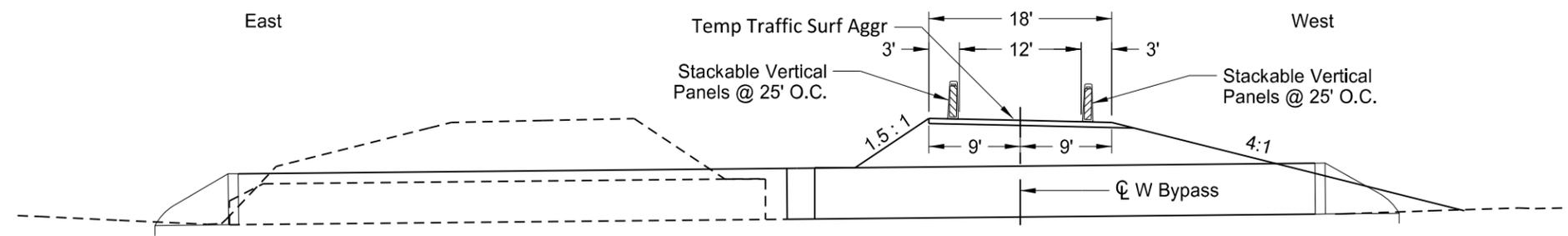
**Construction Sequencing - Phase 1:**

- Maintain 1-lane, 2-way traffic on existing roadway while constructing east side bypass lane.
- Shift traffic to east side bypass and maintain 1-lane, 2-way traffic on bypass lane.
- Remove west half of existing pipe and place approx. 52 LF (each line) of proposed pipe.
- Place backfill for new pipe and construct west side bypass lane over new pipe.



**Construction Sequencing - Phase 2:**

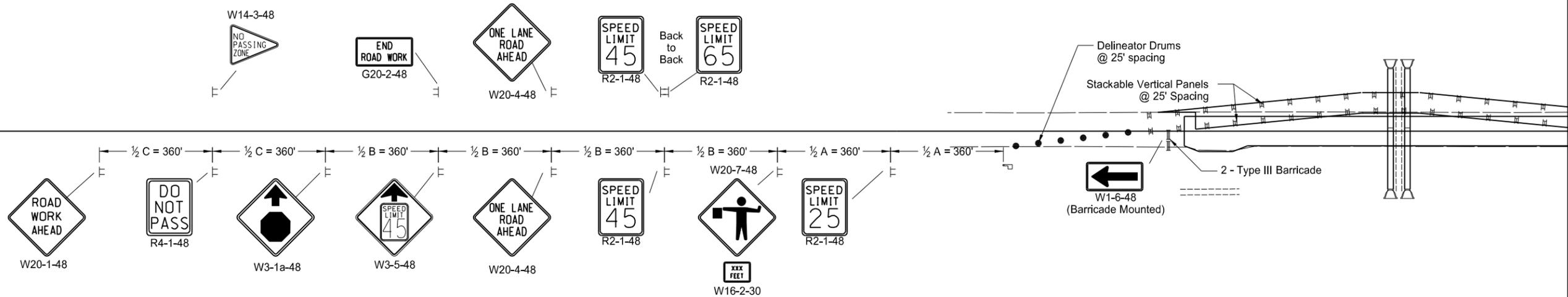
- Shift traffic to west side bypass lane and maintain 1-lane, 2-way traffic on west side bypass lane.
- Remove remainder of existing pipe and place approx. 54 LF (each line) of proposed pipe.
- Place backfill for new pipe and reconstruct east half of roadway to top of base grade.
- Shift traffic to east half of roadway and maintain 1-lane, 2-way traffic while completing roadway reconstruction to top of base grade for west half of roadway.



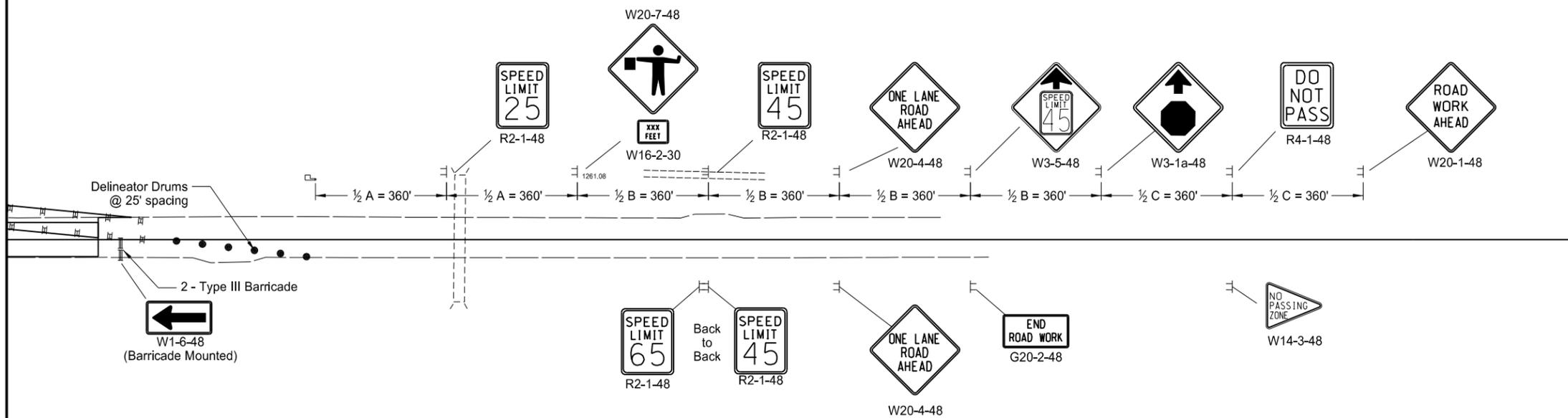
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Work Zone Traffic Control  
Construction Phasing  
Section @ Pipe Replacement  
  
ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	100	3



Notes:  
See Standard Drawing D-704-17 for Sign Spacing

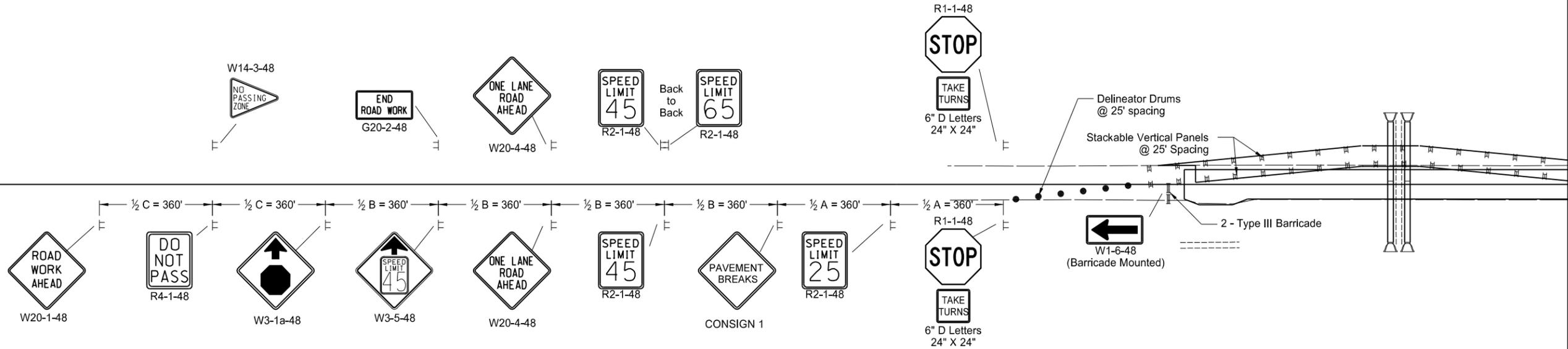


Notes:  
See Standard Drawing D-704-17 for Sign Spacing

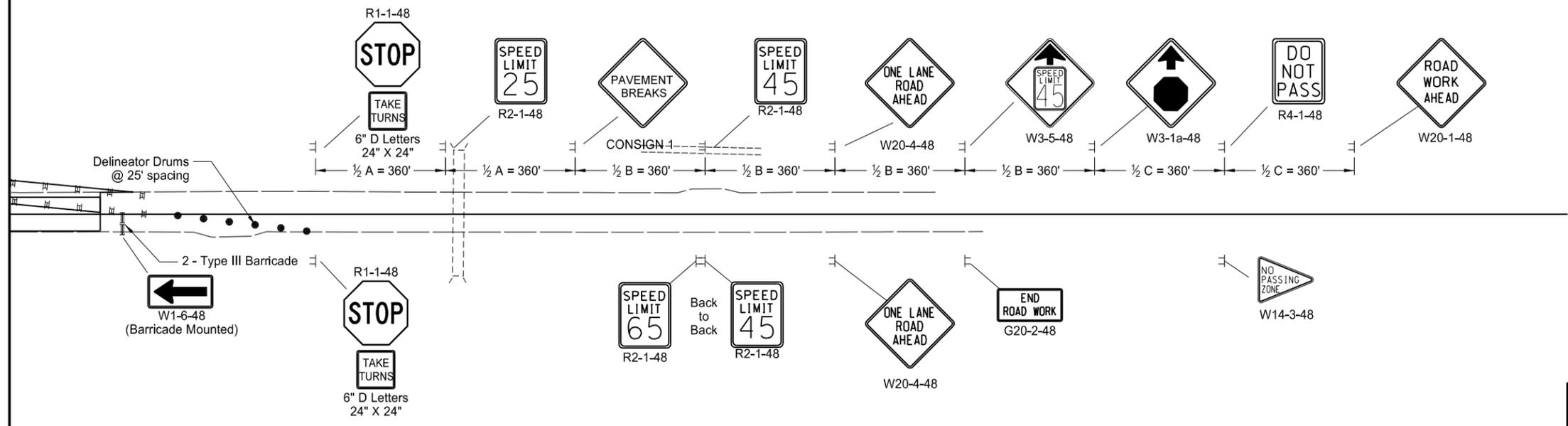
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Construction Sign Layout  
Work Hours - Single Lane Open  
ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	100	4



Notes:  
See Standard Drawing D-704-31 for Sign Spacing

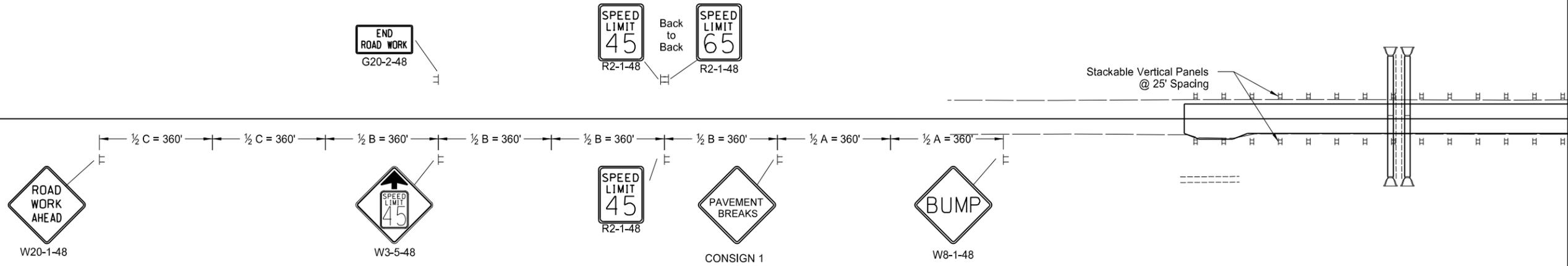


Notes:  
See Standard Drawing D-704-31 for Sign Spacing

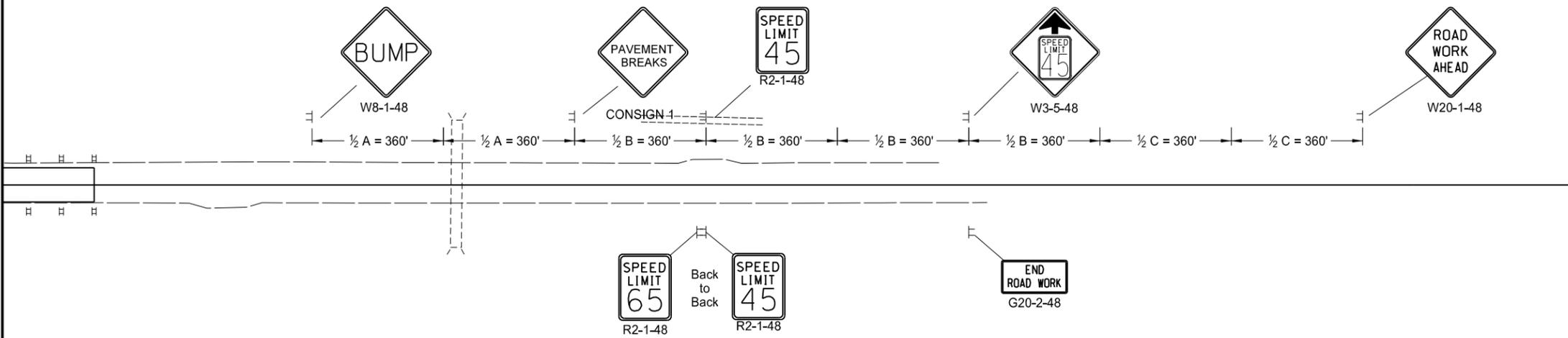
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Construction Sign Layout  
Non-Work Hours - Single Lane Open  
ND Hwy 32  
11 Miles North of I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	H-2-032(028)086	100	5



Notes:  
See Standard Drawing D-704-31 for Sign Spacing



Notes:  
See Standard Drawing D-704-31 for Sign Spacing

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Construction Sign Layout  
Non-Work Hours - Two Lanes Open  
ND Hwy 32  
11 Miles North of I-94



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  
 Ac acres  
 Adj adjusted  
 Aggr aggregate  
 Ahd ahead  
 ARV air release valve  
 Align alignment  
 Al alley  
 Alt alternate  
 Alum aluminum  
 ADA Americans with Disabilities Act  
 A ampere  
 & 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  
 Az azimuth  
 Bk back  
 BF back face  
 Bs backsight  
 Balc balcony  
 B Wire barbed wire  
 Barr barricade  
 Btry battery  
 Brg bearing  
 BI beehive inlet  
 Beg begin  
 BM bench mark  
 Bkwy bikeway  
 Bit bituminous  
 Blk block  
 Bd Ft board feet  
 BH bore hole  
 BS both sides  
 Bot bottom  
 Blvd Boulevard  
 Bndry boundary  
 BC brass cap  
 Brkwy breakaway  
 Br bridge  
 Bldg building

BV butterfly valve  
 Byp bypass  
 C Gdrl cable guardrail  
 Calc calculate  
 Cd candela  
 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  
 Cm centimeter  
 Ch chain  
 Chnlk chain-link  
 Ch Blk channel block  
 Ch Ch channel change  
 Chk check  
 Chsld chiseled  
 Cir circle  
 Cl class  
 Cl clay  
 Cl F clay fill  
 Cl Hvy clay heavy  
 Cl Lm clay loam  
 Clnt clean-out  
 Clr clear  
 Cl&gr clearing & grubbing  
 Co S coal slack  
 Comb. combination  
 Coml commercial  
 Compr compression  
 CADD computer aided drafting & design  
 Conc concrete  
 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  
 CSP corrugated steel pipe  
 C coulomb  
 Co County  
 Crse course  
 C Gr course gravel  
 CS course sand

Ct Court  
 Xarm cross arm  
 Xbuck cross buck  
 Xsec cross sections  
 Xing crossing  
 Xrd Crossroad  
 Crn crown  
 CF cubic feet  
 M3 cubic meter  
 M3/s cubic meters per second  
 CY cubic yard  
 Cy/mi cubic yards per mile  
 Culv culvert  
 C&G curb & gutter  
 CI curb inlet  
 CR curb ramp  
 CS curve to spiral  
 C cut  
 Dd Ld dead load  
 Defl deflection  
 Defm deformed  
 Deg or D degree  
 DInt delineate  
 DIntr delineator  
 Depr depression  
 Desc description  
 Det detail  
 DWP detectable warning panel  
 Dtr detour  
 Dia diameter  
 Dir direction  
 Dist distance  
 DM disturbed material  
 DB ditch block  
 DG ditch grade  
 Dbl double  
 Dn down  
 Dwg drawing  
 Dr drive  
 Drwy driveway  
 DI drop inlet  
 D dry density  
 Ea each  
 Esmt easement  
 E East  
 EB Eastbound  
 Elast elastomeric  
 EL electric locker  
 E Mtr electric meter  
 Elec electric/al  
 EDM electronic distance meter  
 Elev or El elevation  
 Ellipt elliptical  
 Emb embankment  
 Emuls emulsion/emulsified

ES end section  
 Engr engineer  
 ESS environmental sensor station  
 Eq equal  
 Eq equation  
 Evgr evergreen  
 Exc excavation  
 Exst existing  
 Exp expansion  
 Expy Expressway  
 E external of curve  
 Extru extruded  
 FOS factor of safety  
 F Fahrenheit  
 FS far side  
 F farad  
 Fed Federal  
 FP feed point  
 Ft feet/foot  
 Fn fence  
 Fn P fence post  
 FO fiber optic  
 FB field book  
 FD field drive  
 F fill  
 FAA fine aggregate angularity  
 FS fine sand  
 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  
 Fs foresight  
 Fnd found  
 Fdn foundation  
 Frac fractional  
 Frwy freeway  
 Frt front  
 FF front face  
 F Disp fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
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NDDOT ABBREVIATIONS

FFP	fuel filler pipes	IP	iron Pipe	M	mega	Ped	pedestrian
FLS	fuel leak sensor	Jt	joint	Mer	meridian	PPP	pedestrian pushbutton post
Furn	furnish/ed	J	joule	M	meter	Pen.	penetration
Gal	gallon	Jct	junction	M/s	meters per second	Perf	perforated
Galv	galvanized	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gar	garage	Kn	kilo newton	Mi	mile	PL	pipeline
Gs L	gas line	Kpa	kilo pascal	MM	mile marker	PI	place
G Reg	gas line regulator	Kg	kilogram	MP	mile post	P&P	plan & profile
GMV	gas main valve	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
G Mtr	gas meter	Km	kilometer	Mm	millimeter	PI	plate
GSV	gas service valve	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GVP	gas vent pipe	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
GV	gate valve	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Ga	gauge	Ln	lane	Mon	monument	PI	point of intersection
Geod	geodetic	Lg	large	Mnd	mound	PRC	point of reverse curvature
GIS	Geographical Information System	Lat	latitude	Mtbl	mountable	PT	point of tangent
G	giga	Lt	left	Mtd	mounted	POC	point on curve
GPS	Global Positioning System	L	length of curve	Mtg	mounting	POT	point on tangent
Gov	government	Lens	lenses	Mk	muck	PE	polyethylene
Grd	graded/grade	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Gr	gravel	LB	level book	N	nano	PCC	Portland Cement concrete
Grnd	ground	LvIng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
GWM	ground water monitor	Lht	light	NS	near side	PP	power pole
Gdrl	guardrail	LP	light pole	Neop	neoprene	Preempt	preemption
Gtr	gutter	Ltg	lighting	Ntwk	network	Prefab	prefabricated
H Plg	H piling	Lig Co	lignite coal	N	newton	Prfmd	performed
Hdwl	headwall	Lig Sl	lignite slack	N	North	Prep	preparation
Ha	hectare	LF	linear foot	NE	North East	Press.	pressure
Ht	height	Liq	liquid	NW	North West	PRV	pressure relief valve
HI	height of instrument	LL	liquid limit	NB	Northbound	Prestr	prestressed
Hel	helical	L	litre	No. or #	number	Pvt	private
H	henry	Lm	loam	Obsc	obscure(d)	PD	private drive
HZ	hertz	Loc	location	Obsn	observation	Prod.	production/produce
HDPE	high density polyethylene	LC	long chord	Ocpd	occupied	Prog	programmed
HM	high mast	Long.	longitude	Ocpy	occupy	Prop.	property
HP	high pressure	Lp	loop	Off Loc	office location	Prop Ln	property line
HPS	high pressure sodium	LD	loop detector	O/s	offset	Ppsd	proposed
Hwy	highway	Lm	lumen	OC	on center	PB	pull box
Hor	horizontal	Lum	luminaire	C	one dimensional consolidation		
HBP	hot bituminous pavement	L Sum	lump sum	OC	organic content		
Hr	hour(s)	Lx	lux	Orig	original		
Hyd	hydrant	ML	main line	O To O	out to out		
Ph	hydrogen ion content	M Hr	man hour	OD	outside diameter		
Id	identification	MH	manhole	OH	overhead		
In or "	inch	Mkd	marked	PMT	pad mounted transformer		
Incl	inclinometer tube	Mkr	marker	Pg	pages		
IMH	inlet manhole	Mkg	marking	Pntd	painted		
ID	inside diameter	MA	mast arm	Pr	pair		
Inst	instrument	Matl	material	Pnl	panel		
Intchg	interchange	Max	maximum	Pk	park		
Intmdt	intermediate	MC	meander corner	PK	Parker-Kalon nail		
Intscn	intersection	Meas	measure	Pa	pascal		
Inv	invert	Mdn	median	PSD	passing sight distance		
IM	iron monument	MD	median drain	Pvmt	pavement		
IPn	Iron Pin	MC	medium curing	Ped	pedestal		

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NDDOT ABBREVIATIONS

D-101-3

Qty	quantity	Sig	signal	TS	tangent to spiral	WB	Westbound
Qtr	quarter	Si Cl	silt clay	Tel	telephone	Wrng	wiring
Rad or R	radius	Si Cl Lm	silty clay loam	Tel B	Telephone Booth	W/	with
RR	railroad	Si Lm	silty loam	Tel P	telephone pole	W/o	without
Rlwy	railway	Sgl	single	Tv	television	WC	witness corner
Rsd	raised	SC	slow curing	Temp	temperature	WGS	World Geodetic System
RTP	random traverse point	SS	slow setting	Temp	temporary	Z	zenith
Rge or R	range	Sm	small	TBM	temporary bench mark		
RC	rapid curing	S	South	T	tesla		
Rec	record	SE	South East	T	thinwall tube sample		
Rcy	recycle	SW	South West	T/mi	tons per mile		
RPCC	recycled Portland cement concrete	SB	Southbound	Ts	topsoil		
Ref	reference	Sp	spaces	Twp or T	township		
R Mkr	reference marker	Spcl	special	Traf	traffic		
RM	reference monument	SA	special assembly	TSCB	traffic signal control box		
Refl	reflectorized	SP	special provisions	Tr	trail		
RCB	reinforced concrete box	G	specific gravity	Transf	transformer		
RCES	reinforced concrete end section	Spk	spike	TB	transit book		
RCP	reinforced concrete pipe	SC	spiral to curve	Trans	transition		
RCPS	reinforced concrete pipe sewer	ST	spiral to tangent	TT	transmission tower		
Reinf	reinforcement	SB	split barrel sample	Trans	transverse		
Res	reservation	SH	sprinkler head	Trav	traverse		
Ret	retaining	SV	sprinkler valve	TP	traverse point		
Rev	reverse	Sq	square	Trtd	treated		
Rt	right	SF	square feet	Trmt	treatment		
R/W	right of way	Km2	square kilometer	Qc	triaxial compression		
Riv	river	M2	square meter	TERO	tribal employment rights ordinance		
Rd	road	SY	square yard	Tpl	triple		
Rdbd	road bed	Stk	stake	TP	turning point		
Rdwy	roadway	Std	standard	Typ	typical		
RWIS	Roadway Weather Information System	N	standard penetration test	Qu	unconfined compressive strength		
Rk	rock	Std Specs	Standard Specifications	Ugrnd	underground		
Rt	route	Sta	station	USC&G	US Coast & Geodetic Survey		
Salv	salvage(d)	Sta Yd	station yards	USGS	US Geologic Survey		
Sd	sand	Stm L	steam line	Util	utility		
Sdy Cl	sandy clay	SEC	steel encased concrete	VG	valley gutter		
Sdy Cl Lm	sandy clay loam	SSD	stopping sight distance	Vap	vapor		
Sdy Fl	sandy fill	SD	storm drain	Vert	vertical		
Sdy Lm	sandy loam	St	street	VC	vertical curve		
San	sanitary sewer line	SPP	structural plate pipe	VCP	vitrified clay pipe		
Sc	scoria	SPPA	structural plate pipe arch	V	volt		
Sec	seconds	Str	structure	Vol	volume		
Sec	section	Subd	subdivision	Wkwy	walkway		
SL	section line	Sub	subgrade	W	water content		
Sep	separation	Sub Prep	subgrade preparation	WGV	water gate valve		
Seq	sequence	Ss	subsoil	WL	water line		
Serv	service	SE	superelevation	WM	water main		
Sh	shale	SS	supplement specification	WMV	water main valve		
Sht	sheet	Supp	supplemental	W Mtr	water meter		
Shtng	sheeting	Surf	surfacing	WSV	water service valve		
Shldr	shoulder	Surv	survey	WW	water well		
Sw	sidewalk	Sym	symmetrical	W	watt		
S	siemens	SI	Systems International	Wrng	wearing		
SD	sight distance	Tan	tangent	Wb	weber		
SN	sign number	T	tangent (semi)	WIM	Weigh In Motion		
				W	West		

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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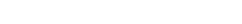
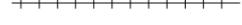
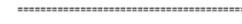
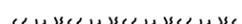
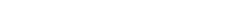
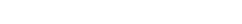
Line Styles

.....	Limits of Const Transition Line	—— s —— s ——	Floating Silt Curtain	—— ——— ———	Existing Aggregate (Cross Section View)	- - - - -	Existing Centerline
.....	Bale Check	—— ——— T ——	Existing Telephone Line	—— ——— ———	Existing Curb and Gutter (Cross Section View)	- - - - -	Supplemental Contour
.....	Rock Check	—— ——— TV ——	Existing TV Line	—— ——— ———	Existing Riprap	—— - - - - -	Right of Way
.....	Sight Distance Triangle Line	Void — void — void — v	Existing Assumed Ground (Not Surveyed)	—— ——— ———	Existing Underground Vault or Lift Station	—— - - - - -	Existing Right of Way
- - - - -	Small Hidden Object	Void — void — void — v	Tentative Ground Line	—— ——— ———	Tangent Line	—— - - - - -	Existing Right of Way Railroad
- - - - -	Dimension Leader	—— ——— w ——	Existing Water or Steam Line	- - - - -	Hidden Object	- - - - -	Failure Line
- - - - -	Existing Ground	=====	Existing Under Drain	—— ——— ———	Existing Dirt Surface	- - - - -	Existing Conditions
- - - - -	Existing Topsoil (Cross Section View)	=====	Under Drain	—— ——— ———	Existing Conduit	- - - - -	Existing Ground (Details)
—— ——— ———	Large Hidden Object	=====	Wall	—— ——— ———	Topsoil Profile	—— - - - - -	Existing Sixteenth Section Line
—— ——— ———	Edge Drain	=====	Existing Slotted Drain	- - - - -	Existing Conductor	- - - - -	Existing Right of Way Not State Owned
—— D —— D ——	Geotextile Fabric Type D	—— + —— + ——	Existing Cemetary Boundary	- - - - -	Conductor	- - - - -	Phantom Object
—— ——— E ——	Existing Electrical	—— ——— ———	Centerline Pavement Marking	- - - - -	Fiber Optic	- - - - -	Centerline Main
—— ——— FO ——	Existing Fiber Optic Line	=====	Barrier with Centerline Pavement Marking	- - - - -	Existing Loop Detector	- . . . .	Existing Guardrail Cable
—— ——— FO ——	Existing TV Fiber Optic	=====	Barrier Pavement Marking	- - - - -	Subgrade, Subcut or Ditch Grade	— . — . — . — .	Existing Guardrail Metal
—— ——— G ——	Existing Gas Pipe	- - - - -	Stripe 4 IN Dotted Extension White	—— ——— ———	Existing Asphalt Surface	—— . —— . —— . ——	Existing Edge of Water
—— <b>Geo</b> —— <b>Geo</b> ——	Geogrid	- - - - -	Stripe 8 IN Dotted Extension White	—— ——— ———	Existing Asphalt (Cross Section View)	- - - - -	Excavation Limits
—— ——— OH ——	Existing Overhead Utility Line	- - - - -	Stripe 8 IN Lane Drop	—— ——— ———	Existing Reinforcement Rebar	—— . . . —— . . . ——	Existing Government Lot Line
—— ——— P ——	Existing Power	—— v v v ——	Wetland Mitigation	—— ——— ———	Existing Tie Point Line	.....	Existing Adjacent Block Lines
—— ——— PL ——	Existing Fuel Pipeline	- - - - -	Existing Box Culvert Bridge	—— ——— ———	Existing State or International Line	.....	Existing Adjacent Lot Lines
—— ——— <b>PL</b> ——	Existing Undefined Above Ground Pipe Line	- - - - -	Existing Concrete Surface	—— ——— ———	Existing Quarter Section Line	.....	Existing Adjacent Property Line
—— ——— R —— R ——	Geotextile Fabric Type R	- - - - -	Existing Drainage Structure	—— ——— ———	Existing County	.....	Existing Adjacent Subdivision Lines
—— ——— R —— R ——	Geotextile Fabric Type R1	- - - - -	Easement	—— ——— ———	Existing Section Line	.....	
—— REMOVE —— REMOVE ——	Remove Line	- - - - -	Existing Concrete	—— ——— ———	Existing Township	.....	
—— RR —— RR ——	Geotextile Fabric Type RR	- - - - -	Existing Easement	—— ——— ———	Existing Railroad Centerline	.....	
—— S —— S ——	Geotextile Fabric Type S	—— ——— ———	Existing Gravel Surface	—— ——— ———	Centerline	.....	

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Line Styles

	Subgrade Reinforcement		Existing Railroad Switch		Sheet Piling
	Existing Down Guy Wire Down Guy		Overhead Sign Structure Cantilever		W-Beam w Posts
	Existing Fence		24 Inch Pipe		Existing W-Beam Guardrail with Posts
	Existing Railroad		Reinforced Concrete Pipe		Exst Wet Area-Vegetation Break
	Existing Sanitary Sewer		Signal Head with Mast Arm		Existing Wetland Delineated
	Existing Sanitary Force Main		Existing Signal Head with Mast Arm		
	Existing Storm Drain		Tie Bar at Random Spacing		
	Existing Storm Drain Force Main		3-Cable w Posts		
	Fence		Existing 3-Cable w Posts		
	Silt Fence		Site Boundary		
	Existing Field Line		Fiber Rolls		
	Exst Flow		Doweled Joint		
	Flow		Tie Bar 30 Inch 4 Foot Center to Center		
	Existing Culvert		Tie Bar 18 Inch 3 Foot Center to Center		
	Existing Curb		Existing Berm, Dike, Pit, or Earth Dam		
	Existing Valley Gutter		Existing Ditch Block		
	Existing Driveway Gutter		Depression Contours		
	Existing Curb and Gutter		Existing City Corporate Limits or Reservation Boundary		
	Existing Mountable Curb and Gutter		Gravel Pit - Borrow Area		
	Existing Double Micro Loop Detector		Existing Tree Boundary		
	Micro Loop Detector Double		Tree Row		
	Existing Overhead Sign Structure		Existing Brush or Shrub Boundary		
	Existing Micro Loop Detector		Existing Retaining Wall		
	Micro Loop Detector		Existing Planter or Wall		
	Existing Overhead Sign Structure Cantilever		Retaining Wall (Plan View)		

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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

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Symbols

	Existing Light Standard		Existing Manhole with Valve Water		Existing Telephone Pole		Existing Undefined Manhole
	Existing High Mast Light Standard 10 Luminaire		Existing Water Manhole		Existing Wood Pole		Existing Undefined Pull Box
	Existing High Mast Light Standard 3 Luminaire		Existing Mile Post Type A		Existing Post		Existing Undefined Pedestal
	Existing High Mast Light Standard 4 Luminaire		Existing Mile Post Type B		Existing Pedestrian Push Button Post		Existing Undefined Valve
	Existing High Mast Light Standard 5 Luminaire		Existing Mile Post Type C		Existing Control Point CP		Existing Undefined Pipe Vent
	Existing High Mast Light Standard 6 Luminaire		Existing Reference Marker		Existing Control Point GPS-RTK		Existing Gas Valve
	Existing High Mast Light Standard 7 Luminaire		Existing RW Marker		Existing Control Point TRI		Existing Water Valve
	Existing High Mast Light Standard 8 Luminaire		Existing Utility Marker		Existing Reference Marker Point NGS		Existing Fuel Pipe Vent
	Existing High Mast Light Standard 9 Luminaire		Iron Monument Found		Existing Pull Box		Existing Gas Pipe Vent
	Existing Overhead Sign Structure Load Center		Iron Pin R/W Monument		Existing Intelligent Transportation Pull Box		Existing Sanitary Pipe Vent
	Existing Luminaire		Existing Object Marker Type I		Existing Water Pump		Existing Storm Drain Pipe Vent
	Existing Light Standard Luminaire		Existing Object Marker Type II		Existing Slotted Reinforced Concrete Pipe		Existing Water Pipe Vent
	Existing Federal Mailbox		Existing Object Marker Type III		Existing RR Profile Spot		Existing Weather Station
	Existing Private Mailbox		Existing Electrical Pedestal		Existing Fuel Leak Sensors		Existing Ground Water Well Bore Hole
	Existing Meander Section Corner		Existing Telephone Pedestal		Existing Highway Sign		Existing Windmill or Tower
	Existing Meter		Existing Fiber Optic Telephone Pedestal		Existing Miscellaneous Spot		Existing Witness Corner
	Existing Electrical Manhole		Existing TV Pedestal		Existing Lighting Standard Pole		Flashing Beacon
	Existing Gas Manhole		Existing Fiber Optic TV Pedestal		Existing Traffic Signal Standard		Flagger
	Existing Sanitary Manhole		Existing Fuel Filler Pipes		Existing Transformer		Pipe Mounted Flasher
	Existing Sanitary Force Main Manhole		Existing Traverse PI Aerial Panel		Existing Large Evergreen Tree		Sanitary Force Main with Valve
	Existing Sanitary Manhole with Valve		Existing Pole		Existing Small Evergreen Tree		
	Existing Storm Drain Manhole		Existing Power Pole		Existing Large Tree		
	Existing Force Main Storm Drain Manhole		Existing Power Pole with Transformer		Existing Small Tree		
	Existing Force Main Storm Drain Manhole with Valve				Existing Tree Trunk		
	Existing Telephone Manhole				Existing Pad Mounted Traffic Signal Control Box		

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# Symbols

D-101-32

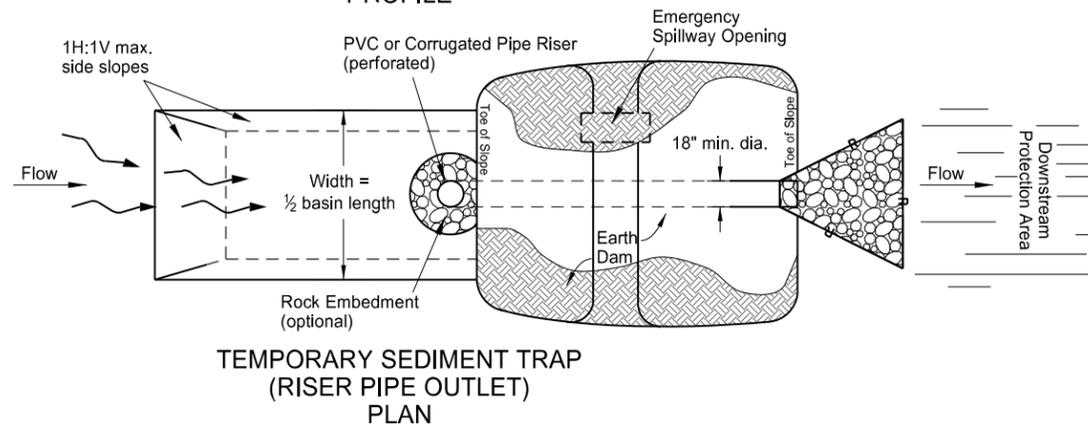
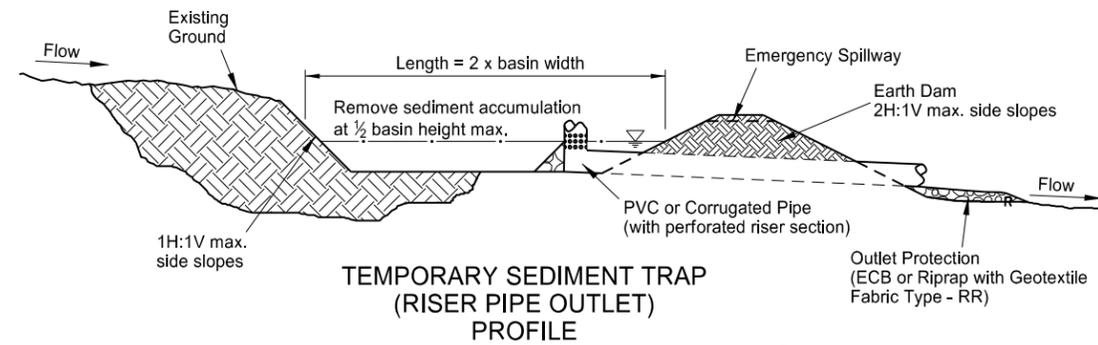
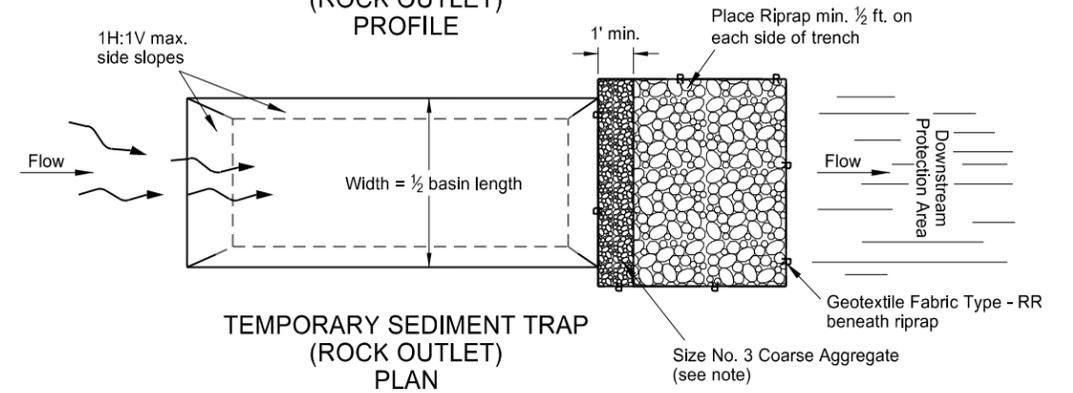
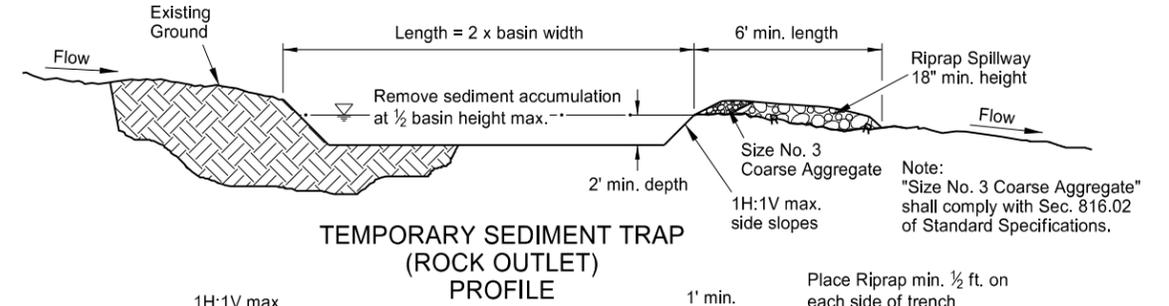
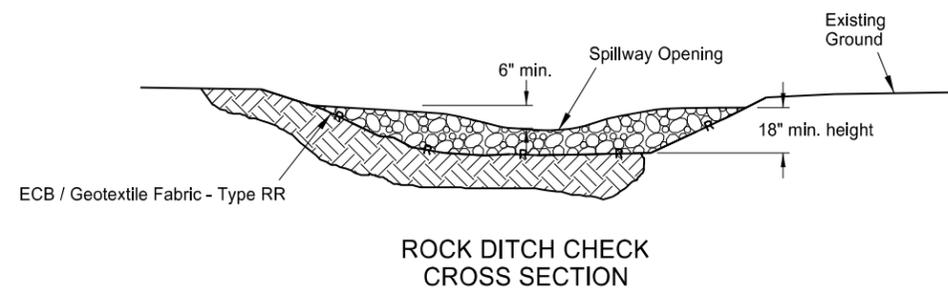
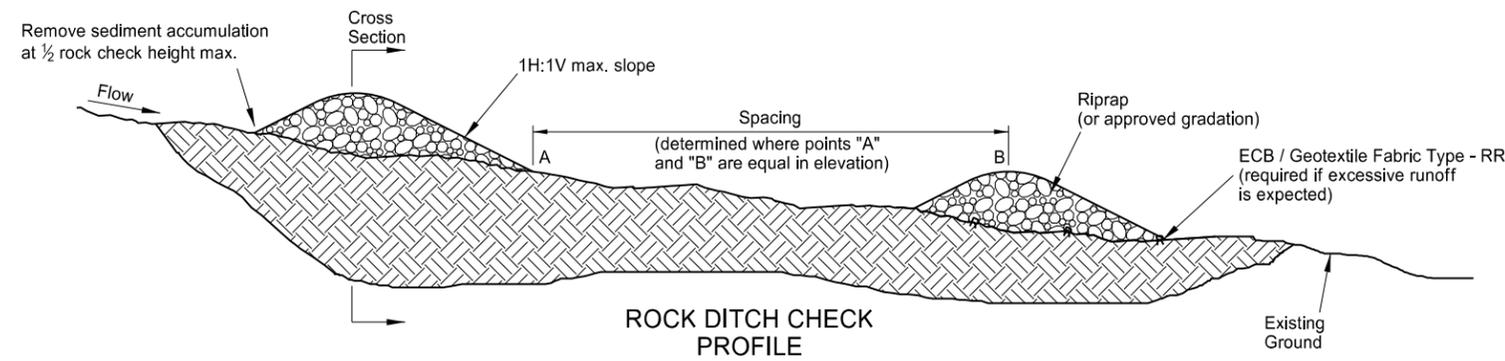
 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 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 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 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 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Alignment Monument  Iron Pin Reference Monument	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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# EROSION AND SILTATION CONTROLS

D-256-1

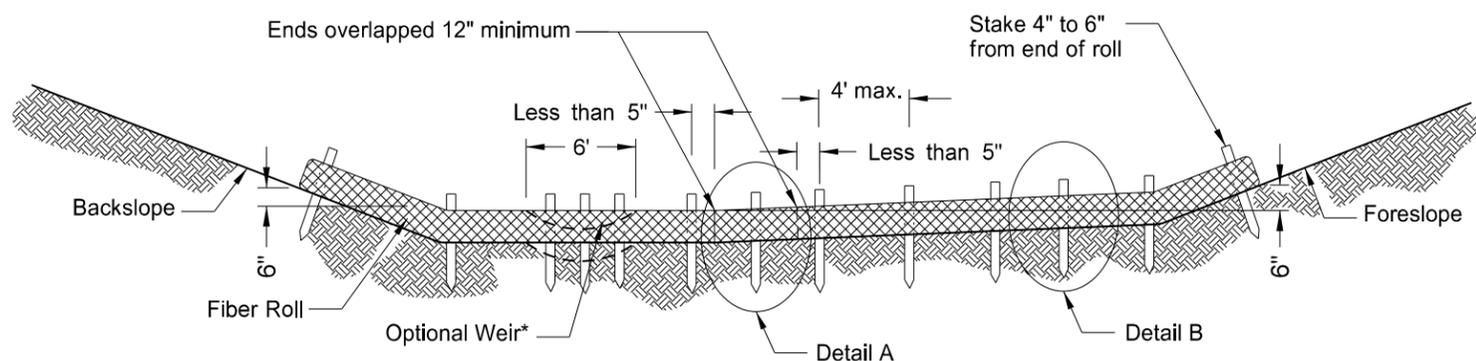


NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
10-03-13

REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-2 to D-256-1. Deleted silt fence details.

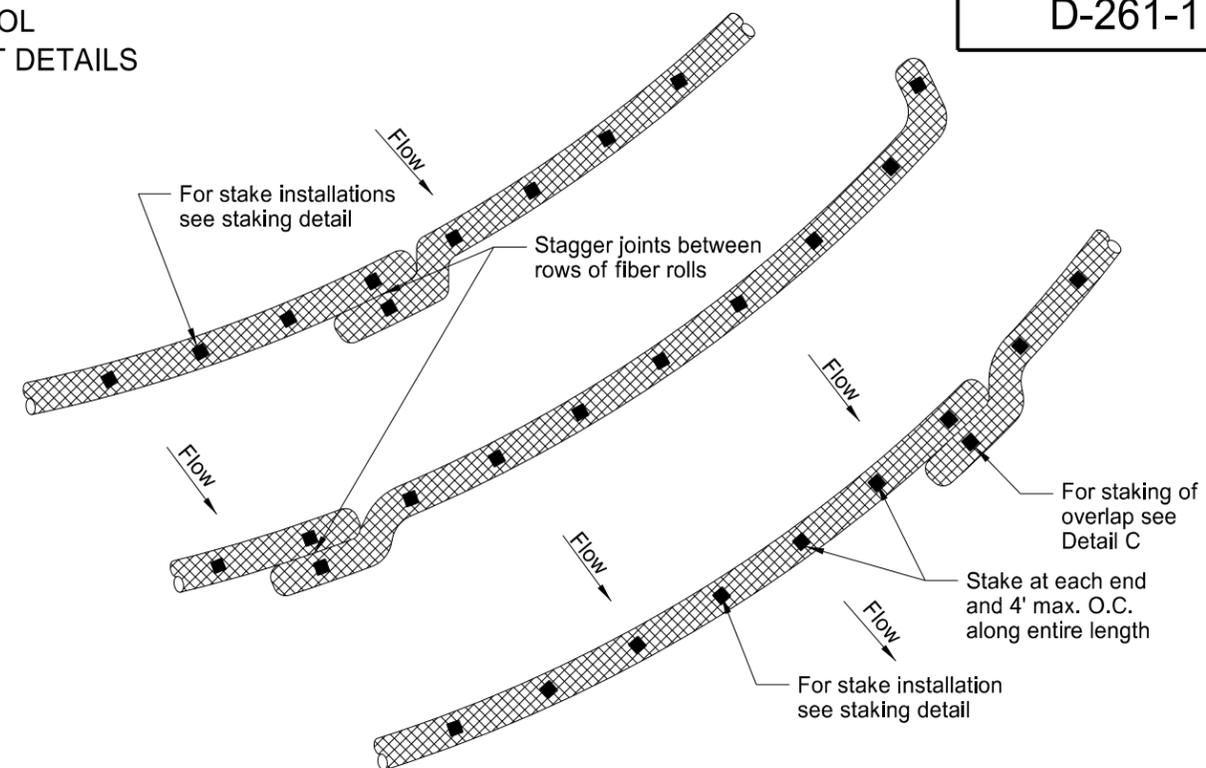
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EROSION CONTROL  
FIBER ROLL PLACEMENT DETAILS

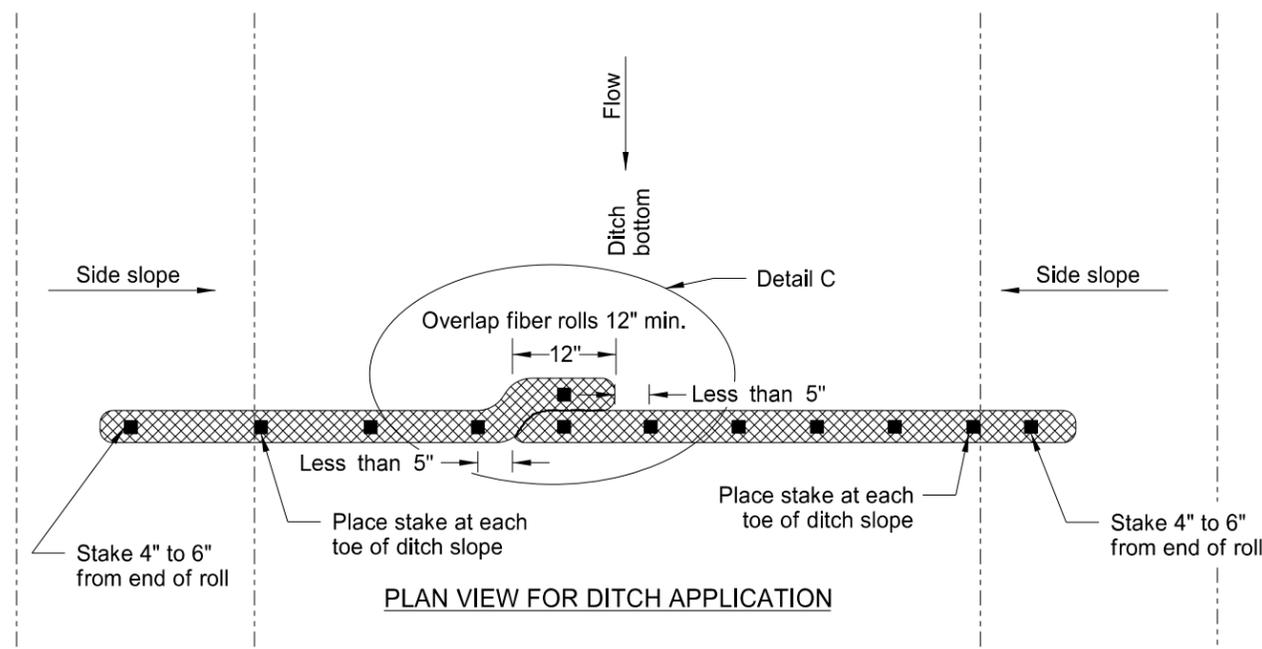


\*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back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

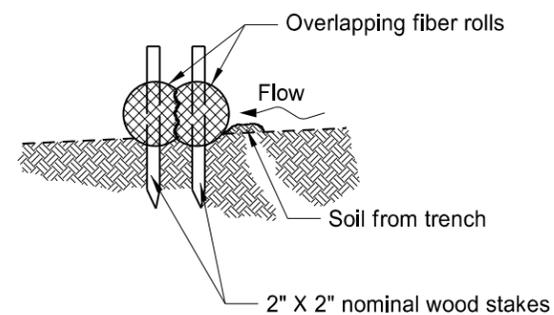
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



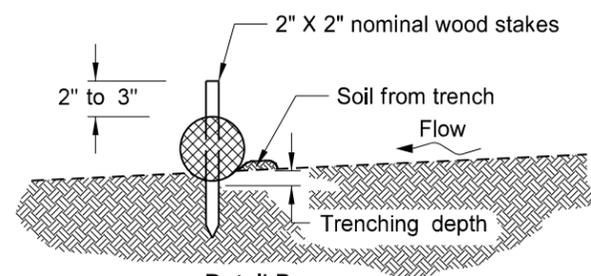
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A  
Fiber Roll Overlapping Staking Detail



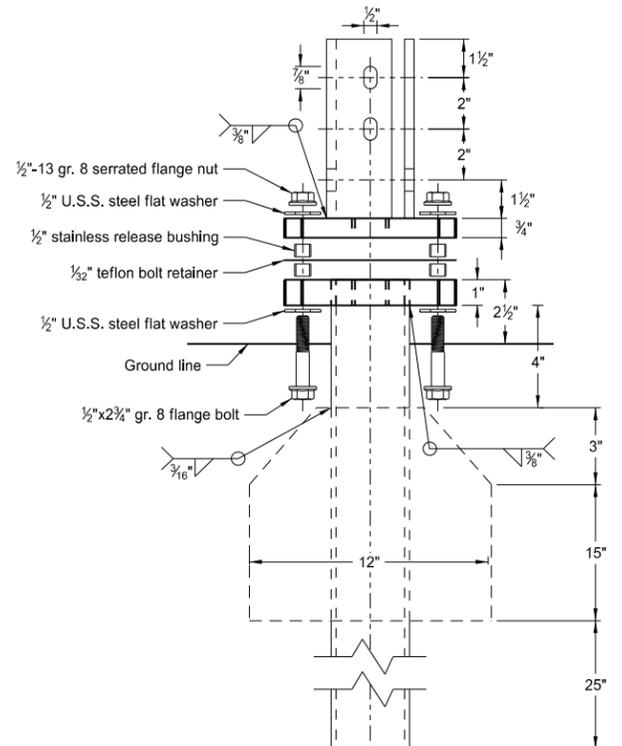
Detail B  
Fiber Roll Staking Detail

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.

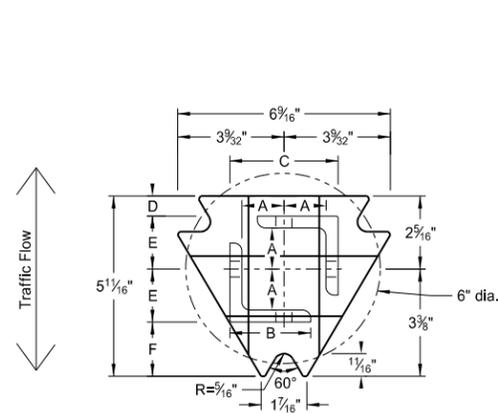
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1

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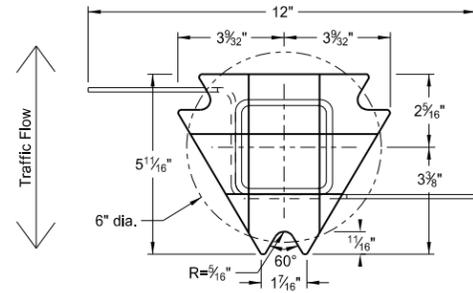


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver  
Plate - ASTM A572 grade 50  
Angle Receiver - 2 1/2 x 2 1/2 x 3/8 ASTM A36 structural angle



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

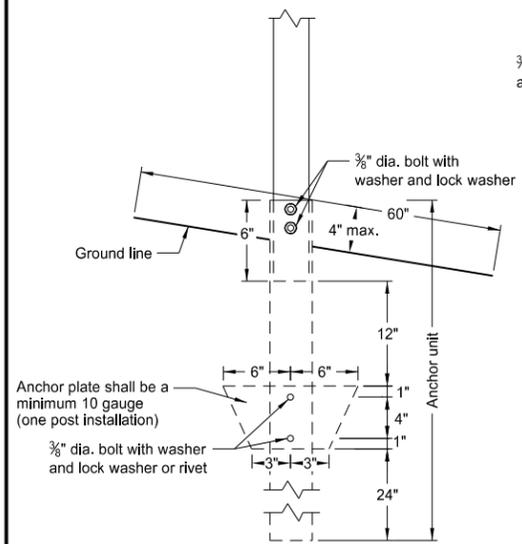
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

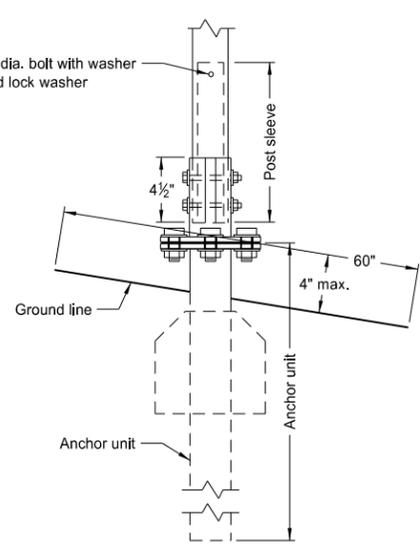
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. <sup>4</sup>	Cross Sec. Area in. <sup>2</sup>	Section Modulus in. <sup>3</sup>
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

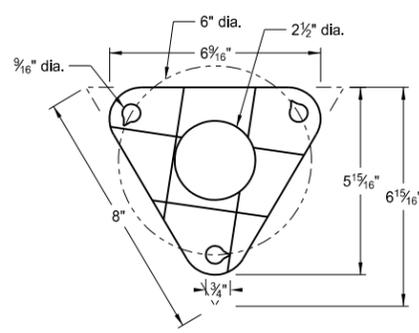
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



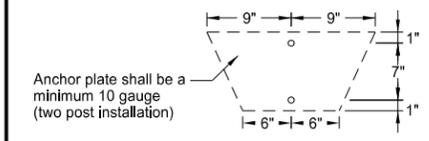
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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



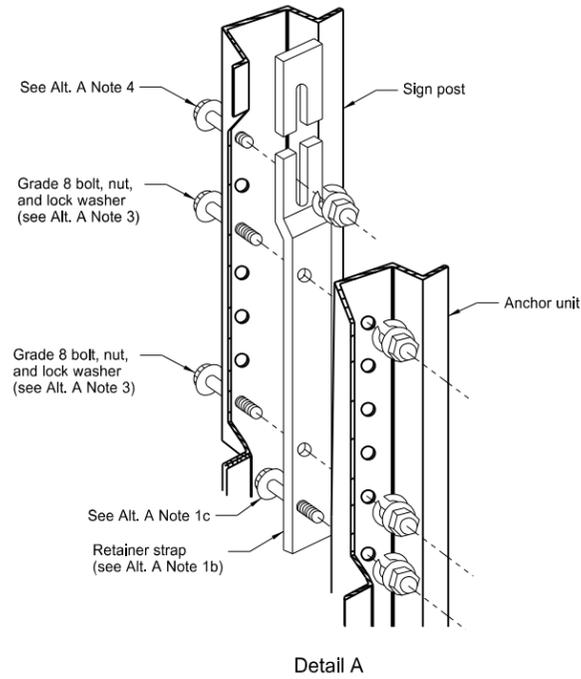
Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.  
 (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

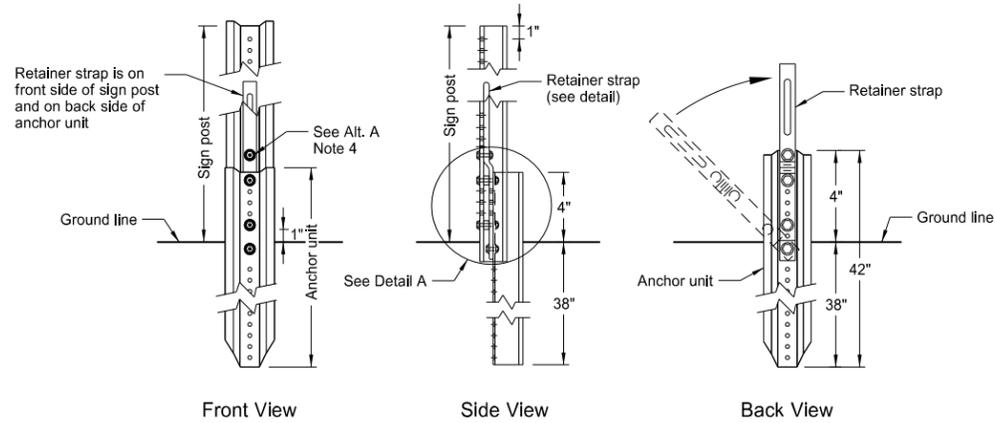
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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U-Channel Post



Detail A



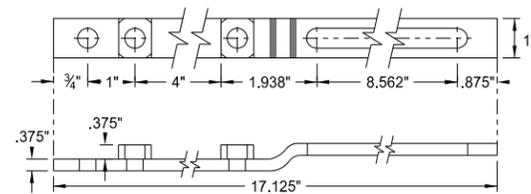
Front View

Side View

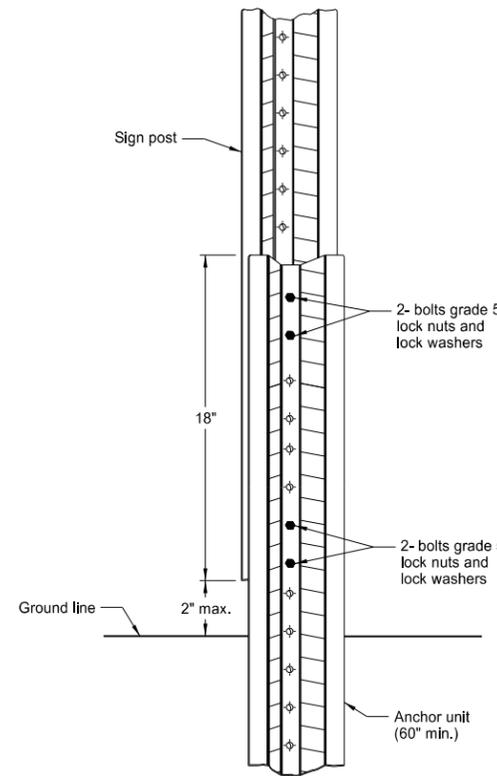
Back View

Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

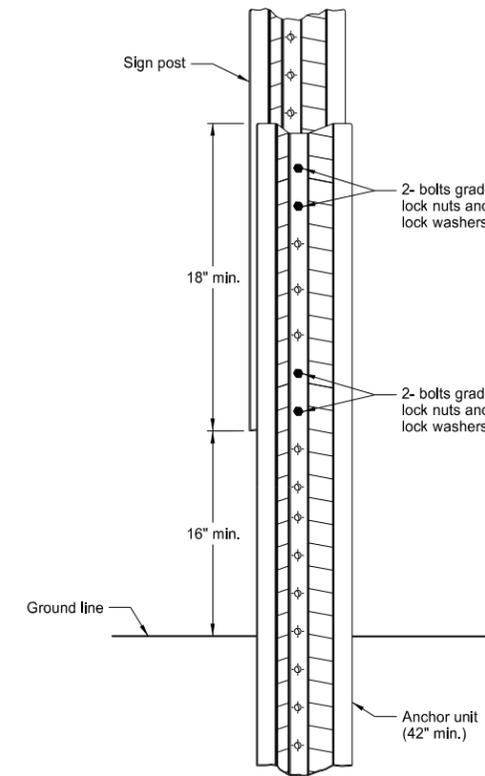


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

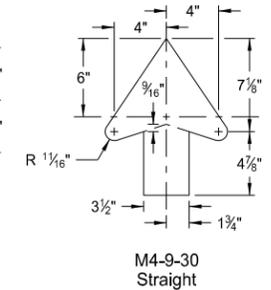
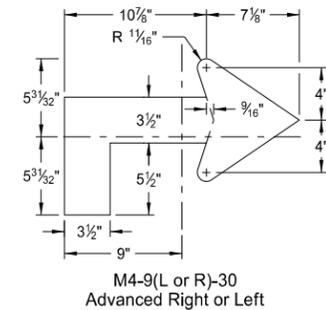
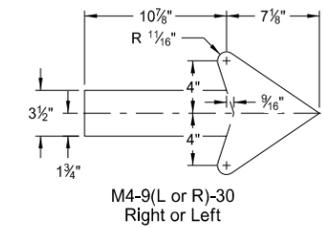
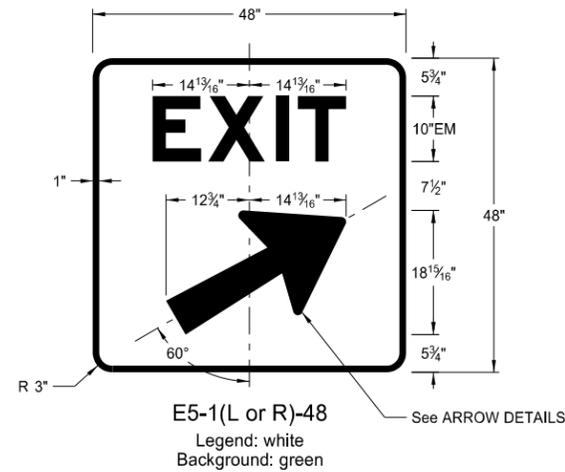
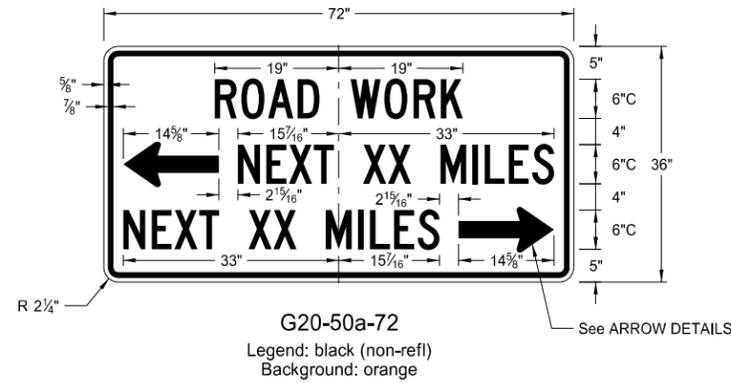
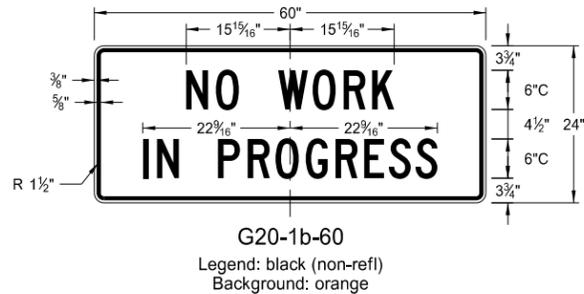
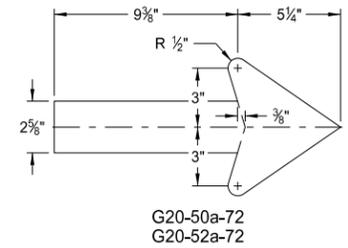
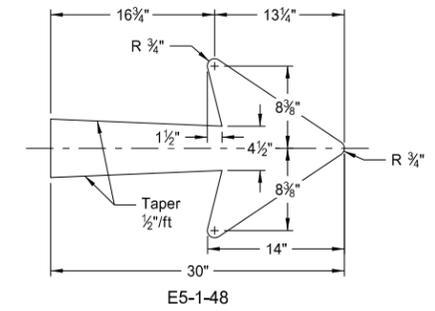
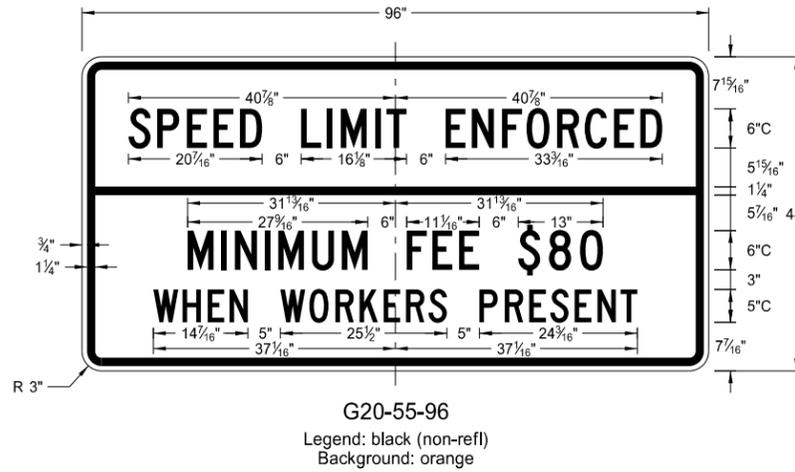
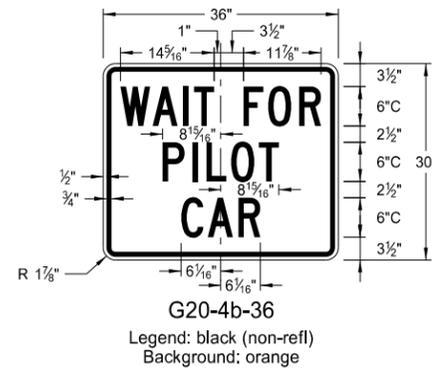
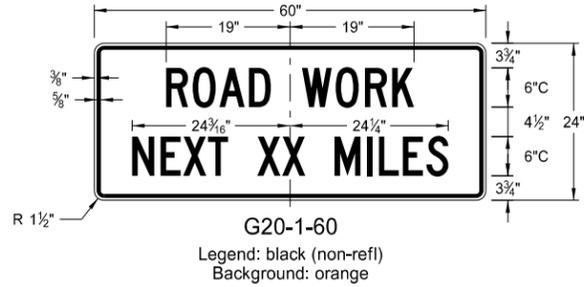
1. a) Drive anchor unit to within 12" of ground level.  
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.  
d) Rotate strap 90° to left.
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. The base post, strap and sign post shall be properly nested. 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.

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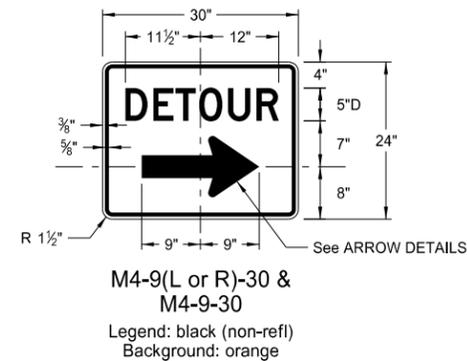
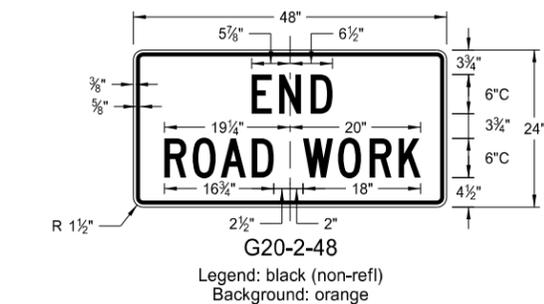
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CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

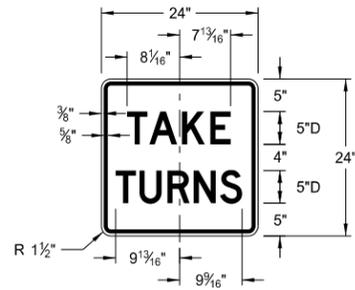
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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8-13-13	
REVISIONS	
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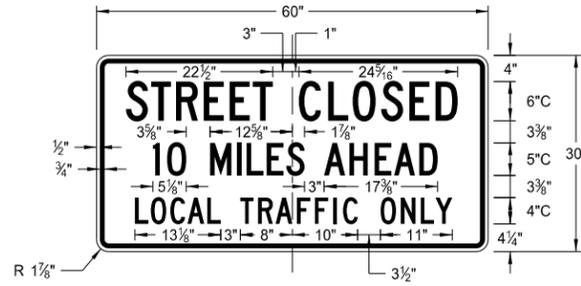
CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

D-704-10



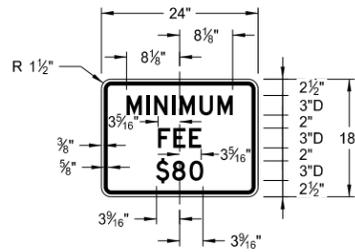
R1-50-24

Legend: black (non-refl)  
Background: white



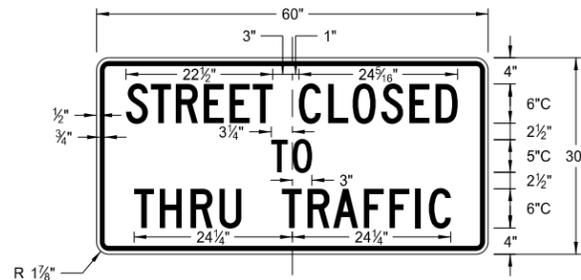
R11-3c-60

Legend: black (non-refl)  
Background: white



R2-1a-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

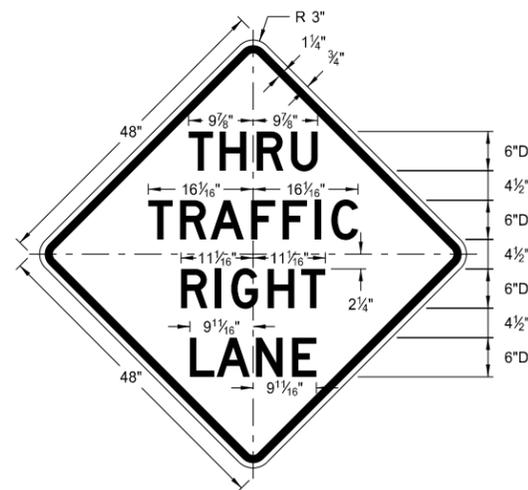
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
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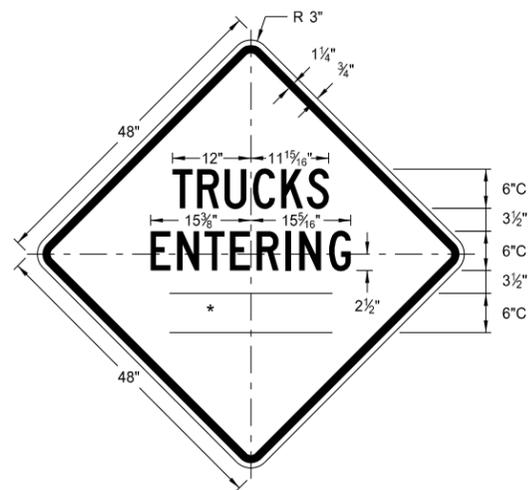
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

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

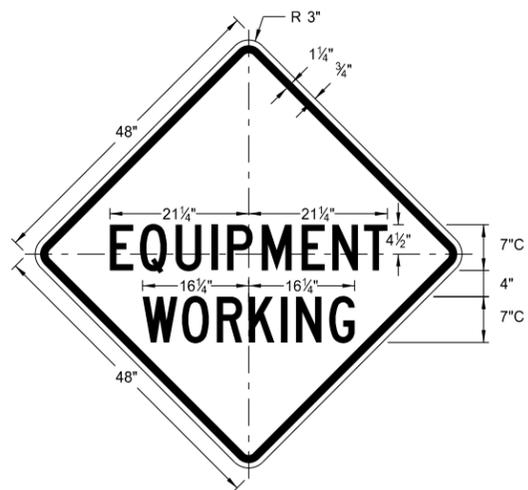
\* DISTANCE MESSAGES



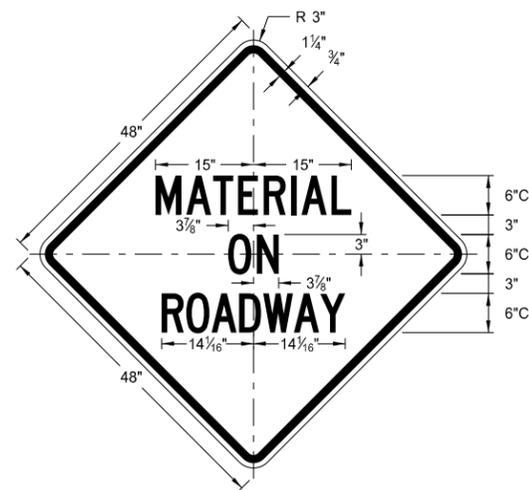
W5-8-48  
Legend: black (non-refl)  
Background: orange



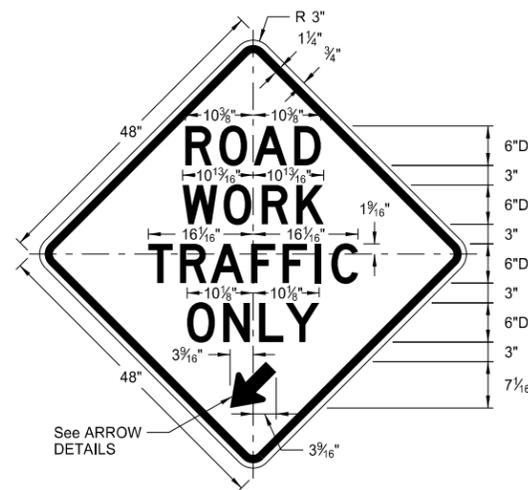
W8-54-48  
Legend: black (non-refl)  
Background: orange



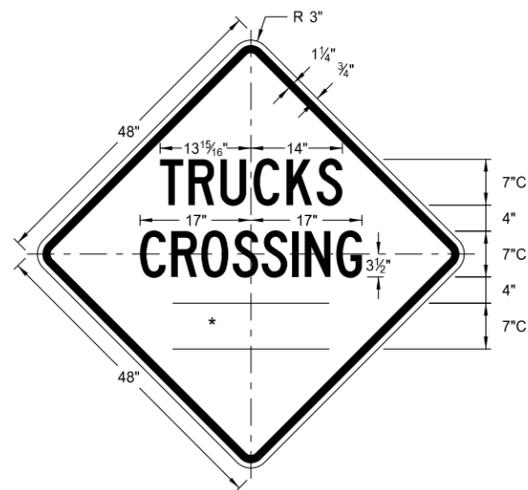
W20-51-48  
Legend: black (non-refl)  
Background: orange



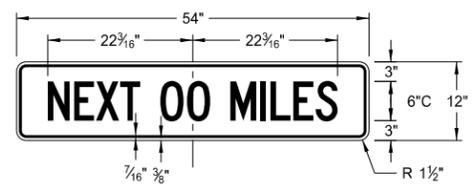
W21-51-48  
Legend: black (non-refl)  
Background: orange



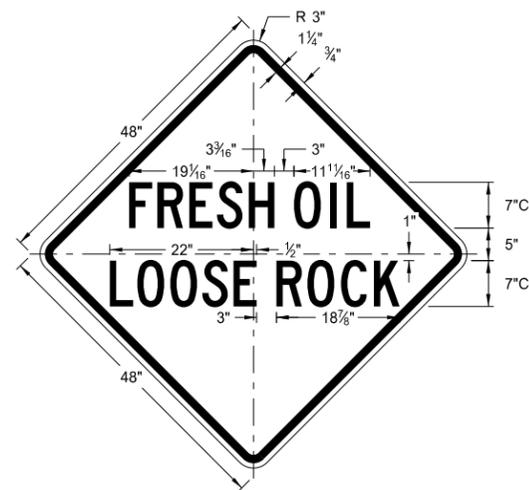
W5-9-48  
Legend: black (non-refl)  
Background: orange



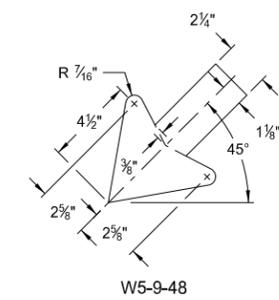
W8-55-48  
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Background: orange



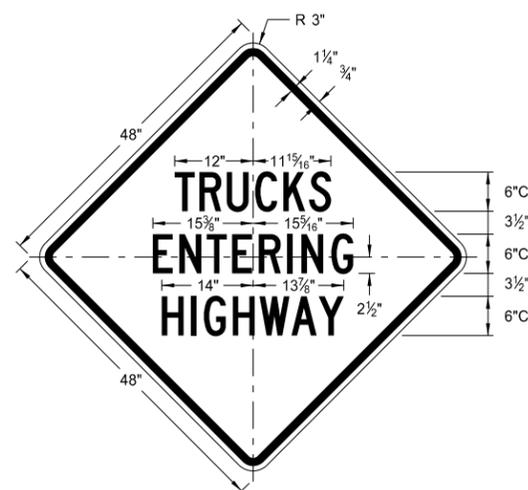
W20-52-54  
Legend: black (non-refl)  
Background: orange



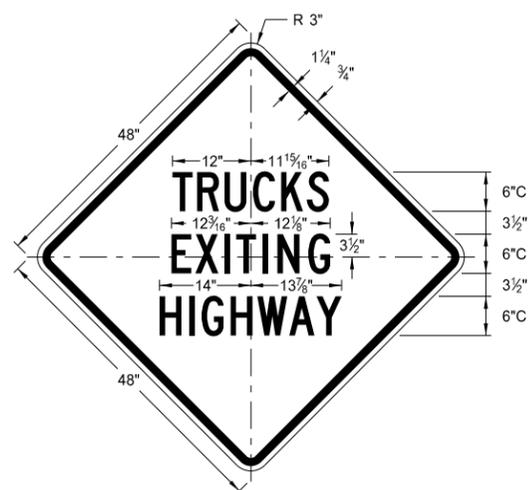
W22-8-48  
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Background: orange



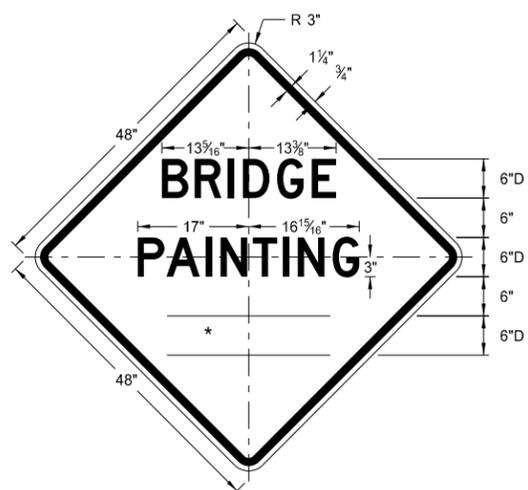
W5-9-48  
ARROW DETAILS



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



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

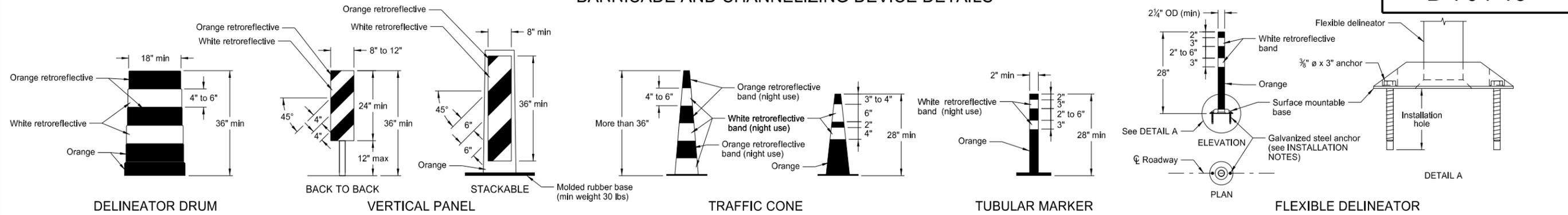


W21-50-48  
Legend: black (non-refl)  
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
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BARRICADE AND CHANNELIZING DEVICE DETAILS



The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

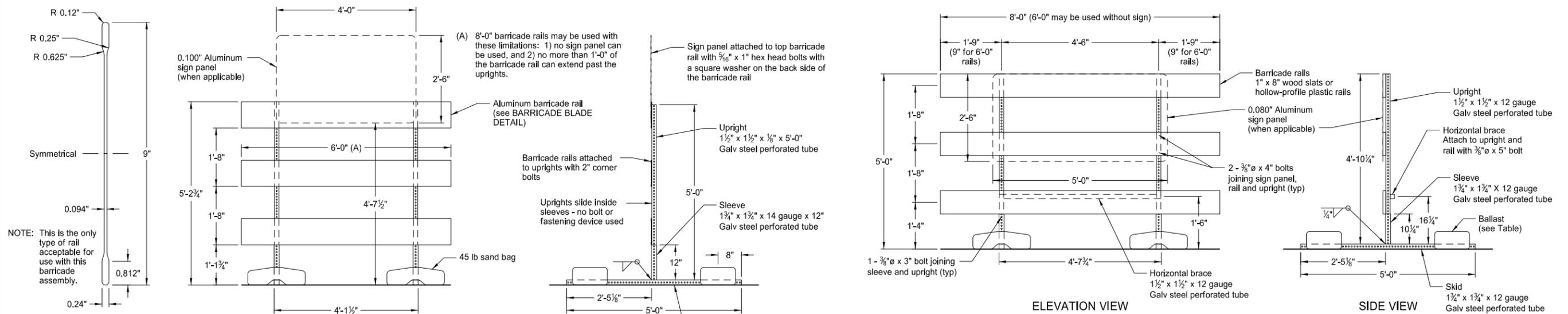
Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.

Retroreflectization of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective space between the orange and white stripes shall not exceed 3" wide.

Retroreflectization of tubular markers more than 42" in height shall be provided 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 as 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, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

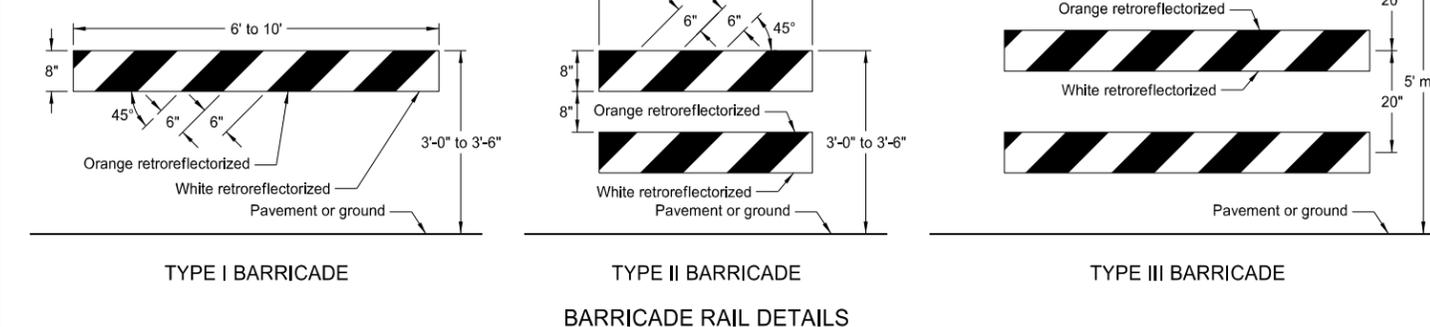
SIDE VIEW

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

SIDE VIEW

NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".

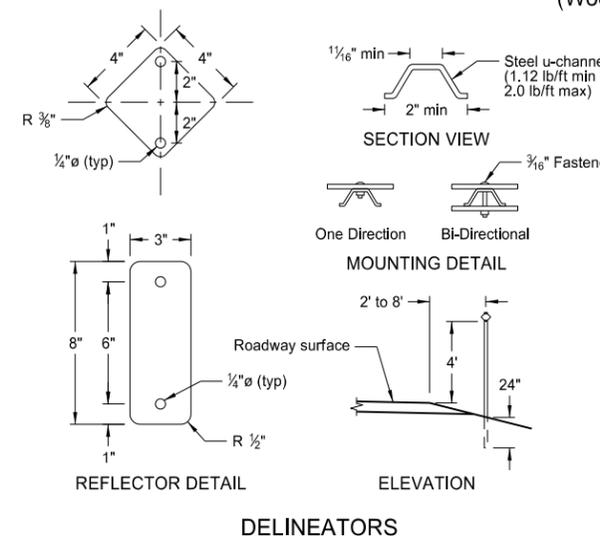


TYPE I BARRICADE

TYPE II BARRICADE

BARRICADE RAIL DETAILS

TYPE III BARRICADE



REFLECTOR DETAIL

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

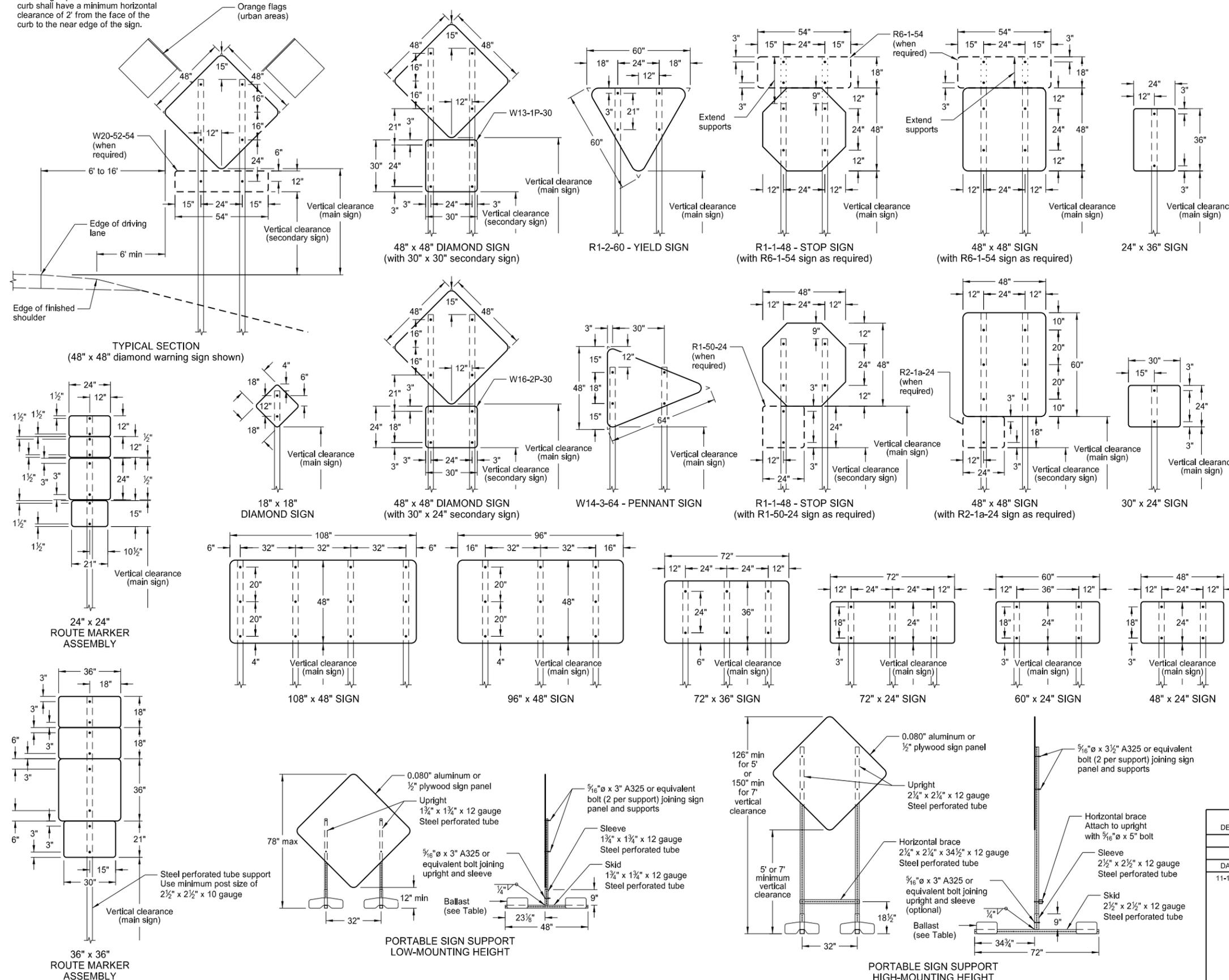
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



- NOTES:
- Sign Supports:** Supports shall be galvanized or painted. 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, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.  
Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.  
Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
  - Sign Panels:** Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.
  - Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a 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 as stated above.  
Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
  - Portable Signs:** Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.  
When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used 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. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.  
Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have 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

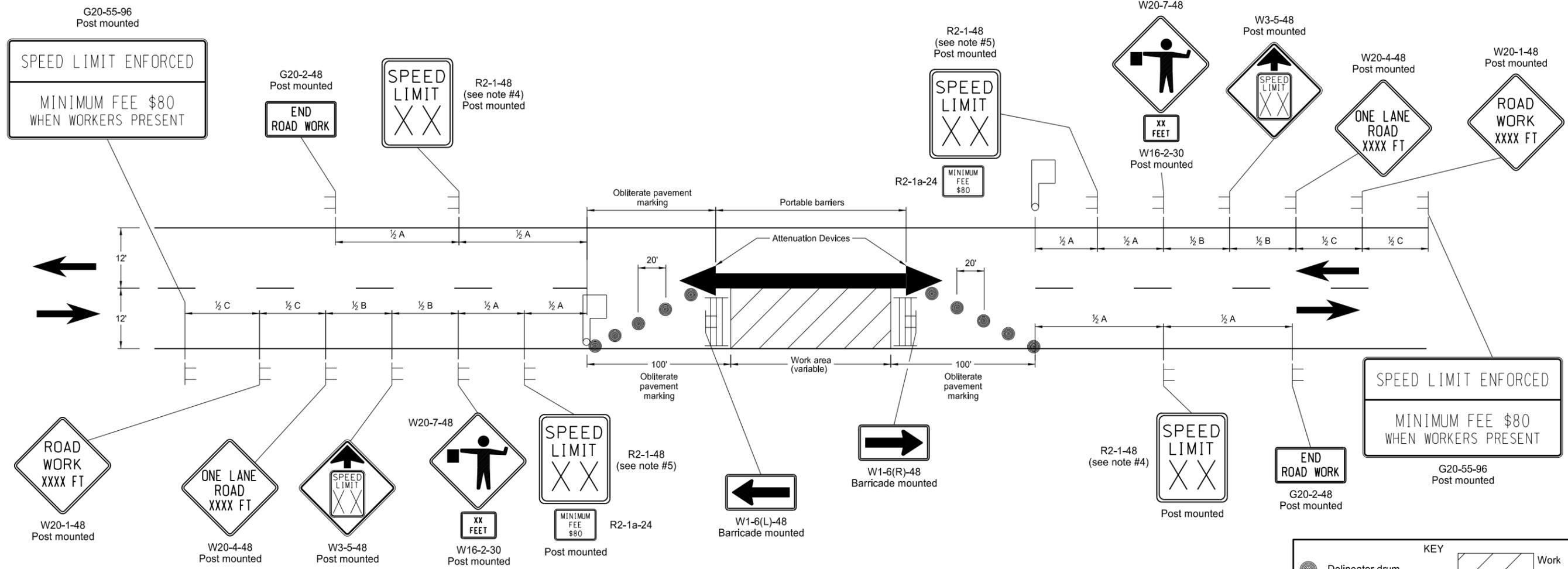
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

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**Roger Weigel,**  
Registration Number  
**PE-2930,**  
on 11/14/13 and the original document is stored at the  
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# SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



**Notes**

- Floodlights shall be provided to mark flagger stations at night. The lighting shall not create a disabling glare for drivers. Placement and elimination of potential glare can best be determined by driving through and observing the floodlighted area from each direction on the main roadway after lighting is set up.
- Barricades placed on roadway shall be on a movable assembly. Signs placed on the roadway shall be placed on skid mounted assembly.
- Existing striping shall be removed as required. Delineators will only be used when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways have steep slopes and alignment is not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Existing speed limit signs within a reduced speed zone shall be covered. G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
- 

**KEY**

- Delineator drum
- Sign
- Type III barricade
- Work area
- Flagger

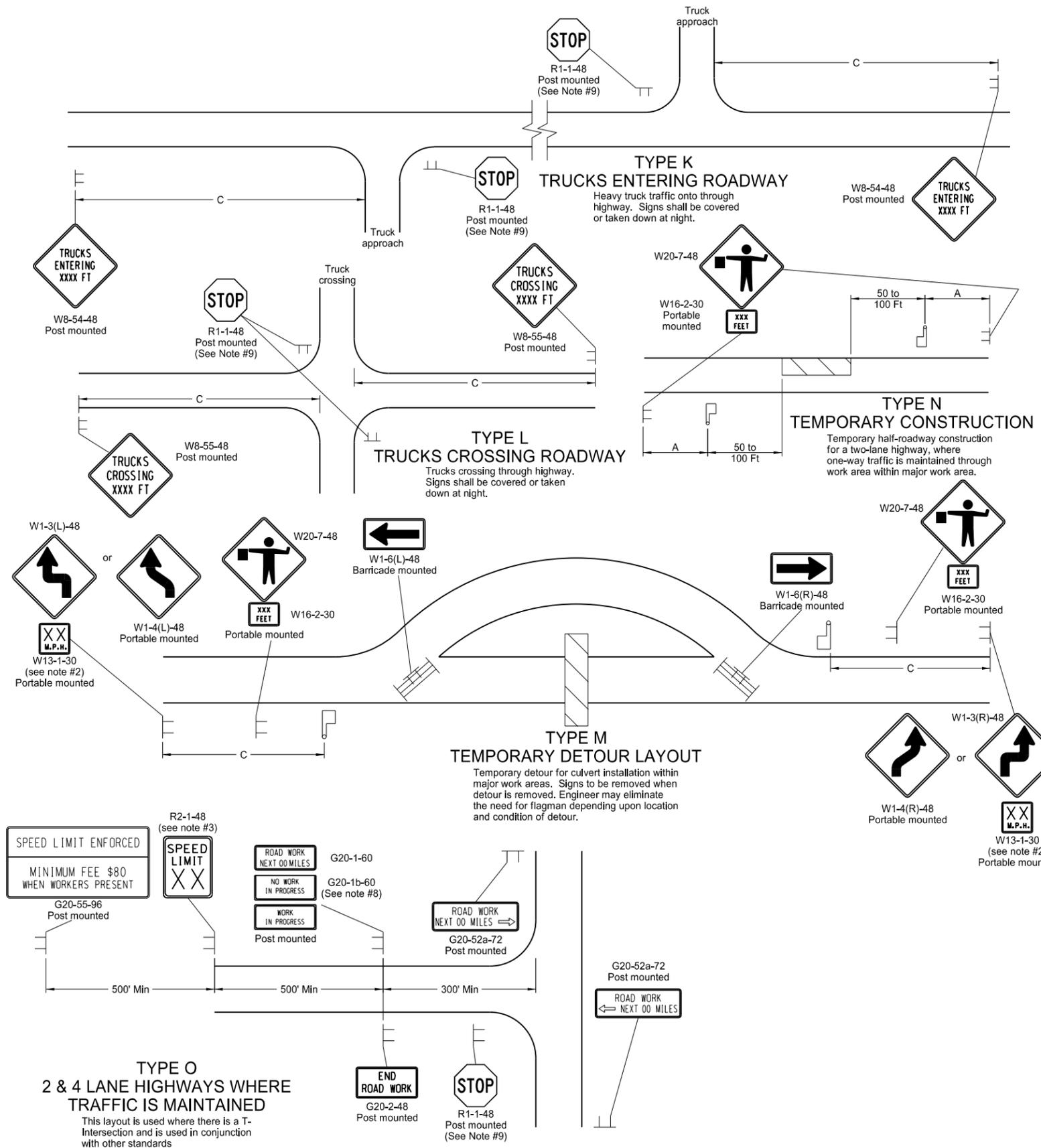
Road Type	Distance Between Signs (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

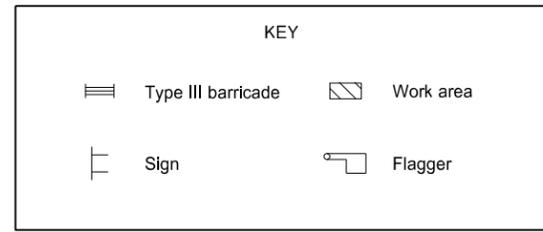
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**Roger Weigel**  
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# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
  2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
  3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  4. Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
  5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
  6. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
  7. If existing stop sign is in place, a 48" stop sign is not required.
  8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.



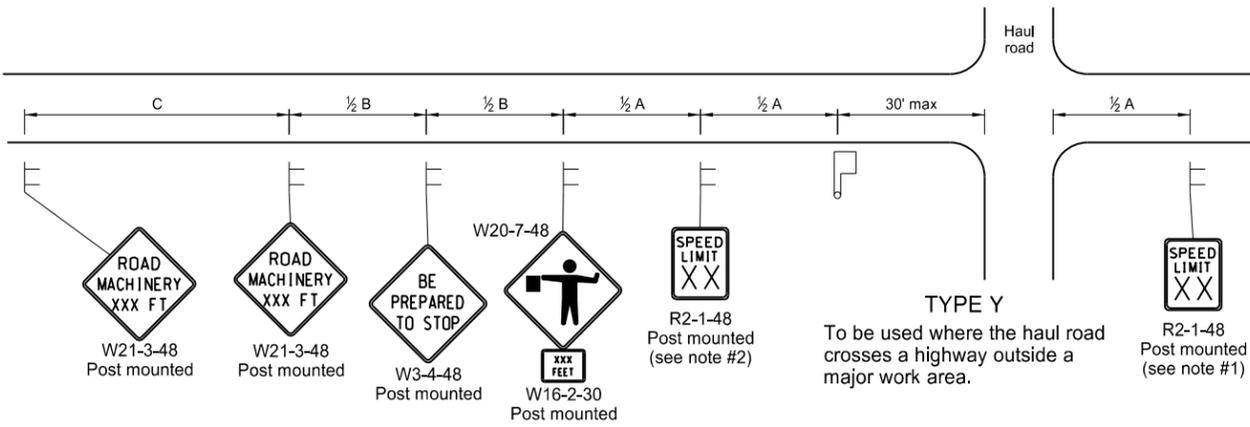
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 9-27-13	
REVISIONS	
DATE	CHANGE

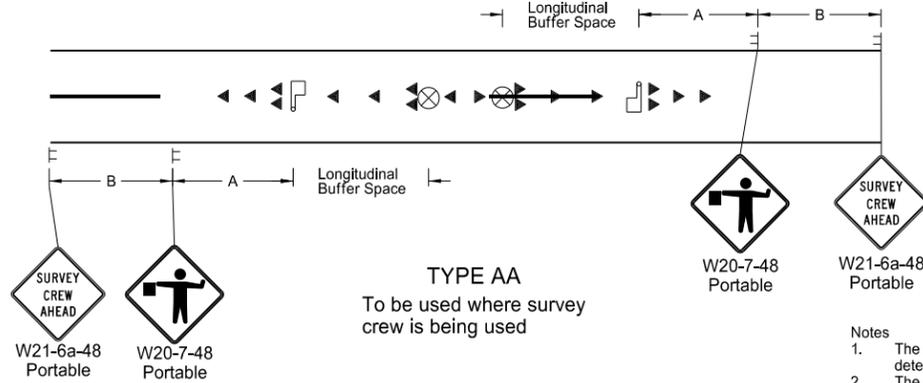
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MISCELLANEOUS SIGN LAYOUTS

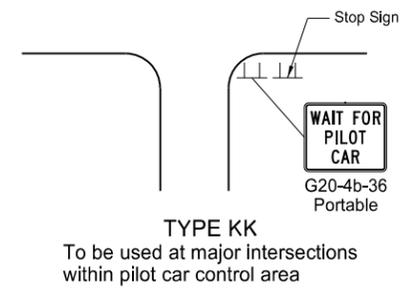
D-704-26



**TYPE Y**  
To be used where the haul road crosses a highway outside a major work area.

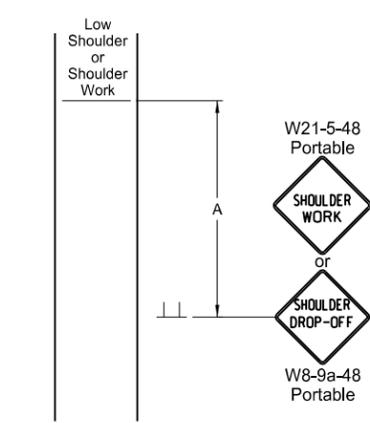


**TYPE AA**  
To be used where survey crew is being used

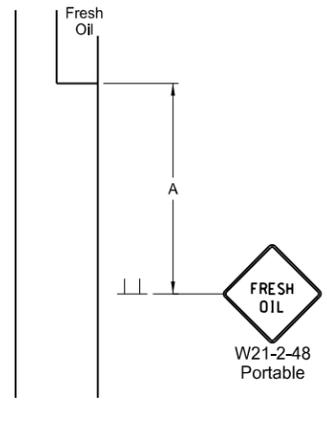


**TYPE KK**  
To be used at major intersections within pilot car control area

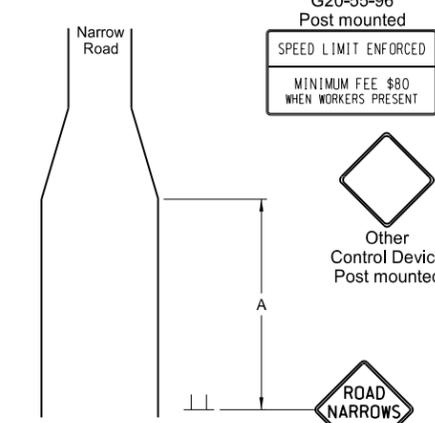
- Notes
1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
  2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
  3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  4. Existing speed limit signs within a reduced speed zone shall be covered.
  5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
  6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
  7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



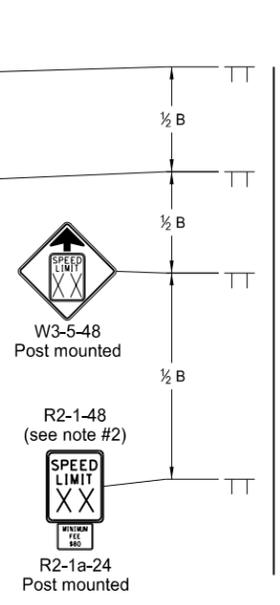
**TYPE BB**  
To be used within a major work area where the sign conditions exist



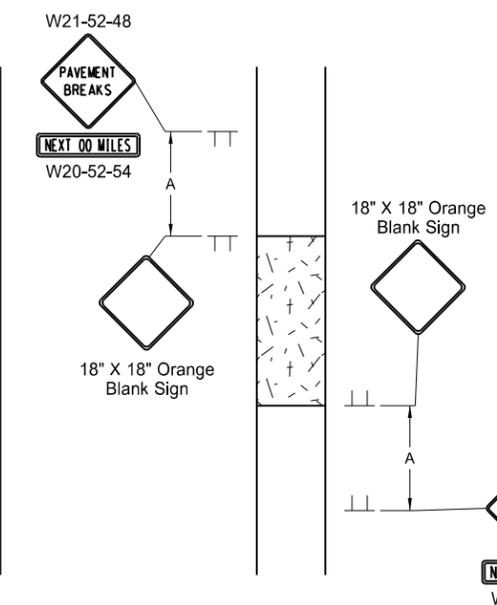
**TYPE CC**  
To be used where the sign conditions exist



**TYPE DD**  
To be used where the sign conditions exist



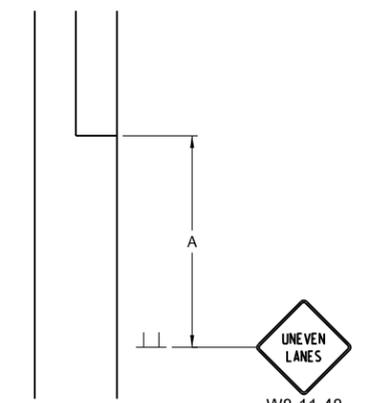
**TYPE Z**  
To be used where speed zone is needed



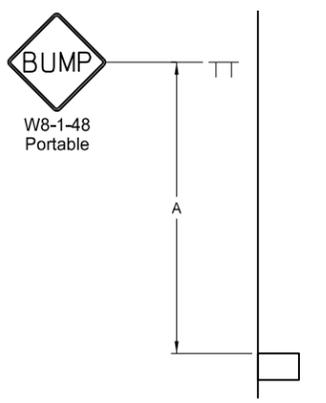
**TYPE JJ**  
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

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

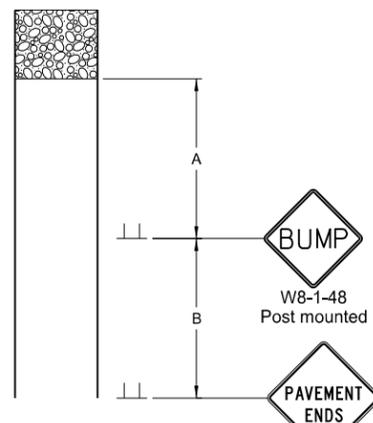
\* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



**TYPE GG**  
To be used where a difference of elevation between lanes exist



**TYPE EE**  
To be used where the sign conditions exist



**TYPE FF**  
To be used where the sign conditions exist

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

**KEY**

Sign (represented by a vertical line with a horizontal bar)

Flagger (represented by a square with a diagonal line)

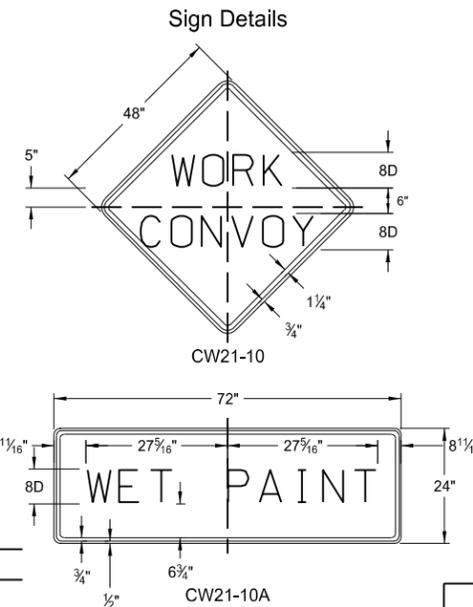
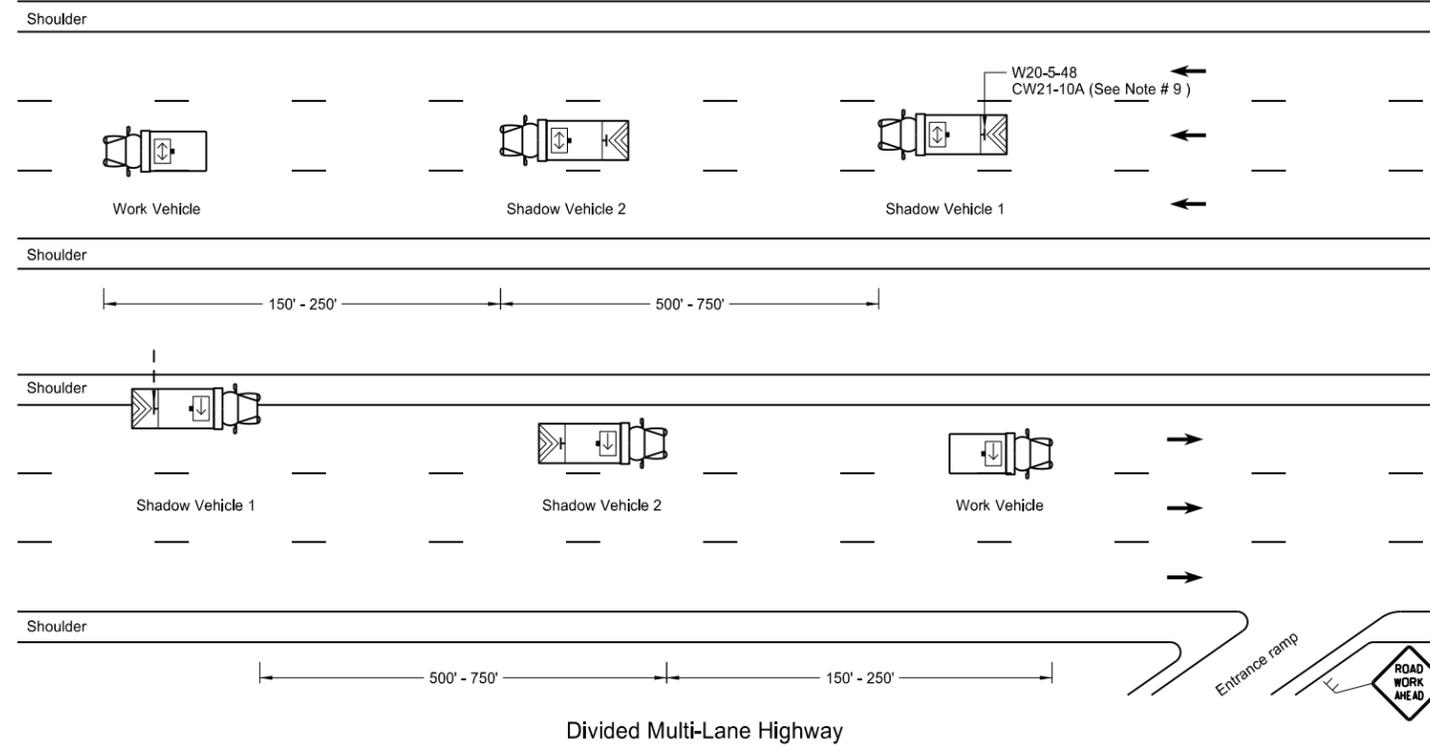
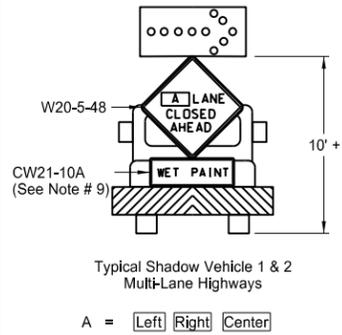
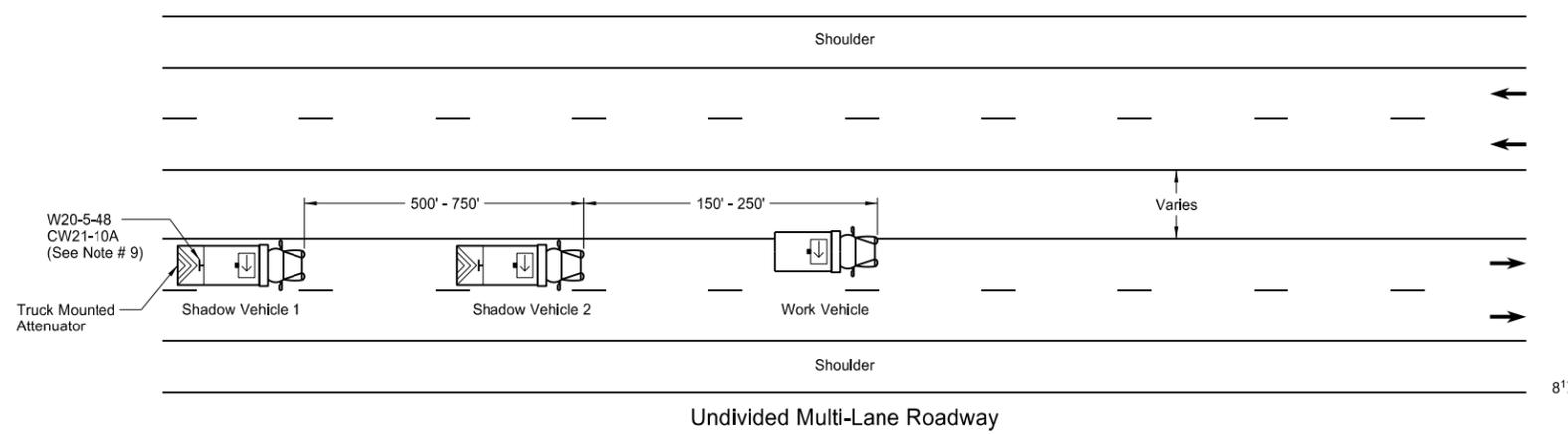
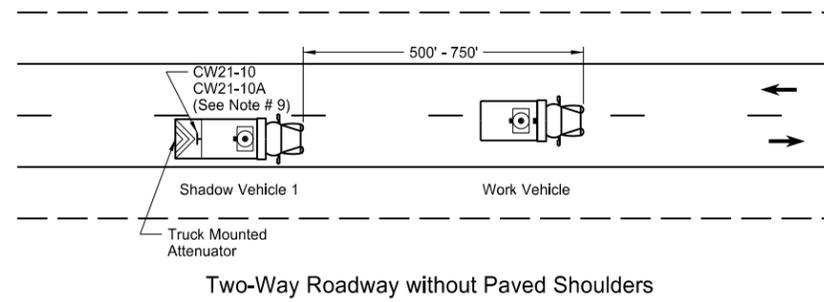
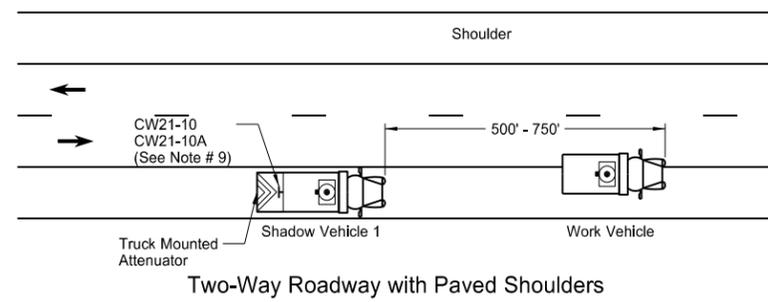
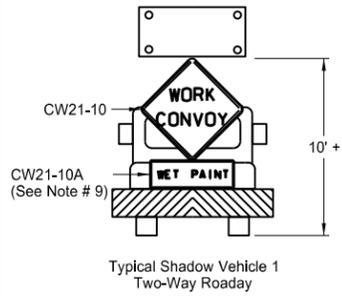
Cones (represented by a triangle)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

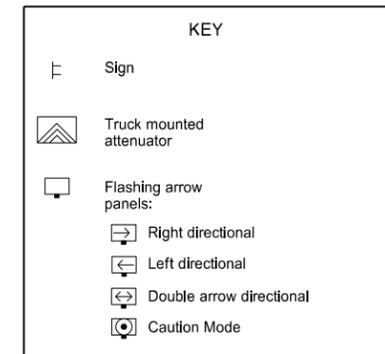
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# TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



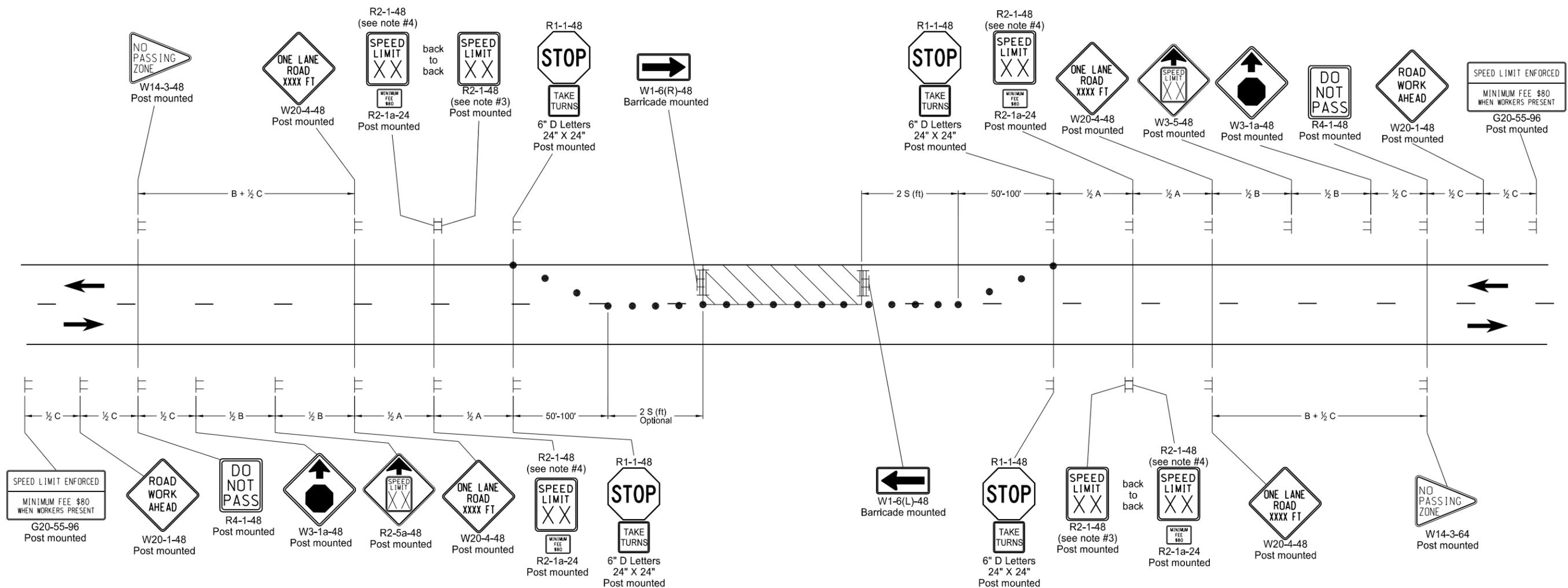
- Notes
- If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
  - Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
  - Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
  - Each vehicle shall have two-way electronic communication capability.
  - When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
  - Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
  - Sign Colors  
Letters = Black  
Border = Black  
Background = Orange
  - Shadow vehicle 2 may be used as the paint tender vehicle.
  - Sign CW21-10A shall only be used during a painting operation.
  - On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

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### CONSTRUCTION SIGN LAYOUT Non-signalized Low Volume One Lane Closure



**Notes**

- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Delineator drums or cones used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at dimension "S". "S" = the numerical value of speed limit.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

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

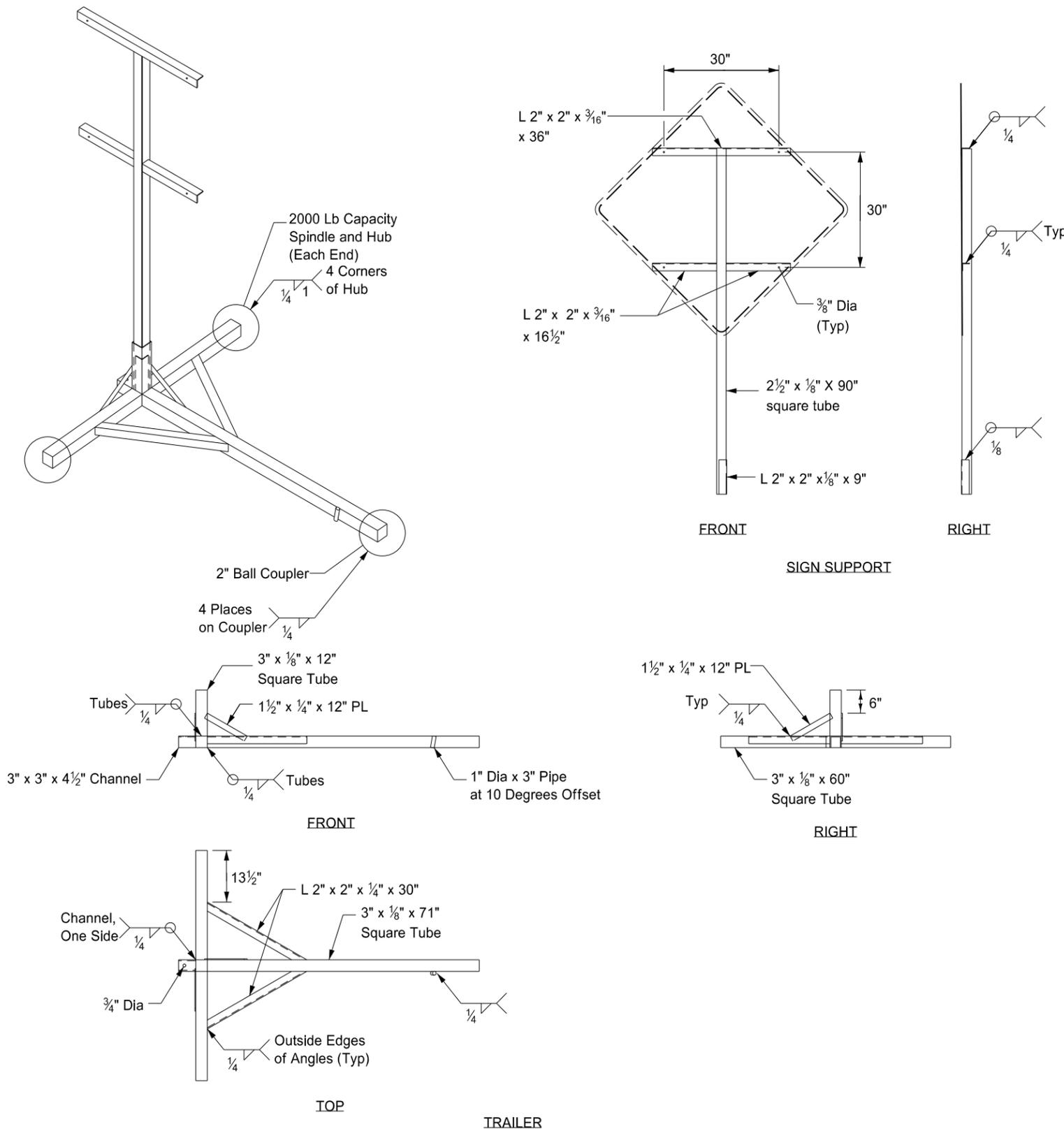
KEY	
	Type III barricade
	Sign
	Work area
	Delineator drum

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



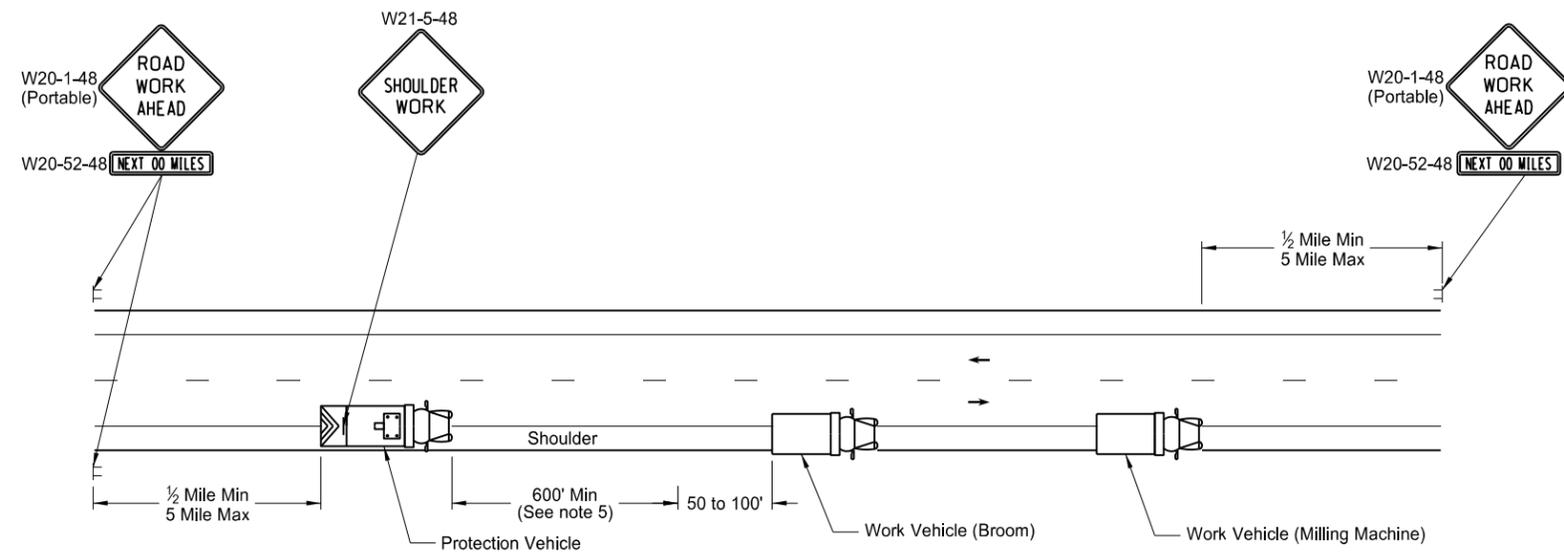
Notes:

- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

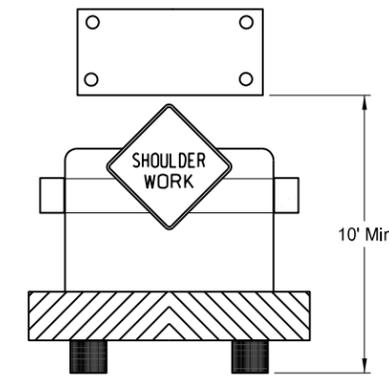
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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MOBILE OPERATION  
Grinding Shoulder Rumble Strips

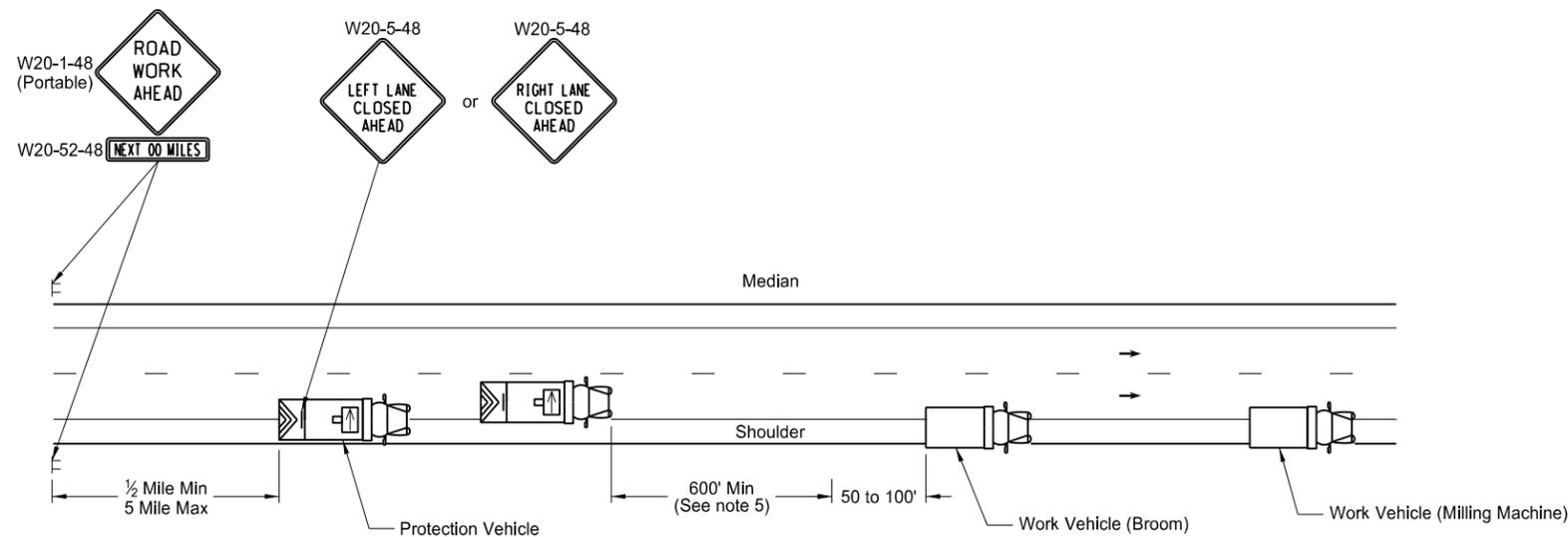


TWO LANE - TWO WAY ROADWAY

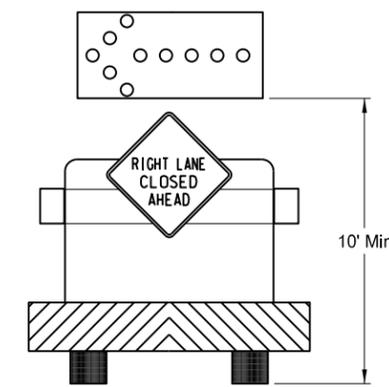


TWO LANE - TWO WAY ROADWAY  
Typical Protection Vehicle with  
Flashing Arrow Panel In Caution Mode

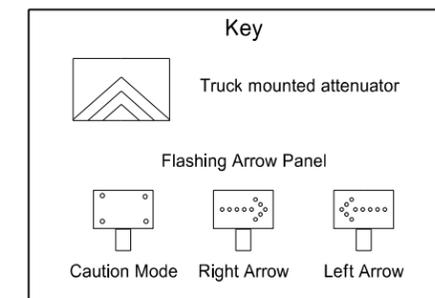
- Notes:
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
  2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
  3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
  4. Each vehicle shall have two - way electronic communication capability.
  5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
  6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
  7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



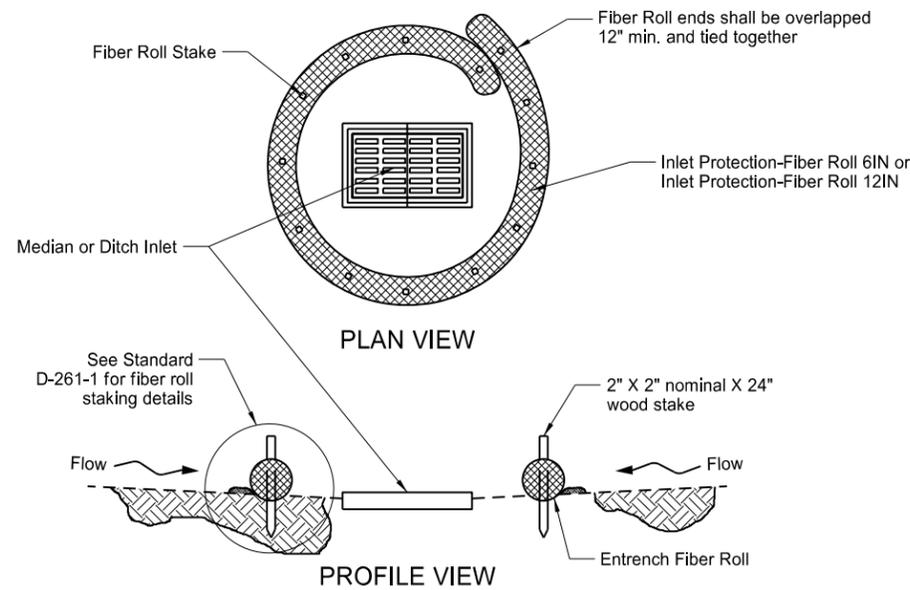
INTERSTATE & 4 LANE DIVIDED HIGHWAY  
Typical Protection Vehicle with Flashing Arrow  
Panel In Flashing Arrow Mode



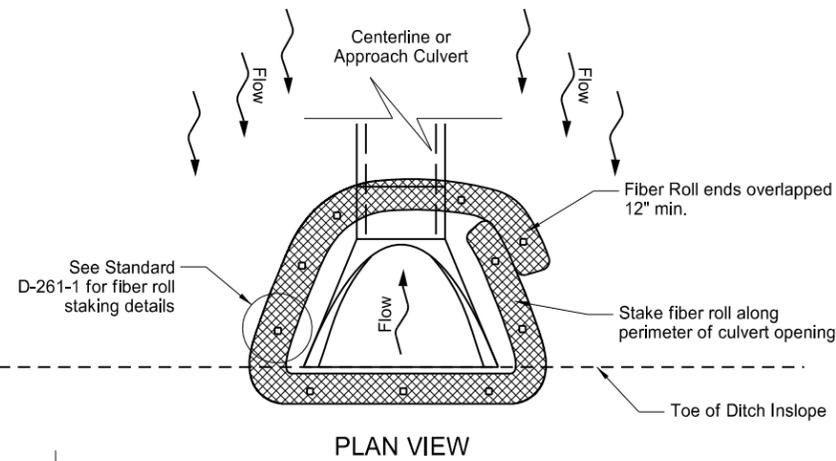
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

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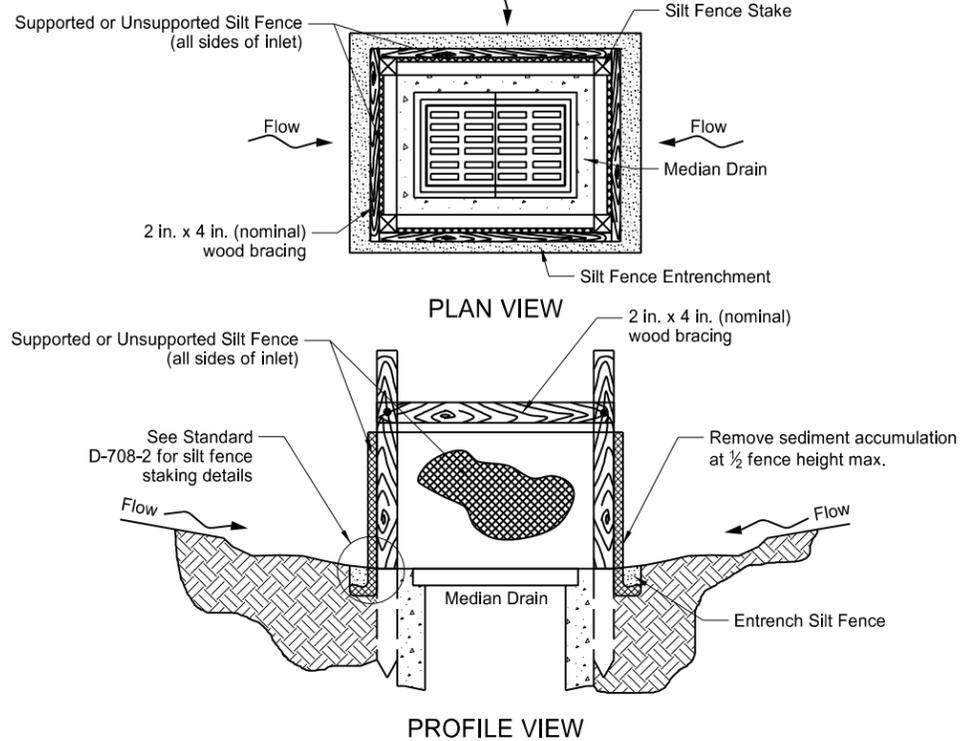
EROSION AND SILTATION CONTROLS  
MEDIAN OR DITCH INLET PROTECTION



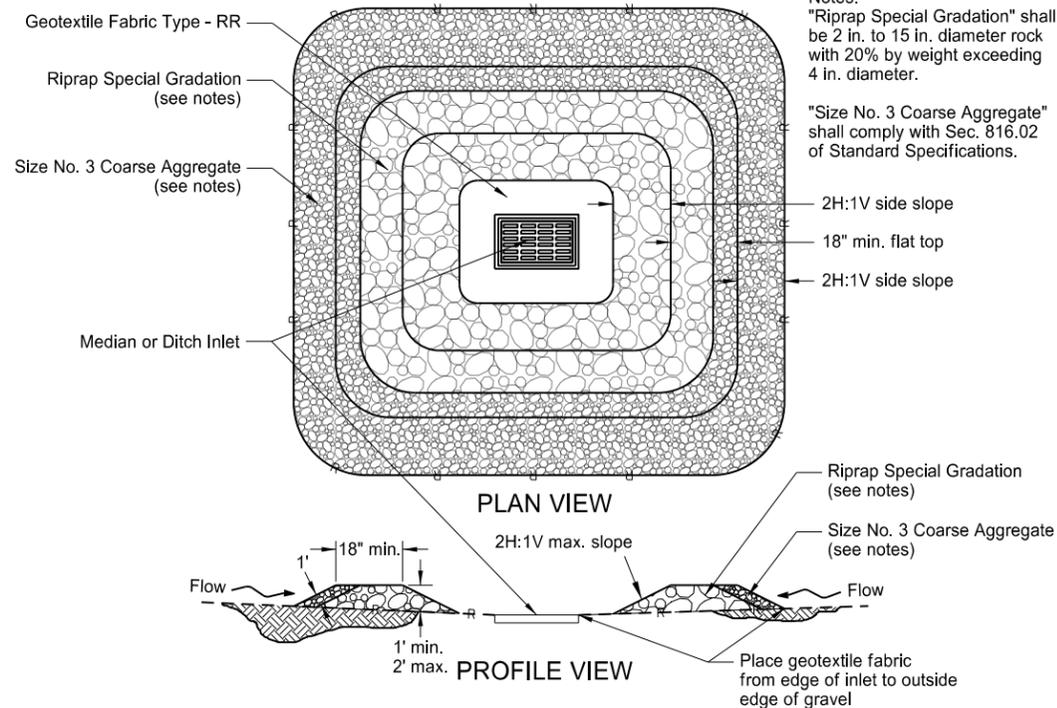
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



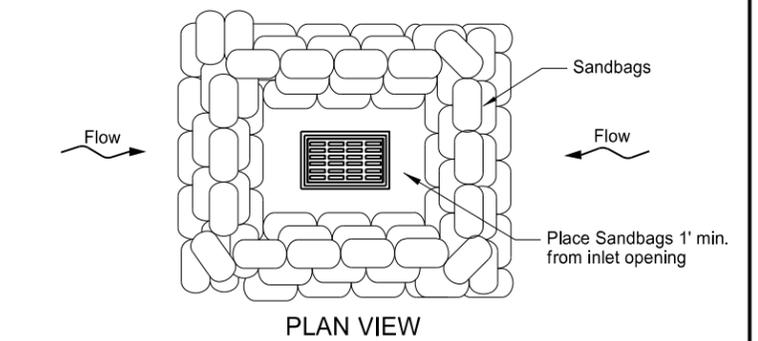
FIBER ROLL PROTECTION (INLET OF CULVERT)



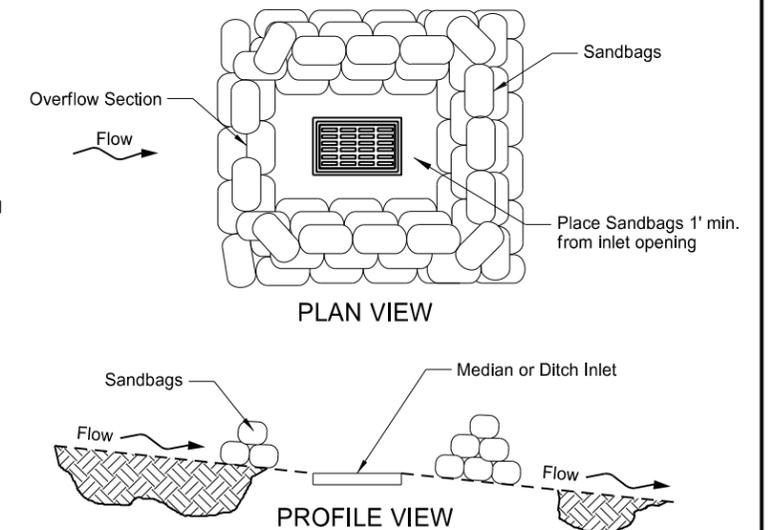
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (LOW POINT)



SANDBAG PROTECTION (ON SLOPE)

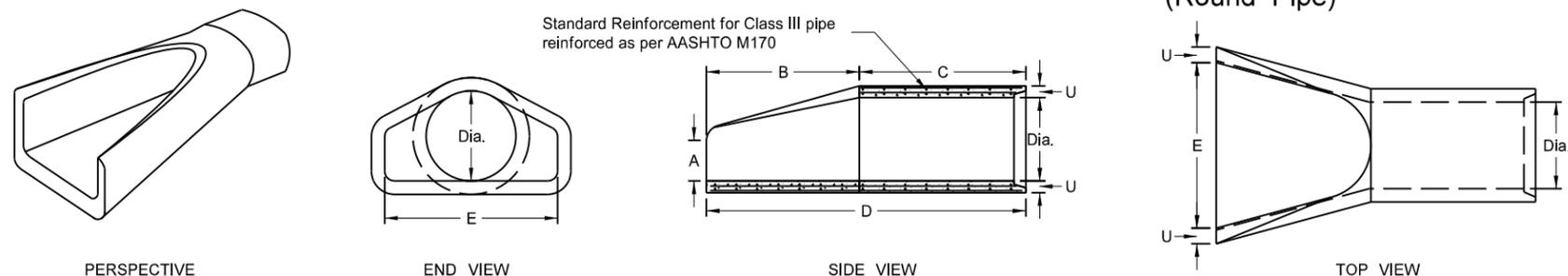
Notes:  
"Riprap Special Gradation" shall be 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter.  
"Size No. 3 Coarse Aggregate" shall comply with Sec. 816.02 of Standard Specifications.

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.
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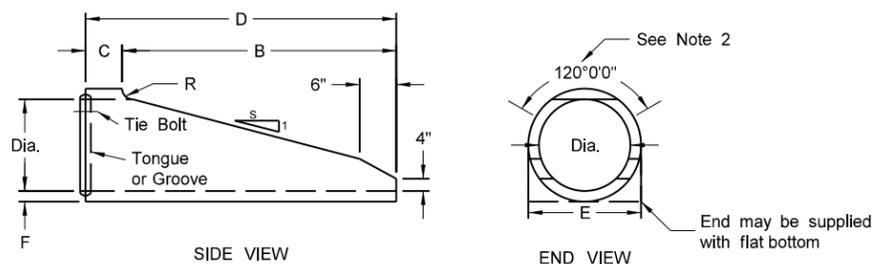
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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS  
(Round Pipe)



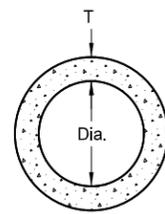
REINFORCED CONCRETE PIPE - FLARED END SECTION  
Reinforcement to be equivalent to Class III RCP

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4

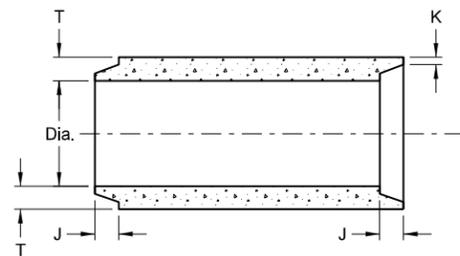


- NOTES (Traversable End Section):
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
  2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

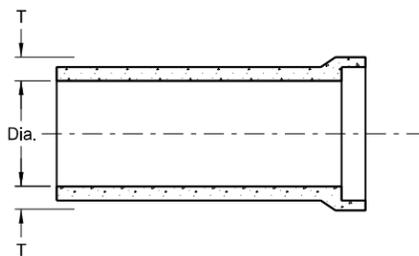
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION  
Reinforcement to be equivalent to Class III RCP



END VIEW  
CIRCULAR PIPE

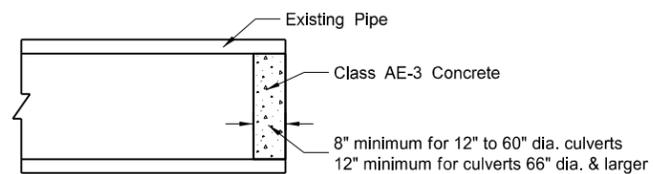


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0½"	6'-0½"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2½"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2½"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3½"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9½"	8'-2½"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

All Classifications of Round Concrete Pipe

Internal Dia. of Pipe (In.)	Cross-Sectional Water Area (Sq. ft.)	Weight per Lin. Foot of Pipe (Lbs.)	Joint Groove Min./Max. (In.)	Joint Tongue Min./Max. (In.)	Minimum Wall Thickness (In.)
12	0.79	92	1½-2¾	¾	2
15	1.23	127	1¾-2¾	¾	2½
18	1.77	168	1¾-2¾	1	2½
21	2.40	214	1¾-3¾	1½	2¾
24	3.14	265	2¾-3¾	1½	3
27	3.98	322	2¾-4	1¾	3¼
30	4.91	384	3¼-4¼	1¾	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3¼-4¼	1½	4
42	9.62	685	3¼-4¼	1¾	4½
48	12.57	885	3¼-4¼	1¾	5
54	15.90	1070	4¼-5½	2	5½
60	19.63	1296	4¼-5½	2¼	6
66	23.76	1542	5-6	2½	6½
72	28.27	1810	5¼-6¾	2½	7
78	33.18	2098	6¼-7¼	2½	7½
84	38.48	2410	5¾-7¾	3¾	8
90	44.18	2793	6¾-8½	3¾	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

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

NOTES:

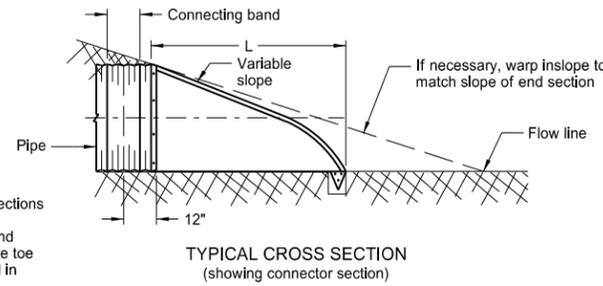
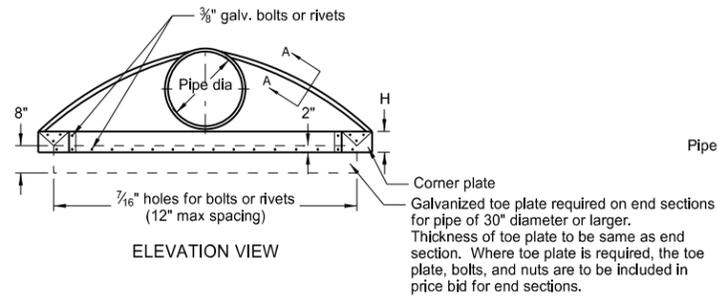
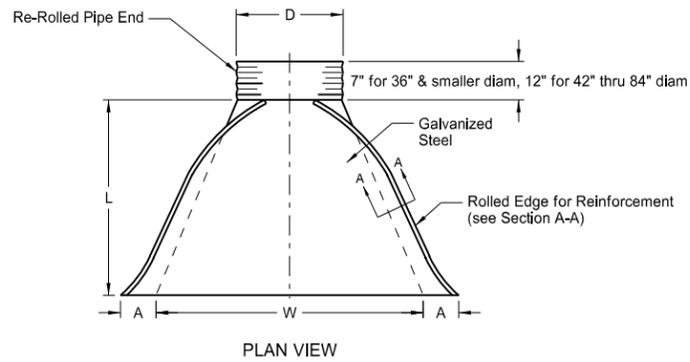
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66"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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE

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# ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



PIPE DIA. IN	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/2:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

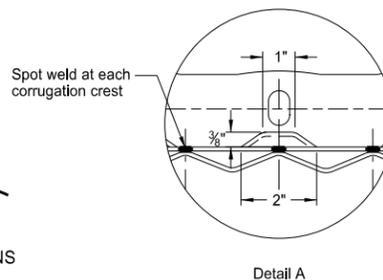
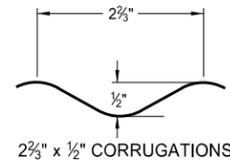
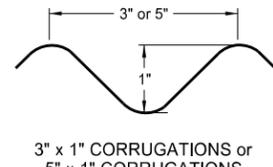
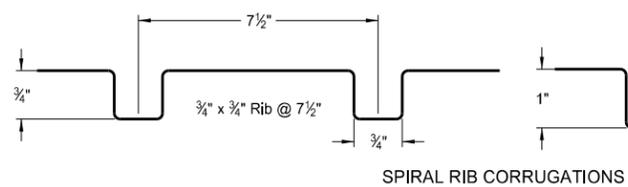
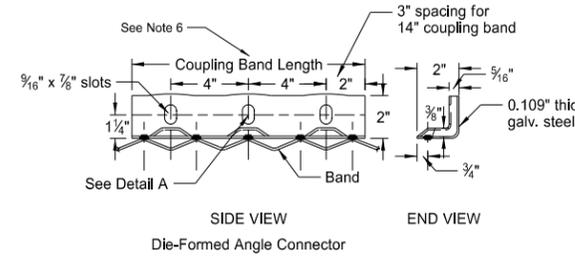
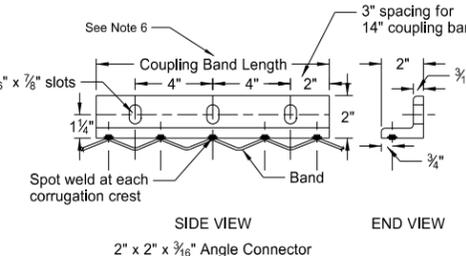
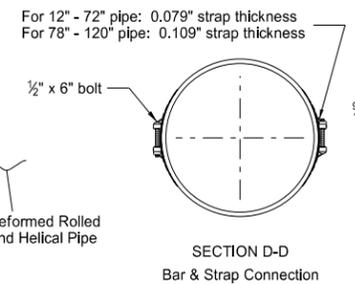
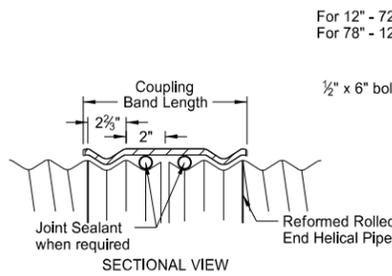
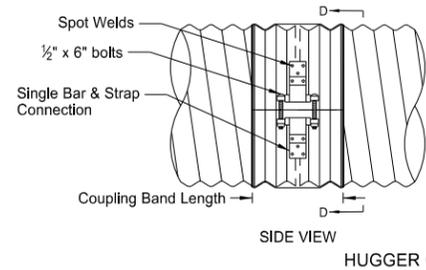
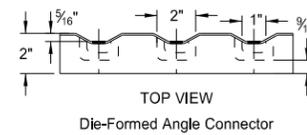
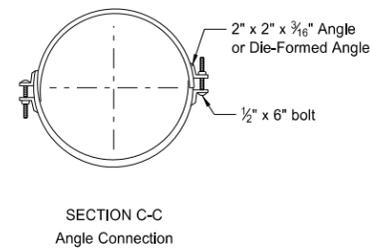
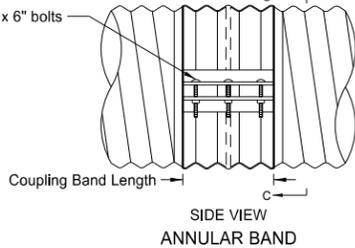
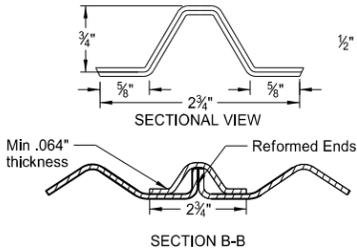
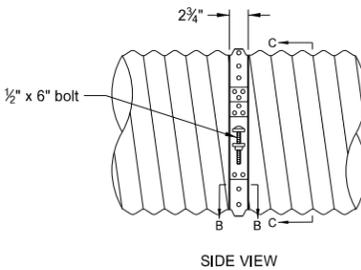
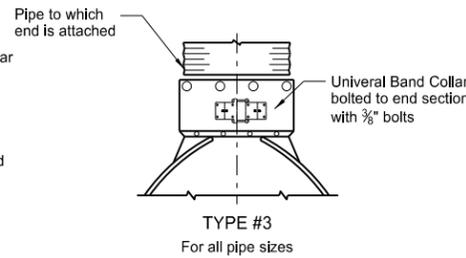
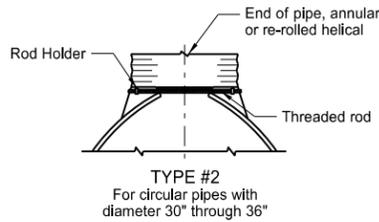
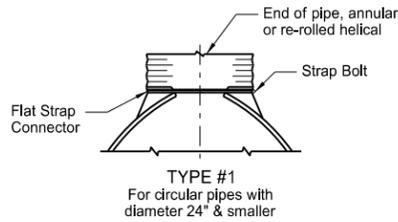
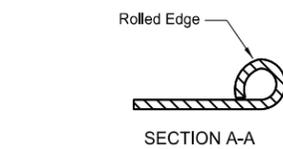
- These sizes have 0.109" sides and 0.138" center panels.
  - Pipe diameter is equal to dimension "D" of end section.
- Manufacturers tolerances of above dimensions will be allowed.
- Splices to be the lap riveted type.

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
7. Length of spot welds shall be minimum 1/2".

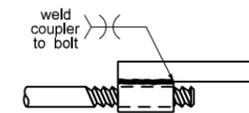
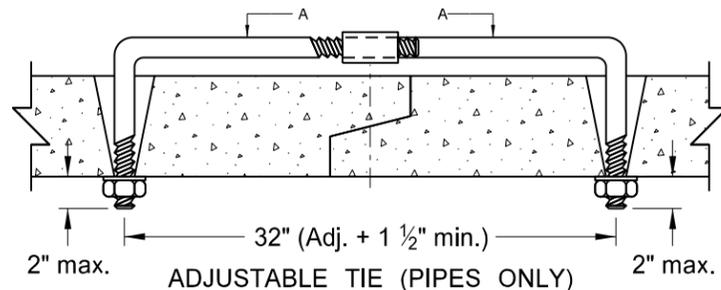
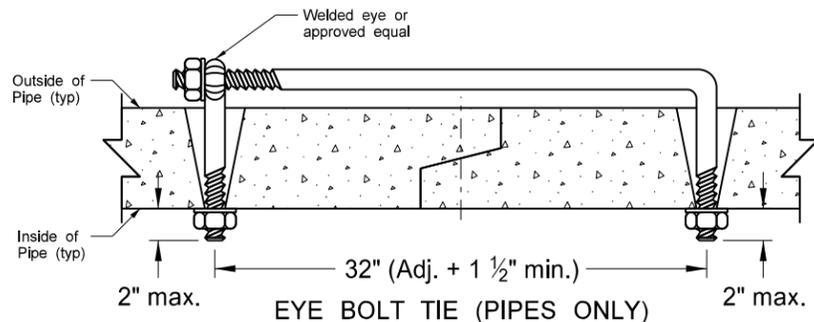
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 3/8" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 3/8" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 3/8" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

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# CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES

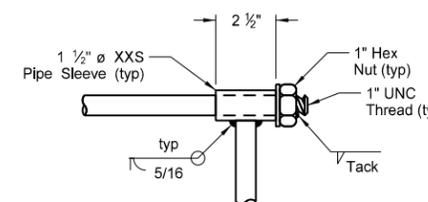
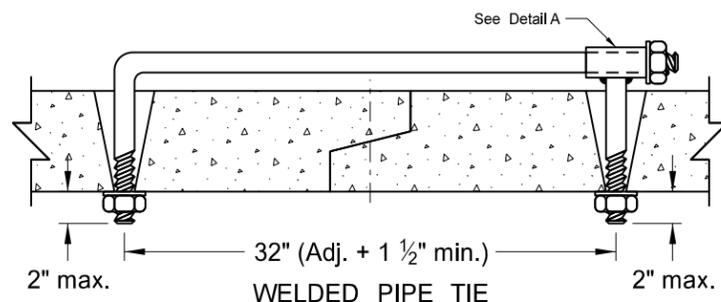
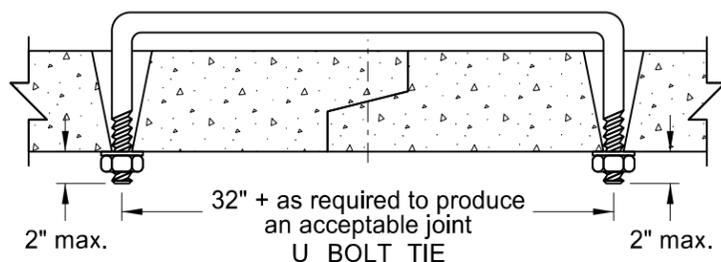


SECTION A-A

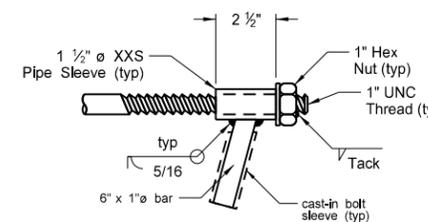
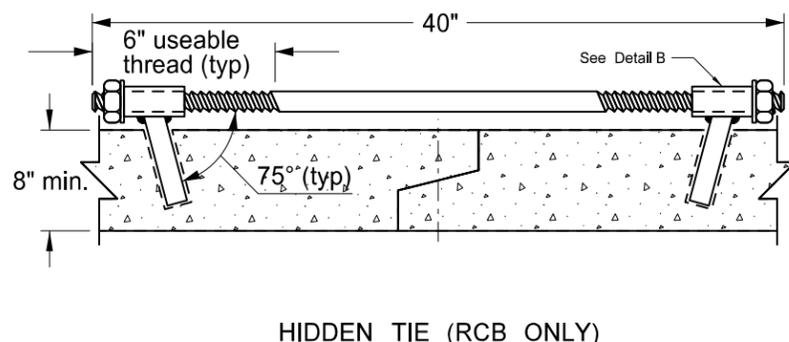
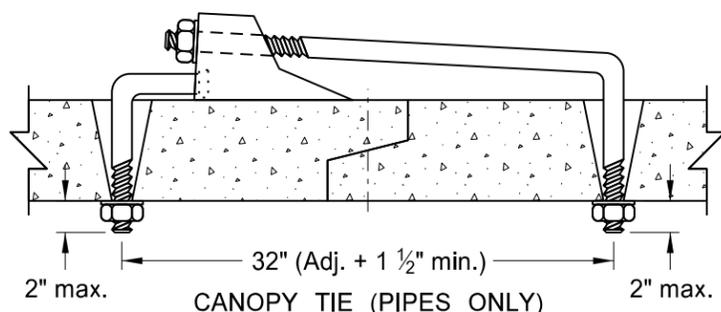
REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread $\phi$	XXS Pipe Sleeve Inner $\phi$
18" - 24"	5/8" See note 2	3/4"
30" - 66"	3/4"	1"
72" - 78"	1"	1 1/4"
RCB		

NOTES:

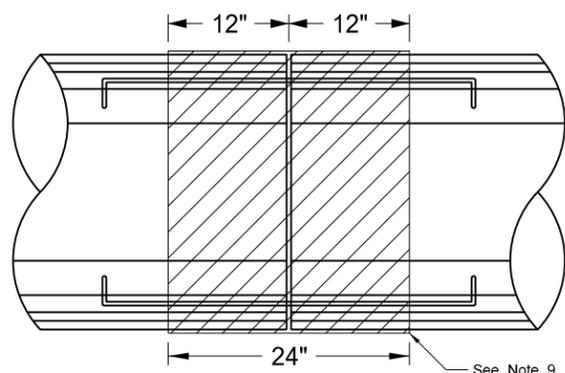
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
- Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
- Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
- Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
- Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter 1/4" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 1/4".
- The contractor has the option of selecting the type of tie bolt used from those shown.
- The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
- All concrete culvert and storm sewer joints, including the end section joints, shall be tied unless otherwise specified.
- When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
- Tie bolts shall conform to ASTM A 36. Nuts shall be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
- Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
- RCB tie locations shall be as shown on the plans.



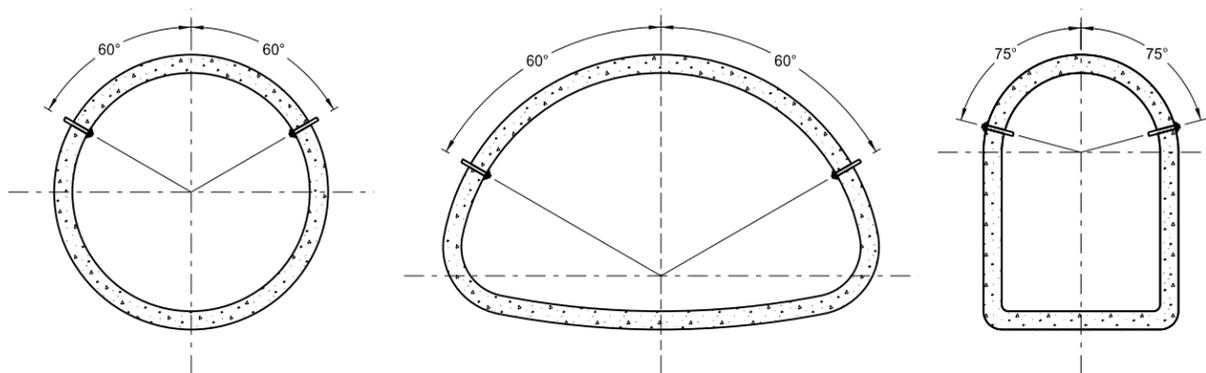
DETAIL A



DETAIL B



PLAN VIEW



END VIEW

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
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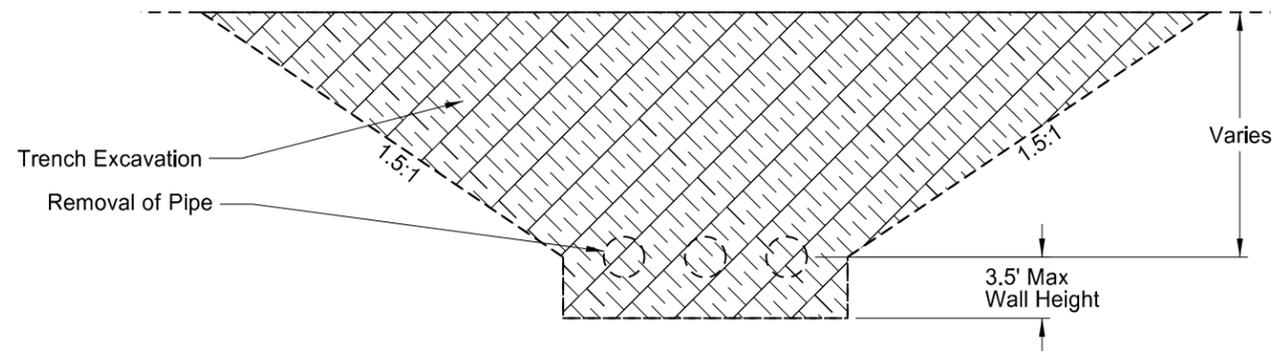
TRANSVERSE MAINLINE PIPE EXCAVATION AND INSTALLATION DETAIL FOR MULTIPLE PIPES MORE THAN 4 FEET VELOW THE TOP OF PROPOSED SUBGRADE

- Pay Items  
 1) Pipe\*  
 2) Reinforcement Fabric - Type R1  
 3) Removal of Pipe (if required)

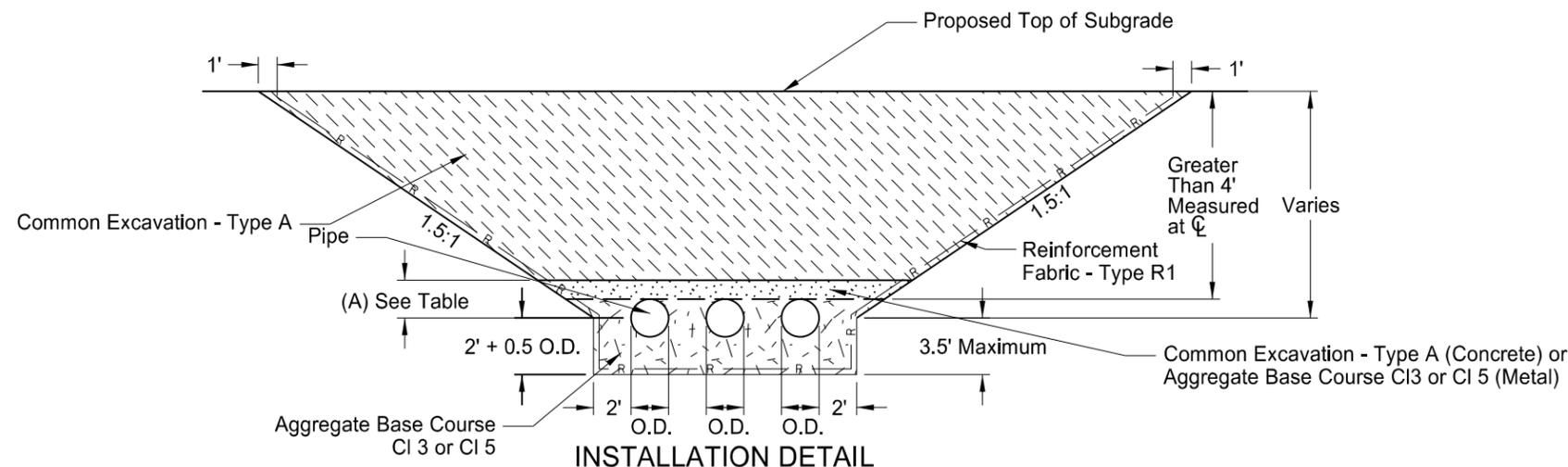
- \*Included in Pipe Pay Items  
 1) Pipe  
 2) Trench Excavation  
 3) Aggregate Base Course CI 3 or CI 5  
 4) Common Excavation - Type A

NOTES:

- 1) This drawing applies to new/replaced mainline and paved intersection roadways (including ramps). It does not include pipes in approaches.  
 2) The exact location of the pipes shall be shown in the plans.

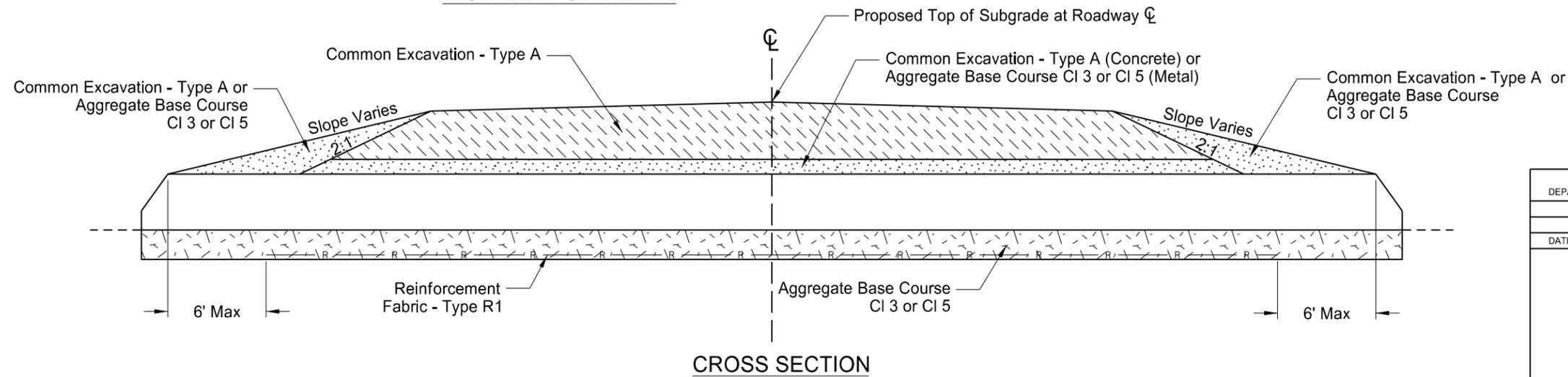


EXCAVATION DETAIL



INSTALLATION DETAIL

Backfill Dimensions	
Pipe Materials	Dimension (A)
Concrete	0.5 O.D.
Metal	0.5 O.D. + 1'



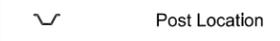
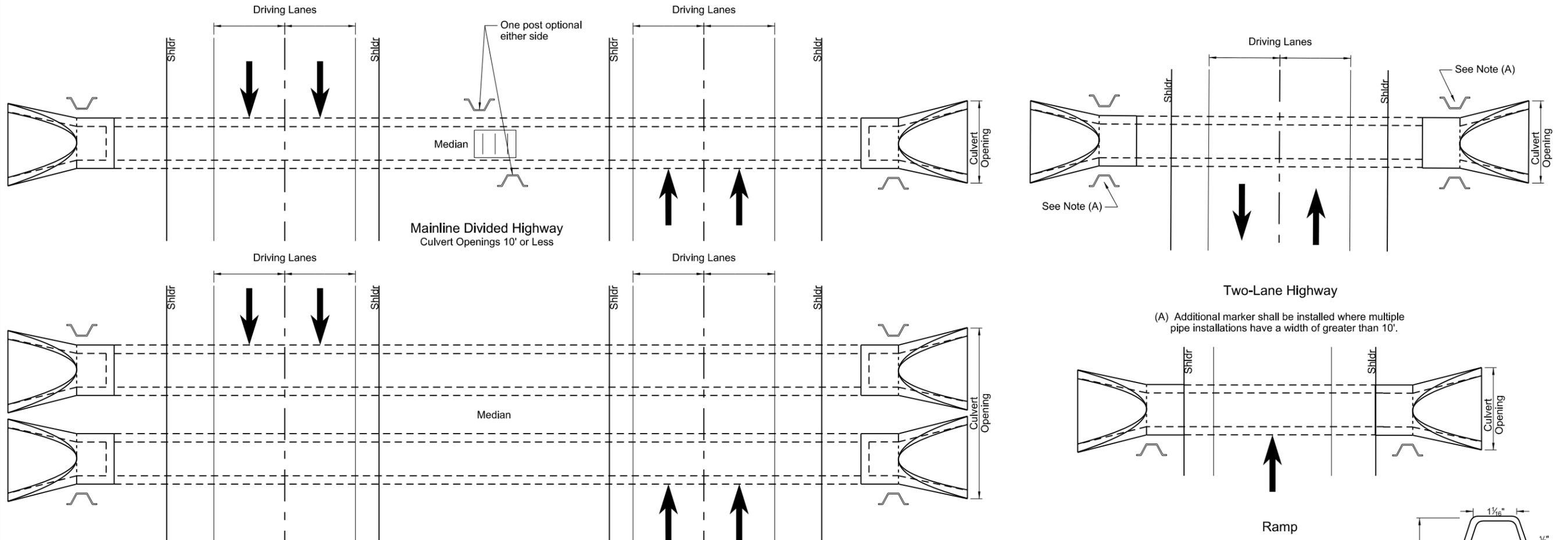
CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-4-14	
REVISIONS	
DATE	CHANGE

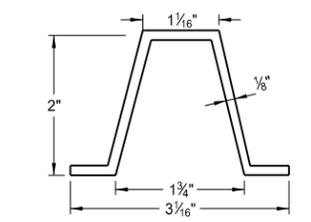
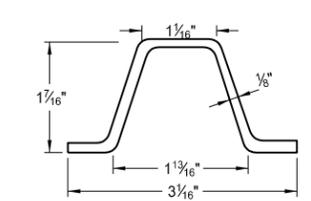
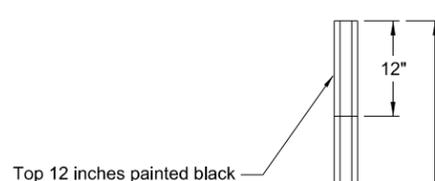
This document was originally issued and sealed by  
 Ron Horner  
 Registration Number  
 PE-2087,  
 on 02/04/14 and the original document is stored at the  
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OBJECT MARKERS - CULVERTS

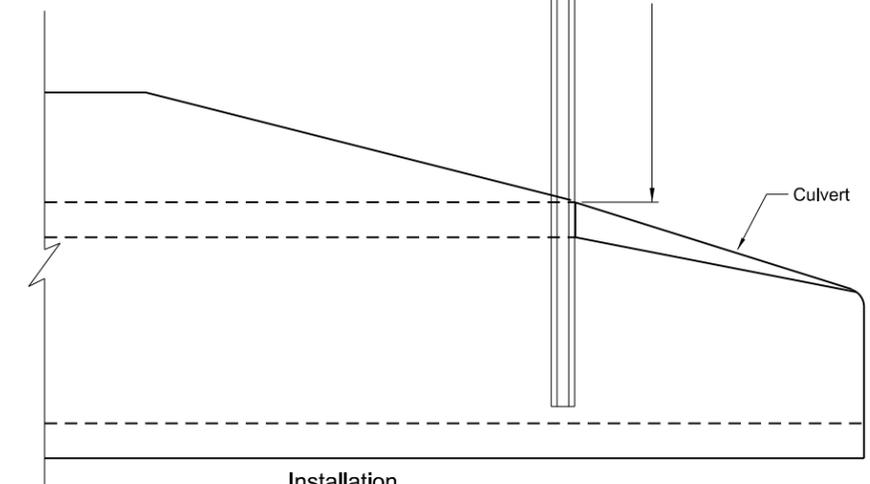
D-754-83



Mainline Divided Highway  
Culvert Openings Greater than 10'  
Multiple Installations



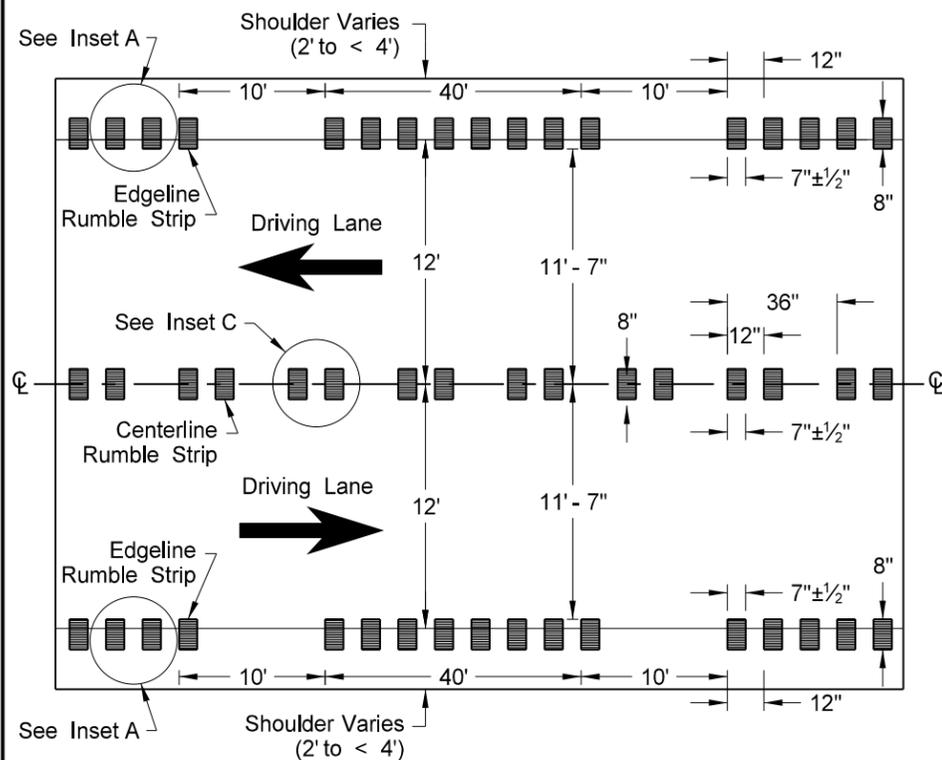
- Notes:**
- Installation:** Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.
  - Posts:** Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.
  - Basis of Payment:** The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



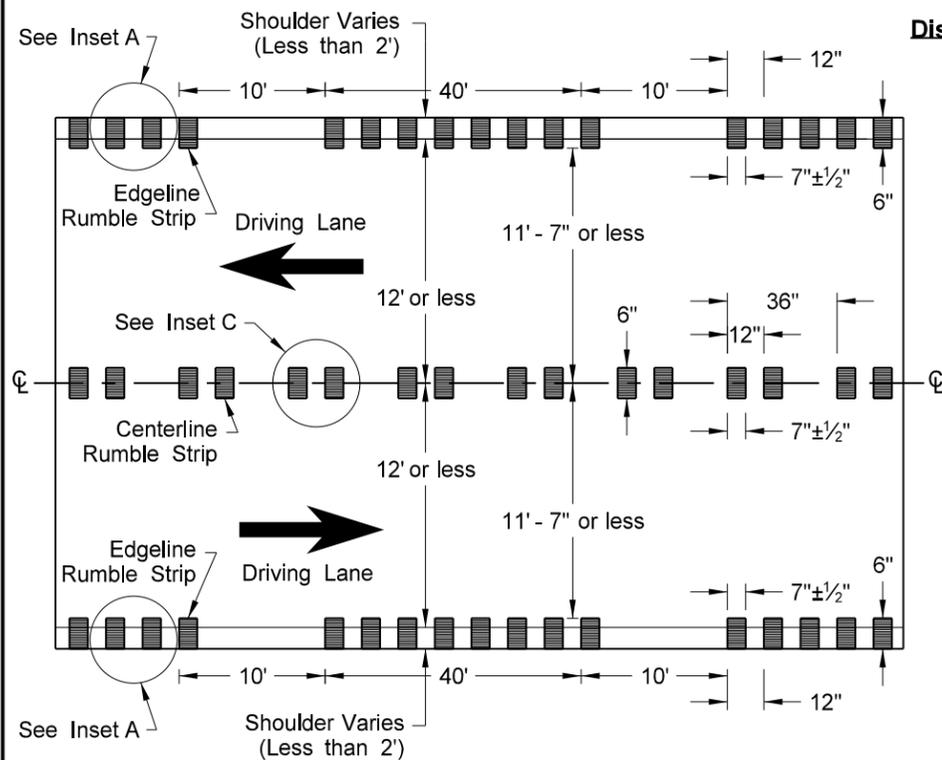
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

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**Roger Weigel,**  
 Registration Number  
 PE-2930,  
 on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation

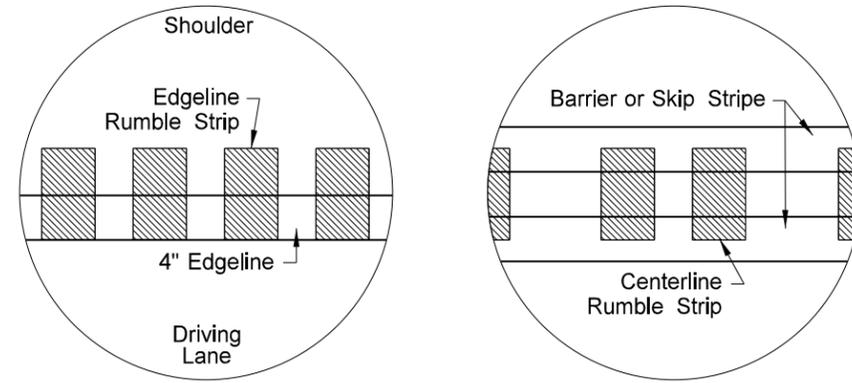
RUMBLE STRIPS  
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')



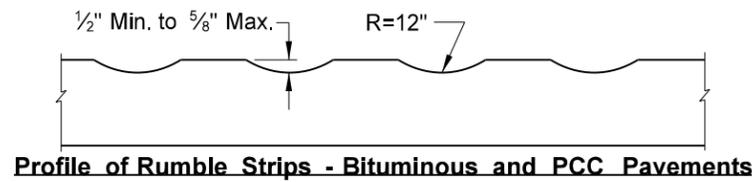
**Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')**



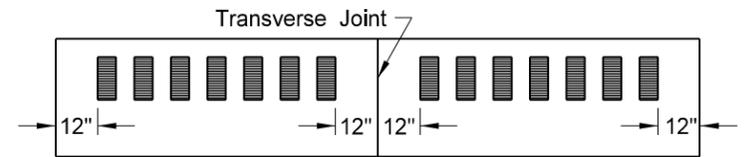
**Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')**



**Inset A - Edgeline Rumble Strip      Inset C - Centerline Rumble Strip**



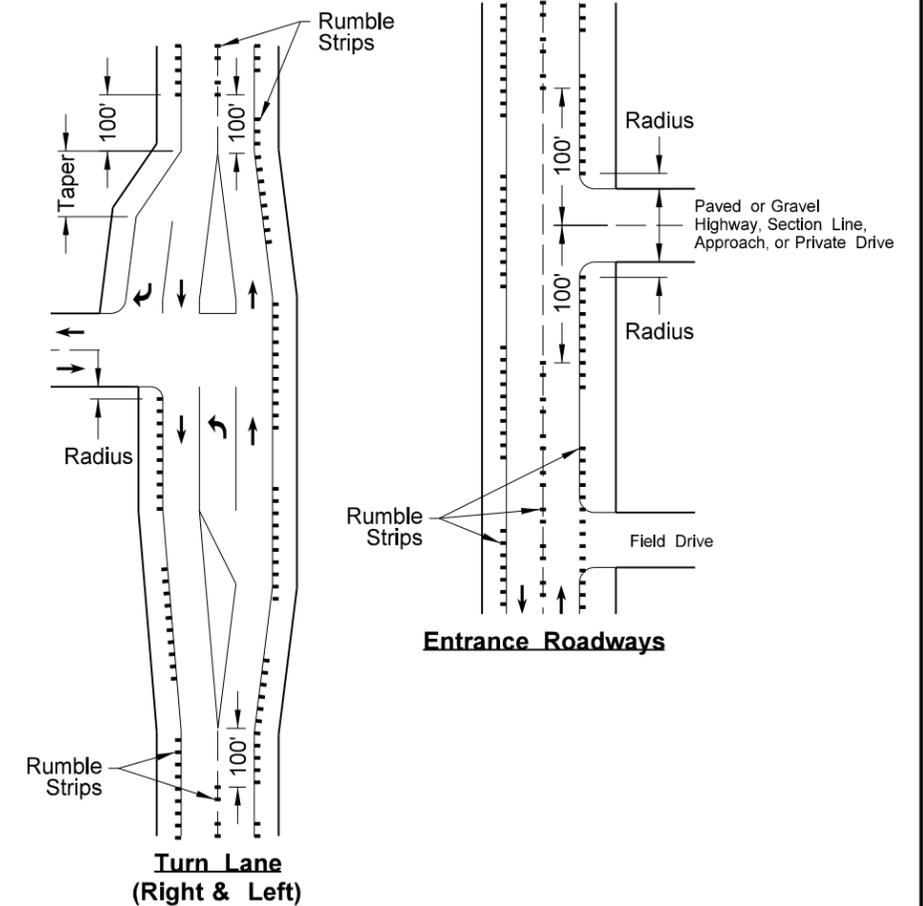
**Profile of Rumble Strips - Bituminous and PCC Pavements**



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

NOTES:

- 1) Discontinue edgeline rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, 100' before and after a paved or gravel highway, section line, approach, or private drive.

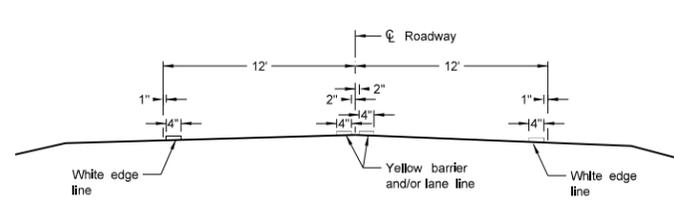


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-8-11	Revised Notes and D-760-4.
1-26-12	Revised details for rumble strip widths and dimensions.

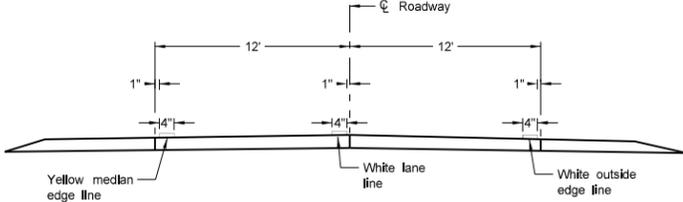
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# PAVEMENT MARKING

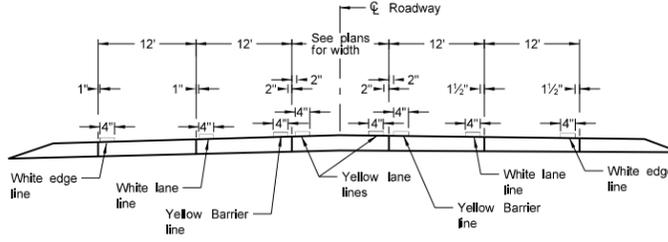
D-762-4



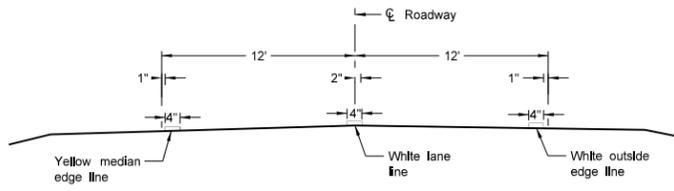
Two Lane Two Way  
RURAL ROADWAY



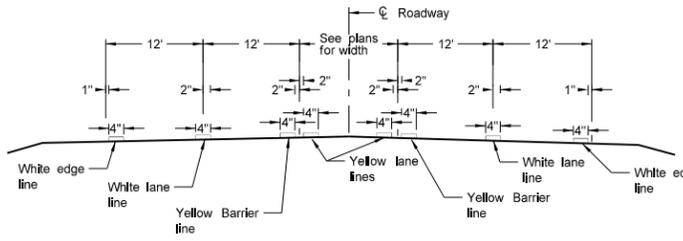
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



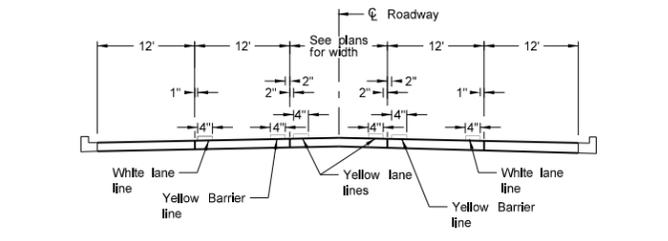
RURAL FIVE LANE ROADWAY  
Concrete Section



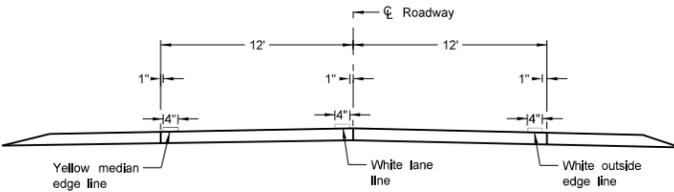
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



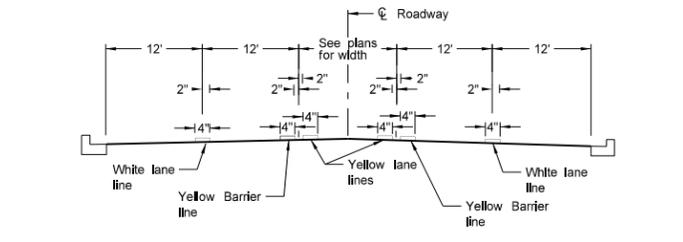
RURAL FIVE LANE ROADWAY  
Asphalt Section



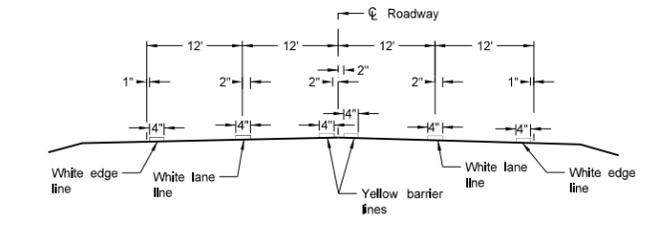
URBAN FIVE LANE SECTION  
Concrete Section



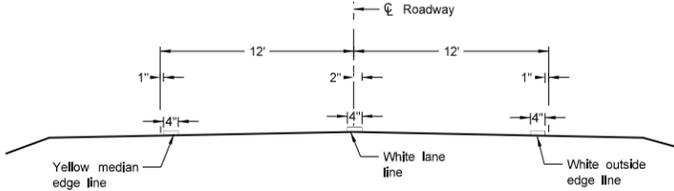
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



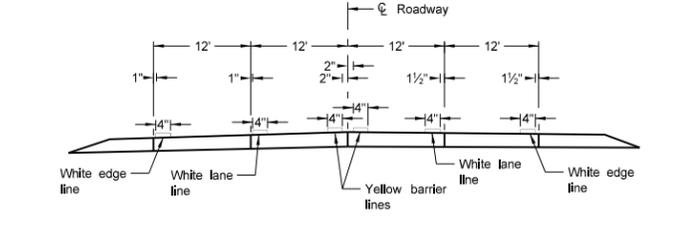
URBAN FIVE LANE SECTION  
Asphalt Section



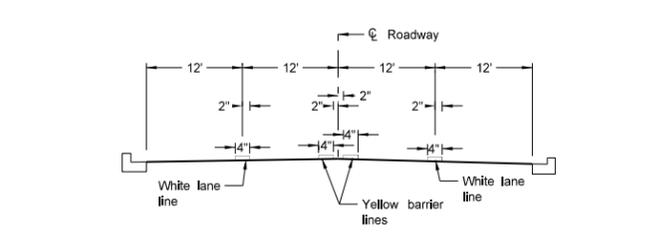
RURAL FOUR LANE ROADWAY  
Asphalt Section



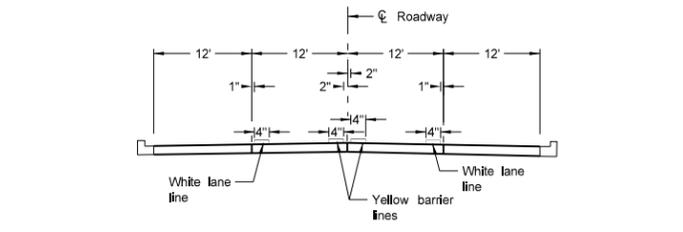
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



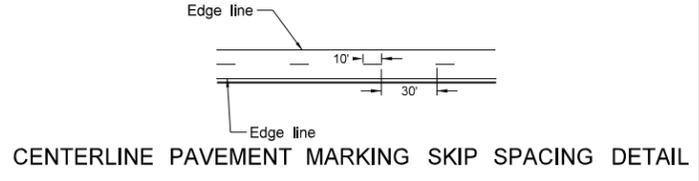
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



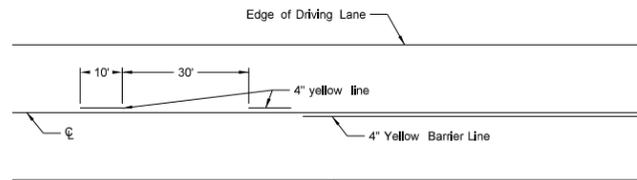
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:  
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

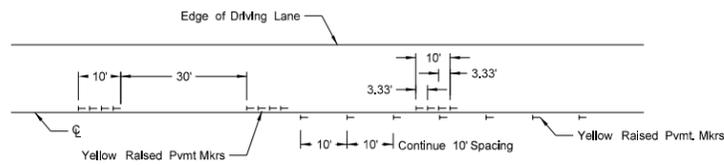
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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# SHORT-TERM PAVEMENT MARKING

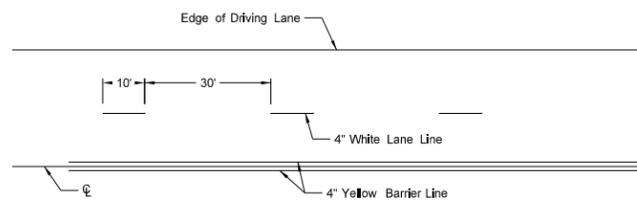


Painted or Tape Lines

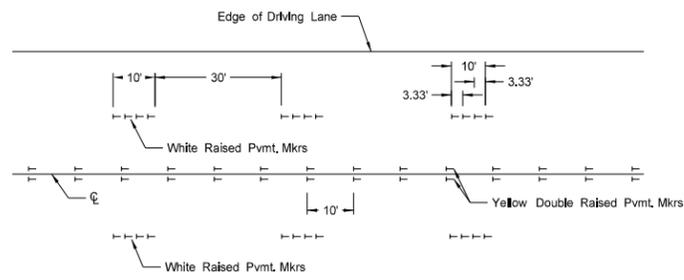


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

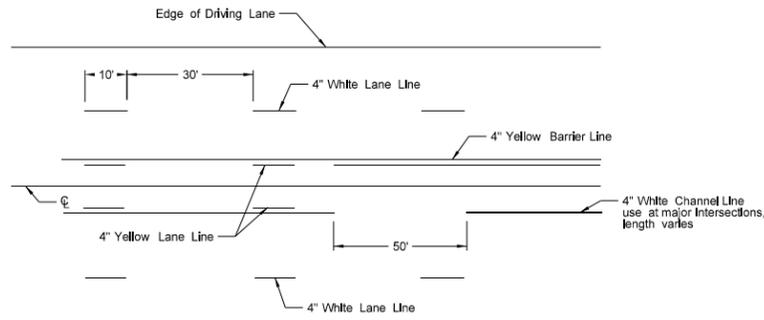


Painted or Tape Lines

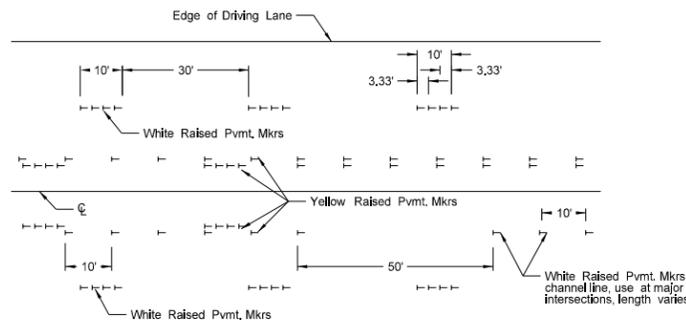


Raised Pavement Markers

FOUR LANE ROADWAY

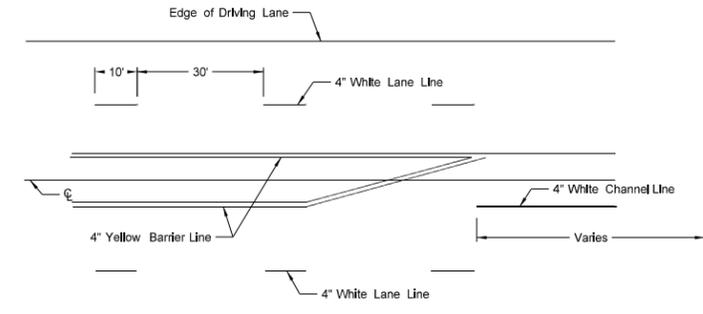


Painted or Tape Lines

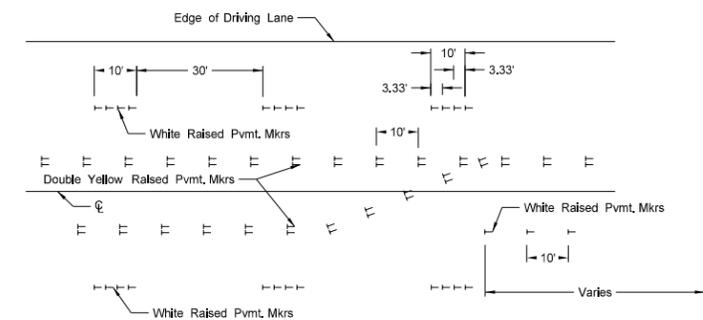


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

**NOTES:**

1. Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.
2. Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.
3. Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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